

# HA'ENA STATE PARK MASTER PLAN

.....  
BACKGROUND RESEARCH & ANALYSIS REPORT



 **PBR HAWAII**  
& ASSOCIATES, INC.

*April 2011*  
FINAL



# ***Hā'ena State Park Master Plan***

Background Research Report

*Prepared for:*

State of Hawai'i, Department of Land and Natural Resources  
Division of State Parks

*Prepared by:*

PBR HAWAII

**REVISED**

April 2011

---

---

# Kūnihi Ka Mauna i Ka La'i ē

Mele Kahea

*Kūnihi ka mauna i ka la'i ē  
'O Wai'ale'ale lā i Wailua  
Huki a'ela i ka lani  
Ka papa 'auwai o Kawaikini  
Alai 'ia 'ela e Nounou  
Nalo Kaipuha'a  
Ka laula mauka o Kapa'a ē  
Mai pa'a i ka leo  
He oli e kāhea mai ē*

The mountain stands out clearly  
Mount Wai'ale'ale at Wailua  
Lifted up to heaven  
The stream plank of Kawaikini  
Obstructed by Nounou  
Concealed is Kaipuha'a  
The upland expanse of Kapa'a  
Do not withhold the voice  
Speak up the call to come in

*This mele komo (permission for entrance) is usually used in hula settings. It was first chanted above the Wailua River on Hi'iaka's journey to Hā'ena to fetch Lohi'au.*

---



---

# *Table of Contents*

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1-1</b>
1.1	BACKGROUND INFORMATION.....	1-1
1.2	MASTER PLAN PURPOSE, GOALS AND OBJECTIVES.....	1-1
1.3	PLANNING PROCESS.....	1-2
<b>2.0</b>	<b>REGIONAL CONTEXT AND EXISTING SITE .....</b>	<b>2-1</b>
2.1	REGIONAL CONTEXT .....	2-1
2.2	HĀ'ENA STATE PARK: SETTING AND SITE CONDITIONS.....	2-1
2.2.1	<i>Site Description</i> .....	2-1
2.2.1.1	Ownership, Jurisdiction and Operations.....	2-1
2.2.1.2	Existing Site .....	2-4
2.2.1.3	History of Hā'ena State Park .....	2-9
2.2.2	<i>Natural Environment</i> .....	2-15
2.2.2.1	Physical Characteristics .....	2-15
2.2.2.2	Geology .....	2-15
2.2.2.3	Topography .....	2-16
2.2.2.4	Soils.....	2-17
2.2.2.5	Climate .....	2-18
2.2.2.6	Ocean Conditions .....	2-18
2.2.2.7	Marine Environment .....	2-19
2.2.2.8	Wetlands .....	2-22
2.2.2.9	Ground and Surface Water.....	2-33
2.2.2.9.1	Ground Water.....	2-33
2.2.2.9.2	Surface Water.....	2-33
2.2.2.10	Natural Hazards .....	2-34
2.2.2.10.1	Flood Hazard .....	2-34
2.2.2.10.2	Wind and Storm Hazard .....	2-37
2.2.2.10.3	Tsunami Hazard.....	2-37
2.2.2.10.4	Shoreline Erosion .....	2-37
2.2.2.10.5	Rockfall Hazard.....	2-40
2.2.2.11	Biological Resources.....	2-43
2.2.2.11.1	Flora .....	2-43
2.2.2.11.2	Fauna .....	2-48
2.2.3	<i>Human Environment</i> .....	2-53
2.2.3.1	Regional Context.....	2-53
2.2.3.2	Archaeology and Historic Resources .....	2-56
2.2.3.2.1	Known Burials .....	2-57
2.2.3.2.2	Settlement Patterns .....	2-60
2.2.3.2.3	Agricultural Field Complex .....	2-60
2.2.3.2.4	Hula & Related Sites .....	2-61
2.2.3.2.5	Habitation Sites .....	2-64
2.2.3.2.6	Loko .....	2-65
2.2.3.2.7	Caves.....	2-66
2.2.3.2.8	Other Sites/Features .....	2-66
2.2.3.2.9	Kūhiō Highway – North Shore Section .....	2-66
2.2.3.3	Cultural Resources.....	2-67
2.2.3.3.1	Traditional Uses of the Environment .....	2-68
2.2.3.3.2	Place Names of Hā'ena .....	2-69
2.2.3.3.3	ʻŌlelo No'eau .....	2-75
2.2.3.3.4	Ethnographic Survey .....	2-75
2.2.3.4	Visual Resources .....	2-76
2.2.3.4.1	Regional Context.....	2-76
2.2.3.4.2	Hā'ena Visual Resources .....	2-77

2.2.3.5	Social-Economic Resources .....	2-86
2.2.3.5.1	Population.....	2-86
2.2.3.5.2	Economy and Labor Force.....	2-88
2.2.4	<i>Infrastructure and Utilities</i> .....	2-89
2.2.4.1	Regional Transportation.....	2-89
2.2.4.2	Roadways.....	2-91
2.2.4.3	Public Transit.....	2-92
2.2.4.4	Traffic.....	2-92
2.2.4.5	Parking.....	2-93
2.2.4.6	Water.....	2-93
2.2.4.6.1	Potable Water .....	2-93
2.2.4.6.2	Non-Potable Water .....	2-94
2.2.4.6.3	Fire Protection .....	2-94
2.2.4.7	Wastewater.....	2-94
2.2.4.8	Drainage .....	2-96
2.2.4.9	Solid Waste.....	2-97
2.2.4.10	Electrical.....	2-97
2.2.4.11	Telecommunications.....	2-97
2.2.5	<i>Public Services and Facilities</i> .....	2-97
2.2.5.1	Educational Facilities .....	2-97
2.2.5.2	Police Protection .....	2-98
2.2.5.3	Fire Protection.....	2-98
2.2.5.4	Medical Facilities.....	2-98
2.2.5.5	Recreational Facilities .....	2-98
<b>3.0</b>	<b>LAND USE REGULATIONS AND REQUIREMENTS .....</b>	<b>3-1</b>
3.1	FEDERAL REGULATIONS .....	3-1
3.1.1	<i>Endangered Species Act</i> .....	3-1
3.1.2	<i>Land and Water Conservation Fund</i> .....	3-1
3.1.3	<i>Clean Water Act</i> .....	3-3
3.1.4	<i>National Historic Preservation Act of 1966</i> .....	3-4
3.2	STATE OF HAWAII'Ī.....	3-4
3.2.1	<i>State Environmental Review Law</i> .....	3-4
3.2.2	<i>State Land Use Law</i> .....	3-5
3.2.3	<i>North Shore Kaua'i Ocean Recreation Management Area</i> .....	3-5
3.2.4	<i>Act 241, Establishing a Community-Based Subsistence Fishing Area</i> .....	3-6
3.2.5	<i>Burial Sites and Human Remains</i> .....	3-6
3.2.6	<i>Commission on Water Resource Management</i> .....	3-9
3.2.7	<i>Kūhiō Highway (Route 560) Historic Roadway Corridor Plan</i> .....	3-9
3.3	COUNTY OF KAUA'Ī.....	3-10
3.3.1	<i>General Plan</i> .....	3-10
3.3.2	<i>North Shore Development Plan</i> .....	3-10
3.3.3	<i>Zoning</i> .....	3-16
3.3.4	<i>Special Management Area</i> .....	3-17
3.3.5	<i>Shoreline Setback Ordinance</i> .....	3-17
<b>4.0</b>	<b>HUMAN USE DATA .....</b>	<b>4-1</b>
4.1	OVERVIEW.....	4-1
4.2	TRADITIONAL AND CULTURAL ACTIVITIES .....	4-1
4.2.1	<i>Hula Complex</i> .....	4-1
4.2.2	<i>Kalo Cultivation</i> .....	4-1
4.2.3	<i>Fishing</i> .....	4-2
4.2.4	<i>Gathering</i> .....	4-3
4.2.5	<i>Other Cultural Practices</i> .....	4-3
4.3	RECREATIONAL ACTIVITIES.....	4-3
4.3.1	<i>Marine and Nearshore Recreational Activities</i> .....	4-4

4.3.1.1	Beachcombing, Sunbathing, and Picnicking .....	4-4
4.3.1.2	Swimming, Snorkeling, and Scuba Diving .....	4-5
4.3.1.3	Surfing, Windsurfing, and Kiteboarding.....	4-6
4.3.1.4	Kayaking.....	4-7
4.3.1.5	Shore Fishing.....	4-7
4.3.1.6	Effects of Ocean Conditions on Recreational Activities.....	4-11
4.3.1.7	Effects of Stream Conditions on Recreational Activities .....	4-12
4.3.2	<i>Land-Based Recreational Activities</i> .....	4-12
4.3.2.1	Hiking.....	4-12
4.3.2.2	Sightseeing.....	4-13
4.3.2.3	Whale Watching and Bird Watching.....	4-14
4.3.2.4	Off-Road Vehicle Use.....	4-14
4.3.2.5	Bicycling.....	4-14
4.4	VISITOR USE INFORMATION AND SURVEYS.....	4-15
4.4.1	<i>Visitor Counts</i> .....	4-15
4.4.2	<i>2007 HTA OmniTrak Survey</i> .....	4-17
4.4.3	<i>Hā'ena Community Based Studies</i> .....	4-21
4.5	USER IMPACTS AND CONFLICTS .....	4-22
4.5.1	<i>Traffic Congestion and Parking</i> .....	4-22
4.5.2	<i>Non-Point and Point-Source Pollution</i> .....	4-23
4.5.3	<i>Sunscreen</i> .....	4-24
4.5.4	<i>Fishing</i> .....	4-25
4.5.5	<i>Diving</i> .....	4-25
4.5.6	<i>Reef Walking</i> .....	4-25
4.5.7	<i>Fish Feeding</i> .....	4-26
4.5.8	<i>Sand Dunes</i> .....	4-27
4.5.9	<i>Invasive Species</i> .....	4-27
4.5.10	<i>User Group Conflicts</i> .....	4-28
4.5.10.1	<i>Ahupua'a 'Ohana vs. Visitors and Other Residents</i> .....	4-28
4.5.10.2	<i>Resident Users vs. Visitors</i> .....	4-29
4.5.10.3	<i>Recreation/Tourism vs. Conservation</i> .....	4-29
4.5.10.4	<i>Windsurfers vs. Other Users</i> .....	4-30
4.5.10.5	<i>ORVs vs. Other Users</i> .....	4-31
4.5.10.6	<i>Traditional Fishery Management vs. Recreational/ Commercial Fishing</i> ....	4-31
4.5.10.7	<i>Commercial vs. Private Use</i> .....	4-32
4.5.10.8	<i>Homeless/Squatters vs. Park Users</i> .....	4-32

**5.0 RECOMMENDED PARK IMPROVEMENTS AND MANAGEMENT STRATEGIES..... 5-1**

5.1	DEMANDS AND NEEDS.....	5-1
5.1.1	<i>Previously Identified Needs</i> .....	5-1
5.1.1.1	<i>Hawaiian Cultural Groups</i> .....	5-1
5.1.1.2	<i>Residents</i> .....	5-1
5.1.1.3	<i>Visitors</i> .....	5-3
5.1.1.4	<i>Commercial Operators and Business Interests</i> .....	5-3
5.1.1.5	<i>Previous Master Plan Community Preferences/Feedback</i> .....	5-3
5.1.2	<i>Current Community-Identified Issues</i> .....	5-4
5.1.2.1	<i>Cultural and Historic Resources</i> .....	5-5
5.1.2.2	<i>Recreational Uses</i> .....	5-5
5.1.2.3	<i>Coastal and Marine Resources</i> .....	5-6
5.1.2.4	<i>Terrestrial Resources</i> .....	5-7
5.1.2.5	<i>Traffic and Parking</i> .....	5-7
5.1.2.6	<i>Facilities and Signage</i> .....	5-8
5.1.2.7	<i>Natural Hazards</i> .....	5-9
5.1.2.8	<i>Other Comments/Suggestions</i> .....	5-9
5.2	RECOMMENDED IMPROVEMENTS .....	5-9
5.2.1	<i>Cultural Environment</i> .....	5-9

5.2.1.1	Restoration and Increased Prominence of Hula Sites.....	5-10
5.2.1.2	Restoration of Lo'i.....	5-10
5.2.1.3	Restoration and Protection of Cemeteries and Burial Sites .....	5-12
5.2.1.4	Study Potential to Restore Hawaiian Fishpond .....	5-14
5.2.1.5	Canoe Hale for Navigational Education .....	5-14
5.2.1.6	Poi Mill.....	5-14
5.2.2	<i>Natural Environment</i> .....	5-15
5.2.2.1	Water Quality .....	5-15
5.2.2.2	Shoreline Erosion.....	5-15
5.2.2.3	Marine Resources and Conservation .....	5-16
5.2.2.4	Rockfall Hazards .....	5-17
5.2.2.4.1	Permanent Mitigation Design Alternatives.....	5-17
5.2.2.4.2	Temporary Mitigation Design Alternative.....	5-19
5.2.2.4.3	Other Mitigation Methods.....	5-19
5.2.2.4.4	Summary Recommendations .....	5-19
5.2.2.5	Flora/Fauna/Wildland .....	5-20
5.2.2.5.1	The Coastal Community .....	5-20
5.2.2.5.2	Limahuli Stream.....	5-20
5.2.2.5.3	Loko Restoration.....	5-21
5.2.2.5.4	Native Plant Restoration on Talus Slopes and Cliff Faces.....	5-21
5.2.2.5.5	Threatened and Endangered Species .....	5-22
5.2.2.5.6	General Fauna Recommendations.....	5-23
5.2.3	<i>Visual Resources</i> .....	5-23
5.2.4	<i>Recreational Resources</i> .....	5-24
5.2.5	<i>Facilities</i> .....	5-25
5.2.6	<i>Infrastructure</i> .....	5-26
5.2.6.1	Water.....	5-26
5.2.6.2	Wastewater.....	5-26
5.2.6.3	Drainage .....	5-26
5.2.6.4	Transportation .....	5-27
5.2.6.5	Parking.....	5-27
5.2.6.6	Solid Waste.....	5-27
5.3	MANAGEMENT RECOMMENDATIONS .....	5-27
5.3.1	<i>Restoration of Traditional Stewardship Practices</i> .....	5-27
5.3.1.1	Stewardship vs. Management Concept.....	5-27
5.3.1.2	'Aha Councils and Konohiki/Caretaker/Ambassador Concept .....	5-29
5.3.1.3	Kuleana or Special Areas of Curatorship Concept .....	5-30
5.3.1.4	Parks Management Concept .....	5-30
5.3.2	<i>Carrying Capacity</i> .....	5-30
5.3.2.1	Environmental Carrying Capacity .....	5-31
5.3.2.2	Cultural or Social Carrying Capacity.....	5-31
5.3.2.3	Psychological Carrying Capacity .....	5-33
5.3.3	<i>Education and Interpretive Programs</i> .....	5-33
5.3.3.1	Interpretive Programs.....	5-34
5.3.3.2	Public Safety.....	5-38
5.3.3.2.1	Beach Safety.....	5-38
5.3.3.2.2	Trail Safety.....	5-38
5.3.3.2.3	Natural Hazard Warning System .....	5-38
5.3.4	<i>Shoreline Access</i> .....	5-39
5.3.5	<i>User Fees</i> .....	5-39
5.3.6	<i>Construction Processes</i> .....	5-40
5.3.7	<i>Transportation and Circulation</i> .....	5-40
5.4	PARTNERSHIPS .....	5-40
5.4.1	<i>Federal Conservation Partnership Programs</i> .....	5-40
5.4.2	<i>Local Community-Based Organizations and NGOs</i> .....	5-41
5.4.3	<i>Curators and Halau Hula</i> .....	5-43
5.5	POTENTIAL FUNDING SOURCES.....	5-43
5.5.1	<i>Federal Sources</i> .....	5-43

---

5.5.1.1	US Fish and Wildlife Service .....	5-43
5.5.1.2	National Oceanic and Atmospheric Administration .....	5-43
5.5.1.3	National Parks Grants .....	5-43
5.5.2	<i>State Sources</i> .....	5-44
5.5.2.1	Hawai'i Tourism Authority .....	5-44
5.5.2.2	Office of Hawaiian Affairs .....	5-44
5.5.3	<i>Private Donations and Grass Roots Fundraising</i> .....	5-44
5.5.4	<i>Other Resources and Clearinghouses</i> .....	5-45
<b>6.0</b>	<b>REFERENCES .....</b>	<b>6-1</b>

## ***List of Appendices***

- APPENDIX A: CULTURAL IMPACT ASSESSMENT (KAIMIPONO CONSULTING SERVICES, JANUARY, 2011)
- APPENDIX B: MARINE NATURAL RESOURCES AND RECREATION ASSESSMENT, HA'ENA STATE PARK, KAUA'I, HAWAI'I (SWCA, FEBRUARY, 2010)
- APPENDIX C: ROCKFALL HAZARD ASSESSMENT (EARTH TECH/AECOM, SEPTEMBER 2008)
- APPENDIX D: BIOLOGICAL SURVEY (TERRY AND HART, GEOMETRICIAN ASSOCIATES, LLC, FEBRUARY 2009)
- APPENDIX E: WETLAND DELINEATION STUDY
- APPENDIX F: TRAFFIC IMPACT ANALYSIS REPORT (AUSTIN TSUTSUMI & ASSOCIATES, DECEMBER 2008 DRAFT)
- APPENDIX G: CIVIL BASELINE REPORT (KENNEDY/JENKS CONSULTANTS, JANUARY, 2011)
- APPENDIX H: VISITOR SURVEY (JURAN, 2006)
- APPENDIX I: OMNI TRAK VISITOR SURVEY DATA (HTA 2007)
- APPENDIX J: OPEN HOUSE QUESTIONNAIRE RESPONSES
- APPENDIX K: COMMUNITY MARK-UPS OF 2001 COMMUNITY PREFERRED MASTER PLAN

---

---

## **List of Figures**

FIGURE 1: REGIONAL LOCATION MAP .....	2-2
FIGURE 2: AERIAL PHOTOGRAPH .....	2-3
FIGURE 3: TAX MAP .....	2-5
FIGURE 4: EXISTING SITE.....	2-6
FIGURE 5: LAND COMMISSION AWARDS.....	2-13
FIGURE 6: TOPOGRAPHY.....	2-23
FIGURE 7: SCS SOIL SURVEY.....	2-24
FIGURE 8: LAND STUDY BUREAU DETAILED LAND CLASSIFICATION .....	2-25
FIGURE 9: AGRICULTURAL LANDS OF IMPORTANCE TO THE STATE OF HAWAI‘I.....	2-26
FIGURE 10: SHORELINE SUB-AREAS.....	2-27
FIGURE 11: SOEST SHORELINE EROSION RATES .....	2-28
FIGURE 12: SHALLOW-WATER BENTHIC HABITAT ZONES .....	2-29
FIGURE 13: SHALLOW-WATER BENTHIC HABITAT – GEOMORPHOLOGY .....	2-30
FIGURE 14: SHALLOW-WATER BENTHIC HABITAT – BIOLOGICAL COVER .....	2-31
FIGURE 15: WETLANDS.....	2-32
FIGURE 16: GROUND WATER RESOURCES – AQUIFER SUSTAINABLE YIELDS .....	2-35
FIGURE 17: SURFACE WATER HYDROLOGIC UNITS.....	2-36
FIGURE 18: FLOOD INSURANCE RATE MAP.....	2-38
FIGURE 19: TSUNAMI EVACUATION ZONE.....	2-39
FIGURE 20: ROCKFALL HAZARDS .....	2-42
FIGURE 21: VEGETATION ZONES – 1991 AND 2009.....	2-52
FIGURE 22: ARCHAEOLOGICAL FEATURES.....	2-58
FIGURE 23: ARCHAEOLOGICAL SENSITIVITY MAP.....	2-59
FIGURE 24: KEKAHUNA’S 1959 DRAWING OF KA ULU A PAOA HEIAU .....	2-62
FIGURE 25 A-C: VISUAL RESOURCES.....	2-81
FIGURE 26 A&B: SITE PHOTOGRAPHS .....	2-84
FIGURE 27: STATE LAND USE DISTRICT.....	3-7
FIGURE 28: CONSERVATION DISTRICT SUBZONES .....	3-8
FIGURE 29: GENERAL PLAN NORTH SHORE PLANNING DISTRICT LAND USE MAP.....	3-12
FIGURE 30: GENERAL PLAN N. SHORE PLANNING DISTRICT HERITAGE RESOURCE MAP .....	3-13
FIGURE 31: NORTH SHORE DEVELOPMENT PLAN UPDATE .....	3-14
FIGURE 32: SPECIAL MANAGEMENT AREA .....	3-20
FIGURE 33: REEF ENVIRONMENT AND SURF BREAKS .....	4-9
FIGURE 34: MARINE MANAGEMENT AREAS .....	4-10
FIGURE 35: SITE ANALYSIS PLAN .....	5-2
FIGURE 36: LO‘I RESTORATION PHASING PLAN .....	5-12

---

---

## *List of Tables*

TABLE 1: TAX MAP KEY AND OWNERSHIP .....	2-4
TABLE 2: POPULATION TRENDS, 1950 – 2000.....	2-86
TABLE 3: DEMOGRAPHIC CHARACTERISTICS, 2000 .....	2-87
TABLE 4: LABOR FORCE CHARACTERISTICS, 2000.....	2-89
TABLE 5: OCEAN AND BEACH ACTIVITIES ALONG HĀ’ENA COASTLINE.....	2-100
TABLE 6: COUNTY OF KAUA’I SHORELINE SETBACK FOR LOTS WITH AN AVERAGE DEPTH OF 160 FEET OR LESS.....	3-17
TABLE 7: COUNTY OF KAUA’I SHORELINE SETBACK FOR LOTS WITH AN AVERAGE DEPTH GREATER THAN 160 FEET .....	3-18
TABLE 8, KALALAU TRAIL PERMITS .....	4-13
TABLE 9, RANGER VISITOR COUNTS.....	4-17
TABLE 10: PARK VISITOR RESIDENCY .....	4-17
TABLE 11: PARK VISIT MOTIVATION .....	4-18
TABLE 12: NUMBER OF VISITS TO HĀENA STATE PARK .....	4-18
TABLE 13: TRANSPORTATION TO PARK.....	4-18
TABLE 14: PARK ACTIVITIES.....	4-19
TABLE 15: LENGTH OF PARK STAY .....	4-19
TABLE 16: VISITOR SATISFACTION .....	4-19
TABLE 17: IMPORTANCE OF SERVICES AT PARK.....	4-20
TABLE 18: KĒ’Ē BEACH OBSERVED ACTIVITIES.....	4-21

---

---

## ***Acronyms and Abbreviations***

<b>ADA</b>	Americans with Disability Act of 1990, as amended
<b>ALISH</b>	Agricultural Lands of Importance to the State of Hawai'i
<b>ATA</b>	Austin, Tsutsumi & Associates, Inc.
<b>CAG</b>	Community Advisory Group
<b>CDP</b>	Census Designated Place
<b>CIA</b>	Cultural Impact Assessment
<b>CWRM</b>	State Department of Land and Natural Resources Commission on Water Resource Management
<b>DAR</b>	State DLNR Division of Aquatic Resources
<b>DLNR</b>	State of Hawai'i Department of Land and Natural Resources
<b>DOBOR</b>	State DLNR Division of Boating and Ocean Recreation
<b>DOT</b>	State Department of Transportation
<b>DOW</b>	County of Kaua'i Department of Water
<b>EA</b>	Environmental Assessment
<b>EIS</b>	Environmental Impact Statement
<b>EISPN</b>	Environmental Impact Statement Preparation Notice
<b>ESA</b>	Endangered Species Act
<b>FEMA</b>	Federal Emergency Management Agency
<b>FHWA</b>	Federal Highway Administration
<b>FIRM</b>	Flood Insurance Rate Map
<b>FONSI</b>	Finding of No Significant Impact
<b>GPD</b>	Gallons per day
<b>GPM</b>	Gallons per minute
<b>HAR</b>	Hawai'i Administrative Rules
<b>HRS</b>	Hawai'i Revised Statutes
<b>HTA</b>	Hawai'i Tourism Agency
<b>MGD</b>	Millions of gallons per day
<b>NCDC</b>	National Climatic Data Center
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NTBG</b>	National Tropical Botanical Garden
<b>ORV</b>	Off-road vehicles
<b>SHPD</b>	State Department of Land and Natural Resources, Historic Preservation Division
<b>SIA</b>	Social Impact Assessment
<b>SMA</b>	Special Management Area
<b>SOEST</b>	University of Hawai'i School of Ocean and Earth Science and Technology
<b>TIAR</b>	Traffic Impact Analysis Report
<b>TMK</b>	Tax Map Key
<b>UH</b>	University of Hawai'i

---

**USACOE** United States Army Corps of Engineers  
**USFWS** United States Fish and Wildlife Service  
**USGS** United States Geological Survey

---

This page intentionally left blank

---

---

# **1.0 Introduction**

## **1.1 BACKGROUND INFORMATION**

Located on Kaua'i's North Shore, Hā'ena State Park finds itself at the intersection of cultural and ecological significance and popular visitor attraction. Hā'ena's dynamic geology, weather patterns and ocean conditions intensify a dramatic landscape that fuels ancient stories and visitor guidebook alike. At Hā'ena, continuous streams of visitors converge with a passionate 'ohana and socially diverse resident community. This mix of human, cultural and environmental resources gives rise to the need to develop a conscientious and comprehensive master plan in order to balance conservation, recreation, cultural interpretation and preservation.

In 2001, after several years of research, community meetings and interviews, The Keith Companies-Hawai'i, Inc. (The Keith Companies) and Earthplan Planning and Design prepared a draft report entitled, *Hā'ena State Park Master Plan and Draft Environmental Impact Statement* for the State Department of Land and Natural Resources Division of State Parks (State Parks). This report included extensive background information as well as a site plan. While the master plan was never completed or adopted, it contains valuable information and is the starting point for this effort. References are made to the document throughout this report as the "2001 draft park plan" and updated information provided where appropriate.

In 2008, State Parks contracted with PBR HAWAII to complete the master plan and environmental impact statement for Hā'ena State Park. PBR HAWAII was tasked to refine the community preferred alternative described in the 2001 draft Master Plan by The Keith Companies, Inc. with an emphasis on the cultural and historic significance of Hā'ena and to consider alternatives for future development including transportation and parking.

## **1.2 MASTER PLAN PURPOSE, GOALS AND OBJECTIVES**

The purpose of the current master plan and EIS effort is to build upon the previous effort to develop a master plan for Hā'ena State Park. The plan will include management and development strategies that bring the significant historic, cultural and ecological resources to the forefront and

---

---

balance the protection of those resources with increased recreational and community uses. As part of the previous master planning effort, a social impact analysis (SIA) was conducted by Earthplan (1996). The SIA indicated a need to elevate consideration of Hā'ena State Park's interlaced cultural and natural resources in the planning process. The current master planning effort builds upon the previous master planning work, utilizing existing and previously prepared data, including updated historic, cultural and ecological information where necessary, and continued community input.

The plan's goal is to present appropriate and reasonable management strategies and facility improvements along with the protection of significant resources, as identified through historical and cultural perspectives that will better serve the users and visitors to Hā'ena State Park.

The objective is to prepare a plan that can be accepted by the State and used as a guide to implement the management actions and physical improvements and balances public usage of the area with the protection and preservation of the natural and cultural features significant to its status as an important site in Hawaiian history.

### **1.3 PLANNING PROCESS**

The planning process will include the following tasks:

*Pre-Consultation* – Notification to agency and public stakeholders of the preparation of the impending master plan and environmental impact statement (EIS). Input on the project will be solicited to address impacts on existing or proposed projects, plans, policies, or programs, and to identify specific issues that should be addressed.

*Community Outreach* – Early in the process, public input through a community advisory committee established by the State will be obtained. This committee will assist in formulating the plan, reviewing the 2001 draft park plan, share new information gathered through the cultural and resource studies conducted to develop management strategies and park improvements. Additionally, public meetings will be held to solicit further public input when the revised plan and draft EIS are prepared.

*Compilation and Review of Existing Data* – Collect and summarize previously conducted technical studies, reports and documented interviews.

---

---

***Preparation of Updated and New Data*** – Technical consultants will conduct updated or new surveys of the existing site and facilities. Focus will be on flora and fauna and wildland resources, cultural resources, marine resources, wastewater treatment and other civil engineering issues, traffic, and geologic hazards. State archaeologists will prepare archaeological surveys and historic information on the site.

***Background Research Report*** – Existing and new data are summarized and compiled into a report. Management issues and physical facility needs are identified.

***Draft Master Plan Report*** – Analysis of the background research will form the basis for the refined master plan management alternatives and recommendations. The analysis will consist of evaluating the condition of the cultural, marine, freshwater and scenic resources and actions taken to conserve and/or enhance the natural, cultural/historic and scenic resources, traffic circulation and parking issues, as well as the suitability of recreational activities and potential conflicts with conservation/preservation goals, interpretive activities, and park organization and operations. Complimentary and conflicting opportunities will be identified, the potential impacts of alternatives considered as well as the possibilities for expansion of activities and the recreational area.

***Final Master Plan*** – A Final Master Plan to guide the development and management activities within the park will be prepared using the refined master plan and management alternatives selected by the community and the advisory committee.

***Environmental Impact Statement (EIS)*** - An EIS pursuant to Chapter 343, HRS, will be developed using the background information and refined Master Plan for an analysis of the potential impacts of those recommendations upon their implementation.

---

---

*Ka moku kā'ili lāo Manokalanipo*

The sun-snatching island of Manokalanipo

*Kaua'i, the northwestern-most island of the group, beyond which the sun vanishes at dusk. Manokalanipo was an ancient ruler of Kaua'i.*

---

---

## **2.0 Regional Context and Existing Site**

### **2.1 REGIONAL CONTEXT**

Hā'ena State Park is located within the ahupua'a of Hā'ena on the island of Kaua'i. The ancient moku or district name was Halele'a or "house of happiness" (Wichman 1998). Halele'a is a moku unique to the island of Kaua'i, cited in chants as the most beautiful place in all the islands (Wichman 1998). The modern administrative district in which Hā'ena is located is the Hanalei District which occupies much of Kaua'i's north shore. A regional location map of Hā'ena State Park is shown in Figure 1 and an aerial is provided in Figure 2.

Regional context and site specific conditions are discussed in the next section of this report.

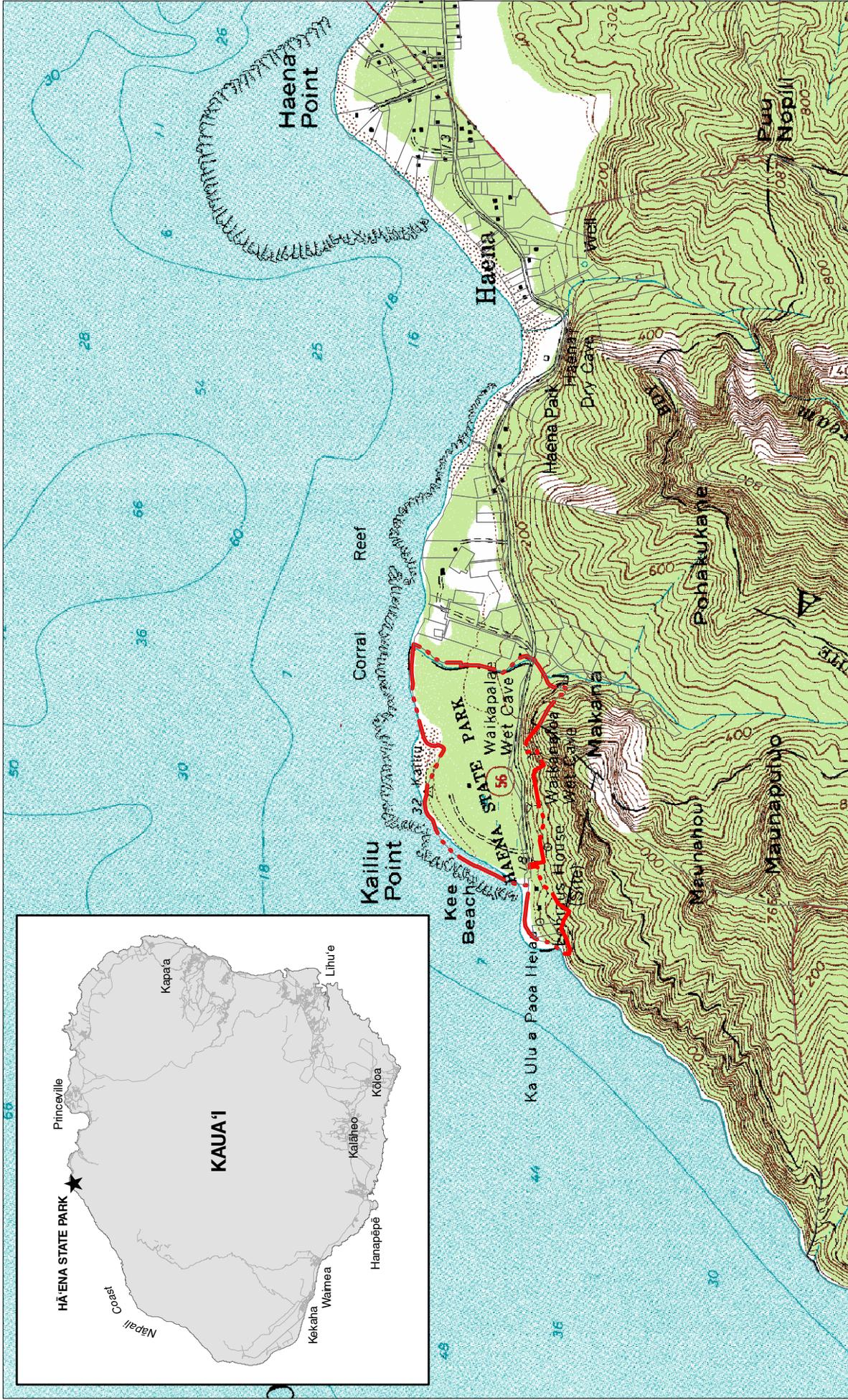
### **2.2 HĀ'ENA STATE PARK: SETTING AND SITE CONDITIONS**

#### **2.2.1 SITE DESCRIPTION**

##### **2.2.1.1 OWNERSHIP, JURISDICTION AND OPERATIONS**

Hā'ena State Park encompasses approximately 65.7 acres. It is comprised of three parcels, two of which are owned by the State of Hawai'i, Department of Land and Natural Resources (see Table 1 below and Figure 3). A small parcel owned by the County of Kaua'i encompasses Ka Ulu A Paoa heiau and Ke Ahu A Laka hula platform. This parcel is surrounded by the State park.

A roughly thirteen-acre portion of parcel 22 of TMK 5-9-01 is located within Hā'ena State Park. The remaining 167 acres falls within the Nāpali Coast State Wilderness Park. Visitors typically access the Nāpali Coast State Wilderness Park via the Kalalau trail head which is located within Hā'ena State Park. Thus, Hā'ena State Park facilities such as parking, the comfort station and shower service both State Park facilities.



**LEGEND**

 Hā'ena State Park Project Boundary

**FIGURE 1**  
Regional Location Map

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kauai



Source: U.S. Geological Survey (2009)  
Disclaimer: This graphic has been prepared for general planning purposes only.  
Incorrect or outdated Hawaiian spellings on source maps have not been corrected.



**LEGEND**

 Hā'ena State Park Project Boundary

**FIGURE 2**

Aerial Photograph

**HĀ'ENA STATE PARK**

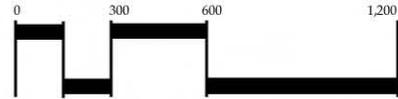
Department of Land and Natural Resources

Island of Kaua'i

NORTH



LINEAR SCALE (Feet)



Source: Google Earth Pro  
 Disclaimer: This graphic has been prepared for general planning purposes only.

---

---

**TABLE 1: TAX MAP KEY AND OWNERSHIP**

TMK	Area (in acres)	Owner
(4)-5-9-008:01	50.38	State of Hawai'i
(4)-5-9-001:22 (por.)	12.64*	State of Hawai'i
(4)-5-9-001:25	0.68	County of Kaua'i
*Note: The entire parcel is 180.23 acres. Only a narrow portion of the parcel to the south of Kūhiō Highway is within Hā'ena State Park.		

Kūhiō Highway extends within the park boundaries and is owned and operated by the State of Hawai'i Department of Transportation (DOT). It occupies roughly two acres and is included in this project.

Hā'ena State Park is managed and operated by the Division of State Parks. Up until December 31, 2010, a full-time Resource Ambassador (Park Ranger) was assigned to the park. The Ranger's duties included interacting with the public to provide information on the park's natural and cultural resources as well as safety precautions while also serving maintenance and monitoring functions. The park is also serviced by State Parks staff who clean the comfort station and collect the garbage on a daily basis. Enforcement of park rules falls under the jurisdiction of DLNR's Division of Conservation and Resources Enforcement (DOCARE).

#### 2.2.1.2 EXISTING SITE

The park boundaries are roughly defined by Limahuli Stream to the east, the ocean to the north and west and the Nāpali cliffs of Nāpali Coast State Wilderness Park to the south. An existing site map is shown in Figure 4.

The majority of the park consists of a wide coastal plain with a fringing reef and extensive sand dunes which up until the 1946 and 1957 tsunamis were wide open with little tree cover. Since the 1960's the kalo lo'i within the park had been left fallow and much of the park has become overgrown with false kamani, java plum, hau and ironwood forests (Terry and Hart 2009).

Previous archaeological studies show that nearly the entire coastal flat behind the dunes was developed as irrigated lo'i terraces which originated in prehistory (Major and Carpenter 2000). There is also evidence that the lo'i extended to the base of the pali, but was disrupted by the construction of the highway (Hammatt 1978).





---

---

The vast Hā'ena agricultural complex extended east of Limahuli Stream (outside of the park) and also included loko kalo, or swampy planting areas that used innovative methods of planting on rafts within ponds (Handy 1972). Other crops such as sweet potato in sandy areas and bananas, sugar cane and 'awa in the Mānoa and Limahuli Valleys were also known to be cultivated (Handy 1972). Portions of the Hā'ena lo'i were cultivated into the 1960's although the loko were abandoned by then (Carpenter 1996). More detailed information regarding the archaeological sites within the park is provided in Section 2.2.3.2.

Until recently, the lo'i system was overgrown by the alien forests. Renewed community interests have begun the work of clearing the invasive plants and cultivating kalo. Building on these efforts initiated by the community and with the help of a local nonprofit group interested in the care and restoration of native ecosystems and cultural sites, Hui Maka'āinana o Makana (the Hui), Maurice Major and Alan Carpenter prepared a draft archaeological restoration plan in December 2000 for State Parks that focused on mapping and restoring the lo'i system within Hā'ena State Park. The restoration plan identified "Phase I," a 13.6-acre area just east of the two loko as the easiest portion of the lo'i to restore. Additional taro lo'i restoration studies, which included water resource studies, were prepared by Fujita and Associates in 2002 which primarily focused on a 4.4-acre portion of Phase I. These reports were prepared in support of State Park's efforts to restore the lo'i as a cultural landscape and educational resource for the local community and visitors alike. State Parks currently has a curatorship agreement with the Hui to manage the cleared portion of the lo'i kalo system as well as a three-foot buffer along the rock walls of the lo'i. The agreement allows the Hui to prepare and plant wetland kalo for educational purposes and to restore the cultural landscape.

The majority of the recreational uses of the park are focused at Kē'ē Beach and Lagoon which are popular with visitors for snorkeling, swimming, and sunbathing. The trailhead for the Kalalau Trail and access to the Nāpali Coast State Wilderness Park are also located within the park near Kē'ē. Those camping overnight or hiking beyond Hanakāpī'ai Valley must obtain the proper permits at the State Parks office in Līhu'e or on-line. However, there are no staff onsite checking on hiking and camping permits.

Makai of Kūhiō Highway and near Kē'ē Beach is a comfort station, recently completed and opened to the public in 2009 to replace a 1970's era restroom. Americans with Disability Act (ADA) compliance and decommissioning of the cesspool system were important upgrades to the facility. Approvals for a constructed wetland to treat the comfort station effluent have recently been secured.

---

---

Throughout the park, there are several house sites, some prehistoric and others historic. The known sites are identified on Figure 4 and include significant sites such as Lohiau's house platform near the Kalalau trailhead as well as modern structures such as the former caretaker's cottage for the Allerton Estate.

The former Allerton Estate is located at the far western side of the park site and is accessed by a narrow path off Kē'ē. Although in a state of disrepair, the Allerton caretaker's cottage serves as an informal "baseyard" for community members who steward the park's cultural sites and informally provide watch over Kē'ē Beach. The Allerton Estate's main house burned to the ground in 1993 but its location is also mapped in Figure 4.

Farther north and upslope of the caretaker's cottage, Ka Ulu A Paoa Heiau and Ke Ahu A Laka hula platform overlook the rock Kili'oe and Kē'ē Beach. Historically, the hula community used to help maintain the sites and the path to the heiau and hula platform but in recent times, the community members have also been helping to maintain these areas.

Extending from Kē'ē Beach to the outlet of Limahuli Stream is a coastal dune system, known to contain cultural deposits and Hawaiian burials. Behind the dune system is an unimproved road that parallels the beach and is believed to have connected once to a coastal roadway but currently terminates near Loko Naia. This road was open to the public, at least informally, until 2007, when a gate was installed at Kūhiō Highway by State Parks to control illegal dumping and prevent vehicle access over the dune.

The only vehicle access to Hā'ena State Park is via Kūhiō Highway. The highway enters the park by a bridge over Limahuli Stream and terminates at Kē'ē Beach. Two unimproved parking areas are located within the park. The small parking area located at the terminus of Kūhiō Highway and along the shoulder of Kūhiō Highway is typically full by 10:00 a.m.. The parking area also serves as a vehicle turn-around and is the location of the temporary lifeguard stand. A larger parking lot and emergency helipad is located approximately a half mile inland of Kē'ē, makai of the Highway. This parking lot was recently expanded and there are currently discussions within State Parks to relocate the emergency helipad. Because these parking lots are often filled to capacity by mid-day, visitors also use both sides of the highway for parking despite its narrow width. They are also known to park illegally in front of Waiakanaloa (wet cave) and in any shoulder area they can find.

---

---

### 2.2.1.3 HISTORY OF HĀ'ENA STATE PARK

The following section focuses on the history of Hā'ena State Park from just after the 1824 rebellion, when control over the lands underwent a transition from Kaua'i to O'ahu and Maui ali'i. It also discusses the period of time when formal land ownership was established in Hawai'i, known as the Great Mahele (1846-1852), and then up until current times. The early history, as well as the cultural significance of Hā'ena and the legends related to Pele, Lohi'au and Hi'iaka, among others, are discussed in other sections of this report (see Section 2.2.3.2 Archaeology and Historic Resources and Cultural Resources in Section 2.2.3.3) and will not be repeated here.

Abner Kuho'oheiheipahu Pākī was awarded the entire Hā'ena ahupua'a as a direct result of the partition following the 1824 rebellion. Pākī, father of Bernice Pauahi Bishop, was married to Konia, one of Kamehameha I's granddaughters, who was an ali'i wahine or high chiefess in her own right (Silva 1995).

Paki had apparently held Haena prior to the Mahele. He and Konia had approached the Privy Council with an undated request to purchase the Government's share of the ahupua'a. A resolution was drawn up and approved granting their request (Privy Council Minutes v.3 p.573). Paki laid a formal claim to this land before the King and Haena was awarded to him under LCA 10613. (Silva 1995)

Pākī, as chief of Hā'ena, held control over Hā'ena's fresh water sources, the produce harvested from the ocean, fisheries, mountain and special fields reserved for the chief, called ko'ele. These ko'ele were harvested once a week to support the chief and his household. Hā'ena residents cultivated at least twelve ko'ele, each having a specific name, to serve Pākī (Silva 1995). As chief, Pākī also had the privilege of putting a kapu on certain fish harvested from the waters off the coast. According to Silva, Pākī placed this kapu on he'e (octopus) (Carpenter 1996, Silva, 1995)).

Interestingly, Silva notes that Kekela'akalaniwahikapa'a (Kekela) was appointed the konohiki (land manager) of Hā'ena circa 1837.

It was unusual for Kekela to hold this position of authority; although she was a ranking chiefess, she nevertheless was a woman and remains in history as one of the few known female konohiki. Women were rarely given the right to claim lands during this period; widows of bonafide native tenants or female heirs (in absence of a male heir) of long-time residents of an area would apply for lands, however this was uncommon and infrequent. Native testimony recorded that Kekela herself had claimed five parcels in Haena and had resided there in 1839.

Kekela also listed among the usual konohiki responsibilities, the management of 12 ko'ele whose names she gave as: Paki, Kahookumaka, Oahu, Kapalaa, Akole, Kaluahine, Kailili, Peekauai, Kalaole, Koi, Kanaele and Keokea.

---

---

Soon after settling in Haena, testimony reported that she made three loko or ponds within the ahupua'a. Native testimony does not reveal the names, locations, sizes or nature of these ponds or whether these ponds are the loko kalo which she claimed in her own application (see LCA 7949...). (Silva 1995)

Silva explains that during the time Kamehameha and Kaumuali'i were negotiating their truce, Kamehameha impressed the Kaua'i chiefs by presenting his recently widowed sister-in-law, Kekela, to Kamaholelani, sometimes referred to as Kaumuali'i's cousin and son. Kekela returned with Kamaholelani to Kaua'i and the two settled in Lumahai, which Kaumuali'i had given to both of them. In 1820, Kamaholelani dies and Kekela remains in Lumahai until 1824, the time of Kaumuali'i's death and the uprising, when she returns to O'ahu and either forfeits her claim to Lumahai or is dispossessed of it. However, Silva also states that Kekela is well-spoken-for in the courts of Kamehameha and Kaumuali'i, and she is also the sister of Abner Pākī's own mother. Hence, her close association to her Hā'ena claim, Pākī's claim to the ahupua'a and her management of Pākī's Hā'ena holdings (Silva 1995).

Kekela is also credited for advising many of the maka'āinana to apply for kuleana awards during the Mahele (Wichman 1998). There is a slight difference between Silva and Carpenter's counts as to how many Land Commission Awards (LCA) were within Hā'ena. However, it is either 22 or 23 claims made within the Hā'ena ahupua'a, ten of which overlap the current park boundaries.

Although Pākī retained interest to the entire ahupua'a, those parcels awarded to native tenants were respected and excluded from his award (Silva 1995). Ten of these kuleana awards (or portions of awards) are located within the Hā'ena State Park boundaries, and they consisted of thirteen parcels (Carpenter 1996). Of the ten claimants, only three trace their claims to the lands before 1824, and there are no clear records of the dispossessed chiefs of this area prior to this date, again a reflection of the political changes that occurred in that year (Carpenter 1996).

Silva further explains that Mahele land records for Hā'ena indicate a "layer[ing] of residence and cultivation," a transition from an older regime to Pākī's, where Kekela's testimony on a few of the claims supported those of the newer residents. At the same time, Silva notes that under Kekela, this did not happen often when looking at all of the recorded claims within the ahupua'a.

The older residents... claimed interest originating pre-1824. The arrival of Kekela in 1839, brought a set of new residents... who asserted their rights to these claims under Kekela and received these parcels during the *Mahele*. Such was the prerogative of the appointed *konohiki*, to assign, dispossess and re-assign at will. As it stands, Haena was relatively fortunate in this regard; the

---

---

corps of older tenants was respected and their holdings honored and protected. (Silva 1995)

...

Haena thus sustained the majority of its original tenants from Kaumuali'i's time and the residential and agricultural patterns were largely preserved during Kekela's management. It might be suggested... that Kekela's long association with the neighboring *ahupua'a* of Lumahai would cause her to be familiar with the older Haena residents. She could not easily dispossess original tenants, especially if they were productive and responsible to their duties as well as respectful of her office.

Land registry and testimony numbered well over 150 taro pond fields of varying sizes and shapes in Haena. Of these 40 or so were situated within the park site. That Haena was well-developed and productive is unquestioned. Its water resources and available cultivable lands appear to be utilized maximally. (Silva 1995)

The land commission awards (LCA) within the park boundaries range in size from 0.75 acres to 4.4 acres and are shown in Figure 5. Carpenter and Silva provide more detailed accounts from the Land Commission Award records in their reports which will not be repeated here.

Pākī died in 1855, followed soon after by his wife, Konia, in 1857. Pākī's daughter, Bernice Pauahi Bishop, inherited their lands but soon after sold Hā'ena to W.H. Pease, a surveyor, in 1858. Because the lands were "in name only," this meant that the lands were never described or surveyed at the time of deeding (Silva 1995). Kekela died in Honolulu in 1865 but did make five claims of her own in Hā'ena (Silva 1995), at least one of which was within the park site (Carpenter 1996). Pease died in 1871 and the administrators of his estate conveyed Hā'ena to William Kinney in 1872 who then sold Hā'ena to Kenoī Kaukaha and 37 other individuals, referred to as the Hā'ena Hui (Hui Ku'ai'ainana o Hā'ena), as tenants in common in 1875. In this transaction, roughly 2,500 acres were transferred. Five years later, "Mahuiki and Company of 30 natives" are listed as "taro planters" in Hā'ena. The company was said to be owners of 900 acres, 40 acres of which was in active cultivation (Silva 1995).

From historical accounts, it was known that a small landing was located at Kē'e in 1895, and it probably served the residents of Hā'ena and the Nāpali coast (Silva 1995).

Missionary censuses showed a relatively small population residing in Hā'ena over this time period. In 1835, there were 116 people (16 of whom were minors) who resided in Hā'ena. By 1847, the population rose to 162 (54 of whom were under the age of 20). According to Silva (1995), this rise was probably due to the arrival of Chiefess Kekela and her entourage in 1839. However, by 1900, there were only 45 residents (seven households) in Hā'ena, all of whom were native Hawaiian, a drastic decrease over 50

---

---

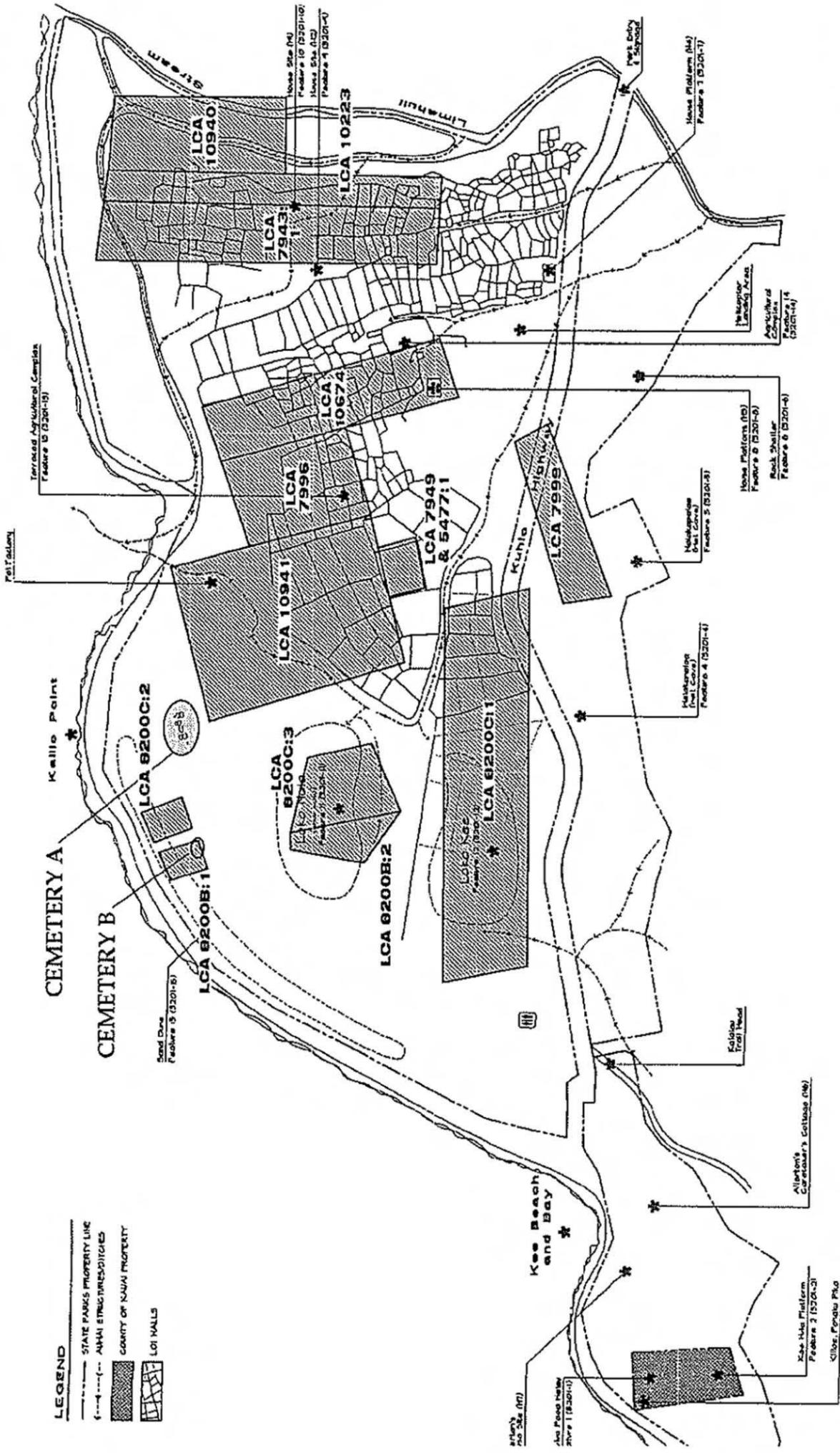
years. Ten years later in 1910, there was a slight population increase to 67 individuals in fifteen households. However, demographically the population was beginning to change with two Asian immigrant households leasing land to grow rice in Hā'ena (Carpenter 1996).

Carpenter also notes that photographs from the early 1900s show that extensive areas of the park were still under taro cultivation. This included Loko Kē'e which photos show planted with taro and Loko Naia, which appears in photos to have two dividing walls within it. The entire park area also appeared to be a treeless plain with only low-lying beach vegetation just behind the dunes (Carpenter 1996). According to Handy, by the 1930s, taro production dropped significantly, with the Limahuli and Mānoa Valley terraces being abandoned first. Limited production continued in the flatlands but also large areas along the lower reaches of Limahuli Stream were turned over to pasture or overgrown with brush and grass (Carpenter 1996).

Then, in 1946 and again in 1957, tsunamis devastated the area. According to Silva, there was a stable Hawaiian population of about 60 individuals in Hā'ena at the time of the 1946 tidal wave. At least nine people died and one went missing (Silva 1995).

Out of 29 homes that stood in Hā'ena before the 1957 tsunami, only four remained livable after the tsunami but amazingly there were no injuries or deaths. This was "miraculous" given that warning to Hā'ena residents was almost by chance. The only way residents found out about the tsunami before it hit was by telephone from persons in other parts of Kaua'i due to the delay between the first warning from the Coast Guard and subsequent police confirmation 40 minutes later before which an officer was sent out to the community. Luckily, everyone who wanted to leave Hā'ena was taken out by helicopter before the tsunami hit including a couple from Honolulu who were honeymooning there. Mrs. Juliet Wichman also took in 54 refugees into her home. Of all the major islands, Kaua'i was worst hit. Wave heights of 32 feet above normal were reported at Hā'ena (Silva 1995).

Prior to the second tsunami, Hā'ena Hui members John Gregg Allerton and Paul G. Rice filed a petition for partition and dissolution of the Hui in June 1955. The three commissioners assigned to the case submitted their report ten years after the 1957 tsunami in April 1967. As a result of the suit filed vs. the heirs of Hanah K. Ahi et. al., the County of Kaua'i received parcels within the current park site, which included Waiakanaloa and Waiakapala'e wet caves and Lohi'au's housesite. The County also received Maniniholo, which is in Hā'ena County Park. The County was tasked with the maintenance and preservation of these sites for the general public.



**EXISTING FEATURES**  
**HAENA STATE PARK**  
 HAENA, KAUAI, HAWAII

**FIGURE 5**  
 Land Commission Awards  
**HA'ENA STATE PARK**  
 Department of Land and Natural Resources  
 Island of Kauai

NORTH

LINEAR SCALE (Feet)

0 300 600

Department of Land and Natural Resources  
 Island of Kauai  
 PBR HAWAII  
 & ASSOCIATES, INC.

Source: Carpenter (1996); Figure 3: Approximate Locations of Land Commission Awards in Ha'ena State Park (LCA boundaries taken from Hawaii Tax Map Key).  
 Disclaimer: This graphic has been prepared for general planning purposes only. Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

---

---

Disregard for this meant automatic transfer of the sites to the Pacific Tropical Botanical Garden. Title to another parcel was given to Allerton with the condition that he maintain and preserve a five-foot wide path for public access to the heiau and hula site. Upon his death or conveyance of property, title would automatically transfer to the County. The State also requested a 40-acre section of prime beach front property for a public park. Four unawarded lots were also auctioned in 1967 to cover the legal costs of the partition. The auction was limited to existing shareholders and \$35,801 was netted. (Silva 1995) Additional details regarding the partition and parties involved is provided in Carlos Andrade's book, *Hā'ena through the Eyes of the Ancestors*.

Also during the late 1960s through the early 1970s, Howard Taylor, actress Elizabeth Taylor's brother, purchased a large parcel along the Hā'ena coast. A transient community arose at the "Taylor Camp." The Taylor Camp is remembered through various lenses; fondly by some who came across the place during the "flower power" years; and less so by those who observed drug use, an abundance of rubbish, lack of sewer or waste disposal facilities and resulting hepatitis outbreaks. Eventually, the State condemned this property in 1975 due to the unsanitary conditions and it was added to the park's inventory. According to Carpenter, the last of the Taylor Camp residents were evicted in 1977, which allowed the State to finally create the State Park. Initial park development was limited to a small comfort station and a small dirt parking lot in 1979.

Carpenter also notes that by 1964, based on a historical photograph of the area, both loko within the park site seem to be abandoned although several lo'i on the eastern side of the park were still actively cultivated. He also notes that the vast majority of the park site, particularly along the coast, is covered by a dense canopy of trees, similar to conditions today (Carpenter 1996).

As a State Park, several plans have been developed to address park use and management of the resources. In 1982, a Nāpali Coast Management Plan was prepared by State Parks. This plan considered coastal lands between Hā'ena and Kalalau Valley and identified a need to determine what facilities are needed at the Kalalau trailhead located in Hā'ena State Park.

In the mid-1990s a comprehensive effort to master plan Hā'ena State Park was commenced. The work included natural resource inventories; archaeological inventories; focus-group interviews and social impact assessment that resulted in management suggestions and a "Community Preferred Master Plan." An Environmental Impact Statement (EIS) was prepared and a draft Master Plan document was developed. However, the EIS was never filed with the Office of Environmental Quality (OEQC) and

---

---

the Master Plan was not adopted by the State Board of Land and Natural Resources (BLNR).

## **2.2.2 NATURAL ENVIRONMENT**

### **2.2.2.1 PHYSICAL CHARACTERISTICS**

At the northeastern end of the Nāpali Coast, the Hā'ena coastal plain is backed by high former sea cliffs, which have been cut by two small stream valleys, Mānoa and Limahuli. Makana, a mountainous peak at 1,280 feet in height is located south of the park and dominates the landscape. The narrow coastal plain between the cliffs and the beach is the result of colluvial and alluvial deposition in a basalt substrate. This alluvial flat is fronted by calcareous beaches and a sand dune system that extends from Kē'ē Beach eastward to Wainiha Bay. The park corresponds to the western end of the coastal plain and encompasses both the dune system and alluvial deposits. Portions of the western side of Limahuli Valley fall within Hā'ena State Park, with Limahuli Stream serving as the park's eastern boundary. The park contains two wet caves, Waiakanaloa and Waiakapala'e. These caves and the dry cave near Hā'ena County Park were created by fluctuating sea levels and wave action. Kē'ē Beach is located where the coastal flat meets the cliffs of Nāpali. Boulder beaches exist along the west side of Kē'ē Beach and the mouth of Limahuli Stream. Offshore is a narrow fringing reef.

### **2.2.2.2 GEOLOGY**

At approximately five million years in age, the Island of Kaua'i is among the oldest within the major Hawaiian archipelago. Originally thought to have been built from a single shield volcano, the island is now believed to have been built primarily by the initial Nāpali formation of the Waimea (also Wai'ale'ale) shield volcano 4.35-5.1 million years ago with a probable second shield volcano building up the eastern portion of the island after a catastrophic collapse of the eastern side of the original volcano. This second volcano, the Lihu'e shield volcano, was active about a million years later and is believed to have been located in the area of the Lihu'e Basin. The Kōloa Volcanics represent the rejuvenation stage lava flows that erupted mainly at around 2.01-0.52 million years ago. They cover most of the eastern portion of the island, but only comprise a thin veneer of flows that make up less than one percent of the island mass. The flows along the coast in the area of Hā'ena are of the original Nāpali Member and have been dated between 4.27-4.36 million years old (Blay and Siemers 2004).

The Nāpali scarp's dramatic 1,000-2,000 foot cliffs that stretch for over fourteen miles along the northwestern coastline is generally believed to

---

---

represent a major structural failure of the original volcanic dome. However, there have been some theories recently that this formation may have actually been created mainly by wave erosion (Blay and Siemers 2004). According to Blay and Siemers (2004), this remains a geologic controversy but believe it is probably a combination of both theories.

Kaua'i's post-erosional volcanic activity has largely been limited to the eastern portion of the island, leaving sedimentary processes the major geological influence affecting the Hā'ena State Park and the Nāpali Coast.

Hā'ena State Park sits at the western end of the Hā'ena Plain, a coastal plain comprised of a basalt substrate covered by alluvial deposits along its mauka reaches and sandy beaches makai. Biogenic reefs, comprised mainly of coral and coralline algae, have grown like a "fringe" around the island. These reefs have provided skeletal matter for fragmentation, transport and deposition at the shoreline to produce sandy beaches (Blay and Siemers 2004).

During the Pleistocene epoch (0.126 to 2.558 million years ago), the Earth experienced large fluctuations in global sea level. Drops in sea level lowered the erosional baseline for streams, carving valleys and cliffs to steep grades. The lower sea level allowed for the deposition of calcareous and alluvial deposits, including calcareous dunes now lithified. These dunes run along the park's makai boundary and are a prominent feature along the existing beach.

Another geologic feature of note within the park boundary includes the sea caves carved into the side of the mountain through natural processes. These caves were carved as a result of a rise in sea level during the Pleistocene, when existing lava tubes were enlarged by wave action. Currently, the valley flats are a result of alluvial fill from stream erosion and a decrease in sea level of five feet from its highest stand.

### **2.2.2.3 TOPOGRAPHY**

The majority of Hā'ena State Park lies on coastal plain formed by colluvial and alluvial deposition. The bulk of the park area is at a ground elevation of between 10 and 30 feet above sea level. However, mauka of Kūhiō Highway, the land rises steeply into the Nāpali cliffs. A dune system parallels the shoreline while the area of the park bound by the dunes and Kūhiō Highway is generally flat with hydrology altered by 'auwai that date to pre-western contact. Figure 6 is a topographic map of Hā'ena State Park. As the land rises mauka of Kūhiō Highway, weathering has exposed rock formations and talus boulders piled up along the cliffs. Within the boundary of Hā'ena State Park the cliffs rise to nearly 500 feet in elevation.

---

---

Beyond the park boundaries into the Nāpali Coast State Wilderness Park, the shoreline cliffs rise to over 800 feet.

#### 2.2.2.4 SOILS

There are three soil suitability studies prepared for lands in Hawai'i whose principal focus has been to describe the physical attributes of land and the relative productivity of different land types for agricultural production. These are: 1) the U.S. Department of Agriculture Soil Conservation Services Soil Survey (SCS); 2) the University of Hawai'i Land Study Bureau (LSB) Detailed Land Classification; and 3) the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawai'i (ALISH).

The SCS Soil Survey shows that there are a variety of soil types found within Hā'ena State Park, ranging from beach sand and dune lands along the coast to sandy loams, to clays, marshes and rocky outcrops (see Figure 7).

The University of Hawai'i LSB document titled, "Detailed Land Classification, Islands of Kaua'i, O'ahu, Maui, Moloka'i, and Lāna'i" classifies non-urban land based on a five-class productivity rating system using the letters A, B, C, D, and E, where A represents the highest class of productivity and E the lowest based on a variety of factors. The LSB rating for the entire park site is E, or the lowest productivity rating. This may have more to do with its designation as a park site than the actual productivity of the soils since the entire region is also designated as E. See Figure 8.

The State of Hawai'i Department of Agriculture's Agricultural Lands of Importance to the State of Hawai'i (ALISH) system rates agricultural land as Prime, Unique or Other Lands. The rest of the lands are not classified. Portions of the park site are classified as Prime and Other Lands, while the marsh, areas mauka of the highway, and the coastal area between Kē'ē and Ka'ilio Point are not classified. There is also a small area that is not classified just to the west of Limahuli Stream along the coast. See Figure 9. Prime Agricultural Land is land best suited for the production of food, feed, forage, and fiber crops. The land has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to modern farming methods. Other Agricultural Land is land other than Prime or Unique Agricultural Land that is also of statewide or local importance for the production of food, feed, fiber, and forage crops. The lands in this classification are important to agriculture in Hawai'i yet they exhibit properties, such as seasonal wetness, erosion, limited rooting zone, slope, flooding, or drought, that exclude them from

---

---

the Prime or Unique Agricultural classifications. These lands can be farmed satisfactorily by applying greater inputs of fertilizer and other soil amendments, drainage improvement, erosion control practices, flood protection and produce fair to good crop yields when managed properly.

#### **2.2.2.5 CLIMATE**

In general, northeasterly trade winds, interrupted by the occasional large-scale storm, are present year round at Hā'ena. Nearby Wai'ale'ale receives an annual rainfall of approximately 450 inches per year. Due to the orographic effect (the process of moisture-laden northeasterly tradewinds lifting along windward slopes), Hā'ena receives an estimated 50-70 inches of rainfall annually (Blay and Siemers 2004).

Although no climatic data is officially collected for Hā'ena, the Western Regional Climate Center (a three-partner program with NOAA's National Climatic Data Center, the Regional Climate Centers and State Climate Offices) collects historic weather data at Wainiha, which can provide some generalities about climatic conditions along this stretch of Kaua'i's coastline. At Wainiha, the average annual temperature ranges between a high of 79.5 degrees to a low of 63.3 degrees Fahrenheit. While December through February are generally the coolest months, June through September are the warmest. Mean annual relative humidity ranges between 61 to 80 percent (NCDC 2009).

Surface winds are generally around 13 to 24 miles per hour from the northeast. There are some seasonal changes in prevailing wind direction in winter with southerly Kona winds. Strong winds occur at times in connection with storm systems moving through the area. Wind velocities and directions are influenced by the mountainous terrain to the south and west. Daily variations include diurnal effects of winds from the southwest quadrant during the night and morning hours, shifting to the northeast during the day.

#### **2.2.2.6 OCEAN CONDITIONS**

Surf conditions in Hā'ena are typical of other exposed north shore environments in Hawai'i with the low surf season occurring between May and October and the high surf season during the second half of the year from October through May. Southern swells usually arrive in the summer months and Kona swells usually arrive during the winter months. According to Clark, both originate to the south of the islands and normally only strike southern shores, but in Kaua'i's case, because of the island's rounded shape, both southern and Kona storm swells can wrap around the west end of Kaua'i and hit the Hā'ena shoreline with surf from

---

---

two to six feet. Kona storm swells from the west or southwest may produce surf heights up to ten feet (Clark 1992).

#### **2.2.2.7 MARINE ENVIRONMENT**

In 2008, SWCA Environmental Consultants investigated the existing marine conditions at Hā'ena State Park. The subsequent report analyzed the adjacent nearshore waters around Kē'ē Beach and is attached as Appendix B. A beach and ocean recreation study for Hā'ena State Park was prepared for DLNR by John Clark in 1992. In addition to analyzing potential recreational opportunities and constraints, the study also provides a general description of the nearshore marine environment. The SWCA report included a review of Clark's 1992 report and provided updates to Clark's findings where necessary.

Hā'ena State Park is located in the Ka'ilio shoreline sub-section of Hā'ena (see Figure 10). Three outlets bisect the beach within the park boundaries—Limahuli Stream, a small intermittent tributary stream and freshwater seeps. Ocean conditions in the park are typical of northern exposed coasts in Hawai'i which can experience dangerously high surf conditions particularly during winter months. Between October and May, swells can be in excess of ten feet at Hā'ena, but during summer months when trade wind swells typically dominate, the surf is generally reduced (Clark 1992). Recent observations show that many of the tree roots along the shoreline have become exposed due to erosion from wave action (SWCA 2009).

According to SWCA, northeast trade winds are present between 90-95 percent of the year and almost always generate some surf activity on the outer reef margins. Predominant long shore currents run east to west outside the reef. Add high surf conditions and a powerful rip current can be generated that runs out of the narrow channel at the west end of Kē'ē Lagoon to the open ocean, creating a hazard for swimmers and divers (SWCA 2009). Previous studies found tidal currents ranging from 0.1 to 1.0 knots, and Clark (1992) suggested that such current velocities were not usually a concern for nearshore ocean recreation activities. However, lifeguards at Kē'ē Beach strongly objected to SWCA biologists' plan to conduct snorkel surveys of the outer reef even during a day with unusually calm conditions in November 2008 (SWCA 2009).

Between Kē'ē Beach and Limahuli Stream, the beach is the widest and extends up to 150 feet mauka. The edge of the beach is lined with false kamani and ironwood trees. The area between Hā'ena Point and Kē'ē Beach is backed by low sand dunes roughly four to eight feet high. Growth of these sand dunes is limited due to the presence of introduced

---

---

tree stands. Historical photo analysis of the region indicates continued recession of the existing shoreline.

Clark's description of the Hā'ena shoreline notes:

A comparison of the present-day photographs of the Ha'ena [sic] shoreline with historical photographs from the 1920s (on file in the Division of State Parks) indicates a long-term pattern of shoreline recession. Broad beaches sloping steeply back to extensive dunes are evident in the 1920s. The same beaches are narrower today. Although planting of ironwoods along the backshore has no doubt stabilized the position of the dunes, it has also deterred dune accretion on the back slope by wind-blown sand. This has altered the balance between dune accretion (by wind-blown sand) and dune erosion by large storm surf. (Clark 1992)

In his report, Clark also describes the reefs offshore of Hā'ena State Park, starting from the eastern end near Limahuli Stream. These reef formations can be seen in Figure 10 and are described by Clark below:

The fringing reef west of Paweaka Channel and near Limahuli Stream is ... characterized by a shallow and narrow platform of consolidated limestone terminating in a well-defined seaward margin that is emergent at low tide. The reef is bisected in several places by channels that merge with stream channels onshore. Reef development in the channels may be retarded by surface and spring freshwater discharge.

...

Irregularly-shaped but well-developed apron reefs extend offshore from Ka'ilio Point. The shallow outer reef flat shoals to an elevated algal ridge exposed at low tide. Inshore of the outer reef flat is a slightly deeper moat. The reef margin and slope are highly irregular and deeply-incised by canyons, overhangs, caves, and crevices which provide considerable bathymetric relief within a short distance. Below a depth of 30 feet, the reef terminates in white sand deposits which extend far offshore.

...

Limahuli Stream bisects the shoreline at two points along Ka'ilio Point and flows into the ocean. The stream's fresh water discharge at the west stream mouth has retarded the growth of nearshore corals and formed Poholoikeiki Channel, a narrow channel that angles east through the reef offshore. Inshore the channel is shallow with a sandy bottom.

To the west of Poholoikeiki Channel is the last major section of fringing reef in Ha'ena [sic], Ka'ilio Reef. Ka'ilioiki, the first half of the reef, begins at the Poholoikeiki Channel and ends at a smaller, narrower channel through the reef margin approximately 100 yards to the west. Ka'ilionui is the remainder of the reef from the small channel to Ke'e [sic]. The entire Ka'ilio Reef is long and narrow with a very shallow inner reef flat. The reef margin, particularly at the west end, is emergent at low tide. The most prominent feature in the reef is the small, protected lagoon at Ke'e Beach. A large deep hole in the reef flat immediately east of the lagoon is known as Blue Hole.

The Ke'e lagoon is a large pocket of sand protected by the west end of Ka'ilio Reef. The reef forms the lagoon's eastern and seaward margins while a rocky point forms its western border. Near the point, the lagoon narrows into a deep channel that parallels the shore as it passes between the point and the end of the reef. Depths in the channel average 8 to 10 feet. The channel ends in the open

---

---

ocean beyond the reef. The sand-bottomed lagoon is shallow nearshore and slopes gradually to overhead depths. Along the shoreward margin of the lagoon, the reef is characterized by a spur and groove system with overhangs and tunnels. Underwater visibility is excellent. (Clark 1992)

Since Clark's inventory, the University of Hawai'i, School of Oceanography and Earth Science and Technology (SOEST) has further studied beach erosion. Depending upon the location along the shoreline at Hā'ena State Park, SOEST has found different transects along the beaches to be eroding at a rate of between less than six inches per year to as much as one foot per year. See Figure 11.

The major swimming area in Hā'ena State Park is Kē'ē Lagoon which is a large sand pocket protected by the surrounding platforms of fringing reef. SWCA found that much of Clark's description of the reef in 1992 still remains accurate in 2009. "Sand and reef pavement comprise the dominant marine geomorphologic structures between Kē'ē Beach and Maniniholo Bay to the east. From Maniniholo Beach west to Hā'ena Point the reef consists of aggregate reef, scattered coral and rock, and rubble with small patches of reef pavement. The reef pavement is covered with macro-algae, coralline algae, and corals; however, the sandy lagoon floors and channels are uncolonized" (SWCA 2009). SWCA continues, "live coral cover in Kē'ē Beach ranges between four to 47 percent in some areas due to large amount of visitor traffic. There are a variety of inshore reef species in addition to macroinvertebrates, algae, and live coral species". See Figure 12 through Figure 14.

The State Department of Health has designated the offshore marine waters of Hā'ena with a Class AA rating which recognizes the area's significant ecological and recreational value. According to SWCA:

Within the defined reef at Hā'ena, Class AA waters are bounded by areas less than 18 meters (60 feet) in depth. Uses to be protected in the class of waters include oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment. Until recently, the coastal waters of Hā'ena State Park were not actively monitored by DOH. However, in late 2005, the DOH Clean Water Branch (CWB) and the Hanalei Watershed Hui (HWH) joined in the protection of Kaua'i beaches through a partnership between DOH and the community based organization. Hanalei Watershed Hui's involvement allowed DOH to increase the number of beaches that it monitors on Kaua'i, and the frequency at which they are sampled. Hā'ena Beach Park is one of the beaches covered under this agreement. (SWCA 2009)

Based on initial samples collected in 2005-2006, state standards for Class AA waters for enterococci and coliform were attained at Hā'ena. State standards were also attained for temperature, salinity, dissolved oxygen, pH, and turbidity (SWCA 2009).

---

---

### 2.2.2.8 WETLANDS

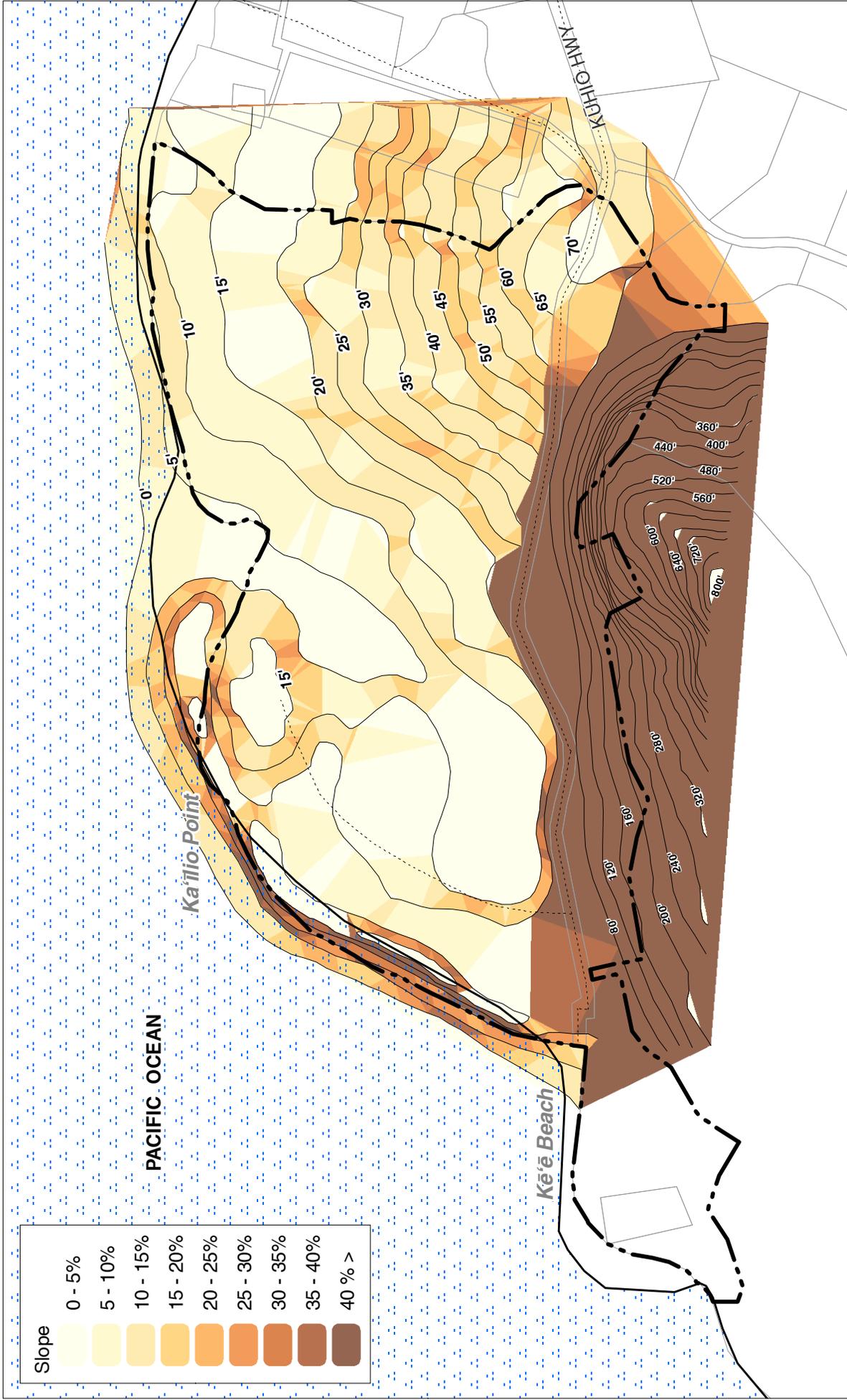
Throughout the park there are areas designated as wetlands by the US Fish and Wildlife Service's National Wetlands Inventory (NWI). The primary designation covers most of the interior areas behind the dunes and makai of the highway. It is classified as a seasonal, forested palustrine (inland, non-tidal) wetland with broad-leaved evergreens and is seasonally flooded (PFOC). Along and off the coast, the marine areas are classified as a subtidal marine wetland with coral reefs (M1RFL). Shore areas that are irregularly flooded (by tides) are designated as estuarine (M2RSN, M2USN and M2USP). Another wetland type is mapped on the NWI over the Loko Kē'e and east of the parking area. These areas are mapped as Palustrine (inland) Emergent (characterized by hydrophytic plants) and seasonally flooded (PEMC). The NWI map characterizes the Limahuli Stream channel as an upper perennial riverine system with a rock bottom that is permanently flooded (R3RBH). The NWI maps are currently the best available data from the US Fish and Wildlife Service. They were primarily created through aerial photography interpretations and while they cannot provide a definite wetland boundary for construction or regulatory purposes, they are thus useful for guidance when evaluating an area's suitability for development or uses.

In October 2008, a wetland delineation study was also prepared for State Parks by AECOS, Inc. for the existing comfort station's individual wastewater system (constructed wetland) project. AECOS interpreted the western edge of the PFO3C wetland to be a former pond wall (thought to be the edge of Loko Kē'e). However, in their June 15, 2009 letter,<sup>1</sup> the US Army Corps of Engineers (USACOE) determined that the wetland did not extend as far as the wall and recommended that any work performed fifteen feet east of the wall require a new wetland determination study. The new study would also require a new determination by the USACOE. Figure 15 compiles the approximate NWI wetland boundaries from the State GIS files, the AECOS wetland survey map from their report and the recommendation from the USACOE. The AECOS wetland delineation study and USACOE determination letter are attached as Appendix E in this report.

Presently, ongoing management of the wetlands is limited to the stocking of the surface water with mosquito guppies as a vector control measure (Juran, personal communication).

---

<sup>1</sup> USACOE File Number POH-2009-00067.



**FIGURE 6**  
Topography

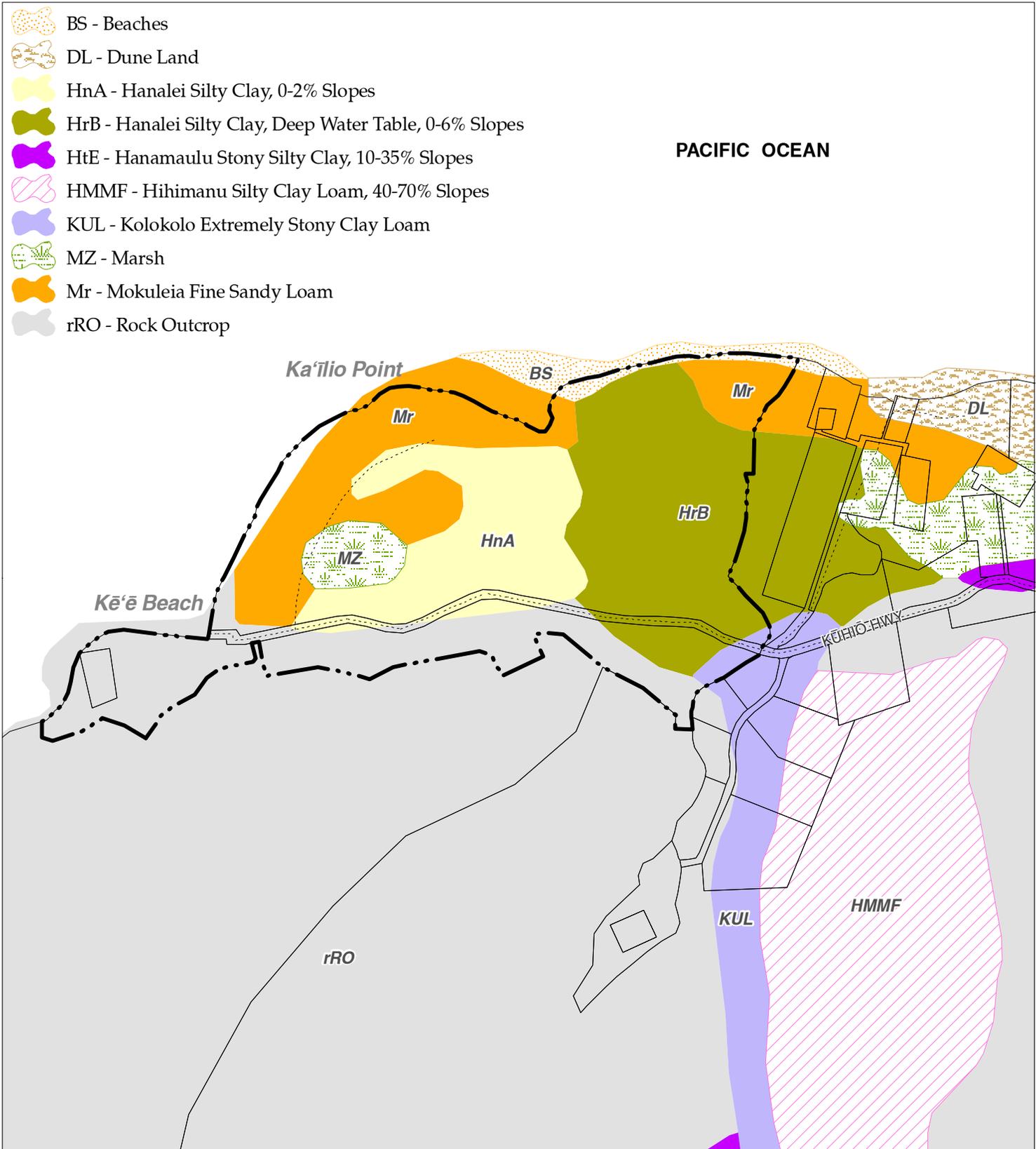
# HĀ'ENA STATE PARK

Department of Land and Natural Resources  
Island of Kauai

NORTH

LINEAR SCALE (Feet)  
0 200 400 800

Source: Engineering Solutions, Inc. (May 2009)  
Disclaimer: This graphic has been prepared for general planning purposes only.  
No topographic survey completed.



-  BS - Beaches
-  DL - Dune Land
-  HnA - Hanalei Silty Clay, 0-2% Slopes
-  HrB - Hanalei Silty Clay, Deep Water Table, 0-6% Slopes
-  HtE - Hanamaulu Stony Silty Clay, 10-35% Slopes
-  HMMF - Hihimanu Silty Clay Loam, 40-70% Slopes
-  KUL - Kolokolo Extremely Stony Clay Loam
-  MZ - Marsh
-  Mr - Mokuleia Fine Sandy Loam
-  rRO - Rock Outcrop

PACIFIC OCEAN

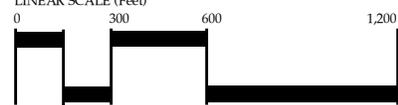
- LEGEND**
-  Hā'ena State Park Project Boundary
  -  Road

**FIGURE 7**  
SCS Soil Survey  
**HĀ'ENA STATE PARK**  
Department of Land and Natural Resources  
Island of Kaua'i

NORTH



LINEAR SCALE (Feet)




Source: Soil Conservation Service, SCS (GIS, 2007)  
Disclaimer: This graphic has been prepared for general planning purposes only.  
Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

**Ag. Land Productivity Ratings**

-  A - Excellent
-  B - Good
-  C - Fair
-  D - Poor
-  E - Very Poor
-  Not Classified

PACIFIC OCEAN



**LEGEND**

-  Hā'ena State Park Project Boundary
-  Road

**FIGURE 8**

Land Study Bureau Classification

**HĀ'ENA STATE PARK**

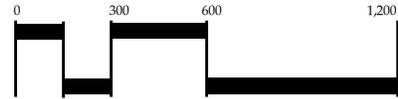
Department of Land and Natural Resources

Island of Kaua'i

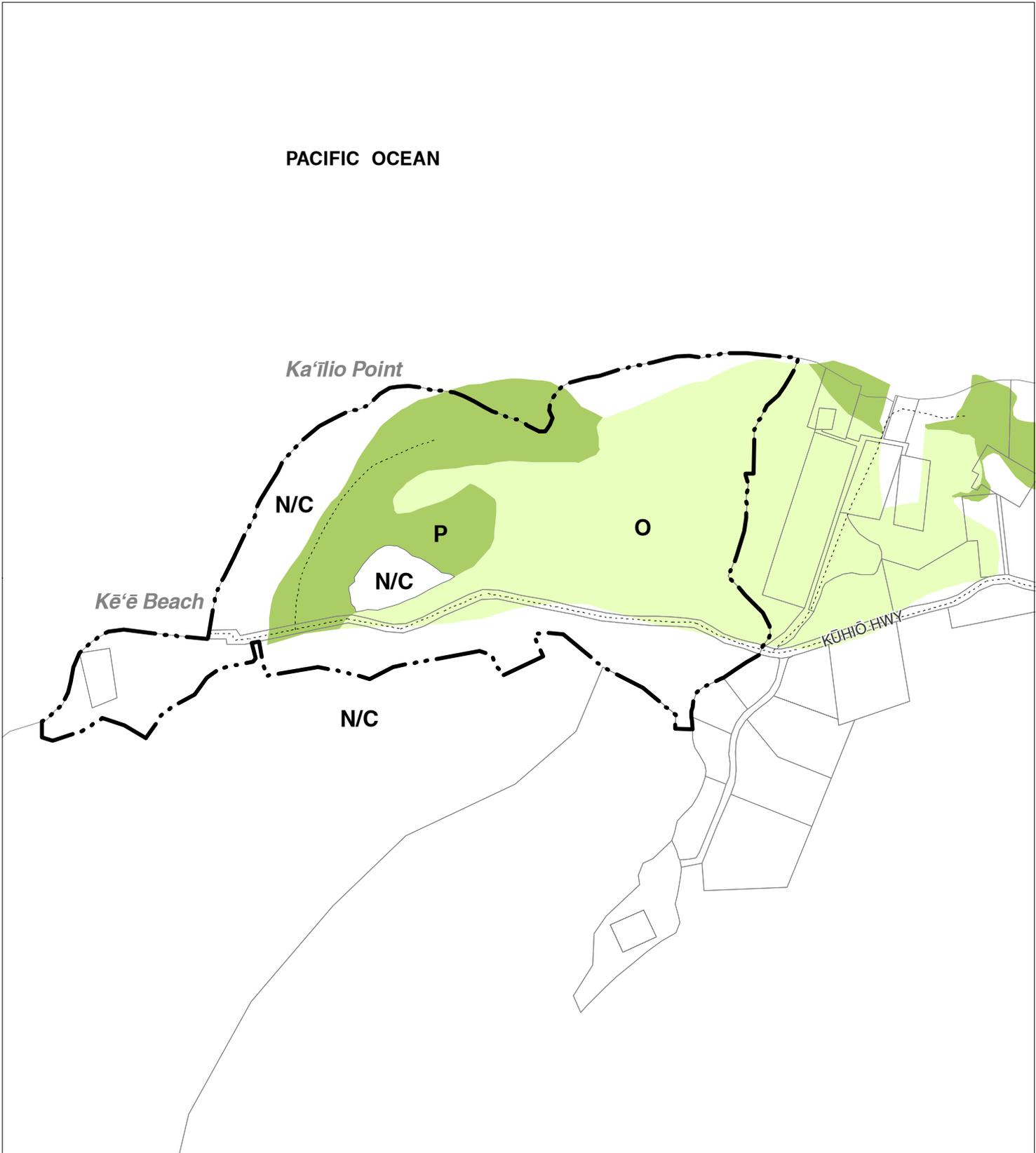
NORTH



LINEAR SCALE (Feet)



Source: Land Study Bureau (GIS, 1998)  
 Disclaimer: This graphic has been prepared for general planning purposes only.



**LEGEND**

-  Hā'ena State Park Project Boundary
-  Road
-  Prime ALISH (P)
-  Unique ALISH (U)
-  Other ALISH (O)
-  Not Classified (N/C)

Source: State Department of Agriculture (GIS)  
 Disclaimer: This graphic has been prepared for general planning purposes only.

**FIGURE 9**

Agricultural Lands of Importance to the State of Hawai'i

**HĀ'ENA STATE PARK**

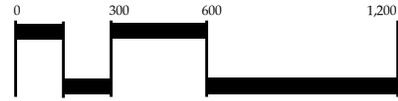
Department of Land and Natural Resources

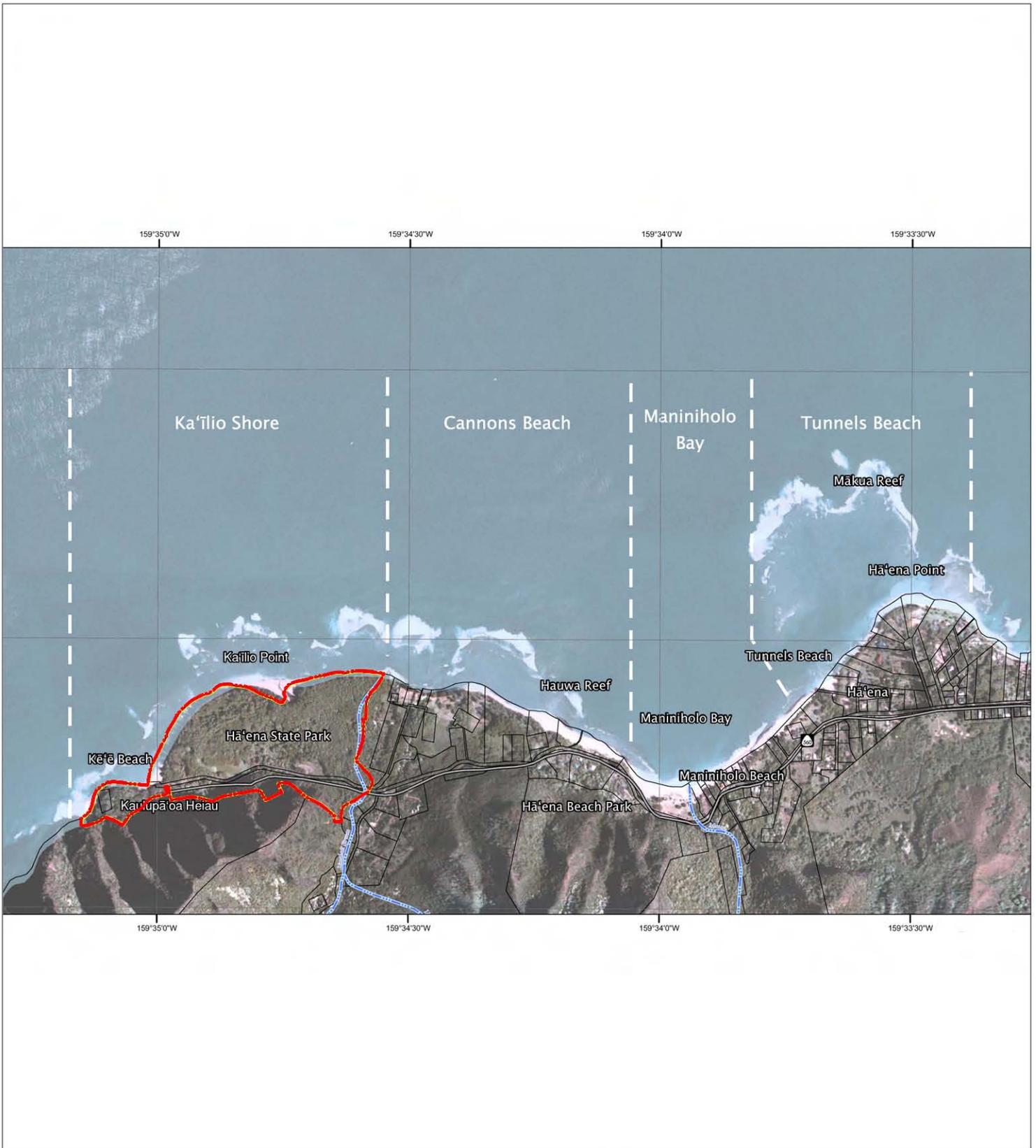
Island of Kaua'i

NORTH



LINEAR SCALE (Feet)





**LEGEND**

- - - Hā'ena State Park Project Boundary
- State Parks
- ~ ~ ~ Streams

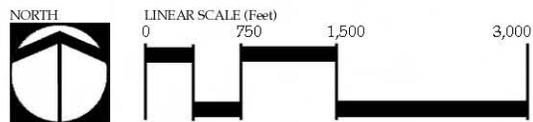
**FIGURE 10**

Marine Environment Maps  
Shoreline Sub-Areas

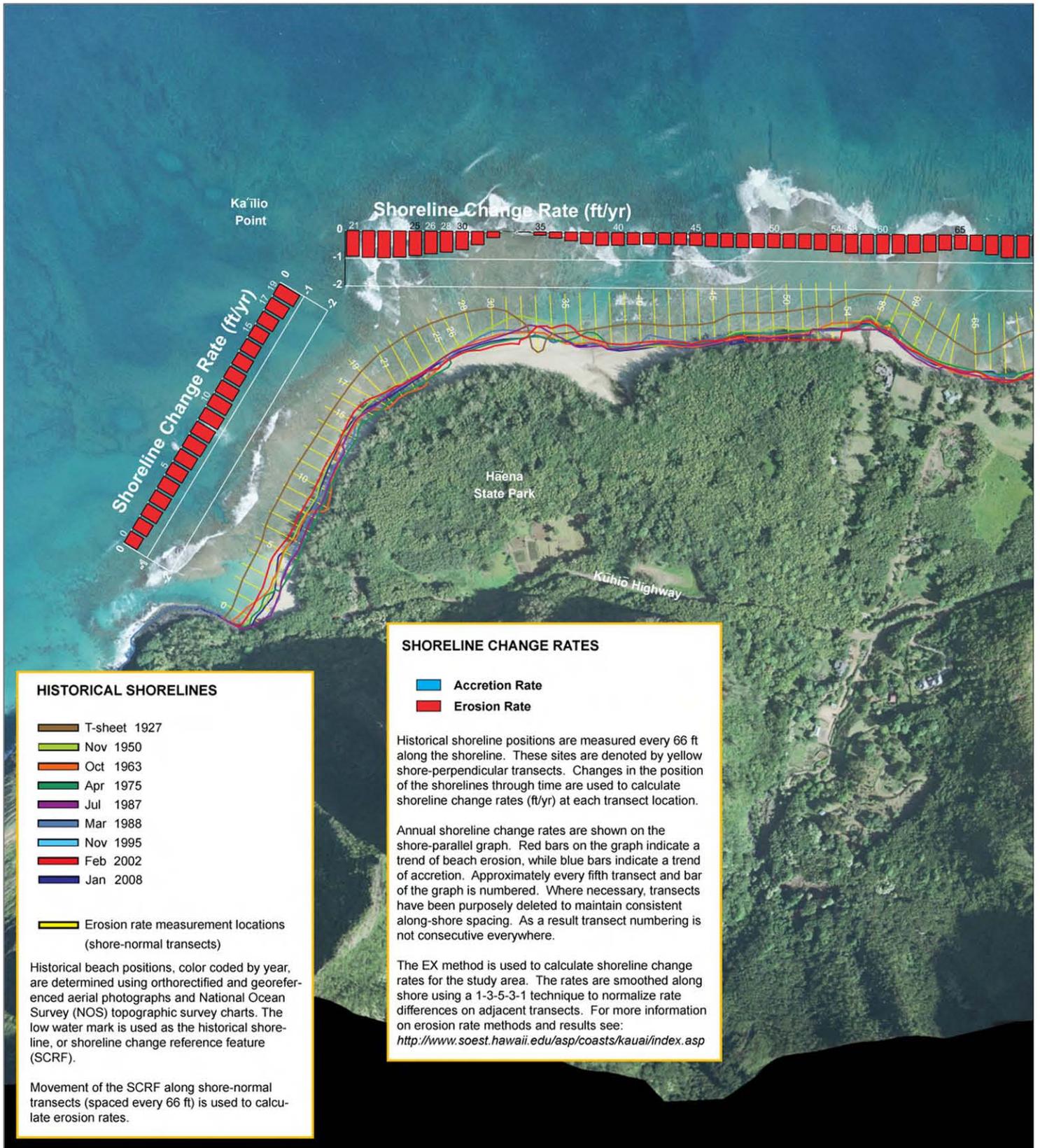
**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kauai

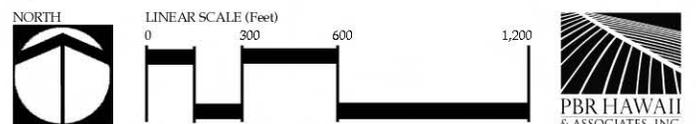


Source: SWCA Environmental Consultants (2009)  
Disclaimer: This graphic has been prepared for general planning purposes only.

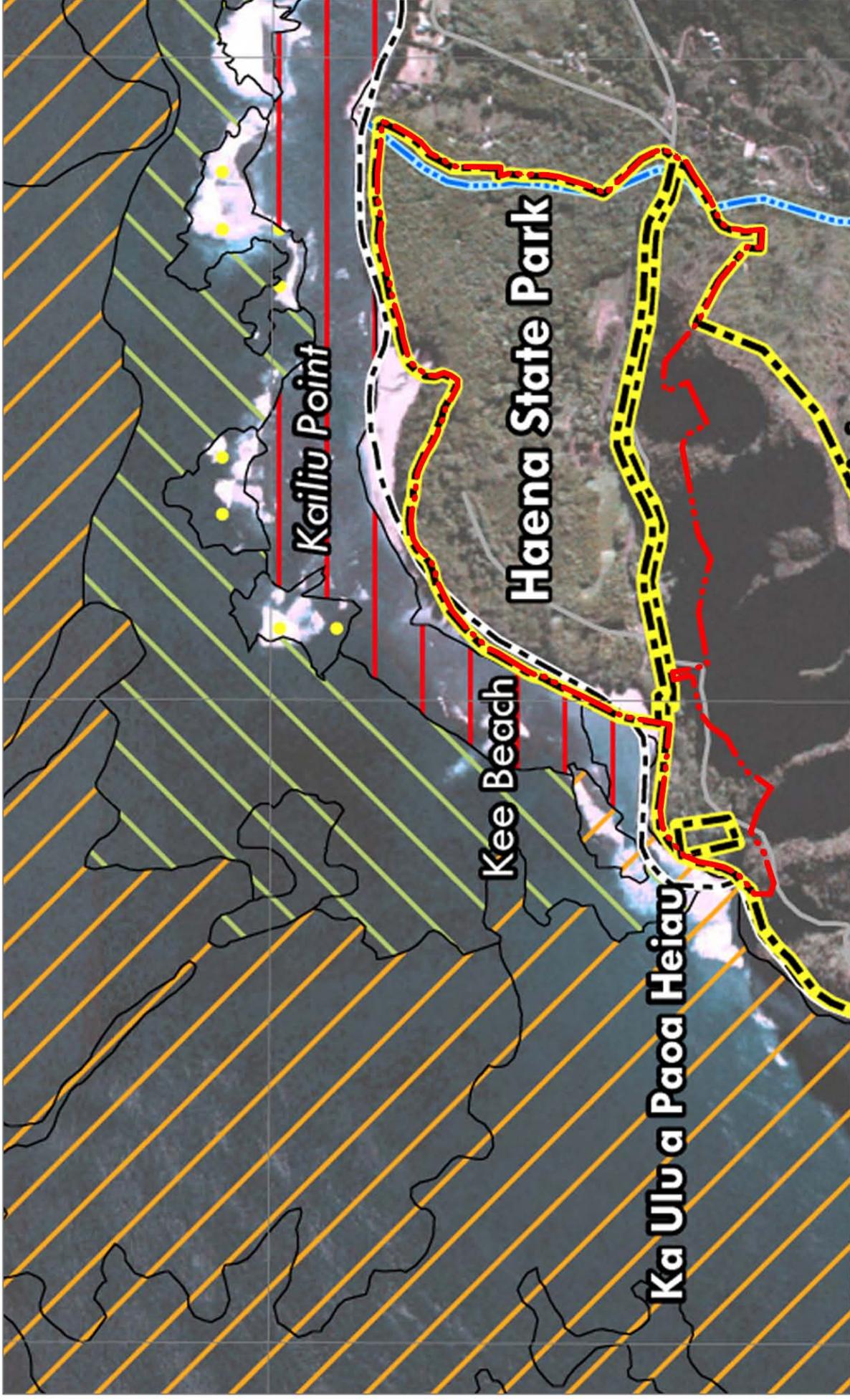


**FIGURE 11**  
**SOEST Shoreline Erosion Rates**  
**HĀ'ENA STATE PARK**

Department of Land and Natural Resources Island of Kaua'i



Source: University of Hawaii School of Ocean and Earth Science and Technology (2008)  
 Disclaimer: This graphic has been prepared for general planning purposes only.  
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.



**LEGEND**

- Ha'ena State Park Project Boundary
- State Parks
- Ahupuua
- Streams
- Roads
- Bank/Shelf
- Reef Crest
- Reef Flat
- Fore Reef
- Land
- Unknown

**FIGURE 12**

Marine Environment Maps  
Shallow-Water Benthic Habitat Zones

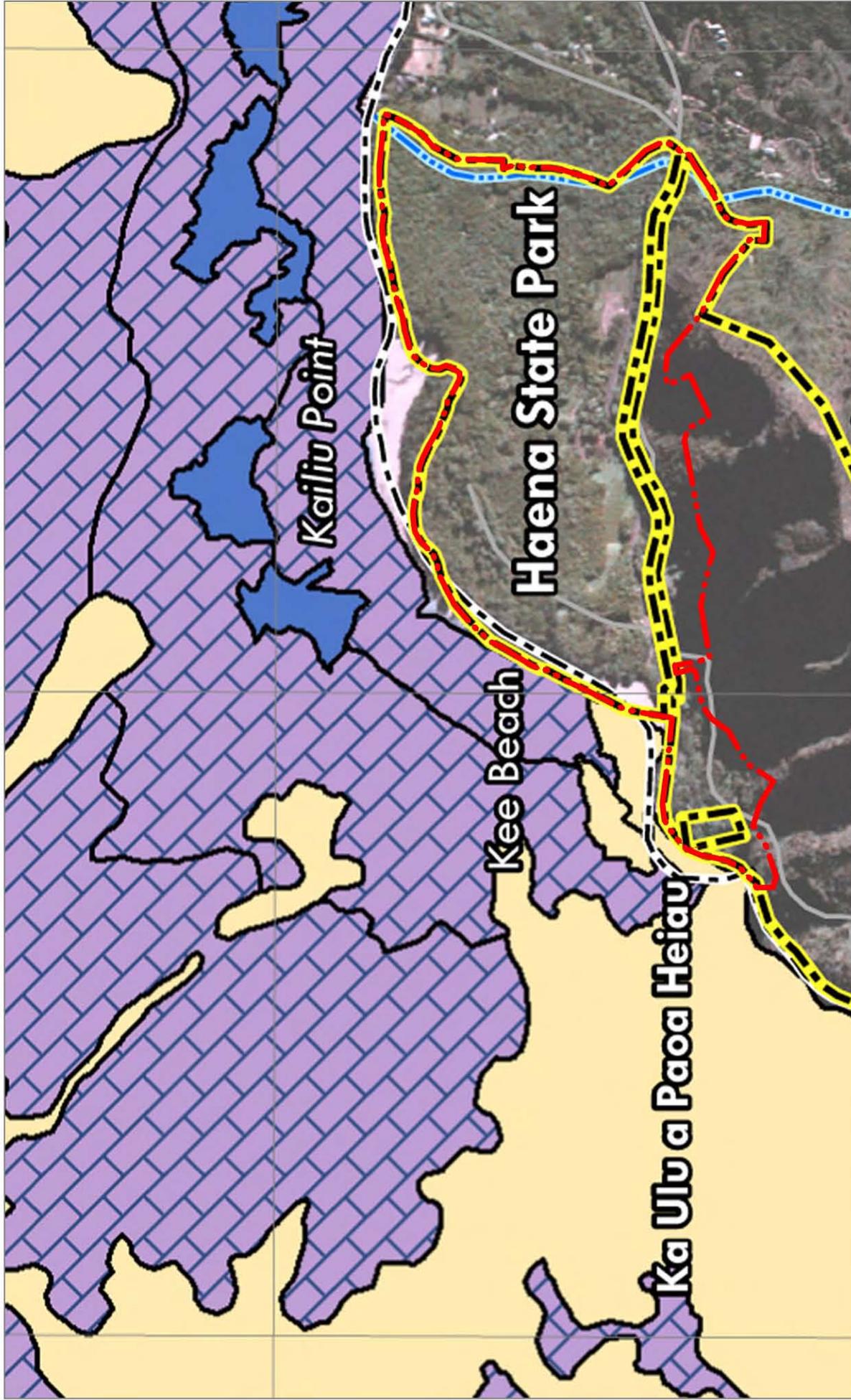
**HĀ'ENA STATE PARK**

Department of Land and Natural Resources  
Island of Kaua'i  
NORTH

LINEAR SCALE (Feet)  
0 300 600 1,200

PBR HAWAII  
& ASSOCIATES, INC.

Source: SWCA Environmental Consultants (2009)  
Disclaimer: This graphic has been prepared for general planning purposes only.



**FIGURE 13**  
 Marine Environment Maps  
 Shallow-Water Benthic Habitat - Geomorphology  
**HĀ'ENA STATE PARK**  
 Department of Land and Natural Resources  
 NORTH  
 LINEAR SCALE: (Feet)  
 0 300 600 1,200  
 Island of Kaua'i  
 PBR HAWAII & ASSOCIATES, INC.

Source: SWCA Environmental Consultants (2009)  
 Disclaimer: This graphic has been prepared for general planning purposes only.



**LEGEND**

- · - · - Ha'ena State Park Project Boundary
- State Parks
- Ahupuua
- Streams
- Roads
- Coral, 10% - <50%
- Coralline Algae, 10% - <50%
- Coralline Algae, 50% - <90%
- Macroalgae, 10% - <50%
- Turf, 10% - <50%
- Turf, 50% - <90%
- Turf, 90% - 100%
- Uncolonized, 90% - 100%
- Unknown

**FIGURE 14**

Marine Environment Maps  
Shallow-Water Benthic Habitat - Biological Cover

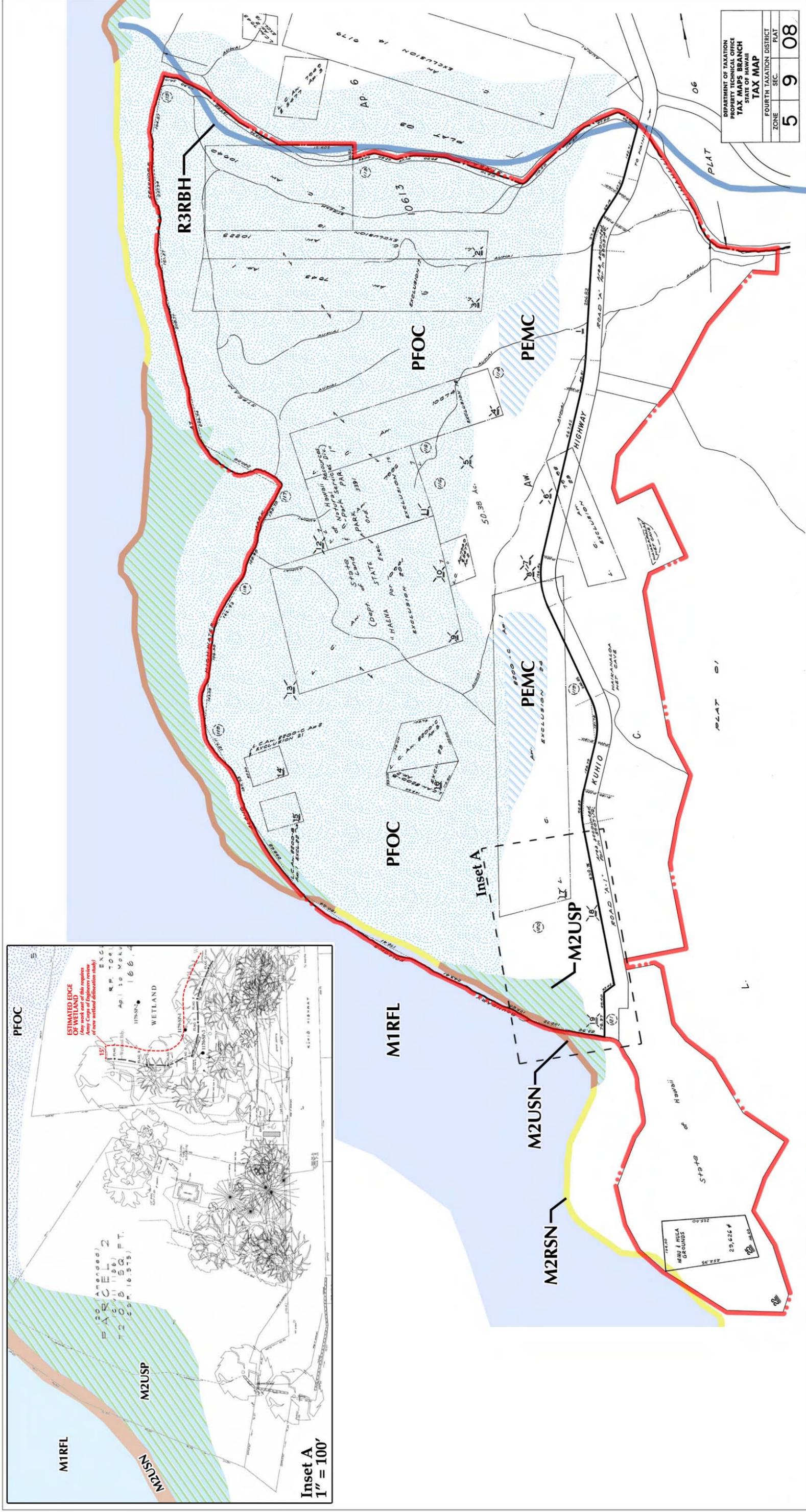
**HĀ'ĒNA STATE PARK**

Department of Land and Natural Resources  
NORTH

LINEAR SCALE: (Feet)  
0 300 600 1,200

Island of Kaua'i  
PBR HAWAII & ASSOCIATES, INC.

Source: SWCA Environmental Consultants (2009)  
Disclaimer: This graphic has been prepared for general planning purposes only.



**LEGEND**

- - - Project Boundary
- - - Estimated Edge of Wetland (USACOE)
- Wetland Boundary (AECOS, Inc.)

**NATIONAL WETLAND INVENTORY**

- Estuarine and Marine Wetland (M2USP)
- Freshwater Emergent Wetland (PEMC)
- Freshwater Forested/Shrub Wetland (PFOC)
- Estuarine and Marine Wetland (M2USN)
- Estuarine and Marine Deepwater (M1RFL)
- Estuarine and Marine Wetland (M2RSN)
- Riverine (R3RBH)

**FIGURE 15**  
Wetlands

**HA'ENA STATE PARK**

Department of Land and Natural Resources  
Island of Kauai  
NORTH  
LINEAR SCALE (Feet)  
0 250 500  
PBR HAWAII & ASSOCIATES, INC.

Source: AECOS, Inc. (October 31, 2008)  
Dept. of Army, Corps of Engineers letter (File Number POH-2009-00067, June 15, 2009)  
U.S. Department of the Interior, Fish and Wildlife Service (GIS)  
Disclaimer: This graphic has been prepared for general planning purposes only.  
Incorrect or outdated Hawaiian spellings on source map have not been corrected.

---

---

## 2.2.2.9 GROUND AND SURFACE WATER

### 2.2.2.9.1 *Ground Water*

The dominant water resource on each of the Hawaiian Islands is volcanic rock aquifers. There are four general types of groundwater, dike, perched, unconfined basal and confined basal. Especially on Kaua'i, perennial streams fed by groundwater springs are common. The groundwater resource beneath Hā'ena State Park is basal water floating on salt water (UH Department of Geography 1983). However, due to the presence of a discontinuous, unmapped confining layer, the nature and extent of the basal ground water lens is not well understood (Wilson Okamoto 2008). Further mauka beneath the Nāpali mountains, the water is confined by dikes and not floating on salt water (UH Department of Geography 1983). According to the State Commission on Water Resource Management (CWRM)'s Water Resource Protection Plan, Hā'ena State Park is located within the Wainiha System (Hanalei Sector), which has an estimated sustainable yield of 24 million gallons per day (Wilson Okamoto 2008). See Figure 16.

### 2.2.2.9.2 *Surface Water*

Surface water resources in Hā'ena State Park include Limahuli Stream, water in the two wet caves, and a growing marsh (Loko Kē'ē) located makai of Kūhiō Highway.

The Hawai'i Stream Assessment (1990) lists Limahuli Stream as a perennial stream that flows to the sea year-round and identifies it as an "outstanding aquatic resource" due to the presence of native 'o'opu. It is the source of freshwater within Hā'ena State Park, begins at the top of the valley at 3,300 feet above sea level and reaches the valley floor after plummeting down an 800-foot waterfall. Only the lower 1,000 feet of the stream courses through Hā'ena State Park.

The United States Geological Survey (USGS) maintains one crest-stage gage in the stream. One diversion for taro lo'i is recorded by the State Commission on Water Resource Management (CWRM), although up to seven diversions are known to exist within the Limahuli Surface Water Hydrologic Unit (Wilson Okamoto 2008). See Figure 17.

In October 2001, Mike Kido with the University of Hawai'i's Hawai'i Stream Research Center produced an overview of the existing conditions, flora, and fauna in Limahuli Stream. Kido reported that between 1994 and 1999, average stream flow was approximately 6.3 million gallons per day (gpd). In drought periods, average surface flow is approximately 2.6 gpd.

---

---

According to USGS Annual Statistics for Hawai'i, for the period of 1999-2005 the average surface flow was 7.72 gpd.

Limahuli Stream water is diverted for irrigation and residential purposes by multiple landowners. There are a total of five separate pipes that divert water from Limahuli Stream between the 40 and 320 ft level of elevation. A total of 257 gallons per minute (gpm) is diverted from the stream. Surface water from Limahuli Stream is diverted upstream of Hā'ena State Park for taro lo'i at Limahuli Garden and Preserve. A portion of these diverted waters flow via PVC pipe to irrigate taro within the park (Fujita 2002).

Wilson Okamoto (2008) notes that there are seven stream diversions on Limahuli Stream; two more than in the Fujita report. However, the stream diversions are not described in detail except for one related to a stream channel alteration permit for 0.115 MGD for landscape irrigation dated 7/19/1995.

#### **2.2.2.10 NATURAL HAZARDS**

Natural hazards impacting the Hawaiian Islands include flooding, tsunami inundation, hurricanes, volcanic eruptions, and earthquakes.

##### ***2.2.2.10.1 Flood Hazard***

According to the Flood Insurance Rate Map (FIRM) Panel 1500020030E (9/16/05) prepared by the Federal Emergency Management Agency (FEMA), National Flood Insurance Program, there are several Special Flood Hazard Areas within Hā'ena State Park (see Figure 18). They are located along the coast and along Limahuli Stream and include Zones VE, AE and A. Zone VE is a coastal flood zone with velocity hazard for wave action within the Special Flood Hazard Area subject to the one percent chance annual flood (100-year flood). Within the park and nearshore waters, base flood elevations have been determined and range between ten and 21 feet with the lower base flood elevations at the furthest eastern and furthest western edges of the park and the highest located offshore of Ka'ilio Point.

Moving inland of the Zone VE areas are the Zone AE areas. These are the Special Flood Hazard Areas subject to the one percent chance annual flood and where base flood elevations have been determined. Base flood elevations start at ten to eleven feet near Limahuli Stream and fifteen feet near Kē'e and increase to eighteen feet again near Ka'ilio Point.



COMMISSION ON  
WATER RESOURCE MANAGEMENT

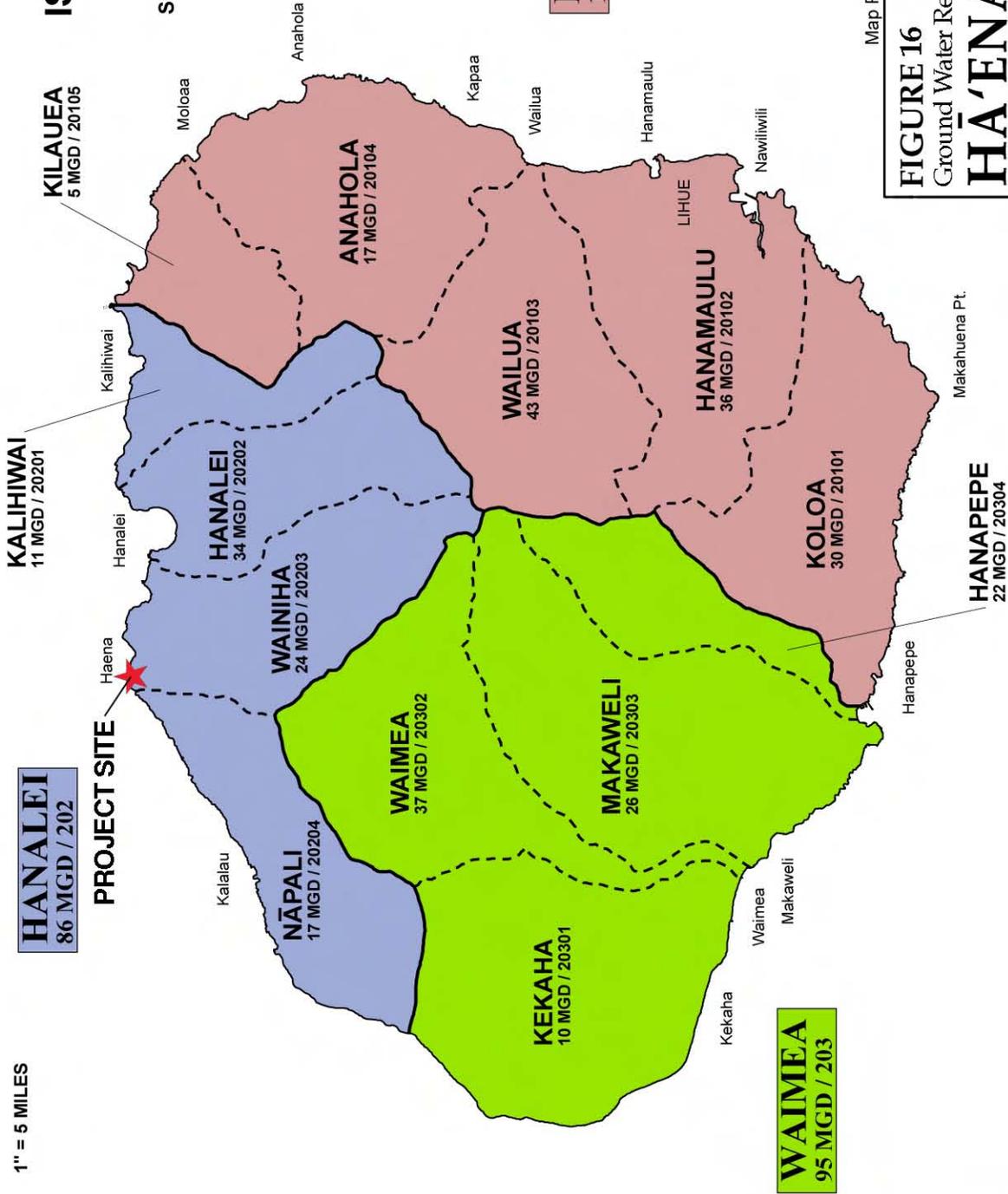
# ISLAND OF KAUAI

TOTAL = 312 MGD

HYDROLOGIC UNITS  
Sustainable Yield / Aquifer Code



1" = 5 MILES



Map Projection: Universal Transverse Mercator

**FIGURE 16**

Ground Water Resources - Aquifer Sustainable Yields

# HĀ'ENA STATE PARK

Department of Land and Natural Resources

Island of Kauai



LINEAR SCALE (Miles)



**Commission on Water Resource Management  
Surface-Water Hydrologic Units**

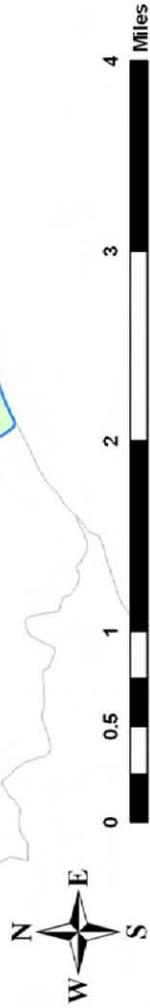


**Project Site**

- 2001: Awaawapuhi
- 2002: Honopu
- 2003: Nakeikōnaitiwi
- 2004: Kalalau
- 2005: Pohakuao
- 2006: Waiolaa
- 2007: Hanakoa
- 2008: Waiahuakua
- 2009: Hoolulu
- 2010: Hanakāpā'ai
- 2011: Maunapuluo
- 2012: Limahuli
- 2013: Mānoa

Watershed Boundaries

**ISLAND OF KAUAI**  
**Hydrologic Unit Codes**  
**2001 to 2013**  
**Figure 3-22A**



**FIGURE 17**  
**Surface Water Hydrologic Units**

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources  
Island of Kauai

NORTH

LINEAR SCALE (Miles)  
0 1 2

PBR HAWAII & ASSOCIATES, INC.

Source: Wilson Okamoto (2008), Figure 3-22A  
Disclaimer: This graphic has been prepared for general planning purposes only.  
Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

---

---

The base flood elevations have not yet been determined along the mauka portions of Limahuli Stream and are therefore located in Zone A. However, it is still within the Special Flood Hazard Areas subject to the 100-year flood. Also according to Engineering Solutions, Inc. (ESI), there are mapping discrepancies between the location of Limahuli Stream on the FEMA maps, the Kaua'i Online Hazard Assessment (KOHA) database, and the Hawai'i National Flood Insurance Program (NFIP) database. As a result, the exact location of the Zone A area is not clear and ESI has contacted DLNR who is currently working to resolve this issue with EPA Region 9. ESI recommends maintaining a buffer along the stream until this can be resolved.

#### ***2.2.2.10.2 Wind and Storm Hazard***

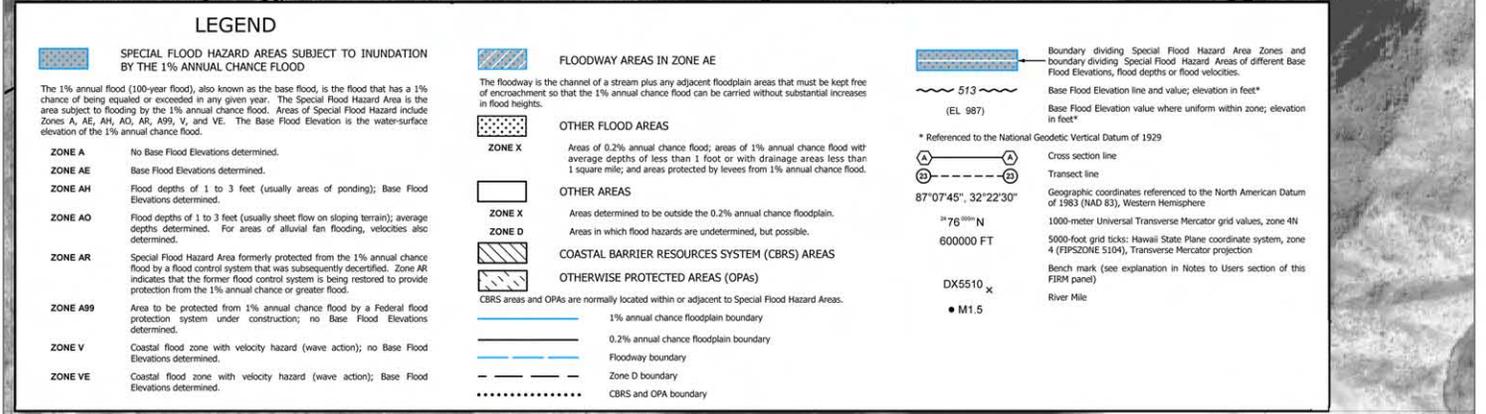
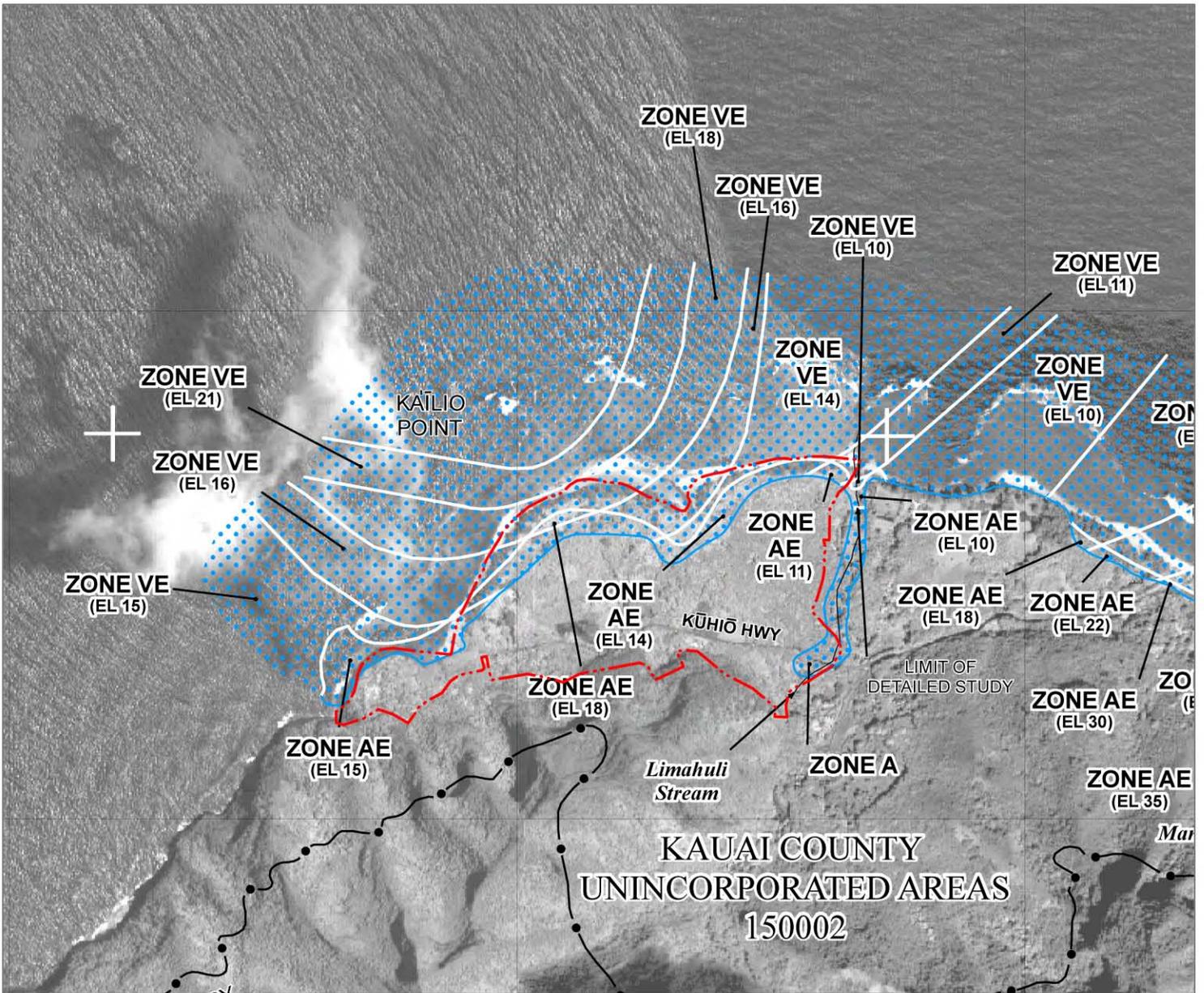
Since 1980, two hurricanes have had a devastating effect on Kaua'i—Hurricane 'Iwa in 1982 and Hurricane 'Iniki in 1992. There are no recorded data on hurricane overwash in the area after Hurricane 'Iniki. While it is difficult to predict such natural occurrences, it is reasonable to assume that future incidents are likely, given historical events and the FEMA special flood hazard areas along the coastline.

#### ***2.2.2.10.3 Tsunami Hazard***

Hā'ena is exposed to northwest swells and has been struck by tsunami waves multiple times in recorded history. The tsunami of 1946 is remembered as particularly devastating, destroying homes, a church, a school and taking lives. Another destructive tsunami struck in 1957, leaving only four of the 29 homes in Hā'ena standing, although it did not result in loss of life. Hā'ena State Park is located within the tsunami evacuation zone (see Figure 19). The nearest State Civil Defense siren is located at Hā'ena County Park.

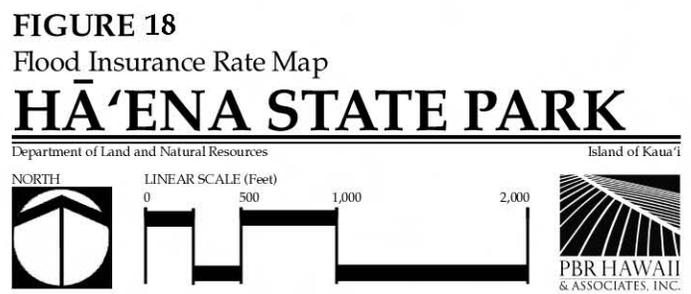
#### ***2.2.2.10.4 Shoreline Erosion***

The coastal geology group at the University of Hawai'i School of Ocean and Earth Science and Technology (SOEST), has documented shoreline rates of change since 1927. As shown in Figure 11, shoreline erosion takes place along the entire park site at rates between six inches and nearly one foot per year.

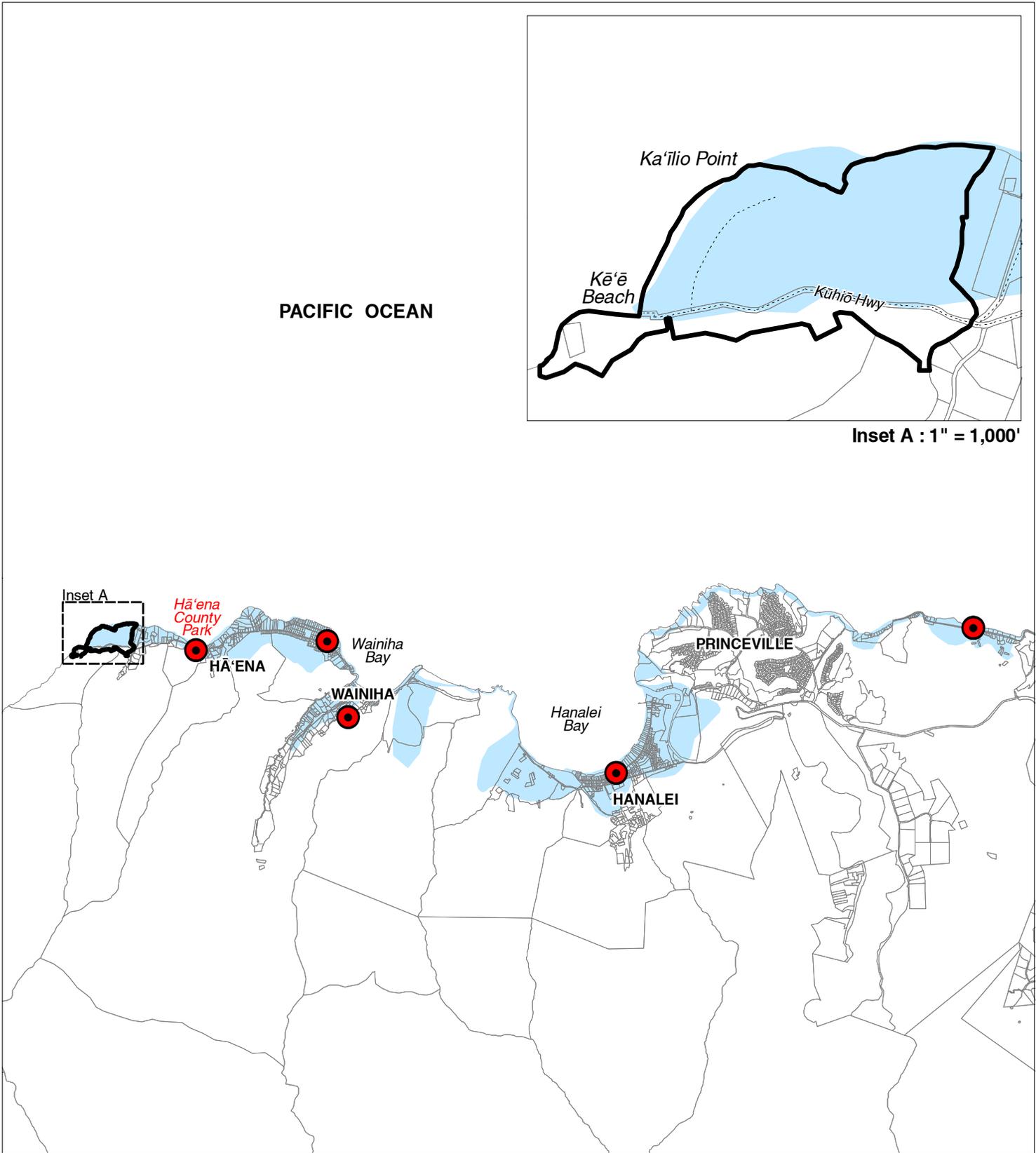


**LEGEND**

Hā'ena State Park Project Boundary



Source: Federal Emergency Management Agency (Map No. 1500020030E) (9/16/2005)  
 Disclaimer: This graphic has been prepared for general planning purposes only.  
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.



**LEGEND**

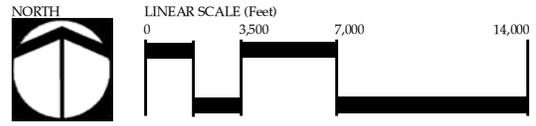
-  Hā'ena State Park Project Boundary
-  Road
-  Tsunami Evacuation Zone
-  Existing Civil Defense Siren

**FIGURE 19**

Tsunami Evacuation Zone

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources Island of Kaua'i



Source: Pacific Disaster Center (PDC), 1998; PBR Hawaii  
 Disclaimer: This graphic has been prepared for general planning purposes only.

---

---

#### **2.2.2.10.5 Rockfall Hazard**

A Rockfall Hazard Assessment was performed during the months of August and September, 2008 by Earth Tech, AECOM Technical Services (Earth Tech). The draft assessment, attached in its entirety as Appendix C, included a geological survey of the site and rockfall hazard identification which included a visual assessment and preparation of a geological report, locating rock outcroppings with GPS readings, and color photography. The Assessment also included an engineering planning study of the rockfall condition, development of preliminary rockfall protection design options and cost estimates.

As described previously in this report and in Earth Tech's report (2008), the rock formation exposed at Hā'ena State Park belongs to the Nāpali Formation, the oldest shield volcano formation above ocean water. Fallen rocks piled against the high cliffs called talus is another major rock formation exposed at Hā'ena. The Nāpali Formation consists of basaltic lava flows with two morphology types, 'a'a and pāhoehoe. 'A'a flows are more dense and viscous with clinkers compared to the smooth pāhoehoe flows, which are fluid, volatile and tend to form lava tubes. Both types of lava are prone to rockfall due to differential erosion of their flow components. However, 'a'a flows are prone to overhang and rockfall because the poorly cemented clinkers erode faster than the dense cores, whereas pāhoehoe flows are prone to collapse and rockfall because the thin, poorly cemented internal flow layers of the tubes erode faster than the thicker outer crust of the lava tube.

Also according to Earth Tech, both chemical and mechanical weathering processes are involved in erosion and contribute to rockfalls. Examples of mechanical weathering include stream and wave action, the wedging of growing plant roots, and the fragmentation of rock faces caused by gravity. Chemical weathering involves a change in the chemical composition of the soils and new materials such as clay minerals and hydrated iron oxides are typical products of chemical weathering. Due to the high temperature, rainfall and abundant vegetation, conditions for chemical weathering are nearly optimum at Hā'ena State Park. Breaking up of the rock by mechanical weathering greatly aids chemical weathering and chemical weathering in turn, hastens mechanical weathering. Stress between outer, more weathered and inner less weathered portions of rock can cause rock to break apart, the mutual reinforcement of chemical and physical weathering is an ongoing process, the degree and rate of which will largely determine the stability of rock in the area (Earth Tech 2008).

Water is the most important agent in the weathering process and the most important factor affecting the timing of rockfall events. Due to hydraulic pressure and erosion, rockfall events tend to occur more frequently during

---

---

or after heavy rains in Hawai'i. At Hā'ena, the generally wet climate and the average annual rainfall of 122 inches is considered high, contributing to higher rockfall risks (Earth Tech 2008).

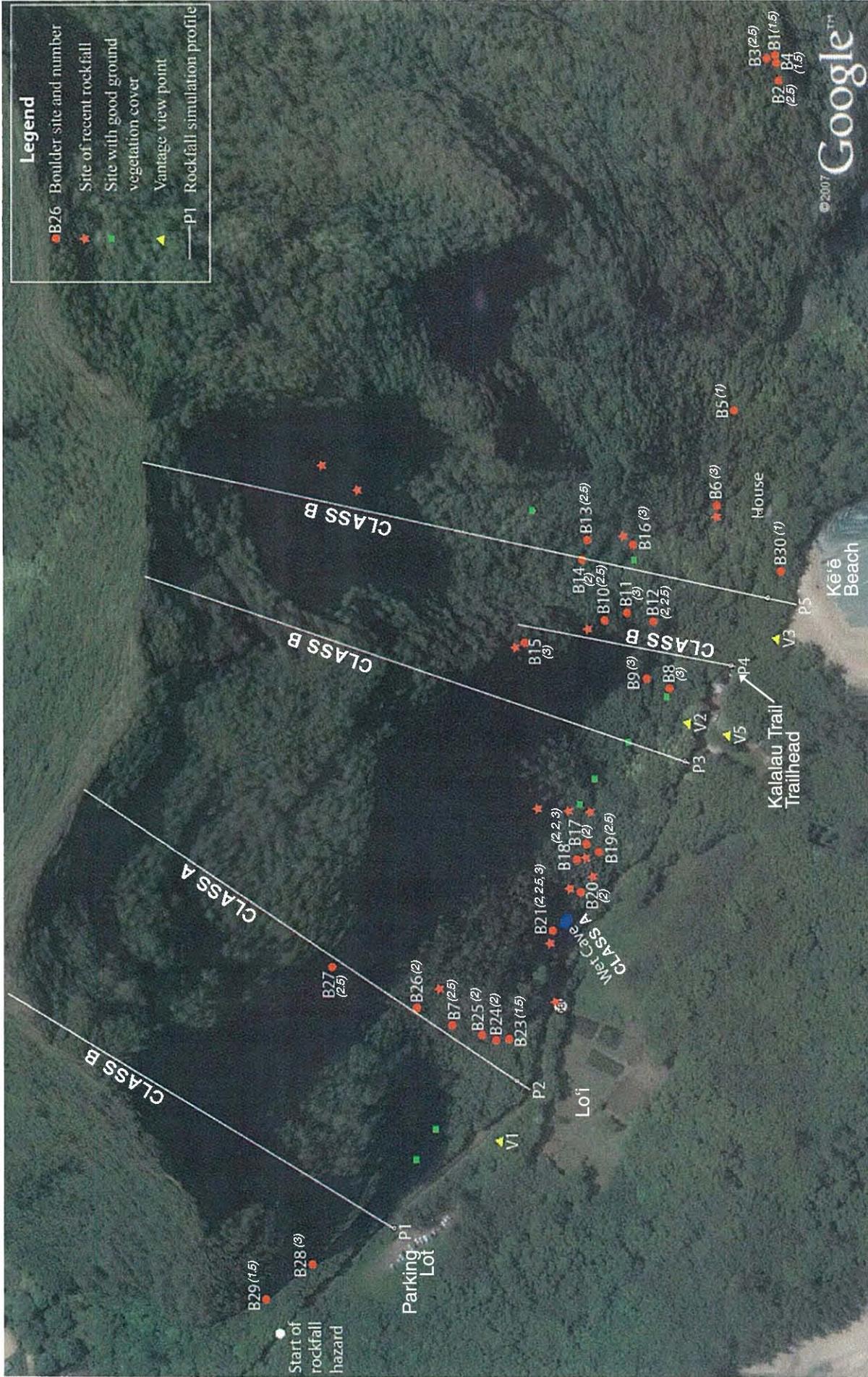
To evaluate rockfall risk, Earth Tech utilized the DOT/FHWA (Department of Transportation/Federal Highway Administration) Rockfall Hazard Rating System methods and guidelines. This rating system evaluates a number of criteria including: slope height, ditch effectiveness, structural conditions, rock friction, erosion rates, volume of rockfall events, climate and presence of water on slope, rockfall history and slope topography. It uses a three-class rating system for hazardous conditions based on its potential to impact adjacent properties.

- **Class A** – high estimated potential for rockfall on adjacent properties with high historical rockfall activity. Chances for rockfall is moderate to high and when rockfalls occur, they will more than likely reach adjacent properties.
- **Class B** – moderate estimated potential for a rock to fall on adjacent properties with moderate historical rockfall activity. Class B rating indicates that although a rockfall is probable, the chances of it reaching adjacent properties are low to moderate. This could involve scenarios where risk is mitigated by the presence of catchment ditches or large flat areas that can contain rockfalls.
- **Class C** – low to no estimated potential for rockfall on adjacent properties with low historical rockfall activity.

Earth Tech also analyzed the chance of rockfall. This is primarily based on the stability of the rock face and condition of the supporting materials. There are four categories:

- **Category 1** – imminent potential for rockfall (could happen anytime)
- **Category 2** – short term potential for rockfall (within several to a dozen years)
- **Category 3** – medium term potential for rockfall (within dozens of years)
- **Category 4** – long term potential for rockfall (up to or more than a hundred years)

Please note that the time scale references are used symbolically and are not meant to represent an actual timeframe within which the rockfall events may occur.



**LEGEND**

**Rockfall Hazard**

- Class A- High Estimated Potential
- Class B- Moderate Estimated Potential

**Chance of Rockfall**

- Category
- (1)- Imminent
- (2)- Short-term Potential
- (3)- Medium-term Potential
- (4)- Long-term Potential

**FIGURE 20**  
Rockfall Hazards

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources



NOT TO SCALE

Source: EarthTech (2008); Figure 1-1  
Disclaimer: This graphic has been prepared for general planning purposes only.

---

---

Earth Tech used computer simulation to model rockfall events along five transects within the park. They determined that the rockfall hazard conditions at Hā'ena State Park consists of both Class A and Class B rockfall ratings based on the potential for rockfalls to reach the highway at various positions as well as at Kē'ē Beach and the Kalalau Trailhead. See Figure 20. The area around Waiakanaloa is the most hazardous rockfall area (Class A) because: 1) many rockfall features exist here; 2) the very high probability for rockfalls to reach the highway and Waiakanaloa; and 3) the almost constant presence of visitors (EarthTech 2008). Rockfalls are less likely to reach the highway or beach at the other areas (Class B).

Earth Tech also analyzed the chance of rockfall at specific locations within the park which are also shown on Figure 20. They range from Category 1 through 3 and photos from these sites are provided in Earth Tech's report (see Appendix C).

Earth Tech also estimated the rockfall risk and potential annual loss of life at Hā'ena State Park. They determined that the probability of loss of life at this site is higher than the recommended tolerable level for the general public. Therefore, they recommend that mitigative measures be taken to reduce rockfall risk to park users which includes a combination of permanent and temporary mitigation measures. A detailed description of these measures is discussed later in this report under Section 5.2.2.4.

## **2.2.2.11 BIOLOGICAL RESOURCES**

### ***2.2.2.11.1 Flora***

In May 1988, Kenneth M. Nagata conducted a botanical study for Hā'ena State Park on behalf of DLNR (report published in 1991). In addition to identifying the various types of vegetation found within the confines of the park, Nagata also provides additional recommendations to preserve existing fauna. In January 2009, Drs. Terry and Hart (Geometrician Associates, LLC) conducted an updated biological survey of Hā'ena State Park. The survey included a physical survey of flora and fauna; a review of previous surveys of the area (including Nagata's work); report of the results describing plant communities, and habitats; and, discussion of potential effects from increased recreation on wildland resources. It is attached in its entirety as Appendix D. Figure 21: Vegetation Zones – 1991 and 2009 shows a side-by-side comparison of the vegetation zone maps from the 1991 Nagata and 2009 Geometrician surveys.

#### ***1991 Nagata Study***

Within Hā'ena State Park, Nagata identifies a total of six types of vegetated communities—Strand, Ironwood/False Kamani, Java Plum

---

---

Forest, Mixed Forest, Grassland, and Cultivated Area. Of the six, three are forest types which dominate the site. Nagata also describes vegetation within the cliff faces which were only observed from a distance with field glasses but notes that all of the observed species were represented in the other flora communities.

- **Strand Community** - Nagata described the area makai of the tree line as the strand area. Within this area facing the ocean, there was relatively little vegetation. Beyond the presence of native pōhuehue (*Ipomoea brasiliensis*) and kukaipua'a (*Digitaria setigera*), and alien fireweed (*Erechtites hieracifolia*), sow thistle (*Sonchus oleraceus*), narrow-leaved plantain (*Plantago lanceolata*) and seedlings of ironwood (*Casuarina equisetifolia*) and false kamani (*Terminalia catappa*) there was little vegetative growth.
- **Ironwood-False Kamani Forest** – According to Nagata, the ironwood and false kamani trees were probably planted to protect the shoreline from erosion. The Ironwood (*Olneya tesota*) and False Kamani (*Terminalia catappa*) forest dominates the area and is approximately 30 to 40 feet tall. Canopy cover is typically 100 percent and beneath ironwood forests are thick carpets of needles. Both situations preclude significant understory growth.
- **Java Plum Forest** - The Java Plum Forest was one of the two largest plant communities on site. It was mainly located along the banks of the Limahuli Stream on the eastern boundary of the park. The java plum trees (*Syzygium cuminii*) were at least 30 feet tall and provided 50-100 percent canopy cover. In some areas false kamani is co-dominant in the upper canopy forming a second canopy. The density and composition of the understory varied by location.
- **Mixed Forest** - The Mixed Forest occupied the central portion of the park makai of the highway, as well as the area around Lohi'au's house site and on the east side along Limahuli Stream mauka of the highway. Due to the highly varied mix of flora species, there is no single dominant species. Within this vegetation type, there are large introduced species such as African tulip (*Spathodea campanulata*), mango (*Mangifera indica*), and Java plum trees, in addition to native species such as hala (*Pandanus odoratissimus*) and kukui (*Aleurites molaccana*). Understory in the central portion is similar to that of the Java Plum Forest. Hilo grass is the dominant herb layer in areas makai of the Grassland. Interesting to note, Nagata found a "small plantation" of 210 marijuana plants (*Cannabis sativa*) up to seven feet tall stretched across three former lo'i terraces in the central part of the park makai of the highway.

- 
- 
- **Grassland** - To the east of the comfort station in an area that corresponds with Loko Kēʻē, Nagata found grasslands completely vacant of taller shrubs and trees. A total of only eight species comprised this plant community with two major dominants— Hilo grass and honohono. The Grassland occupied a series of low-lying loʻi that were fed by a single ʻauwai, but was dry at the time of Nagata’s survey in May. Nagata believed it became marshy during the wet season. In 2009, Terry and Hart found that much of this area is wetland.
  - **Cultivated Areas** - The Cultivated Areas within the park consist of three different areas—the Allerton Estate (including the area around Ka Ulu A Paoa Heiau), the area around the small cabin within the Java Plum Forest near Limahuli Stream, and the large bulldozed area along Kūhiō Highway used for parking. The Cultivated Areas contain the widest variety of plant species as would be expected in most cultivated gardens. More than half the plant species found in the park are located within this plant community. Many are ornamental exotics as well as lawn and weed grasses, fruit trees, and other introduced species.

Nagata found that although nearly 10 percent of the flora species within the park were native, their relative abundance was negligible. Moreover, none of the species identified were listed as rare or endangered. However, two of the nine endemic species, koʻokoʻolau (*Bidens forbesii*) and ʻāhinahina (*Artemisia kauaiensis*) are restricted to Kauaʻi. Of the fifteen indigenous species and four possible indigenous species, three are important components of certain flora communities at the park. Pōhuehue was abundant within the Strand and lauaʻe (*Phymatosorus scolopendria*) and Boston fern (*Nephrolepis exaltata*) were common in the Java Plum Forest. Lauaʻe and koali-ʻawahia (*Ipomoea indica*) were the most widely distributed native species. However, besides lauaʻe and the Boston fern which were found in abundance in certain areas and the small groves of hau (*Hibiscus tiliaceus*), no area within the park could be considered a native plant community.

Of the eleven species of cultural significance (Polynesian introductions), all but two have become widespread and naturalized within Hawaiʻi. Only milo (*Thespesia populnea*) and breadfruit (*Artocarpus altilis*) are persistent with cultivation although milo is sparingly becoming naturalized. The distribution of the culturally significant plants within the park could not be traced to any traditional land use within the park except possibly around the heiau. At the same time, it was not clear whether the plants were remnants of ancient plantings or modern additions.

---

---

Nagata identified a total of 18 noxious species as defined by the State of Hawai'i in 1979. Most notably, Java plum was by far the most abundant noxious species within the park. Five others occurred within at least half of the vegetation communities. They were guava (*Psidium guajava*), purple strawberry guava (*Psidium cattleianum*), Jamaica vervain (*Stachytarpheta jamaicensis*), Christmas berry (*Schinus terebinthifolius*) and pluchea.

Because alteration to the ecosystem that originally existed in this area dates back at least to the construction of the lo'i, Nagata felt it was impossible to reconstruct the original vegetation with 100 percent accuracy. However, he noted that based on the remnant species in the site and the vegetation patterns on the cliffs and along the Nāpali coast, reasonable assumptions could be made. A strand ecosystem consisting of pōhuehue, beach naupaka, nanea, pōhinahina, nehe and pa'u o Hi'iaka probably existed on much of the sand dunes. On the mauka portions of the dunes and especially in whatever depression may have existed, various sedges such as marsh cypress and *Cyperus polystachyus* probably existed. Hala or hala with a mix of alahe'e (*Canthium odoratum*) papala-kepau (*Pisonia* spp.), 'ōhi'a-lehua and hau may have dominated the main lowland areas. Laua'e, Boston fern and pala'a (*Sphenomeris chusana*) probably existed in the original herb layer. Other species in the mauka areas probably included hapu'u (*Cibotium* spp.), *Peperomia leptostachya*, *Carex meyenii*, *Bidens forbesii* and 'emo-loa. 'Uki (*Cladium leptostachyum*) was also found along the Kalalau Trail and probably existed in these higher regions (Nagata 1991). Nagata concluded that no botanically significant areas or culturally significant vegetation communities remained at the site and so other significant resources such as archaeological sites should take precedence over the botanical resources in the future management of Hā'ena State Park. Additional and updated management recommendations are presented in Section 5.0.

### **2009 Geometrician Associates Report**

Drs. Terry and Hart (Geometrician Associates) reviewed Nagata's 1991 survey and concur that the vegetation is similar to what existed nearly twenty years ago with a few notable exceptions. They identified eleven vegetation zones compared with Nagata's six. A comparison of the two vegetation zones maps—Nagata's 1991 map and the 2009 map developed by Terry and Hart—is provided in Figure 21: Vegetation Zones – 1991 and 2009. Their report, including the full species list from their survey, is attached in its entirety as Appendix D.

Of significance is the replacement of much of the former Grassland vegetation zone for Marshland/Pond, Cultivated lo'i and a transitional vegetation type called Marshland/Cultivated. This represents a larger wetland area than that observed by Nagata. Terry and Hart dug several

---

---

soil pits during their winter survey (January 2009) and noted the presence of mucky, sulfidic soils indicating frequent saturation and reducing conditions, meaning that the inundated condition is not unusual and recommend further investigation to delineate the boundaries of the wetlands per the definitions of Section 404 of the Clean Water Act (U.S. Department of the Army 1987). The area also included approximately an acre of standing water and they noted native Koloa or Hawaiian Ducks (*Anas wyvilliana*) utilizing the ponds daily.

Another obvious change is the distinct decline in Ironwood Forest along the dunes, which has been replaced by false kamani and emergent java plum, and the mixing of the Java Plum and False Kamani Forests. Today, the Ironwood Forest is mostly contained near Kē'ē Beach and there is less distinction between the false kamani and java plum forests and Terry and Hart have combined much of them within the Mixed Forest. These areas are identified in their map Figure 21: Vegetation Zones – 1991 and 2009 and they have noted the areas where one or the other is either dominant or co-dominant. Within the Mixed Forest, Terry and Hart also noted that the well-developed herb layer of 'awapuhi and moon flower (*Ipomoea alba*) that Nagata recorded in 1991 were not observed in 2009.

A total of 117 flowering plants and nine ferns or fern allies were observed by Terry and Hart at the park in 2009. Most of the plant species found were alien. Fifteen were indigenous and six were Hawai'i endemics. Several alien species recorded are considered invasive. No listed or proposed threatened or endangered plant species (USFWS 2009) were found on site.

They also found that throughout the park, native species comprised only seventeen percent of the total number of species identified and were not abundant except in restricted areas near the pali, on the strand and in the hau (*Hibiscus tiliaceus*) forest and swamp. The same two endemics which are restricted to Kaua'i were noted in 2009 as in 1988— ko'oko'olau (*Bidens forbesii*), a common lowland species on the north shore, and 'āhinahina (*Artemisia kauaiensis*), which is found throughout the sea cliffs of Kaua'i.

Most of the native species were widely scattered in small numbers. Of the 15 native species, only Koali (morning glory) and the ni'ani'au fern are widely common, with hala and hau scattered but locally abundant. Pōhuehue is considered abundant in the Strand zone. Except in the pali area, all of the endemic species are uncommon in the park (Terry and Hart 2009).

Species of cultural importance, such as ti (*Cordyline fruticosa*), mountain apple (*Eugenia malaccensis*), sugar cane (*Saccharum officinarum*), banana

---

---

(*Musa acuminata*), noni (*Morinda citrifolia*), coconut (*Cocos Nucifera*), breadfruit, 'ape (*Alocasia macrorrhiza*), taro and kukui are found in small numbers throughout the park, with some larger specimen of kukui and breadfruit indicating old plantings.

Terry and Hart noted the presence of at least thirteen invasive species as defined by the Hawai'i-Pacific Weed Risk Assessment (HP-WRA) (University of Hawai'i and USDA Forest Service); seven of which are identified as likely to be invasive and six which are already established as invasive. The six invasives were strawberry guava (*Psidium cattleianum*), guava (*Psidium guajava*), octopus tree (*Schefflera actinophylla*), Christmas berry (*Schinus terebinthifolius*), Guinea grass (*Panicum maximum*), and Hilo grass (*Paspalum conjugatum*). Although not listed among the thirteen species, Java plum (*Syzygium cumini*) should probably be considered highly invasive, and based on its rapid initial inroads into the forest in no more than 17 years, the Madagascar olive (*Noronhia emarginata*), which is currently on the HP-WRA list as a species to evaluate, may soon merit classification as invasive in Hawai'i (Terry and Hart 2009).

#### **2.2.2.11.2 Fauna**

##### **2.2.2.11.2.1 Terrestrial Species**

Terry and Hart (2009) observed thirteen species of birds during their January 2009 survey including the endangered Hawaiian Duck (Koloa Maoli, *Anas wyvilliana*), two indigenous shorebirds (Kōlea, *Pluvialis fulva* and 'Ulili, *Heteroscelus incanus*) and an indigenous seabird (Koa'e Kea, *Phaethon lepturus dorotheae*). All other birds sighted were non-native introductions. Japanese White-eyes (*Zosterops japonicus*) were particularly abundant in the Mixed Forest, as were the White-rumped Shama thrush (*Copsychus malabaricus*) and Red Jungle Fowl (*Gallus gallus*) (Terry and Hart 2009).

Although not sighted during their survey, Terry and Hart believe additional species of seabirds, waterbirds, shorebirds and forest birds that are federally listed as endangered or threatened may use the park. The wetlands may also provide feeding and nesting areas to the indigenous Black-crowned Night-heron ('Auku'u; *Nycticorax nycticorax hoactli*). Other federally endangered waterbirds that would likely use the wetlands are the Black-necked Stilt (Āe'o; *Himantopus mexicanus knudseni*), Hawaiian Coot ('Alae ke'oke'o; *Fulica alae*), Hawaiian Moorhen ('Alae'ula; *Gallinulae chloropus sandvicensis*), and Nēnē (*Branta sandvicensis*).

It is expected that the federally endangered Hawaiian Petrel ('Ua'u; *Pterodroma phaeopygia sandwichensis*), federally threatened Newell's Shearwater ('A'o; *Puffinus auricularis newelli*) and the Band-rumped Storm-

---

---

Petrel (*Oceanodroma castro*), listed by the State of Hawai'i, as endangered would fly over Hā'ena State Park to their nests in the mountains. These birds, especially the young, can be affected by exterior lighting and become disoriented.

Terry and Hart detected feral cats (*Felis catus*) during their survey, and also recognized that mice (*Mus* spp.) and rats (*Rattus* spp.) are likely also present. They also acknowledged the presence of wild pigs (*Sus s. scrofa*) and goats (*Capra h. hircus*) that are known throughout this part of Kaua'i.

Although not sighted during the survey, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), probably utilizes Hā'ena State Park as it has been seen in the Hanalei and Princeville areas.

Terry and Hart's survey also identified various skinks, anole, gecko and bullfrog in the park, and acknowledge that there are likely more species of reptiles and amphibians throughout the park. All were alien species and common on Kaua'i.

#### **2.2.2.11.2.2 Freshwater Species**

Terry and Hart (2009) also surveyed the freshwater species inhabiting Limahuli Stream. However, much of their report summarizes several stream surveys that have been previously conducted for Limahuli Stream in its lower, middle and upper reaches. They note that Hā'ena State Park includes only the very lowest 1,000-foot stretch of Limahuli Stream, but emphasize that this portion is critical because it provides the connection between the stream and the ocean for a number of fish species that are diadromous. This means these species spend part of their life cycle in the sea and part in a stream. They note:

Five species of endemic and indigenous Hawaiian gobies (o'opu) may inhabit this stream, including the o'opu alamo (*Lentipes concolor*), o'opu nopili (*Sicyopterus stimpsoni*), o'opu naniha (*Stenogobius hawaiiensis*), o'opu akupa (*Eleotris sandwicensis*) and o'opu nakea (*Awaous guamensis*). These o'opu live their adult lives and lay their eggs in the streams, but upon hatching, the larvae drift out to sea where they develop as plankton for a number of months before returning to fresh water. The alamo'o, nopili, and nakea may be found furthest up Limahuli Stream because their sucker-like pectoral fins allow them to climb waterfalls, whereas naniha and akupa lack this ability and would only inhabit the sections of the stream nearest the ocean. (Terry and Hart 2009)

They quote an unpublished report from 2001 by Mike Kido for the Division of Aquatic Resources (DAR) which summarized findings from a Hawai'i Stream Research Center (HSRC) long-term ecological research program (LTER). The HSRC was established in 1996 as a partnership between NTBG Limahuli Gardens and DAR to set up a program that

---

---

monitored biological structure and function in Limahuli Stream. The unpublished report was supplied as part of background material for Terry and Hart's survey. The report stated that several years of population monitoring studies showed:

...a relatively fixed species distribution pattern over time along the "mauka to makai" stream continuum despite variation in species population densities and ranges of species overlap. This is the first documented evidence for a stable population distribution pattern for native fish and invertebrates along the continuum of a Hawaiian stream. Native 'o'opu populations in Limahuli Stream are relatively robust overall; however, densities of the herbivorous 'o'opu-nopili (*Sicyopterus stimpsoni*) are significantly lower than that in neighboring Hanakapiai Stream at similar elevations. A plausible cause is the light limitation induced by the aggressive alien riparian canopy which lowers primary production levels and regulates algal diversity. (Kido 2001 unpublished)

Riparian cover along the streams contours are predominantly alien species and provide shade for approximately 70.4 percent of the stream. Native tree species account for less than one percent of all riparian areas below Limahuli Falls. Approximately 328 metric tons of plant litter is deposited within riparian areas annually, which Kido estimates translates into 48,204 metric tons of plant litter being processed within the stream environment and exported as organic nutrients in times of flooding (Kido 2001).

Invasive species in Limahuli Stream include the Tahitian prawn (*Macrobrachium lar*) and poeciliids (*swordtails-Xiphophorous helleri* and *guppies-Poecilia reticulata*). According to Kido, in particular the presence of poeciliids poses a serious threat to the native 'o'opu. Poeciliids are known to carry water-borne pathogens which infect 'o'opu (Kido 2001 unpublished).

#### **2.2.2.11.2.3 Marine Species**

The nearshore waters of Hā'ena are known for their abundance of marine life. The plant and animal life of Hā'ena's waters provided sustenance for the ahupua'a and have become an attraction for sport fishers and snorkelers. Historically, Hā'ena is particularly known for abundant limu kohu (*aparagopsis taxiformis*) and a strong population of octopus (*octopus cyanea* and *octopus ornatus*).

In 1999, Save our Seas found that fish populations in Kē'ē were not as abundant as in other areas. During the survey, approximately 40 species of fish were identified by divers. However, in neighboring Hanalei Bay, approximately 160 species of fish were identified. The majority of fish observed in the study areas were in their juvenile stage which indicates Kē'ē as an important nursery area for native fish species.

---

---

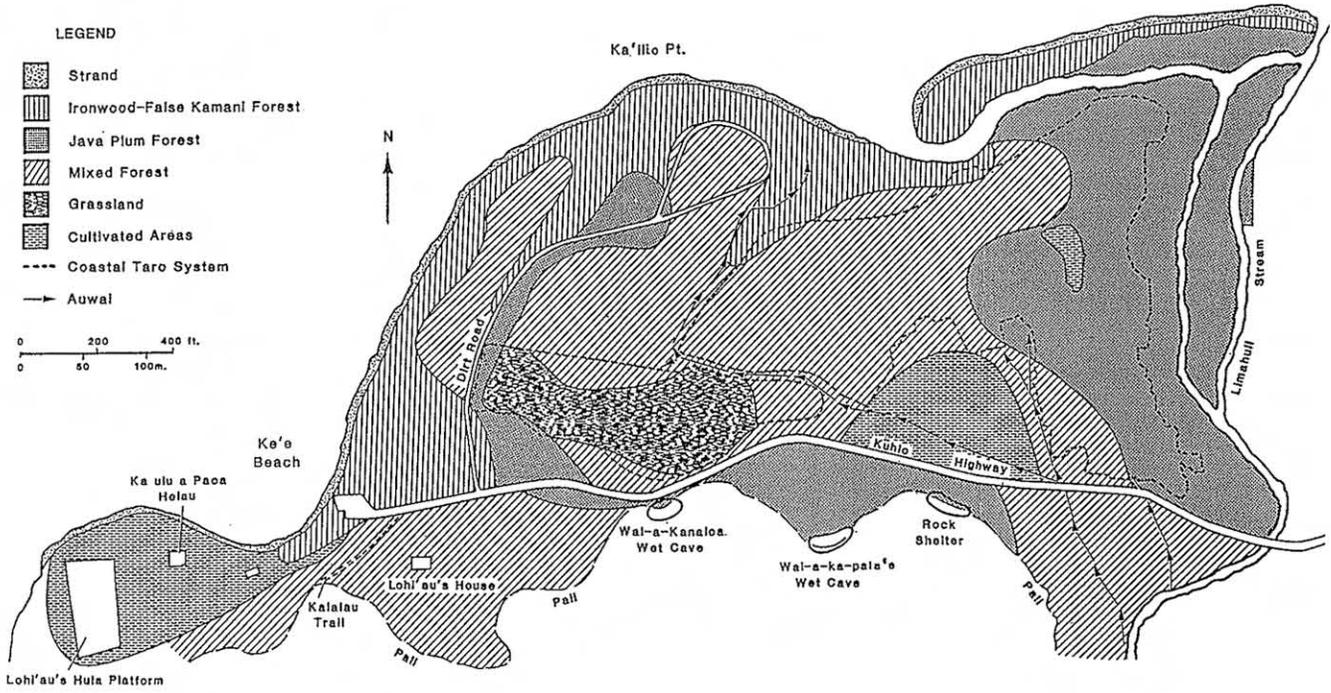
A general description of marine resources was also provided by Clark (1992), and five other studies were summarized in the Save Our Seas report. The results of these studies in concert with a brief snorkel survey conducted by SWCA biologists Dr. Robert Kinzie and John Ford in November 2008 found 80 species of fish along Kaua'i's North Shore, with only 46 of those species occurring in Kē'ē lagoon. The studies do note that fish species diversity is much greater on the seaward side of the reef and over 160 species were recorded off Limahuli Stream and in Hanalei Bay. The full list of observed marine shore fishes within and adjacent to Kē'ē Lagoon and Reef Flat can be found in Table 2 of Appendix B.

Seasonally, the endangered Humpback Whale (*Megaptera novaeangliae*) can be found in deeper waters outside Hā'ena's reefs. The marine waters of Hā'ena State Park are within the Hawaiian Humpback Whale Marine Sanctuary as designated by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Sanctuary Program.

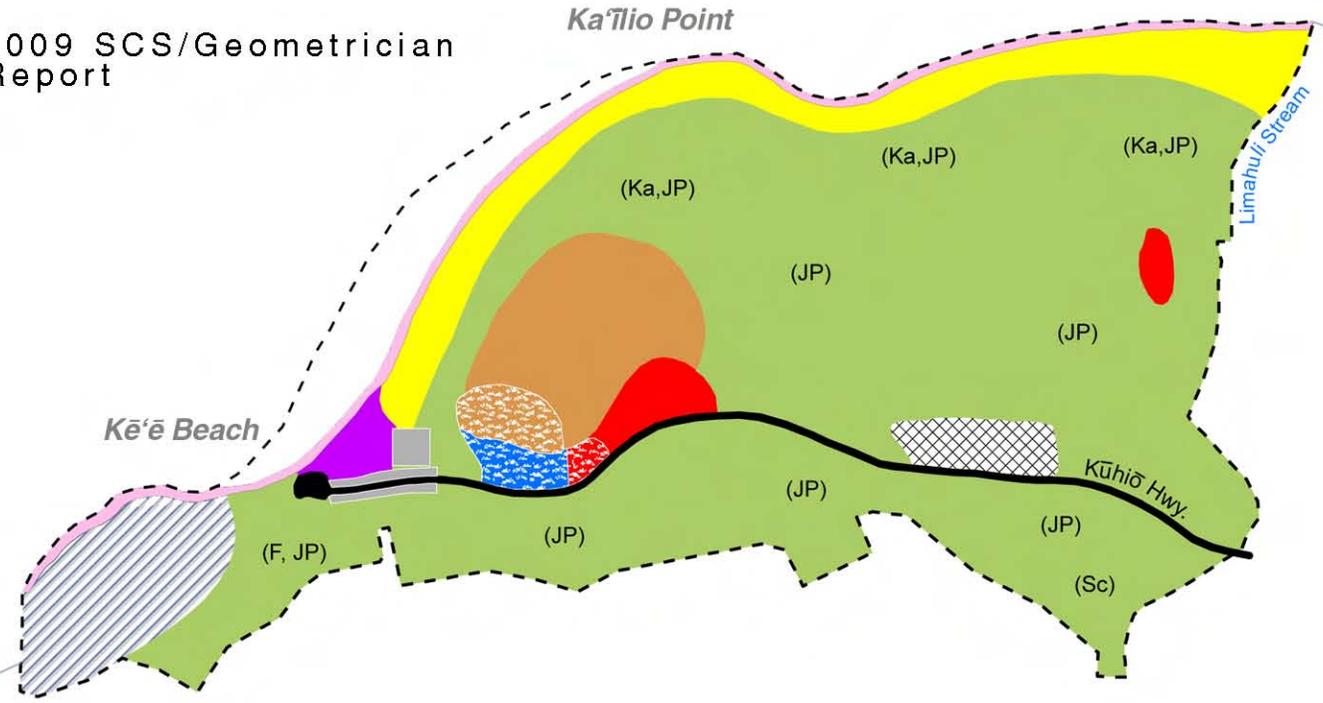
Endangered Hawaiian monk seals (*Monachus schauinslandi*) are frequently observed (and have been observed by Terry and Hart at different times) at Hā'ena State Park. They tend to spend most of their time in the ocean, but come ashore to rest on beaches and even utilize fringe vegetation as shelter from storms. At this time, the nearshore waters and beaches at Hā'ena are not designated as critical habitat but a petition was submitted in 2008 by conservation groups to the National Marine Fisheries Service to have Hā'ena designated as such.

The honu, or Green Sea Turtle (*Chelonia mydas*), is listed as threatened under the Endangered Species Act (ESA). Seventeen sea turtle nests have been reported on the island of Kaua'i in 2008. There have been no turtle nests reported at Hā'ena beaches in 2008 but they are known to graze upon algae in shallow nearshore reef waters around the north shore of Kaua'i, including the waters of Hā'ena State Park. The sandy beaches within Hā'ena State Park are suitable for sea turtle nesting, and the possibility of a future turtle nesting there cannot be dismissed (SWCA 2009).

# 1991 Nagata Report



# 2009 SCS/Geometrician Report



**FIGURE 21**  
Vegetation Zones - 1991 and 2009  
**HĀ'ENA STATE PARK**

Department of Land and Natural Resources  
Island of Kaua'i

NORTH

LINEAR SCALE (Feet)  
0 500 1,000

PBR HAWAII & ASSOCIATES, INC.

Source: Nagata (1991); Scientific Consultant Services, Inc./Geometrician Associates (2009)  
Disclaimer: This graphic has been prepared for general planning purposes only.  
Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

---

---

## 2.2.3 HUMAN ENVIRONMENT

### 2.2.3.1 REGIONAL CONTEXT

Present day cultural characteristics of Kaua'i and the ahupua'a of Hā'ena, reflect the history of independence from, as well as interconnectedness with, the rest of the Hawaiian Islands. This independence and connectedness is best understood by scholars of Kaua'i and Hā'ena's historians and 'ohana. An overview of traditional literature and genealogies related to Kaua'i and Hā'ena from mo'olelo, oli, and mele (histories and legends, chants, and songs), as well as the human impact, settlement and socio-economic development in the context of Greater Hawai'i is provided in detail in the attached Cultural Impact Assessment (CIA) (Appendix A). Some excerpts from the report highlight Kaua'i's unique history, even compared with the rest of Hawai'i:

According to Wichman (2003), Kaua'i was first settled by descendants of Kumu-honua and Lalo-honua -- thirty-six generations before Papa was born (Wichman 2003:2) -- during the time of Papa and Wakea (second son of Kahiko and Kū-pūlanakehau) (Wichman 2004:3) who came well before the descendants of Nana'ulu came to Kauai. Wichman's genealogies (2003:117-131) are used as approximate/guiding dates...

Ho'ohoku-i-kalani [daughter of Papa and Wākea (ca A.D. 530)] gave birth to another son [from Wākea] whom they named Hāloa after his dead brother. From Hāloa, it is said, descend all the Polynesians. Kaua'i historians claim that a younger brother of Hāloa discovered and settled this island. This was Chief Ka-māwae-lua-lani-moku [ca A.D. 555], who traveled to this island with his wife, Kahiki-lau-lani, and her two paddlers Kō-nihinihi and Kō-nahenahe. Because of his good deeds, the great number of his descendants, and the prosperity of his reign, people began to call this island Kau-a'i (*Place of Abundance*)....

Other uniquely Kaua'i elements are also described in the CIA:

Kaua'i developed several unique implement forms such as *pōhaku ku'i poi* (ring and stirrup pounders), double-grooved stone club heads, and a broad anvil *kapa* beater (Wichman 2003:6).

On Kauai there is evidence of ancient connections with the southern islands of Central Polynesia not found on the other islands of Hawaii.... Differences are seen in the stone implements that were once used on Kauai, in styles of heiau, in language, and in the stories of the Menehune. Long considered a mythical people of Kauai, in reality the Menehune were a distinct people of an ancient time. Among the stone implements common to Kauaians were two types of poi pounders restricted almost exclusively to that island.... The two Kauai types are the ring and stirrup pounders.... A discovery of significance was made in recent years on the

---

---

island of Uahuka in the northern Marquesas when an “ancestor” stirrup pounder was discovered there. It is estimated, through radiocarbon dating that it was in use at sometime between AD 600 and 1300. This type of pounder had been found only on Uahuka and Kauai (Joesting 1984:19).

Their ali’i were also recognized for their highly valued genealogy:

The genealogy of Kaua’i *ali’i* was considered the most ancient and impeccable in all the Hawaiian Islands. *Ali’i* from other islands were eager to introduce the Kaua’i bloodline into their own.... A chiefess would live with a Kaua’i chief for a time, bear one or more children, then send the chief on his way, leaving his bloodline and genealogy to mingle with those of her own family on Maui and Hawai’i. Marriage to the O’ahu families was commonplace for Kaua’i chiefesses. It was a peaceful kingdom that Mano-ka-lani-pō inherited and helped to create. He ruled over the Golden Age of Kaua’i history (Wichman 2003:55).

Kaua’i also enjoyed relative political stability having never been conquered by external armies, including Kamehameha’s:

**Kūkona and Peace in the islands.** Ka-lau-nui-o-Hua successfully defeated Maui’s Ka-malu-o-Hua, Molokai’s Ka-haku-o-Hua and O’ahu’s Hua-i-pou-leilei. He took the three chiefs with him on his invasion of Kaua’i where they landed at Māhāulepu, Pā’ā and Weliweli with no opposition. What he didn’t know was that Kūkona knew of the invasion as the guardian watchers of Hā’upu had seen the fleet as it left O’ahu. Kūkona ordered everyone to leave their homes, take all their food with them, and go to the center of the island. He had all of his warriors hide among the trees on all the ridges overlooking Māhāulepu to Lāwa’i. He also ordered every canoe on the island to gather at Hanapēpē Bay. Kūkona surrounded the invaders by land and by sea. By nightfall Kūkona had all the rulers of the major islands as his prisoners. He took his prisoners on a tour of the island and while taking a nap had a dream that three of the four rulers tried to plot his death, but Ka-malu-o-Hua of Maui rejected the plan saying that Kūkona had been good to them instead of killing them all and taking over all the islands. Kūkona woke up to discover that his dream was true, but instead of putting them to death he said he only wanted peace. He freed the rulers except for Ka-lau-nui-o-Hua whom he kept for ransom, and made them swear that they or their descendants would never invade Kauai again. Kūkona ordered the heiau Ka-unu-o-Hua built near Alaka’i swamp and it was here that the rulers all swore to uphold their promise not to invade Kaua’i. This peace was called Ka-lai-loa-ia-Kamaluohua (The Long Peace of Kamaluohua), which lasted over five hundred years. The royal court was kept at Wailua, but a permanent home was also

---

---

maintained at Waimea (Wichman 2003: 49-52). ...

Once Kaua'i was united as one kingdom and was free from any threat of invasion from its windward neighbors, attention was focused on the development of a solid political system based on land division. The paramount chief ruled the entire island, owned all the land, and had the power of life and death over the people, *ali'i* and *maka'āinana* alike. To help him govern, the *ali'i nui* chose a *kalāimoku* (prime minister, land manager) to advise him on all practical and civil matters. The royal establishment was kept at Wailua, although there was also a permanent home at Waimea.... Kaua'i was divided into six *moku* (districts), which were governed by an *ali'i'aimoku*, each carefully chosen for his loyalty and close relationship to the ruling chief. The largest district was Kona, the former kingdom centered at Waimea, followed by Puna (Wichman 2003:53-54).

Even during Kamehameha's time, according to Silva, "Kaua'i natives never felt the sting and humiliation of defeat by marauding armies; neither were they pillaged nor their lands re-apportioned and managed by enemy chiefs during Kaumuali'i's life." Kaumuali'i and Kamehameha made a peaceable agreement in 1810 that upon Kaumuali'i's death, Kaua'i would revert to Kamehameha, and in the meantime, Kaumuali'i was subject to commands from O'ahu and paid taxes to Kamehameha. However, in 1819 Kamehameha preceded Kaumuali'i in death and his son, Liholiho, ascended the throne. In 1821, Liholiho visited Kaua'i and after spending much time together convinced Kaumuali'i that his position as ruler of Kaua'i would not change. However, Liholiho had other plans and secretly ordered his ship to sail to Honolulu with Kaumuali'i aboard and kidnapped him. Kaumuali'i was then forced to marry Ka'ahumanu, Kamehameha's widow, and spent the rest of his life as a virtual prisoner on O'ahu. He died on O'ahu on May 26, 1824 (Carpenter 1996).

Despite these turn of events, at the time of his death, Kaumuali'i left clear instructions to honor the original agreement he held with Kamehameha. He ordered that rule over Kaua'i and Ni'ihau would be turned over to Liholiho and that chiefly control over the individual lands should remain the same as they were; no reappportionment was to take place. The Kaua'i chiefs, including Kaumuali'i's son, rebelled against this but were defeated by Hawai'i ali'i (Carpenter 1996) and Maui and O'ahu reinforcements (Silva 1995) during the uprising. As a result, most of the powerful Kaua'i chiefs were dispossessed of their lands and the lands were reappportioned among the Maui Hawai'i, and O'ahu chiefs and Kaikioewa, a native of O'ahu, was appointed as governor (Carpenter 1996 and Silva 1995).

Thus, the old order of political power on Kauai is dissolved and displaced by a new society of konohiki (land managers) who descend from Oahu and Maui lines. After 1824, there is also a disruption of the traditional land division as these Oahu and Maui chiefs staked their claims for choice lands – those having arable qualities, abundant water sources (translating into high-volume taro

---

---

production), a sufficient labor force and rich off-shore fishing grounds. (Silva 1995)

### 2.2.3.2 ARCHAEOLOGY AND HISTORIC RESOURCES

Although Hā'ena State Park is regarded as one of Kaua'i's most popular visitor and recreational parks, there are considerable historic and cultural resources, archaeological sites and burial remains within its boundaries. For many within the community and as voiced strongly by the MPAC, the entire site is culturally significant. It contains an extensive and mostly intact archaeological complex (see Figure 22 and Figure 23).

The Hā'ena Archaeological Complex corresponds to the park boundaries and is listed on both the Hawai'i and National Registers of Historic Places (Site Number: 50-30-20-1600). The complex extends from Kē'ē Beach to Limahuli Stream and according to the nomination form, "represents a large, complete, and intact archaeological complex." The complex contains a range of surface and subsurface archaeological features dating from early prehistoric (ca. AD 989), which is the earliest date for Kaua'i settlement known to-date, up to the recent historic period including the Taylor Camp settlement (ca. 1969-1977) (Carpenter 1996 quoting the National Register of Historic Places 1983). The complex includes a heiau, including Ka Ulu A Paoa Heiau and Ke Ahu A Laka hula platform, rock shelters, enclosures, subsurface cultural deposits, several burial sites including a cemetery, Waiakanaloa and Waiakapala'e wet caves, prehistoric and modern house sites including the legendary Lohi'au's house platform, and an extensive agricultural complex.

Carpenter adds that:

...the area is much more than an archaeological relic.... The *heiau* and *hula* platform continue to be a significant place for Hawaiians today, particularly those practicing the *hula*. The site is utilized by *hula halau* from all around the state. Adjacent areas, including Kē'ē beach, were also used in *hula* rituals. The association of this area with important Hawaiian legendary figures, the association with *hula*, and its enormous archaeological potential combine to make Hā'ena State Park a site of statewide historical significance on several criteria. (Carpenter 1996)

The following sections of this report include a mix of information summarized from previous reports and updates from State Park's survey. Figure 22 compiles the available maps from those studies. Feature numbers labeled on the map correspond to the 2001 draft park plan and originated in the National Register of Historic Places nomination (Yent, 1983) descriptions of the sites and are included in the text below. Figure 23: Archaeological Sensitivity Map extrapolates the specific archaeological site information into an archaeological sensitivity map. Prepared by State Parks archaeologists, Figure 23 highlights the most significant traditional

---

---

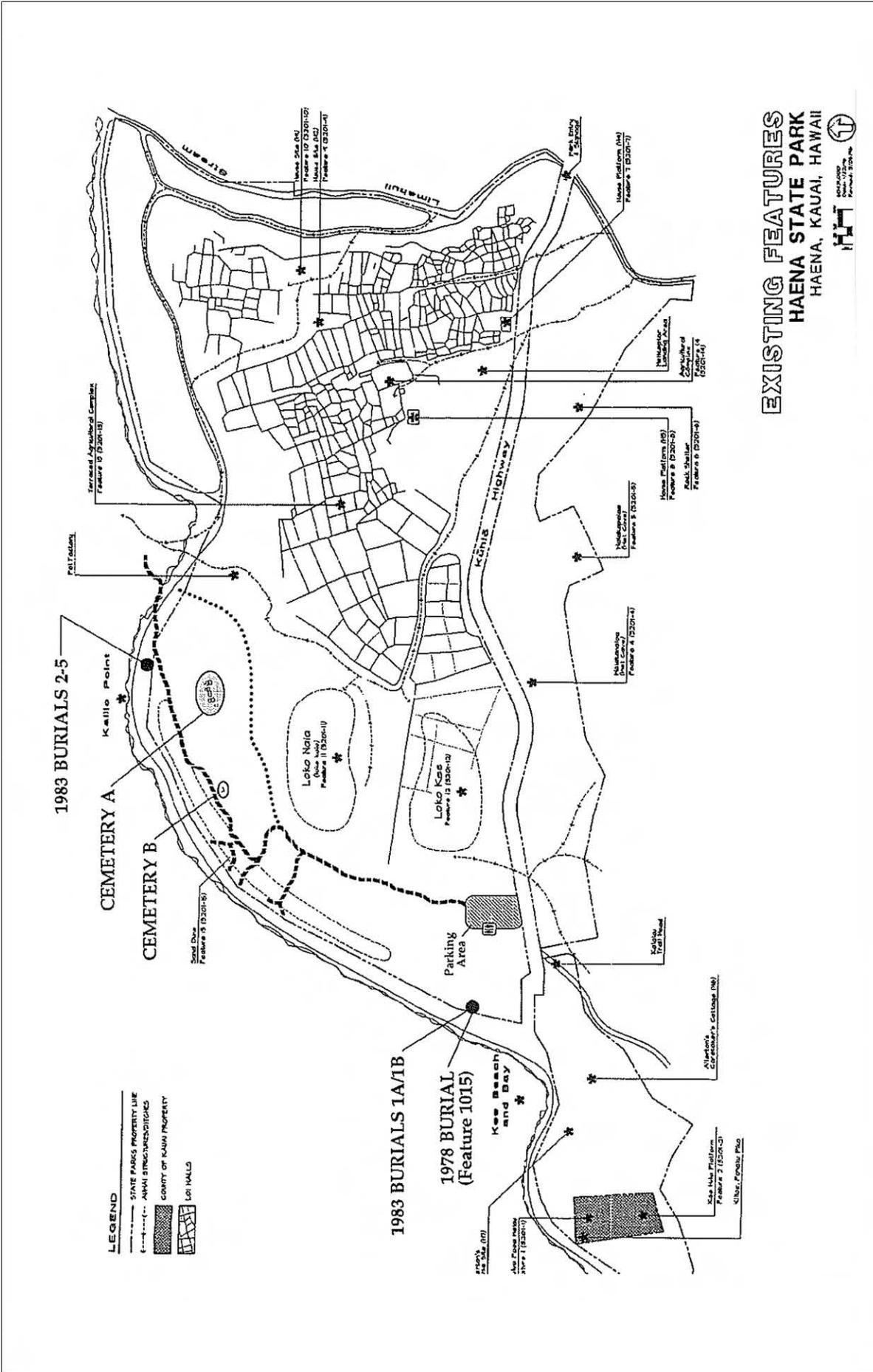
sites associated with religious beliefs, legends, known habitation sites and burials in yellow. From an archaeological perspective, these areas are deemed the most sensitive. Traditional agriculture and aquaculture sites are shaded green. These areas include the Loko and pre-historic lo'i complex. Areas shaded in blue relate to more historic (early 20<sup>th</sup> century) alterations and finally, areas shaded in red are those areas with the greatest amount of modern disturbance.

#### **2.2.3.2.1 Known Burials**

The extensive burials within the sand dunes (Feature 15) along the Hā'ena coastline have long been documented in historic reports and surveys dating back to at least 1865 with Brigham's accounts. Silva linked these burials to the settlements that established themselves in this rich environment. She reasoned that while the cliffs above Hā'ena would be the appropriate places for chiefly internment, the dunes were more likely where the commoners were buried if they did not have a family house lot (Silva 1995). Over time, many of the burials within the dunes have become exposed due to wind and wave action and continue to be impacted today by both natural and human means.

In his 1996 Burial Treatment Plan for Hā'ena State Park, Carpenter summarizes several archaeological surveys performed in the late 1970s through the 1990s that documented other known burials within the park. They include the two known family cemetery areas [(Cemetery A and Cemetery B (Feature 16)] and Feature 1015 (1978)/Burials 1A/1B (1983) and Burials 2-5 (1983). It also describes a re-internment of several remains exposed during Hurricane 'Iwa. Although the main purpose of the report is to provide a management plan for the two family cemetery areas for State Parks, Carpenter mapped all known burial areas and provides recommendations for the dune areas as well as any inadvertent finds within the park. These will be discussed in more detail in Section 5.0.

Installation of the individual wastewater system (septic tank and leach field) for the existing comfort station prompted additional archaeological data recovery. The work at that time indicated extensive disturbance of the uppermost 50 cm (20-inches) of the site. Cultural deposits and intact features were recorded below this depth, including postholes and pits. A single prehistoric human burial was disturbed by the septic tank installation, located approximately 40 feet northeast of the restroom. The iwi were reinterred within the park at that time (Major and Carpenter 2001).



**LEGEND**

-  Existing Dirt Road
-  Original Road Alignment (pre Hurricane Iwa)

**FIGURE 22**

Archaeological Features

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources  
 Island of Kauai  
 NORTH  
 LINEAR SCALE (Feet)  
 0 400 800  


Source: Carpenter (1996). Figure 4: Location of Burial Areas within Hā'ena State Park  
 Disclaimer: This graphic has been prepared for general planning purposes only.  
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.



---

---

#### 2.2.3.2.2 *Settlement Patterns*

Dr. Hallett Hammatt and his colleagues at the Archaeological Research Center Hawai'i, Inc. (ARCH) performed a series of five excavations along the Hā'ena State Park dunes in 1978 to characterize the historic use of the area. Based on their findings, they provide a preliminary sequence of human settlement and subsistence beginning with a marine oriented occupation at Kē'ē Beach sometime before 1000 AD. After 1000 AD, occupation expanded at Kē'ē as well as inland utilizing a broader resource base and further intensification occurred after 1400 AD with the construction of the agricultural fields and lo'i. By 1700 – 1800, occupation continued but with less emphasis on exploitation of marine resources and the density of cultural material in the deposits indicates a possible depopulation of the area or a shifting settlement pattern (Hammatt et al. 1978).

#### 2.2.3.2.3 *Agricultural Field Complex*

Feature 13 is the extensive terraced agricultural field complex consisting of rock-faced built terraces and 'auwai. The majority of this complex is located west of Limahuli Stream and north of Kūhiō Highway. However, there is evidence that the taro lo'i extended to the base of the pali but has been disrupted by the construction of Kūhiō Highway (Hammatt et al 1978).

In their 2000 draft archaeological restoration plan, Major and Carpenter focused mainly on the extensive agricultural complex that occupies much of the alluvial flat within the park. They summarized other previous archaeological studies prepared through 1980. Some of the primary findings from these reports concluded that:

- Nearly the entire alluvial flat covering the coast behind the dunes had been intensively developed for wetland taro cultivation.
- Inland clay sediments had been introduced to the alluvial fan due to human agricultural activity.
- The first lo'i had been built inland and expansion seaward took place gradually over time.
- Over time, larger fields became the trend over smaller fields. This signified that the irrigation system was relatively simple and need not have been associated with complex social or technological mechanisms (Major and Carpenter 2000 draft).

The 2001 Major and Carpenter's supplementary inventory survey focused mainly on the agricultural system with the intent to support State Parks efforts to restore the lo'i as a living cultural landscape. It described the ditches, banks, terraces and fields. It also identified the features used to

---

---

irrigate the system and described how the water was channelized through them. The report finds a relative lack of permanent habitation sites and notes that there was relatively little change to the agricultural complex since prehistoric times.

Major and Carpenter's analysis of the water management features refined the understanding of the agricultural system, showing that although any given ditch, bank, or spillway was a simple construction, the system as a whole offered a high degree of flexibility. Because there were multiple possibilities for channeling water through the system, complex configurations were possible including stoppages of water within certain areas (i.e. for dryland cultivation, fallow, or repair) without impacting the entire system (Major and Carpenter 2000 draft).

Feature 14 are two probable animal enclosures within the agricultural complex. They are defined by a high, core-filled stacked boulder wall, joined by a double-faced wall, with a stone capped culvert for an irrigation ditch. Historic artifacts are associated with these features (Earle 1978).

#### 2.2.3.2.4 *Hula & Related Sites*

- **Ka Ulu A Paoa Heiau and Ke Ahu A Laka** Ka Ulu A Paoa (Feature 1) translates to “the inspiration and growth of Paoa.” Paoa comes from the formal name, “Kauakahiapaoa,” who was an ali'i of Hā'ena. He was a very close friend of Lohi'au, as well as a master of hula himself (K. Kekua, personal communication, November-December 2010). According to Henry Kekahuna's 1959 drawing (Figure 24), the entire site measures roughly 270 feet by 100 feet and there are three divisions within the site. The First Division is labeled the “Heiau proper” and is located on the makai side of the site. It lies 25 feet lower than the Third Division, which is labeled as “encompassing the whole dancing institution.”

The Third Division includes the “site of the Halau Hula” and Ke Ahu A Laka (Feature 2). The Second Division spans over 100 feet between two and consists of soil-covered terraces sloping towards the sea. The text in quotations in this description of the site is taken directly from Kekahuna's drawing. The next paragraphs are from Kekahuna's written description of the activities that occurred at the site as reprinted in Bailey 2008.

“The ancient, most renowned hula seminary of the island of Kaua'i, Ka Ulu o Paoa, institution for the growth (ulu) of knowledge of the art of hula dancing, founded by Paoa, nestles at the base of the cliff on the west side of the famed fire-throwing cliff of Makana (Ka Pali O Ahi o Makana). It is adjoined by the



---

---

The First Division, or the Heiau proper, is an unenclosed stone terrace measuring 60 feet by 100 feet and built up twenty feet at the highest corner. It is built into the bluff slope with the retaining wall on the makai side being almost vertical and dropping 60 feet to the rocky shoreline below. The surface of the heiau is marked by different levels and pavements, and short walls along with several indications of pits. Kekahuna labeled certain features within the Heiau proper including the Lono-nu'u, several square idol sites, a 16-foot long compartment facing the only circular idol site which is located within a walled square enclosure, and a fourteen-foot diameter by five-foot deep refuse pit. A large boulder sits between the First and Second Division on the western side of the site, forming one side of an 11.5' by 11' paved enclosure housing four round idol sites.



The Second Division is a 100-foot long span of soil-covered terraces separated by boulders and sections of rock walls. Fronting the Third Division are three large round idol sites – one on the eastern corner and two on the western corner – along with a large boulder on the west with a “platter-like top” 8.5 feet in diameter “on which hula students place offerings.”

---

### ***Ke Ahu A Laka***

---

Between the Second and Third Divisions is the “stairway for students” entering from the eastern side to a five-foot wide paved walkway. Makai of this walkway is an 18-foot wide paved terrace and mauka of the walkway is a 17-foot wide soil-covered terrace. Above this is the pā hula, a 28' x 60' soil-covered terrace labeled by Kekahuna as the “Site of the Halau Hula.” A stairway reserved “for priests, and hula instructors and their associates” approaches this terrace from the east and runs along the cliff. These stairs lead directly to the “Sacred altar (kuahu) of goddess Laka” (Ke Ahu A Laka, see photo above) and a ~15' x 28' paved terrace, which is separated from the pā hula by a low rock wall. At the makai end of this wall is the “site of the main drum, which called hula students to assembly.” At the southwestern-most corner of the Third Division, up against the cliff and rising above the pā hula, is a walled enclosure measuring roughly 20' by 30' with two large round idol sites.

- 
- 
- There is a large boulder called **Kilioe** located near the edge of the ocean cliff. According to Wichman (1998), Kilioe was a chiefess of the hālau hula at Hā'ena whose body became this furrowed rock. This pōhaku piko is still used today to safeguard the umbilical cords of newborns and in doing so, place those children under the protection of Kilioe. According to mo'olelo, the boulder Kilioe, is the physical remains of one of two mo'o (lizard) women who challenged Pele when she arrived at Kē'ē and to later steal Lohi'au's spirit from his body (Andrade 2008).
  - Mauka of Kūhiō Highway and near Kē'ē Beach is **Lohi'au's House Platform** (Feature 3). It consists of a dry stack rock platform earth and stone-filled with an unpaved terrace. It is 80 feet long, 54 feet wide and 8.5 feet high at its highest part. It is located at the base of the bluff near the Kalalau trailhead. The feature has suffered in recent history. In 1959, Henry E. Kekahuna referred to it as, "the sad remnant of king Lohi'au's residence", observing that the County of Kaua'i's road work undermined the structure. Invasive exotic forest plants have overgrown portions of this site. Although easily accessible, no interpretive signage is present to educate visitors of the importance or significance of the site.

#### 2.2.3.2.5 *Habitation Sites*

- A **Rock Shelter** (Feature 6), is located in the pali face to the east of Waiakapala'e and south of Kūhiō Highway. It is a shallow rock shelter that may represent a habitation site. No archaeological work has been conducted at this site to date.
- A **House Platform** (Feature 7) situated within the agricultural field system along the north side of Kūhiō Highway includes midden and artifacts indicating a diversified economy with a utilization of both marine and agricultural resources.
- **House Platform** (Feature 8) is located to the northwest of Feature 7, about 100 meters apart. It is described as a paved house foundation with associated 19<sup>th</sup> and 20<sup>th</sup> century glass bottles and other historic artifacts.
- **House Site** (Feature 9) is situated on the west side of Limahuli Stream within the agricultural terrace complex. This feature is described as a square rock foundation built for a wood-frame house dating to the historic period with 19<sup>th</sup> and 20<sup>th</sup> century glass bottles.

- 
- 
- **House Site** (Feature 10) the Montgomery House is situated within the agricultural terrace complex to the west of Feature 9 and closer to Limahuli Stream. It is a wood frame house which is still standing, although it is very deteriorated after being vacated in the 1970's.).
  - **Historic Allerton House Site.** The former Allerton Estate is located at the far western side of the park site and is accessed by a narrow path off Kē'ē. The primary residence burned to the ground and what remains is the building's foundation and the remnants of a formal garden. Both the foundation and garden area are obscured by overgrown vegetation. Perched above Kē'ē, the Allerton caretaker cottage remains, although in a state of disrepair.
  - **Ali'i habitation site near comfort station.** Archaeological testing prior to construction of the original comfort station revealed a transitional zone from coastal habitation to an agricultural system. Numerous fire hearths and refuse pits, a large stone lined storage pit, an 'auwai, pavement, and at least two cultural strata were uncovered in the area where the comfort station site and adjacent parking area are now located. Installation of the individual wastewater system prompted additional archaeological data recovery. The work at that time indicated extensive disturbance of the uppermost 50 cm (20-inches) of the site. Cultural deposits and intact features were recorded below this depth, including postholes and pits. A single prehistoric human burial was disturbed by the septic tank installation, located approximately 40 feet northeast of the restroom. The iwi were reinterred within the park at that time. Archaeological testing for this project and for others related to the comfort station and existing leachfield provided information on the probable distribution and nature of intact subsurface archaeological deposits and burials in this project area (McEldowney and Yent 2007, Major and Carpenter 2001, Yent and Carpenter, field notes, 2009).

#### 2.2.3.2.6 *Loko*

- **Loko Naia** (Feature 11) is referred to as a loko kalo, or a low-lying area for the planting of taro. The depression measures roughly 100 by 200 meters and is located mauka of the sand dune. Testing in 1977 indicated an agricultural use of the feature, including evidence of 'auwai and agricultural soils.
- **Loko Kē'ē** (Feature 12) has been described as both a buried fishpond and a loko kalo (Griffin et al 1977). It is located to the south of Loko Naia and adjacent to the highway. Testing indicated

---

---

low walls and an 'auwai suggestive of a kalo lo'i. It measures approximately 150 by 50 meters.

#### 2.2.3.2.7 *Caves*

- **Waiakanalooa, “water made by Kanalooa”** (Feature 4) is a wet cave located in the pali face on the south side of Kūhiō Highway. The waters of the cave were called, “Halaaniani”, or “clear pandanus”. The waters were thought to have restorative properties and were reserved for the ali'i. The feature may have been an important water source, but no archaeological work has been conducted in the area.
- **Waiakapala'e, “water of the lace fern”** (Feature 5) is a wet cave to the east of Waiakanalooa, also in the pali face south of the highway but further up the slope. This feature is another probable water source with legendary associations. It is said that the water in the cave had a brown hue, and was the hair of a beautiful mo'o and as she grew older, the hue turned to grey (Orr, 2010).

#### 2.2.3.2.8 *Other Sites/Features*

- Feature 17 are **boulders** along the beach line which was a source area for basaltic glass. This feature is located on the west side of Kē'e Beach and downslope of Ka Ulu A Paoa Heiau.
- Subsurface Cultural Features including burials are found within sand dune and beach-derived deposits forming a band along the seaward edge of the coastal flat. Archaeological testing within the park for various developments such as the comfort station and individual wastewater treatment system suggest that the subsurface features tend to diminish toward the backslope of the dunes (McEldowney and Yent 2007, Major and Carpenter 2001, Yent and Carpenter, field notes, 2009)
- Remnant slabs of a poi mill remain, mauka of Ka'ilio Point.

#### 2.2.3.2.9 *Kūhiō Highway – North Shore Section*

The ten-mile stretch of Kūhiō Highway (State Highway 560) between Princeville and Kē'e Beach was listed on the National Register of Historic Places on February 11, 2004. The nomination was supported by the Hanalei Roads Committee, an ad hoc community group created in 1976 to preserve the rural nature of the narrow, scenic highway along the North Shore. The “Kaua'i Belt Road” stretches 10 miles from Princeville to Kē'e Beach and is considered the only remnant of the Belt Highway system on Kaua'i to retain a high degree of integrity (Duensing 2003). This section is

---

---

characterized by its narrow lanes, winding road alignments, historic bridges and culverts, road cuts, and scenic settings. The stretch from Hā'ena Beach County Park to Kē'ē was the last to be completed, probably in 1928. The concrete culvert crossing Limahuli Stream at the entrance to the Hā'ena State Park is one of 13 bridges and culverts designated as contributing to the significance of the Belt Road.

### 2.2.3.3 CULTURAL RESOURCES

Hā'ena is especially rich in tradition and mo'olelo, including significant stories and legends involving menehune, Pele, Hi'iaka and the legendary chief Lohi'au. Silva in her 1995 report summarized archival and literary references to Hā'ena. For this effort, Maria Ka'imipono Orr prepared a cultural impact assessment (CIA) including a detailed overview of the historical and cultural background of Hā'ena and Kaua'i, traditional literature from mo'olelo (stories and legends), oli (chants), and mele (songs), genealogies, as well as recent interviews and surveys of those most familiar with the area. The CIA is attached as Appendix A.

Orr's report calls to attention the importance of Hā'ena and particularly Ka Ulu A Paoa Heiau and Ke Ahu A Laka as a revered place for training, particularly those of chiefly blood in history and genealogy. Lohi'au and his sisters honored Laka by establishing a halau and perpetuating hula. Students of the hula halau committed themselves to learning and undertook rigorous training at the revered site.

Hā'ena remained a residence of chiefly lineage into historic times when during the Great Mahele (1848) the ahupua'a was awarded to Abner Kuho'oheipahu Pākī, father of Princess Bernice Pauahi Bishop. The ahupua'a's konohiki was Kekela (Kekelaakalaniwahikapa'a). Her konohiki responsibilities included management of 12 kō'ele (farms) including one named as Pākī. She is said to have made three loko in Hā'ena, although testimony does not disclose the names of the ponds (Orr, 2010). Konohiki Kekela selected the he'e (octopus) as her kapu (restricted) fish.

Despite westernization of the land tenure system after the Great Mahele, traditional ahupua'a systems persisted at Hā'ena due to the fact that the people of Hā'ena formed Hui Ku'ai'aina o Hā'ena and purchased the ahupua'a. This unique arrangement, coupled with the remoteness of the location allowed the perpetuation of traditional practices and lifestyles. In the years between 1955-67, Hā'ena was formally partitioned and change came more rapidly to the place and its 'ohana (Orr, 2010). Subsequent to the partition, lands owned by Allerton were exchanged to the State and holdings owned by Richard Taylor were eventually condemned and absorbed by the State after the Taylor Camp years.

---

---

The CIA underscores the importance of Hā'ena to Hawaiian culture, describes the ahupua'a life-system that existed into the 20<sup>th</sup> century and highlights individuals' personal relationships with Hā'ena's resources through their stories and recollections. The CIA carries forward a number of specific recommendations from those interviewed. It also includes a single over-arching recommendation to establish a Cultural Advisory Committee or Group to provide cultural expertise during the Master Plan/EIS process and through any later park developments.

#### *2.2.3.3.1 Traditional Uses of the Environment*

In her report, Orr (2010) identifies the traditional uses of various ecosystems within Hā'ena and their cultural significance. She also identifies threats to these areas. They are:

- **Native Wet Forest and Woodland** - traditional realm of Hawaiian gods (wao akua); not for casual human visitation. Source of plants for fiber ('olonā); weaving ('ie'ie), clothing (kapa from wauke), medicines and construction woods. Also primary zone for bird collection for featherwork. Threats include feral pigs, feral cats, black and Polynesian rats; alien slugs; introduced plants.
- **Lowland Dry and Mesic Forest, Woodland and Scrubland** - Forested zone was the realm of Hawaiian gods, especially Kū. Sandalwood exploitation of the early 1880s occurred in lowland mesic forests. Pili grasslands, a source of thatch material was maintained by fire; medicinal plants and hardwoods were gathered. Some mesic areas were converted from forest to dryland kalo and 'uala agriculture. Threats include feral goats, feral cats, rats, alien invertebrates, especially ants; invasive alien plants. Many lowland areas were burned and cleared in ancient Hawaiian times.
- **Coastal Communities** - Coastal areas, the most densely populated lands in ancient times, continue to be important in traditional Hawaiian culture, providing medicines, lei materials and other resources.
- **Sandy Beaches** - Hawaiian used beaches for burials (cemeteries), canoe launch sites and recreational, subsistence and ceremonial purposes. Beach sand and waterworn pebbles were used in the floors of Hawaiian houses. Threats include degradation by trash, beach erosion caused by recreational use, vehicles, floods, and storms.

- 
- 
- **Rocky Beaches** - Rocky beaches often were important fishing grounds and canoe launching sites for Hawaiians.
  - **Estuaries** - Sources of fresh water and fish for Hawaiian communities in the past. Threats include: Modification for development, hardening for drainage control; pollution by sewage and other discharges.
  - **Fringing Reefs** - Fishpond development and intensive fishing occurred on reef flats. Threats include coastal construction, erosion, sewage discharges, overharvesting of fish, freshwater flooding.

#### 2.2.3.3.2 Place Names of Hā'ena

The following are a list of place names significant to Hā'ena:

Kaua'i's only lagoon, **Kai-kua'au-o-Hā'ena**, "lagoon sea of Hā'ena," protects Makua bay. **Papa-loa**, "long reef," encloses the lagoon. A fishing hole near shore is named **Ka'aulama-poko**, "light from a short-burning torch," because it can be fished at night using a kukui nut torch, which never burned for very long. **Ka-lua-āweoweo** is the fishing hole at the farthest point from the land. The āweoweo, a 20-inch long (bigeye) fish, gather in this grotto. It is usually eaten raw, cooked or dried. A large school of young āweoweo called *'alalauā*, swimming into the bay was an omen of the death of a high chief. (Wichman, 1998)

**Ke-a'a-lewalewa**, "dangling root," is a peak on the east side of Mānoa Valley. *'A'a lewalewa* are the aerial roots of the *'ōhi'a lehua* tree of the forests or the pandanus tree of the lowlands. Kea'alewalewa was a Wainiha man who constantly stole food from the *menehune* farmers in Mānoa Valley. They got so angry after a time that they chased after him and turned him into stone. The name conveys the connotation of "dangling," and thus indicates that he was doing more than stealing food. (Wichman, 1998)

Another Hawaiian man and his wife used to steal food from the *menehune* farmers in Mānoa Valley. The *menehune* decided to chase them down and get rid of them forever. The wife was chased into **Limahuli** Valley. Near the waterfall, she grew tired and the *menehune* killed her and turned her to stone, which is now known as **Naenaē**. The man was chased up the ridge toward Pōhaku-a-Kāne. He was frightened, but put up a strong fight with the *menehune*. Eventually, with the help of their slingshots, the man was pelted to death. His skull was crushed to pieces, and the stones

---

---

stuck up through his scalp. The ridge where he lies, was named **Ka-iwi-ku'i**, "hammered bone" (Wichman, 1998)

**Nā-piliwale**, "clinging ones," is stone formation on the Mānoa ridge that looks like two running figures with their skirts flying up behind them. It was custom for the four Piliwale sisters to visit a chief's court and remain there until all the food in the area was consumed. Their appearance would always signify a forthcoming famine. Their favorite foods were freshwater shrimp, the wī, freshwater snails, and the fiddlehead of the hō'i'o fern. Two sisters went to visit Hā'ena. Because they were kupua, they could not tolerate the sun. Lohi'au and his sister Kahua built them a shelter in Maniniholo cave and another ridge where they could enjoy the view. They were fed and entertained by hula dancers of Kē'ē. One evening it grew chilly, Kahua ordered that mats be placed on the sides of their shed. The sisters so enjoyed themselves that they forgot the time. At the crack of dawn, cries of dismay were heard as they tried to race back to their cave. The sun's rays caught up to them and they turned to stone. They remain there as a warning to the other two sisters to never visit Kaua'i. (Wichman, 1998)

**Maniniholo** is a large cave on Kaiwiku'i Ridge. Maniniholo was the head fisherman at the time the Menehune were leaving the island and returning home. He brought his workers to gather food from the reefs and bay of Hā'ena, but there was so much that they left some behind. During the night, all of this food had disappeared. Maniniholo noticed 'e'epa (imps) in the fissures of the cliffs and realized that they were thieves. Maniniholo and his workers dug into the stone and killed all the 'e'epa. The cave that was formed was named after the head fisherman. (Wichman, 1998)

**'Ō'ō'ā'ā**, "fast-rooted one," is a boulder formerly on Hauwā reef, now sits on the depths. **'Ō'ō'ā'ā** came to Kaua'i with her two brothers in the form of rocks. Upon her arrival she rested where she became the guardian of the reef. She was moved from the reef by the 1946 tsunami. She is still waiting for her brothers offshore and can be still seen today. **Pōhaku-loa**, or "long rock," **'Ō'ō'ā'ā's** brother, rested on top of the sand dunes, leaving his brother **Pōhaku-o-Kāne**, "stone of Kāne," all alone. Pōhaku-o-Kāne tried to climb the peak but failed after many attempts, the god, Kāne took pity and placed him on the peak. It is said that when Pōhakuokāne decides to leave his perch, Kāne will raise the ocean waters to his level. (Wichman, 1998)

---

**Makana**, “gift,” is a triangular peak, prominent and unmistakable. Firebrands made up of hau or pāpala wood whose soft core burned before the outer layers, were thrown from the top of this peak. With the right conditions, the brands would fall and rise, moving slowly a mile or more over the ocean, leaving a trail of glowing embers. On the side of the Makana is a storied stone, a reminder of a tale of friendship. (Wichman, 1998)

**Waiakanaloa**, “water made by Kanaloa,” is a wet cave dug by Kanaloa. Kanaloa and his brother Kāne are known for their digging for sources of drinking water. Another legend says that Pele struck the cliff here with her staff Pā’oa when she was searching for a home. Instead she had struck water. (Wichman, 1998)

**Halaaniani**, “clear pandanus” is a fresh water lake located within the cave. This lake was set aside for the chiefs, and commoners were not allowed to bathe in it. It is said that the waters were able to restore an ailing person’s health. The chiefs either drank this with a calabash or swam in it. (Wichman, 1998)

**Pākamoi**, “enclosure of the threadfish,” is a boulder located near the base of the upper wet cave. This boulder is also associated with Pele. Upon the arrival of Hi’iaka and her companion Wahine’ōma’o, they asked a fisherman, Pākamoi to find them a place to sleep for the night. He misunderstood the request when he noticed them undressing as they prepared to sleep. Pākamoi attempted to fulfill his desires with Hi’iaka, who was saved by Pā’ū-o-Pala’e, a friend and servant, who changed places with her. Pākamoi was then turned to stone. (Wichman, 1998)

**Waiakapala’e**, “water of the lace fern,” is the lower wet cave. Traditionally, the water was brownish in appearance and was said to be the hair of a beautiful mo’o who would usually be sitting at the entrance of the cave combing her hair. A Wainiha chief fell in love with her and disappeared for months. The mo’o reappeared one day without the chief but with a baby. When she informed the chief’s friends that she had killed him, they tried to kill her as well but she escaped by diving in to the water. As she grew older the water turned from brown to grey. For this reason, the cave was known as either Waiakapala’e, “water of terror,” or as Waiakapala’e, “water of shiny tapa.” (Wichman, 1998)

**Nāhiki**, “many arrivals,” is the bay beside the two heiau KauluoPā’oa and KauluoLaka. At the end of their training, hula students had to swim to the lagoon, go out the channel into the

---

---

ocean, and come ashore at Nāhiki where the waves often surge in and out. During their swim they would pass the shark that was fed by the chiefess. In the event one of the students had broken any of the rules, they would be eaten by it. Those who were without fault would arrive safely to shore. (Wichman, 1998)

**Mānoa**, is the other main valley of Hā'ena. There is an extensive cluster of stone-faced terraces interwoven with an intricate network of 'auwai (waterways). In the past, Mānoa valley supported an abundance of taro providing the staple food complementing the abundance of fish from the sea. Today, the 'auwai no longer carry water to the lo'i, and the aquifer is tapped by the government, supplying water to the growing number of residential vacation rental homes. Trees and shrubs are overgrown and fill the valley with shadows. (Andrade, 2008)

**Lae O Ka 'Īlio** (Ka'īlio Point) refers to the endangered monk seals, which have been spotted even after they were federally protected by law. This area provides shelter from the wind at the canoe landing at Kē'ē. According to longtime resident, Kaipo Chandler, this area was used as a lookout for whales during the historical whaling era in Hawai'i. (Andrade, 1998)

**Poholokeiki**, is a small channel northeast of Lae O Ka 'Īlio. Poholo means to sink or vanish, and keiki refers to a child or person. (Andrade, 1998)

**Pu'ukahuanui**, is a reef fronting the area where Limahuli stream meets the ocean, two reefs to the east of Poholokeiki. Pu'u means small hill, or hump, Kahua is the name of Lohi'au's sister, and nui is big. After Hi'iaka restored Lohi'au back to life, Kahua wanted to celebrate. When Lohi'au's health was completely restored, his priority was to go surfing with Hi'iaka and the people watched as their ali'i enjoyed the surf with Hi'iaka. Kahua ordered that a big feast be prepared in celebration of her brother's recovery. Pu'ukahuanui is still considered a quality surfing spot during certain times of the year. It is a challenging, shallow and temperamental area to surf with very powerful winter waves. The next reef to the west is **Pu'ukahuaiki** (small Kahua). Both reefs are visible during low tides marking the full and new moons. (Andrade, 1998)

An area which deserves special attention, is **Kē'ē**. It is located west of Hā'ena Bay at the end of the present highway. "In sayings, the word Kē'ē

---

---

represents great distances and trouble,” a place too far away “to bother about,” literally, “avoidance” (Pūku’i, Elbert & Mo’okini, 1974:105).

This is the site of the legend of Pele, Lohi’au and Hi’iaka. Pele first arrived at Kē’ē when she was looking for a home safely away from her rival sister, Nāmakaokaha’i. Once she finally returned to her home on Hawai’i Island, she was lured back by the drumming of Lohi’au. She returned to Kaua’i and fell in love with him. Every time she dug a cave to make a home for the two to live in, she was met with water. In her spiritual body she returned to Hawai’i and promised that she would return. Lohi’au waited anxiously, and eventually killed himself in despair. His body was placed in a cave above Kē’ē and was guarded by two mo’o sisters, Kilioe and Aka.

Pele sent her favorite sister, Hi’iaka and her companion Wahine’ōma’o to fetch her beloved Lohi’au and promptly bring him back to Hawai’i. By the time they had arrived Hi’iaka realized he was dead and killed the two mo’o sisters in order to retrieve the body of Lohi’au. With herbs and prayer she restored Lohi’au to life.

Meanwhile, Pele had grown impatient. She destroyed Hi’iaka’s favorite Lehua groves in anger. Upon their return to Hawai’i, Hi’iaka realized what her sister had done and embraced Lohi’au. Pele furiously covered Lohi’au in lava. Instead of retaliating and killing Pele, Hi’iaka returned to Kaua’i. With the help of her brothers, Lohi’au’s life was once again restored. The two married and spent the rest of their lives in Kē’ē. (Wichman, 1998)

The most accessible of the traditional sites at Kē’ē is a large platform at the base of the cliff next to the end of the road. This structure is associated with legendary Kaua’i Chief Lohi’au. The well-built stone retaining wall of this platform is visible in the underbrush, a few feet from the road.

*The house terrace associated with the legendary Lohi’au, is located against the cliff approximately 200 meters east of Ka-ulu-a-Pā’oa heiau. Both Emory and Dickey identified this terrace as the structure that had also been called the heiau of Lohi’au. Judging from the lack of typical heiau features, Emory indicated that it may have been a house platform. (Kelly, 1980)*

On the cliffs above Kē’ē are said to be two curiously shaped natural stones, one resembling a profile of a man, and the second that of a stooping man. In 1845 the name Pōhaku-a-Kāne was recorded for the latter stone. A third stone, in the sea below, was said to represent Hauwā, the sister of Pōhaku-a-Kāne. (See also description regarding ‘O’o’a’a.)

---

---

Beyond the sand beach of Kēʻē, a short coastal trail leads to the last rock-strewn stretch of shoreline before the cliffs begin. There stands a large boulder known as Kilioe, the *pōhaku piko* of the area:

*...After being killed by Hiʻiaka, the body of Kilioe became a furrowed rock beside the sea that is still used as a birth rock, a place for safeguarding of the umbilical cord of a newborn. In doing so, the child was placed under the protection of Kilioe. The ancients believed that the fate of the umbilical cord foretold the child's life. (Wichman, 1998)*

Directly above Kilioe is the impressive stone structure identified as **Ka Ulu A Paoa Heiau**. At the top of the slope above the heiau and against the cliff is the unpaved hula platform identified as a *hālau hula* and sometimes called Ke Ahu A Laka, Ka Ulu A Laka. (Kelly, 1980)

In notes on place names collected by Mary Kawena Pūkuʻi, the heiau at the end of the road beyond the Allerton House is known as Kauluolaka. Elsewhere “Ka-ulu-o-Laka” is identified as “a heiau for hula dancers not far from Ka-ulu-Pāʻoa heiau, both below Kēʻē cliff...” (Pukui et al, 1974). Names that incorporate the name Laka, patron of hula, probably refer to the *hālau hula*, the hula platform located mauka of the *heiau*.

Pāʻoa (Paoa) is identified as “the great friend of Pele’s lover, Lohiʻau” (Pūkuʻi & Elbert, 1971). Abraham Fornander gave the name of the friend of Lohiʻau as Kahuakaiapāʻoa. He also gave the name Mapu as that of the music teacher, whose drum beating at Kēʻē disturbed Pele’s sleep at Kīlauea on Hawaiʻi. Lohiʻau, Pāʻoa, and Mapu were all sitting on the heiau platform when Pele came to Hāʻena, according to Fornander.

According to Fornander, Kilioe and Aka “were two women who watched over the cave where Lohiʻau was interred. They were killed by Hiʻiaka.” Storyteller William Rice identified Kilioe as the sister of Lohiʻau, a celebrated tapa maker of Kalalau Valley, and a great hula dancer and teacher. No one was allowed to hula in public unless approved by her by means of ʻuniki, graduation.

Juliet Wichman identified Kilioe as part “*moʻo*” the sister of Lohiʻau, and the patroness of the whole area, that is, everything from the Dry Cave at Hāʻena to Kēʻē. She also thought that she was probably the patroness of hula in that area.

All of the incorporated names (Kilioe, Pāʻoa, Lohiʻau, and Laka) have one thing in common: they are all associated with hula in one tradition or another. At one time or another both sites have been identified as heiau,

---

---

and the *mauka* site also as a “hula platform” or hālau hula dedicated to Laka, and the *makai* site as the hula temple of Lohi’au. (Kelly, 1980)

#### 2.2.3.3.3 *‘Ōlelo No’eau*

Orr also summarizes ‘ōlelo no’eau, or proverbial sayings, related to Hā’ena and areas nearby in her report. They feature the fragrant laua’e ferns of Kalalau and Makana, the firebrands that were thrown from the pali, the Lehua blossoms of Lulu’upali, the hala trees of Naue, the sunsets to the west, and the cold, adz-like cutting rains of Halele’a.

#### 2.2.3.3.4 *Ethnographic Survey*

The Cultural Impact Assessment prepared for this report includes an ethnographic survey. Individuals consulted or interviewed were those with ties to the project location; were known as a person with expertise in Hawaiian cultural resources; or were referrals of State Parks and NTBG-Limahuli Garden and Preserve staff. The ethnographic interview process is described in detail in Appendix A, but was essentially an open ended opportunity for the consulted party to “talk story”. When consented to, the interviews were recorded, transcribed and provided back to the interviewee for review and approval. Six people were interviewed and efforts to interview two additional individuals failed as the individuals did not respond to phone call and email requests. Of the six individuals interviewed, all are part-Hawaiian and have either family ties to the project area and vicinity or are familiar with the history of Hā’ena State park and vicinity. Those interviewed included, Kumu Hula Kapu Kinimaka Alquiza; fisherman Tom Hashimoto; lineal descendant of Mokuohai (kuleana land) Clarence Medeiros; and historians Chipper Wichman, F. Bruce Wichman and Randy Wichman. In addition to the direct ethnographic interviews, an ethnographic survey questionnaire was developed to gain additional knowledge from individuals who wanted to share information about Hā’ena. This form was mailed to individuals of standing or those who expressed interest at public meetings. Two questionnaires were returned.

The ethnographic survey and interviews were designed to gain better understanding of the following themes:

- Consultant (Interviewee) Background and ties to Hā’ena
- Land, water, marine and cultural resources and use
- Anecdotal stories
- Project concerns

The Ethnographic Survey also collected the interviewee’s concerns about Hā’ena State Park and thoughts about the Master Plan. A primary theme

---

---

throughout the interviews is a concern about a general lack of respect for the place. The interviewees cite the proximity of park improvements to cultural sites (such as the location of the comfort station in relation to subsurface archaeological features and parking areas too close to Lohiau's house) as a lack of respect in the park's present physical design.

Specific suggestions made by the interviewees for the physical plan of the park include clean up and restoration of the site's cultural resources; establishing appropriate buffers surrounding cultural/archaeological sites; consideration of drainage when restoring the 'auwai, particularly near the parking area; and reconsideration of the bike paths that were proposed in the 2001 draft park plan. The individuals also supported the idea of closing Kūhiō Highway to vehicles, allowing visitors to walk from the parking lot was also supported.

Additionally, the interviewees cite the lack of interpretation of Hā'ena's cultural importance as an ongoing problem. Comments from the interviews acknowledge that visitors approach Kē'ē as a place to go swimming and lie on the beach. They also raise concerns that restoration of the cultural and archaeological sites could attract more visitors to the most sacred places within the park and recommend that a cultural advisory group help to guide restoration and management. Further, the interview responses promoted the idea of multiple entities sharing in the interpretation and care of the significant aspects of park (fishing, cultural protocols, taro, masonry and botany). The need for diplomatic cooperation from State Parks with a volunteer group or groups was stressed.

#### **2.2.3.4 VISUAL RESOURCES**

##### ***2.2.3.4.1 Regional Context***

Kaua'i, The Garden Isle, is known for its beauty and scenic qualities. As one's airplane makes its final descent into Līhu'e Airport, one is often struck by the contrast of azure water and lush green vegetation spread over the island. The thriving tropical rainforests spread over Kaua'i is nourished by the numerous streams and rivers that originate from Wai'ale'ale which has an annual observed average rainfall of 460 inches per year.

Lush valleys are not Kaua'i's only unique scenic features. Along the southern shore of Kaua'i is the impressive Waimea Canyon. Waimea Canyon is more than 3,000 feet deep in some areas and provides breathtaking views. With additional facilities located at Kōke'e State Park, visitors can utilize park facilities and enjoy the surrounding environment.

The East Coast of Kaua'i is often referred to as the 'Coconut Coast' due to the extensive sand beaches with accompanying coconut groves planted in

---

---

the late 1800's. Along the Wailua River, one can enjoy the pristine beauty of the area and head to the famous Fern Grotto, a natural lava-rock volcanic formation with overhanging ferns.

Since volcanic activity on Kaua'i ended between 1,000,000 and 2,000,000 years ago, time has allowed for the slow process of erosion and has resulted in a lush, green sculpted landscape resplendent with the numerous native flora and fauna. One of the most dramatic scenic landscapes on Kaua'i is the famed Nāpali Coast. With wave and stream-carved cliffs dropping vertically into the ocean below, the area is a popular site with boaters, hikers, and helicopter tours. Although cars cannot proceed past Hā'ena, hikers can traverse the narrow hiking trails along the Nāpali Coast, beginning their trek at Hā'ena State Park. The eleven mile hike along the scenic Kalalau Trail is taken by the hardy while many day visitors take the first two miles of the hike to Hanakāpā'ai Valley. An aerial photograph is provided as Figure 2.

Kaua'i's visitor experiences are closely linked to the island's scenic resources. According to the "2007 Visitor Satisfaction and Activity Report" published by the Hawai'i Department of Business, Economic Development and Tourism, visitors from the U.S. West, U.S. East, Canada and Europe were more likely to take a helicopter or plane tour and or take part in backpacking, hiking, and camping on Kaua'i than on other islands.

#### ***2.2.3.4.2 Hā'ena Visual Resources***

Highlights of the major visual resources are described below. Existing viewplanes and constraints to important scenic and cultural views are illustrated in Figure 25 A-C: Visual Resources.

Makana, the majestic peak standing at 1,280 feet in elevation, dominates the landscape as one approaches Hā'ena State Park from land, air or sea. Prominent views of Makana can be observed from Limahuli Gardens and Preserve as well as from Ke Ahu A Laka. Stories of firebrands ('ōahi ceremony) being hurled from Makana's peak and dancing above the coastal plain and sea are reminders of the importance of this landmark. From inside the park, Makana is often obscured by tree cover.

The rock cliffs of the pali fall steeply into a reef-fringed lagoon and sandy beach at Kē'ē. As approached from land, one can barely imagine the view of the beach and lagoon since the entire coastal area is enveloped in a large canopy of invasive alien forest trees. See visual constraint illustration, Figure 25 C. As noted earlier, the alien forest did not exist prior to the 1946 and 1957 tsunamis and in fact, the entire coastal plain was once wide open with very few trees. If any did exist, based on previous research by Gagne and Cuddihy (1990), Terry and Hart suggest

---

---

that prior to human disturbance, the area that is now Hā'ena State Park probably supported a Coastal Mesic Forest consisting of hala (*Pandanus Odoratissimus*) and 'ōhi'a lehua (*Metrosideros polymorpha*). The strand community was likely much wider than at present and it is possible that marsh ecosystems were also present allowing for views to Kē'ē Beach.

Kē'ē Beach and Lagoon are also valuable visual resources viewed from the air or points on the trails above. See Figure 25 A. The white sand beach nestled beneath the rising cliffs of the Nāpali draw visitors as they approach from Kūhiō Highway. The beach is wide enough that it allows an easy stroll from Ke'ē to Ka'ilio Point. On the first segment of the Kalalau Trail, which quickly gains elevation, hikers often stop to rest and catch a glimpse of Kē'ē where vegetation permits a view. From this vantage point, the blue-green waters of the shallow lagoon contrast with the bright sand beach and coral formations seaward.

When on Kē'ē Beach, one can look immediately to the west and view the rugged and uncompromising Nāpali cliffs. In contrast, Hā'ena's white sand beach wraps around the coastal plain to Ka'ilio Point and beyond.

Views of Kē'ē and beyond from Kauluapā'oa Heiau and hula platform are integral to these important cultural resources. See Figure 25 B, Views 1, 2 and 3.

From the air, the dramatic elevation contrast between the pali and Hā'ena's coastal plain are apparent. Due to the canopy cover at Hā'ena, the improved areas, such as the roadway are partially obscured from view.

A portion of the kalo lo'i in the park has been cleared and replanted with taro. From Kūhiō Highway, the forest opens up for views across the lo'i and neighboring marsh. See Figure 25 B, View 5. This visual reminder of the living culture at Hā'ena is a source of tradition, education and pride.

Waiakapala'e and Waiakanaloa wet caves are geologic formations visually interesting to visitors as well as culturally significant. Waiakapala'e is visually accessible from Kūhiō Highway. Easy access to this cave creates some management issues as visitors are attracted to stand below the vertical rock cliffs and swim in the cave as shown in Figure 24 B, View 6. The convenient location also offers the opportunity for cultural interpretation and education.

Limahuli Stream intersects Kūhiō Highway at the entrance to Hā'ena State Park. Visitors cross over this natural threshold by a single-lane bridge. The natural boulder stream has not been altered for flood control. The pool of water mauka of the park's entrance bridge at Kūhiō Highway has

---

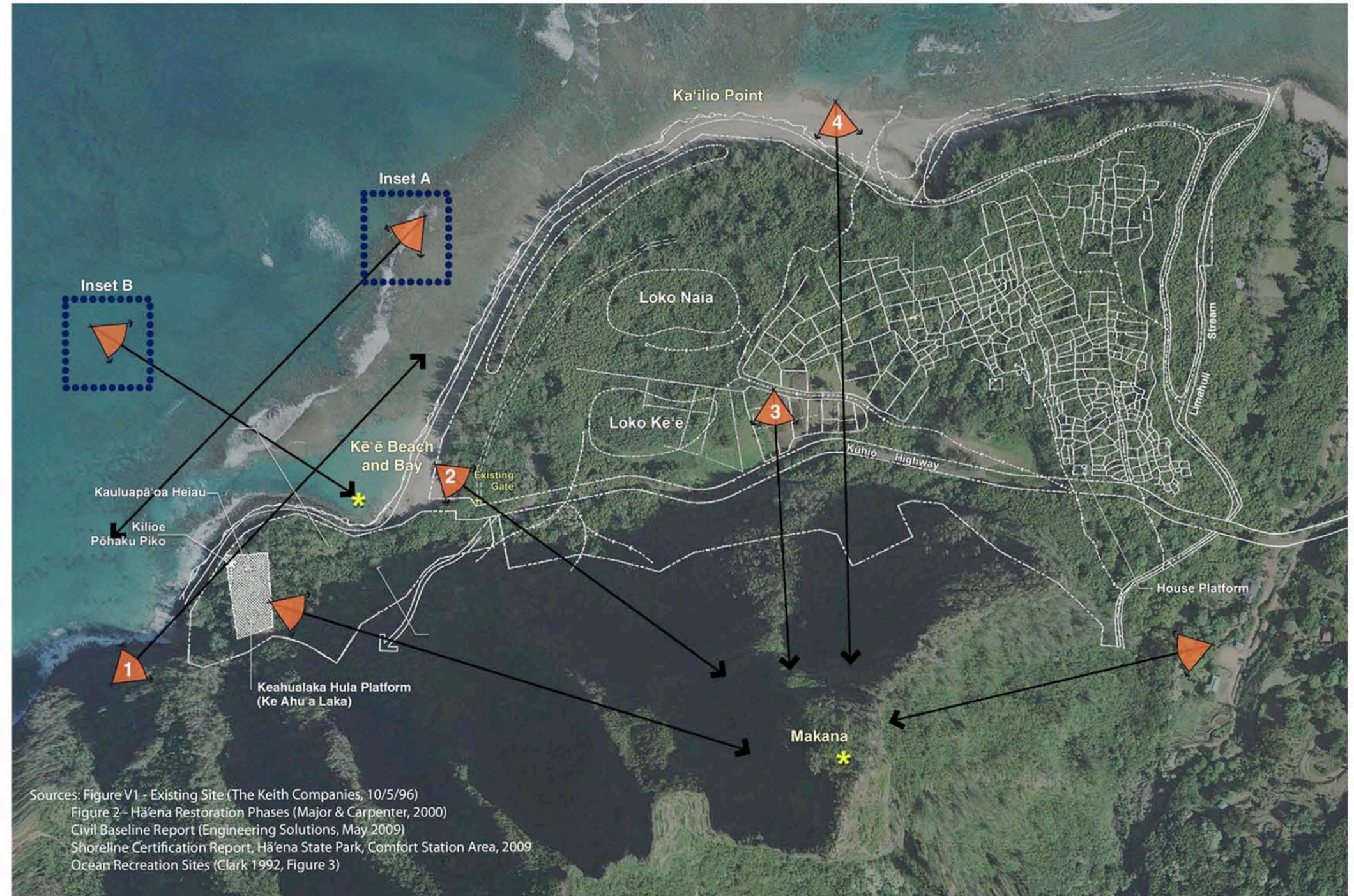
---

traditionally been used by the Hā'ena 'ohana and nearby residents for a swimming hole and is commonly known as "Cold Pond". See Figure 25 B, View 7.

Unfortunately, many of these visual resources are impaired by the many cars parked along the highway and within the park. Because Hā'ena is such a major destination for visitors, hikers and residents alike, parking is in high demand. Oftentimes people will park illegally and congest the visual resources sought for enjoyment. Visual constraints caused by vehicle parking and alien forest canopy are illustrated in Figure 25 C.

---

This page intentionally left blank



**LEGEND**

Historic and Visual Resources

View Planes Documented in Current Study

**FIGURE 25A**  
**Major Views to Makana and Kē'ē**  
**HĀ'ENA STATE PARK MASTER PLAN**



View 1: View of Kē'ē from 1/2 mile point on Kalalau Trail



View 2: Makana from Kē'ē



View 3: Makana from the cleared lo'i



View 4: Makana from Limahuli stream outlet near Ka'ilio Point



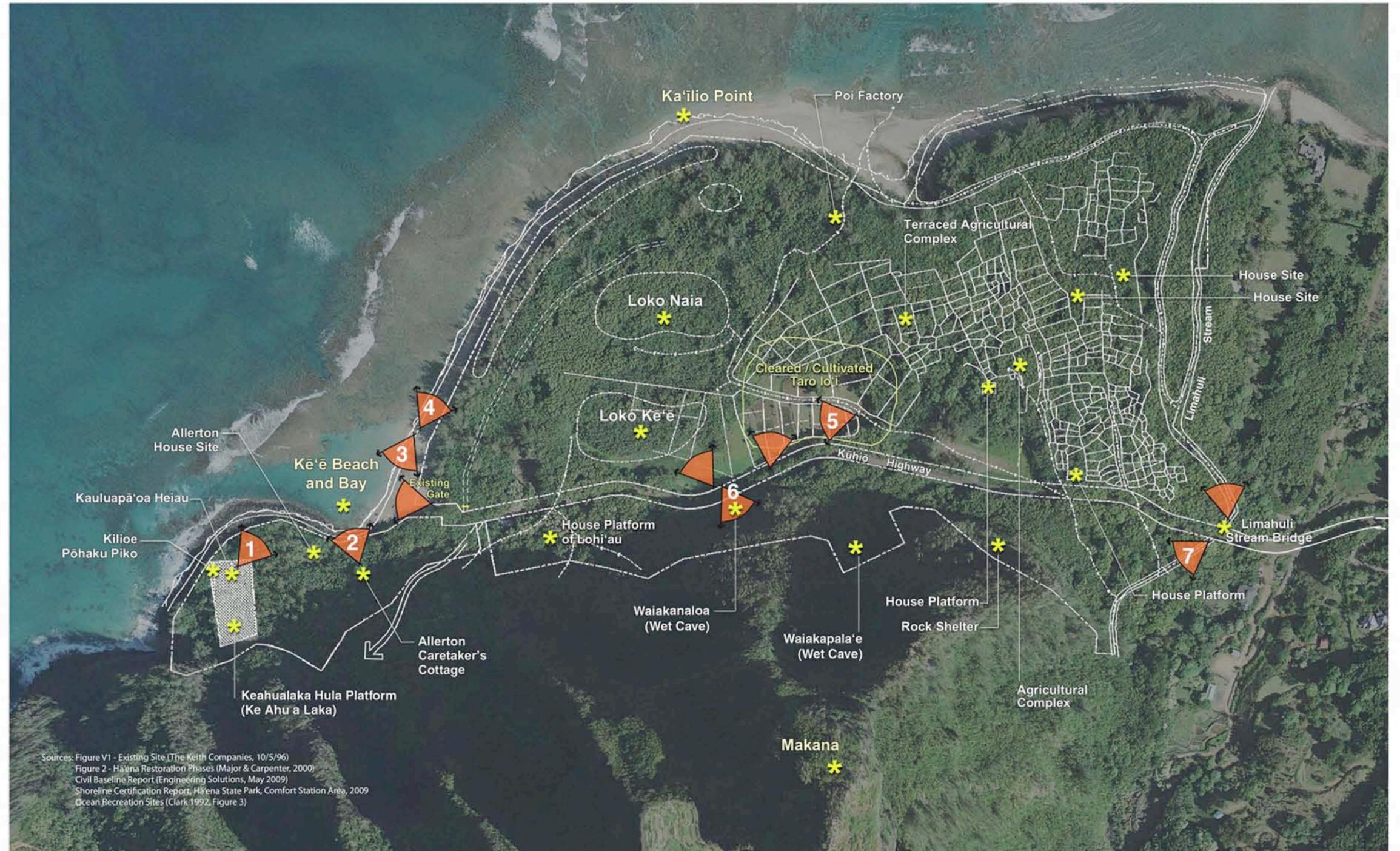
View 1: Hula Platform looking northeast



View 2: Kē'e from Allerton Caretakers Cottage



View 3: Kē'e Beach



**LEGEND**

- Points of Interest
- View Planes Documented in Current Study

Note: View 7 photo credit to Kennedy Jenks.



View 4: Looking toward Ka'ilio Point



View 5: Cleared lo'i looking west



View 6: Waiakanaloa (Wet Cave)



View 7: Limahuli Stream looking upstream from bridge

**FIGURE 25B**  
**Visual Resources**  
**HĀ'ENA STATE PARK MASTER PLAN**







Park Entrance & Limahuli Stream



Makana



Kē'ē Beach looking toward Ka'ilio Point



Waiakanaloa wet cave



Kē'ē Beach looking toward Nāpali



Kē'ē Beach from trail to Allerton Caretaker Cottage



Vehicles at Kē'ē Beach



Parking pattern

**FIGURE 26**  
Site Photographs A  
**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kaua'i





Lo'i



Lohi'au House Site



Kalalau Trailhead Signage



Laua'e at Keahualaka



Allerton Caretaker Cottage



Keahualaka



At Keahualaka



Coastal dunes covered by non-native ironwood & false kamani forests

**FIGURE 26**  
Site Photographs B  
**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kaua'i



---

---

## 2.2.3.5 SOCIAL-ECONOMIC RESOURCES

### 2.2.3.5.1 Population

According to the 2007 State of Hawai'i Data Book, the resident population of Kaua'i County was 62,828 persons and the de facto population (the number of people, including visitors physically present) is calculated to be 81,692 persons.

Building on the historical US Census data that was compiled in the "Social Impact Assessment for Hā'ena State Park Master Plan," (SIA) prepared by Earthplan in November 1996 for the 2001 draft park plan, the population trends for the four Census Designated Places (CDP) on Kaua'i's North Shore are shown in the table below. Although no separate population data is available for Hā'ena, it is included within Census Tract 401, which stretches from Honopū on the Nāpali coastline to Lepeuli near Moloa'a Stream. The following are some general population and demographic data for the North Shore (Census Tract 401) and the four closest CDPs to the site from the year 2000 Census.

**TABLE 2: POPULATION TRENDS, 1950 – 2000**

	1950	1960	1970	1980	1990	2000**
TOTAL KAUA'I	29,905	28,176	29,761	39,082	51,177	58,463
Total North Shore*	1,619	1,312	1,182	2,668	4,631	6,348
Hanalei CDP	364	370	153	483	461	478
Kalihiwai CDP	n/a	n/a	n/a	n/a	435	717
Kilauea CDP	757	665	671	895	1,685	2,092
Princeville CDP	n/a	n/a	n/a	500	1,244	1,698

\*Coterminous with Census Tract 401.  
\*\*All information from "Table 2: Population Trends, 1950-1990" (Earthplan, 1996) except for 2000 data which is from the US Census 2000 (website: <http://censtats.census.gov/pub/Profiles.shtml>).

Post-World War II population trends along the North Shore followed the general trends of the State and the changing economy from an agricultural-based economy to a visitor-based one. Up until 1970, the North Shore lost population. However, between 1970 and 2000, the population has increased by over 437 percent.

An updated demographic table with 2000 Census data shows how the North Shore communities compare with the county's population in terms of age, ethnicity and educational attainment (see Table 3: Demographic Characteristics, 2000).

**TABLE 3: DEMOGRAPHIC CHARACTERISTICS, 2000**

	Kaua'i County	North Shore*	Census Designated Place			
			Kilauea	Kalihiwai	Princeville	Hanalei
Population	58,463	6,348	2,092	717	1,698	478
<b>AGE</b>						
Under 5	3,605 6.2%	394 6.2%	129 6.2%	50 7.0%	92 5.4%	34 7.1%
5 to 19	13,147 22.5%	1,309 20.6%	532 25.4%	149 20.8%	257 15.1%	95 20.0%
20 to 44	18,734 32.0%	2,023 31.9%	690 33.0%	230 32.1%	466 27.4%	150 31.4%
45 to 64	14,908 25.5%	1,961 30.9%	541 25.9%	242 33.8%	604 35.6%	144 30.1%
65 or more	8,069 13.8%	661 10.4%	200 9.6%	46 6.4%	279 16.4%	55 11.5%
Median Age	38.4	40.2	36.3	39.8	45.9	40.2
<b>ETHNICITY**</b>						
Caucasian	29.5%	64.1%	47.8%	72.1%	81.3%	57.1%
Filipino	19.1% (31.7%)	7.8% (12.5%)	18.4% (26.9%)	6.8% (9.6%)	1.0% (3.1%)	2.1% (5.4%)
Japanese	12.8% (21.4%)	3.8% (7.5%)	5.3% (10.3%)	1.1% (3.3%)	2.1% (3.5%)	11.3% (21.5%)
Hawaiian	8.4% (23.1%)	6.0% (13.1%)	5.7% (14.3%)	3.9% (10.7%)	2.7% (6.6%)	2.9% (17.6%)
Other	30.2%	18.3%	22.8%	16.1%	12.9%	26.6%
<b>EDUCATIONAL ATTAINMENT FOR PERSONS 25 YEARS AND OLDER†</b>						
High school graduate or higher	83.3%	88.8%	80.0%	93.3%	96.5%	82.8%
Bachelor's degree or higher	19.4%	30.1%	20.0%	34.6%	44.5%	21.7%
*Coterminous with Census Tract 401. Source for Educational Attainment: <a href="http://factfinder.census.gov">http://factfinder.census.gov</a>						
**Percentages outside of parentheses are for those listing only one race/ethnicity. Percentages within parentheses include all individuals who listed the ethnicity either alone or in combination with another.						
Source: Aggregated data from US Census 2000 American FactFinder (website: <a href="http://factfinder.census.gov">http://factfinder.census.gov</a> ).						
†Source: US Census 2000 Demographic Profiles (website: <a href="http://censtats.census.gov/pub/Profiles.shtml">http://censtats.census.gov/pub/Profiles.shtml</a> )						

In terms of age, the North Shore populations tend to be a little older except for the Kilauea CDP where the median age is 36.3 compared to 38.4 for the County and 40.2 for the North Shore as a whole. There are relatively similar proportions of children and adults under the age of 44. In the Hanalei, Kilauea and Kalihiwai CDPs, there is a smaller proportion of seniors over the age of 65 compared with the County as a whole, and in the Princeville CDP, there is a higher proportion of seniors over the age of 65.

The ethnic composition of the North Shore communities differs quite drastically from Kaua'i County as a whole. A much higher percentage is Caucasian. Caucasians make up 29.5 percent of the County population as a whole whereas on the North Shore it is 64.1 percent, with Princeville

---

---

CDP having over 81 percent Caucasians. There are also much smaller proportions of Filipino, Japanese and Native Hawaiians in the North Shore communities. Only in Kilauea CDP and Hanalei CDP were the ratios of Filipino and Japanese close to the County averages, respectively.

In terms of educational attainment for those over the age of 25, Kalihiwai and Princeville CDPs had much higher levels of high school graduates and college graduates. Kilauea and Hanalei CDP's numbers mirrored the County's more closely.

Other 2000 Census data relating to household and housing data are summarized for the Hanalei CDP. Of the 193 households within the Hanalei CDP, 30.1 percent (58 households) had children under the age of 18 years and 43 percent (22 households) had individuals 65 years or older. Twelve percent of households consisted of individuals living alone who were over the age of 65 (6.2 households). Of the 303 total housing units in the Hanalei CDP, 63.7 percent were occupied and 30.7 percent (93) were considered "vacant" for seasonal, recreational or occasional use.

#### ***2.2.3.5.2 Economy and Labor Force***

After recovering from soaring unemployment attributed to Hurricane 'Iniki, Kaua'i's unemployment rate declined to as low as 4 percent in 2006. However, as reported by the State Department of Labor and Industrial Relations, Kaua'i's unemployment rate had risen to 7.6% by December, 2008 and to 8.9% in December, 2009. As no specific economic data from the 2000 Census for Hā'ena is available, data relating to the Hanalei CDP is provided to draw some general conclusions about the economics of Kaua'i's North Shore. Per the 2000 Census, 25 percent of the Hanalei CDP's workforce (58 persons) are employed in the "arts, entertainment, recreation, accommodation and food service" industry. Over 17 percent (40 persons) of the labor force is in the construction industry and nearly 12 percent (27 persons) are in the "finance, insurance, real estate and rental and leasing" industry.

Updating the labor force data provided in Table 6 of the 1996 SIA, 2000 Census data related to the labor force of the North Shore communities in relation to the County as a whole are provided below.

**TABLE 4: LABOR FORCE CHARACTERISTICS, 2000**

	Kaua'i County	North Shore*	Census Designated Place			
			Kilauea	Kalihiwai	Princeville	Hanalei
<b>LABOR FORCE (16 YEARS OR OLDER)</b>						
Civilian Labor Force	63.1%	68.3%	69.5%	73.6%	57.5%	68.0%
Armed Forces	0.1%	0.1%	0.2%	--	--	--
Not in Labor Force	36.9%	31.7%	30.5%	26.4%	42.5%	32.0%
Unemployment Rate	3.3%	2.1%	3.1%	0.8%	1.9%	2.6%
<b>EMPLOYED CIVILIAN LABOR FORCE BY OCCUPATION</b>						
Managerial and Professional	29.0%	33.1%	23.1%	37.0%	38.8%	24.5%
Service Occupations	24.2%	25.8%	34.8%	26.9%	11.4%	25.8%
Sales & Office	25.6%	24.2%	22.3%	26.6%	36.8%	23.1%
Farming, Fishing & Forestry	2.3%	1.6%	2.0%	0.8%	2.7%	1.7%
Construction, Extraction & Maintenance	9.9%	11.1%	12.1%	6.5%	8.3%	16.6%
Production & Transportation	9.1%	4.1%	5.7%	2.3%	2.0%	8.3%
<b>INCOME IN 1999</b>						
Median Household Income	\$45,020	\$42,586	\$41,312	\$42,083	\$63,833	\$34,375
Per Capita Income	\$20,301	\$27,651	\$19,184	\$37,062	\$37,971	\$21,241
<b>COMMUTE TIME</b>						
Mean Travel Time to Work (in minutes)	21.5	21.7	20.6	23.5	21.5	15.9
*Coterminous with Census Tract 401. (Source: US Census 2000 <a href="http://factfinder.census.gov">http://factfinder.census.gov</a> ) Source of all other data: US Census 2000 Demographic Profiles (website: <a href="http://censtats.census.gov/pub/Profiles.shtml">http://censtats.census.gov/pub/Profiles.shtml</a> )						

For Kaua'i, the average annual wage in 2006 was \$33,254. As a comparison, the average annual wage for Maui was \$35,559, for Hawai'i Island, \$33,960 and for O'ahu was \$39,006.

## **2.2.4 INFRASTRUCTURE AND UTILITIES**

Much of the information in the following sections on infrastructure and utilities is provided by consultants retained for this project. Kennedy Jenks (formerly Engineering Solutions, Inc.) is the civil engineer and Austin Tsutsumi and Associates (ATA) is the traffic engineer. Their reports are included in the appendices.

### **2.2.4.1 REGIONAL TRANSPORTATION**

Kaua'i is accessed by air primarily through the Līhu'e Airport. A secondary airport for small aircraft and helicopters is also located at Princeville (approximately 10 miles from Hā'ena).

---

---

Kaua'i's major seaport and commercial harbor is Nāwiliwili Harbor, located on the southeastern corner of the island. It is operated by the State of Hawai'i, Department of Transportation, Harbors Division. The other State-operated commercial harbor on Kaua'i is Port Allen on the south side of the island. There are other smaller boat facilities on Kaua'i maintained by the State Department of Land and Natural Resources Division of Boating and Ocean Recreation (DOBOR). On the South Shore, there is Kikiaola, Port Allen and Kukui'ula Small Boat Harbors. On the East Side, there are Nāwiliwili Small Boat Harbor and Wailua, Kaumuali'i, and Waikaea Launch Ramps. On the North Shore, there are the Hanalei Bay Offshore Mooring Area and Pier and the Anini Beach Park Boat Ramp.

The County of Kaua'i owns and operates approximately 235 miles of paved and 40 miles of unpaved roads. Most of these roads serve individual communities and neighborhoods throughout the island. The two major regional highways are owned and operated by the State DOT-Highways Division. They are Kūhiō Highway on the east and north and Kaumuali'i Highway on the south. The two highways connect in Lihu'e but do not fully circumnavigate the island. On Kaua'i's North Shore, Kūhiō Highway terminates in Hā'ena State Park, near Kē'e Beach. Route 560, the segment of Kūhiō Highway between Princeville and Hā'ena was listed on the National Register of Historic Places on February 11, 2004 and on the Hawai'i Register of Historic Places on March 29, 2003 (Site #50-30-02-1600). This segment of the highway is the subject of the Hanalei Roads Committee efforts and the *Kūhiō Highway Historic Road Corridor Plan* prepared by Belt Collins and adopted by the State DOT in 2005.

On the North Shore alone, there are a total of thirteen one-lane bridges between Princeville and Hā'ena. According to the Kaua'i General plan, the bridges are not only important for their historical significance but also their role in slowing traffic and restricting large busses and trucks.

The DOT bridges from Hanalei to Hā'ena include:

- Hanalei River Bridge. A single vehicle lane steel truss bridge constructed in 1912, it has a weight limitation of 20,000 lbs.
- Wai'oli and Waipa Bridges. Consisting of flat concrete slabs, also constructed in 1912, these bridges allow for one lane of vehicle travel and have a weight restriction of 30,000 lbs.
- Waikoko Bridge. Constructed in 1913, the Waikoko bridge allows one vehicle lane of travel and has a weight restriction of 20,000 lbs.
- Lumahai Bridge. This bridge was constructed in 1968, has a 28 foot width and a weight restriction of 40,000 lbs.

- 
- Wainiha Bridges #1, #2, #3. These steel truss decked bridges were constructed in 1969, 1973 and 1975 and have restrictions of 20,000, 30,000 and 30,000 lbs respectively.

Progressing from the Wainiha Bridges toward Hā'ena, a ford at Hā'ena County Park permits vehicles on the highway to cross Mānoa stream.

The structure that crosses Limahuli Stream at the entrance to Hā'ena State Park is not documented by DOT as a "bridge", but a "stream crossing". For practical purposes, the concrete structure serves as a bridge during normal stream flow conditions and during rain events that trigger high flows, the structure operates more as a ford.

---

***Limahuli Stream Road Crossing  
During Storm Event***

---

Austin, Tsutsumi & Associates, Inc. (ATA), a traffic engineering firm will be conducting a Transportation Impact Assessment Report (TIAR) for this project, noted that traffic in front of the bridges slowed down and queued up to allow oncoming vehicles traverse the single-lane bridges. ATA's preliminary findings regarding existing traffic near Hā'ena State Park are attached as Appendix F and will be discussed in greater detail later in this report.



#### **2.2.4.2 ROADWAYS**

The only vehicle access to Hā'ena State Park is provided via Kūhiō Highway (State Highway 560). The highway is owned and managed by the State Department of Transportation (DOT) and terminates at Kē'ē Beach. The highway is two lanes and 24 feet wide and runs in an east-west direction along the southern portion of the park. Shoulder lanes and some guardrails were installed in 1985 and 2002 (ESI 2008 draft). However, the shoulders are often used for illegal parking, particularly in areas around Waiakanaloa and closer to Kē'ē.

In 2004, a ten-mile stretch of the highway between Princeville and Kē'ē Beach was listed on the National Register of Historic Places. It includes the thirteen one-lane bridges within this span and essentially eliminates the passage of large tour buses and trucks to traverse this area of the North Shore.

---

---

### 2.2.4.3 PUBLIC TRANSIT

The County of Kaua'i Transportation Agency provides public transit service between Hanalei and Kekaha via the Kaua'i Bus. Service between Līhu'e and Hanalei is provided six days a week, Monday through Saturday, between 6:20 AM and 8:00 PM. Route 400 runs from the Hanalei Courthouse to Kaua'i Community College and Route 500 runs in the opposite direction. Fares are \$1.50 per trip for adults, \$0.75 per trip for seniors (60+ years) and youth (7 – 18 years). The County also offers monthly passes for \$15.00. All buses are wheelchair accessible. Folding baby strollers, musical instruments, and body boards are permitted onboard. However, surfboards, large backpacks and other bulky items that block the aisle or seat are not permitted onboard. There is no public transportation service to Hā'ena. Private shuttles and taxis can be arranged for a fee.

### 2.2.4.4 TRAFFIC

A Traffic Impact Analysis Report (TIAR) will be conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate potential traffic impacts resulting from the proposed Hā'ena State Park Master Plan. The preliminary findings related to existing traffic are provided in their draft report (attached as Appendix F).

Traffic data was collected via pneumatic tubes placed at the Hā'ena State Park entrance between August 14, 2008 and August 18, 2008. During this analysis period, a three day weekend was included in the study (Admission's Day). According to 1993 data from County of Kaua'i Lifeguards, Kē'e experiences its highest attendance during the month of August.

Weekend peak hour traffic occurred during 12:00 p.m. and 1:00 p.m. However, a large influx and efflux of traffic occurred between 10:45 a.m. and 3:45 p.m. Regional weekday morning and afternoon commuter traffic was assumed to occur between 8:00 a.m. and 9:00 a.m. and between 3:00 p.m. and 4:00 p.m. respectively.

A total of 1,550 vehicles per day were counted entering and exiting Hā'ena State Park. Peak traffic was observed on August 17<sup>th</sup> between 12:00 p.m. and 1:00 p.m. where a total of 107 vehicles entered and 85 exited the park. ATA concluded that observed traffic was well below the potential capacity of a two-lane highway (two-lane highways have the potential capacity of 1,700 passenger vehicles per hour per direction of travel). However, congestion within the park occurred due to the slow speeds

---

---

resulting from pedestrians on the roadways and cars waiting for parking stalls. Some waited as long as five minutes for a stall.

ATA also noted the considerable amount of vehicles that were parked alongside the highway leading to Kēʻē. Visitors that park alongside the roadway or parked in the lot closer to the entrance were exposed to oncoming traffic due to a lack of pedestrian sidewalks.

#### 2.2.4.5 PARKING

There are currently two parking areas at Hāʻena State Park. The first is a visitor parking lot located approximately 750 feet west of the park entrance. It was recently enlarged and can accommodate roughly 80-100 cars. The second is a parking area located at the end of Kūhiō Highway near Kēʻē Beach. Cars also park legally and illegally along the highway leading up to Kēʻē. Based on a rough count, there were between 50 and 70 cars in this area. Neither parking area is paved nor are any stalls striped except for the four ADA stalls near Kēʻē. Because there is no striping to direct drivers as they park, and both areas can become muddy and uneven, the use of these parking areas can be inefficient and underutilized since drivers use their own judgment lining up their cars to park.



---

***Parking Area near Kēʻē***

---

#### 2.2.4.6 WATER

##### 2.2.4.6.1 Potable Water

The County of Kauaʻi Department of Water (DOW) operates 11 separate, unconnected water systems island-wide. The County DOW provides potable water by a 4-inch PVC water line that terminates at the entrance to the park. The water is gravity fed from a 0.1 million gallon (MG) reservoir located approximately a mile away at a ground elevation of 126.5 feet above MSL (Kennedy Jenks, 2011).

Within the park, water is transmitted by a 3-inch galvanized iron waterline which runs along the highway from the entrance at Limahuli Stream and serves the comfort station and showers by Kēʻē Beach. Most of the pipe is above ground and buried pipe depths are unknown. See Figure 4.

---

---

Recently completed renovations at the existing comfort station near Kē'ē include two lavatories (one for women with two water closets, and one for men with one water closet and one urinal), one outdoor shower tree with three showerheads, a drinking fountain, and three hose bibs. A backflow prevention device was installed with these renovations in 2008

Recorded water usage from October 2003 to November 2006 is documented to average 2,125 gallons per day. At the comfort station, the fixtures have recently been replaced under DLNR Job No. H10C663A with the following:

1. A two-inch PVC water lateral serving three water closets, one urinal, two lavatories, one drinking fountain with a drywell and two hose bibs
2. A One-inch PVC water lateral serving an outdoor shower

It is anticipated that these new fixtures will decrease water demands by four gallons per minute (gpm).

#### **2.2.4.6.2 Non-Potable Water**

Lo'i located on park grounds are supplied by water diverted from nearby Limahuli Stream and transmitted via an 8-inch HDPE gravity-fed pipe at the 95.9-foot elevation and transitions to a 6-inch HDPE pipe at the 57.5-foot elevation. The intake is located on the south side (mauka) of the highway and provides an average of 760,000 gallons per day to the lo'i.

#### **2.2.4.6.3 Fire Protection**

There is no fire protection water system within the park. If needed, seawater is airlifted to the site of any fire. The last fire hydrant/standpipe is located outside of the park, roughly 75 feet away, and is connected to the County's potable water system.

#### **2.2.4.7 WASTEWATER**

The Kaua'i County Department of Public Works operates four wastewater treatment plants at Wailua, Līhu'e, 'Ele'ele and Waimea. County wastewater systems are not utilized at Hā'ena State Park.

Hā'ena State Park's first comfort station was built in 1979 and was connected by a main water line with wastewater emptying into a cesspool. In 2004, a 2,500-gallon individual wastewater system (IWS) was built for the existing comfort station which included a concrete septic tank and a leach field to comply with EPA's large capacity cesspool closures. See Figure 4.

---

---

In 2008, a replacement comfort station was constructed and five portable toilets were installed at the park for visitor usage during these improvements. In 2009, the comfort station was put back in service and the portable toilets removed. The new comfort station retains the same fixture count as its predecessor; 3 water closets, 1 urinal and 2 lavatories, which is estimated to generate 2,016 gpd. The comfort station renovation drawings call for the installation of a 30-inch diameter drywell to service a relocated drinking fountain near Ke'e beach. This drywell was not constructed as of September 2008.

The outdoor shower is located to the south of the comfort station. Greywater from the showers is allowed to drain and infiltrate into the surrounding soils.

In the years between 2007-2010, DLNR and members of the Hā'ena community collaborated on the design of an alternate IWS to mitigate impacts to cultural and archaeological resources beneath the existing system. A constructed wetland IWS feasibility study was submitted to DLNR by its consultants, Strategic Solutions. The report identifies the site characteristics, objectives, design options, construction costs, and operations. The study was prepared in support of a community-supported treatment alternative to the existing leach field treatment system.

In order to minimize further excavation and disturbance in the area, Strategic Solutions began to analyze options to allow wastewater to bypass the existing leach field and into a constructed surface wetland where the effluent can be processed naturally through plant uptake as nutrients.

In their report, Strategic Solutions recommended that a subsurface flow-based wastewater lined system be constructed that would allow wastewater to flow beneath a constructed wetland utilizing gravel and other media. Primary treatment will still be required through two septic tanks which will contain solid waste material and allow liquid effluent to enter the wetlands. The system consists of four-inch diversion valves and piping; two 1,500 gallon primary treatment fiberglass tanks (septic tanks) with battery-operated alarm control and panel; 968 square feet of constructed wetland and 1,358 square feet of infiltration field and appurtenances. The existing septic tank and leach field will continue to serve as an emergency backup system in the event the constructed wetland system requires maintenance.

Native plants such as makaloa (*Cyperus laevigatus*) and ahu'awa (*Cyperus javanicus*), two perennial sedges, are prime native species that may be used to treat the effluent passing through the constructed wetland, and enhance the existing inventory of native flora in the park.

---

---

The alternative wetlands IWS will ensure impacts to significant cultural and archaeological resources are minimized by treating wastewater to a higher level of quality than the more conventional septic tank/leach field system that is currently in place.

In addition to the existing wastewater system for the comfort station, an abandoned cesspool was found at the old house site near Limahuli Stream. The existing Allerton House and Caretaker's cottage should also have abandoned cesspool(s). If any of these facilities are renovated the wastewater systems should also be upgraded or abandoned completely.

Electric power is currently not available anywhere within Haena State Park and has been a limiting factor in the development of other wastewater treatment options.

#### **2.2.4.8 DRAINAGE**

Urbanized areas of Kaua'i, such as Līhu'e are served by stormwater drainage systems that include curbs, gutters and catch basins. Such facilities are not present at Hā'ena State Park, except for limited storm drainage culverts associated with Kūhiō Highway.

The only perennial stream within the Park is Limahuli Stream, but during periods of heavy rainfall, there are several intermittent streams flowing north through natural swales in the Park. During these times, storm water runoff is typically full of sediment, soil, stream fish, logs, plants and other debris material. The runoff creates a muddy plume at the stream outfall, but is part of the naturally occurring drain pattern in Haena State Park.

There are five 18-inch drainage culverts crossing Kūhiō Highway from south to north, emptying into the park (see Figure 4). It is estimated approximately 56.8 cubic feet per second (cfs) and 37.9 cfs of runoff from approximately 14.2 acres above Kuhio Highway flows down Makana into the five culverts, during the 10-year and 2-year storm, respectively. Drainage calculations are included with Appendix G. Three of the culverts have grated drain inlets on the south edge of the roadway to collect runoff from the south and discharge through endwalls located along the north edge of Kūhiō Highway. The remaining two culverts have headwalls a little south from the highway and endwalls on the opposite side of the roadway. The 18" drainage culverts satisfy the requirements set forth in the County of Kaua'i, Department of Public Works Storm Drainage Standard, dated February 1972. (ESI 2008)

The remainder of the site discharges stormwater runoff directly into the Pacific Ocean. It is estimated that approximately 7,300 cfs of runoff flows directly to the ocean during a 50-year storm. This includes the runoff from

---

---

the west end of Maunahou that flows over Kuhio Highway and the entire area of the Park below Kuhio Highway. During heavy rain storms the entire Park is inundated with rushing waters from this surge of rainwater. The existing drainage improvements do not have the capacity and were not designed to handle the larger storm events.

A 30-inch diameter drywell is included to service the drinking fountain. It is located within the existing leach field and is not anticipated to have any impacts as the existing leach field will only be used in emergencies once the constructed wetlands project is completed and the IWS is operable, and the existing leach field is also several feet lower than the depth of the drywell.

#### **2.2.4.9 SOLID WASTE**

The Kaua'i County Department of Public Works operates one landfill at Kekaha and four refuse transfer stations located in Līhu'e, Hanalei, Kapa'a and Hanapēpē.

There are various trash receptacles located throughout the Kē'e beach area. State Parks staff provides routine trash removal and ground maintenance on a daily basis.

#### **2.2.4.10 ELECTRICAL**

Kaua'i Island Utility Cooperative provides electricity for the island of Kaua'i. Currently, no electrical lines extend into the park.

#### **2.2.4.11 TELECOMMUNICATIONS**

Hawaiian Telcom provides telecommunication services for residents of Kaua'i. A single 3/4-inch telephone line runs along the same alignment as the three-inch waterline. The telephone line serves a single payphone located near the existing comfort station. Currently, a phone line is planned for installation in the comfort station maintenance room for use by Parks staff to provide immediate notice of trail and beach closures.

### **2.2.5 PUBLIC SERVICES AND FACILITIES**

#### **2.2.5.1 EDUCATIONAL FACILITIES**

Public school education is under the direct supervision of the Hawai'i State Department of Education. Kaua'i's public schools are divided into three school complexes, Kapa'a, Kaua'i, and Waimea. There are a total of ten elementary schools, three intermediate schools, four high schools, and four charter schools. A total of 9,338 students were enrolled in Kaua'i's public school system in 2008. The Kapa'a Complex serves the North Shore

---

---

communities including the Hā'ena area. The complex consists of Kapa'a High School, Kapa'a Middle School, Kapa'a Elementary School, Kilauea Elementary School, Hanalei Elementary School and Kanuikapono Public Charter School.

Higher education in Kaua'i is provided through Kaua'i Community College under the University of Hawai'i System. This two-year college offers a variety of post-secondary education opportunities for its students.

#### **2.2.5.2 POLICE PROTECTION**

The Kaua'i Police Department is divided into three regional districts (Līhu'e, Hanalei, and Waimea) in addition to the Patrol Services, Administrative, Investigative, and Traffic Safety Units. Hā'ena State Park is located within the Hanalei District. Hanalei District Office is located along Kūhiō Highway north of the Princeville Shopping Center. When fully staffed, there are twenty-one officers, one district commander, three sergeants, and one senior clerk. The Hanalei District spans from Kapa'a to Kē'e Beach.

#### **2.2.5.3 FIRE PROTECTION**

The Kaua'i Fire Department is County managed and is tasked with protecting and preserving lives and property and from all hazards. There are a total of seven different sub-stations throughout the island. Hā'ena State Park is served by the Hanalei Fire Station which provides ocean and trail rescue services for those who become lost or injured.

#### **2.2.5.4 MEDICAL FACILITIES**

Health care services for the island of Kaua'i are provided by three major hospitals. Samuel Mahelona Memorial Hospital in Kapa'a, Wilcox Memorial Hospital in Līhu'e and West Kaua'i Medical Center in Waimea. Samuel Mahelona Memorial Hospital is the closest medical facility to Hā'ena State Park.

#### **2.2.5.5 RECREATIONAL FACILITIES**

The County of Kaua'i owns and manages a total of 67 parks totaling 487.4 acres in land area. County parks include facilities for active as well as passive recreation. Within the Hanalei District, there are 38.93 acres of County-run facilities. They are:

- Hā'ena Park, 5.50 Acres - Beach Park  
Facilities and activities include: a pavilion, comfort stations, picnicking & camping, lifeguarded beach

- 
- 
- Hanalei Black Pot, 2.47 Acres - Beach Park  
Facilities and activities include: a comfort station, picnicking and camping
  - Hanalei Pavilion, 1.34 Acres - Beach Park  
Facilities and activities include: picnic pavilion, comfort station, lifeguarded beach
  - Wai'oli Beach Park, 6.41 Acres - Beach Park  
Facilities and activities include: a comfort station, picnicking
  - Wai'oli Town Park, 5.50 Acres - Neighborhood Park  
Facilities and activities include: soccer field, playground equipment, lighted basketball court
  - 'Anini Beach Park, 12.53 Acres - Beach Park  
Facilities and activities include: picnicking and camping, comfort stations, pavilions, boat ramp
  - Kilauea Park, 4.93 Acres - Neighborhood Park  
Facilities and activities include: playground equipment, lighted softball field, comfort station
  - Kilauea Dispensary Park, .25 Acres - Neighborhood Park  
No facilities

Seven of the parks offer camping facilities. Hā'ena Park is the nearest County park to Hā'ena State Park. The County is also developing Ke Ala Hele Makalae, a multi-use coastal path from Nāwiliwili to Anahola.

The Division of State Parks owns and operates nine State Park facilities on Kaua'i, including Ahukini and Waimea State Recreation Piers, Kōke'e and Waimea Canyon State Parks, Wailua River State Park, Russian Fort Elizabeth State Historical Park, Polihale State Park; Nāpali Coast State Wilderness Park and Hā'ena State Park. The total acreage of State Parks on Kaua'i is 14,095 acres.

Privately-run recreational vendors abound on the island of Kaua'i offering tours and equipment rentals for watersports (snorkeling, surfing, kayaking); helicopter tours; golfing; bed-and-breakfast inns and resort hotels. Nonprofit organizations also offer recreational opportunities. The Limahuli Garden and Preserve, owned and operated by the National Tropical Botanical Garden (NTBG), is located adjacent to Hā'ena State Park along Limahuli Stream, and on both sides of Kūhiō Highway. The

Garden provides opportunities for education about native plants, tropical ecosystems and Hawaiian culture through self-guided and organized tours.

John Clark summarized beach activities along the Hā'ena shoreline in his 1992 "Beach and Ocean Recreation Study" prepared for State Parks. The following table highlights the different activities and skill levels recommended by Clark at each location. The description of the Ka'ilio Shore in the report covers the entire shoreline fronting Hā'ena State Park from Limahuli Stream to Kē'ē. The 1992 report should be referenced for a full description of Clark's recommendations. These locations are also shown in Figure 10.

**TABLE 5: OCEAN AND BEACH ACTIVITIES ALONG HĀ'ENA COASTLINE**

ACTIVITY	TUNNELS BEACH	MANINIHOLO BEACH	CANNONS BEACH	Ka'ilio SHORE (Fronts Hā'ena State Park)
Beachcombing	✓	✓	✓	✓
Sunbathing	✓	✓	✓	✓
Picnicking		✓		✓
Camping		✓		
Swimming	● during calm seas	■ during calm seas		● Kē'ē Lagoon ■ Pohoikeiki
SCUBA Diving	● inside reef ■ outside reef		■ summer only, no diving in winter	● inside reef ■ outside reef
Snorkeling	● inside reef ■ outside reef			● inside reef ■ outside reef
Surfing, Bodysurfing, Bodyboarding	■ moderate surf ◆ high surf	◆	■ moderate surf ◆ high surf	■ moderate surf ◆ high surf
Windsurfing/ Kiteboarding	◆			■ moderate surf ◆ high surf
Kayaking	✓	✓ during calm seas		✓ during calms seas
Fishing	✓	✓	✓	✓
Whale Watching				✓
Bird Watching				✓
Symbols represent minimum skill level recommended by Clark (1992): ● = Beginner ■ = Intermediate ◆ = Advanced/Expert ✓ = Skill level not rated, but activity occurs				

---

---

## **3.0 Land Use Regulations and Requirements**

Development of additional facilities at Hā'ena State Park will require compliance with various local, State and in some cases, federal regulations, depending on the scope of development. Similarly, certain management actions may also require regulatory oversight.

### **3.1 FEDERAL REGULATIONS**

#### **3.1.1 ENDANGERED SPECIES ACT**

As described previously, the Hawaiian monk seal, Hawaiian hoary bat, native green sea turtle and hawksbill turtle, along with a number of native Hawaiian waterbirds are listed by the Endangered Species Act as "Threatened" or "Endangered." At this time, none of the land or nearshore waters at Hā'ena State Park are designated by the US Fish and Wildlife Service (USFWS) as critical habitat. However, if critical habitat designations are made for Hā'ena's land or waters, development will require consultation with the USFWS.

#### **3.1.2 LAND AND WATER CONSERVATION FUND**

In 1977, grant monies from the Department of Interior, National Park Service (NPS), Land and Water Conservation Fund (LWCF) Act of 1965 (Section 6, Land and Water Conservation Fund Act of 1965, as amended; Public Law 88-578; 16 U.S.C. 4601-4 et seq.) were used toward the acquisition of Hā'ena State Park. The original project agreement called for the acquisition of 24 parcels totaling 228.36 acres, an area much larger than Hā'ena State Park itself. The project scope was reduced to reflect a reduction of 172.91 acres, of which 171.46 acres was acquired through a land exchange and a 1.45-acre adjustment was made to one of the parcels.

The LWCF fund provides matching grants to states with the objective of preserving and developing outdoor recreational resources. As such, any development or use in the park must follow the post-completion and stewardship requirements of this program. These requirements are specified in Section 8 of the LWCF State Assistance Program Manual (LWCF Manual 2008). Some highlights include but are not limited to:

- 
- 
- **Operation and Maintenance:**
    - Maintain the park for public outdoor recreational use.
    - Maintain sanitation, accessibility, safety and overall appearance.
    - Maintain facilities and roads.
    - Keep open for public use at reasonable hours and times of the year. Post LWCF acknowledgement sign.
  
  - **Availability to Users:**
    - No discrimination on basis of race, color, national origin, religion or sex.
    - No discrimination on the basis of residence, including preferential reservation or membership systems, except to the extent that reasonable differences in admission and other fees may be maintained on such basis.
    - Fees charged to nonresidents cannot exceed twice that charged to residents. Where there is no charge for residents but a fee is charged to nonresidents, nonresident fees cannot exceed fees charged for residents at comparable State or local public facilities. Reservation, membership, or annual permit systems available to residents must also be available to nonresidents and the period of availability must be the same for both residents and nonresidents. Recipients are prohibited from providing residents the option of purchasing annual or daily permits while at the same time restricting nonresidents to the purchase of annual permits only. Nonresident fishing and hunting license fees are excluded from these requirements.
    - Reasonable limits on the extent and use of areas and facilities are permitted when such limitations are necessary for maintenance or preservation. Limitations may be imposed on the number of persons using an area or facility or the type of users, such as “hunters only” or “hikers only.” All limitations shall be in accord with the applicable grant agreement and amendments.
  
  - **Lease and Concession Agreements:** Such agreements with third parties are allowed within LWCF sites. However, the State remains responsible for maintaining compliance with all federal regulations and there are specific rules for the agreements and operations including compliance with civil rights and accessibility laws, periodic compliance reviews, competitive fees, and clear indication that the area is a public facility.

- 
- 
- **Conversions of Use:** There are also specific rules regarding conversions of use, or the loss of outdoor recreational space. However, they will not be elaborated here since a conversion is not anticipated for the park. The full rules can be found in Section 8.E of the LWCF Manual as amended.
  - **Underground Utility Easements and Rights-of-Way:** The State may allow underground utility easements within the Section 6(f)(3) area so long as the easement site is restored to its pre-existing condition within 12 months of disturbance.
  - **Proposals to Construct Public Facilities:** Public facility requests will only be approved if the public facility clearly results in a net gain in outdoor recreation benefits or enhances the outdoor recreation use of the entire park and the facility is compatible with and significantly supportive of the outdoor recreation resources and opportunities. Proposals must be submitted as a project amendment and request approval from NPS.
  - **Significant Change of Use:** The LWCF Act requires that the Section 6(f)(3) area be maintained for some form of outdoor recreation use as defined in the project agreement. NPS approval must be obtained prior to any significant change in use from the original intent or plans. Not every change requires NPS approval and should be viewed in the context of overall use and monitored in this context.

The State Liaison Officer (SLO) is responsible for administration of the LWCF Program in his/her State. This includes initial reviews for compliance of LWCF projects prior to forwarding to NPS for final evaluation. It also requires the development and regular updates to the State Comprehensive Outdoor Recreation Plan (SCORP). Hawai'i's SCORP was last updated in 2008. For the State of Hawai'i, the SLO is the Chairperson of the Department of Land and Natural Resources.

### **3.1.3 CLEAN WATER ACT**

Section 404 of The Clean Water Act regulates removal or fill of material from navigable waters of the United States. The US Army Corps of Engineers is tasked with implementing these regulations. Types of activities that are typically subject to this regulation are dredging and filling. Depending on the location, beach nourishment activities may be subject to Section 404.

---

---

Filling or altering wetlands are also subject to these regulations, if they are determined to be jurisdictional. As described previously, much of the park is mapped as wetlands on the US Fish and Wildlife Service produced National Wetland Inventory (NWI) maps. These maps are non-regulatory and serve to provide an indication that wetlands may be present in the area. Depending on the proposed location of development within the park, the Army Corps of Engineers may need to determine whether wetlands are present. Also depending on location, Army Corps involvement could be limited to confirming a biologist's assessment that no wetlands are present. However, if it appears that development is within or near wetland features, a biologist will likely need to delineate the feature and request concurrence with the delineation from the Army Corps Regulatory Branch. If development within a wetland is proposed, it is likely that the Regulatory Branch will require compensatory mitigation.

Section 402 of the Clean Water Act relates to the National Pollutant Discharge Elimination System (NPDES). NPDES permits are administered by the State Department of Health and are the basic structure for regulating discharge of pollutants to waters of the US. In general, for new construction, compliance with NPDES requirements involve employing appropriate best management practices (bmps) to control sediment or polluting runoff from flowing into waterways during the construction activity. Certain construction activities within the park may trigger the need for an NPDES permit.

### **3.1.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966**

The State Historic Preservation Division (SHPD) of DLNR is tasked with implementing the National Historic Preservation Act of 1966 in Hawai'i. Because the entire park site is on both the State and National Registers of Historic Places, it is expected that any development within the park will be subject to historic preservation review. The park includes the Hā'ena Archaeological Complex, which stretches from Limahuli Stream to Kē'ē (site number 30-02-1600), as well as Kūhiō Highway between Princeville and Kē'ē (site number 30-02-9396) and the Nāpali Coast Archaeological District (30-02-3200) which overlaps the park within TMK 5-9-01:22, the areas mauka of the highway.

## **3.2 STATE OF HAWAI'I**

### **3.2.1 STATE ENVIRONMENTAL REVIEW LAW**

The State Environmental Review Law (Chapter 343, Hawai'i Revised Statutes (HRS) requires an environmental assessment for any action that proposes the use of State or County lands and funds. Compliance with

---

---

Chapter 343, HRS, will be necessary for any new development in Hā'ena State Park. An environmental impact statement (EIS) will be prepared for this project for compliance.

### ***3.2.2 STATE LAND USE LAW***

The State Land Use Law (Chapter 205, HRS), establishes the State Land Use Commission and authorizes this body to designate all lands in the State into one of four districts: Urban, Rural, Agricultural, or Conservation. Hā'ena State Park is within the Conservation District (see Figure 27). This district is intended to protect watersheds and water sources; scenic and historical areas; parks; wilderness; open spaces; recreational areas; habitats of endemic plants; fish and wildlife; and all submerged lands seaward of the shoreline. Conservation lands are administered by the State Board of Land and Natural Resources.

Within the Conservation District, there are five subzones: Protective, Limited, Resource, General and Special. Excluding the Special Subzone, the four subzones are arranged hierarchically with regards to environmental sensitivity. The most sensitive areas are within the Protective Subzone and the least sensitive are within the General. The Special subzone is applied only to certain areas to allow a unique land use on a specific site. The majority of the terrestrial portions of Hā'ena State Park are located within the Resource Subzone with a small portion of the mauka lands south of the highway near the entrance classified as Limited (See Figure 28: Conservation District Subzones). The offshore areas of the park are within the Protective Subzone. Proposed uses within the Conservation District may or may not require various DLNR approvals depending upon the proposed use and the subzone in which it is located. Section 13-5-22 of the Hawai'i Administrative Rules identifies the various uses that are permitted and which approvals are required for each use.

### ***3.2.3 NORTH SHORE KAUA'I OCEAN RECREATION MANAGEMENT AREA***

Currently, all recreational boating and related vessel activity is under the jurisdiction of the State DLNR Division of Boating and Ocean Recreation (DOBOR) and regulated by HAR Title 13, Chapter 256, Subchapter 2, "North Shore Kaua'i Ocean Recreation Management Area." This management area includes all ocean waters and navigable streams between Moloa'a Bay and the southernmost boundary of the Nāpali Coast State Wilderness Park, and extends 3,000 feet seaward.

Section 13-256-41, HAR outlines restrictions specifically for the Nāpali Coast ocean waters which encompass all offshore waters of Hā'ena State Park. The restrictions include:

---

---

No person shall navigate a commercial motorboat or conduct a commercial kayak tour except for those who have been issued a permit by DLNR.

- Commercial vessels are limited to a passenger carrying capacity of less than 50.
- No commercial operator shall embark or disembark passengers along the shoreline unless they have a valid permit from the BLNR.

There are also regulations regarding operations within sea caves and within the Nualolo Kai subzone, which is further down the coast to the west.

#### **3.2.4 ACT 241, ESTABLISHING A COMMUNITY-BASED SUBSISTENCE FISHING AREA**

At present, fishing activity in the nearshore waters of Hā'ena State Park is regulated by the DLNR Division of Aquatic Resources (DAR). In the works since 2002, State Representative for District 14, Mina Morita and Senator Gary Hooser in 2006 introduced bills to create a community-based subsistence fishing area for the ahupua'a of Hā'ena. Act 241 was enacted on June 26, 2006. The goal for this legislation is to establish rules set by the Board of Land and Natural Resources (BLNR), based on traditional Hawaiian fishery management, where the resource is utilized by the community with enough protection to ensure that the resource is not exhausted. Currently, data is being gathered by the community to provide a solid foundation for development of the fishery rules.

#### **3.2.5 BURIAL SITES AND HUMAN REMAINS**

The Rules of Practice and Procedure Relating to Burial Sites and Human Remains [Title 13, Subtitle 13, Chapter 300, (HAR)] relate to the management of burial sites over 50 years. The rules are implemented by the DLNR Historic Preservation Division. The division works with other cultural organizations when burial remains related to their specific ethnic group are discovered. Island burial councils are administratively attached to the Historic Preservation Division to address concerns relating to Native Hawaiian burial sites.

Relocation or preservation in place of previously identified Hawaiian burials over 50 years old must obtain the approval of the appropriate Island Burial Council, which meets on a monthly basis on its respective islands. The Kaua'i/Ni'ihau Burial Council typically meets the first Thursdays of every month.

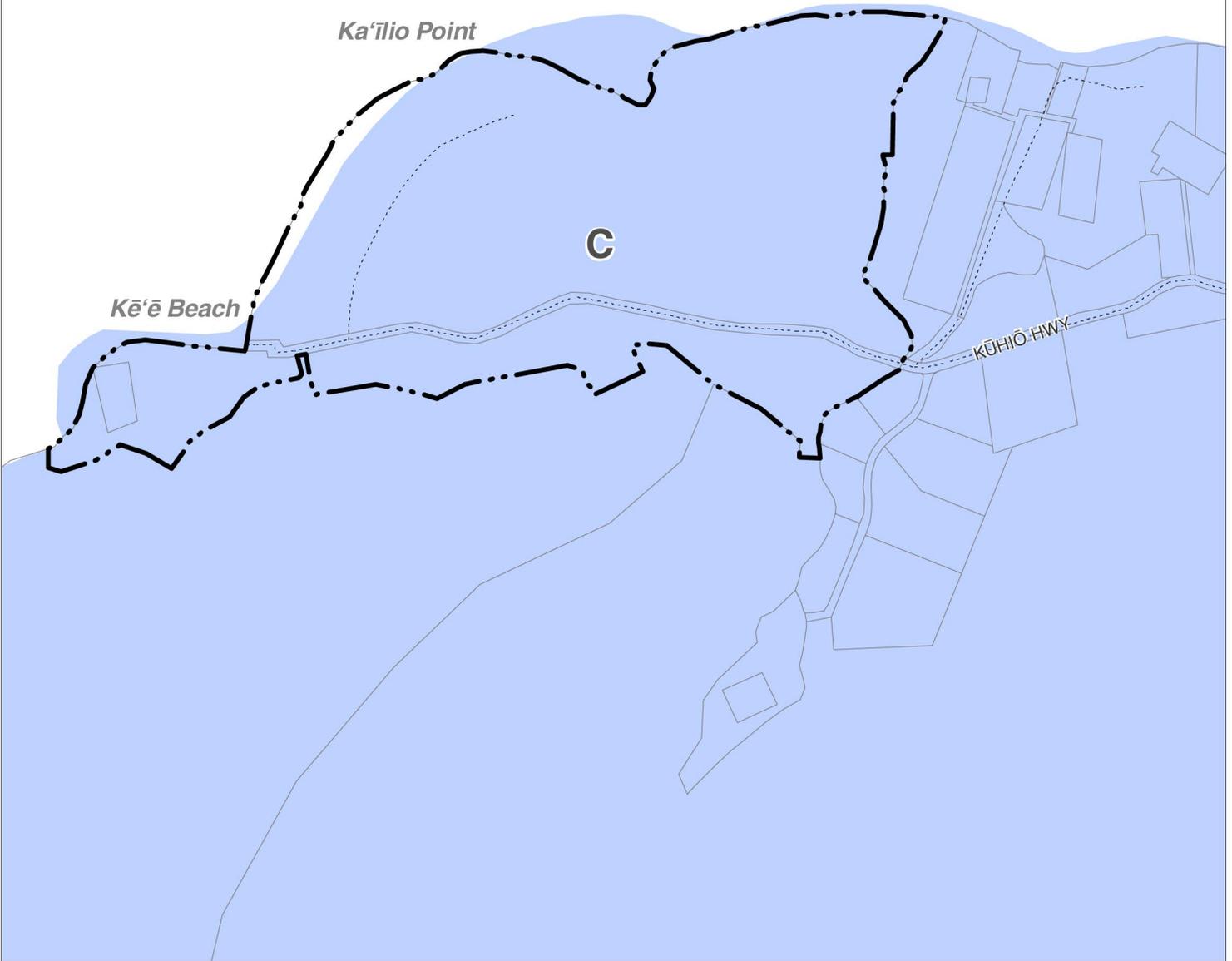
PACIFIC OCEAN

*Ka'ilio Point*

*Kē'e Beach*

C

KUHIŌ HWY



**LEGEND**

-  Hā'ena State Park Project Boundary
-  Road
-  A - Agricultural
-  C - Conservation
-  R - Rural
-  U - Urban

Source: State Land Use Commission (GIS, 2008)  
Disclaimer: This graphic has been prepared for general planning purposes only.

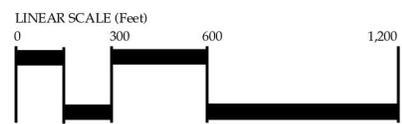
**FIGURE 27**

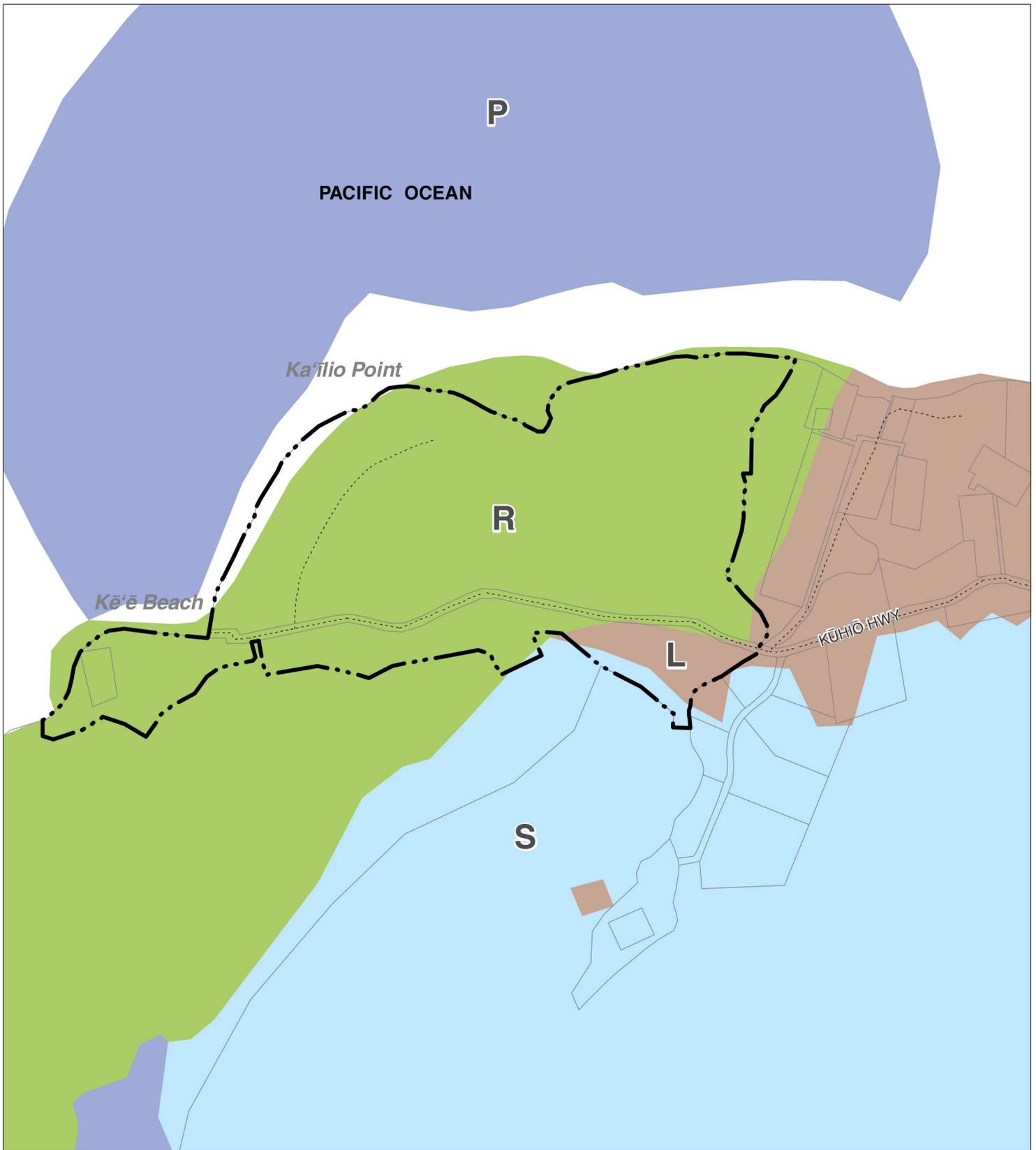
State Land Use District

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kaua'i





**LEGEND**

- Hā'ena State Park Project Boundary
- Road
- R - Resource Subzone
- L - Limited Subzone
- S - Special Subzone
- P - Protective Subzone

Source: State Department of Land and Natural Resources (1995)  
 Disclaimer: This graphic has been prepared for general planning purposes only.

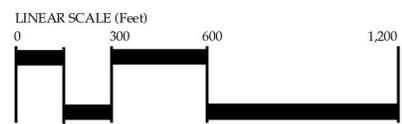
**FIGURE 28**

Conservation District Subzones

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kaua'i



---

---

### **3.2.6 COMMISSION ON WATER RESOURCE MANAGEMENT**

Alterations to streams such as dams, diversions and even some restoration activities are subject to a Stream Channel Alteration Permit. These permits implement the State Water Code (HRS 174C) and are administered by the Commission on Water Resource Management. Any alteration to Limahuli Stream would require such a permit.

### **3.2.7 KŪHIŌ HIGHWAY (ROUTE 560) HISTORIC ROADWAY CORRIDOR PLAN**

Adopted in 2005 by the State DOT, the *Kūhiō Highway (Route 560) Historic Roadway Corridor Plan* was prepared by Belt Collins Hawai'i Ltd. and provides design guidelines to help preserve the natural, historic, and rural character of Route 560 on Kaua'i. Route 560 stretches roughly ten miles from Hā'ena to the west side of the Princeville entrance road (Ka Haku Road). With strong community support, Route 560 has been listed on both the Hawai'i and National Registers of Historic Places and has retained much of its original character including narrow lanes and pavement, one-lane bridges, winding alignments, concrete ford crossings, and timber and masonry guardrails. It also crosses one of only fourteen American Heritage Rivers in the US and is recognized for its scenic qualities by being designated as a Scenic Roadway Corridor in the County's General Plan.

The plan was developed using context sensitive design (CSD), an inclusive, community-based design process that has been adopted in several transportation plans nationally. The approach recognizes that historic preservation and highway safety are not necessarily mutually exclusive concepts (Belt Collins 2005).

The plan is used mainly by the Kaua'i District Office of the State DOT to guide the long-term "preservation, rehabilitation, restoration, reconstruction and improvement, and repair and maintenance work on Route 560 over the next 25 years" (Belt Collins 2005). The plan does not include specific improvement projects but provides guidance for any work that is required on Route 560. It recommends that the DOT use the flexible design standards of the AASHTO's "Green Book" and "A Guide for Achieving Flexibility in Highway Design" in order to balance preservation of the highway's historic and aesthetic nature with the State DOT's need to provide a safe and efficient roadway. Whenever preservation of existing roadway features fall outside of AASHTO's design parameters, design exceptions should be sought. This process, however, is complex and highly procedural and therefore the plan

---

---

recommends “early, careful planning... be undertaken from the start” (Belt Collins 2005).

The plan also recommends including community input and documenting final design decisions. It notes that Route 560 is not on the National Highway System and therefore does not require Federal Highway Administration approval for design exceptions. If, however, federal aid is used for the project, federal review is required. It also recommends that any rockfall stabilization work be designed “in harmony with the historic character-defining qualities of the right-of-way corridor” while providing safety for motorists, bicyclists, and pedestrians (Belt Collins 2005).

### **3.3 COUNTY OF KAUA‘I**

#### **3.3.1 GENERAL PLAN**

The General Plan (GP) of the County of Kaua‘i is a long-range policy document that fulfills legal mandates of State Law and the Charter of the County of Kaua‘i. It is intended to help guide long-range development for the enhancement and improvement of life on Kaua‘i, advance the County’s vision for Kaua‘i and establish the strategies to help achieve that vision including recommended land uses. The GP was last updated in 2000.

The GP (4.2.8.3(e)) includes policy statements and goals such as, “*improve facilities, maintenance and management of activities at State and County Parks.*” The GP North Shore Planning District Land Use Map designates the areas of Hā‘ena State Park makai of the highway as “Park.” The areas mauka of the highway including the area around the hula heiau complex are designated as Open. See Figure 29.

The GP North Shore Planning District Heritage Resource Map identifies the park as “Open Space/Park” fronting a Scenic Roadway Corridor. It also identifies the coral reefs along the shore and two heiau sites within the park (see Figure 30). One is Ka Ulu A Paoa Heiau and the other appears to be located in the area of Lohi‘au’s House Platform although it is not labeled on the County’s map.

#### **3.3.2 NORTH SHORE DEVELOPMENT PLAN**

The North Shore Development Plan (DP) implements zoning and provides a framework for guidelines to direct the physical locations and relationships of major improvements, buildings and landscapes within the North Shore Special Planning Area. It was last updated in 1980 by Wilson Okamoto & Associates. The development plan designation and

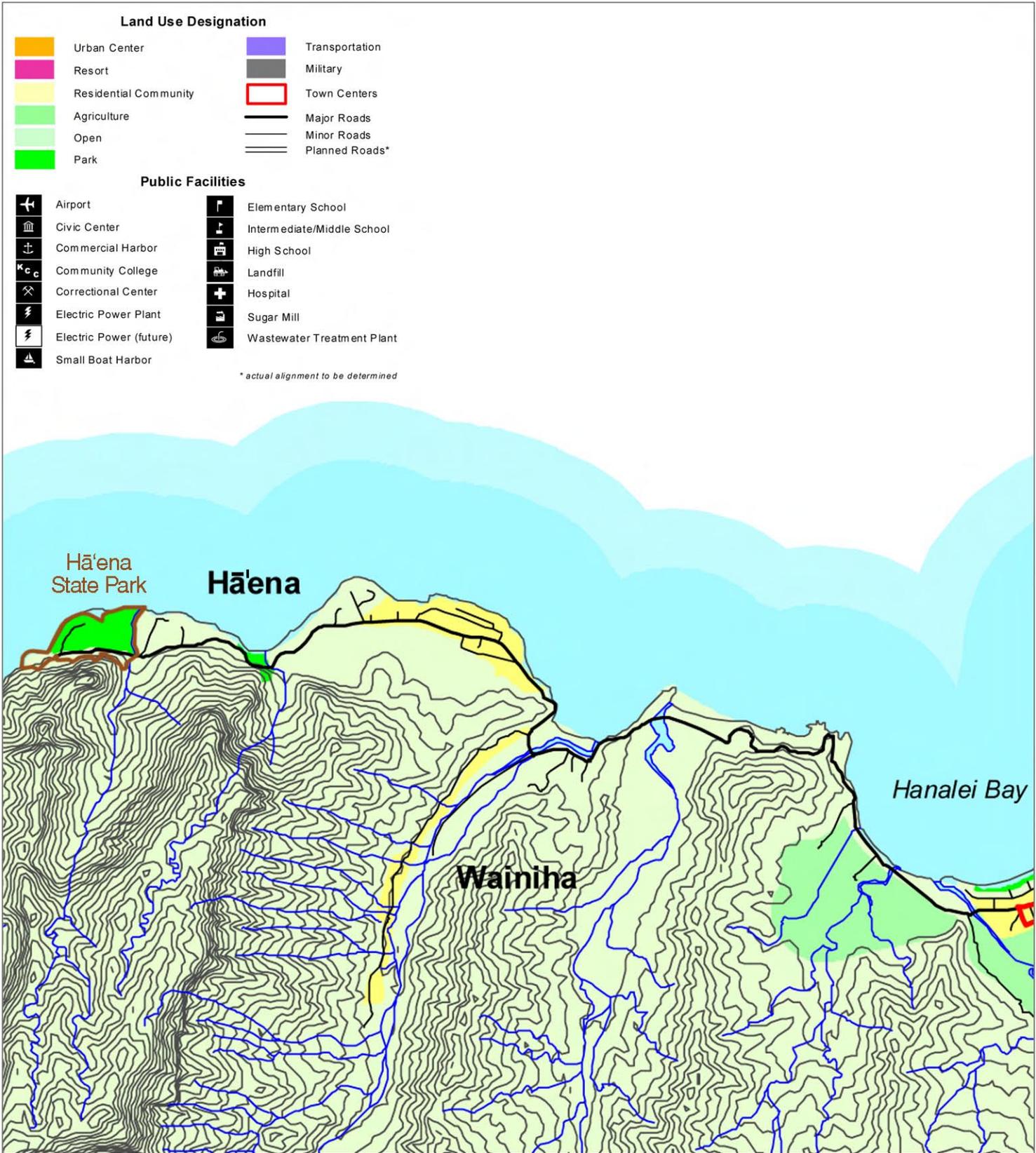
---

---

recommended zoning for the park were both Open. Parks are permitted uses in the Open District. See Figure 31. Applicable guidelines and policies from the DP are as follows:

**Goals and Objectives:**

- **Goal A:** To preserve the unique natural beauty of the North Shore Planning Area.
  - To identify those features of natural beauty and the measures necessary to assure their preservation.
  - Retain the Nāpali Coastline as it is now.
- **Goal B:** To preserve the special rural charm of the North Shore Planning Area.
  - To provide for the development of man-made features that do not visually overwhelm the existing small structures and the prevailing plant materials and soft groundcover (landscape treatment).
  - To provide for the development of man-made features that will not require extensive services or modifications to the landscape, not in harmony with the rural character.
- **Goal E:** To preserve the wildlife and flora of the North Shore, recognizing man's dependence upon this preservation for his own health and welfare.
  - Identify the habitats of birds, fish and animal life, and present programs for the preservation of endangered species.
  - Identify the major vegetation patterns and develop programs for the preservation of significant forests or particular species or plant associations.
- **Goal F:** To insure the preservation of the historic-archaeological sites in the North Shore Planning Area.
  - Identify and catalog the archaeological sites within the North Shore Planning Area and provide for their protection and appropriate future inspection by the public.
  - Identify the historic sites, trails, plant materials, buildings, water systems and other items of historic interest to the people and provide for their protection.
- **Goal H:** To provide for recreational opportunities that are compatible with the unique qualities and natural features of the North Shore.
  - Develop a recreation plan that provides for a diversity of recreation opportunities for the people of the North Shore Planning Area and visitors.



\* actual alignment to be determined

**LEGEND**

 Hā'ena State Park Project Boundary

**FIGURE 29**

General Plan - Land Use Map

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kaua'i



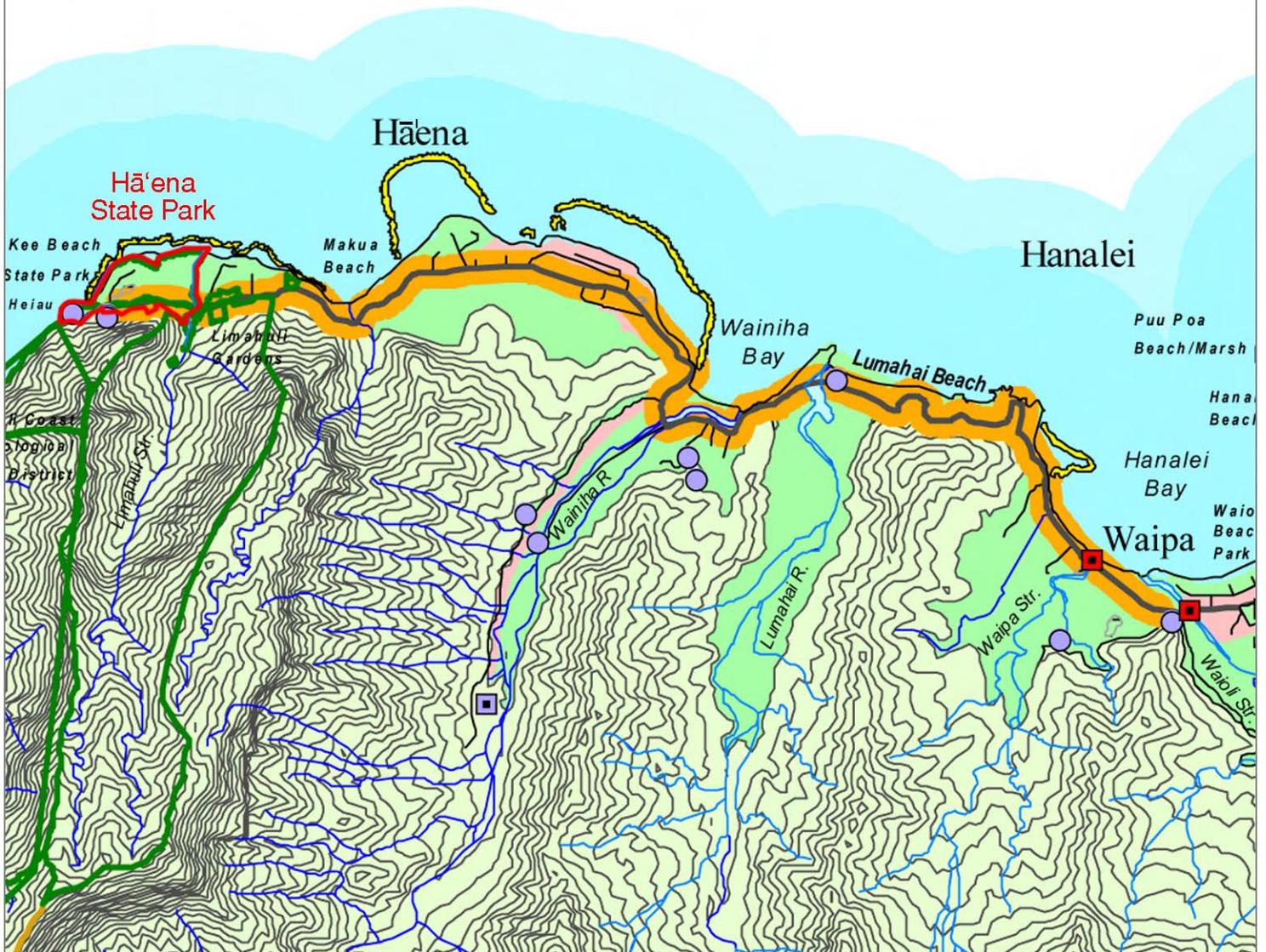
NOT TO SCALE



Source: North Shore Planning District - Land Use Map  
 Disclaimer: This graphic has been prepared for general planning purposes only.

**Legend**

- |   |  |
|---|--|
|  Important Land Form   |  Registered Archaeological Sites (excluding burials & lava tubes) |
|  Open Space, Parks, Agriculture, Conservation                |  Heiau Site   |
|  Residential, Urban Center, Resort, Transportation, Military |  Registered Historic Buildings & Structures                       |
|  Streams, Reservoirs, Ponds                                  |  Other Important Historic Buildings & Structures                  |
|  Scenic Roadway Corridors                                    |  Major Taro Growing Areas   |
|  Coral Reefs   |  Other Natural, Historic, Cultural, Scenic Features               |
|  Marshes   |  Special Streams  |
|  Resource Parks & Sites                                      |  Streams  |
|  Federal & State Natural Preserves                           |  Small Boat Harbors/Ramps   |



**LEGEND**

-  Hā'ena State Park Project Boundary

**FIGURE 30**

General Plan - Heritage Resources

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

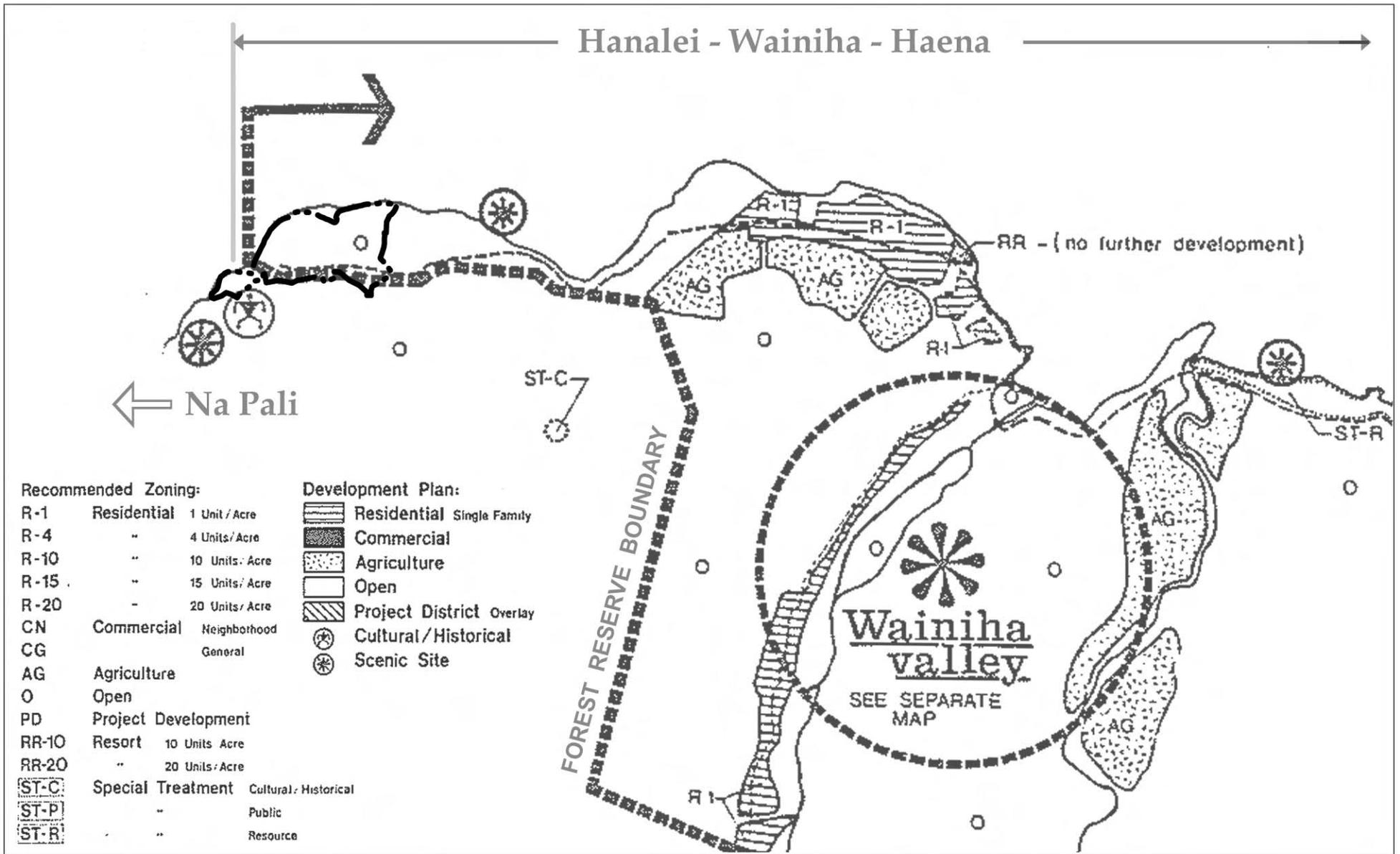
Island of Kaua'i



NOT TO SCALE



Source: North Shore Planning District - Heritage Resource  
 Disclaimer: This graphic has been prepared for general planning purposes only.  
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.



## LEGEND

Hā'ena State Park Project Boundary

FIGURE 31

North Shore Development Plan Update

# HĀ'ENA STATE PARK

Department of Land and Natural Resources

Island of Kaua'i

NORTH

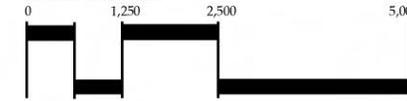
LINEAR SCALE (Feet)

0

1,250

2,500

5,000



---

---

**Recommendations:**

- **Economy:**
  - 1. In terms of maintaining the desired rural lifestyle, the agricultural industry is the most important industry to the North Shore.
  - 9. The natural beauty of the area is the primary attraction to tourists, and should be preserved and enhanced. Tourist accommodations or facilities must not be allowed at the expense of environmental degradation.
  - 10. Scenic and recreational resources should be made available to tourists only to the extent that proper management can assure the preservation of such resources from exploitation and irreversible loss.
  - 11. The values and lifestyle of the local residents should not be unreasonably compromised to accommodate the tourist industry.
  - 12. Commercialization of natural resources is to be discouraged.
  
- **Natural Resources:**
  - *Scenic/Historic:*
    - 1. Scenic views should not be adversely affected by man-made improvements.
    - 3. Archaeological reconnaissance surveys should be required for activities and new developments proposed on lands which may contain significant historical features.
    - 4. Discretion must be exercised in determining the value of preserving historical features, with respect to safety, hardship, maintenance costs, and educational, cultural, and aesthetic benefits.
  - *Outdoor Recreation:*
    - 1. Only basic supportive facilities should be provided at outdoor recreation areas selected for general public use in order to enhance the experience. Improvements should be limited to such things as access, comfort stations, trash receptacles, water fountains, emergency telephones, and parking.
    - 2. Multiple activity recreation areas must be managed to avoid hazardous conflicts between recreators and allow maximum use of resources (e.g. area suitable for swimming, paddling, and fishing; or area suitable for hunting, bird watching, and hiking).
    - 6. Although public access is obtained to recreational resource areas, publicity should be minimized unless

- 
- 
- the appropriate agency can assure adequate management and security measures. Local residents should be allowed to continue traditional patterns of resource use.
- 7. New public access to resource areas should be limited to pedestrian trails rather than vehicular roads, if control of use is an objective. Vehicular access should be allowed only for maintenance and emergencies.
  - 8. Access to the Nāpali coast area [west of Kēʻē] should be limited to foot trails by hikers and campers with permits only. Other modes of commercial access such as helicopters and boats should be discouraged, except for maintenance and emergency purposes.
- *Wildlife:*
    - 1. Important natural habitat areas for wildlife should be protected and enhanced.
    - 2. Wildlife resources significant to traditional recreational and dietary habits of local residents, must be managed to assure availability in the future.
    - Rare and endangered animal and plant species habitats should receive particular attention, in order to assure viable future communities.
  - *Natural Hazards:*
    - Development in tsunami inundation areas should be discouraged. No high density improvements should be permitted.
    - Development in areas subject to riverine flooding should be discouraged, unless adequate flood-proofing measures can be demonstrated. No high density improvements should be permitted.
  - *Social Development:*
    - Improve recreational facilities.
  - *Land Use:*
    - Nāpali Subarea: 1. The region should be maintained primarily as a natural wilderness reserve, and secondarily as a limited outdoor recreational area. 2. Public access should be by foot trail only. Other modes of access such as boats and helicopters should be restricted to maintenance, emergencies, and scientific research only.

### **3.3.3 ZONING**

Hāʻena State Park is in the State Land Use Conservation District. Therefore, it is not assigned a County zoning designation.

---

---

### 3.3.4 SPECIAL MANAGEMENT AREA

The Special Management Area (SMA) implements HRS Chapter 205A, Coastal Zone Management Act and was established to protect coastal resources in areas extending inland of the shoreline. The majority of Hā'ena State Park is located within the SMA as shown on Figure 32.

Upon acceptance of a Final EIS, a Special Management Area (SMA) permit will be required for any park development within the SMA from the County of Kaua'i. An SMA permit will also be required for the constructed wetlands should that project move forward.

### 3.3.5 SHORELINE SETBACK ORDINANCE

The County of Kaua'i Shoreline Setback is set forth in Section 8-27, Kaua'i County Code. The ordinance's purpose statement emphasizes the economic and ecological importance of Kaua'i's coast and the potential for natural coastal hazards to occur. The purpose statement goes on to stress the need to recognize coastal hazards and to utilize "documented rates of shoreline change" in all aspects of planning, including the siting of structures.

The shoreline setback ordinance applies to all land that abuts the shoreline or is located within 500 feet of the shoreline. A property's shoreline setback is determined based on a property's average depth from the certified shoreline or, depending on parcel size and shape, may incorporate the local coastal erosion rate. The ordinance sets forth the following table to calculate the shoreline setback as measured from the certified shoreline:

**TABLE 6: COUNTY OF KAUA'I SHORELINE SETBACK FOR LOTS WITH AN AVERAGE DEPTH OF 160 FEET OR LESS**

If the average lot depth is:	100 feet or less	101 to 120 feet	121 to 140 feet	141 to 160 feet	161 to 180 feet	181 to 200 feet	More than 200 feet
Then the minimum setback is:	40 feet	50 feet	60 feet	70 feet	80 feet	90 feet	100 feet

Source: Table 1, §8-27 KCC.

However, for lots with an average depth of more than 160 feet from the certified shoreline, the setback from the certified shoreline is based on a coastal erosion study and shall follow the table below:

**TABLE 7: COUNTY OF KAUA'I SHORELINE SETBACK FOR LOTS WITH AN AVERAGE DEPTH GREATER THAN 160 FEET**

For structures with a building footprint that is:	Less than or equal to 5,000 square feet	Greater than 5,000 square feet
Then the setback distance is:	40 feet plus 70 times the annual coastal erosion rate	40 feet plus 100 times the annual coastal erosion rate
Source: Table 2, §8-27 KCC.		

For lots that require a calculation under Table 7, a current (within six months) certified shoreline survey must be provided. The average lot depth must be determined and the County of Kaua'i Shoreline Study must be used.

Certain types of development are permitted within the shoreline setback. Examples of these include: repairs to lawfully existing structures; structures built to address emergencies and unmanned civil defense structures; beach nourishment or dune restoration projects approved by all applicable government agencies; and structures or activities determined by the Planning Director to be "minor," which include those which cost less than \$125,000 and do not adversely affect beach processes or significantly interfere with public access or views. It also "includes, but is not limited to, lighting in conformance with HRS Chapter 205A, landscape features, barbeques, picnic tables, benches, chairs, borders, wooden trellis, bird feeders, signs, safety improvements, movable lifeguard stands, walkways for access, outdoor showers and water faucets, public utility lines, utility poles and accessory structures along existing corridors, temporary tents for special events not exceeding fourteen consecutive days in any three-month period, walls and fences located more than forty feet from the shoreline, landscape planting and irrigation systems provided they are directed away from a valid certified shoreline and do not artificially extend the shoreline or shoreline setback area seaward." The complete definition of "minor activities" and "minor structures" is provided in Section 8-27.2 of the Kaua'i County Code.

A variance to the ordinance to the shoreline setback may also be requested. Approval of a variance is based on specific criteria which evaluate the proposed use and/or hardship of a particular situation.

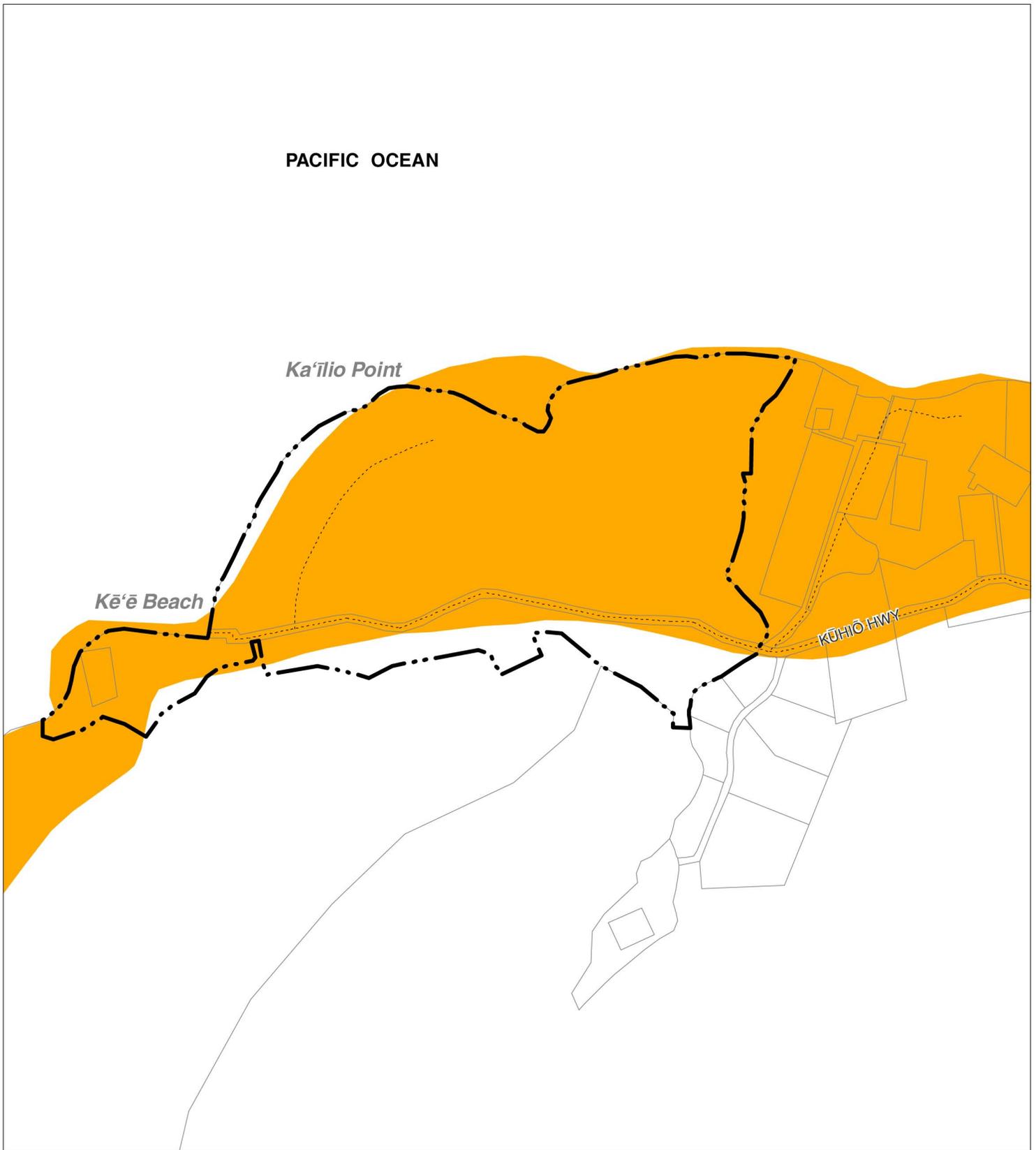
At Hā'ena State Park, TMK: 5-9-008:01, 5-9-008:22 and 5-9-008:25 are subject to the Shoreline Setback Ordinance because the lots abut the shoreline. TMK 5-9-008:01, where the bulk of the park's activity occurs is an irregularly shaped lot. Thus, pursuant to the ordinance, the average lot depth will be determined by the Planning Director. However, given the lot's size of over 50 acres, for planning purposes, it is safe to assume that the average lot depth is greater than 160 feet. As such, Table 7 above

---

---

should be used to determine the shoreline setback for development on this TMK. The exact setback at a particular location will depend on the type of activity, structure footprint (greater than or less than 5,000 square feet), a current certified shoreline and the coastal erosion rate as documented in the County of Kaua'i Shoreline Study.

A portion of the shoreline at Hā'ena State Park was surveyed by Dennis Esaki on January 22, 2009 and certified by the Board of Land and Natural Resources on June 1, 2009. It runs roughly from the edge of the highway parcel near Kē'e Beach to Ka'ilio Point. It is shown in the Site Analysis graphic in Figure 35: Site analysis Plan. Please note, however, that shoreline surveys should not be certified more than six months in advance of an application for shoreline setback determination.

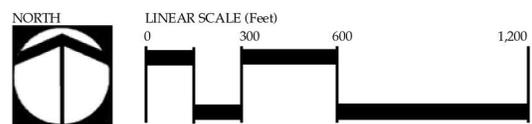


**LEGEND**

-  Hā'ena State Park Project Boundary
-  Road
-  Within the Special Management Area

**FIGURE 32**  
 Special Management Area  
**HĀ'ENA STATE PARK**

Department of Land and Natural Resources Island of Kaua'i



Source: County Planning Department (GIS, 2008)  
 Disclaimer: This graphic has been prepared for general planning purposes only.

---

This page intentionally left blank.

---

---

Many believed Laka to be a goddess, but there were still others who claimed that he was a god who was also called Kuohia-laka whose plant form was the 'ōhi'a lehua.  
The following chant appears to substantiate this:

*Noho ana Laka I ka ulu wehiwehi,  
Ku ana iluna o Moohelaia,  
Ka ohia ku iluna o Maunaloa,  
E aloha mai Kaulanaula ia'u,  
Eia ka ula he ula leo  
He kanaenae aloha na'u ia oe, a Laka,  
E Laka e hoola ia.*

Laka dwells in a beautiful grove,  
Standing up on Moohelaia,  
As an ohia tree on Maunaloa.  
Have compassion on me, O Kaulanaula,  
Here is my gift, a gift given by voice,  
A prayer of affection to you, O Laka.  
O Laka, inspire us.

*From an unpublished manuscript written by Mary Kawena Pūku'i, date stamped September 14, 1936 and printed in the 2008 Humu Mo'olelo Journal of the Hula Arts (volume 1, number 3) with permission from the Bishop Museum.*

---

---

## ***4.0 Human Use Data***

### **4.1 OVERVIEW**

Within Hā'ena State Park, there are a wide variety of activities that occur. Some are culture-based activities that have been practiced here for generations such as hula, fishing, and gathering. Others are recreational and tend to be transitory in nature such as swimming, snorkeling, and hiking. Because of the inherent differences between the two types of activities, conflicts between user groups can arise. The following section describes current and historical human use of the park area and summarizes some of the issues, needs, and conflicts that exist.

### **4.2 TRADITIONAL AND CULTURAL ACTIVITIES**

#### ***4.2.1 HULA COMPLEX***

Hā'ena is well-known for its importance to hula. Ka Ulu A Paoa Heiau and Ke Ahu A Laka are significant places in the training and 'uniki, or graduation, of hula students. Ke Ahu A Laka or, "Inspiration of Laka" is named for Laka. The heiau and its students were dedicated to Laka, the goddess of the forest and dance (Orr, 2010). Ka Ulu A Paoa or, "Inspiration of Pā'oa" after Lohi'au's great friend, Pā'oa (Paoa), who swore to avenge his death. This heiau was the school for historians where it is said that students were required to recite long genealogies without error. The hula platform continues to receive regular visits from hula hālau from Hawai'i and abroad. However, at times practitioners are deterred from accessing the hula complex when the access is not maintained and becomes overgrown. Interviews conducted for the Cultural Impact Assessment (CIA) (Appendix A) make the distinction between these two discreet sites as they serve two separate functions.

With regard to vegetation in the park, the interviewees for the CIA recall being able to see the heiau and the platform from the beach.

#### ***4.2.2 KALO CULTIVATION***

Historically, Hā'ena was the site of an extensive agricultural complex. Those interviewed for the Cultural Impact Assessment (CIA) (Appendix A) recollected the history of taro cultivation in the area that is now the park. Chipper Wichman recalls those who raised taro when he was growing up. Thomas Hashimoto recalls planting taro after the 1957 tsunami through the year 1966 when the State became interested in owning the property. In the late 1950's, the nukea viariety was planted as well as peali'i, Lehua, piko and hapu'u varieties (Orr 2011 p. 94). The

---

---

agricultural complex at Hā'ena was just one part of a larger regional agricultural complex that included Limahuli Valley and the valleys of the Nā Pali.

Thomas Hashimoto also recalls the poi mill, operated by "old man Kina". He describes the poi mill equipment being intact and on site (although out of use) up until the land was acquired by the state.

Over the years, the lo'i fell out of use and became overgrown. Several studies have been prepared to restore the lo'i and the first part of Phase I of the restoration has been cleared and kalo cultivation has commenced again. Currently, local community members, organized by Hui Maka'ainana o Makana, have a curatorship agreement with State Parks and serve as the caretakers of the lo'i.

Those interviewed for the CIA recall Hui Maka'ainana o Makana re-opening the lo'i and envision the areas where more lo'i can be opened up. They recall that the 'auwai that conveyed water from Limahuli Stream to the lo'i was also overgrown (Orr, 2011 p. 99).

#### **4.2.3 FISHING**

Fishing at Hā'ena is a subsistence practice for some and recreational activity for others. Fishing is discussed in more length under "Marine and Nearshore Recreational Activities". However, this does not diminish the importance of the Hā'ena fishery in nourishing the traditions and bodies of the Hā'ena 'ohana and kama'aina. Interviews conducted for the Cultural Impact Assessment tell of making soup with simply fish, salt and water. Mullet was eaten raw with shoyu, steamed with salt cabbage and black beans or broiled (pulehu). According to the CIA interviews, the Hā'ena fishery was one of abundance that was shared among family and neighbors. Traditional fishing methods included various nets and some pole and line. 'Ōpelu (mackerel), 'ahi (yellow fin tuna), moi (threadfish), kala (surgeon or unicorn fish), 'ō'io (ladyfish or bonefish) and ulua (jack) were specific fish described in the interviews. The need for greater management of Hā'ena's fishery has been recognized by the State, and a collaborative process involving the local community to establish a Community Based Subsistence Fishery is underway.

'Opihi were also gathered at Hā'ena (Orr, 2010) and prior to designation on the Endangered Species List, honu were also harvested from the sea for subsistence. Limahuli Stream continues to be habitat for 'o'opu (goby), and interviews conducted for the CIA tell of collecting and frying 'o'opu. Those interviewed for the CIA also recall 'o'opu, 'akupa and crayfish and bullfrog all being in the former fishponds.

---

---

#### **4.2.4 GATHERING**

Limu gathering continues to occur along the reefs off Hā'ena State Park. Interviews conducted for the Cultural Impact Assessment (Appendix A) indicate that there were many varieties of limu to be gathered in Hā'ena's nearshore waters, but that the variety and abundance has diminished over time. According to the Stepath/Save Our Seas study, "the Hawaiians use the reef for food collection and feel that the walking and suntan oil use in the area has a negative impact on the limu (algae) and marine life that they collect for food off the reef. This was not specifically studied, but the local residents seem to be convinced that it is true" (Stepath 2006).

#### **4.2.5 OTHER CULTURAL PRACTICES**

The descendants of Hā'ena actively care for the cemeteries which are located west of Limahuli Stream. Interviews conducted for the CIA confirm that lineal descendants know where their kupuna are buried and continue to care for the burial sites. Care for the documented cemeteries is documented in the 1996 Burial Treatment Plan (Carpenter). The Burial Treatment Plan also includes recommendations for future management of the cemeteries. These recommendations included fencing cemetery areas, allowing access to lineal descendants and State staff as well as marking the area as a cemetery and prohibiting vehicle access along the dunes. Since the burial treatment plan was written, a gate prohibits vehicle access to the cemetery areas. Those who care for the cemeteries must utilize public parking areas, and at times, have found locating parking difficult due to high visitor use (Community Open House, October, 2008).

Other non-Hawaiian practices have also been reported at the park. "Spiritual" cave visits at Waiakanaloa and Waiakapala'e are known to take place where people burn incense or bring other paraphernalia into the caves. Often, they leave these behind adding to the litter problem within the caves (The Keith Companies 2001).

### **4.3 RECREATIONAL ACTIVITIES**

SWCA summarized the current recreational uses at Hā'ena State Park in their 2009 report (Appendix B). It includes information gathered during their surveys as well as information from the late 1990s master planning effort and other earlier studies. In the summer of 2009, a research project conducted by Mehana Vaughan with the cooperation of many community volunteers also documented human use of the nearshore marine environment at Hā'ena, from Kē'e to the west and Naue to the east. Vaughan's study included over 250 counts of human activity; surveys of 175 individuals; and interviews with lawai'a (fishermen/women). The counts were developed through collaboration with many community members, coordinated with the help of the Hawai'i Community

---

---

Stewardship Network (HCSN) and in collaboration with County lifeguards who staff Kēʻē.

In 1992, John Clark prepared the “Beach and Ocean Recreation Study” specifically for State Parks to provide a recreational resource inventory and management recommendations for the entire Hāʻena shoreline. It included field surveys conducted from June 1988 to June 1989, descriptions of the shore and nearshore environment and recreational resources from Tunnels Beach to the Kaʻilio Shore. Descriptions of user group activities, conflicts and problems, recommended carrying capacities and water safety recommendations were also provided. The information summarized below focuses mainly on recreational activities within Hāʻena State Park.

#### **4.3.1 MARINE AND NEARSHORE RECREATIONAL ACTIVITIES**

As summarized earlier, the Kaʻilio Shore fronts the entire shoreline of Hāʻena State Park and includes a wide variety of ocean and beach related recreational activities. They include beachcombing, sunbathing, swimming, scuba diving, snorkeling, surfing, windsurfing, and kayaking. Other activities observed include whale watching and bird watching. Clark describes the Kaʻilio Shore as having two main recreational areas: Kēʻē Beach and Lagoon on the west and Poho-lokeiki on the east where Limahuli Stream flows into the ocean.

##### **4.3.1.1 BEACHCOMBING, SUNBATHING, AND PICNICKING**

According to Clark, beachcombing is best at the east end near Limahuli Stream, especially during the winter months and immediately after high surf. Clark also notes that the beach is the most level and widest on the northern stretch of shoreline. Sand borders both sides of Limahuli Stream, extending approximately 150 feet to the vegetated sand dunes. Continuing west, it narrows and widens again at the secondary outfall of Limahuli Stream and the natural drainage outflow from the park site at about halfway down the coast. As the beach rounds Kaʻilio Point towards Kēʻē, it narrows and steepens with the sand becoming noticeably darker. Clark notes that this is primarily due to the admixing of detrital material from the adjoining park areas. At Kēʻē Lagoon, the beach widens and levels out again, providing another good area for sunbathing. Picnicking tends to happen mainly at Kēʻē Beach, close to parking and public facilities. However, couples and small groups were also observed walking further east with their beach towels and coolers.

Vaughan also found through counting individuals on the beach, in the water and in the surf that the majority of individuals at Kēʻē were using

---

---

the beach. Peak use was found to be early afternoon, between 1:00 and 2:00 PM.

#### **4.3.1.2 SWIMMING, SNORKELING, AND SCUBA DIVING**

According to Clark, there are two swimming areas: Poho-lokeiki and Kē'ē Lagoon. Poho-lokeiki is near Limahuli Stream where the freshwater discharge has retarded the growth of nearshore corals and created Poho-lokeiki Channel. The inshore channel is shallow with a sandy bottom, providing a partially protected swimming area under normal ocean conditions. The area is suitable for intermediate and advanced swimmers eight years and older during calm sea conditions (Clark 1992). Clark noted that this area used to be the primary swimming site in the 1970s when the Taylor Camp was active but by the time of his survey in the late 1980s, it was infrequently used due to the lack of facilities and convenient access nearby.

Kē'ē Lagoon is the second swimming area within the park and is the primary site for swimming and sunbathing due to its close proximity to parking and public facilities. It is suitable for all ages and skill levels (Clark 1992). Ka'ilionui Reef forms its east and offshore edge, with a rocky point to the west. The sandy bottom is shallower nearshore and slopes gradually to overhead depths and provides an excellent swimming area. Near the point, however, the lagoon narrows into a deep channel that parallels the shore as it passes the end of the reef and ends in the open ocean. Depths in the channel average eight to ten feet (Clark 1992).

The lower reaches of Limahuli Stream are also occasionally used by locals and visitors as a freshwater dipping and wading area. "Cold Pond" located at the entrance of the park is a popular spot for these activities. However, the level of use of these areas has not been studied (SWCA 2009).

According to Clark, Kē'ē Lagoon is also recognized as a primary snorkeling site for Kaua'i and of statewide significance for snorkeling and SCUBA diving. Snorkelers were observed in the lagoon at all times of the day except during the most adverse high surf conditions. Inside the reef, conditions are suitable for novice snorkelers and SCUBA divers and outside the reef for intermediate and advanced snorkelers and SCUBA divers (Clark 1992). Clark's findings are supplemented by the 2009 data compiled by Vaughan who found that the most common water activity along the entire coast of Hā'ena was snorkeling.

---

---

#### 4.3.1.3 SURFING, WINDSURFING, AND KITEBOARDING

Clark lists three surfing sites off Ka'ilioiki Reef—Insanities, Mad Dogs, and Reefers. A map of the local surfbreaks off the Hā'ena coastline is provided in Figure 33: Reef Environment and Surf Breaks. They are suitable for intermediate surfers during moderate surf and advanced surfers during high surf. According to Clark, Insanities and Mad Dogs are side-by-side, almost the same break, but Insanities is the name of the left slide and Mad Dogs is the name of the right slide. Blue Hole surf spot is located offshore of Ka'ilionui Reef and similarly suitable for intermediate surfers during moderate surf and only advanced surfers during high surf. All four breaks are dangerously close to their respective reefs and are therefore only suitable for more skilled surfers (Clark 1992). Clark also noted that these surf spots were infrequently surfed during his survey in the late 1980s due to the perilously close breaks along the reefs.

Reefers is the primary site for windsurfers. According to Clark, it is considered to be of statewide importance for windsurfers with one of the best wave-jumping sites on the North Shore. It is a sailing and wave-jumping site suitable for intermediate windsurfers during moderate surf and for advanced and expert windsurfers during high surf. Entry and exit is across the reef flat during high tides of two feet or more and also through the small channel between Ka'ilioiki and Ka'ilionui Reefs (Clark 1992). In the late 1980s during Clark's survey, 30 to 40 windsurfers could be spotted at Reefers on a good day. During the July 1999 Save Our Seas survey, the highest number of windsurfers in the water off Ka'ilio Point at any one time was sixteen. They noted that this was a seasonal situation, that only happens in the summer at high tide on windy days (Stepath 1999).

Recently, kiteboarding, or kitesurfing, has become more popular. According to Kē'ē lifeguard, Chad Listman, kiteboarders have been known to use the site although Tunnels is a more popular spot since the wind tends to die down too much along this stretch of the shoreline. He also noted that the windsurfers tend to frequent the area more in summer than winter with at least four to five a day continuously surfing down from Tunnels starting near the YMCA Camp Naue (Listman Interview, February 4, 2009). Vaughan's study, which examined human use in a larger geographical area (from Kē'ē to Naue) confirms the rise of new board sports finding surfers, bodyboarders, windsurfers, kiteboarders and stand up paddle boarders utilizing the waters of greater Hā'ena (Vaughan, 2009).

---

---

#### 4.3.1.4 KAYAKING

Kayakers take off and land at both Kēʻē Lagoon and Poholoikeiki Channel during periods of calm seas. It is a primary departure point for kayakers who tour the Nāpali coastline (Clark 1992).

#### 4.3.1.5 SHORE FISHING

Clark noted in his study that the entire shoreline fronting Hāʻena State Park from Limahuli Stream to Kēʻē is an important recreational fishing area. During his survey in the late 1980s, pole fisherman fished off the point at Kēʻē and at low tide off the west end of the reef surrounding the lagoon. Throw net fishermen were observed to walk the entire reef margins, even during periods of high surf, depending on tide conditions, wave heights, and swell directions. Lay-net fishing was observed in all channels. Clark also noted that most fishermen avoided the lagoon during the day when snorkelers and swimmers were present but they would pole fish, lay net, or throw net during the very early morning or late in the day when less visitors were present.

In 2009, the Hāʻena community fishing study, conducted with assistance from Vaughan included observations and interviews with those fishing Hāʻena's waters from Kēʻē to Naue. The study found that lawaiʻa (fishermen) are primarily Kauaʻi residents, with the majority of those being from Hāʻena. The remaining lawaiʻa are from Oʻahu or the US Mainland. As with Clark, the Hāʻena community study documents pole and throw net fishing, also found fishers using three-prong spears and to a lesser extent, scoop net and spear gun, as well as gathering shells. The accompanying interviews found that most fish is caught for personal, family or community consumption (for parties and luʻau), and not for commercial use (Vaughan 2009).

According to SWCA, the most valuable information on traditional fishing in the vicinity is found in personal interviews with local fishermen and kupuna (Maly and Maly 2003). Several prominent local fishers from Hāʻena related stories to Maly and Maly of their fishing experience in the nearshore waters off Hāʻena. However, recent concerns about the impact of visitors on reef resources at Hāʻena led to the enactment of a new law creating a community-based subsistence fishery area.

On June 26, 2006, Hawaiʻi Governor Linda Lingle signed into law Act 241 to help protect the fish stocks and coral reef habitats within the ahupuaʻa of Hāʻena. The Act took effect on June 30, 2007. The Act states that the waters of Hāʻena have been an important subsistence fishery resource for native Hawaiians and local families of the ahupuaʻa, and that the area's natural beauty attracts thousands of visitors each year to Hāʻena State Park. It is believed that the influx of visitors has resulted in adverse impacts to fish stocks and the integrity of the coral reef habitats in the

---

---

area. The purpose of the Act is to allow inhabitants of the ahupua'a to develop and enforce traditional regulations for the maintenance of the fishery within the Hā'ena ahupua'a. (SWCA 2009)



**LEGEND**

--- Hā'ena State Park Project Boundary

**FIGURE 33**  
 Reef Environment and Surf Breaks  
**HĀ'ENA STATE PARK**

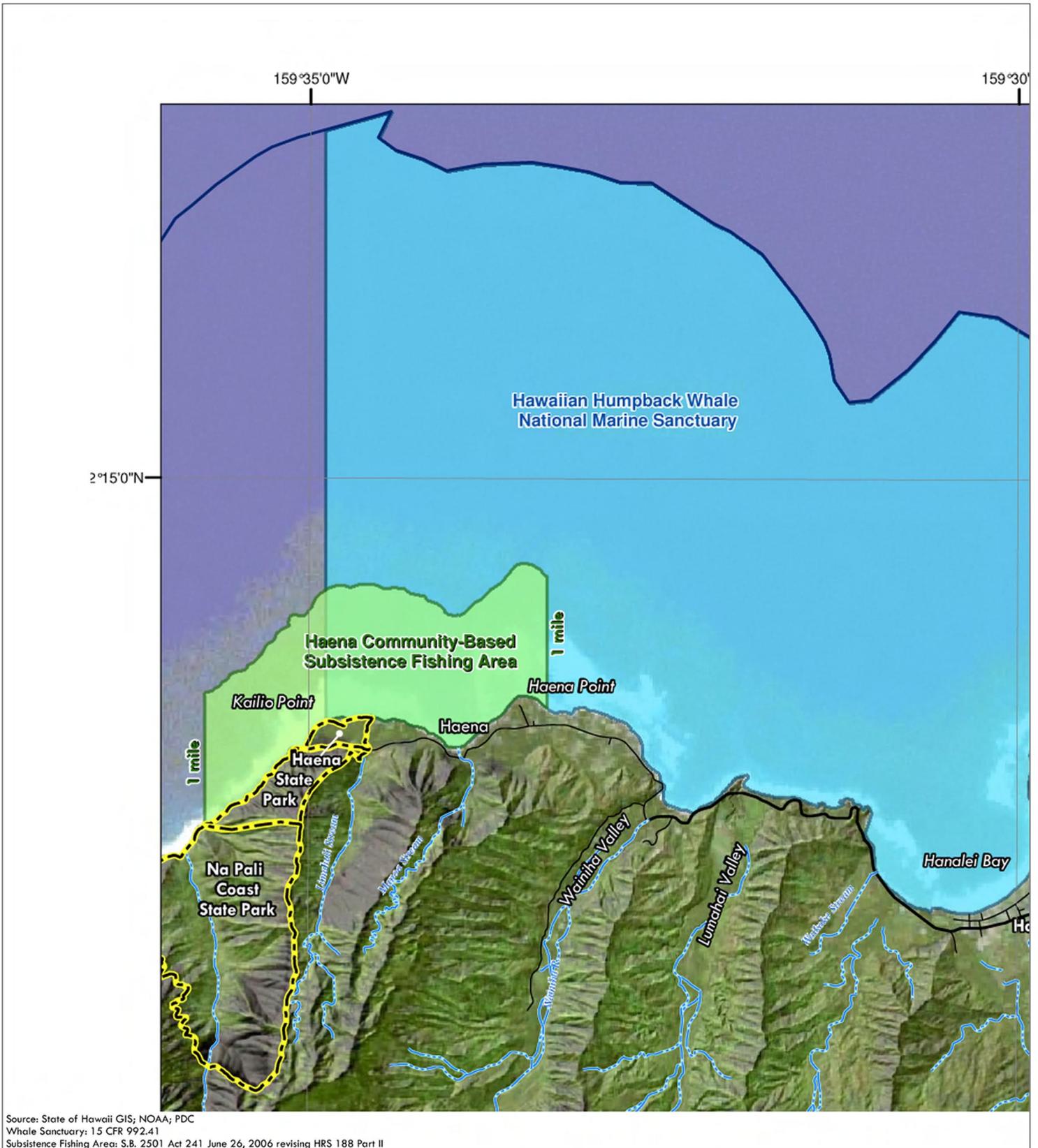
Department of Land and Natural Resources Island of Kaua'i

NORTH LINEAR SCALE (Feet)

0 300 600 1,200

**PBR HAWAII**  
 & ASSOCIATES, INC.

Source: SWCA Environmental Consultants (2009)  
 Disclaimer: This graphic has been prepared for general planning purposes only.  
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.



Source: State of Hawaii GIS; NOAA; PDC  
 Whale Sanctuary: 15 CFR 992.41  
 Subsistence Fishing Area: S.B. 2501 Act 241 June 26, 2006 revising HRS 188 Part II

**LEGEND**

- Haena Community-Based Subsistence Fishing Area
- Hawaiian Humpback Whale National Marine Sanctuary Boundary
- State Parks
- 600' Bathymetric Contour

**FIGURE 34**  
 Marine Management Areas

**HĀ'ENA STATE PARK**

Department of Land and Natural Resources

Island of Kaua'i

NORTH

LINEAR SCALE (Miles)



Source: SWCA Environmental Consultants (2009)  
 Disclaimer: This graphic has been prepared for general planning purposes only.  
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

---

---

The approximate boundaries of the new subsistence fishing area are shown in Figure 34. SWCA notes that commercial activities, issuance of a commercial marine license, aquarium fishing permits, gill net fishing, spear fishing with SCUBA, must still be considered for approval by DLNR in consultation with the inhabitants of the ahupua'a (SWCA 2009). These considerations are anticipated to be adopted to Hawai'i's Administrative Rules (HARs). The rule-making process is expected to occur in 2010-2011 (Gowensmith, 2010).

#### **4.3.1.6 EFFECTS OF OCEAN CONDITIONS ON RECREATIONAL ACTIVITIES**

Under normal trade wind conditions, some surf activity is almost always generated on the outer reef margins. This transports water shoreward, in turn generating local longshore currents and rip currents in the reef channels. While often negligible in velocity, they may pose a threat to beginning or intermediate swimmers. Trade winds can also make the ocean surface choppy during daylight hours when they increase. The increased winds may be attractive to windsurfers but can be difficult for kayakers who favor calmer conditions (Clark 1992).

Tidal currents within Hā'ena can also affect recreational ocean activity. The ebb (falling) and flood (rising) tides reverse directions with the ebb current flowing from west to east and the flood current flowing from east to west. The generalized surface current flow under normal trade wind conditions is from east to west. Therefore, an ebb current just below the surface flows in the opposite direction of the surface current. According to Clark, the tidal current velocity varies greatly from 0.1 to 1.0 knot, but is usually not a safety concern for nearshore ocean recreational activities as the strength of the currents is felt primarily in deeper waters outside of the reef. Most swimmers and snorkelers are in the nearshore waters inside the reef and generally, ocean recreation activities taking place outside of the reef are in crafts that allow users to contend with the currents (surfboards, sailboards, sailboats, motorboats, etc.) (Clark 1992).

According to Clark, the high winter surf season is of particular concern because it generates all of the dangerous ocean conditions that cause drowning and near-drownings. These conditions include: powerful shorebreaks on exposed beaches, waves washing over rocky ledges, and rip currents in all reef channels. Surfers and other users familiar with the local conditions may be able to navigate these conditions. However, these conditions would be dangerous to visitors and users of beginner abilities. Surfing should be restricted to those of intermediate or advanced ability and swimming should be restricted to areas protected from the surf (Clark 1992).

---

---

#### **4.3.1.7 EFFECTS OF STREAM CONDITIONS ON RECREATIONAL ACTIVITIES**

Clark notes in his study that the normal freshwater discharge from streams, the largest of which is Limahuli Stream, that outlet along the Hā'ena coastline is not strong enough to generate dangerous ocean currents. Occasionally after heavy rains however, the streams can flood and flashflood causing dangerous nearshore currents. Flood waters also carry soil and debris into the ocean, creating large mud plumes, as well as stream fish and invertebrates and land animal carcasses which can attract predators such as sharks and ulua (Clark 1992). Swimmers, bodysurfers, bodyboarders and surfers should be warned not to enter the waters during this time, or they may risk health and safety dangers.

#### **4.3.2 LAND-BASED RECREATIONAL ACTIVITIES**

##### **4.3.2.1 HIKING**

There are no maintained hiking trails within Hā'ena State Park. However, the trailhead for the popular eleven-mile (22 miles roundtrip) Kalalau Trail and access to the Nāpali Coast State Wilderness Park is located within the park. In 2007, the Nāpali Coast State Wilderness Park had 423,100 recreational visits according to DBEDT statistics (SWCA 2009). The peak camping period is generally between Memorial Day and Labor Day.

The Kalalau Trail traverses five steep valleys before terminating at Kalalau Beach, blocked by sheer, fluted cliffs. The first two miles of the trail from the park to Hanakāpī'ai Beach and a spur trail to Hanakāpī'ai Falls is a popular day hike for visitors. Day-use hiking permits are required by State Parks for those hiking beyond Hanakāpī'ai Valley and camping permits are required for those staying overnight at Hanakoa and Kalalau Valleys. Hiking the trail to Hanakāpī'ai Falls and beyond Hanakāpī'ai Beach is recommended for experienced hikers only by State Parks. Hikers are also warned to stay on the main trails and check posted safety signs since the area stretching from Hanakāpī'ai to Kalalau Beach, makai of the 300-foot elevation, is located within a public hunting area (Area G). The following table documents the number of permits issued by DLNR to campers and others requiring a special use permit in the Nāpali Coast State Wilderness Park.

---

---

**TABLE 8, KALALAU TRAIL PERMITS**

Year	Camping Permit	Special Use Permit	Cancellations	Total
2006	1,154	269	132	<b>1,291</b>
2007	3,926	334	297	<b>3,963</b>
2008	4,428	373	406	<b>4,395</b>
2009	4,487	412	206	<b>4,693</b>

A recent one day count on December 27, 2009 conducted by Megan Juran, the State Park Resource Ambassador (ranger) documents Kalalau Trail users, both with permits and day hikers without permits. On that day between the hours of 9:15 a.m. and 4:15 p.m., 574 hikers were documented going on to Kalalau Trail while 526 hikers came off the trail. Of the hikers 12 were observed to be backpackers, nine of the twelve did not have permits for overnight camping, and indicated verbally that they were going to day hike.. For the same day and time period, no hunters were documented accessing the trail, but 8 hunters returned on the trail (Juran, Kalalau Trail Count).

Previous counts of trail users were done by LIMU Coalition in 1999. A count of eight summer days between June 8, 1999 and July 4, 1999 showed an average trail use of 328 persons per day. The highest use days were Tuesdays June 8<sup>th</sup> and 22<sup>nd</sup>, 1999, with 385 hikers. The lowest use day with 150 hikers was July 4, 1999, a national holiday that fell on a Sunday.

As the trailhead is accessed via Hā'ena State Park, many hikers use the park facilities for parking, refuse disposal, and comfort stations.

The Kaua'i Planning and Action Alliance (KPAA) was recently awarded a State contract to restore and reconstruct the first two miles of the Kalalau Trail. Based on a June 4, 2009 posting on their website, Thomas Noyes was hired to serve as parks project manager and has conducted meetings with the Department of Land Natural Resources officials, and invited community members to participate in a (CAC) that has already helped to structure the Kalalau Trail project's scope of work. The CAC will also help assess the bids, and provide input as the Kalalau Trail work progresses. Currently, the Kalalau Trail Restoration and Reconstruction project is out to bid (KPAA 2009).

#### **4.3.2.2 SIGHTSEEING**

The scenic views of the North Shore and Hā'ena coastline are major sightseeing attractions. The majestic mountains, vibrant flora and wildlife, ocean views, sandy beaches and winding, narrow roads make it a popular

---

---

visitor destination. Visitors also frequent the wet caves, particularly Waiakanaloa, which is visible from the highway. Many are regularly observed standing below the overhanging rock face above the cave, swimming in the cave and parking illegally. During high tide, the caves are frequently flooded, causing potentially hazardous conditions (The Keith Companies 2001). Hā'ena and Kē'ē are also advertised as being at the "end of the road" by the visitor industry which attracts many sightseers for the simple act of driving out to the "end of the road."

#### **4.3.2.3 WHALE WATCHING AND BIRD WATCHING**

Seasonal whale watching is also known to occur at the park (Clark 1992). The park's offshore area between Limahuli Stream and roughly Ka'ilio Point is the western end of the Hawai'i Humpback Whale National Marine Sanctuary along Kaua'i's shores. The area is designated as such by the NOAA National Marine Sanctuary Program and the State's maps were last updated in March 2006. SWCA notes that the peak time to see endangered North Pacific Humpback whales in Hawaiian waters is late November through early May and that several tour operators offer whale watching tours within the boundaries of the Hawaiian Humpback Whale National Marine Sanctuary (SWCA 2009).

Clark also observed an organized bird watching party at dusk at Kē'ē Beach during his field survey. They were watching the sea birds offshore returning to Kilauea Point National Wildlife Refuge to the east (Clark 1992).

#### **4.3.2.4 OFF-ROAD VEHICLE USE**

The 2001 draft park plan noted that ORVs were known to drive through the sand dunes and across the sandy beaches at Ka'ilio Point flattening dunes and impacting strand species (Clark 1992, DLNR 1999). However, this activity has essentially ceased since 2007 when a gate blocking vehicular access to the dunes was installed. Lifeguards also utilize a 4-wheeler in the pursuit of their duties, however, it is driven on the sand, makai of the dunes. Additionally, vehicles belonging to those working in the lo'i can regularly be found near the cleared lo'i, off Kūhiō Highway.

#### **4.3.2.5 BICYCLING**

The 2003 Bike Plan Hawai'i prepared by Kimura International, Inc. for the State Department of Transportation (DOT) Highways Division shows both a proposed signed shared roadway and proposed North Shore bike path continuing along Kūhiō Highway and terminating at Hā'ena State Park. Both were priority III projects (out of four levels), or lower on the priority list. The plan proposed continuous bikeways for the entire island of Kaua'i. The County of Kaua'i Department of Public Works Building Division is also constructing a coastal bicycle path between Anahola and

---

---

Nāwiliwili. Although it does not continue through to the North Shore, it is based on some of the recommendations from the DOT's bike plan. Based on previous survey data, the 2001 draft park plan found that Hā'ena visitors tended to prefer more physical activities, such as swimming, surfing, bodyboarding and bodysurfing (The Keith Companies 2001). However, in their preferred master plan, they note that the 7,300 feet of proposed public trails shown in the plan would allow for pedestrian and bicycle traffic (The Keith Companies 2001). There is no documentation of current bicycle use at the park.

## 4.4 VISITOR USE INFORMATION AND SURVEYS

### 4.4.1 VISITOR COUNTS

Hā'ena State Park's popularity for visitors has remained relatively high over the past several decades. Using a representative year, the 2001 draft park plan noted that in 1993 Kē'ē Beach saw roughly 1,500 visitors during the off-peak month of February and over 10,600 visitors during the peak month of August. Daily attendance during off-peak months did not often exceed 100 visitors while daily attendance during peak months often exceeded 500 visitors a day (The Keith Companies 2001). It is interesting to note that visitor numbers were still relatively high despite the tourism downturn following Hurricane 'Iniki in 1992. Historically, the 2001 draft park plan indicates that annual recreational visitor counts to Hā'ena State Park were even higher prior to the hurricane. In 1980-1990, 1,974,000 recreational visits were made to the park. In 1993-1994, that number was down to 663,000 recreational visits (The Keith Companies 2001).

In 1999, according to DLNR tabulations, the Kē'ē area received approximately 1,700 visitors daily with an estimated 450 continuing on to the Kalalau Trail (Stepath 2006). During their three-day human use survey performed in July 1999, Save Our Seas volunteers noted that peak visitor usage at Kē'ē was at 4:00 p.m. with a high level of usage starting at 10:00 a.m. and lasting until 6:30 p.m. By 2006, Save Our Seas noted that visitors arrived much earlier than in 1999 with the parking lots full by 9:30 a.m. (Stepath 2006).

In 2006, Hā'ena State Park Resource Ambassador (ranger), Megan Juran, took various visitor counts between May and July. They included estimated parking counts, number of swimmers and beachgoers, and number of hikers on the Kalalau Trail. The counts were taken at different times of the day and typically Friday through Tuesday. Although not consistent, some general use patterns can be drawn from the data. The data tables are attached as Appendix H.

---

---

The number of beachgoers and swimmers were only counted in the month of April on the 16<sup>th</sup>, 17<sup>th</sup>, 23<sup>rd</sup>, 29<sup>th</sup>, and 30<sup>th</sup>. The number of beach users at any one time varied between nine at just before 9:00 a.m. on a Sunday morning to 195 at 1:00 p.m. on a Monday afternoon. The highest number of people on the beach tended to fall between midday to late afternoon with over 70 people still on the beach at around 5:00 p.m. The number of swimmers ranged from a low of three at just before 9:00 a.m. to a peak of 58 at 1:00 p.m. Similarly, most swimmers were in the lagoon during midday through late afternoon with roughly twenty swimmers still in the water at around 5:00 p.m.

For the number of hikers observed on the Kalalau Trail, Juran took counts on five days in April and on three days in May in 2006. Most of her counts were taken around midday or in the afternoon. There did not seem to be much of a pattern of use except that a higher number of hikers (40-60 over half-hour periods) were observed on the trail at or around 10:30-12:00 noon and decreased to about twenty per half hour after that. Since very few counts were taken earlier than 10:30-11:00 a.m., it is not clear how many hikers were on the trail in the morning.

Juran took parking counts over several days (10-14 days) in each month from April to July 2006 and at different times of the day. Whenever possible, a morning (8:30-9:30 a.m.), midday (10:00 a.m. -2:00 p.m.) and afternoon (3:00-5:00 p.m.) count was recorded.

Counts were also separated into three areas: the parking area close to Kē'ē, the overflow parking lot closer to the park entrance, and a third unofficial area along the beach road and sand dunes. Since the counts were taken in 2006, this was before the gate was installed on the beach road and so visitors would drive and park indiscriminately in this back area along the dunes. During this survey period before the gate was installed, anywhere from one to 121 cars would be parked along the dunes while the overflow parking lot was usually empty. The maximum number of cars recorded in the overflow parking lot was 34 and that was on the Fourth of July.

The peak number of total cars parked at Hā'ena State Park (includes all three areas) in 2006 seemed to be during the midday hours. Parking counts typically ranged from 50-224 cars at any one time. However, during the summer months, the parking counts were high even in the morning hours. In June and July, there were often 50-70 cars already parked in the three areas by 9:00 a.m. compared with 20-40 in April and May. Afternoon counts when recorded seemed to remain high, ranging between 60 and 144 total cars parked at any one time at the park.

Vehicle count data collected by Megan Juran can be compared between the years 2007 and 2009.

**TABLE 9, RANGER VISITOR COUNTS**

Month	Year	Average Number of Vehicles Per Day
May	2007	224
	2009	181
June	2007	230
	2009	200
July	2007	206
	2009	210

Currently, the Kēʻē lifeguards take counts of the number of people on the beach at 9:00 a.m., 12:00 noon, and 4:00 p.m. During the summer months, there are anywhere from 200 to 400 people on the beach with 250 to 300 at any one time. In the winter, the beach is still busy with 100-150 people at Kēʻē. The parking lots remain full even with the recent economic downturn (Listman Interview, February 4, 2009).

#### **4.4.2 2007 HTA OMNI TRAK SURVEY**

The OmniTrak Group Inc. conducted user surveys on random days between July 1 through October 31, 2007 on behalf of the Hawaiʻi Tourism Authority (HTA).

Of the 283 people surveyed, 28 were from Hawaiʻi and 255 were from outside of Hawaiʻi. It was also found that visitors to Hāʻena State Park hail primarily from the U.S. Mainland. Table 10 summarizes the residency breakdown of those surveyed.

**TABLE 10: PARK VISITOR RESIDENCY**

PLACE OF RESIDENCY	BREAKDOWN (OF 283)
Hawaiʻi	9.89%
U.S. Mainland	82.69%
Canada	2.47%
Japan	0.71%
Other	4.24%
TOTAL	100.00%

The same survey found that visitors came to Hāʻena State Park for various reasons. For Hawaiʻi residents, an outing with family or friends motivated the visit. For out-of-state or international visitors, ocean activities were the primary motivation with outing with family or friends second (see Table 11).

**TABLE 11: PARK VISIT MOTIVATION**

	HI RESIDENT	NON-HI VISITOR
Outing with family/friends	63%	31%
Ocean/water activity	19%	46%
Hike trails/walk	7%	7%
Scenic view	4%	7%
Party/Celebration	4%	0%
Other	4%	1%
See flora/fauna		2%
Event by an organization you belong to		1%
Guided tour stop		0%
Use restrooms		0%
Famous landmark		4%

The average party size for all users was 4.3 people with typically three adults and one to two children. For the majority of non-Hawai'i visitors, it was their first time to the park (70 percent) compared with only 39 percent of Hawai'i residents.

**TABLE 12: NUMBER OF VISITS TO HĀENA STATE PARK**

NUMBER OF VISITS	HI RESIDENT	NON-HI VISITOR
1	39%	70%
2 to 5	30%	27%
6 to 9	13%	3%
10 to 49	9%	1%
50 to 99	4%	
100+	4%	

OmniTrak found that visitors primarily arrive to Hā'ena State Park by vehicle, either a rental or personal vehicle.

**TABLE 13: TRANSPORTATION TO PARK**

	HI RESIDENT	NON-HI VISITOR
Private vehicle	69%	42%
Rental car	19%	55%
Walk, on foot	8%	1%
Public bus	4%	1%
Tour bus/van/shuttle		1%

Once at the park, OmniTrak found that visitors participated in a variety of activities as shown in Table 14.

**TABLE 14: PARK ACTIVITIES**

	HI RESIDENT	NON-HI VISITOR
Ocean/water recreation	65%	81%
Picnic/Outing	46%	39%
Scenic views/Photography	42%	71%
Hike/Walk	35%	30%
Use restroom	27%	32%
See park flora/fauna	23%	23%
Visit historical/cultural site	8%	7%
Other	8%	2%
Camp	4%	0%
Fishing/Hunting		1%

Park stay was found to be typically two to five hours for both Hawai'i resident and non-Hawai'i visitors alike. It should be noted that this survey may not account for the volume of traffic that drives to the end of Kūhiō Highway at Kē'e Beach, and turns around and leaves without staying at the park.

**TABLE 15: LENGTH OF PARK STAY**

	HI RESIDENT	NON-HI VISITOR
Less than one hour	14%	5%
One to two hours	11%	19%
Two to five hours	50%	55%
Five to ten hours	7%	9%
More than ten hours	4%	1%
<i>Average</i>	5.3	3.6

Overall satisfaction and satisfaction with regards to specific aspects of their stay are shown for both Hawai'i residents and non-Hawai'i visitors below. It is on a scale of one to ten with ten being the highest level of satisfaction.

**TABLE 16: VISITOR SATISFACTION**

	HI RESIDENT	NON-HI VISITOR
<b>OVERALL SATISFACTION</b>		
Average	8.0	8.7
<b>ATTRIBUTE SATISFACTION</b>		
Scenic views	9.4	9.5
Ocean/water experience	8.9	9.2
Flora/fauna	8.0	8.8
Overall experience	8.0	8.7
Hiking experience	7.8	8.7
Historical/cultural site	7.3	8.1
Directional signage	6.7	6.6
Interpretive signs/brochure	6.7	7.3
Security	6.4	6.5

	HI RESIDENT	NON-HI VISITOR
Overall Maintenance	5.7	7.2
Cabins/Campgrounds	5.4	6.2
Restroom facilities	5.4	5.5
Food Concessions	3.9	4.9
Parking	3.5	4.2

The importance of various services at Hā'ena State Park is summarized in Table 17.

**TABLE 17: IMPORTANCE OF SERVICES AT PARK**

IMPORTANCE OF...	HI RESIDENT	NON-HI VISITOR
<b>INTERPRETIVE SIGNS/BROCHURE</b>		
IMPORTANT		33%
Very Important		11%
Somewhat Important		22%
NOT IMPORTANT	100%	67%
Not Too Important		22%
Not Important At All	100%	44%
<b>RESTROOM FACILITIES</b>		
IMPORTANT	100%	80%
Very Important		80%
Somewhat Important	100%	
NOT IMPORTANT		20%
Not Too Important		20%
Not Important At All		
<b>SECURITY</b>		
IMPORTANT	100%	71%
Very Important		43%
Somewhat Important	100%	29%
NOT IMPORTANT		29%
Not Too Important		14%
Not Important At All		14%
<b>DIRECTIONAL SIGNAGE</b>		
IMPORTANT	100%	25%
Very Important	100%	25%
Somewhat Important		
NOT IMPORTANT		75%
Not Too Important		50%
Not Important At All		25%
<b>FOOD CONCESSIONS</b>		
IMPORTANT		29%
Very Important		4%
Somewhat Important		25%
NOT IMPORTANT		71%
Not Too Important		29%
Not Important At All		42%
<b>PARKING</b>		
IMPORTANT		100%

<b>IMPORTANCE OF...</b>	<b>HI RESIDENT</b>	<b>NON-HI VISITOR</b>
Very Important		75%
Somewhat Important		25%
NOT IMPORTANT	100%	
Not Too Important		
Not Important At All	100%	
<b><i>CABINS/CAMPGROUNDS</i></b>		
IMPORTANT	50%	20%
Very Important		
Somewhat Important	50%	20%
NOT IMPORTANT	50%	80%
Not Too Important		27%
Not Important At All	50%	53%

The summary data sets prepared by OmniTrak are provided in full in Appendix I.

#### ***4.4.3 HĀ'ENA COMMUNITY BASED STUDIES***

According to observed data collected over a year and a half by the community for the Hā'ena Community Based Subsistence Fishing Area and compiled in 2008, daily use patterns at Kē'ē are as follow:

**TABLE 18: KĒ'Ē BEACH OBSERVED ACTIVITIES**

<b>TIME OF DAY</b>	<b>USE/ACTIVITY</b>
7:00 a.m. and earlier	Fishing, beach walking (locals for exercise)
7:00 a.m. – 10:00 a.m.	Kayak launching (summer only); accessing the Kalalau Trail; beach walking
10:00 a.m. – 1:00 p.m. (time of heaviest use)	Sunbathing, snorkeling, sightseeing (not many locals)
3:00 p.m. – evening	Sunbathing, sightseeing, snorkeling, sunset viewing (not many locals)
After dark	Fishing, illegal camping

In 2009-10, Vaughan also surveyed 264 individuals utilizing Hā'ena's beaches at Makua, Maninihola (both outside Hā'ena State Park) and Kē'ē. The surveys were conducted in both winter and summer months. Survey results were sorted by visitors and residents of Kaua'i. Vaughan found that of the 187 visitors surveyed, three percent were non-Kaua'i Hawai'i residents. The majority (52% of those surveyed) were visiting from the US Mainland's west coast states and an additional 31% of those surveyed were from the US Mainland's east coast, mid-west and southwest states. Vaughan found that 6% of those surveyed were from Canada, 6% were visiting from Europe and the remaining 1% were from elsewhere. Nearly

---

---

half (44%) of the visitors surveyed reported that it was their first visit to Kaua'i.

Of the 77 Kaua'i residents surveyed, 22% reported living in Hā'ena, with another 11% in the neighboring ahupua'a of Wainiha. 32% lived in other North Shore (Halele'a district) communities including Hanalei, Princeville and Kilauea. Nine percent lived in the Hawaiian homes community of Anahola where many families originating in Hā'ena have relocated. Another 17% of residents lived elsewhere on Kaua'i, an hour or more drive away. Residents visited Hā'ena an average of 158 times per year, and 13 times per month. This average is high because many people who live in Hā'ena report visiting the beach every day.

The majority of non-Kaua'i visitors learned of Hā'ena through guidebooks. Once at Hā'ena, 48% of these visitors reported learning about the place through their guidebook. To a lesser extent, visitors learned more about Hā'ena through talking with a local person, and their own personal observations and explorations. In contrast, Kaua'i residents surveyed knew of Hā'ena through friends, family, other local residents, or just as a result of growing up near the place. Knowledge about Hā'ena is gained through personal observation and by talking with a local person.

Vaughan's survey also inquired about individuals' willingness to pay an entrance fee. The surveys found that non-resident visitors were more willing to pay a \$5 fee than Kaua'i residents. However, when asked if they would be willing to pay a fee knowing that the funds would be used at the park, both visitors and Kaua'i residents responded with a greater willingness to pay the fee (Vaughan, 2010).

## **4.5 USER IMPACTS AND CONFLICTS**

Due to the relatively heavy usage of Hā'ena State Park, several potential risks and conflicts have been identified that were connected to the presence of visitors and the types of activities occurring at the park. As the popularity of Hā'ena State Park increases, the rate at which the number and types of conflicts between different resource users will invariably become a pressing issue. Based on previous studies and their own observations, the following areas of visitor impacts and user conflicts have been identified.

### **4.5.1 TRAFFIC CONGESTION AND PARKING**

Because there is only one road in and out of the park, and the popularity of Kē'ē, the Kalalau Trail, sightseeing and the novelty for visitors to "drive to the end of the road," traffic congestion and parking are major issues

---

---

affecting Hā'ena State Park. With only two official parking areas within the park, they tend to fill up quickly, leading visitors to either park illegally on the side of the highway or to sit and wait within the narrow roadway for spaces to open. Also, according to the State Parks website, hikers and campers using Kalalau Trail are discouraged from leaving their cars long-term in the parking lots. However, it is highly likely that some inevitably do. There is no staff onsite to monitor or direct drivers. Nor are there any signs posted with information on parking availability. As a result, traffic becomes congested and the quality of user experiences is reduced. Clark (1992) notes that as visitor and resident populations expand, the situation will continue to worsen if no mitigation is provided.

#### **4.5.2 NON-POINT AND POINT-SOURCE POLLUTION**

The State Department of Health rates Hā'ena's offshore marine water quality as AA. According to HAR §11-54-3, the objective of these waters is to "remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected." The HAR also state that:

- (A) Within a defined reef area, in waters of a depth less than 18 meters (ten fathoms); or
- (B) In waters up to a distance of 300 meters (one thousand feet) off shore if there is no defined reef area and if the depth is greater than 18 meters (ten fathoms). The uses to be protected in this class of waters are oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment. The classification of any water area as Class AA shall not preclude other uses of the waters compatible with these objectives and in conformance with the criteria applicable to them.

According to SWCA, point-source pollution is pollution from any confined or discrete conveyance such as pipes, ditches, channels, wells, or vessels. At Hā'ena State Park, recreational and commercial boats can create point source pollution in the offshore waters. However, the amount of point source pollution from these sources is unknown and likely varies during the year depending on the number of boats (SWCA 2009).

Non-point source pollution is water pollution that comes from many diffuse sources and is often the result of human activities. Pollutants are carried by rainwater runoff on the ground or through natural or man-made drainageways and can include fertilizers, herbicides, insecticides, oil, grease, sediment, and pathogens. Impervious surfaces such as roadways, parking lots, sidewalks, and roofs prevent water and pollutants

---

---

from percolating through the ground and being naturally filtered by the soil. SWCA notes that at Hā'ena State Park, pollutants from motor vehicles, trash, and other debris not properly disposed of can be carried to nearshore and freshwater areas in storm, flood, or wash water across impervious surfaces. Stepath also suggested that sewage seepage from the restroom facilities could also enter Hā'ena's aquatic environments (Stepath 1999). The 2001 draft park plan considered whether dipping or wading in Limahuli Stream may also contribute to soil erosion, sedimentation, and temporary impacts to water quality (The Keith Companies 2001). SWCA's report states:

According to the Hawai'i Coastal Nonpoint Pollution Control Management Plan (1996), non-point source pollution has a greater impact on nearshore waters than point-source pollution. Non-point source pollution can result in increased turbidity, sediment accumulation on coral reefs, fish kills, and destruction of aquatic habitats. Excess nutrients can also lead to eutrophication or algae blooms in coastal waters (DBEDT and DOH 2000). Toxic chemicals and pollutants can pose a risk to marine plants and animals (County of Kaua'i Planning Department 2000) and increase the risk of human diseases during aquatic recreation (DBEDT and DOH 2000).

Clean coastal water is an important component of the tourism industry in Hawai'i. More than 80% of visitors to the Islands engage in recreation activities in coastal and marine areas (Needham et al. 2008). Coastal leisure and recreation activities (swimming, diving, surfing, etc) are also vital to native Hawaiian cultural practices and local resident recreation (DBEDT and DOH 2000). Most local residents engage in ocean recreation on a regular basis (Friedlander et al. 2008). (SWCA 2009)

The increase in visitor numbers and lack of environmental quality control measures may lead to serious pollution problems if not properly enforced.

#### **4.5.3 *SUNSCREEN***

In their report, SWCA (2009) states that:

Some chemicals contained in commercial sunscreens can adversely impact coral reefs by promoting viral infections of endosymbiotic zooxanthellae, which are essential for the survival of coral species. The chemical compounds in sunscreen can cause dormant viruses present in zooxanthellae to continually replicate until the zooxanthellae are expelled and the coral is bleached (Buddemeier et al. 2004, Danovaro et al. 2008, and Than 2008). Sunscreens may also decrease the penetration of UV radiation, impacting marine organisms that depend on light for various functions (Eichenseher 2006, Blitz and Norton 2008). Furthermore, sunscreen agents have been shown to bioconcentrate in freshwater or brackish aquatic species (Daughton and Ternes 1999). The impact of sunscreen on the coral reef environment at the Hā'ena State Park is not known; however, according to interviews by Juran (2007), the impact of

---

---

sunscreen at the park is believed to be minimal compared to other sites around the state. (SWCA 2009)

#### ***4.5.4 FISHING***

According to SWCA (2009), “fishers of all kinds tend to target specific species, many of which are top carnivores. Today, these resources are scarce. ... Declines were evident among fishes targeted by fishers, but not among non-target groups of fishes in hard bottom and mid-depth habitats. Standing stock of highly desired target species (e.g. surgeonfishes, wrasses, parrotfishes, snappers, goatfishes, big-eyes, jacks, squirrelfishes, barracuda, moi, milkfish, and hawkfish) in accessible and populous locations were significantly lower than in areas where public access was prevented and also in lightly populated or remote areas.”

SWCA also noted that the use and discard of inexpensive monofilament gillnets have had a major effect on reef fish by the indiscriminate taking of unwanted as well as target species. They can also lead to habitat destruction and fatal entanglement of endangered and threatened species.

Other methods of fishing can affect endangered and threatened species. SWCA cited that “during the period 1982-2007, there have been 49 documented cases of interactions between fishers and monk seals in the Main Hawaiian Islands (Katekaru 2008). Twenty-seven of these cases were reported from Kaua’i, two of which were from Hā’ena State Park. These cases usually involved the accidental hooking by ulua fishers using slide-bait tackle (SWCA 2009).” Sea turtle strandings, including trauma induced by hook-and-line and gillnet fishing gear have also been linked to fishing-related incidents throughout Hawai’i (SWCA 2009).

#### ***4.5.5 DIVING***

SWCA notes that “damage to coral reef as a result of diving has been documented worldwide (Rouphael and Inglis 1995, Tratalos and Austin 2001, and Tabata 1992). Divers and snorkelers can physically damage reef corals, invertebrates, and algae by standing on the reef, accidentally kicking coral with their fins, or stirring up silt that suffocates coral. Contact with corals can facilitate disease transmission. Physical damage to coral species can be long lasting due to generally slow tissue regeneration (Davenport and Davenport 2006).”

#### ***4.5.6 REEF WALKING***

SWCA (2009) noted in their report that reef walking occurs at Hā’ena when visitors climb the reef to view tide pools and some divers transverse

---

---

the reef to dive off the outer portion at Kē'ē. Reef walking has the potential to trample corals resulting in damage to coral tissue, growth rates, reproductive success, and community structure, leading to mortality and overall reduction in coral cover (SWCA 2009). The decrease in coral cover can also affect fish populations which are dependent on coral for shelter and food supply (algae).

The 2006 Save Our Seas study indicates reef damage is occurring along areas where visitors walk on the reef flats. When visitors walk along the reef flats, they are also invariably causing serious damage to existing algae and coral stock. The adverse impacts of visitors walking on the reef flat were estimated by Save Our Seas in 1999 and again in 2006 by analyzing coral cover at Kē'ē at low tide. The dates of the surveys were Tuesday, August 10, 1999, Wednesday, August 11, 1999, and Thursday, June 8, 2006. The reef flat was divided into two sections that included the visit impact area and a separate control area. The peak time number of reef walkers at any one time in 1999 was eighteen and this occurred at 1:30 p.m.. However, the highest total number of reef walkers within a half-hour time period was twenty at 10:30 a.m.. The number of reef walkers fluctuated throughout the day and showed no correlation to tidal stage.

The results of their surveys showed that coral accounted for 4.76 percent of the average cover while the control areas were nearly double at 8.92 percent in 1999. In 2006, the average cover was 5.73 percent in the visitor impact area and 7.51 percent in the control area in 2006 (Stepath 2006). Stepath included the caveat that to establish a statistically valid sampling, more work needs to be done and more data collected. However, a similar difference between the visitor impact area and control area has been established between the two sampling events seven years apart. Stepath notes that the area of most concern is the corridor between the beach and the outer reef, where the highest percentages of visitors travel across the reef (Stepath 2006).

#### **4.5.7 FISH FEEDING**

According to SWCA (2009), divers and snorkelers feed fish at Kē'ē Lagoon which can disrupt normal distribution and abundance patterns as well as alter normal reproductive output of marine species. It can also modify natural feeding cycles and have negative effects on prey populations by minimizing feeding on algae. Feeding large fish can attract predators that scare off smaller fish, reducing local biodiversity and interfering with natural instincts and behaviors required for fish survival. Feeding fish can also alter their behavior towards humans and become aggressive, leading to attacks.

---

---

#### **4.5.8 SAND DUNES**

According to SWCA (2009), some of the recreational activities occurring at Hā'ena State Park are known to affect coastal dunes. Vehicle and pedestrian traffic on the dunes causes erosion and sand movement as well as disturbance of archaeological deposits including burials. They cite Vogt (1979) who found that fewer than 10,000 pedestrians walking over sand dunes during a single season can eliminate dune vegetation and result in erosion (Tabata 1980) and note that dune vegetation has little resistance to trampling due to the extremely low soil penetration and is slow to recover (Davenport and Davenport 2006). Both motor vehicles and pedestrian traffic can lead to sediment disruption and erosion and destroy sand coastal vegetation that helps to stabilize the dunes. ORVs can also disturb sand dune and shore ecosystems for use by wildlife including birds, turtles, and monk seals as well as disturb subterranean cultural deposits. ORVs and other vehicle use on the beaches can also impact other park users by creating noise and safety hazards. Earlier this year on Kaua'i, there was an incident reported at a Wailua beach where a truck ran over a woman lying on the beach (The Garden Island 2009).

The 2001 draft park plan noted that ORVs were known to drive through the sand dunes and across the sandy beaches at Ka'ilio Point flattening dunes and impacting strand species (Clark 1992, DLNR 1999). However, this activity has essentially ceased since 2007 when a gate blocking vehicular access to the dunes was installed. Lifeguards also utilize a 4-wheeler in the pursuit of their duties, however, it is driven on the sand, makai of the dunes.

#### **4.5.9 INVASIVE SPECIES**

SWCA (2009) notes that the threat of invasive species increases in areas with high visitation such as recreational parks. In particular, they state that recreational boating, diving, snorkeling, and fishing increases the risk of introducing non-native species through hulls, wetsuits, bait, or other equipment (Meliane and Hewitt 2005) and recreational hiking can also introduce invasive species, especially plants, by passive dispersal on hiker's shoes and clothing (SWCA 2009).

They also identify two non-native reef fish species in the nearshore waters of the park which were introduced by the Hawai'i Department of Land and Natural Resources, Division of Aquatic Resources (DAR) to supplement coastal sport fisheries. They are the predatory grouper roi (*Cephalopholis argus*) and the blue line snapper ta'ape (*Lutjanus kasmira*). SWCA notes that although the two have successfully established large populations throughout the main Hawaiian Islands, their impact upon preferred local species has not been well-understood and is the subject of

---

---

controversy. Roi feed on small fishes over shallow reefs, while ta'ape feeds over sand flats during the night (Dierking 2007, Birkeland and Dierking 2007).

SWCA also notes that invasions by non-native limu are known to blanket coral reefs, kill coral, and reduce water exchange within reef environments. None of the four noxious invasive limu were found at Hā'ena during a 2000 survey by Abbott and Hunter performed off Ka'ilio Point. However, according to the University of Hawai'i Botany Department and the Bishop Museum there were certain native species found there that have been identified as being potentially invasive. These include: *Ulva fasciata*, *Caulerpa taxifolia*, *Dictyosphaeria cavernosa*, *Enteromorpha flexuosa*, *Sargassum polyphyllum*, and *Turbinaria ornate*. Some native algae species have the potential to become invasive or to dominate areas that receive excessive nutrient input or have been altered in some other way to foster the growth of a single species. However, there is no evidence that this has become a problem at Hā'ena (SWCA 2009).

Also, ironwood (*Casuarina equisetifolia*), false kamani (*Terminalia catappa*) are invasive terrestrial trees found within the park boundaries that compete with native vegetation and have blanketed the once open coastal plain at Hā'ena.

#### **4.5.10 USER GROUP CONFLICTS**

Previous and current studies prepared for Hā'ena State Park discussed conflicts between various user groups. The following is a summary of their findings.

##### **4.5.10.1 AHUPUA'A 'OHANA VS. VISITORS AND OTHER RESIDENTS**

The 2001 draft park plan defines the ahupua'a 'ohana as those Hā'ena residents and descendants who maintain close ties to their ancestral lands. Many were raised in Hā'ena and also have ancestors buried in the area. They also include those whose lands were condemned by the State to establish the park. For them, the existing conditions at the park elicit strong feelings. According to Earthplan's SIA (1996), "many are personally hurt by fellow residents and tourists who do not seem to appreciate the 'ohana and cultural significance of Hā'ena. In particular, they cited instances where ancestral lands were desecrated and degraded by trash, New Age rituals, and commercial activities." Other complaints include souvenir vending, disturbing fishermen, harassing marine life, walking on the reef, inappropriate public activities, and failure to heed traditional community protocols (SWCA 2009). The ahupua'a 'ohana are also prevented from practicing cultural activities because of the high volumes

---

---

of park visitors (The Keith Companies 2001). They also feel that denying them access affects their physical, mental, and spiritual health (Juran 2007).

Recent interviews with current community and ahupua'a 'ohana members also reveal that there is often a lack of respect shown by tourists and visitors. They explain that some visitors feel it is their "right" to do as they please wherever they please at the park and sometimes disregard efforts by 'ohana members to educate them on the cultural sensitivities and potential safety hazards at the park.

#### **4.5.10.2 RESIDENT USERS VS. VISITORS**

Although resident users appreciate the beauty and cultural significance of the area, most local residents enjoy Hā'ena State Park for its recreational opportunities. The 2001 draft park plan noted that "residents who are primarily recreational park users are the most resistant to any change in the existing conditions at the park as these conditions suit their personal needs" (The Keith Companies 2001). The major conflict between resident users and other visitors is the high volume of users at the park which leads to residents having antagonistic feelings towards visitors because they are overwhelmed by the number of tourists and traffic conditions. The SIA also found that the residents are strongly against having to pay a park user fee and that some residents would resist attempts to increase enforcement of park rules (The Keith Companies 2001). These findings are supported by a survey conducted by Vaughan in 2009 where she found that non-residents were "fairly" willing to pay an entrance fee. If a portion of the fee were to be dedicated to Hā'ena State Park, Vaughan reports that the willingness to pay a fee increased. SWCA also found that according to a 2002 tourism study prepared by the Kaua'i Economic Development Board, Kaua'i residents are more strongly opposed to increased tourism activity than the residents of any other island in the State.

#### **4.5.10.3 RECREATION/TOURISM VS. CONSERVATION**

The 2001 draft park plan cited an overall growing concern and conflict between Kaua'i's primary attraction for visitors and recreation—the beauty of its unique natural environment—and the degradation of those resources from overuse and a lack of maintenance due to inadequate funding. The State's 2008 State Comprehensive Outdoor Recreation Plan (SCORP) listed "protection of natural and cultural resources in areas of recreational demand" as well as the "lack of personnel in many parks, especially historic sites, rais[ing] management concerns (vandalism, site damage)" as some of the most pressing challenges facing State Parks (PBR Hawaii 2009).

---

---

Interestingly, while recreation and tourism are often at odds with conservation, there are conservation-related reasons people visit outdoor recreational areas. According to the public survey conducted for the 2008 SCORP Update, “having fun (96% [of respondents])” was the top reason respondents recreated outdoors. However, the survey also found that people participated in outdoor recreation “to be close to nature (66%),” “to visit/see new places and things (62%),” and “to learn (53%).” Other motivations for recreating outdoors included “gather food/subsistence,” “spiritual reasons,” and even specifically for “conservation/volunteer work” including invasive species control and eradication efforts (PBR Hawaii 2009). In addition, respondents also felt that “protection of natural and wildlife resources and wilderness areas” and the “protection of cultural/historic resources” were the top two priority issues today (PBR Hawaii 2009). Recreation users are also drawn to Hawai‘i’s cultural and historic resources. According to the survey, 76% of respondents reported visiting a historic site at least yearly (PBR Hawaii 2009). The 2008 SCORP Update identifies protection of natural and cultural resources as the number one priority issue and lists several strategies and actions to accomplish this in Section 5.1.1 of the report (which will not be repeated here). So while often conflicting, conservation and preservation have become priorities even for recreational users. It will be important, however, to avoid exploitation and overexposure of sensitive natural and cultural resources even by well-intentioned recreational uses. Education along with strong enforcement with regards to appropriate behaviors and protocols will be required to help protect these resources.

Much of what is discussed above is recognized as a specific type of tourism called ecotourism. According to the International Ecotourism Society, ecotourism is the “responsible travel to natural areas that conserves the environment and improves the well-being of local people” (SWCA 2009 quoting Blangy and Mehta 2006). In Hawai‘i, ecotourism could be either nature or culture-based, and according to DLNR, is “designed to prevent negative social and environmental impacts that can be associated with tourism (SWCA 2009). However, there are concerns tied to ecotourism related to sustainability and carrying capacities (SWCA 2009), particularly in sensitive areas that have had little or no exposure to human intrusion. The inadvertent dispersal of non-native invasive species is a major concern related to ecotourism.

#### **4.5.10.4 WINDSURFERS VS. OTHER USERS**

SWCA (2009) notes that windsurfing can disrupt other recreational users by coming close to swimmers, snorkelers and divers at high speeds. Similarly, these other users can obstruct windsurfing zones and launching areas. Beginning windsurfers also often have difficulty controlling their

---

---

boards and pose a greater risk to other users than more expert windsurfers (SWCA 2009).

Clark (1992) mentioned only a “minor conflict” between throw net fishers and windsurfers off the Ka’ilio shore.

The reefs fronting the park are well used for throw net fishing, especially during the late spring and summer months when there is no winter surf and the highest and lowest tides of the year occur. During the lowest tides the north shore reefs are more emergent than usual, ideal conditions for throw-netting. This time of the year is also when the trade winds are very strong and constant, ideal conditions for windsurfing. Windsurfers sailing at Reefers scare away the schools of fish sought by the throw net fishermen. The resolution of this conflict may be a matter of education. If windsurfers were aware of throw net fishermen and gave them a minimum 50 yard clearance whenever possible, the conflict might be mitigated. (Clark 1992)

#### **4.5.10.5 ORVs vs. OTHER USERS**

As noted earlier, ORVs can degrade the natural dune system, unearth subsurface burial remains, and damage vegetation. In 2009, it was reported that an ORV ran over a woman on Wailua Beach (Garden Island, 2009). Noise and safety hazards are also associated with vehicle use on beaches and can disturb cultural and recreational users at the park. Personal communication with the park’s ranger indicates that ORV use on the dunes has essentially been put to a halt since the installation of a gate in 2007 that blocks vehicular access to the sensitive dune ecosystem (Juran, 2010).

#### **4.5.10.6 TRADITIONAL FISHERY MANAGEMENT VS. RECREATIONAL/ COMMERCIAL FISHING**

On June 26, 2006, Act 241 passed the state legislature establishing the Community-Based Subsistence Fishing Area for the ahupua’a of Hā’ena. The law authorizes the DLNR to consult with the ahupua’a inhabitants and other interested parties to regulate uses and activities in the designated fishing areas (Juran 2007). The inspiration for the law arose out of the desire of many rural communities wanting to reinstate traditional Hawaiian marine stewardship practices to stem the problems of overfishing. For generations, the kūpuna of the ahupua’a passed down their wisdom of careful management of nearshore resources in order to sustain its abundance. This included limitations on harvests, such as prohibiting fishing during spawning seasons or in species’ nursery areas (Juran 2007).

---

---

According to Kauaʻi Representative Hermina Morita, an earlier 2003 version of the bill that involved a network of similar conservation areas throughout the state did not pass the legislature since there were fisher groups who felt the bill was a prohibition against fishing rather than a way of protecting and enhancing the resource (Juran 2007). Despite the earlier failure, a strong showing of community support from Kauaʻi's North Shore helped pass Act 241 for Hāʻena. Currently, the rule making process for the Hāʻena Community-Based Subsistence Fishing Area is underway and it can be expected that similar conflicts between recreational/commercial fishing activities and traditional management practices (including prohibition periods and areas) may arise as various policies and protocols are established.

#### **4.5.10.7 COMMERCIAL VS. PRIVATE USE**

During the previous master planning effort, the 2001 draft park plan noted that "local Hawaiians do not care for the commercial activities currently occurring at Hāʻena State Park. These activities include weddings on Kēʻē Beach, kayak tours of the Nāpali Coast which launch from the beach, people selling trinkets, and tour groups which use the area for 'spiritual enlightenment.' The local Hawaiians believe that these kinds of activities degrade and exploit the Hawaiian cultural resources of the area" (The Keith Companies 2001). They add that the park is also highly promoted throughout the visitor industry—in guidebooks, by hotels, tour companies, ocean recreation companies, etc. They note that all private enterprises need a State-issued permit to operate on State lands and for the most part, the various commercial businesses that occur at the park are not sanctioned by the State. They also questioned whether commercial operators should be allowed to exploit the resources at Hāʻena State Park for their own economic interests (The Keith Companies 2001).

#### **4.5.10.8 HOMELESS/SQUATTERS VS. PARK USERS**

The 2001 draft park plan notes that squatters have not been present within the park since the Taylor Camp residents were evicted in the 1970s. However, squatters are known to reside in the remote canyons of the Nāpali Coast. They also note that homelessness is not a recreational issue but a socio-economic problem that is beyond the scope of this project. However, they add that the presence of homeless or squatters in public parks can make other users feel uncomfortable and can create visual, sanitation and health problems within the park (The Keith Companies 2001).

Recent information from the park ranger also confirms that homelessness and vagrants are not a significant issue at the park today. However, there are individuals who will camp overnight and stash items at the park on

---

---

occasion. They tend to hide in overgrown areas away from the parking lots and heavily visited areas. Regular patrolling by the park ranger and some of the volunteers helps to manage the problem and keep the areas clean (Juran pers. communication 2009).

---

This page intentionally left blank.

---

---

## ***5.0 Recommended Park Improvements and Management Strategies***

A site analysis that compiles the information from the previous sections is provided in Figure 35: Site analysis Plan. This forms the physical basis from which the master plan will be updated. However, upon these physical constraints and opportunities are the human factors including community concerns and management needs. The following section summarizes the various park improvements and management strategies recommended for Hā'ena State Park based on the collected data, community open house and interviews, onsite observations and previous studies.

### **5.1 DEMANDS AND NEEDS**

#### ***5.1.1 PREVIOUSLY IDENTIFIED NEEDS***

During the previous master planning effort in the late 1990s, the 2001 draft park plan identified several requests from the major user and interest groups. They are summarized in the following sections.

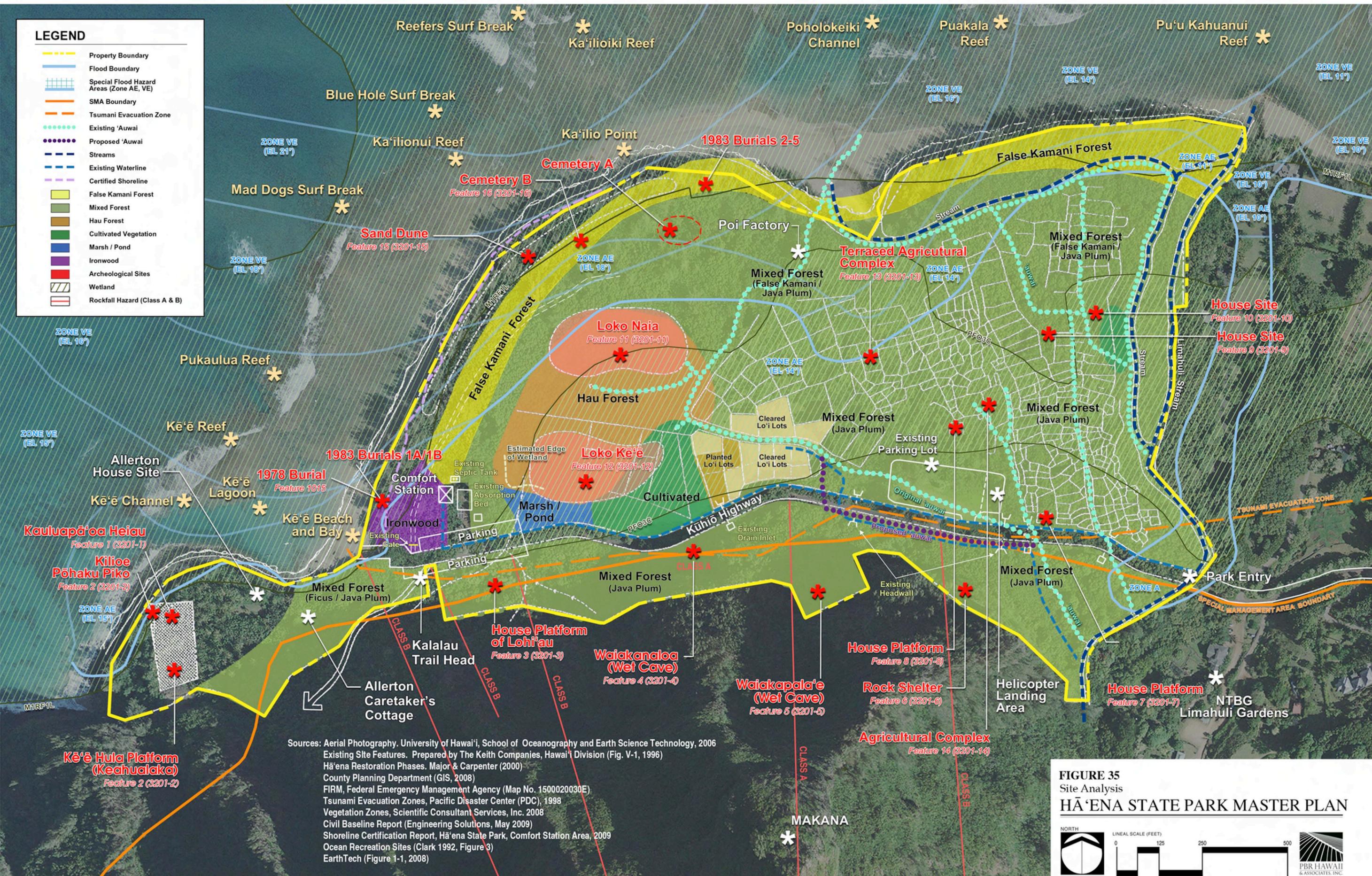
##### **5.1.1.1 HAWAIIAN CULTURAL GROUPS**

During the community workshop held for the 2001 draft park plan, two important perspectives were shared by kūpuna. Victoria Lindsey, born and raised in Hā'ena, stressed that it is important to let the land heal, and that the community needs to help the land heal and return to its former good health. Pohaku Nishimitsu, a noted kumu hula, emphasized the significance of Hā'ena and Kē'ē and said that the plan needs to respect the ancient traditions (The Keith Companies 2001). The ahupua'a 'ohana and those who have an interest in Hawaiian culture requested the following:

- Public recognition of the cultural significance of Hā'ena
- Designated areas for cultural practice, especially hula
- Restored village elements including lo'i and fishponds
- Protected burial sites
- Stricter enforcement of rules and regulations

##### **5.1.1.2 RESIDENTS**

This group included local residents who use the park primarily for recreational purposes. In 2001, the draft park plan summarized that resident recreational users were strongly against a park entrance fee and some residents would resist attempts to increase enforcement of park rules. Their requests included:



**LEGEND**

- Property Boundary
- Flood Boundary
- Special Flood Hazard Areas (Zone AE, VE)
- SMA Boundary
- Tsunami Evacuation Zone
- Existing 'Auwai
- Proposed 'Auwai
- Streams
- Existing Waterline
- Certified Shoreline
- False Kamani Forest
- Mixed Forest
- Hau Forest
- Cultivated Vegetation
- Marsh / Pond
- Ironwood
- Archeological Sites
- Wetland
- Rockfall Hazard (Class A & B)

Sources: Aerial Photography, University of Hawai'i, School of Oceanography and Earth Science Technology, 2006  
 Existing Site Features. Prepared by The Keith Companies, Hawai'i Division (Fig. V-1, 1996)  
 Hā'ena Restoration Phases. Major & Carpenter (2000)  
 County Planning Department (GIS, 2008)  
 FIRM, Federal Emergency Management Agency (Map No. 1500020030E)  
 Tsunami Evacuation Zones, Pacific Disaster Center (PDC), 1998  
 Vegetation Zones, Scientific Consultant Services, Inc. 2008  
 Civil Baseline Report (Engineering Solutions, May 2009)  
 Shoreline Certification Report, Hā'ena State Park, Comfort Station Area, 2009  
 Ocean Recreation Sites (Clark 1992, Figure 3)  
 EarthTech (Figure 1-1, 2008)

**FIGURE 35**  
 Site Analysis  
**HĀ'ENA STATE PARK MASTER PLAN**

NORTH

LINEAL SCALE (FEET)  
 0 125 250 500

PBR HAWAII & ASSOCIATES, INC.

- 
- 
- Maintain existing conditions, lax enforcement
  - Improve comfort stations
  - Support park user fees only if local residents exempted

#### **5.1.1.3 VISITORS**

Visitors included tourists and those who visit the area infrequently. Most of these users learn about the park through guidebooks or other tourist related sources. Their requests included:

- Improve comfort stations and add picnic tables
- Improve security (primarily against vehicle break-ins)

#### **5.1.1.4 COMMERCIAL OPERATORS AND BUSINESS INTERESTS**

This group included those who operated State-permitted businesses such as kayak tours and SCUBA lessons, and non-permitted enterprises such as weddings and souvenir sales. It also included other tourist related industries such as hotels and tour companies. The 2001 draft master plan concluded that most commercial businesses that occur at Hā'ena State Park do not have a State sanctioned permit to operate in the park. Their requests were more mixed and included:

- Any improvements to infrastructure and amenities to increase the number of visitors and improve business opportunities
- Continuation of the lax enforcement of existing conditions (non-permitted businesses)

#### **5.1.1.5 PREVIOUS MASTER PLAN COMMUNITY PREFERENCES/FEEDBACK**

At the community workshop held to review the master plan alternatives for the 2001 draft park plan, the following preferences were identified by community participants:

- Restore and enhance the cultural resources.
- Close at least a portion of the road to general traffic to help reduce vehicular congestion and help in the environmental and cultural restoration. Of the three alternatives presented, the majority of community workshop attendees preferred closing the public road near the existing emergency helipad. However, at a subsequent public review meeting, some disagreed with the road closure at the northwestern end of the park.
- Consider establishing a shuttle system to ease inconvenience and congestion.
- Include resident passes.
- Return to the konohiki system

---

---

### **5.1.2 CURRENT COMMUNITY-IDENTIFIED ISSUES**

Three open house events were held on October 24 and 25, 2008. The first two were held at Limahuli Hale at the National Tropical Botanical Garden and the third event was held at the County of Kaua'i's Mo'ikeha meeting room 2A-2B in Lihu'e. The purpose of the open houses were to gather community input on recent issues and concerns regarding Hā'ena State Park, including gathering feedback on the 2001 draft park plan in order to help refine and finalize it. The event was advertised via radio and news postings, email mailouts and flyers posted around the North Shore community. Contact and distribution lists were compiled from State Park's list of participants from the previous master planning effort, local community members and organizations, and the County of Kaua'i. Over forty participants attended the open house events, five written comments/questionnaires were collected, and four respondents participated online. During the open house events, many participants reviewed and provided input on the 2001 draft park plan. At any one time, eight to ten participants gathered around the plan, working together to mark up the plan. A second set of mark-ups on the 2001 draft park plan was collected in August 2008 during a site visit. Both are provided in Appendix K. However, there may be some overlap as the participants at the site visit also attended the open house.

At the event, seven stations were set up where participants could provide their input either in written or spoken form based on different topics. The topic areas were cultural and archaeological resources, recreational uses, coastal and marine resources, land-based natural resources (flora, fauna, and native ecosystems), traffic and parking, facilities and signage, and natural hazards. Two other stations were for specific suggestions to improve or address the concerns described and a general comment station. The last station included a large printout of the 2001 Community Preferred Master Plan from the previous master planning effort. Pens were provided so participants could draw or mark up the plan to further refine it and provide comments. All questions were open-ended. Hard copies of the same questions and the 2001 Community Preferred Master Plan were also made available for those who wanted to fill them out and turn in at a later time, or to take to those who could not attend the event but wanted to provide input. The questionnaire was provided in both English and Hawaiian and was also made available after the open house at Limahuli Garden and Preserve, and on-line. In addition to the formal responses received, the open house served as an opportunity for the project team and community to get to know one another and talk frankly about the park, the history of the land and people, and to share concerns about current park uses and issues, management, and enforcement.

---

---

The responses received from questionnaires and open house participants are fairly consistent with each other. The full, verbatim responses collected from the open house, questionnaire, and website are provided in Appendix J. Appendix K includes the community mark ups of the 2001 draft park plan.

The following is a summary of the responses received organized by topic area.

#### **5.1.2.1 CULTURAL AND HISTORIC RESOURCES**

Overall, the responses with regards to cultural and historic resources are very similar and consistent.

- Culture and history should be the driving force of the master plan.
- Restoration and preservation of cultural and historic resources of the utmost importance.
- Opportunity to create a cultural park, working model of community stewardship within the Hawai'i State Park system. Incorporate food production and perpetuation of Hawaiian culture. Instill values of mālama 'āina and mālama pono in our keiki.
- Maintain access to the heiau, Kē'ē Beach, and cultural sites for native Hawaiians and kama'aina. Control tourist access to sensitive sites.
- Misuse, neglect, overrunning of the cultural sites needs to stop.
- Hawaiian People should be the ones determining the use and future of the cultural/historic resources. They were taken from them and should be returned to their use intact and in place.
- Restoration of the poi mill would add to the history and continued stewardship of the surrounding lo'i would help to enhance the cultural feeling.
- Construction of a canoe hale for navigational education (from community mark-ups).
- Adequate facilities such as a baseyard or structure, would allow storage of tools and equipment, ensuring security, protection from the elements as well as keeping them out of sight when not in use (from community mark-ups).

#### **5.1.2.2 RECREATIONAL USES**

There are a wide range of responses with regards to recreational resources. They range from increasing recreational uses at the park to reducing and eliminating them in order to restore cultural use of the site. Others feel a balance of the two could be established. Feedback is grouped by activity:

- 
- 
- Level of use: Recreational resources at Hā'ena State Park are extremely important to maintain for both the local community and visitors. Allow recreation to coexist with historic resources. Recreation should be secondary to cultural use and minimized. Recreational uses should not interfere with cultural needs, including privacy of the native peoples. This area should be for Hawaiians; there are other places for recreation. Excited how the plan will open up more space for recreational use.
  - Fishing: Fishing resources are critical to the local community. Create a marine preserve extending to Tunnels. Limit fishing methods to pole and line-fishing.
  - Windsurfing/Surfing: Good windsurfing spots are rare and Reefers at Ka'ilionui is one of the best sites on Kaua'i. Access needs to be maintained. Allow surfing, windsurfing, kitesurfing, etc.
  - Bicycle path: The bike path connecting features of the park was a critically important feature of the 2001 Community Preferred Plan that needs to be included in any future plan. This will be the path for local fisherman, surfers, windsurfers and families to access the recreational areas. Extensive bike path around the park would be dream come true.
  - Hiking: Too much traffic on Kalalau Trail. Better enforcement and management required.
  - Camping: Allow camping in some area of the park to take pressure off County's Hā'ena Beach Park.
  - Access: Allow occasional vehicle use. No vehicles on beaches, not even fishermen. No motorcycles, helicopters or other loud recreational vehicles. Would like to see extensive walk/bike path around the park for access and recreation. Keep park accessible to the community.
  - Picnic Areas: During the Open House events held in 2008, community members crossed off picnic areas proposed on the 2001 draft master plan.

### 5.1.2.3 COASTAL AND MARINE RESOURCES

Many of the responses regarding coastal and marine resources are very similar to one another and overlapped with recreational issues not voiced in the feedback received for that topic area.

- Reef: Trampling on the reef is a problem 365 days a year from sunup to sundown. Reef is dying.
- Education: None in place. Need to instruct people to respect the resources they are enjoying. Educate locals and visitors alike about the vulnerability of nearshore resources and not to walk on the reef. Include education for fishermen also to eliminate illegal fishing activities.

- 
- 
- **Enforcement:** Need to enforce rules regarding kayak egress and ingress. Heavy fines for walking on the reef and taking of protected species.
  - **Management:** Fishing resources should be managed via the community-based subsistence fishing rules and mana’o of the kūpuna from this ahupua’a. Management should be by the Hawaiian families of Hā’ena in the original ahupua’a fashion. Protect them actively and sustainably in a culturally appropriate manner.
  - **Runoff and water quality:** Runoff from parking area runs directly into Kē’ē Beach and Lagoon and taints the water.
  - **Marine preserve:** Create a marine preserve to give the environment a chance to recover.

#### 5.1.2.4 TERRESTRIAL RESOURCES

Responses regarding terrestrial resources are consistent and emphasize the protection and preservation of these fragile resources. Feedback is summarized by topic area.

- **Flora:** Native plants are being replaced by non-native and invasive species. Not many indigenous plants still exist here. Currently there is no fostering of the native plants. Native plants should be propagated and the site restored to pre-contact state. Plantings should be limited to the following: niu, ‘uala, kalo, milo, ‘ākulikuli, ‘ae’ae, kukui, kou, olonā, makaloa, wauke, mai’a, kō, ‘ilima, pōhina, pōhuehue, naupaka and coastal native plants. Any remaining native ecosystems need to be clearly marked so as not to be disturbed by trampling feet. If done correctly, this can also be very educational with possible reforestation of the park with more native plants.
- **Water quality/resources:** Need to maintain watershed and good drainage. Water resources are being degraded due to poor drainage.
- **Trails/Interpretive path:** Trail maintenance is dismal. Park should have walking/biking paths with interpretive signs that connect all the features of the park. Consider boardwalk from parking lot to cold pond, wet caves and all throughout park.
- **Access:** Hawaiians of Hā’ena ahupua’a should have total access including upland for gathering and hunting and should be the overseers of the area.

#### 5.1.2.5 TRAFFIC AND PARKING

In general, every respondent believes that parking and traffic are major issues and need improvement. Most feel parking needs to be limited and parking along the highway eliminated. Others note that additional

---

---

parking is required, but believe it should be outside of Hā'ena. Many also think charging for parking or paying for transportation service is appropriate.

- Limit parking to the 108 stalls included in the 2001 Community Preferred Master Plan. The Master Plan makes a good attempt at keeping the cars all in one parking area and keeping access to the park by foot or bike.
- Overflow parking needs to be addressed so cars are not parked along the highway and throughout Hā'ena. Consider shuttle system from Hanalei or Princeville. Electric shuttle bus powered by microhydro generator was suggested.
- Charge for parking. Charge admission for parking with different rates for different users (hikers, annual pass, etc.). Keep funds at the park so it can be self sustaining.
- Add a gate at park entrance and admit cars only when parking is available. Addition of a Park gate that is closed after sunset to all vehicles may also help avoid misuse.
- No driving on beaches for any vehicles. Minimize driving and parking in the park.
- Set aside parking for hula kumu (from community mark up of 2001 draft master plan).

#### 5.1.2.6 FACILITIES AND SIGNAGE

Most respondents feel that the facilities and signage at the park are currently inadequate. However, there were a few who wanted to minimize development and signage as much as possible.

- Provide interpretive signs along walking and bike paths.
- Do not pave walking and bike paths (from community mark up of 2001 draft master plan).
- Should be culturally appropriate, visually appealing in keeping with the natural surroundings and green (sustainable technologies).
- Keep signage and facilities to a minimum. Keep Hā'ena State Park as undeveloped as humanly possible.
- Include permit station at the start of the Kalalau Coast Trail to allow on-site camping permits.
- Road needs shoulders or walkway for safety.
- Needs cellphone coverage.
- Comfort stations and sanitation needs improvement.
- Information should present a living culture rather than an ancient civilization.
- Signs should include proper snorkeling activities.

---

---

### 5.1.2.7 NATURAL HAZARDS

A variety of natural hazards are highlighted by the respondents.

- Ocean hazards: signage should be clear about ocean dangers, particularly in the winter. Concern for swimmers, snorkelers, and kayakers who leave the lagoon for open ocean without knowing hazards.
- Tsunamis: no signage. Locate facilities appropriately.
- Signage: small signs should be located where appropriate but should not overwhelm the site. No way to prevent foolish people from doing stupid acts.
- Rockfalls: Rockfalls are natural, just need to warn of them. Consider some kind of netting to protect people in area below the cliff near wet cave.

### 5.1.2.8 OTHER COMMENTS/SUGGESTIONS

Other comments and suggestions were requested of the respondents in the last two questions. Where appropriate, some of the comments collected under these questions are included in the above topic areas. Only new or different recommendations not noted above are included below.

- Support for the 2001 Community Preferred Master Plan.
- Listen to the local community.
- Contact Sierra Club, Mālama Kaua‘i and 1,000 Friends of Kaua‘i to assist.
- Avoid thinking in terms of creating a commodity at Hā‘ena.
- Consider other examples: Kilauea Lighthouse, Limahuli Gardens.
- Dredge the fishpond and reconnect the mākāhā and stream flow. Stock and operate for moi, awa, āholehole production.
- Suggest privatizing care of the park to spark more interest and pride in caretaking.

## 5.2 RECOMMENDED IMPROVEMENTS

### 5.2.1 CULTURAL ENVIRONMENT

Throughout Hā‘ena State Park’s history, the emphasis has been on recreational activities at the expense of the significant historic and archaeological resources. The use of federal Land and Water Conservation Fund grants to purchase the park required that the park be developed for outdoor recreation. Through the master plan process, recommendations have advanced to change this perspective and orient toward a culturally-based and historically-inspired master plan for the park. The following are compiled from many sources and have been updated as necessary.

---

---

### 5.2.1.1 RESTORATION AND INCREASED PROMINENCE OF HULA SITES

According to Hawaiian tradition, it was here that Pele was drawn to Lohi'au's beating drums in one of the most famous love stories in Hawaiian history involving Pele, Lohi'au, and Hi'iaka and it is significant for its place in hula traditions. One recommendation from the 2001 draft park plan involved the restoration of Ke Ahu A Laka. According to Mary Kawena Pūku'i, Laka, for whom the site is named, is the patron god of hula and whose full name is believed to be Kuohia-laka. His plant form was the 'ōhi'a lehua (Humu Mo'olelo 2008). Over the years, an informal system of maintenance over the hula site has been in place. In 1987, a request by Ka'Imi Na'auao o Hawai'i Nei to be appointed kahu (guardian) of the site was submitted, but this proposal did not come to fruition. In the intervening years, malama for the hula site has been performed at times by halau hula, by State Parks staff, by community volunteers and at times the hula site has gone unmaintained.

Community responses at the 2008 open house event included those seeking to preserve access to the Hula sites for practitioners and Kama'aina, while restricting access for visitors to prevent them from being overrun. Community suggestions also included reserving parking among the public parking areas for kumu hula.

The individuals who were interviewed for the ethnographic survey (contained in Appendix A) also had recommendations for restoration of the hula platform and heiau. The individuals recommended restoring the platform and removing the invasive trees and roots that are undermining the structure. They emphasized that restoration efforts should be directed by the practitioners who use the platform.

### 5.2.1.2 RESTORATION OF LO'I

Considerable effort has already commenced to restore the lo'i fields. As noted previously, several studies have been completed and portions of Phase I of the restoration are currently being cultivated (see Figure 36: Lo'i Restoration Phasing Plan). Additionally, the interviews conducted for the Cultural Impact Assessment included discussion and general support for continued lo'i restoration.

State Park's vision for restoring the lo'i is described by Major and Carpenter in their 2000 restoration plan:

State Parks proposes to revitalize the cultural landscape and preserve the archaeological sites as a living system, rehabilitating the *'auwai* (ditches),

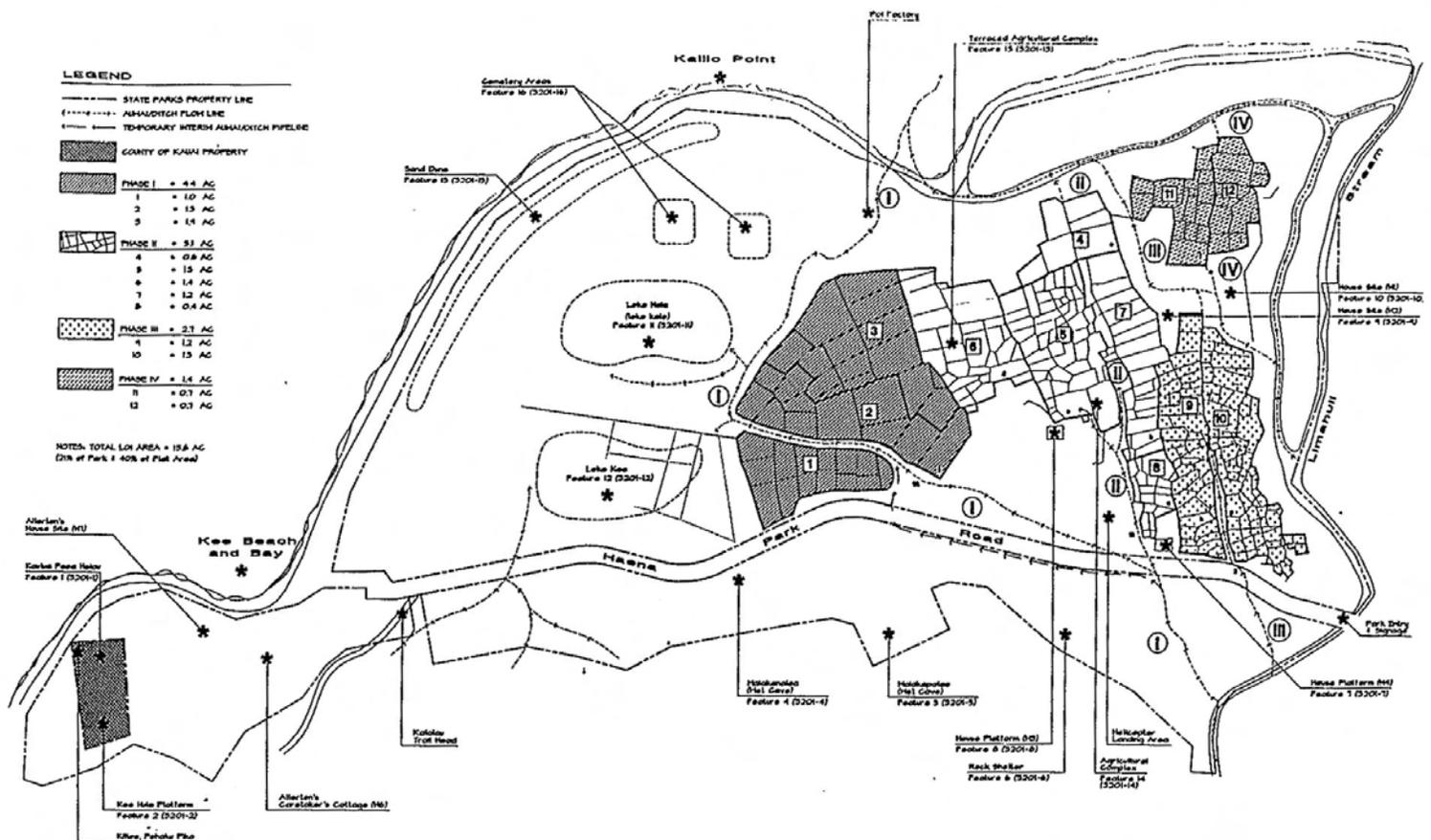
---

---

*lo'i* (irrigated fields), and *kuāuna* (banks separating the fields). Water will be channeled from Limahuli stream at the traditional diversion point, following the ancient 'auwai over most of its course and into the wetland field system. In partnership with the site curators (Hui Maka'ainana o Makana), the cultivated *lo'i* will serve as interpretive resources where school children, local residents, and visitors can learn about the original culture of Kē'ē and Hā'ena. (Major and Carpenter 2000)

These efforts based on the 2000 *lo'i* restoration plan should be continued and integrated into the overall cultural restoration of the park and interpretive programs. A brief outline of the restoration steps are provided below:

- Initial vegetation clearing and removal
- Archaeological inventory survey
- Design of water diversion and transmission system
- Permits and other requirements
- Establishing temporary vehicle access
- Removal of derelict vehicles and rubbish
- Removal of trees
- Restoration of *lo'i* and 'auwai
  - Installation of stream diversion and water transmission system
  - *Lo'i* bank and rockwall reconstruction
  - 'Auwai excavation and reconstruction
  - Planting of taro



**FIGURE 36: LO'I RESTORATION PHASING PLAN**

(Source: The Keith Companies 2001, Figure VII-6)

### 5.2.1.3 RESTORATION AND PROTECTION OF CEMETERIES AND BURIAL SITES

Carpenter (1996) prepared a burial treatment plan as described earlier in Section 2.2.3.2.1. The plan was prepared at the request of the local lineal descendants of the area who saw a continual decline in maintenance and neglect of the cemetery areas within the park. The plan focused mainly on the two family cemetery areas, but also included general recommendations for ongoing inadvertent burial discoveries. The following is a summary of the preservation plan and recommendations.

- **Family Cemetery Areas (A and B):**
  - Fence and gate the two cemetery areas to protect them and delineate area to be cleared, landscaped and maintained (weeded, raked, etc.).
  - Install appropriate fencing material that respects historic nature of site such as wrought iron or a stone wall. Install signage that identifies the areas as cemeteries and requests respect from the public when in the area.

- 
- 
- Recommend that the families be responsible for the ongoing upkeep of these areas. This could be accomplished through a special use permit or a formal maintenance agreement between the families and State Parks similar to the existing curator agreements.
  - Restrict access only to lineal descendants and State personnel. Access to these areas for lineal descendants should be unrestricted for maintenance and paying respect.
  - **Recommended Preservation Measures for Dune Sites:**
    - Prohibit vehicle traffic on the sand dunes stretching from Ka'ilio Point to Kē'ē. Direct traffic (roadways and other accesses) away from sensitive areas.
    - Realign the dirt road that runs behind and over sand dunes to its original pre-Hurricane 'Iwa alignment. This will help protect the dunes from erosion, reduce potential unearthing of additional burials within the dune, and provides a larger buffer for the two cemetery areas.
    - Contact known lineal descendants or a designated representative in addition to SHPD and the Kaua'i Island Burial Council when human remains are discovered within Hā'ena State Park boundaries. Involve all three groups in the decision-making process involving the disposition of the remains.
    - Reinter burials as close to the original location within the dune system as possible when inadvertent discoveries of unmarked burials are made. Provide markers for reburial sites to avoid further damage.
    - If a suitable reinterment site cannot be found in the vicinity of the discovery due to continuing erosion or other factors, it is recommended that these remains be reinterred within the confines of the existing cemetery areas. As such, the cemeteries are recognized as designated reinterment sites.
  - **Policies and Guidelines for Inadvertent Burial Discoveries**
    - In the event of discovering new remains, notify known lineal descendants, Kaua'i Island Burial Council, and State Historic Preservation Division (SHPD).
    - Preserve in place. If this option is not feasible due to ongoing threats to the burials from erosion, park visitation or other factors that cannot be mitigated, then a reinterment site will be designated.
    - Consult and respect the wishes of lineal descendants. On a case-by-case basis, a preferred course of action should be decided upon with the consultation of the descendants.

- 
- 
- Mark reburial sites on the surface when feasible to help avoid future disturbance.
  - Encourage community and family participation in maintenance and management of burial areas.
  - Establish a monitoring program based on known burial areas and suspected burial areas. The shoreline should be examined immediately after periods of high surf for exposed burial remains.

Additionally, 'ohana who come to the park to care for the cemeteries or commune with their ancestors must compete for parking space with park visitors. Suggestions made at the 2008 community open house included reserving parking for cemetery caretakers.

#### **5.2.1.4 STUDY POTENTIAL TO RESTORE HAWAIIAN FISHPOND**

Comments at the October 24, 2008 Community Open House included an interest in restoring Loko Kē'ē, a Hawaiian fishpond for cultural and ecological purposes. Loko Kē'ē is located east of the park comfort station and north of Kūhiō Highway. Presently, Loko Kē'ē is a seasonally inundated wetland. A broken line of boulders may mark the fishpond's former boundary. These comments were echoed in interviews conducted for the Cultural Impact Assessment, where it was suggested that restoration of the fishponds could be phased in as part of a Master Plan.

State Parks could explore the opportunity for restoration and perform an analysis of a restoration project's public benefits, costs and potential outcomes. Management or stewardship of the Loko by an interested community group similar to the curatorship of the lo'i by Hui Maka'āinana o Makana could also be evaluated. Additional discussion about Loko restoration is in the next section of this report, Natural Environment.

#### **5.2.1.5 CANOE HALE FOR NAVIGATIONAL EDUCATION**

The suggestion to construct a canoe hale for navigational education was brought forth on the community mark up of the 2001 draft park plan.

#### **5.2.1.6 POI MILL**

Another suggestion that surfaced at open house events and in the CIA interviews is restoration of the poi mill. Currently, remnant concrete remains are all that is left of the structure. Restoration of the structure/activity will need to be coordinated with SHPD to ensure that any historic remains of the structure that are worthy of protection are preserved.

---

---

## 5.2.2 *NATURAL ENVIRONMENT*

The following recommendations are compiled from the technical consultant studies prepared for this effort as well as previous reports, where appropriate.

### 5.2.2.1 WATER QUALITY

According to SWCA (2009), several design considerations can be implemented to help maintain Class AA coastal water quality standards even as visitation increases. They are:

- Conduct a high-resolution assessment of Park topography and evaluate alternate storm drainage features to minimize or slow runoff into the ocean. A concern with runoff from Kūhiō Highway directly into Kēʻē Lagoon was also expressed by community members at the 2008 open house.
- Upgrade sanitation facilities and conduct regular inspection and maintenance of sanitation systems at the public restrooms to prevent sewage seepage or spillage into the ocean or groundwater.
- Create parking areas remote from the park and allow only pedestrian or shuttle bus access.
- Carefully design parking areas and apply best management practices to prevent the runoff of contaminants to streams and coastal waters.
- Conduct regular maintenance of, and apply best management practices to, the Kalalau Trail to prevent unnecessary soil erosion, siltation, high turbidity, and possible coral mortality within the Kēʻē Lagoon and reef.
- Provide and regularly maintain an appropriate number of trash and recycling receptacles to reduce the amount of plastic and other solid waste that blows or gets washed into the ocean in storm runoff.

For freshwater resources:

- Minimize disturbance to fragile habitats around the riparian zone surrounding Limahuli Stream, the Cold Pond, Waiakapalaʻe and Waiakanaloa.

### 5.2.2.2 SHORELINE EROSION

Recommendations from SWCA (2009) to prevent shoreline erosion originate from the 1990 Kauaʻi Shoreline Erosion Management Study prepared for the State Coastal Zone Management Program office. They are consistent with various state and county polices and guidelines. Erosion control measures specifically relevant to the park include:

- Delineate and manage specific erosion prone areas by ‘littoral cells.’ Littoral cells are self-contained beach compartments that are geographically bounded by specific physical features (e.g. groins,

---

---

piers, points of land) that either provide or remove sand from the cell.

- Establish shoreline setbacks of no less than 60 feet for Hā'ena. Design of future Hā'ena State Park facilities should employ the recent data and maps developed by the University of Hawai'i (UH) Coastal Geology Group (<http://www.soest.hawaii.edu/coasts/>) and comply with County of Kaua'i shoreline setback standards to calculate appropriate setbacks along the coastline.
- Prohibit shore protection structures.
- Remove unpermitted shoreline structures.
- Preservation of public shorelines in natural state.
- Give non-structural remedies (e.g. beach nourishment) preference over structural work.
- Develop and update a shoreline structure inventory.

In addition to the recommendations above, in consideration of the archaeological sensitivity of the dunes, the setback for development should be behind the dune system.

### **5.2.2.3 MARINE RESOURCES AND CONSERVATION**

SWCA (2009) notes that four years of the University of Hawai'i Coral Reef Assessment and Monitoring Program (CRAMP) as well as several other independent studies suggest that the nearshore waters of Hā'ena State Park "contain largely undisturbed coral reef resources that provide habitat for healthy populations of fishes and invertebrates of subsistence and recreational value." However, excessive fishing, particularly upon target species could have severe impacts to the marine environment, reef and nearshore environment. Therefore, in order to protect and sustain the long-term viability of these resources, SWCA recommends the following measures:

- Encourage the development of management guidelines and protocols for the Community-Based Subsistence Fishery Area established for Hā'ena by Hawai'i state law within a structured administrative framework. This effort is currently underway with the assistance of the Hawaii Community Stewardship Network (formerly Community Conservation Network).
- Establish a permit system as part of this program that requires catch reporting to allow the evaluation of changes over time in catch per unit effort and size distribution of the resource allows management to improve (Birkeland 2001).
- Establish a program of long-term scientific monitoring of fish and invertebrate populations trends within park marine waters.
- Allow sufficient flexibility and insure long-term monitoring to employ the principal of adaptive management and allow changes to be made to permitting processes and management actions, as

---

---

deemed appropriate based upon the results of long-term monitoring and catch statistics.

- Establish a means of enforcing the permitting system for recreational fishing within the park waters.
- Consideration might also be given to the establishment of a marine protected area (MPA) adjacent to or within a portion of the park to serve as a fishery stock replacement area.

#### 5.2.2.4 ROCKFALL HAZARDS

EarthTech (2008) provides two methods of rockfall mitigation: permanent and temporary. Permanent mitigation solutions provide a high level of protection against falling rocks for the entire site with the intent to remain effective for many years (the design life of the system). Temporary design alternatives usually provide emergency or cost-effective rockfall hazard reduction. However, it does not provide full hazard protection coverage and may need to be repeated periodically. The use of temporary methods must be based strictly on the results of a risk management process by the owner and are typically preferred when there is a need for emergency protection or permanent solutions are cost prohibitive (EarthTech 2008). The following mitigation measures are organized by permanent and temporary solution.

##### 5.2.2.4.1 *Permanent Mitigation Design Alternatives*

There are six design alternatives for permanent mitigation:

1. Installation of **wire mesh or ringnet drape system** over entire slope where rocks could fall onto roadways or other protected structures. This method offers a high level of rockfall protection. However, this is not recommended for Hā'ena State Park due to the visual impact and high cost of construction.
2. Installation of **anchored wire mesh** over the entire slope where rocks could fall onto roadways or other protected structures. After cleaning, scaling and leveling, the terrain surface is covered by a high strength steel wire mesh that is tensioned with anchors typically spaced 8 to 10 feet apart. This system is designed to prevent rockfalls by restraining the loose material in place and the anchors can be designed to stabilize slopes with large-scale landslide potential. This method stabilizes the slope and retains loose material in place. However, this method is not recommended for Hā'ena State Park due to its high cost and visual impact.
3. Installation of a **rockfall impact fence system** along the shoulder or toe of the slope to intercept rolling rocks from upslope areas. The

---

---

fence provides blanket rockfall protection from large areas and can be designed to absorb various levels of energy and jumping heights for various site conditions. It requires periodic maintenance such as checking and replacing braking elements and removing rocks as they collect behind the fence. The main drawback is the catchment area required. Sites with launching features or little shoulder room may require widening or realignment. EarthTech explains that this alternative would be suitable for Hā'ena State Park due to its reasonable cost and the ability to hide the fence from view by trees and vegetation, limiting its visual impact.

4. **Combination of rockfall impact fence and drape or anchored wire mesh system.** This alternative includes impact fence installation in strategic locations and a draped or anchored wire mesh over steep slopes where no catchment zone is available for an impact fence such as along the highway. The fence would provide blanket protection from upslope rockfalls with the anchored wire mesh installed just above the areas needing protection such as Waiakanaloa. There will be some visual impact where the wire mesh is installed but EarthTech suggests that this would be a cost-effective alternative for Hā'ena State Park.
5. Construction of a **catchment ditch** along the shoulder of Kūhiō Highway. The ditch should be designed based on specific site conditions to provide adequate catchment zone for falling rock. Sections with little shoulder will require partial cutting of the slope or realignment of the highway. The area around Waiakanaloa does not have adequate space for the catchment ditch and therefore will require anchored wire mesh in this area. Impact fences may also be required where the ditch is not effective at intercepting falling rocks. This alternative may also require relocation or modification of existing utilities along the highway but could increase drainage capacity. EarthTech believes this is also another suitable, cost-effective alternative.
6. Construction of a new **realigned roadway** parallel to the existing road. The last permanent alternative presented by EarthTech is a new realigned roadway constructed makai of the existing highway. An impact fence will be installed in areas where the new roadway is in close proximity to rockfall hazards. The existing road would be used as a rock catchment area and would limit access to Waiakanaloa due to the installed safety control measures. Although EarthTech describes this alternative as "very suitable" for the park, it may impact sensitive areas makai of the existing highway and has higher construction costs than alternatives 3 through 5.

---

---

#### ***5.2.2.4.2 Temporary Mitigation Design Alternative***

EarthTech (2008) offers one temporary rockfall mitigation alternative for Hā'ena State Park, **rock scaling**. During scaling, rock outcrops that are ready to fall are removed by using hands, prying bars and hydraulic jacks or airbags for large rocks. Rock scaling is most effective when 1) there is nothing at the base of the slope to be scaled that requires protection and 2) rocks are allowed to run down the slope freely. In the case at Waiakapala'e, temporary protective measures such as fencing or covering the area with strong mats will need to be installed prior to scaling to minimize debris entering the cave. Metal plates can also be placed temporarily to protect the ground and roadway areas around the cave prior to scaling.

After a thorough scaling of the rockface, the rockfall hazard is generally maintained at a low level for quite a few years since the natural geologic processes that produce rockfalls are generally slow and those at the park are reasonably slow. There are exceptions, however, such as the development of new water channels or significant geologic events.

EarthTech identified the slope above Waiakapala'e as the most hazardous condition at the park and recommended that it should be scaled first. Profile P2 has the highest percentage (63 percent) of the potential rockfalls that would reach the highway and is therefore the second area that should be scaled. The other four simulated profiles have a low percentage of rockfalls reaching the roadway or beach (less than 5 percent) and should be scaled if additional funding is available.

#### ***5.2.2.4.3 Other Mitigation Methods***

Other mitigation methods identified by EarthTech include: rock demolition, bolting, cable lashing, pedestal support and local netting. These methods can be used independently or in combination with other mitigation methods. High-cost methods like constructing concrete canopy or elevated roadways above rock fallout zones can also be used if warranted.

#### ***5.2.2.4.4 Summary Recommendations***

1. For permanent rockfall mitigation design, the combination of impact fence and anchored wire mesh system is recommended due to its ease of construction, least disturbance to the environment and relatively low cost (EarthTech 2008).
2. For temporary rockfall mitigation design, perform rock scaling at selected locations due to its ease of construction, least disturbance

---

---

to the environment, cost effectiveness and minimal construction time (EarthTech 2008).

3. Consider the cultural implications of rockfall mitigation options prior to selection.
4. Consider closure of Kūhiō Highway to vehicles (with exception of Park maintenance, lifeguard, and emergency service vehicles) beyond the first parking area.
5. Install signage to warn of rockfall hazard.

#### 5.2.2.5 FLORA/FAUNA/WILDLAND

Management and restoration recommendations for the flora, fauna and wildland resources at Hā'ena State Park are organized first at the ecological community level. Following these sections, specific management recommendations for each resource are provided.

##### 5.2.2.5.1 *The Coastal Community*

Terry and Hart (2009) note that the most important opportunity for restoration is in the coastal areas currently occupied by the Strand, Ironwood and False Kamani Forest zones. Historical photos indicate that the entire coastal area was open coastal dunes prior to the major tsunami events of 1946 and 1957. Plants such as pōhuehue (*Ipomoea pes-caprae*), naupaka (*Scaevola taccada*), nanea (*Vigna marina*), pōhinahina (*Vitex rotundifolia*), nehe (*Lipochaeta*), pā'ū-o-Hi'iaka (*Jacquemontia ovalifolia*), 'aki'aki grass (*Sporobolus virginicus*), milo (*Thespesia populnea*), hala (*Pandanus tectorius*) and kou (*Cordia subcordata*) would provide authentic vegetation for a restored dune ecosystem. Although the existing vegetation provides some measure of erosion control, native species are also adapted to coastal environments. If such restoration efforts are carefully conducted, Terry and Hart argue that they would likely not increase coastal erosion and might in fact reduce it. Restoration of these dunes would also improve habitat for common native shorebirds, including Kōlea, 'Ulili, Ruddy Turnstone, Bristle-thighed Curlew, Sanderling, and Sandpiper (Terry and Hart 2009).

##### 5.2.2.5.2 *Limahuli Stream*

Terry and Hart (2009) also recommend restoration of the riparian areas around Limahuli Stream. Below the 2,000-foot elevation, dense, closed canopies of alien tree species such as rose-apple (*Syzygium jambos*), waiawi and java plum (*Syzygium cumuni*) have formed around riparian areas. The deep shade produced by these alien trees prevents the establishment of a mid-canopy and ground cover layer in the forest leaving the soil beneath the trees bare. This exposed soil erodes easily and rainfall events can carry

---

---

large amounts of sedimentation into streams and the ocean. The dense shade also restricts sunlight to the stream, preventing the growth and establishment of native riparian plant species such as benthic algae, which are a major food source for many rare and federally endangered native fish and invertebrates. A reduction in this important food source, coupled with increased sediment loading, could ultimately result in decreased habitat quality of streams (Terry and Hart 2009). The alien trees should be removed and replaced by appropriate native species or at the very minimum the dense canopy should be thinned to increase sunlight penetration in and around the riparian areas.

#### ***5.2.2.5.3 Loko Restoration***

Community members voiced an interest in restoring the two loko for both cultural and ecological reasons. Historically, there is evidence that the two loko were used for kalo cultivation, and that Loko Kē'ē, the loko closer to the highway, may have also been used as a fishpond. There is strong community interest to restore the two loko and reestablish their use for food production.

In addition, the endangered native duck, Koloa, have been observed to frequent the loko and there is interest among local community members to provide a habitat for their protection. A local working group would like to see Hā'ena become a habitat for the Koloa as well as other endangered water fowl.

When asked about the potential of establishing the loko as habitat for endangered water fowl, Dr. Terry noted that regardless if the loko were specifically restored as a habitat or for cultivation, waterfowl such as the endangered Koloa and others would likely be attracted to the area. However, he did not feel that such a public location would be ideal for a habitat meant specifically to protect and restore the endangered species. In addition, should the State sanction and fund such a restoration, he felt it would be prudent to undertake a Safe Harbor Agreement (SHA) with the US Fish and Wildlife Service (USFWS) (personal communication). The SHA would include an Enhancement of Survival Permit to protect the state from incidental takes and additional restrictions on use.

#### ***5.2.2.5.4 Native Plant Restoration on Talus Slopes and Cliff Faces***

Of less importance but still of interest according to Terry and Hart (2009) is the restoration of native plants on the talus slopes and cliff faces. They are some of the most pristine native habitats remaining within the park and offer a diversity of native species. However, due to the remote location and hazardous conditions of these areas, this effort would probably be best suited for long-term consideration, if at all.

---

---

#### 5.2.2.5.5 *Threatened and Endangered Species*

Terry and Hart (2009) note that “the restoration of threatened and endangered (T&E) plants species provides the opportunity to not only assist directly in native plant conservation but also to educate the public. State and private landowners may utilize T&E species as long as they obtain these plants from licensed nurseries and keep records that demonstrate this.”

Terry and Hart also emphasize that restoring habitat that encourages repopulation by endangered animal species requires special management and permitting. Should the State decide to establish T&E animal species at the park, they must also bear the responsibility to protect these animals once they are established. According to Terry and Hart, in order to provide for maximum compliance with State and federal endangered species laws, the State must enter into a “Safe Harbor Agreement” prior to undertaking the habitat improvement. This is a voluntary arrangement between the U.S. Fish and Wildlife Service and a cooperating non-federal landowner under the authority of Section 10(a)(1) of the Endangered Species Act of 1973, 16 U.S.C. 1536(b)(4), 1539(a)(1). Under the Safe Harbor Agreement and an associated enhancement of survival permit, the non-federal property owner implements actions that will result in a net conservation benefit for species listed under the Act without the risk of further restrictions pursuant to section 9 of the Act, which prohibits take of listed species. The property owner also receives assurances related to modifications of the SHA or termination of the permit. Such agreements allow a landowner to promote threatened and endangered species on their property without liability for incidental takes that may occur. It might be possible to restore the small wetlands on the property with the purpose of creating native bird habitat that encourages native endangered waterbirds such as Nēnē, Koloa (which already utilize the pond), or Black-necked Stilts. However, the wetlands area is so small that it would be of limited value. Furthermore it is located directly adjacent to the road, where endangered birds might be harassed, injured or killed directly or indirectly by people or their pets. For both practical and legal reasons, Terry and Hart advise against modifying the loko areas to attract endangered birds and suggest finding a more remote area should this be desired (Terry and Hart 2009).

#### General Flora Recommendations:

- Remove invasive and alien plants and revegetate with native plants to restore the natural and cultural landscape as well as prevent/mitigate erosion and encourage stabilization where appropriate.

- 
- 
- Revegetation efforts should exclude invasive species, as well as employ native species to the greatest degree possible.
  - When restoring with threatened and endangered plant species, obtain all plant material from licensed nurseries and maintain records to document their authenticity.
  - Park personnel, DLNR experts, and volunteers should monitor the park periodically for encroachment of new invasive species and monitor expansion of existing areas.
  - Utilize non-chemical maintenance techniques and minimize the use of chemical fertilizers and pesticides wherever feasible.

#### ***5.2.2.5.6 General Fauna Recommendations***

- Park planning, particularly the location of trails and destinations, warning signage, and security personnel training and duties, must consider balancing recreation and ecosystem protection.
- Park personnel, DLNR experts, and volunteers should monitor the park periodically for invasive species.
- In order to prevent impacts to Hawaiian hoary bats, State Parks should restrict any cutting of large shrubs or trees to periods outside the April to August pupping period (raising their young) for Hawaiian hoary bats.
- To reduce the potential for interactions between nocturnally flying threatened or endangered seabirds, any external lighting planned to be used during construction or within the completed project must be fully-shielded and facing downward.
- State Parks should continue cooperation with federal, State of Hawai‘i, and nonprofit organizations that help protect Hawaiian monk seals from natural and human threats.
- State Parks should continue to cooperate with the Division of Aquatic Resources to keep new alien fish out of the ‘auwai and Limahuli Stream and in ridding the stream of periodic invasions of swordtails, guppies, and other alien fish.
- Signage and other educational material should be developed and distributed to advise the visiting public about the value of native species and not to drop off pests or unwanted pets.

### ***5.2.3 VISUAL RESOURCES***

Figure 25 A-C: Visual Resources provide an illustration of Hā‘ena’s important scenic and cultural visual resources. Figure 25 C includes a depiction of visual resources that are constrained by alien forest and vehicle parking. Additional input from community members was sought to verify these views and prioritize which views should be preserved or re-established.

---

---

A prioritized list of views to be preserved and re-established can help to guide park development and maintenance.

- Remove all parking except that for handicapped accessible spaces and spaces for kumu hula from the parking area at the end of Kūhiō Highway to offer unobstructed views of Kēʻē Beach.
- Remove alien trees located on the backslope of the dune between Kēʻē Beach and Loko Kēʻē to aid visual access to Kēʻē Beach.
- Enforce “no parking” zones in front of Waiakanaloa Cave.
- Remove alien plants and trees that undermine physical and visual access to Ke Ahu A Laka Hula Platform.
- Remove alien trees between Kūhiō Highway and the cleared kalo loʻi. Replant with native shrubs such as hala (*Pandanus odoratissimus*).
- Support efforts to maintain the cleared loʻi and encourage efforts on the part of Hui Makaʻāinana o Makana and other community groups to continue clearing and restoration of the loʻi.
- Monitor vegetation at the park entrance, particularly in the riparian zone associated with Limahuli Stream. Restore as necessary with native plants and trees so as to restore the landscape as well as maintain the integrity of Limahuli Stream.
- Selectively remove alien plants from the cemeteries to create an understated and respectful approach for visiting ʻohana.
- Consider view planes when implementing park design, infrastructure improvements and plantings.

#### **5.2.4 RECREATIONAL RESOURCES**

The 2001 draft park plan recommended maintaining much of the existing recreational opportunities at the park as they are the primary reason visitors went to the park. They also added extensive pedestrian and bicycle paths throughout the park. Roughly 7,300 linear feet of public paths were included in the Community Preferred Master Plan, the majority of them following along the ʻauwai and highway alignments. They also recommended providing for recreational and community kalo farming. The main concern with user satisfaction of the recreational opportunities related to traffic congestion, beauty and quality of visual resources, and overuse and misuse of the site. Therefore, their recommendations to reduce the number of parking stalls, control pollution and invasive species, adding an on-site caretaker and limit access were designed to mitigate these issues.

- Park planning, particularly the location of trails and destinations, warning signage, and security personnel training and duties, must take into account balancing recreation and ecosystem protection.

- 
- 
- Reconsider trail alignments to accommodate buffer zones around specific archaeological and cultural sites.
  - Trail surfaces should be carefully evaluated due to proximity to the dune ecosystem, with considerations for minimizing excavation and natural dune movement.
  - ADA accessible trails constructed of firm and stable materials could be limited to areas within the park where subsurface soils are silty clays rather than sand to minimize excavation in archaeologically sensitive areas.
- Conduct regular maintenance of, and apply best management practices to the Kalalau Trail to prevent unnecessary soil erosion, siltation, high turbidity, and possible coral mortality within the Kēʻē lagoon and reef.
  - Establish a sign-in post at the Kalalau trailhead to better monitor trail use.
  - The 2001 draft park plan included picnic areas at locations within the dune system. More recent community input at open house events in 2008 indicated less enthusiasm for picnic tables at these locations due to their proximity over archaeological resources. Thus, if new picnic facilities are to be incorporated into the Master Plan, locations of tables and/or pavilions should be closely evaluated for cultural sensitivity.

### **5.2.5 *FACILITIES***

- Visitor Center: The 2001 draft park plan recommended the establishment of a Visitor Center run by DLNR or a concession where interpretive and educational material would be available. It included a gift shop and was seen as a natural gathering point for visitors. The staff at the visitor center could also coordinate cultural events at the park, including use of the hula heiau by various hula groups (The Keith Companies 2001). A visitor center could also serve as a facility to conduct educational experiences for visitors (i.e. organized tours of loʻi). Consider management of the visitor center by a local community organization where visitor center and gift shop revenues are re-invested in educational programs at Hāʻena.
- Baseyard and Storage: Provide a secure and visually pleasing baseyard or storage facility for park maintenance equipment, including equipment used in taro cultivation.

---

---

## 5.2.6 INFRASTRUCTURE

### 5.2.6.1 WATER

At present, County water systems serve the park comfort station and associated shower. Water from Limahuli Stream is diverted to irrigate the taro lo'i.

- Where possible, water for irrigation and non-potable uses should be derived from sources alternate to the County water supply. Catchment and re-use of wastewater should be considered with all new development proposals.

### 5.2.6.2 WASTEWATER

An evaluation of wastewater treatment options for the park was conducted by Kennedy Jenks (formerly Engineering Solutions, Inc.) with an emphasis on systems that could manage water in a more sustainable way than a conventional septic/leach field system. A Wastewater Treatment Matrix is included as part of Appendix G. Current trends toward sustainable water management and the desire of the community direct that any new systems installed be as environmentally sound and treat water to be re-used if possible. Specific wastewater recommendations include:

- Add an additional comfort station near the parking area to take pressure off the heavy usage of the comfort station at Kē'e.
- New wastewater systems should treat water so that it might be re-used within the park.
- Implement the constructed wetlands for wastewater treatment at the existing comfort station. Conduct regular inspection and maintenance of the systems to ensure water quality targets for the system (Department of Health R-2 standards) are met.

### 5.2.6.3 DRAINAGE

- Conduct a high-resolution assessment of park topography and evaluate alternate storm drainage features to minimize or slow runoff into the ocean
- Wherever possible, storm drainage features within the park should mimic natural systems, incorporating "Low Impact Development" techniques such as pervious concrete and bioinfiltration through swales and raingardens.
- Minimize grading and man-induced erosion. Best management practices for erosion control should accompany any ground disturbing activities.

---

---

#### 5.2.6.4 TRANSPORTATION

- Follow guidelines provided in the *Kūhiō Highway Historic Road Corridor Plan* prepared by Belt Collins and adopted by the State DOT in 2005.

#### 5.2.6.5 PARKING

- Create parking areas remote from the park and allow only pedestrian or shuttle bus access.
- Carefully design parking areas and apply best management practices to prevent the runoff of contaminants into streams and coastal waters.
- Redesign or eliminate parking and vehicle turn-around area at Kēʻē Beach to avoid vehicle/vehicle conflicts, vehicle/pedestrian conflicts, reduce congestion, facilitate emergency vehicle access and protect scenic views.
- Re-evaluate signage to ensure voluntary compliance with parking regulations.

#### 5.2.6.6 SOLID WASTE

- Provide and regularly maintain an appropriate number of trash and recycling receptacles to reduce the amount of plastic and other solid waste that blows or gets washed into the ocean in storm runoff.
- Replace existing trash receptacles with animal-proof receptacles to discourage foraging by feral cats, dogs and rats.

### 5.3 MANAGEMENT RECOMMENDATIONS

The following management recommendations are compiled from community and public input and previous and current technical studies. Each should be thoroughly discussed with and considered by State Parks as well as the community advisory committee in order to determine what would work best for ongoing management of Hāʻena State Park. The management recommendations will then be incorporated into the master plan and will require approval by the Board of Land and Natural Resources.

#### 5.3.1 RESTORATION OF TRADITIONAL STEWARDSHIP PRACTICES

##### 5.3.1.1 STEWARDSHIP VS. MANAGEMENT CONCEPT

The Hawaiʻi Ocean Resources Management Plan (ORMP) describes traditional ahupuaʻa management in the following way:

---

---

Modern ahupua'a management should focus on fostering stewardship of the land and sea and an understanding of the interconnectedness of the health of the environment and people. The ahupua'a concept provides the foundation for an integrated approach to natural resource management where communities assess the health and vulnerability of their surrounding environment and can formulate best management practices for sustainable, long-term land and natural resource management alternatives. It provides opportunities to complement agency management with community-based efforts, utilizing localized knowledge while including the community as an active part in decisions about the use of the ahupua'a.

Traditional Hawaiian Approaches that can be Applied in Integrated Natural Resources Management:

- Management systems at multiple levels: ahupua'a, moku, and moku puni when appropriate
- Integrated and place-based approaches that highlight linkages between land and sea and unique features of specific ecosystems
- Recognition that resource use is integrally linked with responsibility for and care of the environment
- Ahupua'a-based organization, such as 'aha councils, that advise management decision-making by employing traditional and local knowledge as well as science-based information and data
- Kapu system (prohibitions) and best management practices developed at appropriate scales of management and consistent with natural processes (State of Hawai'i Coastal Zone Management Program 2006)

The ahupua'a approach contrasts with conventional approaches to park management, where park or park systems are managed with a top-down approach. Such an approach places all responsibility for the park on to an administrative body, typically a government or quasi-governmental entity. In this model, kapu (forbidden actions) is only as strong as the enforcement ability of the park management entity. In a remote location such as Hā'ena, enforcement is difficult especially in light of DLNR personnel budgets. Similarly, park maintenance and care also falls to the managing entity. Again, DLNR personnel budgets allow for one full time caretaker and one ranger which is inadequate to manage a park with such a diversity of uses and volume of guests.

Following are some traditional Hawaiian principles for stakeholder involvement and cooperation that reinforce ahupua'a-style management.

### ***Ho'okuleana – Responsibility***

Kuleana places both responsibility and privilege and ho'o means "to give." Clear assignments of responsibility for management are needed, as well as performance measures and benchmarks to track progress, identify areas for improvement, and maintain accountability.

---

---

*Ho’oūlu – Be proactive*

Preventive or mitigative actions should be taken before a crisis situation develops. The cost of prevention is minimal compared to the enormous expenses incurred in reactive or crisis management.

*Makemake – Willingness*

A plan is just a document unless it asserts or creates a motivation to act. Politicians, legislators and community members are all crucial players in initiating change. Political will combined with active stakeholder involvement must be cultivated to provide the impetus for change.

*Kōkua – Collaboration*

Collaboration between all stakeholders is needed to adopt more integrated and adaptive management approaches. Collaborative governance mechanisms must be developed to facilitate effective and efficient management of ocean resources.

*Ho’okō Kānāwai – Compliance*

Enforcement of existing laws and regulations can improve the health of our ocean resources. While the primary responsibility for enforcement lies with government agencies, voluntary compliance with ocean regulations can be fostered with education and community involvement.

*Ho’oponopono and ‘Aelike – Dispute resolution and consensus building*

Conflict resolution and consensus building processes are needed to address growing resource use conflicts.

**5.3.1.2 ‘AHA COUNCILS AND KONOHIKI/CARETAKER/AMBASSADOR  
CONCEPT**

The State Ocean Resources Management Plan also promotes the use of ‘Aha Councils to guide ahupua’a activities. “Ahupua’a were originally governed by regional ‘aha councils, composed of experts in various cultural and livelihood-related skills, and later konohiki, leaders appointed by the ali’i (chiefs). ‘Aha councils or konohiki managed resources by setting kapu, forbidden actions, which were severely punished when broken. The Hawaiians dependence on the health of the land and sea infused a sense of responsibility and stewardship into their culture and morals. Kuleana, which interweaves honor and duty, best describes the Hawaiian resource management attitude, and best parallels the idea of resource stewardship as opposed to management. Ahupua’a and moku management reinforced an extensive set of social norms and cultural practices to protect the natural resources from overexploitation, pollution, and extinction.”

---

---

The 2001 draft park plan also recommended the creation of an “ambassador” or caretaker at Hā’ena who would ideally be a local resident, preferably one with family ties to the land. The ambassador would be trained by DLNR to educate visitors with regard to resource protection and appropriate behavior around sensitive cultural sites. A similar ambassador program was instituted by DLNR Division of Forestry and Wildlife at Kā’ena Point, O’ahu.

#### **5.3.1.3 KULEANA OR SPECIAL AREAS OF CURATORSHIP CONCEPT**

An idea that was brought forth by community members and by individuals interviewed for the Cultural Impact Assessment is to divide stewardship responsibilities among multiple entities. Currently, Hui Maka’āinana o Makana has a formalized agreement to be the curator or steward of the lo’i within the park. The many facets within the park necessitates additional energy and mana’o to curate the hula site; the beach resources, the cemetery and the Kalalau trailhead.

#### **5.3.1.4 PARKS MANAGEMENT CONCEPT**

Under this concept, Hā’ena State Park is managed by a public entity in order to manage a high number of visitors. A successful model of this type of management can be found at Hanauma Bay, O’ahu. Hanauma Bay is a Marine Life Conservation District and park managed by the City and County of Honolulu. At Hanauma Bay, an entry fee is levied on out-of-state visitors and the number of guests at any one time is limited to a certain number. The entry fee is \$1.00 to park a car and \$7.50 per person. Entrance is free for children under 13 and Hawai’i residents. The revenue stream from Hanauma Bay is used to fund operations and maintenance as set forth by a county ordinance.

Recognizing the realities of parks and recreation budgets at all governmental levels, this model of management could incorporate a community stewardship component. Again, using Hanauma Bay as an example, Friends of Hanauma Bay, a volunteer group assists with education at the facility.

### **5.3.2 *CARRYING CAPACITY***

Local and international parks organizations recognize that parks and natural areas have carrying capacities. There is a physical capacity that the resource can accommodate a social capacity that a local community can provide and a psychological capacity that relates to the park user’s expectations.

---

---

### 5.3.2.1 ENVIRONMENTAL CARRYING CAPACITY

In the report, *Loving them to Death? Sustainable Tourism in Europe's Nature and National Parks*, The Federation of Nature and National Parks of Europe describes environmental carrying capacity as the, "degree to which an ecosystem, habitat or landscape can accommodate the various impacts of tourism without damage being caused or without losing its 'sense of place'" (FNNPE, 1993).

Clark (1992) defines carrying capacity as "the number of users that can be accommodated by a given area without loss in the quality of the natural environment and the visitor experience." He describes it as the "optimal capacity" or "desirable capacity," the median between the minimum number of users needed to keep a recreation setting open, and the maximum number when the recreation setting is full and often accompanied by many problems such as overcrowded facilities, diminished resources, inappropriate activities and a deterioration of safety. "Carrying capacity in general ... is the level of use beyond which impacts exceed acceptable levels of change" (Clark 1992).

### 5.3.2.2 CULTURAL OR SOCIAL CARRYING CAPACITY

Cultural or social carrying capacity can be described as the, "level beyond which tourism developments and visitor numbers adversely affect local communities and their ways of life" (FNNP 1993). The report, *Guidelines for Tourism in Parks and Protected Areas of East Asia* which was prepared for the International Union for Conservation of Nature (Eagles, Bowman & Tao 2001), elaborates to say, "Tourism levels that are too high will interfere with local people's ability to go about their necessary daily routines, and after the initial curiosity and excitement associated with potential economic benefits fades, the local people may begin to resent tourists." With regards to the economic impacts of exceeding cultural carrying capacity the FNNP Guidelines document states, "once communities are adversely affected (i.e. a once peaceful place becomes very busy and congested or a historic site is damaged), their ability to attract visitors declines."

Clark (1992) also characterizes carrying capacity in a recreational setting as a combination of four components:

1. Physical capacity: the amount of space per person.
2. Facility capacity: the size of the buildings or improvements serving visitor needs.
3. Ecological capacity: the ability of the natural ecosystem to recover from visitor impacts.
4. Social capacity: the limit at which impacts impair or alter human experience of a place.

---

---

Clark primarily describes the carrying capacity of Hā'ena State Park from a social viewpoint and believes that the area "should be able to accommodate all the current and potential users without degradation of the resources or the recreation experiences associated with the resources." He did not believe that establishing a carrying capacity at any of the beaches or nearshore recreation sites was necessary at the time of his report (Clark 1992). His explanation focused on the recreational segment of users and primarily visitors, and did not consider other users such as local residents or cultural practitioners. He does mention fishermen may be affected but that they would change their behavior and either come to the site early in the morning or late in the day to fish.

Since Clark's study, however, there appears to be a diminishing of the natural resources (ecological capacity), facility and physical capacity and even social capacity. Comments and interviews conducted for the Master Plan express the local Hawaiian and kama'āina's fatigue with the volume of visitors to Hā'ena. SWCA (2009) summarizes the impacts of increased recreational uses at Hā'ena State Park:

An increase in recreational uses at Hā'ena State Park would place greater demands on existing facilities infrastructure, and on the physical, ecological, and societal capacity of the area. Attracting more recreational users would further increase current traffic congestion and parking issues for both visitors and residents. More users would also have the potential to impact stream and nearshore water quality by increasing the amount of non-point and point-source pollution in the area. The reef ecosystem would be significantly impacted by an increase in unregulated recreational activity at the Park. Potential impacts to the coral reef ecosystem as a result of increased recreation in the nearshore area include: decreased coral coverage, altered coral growth, decreased fish populations, reduced local biodiversity and increased propagated pressure of invasive species. Without an enforceable Park management plan, an uncontrolled increase in current recreational activities at the park would lead to further dune erosion and the removal of dune vegetation; create untenable traffic congestion and conflicts; increase the level of pollutants in non-point source stormwater runoff; conflicts between recreational and subsistence fishers, and between other and various users of the Park's marine waters; loss of the unique socio-cultural character of the Park are surrounding neighborhood; reduced level of enjoyment by visitors and residents alike; and ultimately as a 'worst case,' the potential economic collapse of the area as a visitor destination. (SWCA 2009).

However, SWCA does believe that with proper management, "most of the recreational uses currently occurring at Hā'ena State Park can be sustainable," but recommends that an ecological carrying capacity study be completed to determine the sustainability of existing recreational uses. The concept of an ecological carrying capacity takes into account "the

---

---

various recreational activities and the unique physical conditions at a particular reef site to provide a sound scientific basis for proactive management and to allow managers to identify optimal levels of use and set limits of use... before projected increases occur” (SWCA 2009).

The SWCA recommendations are generally supported by the 2008 update to the State Comprehensive Outdoor Recreation Plan (SCORP) which includes recommended actions to, “implement monitoring programs to assess impacts/damage to natural and cultural resources at heavily used facilities”. The SCORP suggests that this action may include establishing carrying capacities and limits of acceptable change studies.

### **5.3.2.3 PSYCHOLOGICAL CARRYING CAPACITY**

Psychological carrying capacity can be described as, “the level beyond which the essential qualities that people seek in the protected area (such as peace and quiet, few other people, few signs of human developments) would be damaged by tourism developments” (FNNP 1993). In other words, park visitors have an expectation of what their experience will be like. To use Hanauma Bay as an example, a visitor would likely expect large crowds of beach goers due to the parks proximity to urban Honolulu and its promotion by the travel industry. On the other extreme, visitors to Mo’omomi Preserve on Moloka’i would expect quite a different experience. Consideration of psychological carrying capacity is valuable as the IUCN’s Guidelines for Tourism points out, “When visitors’ expectations are not met, visitors may leave feeling unsatisfied and unhappy with their experience”.

Clark also speaks to this point noting that carrying capacity cannot be determined in absence of management objectives and recommends a monitoring program and user surveys to determine the point where perceptions of crowdedness move from acceptable to unacceptable levels.

### **5.3.3 EDUCATION AND INTERPRETIVE PROGRAMS**

Many of the local community members mentioned the overwhelming lack of respect and awareness many visitors—resident and tourist alike—had of the significance of the area. The rich history, cultural significance and natural environments within Hā’ena State Park provide a unique opportunity to provide visitors and kama’āina a diverse and broad educational experience. The concept of creating a living cultural park should be explored in conjunction with better management of the recreational activities that occur at the park.

---

---

### 5.3.3.1 INTERPRETIVE PROGRAMS

Prior to selection of an interpretive program, the background data combined with community desires, State Parks' mission and budgetary realities described in this report should be evaluated to determine interpretive goals for Hā'ena State Park. Once goals are identified, a path for implementation and evaluation should be defined so that all stakeholders are knowledgeable about interpretive direction and can participate and monitor its success. The Australian Government has published a manual, *Best Practice in Park Interpretation and Education* that includes straight-forward checklists for best practices in defining, developing, delivering, evaluating and supporting interpretation and education in parks. These checklists could be used in the future to help refine desired concepts for park interpretation, implementation and evaluation.

In developing interpretation services, the Australian best practices manual checklist reads:

- Ensure a planning process is in place which is able to translate broad interpretation and education services goals into tangible operational objectives that are related to organizational goals
- Identify and analyse the priority needs of both primary and secondary customers
- Formulate the specific messages which are to be communicated to identified audiences
- Establish performance standards for all interpretation and education services including delivery involving contracted providers and other external parties
- Identify the principal feedback mechanisms to be applied in service delivery monitoring
- Ensure data/information/knowledge collection systems are in place to gather key planning information to inform interpretation and education product and message development
- Develop criteria to determine which interpretation and education services are to be delivered to customers without a charge, as fee for service or on a mixed revenue source basis
- Consider the park asset and visitor health and safety risk management issues involved
- Specify interrelationships between the purposes of interpretation and education delivery and other agency services or products including points of complimentary, overlap, conflict and similarity in operational objectives and the design of delivery modes, especially other forms of external communication
- Use a market segmentation tool to help more clearly identify audiences, the key messages and methods of delivery
- Scope the feasible options and methods available to the agency to deliver interpretation and education
- Establish communications systems for external stakeholders
- Analyse the cost/benefit relationships of undertaking or refraining from interpretation and education services in specified locations

- 
- 
- Consider the cost/benefit in terms of the customer, the environment and the agency expressed in ecological, cultural, social, promotional and dollar values (Earthlines consortium 1999)

Several recommendations and concepts for interpretive programs and activities at Hā'ena State Park have been made by the various consultants as well as in the 2001 draft park plan. Other concepts for interpretive plans can be learned from cultural and natural parks internationally. They are listed below in no particular order but are grouped by topic area.

#### Cultural Interpretation:

- Restoration of the culturally related features that represent a “complete Hawaiian cultural unit” along an interpretive walking path. These include the lo'i kalo and marine related sites, religious and habitation sites, many of which are within walking distance from one another within the park (The Keith Companies 2001).
- The 2008 SCORP suggests as an action item to, “coordinate with Native Hawaiian cultural practitioners to develop interpretive programs to establish protocol for recreation activities in and around cultural resources”. Based on community interest expressed since the beginning of the Master Plan process in 1990, develop an active interpretive program run by the community. Successful examples of volunteer interpretive programs include Friends of Hanauma Bay or Friends of Chaco (Chaco Culture National Park), which operates as a 501(c)(3) nonprofit organization.
- Formalize partnership with Limahuli Garden (NTBG) to provide interpretive services either with paid staff or under contract to manage a volunteer corps to interpret the park's flora and cultural history. Some interpretation of Hā'ena already occurs at the garden due to its proximity and connectedness (i.e. Limahuli Stream) to the park.
- Partner with the Kaua'i Chapter of Slow Food® to promote knowledge of the gastronomic culture of Kaua'i's north shore, utilizing the lo'i kalo within the park as an interpretive asset. Founded in 1986, Slow Food is an international organization whose mission includes a goal to, “protect the pleasures of the table from homogenization of modern fast food and life”. A particular focus of this international organization is to protect traditional foods. In 2009, the Kaua'i chapter worked to promote the lease of four acres of land in Kilauea for the Mālama Kaua'i Community Garden.
- Consider tour operator certification. The 2008 SCORP suggests an action item to, “formulate policies and processes to guide the use of public recreation facilities and areas by commercial operators, or endorse an existing third-party certification programs for nature-based commercial operators”. An international report, Guidelines

---

---

for Tourism in Parks and Protected Areas of East Asia points out that one reason visitors travel through a tour operator is to receive guidance and help in observing the protocols of an unknown place.

- Develop “Code of Conduct” materials directed toward tour operators and visitors. A tour operator and equipment outfitter “Code of Conduct” could adapt standards for Hā’ena established by a recognized entity, such as the National Audubon Society’s, Travel Ethic for Environmentally Responsible Travel. Audubon’s tenants for tours or “Nature Odysseys” are:
  - Wildlife and its habitat must not be disturbed
  - Audubon tourism to natural areas will be sustainable
  - Waste disposal must have neither environmental nor aesthetic impacts
  - The experience a tourist gains in traveling with Audubon must enrich his or her appreciation of nature, conservation and the environment
  - Audubon tours must strengthen the conservation effort and enhance the natural integrity of places visited.
  - Traffic in products that threaten wildlife and plant populations must not occur.
  - The sensibilities of other cultures must be respected. (Eagles et al. 2001)
- Provide an easy to digest code of conduct for visitors to the park who do not have the guidance of a tour operator. On-site guidelines can be quick statements, translated in multiple languages. An on-site example is already in place at Kē’ē Beach, where a hand made sign (including slang spelling) reading “pak your trash” is posted. This is an easy to follow message for English speakers. Additional statements could include those instructing the public to not walk on or remove the coral reef; park in designated places or climb on the archaeological features.

#### Flora/Fauna/Wildland Interpretation:

- Restoration areas, particularly those that support threatened and endangered (T&E) plant and fauna species, provide an opportunity to not only assist directly in native plant conservation but also opportunities to educate and actively involve the public in the restoration efforts.
- Signage and other educational material should be developed and distributed to advise the visiting public about the value of native species and not to drop off pests or unwanted pets.



---

---

Kalalau Trailhead/Nāpali Coast State Wilderness Park Interpretation:

- Install interpretive material related to the Nāpali Coast at the Kalalau trailhead (some of which have already been installed at the trailhead, see photo).
- Consider the use of educational signage, a docent program, lectures, films and interactive kiosks to enhance visitor enjoyment. The 2008 SCORP states, “interpretive signage helps restore a Hawaiian sense of place to the area as well as provides the following benefits: 1) it makes visitors more appreciative of the natural and cultural history of Hawai‘i; 2) it helps differentiate Hawai‘i from other tropical ‘exotic’ destinations; 3) it helps restore a relationship between residents and resources, instilling a stronger sense of stewardship for the site; and 4) it can provoke interest in learning more and visiting other areas.”
- Consider establishment of a nonprofit organization such as the “Friends of Hā‘ena State Park,” that could help develop and sustain a visitor education program, coordinate park cleanups by volunteer service groups, coordinate use of the park by different marine recreation groups (i.e. dive clubs), provide formal and informal docent services, assist the Division of State Parks with management and help alleviate use conflicts. A service group such as this might also serve as the point-of-contact for the community-based subsistence fishing area for those wishing to shorefish or spearfish within the park.
- Continue and strengthen the Makai Watch program where the local community educates beach goers about how certain human activities impact the lagoon and reef ecosystem. According to the Nature Conservancy which is a partner in Makai Watch programs, the purpose of Makai Watch is for the community to be the “eyes and ears” for law enforcement (The Nature Conservancy, 2010). At Hā‘ena, the Makai Watch program was initiated with the assistance of the Hawai‘i Community Stewardship Network (HCSN, formerly Community Conservation Network). The Hā‘ena Makai Watch program in collaboration with Limahuli Garden and Preserve, has been focused on collecting human use data to assist in establishing the Community Based Subsistence Fishery (Gowensmith, 2010). On an informal basis, Makai Watch volunteers along side County lifeguards disseminate information about human impacts to the environment. A formalized training of Makai Watch volunteers could be implemented to help educate the visiting public about Hā‘ena’s marine resources and assist the State in enforcement. A model program is that of the Turtle Guardians that take shifts

---

---

educating the public and serving as a contact for enforcement by NOAA officials at Laniakea (also known as Turtle Beach or Houliani), O'ahu.

### **5.3.3.2 PUBLIC SAFETY**

Water safety is the primary issue where mitigation measures may become necessary. Clark recommended that the State consider stationing lifeguards to ensure visitor safety. In July 2008, lifeguards were stationed at Kē'ē Beach. Rescue data is collected by the lifeguard staff and is being compiled by the County of Kaua'i. Interviews with the lifeguard staff at Kē'ē indicate that the visiting public has a general lack of knowledge of the hazards associated with ocean conditions (Listman Interview, February 4, 2009). A review of existing safety signs along the beach may become necessary to maximize visitors' level of understanding of the existing water safety hazards in the region.

Lastly, Clark addresses the need for additional safety along the Nāpali Coast. For many visitors, Hā'ena State Park is often used as a starting point for hikers along coastal trails. Clark recommends positioning a full-time visitor center/ranger station with necessary rescue equipment (such as inflatable rescue boat) in Hā'ena State Park, in order to increase visitor safety.

Clark's recommendations for safety interpretation have been echoed by the community at site visits and open house events held in 2008, with suggestions that more safety information be provided to the public at Kē'ē Beach and the Kalalau trailhead.

#### **5.3.3.2.1 Beach Safety**

- Install adequate ocean hazard warning signage.
- Continue lifeguard service and install properly equipped lifeguard stand.

#### **5.3.3.2.2 Trail Safety**

- Install signage warning of trail hazards including the remote nature of the trail, difficulty for rescue and limited cell-phone coverage.
- Continue partnerships for trail maintenance with community-based organizations

#### **5.3.3.2.3 Natural Hazard Warning System**

- Tsunami evacuation routes

- 
- 
- Provide off-site, out-of-park signage capable of warning visitors of current conditions such as: crowded parking conditions, rough ocean conditions, flood or trail closures

#### **5.3.4 SHORELINE ACCESS**

The public has a right to access all beaches and shorelines within the State of Hawai'i below the upper reaches of the wash of waves (SWCA 2009). In order to protect the shoreline environment but also provide for public access, SWCA makes the following recommendations with regards to shoreline access:

- Shoreline access points can be placed to control access for specific recreational and subsistence uses, and should be limited to pedestrian access.
- No public vehicular traffic should be allowed on the beach within the park.

Shoreline accesses should also be located away from sensitive cultural and natural areas. Paths through the park should similarly be designed to direct people away from sensitive areas.

#### **5.3.5 USER FEES**

Due to fiscal shortfalls, State Parks will be required to generate revenues to sustain basic services and keep parks open. A concept that continually emerges, including the DLNR's recent Recreational Renaissance and Recreational Renaissance Plan B "Back to Basics" proposal are instituting user fees at high visitor destination State Parks, including Hā'ena State Park. The goals of the Recreational Renaissance Plan B is two fold: Increase routine repair, maintenance and improved operations for the year 2010 and start the longer-term process of raising new revenues from vacant urban lands so that the department can move forward with capitol improvements when the legislature gives approval. The Recreational Renaissance is inspired by Hawai'i State Parks general state of disrepair and the bleak funding future for parks. At the time the Recreational Renaissance Plan B was formulated, State Parks had less than \$9 million to manage 69 parks and park reserves. After subtracting out lifeguard contracts and utilities, it leaves approximately \$93,000 for operations and maintenance per park annually. This is expected to decrease to approximately \$70,000 per park in the next fiscal year (DLNR, 2009).

Through implementation of visitor parking fees, DLNR anticipates raising \$4 million for parks maintenance, or approximately \$127,000 annually per park.

---

---

There are varying methods of application, management and distribution of these fees but the fees are recommended by State Parks and community members alike.

### **5.3.6 CONSTRUCTION PROCESSES**

As evidenced by the level of community interest and involvement in development activities at Hā'ena State Park, decisions about development and construction practices will more likely be supported if they involve a participatory process. Developing a system for involving the community in project development creates an environment where local insight and innovation can ideally contribute to a better end product. Some construction process suggestions include:

- Solicit input from cultural practitioners or Advisory Group before embarking on design of any infrastructure improvements.
- Ensure any new structures and facilities comply with minimum standards to protect them from flood and winds.
- Consider storm surge, sea level rise and beach erosion when locating any new structures or facilities. Utilize SOEST beach erosion maps in addition to County of Kaua'i's shoreline setback ordinance in setting a minimum setback.
- Consider sustainability of all new structures and facilities in terms of building materials, energy, water use and stormwater runoff.

### **5.3.7 TRANSPORTATION AND CIRCULATION**

Traffic volumes, circulation and parking issues have been identified as significant deterrents to the enjoyment of Hā'ena's natural, cultural and visual resources. Specific traffic and parking improvements were suggested in Section 5.2.6 of this report. The following management considerations may help to facilitate successful implementation of the suggested improvements.

- Enforce no parking zones. Look to authorize the County or a private contractor with enforcement capabilities.
- Contract with a private, for-profit business or a non-profit to manage remote parking areas and shuttle bus access.
- Consider establishment of a parking fee for all non-resident vehicles (see previous discussion entitled User Fees).

## **5.4 PARTNERSHIPS**

### **5.4.1 FEDERAL CONSERVATION PARTNERSHIP PROGRAMS**

There are two USFWS Conservation Partnership Programs that the State could engage in with the USFWS (USFWS 2009):

- 
- 
- Pacific Islands Coastal Program – A new effort to identify important coastal resource problems and solutions, develop partnerships to carry out on-the-ground conservation projects, and encourage community action in high priority coastal areas
  - Hawai'i Fish Habitat Partnership – cooperatively develops and implements aquatic conservation projects in Hawaiian streams and estuaries with a focus on preserving freshwater aquatic resources as a cultural and natural resource legacy for indigenous inhabitants of the islands.

The Hawai'i-based coordinators of these programs are Chris Swenson for the Coastal Program and Gordon Smith for the Hawai'i Fish Habitat Partnership. The USFWS are currently working with the Hā'ena community and the Hawai'i Community Stewardship Network (formerly Community Conservation Network) organization through the Coastal Program. This group is continuing the work of the Community Conservation Network and coordinating their efforts with DLNR Division of Aquatic Resources (DAR) to develop planning and monitoring for the nearshore marine waters off of Hā'ena, including waters in front of the park. Debbie Gowensmith is the contact for this effort.

The United States Department of Agriculture (USDA), sponsors the Garden Island Resource Conservation & Development, Inc. The GIRC&D's Vision Statement reads, "*Mālama 'Aina o Kaua'i. The community working together towards a harmonious relationship with the environment.*" With eight committees focused on specific issues relevant to Ha'ena State Park, this organization could bring additional capacity to efforts at Hā'ena State Park, particularly as it relates to conservation and best practices for agricultural uses within the park.

#### **5.4.2 LOCAL COMMUNITY-BASED ORGANIZATIONS AND NGOS**

A number of community-based and non-governmental (NGO) organizations, as well as government/private and NGO partnerships support periodic monitoring and educational studies of the lagoon and reef at Hā'ena State Park. These include Windward Community College's Coral Reef Assessment and Monitoring Program (CRAMP), Makai Watch, Save our Seas, Reef Check, The Nature Conservancy, Mālama Hawai'i, Hawai'i Community Stewardship Network, Hawai'i Wildlife Fund, Sea Grant Program, Hawai'i Department of Land and Natural Resources Division of Aquatic Resources. Many of these activities are in turn supported by grants from government agencies and the private sector including those from Tesoro, Harold K.L. Castle Foundation, National Fish and Wildlife Foundation, NOAA, Hawai'i Tourism Authority, and others (SWCA 2009).

---

---

The following organizations could also be potential partners in restoration and monitoring of terrestrial or land-based flora and fauna including, The Nature Conservancy, Hawai'i Joint Venture (a consortium of agencies and organizations with a wetlands and waterbird focus); Hawai'i Association of Watershed Partnerships (the Kaua'i Watershed Alliance includes the State and Limahuli Garden and Preserve as member land owners);

Other community groups and non-profits that are or have been active in some aspect of Hā'ena's preservation, informal management and interpretation include:

- The Limahuli Garden and Preserve (NTBG). Formalize partnership with Limahuli Garden (NTBG) to provide interpretive services either with paid staff or under contract to manage a volunteer corps to interpret the park's ethnobotanical history. Some basic interpretation of Hā'ena naturally occurs at the garden due to its proximity and connectedness (i.e. Limahuli Stream).
- Makai Watch. Formalize and continue a Makai Watch program where the local community educates beach goers about how certain human activities impact the lagoon and reef ecosystem. According to the Nature Conservancy which is a partner in Makai Watch programs, the purpose of Makai Watch is for the community to be the "eyes and ears" for law enforcement (The Nature Conservancy, 2010). At Hā'ena, the Makai Watch program was initiated with the assistance of the Community Conservation Network. At present, an informal, cooperative system exists, where Makai Watch volunteers along side County lifeguards disseminate information about human impacts to the environment on an informal basis. A formalized system of Makai Watch volunteers could be organized similar to the Turtle Guardians that take shifts educating the public and serving as a contact for enforcement by NOAA officials at Laniakea (Turtle Beach or Houlani), O'ahu.
- Historical Society. Partner with Kaua'i Historical Society and/or the Hanalei Roads Committee for interpretation of Hā'ena's historic resources. The community interest in protecting Hā'ena's historic resources has been ongoing including the nomination and acceptance of both the Hā'ena Archaeological Complex and the Kaua'i Belt Road to the State and National Register which required significant community contribution.

---

---

### ***5.4.3 CURATORS AND HALAU HULA***

The overriding recommendation from the CIA prepared for this effort is to establish a Cultural Advisory Committee or Group to provide cultural expertise during the Master Plan process and through any future park development projects. This recommendation has received broad support from the community and should be carried forward in any management plans that are developed for the park.

## **5.5 POTENTIAL FUNDING SOURCES**

### ***5.5.1 FEDERAL SOURCES***

#### **5.5.1.1 US FISH AND WILDLIFE SERVICE**

The USFWS has several funding opportunities and grants available to support flora, fauna, and natural habitat restoration and protection. Many of the programs also offer technical support to the projects. The following is a brief list of the available programs. The USFWS Pacific Island Office website can be accessed for additional information.

- Pacific Island Coastal Program
- Partners for Fish and Wildlife Program
- National Coastal Wetlands Conservation Grant Program
- Endangered Species Conservation Grants

#### **5.5.1.2 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**

The NOAA Restoration Center provides funding opportunities and technical assistance to help implement fishery restoration projects. They collaborate with local agencies and also engage the community and encourage local stewardship of the coastal and riverine habitats. Scientific monitoring to evaluate success and efficient use of funding is also provided. More information is provided at their website: <http://www.nmfs.noaa.gov/habitat/restoration/>.

#### **5.5.1.3 NATIONAL PARKS GRANTS**

The National Parks Service (NPS) has a suite of grants focused on protecting significant historic and cultural sites in the United States.

- Native American Graves Protection and Repatriation Act (NAGPRA) grants provide funds for the consultation, documentation and repatriation of human remains and objects of

---

---

cultural patrimony. These grants are available to Native Hawaiian organizations and museums.

- Preservation Technology and Training grants are administered through the National Center for Preservation Technology and Training. These grants are oriented toward applying science and technology to historic preservation.
- Tribal Heritage Grants are available to Native Hawaiian Organizations with the objective of protecting and promoting cultural heritage and traditions.

## **5.5.2 STATE SOURCES**

### **5.5.2.1 HAWAI'I TOURISM AUTHORITY**

In 2003, the Hawai'i Tourism Authority (HTA) commissioned a Natural Resource Assessment Study to identify key sites important to tourism but also vulnerable to tourism activity and overuse. The purpose of the assessment was to provide a long-term plan for HTA's expenditure of monies set aside for improving natural resource sites frequented by visitors. Of the 110 sites inventoried, Hā'ena State Park was identified as a high priority site that has critical needs and could have increased benefits if those needs were addressed (PBR Hawaii 2003).

### **5.5.2.2 OFFICE OF HAWAIIAN AFFAIRS**

The Office of Hawaiian Affairs (OHA) is a State of Hawai'i agency under the direction of nine trustees who have a mission to provide the opportunity for a better life and future for all Hawaiians. OHA has provided a spectrum of grants (economic development, education, governance, health, human services, native Hawaiian rights and housing) benefitting organizations serving the native Hawaiian population. The OHA grants program is currently being restructured, however, this may be an important partnership for educational and/or restoration grants.

## **5.5.3 PRIVATE DONATIONS AND GRASS ROOTS FUNDRAISING**

Private donors and community fundraising will likely be an important component should organizations or community groups be tasked with stewardship or conservatorship of the park or specific park services. This report does not include an evaluation of private funding sources. However, the ability to implement a business plan and fund raise to implement a plan must be an important consideration for State Parks

---

---

when venturing into an agreement for management of cultural and ecological resources.

#### ***5.5.4 OTHER RESOURCES AND CLEARINGHOUSES***

Other sources of grants and funding can be found through the following national and local resource groups:

- National Fish and Wildlife Foundation
- The Foundation Center
- Hawai'i Community Foundation
- Cyber-Sierra's Conservation Grants Center

---

This page intentionally left blank

---

---

## 6.0 References

- Andrade, Carlos. 2008. *Hā'ena Through the Eyes of the Ancestors*. Honolulu: University of Hawai'i Press.
- Barrère, Dorothy B., Mary Kawena Pūku'i, and Marion Kelly. 1980. *Hula: Historical perspectives*. Honolulu: Bishop Museum Press.
- Belt Collins Hawai'i Ltd. 2005. *Kūhiō Highway (Route 560) Historic Roadway Corridor Plan, Hanalei, Kaua'i, Hawai'i*. Prepared for the Department of Transportation. Prepared by Belt Collins Hawai'i Ltd. with contributions from Kūhiō Highway (Route 560) Community Advisory Committee.
- Bennett, Wendell C. 1931. "Archaeology of Kaua'i." *Bernice P. Bishop Museum Bulletin*, 80.
- Blay, Chuck and Robert Siemers. 2004. *Kaua'i's Geologic History: A simplified guide. Updated edition*. Poipu: TEOK Investigations.
- Clark, John. 1992. *Beach and Ocean Recreation Study, Hā'ena Kaua'i*. For Division of State Parks, Department of Land and Natural Resources. Honolulu.
- Code of Federal Regulations. 2009. "Title 36, Chapter 1, Part 59 - Land and Water Conservation Fund Program of Assistance to States; Post-Completion Compliance Responsibilities." From the National Park Service website:  
<http://www.nps.gov/ncrc/programs/lwcf/protect.html>.
- County of Kaua'i Building Division, Department of Public Works website. 2009. "Bike Path Project." Website:  
<http://www.kauai.gov/Government/Departments/PublicWorks/BuildingDivision/BuildingDivisionProjects/AhukiniLydgateBikePathProject/tabid/335/Default.aspx>.
- County of Kaua'i Department of Water. 2009. Website:  
[http://www.kauaiwater.org/current\\_operations.asp](http://www.kauaiwater.org/current_operations.asp).
- County of Kaua'i Fire Department. 2007. Website:  
<http://www.kauai.gov/Government/Departments/FireDepartment/tabid/107/Default.aspx>.

---

---

County of Kaua'i Police Department. 2009. Patrol Services Bureau - Hanalei District Website: <http://www.kauai.gov/Government/Departments/PoliceDepartment/PatrolServicesBureauHanaleiDistrict/tabid/316/Default.aspx>.

County of Kaua'i Transportation Agency. 2009. Website: <http://www.kauai.gov/Government/Departments/TransportationAgency/tabid/58/Default.aspx>.

Eagles, Paul F.J., Margaret E. Bowman and Theresa Chang-Hung Tao. 2001. *Guidelines for Tourism in Parks and Protected Areas of East Asia*. Prepared for the International Union for Conservation of Nature. Gland, Switzerland and Cambridge, UK.

Earthlines consortium, Victoria. 1999. *Best Practice in Park Interpretation and Education*. A report to the ANZECC Working Group on National Park and Protected Area Management Benchmarking and Best Practice Program by Department of Natural Resources and Environment, Victoria in conjunction with Parks Victoria. April 1999.

Earthplan. 1996. *Social Impact Assessment for Ha'ena [sic] State Park Master Plan*. Prepared for The Keith Companies, Hawai'i.

Gowensmith, Debbie. 2010. Personal communication. March 10, 2010.

Hammatt, Hallett H., Myra J. Tomonari-Tuggle and Charles F. Streck. 1978. *Archaeological Investigations at Hā'ena State Park, Halele'a, Kaua'i Island, Phase II: Excavations of beach localities and visitors facilities area*. Prepared by Archaeological Research Center Hawaii, Inc. Prepared for the Division of State Parks, Department of Land and Natural Resources. Lawa'i: November 1978.

Handy, E.S. Craighill, Elizabeth Green Handy, and Mary Kawena Pūku'i. 1991. *Native Planters in Old Hawai'i: Their life, lore, and environment*, Revised Edition. Honolulu: Bishop Museum Press.

Hawai'i Visitors and Convention Bureau. 2009. "Kaua'i Quick Guides." Website: [http://www.gohawaii.com/kauai/learn/quick\\_guides](http://www.gohawaii.com/kauai/learn/quick_guides)

Humu Mo'olelo. 2008. *Humu Mo'olelo: Journal of the Hula Arts*. Volume 1, Number 3.

- 
- 
- Juran, Megan. 2007. *Community-Based Marine Management Hā'ena Ahupua'a, Kaua'i, Hawai'i: Listening to Community Members and Respected Scientists to Better Understand the Implications of Community-Based Marine Management on Our Near-Shore Fisheries*. Kaua'i: Community Conservation Network. Final Report.
- Juran, Megan. 2009. *Kalalau Trail Count Sunday 27 Dec 09 (7 Hours)*.
- Juran, Megan. 2010. Personal Communication.
- Juvik, Sonia P. and Juvik, James O. 1998. *Atlas of Hawai'i, Third Edition*. Honolulu: University of Hawai'i Press.
- Kaua'i Community College. 2009. Website:  
<http://info.kauaicc.hawaii.edu/admin/gov/mission/index.htm>.
- Kaua'i Planning and Action Alliance. 2009. "KPAA Progress Report on Park Improvements." Posted June 4, 2009. Website:  
<http://www.kauainetwork.org/park-improvements.asp>.
- Kennedy/Jenks Consultants (formerly Engineering Solutions, Inc.). 2011. *Civil Baseline Report*. Honolulu. January 2011.
- Kido, Mike. 2001 unpublished. "Freshwater Resources." Prepared for the Hawai'i Stream Research Center (University of Hawai'i).
- Kimura International, Inc. 2003. *Bike Plan Hawai'i Update*. Prepared for the Highways Division, Department of Transportation.
- Limahuli Garden and Preserve. 2006. *Limahuli Garden: A Window to Ancient Hawai'i*. Hā'ena, Kaua'i.
- MacDonald, Gordon A., Agatin T. Abbott, Frank L. Peterson. 1983. *Volcanoes in the Sea: the Geology of Hawai'i*. Honolulu: University of Hawaii Press.
- MacDonald, Gordon A., Dan A. Davis, and Doak C. Cox. 1960. *Geology and Ground-Water Resources of the Island of Kaua'i, Hawai'i*. Bulletin 13. Honolulu: Hawai'i Division of Hydrography in cooperation with the Geological Survey, U.S. Department of the Interior.
- Major, Maurice and Alan Carpenter. 2000. *Archaeological Restoration Plan, Hā'ena State Park, Kaua'i, TMK: 5-9-06:14 and 5-9-08:1 -19, Draft*. Prepared by the Archaeology Section of the Division of State Parks, Department of Land and Natural Resources.

- 
- 
- Major, Maurice and Alan Carpenter. 2001. *Supplemental Archaeological Inventory: Hā'ena State Park, Kaua'i, TMK: 5-9-06:14 and 5-9-0:1 -19*. Prepared by the Archaeology Section of the Division of State Parks, Department of Land and Natural Resources.
- Maly, Kepa and Onaona Maly. 2003. *Hana Ka Lima, 'Ai Ka Waha: A Collection of Historical Accounts and Oral History Interviews with Kama'āina Residents and Fisher-People of Lands in the Halele'a-Nāpali Region on the Island of Kaua'i*. Prepared for The Nature Conservancy and National Tropical Botanical Garden – Limahuli Gardens, Hui Maka'āinana. Makana, Limahuli Garden ICMI Project.
- National Climatic Data Center. 2009. "Climate Maps of the United States. Hawai'i Annual Mean Relative Humidity." Website: <http://cdo.ncdc.noaa.gov/climaps/hirh2313.pdf>.
- National Oceanic and Atmospheric Administration. 2009. "Global Measured Extremes of Temperature and Precipitation." Website: <http://lwf.ncdc.noaa.gov/oa/climate/globalextremes.html>.
- PBR HAWAII. 2003. *Natural Resource Assessment*. Prepared for the Hawai'i Tourism Authority.
- PBR HAWAII. 2009. *State Comprehensive Outdoor Recreation Plan (SCORP) 2008 Update*. Prepared for the Division of State Parks, Department of Land and Natural Resources.
- Plan Pacific. 2000. *Kaua'i General Plan*. Prepared for the County of Kaua'i Planning Department.
- Pūku'i, Mary Kawena and Samuel H. Elbert. 1986. *Hawaiian Dictionary*. Honolulu: University of Hawai'i Press.
- Pūku'i, Mary Kawena, Samuel H. Elbert, and Esther T. Mookini. 1974. *Place Names of Hawai'i*. Honolulu: University of Hawai'i Press.
- Quinn, Patrick. 2009. "Malama Kaua'i Community Garden." Slow Food Kaua'i Blog, November 11, 2009. <http://slowfoodkauai.blogspot.com/>
- Riley, Thomas J. and Riley, Karma-Ibsen. 1979. "Taylor Camp, Hawai'i: The life and death of a hippie community." Article from the Field Museum of Natural History Bulletin 50(6), 1979. Posted on the Pacific Worlds "Hā'ena, Kaua'i: Taylor Camp" Website: <http://www.pacificworlds.com/haena/memories/memory5.cfm>.

- 
- Silva, Carol. 1995. *A Historical and Cultural Report of Hā'ena State Park Halele'a, Kauai*. Prepared for the Division of State Parks, Department of Land and Natural Resources.
- State of Hawai'i, Department of Business, Economic Development, & Tourism. 2007. *2007 State of Hawai'i Data Book*. Website: <http://hawaii.gov/dbedt/info/economic/databook/db2007/>.
- State of Hawai'i, Department of Business, Economic Development & Tourism website. 2009. "Visitor Statistics." Website: <http://hawaii.gov/dbedt/info/visitor-stats/>.
- State of Hawai'i, Research & Economic Analysis Division, Department of Business, Economic Development & Tourism. 2007. *2007 Visitor Satisfaction and Activity Report*. Honolulu.
- State of Hawai'i, Department of Education. 2009. "Kapa'a,-Kaua'i-Waimea Complex Area." Website: [http://165.248.6.166/data/complexarea.asp?key\\_complexarea=15](http://165.248.6.166/data/complexarea.asp?key_complexarea=15).
- State of Hawai'i, Department of Labor and Industrial Relations. 2008. "Hawai'i Workforce Informer: Unemployment/Labor Force Estimates 3/28/2008" Website: <http://www.hiwi.org/article.asp?ARTICLEID=463&PAGEID=94&SUBID>.
- State of Hawai'i, Department of Labor and Industrial Relations. 2009. "Unemployment Rates and Charts, February 2008 - February 2009." Website: [http://www.hiwi.org/admin/uploadedPublications/1019\\_URATE\\_current.pdf](http://www.hiwi.org/admin/uploadedPublications/1019_URATE_current.pdf).
- State of Hawai'i, Commission on Water Resource Management, Department of Land and Natural Resources and The National Park Service. 1990. *Hawaii Stream Assessment: Hawaii's Streams and their Instream and Riparian Resources*.
- State of Hawai'i, Office of Conservation and Coastal Lands, Department of Land and Natural Resources. 2009. Website: <http://hawaii.gov/dlnr/occl/>.
- State of Hawai'i, Division of State Parks, Department of Land and Natural Resources. 2006. "Curatorship Agreement, Hā'ena Lo'i Restoration-Phase I, Hā'ena State Park, Hā'ena, Halele'e District, Kaua'i, Historic Site #50-30-02-7009." Draft renewal, August 2006.

---

---

State of Hawai'i, Division of State Parks, Department of Land and Natural Resources. 2009. *Recreational Renaissance "Plan B" Back to Basics*. Website: <http://hawaii.gov/dlnr/recreate/planb/RR-PLAN-B-FACT-SHEET>.

State of Hawai'i, Harbors Division, Department of Transportation. 2009. Website: <http://www.state.hi.us/dot/harbors/index.htm>.

State of Hawai'i, Harbors Division, Department of Transportation. 2001. *Kaua'i Commercial Harbors 2025 Master Plan*.

State of Hawai'i, Coastal Zone Management Program, Office of Planning, Department of Business, Economic Development & Tourism. 2006. *Hawai'i Ocean Resources Management Plan*.

Stepath, Carl M. 1999. "Ke'e Lagoon and Reef Flat Users Baseline Study." Save Our Seas, August 21, 1999. Website: <http://www.saveourseas.org/CarlStepath/Keebaselinestepath/KeBaselineStudy.doc>.

Stepath, Carl M. 2006. "Draft Kē'ē Lagoon and Reef Flat Users Baseline Study." Save Our Seas. Website: [http://www.saveourseas.org/saveourseas/haena\\_files/Kee\\_report\\_update\\_9-06.pdf](http://www.saveourseas.org/saveourseas/haena_files/Kee_report_update_9-06.pdf).

Strategic Solutions, Inc. 2007. "Feasibility Study for Haena Comfort Station Constructed Wetland Wastewater Treatment." Submitted to DLNR.

Terry, Ron and Patrick Hart. Geometrician Associates, LLC. 2009. *Biological Survey, Hā'ena State Park, Island of Kaua'i*.

The Garden Island. 2009. "Truck runs over Wailua beachgoer." Published January 19, 2009. Website: [http://www.kauaiworld.com/articles/2009/01/19/news/kauai\\_news/doc497429d34e868395578164.txt](http://www.kauaiworld.com/articles/2009/01/19/news/kauai_news/doc497429d34e868395578164.txt).

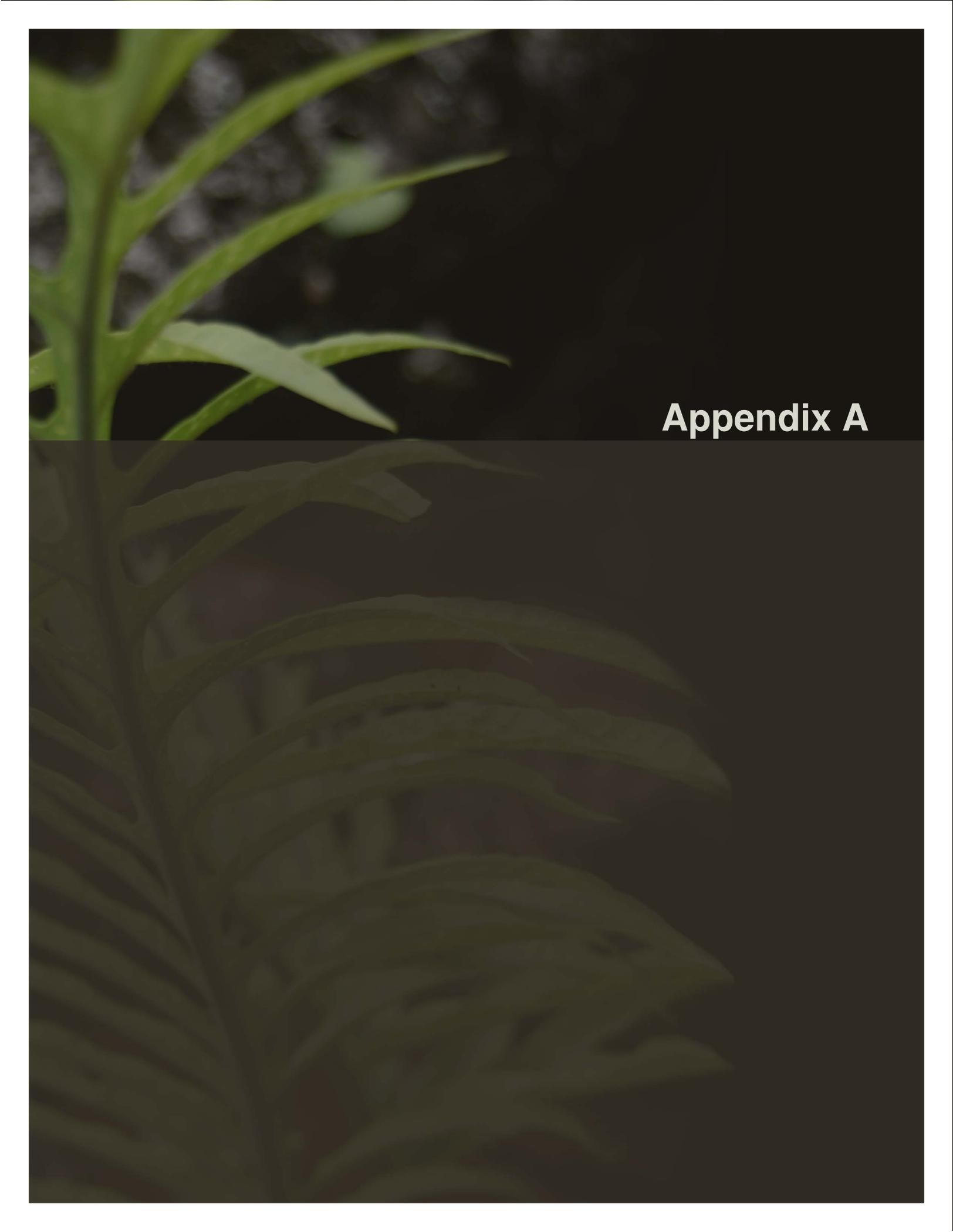
The Keith Companies – Hawaii, Inc. and Earthplan Planning and Design. (2001 unpublished) *Hā'ena State Park Master Plan and Draft Environmental Impact Statement*. Prepared for the Division of State Parks, Department of Land and Natural Resources.

The Nature Conservancy. 2010. *Hawai'i Marine: Makai Watch*. Website: <http://www.nature.org/wherewework/northamerica/states/hawaii/marine/art20999.html>.

- 
- United States Census Bureau. 2009. "American FactFinder: Census 2000." Website: [http://factfinder.census.gov/servlet/DatasetMainPageServlet?lang=en&ts=256850074328&ds\\_name=DEC\\_2000\\_SF1\\_U&program](http://factfinder.census.gov/servlet/DatasetMainPageServlet?lang=en&ts=256850074328&ds_name=DEC_2000_SF1_U&program).
- National Park Service, United States Department of Interior. 2008. *Land and Water Conservation Fund State Assistance Program, Federal Financial Assistance Manual, Volume 69*. Effective Date: October 1, 2008. Website: <http://www.nps.gov/lwcf/manual/lwcf.pdf>.
- National Park Service, United States Department of Interior. 2009. Website: [www.nps.gov](http://www.nps.gov).
- Pacific Islands Fish and Wildlife Office, United States Fish and Wildlife Service. 2009. Website: <http://www.fws.gov/pacificislands/>.
- United States Fish and Wildlife Service. 2010. Hawaii Fish Habitat Partnership. Website: [http://fishhabitat.org/index.php?option=com\\_content&view=article&catid=44:partner-profiles&id=182:hawaii-fish-habitat-partnership&Itemid=37](http://fishhabitat.org/index.php?option=com_content&view=article&catid=44:partner-profiles&id=182:hawaii-fish-habitat-partnership&Itemid=37).
- United States Geological Service. 1999. "Ground Water Atlas of the United States." Archive (online version) HA 730-N. Website: <http://pubs.usgs.gov/ha/ha730/gwa.html>.
- United States Geological Service. 2009. "USGS Annual Statistics for Hawai'i, USGS 16114000 Limahuli Stream near Wainiha, Kaua'i, Hawaii." Website: [http://nwis.waterdata.usgs.gov/hi/nwis/annual?search\\_site\\_no=16114000&format=sites\\_selection\\_links](http://nwis.waterdata.usgs.gov/hi/nwis/annual?search_site_no=16114000&format=sites_selection_links).
- University of Hawai'i Department of Geography. 1983. *Atlas of Hawai'i, Second Edition*. Honolulu: University of Hawai'i Press.
- Vaughan, Mehana. 2009. *Summer 2009 Final Report*. Stanford University.
- Vaughan, Mehana. 2009. *Pawehe ke Kai a'o Ha'ena*. Community presentation.
- Western Regional Climate Center website. 2009. "Hawai'i Climatological Data Summary, Wainiha 1115, HAWAII (518155)." Website: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?hi8155>.

- 
- 
- Wichman, Frederick B. 1998. *Kaua'i: Ancient Place-Names and Their Stories*. Honolulu: University of Hawai'i Press.
- Wichman, Frederick B. 1985. *Kaua'i Tales*. Honolulu: Bamboo Ridge Press.
- Wichman, Frederick B. 1997. *More Kaua'i Tales*. Honolulu: Bamboo Ridge Press.
- Wichman, Frederick B. 2001. *Pele Mā: Legends of Pele from Kaua'i*. Honolulu: Bamboo Ridge Press.
- Wilson Okamoto & Associates. 1980. *North Shore Development Plan Update, includes Kilauea*. Prepared for the Planning Department, County of Kaua'i.
- Wilson Okamoto Corporation. 2008. *Hawaii Water Plan: Water Resource Protection Plan*. Prepared for the Commission on Water Resource Management, Department of Land and Natural Resources.
- Yent, Martha. *Hā'ena Archaeological Complex* (State Site No. 30-03-3201). 1983. National Register of Historic Places Registration Form prepared by the Division of State Parks, Department of Land and Natural Resources.

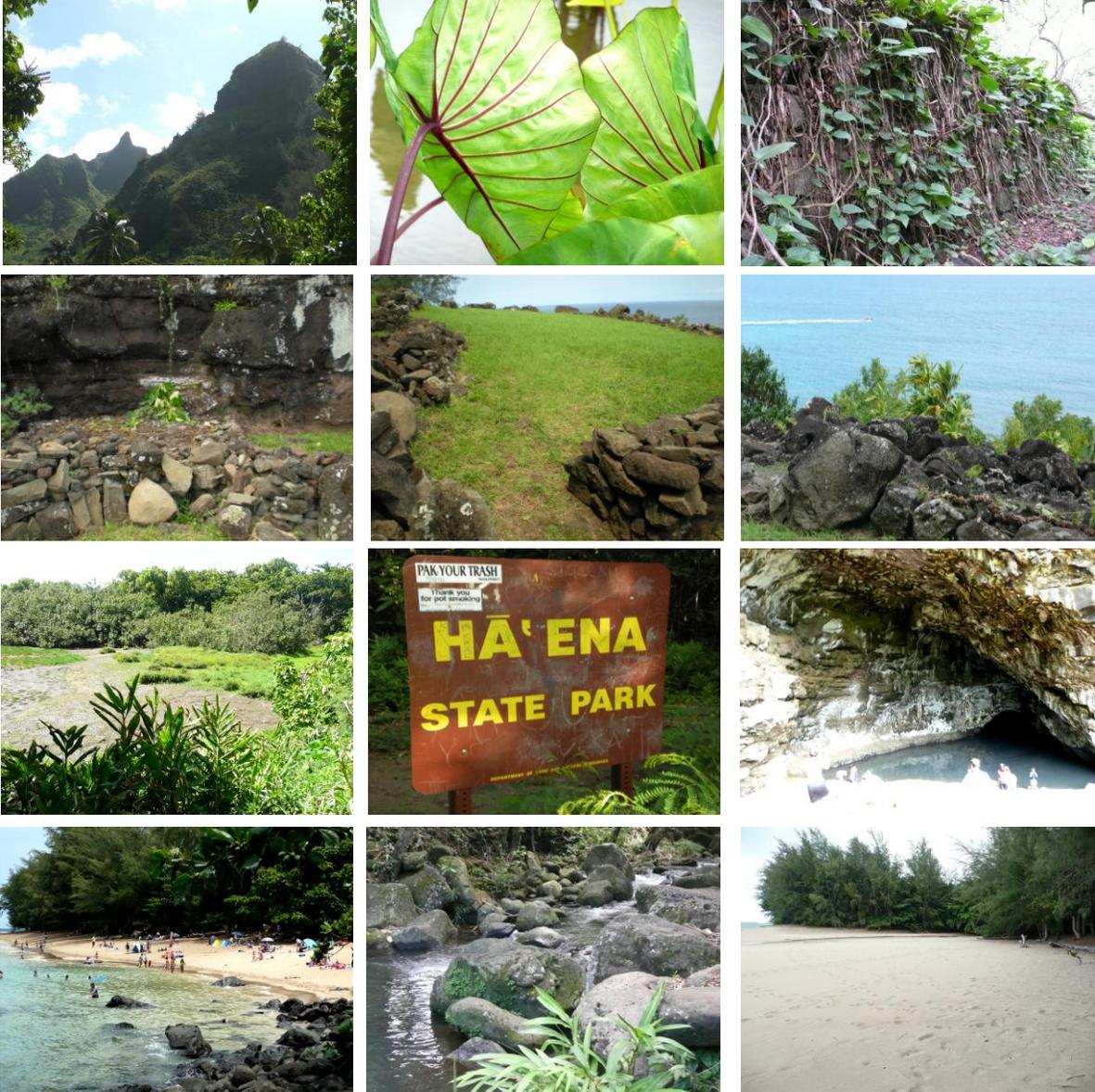
O:\Job26\2627.01 DLNR-Haena State Park Master Plan\Reports\Background Research\MPBackground-Final.doc



# Appendix A



# Hā`ena State Park Master Plan/EIS Cultural Impact Assessment



Prepared for  
PBR Hawai`i and Associates Inc.  
by  
Maria "Kaimi" Orr  
Kaimipono Consulting Services LLC  
2<sup>nd</sup> Revision  
January 27, 2011

**Cover Photos 1-12**

Hā`ena State Park cultural resources:

Mountain peaks, Kalo, Lohiau's wall,  
Ka-Ahu-A Laka, Hula Pā, Ka-Ulu-O-Paoa,  
Loko Kē`ē/Loko Naia/Marsh, Park sign, Waiakapala`e Cave,  
Kē`ē Beach/Lagoon, Limahuli Stream, Muliwai Beach

## EXECUTIVE SUMMARY

At the request of *PBR Hawai`i and Associates, Inc.* and the Division of State Parks, Department of Land and Natural Resources (DLNR), a Cultural Impact Assessment [CIA] was conducted for *Hā`ena State Park* as part of a larger project, *Hā`ena State Park Master Plan/EIS*. The purpose of this CIA was to gather information about traditional cultural practices, ethnic cultural practices and pre-historic and historic cultural resources that may be affected by the implementation of the Master Plan. The *level of effort* of this study included a broad cultural and historical background review; review/analysis of oral histories of six people knowledgeable about Hā`ena State Parks lands.

According to the archival material, Kaua`i has had a long history of habitation that included most of its coastal lands, with great resources in the interior lands and waterways. Kaua`i was inhabited long before the arrival of the Pele *ohana*. The famous epic saga of Pele, her sisters and brothers is where we see Lohi`au mentioned, Hā`ena`s most famous resident *ali`i*. The foundation and walls of his *hale* still stand today, as does the *heiau* and *hula* platform where he worshipped and honored the *hula* goddess Laka. Ancient Menehune and Mai`a people were said to have gone back to their homeland from Hā`ena. The ancient ceremony of throwing fire brands (*ōahi*) off the mountain was performed from the top of Pu`u Makana, a prominent natural feature in Hā`ena State Park lands. There are many other stories about gods, goddesses, chiefs and chiefesses who made Hā`ena home, as well as a long tradition of *maka`āinana* who farmed its rich lands and fished in the abundant coastal waters, evidenced by burials and oral histories that have been passed down through generations.

The Hā`ena State Park lands were once part of an ancient Hawai`i an ahupua`a life-system as well as a support system for the *ali`i* who lived there. The physical evidence of multi-use ancient or traditional cultural practices still exists nearby (e.g. Lohi`au`s *hale*, *hula* platform, *heiau*, *loko* or fishponds and *lo`i*), which not only indicate traditional land use of the area, but that it was/is considered *wahi pana* (sacred or significant place). They also indicate that Hā`ena was not only well established, but part of ancient Hawai`ian life-systems that included the *ali`i*, officiating *kahuna* and people who lived and cared for the land. The *hale* complex of Lohi`au confirms that portions of Hā`ena were *ali`i* lands with all the infrastructure and required support systems. Fishponds or *loko* were considered resource/property of the *ali`i nui* therefore it can be assumed that Loko Kē`ē and Loko Naia were most likely under the control of and primarily for the benefit of *ali`i*.

According to several sources, there are many pre-Contact burials in the park sand dunes and in the vicinity of the comfort station; one consultant said there were burials in the *lo`i* area as well. There are several historic burials near the area of the foundation of the old poi mill. Burials were and are considered a very significant cultural practice.

Hā`ena State Park lands are located on storied lands, once part of ancient and historic communities who lived, farmed, fished, gathered, tended fishponds and buried their dead. A limited number of people were interviewed and shared their *mana`o* and many concerns regarding Hā`ena State Park; a long list of recommendations for the Hā`ena State Park Master Plan/EIS is provided based on their *mana`o*. It is also highly recommended that a cultural advisory committee or group be formed, hopefully including these interviewees, who could provide cultural expertise during the Master Plan/EIS process and during any later park development projects.

## ACKNOWLEDGEMENTS

Mahalo nui loa to all the people who agreed to take the time to be interviewed for the Master Plan/EIS in 2008 whose interviews I reviewed and analyzed for this project: Kumu Kapu Alquiza; Uncle Thomas Hashimoto; Mr. Clarence Hashimoto; Mr. Chipper Wichman; Uncle F. Bruce Wichman; and especially Mr. Randy Wichman (and his wife Victoria) for their awesome hospitality and dinner. And another *mahalo nui loa* to Randy for agreeing to a telephone interview (2009) for the comfort station project.

Mahalo to Mr. Kepā Maly for allowing me to review his reports and to the staff of PBR for providing reports of various studies conducted in Hā`ena State Park.

MAHALO NUI LOA!!!!

## TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1.0 Scope of Work	1
1.2.0 Project Area	2
1.2.1 Project Location	3
1.3.0 Environment	4
1.3.1 Terrestrial Ecosystems in Hā`ena State Park	4
1.3.1.1 Native Wet Forest and Woodland	4
1.3.1.2 Lowland Dry and Mesic Forest, Woodland and Shrubland	5
1.3.1.3 Coastal Communities	5
1.3.2 Marine Ecosystems in Project Area	6
1.3.2.1 Sandy Beaches	6
1.3.2.2 Rocky Beaches	6
1.3.2.3 Estuaries	6
1.3.2.4 Fringing Reefs	7
1.4.0 Marsh-Wetland Environment	7
1.5.0 Geology	8
1.6.0 Flora	9
1.6.1 Wetland Community	9
1.6.2 Strand Community	9
1.6.3 Beach Forest Community	9
1.6.4 Java Plum Forest Community	9
1.6.5 Mixed Forest Community	9
1.6.6 Ancient Taro Beds	10
1.7.0 Fauna	10
1.7.1 Stream Fauna	10
1.7.2 Marsh Fauna	10
1.7.3 Park Wildlife	10
2.0 METHODS	12
2.1.0 Personnel	12
2.2.0 Level of Effort	12
2.3.0 Theoretical Approach	12
2.4.0 Archival Research	12
2.5.0 Ethnographic Consultant Selection	12
2.6.0 Ethnographic Questionnaires	13
2.7.0 Ethnographic Interview Process	13
2.8.0 Interview Procedures	13
2.9.0 Transcribing/Review Process	13
2.10.0 Ethnographic Analysis Process	13
2.11.0 Research Problems	13
3.0 CULTURAL & HISTORICAL BACKGROUND REVIEW	14
3.1.0 Models of Hawai`ian Chronology	14
3.2.0 An Overview of Human Impact, Settlement and Socio-economic Development of Kaua`i in the context of Greater Hawai`i	15

3.2.1 Colonization Period (AD 300-600)	15
3.2.2 Developmental Period (AD 600-1100)	16
3.2.3 Expansion Period (AD 100-1650)	19
3.2.4 Proto-Historic Period (AD 1659-1795)	22
3.2.5 Early Historic Period (AD 1795-1900)	30
3.2.6 Territorial History Period (AD 1900-1949)	33
3.2.7 Modern History Period (AD 1950- )	34
3.3.0 Traditional Literature	34
3.3.1 Genealogies	34
3.3.1.1 Kumuhonua	35
3.3.1.2. Kumulipo	35
3.3.1.3 Hawai`ian <i>Genealogies</i>	36
3.3.2 Mo`olelo	36
3.3.2.1 History of Mo`olelo Collecting	37
3.3.2.2 Legends involving Hā`ena	37
3.3.3 Mo`olelo and Genealogy of Ali`inui of Kaua`i	38
3.3.3.1 Papa and Wākea Progenitors of Kaua`i Chiefs	38
3.3.3.2 Waimea and Wainiha Alliance	40
3.3.3.3 Puna Chiefdom and Interisland Ali`i Nui Connections	41
3.3.3.4 Kona and Puna Conflict	42
3.3.3.5 Merge of Puna and Kona Chiefdoms	43
3.3.3.6 Ali`i Nui and Hā`ena Connections	44
3.3.3.7 More Ali`i Nui Interisland Travels and Marriages	44
3.3.3.8 Kaua`i - O`ahu Ali`i Nui Merge	46
3.3.3.9 End of Kaua`i Direct Line Rule	47
3.3.3.10 O`ahu-Kaua`i - Maui Ali`i Nui	47
3.3.4. `Olelo No`eau	49
3.3.5 Place and Object Names	51
3.3.6 Winds	55
3.3.6.1 Winds of Halele`a	55
3.3.6.2 Winds of Hā`ena	55
3.3.7 Wahi Pana of Hā`ena	56
3.3.8 Heiau/Sites of Hā`ena	56
3.4.0 Historic References	58
3.4.1. History of Land Divisions	58
3.4.2. Hā`ena Ahupua`a	61
3.4.3 Konohiki of Hā`ena	61
3.4.3.1 Mo`olelo of Kekela, Konohiki of Hā`ena	61
3.4.3.2 Konohiki Privileges	61
3.4.4 Mahele Awards in Hā`ena State Park Lands	62
3.4.5 Hā`ena Land Transfers (Post 1855)	63
3.4.6 Kē`ē, `Ili of Hā`ena	63
3.4.7 Other `Ili Names of Hā`ena	64
3.5.0 Hā`ena Land Resources and Use (Traditional and Historic)	64
3.5.1 Hā`ena Pu`uone (Dune-banked Ponds)	64
3.5.2 Sand Dune Habitation	65
3.5.3 Taro Lo`i	65
3.5.4 Burials	66
3.5.4.1 Dune Burials	66
3.5.4.2 Hā`ena Cave Burials	66
3.5.5 Hā`ena Caves as Places of Interest in 1800s Literature	66
3.6.0 Hā`ena Demographics of mid-1800s	68
3.7.0 Previous Archaeological and Other Studies: Hā`ena and Vicinity	68
3.7.1 Thrum (1907)	69

3.7.2 Stokes (1908, 1909, 1927)	69
3.7.3 Emory (1929)	69
3.7.4 Bennett (1931)	69
3.7.5 Handy & Handy (1972)	70
3.7.6 Griffin et. al. (1977)	70
3.7.7 Earle (1978)	70
3.7.8 Hammatt et. al. (1978)	70
3.7.9 Riley and Ibsen-Riley (1979)	70
3.7.10 Riley and Clark (1979)	70
3.7.11 Hammatt and Meeker (1979)	70
3.7.12 Yent (1980)	71
3.7.13 Yenta and Ota (1983)	71
3.7.14 Griffin (1984)	71
3.7.15 Silva (1995)	71
3.7.16 Major and Carpenter (2001)	71
3.7.16.1 Chronology of Kē'ē Site 7009 [Agricultural System]	74
3.7.16.2 Significance Evaluation	75
3.7.17 Dye (2002)	75
4.0 ETHNOGRAPHIC SURVEY	76
4.1.0 Research Themes or Categories	76
4.2.0 Consultant Background	76
4.2.1 Kapu Kinimaka Alquiza (Kumu Hula)	77
4.2.2 Tom Hashimoto	78
4.2.3 Clarence Medeiros, Jr.	81
4.2.4 Chipper Wichman	85
4.2.5 F. Bruce Wichman	85
4.2.6 Randy Wichman	87
4.3.0 Land Resources and Use	90
4.3.1 Hā'ena in Halele`a	90
4.3.2 Park Lands: Former Residents	91
4.3.3 Park Lands: Taro Agriculture	93
4.3.4 Park Lands: Other Vegetation	96
4.3.5 Park Lands: Activity	96
4.3.6 Park Lands: Kalalau-Hanakāpī`ai Trail	96
4.3.7 Park Lands: Taylor Camp	97
4.3.8 Park Lands: The Future (Master Plan)	97
4.4.0 Water Resources and Use	98
4.4.1 Fishponds and Fishpond Fauna	98
4.4.2 `Auwai	99
4.4.3 Hā'ena Watershed and Water Sources	99
4.4.4 Limahuli Fauna	100
4.4.5 Hā'ena Floods	100
4.5.0 Marine Resources and Use	100
4.5.1 Fishing Lifestyle	100
4.5.2 Fishing Grounds	101
4.5.3 Fishing Methods	101
4.5.4 Fish Catches	102
4.5.5 Cooking, Preparing Fish, Etc.	103
4.5.6 Open Turtle Season	104
4.5.7 Limu Gathering	104
4.5.8 Gathering `Opihi	105
4.5.9 Beach Erosion	105
4.5.10 Tsunami Impact	105
4.5.11 Surfing	105

4.5.12 Shark Grounds	105
4.6.0 Cultural Resources and Use	106
4.6.1 Burial Sites in the Park and Vicinity	106
4.6.2 Traditional Hawai`ian Sites and Legends in Hā`ena	107
4.6.2.1 Heiau and Hula Platform	107
4.6.2.2 Pele Connections	109
4.6.2.3 Other Legends	110
4.6.3 Traditions	110
4.6.3.1 `Ō`ahi Ceremony	110
4.6.3.2 Kē`ē Pu`uhonua and Halau	111
4.6.3.3 Gathering Rights	111
4.6.3.4 Fish Gods	111
4.6.3.5 Hā`ena Rains	112
4.6.3.6 Hā`ena Boundaries	112
4.6.4 Ali`i of Hā`ena	112
4.6.5 Kē`ē – Na Pali Connections	113
4.6.6 Kekahuna: Park Mapper	113
4.6.7 Cultural Identity and Balance	113
4.7.0 Thoughts/Concerns about Hā`ena State Park	114
4.7.1 Heiau and Hula Pā	114
4.7.2 Lohi`au Site	115
4.7.3 Master Plan: Cultural Methods/Protocol Recommendations	115
4.7.4 Master Plan: General Issues	117
4.7.5 Park Volunteer Issues	120
4.7.6 Kapu Issue	121
4.8.0 Anecdotal Stories	122
4.8.1 Kekela-Wichman House	122
4.8.2 Tsunami	123
4.8.3 Pōhākupukane and Pōhākuloa	124
4.8.4 Lohi`au Stone Wall	124
5.0 SUMMARIES and ASSESSMENTS	125
5.1.0 Act 50 – State of Hawai`i 2000	125
5.2.0 Summary of Findings	125
5.2.1 Summary of Significant People and Events: Project Area and Vicinity	125
5.2.1.1 Ancient or Mythical People	125
5.2.1.2 Significant Ancient Events	126
5.2.1.3 Ali`i Nui	126
5.2.1.4 Ancient Practices	127
5.2.1.5 Historic People	127
5.2.1.6 Historic Events	128
5.3.0 Summary of Interviewee Concerns/Mana`o	128
5.4.0 Guideline Criteria in Relation to Project Lands	131
5.4.1 Cultural Practices/Resources in Project Area	131
5.5.0 Cultural Impact Assessment (CIA)	131
5.5.1 Cultural Resources	131
5.5.2 Cultural Practices	132
5.5.3 Historic Resources	132
5.6.0 Summary of Cultural Impact Assessment/Recommendations	132
5.6.1 Cultural Resources (Land, Water and Marine) Impact	132
5.6.2 Cultural Practices/Access (Land) Impact	132
5.6.3 Historical Resources (Land) Impact	133

5.6.4 Historical Practices (Land and Water) Impact	133
5.7.0 Interviewees Master Plan Recommendations	133
5.8.0 ADDITIONAL RECOMMENDATION	136
REFERENCES CITED/REVIEWED	137

## LIST OF APPENDICES

A.	Act 50 SLH 2000 [HB 2895 H.D.1]	145
B.	Scope of Work (SOW)	147
C.	<i>Guidelines for Assessing Cultural Impacts</i> (1997)	148
D.	Consent Form	151
E.	Ethnographic Instrument	153
F.	Release Form	155
G.	Ali`i Aimoku of Kaua`i	156
H.	Signed Consent Forms	157
I.	Signed Release Forms	164

## LIST OF FIGURES

1.	Ahupua`a of Hā`ena and Kaua`i Moku (Pacific Worlds/Stokes 1995)	2
2.	Map of Kaua`i (Juvik and Juvik 1998:2)	3
3.	Map of Kaua`i Archaeological Sites (Bennett 1931:98)	57
4.	LCA Claims in Hā`ena State Park (Pacific Worlds)	62
5.	Map illustrating resources within Park boundaries (Pacific Worlds).	64
6.	Map of fishponds, taro pondfields and `auwai systems (Griffin 1984: 9)	65
7.	Recorded Archaeological Sites in Hā`ena (Major and Carpenter 2001:24)	72
8.	Kē`ē Lo`i Complex, Hā`ena State Park (Major and Carpenter 2001:52)	73
9.	Poi Mill Foundation, Site 50-30-02-7014 (Major and Carpenter 2001: 54)	74
10.	Valley Systems of Hā`ena (Pacific Worlds)	90

## LIST OF TABLES

1.	Ethnic Demographics of Hawai`i	33
2.	Place and object names in Hā`ena and their <i>mo`olelo</i> and significance	51
3.	Demographics for Hā`ena State Park CIA Interviewees	77

## LIST OF PHOTOGRAPHS

1.	Mountain Peaks	Cover
2.	Kalo	Cover
3.	Lohi`au`s Wall	Cover
4.	Ka-Ahu-A-Laka	Cover
5.	Hula Pā	Cover
6.	Ka-Ulu-O-Pā`oa	Cover
7.	Loko Kē`ē/Loko Naia/Marsh	Cover
8.	HSP Sign	Cover
9.	Waiakapala`e Cave	Cover
10.	Kē`ē Beach/Lagoon	Cover
11.	Limahuli Stream	Cover
12.	Muliwai Beach	Cover
13.	Loko Kē`ē or Waiakapala`e Marsh	7
14.	Introduced species around the wetland area	8
15.	Wild chickens in Park	10
16.	Ironwood and False Kamani	11
17.	Canopy and understory	11
18.	Kē`ē Beach and Kai-kua`au-o-Hā`ena Lagoon	64
19.	Taro Lo`i in Hā`ena State Park	65
20-22.	Evidence of burials on public lands	66
23.	Part of Dune System in HSP	66
24.	Waiakanaloa Cave	67
25.	Waiakapala`e Cave	67
26.	Entrance to Hula Terrace	69
27.	Ke Ahu a Laka	69

28.	Kauluopā`oa Heiau	69
29-31.	Views of Heiau Site	69
32-34.	Views of Lohiau’s House Site covered with vegetation	70
35.	Part of Restored Lo`i System in Hā`ena State Park	73
36.	Remnants of Poi Mill Foundation	74
37.	Kapu Kinimaka Alquiza (Kumu Hula)	77
38.	Tom Hashimoto	78
39.	Clarence Medeiros, Jr.	81
40.	Chipper Wichman	85
41.	F. Bruce Wichman	85
42.	Randy Wichman	87
43.	Kē`ē Beach at the end of the road	91
44-45.	Allerton Estate	92
46-47.	Restored <i>lo`i kalo</i> in Hā`ena State Park	94
48.	Broad-leaf <i>hala</i> off of Kē`ē Beach	95
49.	Hau grows in several places in HSP	96
50.	Coconut trees in HSP	96
51.	Can no longer see heiau from Kē`ē	96
52-54.	Trail signs in Hā`ena State Park.	97
55.	Kalalau-Hanakāpī`ai Trail	97
56.	Part of former fishpond and marshlands	99
57.	Modern `auwai system	99
58-59.	Limahuli and Mānoa Streams	99
60.	Kē`ē Reef sign	100
61.	Kē`ē Reef trespassers	100
62.	Kē`ē Beach	100
63.	Uncle Tom’s throw nets	101

64.	Kē`ē Beach at low tide	105
65.	HSP Comfort Station	106
66.	Ke-Ahu-a-Laka	108
67.	Pu`u Makana	110
68.	Possible fish god stone	111
69.	Mānoa Stream going over road	112
70.	Lohi`au`s house site covered with vegetation	115
71.	End of the road turn-around	117
72.	Comfort Station	117
73.	Footpath through dune	117
74.	Fishpond Area	118
75.	Parking Lot in Hā`ena State Park	118
76.	Rockfall	120
77.	Native plant in the Park	136
78.	Kumu Hula and <i>haumana</i> end ceremony on <i>hula pā</i>	167

## 1.0 INTRODUCTION

At the request of *PBR Hawai'i and Associates, Inc.* and *Hawai'i State Parks*, a Cultural Impact Assessment (CIA) was conducted for *Hā'ena State Park* as part of a larger project, *Hā'ena State Park Master Plan and Environmental Impact Statement* (Job No. F74C664A). This CIA was in accordance with the State of Hawai'i Environmental Council *Guidelines for Assessing Cultural Impacts* [1997] and in compliance with Act 50 SLH 2000 (HB 28 H.D.1) (Appendix A) as it amends the State of Hawai'i Environmental Impact Statement law [Chapter 343, HRS] to include “effects on the cultural practices of the community and State. [It] also amends the definition of ‘significant effect’ to include adverse effects on cultural practices.”

The purpose of this CIA was to gather information about traditional cultural practices, ethnic cultural practices and pre-historic and historic cultural resources that may be affected by the implementation of the development project. The *level of effort* of this study included a broad cultural and historical background review; ethnographic survey (oral histories of six people); and review/analysis of twenty-two past oral histories.

This report is organized into five parts or chapters. Chapter 1 describes the project area in terms of location, in the context of *ahupua`a*, district and island, as well as a generalized description of the natural environment [geology, fauna, flora]. Chapter 2 explains the methods and constraints of this study. Chapter 3 summarizes the review of the traditional and historical literature in the context of the general history of Hawai'i, the island of Kaua'i and the local history of Hā'ena Ahupua`a (Figure 1). Chapter 4 presents the analysis of the ethnographic survey as it pertains to land, water, marine and cultural resources and use in the project area and vicinity. Chapter 5 summarizes the findings of this cultural impact assessment, which is based on the archival and ethnographic research data.

### 1.1.0 SCOPE OF WORK

The scope-of-work (SOW) [Appendix B] was based on the recommendations in the Environmental Council *Guidelines for Assessing Cultural Impacts* (1997) [Appendix C] and focuses on three cultural resource areas (traditional, historical and archaeological), conducted on two levels: archival research (literature review) and ethnographic survey (oral histories).

The research for this cultural impact assessment (CIA) was conducted within the broader context of the *ahupua`a* (traditional land division) and *moku* (traditional district), as well as the history of the agriculture, fishing and other industries in the area. The *level of effort* of this study included six interviews (oral history) and a broad literature review that included a review and analysis of twenty-two past oral histories.

Research on traditional resources entailed a review of the literature of Hawaiian *mo`olelo* or stories/legends, late nineteenth and early twentieth century ethnographic works and interviews with people who were knowledgeable about the area.

Historic research focused on Land Commission Awards (LCA) and archival material from the following: University of Hawai'i-Manoa Hamilton Library-Hawaiian Collections; Kaua'i Museum Archives; DLNR State Parks reports; reports provided by PBR-Hawai'i (on-line); Internet searches and personal library. Archaeological research entailed a review of reports provided by DLNR State Parks staff.

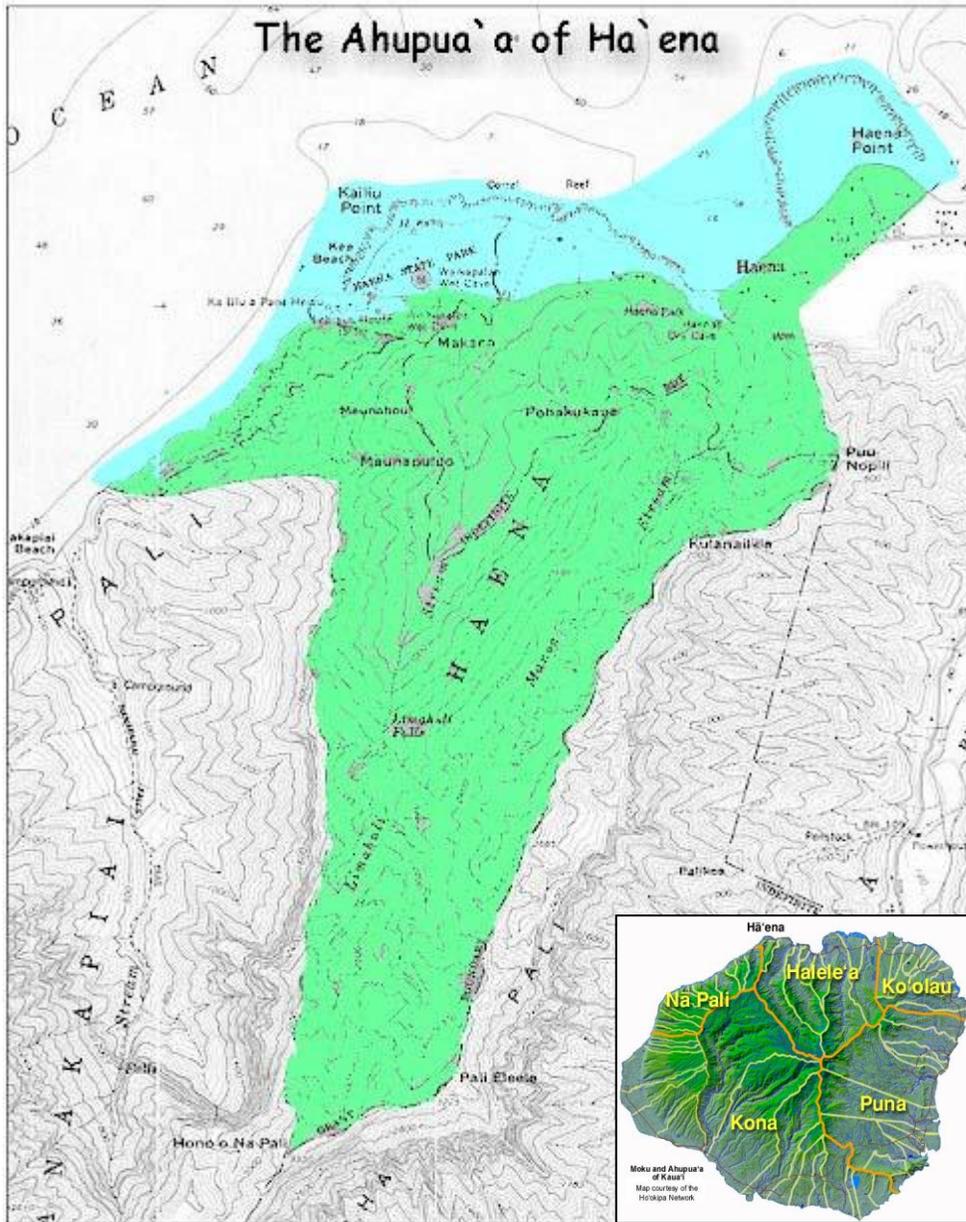


Figure 1. Ahupua'a of Hā'ena and Kaua'i Moku (Pacific Worlds/Stokes 1995)

## 1.2.0 PROJECT AREA

The project area is comprised of 64 acres within the park boundaries, the adjacent near-shore waters and Ke'e Beach, TMK 5-9-01:22 (por.) and TMK 5-9-08:1. Within the park area, parcel 25 of TMK: 5-9-01 owned by the County of Kaua'i (County) and includes Ka Ulu O Paoa Heiau and Ke Ahu A Laka (Hula Platform) and managed by the State Historic Preservation Division (SHPD). The project area also includes the State Department of Transportation highway within the park area.

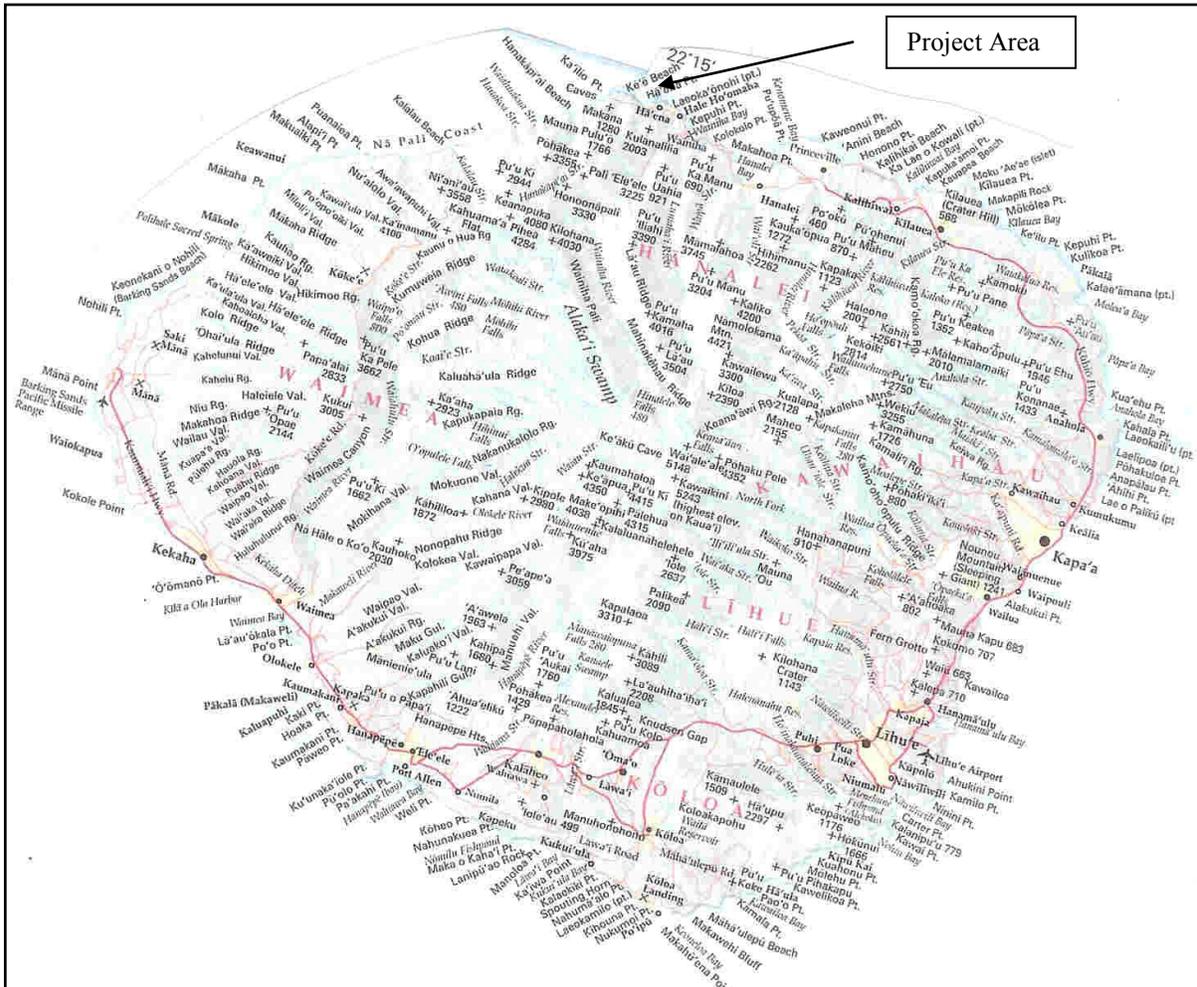


Figure 2. Map of Kaua'i. (adapted from Juvik & Juvik 1998:5).

### 1.2.1 PROJECT LOCATION

The park boundaries are defined by the Limahuli Stream on the east, the ocean on the north and west boundaries and cliffs on the south boundary. The majority of the park is below 40 feet above sea level, however, portions of the park area that are against the cliffs can be as high as 400 feet above sea level. The Kūhiō Highway (former Government Road and only access) runs east-west, bisects the park and terminates at Kē'ē Beach. Natural features within the park include two wet caves (Waiakapala'e and Waiakanaloa) *ma uka* (mountain) side of the road, and a well defined sand dune. The *ma kai* (ocean) side of the road contains large areas of remnant irrigated taro terraces from pre-contact era through the 1960s - currently being revived - and mixed (introduced and alien) vegetation; portions of this area are marsh or wetlands with sections once former fishponds (now overgrown). Other cultural features within the park proper include remnants of Lohi'au's house, the *hula* platform and *heiau*, and several burials within the sand dunes. Developed areas within the park included a newly constructed restroom facility that includes a shower system; two unimproved parking areas, the Kalalau trail, remnants of the former Brown/Allerton estate, which includes a caretaker's house, remnants of a mill and several historic burials. The majority of the park use includes Kē'ē Beach and fringing reef (see Figure 1), the Kalalau trail, the beach trail through the Allerton estate, access to the *hula* platform (owned by Kaua'i County), the restored taro *lo'i* (pond fields) and access to fishing areas (TKC 2001:I-4).

The following is from the “Hā`ena State Park Master Plan and Draft Environmental Impact Statement” prepared by The Keith Companies –Hawai`i, Inc. (TKC) and Earthplan Planning and Design (July 2001).

The significance of Hā`ena State Park on a statewide scale relates to the cultural, historical, religious and recreational resources found within the park and beyond. From a cultural standpoint the Hā`ena State Park is unique in the sense of containing a large, complete, intact, Hawaiian cultural unit/complex in the regional context of the Hā`ena - Nāpali Coast, including sites associated with agriculture and marine subsistence, religion and habitation. It was a significant gathering place for early Native Hawaiians and continues to be so. The statewide (and national) significance of this Hā`ena Archaeological Complex is confirmed by its inclusion on the State and National register of Historic Sites. Interpretation of these features can offer a valuable educational tool that will enlighten visitors and the community alike of the early Native Hawaiian lifestyle (TKC 2001:I-1).

The Hā`ena State Park is a very significant feature as related to the island of Kaua`i. Located at the extreme northwestern end of the coastal belt-road highway system (Kūhiō Highway). Hā`ena State Park is, for many of the visitors to the island, one of the primary destinations. As is the case with its statewide significance, the Hā`ena State Park is significant island wide for its cultural, historical, religious and recreational resources. Historical features located within the park create a sense of island pride in its Hawaiian heritage value, especially for the North Shore community, whose *hula halau* continues to assist in the maintenance and care of the *hula* platform in exchange for use of the site (TKC 2001:I-2).

### **1.3.0 ENVIRONMENT**

The Hawaiian Islands are geographically extremely isolated – 2,000 miles from North America and 1,000 miles from the nearest Pacific atoll. However, an impressive number of native plants, invertebrates and birds reached these islands by natural means (long-distance dispersal: direct, windborne, or waterborne) thousands of years before any human introductions (Juvik & Juvik 1998:103-104).

According to the Kaua`i ecosystem map (Juvik & Juvik 1998:122-123), the native ecosystems of the project area consisted of lowland dry and mesic forest, woodland and shrubland (terrestrial) and sandy beaches and major fringing reefs (marine). Today, the project area has been greatly transformed by human activity with trace remaining native ecosystem that consists of wet forest/woodland and lowland dry and mesic forest, woodland and shrubland.

#### **1.3.1 Terrestrial Ecosystems in Hā`ena State Park**

##### **1.3.1.1 Native Wet Forest and Woodland (Juvik & Juvik 1998:126-127):**

Climate/Substrate. Annual rainfall 80-<400 inches without regular dry periods; temperatures warm at low elevation, cool in montane areas. Substrates - very weathered soils on older islands.

Biota. Vegetation – closed-canopy forests of `ōhi`a, sometimes with *koa* or `ōlapa codominant; open-canopy forests or woodlands of `ōhi`a and *uluhe*. Forests of *hala* in coastal lowlands; shrublands of `ōhi`a and ferns; also `ākala and shrublands.

Biota. Fauna – primary habitat of most extant Hawaiian honeycreepers and other forest birds: `apapane most common; great diversity of native invertebrates.

Endangered Species: more than 50 plant species including lobelioids, *ha`iwale*, endemic mints and ferns (*kihi*). Birds including `ō`ū and `ākohekohe.

Cultural Significance: traditional realm of Hawaiian gods (*wao akua*); not for casual human visitation. Source of plants for fiber (*olonā*); weaving (*ie'ie*), clothing (*kapa* from *wauke*), medicines and construction woods. It is also primary zone for bird collection for feather work.

Threats. Feral pigs, feral cats, black and Polynesian rats; alien slugs; introduced plants; clearing for agriculture and grazing; and suburbanization.

### **1.3.1.2 Lowland Dry and Mesic Forest, Woodland and Shrubland (Juvik & Juvik 1998: 127):**

Climate/Substrate. Annual rainfall 20-80 inches; warm to hot with seasonal drought. Soils less weathered than in wet forest.

Biota. Vegetation – plains, lower slopes, dry ridge tops and cliffs support grasslands of *pili* or *kāwele*. Dry or mesic shrublands of *a`ali`i*, *ākia*, *ko`oko`olau*, *ūlei*, and other shrubs. Dry forests of *ōhi`a*, *koa*, *lama*, *wiliwili* and rarer trees on ridges, rocky slopes and leeward gulches. Mesic forests (now rare) of *ōhi`a*, *koa* or *lama* and rarely *olopua* or *halapepe* occur in gulches and on lower slopes and less disturbed sites.

Biota. Fauna – native birds (*elepaio*, *apapane* and *amakahi*); native insects now depleted.

Endangered Species. Many trees and shrubs including *koki`o* and Kaua`i *hau kuahiwi*; Hawaiian hoary bat greatest abundance in this zone.

Cultural Significance. Forested zone was the realm of Hawaiian gods, especially Kū. Sandalwood exploitation of the early 1880s occurred in lowland mesic forests. *Pili* grasslands, a source of thatch material maintained by fire; medicinal plants and hardwoods were gathered. Some mesic areas were converted from forest to dryland *kalo* and *uala* agriculture.

Threats. Feral goats, feral cats, rats, alien invertebrates, especially ants; invasive alien plants. Many lowland areas were burned and cleared in ancient Hawaiian times; today urbanization and development continue.

### **1.3.1.3 Coastal Communities (Juvik & Juvik 1998:128-129):**

Climate/Substrate. Warm; windward shores receive up to 120 inches annual rainfall; strong winds typical. Substrates include raised coral, basalt cliffs, sandy beaches, basalt and coral boulders, and littoral cones or tuff.

Biota. Vegetation – greatly influenced by proximity to ocean; many salt-tolerant species. Dwarf shrublands of *naupaka-kahakai* most common, *ilima*, *naio*, *hinahina* (uncommon), *ākulikuli*, *aki`aki* grass, or sedge. Coastal forest of *hala* in a few windward sites; wetlands of native sedge now rare.

Biota. Fauna – threatened green sea turtle (*honu lū`au*); shorebirds such as wandering tattler (*ulili*) and ruddy turnstone (*akekeke*) common in winter.

Endangered Species. Hawaiian monk seal, hawksbill turtle very rare; black-necked stilt (*ae`o*) and Hawaiian coot (*alae ke`oke`o*) depend on remaining wetlands. Plants include *ōhai* and dwarf *naupaka*.

Cultural Significance. Coastal areas, the most densely populated lands in ancient times, continue to be important in traditional Hawaiian culture, providing medicines, *lei* materials and other resources.

## 1.3.2 Marine Ecosystems in Project Area

### 1.3.2.1 Sandy Beaches (Juvik & Juvik 1998: 113-114):

White sand is primarily from the breakdown of coralline algae and corals. Wave action and biological and chemical erosion determine composition and longevity of beaches. Offshore sand reservoirs connected to beaches often undergo seasonal cycles of erosion, accretion and alongshore drift.

Biota. Vegetation – beach morning glory (*koali*), beach heliotrope, milo and *hau*.

Biota. Fauna – ghost crabs, mitre and auger shells, seabirds, threatened green sea turtle, endangered hawksbill sea turtle, and endangered monk seal use beaches for resting and nesting.

Cultural Significance. Hawaiians used beaches for burials (cemeteries), canoe launch sites and recreational, subsistence and ceremonial purposes. Beach sand and waterworn pebbles were used in the floors of Hawaiian houses.

Threats. Sand mining, degradation by trash, beach erosion caused by shoreline fortifications.

[On the sandy areas along the coastal plain sweet potatoes [*‘uala*] were grown. Formerly many varieties of banana [*mai ‘a*] were planted in Limahuli and Mānoa Valleys, as well as many kinds of sugar cane [*ko*] and several varieties of *‘awa*...and while cultivation of coconut (*niu*) was limited in Hawai‘i due to its northerly latitude, on Kaua‘i ‘the favored places’ included Hā‘ena and Hanalei (Handy In Pacific Worlds).]

### 1.3.2.2 Rocky Beaches (Juvik & Juvik 1998:114):

Shorelines where sand and other sediments are absent due to constant wave action, currents, steep submarine slopes and lack of offshore sand reservoirs.

Conditions/Substrates. Mostly consolidated basalt, but sometimes consolidated limestone (cemented beach rock or raised coral reefs).

Biota. Vegetation – sea lettuce, Sargasso or various algae.

Biota. Fauna – Limpet, periwinkles, littorine snails, rock crabs, gastropods and rock urchin; offshore waters are possible feeding areas for threatened green turtle.

Cultural Significance. Rocky beaches often were important fishing grounds and canoe launching sites for Hawaiians.

Threats. Coastal, urban, resort development.

### 1.3.2.3 Estuaries (Juvik & Juvik 1998:114-115):

Distribution. Places where fresh and marine waters meet at the coastline (stream mouth).

Conditions/Substrates. Freshwater flowing into the ocean floats on the sea surface because of its lower salt content and density.

Biota. Vegetation – marshes...some seaweeds.

Biota. Fauna – crabs, shrimps, mullets, endemic flagtails, *āholehole*, anchovies, small jacks, barracudas, eels, shorebirds, waterbirds,

Cultural Significance. Sources of fresh water and fish for Hawaiian communities in the past.

Threats. Modification for settlements; pollution by sewage and other discharges.

#### **1.3.2.4 Fringing Reefs** (Juvik & Juvik 1998:117-118) (see also Figure 1):

Distribution. These reefs grow, terrace-like, off island shores, with their outer slopes extending to depths of about 165 feet.

Conditions/Substrates. Calcium carbonate skeletons and sediments produced by corals and coralline algae comprise the bulk of reefs. Sand deposits and seaweed common on shallow inner reef flats; living corals and coralline algae predominate at reefs outer edge; deeper slopes are mostly dominated by live corals or old reef rock. Beneath living outer layer of reef organisms, remains of previous reef builders are compacted and cemented into a hard, limestone, wave resistant structure which may be cut through by channels.

Biota. Threatened green sea turtle forage on reef flats; endangered hawksbill turtle feeds where sponges are common.

Cultural Significance. Fishpond development and intensive fishing occurred on reef flats.

Threats. Coastal construction, erosion, sewage discharges, overharvesting of fish, freshwater flooding.

#### **1.4.0 MARSH-WETLAND ENVIRONMENT**

Loko (fishpond) Kē`ē, Waiakapala`e Marsh - also called Hā`ena Marsh - is a small fresh water marsh located across Kūhiō Highway from Waiakapala`e Wet Cave. The wetlands appear and disappear depending on precipitation and marsh conditions and probably occur due to heavy rainfall and high water. During wetter years, grass encroached to the wetland and left only a small pooling of water, which is shallow and stagnant. While a dry streambed inlet empties into the northeast corner, there is no perennial stream or river that feeds the marsh and does not appear to be connected to the ocean (TKC 2001:II-33).



Photo 13. Loko Kē`ē or Waiakapala`e Marsh.

## 1.5.0 GEOLOGY

The island of Kaua`i is a single shield volcano, 552 square miles and the oldest (5.6 million years) of the major Hawaiian Islands. The highly eroded island has spectacular land forms. Landslides have modified the island's north, northeast and possibly east flanks (Juvik & Juvik 1998:41).

The lava flows that produced the majority of this volcano are collectively known as the Nāpali Formation, which is the earliest phase of the Waimea Canyon volcanic series. Later eruptions filled a central caldera...but the Nā Pali coast and Hā`ena State Park area were protected from these later flows by the caldera rim. The Nā Pali coast and Hā`ena State Park area have therefore been subject to tropical weathering and erosion since their initial formation of Kaua`i.... The prolonged erosion has created the dramatic sea cliffs, knife-like ridges and valleys along this portion of the coastline. The Hā`ena *ahupua`a*, which is situated in the Hanalei district at the extreme northeastern end of Nā Pali coast, is backed by high former sea cliffs, which have been cut by two small stream valleys, Mānoa and Limahuli. Portions of the western side of the Limahuli Valley fall within the Hā`ena State Park. The dry cave near the Hā`ena County Park and the two wet caves within Hā`ena State Park are former sea caves carved by wave action. The narrow coastal flat between the cliffs and the beach is the result of alluvial deposition. This alluvial flat is fronted by calcareous beaches and a sand dune system that extends from Kē`ē Beach eastward to Wainiha Bay. The majority of the park falls on this alluvial deposition and encompasses portions of the dune system. Boulder beaches exist along the west side of Kē`ē Beach and the mouth of Limahuli Stream. Offshore is a fringing reef (TKC 2001: 1-3).

Calcareous sand beaches are beautifully developed on Kaua`i with the largest between Hā`ena and Lumahai and at Hanalei Bay. Sand is cemented into "beach rock" at places such as Ka Lae o ka `ilio near Hā`ena and contains enough olivine to give it a greenish color (Macdonald et al 1983:470). The Hā`ena dune site estimated (1200-1860AD) (Juvik & Juvik 1998:166-map).

According to Quinn (2010:1) the current view of Kaua`i geology is as follows:

Current thinking is that a probable second large shield volcano built the eastern part of the island and slipped down to create the expansive Līhu`e basin and the windward facing scarp of Mt. Wai`ale`ale. *Kaua`i Geologic History, A Simplified Guide*, by Chuck Blay and Robert Siemers represents an alternate view of the island's geologic history. Alluvial deposits are silts and clay, not sand. Hā`ena is a coastal plain and covering of alluvial deposits over basalt substrate behind the dune. Biogenic reefs, comprised mainly of coral and coralline algae, have grown like a "fringe" around the island. These reefs have provided skeletal matter for fragmentation, transport and deposition at the shoreline to produce sandy beaches.



Photo 14. Introduced species around the wetland area

## 1.6.0 FLORA

Hā'ena State Park is dominated by introduced species that include 218 flowering plants and nine species of pteridophytes; eleven were Polynesian-introduced species, nine are endemic, fifteen are indigenous to Hawai'i and four are possibly indigenous. Many of the introduced species are ornamentals (TCK 2001:II-34).

### 1.6.1 Wetland Community

During wet periods, land surrounding Waiakapala'e Marsh is covered with a dense growth of *hau*, guava and *koa haole*. A small patch of *`ape* or arrowhead, a close relative of taro and a food of early Hawaiians, still remains in the wettest, northeast corner. A *hau* thicket borders the wetland to the north, east and west. During the dryer periods, the marsh was observed to be covered with a dense hummocky, two feet high growth of *hono hono* grass. The *`ape* still occupied the northeastern corner, *Halo* grass covered the western tip and a *hau* thicket still bordered the north, east and west (TKC 2001:II-34).

### 1.6.2 Strand Community

The strand, defined as the zone seaward of the tree line at Hā'ena State Park, does not have much growth...it consists mostly of *pōhuehue*, *kūka'ipua'a*, fireweed, sow thistle, narrow-leaved plantain and seedlings of ironwood and false *kamani*. Beach *naupaka* occurs uncommonly. Few other species are found in this community (TKC 2001:34).

### 1.6.3 Beach Forest Community

The Hā'ena State Park coastline, especially in sandy areas...consists of false *kamani* and ironwood trees, 30 to 40 feet tall with occasional Java plum inland. The canopy cover is typically 100%, the understory is generally open and dense shade and needles preclude the development of any significant ground cover.... Understory species include vedelia, pothos, four o'clock and sow thistle (TKC 2001:II-34).

### 1.6.4 Java Plum Forest Community

The Java plum forest is one of the two largest plant communities in Hā'ena State Park. It is found along Limahuli Stream occupying abandoned taro terraces, along the dirt road near the restroom facilities and on the talus along the *ma uka* side of Kūhiō Highway between Waiakanaloa wet cave and the rock shelter. Typically the forest consists of Java plum trees at least 30 feet tall with 50-100% canopy cover.... The density and composition of the understory vary considerably (e.g. Java plum saplings, guava, Boston fern, Christmas berry, basket grass).... Near Limahuli Stream, numerous ornamental species are found. Several are remnants of old plantings; others have become widespread such as gingers, spiral flag and marica (TKC 2001:II-34).

### 1.6.5 Mixed Forest Community

The mixed forest is the second largest vegetation type and is located in the central portion of Hā'ena State Park, *makai* of Kūhiō Highway, at the west end along the Kalalau Trail and Lohi'au's House and on the east side along Limahuli Stream *mauka* of Kūhiō Highway...it consists of groves of *hau*, Java plum and *kukui*, mango, African tulip, octopus tree, *hala* and strawberry guava.... The Kalalau Trail portion consists largely of *hala*, *kukui*, Java plum, octopus tree and guava that are overgrown with yellow water lemon, *taro* and pothos vines [other species include rose apple, cinnamon, *laua'e*, *`awapuhi-kuahiwi* and *ti*] (TKC 2001:II-35).

### 1.6.6 Ancient Taro Beds

There are taro beds along the trail from Hā`ena to Kalalau valley which must have been cultivated by the people living at one of the two places (Bennet 1931:9).

### 1.7.0 FAUNA

In almost all of the elevation zones of the Hawaiian Islands, alien animals such as feral pigs, goats, cattle and horses have damaged native vegetation. Terrestrial fauna in pre-colonized Hawai`i consisted of only one endemic mammal, the hoary bat (*Lasiurus cinereus*), thousands of endemic insects [i.e., damselflies (*Ischnura ramburii* and *Ischnura posita*) found around reservoirs and streams], and about 100 species of endemic birds such as the Hawaiian owl (pueo) and Hawaiian honeycreeper (*Drepanididae spp*) (Berger, 1972:7, Kirch, 1985:28). Early Polynesians introduced animals included the Southeast Asian pig (*Sus scrofa*), jungle fowl or chicken (*Gallus gallus*), dog (*canis j. familiaris*), and the Polynesian rat (*Rattus exulans*). Photo 15. Wild chickens in Park



### 1.7.1 Stream Fauna

Nineteen species of macro fauna were found in Limahuli Stream...and include ten insects, three crustaceans and five fishes. Of the nineteen, eleven are native to Hawai`i, with ten of those being endemic or occurring naturally only in Hawai`i. Three of these endemic (*opae-kala`ole*, *o`opu-nākea* and *o`opu-nōpili*) are of some economic importance. Two endemic species (*o`opu-nakea* and *o`opu-nopili*) are listed as “threatened” and of special concern. The *o`opu-nakea* is diadromous, meaning it is migratory between fresh and salt water and it is probable that all gobies (*o`opu*) are [endangered]. Of the alien species, the Tahitian prawn is harvested for food. In checking with the Limahuli Gardens, no other exotic species are apparent (TKC 2001:II-31).

### 1.7.2 Marsh Fauna

Bullfrogs have been heard in the marsh, however, no fish were observed.... Small numbers of Spotted Munia, Common Myna, Spotted and Barred Dove have been seen at Hā`ena Marsh. Other exotic birds (Northern Cardinal, Shama, Japanese White-eye, House Finch) are common in adjacent forested habitat. White-tailed Tropicbirds were seen in the area, though their presence bears no relationship to the wetland. No other waterbirds have been observed and there are no records of wetland birds at Hā`ena Marsh, however, because of proximity to the ocean, it is possible that all five resident native species of waterbirds and the Cattle Egret are temporary visitors (TKC 2001: II-33).

### 1.7.3 Park Wildlife

**Goats** Feral goats live in herds primarily on the cliffs of the Nā Pali Coast. Because of the proximity of the Nā Pali Coast to Hā`ena State Park, there is the possibility that goats frequent the park, especially the rugged westerly portion surrounding the *heiau* and the *ma uka* cliff areas...[however] there are no records or evidence of goats in Hā`ena State Park (TKC 2001:II-41).

**Pigs** Although there is a large population of feral pigs on the island, no feral pigs have been sighted in Hā`ena State Park...[but] feral pigs have been observed along the beginning of the Kalalau Trail, with the only access to that area being through the Park (TKC 2001:II-41).

**Bats** Kaua`i’s only endemic land mammal is the Hoary bat (*Lasiurus cinereus semotusi*). According to the DLNR-DoFAW, the hoary bat was added to the Federally endangered species list over thirty years ago.... They frequent all low lying coastal areas and DLNR- DoFAW

confirmed that they dwell in caves and treetops of Hā'ena State Park. It is recommended by DLNR- DoFAW that mass clearing of the park be avoided and that forested areas be maintained to preserve the bat habitat (TKC 2001:II-42).

**Birds** The DLNR- DoFAW confirms that there are no native, resident forest birds below 2000 feet because of avian diseases carried by mosquitoes.... Gallinule and the Koloa Duck have been sighted by DLNR- DoFAW in the Hā'ena State Park.... The indigenous Hawaiian Short-eared Owl (*pueo*) and Black-crowned night heron (*`auku`u*) are present along the coast; the latter is also found along the major streams (TKC 2001: II-42).



Photo 16. Ironwood and False Kamani



Photo 17. Canopy and understory

## **2.0 METHODS**

The Hā`ena State Park Cultural Impact Study/Assessment was conducted between the months of September 2008 to April 2009. The study consisted of three phases: (1) cultural and historical archival research (limited literature review); (2) ethnographic survey (oral history interviews/questionnaires), transcribing interviews, analysis of ethnographic data; and (3) report writing.

### **2.1.0 Personnel**

The personnel consisted of (1) the principal investigator-author- ethnographer who has a Masters degree in Anthropology, with a graduate curriculum (archaeology track) that included anthropology theory, cultural resource management, ethnographic research methods, and public archaeology; an undergraduate curriculum background (archaeology track) that included Hawaiian History, Hawaiian Language, Hawaiian Archaeology, Pacific Islands Religion, Pacific Islands Archaeology, Cultural Anthropology, as well as Geology and Tropical Plant Botany; and ethnographic field experience that includes over 300 interviews to date; and (2) subs, transcribers Carol Kalahiki and Dot Uchima.

### **2.2.0 Level of Effort**

The level of effort for this CIS/A project was an ethnographic survey that consisted of 5-7 interviews and questionnaires; and a broad archival research primarily based on reports of previous studies and limited primary source research in Kaua`i Museum Archives.

### **2.3.0 Theoretical approach**

This study is loosely based on *Grounded Theory*, a qualitative research approach in which “raw data” [transcripts and literature] are analyzed for concepts, categories and propositions. Conceptual labels or codes are generated by topic indicators [i.e., agriculture, flora, burials, fishing]. Categories are generated in a similar manner by forming groupings such as “Land Resources & Use,” “Marine Resources & Use” or “Cultural Resources & Use.” Since this was a semi-focused study, categories were pre-selected as part of the overall research design. However, it is not always the case that these research categories are supported in the data. In the *Grounded Theory* approach, theories about the social process are developed from the data analysis and interpretation process (Haig 1995; Pandit 1996). This step was not part of this cultural impact assessment as the research sample was too small.

### **2.4.0 Archival Research**

It took several weeks of intermittent archival research and reviewing archival material compiled by *Hawai`i State Parks* staff. The majority of the archival research [primary and secondary sources] came from the Kaua`i Museum Archives, State Historic Preservation Division library; State Parks collections, personal library; and Internet searches. Most of the secondary source material included translations of 19<sup>th</sup> century ethnographic works, historical texts, archaeological reports, and Hawaiian language resources [i.e., proverbs, place names and dictionary].

### **2.5.0 Ethnographic Consultant (Interviewee) Selection**

The selection of the consultants was based on the following criteria (explained further in Chapter 4):

- ❖ Had/has Ties to Project Location (including lineal descendant)
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Referred by *Hā`ena State Park* Staff
- ❖ Referred by NTBG-Limahuli staff

## **2.6.0 Ethnographic Questionnaires**

An ethnographic survey form/questionnaire was developed to accommodate the people who wanted to share information about Hā`ena and vicinity, but who were not slated to be interviewed due to time constraints or other limitations. This form was either mailed to people of “standing” or who expressed an interest in sharing information or distributed at public information meetings. Only two people filled out the questionnaire and mailed it back (insufficient information).

## **2.7.0 Ethnographic Interview Process**

The interview process included a brief verbal overview of the study. Then the ethnographic consultant was provided with an informed consent or agreement to participate form to review, which was drafted for the edification and protection of each consultant (Appendix D). An ethnographic research instrument (Appendix E) was designed to facilitate the interview, a semi-structured and open-ended method of questioning based on the person’s answers to questions (‘talk-story’ style). Each interview was conducted at the convenience (date, place and time) of each consultant. A *makana* or gift was given to each consultant in keeping with traditional reciprocal protocol.

## **2.8.0 Interview Procedures**

Interviews were conducted at Limahuli Hale (1), home (3), or work office (1) at the request of the consultants, using an audio-cassette tape recorder. Notes were also taken as needed, but more attention was given to listening intently to each consultant.

## **2.9.0 Transcribing/Review Process**

The taped interviews were transcribed by hired transcribers using a Sony Dictator Transcriber (BM-87DST) and later edited by the author. Most consultants were emailed a copy of the edited interview transcripts along with a *mahalo* letter that explained the transcript review process, along with a self-addressed, stamped envelope for return of the revised transcripts; one was mailed although the consultant said there was no need to mail copy. This allowed for corrections (i.e., spelling of names, places), as well as a chance to delete any part of the information if so desired. Consultants were also given a “Release” form (Appendix F) to sign when they were satisfied with the transcript information/revisions. One emailed permission to use information without revisions; no one else submitted any release forms.

## **2.10.0 Ethnographic Analysis Process**

The analysis process followed a more traditional method, as a qualitative analysis software program was not necessary. The interview was manually coded for research thematic indicators or categories (i.e., personal information; land, marine and cultural resources and use; site information-traditional and/or historical; and anecdotal stories). For the purpose of this study, it was also not necessary to go beyond the first level of content and thematic analysis, as this was a more focused study. However, sub-themes or sub-categories were developed from the content or threads of each interview [i.e., agriculture, fishing, hula].

## **2.11.0 Research Problems**

Coordinating people’s schedules for interviews was cumbersome. Coordinating tasks was also a problem. However, the primary problems were people not following through with scheduled interviews, and not returning phone calls and emails.

### 3.0 CULTURAL and HISTORICAL BACKGROUND REVIEW

The Cultural and Historical Background Review entailed a broad search of primary and secondary source literature over time. The majority of the research material for this section came from the State Historic Preservation Division library, Bishop Museum archives; Hawaiian Collections of the University of Hawai'i Hamilton Library (Manoa Campus) and the author's private library. Primary source material included maps, visitor journals, genealogies and other studies. Secondary source material included translations of 19<sup>th</sup> century ethnographic works, historical texts, indexes, archaeological reports, and Hawaiian language resources (i.e., proverbs, place names and Hawaiian language dictionary). A review of the archival material is presented in this section within the chronological context of the broader history of Greater Hawai'i, the *moku`āina* (island) of Kaua'i and the Hā'ena District. This context will illustrate that Hā'ena was not only a part of the dynamics of Kaua'i, but of greater Hawai'i as well.

#### 3.1.0 Models of Hawaiian Chronology

Models of Hawaiian Chronology such as Cordy (1974/1996), Hommon (1976/1986) or Kirch (1985) provide a temporal view of settlement patterns as well as cultural changes through time, from initial settlement through first recorded contact with the western world. Cordy's (1974) first model of a cultural development sequence looked at Initial Settlement Period, New Adaptation Period and a Complex Chiefdom Period. He has since modified this model (1996). Hommon's (1976) model of sociopolitical development sequence included four phases: Phase I AD 500-1400; Phase II AD 1400-1550; Phase III AD 1550-1650; and Phase IV AD 1650-1778. This model was later modified (1986) to three phases: Phase I AD 400-1400 Exploration and Settlement; Phase II AD 1400-1600 Expansion; and Phase III AD 1600-1778 Consolidation. Kirch (1985) believed that initial settlement occurred much earlier than AD 600. His cultural-historical sequence model has four phases: Phase I Colonization Period (AD 300-600); Phase II Developmental Period (AD 600-1100); Phase III Expansion Period (AD 1100-1650); and Phase IV Proto-Historic Period (AD 1650-1795) (Kirch, 1985:296-308; Kolb, 1991:205).

For this cultural impact study/assessment, Kirch's (1985) model will be used with the following additions: Early Historic Period (AD 1795-1899), Territorial History (AD 1900-1949), and Modern Historic Period (post AD 1950). The reasoning behind Kirch's model is the belief of many aboriginal Hawaiian people that based on oral histories or legends, the migrations of their Polynesian ancestors to Hawai'i took place prior to 700 AD. According to Fornander (1917: IV: II: 406), there are seventy-five generations from Wakea to Kamehameha I who was born around 1753 AD. If just eighteen years were allotted to each generation (typically a generation is twenty years) that would make the time of Hawaiian progenitors Wakea and Papa Haumea (who settled in Nu'uano, O'ahu) approximately 403 AD. [McKinzie (1983:12) gives thirty years per generation.] Yent's (1980) settlement phase for Hā'ena will also be referenced (In Dye 2002:5).

It should be noted that a study by Tuggle & Spriggs (2001) refutes the 'early colonization' supposition. For decades, the consensus among Hawaiian archaeologists was that evidence from Bellows, O'ahu and Ka'ū, Hawai'i Island, supported early Polynesian colonization dates of AD 300 to AD 600 (Tuggle 1979; Kirch 1985). However, Tuggle and Spriggs (2001) have since studied new data and re-evaluated past dates and dating methods and have concluded that acceptable early dates fall within 700-1100 AD. These dates appear to coincide with data that eastern Polynesia was settled much later than previously thought (Rolett 1989).

The following overview encapsulates cultural changes over time and highlights significant events and people. More corroborating details follow this overview section with traditional *mo'olelo*, *mele*, *oli*, historic works and various studies.

### 3.2.0 An Overview of Human Impact, Settlement and Socio-economic Development of Kaua`i in the context of Greater Hawai`i

#### 3.2.1 Colonization Period (300-600 AD)

First voyager dating is scanty at best, however, based on early site dates from Bellows, O`ahu and South Point, Hawai`i, Kirch (1985) estimated that the Colonization Period of the Hawaiian Islands was somewhere between 300-600AD. These first Polynesian voyagers to Hawai`i followed the tracks of migratory birds. They traveled mainly by the stars on a voyage of migration; sixty to a hundred persons could exist for weeks on a large canoe, which could have been a hundred feet in length (Day 1992:3). This feat was “remarkable in that it was done in canoes carved with tools of stone, bone, and coral; lashed with handmade fiber; and navigated without instruments” (Henry 1995: vii).

Reconstructing the cultural sequence for the district of Hā`ena, Kaua`i and greater Hawai`i during the colonization period would involve the ‘founder effect’ and time necessary to adjust and adapt to a new environment. The colonizers were not able to bring all of the gene pool or cultigens from their homeland, so their new culture consisted of what survived the journey, what was remembered and what could be applied to the new environment (Kirch 1985:285-6). Although early Hawaiians were farmers and felt spiritually tied to the ‘*aina* (land) in many ways (Waters, n.d.), when they first arrived they had to modify both their subsistence practices and the land. Faunal remains analyses indicate that early Hawaiian subsistence depended on fishing, gathering, bird hunting (extinct fossil remains, see Olson and James, 1982), as it took time to clear the forests, plant their crops, breed their animals, and construct suitable living quarters.

According to Wichman (2003), Kaua`i was first settled by descendants of Kumu-honua and Lalo-honua - thirty-six generations before Papa was born (Wichman 2003:2) - during the time of Papa and Wakea (second son of Kahiko and Kū-pūlana-kehau) (Wichman 2003:4) who came well before the descendants of Nana`ulu came to Kaua`i . Wichman’s genealogies (2003:117-131) are used as approximate/guiding dates in this report.

Ho`ohoku-i-kalani [daughter of Papa and Wākea (ca A.D. 530)] gave birth to another son [from Wākea] whom they named Hāloa after his dead brother. From Hāloa, it is said, descend all the Polynesians. Kaua`i historians claim that a younger brother of Hāloa discovered and settled on this island. This was Chief Ka-māwae-lua-lani-moku [ca A.D. 555], who traveled to this island with his wife, Kahiki-lau-lani, and her two paddlers Kō-nihinihi and Kō-nahenahe. Because of his good deeds, the great number of his descendants, and the prosperity of his reign, people began to call this island Kau-a`i (*Place of Abundance*).... Whether Ka-māwae-lua-lani-moku and Kahiki-lau-lani ever lived on Kaua`i is unknown. It is more certain that one day, not too many generations after Papa and well before the descendants of Nana`ulu came to Kaua`i, a voyaging canoe commanded by Kū`alu-nui-kini-akua approached the island from the west. Nothing is known of him except his name and that he had a counselor named Pi`i-`ali`i. The genealogy of the first Kaua`i settlers is broken, for they lost their lands and identity after a long war to new, vigorous, and more warlike adventurers.... The most famous connected to two almost mythical groups of people, the Menehune and the Mū (Wichman 2003:5).

The first group to settle on Kaua`i landed at the river mouth of Waimea in the Kona district. What they encountered was an area of abundant water and resources.

Kū`alu-nui-kini-akua stepped ashore at the mouth of Waimea river. It was an ideal place. There was abundant water from the swift rivers and streams that flowed within a protected canyon complex....There was good soil within the canyon valleys.... As the population increased, settlements spread inward into Waimea canyon and its side canyons, into the valleys of Nāpali along the southern coast to Koloa and northward to Wailua and Hanalei (Wichman 2003 5-7).

It was during this period that Kū`alu-nui-paukū-mokumoku was the ruling chief. His first wife had been murdered by his *kahuna nui* who wanted to go back to their homelands so he married Kahāpula, a chiefess born on the slopes of Pe`ape`a overlooking Hanapēpē Valley. When she became pregnant, Kū`alu arranged for her to live in the remote valley of upper Waimea in order to protect their child. During this time Kū`alu-nui-paukū-mokumoku sent back to his homeland for the Menehune who were masters of stonework and engineering and under his direction they built many *heiau*, fishponds and irrigation systems for wetland farming. The Menehune preferred to live on the ridge between Wainiha and Lumahai valleys (Wichman 2003: 7-10). When his son Ola was of age he was brought to his father. Ola later became the ruling chief of Kaua`i and it was during his reign that many other works by the Menehune were constructed. However, years later Menehune Queen Mōhihi decided to take her people back to their homelands as the men were marrying Hawaiian women. They marched along the edge of Napili valleys to the plains of Hā`ena where they sailed away to their homeland (Wichman 2003: 8-12).

### 3.2.2 Developmental Period (600-1100 AD)

During the Developmental Period, 600-1100 AD, as the founding groups grew, they fissioned into subgroups referred to as ramares, with the senior male of the original ramares as chief of the conical clan, although hierarchical ranking was not just relegated through the patrilineal line of descent (Kirch 1985:31). Bellwood refers to these groups as tribal and related by blood (Bellwood 1978:31). In *Ka Po`e Kahiko* Kamakau refers to Hawaiian ranking in the following passage:

For 28 generations from Hulihonua to Wakea, no man was made chief over another. During the 25 generations from Wakea to Kapawa, various noted deeds are mentioned in the traditions and well-known stories. Kapawa was the first chief to be set up as a ruling chief. This was at Waialua, O`ahu; and from then on the group of Hawaiian Islands became established as chief-ruled kingdoms - Maui from the time of Heleipawa, son of Kapawa and Kaua`i from the time of Luanu`u[\*]. In [this] time...records (oral) began to be kept of the chiefs; of the day of birth, the land where each was born, the land where each was born, the places where the placenta (`a`a) and its navel string (*ewe*) were deposited, the place where the navel cord (*piko*) was cut, the famous deeds of each, and the burial place where each was laid (Kamakau 1964:3).

[\*Luanu`u (ca A.D. 1380) was the son of Kama-hano and Ka`auea-o-ka-lani; grandson of Ahukini-a-La`a and Ha`i-a-Kama`i`o; great-grandson of La`a-mai-Kahiki, foster son on Mo`ikeha (Wichman 2003:39-41). These people could very well have been living in the later part of this period but more likely the early part of the Expansion Period.] (see Appendix G for Kaua`i Ali`i Aimoku)

Over time other settlers inhabited all the Hawaiian Islands. Many genealogies of Hawaiian *ali`i* indicate that Nana`ulu and `Ulu (ca A.D. 830) were prominent ancient ancestors who settled all over the Pacific islands.

Thirteen generations or more than three hundred years, after Papa-nui-hānau-moku and Wākea, a chief of Tahiti, Ki`i and his wife, Hina-kō-`ula, became parents of two sons, Nana`ulu and `Ulu. When they were grown, Ki`i asked his sons to go on a voyage of discovery. All memory of the navigational signposts back to their original homeland were forgotten.... Nana`ulu sailed north in his canoe named *Manō-nui* (Great Shark) and found the islands of Hawai`i. The way from Hawai`i to Tahiti was charted. Voyagers came in increasing numbers (Wichman 2003:21-22).

According to Kalākaua (1887/1990), it is likely that when Nana`ulu first landed in the islands, he did not find anyone else. This may be true if they landed on an island not yet inhabited by those from the north islands such as Kaua`i, Ni`ihau, Necker and Nihoa.

Nanaula, a distinguished chief, was the first to arrive from the southern islands. It is not known whether he discovered the group [Hawai'i] by being blown northward by adverse winds, or in deliberately adventuring far out upon the ocean in search of new lands. In either event, he brought with him his gods, priests, prophets and astrologers, and a considerable body of followers and retainers. He was also provided with dogs, swine and fowls, and the seeds and germs of useful plants for propagation. It is probable that he found the group without human inhabitants.

During that period--probably during the life of Nanaula--other chiefs of less importance arrived with their families and followers either from Tahiti or Samoa. They came in barges and double canoes capable of accommodating from fifty to one hundred persons each. They brought with them not only their priests and gods, but the earliest of Polynesian traditions. It is thought that none of the pioneers of the time of Nanaula ever returned to the southern islands, nor did others immediately follow the first migratory wave that peopled the Hawaiian group (Kalākaua 1887/1990:19-20).

The descendants of `Ulu spread out over the South Pacific. Among them were extraordinary people who lived such wonderful adventures that storytellers had rich material to develop into entertaining sagas [e.g., Māui-ki`iki`i, `Aikanaka-a-Mako`o, Hina-hānau-a-ka-mālama, twins Puna and Hema].... There were so many astonishing ancestors like these that the genealogists added them all into the `Ulu genealogy (Wichman 2003:23).

Changes occurred during this period that brought about a uniquely Hawaiian culture, documented by the material culture found in archaeological sites. These include quadrangular adze, bone fishhook variations, *'ulu maika* (a game piece) stones, *lei niho palaoa* (necklace of bone or ivory and human hair worn by high ranked chiefs) and evidence of shifting cultivation. Kaua`i developed a unique form of poi pounder such as *pōhaku ku`i poi* (ring and stirrup pounders), double-grooved stone club heads, and a broad anvil *kapa* beater (Wichman 2003:6).

On Kaua`i there is evidence of ancient connections with the southern islands of Central Polynesia not found on the other islands of Hawai`i.... Differences are seen in the stone implements that were once used on Kaua`i, in styles of heiau, in language, and in the stories of the Menehune. Long considered a mythical people of Kaua`i, in reality the Menehune were a distinct people of an ancient time. Among the stone implements common to Kaua`i ans were two types of poi pounders restricted almost exclusively to that island.... The two Kaua`i types are the ring and stirrup pounders.... A discovery of significance was made in recent years on the island of Uahuka in the northern Marquesas when an "ancestor" stirrup pounder was discovered there. It is estimated, through radiocarbon dating that it was in use at sometime between A.D 600 and 1300. This type of pounder had been found only on Uahuka and Kaua`i (Joesting 1984:19).

The archaeological evidence indicates that transient fishing camps were already utilizing Kē`ē, Hā`ena prior to AD 1000 (Major and Carpenter 2001:38). According to Yent's (1980) Phase I of Hā`ena, there was transient settlement along the coastal terrace of Kē`ē Beach from about 989 AD. Legends indicate that a chief of Hā`ena, Lohi`au, lived around this time and had several encounters with goddesses of Hawai`i Island; the structural remains of his house still exist.

As Pele and Hi'iaka danced in human form before Lohi'au on the hula platform at Ha'ena, gods and mortal Hawaiians alike could look at the cliffs - Na Pali - running down the coast beyond Kalalau, and at headland after headland, each marking another narrow valley as the wet of the north changed to the dry of the west. Glancing below and east, Lohi'au and his companions could see the blues, whites, and greens of Ha'ena itself, for Ha'ena was fronted by reef and the many blues of the Pacific, by the white coral sand of Ke'e beach, and the green of coastal vegetation, taro, and the cover of the mountainous cliffs immediately beyond. Lohi'au, his ancestors, and his descendants have lived at Ha'ena since perhaps before A.D. 1000 (Griffin 1984: 1).

General archaeological evidence indicates that the “ancestral pattern of corporate descent groups” were still in place at this time (Kirch 1985:302-3). The early culture evolved as the population grew, and many of the changes were related to significant socio-economic changes.

For thirteen or fourteen generations the first occupants of the Hawaiian Islands lived sequestered from the rest of the world, multiplying and spreading throughout the group. They erected temples to their gods, maintained their ancient religion, and yielded obedience to their chiefs. The traditions of the period are so meager as to leave the impression that it was one of uninterrupted peace, little having been preserved beyond the genealogies of the governing chiefs (Kalākau 1887/1990:20).

In about A.D. 1025 or perhaps a little earlier, the people of the group were suddenly aroused from their long dream of six centuries by the arrival of a large party of adventurers from Tahiti. Their chief was Nanamaoa. Their language resembled that of the Hawaiians and their customs and religions were not greatly at variance. They were therefore received with kindness, and in a few years their influence began to be felt throughout the group. They landed at Kohala, Hawai`i, and Nanamaoa soon succeeded in establishing himself as an influential chief. His sons secured possessions on Maui and O`ahu, and on the latter island one of them--Nanakaoko--instituted the sacred place called Kūkaniloko, in the district of Ewa, where it was the desire of future chiefs that their sons should be born.... This became the sacred birth-place of princes', as `Īao, in Wailuku valley, on the island of Maui, became their *taboo* spot of internment. It was at Kūkaniloko that Kapawa, the son of Nanakaoko, was born. His principal seat of power was probably on Hawai`i, although he retained possessions on Maui and O`ahu (Kalākau 1888/1990:70-71).

But stronger leaders were soon to follow from the south. Among the first was the high-priest Pā`ao, from Samoa [some say it was Society Islands]. He arrived during the reign of Kapawa, the grandson of Nanamaoa, or immediately after his death. The people were in an unsettled condition politically, and Pā`ao, grasping the situation, either sent or returned in person to Samoa for Pili, a distinguished chief of that island. Arriving with a large following, Pili assumed the sovereignty of the island of Hawai`i and founded a new dynasty. Pā`ao became his high priest, and somewhat disturbed the religious practices of the people by the introduction of new rites [*luakini* or human sacrifice] and two or three new gods [Kūka`ilimoku] (Kalākau 1887/1990:20-21).

Kamakau (1991) says that there were seventeen generations during which Hawai`i Island was without chiefs--some eight hundred years. “The lack of a high chief was the reason for seeking a chief in Kahiki, and that is perhaps how Pili became the chief of Hawai`i” (island) (Kamakau 1991:101-102).

The Pā`ao/Pili influence created a major shift in “religion” and socio-economic patterns. Pā`ao brought with him the Kū practice of human sacrifice, used in monumental *luakini heiau* or war temples. Pili started a line of *ali`i nui* that would continue to the Kamehameha “dynasty.” The evolution of the *luakini heiau* is difficult to place archaeologically, and although the arrival of Pā`ao may have been a real event; the uniqueness and complexity of *heiau* were most likely a local (Hawaiian) development (Kolb 1989:3).

Two voyaging canoes set out from Tahiti fifteen generations after Nana`ulu and arrived on O`ahu and Kaua`i. Maweke and Paumakua settled peacefully on O`ahu and quickly became ruling chiefs of a district of that island (Wichman 2003:23).

[According to Kalākau (1887/1990)] The next arrivals of note [after Nanamaoa] from the southern islands were the two Paumakua families, one of which settled in O`ahu and Kaua`i and the other in Hawai`i and Maui.... The Paumakua family, which became so influential in Hawai`i and Maui, arrived during the early part of the reign of Pili, in about A.D. 1090. A large party accompanied the family, and they brought with them their gods, priests, astrologers and prophets. They first landed and secured possessions on Maui, but the sons and other relatives of Paumakua were brave and ambitious, and soon by conquest and marriage secured an almost sovereign footing both in Maui and Hawai`i (Kalākau 1888/1990:71-72).

At the same time, Puna-nui-ka-`āina, whose genealogy has not survived, arrived on Kaua`i, having come, most likely, from the Marquesas Islands. Puna-nui-ka-`āina arrived when the chief with the deadly riddles, Ka-iki-pa`a-nānea, was ruler of Waimea. The newcomer chose to settle along the banks of the Wailua River. This land came to be called Puna. There were now two chiefdoms on Kaua`i, Puna and Kona (Wichman 2003:23).

Newcomers were soon changing the socio-political structure of the island polities. There were attempts by some of the prominent families to join forces, but to no avail. Kalākaua (1888/1990) explains:

At that time Kamauaua, a powerful chief of the ancient native line of Nanaula, held sway over the island of Moloka`i. He proudly traced his ancestry to the first migration in the sixth century, and regarded with aversion and well-founded alarm the new migratory tide which for years past had been casting upon the shores of the islands a flood of alien adventurers, whose warlike and aggressive chiefs steadily possessed themselves of the fairest portions of the group. He had sought to form a league of native chiefs against these dangerous encroachments; but the wily invaders, with new gods to awe the native nobility, had, through intermarriage and strategy rather than force, become the virtual rulers of Hawai`i, Maui, O`ahu, and Kaua`i, and he had abandoned all hope of seeing them supplanted. Moloka`i alone remained exclusively under native control, and its resolute old chief had from their infancy instilled into his sons a hatred of the southern spoilers and a resolution to resist their aggressions to the bitter end (Kalākaua 1888/1990:71-72).

### 3.2.3 Expansion Period (1100-1650 AD)

The Expansion Period, 1100-1650 AD, is significant for a number of reasons. Communication between the Hawaiian groups and southern groups suddenly ceases in the latter part of this period and oral histories don't offer any explanations. With the exception of Moloka`i and a portion of O`ahu who were of the Kamauaua and Maweke (ca 1230 AD) families from the Nana`ulu lines, all the others were of the southern chiefs and their descendants (Kalākaua 1887/1990:21-22). Most of the "ecologically favorable zones," the windward and coastal areas of all major islands, were now settled, and the more marginal leeward areas were being developed.

Archaeological evidence indicates that Hā`ena had permanent settlements and larger populations that utilized marine and inland resources by the 1200s (Yent's Phase II); permanent habitations were supported by wetland agriculture from this period to well into the 1700s (Major and Carpenter 2001:38; Yent 1980).

Legends reveal that during the 12<sup>th</sup> century, several Hua chiefs reigned on Maui who would later be connected to Kaua`i chiefs. Huanuikalalailai is the grandfather of Haho [Haho is the son of Paumakua (ca 1255 AD) who is buried in `Īao; Haho also founded the *Aha-ali`i* (Kalākaua 1888/1990:84-85)]; Haho is the grandfather of the famous Hāna twins Hanala`anui and Hanala`aiki who become the progenitors of the *ali`i nui* of Hawai`i Island, Maui, Moloka`i, Lāna`i, as well as O`ahu and Kaua`i (McKinzie 1983: xx).

Oral histories or *mo`ōlelo* of a southern adventurer winning the heart of a chiefess takes place on Kaua`i in the early part of this period, when Hina-`a-ulu-a, daughter of Puna-`ai-koā-i`i (son of Puna-kai-`olohia and grandson of Puna-nui-ka-ia-`āina, the first Puna chief of Wailua, Kaua`i), chooses newcomer Mo`ikeha (ca 1280 AD) over other local suitors. Puna-`ai-koā-i`i, in order to be fair designs a contest where the suitors must swim to the island of Ka`ula off the southwest of Kaua`i, to retrieve a *lei paloa*. Mo`ikeha's genealogy indicated that he came from the Nana`ulu line down to Maweke. Maweke was a chief of a voyaging canoe from the south (Kahiki) who arrived in the islands two generations earlier and settled on O`ahu. Another advantage of Mo`ikeha was that his companion was La`a-maomao, owner of a calabash that kept all the winds of the world. Mo`ikeha's brother `Olopana married a chiefess from Kohala. Mo`ikeha's wife, Hina-`a-ulu-a gave birth to her three sons at the *heiau* Holoholokū, constructed

for Mo`ikeha by orders of his father-in-law Puna-`ai-koā-i`i. From then on all *ali`i nui* on Kaua`i were born at the birthing stones there (Wichman 2003:24-29).

During the early part of this period (ca 1305 AD) the three sons of Mo`ikeha were settled on three different islands, O`ahu, Hawai`i and Kaua`i.

Ho`okamali`i, the oldest, moved to O`ahu to become the ruling chief of the Kona district and settled on the plains of `Ewa. Kila went to Waipi`o on Hawai`i... Haulani-nui-ai-ākea remained on Kaua`i, where on Mo`ikeha's death, he became *ali`i nui* [Mo`ikeha's bones were taken to Ra`iātea by La`a-mai-Kahiki, his foster son]. Haulani-nui-ai-ākea proved to be an unsatisfactory *ali`i nui*. Other Kaua`i chiefs, under the leadership of Ke-oloewa-a-Kamaua, deposed their unfit ruler. Ke-oloewa-a-Kamaua was a Moloka`i chief married to one of Maweke's granddaughters... Haulani-nui-ai-ākea was easily overthrown. When Ke-oloewa-a-Kamaua refused the throne, Kila was asked to come to Kaua`i and take over as *ali`i nui*...his heart was not on Kaua`i. He placed the highest ranking *ali`i* in the family, the beautiful Ka`ili-lau-o-ke-koa, as paramount chief, returned to his canoe and sailed to Ra`iātea to remain the rest of his life (Wichman 2003:35).

The advisors of Ka`ili-lau-o-ke-koa wanted her to marry Ke-li`i-koa, the Kona (Kaua`i) chief, but she declined. A lot of intrigue followed this decision along with attempted murder. This led to several centuries of war between the Kona and Puna chiefdoms. But it was during her reign that Ka`ili-lau-o-ke-koa organized the women of Wailua to fight in the battle instigated by the Kona chief Ke-li`i-koa, who was eventually killed by Ka`ili-lau-o-ke-koa with her *pīkoi* (tripping club). Sadly, Ka`ili-lau-o-ke-koa died later without any heirs. The chiefdom was offered to Ahukini-a-La`a (ca 1305-1355 AD), the oldest son of La`a-mai-Kahiki (ca 1305 AD); followed by his son Kama-hano (ca 1330-1380 AD), then his son Lu`anu`u (ca 1355-1405 AD) (Wichman 2003:36-41).

Lu`anu`u (ca 1355-1405 AD), grandson of Ahukini-La`a (ca. 1305-1355 AD), was named after the grandfather of Ki`i, father of `Ulu and Nana`ulu. He was a good chief and was greatly admired in spite of the continuing wars with Kona - references to him indicate a close relationship to Kona. During the time of Lu`anu`u there was a great warrior named Palila, son of Ka-lua-o-pālena and Maihi-iki. He was taken at birth and raised by his grandmother Hina in a sacred temple of Alana-pō where he was trained very well. Later he helped his father defeat Kona chief Ka-maka-o-ka-lani on the plains of Koloa. Shortly after, a messenger from the ruling chief of O`ahu arrived asking for Palila's help. Palila had many adventures on O`ahu and Hawai`i and later became the ruling chief of Hilo (Wichman 2003: 44-47).

Kūkona (ca 1380-1430 AD) [son of Lu`anu`u] inherited an island at war and left it united as one kingdom. From then on, the legends of the Kona kingdom were seldom told and the genealogies of the first settlers were forgotten... Kūkona's *ali`i wahine* was Lau-puapua-ma`a and they had twin sons, Mano-ka-lani-pō (ca 1405 AD) and Palekaluhi. When Kūkona became *ali`i nui* (ca 1405 AD) of Puna, the Kona chief was Makali`i-nui-ku-a-ka-wai-ea. He had been at the royal court of O`ahu for many years and several times had fought in battles against Kama-pua`a... Makali`i-nui-ku-a-ka-wai-ea had been sent by Kama-pua`a to the royal court with the bad news of defeat. Eventually Makali`i-nui-ku-a-ka-wai-ea returned home to Waimea and organized his own force. Makali`i-nui-ku-a-ka-wai-ea's army included the father and older brother of Kama-pua`a (Wichman 2003:47-48).

Kona and Puna forces met once more in battle in Koloa. After a stalemate the two kingdoms merged with Kūkona as the *ali`i nui* (ca 1405 AD). To insure the success of this situation, Nae-kapu-lani, the daughter of Kona's Makali`i-nui-ku-a-ka-wai-ea was married to Mano-ka-lani-pō (ca 1405-1455 AD), son of Puna's Kūkona.

The archaeological evidence indicates that during this time (1400s) in Hā`ena, the use of inland irrigated agriculture reflects intensification; beach habitation declines, but activity areas persist on the dunes

(Major and Carpenter 2001:38). Yent's (1980) Phase III of Hā`ena (ca 1400 AD) are permanent settlements on the coastal terrace and alluvial plain with the development of an intensive irrigated agricultural complex that supports a subsistence economy that still includes marine resources with added domesticated mammals (Dye 2002:5).

A legend (Skinner 1902:212-216) tells about a Japanese vessel wrecking on Maui in the 1200s (according to Wichman's dates it was in the 1400s). The captain and his sister marry into *ali`i nui* families, but what is most significant about this story is the metal sword that the Captain had. During this period the *ali`i nui* of Hawai`i Island was Kalaunui [Ka-lau-nui-o-Hua] who had subdued Maui [Ka-malu-o-Hua] and Moloka`i [Ka-haku-o-Hua] and on O`ahu [Hua-i-pou-leilei] a great fight ensued. In the battle the Captain fought bravely with his sword, but was finally struck down by a warrior named Kaulu, son of Waahia, a seer of great renown. Rather than turn the sword over to the Hawai`i king, Kaulu buried it on the spot. He later retrieved it and put it into his mother's (Waahia) care before the Hawai`i contingency headed for battle on Kaua`i [where Kūkona (ca A.D. 1380-1430) was the ruling chief].

The Hawai`i warriors were overcome and defeated [by Kūkona] before they could even land their canoes by the sling stones and javelins of the Kaua`i warriors. The Hawai`i king Ka-lau-nui was taken prisoner and the kings of Maui, Moloka`i and O`ahu who were hostages of Ka-lau-nui were set free. Kaulu escaped with a remnant force only to be accused by the queen of cowardice. In the negotiations for the release of Kalaunui, the queen offered several things: a fleet of canoes with many spears; twenty feather cloaks with stone axes, ivory and whalebone; but these were all rejected. The last resort was to offer her daughter in matrimony to the king of Kaua`i. This too was rejected. After three years and unsuccessfully trying to get an army together, the queen was ready to give up. This is when Waahia asked for an audience at court. She explained that she alone could rescue the king, but the court had to grant whatever her wish was when they returned. They agreed and Wa`ahia left Hawai`i Island with a single oarsman for Kaua`i. They arrived during Makahiki festivities and Wa`ahia got an audience in court. Her offer was the Japanese sword "that was harder than stone, that broke spears like reeds, that gave its owner supreme fortune and supreme command." The offer was accepted. Before the release of Kalaunui, Wa`ahia had him agree that his release was contingent on him giving his daughter to her son in marriage. This too was agreed on [see also Wichman 2003:49-52].

Once Kaua`i was united as one kingdom and was free from any threat of invasion from its windward neighbors, attention was focused on the development of a solid political system based on land division. The paramount chief ruled the entire island, owned all the land, and had the power of life and death over the people, *ali`i* and *maka`āinana* alike. To help him govern, the *ali`i nui* chose a *kalāimoku* (prime minister, land manager) to advise him on all practical and civil matters. The royal establishment was kept at Wailua, although there was also a permanent home at Waimea.... Kaua`i was divided into six *moku* (districts), which were governed by an *ali`i`aimoku*, each carefully chosen for his loyalty and close relationship to the ruling chief. The largest district was Kona, the former kingdom centered at Waimea, followed by Puna (Wichman 2003:53-54).

The genealogy of Kaua`i *ali`i* was considered the most ancient and impeccable in all the Hawaiian islands. *Ali`i* from other islands were eager to introduce the Kaua`i bloodline into their own.... A chiefess would live with a Kaua`i chief for a time, bear one or more children, then send the chief on his way, leaving his bloodline and genealogy to mingle with those of her own family on Maui and Hawai`i. Marriage to the O`ahu families was commonplace for Kaua`i chiefesses. It was a peaceful kingdom that Mano-ka-lani-pō inherited and helped to create. He ruled over the Golden Age of Kaua`i history (Wichman 2003:55).

This was also the period of the greatest population growth, the development of large irrigation field system projects, and dry land farming. The uniquely Hawaiian invention, the *loko* or fishpond aquaculture, was developed in the fifteenth century or the latter half of this period (Kirch 1985: 303).

Monumental *heiau* building flourished in this Period, as “religion” became more complex. Other monumental building included irrigation ditches or *auwai* such as the Pi`ilani *Auwai* in Lahaina, Maui and the Menehune Ditch in Waimea, Kaua`i.

During the last 200 years of the Expansion Period, the concept of *ahupua`a* was established, as well as class stratification, territorial groupings, powerful chiefs and “*mo`i*” or king (Kirch 1985:303-6). Most prominent during this period was Liloa and Umi of Hawai`i Island; Kawaokalole, Pi`ilani and his children Lono-a-Pi`ilani, Pi`ikea and Kiha-a-Pi`ilani of Maui; Kakuhihewa and Ku`alii of O`ahu; and Kalanikukama, Kamakapu and the beginning of the Kawelo line of *ali`i nui* on Kaua`i.

Legends mention a few times where foreigners ship-wrecked or landed on the shores of various Hawaiian Islands. One story takes place during the reign of Kealiiokaloa, son of `Umi-a-Liloa, who reigned about 1525-30 AD on Hawai`i Island. A vessel was wrecked at Ke`ei, South Kona at a place now called Kulou, the captain and his sister reached shore in safety. They intermarried with the natives. Centuries later it was learned that on October 31, 1527, three vessels fitted out by Spaniard Cortez, conqueror of Mexico, left Zacatula for the Moluccas. About 1,000 leagues from port they were separated by a severe storm and two smaller vessels never made it to their destination. Later in 1555 the Spanish navigator Juan Gaetano discovered these islands; and ancient manuscript chart in Spanish archives indicates a group of islands in the same latitude as the Hawaiian Islands, but over ten degrees longitude too far east. In June 1743, a British warship captured a Spanish galleon near the Philippine Islands and found a manuscript chart on board with the same group of islands charted the same as the 1555 chart in the archives (Wisecarver 1993:11).

*Mo`olelo* about events that took place in the early to mid 1600s were revealing in that they illustrate that many of the battles of this period were relatively quickly contained by the opposing *ali`i* [see *History of Kualii`i* (Kualii`i ca. 1630-1660s) in Fornander 1917:IV: II: 364-434]. These stories also illustrate the on-going inter-relationships between the people of the various islands. In the *History of Kualii*, the exploits of Kualii (great-great grandson of Kakuhihewa (ca. 1580 AD, *ali`i nui* of O`ahu) take him to every island and he eventually unites all the islands “from Hawai`i to Ni`ihau” (Fornander 1917: IV: II: 406).

### 3.2.4 Proto-Historic Period (1650-1795 AD)

The Proto-Historic Period, 1650-1795 AD, appears to be marked with both intensification and stress. Yent`s (1980) Phase IV of Hā`ena – historic contact period - indicates a decrease in the population and a reduced occupation of Hā`ena ca 1700-1800. Wet taro was grown in a terraced system on the alluvial plain irrigated by Limahuli Stream and sweet potatoes were grown on the coastal terrace (Handy & Handy 1972:429 In Dye 2002:5).

Many wars took place during this time between intra-island chiefdoms and inter-island kingdoms. However, it was during this period that the *Royal Kolowalu Statute* or Kualii`i`s Law was enforced. Kualii Kuniiakea Kuikealaikauaokalani (ca 1655?-1730 AD) lived for a long time, was said to sometimes have supernatural powers, and was the first to “unite” all the islands. Kū-ali`i acquired Kaua`i (ca 1680 AD) after the deaths of cousins [Kawelo had ceded Kaua`i to Kū-ali`i should they both die in battle there. Kū-ali`i was a descendant of the Kawelo line on his grandmother`s side.] Kū-ali`i went to Kaua`i and declared himself *ali`i nui* and installed his son Pele-iō-hōlani (ca 1680-1755+ AD) as governor (Wichman 2003:89).

It (Kualii`s Law) was strict, unvarying and always just. It was for the care and preservation of life; it was for the aged men and women to lie down in the road with safety; it was to help the husbandmen and the fishermen; to entertain (morally) strangers, and feed the hungry with food. If a man says, “I am hungry for food,” feed (him) with food, lest he hungers and claims his rights by swearing the *Kolowalu* law by his mouth, whereby that food becomes free, so that the owner

thereof cannot withhold it; it is forfeited by law. It is better to compensate.... A transgressor or one who is about to die, is, under the application of this law exonerated of his death or other penalty...(Fornander 1917: IV: II: 432).

Kū-ali`i, *ali`i nui* of O`ahu, died at Kailua in Ko`olaupoko in 1730 AD, supposedly at the age of one hundred and seventy five.

When Pele-iō-hōlani left Kaua`i to pursue his destiny as the future ruler of the O`ahu kingdom, he left his daughter Ka`apuwai as governor of Kaua`i. She was the first chiefess since Ka`ili-lau-o-ke-koa, some centuries before, to become paramount ruler. She was married to Ka`ume-he-iwā, a high chief of Kaua`i. They were both descended from Ka-lani-kukuma, and their marriage joined the junior and senior genealogical lines that stemmed from their common ancestor, thus giving their daughter Ka-maka-hele a stronger *mana* than either of her parents (Wichman 2003:92).

In 1736, Maui *ali`i nui* Kekaulike died. He chose his *nī`aupi`o* son Kamehameha-nui to be his heir, though Ka`uhi`aimoku-a-Kama was the oldest he was of a slightly lower rank.

Ke-kaulike had many children by his wives (*wahine*) and female retainers (*haia wahine*). Ka-uhi`aimoku-a-Kama by Kaha-walu was the first born; Manu-ha`a-ipo, Ke-hau-hiwa-moku and Ka`eo [kulani] were the children of Holau; Kamehameha-nui, Ka-lola, Ka-hekili and Ku-ho`oheihai-pahu, of Ke-ku`i-apo-iwa-nui; Na-mahana and Ke-kua-manoha` of Ha`alo`u.... When Ke-kau-like heard that the ruling chief of Hawai`i was at Kohala on his way to war against Maui, he was afraid and fled to Wailuku in his double war canoe named Ke-aka-milo. He sailed with his wives and children...his officers, war leaders, chiefs, and fighting men, including warriors, spearmen, and counselors.... The fleet landed at Kapa`ahu at the pit of `Aihako`ko in Kula. Here on the shore the chiefs prepared a litter for Ke-kau-like and bore him upland to Haleki`i in Kukahua. There Ke-kau-like died, and the sound of lamentation for the dead arose. Then fearing the arrival of Alapa`i bent on war, the chiefs cut the flesh from the bones of Ke-kau-like in order to lighten the load in carrying the body to `Īao (for burial) (Kamakau 1992:69).

Alapa`i sailed from Kohala on Hawai`i with a great company of chiefs of Hawai`i, his war leaders, warriors, and the district chiefs of the island...but when he landed at Mokulau in Kaupō and heard that Ke-kau-like was dying, he gave up all thought of war and wished only to meet Ke-kau-like and his (half) sister Ke-ku`i-apo-iwa-nui. He heard that Kamehameha-nui had been chosen ruler over Maui and he had no desire to make war upon his sister`s child (Kamakau 1992:70).

In 1737 and 1738 a couple of great battles took place in the districts of Lahaina and Kā`anapali. Kauhi`aimoku-a-Kama (Kauhi), oldest son of Ke-kau-like rebelled against his younger brother, Kamehameha-nui. "Near the house of David Malo is a breadfruit tree on which the first victim of the battle was laid. There the fighting men of Kamehameha-nui were slaughtered." This prompted Kamehameha-nui to flee to his uncle`s canoe, big island *ali`i nui* Alapa`i-nui-a-Ka-uaua (Alapa`i), who took him to Hawai`i island where they spent a year preparing for war. Alapa`i was the half-brother of Kamehameha-nui`s mother (Kamakau 1992:73-74).

When Ka-uhi heard that Alapa`i was heading back to Maui, he enlisted the help of his uncle, Pele-iō-hōlani, Kaua`i *ali`i nui*, ruling chief of O`ahu, son of Kū-ali`i and cousin of Alapa`i. Alapa`i attacked Maui (1738 AD), drying up the streams of Kaua`ula, Kanaha and Mahoma near Lahainaluna, destroying the taro patches. His men kept guard over the streams of Olowalu, Ukumehame, Wailuku and Honokawai (sic). "When Pele-iō-hōlani heard that Alapa`i was in Lahaina he gathered all his forces at Honokahua and at Honolulu. At Honokawai (sic) an engagement took place between the two armies, and the forces of Alapa`i were slaughtered and fled to Keawawa." Pele-iō-hōlani had 640 men to Alapa`i's 8,440. The cousins once again came face to face in Pu`unene and decided to once more opt for peace between the families. Kamehamehanui ruled Maui in peace; Pele-iō-hōlani retired to Moloka`i, and Alapa`i went back to rule Hawai`i (Kamakau 1992:74).

About 1755 AD Kaua`i's rule went to Ka-maka-helei, granddaughter of Pele-iō-hōlani.

Ka`apuwai died before her father [Pele-iō-hōlani], and the government of Kaua`i passed to Ka-maka-helei...[who] owed allegiance to her grandfather Pele-i`ō-hōlani.... Her first husband was a Kaua`i chief, Kiha, and with him she had three children: first a daughter, Lele-māhoa-lani, then a son, Keawe, and finally another daughter, Ka-lau-i-pihana. Then Pele-i`ō-hōlani sent his grandson Ka-neoneo to Kaua`i to ensure the island would remain loyal to him. Ka-neoneo and Ka-maka-helei were first cousins, and soon Ka-maka-helei put Kiha aside and took Ka-neoneo for her husband (Wichman 2003:92-93).

A few years later, around 1759 AD, High Chief Kalani`opu`u from the Island of Hawai`i made war on East Maui and conquered Hāna from *ali`i nui* Kamehameha-nui, brother of Kalola and Kahekili. Kalani`opu`u took control of Hāna's prominent Pu`u Kau`iki as his fortress. He appointed one his chiefs, Puna, as "governor" of Hāna and Kīpahulu (Kamakau 1992:81-82). Kamehameha-nui relinquished Hāna and lived in peace in West Maui with his wife and half-sister, Namahanaikaleleonani. In 1766 the peaceful Maui *ali`i nui* died. After ruling Maui for 29 years, Kamehamehanui was taken ill at Kawaipapa, Hāna on a journey about the island. While still in Hāna Kamehamehanui ceded his lands to his younger brother Kahekilini`ahumanu (Kahekili), a fierce warrior and "manipulator" (Kamakau, 1992:82-84; Kame`eleihiwa 1992:47).

But according to Kalākau (1990:353) Kamehamehanui "died very suddenly at Wailuku, which had been his favorite place of residence." During the period of mourning for him, his successor and younger brother, Kahekili "removed his court to Lahaina." It was while there that they were visited by an *ali`i* from Hawai`i Island. The visitor was Ke`eaumoku, son of Keawe-poepoe, who was the son of Lonoikahaupu (sovereign of Kona, Kaua`i) and Kalanikauleleaiwi (half sister/wife of Keawe, once *moi* of Hawai`i Island). Years before, after the death of his uncle Alapa`inui [Hawai`i Island *moi*], in 1754, Ke`eaumoku was discontent with the rule of his cousin Keaweopala so he joined forces with Kalani`ōpu`u of Ka`ū and defeated Keaweopala in Kona, making Kalani`ōpu`u, grandson of Keawe, the new *moi* of Hawai`i Island. Ke`eaumoku fortified himself in Kohala and later (1765) incurred the wrath of Kalani`ōpu`u and was attacked by him. Ke`eaumoku escaped and spent some time on Lāna`i before heading to Maui just after the death of Kamehamehanui. To the displeasure of Kahekili, Ke`eaumoku promptly won the heart of Namahana [I], the widow of his brother (Kalākau 1888/1990:353-356), and also his half-sister [Kekaulike was their father, but they had different mothers]. After the couple settled in Waihe`e (Namahana's lands), Kahekili decided to re-locate his court to Wailuku.

With the help of his nephew Kahahana, who was also a land-holder of Waihe`e, Kahekili contrived to find cause to battle Ke`eaumoku. To this end he was successful, causing Ke`eaumoku, Namahana, her mother, two brothers and a considerable following of chiefs and retainers to flee to Moloka`i. This did not stop Kahekili who invaded Moloka`i with a large force, and once again defeated Ke`eaumoku. Barely escaping, Ke`eaumoku, Namahana and their entourage fled to Hāna which was still under the control of Hawai`i Island. There he was forgiven by Kalani`ōpu`u and given shelter by Mahihelelima, governor of the Hāna district (Kalākau 1888/1990:357-358). While in Hāna, Namahana (I) gave birth to Ka`ahumanu in 1768 (Kalākau 1888/1990:359) in a cave at the base of Pu`u Kauiki; she would later play a pivotal role in the history of Hawai`i.

During this period the socio-political intrigue continued to affect all islands including Kaua`i.

On O`ahu, Kūmahana, who was Pele-i`ō-hōlani's regent, proved himself to be an entirely unsatisfactory ruler. The O`ahu chiefs rebelled against him and sent Kūmahana, his wives, and children into exile on Kaua`i. Pele-i`ō-hōlani returned posthaste from his skirmishes against Kahekili on Maui to renew his claim to O`ahu. Kahekili...took this opportunity to lead his forces once again against those of Pele-i`ō-hōlani. After several battles, Kahekili was victorious. To

consolidate his rule, he married his sister Kalola to Ka-lani-'opu'u of Hawai'i in the hopes that he would either help by sending men and arms or at least, remain indifferent to the situation.... From O'ahu, Pele-i'ō-hōlani sent Ka-neoneo to join him to help stem Kahekili.... This left Ka-maka-helei vulnerable. Although she was the nominal ruler of Kaua'i, her uncle Kūmahana began to make his moves to take over her government (Wichman 2003:93).

Kahekili...was quick to realize the opportunity this presented to neutralize Kaua'i. He sent his young half-brother Ka-'eo-kū-lani to Kaua'i to woo Ka-maka-helei. Ka-'eo-kū-lani was successful...since she was nine years older than Ka-'eo-kū-lani, she did not expect to bear any more children, and her oldest son, Keawe, was named heir to the kingdom.... By this time, all of Maui, Moloka'i and Lāna'i were under the rule of Kahekili who had succeeded in taking them from Pele-i'ō-hōlani. He was gearing up for an invasion of O'ahu where Pele-i'ō-hōlani, now a very old man, had turned over the government to his grandson Ka-neoneo (Wichman 2003:93-94).

In 1775 Kalani'opu'u, son of Ka-lani-nui-I-a-mamao (whom the *Kumulipo* was composed for) and his forces in Hāna raided and severely destroyed the neighboring Kaupō district, before continuing several more raids on the islands of Moloka'i, Lāna'i, Kaho'olawe and parts of West Maui. He returned again in 1776 and for several years later, raiding and treating the *maka 'āinana* cruelly.

The Alapa, the fierce fighting men of Kalani'ōpu'u, were defeated; only two men escaped. The chiefs and fighting men of Kalani'ōpu'u wanted to continue; "tomorrow we will drink the waters of Wailuku and rest in the shade of Hekuawa." Ka-hekili prepared for the "great battle" which took place on the sand hills between Waikapu and Wailuku; Ka-hahana, now ruling chief of O'ahu and Moloka'i came to his aid.

Kahekili stopped that war and made peace at the request of his sister Ka-lola, but a few years later Kalani'ōpu'u once again sailed to ravage the lands of Maui and Lāna'i. It was during this war that Kamehameha I, nephew of Ka-lani-'ōpu'u was noticed as a great and brave warrior by both sides.

In January 1778 Cook landed in Waimea, Kaua'i and the culture of old Hawai'i began its spiraling change (Day 1992). Fishermen off of Koloa, Kaua'i first saw the ship *Discovery* and rushed to tell Kaua'i *ali'i nui* Ka-maka-helei and Ka-'eo-kū-lani. The *kahuna nui* Kū'ohu declared "that can be nothing else than the *heiau* of the god Lono. In the center is the tower of the demi-god Ke-o-lewa, and there in the back is the place of sacrifice at the altar" (Wichman 2003:94; see also Kamakau 1961:92-96). However, after several days of observation the *kahuna* concluded that these were not gods, but men. He said they were like the two white priests who had come to the islands when Paumakua was living and they were like the *haole* Kū-ali'i had seen on his travels less than a hundred years earlier (Wichman 2003:94). According to Captain Clerke, he was visited by a young chief named Kaneoneo; up to this time "no chief had come to see either Clerke or Cook" (Beaglehole 1967:38 In Kikuchi et al 1978:8). According to Wichman (2003) and Kamakau (1961:93-96) Ka-neoneo was now on O'ahu, replaced by Ka-'eo-kū-lani as husband of Ka-maka-helei, granddaughter of Pele-i'ō-hōlani.

[Ka-maka-helei] sent three men on board to see what this strange ship really was and to assess those on board. These three were *kahuna* Kū'ohu, wearing his *lei palaoa* (necklace of woven human hair holding a hook of carved whale ivory), chief Kāne-a-ka-ho'owaha, and chief Kī'i-kīkī who was Ka-'eo-kū-lani's trusted man who had come with him from Maui.... Captain Cook gave Kū'ohu a dagger, a gift beyond price. It was the first gift from Western civilization to Hawai'i, and it was considered an omen.... Kī'i-kīkī reported back to Ka-'eo-kū-lani and described the dagger. Ka-pupu'u, one of the guards surrounding Ka-'eo-kū-lani...went out to the ship and saw quantities of iron things just lying about on deck. He grabbed as many pieces as he could and threw them into his canoe. One of the ship's guards raised his rifle and shot Ka-pupu'u dead. He was the first Hawaiian to die by a bullet....

Some chiefs thought that Captain Cook should be put to death for killing Ka-pupu'u but the

*kahuna* Kū'ohu said "No they were not to blame...Kapupu'u was to blame, for he went to steal even though our *ali'i nui* had forbidden it." The following day Captain Cook came ashore for the first time. His longboat landed at the mouth of the Waimea River, on the beach of Luhi beside Lā'au-`ōkala point. He was greeted by a huge crowd of people pushing and shoving to get a look at this...living god come among them. People had come from Nāpali, Mānā, and Kīpū like a rushing stream during the night.

Captain Cook wandered about Waimea for a time before returning to his ship.... Ka-maka-helei presented gifts to Cook: hogs, chickens, bananas, taro, sweet potatoes, sugarcane, yams, fine mats, and tapa cloth. In return Cook presented them with cloth, iron, a sword, knives, bead necklaces, and mirrors. Then Ka-maka-helei offered Cook her own daughter, Lele-mahoe-lani. According to the Kaua'i source of this story, she spent the night on board with Cook. She left the following morning laden with presents (Wichman 2003:95-96).

Cook also gave the chiefs some goats (Beaglehole 1974:677 In Mills 1996:72), sheep and a new breed of pigs (Joesting 1984:199). After visiting Hawai'i Island Cook left Hawai'i for several months, but returned later in the year. Kalani'ōpu'u was fighting Kahekili's forces in Wailua, Maui on November 19, 1778 when Cook's ship was sighted on his return trip to the islands. Kalani'ōpu'u visited Cook on the *Resolution*, while Kahekili visited Clerke on the *Discovery* (Kuykendall and Day 1976:16). When Cook sailed into Kealahou Bay on January 17, 1779, Kalani'ōpu'u was still fighting Kahekili on Maui. At this time Kahekili's brother, Kaeo was ruling chief of Kaua'i [co-ruler with Ka-maka-helei, granddaughter of Pele-i'ō-hōlani]; Kahekili's nephew Ka-hahana of O'ahu and Moloka'i; Kalani'ōpu'u of Hawai'i and Hāna [eastern Maui]; and Kahekili of western Maui, Lāna'i and Kaho'olawe (Kamakau, 1992:84-86, 92, 97-98). On January 25<sup>th</sup> Kalani'ōpu'u visited Cook again at Kealahou Bay, presenting him with several feather cloaks. By February Cook's scheme to kidnap Kalani'ōpu'u as a hostage were thwarted and Cook was killed following a skirmish over a stolen cutter (Kuykendall and Day 1976:18). His ships and crew visited Kaua'i once more (1799) after Cook's death. A battle had taken place the day before and warriors had been killed. It was also evident that venereal disease had spread throughout the island as a result of their first visit to the island (King 1967: part 2:585-586 In Mills 1996:78).

#### On Kaua'i:

In 1780, Ka-maka-helei gave birth to another son, Ka-umu-ali'i. The situation on Maui grew uncomfortable for Kahekili. He sent a message to his brother Ka-'eo-kū-lani to return to Maui. Ka-'eo-kū-lani brought his two trusted counselors, Kī'i-kīkī and Kai-'awa with him. Ka-umu-ali'i, his son with Ka-maka-helei, was declared heir to Kaua'i, passing over his older half-brother, Keawe (Wichman 2003:96-97).

The warring between the Hawai'i and Maui forces continued. On his way to Kona from Ka'ū, Kalani'ōpu'u was taken ill. He went instead to Ka'iliki'i at Waio'ahukini in Pakini where he died in January 1782. In 1781 a few months before the death of Kalani'ōpu'u, when Kahekili heard how ill Kalani'ōpu'u was, he split his forces and sent them through the south-eastern Kaupō Gap and the north-eastern Ko'olau Gap into Hāna. After damming and diverting the supply of spring water to Pu'u Kau'iki, the Hawai'i chiefs were finally defeated, and the Maui *ali'i nui* regained control of Hāna in 1782 (Kamakau, 1992:84-86; 110, 115-116; Fornander 1900: Vol II 146-7, 150, 216).

But what became of Ke'eumoku and his family [wife Namahana and daughter Ka'ahumanu], whose home for years had been the hills of Hāna? Learning of the meditated invasion of the district, and unwilling to trust himself to the mercy of Kahekili, Ke'eumoku fled with his family to the almost barren island of Kaho'olawe, where he lived in seclusion until after the fall of Kauwiki and death of Kalani'ōpu'u, when he boldly returned to Hawai'i, quietly settled on his old and inalienable estates at Kapalilua, in South Kona, and awaited the development of events, which he perceived were rapidly and irresistibly tending toward wide-spread revolution and disorder. For

more than fifteen years he had heard the clash of arms only at a distance, and he yearned for the shouts of battle and the music of marching columns (Kalākaua 1888/1990:361).

Kahekili reclaimed Hāna, then through war and trickery went on to gain control of all the islands except Hawai`i (Kamakau 1992:116, 128-141).

The O`ahu chief [Ka-hahana, nephew and foster son of Kahekili] was living in Nu`uanu Valley above Honolulu when he received word that Ka-hekili had landed on the beaches with a large fleet of war canoes and was gathering his warriors about him for an attack on the defenders of O`ahu. In January 1783, a decisive battle was fought. Ka`hekili's wife, Kau-wahine, who was also a noted fighter, took part in this battle.... Confusion seized the ranks; the warriors of Ka-hahana were dispersed while he and his wife fled to the forest. Thus, O`ahu and Moloka`i were taken by Ka-hekili.... [However] fighting erupted on his home island of Maui among minor chiefs... [along with] the growing threat from Hawai`i.... Kahekili's son and designated heir, Ka-lani-kū-pule, was dispatched to Wailuku to prepare for the coming attack. Ka-lani-kū-pule took with him Maui's war leaders and Ka-hekili's best warriors, the battle-scarred veterans of the war on O`ahu (Speakman 2001:40-41).

In early 1790 when Captain George Vancouver made his first stop in the Hawaiian Islands he was told that Kalani`ōpu`u was dead; Hawai`i was ruled by Keoua Kuahu`ula (half-brother of Kiwala`ō), his uncle Keawe-mau-hili, and Keoua's cousin, Kamehameha (Day 1984:77). Vancouver went on to trade with Kalanikūpule in Waikīkī. He then found that the ruling chief of Kaua`i, Ka-umu-ali`i, was a mere child; his father Ka`eo was on Maui with Kahekili. Vancouver also noted a decrease in the population and the number of chiefs since the arrival of Cook (Kamakau 1992: 162-163), but foreigners continued to arrive.

In spite of the on-going battles, the foreign explorers and merchants were not deterred; foreign vessels continued to come to the islands.

By 1790 several other foreign ships also visited the islands, helping to establish them as a "familiar resort for the fur traders" and as a "port of call and wintering place -- for those engaged in the more general trade which grew up between Asia and the west coast of North and South America." These voyagers included English Captains Portlock, Dixon, and Meares and French naval vessels under the command of La Perouse.... Because of their excellent harbors and strategic location nearly equidistant from the coasts of the Orient and North America, the Hawaiian Islands quickly became a primary stop on the Pacific trade routes. These islands contained more cultivated land than most of the other Pacific islands, forming "an oasis in the ocean desert" (Greene 1993: Chap II).

By 1790 Kamehameha I had gained enough control of the island of Hawai`i from his uncles and cousins that he could leave to join the war parties on Maui. His canoe fleet "beached at Hāna and extended from Hamoa to Kawaipapa" to battle Kalanikūpule, son of Kahekili (who now ruled from O`ahu). After several battles along the East Maui coast, Kamehameha's forces reached Wailuku where the "great battle" took place. This would be the beginning of the end of independent ruling chiefs because of the inequity of battle strategy and weaponry. Kamehameha had brought a cannon from the *Eleanora* along with her captain, Isaac Davis, and crewmember John Young, who were now his *aikāne punahele* (favorites) and advisors (Kamakau 1992:147-148). This battle of 1790 was known as the *Battle of Kepaniwai* where the bodies of fallen warriors dammed `Īao Stream in Wailuku or "water of destruction" (Engelbretson 2000:2).

While Kamehameha was at Wailuku with his followers he heard of Ka-lola's being on Moloka`i with her daughters and granddaughter and he sent word by Kikane for her not to proceed to O`ahu as he was coming to escort her to Hawai`i. He sailed with a great company, among them Ke`eaumoku, Keawe-a-heulu, Ka-me`e-ia-moku, and Ka-manawa, the brothers of Ka-lola, and landed at Kaunakakai. They met Ka-lola at Kalama`ula and, when Kamehameha saw how ill she

was and of an incurable disease according to kahuna's diagnosis, he asked, "Since you are so ill and perhaps about to die, will you permit me to take my royal daughter and my sisters [Ke-opu-o-lani, her mother Ke-ku'i-apo-iwa and aunt Ka-lani-hau-io-kikilo] to Hawai'i to rule as chiefs?" Kalola answered, "If I die, the girl and the sisters are yours." Then Kamehameha and all the chiefs waited until the death of Ka-lola [widow of Ka-lani-'ōpu'u; sister of Kahekili and highest ranking *ali'i*] (Kamakau 1992:149).

While Kamehameha was on Moloka'i waiting for the passing of Kalola, *kapu* chiefess of Maui, he sent two messengers to O'ahu; one to Kahekili and one to find the Kaua'i *kahuna* Kapoukahi of the *kahuna* order Hulihonua, as he was skilled in the art of reading omens and signs. It was he who advised that if Kamehameha wanted to rule over all the islands that he should build a great *heiau* at Pu'ukohola at Kawaihae (Kamakau 1992:149-150). The messenger to Kahekili threw down two *maika* stones, a black one and a white one. Kahekili asked if Kamehameha was coming to O'ahu to wage war and the messenger said yes. Kahekili then asked him where he would land. The messenger told Kahekili of the landing places that were advised and who advised Kamehameha. After commenting on each suggestion, Kahekili imparted a message for Kamehameha:

Go back and tell Kamehameha to return to Hawai'i and watch, and when the black tapa covers Kahekili and the black pig rests at his nose, then is the time to cast stones. Then, when the light is snuffed out at Kahiki that is the time to come and take the land (Kamakau 1992:150).

While on Moloka'i Kamehameha heard that his cousin Keoua Kuahu'ula, Ka'ū chief, had waged war on other chiefs of Hawai'i Island and had killed Keawe-ma'u-hili, the Hilo chief who had aided Kamehameha in the Maui battle, in spite of an agreement with Keoua that he wouldn't "fight the sons of Kahekili." Keoua took over Hilo then went on to Waipi'o where he destroyed the fishponds and plundered the taro patches and robbed the people from Waipi'o to Waimea, then went on to ravage Kohala. Kamehameha returned to Hawai'i Island from Moloka'i and proceeded to wage war on Keoua. Several battles later, both sides could not gain an upper hand. Although Keoua's warriors seized the muskets of Kamehameha, they didn't have the powder to make them work. It took an act of nature or the goddess Pele to turn the tide as Keoua's army was annihilated by a volcano eruption (Kamakau 1992:151-152).

In the meantime, Ka'eo-kū-lani, ruling chief of Kaua'i and brother of Kahekili, heard what happened to his nephew Kalanikūpule on Maui and how they narrowly escaped death. He heard "how the waters of 'Īao had been choked with the bodies of the slain in this war." He was so upset that he decided to wage war against Kamehameha (Kamakau 1992:148, 159). The shift in style of warfare that Kamehameha started during the *Battle of Kepaniwai* in Wailuku, Maui continued.

[Ka'eo-ku-lani] set out with [nephew] Pe'ape'a, son of Kamehameha-nui, his counselor of war, Ki'ikiki'i, Kai'awa, and chiefs, warriors, and paddlers, all well armed with muskets and weapons of all kinds, and with his two man-eating dogs. (He also took with him) Maka'eha and Mr. Mare Amara [foreigner], a man skillful in the use of arms who acted as his gunner (Kamakau 1992:159).

On O'ahu Ka'eo met up with his brother Kahekili, ruling chief of O'ahu, Maui, Moloka'i and Lāna'i and persuaded Kahekili to join him in the war against Kamehameha. Kahekili left his son Kalanikūpule in charge of O'ahu and left for Moloka'i.

The war party landed at Kaunakakai on Moloka'i, and when the Kaua'i chief saw for the first time, by the ovens they had left, the size of the camp which Kamehameha had occupied he said, "Where a big squid digs itself a hole, there crab shells are heaped at the opening." Upon their reaching Maui...the army camped at Wailuku and of Waiehu the Kaua'i chief remarked, "Here is the land of the warrior to whom Kamehameha owes his kingdom (alluding to Ke'eumoku whose wife Namahana, brought him the land of Waiehu)... Waiehu fell to Ki'iki'i and it was, alas! The

Kaua`i people who ate the poi of Waiehu.... Kahekili gave some of the land of Maui to the ruling chief of Kaua`i to be divided among his men.... This caused discontent among the chiefs of Maui, who had thus to lose some of their land, and they rose against the Kaua`i chief. A battle was fought at Paukukalo adjoining Waiehu while some of the people were out surfing (Kamakau 1992:159-160).

It is not clear what happened right after that battle because what follows is Kahekili leaving Maui with his warriors from Kaupō; while Ka`eo sails for Hawai`i with his warriors from Hāna. However, they both land in Waipi`o and Ka`eo keeps his vow and “wantonly destroyed everything in Waipi`o” including the sacred places and the tabu threshold of Liloa...not even Keoua who has passed through there the year before and destroyed the land and the food, had made such wanton destruction” (Kamakau 1992:160). Kahekili in the meantime goes on to Halawa in Kohala where fighting occurs, then sails from Halawa and joins Ka`eo in Waipi`o. When Kamehameha hears about Ka`eo and Kahekili, he sails with John Young and Isaac Davis and meets up with Ka`eo and Kahekili at Waimanu cliffs. The battle of 1791 called *Kepuwaha`ula*, was a stand-off with loss to both sides. Kahekili left and returned to Maui (Kamakau 1992:161-162).

Kamehameha decided to take the advice of the Kaua`i *kahuna* Kapoukahi and build a *heiau* at Pu`ukohola. Kamehameha personally helped to construct the *heiau* Pu`u Koholā in the summer of 1791, to assure his victory over his cousin, Keoua Kuahu`ula, son of his father’s older brother. Messengers were sent to Keoua to ask him to come to the *heiau* so that there would be peace between the cousins. Keoua left Ka`ū with a fleet of twenty-seven canoes. As he sailed into Kawaihae Bay at Mailekini, Ke`eaumoku thrust a spear at Keoua, which he dodged, snatched and thrust back. Suddenly muskets were fired from the shore, leaving Keoua and all the others from his canoe dead. The rest of Keoua’s warriors were spared when Kamehameha declared the law of the broken paddle [*Mamalaho*] (Day 1984:77; Kamakau 1992:154-157).

Vancouver returned to Hawai`i Island in February 1793 to find all the chiefs wanting guns and powder. Instead he gave Kamehameha a bull and heifer from California and asked that all the chiefs stop fighting. In March he sailed to Lahaina and saw Kahekili who was now an old man. He also asked Kahekili to stop the fighting. Kahekili said that “it was not right for the chiefs of Hawai`i to raid Maui and rob and pillage without cause.” He told Vancouver he should stay and guard him against further wars. Vancouver went on to O`ahu to see Kalanikūpule, then to Kaua`i before going to North America. It was the last time Vancouver saw Kahekili who died later that year at the age of eighty-seven, after becoming ill and returning to Waikīkī, O`ahu. His bones were carried by his twin brothers Ka-me`e-ia-moku and Kamanawa and hidden in a secret cave in Kaloko, North Kona. His gods were Ku-ke-olo-ewa, Kuho`one`enu`u, Kalai-pahoa, Ololupe, Kameha`ikana, Kala-mai-nu`u, Kiha-wahine, Haumea and Wali-nu`u (Kamakau 1992:164-166).

On Vancouver’s third visit to the islands in 1794, Kamehameha I was ruling chief of Hawai`i; Ka`eo was ruling chief of Maui, Moloka`i and Lāna`i; Kalanikūpule of O`ahu and Ka-umu-ali`i of Kaua`i. Then Ka`eo got tired of Maui and wanted to go back to Kaua`i. Not knowing what his uncle’s plans were, Kalanikūpule prepared for war. A few skirmishes and reconciliations took place that year on O`ahu, but as Ka`eo prepared to embark to Kaua`i from West O`ahu he discovered a conspiracy among some of his chiefs, principally his two counselors Ki-Kīkī and Kai-`awa, who were planning to throw him overboard in mid-ocean. He decided it was better to die in battle, then alone in the ocean so he dismantled his canoe and proceeded to make war on Kalanikūpule. Ka`eo won a couple of skirmishes, but in the end was defeated in `Aiea by Kalanikūpule who was aided by foreign vessels in Pearl Harbor, guarding the shores with guns and cannons. Ka`eo died in mid-December 1794 (Kamakau 1992:168-169).

The captain and some of his crew of the foreign vessels were then tricked and killed. Kalanikūpule

confiscated the vessels and munitions with the intention of sailing to Hawai`i to overtake Kamehameha. Just one day out they all got seasick and had to return to Waikīkī with Kalanikūpule and his wife still on board. The foreigners sailed off during the night, but put Kalanikūpule and his wife aboard a canoe and let them go back to O`ahu. The foreigners then sailed for Hawai`i Island to tell Kamehameha what happened and to give him all the munitions on board (Kamakau 1992:170-171).

Demographic trends during the Proto-Historic Period indicate a population reduction in some areas, yet show increases in others, with relatively little change in material culture. There was a continued trend in craft and status material, intensification of agriculture, *ali`i* (chief) controlled aquaculture, upland residential sites, and oral records [*mo`olelo*] from that period were rich in information. The Ku cult, *luakini heiau*, and the *kapu* (restriction or regulation) system were at their peak, although Western influence was altering the cultural fabric of the islands (Kirch 1985:308, Kent 1983:13). By 1794 American, English, Irish, Portuguese, Genoese, and Chinese foreigners were living in the islands (Day 1992:23-25). Between 1778 and 1794 at least 21 ships from various countries had visited Kaua`i for provisions and to trade (Mills 1996:68).

### 3.2.5 Early Historic Period (1795-1900 AD)

The Early Historic Period (1795-1900 AD) is marked by very significant events. Kamehameha left Hawai`i Island in early 1795 and landed in Lahaina, taking over all the food patches and cane fields before leaving for Moloka`i where the “whole coast from Kawela to Kalama`ula was covered by canoes. There on Moloka`i he awaited for the proper time to sail for O`ahu, where the chiefs and warriors of Kalanikūpule were slaughtered.... In the *Battle of Nu`uanu*, O`ahu, Moloka`i, and Lāna`i were conquered” (Kamakau 1992:170-171). Kamehameha took Keku`iapoiwa Liliha and Kalanikauiake`alaneo to O`ahu to witness this battle of Nu`uanu Pali and the defeat of O`ahu. It was during this trip that Kalanikauiake`alaneo was given the name Ke`ōpūolani (Klieger 1998:21).

During this Early Historic Period, “between one hundred and two hundred foreigners lived in the islands.... Hardly a ship touched without leaving a deserter or two behind.... A white man automatically ranked as a chief, although he could not own land in fee simple or build a permanent house...[and] they took Hawaiian wives” (Day 1992:25).

In Hā`ena during the 1700-1800s, according to archaeological evidence, the population declines and intensive occupation ends (Major and Carpenter 2001:38). Although evidence of habitation at the back and east side of Kē`ē Bay is rather intense and in historic times visitors referred to a “village” at this location (Emory 1929; In Major and Carpenter 2001:39).

In 1802 and 1803, Kamehameha I and his court resided in Lahaina where he had a two-story brick house built (Alexander 1953:63). Lahaina became the capitol of the islands (except for Kaua`i). This was short-lived, however, as Kamehameha I moved to Honolulu in 1803 (Klieger 1998:22). In 1802 on the island of Lāna`i a Chinese man named Wong Tze Chun is believed to have been the first person to mill sugar cane (WSC 1962:7); he came to Hawai`i as part of the sandalwood industry. In 1803 the first horses landed in Hawai`i from California (WSC 1962:7).

Hawai`i's culture and economy continued to change radically as capitalism and industry established a firm foothold. In 1810, Kaua`i *ali`i nui* Ka-umu-ali`i ceded his kingdom of Kaua`i, Ni`ihau, Lehua and Ka`ula to Kamehameha (see more C-3) although Ka-umu-ali`i continued to have autonomy over the island. At this time the sandalwood trade in Hawai`i was flourishing; the Fijian and Marquesan supply of sandalwood was exhausted. Sandalwood came under the personal control of Kamehameha I, who had become “a fervent consumer of high-priced western goods.” The sandalwood industry was thriving to the point where the subsistence levels declined, as farmers and fishermen spent most of their time logging,

causing famine to set in (Kent 1983:17-20). Hawai`i became known as “Tan Heong Shan” or the “sandalwood mountains” to entrepreneurs of Southern China, who first came as early as 1794 in search of this prized wood (WSC 1962:41).

Although white men from various countries stayed over in temporary houses, it wasn't until 1816 when a large structure (80 x 100 meters) was constructed, primarily under the supervision of employees of the Russian-American Company (RAC), on the eastern banks of the Waimea River; it was known as *Hippo* or *Fort Elizabeth*—made of stone and adobe apparently with the help of Kaumuali`i's wives and over 300 “native Hawaiians” (Mills 1996:145). Before its completion the employees of the RAC were expelled from the island; the fort was then completed by Kaumuali`i, who had “acquired one of the most important symbols of European power” (Mills 1996:149, 151). However, Kamehameha continued to exercise his suzerainty by collecting tribute from Kaua`i in the form of sandalwood, hogs and vegetables (Mills 1996:153).

On May 8, 1819, Kamehameha I died at Kamakahonu, Kailua, Hawai`i Island. Following his death, his son and heir Liholiho banished the *kapu* system at the advice of his queen mother Keōpūolani and queen regent Ka`ahumanu (Kamakau, 1992:210, 222). On October 1819, seventeen Protestant missionaries set sail from Boston to Hawai`i. The missionaries arrived in Kailua-Kona on March 30, 1820, to a markedly changed culture; one with a “religious” void and a growing appetite for western products. They brought George Humehume, the 21-year old son of Kaumuali`i, who had been living in the United States since he was six or seven—sent there by his father so he could receive an education (Mills 1996:155). Humehume finally returned to Waimea, Kaua`i in May, 1820 where his father Kaumuali`i and the queen Debra Kapule, primarily resided. Kaumuali`i gave Humehume the district of Waimea, including *Hippo* (Damon 1925:205-206, In Mills 1996:160). Shortly after arriving Humehume married Betty, a daughter of Isaac Davis whom he met on Hawai`i Island (Mills 1996:163).

The missionaries quickly started missions on all of the islands, at the objection of the trading community (Mills 1996:158). In 1820 Lahaina was proclaimed the capital of Hawai`i; this lasted until 1845 (Wisecarver 1983:18) when the court moved to Honolulu. Ka`ahumanu, the *kuhina nui* of Kamehameha II (Liholiho) was not automatically a convert to Christianity, however, when she finally embraced it, it was with tremendous zeal. Missionary Bingham (1847:162) wrote an entry in his journal in 1822:

Kaahumanu with husband made tour of windward islands with a large retinue, including sister Namahana [II], her brother-in-law Laanui...and while on this pleasure-seeking tour, searched out and destroyed many idols. On the 4<sup>th</sup> of June, she sent for Kalaipahoa, the so-called poison deity, and caused it to be publicly burnt, with nine other images. On the 26<sup>th</sup> of the same month, one hundred and two idols, collected from different parts of Hawai`i, where they had been hidden ‘in the holes of the rocks and caves of the earth,’... [were] committed to flames.

In 1821 Liholiho paid a visit to Kaua`i, intending to resolve the issue of his sovereignty over all the islands. Kaumuali`i met Liholiho (his cousin) at Waimea, making a pledge to him the same as he had done to his father; he offered Liholiho the fort, his vessels, his munitions and even the island. Liholiho told him to keep the island. But Liholiho did take one of Kaumuali`i's wives. After spending a couple of months on the island, Liholiho invited Kaumuali`i onto his ship. When they had settled on board, Liholiho gave his men a signal to set sail, thus “kidnapping” Kaumuali`i. Shortly after arriving back on O`ahu, Ka`ahumanu married her cousin, Kaumuali`i (Mills 1996:171-172) [her mother Namahana was the half-sister of his father Ka`eo]. Ka`ahumanu, then married one of Kaumuali`i's sons, cementing her position of power. Kaumuali`i died a few years later in 1824 (Mills 1996:173) never being allowed to see his Kaua`i family again.

In August 1824, after Kaumuali`i's death, a skirmish took place at Fort Elizabeth that included his oldest son George Humehume who was married to a daughter of Isaac Davis. He wanted revenge and felt that

his father had been poisoned. Kalanimoku had arrived to check on Kaua'i and was faced with some opposition. He sent back to O'ahu for reinforcements; they came led by Maui governor Hoapili, a former warrior and counselor to Kamehameha I from Hawai'i Island, whose warriors were more experienced and had more weapons. The rebel warriors, including George Humehume, held a position overlooking Hanapēpē Valley. They were subsequently outnumbered and defeated by the forces of Hoapili. George, with his wife and infant daughter fled to the mountains on horseback. They were later captured and shipped off to O'ahu, where he died two years later at age twenty-nine. Most of Kaua'i *ali'i* were dispossessed of their lands and sent to other islands and the Kaua'i lands were divided among the Hawai'i Island chiefs who appointed their own *konohiki* or land managers [e.g. Moku'ohai]. The *maka'āinana* on the lands were treated as conquered rebels (Joesting 1984:104-111).

In the 1820s and 1830's other industries such as whaling, merchandising and sugar crept into Hawai'i. "For the first time Hawaiian masses were drawn to a cash economy as workers and producers." By 1825 most of the powerful chiefs/chiefs' had become Protestant Christians. The first sugar plantation was established on Kaua'i in 1836 (Kent 1983:22, 23, 29). The 1840s heralded other changes as well. The Hawaiian government, with the aid of the missionaries, encouraged the sugar industry as well as other enterprises such coffee, cotton, rice, potatoes, and silk worms (Speakman 2001: 93).

In the mid-1840s a political act of the Hawaiian Kingdom government would change forever, the land tenure system in Hawai'i and have far-reaching effects. The historic land transformation process was an evolution of concepts brought about by fear, growing concerns of takeovers, and western influence regarding land possession. King Kamehameha III, in his mid-thirties, was persuaded by his *kuhina nui* and other advisors to take a course that would assure personal rights to land. One-third of all lands in the kingdom would be retained by the king; another one-third would go to *ali'i* as designated by the king; and the last one-third would be set aside for the *maka'āinana* or the people who looked after the land [native tenants or *kuleana* lands]. In 1846 he appointed a Board of Commissioners, commonly known as the Land Commissioners, to "confirm or reject all claims to land arising previously to the 10<sup>th</sup> day of December, 1845." Notices were frequently posted in *The Polynesian* (Moffat and Kirkpatrick, 1995). However, the legislature did not acknowledge this act until June 7, 1848 (Chinen 1958:16; Moffat and Kirkpatrick 1995:48-49), known today as *The Great Mahele*. In 1850, the Kingdom government passed laws allowing foreigners to purchase fee simple lands (Speakman 2001:91).

In 1846 there were only eleven mills in Hawai'i manufacturing sugar and molasses; two on Kaua'i, three on Hawai'i Island and six on Maui (WSC 1962:10). The whaling industry was at its peak between 1846 and 1860 with almost 600 ships reaching Hawai'i ports in one year. But the late 1850s saw a decline in the whaling industry with the discovery of oil in Pennsylvania, the Civil War, and the sinking of at least forty whale ships by the Union to block the harbors; as well as the early freeze in the Bering Strait in 1871 which trapped thirty-three ships. Although the crews escaped, five hundred Hawaiian sailors returned home penniless (Speakman 2001:88-89).

Disease had a devastating effect on the population and the landscape, killing *ali'i* and *maka'āinana* alike; measles epidemics in 1848 and 1849, were followed by the horrendous smallpox epidemic in 1852-1853. Ten thousand people are said to have died of this disease in Hawai'i (Kamakau, 1992:411, 418). John Papa 'Ūi in *Fragments of Hawaiian History* (1984) talks about the impact of this disease and as *kahu* or guardian of several young *ali'i*, he had to take several of them off of O'ahu island. They just kept sailing from island to island and usually were not allowed to land as O'ahu was thought to be the source of the smallpox.

Historic land records indicate that by 1850, there were several households scattered among the *Hā'ena lo'i*, a pattern that may have developed when *lo'i* were in fallow periods. A photograph ca 1910 shows a Hawaiian family and their house located in the midst of the *Kē'ē lo'i* (Major and Carpenter 2001:39).

By 1858 at least 2,119 foreigners lived in Hawai`i. Many were merchants who traded with whalers, while the missionaries lived in various locations throughout the islands. The foreigners also included one hundred and eighty Chinese contract laborers from Hong Kong (Speakman 2001:109). Some “foreigners engaged in agricultural pursuits with the idea of reaping a profit from the land, in contrast with the Hawaiians, who carried on...subsistence agriculture” (Coulter 1971:11).

The U. S. Civil War of the 1860s brought about a boost for the sugar industry in Hawai`i as sugar plantations in the South were boycotted or destroyed (Speakman 2001:91-96). The rise in the number of plantations brought about a radical change in both the population in general, and the number and ratio of foreigners to native Hawaiians. As more and more labor was needed to accommodate the expanding industry, plantations sought laborers from several countries.

Statistics...show that far from being unsuited to plantation labor, or considered inefficient workers, Hawaiian labor was considered the best obtainable by many planters. As late as 1869 some plantations employed Hawaiian labor exclusively.... ‘The true reason why there is a dearth of Hawaiian labor is the increase of the planting interests from some 2,000,000 of pounds in nine or ten years to 18 or 20,000,000, requiring from eight to ten times as many men now as then.’ This source found more Hawaiians employed in such labor than ever before, and statistics for that year (1873) showed that out of 3,786 laborers employed on thirty-five plantations, 2,627 were Hawaiian men and 364 were Hawaiian women.... Nevertheless, the population decline was palpable and became a matter of public concern for the kings and their advisors, of the Hawaiian legislature, and of the sugar planters.... Immigration of labor from China and Japan [filled] the population and labor gap...it was from these two countries that the largest contingents of immigrants came, though supplemented by Caucasians, including Portuguese, and Filipinos, Koreans, Puerto Ricans, Germans, Pacific Islanders and many others.... In that period the population rose from 55,500 in 1876 to 154,000 in 1900. The following table shows the changes in percentages (Speakman 2001:107-108):

Table 1. Ethnic Demographics of Hawai`i

	1876	1900
Hawaiian & Part-Hawaiian	89.2%	26.0%
Caucasian	6.3%	17.5%
Oriental	4.5%	56.5%

The Overthrow of the Hawaiian Kingdom government in 1893 and the subsequent annexation to the United States in 1898 (Daws 1974:289-290) heralded even more radical changes to the Hawaiian culture and to the local landscapes.

### 3.2.6 Territorial History Period (1900-1949 AD)

In 1900 Hawai`i had a population totaling 154,000 of whom only 29,799 were pure Hawaiians, 7,857 part-Hawaiians and the rest of 116,244 consisting of many other races (Wisecarver 1983:13). This period saw Native Hawaiians running for Congress (Daws 1974 297); and much of the lands being sold in fee simple. The Organic Act was effective on June 14, 1900 and Hawai`i became a Territory of the United States; in 1901 the first Territorial Legislature convened and passed the first income tax law (WSC 1962:26). In the 1940s, World War II also had some lasting influence on lives and industries as young men left the islands by the hundreds, for the front lines abroad.

While the population of Hā`ena decreased between 1700-1800 and the land further modified by the 1946 tsunami, Hā`ena continued to be occupied until decades into the Modern History Period.

If the volcanic glass dates are correct and considering the several projects along the beach, Ha'ena saw Hawaiian beach front cottages until the early decades (c. A.D. 1930) of the present century,

and in fact intensive occupation until the raid and destruction of "Taylor Camp" in A.D. 1977 (Riley and Clark 1979, Riley and Ibsen-Riley 1979). Sporadic occupation on the beach continues, perhaps not unlike the earliest, some one thousand years ago... Beach excavations and the Land Commission Awards testimonies (c. 1850) verify that Ha'ena was never abandoned (Griffin 1984:3).

### 3.2.7 Modern History Period (1950- )

Post World War II brought about an influx of people and industries to Hawai'i, allowing the tourism industry and offshoot enterprises to flourish. Along with the rise of the tourism industry, and competing sugar markets abroad, the sugar companies saw a sharpening decline in business (the Sugar Acts of 1934 and 1937, and ILWU Strike of 1946 didn't help). 1950 marked the introduction of radiocarbon analysis which shifted the focus of study in archaeology to excavation as a primary method of data recovery, with a research focus on settlement patterns, subsistence, land and marine use. The 1950s and 1960s were the bleakest years for the sugar industry and it was becoming apparent that the sugar industry was beyond salvage (Kent 1983:107-108). More changes were soon to take place on the landscapes of Hawai'i.

In the 1960s, various federal and state environmental and historic preservation laws and regulations were passed, mandating surveys and impact studies of the landscape, prior to development. In 2000 Hawai'i Legislature passed an EIS amendment resolution which the governor signed as Act 50. This legislation has broadened the scope of environmental impact studies to include cultural impact studies to assure that traditional Hawaiian and other ethnic cultural practices are not adversely impacted, as vacant sugar fields give way to the ever-growing populations and expanding tourist and real-estate industries.

### 3.3.0 Traditional Literature

The ethnographic works of the late 19<sup>th</sup> and early 20<sup>th</sup> century contribute a wealth of information that comprise the traditional literature--the *mo'olelo*, *oli*, and *mele*--as well as glimpses into snippets of time, and a part of the Hawaiian culture relatively forgotten. The genealogies handed down by oral tradition and later recorded for posterity, not only give a glimpse into the depth of the Hawaiian culture of old, they provide a permanent record of the links of notable Hawaiian family lines. The *mo'olelo* or legends allow *ka po'e kahiko*, the people of old, the *kupuna* or ancestor, to come alive, as their personalities, loves, and struggles are revealed. The *oli* (chants) and the *mele* (songs) not only give clues about the past, special people, and *wahi pana* or legendary places, they substantiate the magnitude of the language skills of *nā kupuna kahiko* (the people of old).

#### 3.3.1 Genealogies

*Po'e ku'auhau* or genealogy *kahuna* (masters) were very important people in the days of old. They not only kept the genealogical histories of chiefs "but of *kahunas*, seers, land experts, diviners, and the ancestry of commoners and slaves.... An expert genealogist was a favorite with a chief." During the time of 'Umi (ca 1500-1600s) genealogies became *kapu* (restricted) to commoners, which is why there "were few who understood the art; but some genealogists survived to the time of Kamehameha and even down to the arrival of the missionaries" (Kamakau 1992:242).

Surviving genealogies illustrate that the ruling families of each island were interrelated quite extensively. The chiefs of O'ahu, Kaua'i, Hawai'i, Maui and Moloka'i had common ancestries. Families branched out, but conjoined several times in succeeding generations (Kamakau in McKinzie, 1983: xxv). Not only were the chiefs or *ali'i* related to each other, they were also related to the commoners. In *Ruling Chiefs*, Kamakau states that "there is no country person who did not have a chiefly ancestor" Kamakau (1992:4). In the following passage Kamakau (1992) explains how some of the *ali'i* were connected.

It is said that the chiefs of Hawai‘i island were from Maui and from O‘ahu and Moloka‘i between the times of ‘Aikanaka and Hānala‘anui. Thus ‘Aikanaka was the chief of Koali and Mu‘olea in Hāna; Hema, the chief of Ka‘uiki in Hāna; Kaha‘i, the chief of ‘‘Īao in Wailuku; Wahieloa, the chief of Papauluana in Kīpahulu. Laka the chief was born at ‘Alae in Kīpahulu, Maui; he ruled in Ko‘olaupoko, O‘ahu; the site of his house, Hale‘ula, was at Waikane, O‘ahu. Lu‘anu‘u was born at Waimea, Kaua‘i, and ruled that kingdom. Kamea was from Waikele, ‘Ewa, O‘ahu; Pohukaina was from Kahuku; Pau, that is Ka-pau-nui-kua-‘ōlohe, was from Kea‘au in Wai‘anae. Hua was from Lahaina, Maui...this is Hua the son of Kapua‘i-manakū [Pohukaina] whose *heiau* was Luakona, near to Kapō‘ulu. Huanuiikalā‘ila‘i [son of Pau, that is Kapaunuiakua‘ōlohe] was born at Kawelo in Honolulu; Paumakua-a-Lonoho‘onewa was born at Kua-‘a-‘ohe, Ko‘olaupoko, and rules there; Haho was born by the *kawa*, the leaping place, of Kua‘ikua at the stream of Kua‘ikua in Wahiwā. Palena [-i-Haho] was born on the hill of Ka‘uiki in Hāna, at the site Hānanaikū; he ruled and died on O‘ahu; his remains and also his stone are at Ka-lua-o-Palena in Kalihi on O‘ahu. Hānala‘a-nui and Hānala‘a-iki were the twin sons of Hī-ka-wai-nui and Palena; they were born at Kahinihini‘ula, at Mokae and Hāmoa, and a certain *moku‘āina* land was named after these boys. Lana-ka-wai [son of Hānala‘a-nui] was born at the *kawa* of Kua‘ikua in Wahiwā, O‘ahu (Kamakau, 1991:101).

Malo (1971) also wrote about the connection between the *maka‘āinana* and the chiefs. “Commoners and *ali‘i* were all descended from the same ancestor, Wakea and Papa” (Malo, 1971:52). This is evident in the genealogies. Genealogies were very important to the chiefs, because ranking was very important. The genealogies not only indicated rank, they ascertained a link to the gods. The following excerpt explains the idea and importance of rank and the role of genealogies:

Position in old Hawai‘i, both social and political, depended in the first instance upon rank, and rank upon blood descent—hence the importance of genealogy as proof of high ancestry. Grades of rank were distinguished and divine honors paid to those chiefs alone who could show such an accumulation of inherited sacredness as to class with the gods among men...a child inherited from both parents.... The stories of usurping chiefs show how a successful inferior might seek inter-marriage with a chiefess of rank in order that his heir might be in a better position to succeed his parent as ruling chief...a virgin wife must be taken in order to be sure of child’s paternity—hence the careful guarding of a highborn girl’s virginity (Beckwith 1990:11).

One could defend and/or prove their rank by knowing or having one’s genealogist recite one’s genealogy. For the *kanaka maoli*, genealogies were the indispensable proof of personal status. Chiefs traced their genealogies through the main lines of ‘Ulu, Nana‘ulu, and Pili, which all converged at Wakea and Papa (Barrere, 1969:24). Two well-known genealogy chants are the *Kumuhonua* and the *Kumulipo* [ten main genealogy chants are known today (Josephides 2010)].

### 3.3.1.1 Kumuhonua

The *Kumuhonua*, first published by Fornander in 1878 in *The Polynesian Race* Vol. I was based on information from Kamakau and Kepelino. Kumuhonua, the man, was of the Nanaulu line, and the older brother of Olopana and Mo‘ikeha (McKinzie 1986:14-15). However, the birth chant *Kumuhonua* has been a subject of controversy (Barrere, 1969: i). Some of the *Kumuhonua* legends were recorded by Kamakau and Kepelino between the years 1865 and 1869, however, the ‘genealogy’ of the *Kumuhonua*, published by Fornander, was given to him “to provide credibility to the legends...this ‘genealogy’ (was) constructed from previously existing genealogies--the *Ōlolo* (*Kumuhonua*) and the *Paliku* (*Hulihonua*) which are found in the *Kumulipo* chant (see Beckwith 1951:230-234) and interpolations of their own invention” (Barrere, 1969:1).

### 3.3.1.2 Kumulipo

A better example is the famous creation chant *The Kumulipo*. Feher (1969) has several notable Hawaiian scholars write passages in his *Kumulipo: Hawaiian Hymn of Creation-Visual Perspectives* by Joseph

*Feher*. In the *Introduction* Momi Naughton states “The Kumulipo belongs to a category of sacred chants known as *pule ho‘ola‘a ali‘i*, ‘prayer to sanctify the chief,’ which was recited to honor a new-born chief (Feher, 1969:1).

In her passage, Edith McKinzie states:

“The *Kumulipo* is a historical genealogical chant that was composed by the court historians of King Keaweikekahiali‘iokamoku of the island of Hawai‘i about 1700 AD in honor of his first born son Kalani-nui-‘I-a-mamao. This important chant honors his birth and shows the genealogical descent of both the *ali‘i* (chiefs) and the *maka‘ānana* (commoners) from the gods, in particular Wakea” (Feher, 1969:1).

### 3.3.1.3 Hawaiian Genealogies

Edith McKinzie completed the first volume of *Hawaiian Genealogies* in 1983, based on genealogy articles translated from 19<sup>th</sup> Century Hawaiian newspapers such as *Ka Nonanona* and *Ka Nūpepe Kū‘oko‘a* in the late 19<sup>th</sup> century and early 20<sup>th</sup> century. These articles were in response to a call to preserve the Hawaiian heritage. Some of the information came from Malo’s (1838) *Hawaiian History*, and in Fornander’s (1880), *The Polynesian Race* (Book I) (McKinzie, 1983:1).

Using thirty years to account for one generation, McKinzie determined that Wakea was born in 190 AD; Umi-a-Liloa in 1450 AD; Keawekehahialiiokamoku in 1650 AD, Kalanihūiikupuapaikalanui Keoua in 1710 AD; and Kamehameha I in 1740 AD” (McKinzie, 1983:12). Volume Two of *Hawaiian Genealogies* was published in 1986 and consists of information extracted from genealogical lists published in thirteen Hawaiian language newspapers from 1858 to 1920. It compliments genealogies found in other works, such as Fornander’s (1880) *An Account of the Polynesian Race...* and David Malo’s *Hawaiian Antiquities* (McKinzie, 1986: v).

The following excerpt is from Kamakau’s article in *Ka Nūpepe Kū‘oko‘a* October 7, 1865, and was translated by McKinzie (1986). It illustrates some of the mid-19<sup>th</sup> century sentiment regarding genealogies:

To the commoners, a genealogy was of no value because their parents forbad (sic) it lest comparisons should occur and country children be born and rise up as chiefs. Therefore, the children of the commoners were not taught beyond father, mother, and perhaps grandparents.... To us, the people of this time, there is no value of this thing of a chiefly lineage; we have no great interest in it. But in our thoughts it is of great value. We have entered into discussion of it; the chiefs valued the chiefs and ancestors; and we also value our knowledge of it. Because it was forbidden to the commoners, they were not to know this. However, due to the rise of wisdom and skill of the children of the commoners, therefore, all of the ranking privileges were no longer restricted; it was only lifted. What remains of the ancestors is something of value (McKinzie 1986:18-19).

### 3.3.2 Mo‘olelo

Legends, stories or *mo‘olelo* are a great cultural resource as well as entertaining. Leib and Day (1979) state in their annotated bibliography of Hawaiian legends, that legends “are a kind of rough history.” They noted Luamala’s idea of the value of legend and myth in the serious study of a culture and her following quote. “To a specialist in mythology, a myth incident or episode is as objective a unit as an axe, and the differences and similarities of these units can be observed equally clearly and scientifically.” The following definitions of terminology, including the Hawaiian classification of prose tales--*mo‘olelo* or *ka‘ao*, come from their work (Leib and Day 1979: xii, 1):

<i>Folklore</i>	a rather inclusive term, covering the beliefs, proverbs, customs, and literature (both prose and poetry) of a people
<i>Ka'ao</i>	“pure fiction”
<i>Legend</i>	deals with human beings and used interchangeably with ‘myth’... because the collectors and translators of the tales often failed to make the strict distinction
<i>Mo'olelo</i>	deals with historical matters and somewhat didactic in purpose... included tales of the gods, as well as tales of historical personages... many have recurring patterns, plots, and types of characters
<i>Myth</i>	a story of the doings of godlike beings
<i>Tradition</i>	used to refer to that which is handed down orally in the way of folklore

### 3.3.2.1 History of Mo'olelo Collecting

According to Leib and Day (1979) a substantial number of legends were collected and written in Hawaiian, during the century following Cook's arrival in Hawai'i. A few accounts of the mythology were printed in the journals of missionaries and travelers, and a few of the Hawaiian lore were printed in languages other than English.

### 3.3.2.2 Legends involving Hā`ena (HSPLS 1989: v1 and other sources)

Pōhaku-loa, long stone of Kaua`i	<u>In</u> Armitage, <i>Ghosts Dog and other Hawaiian Legends</i> . [RH 398.2, A p. 136]
The Fire Goddess	<u>In</u> Colum, <i>Legends of Hawai`i</i> . [RH 398.2 C p. 25-37]
Pele and Hi`iaka	<u>In</u> Emerson, <i>Pele and Hi`iaka</i> [RH 398.2 E]
The History of Moikeha	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> V1 [RH 507 B4M v4 p. 112-159]
Story of Lonoikamakahiki	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v1 [RH 507 B4M, v4 pp 256-363]
Legend of Kuapaka`a	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v2 [RH 507 B4M, v5 pp 78-135] (HSPLS-v1 1989:207).
Tradition of Kamapua`a	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v5 [RH 507 B4M, v4 pp 314-363]
The Maile	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v2 [RH 507 B4M, v4 pp 614-619]
The shark gods of Ka`ū	<u>In</u> Green, <i>Folk-tales from Hawai`i</i> [RH 398.2 G pp105-107]
The story of Lā`ieikawai	<u>In</u> Kalākaua, <i>Legends and myths of Hawai`i</i> [RH 398.2 K pp 455-480]
The phantom goat of Honopu	<u>In</u> Knudsen, <i>Teller of Hawaiian Tales</i> [RH 398.2 K pp 82-85]
The love of a chief	<u>In</u> Knudsen, <i>Teller of Hawaiian Tales</i> [RH 398.2 K pp 99-102]
Na Ōahi O Kaua`i	<u>In</u> Knudsen, <i>Teller of Hawaiian Tales</i> [RH 398.2 K pp 143-146]

Lā`ie i ka wai	<i>The Hawaiian Romance of Lā`ieokawai</i> [RH 398.2 L]
Moikeha	<i>The Hawaiian Romance of Lā`ieokawai</i> [RH 398.2 L pp 363-364]
The love of a chief	<u>In</u> Lawrence, <i>Stories of the Volcano Goddess</i> [RH 398.2 L pp13-26]
Kawelo's parentage	<u>In</u> <i>Legend of Kawelo</i> [RH 398.2 L pp 4-17]
Pele and Lohi`au	<u>In</u> Nakuina, <i>Hawai`i, its People, their Legends</i> [RH 398.2 N p 26]
How the Menehune saved their fish	<u>In</u> Pukui, <i>Tales of the Menehune</i> [RH 398.2 P pp12-13]
The Goddess Pele	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 1-14]
The stones of Kane	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 36]
The Menehunes	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 36-54]
The story of Ola	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 54-56]
Legends resembling Old Testament history	<u>In</u> Thrum, <i>Hawaiian Folk Tales</i> [RH 398.2 T pp 15-30]
Kila, the undaunted	<u>In</u> Thrum, <i>More Hawaiian Folk Tales</i> [RH 398.2 T pp 20-45]
Pele's long sleep	<u>In</u> Westervelt, <i>Hawaiian Legends of Volcanoes</i> [RH 398.2 W pp 72-86]
Lohi`au	<u>In</u> Westervelt, <i>Hawaiian Legends of Volcanoes</i> [pp126-138]
Laukaieie	<u>In</u> Westervelt, <i>Legends of Gods and Ghosts</i> [RH 398.2 W pp 36-48]
Ka-wai-o-Palai	<u>In</u> Wichman, <i>More Kaua`i Tales</i> [pp 105-111]
Nā Kia Manu a me Nā Mai`a	<u>In</u> Wichman, <i>More Kaua`i Tales</i> [pp 125-131]

### 3.3.3 Mo`ōlelo and Genealogy of Ali`i nui of Kaua`i

In the legends or *mo`olelo* collected by Fornander, Kamakau, Knudsen, Wichman and others, we can get a glimpse into the lives of some of the first settlers and *ali`i nui* or ruling chiefs of Kaua`i. Kaua`i was first settled by descendants of Kumu-honua and Lalo-honua thirty-six generations before Papa was born (Wichman 2003:2). The history of the Kaua`i *ali`i* begins in Waimea where according to Wichman (2003) the first settlers to Kaua`i landed generations before. From many of these *ali`i* one can understand why the genealogy of Hawai`i's chiefs and people on all the major Hawaiian islands share common ancestries. To reproduce any legend completely would take too long, therefore only excerpts are generally used for the following ancestors and descendants of the first *ali`i* of Kaua`i, who are said to be descendants of Papa and Wakea (second son of Kahiko and Kū-pūlana-kehau) (Wichman 2004:3) and their daughter Ho`ohoku-i-kalani.

#### 3.3.3.1 Papa and Wākea Progenitors of Kaua`i Chiefs

Papa and Wākea or Wākea and their daughter Ho`ohoku-i-ka-lani are said to be the progenitors of all Polynesians, however the islands were already populated when they arrived and settled in Nu`uanu,

O`ahu. Hāloa is the name given to both sons of Wākea and Ho`ohoku-i-ka-lani. Kaua`i historians claim that a younger brother of Hāloa, Chief Ka-māwae-lua-lani-moku, son of Papa and Wākea, discovered and settled the island.

**Ka-māwae-lua-lani-moku & Kahiki-lau-lani** Chief *Ka-māwae-lua-lani-moku*...traveled to this island with his wife, *Kahiki-lau-lani*, and her two paddlers *Kō-nihinihi* and *Kō-nahenahe*. Because of his great deeds, the great number of his descendants, and the prosperity of his reign, people called the island Kau-a`i (“*place of abundance*”).... Kaua`i is also the name of the youngest son of ancient voyager Hawai`i-loa. His wife was Wai`ale`ale, and her name was given to the lake beside the highest peak of the island. The word *Kaua`i* itself is older than Hawai`i-loa; it’s true meaning is lost in the mists of the cosmic night from which Kaua`i’s ruling chiefs descended (Wichman 2003:5).

Whether *Ka-māwae-lua-lani-moku* and *Kahiki-lau-lani* ever lived on Kaua`i is unknown. It is certain that one day, not too many generations after Papa and well before the descendants of Nana`ulu came to Kaua`i, a voyaging canoe commanded by *Kū`alu-nui-kini-ākea* [also spelled *Kū`alu-nui-kini-ākea*] approached the island from the west. Nothing is known of him except his name and that he had a son...and a counselor *Pi`i-ali`i* (Wichman 2003:5).

**Kū`alu-nui-kini-ākea and Kalaimoku Pi`i-ali`i** The first known settler to Kaua`i, *Kū`alu-nui-kini-ākea*, chose Waimea Valley for his new home. The shallow sea between Kaua`i and Ni`ihau teemed with fish, the river delivered fresh water and food, and even the climate was warm, ideal for growing crops, and comfortable to a people who wore a minimum of clothing.... The first settlers worshipped Kāne, god of sun and fresh water, and thus all living things. The few *kānāwai* (laws) concerned the preservation of agriculture and marine resources. All ceremonies in the *heiau* (temple) were simple and the audience participated in all the rites. *Heiau* were built so that all priestly ceremonies could be seen by the assembled people who participated in the rites. From the beginning, there was a lack of distinction among the Kaua`i *ali`i* (chiefs). The rank of the mother determined in large part the rank of her child (Wichman 1998:6-7).

**Kū`alu-nui-paukū-mokumoku & the Menehune** *Kū`alu-nui-paukū-mokumoku* followed his father *Kū`alu-nui-kini-ākea* as *ali`i nui*. He sent back to his homeland for a people called *Menehune*, who were masters of stonework and engineering. The *Menehune* were an energetic, short but broad-shouldered, muscular people. They were organized in divisions based on their skills and work duties and were completely obedient to their leaders. They worked as a team and if a project was interrupted for any reason, they abandoned it and never returned to finish it. Under *Kū`alu-nui-paukū-mokumoku*, many *heiau*, fishponds, and irrigation systems for wet-land farming were built. These *Menehune* explored the island from one side to the other and left stories of their adventures in place-names that still remain (Wichman 1998:8).

**Kū`alu-nui-paukū-mokumoku, Ola and Kalaimoku Pi`i** The son of *Kū`alu-nui-paukū-mokumoku* was Ola. He opened the land between the ridges and the sea to agriculture. The land was considerably higher than the river, and separating the rich bottomland from freshwater was the cliff **Pali-uli**, “green cliff,” which rose directly from the riverbed.... Ola gathered the *Menehune* and asked that an irrigation ditch be built around Pali-uli (Wichman 1998:8).... The ditch was called *Kīkī-a-Ola*, “container acquired by Ola.” The new farmland was named after their ancient homeland, *Pe`e Kaua`i*, “hidden Kaua`i” (Wichman 1998:9).

Like his ancestor Hawai`i-loa, Ola also contended with cannibalism. For several nights in a row, Ola and Pi`i noticed a bonfire flickering on the shores of Ni`ihau where no one lived. He asked his friend *Ka-hao-o-ka-moku*, who was about to set off on a fishing expedition to Ka`ula islet, to stop by Ni`ihau and find out who was there. Two days later Kāne-opa, the head *lawai`a* (fisherman) of the expedition, returned alone with a harrowing tale. As they landed on Ni`ihau, the fishing party had been greeted by a man who offered them food, shelter, and women. This unknown man had then shown them into a house where, tired from fishing, one by one they fell

asleep, all except Kāne-ōpa who was suspicious by nature and who had not liked the stranger's manner (Wichman 2003:13-14).

Kāne-ōpa was the only one to survive; he went back to Kaua'i and told Ola and Pi'i about the cannibals of Ni'ihau. They devised a plan and went back. Their plan worked and the cannibals were killed. "No mention of Ola's marriage or direct descendants has survived" (Wichman 2003:14).

### 3.3.3.2 Waimea and Wainiha Alliance

**Kā-la-kāne-hina and Lohipono** Sometime after Ola, *Kā-la-kāne-hina* became the *ali'i nui*. He lived at Lā'au-ōkala, the eastern point of the Waimea river outlet. He married Lohipono, a chiefess of Wainiha valley. She left her infant son *Kāne-a-Lohi* with her brother *Ka-lālā-pōpō'ulu*, a bird catcher who brought up his nephew in the mountains and trained him in the art of catching birds whose feathers were greatly prized (Wichman 2003:14).

**Kāne-a-Lohi** Kāne-a-Lohi exasperated his uncle a great deal, for he refused to eat most kinds of food and always demanded the flesh of small birds. To feed this prodigious appetitive *Ka-lālā-pōpō'ulu* moved to the cliffs above Halulu waterfall on the very edge of the immense cliffs of Wai'ale'ale. Here *uwa'u* (dark-rumped petrel) nested in deep holes dug into the sides of the cliffs. Each morning the *uwa'u* flew out to sea and each evening they flew home to their caves. The young...are good to eat (Wichman 2003:14).

A giant, *Ka-wai-pe'e*, from Pe'ape'a above Hanapēpē liked destroying the nests and killing the birds and throwing them away. *Kāne-a-Lohi* and his uncle set a trap for the giant and killed him as he came after a distressed bird. However, the Waimea chief *Kā-la-kāne-hina* also heard that men were eating his favorite *kapu* birds and set out for the mountains to catch and kill them. But *Kāne-a-Lohi* and his uncle destroyed his army and would have killed him too. But *Kā-la-kāne-hina* called out "Save me, in the name of your mother, Lohipono. I am your father." *Kā-la-kāne-hina* returned to Waimea and built a house and invited his son. They suspected a trap when all the chiefs' men were sitting in a circle next to the wall while the mat in the middle of the room sagged. *Kāne-a-Lohi* barred the door and a rush to get out the chief and his men fell into the hold. *Kāne-a-Lohi* then set the house on fire. *Kāne-a-Lohi* became *ali'i nui* for a short time, married and had a son *Ka-lau-lehua*. He later took his mother and son back to the mountains he loved (Wichman 2003:15-16).

**Ka-lau-lehua** *Ka-lau-lehua* later became *ali'i nui*. For reasons not mentioned in the legends, *Ka-lau-lehua* wanted to dig a ditch leading from Wai'ale'ale to the cliff's edge so that the pond would be the headwaters of the Wailua River. *Ka-lau-lehua* sailed to the mythical island of *Kāne-huna-moku* to fetch the *Mū-ai-mai'a* (banana-eating people). He tricked four Mū men and three Mū women into coming with him from their homeland to build his ditch. They refused and asked to be returned home. *Ka-lau-lehua* wouldn't help them, instead he imposed a *kapu* forcing them to live in the Alaka'i swamp. They planted bananas wherever they found a suitable spot and slowly they grew in numbers. They were a shy people and even though they lived in the same area as the Menehune, they avoided them too, but watched unhappily as the Menehune sailed away from Kaua'i. The Mū had lost their knowledge of the stars that could lead them back to their homeland (Wichman 2003:16-17).

**Ka-iki-pa'a-nānea** Several generations later [after *Ka-lau-lehua*], *Ka-iki-pa'a-nānea*... became the *ali'i nui* of Kaua'i. His headquarters was on the small plateau on the eastern side of the Waimea river mouth. *Ka-iki-pa'a-nānea* had two major passions: sports and riddles. He was a champion wrestler and boxer who always tried to kill his opponent. Everyone feared and hated him...only his personal servant, *Kūkae'a* was ever in his company.... Worst still when every chiefess on Kaua'i refused to marry him after the death of his wife, *Ka-iki-pa'a-nānea* sent his messengers to O'ahu, ordering them to bring him a wife (Wichman 2003:17-18).

### 3.3.3.3 Puna Chieftdom and Interisland Ali`i Nui Connections

Ka-iki-pa`a-nānea's men kidnapped Mākolea who was surfing at Waikīkī and took her back to Kaua`i where she too refused to marry him. So he locked her up until a time when she would agree. Mākolea was already married to a Maui warrior Ke-paka`ili-`ula. He sailed to Kaua`i and befriended Kūkae`a. Eventually Kūkae`a gave him the answers to the riddles. Ke-paka`ili-`ula challenged Ka-iki-pa`a-nānea to a boxing match, which he won and answered the riddles correctly. He then seized Ka-iki-pa`a-nānea and tossed him into a firepot. Earlier Ka-iki-pa`a-nānea had been so preoccupied with his riddles and athletics that he had allowed an ocean-traveler from Marquesas, Puna-nui-ka-ia-`āina to settle with his entourage on the banks of the Wailua river where the Menehune had constructed their temples. Now there were two chieftdoms on Kaua`i - Puna and Kona (Wichman 2003:18-19).

**Nana`ulu and `Ulu** More than three hundred years after Papa-nui-hānau-moku and Wākea, a chief from Tahiti, Ki`i and his wife Hina-kō-`ula, became parents of two sons, Nana`ulu and `Ulu. When they were grown Ki`i asked them to go on voyages of discovery.... Nana`ulu sailed north in his canoe named Manō-nui (Great Shark) and found the islands of Hawai`i...voyagers came in increasing numbers. Meanwhile the descendants of `Ulu spread out over the South Pacific. Among them were extraordinary people who lived such wonderful adventures that storytellers had rich material to develop into entertaining sagas [e.g., Maui, `Aikanaka-a-Mako`o, Puna & Hema, Kaha`i & Wahieloa and Laka].... There were so many astonishing ancestors like these that the genealogists added them all into the `Ulu genealogy. Today there seems no way to reconcile the short Nana`ulu and very long `Ulu genealogies (Wichman 2003:20, 23).

**Puna-nui-ka-ia-`āina and Puna-kai-`olohia** Two voyaging canoes set out from Tahiti fifteen generations after Nana`ulu and arrived on O`ahu and Kaua`i. *Maweke* and *Paumakua* settled peacefully on O`ahu and quickly became ruling chiefs of a district of that island. At that same time, Puna-nui-ka-ia-`āina, whose genealogy has not survived, arrived on Kaua`i, having come, most likely from the Marquesas Islands. Puna-nui-ka-ia-`āina arrived when the chief with the deadly riddles, Ka-iki-pa`a-nānea, was ruler of Waimea.... Puna-kai-`olohia followed his father... as leader of his people along the banks of Wailua. Nothing is known of him or his reign, except that he had a son [**Puna-`ai-koā-`i`i**].... Puna-`ai-koā-`i`i had only one child, his daughter, Hina-`a-ulu-ā...they called her Ho`oipo-malanai (*sweetheart of the gentle breeze*) (Wichman 2003:23-24).

**Puna-`ai-koā-`i`i, Hina-`a-ulu-ā and Mo`ikeha** Puna-`ai-koā-`i`i (Puna) urged his daughter to marry, but she couldn't choose from the many suitors who came to court her from many islands - they were all equal to her. Finally Puna and his *kahuna nui* devised a plan--a contest of strength and speed. A *lei palaoa* would be taken to Ka`ula island and the first chief to retrieve it would win her hand. All were pleased with the contest rules. Then on the evening of the contest a stranger arrived in a voyaging canoe on the shores and said he was Mo`ikeha and asked to participate in the contest. The competing chiefs said as long as he could recite his genealogy and that it was equal to theirs. Mo`ikeha chanted his own genealogy: "Nana`ulu the husband, Ulukou the wife...Kekupahaikala the husband, Maihikea the wife; Maweke the husband, Naiolaukea the wife...Muli`ele-ali`i the father, Wehelani the mother; Mo`ikeha the man, Hina-`a-ulu-ā the wife." Everyone enjoyed the boast and the chiefs agreed to his participation (Wichman 2003:23-24).

The names of these chief's names and places of residence is slightly different according to Kamakau's (1991) version:

The chiefs of Kaua`i who lived at Kapa`a while Mo`ikeha was living there were **Puna-nui-kai-anaina, Puna-kai-`olohe,** and **Puna-`ai-koa`e.** A beautiful daughter of the Puna chiefs, Ho`oipo-i-ka-malani - also called Hina-`au-lua - lived at Waimahanalua because of the excellence of the surf of Makaīwa there Mo`ikeha took her to wife, and they were united in a lasting union. When their oldest son was born Mo`ikeha gave him the name Ho`okamali`i for the skin of `Olopana

[Mo`ikeha's older brother]. Their second son he named Haulani-nui-ai-ākea for the eyes of `Olopana, and their third son he named Kila for Lu`ukia, the wife of `Olopana (Kamakau 1991:106).

**Mo`ikeha, La`amaomao and Haulani-nui-ai-ākea** Mo`ikeha's companion was La`a-maomao, his foster son and owner of a large calabash which contained all the winds of the world. Mo`ikeha was able to use the winds and beat the other contestants and win the hand of Hina-`a-ulu-ā. Later Mo`ikeha's youngest son went back to Raiatea to bring La`a-maomao to see Mo`ikeha before he died. La`a [also called La`a-mai-Kahiki because he came from Kahiki] went to O`ahu where he sired three sons by three different chiefesses at the requests of the *kahuna* of Kualoa, as La`a was a descendant of Paumakua and they were afraid this line was dying out.

According to Kamakau (1991) "La`a-mai-Kahiki became an ancestral chief of chiefs and commoners of O`ahu and also for Hawai`i and Kaua`i. You will find his chiefly descendants in the *mo`o kū`auhau* of Nana`ulu, Puna-i-mua, and Hanala`a-nui" (Kamakau 1991:110).

Mo`ikeha's three sons went different routes; the oldest son Ho`okamali`i became the ruling chief of Kona, O`ahu; the second son Kila went to Waipi`o on the Big Island [Kila later went to Kahiki]; and the youngest son Haulani-nui-ai-ākea stayed on Kaua`i where he became the *ali`i nui* after the death of Mo`ikeha (Wichman 2003:23-35).

#### 3.3.3.4 Kona and Puna Conflict

**Haulani-nui-ai-ākea, Ke-oloewa-a-Kamaua and Ka`ili-lau-o-ke-koa** Haulani-nui-ai-ākea was not a good chief so he was dethroned by Ke-oloewa-a-Kamaua a Moloka`i chief married to one of Maweke's granddaughters. However Ke-oloewa-a-Kamaua refused the throne and Kila was sent for in Raiatea, but he too refused wishing to stay with his [foster] brother La`a-mai-Kahiki. Ka`ili-lau-o-ke-koa, a granddaughter of Mo`ikeha was asked to rule and to marry *Ke-li`i-koa*, a Kona, Kaua`i chief. However, she fell in love with someone else of Puna, Kaua`i. This created a riff between Puna and Kona. Ka`ili-lau-o-ke-koa's husband died after a few years and Ke-li`i-koa invaded Puna and the two armies fought at Kuamo`o ridge. With the help of the women, the Kona chief was killed and the army defeated. Ka`ili-lau-o-ke-koa died childless and the chiefdom of Puna was offered to Ahukini-a-La`a, a son of La`a-mai-Kahiki (Wichman 2003:36-39).

**Ahukini-a-La`a, Kama-hano and Lu`anu`u** Ahukini-a-La`a...and Ha`i-a-Kama`i`o had a son, Kama-hano. Kama-hano lived with Ka-`auea-o-ka-lani...they had a son, Lu`anu`u. It was at this time that the first warrior hero of Kaua`i appeared. The war between Kona and Puna flared up (Wichman 2003:40-42).

**Akua-pehu-`ale** Akua-pehu-`ale of Kona swept ashore at Wailua and the surprised Puna chiefs fled for the uplands. Akua-pehu-`ale was considered a *kupua*, a supernatural being who could take two forms...that of a man and that of a giant sea monster. He was greatly feared and hated even by the men on his side. Once he vanquished the Puna forces he settled at the seashore (Wichman 2003:42).

**Ke-`āhua, Ka-uhao, Lepe-a-moa and Ka-u`i-lani** One of the exiled [Puna] chiefs, Ke-`āhua, found refuge in a remote valley in the Wailua uplands, which today bears his wife's name, Ka-uhao, daughter of Hono`uliuli and Ka-pā-lama of O`ahu. Their first child was Lepe-a-moa, a *kupua*, who could take the form of a beautiful woman or a ...feathered chicken. She was taken at birth to be raised by her O`ahu grandparents. Shortly after their defeat, Ka-uhao gave birth to a son...named Ka-u`i-lani (Wichman 2003:42).

When Ka-u`i-lani grew up he became a great warrior and defeated Akua-pehu-`ale. After the victory feast he led the Puna people back down to the mouth of Wailua (Wailua-nui-hōano) river. He later sailed for O`ahu to find his sister, Lepe-a-moa whom he had never seen (Wichman 2003:42-44).

**Lu`anu`u and Palila** Lu`anu`u, grandson of Ahukini-La`a, was named after the grandfather of Ki`i, father of `Ulu and Nana`ulu. He was a good chief and was greatly admired in spite of the continuing wars with Kona - references to him indicate a close relationship to Kona. During the time of Lu`anu`u there was a great warrior named Palila, son of Ka-lua-o-pālena and Maihi-iki. He was taken at birth and raised by his grandmother Hina in a sacred temple of Alana-pō where he was trained very well. Later he helped his father defeat Kona chief Ka-maka-o-ka-lani on the plains of Kōloa. Shortly after, a messenger from the ruling chief of O`ahu arrived asking for Palila's help. Palila had many adventures on O`ahu and Hawai`i and later became the ruling chief of Hilo (Wichman 2003: 44-47).

### 3.3.3.5 Merge of Puna and Kona Chiefdoms

**Kūkona, Makali`i-nui-ku-a-ka-wai-ea, Mano-ka-lani-pō and Palekaluhi** Kūkona [son of Lu`anu`u] inherited an island at war and left it united as one kingdom. From then on, the legends of the Kona kingdom were seldom told and the genealogies of the first settlers were forgotten.... Kūkona's *ali`i wahine* was Lau-puapua-ma`a and they had twin sons, Mano-ka-lani-pō and Palekaluhi. When Kūkona became *ali`i nui* of Puna, the Kona chief was Makali`i-nui-ku-a-ka-wai-ea. He had been at the royal court of O`ahu for many years and several times had fought in battles against Kama-pua`a.... Makali`i-nui-ku-a-ka-wai-ea had been sent by Kama-pua`a to the royal court with the bad news of defeat. Eventually Makali`i-nui-ku-a-ka-wai-ea returned home to Waimea and organized his own force. Makali`i-nui-ku-a-ka-wai-ea's army included the father and older brother of Kama-pua`a (Wichman 2003:47-48).

**Kama-pua`a, Limaloa, Kūkona and Makali`i-nui-ku-a-ka-wai-ea** The Kona and Puna armies met at Kōloa Gap and the war became a stalemate until Limaloa and Kama-pua`a joined the Puna army. Limaloa was a giant and had become friends with Kama-pua`a when he first came to Kaua`i. Kama-pua`a dared Limaloa and Kūkona to join him in one-to-one combat against any Kona champions. Kahiki`ula of Kona was the first to step forward and was struck down by Kūkona, but as he was going to give the finishing blow Kama-pua`a stopped him and said he would finish the job and to go and look for other opponents. Instead of killing the man, he whispered to Kahiki`ula, who was his father, to go back to his family in Kalalau. Limaloa was engaging another warrior, Kahiki-honua-kele, whom Kama-pua`a recognized as his older brother. When Limaloa struck him down, Kama-pua`a told Limaloa he would finish up. Instead he whispered the same thing to his brother. Then Kama-pua`a faced Makali`i-nui-ku-a-ka-wai-ea who did not recognize his former enemy. Kama-pua`a chanted a list of all the warriors he ever defeated and when he was done Makali`i-nui-ku-a-ka-wai-ea replied that he was defeated (Wichman 2003: 48-49).

**Puna and Kona merger** The two kingdoms were merged into one with Kūkona as the *ali`i nui*. To cement the new situation, Nae-kapu-lani, the daughter of Makali`i-nui-ku-a-ka-wai-ea, was married to Kūkona's son Mano-ka-lani-pō. Meanwhile, on the island of Hawai`i, Ka-lau-nui-o-Hua dreamed that his hand was possessed by the god Kāne-nui-akea...he dreamed that he would become the ruler of all the islands (Wichman 2003:49).

**Kūkona and peace in the islands** Ka-lau-nui-o-Hua successfully defeated Maui's Ka-malu-o-Hua, Moloka`i's Ka-haku-o-Hua and O`ahu's Hua-i-pou-leilei. He took the three chiefs with him on his invasion of Kaua`i where they landed at Māhāulepu, Pā`ā and Weliweli with no opposition. What he didn't know was that Kūkona knew of the invasion as the guardian watchers of Hā`upu had seen the fleet as it left O`ahu. Kūkona ordered everyone to leave their homes, take all their food with them, and go to the center of the island. He had all of his warriors hide among the trees on all the ridges overlooking

Māhāulepu to Lāwa`i. He also ordered every canoe on the island to gather at Hanapēpē Bay. Kūkona surrounded the invaders by land and by sea. By nightfall Kūkona had all the rulers of the major islands as his prisoners. He took his prisoners on a tour of the island and while taking a nap had a dream that three of the four rulers tried to plot his death, but Ka-malu-o-Hua of Maui rejected the plan saying that Kūkona had been good to them instead of killing them all and taking over all the islands. Kūkona woke up to discover that his dream was true, but instead of putting them to death he said he only wanted peace. He freed the rulers except for Ka-lau-nui-o-Hua whom he kept for ransom, and made them swear that they or their descendants would never invade Kaua`i again. Kūkona ordered the *heiau Ka-unu-o-Hua* built near Alaka`i swamp and it was here that the rulers all swore to uphold their promise not to invade Kaua`i. This peace was called *Ka-lai-loa-ia-Kamaluohua* (The Long Peace of Kamaluohua), which lasted over five hundred years. The royal court was kept at Wailua, but a permanent home was also maintained at Waimea (Wichman 2003: 49-52).

### 3.3.3.6 Alī`i Nui and Hā`ena Connections

**Golden Age of Mano-ka-lani-pō and Nae-kapu-lani** The reign of Mano-ka-lani-pō was considered the “Golden Age” because it was so peaceful that warriors became athletes and people lived to an old age. Mano-ka-lani-pō and Nae-kapu-lani had three sons: Kau-maka-a-Mano, Nā-pu`u-a-Mano and Ka-ha`i-a-Mano. During the reign of Mano-ka-lani-pō, he eventually allowed the *Mū-`ai-mai`a* people to return to their homeland, Kāne-huna-moku, which was seen by their *kilo kilo* offshore of Miloli`i valley. They left Kaua`i as the *Menehune* before them had done, from Hā`ena. Also during his reign, three goddess sisters came to Kaua`i from the west after visiting Nihoa, Necker and Ni`ihau, in huge voyaging canoes from their homeland in Sāmoa; Kapō-`ula-kinau, who was the first to arrive on Kaua`i, followed by Pele and Hi`iaka-i-ka-poli-o-Pele. Kapō-`ula-kinau married off some of her women attendants to the men of Kaua`i, such as Limaloa the giant and Kau-maka-a-Mano, son of Mano-ka-lani-pō, then she left Kaua`i in search of a husband for herself. Pele also landed at Mānā, seeking a new home and safety from her sister Nā-maka-o-ka-ha`i. As Pele toured the island she met Kama-pua`a and they traded insults. Kama-pua`a tried to rape Pele, but she was saved by her sister Kapō-`ula-kinau. Pele then went on to Kē`ē, Hā`ena where she met Lohi`au, the brother of Limaloa [warrior who fought alongside Kū-kona and Kamapua`a against Kona forces], and fell in love with him (Wichman 2003: 55-59).

**Kau-maka-a-Mano** Kau-maka-a-Mano reigned after his father Mano-ka-lani-pō died. He married Kapō-inu-kai and they had only one child, Ka-haku-a-Kāne. Nothing was known of the other sons of Mano-ka-lani-pō, Nā-pu`u-a-Mano and Ka-ha`i-a-Mano. Ka-haku-a-Kāne was named after one of the four sons of Mo`ikeha, the voyager from Ra`iātea (Wichman 2003: 59-61).

### 3.3.3.7 More Alī`i Nui Interisland Travels and Marriages

**Ka-haku-a-Kāne** Ka-haku-a-Kāne, like so many of his ancestors, made a grand tour of the windward islands. He was...*ali`i nui* of Kaua`i and had an impeccable genealogy. When he reached Maui, Kapō-nae-nae, sister of the ruler, the first Kahekili married him [Kahekili I was married to Haukanuimakamaka or Haukanimaka, a Kaua`i chiefess and was father of Kawaokaohela and Keleanuinohoanaapiapi who married the O`ahu *ali`i* Kalona, son of Ma`ilikukahi; Kahekili I was the grandfather of Pi`ilani]. They had two children, Kahekili-a-Kāne and Kū-o-nā-mau-a-ino. When Kahekili-a-Kāne’s granddaughter married Lono-a-Pi`i, the *ali`i nui* of Maui at that time, Maui chiefs were able to connect themselves to the ancient Kaua`i line leading backwards to La`a-mai-Kahiki. When Ka-haku-a-Kāne left Maui and returned to Kaua`i, he married Mano-kai-ko`o, like himself a grandchild of Mano-ka-lani-pō. They had a son, Kū-walu-paukū-moku (Wichman 2003: 61-62).

**Kū-walu-paukū-moku** His name indicates that the genealogy of the Kona kingdom had not been lost before this time. He was named after an ancestor, the son of Kū-walu-kini-akua, the first

settler on Kaua`i. This Kū-walu genealogy had been joined to that of La-a-mai-Kahiki when Kū-walu-paukū-moku's great-grandfather Mano-ka-lani-pō married Nae-kapu-lani, daughter of Makali`i-nui-kū-a-ka-wai-ea, last ruling chief of Kona. Kū-walu-paukū-moku was a good, wise, and liberal ruler...married Hame-a-Waha`ula, a chiefess whose genealogy has been lost.... Waha`ula was the first *heiau* built by Samoan priest Pā`ao after he made his first landfall in the district of Puna on Hawai`i island.... Pā`ao left his homeland and brought his god Waha`ula to Hawai`i.... Within Waha`ula's enclosure was a sacred grove of trees said to contain one or more specimens of every tree growing on all the Hawaiian Islands. One of these trees was a *hame*, a medium-size tree with grapelike clusters of sour, but edible fruit used to dye tapa; its hard wood was used for anvils for beating *olonā* fiber (Wichman 2003: 62-63).

**Ka-haku-maka-paweo and Ka-haku-a-kukua`ena** There are no legends concerning the quiet and peaceful rule of Ka-haku-maka-paweo.... His wife was Ka-haku-a-kukua`ena, of whom nothing is known, although the name indicates they must have been closely related. They had three sons: Kaile-lalāhai, `A`a-nui-kani-a-weke, and Ka-lani-kukuma. Nothing is known of the two older brothers (Wichman 2003: 63).

**Ka-lani-kukuma, Kū-a-Nu`uanu and Pāka`a** During the time of Ka-lani-kukuma, two Kaua`i heroes, Pāka`a and Pikoi-a`Alalā lived, and their adventures became popular tales of the storytellers. When Keawe-nui-a`Umi, son of `Umi-a-Liloa of Hawai`i, was born he was placed in the care of Kū-a-Nu`uanu who was entrusted as the *kahu* (guardian) to raise and educate the royal youngster.... Kū-a-Nu`uanu became the close advisor of his chief.... After many years, Kū-a-Nu`uanu toured all the islands, leaving his charge behind. Kū-a-Nu`uanu eventually came to Kapa`a where he met La`a-maomao, a descendant of the navigator of the same name who had helped Mo`ikeha, the traveler from Ra`iātea, win his wife many years before. La`a-maomao had inherited the calabash of winds as well as the name of her ancestor. Kū-a-Nu`uanu and La`a-maomao settled down on a bluff overlooking the sea between Kapa`a and Ke`ālia. After six months, word came from Hawai`i that Keawe-nui-a`Umi wanted Kū-a-Nu`uanu to return and take up his duties once again. Before he left Kapa`a, Kū-a-Nu`uanu gave his pregnant wife a white *malo* and a cape woven of *kalukalu*, a grass that grew only at Kapa`a.... After Kū-a-Nu`uanu left, La`a-maomao and her brother Ma`ilou, a bird catcher, raised her son. His name was Pāka`a.... When Kū-a-Nu`uanu died, Pāka`a took his place as the favorite friend of Keawe-nui-a`Umi (Wichman 2003: 63-64).

**Ka-haku-maka-lina and `Ili-hiwa-lani** The wife of Ka-lani-kukuma was Kapo-lei-a-kuila, a direct descendant of Haulani-nui-ai-ākea, the oldest son of the seafaring Mo`ikeha. This union of the two lines after ten generations increased the *mana* and aristocratic rank of their two sons, Ka-haku-maka-lina and `Ili-hiwa-lani. Ka-haku-maka-lina became the *ali`i nui* after his father, but within a few generations, the *ali`i* of Kaua`i successfully searched for a ruler among the descendants of `Ili-hiwa-lani. Unknown and unannounced to...Ka-haku-maka-lina, a well-known chief of Hawai`i island, Lono-i-ka-maka-hiki, arrived on Kaua`i. He had just defeated Kama-lālā-walu of Maui....Lono-i-ka-maka-hiki landed at Waimea.... [Later] Ka-haku-maka-lina made a grand tour of the windward islands. Everywhere he was greeted warmly. When he reached the island of Hawai`i, he was feted by `Akahi-`ili-kapu, a daughter of `Umi-a-Liloa. When it was time for him to return home `Akahi-`ili-kapu sailed to Wailua with Ka-haku-maka-lina. There she gave birth to two children, Ke-li`i-ohiohi, a son, and Koihalauwailaua, a daughter. `Akahi-`ili-kapu returned to Hawai`i with her children, and eventually they married into the Hawai`i *ali`i* line, thus adding the Kaua`i genealogical *mana* to the descendants of `Umi-a-Liloa. (Wichman 2003: 67-70).

**Kama-kapu, Kā-kuhi-hewa and Ka-hā-malu-`ihi** Ka-haku-maka-lina also married Ka-haku-mai`a, a Kaua`i chiefess, whose name indicates that she too was a descendant of Ka-haku-maka-paweo. They had a son, Kama-kapu. [Kama-kapu married Pā-wahine and they had Kawelo-mahamaha-i`a.] When Kama-kapu became *ali`i nui* of Kaua`i, the ruler of O`ahu was Kā-kuhi-hewa, who had earned a fierce reputation as a warrior, statesman, and keeper of the most glorious court in all the islands. By this time he was an old man. For his fourth wife, he chose a young Kaua`i chiefess, Ka-hā-malu-`ihi. She had an impeccable genealogy descending, on her mother's side, from `Ili-hiwa-lani, second son of Ka-lani-kukuma. From her father, Kawelo-`ehu, she was a direct descendant of Ahukini-a-La`a, this

giving her a double-looped genealogy, making her *mana* the strongest on Kaua`i. She owned three powerful *kumukānāwai*.... Ka-hā-malu-`ihi came from the sacred sands of Waimea...and her lands there became a *pu`uhonua* (place of refuge) for those who had broken her laws (Wichman 2003: 70-71).

### 3.3.3.8 Kaua`i - O`ahu Alī`i Nui Merge

**Ka-hā-malu-`ihi and Kūali`i** Kā-kuhi-hewa died shortly after his marriage to Ka-hā-malu-`ihi, then she married Kāne-kapu-a-Kā-kuhi-hewa, his son. They had Ka-ho`owaha-o-ka-lani. Her great-grandson Kūali`i later became *ali`i nui* of O`ahu (Wichman 2003: 71) and Kaua`i.

**Kawelo-mahamaha-`i`a and Ka-pōhina-o-ka-poko** It was Kawelo-mahamaha-`i`a, son of Kama-kapu and Pā-wahine, who made the fateful decision to create once again a child who bore the *nī`aupi`o* rank..... Kawelo-mahamaha-`i`a and his wife Ka-pōhina-o-ka-poko had six children. Their last two were a boy, Kawelo-maka-lua, and a girl, Ka-`āwihi-a-ka-lani, both still young and still virgin.... As soon as it was possible, the youngsters were mated (Wichman 2003: 73).

**Kawelo-pe`e-koa, Kawelo-`ai-kanaka and Kawelo-lei-makua** When Ka-`āwihi-a-ka-lani felt the first pangs of labor she was taken to the sacred enclosure of Holoholokū [birthing stone in Wailua, built by Puna chief for Mo`ikeha's first child]. Ka-`āwihi-a-ka-lani had twins; her first born, Kawelo-pe`e-koa was taken by the priests to be raised in seclusion as the supreme *ali`i kapu*. The second born was Kawelo-`ai-kanaka, who was raised to be a ruler. As the children grew, the island prospered under Kawelo-mahamaha-`i`a's rule and peace prevailed. Kaua`i became an island of plenty and its hospitality was renown throughout the islands. Kawelo-mahamaha-`i`a had two *luakini heiau* constructed in Anahola where human sacrifices were offered. Rumors began to grow that Kawelo-mahamaha-`i`a was part shark and as deaths continued and sacrifices grew, fear turned into anger. One day as Kawelo-mahamaha-`i`a traveled back from Anahola he was stoned to death. Kawelo-maka-lua, father of the twins, was a thoughtful and considerate ruler in contrast to his father, Kawelo-mahamaha-`i`a and his son, Kawelo-`ai-kanaka, but he didn't live long as a ruling chief. Kawelo-`ai-kanaka or `Aikanaka was afforded awesome power because of his *nī`aupi`o* rank, but his cousin Kawelo-lei-makua (Kawelo) was not impressed. The rivalry between the cousins continued until Kawelo and his younger brother Ka-malama decided to leave Kaua`i and join relatives on O`ahu. They settled on land given them at Halemanu where they often crossed the pass [Kolekole] into Wai`anae to enjoy the ocean. While on O`ahu Kawelo trained in many arts. One day Kawelo had a vision of his parents under duress. The following day two men from Kaua`i brought him a message saying that his cousin `Ai-kanaka had stripped his parents of everything and thrown them from the top of the mountain where they had sought refuge (Wichman 2003: 73-78).

**Kawelo and Kāne-wahine-iki-aoha** Kawelo borrowed a war canoe and twenty-four warriors from O`ahu ruling chief Ka-ihi-kapu who waived payment and sailed to Kaua`i with his wife Kāne-wahine-iki-aoha, his brother, his two foster sons, his uncles who had delivered the message, twelve Ulu warriors and his war god Kāne-ika-pua-lena. A great battle ensued and all the champions of `Ai-kanaka were killed and he fled. Kawelo had avenged his parents and now Kaua`i belonged him. He divided the island between his wife, brother, and his foster sons. His brother Ka-malama presided over the Kona district and Kawelo the Puna district with the help of one foster son, Ka-`ele-hā-o-Puna. Peace came to Kaua`i again (Wichman 2003: 78-84).

**`Ai-kanaka and Kawelo** One day Ka-`ele-hā-o-Puna decided to visit Mānā. He arrived at Wahiawa in the evening and was invited to spend the night. His host had another guest, none other than `Aikanaka who had gone into hiding at Kō`ula valley. `Ai-kanaka immediately recognized Ka-`ele-hā-o-Puna and invited him to spend the night in the company of his daughter Kawelo-`eha. Ka-`ele-hā-o-Puna fell in love with Kawelo-`eha and the two were quickly married. Ka-`ele-hā-o-Puna had little to give `Ai-kanaka for his kindness and eventually gave him information that Kawelo did not learn to defend himself against an attack by stones. Huge cairns of stones were piled on the plains of Wahiawa. Kawelo heard

rumors and asked his brother Ka-malama to investigate. His brother did, an altercation broke out and Kamalama was killed by Ka-`ele-hā-o-Puna stabbing him in his back. Upon hearing this news of his brother's death, Kawelo sent for his other foster son and his wife, but left before they arrived. He met up with Ka-`ele-hā-o-Puna and `Ai-kanaka who stoned him. He recovered three times, but the fourth time he laid stunned, assumed dead. His body was wrapped in banana stalks and taken to Maulili *heiau* in Kōloa to be sacrificed the next morning. The guardians of the *heiau* were Kawelo's sister and her husband. During the night they revived him and when `Aikanaka came to the *heiau* he was killed by Kawelo. However, he spared his foster son Ka-`ele-hā-o-Puna. His wife and other foster son arrived with their forces and killed the fleeing warriors of `Aikanaka. They gathered the body of Ka-malama and demanded the death of Ka-`ele-hā-o-Puna. Kawelo still refused until he was shown that his brother had been stabbed in the back. He killed Ka-`ele-hā-o-Puna with one blow. The legends are not clear at what happened to Kawelo; one possibility was that he had been thrown off the cliff at Hanapēpē by his men who feared his obsession to go after all of `Ai-kanaka's relatives. However, not much time had passed between the death of `Ai-kanaka and the arrival of Kūali`i as *ali`i nui* of Kaua`i, breaking the direct line of twelve generations of ruling chiefs from father to son beginning with Ahukini-a-La`a (Wichman 2003: 84-86).

### 3.3.3.9 End of Kaua`i Direct Line Rule

**Kū-ali`i and Pele-io-holani** In order to get warriors and a canoe, Kawelo had agreed to cede Kaua`i to Kū-ali`i in case both he and `Ai-kanaka should die in the impending war. Kū-ali`i had as good a claim on Kaua`i as any other *ali`i* as his grandmother was Kawelo-lau-huki, daughter of Kawelo-mahamaha-i`a. He had inherited the *kumukānāwai* of his great-grandmother Ka-hā-malu-`uhi who had been wife to both Kā-kuhi-hewa and his son Kāne-kapu-a-Kā-kuhi-hewa. As a young man Kū-ali`i went to Kaua`i to gather *kaui* wood for weapons and a war club and Kawelo-lei-makua (Kawelo) had been his guide. When Kū-ali`i, who was now ruling chief of O`ahu, heard that `Ai-kanaka had been killed by Kawelo and he himself killed, Kū-ali`i rushed to Kaua`i to declare himself the *ali`i nui*. He installed his son Pele-io-holani as governor. Under Kū-ali`i Kaua`i supplied men and arms to the wars that spread over the windward islands as Kū-ali`i and his son Pele-io-holani established a multi-island kingdom with Kū-ali`i *ali`i nui* of Moloka`i, Lāna`i, and Maui. Kū-ali`i lived to a very old age [some say 175] and at his death his oldest son, Ka-pi`o-ho`okā-lani became ruling chief of O`ahu and Pele-io-holani of Kaua`i (Wichman 2003: 89-90).

**Pele-io-holani, Ka-naha-o-kalani and Ka`apuwai** Ka-pi`o-ho`okā-lani immediately invaded Moloka`i. Alapa`i-nui heard this and went to Moloka`i to avenge his relatives there and killed Ka-pi`o-ho`okā-lani whose army fled back to O`ahu where his son Ka-naha-o-kalani was now ruling chief. He sent a message to Kaua`i to ask his uncle Pele-io-holani for help. Pele-io-holani left his daughter Ka`apuwai in charge while he was gone. The impending war on O`ahu was averted as the cousins Alapa`i-nui and Pele-io-holani decided to settle peacefully. Pele-io-holani remained on O`ahu as ruling chief and his daughter remained as governor of Kaua`i. Ka`apuwai was married to Ka`ume-he-iwā -- they were both descendants of Ka-lani-kukuma, giving their daughter Ka-maka-helei stronger *mana* than her parents. Ka`apuwai died before Pele-io-holani and the government went to her daughter Ka-maka-helei (Wichman 2003: 91-92).

### 3.3.3.10 O`ahu-Kaua`i-Maui Ali`i Nui

**Ka-maka-helei, Kiha, Ka-neoneo and Ka`eo-kū-lani** Ka-maka-helei ruled Kaua`i with allegiance to her grandfather Pele-io-holani. She married a Kaua`i chief Kiha and they had three children: two daughters, Lele-māhoa-lani and Ka-lua-i-pihana and a son Keawe. Pele-io-holani sent his grandson Ka-neoneo to Kaua`i to check on things and Ka-maka-helei put aside Kiha for Ka-neoneo; they had a daughter Ka-pua`a-moku. Kiha fled to Ni`ihau and gathered a small army and raided Kaua`i. He was

subsequently killed. Pele-io-holani sent for his grandson to help him with problems with Kahekili [II], leaving Ka-maka-helei vulnerable against her uncle Kūmuhana. Seizing this opportunity Kahekili sent his brother Ka`eo-kū-lani to Kaua`i to neutralize the kingdom and woo Ka-maka-helei, who named her son Keawe her heir. It was during this period that Captain Cook landed at Waimea in 1778. Ka-maka-helei presented Cook with gifts of hogs, chickens, bananas, taro, sweet potatoes, sugarcane, yams, fine mats, and tapa cloth. In return Cook presented her with cloth, iron, a sword, knives, bead necklaces and mirrors. Then Ka-maka-helei offered Cook her daughter Lele-māhoa-lani (Wichman 2003: 92-96).

**Ka-maka-helei, Ka`eo-kū-lani and Ka-umu-ali`i** Ka-maka-helei gave birth to a son, Ka-umu-ali`i in 1780 and shortly after, Kahekili sent for his brother Ka`eo-kū-lani to help with problems on Maui. His son Ka-umu-ali`i was declared heir to Kaua`i with Inamo`o as regent. Kahekili died on O`ahu in 1793 and Maui, Moloka`i and Lana`i came under the rule of Ka`eo-kū-lani, who ruled for a year before becoming homesick for Kaua`i. On his way back he stopped on O`ahu. His nephew, Kalani-kū-pule, thought he was invading O`ahu and a battle ensued. The battle was called off and Ka`eo-kū-lani continued on his journey to Kaua`i. While in Wai`anae he discovered that his counselors were plotting to throw him overboard in mid-channel and return to O`ahu to conquer the island. Ka`eo-kū-lani decided to go into battle with them against Kalani-kū-pule rather than die alone at sea. Ka`eo-kū-lani was killed in `Aiea in 1794 by rounds of gunfire from two foreign ships hired by Kalani-kū-pule; only the two treasonous counselors escaped back to Kaua`i. The following year Kamehameha I invaded O`ahu and Kalani-kū-pule ended up as a sacrifice to Kamehameha's war god (Wichman 2003: 96-98).

**Ka-umu-ali`i and Keawe** Ka-maka-helei's oldest son Keawe attacked Wailua and captured his younger half-brother Ka-umu-ali`i, who was made a privileged prisoner free to wander Wailua, but couldn't leave without Keawe. Keawe then declared himself *ali`i nui* of Kaua`i. Joining Keawe was Ki`i-kīkī, one of the treasonous counselors and *konohiki* of Wainiha. Ki`i-kīkī's brother Kāne-`ehu was *konohiki* of Hanapēpē. Keawe did well for a year. He collected all the muskets, guns and ammunition on the island as a symbol of power and put his trust in the brothers Ki`i-kīkī and Kāne-`ehu, as no one had returned from O`ahu to warn him of their treachery. They convinced him to take a tour around the island and meet his subjects. In Kapa`a Keawe went to bathe in the famous pool *Kupa-nihi*. While there Ki`i-kīkī got a rifle and shot Keawe. Kāne-`ehu advised his brother to return to Wailua and kill Ka-umu-ali`i, but Ki`i-kīkī refused saying he could control the young chief. Ki`i-kīkī took all the guns and went to Polihale, while Kāne-`ehu went back to Hanapēpē (Wichman 2003: 99).

**Ka-umu-ali`i, Nā-kaikua`ana and Kamehameha** Although now free from his brother Keawe and his regent Inamo`o, Ka-umu-ali`i knew that Ki`i-kīkī and Kāne-`ehu were very dangerous, so he turned to Nā-kaikua`ana, a member of his court and a close friend of Ki`i-kīkī. Ka-umu-ali`i bribed Nā-kaikua`ana with his wives. After some time Nā-kaikua`ana realized that he could also be in danger of losing his life so he swore allegiance to Ka-umu-ali`i. To prove his loyalty he offered a plan to regain the guns. When Ki`i-kīkī was out surfing one day at Ka-ua, Makaweli, Nā-kaikua`ana seized the guns. Ki`i-kīkī hurried to Hanapēpē to his brother; both of them fled to `Ewa, O`ahu, but Nā-kaikua`ana followed them and killed the brothers. However, Nā-kaikua`ana returned to Kaua`i with disturbing news; Kamehameha, now ruler of the windward islands was preparing to invade Kaua`i. After two failed attempts, Kamehameha sent a message to the young chief to recognize him as sovereign. Ka-umu-ali`i realized that it was a matter of time and he didn't have the resources to beat Kamehameha, so he accepted. However, he refused the many invitations to go to O`ahu and make a public oath fearing the same fate as Keōua. After many more invitations an order came that he could not refuse. Ka-umu-ali`i left Kaua`i to meet Kamehameha on O`ahu. Kamehameha turned down the offer of the lands of Kaua`i and invited him to land where he was royally entertained. A few days later, members of Kamehameha's court invited Ka-umu-ali`i to a feast. On the way there he stopped to visit Isaac Davis who warned him that they were plotting to kill him there. Ka-umu-ali`i changed his plans. Before leaving he stopped by to see

Kamehameha and Ka-lani-moku who told Ka-umu-ali`i to “take care of the chief Liholiho who belongs to you and to your cousin Ka-`ahu-manu. Liholiho shall be the heir” (Wichman 2003: 99-104).

**Ka-umu-ali`i, Liholiho and Ka-`ahu-manu** Ka-umu-ali`i could only agree - he went to O`ahu as a ruler and returned to Kaua`i as a vassal, but he saved his kingdom from a bloodbath. Shortly after returning to Kaua`i he received word that Isaac Davis had himself been poisoned. The young chief’s world was continuously changing as more and more ships came - whalers, merchants, including sandalwood merchants, and traders. The traders built a trading post at Waimea and a fort shortly after. With his new-found income, Ka-umu-ali`i purchased guns, ammunition and ships with hopes of some day getting out of the stranglehold of Kamehameha. This was never to be; in 1819 Kamehameha died and his son Liholiho and Queen Ka`ahumanu as his regent, took over.

They radically and forever changed the social structure of the Hawaiian society by extinguishing the *kapu* system. The following year Calvin Congregational missionaries arrived in Hawai`i to a society with a structural/religious void, as well as Humehume, oldest son of Ka-umu-ali`i who had been given up as lost. He had been placed in the care of a Yankee captain when he was seven, to be educated. The captain died and Humehume was turned out into the streets. He was later sent to the Congregational school in Cornwall, Connecticut where several other Hawaiian youth were. When the first missionaries left, they took Humehume (George) with them. Humehume and the missionaries were welcomed by Ka-umu-ali`i who gave the missionaries land to build a church and school; Ka-umu-ali`i was later converted.

In 1821 after spending over a month enjoying Kaua`i hospitality, Liholiho invited Ka-umu-ali`i to his brig for dinner. He quietly gave the order to set sail with Ka-umu-ali`i as his prisoner. Later that year he was “compelled” to marry his cousin Ka`ahumanu; she also married his son and heir. From then on the Kaua`i chiefs were kept at her side. In 1824, as Ka-umu-ali`i lay dying, his family were allowed to come to O`ahu, but they were not allowed to see him before he died. He was taken in state to Maui where he was buried next to Ke-ōpū-o-lani [also his cousin], sacred queen of Kamehameha. (Wichman 2003:104-110); he was the last king of Kaua`i.

### 3.3.4 `Ōlelo No`eau

`Ōlelo no `eau or proverbial/traditional sayings usually had several layers of meanings. They reflected the wisdom, observations, poetry and humor of old Hawai`i. Some of them referenced people, events or places. The following `ōlelo no `eau were compiled by Pukui between 1910 and 1960 with both translations and an explanation of their meaning (Williamson, et al. in Pukui, 1983:vii), which are often more *kaona* (hidden or double meaning) than obvious; they refer to places or *ali`i nui* associated with places and people of Hā`ena and other places in the vicinity.

<i>‘Ōlelo no `eau:</i>	<i>Kilioe wahine i uka.</i>
Translation:	Kilioe, woman of the upland.
Meaning:	Kilioe was a <i>wahine mo`o</i> (lizard woman) famed in chants and songs of the <i>ali`i</i> . She belonged to Kaua`i and it was she who tried to prevent Hi`iaka from taking the body of Lohi`au from a cave at Hā`ena (#1799, p 193).

<i>‘Ōlelo no `eau:</i>	<i>‘Ō`ili pulelo ke ahi o Kāmaile.</i>
Translation:	The fire of Kāmaile rises in triumph.
Meaning:	Said of one who is victorious over obstacles, this is the first line of a chant composed for Kamehameha II. In olden days, firebrands hurled from the cliffs at Hā`ena, Kaua`i, made a spectacular sight (#2392, p 261).

<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Nui ka hanu o Limahuli i na Lehua o Lulu`upali.</i> Heavily-sighed Limahuli falls over the Lehua blossoms of Lulu`upali. Said of a person in love who sighs over a sweetheart (#2347, p 255).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Na Lehua o Lulu`upali</i> The lehua blossoms of Lulu`upali Famed in songs of Kaua`i were the Lehua blossoms of Lulu`upali (#2251, p 246).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka laua`e `ala o Kalalau</i> Fragrant laua`e ferns of Kalalau Makana and Kalalau on Kaua`i were noted for the growth and fragrance of <i>laua`e</i> (#1433, p 155).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka pali `ōahi o Makana</i> The firebrand-hurling of the cliff of Makana <i>Pāpala</i> or <i>hau</i> wood was cut, thoroughly dried and carried up the hillside to where an <i>imu</i> lay ready to be lighted. When dusk descended, the <i>imu</i> was lighted and the logs placed in it. When the blowing of the wind was just right, the lighted log was hurled into the wind and borne seaward, high over the heads of the spectators, before dropping into the sea (#1532, p 165).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka poli laua`e o Makana</i> Makana, whose bosom is adorned with <i>laua`e</i> ferns. Famed in songs and chants are the fragrant <i>laua`e</i> ferns of Makana, Kaua`i (#1542, p 166).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Laua`e o Makana</i> The <i>laua`e</i> fern of Makana. Famed in songs and chants is the <i>laua`e</i> that grows everywhere at Makana on Kaua`i . When crushed it has a scent similar to that of the <i>maile</i> and is often used with the pandanus fruit in making <i>lei</i> (#1949, p 210).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ke ahi lele o Kāmaile</i> The soaring fire of Kāmaile This refers to the firebrands hurled off the cliffs at Napali, Kaua`i (#1669, p 180).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Na hala o Naue `au i ke kai.</i> The <i>hala</i> trees of Naue swim out to sea. The <i>hala</i> trees of Naue, Kaua`i seem to reach out to sea. This expression is used in songs and chants (#1212, p 242).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka ua Makako`i o Halele`a</i> The adz-edged rain of Halele`a. A rain so cold that it feels like the sharp edge of an adz on the skin. Refers to Halele`a, Kaua`i (#1586, p 172).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Kaua`i a Manokalanipo</i> Kaua`i of Manokalanipo Manokalanipo was a chief of Kaua`i in ancient times (#1556, p 168).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation:</p>	<p><i>Ka moku kā`ili lā o Manokalanipo</i> The sun-snatching island of Manokalanipo</p>

Meaning:	Kaua`i, the northwestern most island of the group, beyond which the sun vanishes at dusk. Manokalanipo was an ancient ruler of Kaua`i (#1488, p 161).
‘ <i>Ōlelo no ‘eau:</i>	<i>‘Akāhi a komo ke anu ia`u, ua nahā ka hale e malu ai.</i>
Translation:	Cold now penetrates me, for the house that shelters is broken.
Meaning:	Fear enters when protection is gone. Said by `Aikanaka of Kaua`i when two of his war leaders were destroyed by Kawelo (#90, p 12).
‘ <i>Ōlelo no ‘eau:</i>	<i>Ka ipo laua`e o Makana.</i>
Translation:	The beloved <i>laua`e</i> of Makana. (Refers to the famed variety of fern used in <i>lei</i> for its fragrance and grew near Pu`u Makana)
Meaning:	Refers to a loved one (Pukui and Elbert 1986:194).
‘ <i>Ōlelo no ‘eau:</i>	<i>Ka pali kā`ili wahine o Kē`ē.</i>
Translation:	The wife-snatching cliff of Kē`ē.
Meaning:	Alludes to a tale in which the men of Kē`ē fell in love with the women ( <i>wahine</i> ) of Nu`alolo, went to that valley and scaled the cliff to reach it, threatened the men and took the women back (Pukui 1983:165).
‘ <i>Ōlelo no ‘eau:</i>	<i>Kupopou ana i ka pali o Kē`ē.</i>
Translation:	Going downhill at the cliff of Kē`ē.
Meaning:	Said of a non-cooperative person and played on the place name’s resemblance to <i>kē</i> (to object) and <i>ē</i> (elsewhere) (Pukui 1983:207).
‘ <i>Ōlelo no ‘eau:</i>	<i>Aia a Kē`ē.</i>
Translation:	There at Kē`ē.
Meaning:	Refers to the distance between Kē`ē and other locales; figuratively it means something hardly worth looking for, it is so far away (Pukui 1976:105).

### 3.3.5 Place and Object Names

Hawaiians of old generally named everything; from winds and mountains, to rocks, canoes, taro patches, fishing stations, and “the tiniest spots where miraculous or interesting events are believed to have taken place” (Elbert in Pukui et al., 1974: x). They all represented a story, some known only locally, while others became legendary. The list below (Table 2) represents place names with an association to project lands in Hā`ena and vicinity.

**Table 2.** Place and object names in Hā`ena and their *mo`olelo* and significance

<b>Hā`ena</b>	Tucked against the Nāpali cliffs is the ahupua`a of Hā`ena; “red hot” – possible reference to strong <i>kapu</i> that surrounded this place (Wichman 1998:125). Land section, village, point. <i>A Lohi`au-ipo i Hā`ena lā, `ena`ena ke aloha ke hiki mai;</i> and <i>Lohi`au-ipo</i> at Red-hot, hot the love that comes (Pukui et al. 1974:34). Hā`ena was always ruled by a chiefess who was independent of the <i>ali`i nui</i> and who ruled for life. One high chiefess was Kekela who was alive during the Mahele and directed the people to file their land claims. Hā`ena was also noted for the quality of dog grown here as food for the chiefesses who were not permitted to eat pork (Wichman 1998:126).
<b>Hala-aniani</b>	“Clear-pandanus” – the lake of fresh water within the upper wet cave of Hā`ena; it was set aside for the <i>ali`i</i> and commoners could not bathe in it. The waters were thought to be able to restore an ailing person back to health. The chiefs either drank from a calabash filled with the water or swam in the underground lake (Wichman 1998:129). Visitors in

1849 reported legends of *mo`owahine* and a white substance on the surface there, although it did not keep them from taking a canoe inside to explore (Alexander 1991:126-127).

- Halele`a** “House of happiness” – cited in chants as the most beautiful place in all the islands. Moku or district on Kaua`i that includes Kalihiwai, Kalihikai, Hanalei, Wai`oli, Waipā, Waikoko, Lumaha`i, Wainiha and Hā`ena; the extent includes Wai`ale`ale to the sea, bordered by Nāpali on the west and Puna (the Makaleha Mtns) and Ko`olau on the east (Wichman 1998:105).
- Īlio Point** “Dog” Point – may refer to the Polynesian-introduced canine or the seal (*Īlioholoikauaua*) - “dog running in the rough seas” who have been known to beach themselves there (Major and Carpenter 2001:9).
- Ka`aulama-poko** A fishing hole near shore “light from a short-burning torch” because it can be fished at night using a *kukui* nut torch, which never burned for very long (Wichman 1998:125).
- Kai-kua`au-o-Hā`ena** “Lagoon sea of Hā`ena” – the only lagoon on Kaua`i – protects Makua Bay (Wichman 1998:125).
- Ka-lua-`āweoweo** “*Āweoweo* hole” is the fishing hole at the farthest point from land; the *`āweoweo* gather in this grotto – this fish was eaten raw, cooked or dried. A large school of young *`āweoweo* (*alalauā*) swimming into the bay was an omen of the death of a high chief (Wichman 1998:125).
- Ka`iwi-ku`i** A Hawaiian man and his wife used to steal from the fields of the Menehune farmers in Mānoa Valley; he was chased up the ridge toward Pōhaku-o-Kāne where he put up a fight, but the Menehune used their slingshots and pelted him with stones. Some were so large that the bones of his skull were shattered...in this form he was turned to stone -- the ridge where he lies was named Ka`iwi-ku`i or “hammered bone” (Wichman 1998:126-127).
- Kānehunamoku** “Kāne’s hidden island” son of two cloud gods Manoiku(kiu)lani (“Male head of the clouds in the blue sky”) and Hihikalani (“Female head of the rolling clouds”) who lives on a floating island that is “sacred and shall not be seen in the light of day. It shall be seen only at certain kapu periods in July and August. When it hovers near Hā`ena, Kaua`i , then he shall be near on the floating island of Kaonohiula” (Beckwith 1970:71).
- Kaonohiula** Floating Island that hovers near Hā`ena, Kaua`i in *kapu* periods of July and August (Beckwith 1970:71). Beckwith interprets references to invisible or floating islands and clouds as metaphors for the seclusion of high-ranking *ali`i* children raised under strict *kapu* and thus it may be inferred that Hā`ena was considered a sacred place...where *ali`i* children were raised and trained (Major and Carpenter 2001:6).
- Ke-ahu-a-Laka** “Inspiration of Laka” – Hā`ena was famous for its schools where students came to study the sacred forms of *hula* or to learn the history and genealogies of the chiefs. Ke-ahlu-o-Laka [*heiau*] was the school of *hula*, chanting and composing religious chants as well as songs. The student remained for seven years. The *heiau* and the student were dedicated to Laka, goddess of the forest and dance (Wichman 1998:132).
- Ka-ulu-o-Pā`oa** “Inspiration of Pā`oa” – This *heiau* was the school for historians and genealogists. It was said that during the final examination a student listened to a genealogical list that lasted several hours and had to repeat it without error. Pā`oa was the *kahuna nui* and close friend of Lohi`au at the time of Pele’s arrival. He swore to avenge Lohi`au’s death and confronted Pele at her home on Hawai`i. Pele, assuming her most beautiful form,

beguiled Pā`oa into living with her for three days. He drowned himself in shame for not having kept his oath (Wichman 1998:132).

**Ke-a`a-lewalewa**

“Dangling root” is a peak on the east side of Mānoa Valley; *a`a lewalewa* are aerial roots of the *ōhi`a lehua* tree of the forests or the pandanus tree of the lowlands. Kea`alewalewa was a Wainiha man who constantly stole food from the Menehune farmers of Mānoa Valley. They got so angry after a time that they chased after him and turned him into stone (Wichman 1998:126).

**Kē`ē**

“Avoidance” – beach and cliff west of Hā`ena, Kaua`i (Pukui 1974:105). The beach and lagoon at the beginning of Nāpali District is Kē`ē, the site of the legend of Pele, Lohi`au and Hi`iaka. Pele came to Kē`ē when she was first looking for a home and safety from her sister Nāmakaokiahā`i. Once she found her home on Hawai`i Island she was lured back by Lohi`au’s drumming. She returned and found him and fell in love with him, but each time she dug a cave to make a home for them, she met with water. She left Kaua`i as she was in her spiritual body, promising Lohi`au she would return for him. After a long wait, Lohi`au hung himself in despair. His body was placed in a cave above Kē`ē and was guarded by two *mo`o* sisters Kilioe and Aka. When Hi`iaka and Wahine-`ōma`o arrived as envoys from Pele they found Lohi`au dead. Hi`iaka killed the two guardians and with herbs and prayers restored Lohi`au’s life then took him to Pele, who in the meantime had destroyed Hi`iaka’s *Lehua* forest. The angry Hi`iaka embraced Lohi`au so Pele covered him with lava. Hi`iaka dug a tunnel from the sea to her sister’s fire pit and almost succeeded in killing Pele, but their brothers persuaded her not to. Hi`iaka returned to Kaua`i ; her brothers restored Lohi`au’s life once more and sent him after Hi`iaka. They married and spent the rest of their life together at Kē`ē (Wichman 1998:130). Kē`ē probably also refers to the *kapu* of the place in light of Beckwith’s interpretation of legends as reference to seclusion of *ali`i* (Major and Carpenter 2001:9). `Ili of Hā`ena (Waihona 2010)

**Kilioe**

The body of Kilioe became a furrowed rock beside the sea that is still used as a birth rock, a place for safeguarding the umbilical cord of newborns. In doing so, the child is placed under the protection of Kilioe. The ancients believed that the fate of the umbilical cord foretold the child’s life (Wichman 1998:130). When Hi`iaka went to find Lohi`au for Pele, she had to fight two supernatural lizard women (Kilioe and Aka according to Wichman 1998; Kilioa and Kalaimanu according to Kalākaua 1990; Kilioekapua and Kalanamainu`u according to Beckwith 1970). Kilioe was turned into a *pōhaku* that was used as a *piko* stone where the umbilical cord of a newborn infant was placed to be under the protection of the *mo`owahine* (Wichman 1998:130).

**Koa-manō**

On the way to Kaua`i , Makani-kau, chief of the winds, god of love, was crossing the channel between O`ahu and Kaua`i in his wind form and saw some people being chased by a big shark. He landed on the canoe and told the frightened people he would play with the shark and they needn’t worry. He jumped into the sea and the shark opened its mouth to seize him but he climbed onto it and caught its fins and forced it to flee through the water into the rocks and became the great shark stone Koa-manō “shark warrior.” Kahuna Pa`ihulu would go to this rock and offer prayers and food to a shark. The shark would then carry him to Kalalau and back again (Wichman 1998:125-126).

**Limahuli**

“Turning hand” – a deep valley in Hā`ena (Wichman 1998:125; Pukui et al. 1974:133).

**Makana**

“Gift” – a triangular peak, prominent and unmistakable. Firebrands (*ōahi*) were thrown from the top of this peak. On the side of Makana is a storied stone, a reminder of a tale of friendship. Nou was a boy who saved the life of a Menehune who had fallen; in return the Menehune promised Nou that he would become a champion firebrand thrower. The other firebrand throwers became jealous of Nou and his prizes and killed him. The Menehune put Nou’s body into a cave and sat at the entrance and allowed himself to turn into stone

to guard the bones of his friend (Wichman 1998:129). `Ō`ahi were thrown from Makana up into early historic times: during Queen Emma’s 1860 visit to Kaua`i; when Eric Knudsen staged a display in the early 1900s; and on Kamehameha Day in 1925(Knudsen 1946; Barrere and Kelly 1978 In Major and Carpenter 2001:8).

- Makua** “Ancestor” – a large lagoon and bay in the *ahupua`a* of Hā`ena (Wichman 1998:125).
- Manini-holo** “Traveling reef surgeon fish” – large dry cave on Ka`iwiku`i Ridge; Manini-holo was also the name of the head fisherman at the time the Menehune were leaving the island to return to their homelands. He brought his workers to gather food from the reef and bay of Hā`ena; during the night all the food disappeared, but Manini-holo saw the *e`epa* in the fissures of the pali and realized they were the thieves so they killed them. The Menehune gathered in the mountains, crossed Nāpali coming to the plain in front of Manini-holo where they boarded their canoes in Makua Bay. They sailed away and never returned (Wichman 1998:127-128). Historic visitors were told that a certain side room of the cave was used as a hiding place by *ali`i* during times of war (Alexander 1991:126) and construed that a stone wall at the rear of the cave was meant to block off a burial area (Lydgate 1991:139) (In Major and Carpenter 2001:9).
- Mānoa** “Thick” – a shallow valley in Hā`ena (Wichman 1998:125). Stream (Pukui et al. 1974:146). `Ili of Hā`ena (Waihona 2010)
- Naenae** “Congested” – wife of Hawaiian man who stole from Menehune farmers; they chased her into Limahuli Valley. She stopped to rest near the waterfall where the Menehune caught her and killed her. She was turned to stone and is called Naenae (Wichman 1998:126).
- Nā-hiki** “Many arrivals” – the bay beside the two *heiau*. At the end of their training students at the *hula* school had to swim the lagoon, go out the channel into the ocean and come ashore at Nāhiki where even on calm days, the waves surge fiercely in and out. In so doing they passed the shark that was fed by the chiefess. Those students who had broken any rules were devoured by it. Those who were without fault came ashore safely (Wichman 1998:132).
- Nā-Piliwale** “Clinging ones” or “the emaciated ones” – a stone formation on the Mānoa ridge looks like two running figures with skirts flying up behind them. It was the custom of the four Piliwale sisters to visit a chief’s court and remain until all the food in the area had been consumed. Therefore their appearance heralded a forthcoming famine. They had extraordinary appetites; their favorite foods were freshwater shrimp and snails and the fiddlehead fern (*hō`i`o*). Two sisters came to Hā`ena and because they were *kupua* and could not tolerate the sun, Lohi`au and his sister Kahuanui built them a shelter in Maniniholo Cave and one on the ridge so they could enjoy the view. They were fed their favorite foods at night and entertained by every *hula* dancer at the school at Ke`e. One night they forgot the time and raced down the ridge to the cave but the sun’s rays caught them and turned them into stone; they remain there as a warning to the other two sisters not to visit Kaua`i (Wichman 1998:127).
- `O`o`a`a** “Fast-rooted one” – a boulder formerly on Hauwā reef that now lies in the depths. `Ō`ō`ā`ā came to Kaua`i with her two brothers in the form of rocks; after their long journey she rested on the sea and became a guardian of the reef. She was moved from the reef in the 1946 tsunami where she is still waiting for her brothers offshore. She can be seen by snorkelers (Wichman 1998:128).
- Pā-ka-moi** “Enclosure of the threadfin fish” – a boulder near the base of the upper wet cave (Waiakanaloa); also connected to the story of Pele and Lohi`au. When Hi`iaka and her companion Wahine`ōma`o reached Hā`ena they asked Pākamoi a fisherman to find them a place to sleep for the night. He mistook the tenor of their request and after watching

them loosen their clothes in preparation for sleeping, he attempted to fulfill his desires on Hi`iaka who was saved by Pā`ū-o-Pala`e, a friend and servant, who changed places with her. Pākamoī was turned to stone where he lay (Wichman 1998:129).

<b>Papaloa</b>	“Long reef” – (Major and Carpenter 2001:9)
<b>Pōhaku-o-Kāne</b>	“Stone of Kāne” – brother of Ō`ō`ā`ā who tried to climb to the peak above but because he was round and the cliff was sheer, he would roll back to the bottom where he would start over. The god Kāne took pity on him reached down and placed the rock on the peak. It is said that when Pōhakuokāne decides to leave his perch, Kāne will raise the waters of the ocean to his level (Wichman 1998:128).
<b>Pōhaku-loa</b>	“Long-rock” – the other brother of ` Ō`ō`ā`ā who rested on the top of the sand dunes (Wichman 1998:128).
<b>Wai-a-Kanaloa</b>	“Water made by Kanaloa” – Kanaloa was one of the four major Hawaiian gods and brother of Kāne. They were known for digging sources of drinking water as they toured the various islands. The upper wet cave (Wai-a-Kanaloa) in Hā`ena was dug by Kanaloa. Other legends say it was Pele who struck the cliff here with her staff <i>Pā`oa</i> when she was searching for a home, but was met by water instead (Wichman 1998:129).
<b>Wai-a-ka-Pa-la`e</b>	“Water of the lace fern” – the lower wet cave in Hā`ena. In the olden times, the water in the cave had a brownish hue, which was said to be the hair of a beautiful <i>mo`o</i> maiden who could usually be seen sitting near the entrance of the cave combing her hair. A chief from Wainiha fell in love with her and the two disappeared for several months. Then the mermaid reappeared with a baby at her breast. When asked where the chief was, she drew her finger across her neck to indicate that he was dead. In revenge, his friends tried to kill the <i>mo`o</i> but she dove into the water and escaped. Her long hair spread out in the water giving the pool its color. As she grew older the brown tint turned gray. For this reason the cave was known either as Wai-a-kapa-lae - “water of terror” or Wai-a-kapa-la`e – “water of shiny tapa” (Wichman 1998:129-130).

---

### 3.3.6 Winds

#### 3.3.6.1 Winds of Halele`a

Halele`a is cooled by *Kaiālulu*, a pleasant and gentle trade wind; and sometimes the forceful Ko`olau trade wind *Hao-Ko`olau-o-Halele`a*.

#### 3.3.6.2 Winds of Hā`ena (Poepoe 1911 In Pacific Worlds).

*He Kalahale ka makani o Hā`ena*  
*He Limahuli ka manaki o Hā`ena*  
*He Kolokini ka makani he`enalu o Kahuanui a Lohi`auipo, i Hā`ena*  
*He Unukupua ka makani lawe leo a Lohi`au-ipo i Hā`ena*  
*He Kanaenae ka makani kaili aloha a Lohi`au i Hā`ena*  
*He Kilauea ka makani kaili aloha a Lohi`au i Hā`ena*  
*He Leoikua ka makani lawe aloha a Lohi`au-ipo i Hā`ena*  
*He Ipo noenoe laua`e ka makani ki`i wahine a Lohi`au ipo i Hā`ena*  
*Aloha wa'e o Lohi`au-ipo i Hā`ena e--!"*

Wichman (In Pacific Worlds) expands on the winds of Hā`ena below:

**Kalahale** refers to a house gable, but was also name of a chiefess of Hā`ena.

<b>Limahuli</b>	"turning hand," is also the name of the valley in which this wind occurs.
<b>Kolokini</b>	is the "surf-raising" wind ( <i>makani he'enalu</i> ) of the Kahuanui surfing area. Kahuanui is sister of Lohi'au; the surfing area is on the Kē'ē side of where Limahuli stream enters the sea.
<b>Unukupua</b>	the "demi-god's altar" - this is the "voice-bearing wind of Hā'ena," which must refer to a women's chorus, because it sounds like a chorus of women chanting.
<b>Kana`ena`e</b>	or "sweet fragrance," is the fragrance-bearing wind of Hā'ena. It is probably an evening wind. Na'ena'e is the name of several varieties of a native shrub with large cones of blossoms. But it may also refer to the scent of the laua'e ferns for which Makana mountain is famous. Kana`ena`e is also a boulder up in Limahuli.
<b>Kīlauea</b>	is the "love-snatching" wind ( <i>makani ka'ili aloha</i> ) of Hā'ena.
<b>Leoikua</b>	refers to voice of the gods heard in the elements; "the love-bearing wind" ( <i>makani lawe aloha</i> ).
<b>Ipu no`eno`e</b>	or "sedate sweetheart," is "the woman-fetching" ( <i>ki'i wahine</i> ) wind of Hā'ena.

### 3.3.7 Wahi Pana of Hā'ena

Henry E. Kekahuna surveyed the sites of Hā'ena in 1959 and wrote the following about Lohi'au's hale site (Pacific Worlds):

The sad remnant of King Lohi'au's residence foundation lies approximately 50 feet upland from the end of the Ka`umualii Highway...the royal foundation was terribly wrecked some years ago by the county of Kaua'i, by hauling stones from it for road building, running in a bulldozer, and even blasting rock. Through this utter lack of comprehension of the preciousness of Hawai'i's unique heritage bequeathed us by the ages past, and its complete lack of foresight concerning the great value of Kaua'i's then potentially foremost legendary relic of antiquity, was irreparably destroyed this fascinating place of interest to our island people, our posterity, and our host of visitors from afar.

Those of chiefly blood were trained in classes exclusively for chiefs. Their graduation ceremonies were elaborate and imposing. About ten days (*anahulu*) were devoted to feasting, *hula*, and the chanting of their name songs by the beautifully wreathed chiefly graduates. End to end of Kaua'i especially from the home districts of the students, would come their families and their hosts of relatives and friends, to lay before them heaps of food and other gifts. Canoes would swarm in the bay and crowd the beach at Hā'ena. In special honor of the chiefly graduates would be held glorious exhibitions of fire throwing, from the towering cliff of the 1590-foot high hill of Makana, at Hā'ena. And also the celebrated fire-throwing cliff of Ka Maile (or Ka Pali O Ahi o Kamaile), 2500 feet in height, at Nualolo.

The following excerpt is from (Pacific Worlds)

The hula school down here was the most revered of the hula schools. It was not for the faint-hearted to enter into scholarship at this *halau*, because it was expected that you would literally dedicate your life to learning. There were many strict *kapu* that governed the protocols of being a *haumana* in the *halau*.

### 3.3.8 Heiau/Sites of Hā'ena [References found in Bennett (1931:136-138)]

Site No.	Heiau/Site	Location	Comment (Figure 3)
154	Kauluopā'oa Heiau	Kē'ē	This heiau was thoroughly studied by Emory.... "The plan of this heiau structure is an unenclosed stone terrace, approximately one hundred feet long and sixty feet wide. It appears to have been built up twenty feet at the highest corner .... The retaining wall towards the sea is almost vertical, but



### 3.4.0 Historic References

By and large “Historic References” pertain to notable historic events, overviews of important place names and land tenure within the project area and districts. One of the most significant practices in the history of the Hawaiian people was their concept of stewardship of the land. However, over time, these practices were replaced by more western methods of land tenure and use, as the lands of Kaua`i went from the domain of the *ali`i nui* to the domain of the monarchy to various individuals and corporate entities.

#### 3.4.1 History of Land Divisions

It was during the time of Kūkōna (ca. 1400s), father of Mano-ka-lani-pō (ca. 1405-1455AD) that the division of lands is said to have taken place (Wichman 2003:53-54). The islands were portioned into districts, sub-districts, and smaller divisions, each ruled over by an agent appointed by the landlord of the next larger division, and the whole under control of the ruling chief over the whole island or whatever part of it was his to govern (Beckwith 1970:383). Each island was divided into *moku* or districts that were controlled by an *ali`i `ai moku*. Within each of the *moku* on each island, the land was further divided into *ahupua`a* and controlled by land managers or *konohiki*. The boundaries of the *ahupua`a* were delineated by natural features such as shoreline, ridges, streams and peaks, usually from the mountain to the sea, and ranged in size from less than ten acres to 180,000 acres (Moffat and Kirkpatrick 1995:24-29, see also Chinen 1958:3). But sometimes “only the line of growth of a certain tree or grass marked a boundary; and sometimes only a stone determined the corner of a division” (Chinen 1958:1). The ideal *ahupua`a*, from mountain to the sea, enabled a chief and his followers to obtain fish and seaweed at the seashore, taro, sweet potatoes and bananas from the lowlands, and forest products from the mountains. However, this more often than not, was not the case (Chinen 1958:3).

Each *ahupua`a* was often divided and sub-divided several times over (i.e., *`ili*, *kuleana*, *mo`o*, *pauka*, *koele*, *kiha pai*), answerable to *ali`i* where the lesser division was located. However the *ili kupo* or the *ili ku* was “completely independent of the *ahupua`a* in which it was situated...tributes were paid directly to the king himself” (Chinen 1958:4). Some *ahupua`a* did not have any *`ili*, while others had as many as forty, “each with its own name and carefully defined boundaries” (Chinen 1958: 3). *Mo`o* or *mo`o`āina* were the next size of land division; these were set for cultivation purposes only. *Mo`o* were subdivided into *pauka* which were also for cultivation only. Patches of land cultivated by tenants for their chiefs were called *koele* or *po`alima* because they were worked only on Fridays. A *kihapai* was cultivated only for the tenant and his family. Rights to lands were mutable or revocable; a ruling chief or any “distributor” of lands could change these rights if displeased, or as favors--usually after a victorious battle, and after the death of the *ali`i nui* (Chinen 1958:5).

During the period between 1839 and 1855, several legislative acts transformed the centuries-old Hawaiian traditions of *ali`i nui* land stewardship to the western practice of private land ownership. In the first stage King Kamehameha III (Kauikeaouli) divided up his lands among the highest ranking *ali`i* (chiefs), *konohiki* (land managers), and favored *haole* (foreigners) (Chinen 1958:7-14; Moffat and Fitzpatrick, 1995:11, 17). This historic land transformation process was an evolution of concepts brought about by fear, growing concerns of takeovers, and western influence regarding land possession. Kamehameha III, in his mid-thirties, was persuaded by his *kuhina nui* and other advisors to take a course that would assure personal rights to land.

In 1846 he appointed a Board of Commissioners ‘To Quiet Land Titles’- commonly known as the Land Commission, to “confirm or reject all claims to land arising previously to the 10<sup>th</sup> day of December, AD 1845.” Notices were frequently posted in *The Polynesian* (Moffat and Kirkpatrick, 1995). Kamehameha III formalized the division of lands among himself (one-third) and 245 of the highest-ranking *ali`i* and *konohiki* (one-third) between January 27 to March 7, 1848. He acknowledged the rights of these

individuals to various land divisions in what came to be known as the *Buke Mahele* or ‘sharing book.’ These lands, however, were all “subject to the rights of native tenants” or *kuleana* lands, with reversionary rights to *ahupua`a* and *ili kupono* claimants if the tenant died without heirs (Chinen 1958: 29-30). The *Great Mahele* marked the end of the feudal system in the kingdom (Chinen 1958:15).

However, the legislature did not acknowledge this act until June 7, 1848 (Chinen 1958:16; Moffat and Kirkpatrick, 1995:48-49). “The mahele did not actually convey title to the various *ali`i* and *konohiki*; it essentially gave them the right to claim the lands assigned to them--these lands became known as the *konohiki* lands. The *konohiki* chiefs were required to present formal claims to the Land Commission and pay a commutation fee, which could be accomplished by surrendering a portion of their land to the government.” The government could later sell these lands to the public. Upon payment of the commutation fee, the Minister of Interior issued a Royal Patent to the chief or *konohiki*.

The last one-third was originally designated to the *maka`ainana*, but not acted on--instead it was set aside to the government, “subject always to the rights of the tenants” (Moffat and Kirkpatrick, 1995:41-43; see also Chinen 1958:15-21). *ili kupono* were the only *ili* (parcel) recognized in this process, all the *ili* and lesser divisions were absorbed into the *ahupua`a* claim (Chinen 1958:20).

In 1892 the legislature authorized the Minister of Interior to issue Royal Patents to all *konohiki* or to their heirs or assignees where the *konohiki* had failed to receive awards for their lands from the Land Commission. The Act further stipulated “that these Royal Patents were to be issued on surveys approved by the Surveyor General of the kingdom” (Chinen 1958:24; Moffat and Fitzpatrick 1995:41-43).

### 3.4.2 Hā`ena Ahupua`a

The *ahupua`a* of Hā`ena is located in the *moku* of Halele`a. Its valleys are not very deep and the *ahupua`a* is relatively small (1500 acres) compared to adjacent *ahupua`a* of Hanakāpī`ai on the west and Wainiha on the east. However, Hā`ena does include extensive, well-watered agricultural areas along two main stream valleys of Mānoa and Limahuli, as well as flat land along the coast making it suitable for both agriculture and habitation. The broad sand beach with its protecting reef would have provided a useful canoe landing and nearshore marine resources. Hā`ena is the westernmost *ahupua`a* in the district of Halele`a with easy access to the bountiful deep-sea fishing grounds of neighboring Nā Pali district (Major and Carpenter 2001:13).

Griffin (1984:6-7) concluded that the occupation of Hā`ena was divided into four phases, each with particular characteristics of cultural adaptation that focused on economy or sources of energy, residence or loci of domicile and task performance. His four phases are (1) Early Occupation, (2) Mid-millennium Stability, (3) Historic Transition and (4) Twentieth Century Adjustment.

The Early Occupation Phase is poorly known. Along the front of Ke'e beach two profiles have revealed deep strata as yet undated, yet suggestive of transient beach use. The data suggest a generalized strand looping adaptation, probably by parties of collectors-fisher people camped a few days at a time. No evidence of agriculture was found, nor is there any reason to argue its necessity. The origins of these hypothetical transients is unknown. Only by archaeological explorations in locations and environments favoring early and simple subsistence systems may we learn of centers of sedentism and population concentration.

The Mid-millennium Occupation Phase is well documented as to presence, duration, concentration, and general adaptation. This phase extends from the 1000s into the 1700s, and marks a shift of increased dependence on taro production and less on collection of marine fauna. The latter never was abandoned, yet as the human population rose, providence of marine resources seems to have diminished somewhat. We suggest that by the time of European arrival, most of the taro

pondfields were completed, the *heiau* built, and the importance of Hā'ena as a social, political, and economic center established.

The Historic Transition Phase, lasting from about A.D. 1800 to 1900, is exciting in what we do know, given excavation results and archival data, yet remains poorly developed. The land award testimonies are suggestive, but no excavations have sought the claimants' houses and fields, nor have the materials likely still hidden in written records and photographs yet been perused. Major anthropological questions remain: were Ha'ena and its people marginal to the colonial activities going on throughout the kingdom, or did Ha'ena play a role as a reservoir of economic and population strength linking Na Pali to Hanalei, Wailua, and other foci of political activity? When and how did Ha'ena lose population? How did the Hawaiian people of the area adapt to changing conditions and cultural systems?

The Twentieth Century Phase cannot be said to be without interest. To an anthropologist the variety of adaptive changes and new people utilizing Ha'ena make the phase one of the most interesting. Hā'ena between 1900 and 1950 saw the end of a land-and-sea focused adaptation, and the withdrawal of the last of the Hawaiian people. Only transient campers, again collectors and fishermen, used the beaches. The Taylor Camp "hippy" occupation was brief and, so far, a bit variant, but is heuristically useful in understanding the range of variations in adaptation to northern Kauai and the nature of American "counter culture" efforts to build alternative life styles. In fact, as we move into the late twentieth century, we are seeing new, diversified uses of Ha'ena. A new form of permanent residence is appearing, in the guise of expensive beach homes of our culture's socio-economic elite. At the same time continued transient occupation by both mobile (vacationing) elite and "squatting" lower class members of society is present. Most distant on the horizon, but still there, are the Hawaiian people, looking toward regaining the land once theirs, for farming, fishing, and residence.

The *mo'olelo* depict Hā'ena as a special place for a very significant chiefly class who interacted with deities such as Pele and her sister Hi'iaka. It was a sacred place where in traditional times Lohiau, lover of Pele and Hi'iaka, was once a chief of Hā'ena. He had a brother Limaloa and a sister Kahuanui who was the actual *ali'i nui* of Hā'ena, which was always ruled by female chiefs who ruled for life. The chiefess was also not under the control or whim of the paramount chief or *mō'ī* of Kaua'i, but rather independent (Wichman 1998:126). Lohiau and his sisters paid tribute to Laka and perpetuated the hula in a *halau* (school) whose significance is still honored to this day by *kumu hula* (teachers) and their *haumana* (students). Hā'ena as a chiefly residence continued into the nineteenth century with the Mahele Award [LCA 10613] of Hā'ena lands awarded to *ali'i* Abner Kuho'oheiheipahu Pākī, husband of L. Konia, granddaughter of Kamehameha I and father of Princess Bernice Pauahi Bishop.

<i>Ahupua`a</i>	<i>Number of Claims</i>	<i>Number of Awards</i>	<i>Ali'i Claimant</i>
Hā'ena	34	25	A. Pākī

Accompanying these chiefs and chiefesses were retainers and favored tenants who provided for the immediate needs of the chief's household.... Hā'ena has limited *kula* lands (flat, open fields/pastures) being that the cliffs drop so sheerly to the shore. Premium *kula* lands would be dedicated to those uses which sustain life – *auwai*, taro cultivation and residence (Silva 1995:18).

As an *ahupua`a* chief Pākī was entitled to select a *kapu* fish and produce of the land (generally taro); Pākī claimed that the *he'e* was the *kapu* fish of Hā'ena and had at least 12 *koele* that were cultivated for him (Silva 1995:25). Abner Pākī informs that *he'e* (octopus) is the *kapu* (restricted) fish [sic] of Hā'ena (Kingdom Konohiki Records 1852; 1854; 1857 In Maly 2003:19).

### 3.4.3 Konohiki of Hā`ena

*Ahupua`a ali`i* were allowed to have a *konohiki* or land manager and about 1837, Esetera Kekela was appointed as Hā`ena *konohiki* making her one of very few women who held this position; she too later claimed Mahele lands [5 parcels] in Hā`ena LCA #5477 [ʻIli of Kalole]. Kekela was the last known *konohiki* of Hā`ena.

#### 3.4.3.1 Mo`olelo of Kekela, Konohiki of Hā`ena

Kekela`akalaniwahikapa`a (Kekela) had married Kamehameha I half-brother Kalaimamahu in 1804; five years later in 1809 she is widowed and in 1810 she is given [by Kamehameha I] to Kamaholelani [nephew of Kaumuali`i, king of Kaua`i ] and returns with him to Kaua`i to live. Kamaholelani and Kekela settle at Lumahai, an *ahupua`a* not far from Hā`ena, which Kaumuali`i had given to both of them (Kamakau 1992:195 In Silva 1995:28-29).

Kamaholelani is sometimes referred as Kaumuali`i's cousin and his son. It was said that like Kaumuali`i and very few other chiefs of this time (early 1800s), Kamaholelani was adept at speaking and reading the English language (Kamakau 1992:244-245). He apparently was a court favorite and was well-respected among his peers. In 1820 Kamaholelani dies. Kekela remains at Lumahai until 1824. In that year, Kaumuali`i passes away, civil strife results and control of the Kaua`i dominions is given to O`ahu and Maui chiefs. Kekela returns to O`ahu and either forfeits Lumahai or is disposed of it. Further, not only is Kekela well-spoken for in the courts of Kamehameha and Ka`umualii, she is also the sister of Abner Pākī's own mother. Hence, her close association to her Hā`ena claim, Pākī's claim to the entire *ahupua`a* and her management of Pākī's Hā`ena holdings (Silva 1995:29).

Land records reveal that Kekela had arrived there [Hā`ena] in 1839 and had probably become settled with her entourage and tenants by 1847 [see missionary census below]. Kekela's obituary indicates that she was born about 1778, making her 69 in 1847 (Silva 1995:22).

#### 3.4.3.2 Konohiki Privileges

Konohiki E. Kekela claimed that the *he`e* (octopus) was her *kapu* (restricted) fish of Hā`ena; and the *lehua* the special plant of Hā`ena.

**Interior Department Doc No. 11 (1850)** (In Maly 2003:20):

<u>Aina</u>	<u>Konohiki</u>	<u>ʻIa Ho`omalu</u>	<u>La`au Ho`omalu</u>
Hā`ena	Kekela	He`e	Lehua

Kekela also listed among the usual *konohiki* responsibilities, the management of 12 *ko`ele* whose names she gave as: Pākī, Kaho`okumaka, O`ahu, Kapala`a, Akole, Kaluahine, Ka`ili`ili, Pe`ekaua`i, Kalaole, Ko`i, Kanaele and Keokea. Soon after settling in Hā`ena, testimony reported that she made three *loko* or ponds within the *ahupua`a*. Native testimony does not reveal the names, locations, sites or nature of these ponds or whether these ponds are the *loko kalo* which she claimed in her application (see LCA #7949) (Silva 1995:26).

Kekela died in Honolulu in 1865 without issue. Her obituary read:

Death of an ancient woman. On Thursday, May 15, died at Honolulu, KEKELA, an aged Hawaiian female, believed to be eighty-seven years old. She was a nurse or *kahu* of the late high chief Pākī, and through a long life of upright conduct and fidelity, she has enjoyed the respect and esteem of the chiefs and all who knew her (Hawaiian Gazette June 17, 1865 p.5 c.4; In Silva 1995:29-30).

### 3.4.4 Mahele Awards in Hā`ena State Park Lands

With the exception of *kuleana* lands awarded to individual tenants, Abner Pākī was awarded the entire *ahupua`a* of Hā`ena in name only, which means that the land was not surveyed at the time. As *ali`i*, he held ultimate control over the resources within the *ahupua`a*, including water sources and products from the mountain and seas. He had twelve *ko`ele* (parcels) in Hā`ena. Eight LCA claims for Hā`ena (Figure 4) were within the Hā`ena State Park boundaries and included Pākī and Kekela as well as these below (Silva 1995:30-33):

**Haole** – LCA #7998: 8+ Lo`i 100 (f) X 25 (f), bound by Makana cliff and other cultivated lots; given to him by Mokuohai. This parcel was formerly cultivated by an older Hā`ena tenant Ho`oleali`i whose claim was not supported by Kekela who said Ho`oleali`i had returned his taro land in 1834 because he suffered poor health and was unable to maintain it. [ `Ili of Kē`ē ]

**Kanehakili** – LCA #7996: His land was given to him by Kekela in 1839; his lo`i measured 50 X 35 (f) and was surrounded by lo`i on three sides and by the beach on the other side...his house was located in Kekela`s lot where he lived since 1839. [ `Ili of Kapihae ]

**Mokuohai** – LCA #8200C/RP 7091: Mokuohai acquired his awards (house lot and pond field adjoining Loko Naia ) from Kekela in the 1840; in c. 1844 Mokuohai received Loko Kē`ē; his holdings totaled 4.25 acres 25 rods which was considered a sizable holding for Hā`ena. Upon his death, his award descended to his grandchild and heir, Kaenaku. [ `Ili of Kē`ē and Hā`ena ]

**Naiwa/Naiui** – LCA #10941/RP 6388: Naiwi received his taro lands from the *konohiki* prior to 1839 [prior to Kekela]. These lands contained 10 lo`i, a house lot adjoined them – the house lot was given to him by Kekela in c. 1839. These parcels appear to be situated in the midst of extensively watered taro lands. [family cemetery front of house cared for - 1964 photo (Major and Carpenter 2001: 19)] [ `Ili of Kamo`okahi ]

**Poa** – LCA #10674/RP 7638: Pea was a tenant from the days of Kaumuali`i [but] his claim was supported by Kekela; he claimed a houselot, 3 large taro pondfield and 10 smaller ones. His parcel was surrounded by well-watered taro lands, bound on the seaward side by sand hills. Pea died in 1849 and his widow claimed and was awarded the parcel under his name. [ `Ili of Pa`akala ]

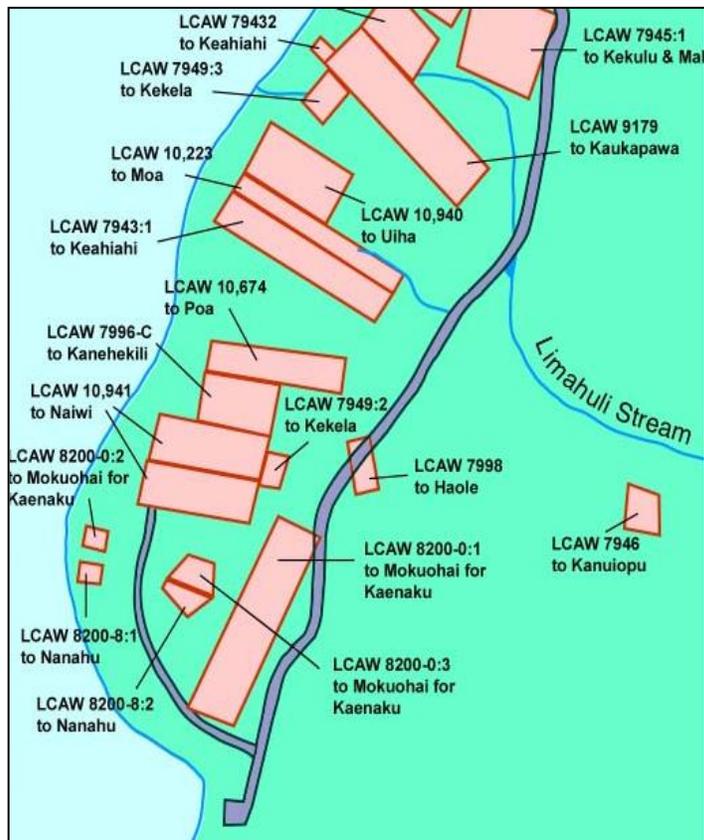


Figure 4. LCA Claims in Hā`ena State Park (Pacific Worlds).

**Nanahu** – LCA #8200B: Taro lands measured 20 X 15 (f); they appear to be situated between Loko Naia and Loko Kē`ē and his house lot is seaward of Loko Naia. Nanahu testified that his

claim descended to him from his relatives from the days of Kaumuali'i (pre-1824). He had received the land immediately from his brother who died in c. 1839. In c. 1840, **Mokuohai** arrived at Hā`ena, asking for a place to set up residence and plant taro. His lot was considered one of the most attractive and fertile parcels in the area. Nanahu and Kekela allowed Mokuohai use of part of the land, no gifting, however Mokuohai who may have been associated with Kekela claimed a part of Navaho's land and was awarded this parcel. Mokuohai gave Haole land to cultivate in 1846; this land was formerly cultivated by Hoolealii although Haole claimed them in LCA 7998. Ho`oleali'i had maintained his house lot in Nanahu's parcel, thus Nanahu's *makai* parcel contained both Nanahu and Ho`oleali'i's houselots.... Mokuohai and Haole may have had an affiliation with Kekela as they both arrived in Hā`ena after 1839 when Hā`ena was under Kekela's management. Kekela testified supporting both Mokuohai and Haole claims and discredited Hoolealii. [`Ili of Naia]

### 3.4.5 Hā`ena Land Transfers (Post 1855)

Royal Patent # 3596, Land Commission award 106.13, apana 6, to Abner Pākī. This is the same land conveyed by deed of William Kinney, dated January 5 1875, to Kenoe D. Kekaha and 37 others as tenants in common, owning the said entire tract of land in 38 equal shares" (Silva, 1995: 25). Abner Pākī died in 1855, his wife Konia in 1857. Their only child Bernice Pauahi Bishop inherited their lands and in 1858 sold Hā`ena to W. H. Pease (Silva 1995). The Hā`ena lands were transferred several times including to a *Hui* (co-op); the Robinson family obtained an interest in the Hā`ena Hui lands. In 1955 the Hā`ena Hui was dissolved and the State later acquired the beachfront property held by the Robinsons for use as a public park. In the late 1960s the brother of actress Elizabeth Taylor, Howard Taylor, acquired a parcel of land and a community known as Taylor Camp was established and populated by transient residents. This parcel was condemned by the State in 1975 and added to the public land bank later becoming the Hā`ena State Park (Major and Carpenter 2001:16).

### 3.4.6 Kē`ē, `Ili of Hā`ena

Kē`ē is located at the end of Kūhiō Highway and includes the beach, canoe landing, trail to the *heiau* and *hula* platform, sand dune, comfort station, Kalalau Trail Head (foot/livestock trail) and Lohiau's house site, taro and sweet potato cultivation and at least one fishpond (although it could have been a *loko i`a kalo* – a pond for both taro and fish cultivation). The abundant resources of the area, both *mauka* and *makai* once supplied a good sized population in pre-contact times, most likely a permanent settlement, as indicated by archaeological cultural remains (Major and Carpenter 2001:16).

However, historic human activity and natural disasters such as the 1946 and 1957 tsunami greatly modified these lands and destroyed settlement evidence. The traditional oral histories (e.g. Lohiau, Laka, Pele & Hi`iaka, etc.) of the area illustrate that Kē`ē was once a very sacred and special place, a *wahi pana*, where deities and *ali`i* co-mingled and where sacred rituals (e.g. `ōahi, Laka's *hula pā*, *hula halau*, *heiau*) were conducted. For some reason by the 1930s when E.S. Craighill Handy visited, much of the cultivation of the greater Hā`ena had been scaled back with limited terraces in Kē`ē still functioning.

The sloping and flat lands east and west of Limahuli Stream between the sand dunes and the mountain sides were developed in terraces irrigated by ditches from Limahuli Stream. About a dozen of these terraces are now under cultivation in taro. The rest are used as pasture or abandoned under brush and grass (Handy 1940; In Major and Carpenter 2001:18).

By the mid-1960s Loko Kē`ē and Loko Naia were abandoned and only a few taro *lo`i* were still being cultivated. However, by 1967 the last taro crop was harvest in Kē`ē. The taro terraces would remain fallow until 2000 when a group, *Hui Maka`āinana O Makana* began to restore old taro *lo`i* (Major and Carpenter 2001: 19).

Today Kē`ē is a tourist destination where as many as 10,000 tourists visit in any given week (Major and Carpenter 2001:19). They come for the scenic drive, but mostly for the great snorkeling at its protected lagoon and its sandy beach. They also come for the hiking adventures to neighboring Kalalau Valley (11 miles) and visits to the wet caves (Waiakanaloa and Waiakapala`e).

Photo 18. Kē`ē Beach and Kai-kua`au-o-Hā`ena Lagoon



### 3.4.7 Other `Ili Names of Hā`ena

The following `ili names of Hā`ena are based on the database of *Waihona `Aina*: Ha`aheo, Hāli`i, Kahakaheana, Kahau, Kaia/Koia, Kaia`aimokua, Kalokomaikai, Kaloli/Kālole, Kamo`oloa, Kanulau, Kaoneana, Kapihae, Keleke, Kiwaa, Kupapaulalu, Lalaole, Mahau, Makaanulua, Mo`olalaole, Naia (fishpond), Pa`akala, Pahole, Pe`ekaua`i, Pu`ukahua, Puukoka, Waikapu.

### 3.5.0 Hā`ena State Park Land Resources and Use (Traditional and Historic)

The following map (Figure 5) depicts some of the traditional and historic resources in Hā`ena.

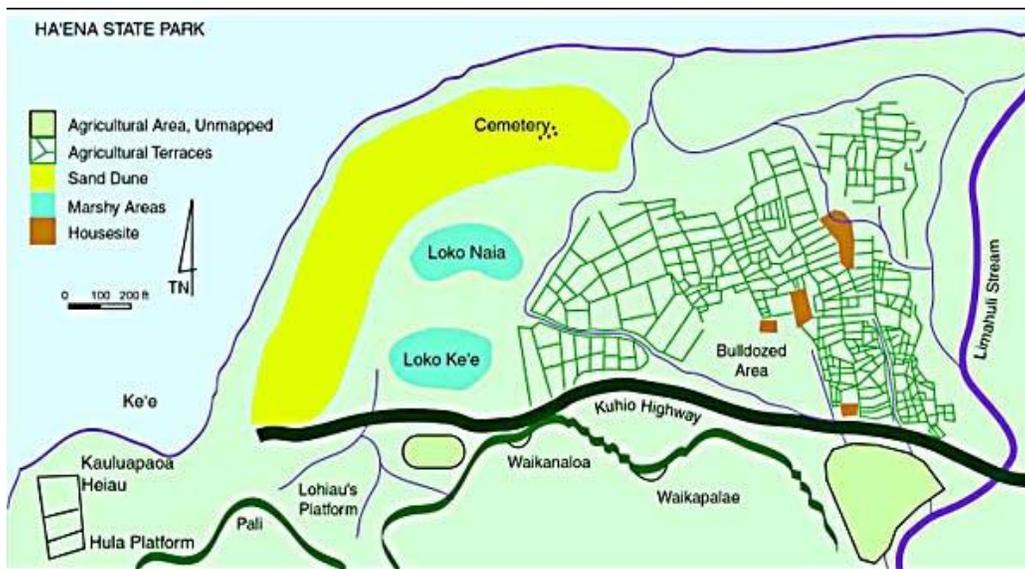


Figure 5. Map illustrating resources within Park boundaries (Pacific Worlds).

### 3.5.1 Hā`ena Pu`uone (Dune-banked Ponds)

Among the significant natural features in Kē`ē are the *Pu`uone* (dune banked ponds), called Loko Kē`ē and Loko Nai`a. The ponds, referenced in *kuleana* claims, 8200 B and 8200 C, were modified for cultural subsistence uses in antiquity, and remained in use through the early 1900s as fishponds and taro pond fields (In Maly 2003:34). One claim in the area generally is known as Kē`ē; specifically, the area of Loko Ke`e (Helu 8200 C) (In Maly 2003:8).

**8200 B Nanahu** at Hā`ena, Kaua`i. House lot, kula and *Loko* “Naia”. *Loko Naia* (Naia Fish Pond) is bounded *mauka* by *Loko Kē`ē* and *makai* by sea beach.

8200 C Mokuohai at Hā`ena, Kaua`i. Loko Kē`ē in the *ili* of Kē`ē; bounded *mauka* by Waiakapalaie *pali*; Napali by sea beach; *makai* by sea beach (In Maly 2003:18).

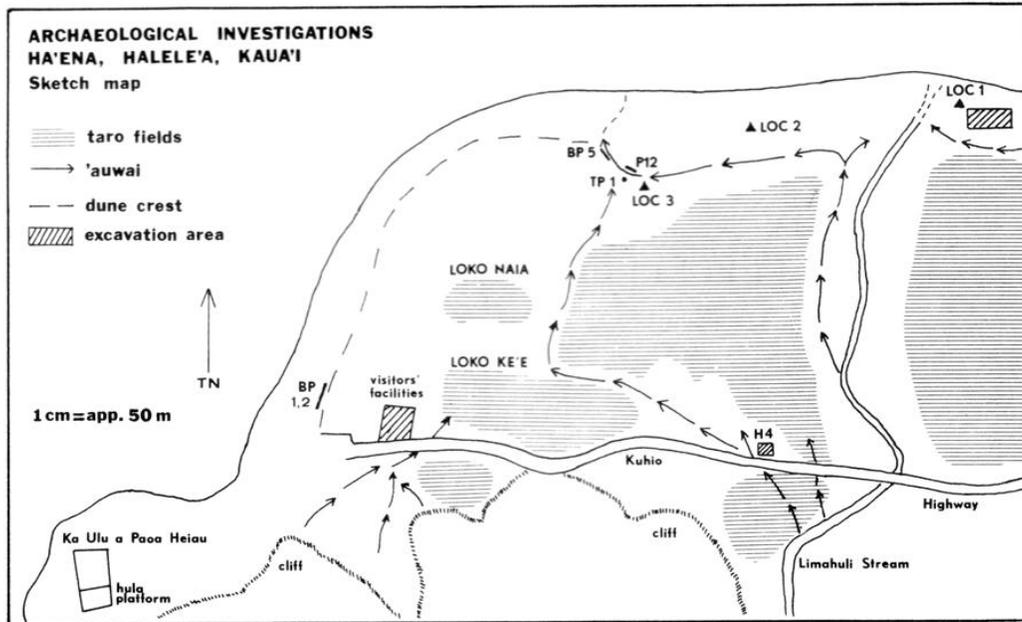


Figure 6. Map of dunes, fishponds, taro pondfields and `auwai systems (Griffin 1984: 9)

### 3.5.2 Sand Dune Habitation

Previous studies revealed the presence of household floors, hearths, *imu*, post holes and an array of midden and artifacts in the dunes and in the flat land between the bay and Loko Kē`ē (Griffin et. al. 1977, Hammatt et. al. 1978 In Major and Carpenter 2001:131)... It appears that habitation was concentrated along the dune crest (i.e. *makai* of the present unpaved access road to the poi mill area), spreading out at the west to occupy the whole flat area between Loko Kē`ē and the bay. Habitation of this area did not cease with the dissolution of the Hā`ena Hui, although the population did change radically (Major and Carpenter 2001:134).

### 3.5.3 Taro Lo`i

Land registry and testimony numbered well over 150 taro pond fields of varying sizes and shapes in Hā`ena. Of these 40 or so were situated within the Park site. That Hā`ena was well-developed and productive is unquestioned. Its water resources and available cultivable lands appear to be utilized maximally (Silva 1995:35). Lo`i restored in 2000 by Hui Maka`āinana. [See below 3.7.14]



Photo 19. Taro Lo`i in Hā`ena State Park



Photos 20-22. Evidence of burials on Parks lands

### 3.5.4 Burials

In August of 1994, the Hawai'i DLNR Division of State Parks conducted a community meeting to gather input for a proposed Hā`ena State Park Master Plan. At this meeting, concerns were expressed regarding the neglect of known burial sites within the park. These burial areas are known to local lineal families who formerly lived in what is today Hā`ena State Park. Some of these areas were formerly landscaped and maintained, leading to their slow deterioration. Some of these burials are as recent as 30 to 50 years old. The family burials are concentrated in one area within the boundaries of the park identified as a cemetery (State site #50-30-02-1892). Also the coastal dune system, a portion of which runs through the park, is a known burial area: some burials were located during previous archaeological testing and others have been exposed as a result of erosion. This pattern suggests a high potential for additional burials to be exposed in the future. The descendant families requested that a joint effort between the families and the Division of State Parks be initiated to stop further deterioration and natural destruction, and to restore a sense of respect to these sacred areas (TKC-H 2001:I-12-13).

#### 3.5.4.1 Dune Burials

Sand dunes were considered “the most reasonable place for internment” for the Hā`ena commoners other than within the family house lot. “Hā`ena’s fairly sizable resident population through time would be reflected in more than moderate burial activity in the sand dunes.... Tidal and human impacts have negatively affected these dunes and will continue adversely unless policy, planning and enforcement measures are established” (Silva 1995:18-19).



Photo 23. Part of Dune System in HSP

#### 3.5.4.2 Hā`ena Cave Burials

Given Hā`ena’s physical environment, one would expect customary royal internment in hidden or inaccessible areas on the steep cliffs. Numerous caves pock-marked the cliffs of this coastline thereby providing natural tombs for the chiefly class. Mythology verifies this practice in Hā`ena; Prince Lohiau was entombed nearby in a cliff cave until revived by Hi`iaka. It is possible and even likely that others of chiefly status have found a final resting place within these cliffs (Silva 1995:18).

### 3.5.5 Hā`ena Caves as Places of Interest in 1800s Literature

The editor of “*The Hawaiian Kingdom Statistical and Commercial Directory and Tourists Guide*” (1880) George Bowser, wrote about various statistics and places of interest around the Hawaiian Islands. The

following excerpt from “An Itinerary of the Hawaiian Islands” offer descriptions of the communities and various attractions of the Halele‘a region (In Maly 2003:35), especially Hā`ena.

From Hanalei I rode out to Hā`ena, which is at the northeast corner of the island, and is distant from Nawiliwili about forty-four miles. The land in this neighborhood is very sandy, and does not seem likely to be turned to account for any purpose but pasture. Two curious caves have been found near here. One of these, called by the natives Kanaloa, which means “the wife of the devil,” has no floor except the water which lies in it, the depth of which no one has yet succeeded in fathoming. At its mouth this cave is about sixty feet wide and twenty feet high, and from these dimensions the sides and roof gradually draw in, with a gentle curve, until there is only six or eight feet either way above the surface of the water. The full extent of the cave has never yet been explored. Its walls are perfectly smooth, and their curved surfaces are so perfect that they might have been cut by the hand of man. The other cave is dry, and is not far from Kanaloa. It is called Maninihola, and is about forty feet long, twenty feet high at the entrance, and gradually diminishing to about six feet at the inner end. The natives used to have various stories about monsters which inhabited these caves, but it is now impossible to find any connected story in what they tell you.

The editor of the *Hawaiian Gazette*, Henry M. Whitney, published a “Hawaiian Guide Book” in 1875 and 1890. The publication was produced as one of the early promotional guides to encourage visitation to the Hawaiian Islands, and included descriptions of the islands, agriculture, plantations, scenery, climate, population, commerce, and places to stay while visiting. His publications provided readers with commentary on traveling the old roadways through Hanalei and Nāpali and included several “traditions” of storied places on the landscape (In Maly 2003:36-38).

The wonderful caves, Waiakanaloa and Waiakapala`e, are about ten miles from Hanalei. In the early days of Hawaiian history, it is said, a brother and sister came from a foreign land, in order to supply the people with water, of which there was a great dearth. They came to a mountain, and determined to dig into its side until water would be discovered. Kanaloa, the brother, selected a spot where he thought he would find water, and after digging a long time detected a lake, whose waters he caused to flow over the land, and to this day the taro patches are irrigated from this source. Visitors are escorted into the arched entrance, and to the lake within. Here the natives light torches, and take the tourist for a row upon the water, which is cold and clear and fresh. At the entrance the depth of the water is forty- two feet, though further in it is said that no bottom has been found.



Photo 24. Waiakanaloa Cave

A strange sensation, a combination of awe and fear, creeps over one as daylight is left behind, and the frail bark glides into the blackness of night, and seemingly into the very bowels of the earth. The black waters reflect the ruddy glare of the torches, and the flickering flames throw strangely contorted shadows upon the rocky sides and ceiling of the cavern, while the half-nude forms of the rowers look weird and unearthly. Even the most frivolous scarcely speak a word, and then only in the faintest whisper, and it is with a long-drawn breath that the traveler steps out of the darkness into the light, but also with an impression that lasts for life.



Photo 25. Waiakapala`e Cave

The other cave, which was dug by Kapalae, has also an arched entrance, and though much smaller than the first cave contains a lake whose waters are ever covered by a thin film. There is a third cave, known as the “Dry Cave,” which one can enter and walk through, or can ride into on horseback. A few seconds walk into its depths brings one beyond the reach of daylight, and no one has ever ventured further within its gloomy recesses. A foreigner could not find his way out, and a native could not be persuaded to enter, because it is said that a gigantic moo (dragon) guards the cave. We are told that the ancient high chiefs of Kaua`i were buried there, far under the mountain, and that many priceless feather cloaks and feather helmets might be found. In speaking of the largest cave, the *Hawaiian Spectator* said: “Its entrance is gothic, from twenty to thirty feet high, and as wide. The entrance to the second compartment (or lake), is also gothic, and one half as large as the other opening. The first chamber is about 150 feet long, 100 feet wide, and sixty feet high, the whole forming a beautiful arch.”

### 3.6.0 Hā`ena Demographics of mid-1800s.

The missionary census of 1835 and 1847 a disproportion between the number of children and adults (Schmitt 1973:46 In Silva 1995:21):

1835		1847*	
Adults:	100	Adults:	108
		Male	46
		Female	62
Children:	16	Children:	54 [up to 20 yrs]
		Male	30
		Female	24
Deaths:	4	Deaths:	10
Births:	1	Births:	2

\*At this time [1847] Hanalei’s adult population was 376 and children 146; Kalihiwai was 156 and 54; Wainiha was 153 and 63; and Kalalau was 115 and 16 (Silva 1995:23).

### 3.7.0 Previous Archaeological and Other Studies: Hā`ena and vicinity

As early as 1931 Bennett voiced this observation: “Unfortunately the continuity of culture on the Island of Kaua`i is broken. The older natives who still remember heiau (temples) are fast dying, and the younger generations are no longer interested” (Bennett 1931:3).

At the western edge of Halele`a, just on the border with the Na Pali District, lies Ha`ena, also the scene of considerable intensive archaeological study (Griffin et al. 1977; Hammatt et al. 1978; Griffin 1984). Earle (1978) mapped several large irrigation complexes that lie just inland of a large sand dune fronted by Kē`ē Beach. Excavations by Griffin, Hammatt, and others have revealed that these dunes incorporate well-stratified occupation deposits, with many superimposed cultural strata. Unfortunately, no radiocarbon dates are available, but a series of hydration-rind age determinations on volcanic-glass artifacts suggests occupation as early as the tenth century and continuing up until historic times. A number of relatively early artifact types were also recovered, including porpoise-tooth pendants and incipiently knobbed two-piece fishhooks. Hammat et al. (1978:168) outlined a tentative sequence for the Kē`ē Beach site. They believe that the first phase consisted of a ‘transient marine-oriented’ fishing settlement. By about A.D. 1200 there was a ‘population increase with a broader resource base,’ and settlement expanded inland. The 1400s witnessed ‘the development of intensified irrigation agriculture in inland areas with a continued use of the littoral environment,’ a pattern that evidently continued up until the historic period. The archaeological potential of the Ha`ena area, with both the stratified Kē`ē Beach deposits and the extensive irrigation systems inland, has just begun to be tapped and future work in the region may reveal much about the development of Hawaiian society in this part of Kaua`i (Kirch 1985:101-104 In Silva 1995:14).

**3.7.1 Thrum (1907)** “Tales from the temples” In *Hawaiian Annual for 1907*.

**3.7.2 Stokes (1908, 1909, 1927)** Various studies.

**3.7.3 Emory (1929)** “Ruins at Kee, Hā`ena, Kaua`i: Famous Court of Lohiau” in the *Hawaiian Annual of 1929*, Emory provided the descriptions for many of the sites listed in Bennett (1931) below.

**3.7.4 Bennett (1931)** *Archaeology of Kaua`i*. Bennett conducted his field work of Kaua`i archaeology in 1928-1929, “supplemented by a study of available collections, of published literature, and of manuscript notes on file in Bernice P. Bishop Museum” (Bennett 1931:3). Bennett (1931:60-69, 95) notes that various artifacts found are unique to Kaua`i such as the curved adze, gouged stone implements, polished stone knives, and Kaua`i pounder (ring, stirrup, and block), block grinders, the broad tapa anvil, *makaloa* sedge mats (Ni`ihau and Kaua`i ), and decorated gourds or *ipu* (Ni`ihau and Kaua`i ). [Hā`ena sites cited above].



Photo 26. Entrance to Hula Terrace



Photo 27. Ke Ahu a Laka



Photo 28 Kauluopā`oa Heiau



Photos 29-31. Views of Heiau Site

Site 154	Kauluopā`oa Heiau	Kē`ē, Hā`ena	Unenclosed stone terrace 100X60X20 at highest corner; top of heiau is divided by different levels
Site 155	Lohi`au’s dancing Pavilion & shrine	Kē`ē, Hā`ena	Above the heiau and against the base of the cliff are two wide and low terraces; the halau was on the upper terrace where dances were performed before the <i>kuahu</i> or altar to Laka, a simple frame decorated with leaves; the eastern end of the lower earth filled terrace slopes down...faced with four foot wall; a few feet back of level terrace is a bluff...a small rough platform stands against it, possible a grave....



Photos 32-34. Views of Lohiau's House Site covered with vegetation.

Site 156	House site of Lohiau	End of government road; stone faced, earth and stone Filled, unpaved terrace 80 feet long and 8.5 feet high at highest part....
----------	----------------------	---

**3.7.5 Handy & Handy (1972) *Native Planters in Old Hawai'i: Their Life, Lore, and Environment.***

Almost certainly the first settlers chose protected bay and beach areas where fresh water was available and there was good inshore and off shore fishing...it would seem, if we accept the evidence of the story of Pele and her clan, that this (Kaua'i) was the first landfall of at least one group of early settlers (Handy & Handy 1972:268).

**3.7.6 Griffin et. al. (1977) *Preliminary Archaeological Investigations at Hā'ena, Halele'a, Kaua'i Island***

The first survey and testing program began in 1977 under the direction of the author (Griffin et al. 1977). The most westerly portion of the dunes and back dune areas, and the terrain west of a transect running from the east edge of *loko* Ke'e to the outlet of the '*auwai*\_(ditch) by BP5 was closely examined on the surface. In addition, test excavations, coring, and profiling of seaward dune faces was completed. Several backhoe trenches were placed where stratigraphic data might be retrieved. Since complex stratification was apparent in the dune, special efforts were made to understand the depositional history and geoarchaeology (In Griffin 1984.:2).

**3.7.7 Earle (1978) *Economic and Social Organization of a Complex Chiefdom: The Halele'a District, Kaua'i, Hawai'i.***

**3.7.8 Hammatt et.al. (1978) *Archaeological Investigations at Hā'ena State Park, Halele'a, Kaua'i Island: Phase II: Excavations of Beach Localities and Visitors Facilities Area.***

**3.7.9 Riley and Ibsen-Riley (1979) "Taylor Camp, Hawaii: The life and death of a hippy community" *Field Museum of Natural History Bulletin* 50, 18.22**

**3.7.10 Riley and Clark (1979) *Archaeological Testing and Excavations at Hā'ena, Kaua'i .***

During the summer of 1978 a combined University of Hawaii-University of Illinois (Urbana) Field School was held at Hā'ena. Griffin coordinated the project, while Thomas Riley directed the effort (Riley and Clark 1979). Riley worked at three "localities", each in beach deposits (Fig. 1). Two, localities 2 and 3, are in eastern and central portions of the park. Locality 1 is to the east of [6] Limahuli Stream, on the property of Mr. Barlow Chu. Riley and Clark opened horizontal test excavations as well as test squares and profiles (In Griffin 1984:2).

**3.7.11 Hammatt and Meeker (1979) *Archaeological and Ethnohistorical Investigation at Hā'ena, Halele'a, Kaua'i Island.***

Riley's work on the Chu property was followed by further excavations in the high dune beside the stream and by surface mapping and ethnohistorical study (Hammatt and Meeker 1979a, 1979b). The work of Hammatt and Meeker was especially interesting, given its richness in data of historical archaeology. Hammatt, building on maps by Earle (1978) drawn in 1973, further mapped the historic remains of the Chu homestead and adjacent taro fields. These features ranged from the present road *makai* to the dunes (In Griffin 1984:2).

**3.7.12 Yent (1980)** *Preliminary Archaeological Testing of House 4, Ha`ena State Park, Halele`a, Kaua`i.*

Martha Yent (1980) conducted emergency mapping and salvage research of a *mauka* house platform, house #4, found near the road among the taro fields. While her project was necessarily limited by salvage constraints--a simple assessment of damage done by laying water pipe - her report has important implications for the Ha'ena settlement and agricultural systems (In Griffin 1984:2).

**3.7.13 Yent and Ota (1983)** *Field check of dune erosion and exposed cultural materials at Hā`ena State Park, Hā`ena, Kaua`i , TMK: 5-908:18.*

**3.7.14 Griffin (1984)** "Where Lohiau Ruled: Excavations at Ha`ena, Halele`a, Kaua`i." *Hawaiian Archaeology I*(1), 1.18

**3.7.15 Silva (1995)** *A Historical and Cultural Report of H`ena State Park, Halele`a, Kaua`i.*

**3.7.16 Major and Carpenter (2001)** "Supplemental Archaeological Inventory: Hā`ena State Park, Kaua`i TMK: 5-9-06:14 and 5-9-08:1 through 19." Map below of sites inventoried (Figure 7).

Much of the archaeology done in Hā`ena has been on buried sites in the coastal flat, primarily because this is where houses have been built in the last two decades. Surface features are common in the valleys (Mānoa and Limahuli – agriculture and habitation), but the coast has very few. Archaeologists have not dwelt upon this pattern and it is not clear whether the lack of surface features reflects the original settlement pattern (post structures without rock walls), post-abandonment deposition of sand that has buried features, or historic removal or disturbance of surface features.... Archaeological excavations have failed to demonstrate that walls or platforms were common in the coastal area. Instead, it appears that although stone lined pits and pavements may have occurred, above surface features may not have ever been a major part of the coastal settlements. What has been recorded numerous times is the presence of fire pits, refuse pits, and one or more strata rich in charcoal, midden and artifacts. These appear to be present...in the Kē`ē dunes [pg 23].

Unfortunately, the archaeology that has been done is in response to development of particular private parcels; therefore the overall distribution is not known and what we have to go on are sporadic glimpses. Although the general opinion is that habitations were dispersed along the shore, rather than clustered in villages, burials seem to be concentrated in certain locales and had yet to be demonstrated that clustered habitations did not exist [pg 25].

Cultural deposits in coastal sands vary in age, but there are enough dates to show that Hā`ena *makai* was occupied by about A.D. 1300-1400. The earliest date (AD 252-549) fits the belief that Hā`ena would have been an attractive area for early settlement, but even the authors suspect the date's bias.... The A.D. 900-1100 dates for Kē`ē (Hammatt et al 1978) are invoked as justification for assuming occupation of the rest of Hā`ena, despite the fact that Kē`ē dates are based on volcanic glass and derive from a different valley catchment. There appears to be a strong willingness to accept the model proposed by Hammatt in 1977 saying that transient fishing camps began before AD 1000 and coastal settlement occurred in the 1200s [pg 26].

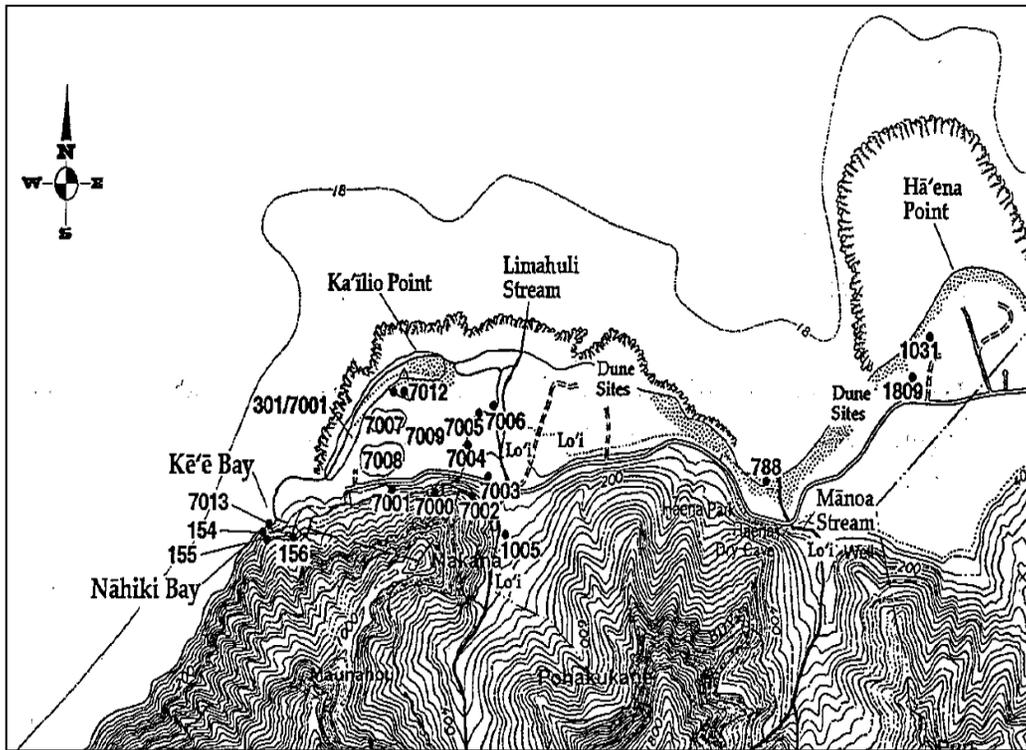


Figure 7. Recorded Archaeological Sites in Hā'ena (Major and Carpenter 2001:24)

Earl (1978) described the general settlement pattern in which inland *lo'i* complexes used all available land down to just behind the coastal dunes, with habitations occurring on and just behind the dunes. Historically, Land Commission data indicate a pattern of [pg 26] habitations dispersed amid the *lo'i*, but still with the majority of habitations located closer to the coast than to valley interiors [pg 27].... Field terraces immediately *makai* of the main road and on the west side of Limahuli Stream were mapped and tested, [and] showed evidence of both wetland and dryland cultivation. Three *mauka-makai* divisions of the project were identified, based on historical *kuleana* boundaries, morphological differences in features, and modern vegetation patterns. On either end, excavations revealed *lo'i* sediments, whereas the middle section lacked such a layer and contained an *imu* indicating at least temporary habitation.... Charcoal from the *imu* suggested occupation as early as AD 1050, well before the AD 1400-1500s dates from other excavations that were interpreted as beginning the wetland field system (Calis 2000:31-32, 35) [pg 29].

The Phase I *lo'i* complex [Figure 8] consists of 42 features, the majority (38) of which were irrigated pond fields; Features 1 and 40 are *'auwai*; Features 41 and 42 are habitation features. Feature 1 at one time brought irrigation water from Limahuli Stream to System A, while Feature 40 is a large ditch that drained System B with runoff flowing into the ocean on the north/northeast preventing stagnation and flooding of the coastal dune habitation system. System A is bordered by the *'auwai* (Feature 1) on the north and by the main road on the south. The original construction of the road (ca. early 1900s) most likely impacted this *lo'i* complex [pg 51]. The terraces within this Phase I are not the entire system; there were more terraces westward eventually draining into Loko Kē'e (65 meters west), a combination agricultural/aquacultural feature with no apparent outlet. System B is bordered on the south by the *'auwai* (Feature 1) and on the northwest by *'auwai* (Feature 40). Remnants of a Poi Mill (Site 7014), is just outside of this Phase I survey area [pg 53].

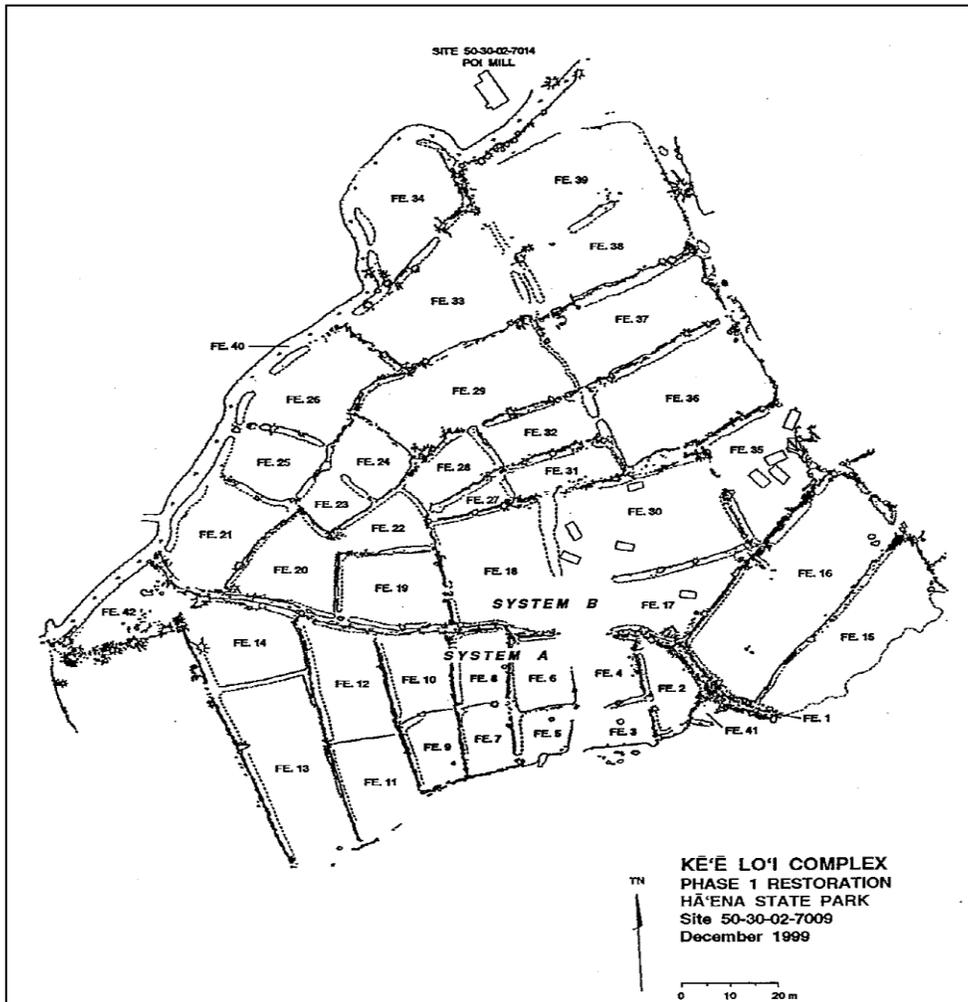


Figure 8. Kē'ē Lo'i Complex, Hā'ena State Park (Major and Carpenter 2001:52).

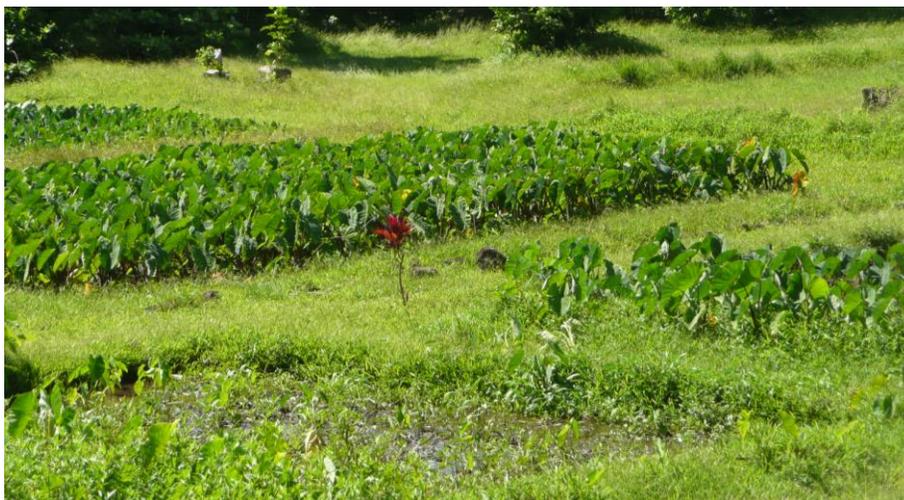


Photo 35. Part of Restored Lo'i System in Hā'ena State Park.

Subsurface testing included test units, stratigraphic trenches (6), a backhoe trench (near the *makai* extreme of the project), and shovel probes [pp 49-50]. Several charcoal samples were submitted for dating. The results yielded several date ranges: AD 1270-1410; AD 1320-1350; AD1390-1440; AD 1440-1480; AD 1440-1640; AD 1470-1660; AD 1490-1600; AD 1520-1590; AD 1620-1680; and AD 1730-1810 [pg 112-113].

Fishing and canoe-making artifacts recovered on the surface provided evidence of marine subsistence activity. Prismatic blades, basalt flakes and an adze fragment all indicated that work occurred amid the fields, but without sufficient resolution to interpret specific activities.... Together, the artifacts yielded the unsurprising information that non-agricultural activities occurred in or near the western edge of the project area [Phase I *lo`i*].... But since excavations were not performed in the middle of [the] field, it would be unfair to say that such artifacts cannot also be found away from the banks. Blades and flakes would be useful tools for preparing *huli* (propagative cuttings) and cleaning harvested corms, so their presence should not be interpreted as evidence of non-agricultural activity [pg 138].

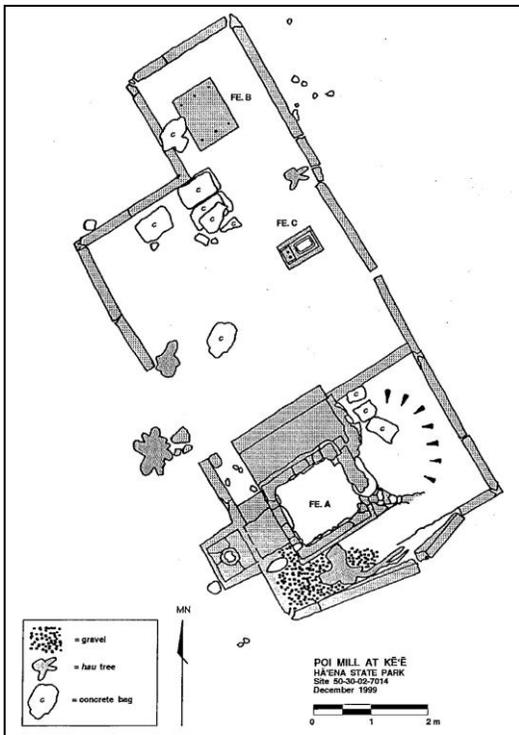


Photo 36. Remnants of Poi Mill Foundation

Figure 9. Poi Mill Foundation, Site 50-30-02-7014 (Major and Carpenter 2001: 54)

### 3.7.16.1 Chronology of Kē`ē Site 7009 [Agricultural System] [pp 148-149]

- |              |  |
|--------------|--|
| AD 1300s     | Irrigated agriculture begins at Kē`ē as early as the late 1200s... “intensive” irrigated pond fields are the first form of agriculture here  |
| AD 1500s     | Existing fields at Kē`ē are overhauled. Large fields are subdivided and the current <i>auwai</i> is constructed. Activity appears to be system-wide and appears to differ from simple repair and rebuilding of fields that have been inundated by flood or wave sediments. |
| AD 1830-1875 | Boundaries of fields change and water flow is probably rerouted and managed differently as Kekela, a non-Kaua`i chief, becomes <i>konohiki</i> . Several land claimants in the area arrived during her tenure.... Abner  |

	Paki received all portions of Hā`ena not otherwise claimed
AD 1875-1955	Most of the <i>ahupua`a</i> of Hā`ena is sold to a Hui of native tenants in common. Parcels now correspond to shares in the Hui.... By the 1930s, farming has declined and the tsunami of 1946 kills many residents and causes others to stop farming.
AD 1955-1967	Members of the Hashimoto `ohana are the last to farm the fields of Site 7009. Although some modern machinery is used for certain tasks, cultivation methods are essentially the same as those used traditionally. Hui parcels are sold off in a piecemeal fashion by many owners.
AD 1968-1975	Taylor Camp commune, a hippie settlement, occupies what is now the central area of the park. No further cultivation of taro, and the `auwai is abandoned. Population fluctuates and farming consists of small, unirrigated gardens on the old terraced fields. Perhaps for the first time, residents do not rely on local subsistence.
AD 1975-2000	The State of Hawai`i condemns land west of Limahuli Stream, evicting Taylor Camp residents so that the land can be developed as a State Park. Parking and restroom facilities are built and other land use is limited to squatter camping, fishing and recreation, all of which are oriented to the shoreline.

### 3.7.16.2 Significance Evaluations

Aside from modern additions...all of the features within the project area [Phase I] are significant under NRHP and SRHP criterion D and certain features are significant under Criterion E of the State of Hawai`i criteria due to their cultural significance to Native Hawaiians [*auwai*][pg 150].

### 3.7.17 Dye (2002) “Archaeological Assessment for a Residential Lot at Hā`ena, Kaua`i (TMK:5.9.02:62)”

The assessment included a brief field check of the parcel to document existing conditions and an extensive review of maps and other documents to determine the likely presence or absence of unrecorded historic properties. Information on historic land-use patterns before, during, and after the *māhele* is presented, as are the results of archaeological surveys at Hā`ena Point and in the vicinity of the residential lot. The archaeological information is synthesized and used in conjunction with information on land-use patterns to formulate expectations for inventory survey results.

## 4.0 ETHNOGRAPHIC SURVEY

The Ethnographic Survey (oral history interviews) is an essential part of the Cultural Impact Assessment (CIA) because they help in the process of determining if an undertaking or development project will have an adverse impact on cultural properties/practices or access to cultural properties/practices. The following consultant selection criteria were initially considered:

- ❖ Have/Had Ties to Project Area
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Referred by State Park staff
- ❖ Referred by NTBG-Limahuli staff

Both State Park and Limahuli Garden staff had names of *kuleana* land awardees, lineal descendants, cultural practitioners, well-known historians and long time residents of the project area and vicinity. An effort was made to contact people from each category.

The consultants for this Cultural Impact Assessment were selected because they met the following criteria: (1) consultant grew up, lives or lived in the vicinity of the project area; (2) consultant is familiar with the history and *mo'olelo* of Hā'ena and vicinity in general; (3) consultant is a known Hawaiian Cultural Practitioner in the project area/vicinity; (4) consultant is a lineal descendant of *kuleana* lands; and/or (5) consultant was referred by Staff of Limahuli Garden or State Parks (see Demographics Table 3 below). Copies of signed "Consent" and "Release" forms are provided in Appendices H/I.

### 4.1.0 Research Themes or Categories

In order to comply with the Scope of Work for this cultural impact assessment, the ethnographic survey was designed so that information from consultants interviewed would facilitate in determining if any cultural sites or practices would be impacted by the implementation of the proposed *Hā'ena State Park Master Plan and Environmental Impact Statement* (Job No. F74C664A). To this end the following research categories or themes were incorporated into the ethnographic instrument: Consultant Background; Land, Water, Marine and Cultural Resources and Use; Anecdotal Stories; and Project Concerns. Except for the 'Consultant Background' category, all the other research categories have sub-categories or sub-themes that were developed based on the ethnographic raw data or responses of the consultants. These responses or clusters of information then become supporting evidence for any determinations made regarding cultural impacts.

### 4.2.0 Consultant Background

The project and the CIA process was explained, then after signing the consent form, each consultant was asked to talk about their background; where they were born and raised, where they went to school and worked, and a little about their parents and grandparents. This category helps to put the person being interviewed at ease, establishes their connection to the project area, their area and extent of expertise, and how they acquired their proficiency. In other words, how the consultant met the research consultant criteria.

The consultants either have family ties to the project area and vicinity and/or are familiar with the history of Hā'ena State Park and vicinity. Six people were interviewed; all are part Hawaiian. Four were interviewed in their homes (one in Hanapēpē, one in Wailua, one in Kīlauea and one in Honokua, South Kona); one was interviewed at Limahuli Garden and one was interviewed at NTBG office in Kalāheo. Efforts were made to interview three more, but there were no responses to emails or telephone messages.

**Table 3. Demographics for Hā`ena State Park CIA Interviewees (all are part-Hawaiian)**

Interviewee	YOB	B/R	Lived/Lives/Works	Connection to HSP
Alquiza, Kapu	1954	O`ahu/Anahola	Hanapēpē (CP-H)	Ke Ahu a Laka – cultural practice
Hashimoto, Thomas	1934	Hā`ena	Hā`ena (CP-F)	Fishing; <i>lo`i kalo</i> ; <i>ohana</i> history
Medeiros, Clarence	1952	Kona	Kona (CP-T/LD)	Descendant of Mokuohai ( <i>kuleana</i> land)
Wichman, Chipper	1957	O`ahu/Kaua`i	Hā`ena (M)	Limahuli; Hā`ena <i>lo`i kalo/mo`olelo</i>
Wichman, F. Bruce	1927	O`ahu/Wailua+	Hā`ena (M)	Limahuli; Hā`ena <i>mo`olelo</i>
Wichman, Randy	1957	Wailua/Hilo+	Hā`ena (CP/M)	Limahuli; Hā`ena <i>mo`olelo</i> , cultural sites

CP = Cultural Practitioner; H= Hula; F Fisherman; T=Taro Farmer; LD = Lineal Descendant; M = Mo`olelo (history expert)

**4.2.1 Kapu Kinimaka Alquiza (Kumu Hula)**

[This interview was disrupted when Kumu Kapu had to leave to pick up a grandchild; the follow-up scheduled interview did not work out.] I don't know why my parents named me this but my mom and dad both married twice, my mom had ten children and my dad had from his previous marriage had six, so they had sixteen children...we were all raised together. My mom had three children from her previous marriage, and then came us 7 kids after that. My dad had the six children before the second batch came around. I'm from the second batch. That's how we distinguish ourselves with each other, first batch and second batch. But anyway, I was actually born on O`ahu, and at a very infant age my parents moved to Kaua`i - I was the youngest at the time, so my [younger] brothers and sisters...four of them, were born on Kaua`i. I was the youngest at that time moving from Honolulu to Kaua`i, so I knew nothing of Honolulu, actually. My dad inherited the first batch of children, and when he met and married my mom, she raised the first batch of his and her children. When my parents moved to Kaua`i (1954) they lived down at Nawiliwili, near the Marriott - that's where we were raised; and the rest of my brothers and sisters were born there.... I think it was 1963 or 1962 when we moved away from there to go to Anahola - in 1963 my mom got awarded a Hawaiian Homestead in Anahola...we stayed there until we all graduated from high school, married, and left the home. Prior to St. Catherine's I went to Immaculate Conception School in Līhu`e from kindergarten to fifth grade and then St. Catherine's from sixth grade until eighth, and then Kapa`a High School from ninth to graduation. Gee I'm amazed I can remember those days. Of course some of the kids came after, so we never had all sixteen children in the house at the same time. Some grew older and went off to their specific destinations, and others came and took their spot. Life has really passed for my mom and my dad.... My mom is Ellen Pai Kinimaka. My great great grandfather's name was Keawemahi Kinimaka; he married Kawahine Pai is what I know her as, I don't really know her first name, but she was from Borabora.



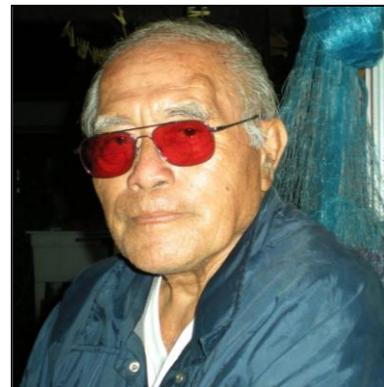
My dad, Joseph Kamanaua Kinimaka, was a glaze tile setter; he was one of the first here on Kaua`i, which was really cool at the time, but of course we really didn't know it yah. Then for his recreation he was a falsetto singer, and a steel guitar player. So his first batch of sons became great entertainers in Honolulu.... We have a cousin who's been doing the family genealogy for over ten years. I was just amazed when we all came together as a family and she busted out this chart, and generations going far back to Umi and Liloa and so forth and I'm like 'holy cow!' My great-grandfather was David Leleo Kinimaka; he was commander in chief to King Kalakaua's guard; he was a Lt. Major. We have documentation on his life too. I don't know my grandpa or my grandma, but my cousin found a lot on his father; so our great-grandfather and great-great-grandfather, and great-great-great-grandfather! My last grandson is named after my great-great-grandfather. Anyway, my dad is from Kona and he was raised in an orphanage, so I don't know much about my grandpa and grandma. He met my mom there in Kona, and moved to O`ahu and living in some really poor districts of O`ahu.

After high school - I was kinda active in high school stuff and did a lot of traveling during high school for Aloha Airlines and Ala Moana Hotel -- we were promoting both the airlines and the hotel during my four years of high school. My kumu was a great kumu and he was asked to take on this responsibility of promoting the islands, and so he selected a few of his dancers within his halau - he was Manu Gonzalves. I was really young, but I was always told I looked old kinda - like mature looking, so I guess I was fortunate that that happened because I got to see the east, west, and Midwest of the mainland; Canada, New Zealand, Australia, all those beautiful places. I know I would never have been able to see these through family travels because of our situation of having so many children, you know how that goes. So I was so blessed - not only me - I had other sisters; there were five of us, so all five of us had the privilege of going to different parts of the world through hula, through promotion of our islands etc...all the way through high school...some of us after high school. I went to college and another went off to continue dancing and traveling, and stayed with our kumu until he moved away. We started out with Auntie Lovey Apana when we were little, and she did get a few promotions but we were babies then, but we did most of the island kind of performances. Then when we got bigger and moved to Anahola, my mom took us to Uncle Joe Kahalelio who was in Kapa'a, so we went to Uncle Joe when I was in the sixth or seventh grade, we stayed with him until we were all out of high school. He was the one that actually took us around the world. It was a good thing that my mom pushed us to keep hula because she just believed that we needed to be part of hula. My mom was a kahiko dancer and to her it was important that we did hula...she danced *auana* too.

I danced at age five with my sisters. I went to high school, got married at age 20, my first son at age 21, my second son at age 24, and my daughter at age 27 I think. I started teaching when I was part of a halau here on Kaua'i that was going to enter the Merrie Monarch Festival, they asked me to come and be part of it and I did. My daughter was two years old at the time, and so I did what my mom did, bring her along and get her to find some interest in the dance. Lo and behold as I was practicing for the whole year with this halau, she was two years old and I sat her in the back, and I said okay mom is gonna practice, you stay here and you watch or dance. She ended up dancing in the back at age two.... Kumu Lake became my kumu at one point, and then he passed away. I called him my kumu although he wasn't officially my kumu, but he took me into his home and shared mele, history, and stories.... And there was this other gentleman, he wasn't my kumu, he's a haole guy that was raised by a Hawaiian family on Lanai, my dearest friend, Kepā Maly. And he is sooo knowledgeable; I love him dearly. Today, I'm so happy because he was here on Kaua'i, married a Kaua'i girl and they lived here and then he moved to Big Island. But when he was here on Kaua'i, he worked with me in my halau. And it's that kind of people that I like, Kumu John and Kepā, that kind of people we get drawn together. They're just all true, real people. When he was on Kaua'i, he educated me on so many places on our island. He got me interested in reading more about Kaua'i, our home. I said wow I've been missing out on all these things! And then he moved away.

\* \* \*

**4.2.2 Tom Hashimoto** I'm Tom Hashimoto and I was born (1934) and grew up in Hā'ena with my mom and dad and my brother Joe Hashimoto. My mother was Dora Poe Hashimoto; she was born in Makua on O'ahu, and my dad was born in Napo'opo'o on Hawai'i. I lived in Hā'ena 41 years. Actually I bought this house [in Kīlauea] and moved away in 1973 to Princeville, and moved up in this area [Kīlauea] in the 1970s when I bought this house. My father worked for the County and my mom worked in the cannery during the summer months...Hawai'i Food Packers. I went to school when we came to Hā'ena -- think we were the last class in Hā'ena -- you don't know the area so it's kinda hard for me to explain. The place is all *kamani* bush. Well, right in between there from Kapuhi to that one near Kuhao, it's right between there that's where the school is...on the mountain side, right where you know that big open lot, that nice open



lot down after you pass Kapuhi and the houses, it's right next to that, but they all covered with *kamani* trees that area. After that to Kapa'a High School, but I never graduate because I went to work to help support the family because my two brothers were in Korea at the time, was war time eh? And then for the Army not taking me, I went go join the National Guard in 1950 to help support my dad. I went to work here and there like the cannery, indoor kind...at the time job was scarce in 1950 and then I worked for McBride for five months in 1954 I think, and then after that I worked for Julia Wichman -- I worked at their house property in Hā'ena. I would be asked to do all kinds of work by Mrs. Wichman and doing all that because I was employed by her. I worked for her and then in 1968 we were called -- the Unit and they took us to Honolulu because we got activated. So I went away for two years. And then while I was in the service, because Mrs. Wichman was paying me my wages while I was away, I figured I owe her something so I came back and worked for her, although my mind was so in the career, in the service because I had 18 years, but because of that I came home and then I was working at the Hanalei Plantation Hotel (overlooking Hanalei River mouth) - worked over there until 1962 until the time that place closed. [Club Med] that's the place and we worked the club too.

I worked for Mrs. Wichman and then I planted some taro down in where the State lo'i is right now, down by the cave. But my pastime was fishing, so that's the reason why I learned it well. My dad was the best fisherman; he go throw net fishing. And of course we fish with old man Hanohano Pa; he was a good fisherman too. And of course I fish with my father-in-law Henry Tai Hook. I still do that now -- throw net, making net, everything, like most fishermen. The only net we had at the time and then we had to go pitch *kala* and then we had *nenue*, that's the only kind of net we had, nothing heavy duty. And the other kind of fish we just throw net on 'em like moi and all that. Bang-bang net is about 500 mesh across with floater and lash too like the time we using *aho*, and *aho* had 96 -- no more this kind rope now you know. That's how we use to rig the net with the *aho*. Twine, that cotton twine, you call them *aho*. We use to use the *hau* floater because you don't have to go buy. You only buy the *aho* and weave and of course the twine -- another *aho* to lash the net down to the length. We use to do everything for the bang-bang net; in fact we use to do everything for the throw net too. We use to sew our own net and we learned it very young. When I was 12, I started to make nets because we were interested in throwing net because my dad catch all the fish, so we learned that time. The other thing we use to catch too was the turtle; that was our meat. So what we use to do was catch the turtle and give every Hawaiian family over there a turtle, one each house. Even at that time the jobs were kind of scarce and the wages no good. Like the County use to pay \$30 a month. So my dad when kinda lay off from the County for a little while in the 1940s I think and worked for Dora Eisenberg and had better wages. At that time the wages Mrs. Eisenberg paid \$55 a month, which was good money. And then of course my dad use to ask her for car like that and then she use to go Garden Island Motors and buy the Model A and give to my dad. My dad would pay back slowly and all of a sudden she tell my dad just to keep the car and stop the payment. She just gave him the car. And we had several cars from Mrs. Eisenberg. My dad use to take care all the properties out here like we use to take care up to across the pond down by Limahuli, we use to take care all that. That was Eisenberg's. And then where Mrs. Wichman owns, they had house made for us, and we stayed there part of the time and where my sister lives, that's where our property was so we use to live there too. We lived there for many years, all my teen days.

My dad use to work *sailamoku* on the boat, you know, deck hand. They call it *sailamoku* at the time. He use to work for the *Wai'ale'ale*, they had I think 3 or 4 ships that ran between the islands to haul cows and rice and whatever. He use to work over there on that boat partly and then go back to the big island when the coffee season harvesting time to help his dad - his dad was a coffee farmer. See, what happened, my grandfather came here - I guess he had a family back in Japan, he came from Japan and married a Hawaiian woman over here. That's where my dad was born and then us guys. He had my dad and one sister; I think there was five of them. My grandma was full blood Hawaiian. My grandfather came from Fukuoka, Japan. My dad's name was Joe Mahi'ula Hashimoto. He came here because...well his grand uncle Keoni - that's what brought him over here. He [Keoni] came to this island when he was 80 years old in 1910, that's why he knew this island all over the place because after my grand uncle passed away, he lived with old man David

Pa. Old man David Pa...this is a complicated story. The old man was 17 years old, he married my grandma who was my grand uncle's wife that came from the big island, and my grand uncle married David Pa's sister, just like switching over. When my grand uncle passed away, he (my dad) lived with David Pa, because David Pa married my grand uncle's wife – my grand aunt. And then we stayed with the Pa family too because the connection was there because my grandfather married the old man's sister, who was Kaihilani. And all these people were born and raised in Kalalau, the last family to come out from Kalalau – the Pa family yeh. So when I was growing up Hanohano Pa's mom who was Wahinekouli, she was in her late 70s when I was in my teens. We got all acquainted with these people because my dad use to live there part of the time, live over there, live in Waimea, live in Hanapēpē, that's why he knew people that lived on this side of the island and in Waimea, Kekaha and Hanapēpē. Like the Akuna, the Malama, all those Hawaiian families. He lived over there. And my dad was very good in Hawaiian - fluent Hawaiian. I don't know why my dad didn't want us to learn the Hawaiian language. Even Japanese, that time they had Japanese school. But war time they went close the school because the Army took over all those places. I understand Hawaiian when people talk, but to converse, no. Now we kinda older and it's hard to learn than the young people. I know my granddaughter, five year old, she good in Hawaiian because she go to the immersion class. Now they get school for that. You just let em go because that's the only way they going learn the language.

I was young, my dad when he was around with people he always talk the language, you gotta talk it every day and that's what happened. Like they would talk funny kind stories that we no can hear or understand, that's the reason why maybe because they talk that kind. So that's what happened. After we grew older we kinda know what the hell was going on he would explain to us. Like he use to tell us...oh you know he use to listen to the music from Alohikea, you know who that is? He was a composer, a cracker-jack composer who lived in Waimea, I think he came from the big island. He used to write songs about how he used to handle a woman. So when the song is sung, so beautiful but the meaning of the song is nasty! And my dad use to explain to us but we were older already. We were married when he use to do that. We use to go sing that song and he laugh because we don't know what the hell's going on. He gotta explain to us what the song was all about. That's how we knew.... My dad never go high school, he went grammar school, but actually it's learning with the people in this difference areas, that's how he learn that. My dad knew his Hawaiian, nobody touch him. Even the name places of this whole island, when you ask him, he tell you what the name of that place like how these activists and all that he tell em the name. Even the other side Waimea side, he going tell you because he lived all over this island, that's how he knows. Like from the old people, the Hawaiians. I was real stupid I never go sit down with my dad because at the time I had family, I gotta go work. I use to work for Julia Wichman during the day and at 5 o'clock go work hotel til 2 o'clock in the morning, bartender. I did that for what 35 years. And then quit 1994. steady go work. And then go work only Limahuli. But I did plenty things in my life.

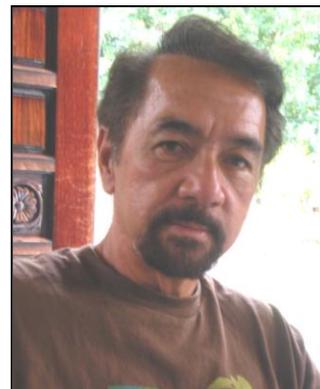
I think they (mom and dad) met over here because my grandma had three families - grandma Martha had three families. One was my mom folks - my mom and her sister - and then they had another family, Saffery. She was for Leonard Saffery. And then she came here and she married Kimokeo Kanehe, so that's how my mom moved over here. And that's how I think my dad got involved. My grandma was Martha Ka'aiakamanu from Maui - the family still there. That was her maiden name. And then she has two sisters in their 80s and they still living in Maui, I think in Lahaina. And they look exactly like her, the smile everything, reactions. That's what my cousin told me because they went down there, they had one reunion so that's how they met these people. And we were thinking about it because last year we went down for my granddaughter's baby luau in Makawao, but we never even think about it because we got so involved but by the time we came home was too late already. So we didn't have any time to go run around the island. [With Saffery] they had two; I think one girl and one boy. My uncle's name was Jack; now I forget what my aunty's name was... ah Sarah - Jack and Sarah Saffery. Kimokeo Kanehe, that was her third family; she had three children with Kimokeo Kanehe.

I don't have that much education, but in my own way, I see all around the way these guys act and that's what made me try..... Where my sister's living in Hā'ena that's my house. I went build that house as my memorial for my dad...but you know what, my dad wanted me to get the property but I wish I didn't get it. My sister, in fact, when my mom died my sister never go put that probate in court, because we were asked to; myself, my brothers Joe, Jack and George who lives in the mainland, and we got two acres in Hā'ena – that's what she got. She tells my brother George 'that's my property, my property' - til today. And you know what happened, she never realize today computer eh? My daughter Dancit can go in too, go find out who own the property; my daughter Leilani own the property - only her name on there. My sister went change um.... I paid the inheritance tax since my dad. Our property value was 40,000.... That's why the Hawaiians sell all their property in Hā'ena because they couldn't handle the tax. Like you know the Chu family they own below Limahuli, Barlow Chu – retired, worked with me. They had to sell um, forced to sell. No can handle the tax. All over there. With that kind price behind over there, no way.

I get a little over 20 when I got married in 1954 I was 19. I got married young. 54 years we were married. We had one reunion, on our 50th anniversary we had one party, my girl went throw one party for us at the Raddison, and that one they went surprise us they went catch us really off guard!

###

**4.2.3 Clarence Medeiros, Jr.** My name is Clarence Medeiros Jr. of Kona, Haleki'i and Kanāueue, North Kona. I also reside in Honokua, South Kona. I went to school in Kona, from first grade to sixth grade at `Alaē School, South Kona. Then I went to Ho`okena School, South Kona. When we -my dad and I-moved to O`ahu – he was working on O`ahu with some other cousins. We stayed in Kalihi, and I went to Lanakila School. We also stayed with my great grandmother over there. She was Mary Pacheco Costa Pimental, on my father's Portuguese side. She lived on Birch Street. Then we moved to Kalihi. Then we moved back to Kona, and I finished school at Ho`okena School until eighth grade. Then I went to Konawaena High School. I joined the U.S. Army in 1969 until 1972. After that I went work but I also went back to school - masonry apprenticeship school in adult education classes at night and earned my journeyman certificate and worked as a journeyman mason as block setter, cement finisher, stone mason, and doing masonry skills such as layouts and estimates. I continued my college education at UH Hilo that included the requirements like English, math, and took up blueprint reading, structural engineering, Hawaiian language, Hawaiian history, ceramics; and I took some fun courses like golfing. I worked in the construction industry for a couple of years, and did some heavy equipment operator jobs too, because when I was in the military I went to engineering school and got a certificate from the military. I worked at the Kona Hospital in the engineering department and took care of all the electrical, nurse's call systems, etc. throughout the facility. I had to stop working because my injuries that I got in Vietnam was getting really bad and I get hard time move around to do my job because I would fall off the ladder when my legs would buckle and my injuries kept me in the hospital as a patient a week at a time. So I was asked to stop working and got disability income. I then stayed home and took care of my farms: macadamia nut, coffee, dry-land taro, a big banana operation, avocado, cattle, and horses, but coffee and macadamia nuts were the main money-maker for my farms; and I also grew produce for the house. I did that from the late 1970s all the way up until 2007 when I decided to let the pigs enjoy my farms because price for the macadamia nuts went down significantly and it was not worth the effort. We haven't harvested the nuts for almost a year now. The coffee is okay. I still plant the taro, and give the huli to my children and grandchildren to work, pass em on to the next generation to learn about em so they can continue.



So now we talking about Hā`ena. But since I`m talking about the taro, I wanted to say how I got involved with Hā`ena because Nellie, my wife, had a seminar on Kaua`i . She was there for three days, and during the day I was by myself and I had this rented car, so I went gallivanting. In preparing for the trip, I had to drive quite a ways to find this place where our relatives had property. In doing genealogy thirty years ago, somehow we get family over there by the name of Mokuohai. I did more research, looked through books and listened to stories from our elders that kinda pinpointed the family to Hā`ena. Then I got the book from State Preservation, Dorothy Barrere - she made this book that was an Ali`i Awards book about the *konohiki* that were awarded properties from the king. That name Mokuohai was in that book, the probate. This was all probates. It showed the genealogy; and then my genealogy was in this probate. It looks like since this probate was done, he had property on Kaua`i and it was in Hā`ena including three kuleana that were located across from the wet cave by the end of the road. Awarded was half of Honokoa Ahupua`a on the Nāpali Coast of Kaua`i.

So, during that trip I left the hotel and went on an adventure and came across this helipad for tourists located on top of the hill on the way to Hā`ena. So I went to inquire how or if I needed to make an appointment to go on the helicopter that was available, and how long it would take to go where I wanted to see; so the tour people said it would take about two hours, so I paid them and went. We flew along the coast, we flew around Hā`ena, Limahuli, and at that point I still didn`t meet anybody yet; but I saw smoke by the wet cave area. We flew in a circle, looking down, seemed like people were opening up the land yeh, cleaning and burning rubbish and stuff. So, we made a couple of passes there and then we went along the coast, but while we were flying somebody was giving us the “birdie,” maybe we were irritating them, tourists or what. So after I got off the helicopter and drove the car down and I seen people working there. So I parked the car, walked across, and talked to this guy who introduced himself as Carlos Andrade, Chipper Wichman, and his wife Hauoli. As we got talking it appeared that Hauoli was a relative of mine on my mother`s side and she was related to the Leslie family etc. from Kona. They invited me and showed me what they were doing and they asked me what was my interest over there. I had my genealogy documents with me and the paperwork that talked about Mokuohai kuleana. They were really happy because they met me, a relative, who was interested. So they asked me if I wanted to come back and help them and join the organization, a nonprofit group. Since then I went back at least three times to help them with the lo`i, planting and clearing; but I haven`t been back there for maybe six years or so, because I`ve been busy and had to take care of some health problems. I got to know Chipper and stayed at their place the second time we went.

The last time we went back Halau Hula O Maiki had a hula uniki there and we were invited to go because Nellie is with the halau, and they asked me if they could have a black pig because whoever they tried to get it from they couldn`t come up with it. It had to be a black pig that was big for the occasion so they can eat the whole thing – as part of the uniki, the people had to eat everything, all of the pig, the whole thing. I went to my friend and he got the pig, it was about 80 lbs, and it was really down to the wire like they were gonna do it on Saturday, we got it on Friday and got em to Kaua`i . When we got there they had prepared the *imu* but it had rained so heavy that they had hard time getting the imu lighted. We had hard time making the water hot because everything was wet; but we got it done. The uniki went on and it was something that I was really impressed with – how they did their customary uniki. I was asked by Coline Aiu to sit with the *kupuna* on top where they had all the guests but I stayed down with Chipper them because I was talking with them about all of the work and stuff so anyway I felt too young to be sitting up there with the *kupuna*, and they respected my wish that I stay down and help with the work.

After the day I went on the helicopter and met with everybody, I still had two days left. So the next day I went to the real property tax office and met this guy named John Kruse who was working there. He made me all the maps that I needed, the areas that I was concerned about. Even Ni`ihau, he made some maps of over there. He gave me the tax map keys. I went to see the County guys the next day about any archaeological stuff down there, and they gave me this report and I was looking for the burial of Ka`aumoana Moa Niau, my great-grandmother who moved from Kona to O`ahu and then to Kaua`i under the name Moa. When I looked at the public notice

that they were looking for descendents of these people, I knew exactly who was there and who I was looking for, and that was the Moa family from South Kona – Kalahiki Ahupuaa, and I found my great grandmother; she was buried over there. Alongside the Mokuohai family was family on my father's side; so I hit two birds with one stone and that fulfilled my search when I was looking for my mother's grandmother – my great grandmother. So I found the link and made the connection. When I went to the census records I found some of our other family that moved from Kona and lived over there in Kapa`a and Waimea areas under the name Moa that came from Kona.

My great-grandmother was married to a Chinese; my great-grandfather was from China. Zen Sing. When I looked in the ship's manifest, I looked for Zen first -- Man Sing that was his first name. But then my grandmother was born they did em just like the Hawaiian way, they drop the Zen and they used Man Sing. That's why her name was Annie Man Sing. Sometimes they would use Zen in the end, not all the time. The first name became the last name - same way in Hawaiian. The first name became the last name. A whole bunch of them came on the same ship, all cousins. I found all of the cousins that came the same time. Was good, because when you look back on the ship's manifest, they tell who the parents were and on the mother's side – Soong family. Sometimes it was Soong depends who wrote em yeh. Other times was Sun, but they were related to Sun Yat Sen.

The Mokuohai genealogy, the one that was awarded the *kuleana* in Hā`ena and part of Honokoa comes from here in Kona and also in Ka`ū. They left Kona when Kamehameha's fleet went over to fight or take care of business with Umiumi; and he never came back here in fact he came back but he was awarded some lands and then had children over there [Kaua`i ] – a different batch of children from the ones that were left here. That Mokuohai, his first cousin is Puhalahua that I descend from, who married Kanika. Mokuohai married to a La`a, and he had a batch of children that stayed in Ka`ū. With another wife that was in the probate, they had a bunch of children that stayed in Kaua`i. Then he had another wife in Kona that would be the Ka`ahanui line from Kona and Ka`ū; so there's a whole bunch of descendents of that Mokuohai. When I was on Kaua`i I met one of my cousins at the same time when I met John Cruz, I went to the OHA office and met one lady named Francine something. She was working at the OHA office in Kaua`i. I just went in there to ask her if anybody by the name of Mokuohai was registered or who come in to inquire of the genealogy to call me, and I gave my telephone number. So when I went back to the hotel waiting for Nellie to get off work so we can have dinner, my phone rang and it was Francine. She said you know had one lady came in here and said she was from the Mokuohai line just after you left that was registering at the office but her last name was Daniels, and she lived someplace in Kapa`a close to town. So she gave me the number, I called her and we met at her house, we had lunch and she had a nursery and was shipping all kinds of plants like ginger etc. to the mainland – really, really nice kind plants, good flowers. I helped her and gave her some of the information I had. She was going share some stuff with me of her line, and she told me that the Fernandez living in Kaua`i who was a state forest enforcement officer, the boss was from the Mokuohai line – a descendent from the William Mokuohai family that was living there, and his mother who was a daughter, married a Fernandez. There are other relatives but I never had a chance to meet any of them. She was gonna get back to me about stuff but she was in the Hawaiian Kingdom movement, and she asked me my opinion, and I think that might have turned her off when I answered her.

As far as the Mokuohai line, that was the only person that I met on Kaua`i. I still have to go find out about the Fernandez family and whatever other families - their names. The Mokuohai was the *konohiki* for that area, the *kuleana*. I think more at the Honokoa area along the coast. There's a big valley in that area. When I walked in quite a ways I seen some remnants - look like people planted coffee in there because I seen some coffee trees. That's some terrain for wet and steep. La`a was one of his wives. Another wife he had was Ka`ahanui, and that wife was from down in Napo`opo`o. And I also seen records of her with him. He had some other wives and had children from them. One of the wives was Kaikai. We come from his cousin. So if we go back to their parents, I descend or Puhalahua descend from Keli`iuwela or Keli`iuwelawela and Kuwalu; where Mokuohai descend from the brother of Keli`iuwela and the mother is `Aukai; but his wife is just

La`a. [Mokuohai's father was] Kekoa and then the grandfather is `Aikanaka. `Aikanaka with Kama`i Keohokalole - that's where Kalākaua and Lili`uokalani them come from. But I come from `Aukai, the second wife – that's where Keli`uwela and Kekoa come from. [Kekoa's grandfather was] `Aikanaka. His second wife was `Aukai yeh, sometimes known as Keli`i`aukai. I seen in different books, Keli`i`aukai, like at the Bishop Museum, it's Keli`i`aukai. In this probate, it's `Aukai. Z. P. Kalokouokamaile's genealogy, it's Keliiaukai. But I saw on record where he had another wife – Kaiohua or Kaiaha. And then they had one daughter named Liliha. Liliha, when they were doing the sandalwood trade `Aikanaka was kind of involved in that; I'm sorry, would be `Aikanaka's sister not daughter – Liliha. They had a fort someplace on O`ahu; they were bringing all the sandalwood down, and she was there. I think it was in Kamakau's book.

[`Aikanaka's parents were] Kepo`okalani and Keohohiwa. And Kepo`okalani descends from Kame`eiamoku and Kamakahekui. Kame`eiamoku is one of the royal twins; his twin brother is Kamanawa. But Kalākaua's father is Kapa`akea who married Keohokalole – he descends from Kame`eiamoku's brother; so they marry family down here yeh. [The twin's parents were] Keawepoepoe and Kanoena. That's where Alapa`i comes in yeh. Pi`ikoi. That's where all the Kawanakoa descendants come in, from this Pi`ikoi line. David Kawanakoa them, they all come from the Pi`ikoi line. Keawepoepoe is the common denominator coming down.... This is old stuff. But we were very fortunate that they had good lines and were easy to find. Once you find one everything, connect back to. That's why every time we get into some civil action kind stuff, especially with land titles, we most likely can get our native rights because of 1778 and when Kamehameha conquered all the islands, we can link ourselves back to almost every place where `Aikanaka was, or Kepo`okalani, all the way back where they either fought or lived there or was in control of battles and stuff so we can pretty much be successful and in most of the cases in fact every one, we get our native rights, not just because of the third generation back but we can go back all the way to prove that in Makalawena or in Maheula or in Ka`u, each chief was in all of that area or buried over there or something. We are very fortunate we can get the proof with all this kind documents, archival records, we can connect to them. Most cases, hard to beat other people that have been on the land for a long time but they cannot beat our native rights, then we can use the old trails or practice some of the things that were done in the past yeh. [Mokuohai had a kid there also named Pu`uhalahua Mokuohai] he died, and then Pu`uhalahua named his child Mokuohai. That's the one I showed you the picture. You see this one here, Kauhewa, Mokuohai he get one sister and she was named Kauhewa. So both sides used each other's names so they no lose the name. So, when we name our grandchildren, we brought the names back, like Kapa`akea; my brother David, he carry Mokuohai; my grandson Lincoln, we named him Kawehe because of Kamae's father; and then my granddaughter we named her Analea, which is another version of Ana Keohokalole's first name; the young one with the curly hair, his name is Na`ea. Kanika, this one here, her father's name was Na`ea and he descends from Keaweheulu; so we named him Na`ea Keaweheulu.

One day, when my dad was still alive back in the early 1990s, we went and met with one of the Kawanakoa grandsons, his name is David, and his brother was running for office – Quentin. He lives in Kona, he has an 11 acre coffee farm up in Holualoa - hard working guy. So we met and then we talked and shared, and we now know we're family; real humble guy, hard working. Eventually, I try meet as many people as I can and go meet the families, and then show em how and make the connection – find the missing part, and everything connect.

# # #

**4.2.4 Chipper Wichman** I'm Chipper Wichman and I was born on O'ahu (1957). Our family is from Kaua'i here; raised both on O'ahu and over here on Kaua'i because every summer we'd come and spend our summer with our grandmother who lived in Hā'ena. That's how I really got to appreciate and get to know some of the people over there. Around 1972/73, I came to live over here with my grandmother. Since 1976 I've lived here full time. My wife father's side, my grandmother is Juliet Rice Wichman, and her husband...well, my Tutu Man is and I were married in 1984 and we raised our kids in Hā'ena. I graduated from Roosevelt, then UH.



My father is Charlie Wichman, and my mother is Jean Wichman. My father was born here on Kaua'i and my mother, Oklahoma, I think; she came over here on the Lurline. I think my dad was working that time as Assistant Attorney General for the State, and he met her - my dad is an attorney. My grandparents on my-actually [my grandfather was] Holbrook Goodale. My grandmother [Juliet Rice] had two children from Holbrook Goodale -- Uncle Holby Goodale and my father. Then he died in a plane crash, and she married Frederick Wichman. And she had a third son, Uncle Bruce...he'd be my dad's half-brother. Then all of them - the two previous sons were adopted so they changed their names to Wichman, but Holby when he got older ...when he became an adult he changed his name back because...the Goodale line was going to die out.

To me it's [Hā'ena] a very special area. Very significant for the fact that...when you go back and look at how our *kupuna* looked at the world and their traditional life style, the way that they lived and their cosmological beliefs and relationship to the *'āina*...it was all so very integrated. It was dependent upon their ability to have a personal relationship with the land and live a subsistent lifestyle to be able to have access. Much of that was factored throughout our *pa'e'āina* when western style of land ownership and looking at the world came to be, starting with the Mahele and the creation of actual land ownership. The Mahele was really the beginning of the demise of the traditional Hawaiian way of life because of the factoring of that system.

**4.2.5 F. Bruce Wichman.** I am Frederick Bruce Wichman. As it turned out, I was born in Honolulu (1927) but the first seven years of my life were in Upper Wailua on this island. Then my father and mother moved away to Oregon, so I didn't get back here until 1945. And this has been more or less home ever since, I've always considered this home even though I've been all over the world. My interest in the Hawaiian stories and place names because as a child we had no electricity so the family always got together in the evenings and there were always stories told, especially up at Kokee or Kipu Kai. And it was just part and parcel of growing up with all of these stories. When I got back here, although when I got back in '45 I worked for the Garden Island newspaper for one summer under Charlie Fern, and he gave me a column to write on, 'Kaua'iana' it was called. So I began to put down certain things, and he would put me on to certain kind of feature article stuff ... like when the *aweoweo* came in by the thousands into Nawiliwili. It's always been of interest. When I got back here after I retired, I found that no one was using the Hawaiian place names; nobody knew the old Hawaiian stories, and so I started collecting both. So my 'Place Name' collection for the entire Hawaiian Islands is around 5,000 words now. I've got four books out with eighteen stories each, and I have two others already in manuscript.



I went to Menlo School in Menlo Park, California for junior high school and junior college. Got my AA degree out of that.... because we were shifting...I was put into boarding school in September of 1941...but of course with no chance to come home. So I just stayed in the school

campus through the summer...instead of just sitting around doing nothing, I took all the courses I could to keep busy, so by the time I was sixteen I had my AA degree. Then I got back to Honolulu before the war ended, finally got permission to come back. And then I went to the University of Hawai'i for one year, but got kicked out over whether I wanted to go to school or play bridge...couldn't do both! By that time I had no problem so I went to the University of Oregon and graduated from there. That was just when all the GI's were coming out...you could get on the waiting list but with no guarantee that's why I went to Oregon.

[My major] ended up being English Lit...it was easier to do. Perfect for what I'm doing now. Then the Korean War broke out...I had missed World War II by twenty days, and I volunteered and was in the first volunteer group in Hawai'i. Got down on to the pier to go to Korea and the officer came down and said, 'You, you, you...step forward...you're going back to Schofield.' The draft had just come in and they needed people who could man typewriters. And because I had a college degree, they figured I could type. I volunteered for Korea five times and ended up in Germany! But during that Germany experience I ended up being -- I was a Private First Class ...and because they had nobody else who had, they thought, any kind of qualifications they wanted to put through One-Star Generals and Colonels into 'public speaking', but they wanted them to be trained so they put me in charge of them. And you talk about a PFC telling a General what he was doing wrong and in public speaking! But that's when I really realized I enjoyed teaching. I could do it...I mean I didn't get court martialed by these guys! After I got out of the army, I took a year and Gladys Brandt had Kapa'a -- she gave me all but two days of the school year as a substitute teacher. So I taught everything from kindergarten though all of the high-school courses....so when I got to the university to get my life-time certificate I knew where I wanted to teach, which was the four, five, six-grade level. I was a pain in their neck because I already had practical experience and I was older than the other students in the class...and would tell the teachers that some of the theory that they were expounding was a bunch of whatever! Gladys never really forgave me for that year of teaching because I walked off with her daughter! But, I was a teacher and then we moved to Switzerland. It was our dream to be in Europe for a year, and we ended up staying eight. I did technical writing for a lot of small American engineer firms, which kept us there...happily. We raised our six kids there and then we came back to Massachusetts...finished my teaching career and came back...and now have started a whole new career. So that's basically the story of my life.

My dad is Frederick Warren Wichman. He was in the Legislative House in Honolulu from '31 to '33. He was part of the Massie Case that took place and he accompanied my grandfather, Charlie Rice, to Washington to try to persuade the powers that be that the Navy should not take over the islands. The Navy wanted to put Marshal Law on the Islands and run it. They almost got there but... I think that's one of the reasons why he wanted to leave. In his old time -- his father had come to Honolulu in the 1880s -- he answered an ad that King Kalākaua wanted an engraver and jeweler. My grandfather answered the ad and got the job! He was H. F. Wichman; he had a store on Fort Street at one time.

My mom was Juliet Rice. Her father was Charlie Rice, the senator ... from Kipu Ranch. Her grandfather was William Hyde Rice, and of course he is the one that wrote the book on Hawaiian legends...Bishop Museum Bulletin #63. It's called *Hawaiian Legends*, I believe. And he was fluent in Hawaiian, his father had come out as a teacher to the Wichman Mission in Oregon, but he and the Harris' were put up in the home of Mr. Hall, who had just set up the printing facilities in Oregon, and he persuaded these two couples not to go because the situation was so bad, so they stayed here. William Harrison Rice taught at what is now Punahou, the Royal School. Then he was the manager for the Līhu'e Plantation. And an even older branch is my grandmother, Grace King -- Grace King Rice, [my mother's mother]. Grace's grandmother had come from Mo'orea to here to Hanalei. A German ship came into the harbor, this was in the late 1830s, and the First Mate on board lay dying. The Captain had asked him what his last wish was, and he said he wanted to die on land. And so they dropped him off in Hanalei and she ended up taking care of him, nursed him back to health and they had six children! So part of the family has been here since 1830s. Her grandmother was Ann Mo'orea Henry, married Freidrich Wundenberg. And he is the

one who blasted out the Kalalau Trail. This was in the 1860s. He did not want to endanger any of the men that were working with him clearing this trail, so he himself set all 400 charges of dynamite that they blew up along the trail ...because he was the Superintendent of Roads for this district and for the Monarchy.

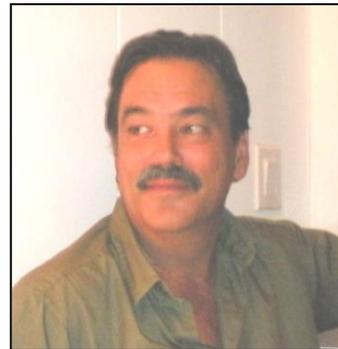
I had one wonderful time being a chauffeur...that was at the Constitutional Convention time when they were electing people for that. And I drove grandpa to all the different political rallies that there were... My grandfather was part of the militia in 1896. And her [my wife's] grandfather was put in prison for being part of the Hawaiian side of the attempt to put Lili'uokalani back on the throne. William Hyde Rice was a member of the Cabinet, I believe -- he was the Governor of Kaua'i. The family story says that when Lili'uokalani was deposed, before she abdicated, that he wrote her and asked her to come to Kaua'i and declare her 'kingdom' there. The center of her kingdom would be there. And evidently so did the Maui governor. Because she trusted the American word, she didn't...all she had to do was walk down the bloody steps...if she had gone and confronted those sixteen marines, they never would have fired on her. They wouldn't have dared. Or if she had gone down the back steps and taken a ship to either island, and then said, 'Here is my kingdom'.....it would have been so different. There had been Lahaina, there had been Kailua, no reason why she couldn't have set up back in Lahaina, or our own Līhu'e .

When I grew up at Pihanakalani....do you know where the Hindu temple is now... That big house there...my father built it...that was my childhood home. My wife's grandfather was raised in Kaupo -- family name Kanuha...[Hana] -- that's like Hā'ena used to be. When my mother first moved out here when you got to the Powerhouse Road, after the *hau* hedges...then you came up over that Kaumaka Point and around, from there on ... narrowly, was just a track through the grass...sandy...double track...that's all there was. The nearest telephone was Mama Nakatsuke's store in Wainiha. As far as we were concerned that was the first electric line too. My mother got a phone call when John Hanohano would jump over and tell her, 'You have a phone call. Here it is. Call back.' But in those days you cranked the phone and the operator answered and you'd say that you were trying to get a hold of so-and-so, and they'd track them down, 'Not at home, but I think they went visiting somewhere.'

# # #

#### **4.2.6 Randy Wichman** I was born at Wilcox Hospital (1957)

-- I was delivered by Dr. J. Kuhns. My father was a schoolteacher. We also lived in Hilo, as he taught school there. When I was six-years old he packed up the whole family and moved to Lausanne, Switzerland. From kindergarten to seventh grade I was in the Swiss private schools -- Swiss public and private schools. Coming back into the U.S., I went into a Naval prep school on the East Coast, Taber Academy, and put to sea when I was fourteen. Graduated at eighteen, came back home and then delivered yachts all over the world -- did the Atlantic, Pacific, and Indian 'till I was about twenty-one or twenty-two. Came ashore, now that I had all the experience I needed, but I wasn't rich enough to afford my own boat so I went to work with Grace Guslander at Coco Palms. Well, first I started at Hanalei Bay Resort...Hurricane 'Iwa knocked us out...right after Iwa I worked for Coco Palms as the Assistant Manager for Grace Guslander.



That was 1982 to '85. Then I moved into the museum. I was a curator for the Kaua'i Museum for four years or so. Then I opened up my own business, photography...the eight by ten glass plate work for various institutions and private collections. I accessioned private collections all over the State, and worked on the big public catalogs. In 1992 I was in a position to afford my own yacht. Purchased a sailing yacht, a fifty foot Swan from the East Coast, sailed her out to Hawai'i. And did five trips across the Equator, to Tahiti, Marquesas, Cook Islands, Tuamotus. Got married when I was forty-five, and have been ashore since. Numerous trips to Paris ...to Europe....as we go back and forth....numerous trips to the South Pacific...traveled extensively for thirty years or

more on my own...all over the world. I am the president of the Kaua'i Historical Society. I'm on the KHPRC, County of Kaua'i Historic Preservation Review Commission. I've chaired it several times over the years; I've been on it eight or nine years now. I think I've been Chair three times. I was a member of the Office of Hawaiian Affairs Historic Preservation Council. We dealt, at that particular time, with all the various issues that were going on at the time...repatriation, things like that.

My background is in this particular aspect, I grew up in a family that each generation made significant contributions to the history of Kaua'i. As my father has done all the place names and the legends, as my grandmother's done many of the botanicals and some of the pre-contact prayers. My great-grandfather made huge contributions, as well as William Hyde Rice, with the Kaua'i legends...and Harrison. So it's a multiple generational thing. Every meal -- three meals a day...it's the only thing that we talk about every day...all day. A lifetime of that...this is where we're at. And then I've been buried in the library several times. My grandmother had one of the finest Hawaiiana collections. By eighteen I was already fluent in all of the material, and in many private journals that are in the family. Since then I've been through her library again and the Historical Society Library twice, which constitutes years...around three or four years solid when you add it all together...reading in the libraries. So I must be on my fourth time going through all the books.

Now Hā`ena, having been raised in Hā`ena ...my parents were living ... we owned the Ahupua`a of Limahuli and the adjoining five thousand acres to it. My ahupua`a is Hā`ena, my mountain is Pōhaku Kāne and Makana. My chief is Lohi`au. I am currently on loan to the Waiālua Complex of Heiau, because as past president of -- I've worked on the *heiau* now for a good twenty years...have been chair or *po`o* of the *Na Ka Hui*.... I am currently the vice-president Nā Pali Coastal Hā`ena also; we've been doing the Nualolo Kai for twelve years....that particular one.

Hā`ena is the center of the Universe to me....especially Kē`ē - the very end of the world. We have a very unique responsibility...my grandmothers, both my grandmothers, Gladys Brandt and Juliet Rice had a love affair. Naturally being in my front yard this is the one place on Earth that I'm the most familiar with. The earliest stories that I knew were the Hā`ena stories. Over the years I've seen Taylor Camp come and go.

[`Ohana]...Kanuha, Lawa`a, Kamakakuokalani, of course, and from the Kona side -- Kohala to Kona -- they were the first architects of Pu`u Honaunau over there. We can trace our ancestry back into the main charts, and even to a direct ancestor that actually started the Pu`uhonua. They were the third banner carriers for Ku-ka-ilimoku during the time of Kamehameha, and that's why we happened to be on his side of the fight and naturally made it. They were generals under him. They fought, killed, and died for him. And in return Kamehameha gave our family extensive war prizes on all islands, except for Kaua'i. Our lands can be easily traced through us. My grandmother ended up with Ka`anapali. She sold it in the 1960s, but clearly Ka`anapali was a war prize for services. We ended up...we had Pelekunu; it was another war prize of our services to Kamehameha on Moloka`i. Our lands on O`ahu were also services from the battles there. My grandmother was Gladys Kamakakuokalani Ainoa Brandt. My grandfather was also part-Hawaiian from the Kapuna`ai and Naele from the west side of this island. So I have both moku old Hawai`i and old Kaua`i also in the line. Although I suspect that my particular line here on Kaua`i were occupation soldiers after the Hume Hume Rebellion. I'm just suspecting it, that they were occupation soldiers. My grandmother [Gladys Brandt], of course, was a matriarch -- as both my grandmothers were. I'm a matriarch male and real proud of it...our men are strong but our women are even better. So I was guided by many very potent and powerful women ....I can take it! Don't stand close to the fire if you can't take the heat....and I always could. So Grandma Brandt...was my mother's mother. My mom is Loretta Kuuleialoha Brandt - `Ainoa-Brandt. Nawa`a also Kanu`u - Nawa`a and `Ainoa are -- we suspect was a name change by my great-grandfather after he was jailed for his role in the Overthrow. But I believe more the story that said he hated his father and that he wanted to break the *kapu* that came with the name, Kanuha, and that's why the name Ainoa is there because that's the lifting of the *kapu* - that it is free, so I suspect that more.

Yes, he was jailed and all that, but I think it's because his relationship with his father was...he needed to break the *kapu* or the stigma. The Provisional Government [jailed him] for his role; he was right there next to John Wise - they were really good friends. It's an old family related to John Wise side of it too. He was right there with Prince Kūhiō also.

On my father's side they arrived here on the ninth company of missionaries. They started Punahou School...1840s. By 1850 they were here on Kaua'i. That was the Rice's. So they were here by the 1840s. He started Līhu'e Plantation...started all the agricultural ditches...really revamped all the sugar production...hated it, got out, and got into purveying. So for the next four generations we did all the beef, the horses, the milk...for Kaua'i. My great-great-great-great-grandfather, William Harrison Rice, was the governor...the first governor after the massacre...after the wars...was Ka'hala'ia...and right after that was Ka'iki'o'ewa, after Ka'iki'o'ewa was Paul Kanoa...well, Ka'iki'o'ewa ...his wife Keaweomahi took over just for a little bit then Paul Kanoa comes in and for a very short period there's another one...then William Harrison Rice is governor...then William Hyde Rice is governor...he takes it through the Overthrow...and then Charlie Rice...my great-grandfather was the senator ....but each one of their brothers - William Harrison Rice's brothers, William Hyde Rice's brothers, and Charlie Rice's brothers, were the sheriffs and judges. Go figure that one. But I think the history books are real clear, they were fair. But you can make up your own mind on that aspect of it. The 'Wichman' comes in from H. F. Wichman who Kalākaua really admired, and brought him to Hawai'i. He was the one who did all the metals and all the jewelry, and all the things that you see in all the photographs that these Ali'i's are wearing. After the Overthrow they started the jewelry shop, H. F. Wichman, both in downtown....

I think the last part of it essentially is that I'm *po'olua*, child of two fathers, my second father is Thomas Hashimoto. I do belong to the Thomas Hashimoto School of Rock Wall Building. I also belong to the Thomas Hashimoto School of Fishing and Fishing Resource Managements. I belong to the Thomas Hashimoto School of Ethics and Hard Work. His training has helped me in my life and a great deal in all of my heiau work, and so I'm deeply appreciative to his training and nurturing my whole life. [Growing up, going to Hā'ena]...absolutely. All over, all the time, especially out to the *heiau* area, to the dry caves, to the wet caves also. I spent a great deal of time working in Limahuli. I was with Thomas Hashimoto learning how to fish, throw a net on these whole areas. I'd be there early morning, mid-day, afternoon, even at night I'd shine my spotlight over the reef just to see what the fish were doing. I very rarely fished on my own; I always carried net for Thomas Hashimoto. But I always kept an eye on it...as he trained me to watch the fish...but I always kept an eye and would report to him every time I saw the black cloud. For him he called it 'black spot'...but because of the *kauna* we needed to use in all our fishing activities, we had our own separate language. He had the names of all the different houses...for instance, the *moi* that was in front there watching through the net, he knew exactly the next house they would run to. And all the way up from Kē'ē at the end of the road, all the way up into Wainiha he knew all the houses of all the fishes there. He knows them.

A *kapu* is a *kapu* and to me there's no exception. I've been *kapu* to bananas for thirty years because it's Kanaloa's *kino lau*. Being a navigator, a deep ocean person, out of respect for Kanaloa I didn't eat any of his *kino lau* forms. It was important for me when I was eighteen years old to know what it was like to live under *kapu*. And after thirty years of it, I can tell you, it's not a big deal. It's very simple. No is no, there's no such this as any exceptions so don't be tempted by anything. I'm sure I'm not under the real serious *kapu*'s that once existed prior to the lifting of the *kapu*. But it was important for me to understand - to have *kapu* in my life and to learn to live with it. I make no requirements on anyone else, this is just me.

###

### 4.3.0 Land Resources and Use

Land resources and use change over time. Often evidence of these changes is documented in archival records. Occasionally cultural remains are evident on the landscape and/or beneath the surface. However oral histories can give personal glimpses of how the land was utilized over time and where the resources are or may be. Oral histories also provide confirmation of cultural practices. Based on archival documents and subsurface studies the pre-contact uses of the project lands were ceremonial, burials, habitation, marine subsistence and agriculture. Based on archival and ethnographic data the cultural and/or historic use of the land in the project area was agriculture, recreation, subsistence fishing, and hula activity.

#### 4.3.1 Hā`ena in Halele`a

[Hā`ena] in Halele`a, but when you look at it[on the map - 1901] it's in Nāpali really, yah you know, that's why they went put that like that because it's in Naāpali. But now just like they been move em around so now stay in Halele`a, - Hā`ena. See Hanalei is way down here. But you know what they did now, they been put Halele`a and Nāpali together now because nobody go represent this place, Nāpali, so we the ones stay take care of this too. This and this. Because me the moku rep for over here...for the fishery and for the moku too [like the *konohiki*] [TH].

Hā`ena is an ahupua`a. The boundaries are kind of unique. It's real interesting during the Mahele, they were arguing over where the boundary between Wainiha and Hā`ena actually fell. They ended up creating a point. It's actually ...there's a small *papa* kind called Haki (?). That is the eastern most boundary of Hā`ena, and from there it runs kind of an angle up towards Mānoa right behind where the Hashimoto's property is. And then from there it goes more inland up towards Mānoa. It includes upper Mānoa Valley and upper Limahuli Valley, and then it comes down by Hanakāpī`ai, it includes all of the Limahuli watershed and then it comes down by...there's a peak called Maunapuluo and from there it goes down by Hanakāpī`ai. So most of the first two miles of the Nāpali Trail are still within the Hā`ena ahupua`a [CW].

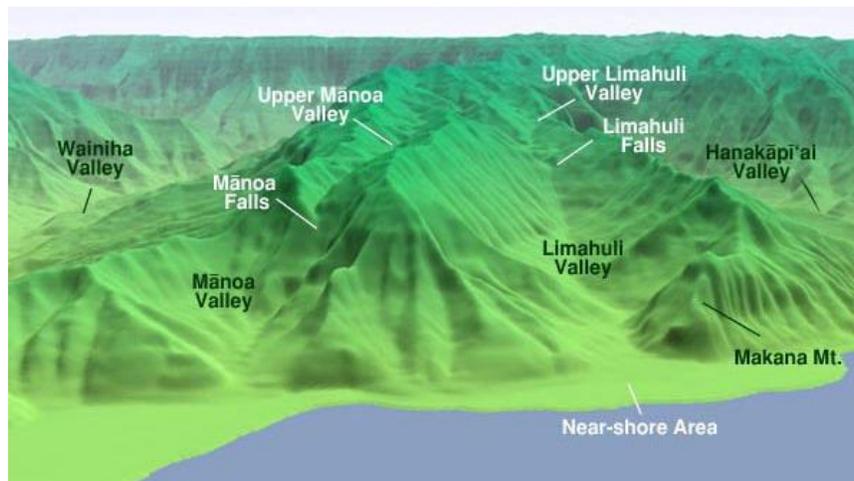


Figure 10. Valley Systems of Hā`ena (Pacific Worlds)

1901. Yeh, this is old map. It's not a new kind, - this is when was Territory yet. But you can get it in Honolulu this map, I think, because this came from Ilei [Beniamina]. Ilei went give me this map. She said "Uncle, you keep this one, this is an old map" and she like one of mine. But I say I don't think so I going give you mine. They wish they could do all their papers of the moku just like mine eh. Get all the names along the coastline. But no more people that know that - they all gone already [TH].

Because Halele`a goes way up to Namahana over here. Shee, Namahana way over here you know. I see em over here. It's past Kalihiwai, that's the boundary for Halele`a. But now stay mark different, the map now, the color [Crown Land = Yellow; Government Land = Green; Napali and Hā`ena were "green" or government lands] [TH].

The actual ahupua`a of Hā`ena was not formally partitioned until the partition process began in 1955, it was concluded in 1967. It wasn't until the conclusion of that that the land was really truly cutup and divided and distributed. It was really from that point on, 1967 that we began to see real change in Hā`ena. So change, in my mind, change really began after 1967 when people could buy and sell and develop property. The other thing that changed in 1967 with the completion of the Hā`ena Hui Partition was the fencing of the cows. The Hui allowed the cows to run unrestrained over the common land in the ahupua`a, once the partition was completed the cows had to be controlled or locked up. Most people didn't have large enough acreage to have cattle, so the cattle began to disappear [CW].

#### 4.3.2 Park Lands: Former Residents

What's really interesting was that *maka`āinana* were able to purchase that *ahupua`a* back - I think it was 1875 when they formed a Hui, Hui Kū`ai`ainā o Hā`ena. That purchase enabled the Hawaiians living in that area to continue their traditional lifestyle. And if you think about it, in 1875 there were still many *kupuna* alive who had been born prior to Contact [pre 1778]. There was still a lot of knowledge of the old ways. And being that Hā`ena was so rural, it was isolated, and being able to more or less recreate their traditional land stewardship model through the purchase of this and the ownership of it in undivided interest, it allowed Hā`ena to really move forward into the modern era in a much more traditional way [CW].

In the Hā`ena Hui [my family] originally purchased as they were doing the Hā`ena Hui because my family had been living already right there on the flats, on the side of Kē`ē Beach where the Morays are and others. But the family had been living there in Hā`ena for quite a bit, so it was just across the river, right across Mānoa Stream. So they were there when the Hā`ena Hui [formed] [RW].

The Provisional Government immediately after the Overthrow banned everyone from Kalalau and dumped them on the beach right here at the end of the road. And there they made their way in through Kaua`i, some stayed in Hā`ena; others moved on, others moved off island and went elsewhere. But the entire Nā Pali Coast essentially came in on the beach right here and then entered into the new society, if you want to call it that, from Kē`ē Beach [RW].



Photo 43. Kē`ē Beach at the end of the road.

So I was there as one of the original members of Hui Maka`ainana. And I was there with Carlos [Andrade], Chipper [Wichman], my father, and others....in the initial conceptualizing. I was there when the master plan originally, in the '90s, was being talked about. I was there when it was pulled off the shelf and put to bed. I'm aware of some of the recommendations in that particular plan. Photographically, as president of Kaua`i Historical Society we have quite a photographic data bank in our society. We have all the original Hā`ena Hui materials, so I'm familiar also with that particular aspect of it. But my expertise is more pre-contact. Let's say Chiefess Kekela on back [RW].

[From the Park stream all the way to Kē`ē Beach, before the tidal wave, was] nothing. The only house, you know the road going inside, was the old man Hailama. Only the old man Hailama use to live inside there, where \_\_\_ own now - that was the only house that I know of that was down in that area. Had that house and get the State house that was Montgomery house where the State get now. Get one house down but you no can see em from the road. From Kekuhi to Kalinakauwili and below Kē`ē` behind the point, then get come Kauila. But anyway, now going back to this, it's some place in this area - the Montgomery house is on this side - you gotta drive past the stream and before you go down the hill get one road going down there on the other side of the river, I think this is it, because this is the parking lot. Yeh, this is the place, the clearing, that's where that house is. You kinda halfway down to the ocean. [and] that's where that lady, that redhead lady she get her house, and I think this is past this place right here -- this bushes over here. But this belong to the haole, and this one over here. This over here I don't know who own this house over here, and then this is the Moore's, that's their house. And then this is the road, and then the black boy, the one went marry Kana's granddaughter, Birdy Birdy, that's his place right here, clearing right by the pear tree right around that bend, now he been clean em all, he went build one little house down there, but never clean when this map was made [TH].

Mahuiki was one of the families that you can trace all the way back to the formation of the Hui Kū`ai`ainā. Their name...you see it in different variations...but I think originally it was Mahu and then it became Mahuiki [CW].

Well, there was Francis Brown who originally bought it. My grandmother before she passed away deeply regretted that she didn't buy up all of it...and she could have. She thought the people that would come into the area would recognize its cultural and sacred significance and not build. But she lived long enough to prove herself absolutely dead wrong on the subject. People moved into the area had no connection whatsoever, did whatever they wanted to as if it was some piece of property on the mainland somewhere with no history. She deeply regretted it [RW].



All I remember...by the time I was growing up over there Mr. Allerton owned that house and then he traded it to the State. I think that trade was right about the time the partition was complete, about 1967. I think before Mr. Allerton was E. E. Brown... Allerton's house burned down. It was like his tool house or something like that. And I think it's okay to leave that up there, I think it's not really that visible in terms of impacting the ancient cultural use. Back like twenty years ago we were working with the *halau* and stuff to try and figure out...sometimes they need a staging area and a place to get ready. We were looking at what was going to happen to the place where the Allerton house was after it burned down, so I think its important [CW].



Photos 44-45 Allerton Estate

They [Allerton cottages] were all there when we were growing up. The workmen house were all there...the workmen use to live there yeh [TH].

It was in the early'70s that I got to come and actually live out there in Hā`ena with my grandmother. Those were really amazing years because it was still very undeveloped, still rural. The hippies had caught on and they had found Taylor Camp, which came really out of the partition process and the State's desire to acquire that. Howard Taylor had that conflict with the State and so he opened his property up to the hippies. And so it was kind of an era of change, it wasn't only Hawaiians and locals over there now, you were getting hippies and you were getting surfers...it

was kind of the beginning of a wave of newcomers that were coming there. But it was a time where there was still a lot of, how would you say -- among the local people -- still really traditional. The families were so closely knit and inter-related...there was still that real sense of aloha and mahele...helping and sharing with each other...it was a wonderful period of time [CW]. Barlow's [Chu] property was right across from Limahuli. That's where he would come out and clean over there. That was their family's property until they sold it. You know who used to live with Barlow...and live down there, was Carlos Andrade [CW].

Most people, they don't call it "Taylor Camp" already. The whole lo'i restoration probably...to me we call it Kē`ē...but to me Kē`ē is more down here. The lo'i is not necessarily, like you said, there would have been a more specific name to that [CW].

This place right here right by the Taylor Camp was Kuakala and Kuahiwi but that name Kuakala was the one right near the shore that's why went put em like that and Pulimukeiki is a little deep water over here and then this is Laikohola because that's where old man Kalei Kelau went get lost and they go send men down there in 1946. That's where we use to go fish down there. But he went die in that tidal wave. And the only house down there had was old man Kelau's house, was down in this area here. That's the only house had down there...down inside this area, below the parking lot, because over here get taro patch. That's where the taro patches are right in this area, this is the meke. All of these places get iwi over here, all these places. Only the old man Kila and like the old man Kila's house, the old man use to live over here the old man Kalei and Kila right next to each other. You gotta look back -- to back here. Right here, that's where they use to live in the back here at Laikohola. You see had different people planting over there. But you see at the time when the people were planting there was undivided interest. So you go claim wherever you like, and then if you had shares to cover what you had, that's yours. Because they went choose taro patch and house lot eh. That's how they did it. That's why some of the properties where they owned like for example like the old man Kila, what he did he took property right next on the side of us and that property use to be my grand uncle's property, use to be five acres but because my grandma went go marry him he gained that half because my grandma died young, so he went get the property was 2.5 acres too. So what he did, he went go take acre and half down the lo'i and one acre where the house was to make up his share. That's what happened. Was right inside here. Below where our taro patch area is right now. Inside here, was close to the kind he was planting all inside this area here right below the parking lot. All inside here, where all the lo'i use to be him, the Maka the Kelau families and that's about it and us, but we were planting on rice land at the time. Adjacent to us was Kinney [TH].

The Kinneys owned property out there [Hā`ena] too. I think they come from Kalalau too. That's why they been own land over there and they get *kuleana* over there. The one house went buy in the back of us Limahuli Garden, that's from Kinney. That's Kinney *kuleana*. So they own that place because get royal deed, the *kuleana*. So they been own that place. And you know where that place stay? Right inside here. Up across the river. Up inside here. Gordon Haas and Roberta Haas own that place. You know that place windy, that place stay right in the wind channel [TH].

Some of the old families that I know are still hanging on to *kuleana*'s right there - the Wann family, Presley Wann, Lei - the Wann family - W-a-n-n. And recently having gone over the *kuleana* claims and then re-familiarizing myself with the names - some of these families are still running around too, and I would imagine, if give a chance, they would take certain *kuleana* in this too. And the other one is Keahi that I know of, that's also in there [RW].

### 4.3.3 Park Lands: Taro Agriculture

I planted all on old man Kila's place. I planted all over here in 1959, after the 1957 tidal wave until 1966. I pulled my last crop from here in 1966 because the State like buy em because of the hippies. That's why all the landowners been sell to the State, that's why the State been own these. But you know what? That was fine. The State went go buy em with federal funds. You would think that's federal place not State. By that time Kila wasn't here already. Too old already, he

was on O`ahu with his daughter. By that time maybe the old man went die. Because I went to Honolulu go see the old man for the land so I can plant taro in 1959. No I seen him in 1958, 1959 I been go plant over there because I went clean all the sand in the taro patch from the tidal wave before I went plant that place [TH].



Photos 46 and 47. Restored *lo`i kalo* in Hā`ena State Park

[We plant] what the ground can handle. Not every variety. The variety we had was *nukea*. That's the dark green one. And then we had *peali`i*, *lehua*, *piko*, get the black and the green – *hapu`u*. *Hapu`u* get the black and the green kind, dark stem on the bottom. Either *nukea* or \_\_\_ that's the best [for poi]. White, when you bag the poi just like sour poi, but *ono* that poi when *poha*. *Ono* that poi! That's what I like, in fact, we all like that. We go pound the poi it still white just like sour poi, but *ono* this poi when *poha*. But now they get more *lehua* now eh. *The hapu`u* is good, the *hapu`u* grow like the Maui taro because he grow big eh. Because before, you can tell the *hapu`u* because he going grow higher than any other taro. The *hapu`u*, the black one or the green one. That's the way it is, just like the Tahitian kind now. They grow like that and the *huli* big like this, big just like one coconut. Like when I went plant the Maui one here in Hā`ena, that buggah was just like one coconut. Nine taro for one bag. Big, enormous – the taro was big like this! The first time I went plant that, when I went to throw fertilizer, I had to go underneath the leaf to throw the fertilizer because was big like this. The first time I went plant the Maui one down in Hā`ena in 1969...that's when the *huli* came around eh. I had some for my friends, that's how we went plant. [Nukea] that's what I like. The other *ono* poi, well, all the poi is *ono*. You see, like the *hapu`u* and the *piko*, the poi is gray, it's not white, it's gray. And then the *lehua*, the poi is red. And then you get the *peali`i* is maroon the poi, on the dull side the color - maroon, just like the purple potato, something like that, the taro. So when you going make em and the buggah come *poha* he going come maroon, like the *lehua*, little different. That's the pure, not all mix up kind [TH].

Well, when we were growing up it was being actively farmed. Fred Fuji was growing *kalo* down there. Uncle Tom was growing *kalo* down there, Uncle Jack, his brother. There may have been a couple of others, but they're the ones that I remember [CW].

[For leaves] any one. But you see, the Maui is the best because no itchy. The one real itchy is the red *lehua* one, but nobody get today. They get all the Maui. So all the other taro even the Tahitian, it's good the leaf and the stalk. No itchy. But the *lehua* you gotta cook em good, you gotta cook em overdone, and still you going feel that little bite. But before the people eat em. Depends what we got. But then of course we get that other one, what they call that, the one that grow in the valleys like that, sweet one, you get that because the taro small like that eh, and the *huli* and the leaf; but sweet that one. I forget what the name that was. And everyplace we get spring, river, or ditch, that thing grow. Like down above I could see em from the ocean, growing in the stream. Because it's kinda high on top where get the house, I forget the place, in fact before is it Hanako? Or right after Hanako? Get that place, you can see on top eh. People use to live in that valley, still get that taro on the side of the river. In fact Kalalau, only place get. You can go take the whole stalk and eat em [TH].

Like up here get all kind, even some from the South Pacific. In Palau, they eat taro. They don't know what ulu is because we get one student come from Palau, they eat taro and fish. That's what they eat down there, that's their staple. Not like the Samoan, the Samoan's staple is ulu eh. But the south Pacific people, theirs is taro. We get taro over here that come from Palau. They no like em for poi, I don't know something's wrong with it. The Palauans no like that, but for go eat like that regular, it's good [TH].

[Poi Mill], that was old man Kina, he had that thing over there. The two places that had that was there and Rice. You know where the pasture is, right across the pasture get that gate over there? Right inside there, in fact the house get one house right there with one white fence on the roadside, use to be right in there. Long house, one long roof house, but only get one two-cycle engine to grind the poi. And Kina had the same thing. Only few people owned that kind machine and of course old man Alohikea had one machine. Sanborn had one in Hanalei, that's the only places that I know had the machine, the kind mounted on a regular basis, they grind. Although my grandfather had, he went go make with the model A, the tire. Start the motor and put the belt on the tire and turn the grinder, that's what he had with the model A. The Kalaaua's had the same thing, with the model A. Some had em on the drive shaft, Some had em on the tire with the belt. I seen that that's why I can talk about it eh. When I was planting taro down there, the thing was in the storage. Was inside the place where I store all my tools. And everything was all intact eh. After the State went buy em, everything went, and we had two hurricanes so everything went [TH].

We have the connection of Limahuli Valley itself which is where a lot of the food was grown that cared for the community that lived out here full time. So I believe you had some of these taro patches right here along the edge of the Limahuli Stream, but also Limahuli Valley was really the entire bread basket that fed the religious center at the end of the road [RW].

At the end of the road here used to be functioning taro patches. And they have started that *lo'i*. Of course the State Parks should never have allowed them to go out of use at the beginning anyway. And there's no reason why that can't be put back and turn it into a sort of a place where people can come and see certain of the stuff growing. Would have to replant the *hala* trees....but I don't see why you can't allow some place where people can come in and do *hala* weaving....fish netting...fish hook making. There's a lot of stuff that can continue the culture; that would go along with the eventual plans for Kamehameha Schools for Lumahai....because their idea is to turn it back into a functional ahupua'a....but of course that's going to take years of planning and lots of money [FBW].



Photo 48. Broad-leaf *hala* at Kē'ē Beach

When we went in originally with Hui Maka'ainana o Makana [1998 or 1999], was there when they founded it, was there when they first went in and they opened up the *lo'i*, worked it and got at least three to four of the *lo'i* up and planted and operating. I was there with Todd Musashimoto -- he did all the initial clearing of the land and subsequent planting.... I think one can easily vision the areas that Hui Maka'ainana o Makana can expand to taro patches. I think we can begin to envision what the experience of our visitors is going to be when they arrive there. That immediate connection into the taro patches to begin with, I think is going to be important. Having a trail that actually loops around the ocean front and actually makes a full circle from the internal parking lot, which we know is going to have to be expanded and is not enough [RW].

They were talking about that way before that guy you know that guy that went go draw the plan and then they went run away go mainland. Run away go home - that's when we started that project. That's when we go open all that taro patch for the archaeologist go inside there go map

em. They had all this drawn up already, but like I told Chipper, you guys go do the paperwork, we go do the tackling part, which I did go clean up all that place [TH].

#### 4.3.4 Park Lands: Other Vegetation

All these guys who plant *hau*, the *hau* do damage. Where I was planting down Kē`ē no had *hau* before you know. That hippies went bring over there go make the kind shed that's how that thing went grow all inside there; before no more *hau* down there - only had palm trees and *kamani*. After 30 years I been go back inside there, I went kinda lose my bearings eh because everything is all high. That's why I told them to go back over there go plant down there, they was going open the one right by that house where I was telling you, Montgomery, the State house. They was going cut over there, the trees like this big! How you going do that in the taro patch? The ones down there at least not big like that - stay all on the *kuleana*. On top the bank, not inside, had some inside - I been get em with the backhoe. The excavator, I been dig em all out. Although we not supposed to take machines inside there, but we go with machines inside there anyway, I did all that thing up. That's why now stay clean eh that place. I take em all out [TH].



Photo 49 Hau grows in several places



You know, it just was always...I guess at that time it just seemed so...it was a lot less overrun with alien vegetation; it was a lot more open.... The coconut trees were all there but a lot of the octopus tree, and all of that stuff that's covering it all now, none of that was there. There were vines and stuff, but you could see the rock walls, you could see the area. None of those *kamani* trees were covering the inside side of the park, right behind the lo'i and all of that. The ironwood trees are still there, were there originally. But it was an area that was never crowded [CW].

Photo 50. Coconut trees in HSP

#### 4.3.5 Park Lands: Activity

Well, when we were growing up it was really different...it was still very rural, very little tourism. Maybe once a day the "stretch"...we call it the "stretch", I don't know what you call it now. Actually, it looked like the long limo kind of thing. That was the tourist car, maybe once a day the thing would come down there. The cows ran wild in those days ....they fenced in the people... now the people run wild and they fenced in the cows. I think it was better before. It was just an amazing place to get to be. It was so beautiful [CW].



The Kauluopā`oa (*heiau*) and Keahualaka, you could see it from the beach. You could go down there and go to the beach... it was just a great resource [CW].

Photo 51. Can no longer see *heiau* from Kē`ē

#### 4.3.6 Park Lands: Kalalau – Hanakāpī`ai Trail

[Freidrich Wundenberg, Grace Rice's grandfather] is the one who blasted out the Kalalau Trail. This was in the 1860s. He did not want to endanger any of the men that were working with him clearing this trail, so he himself set all 400 charges of dynamite that they blew up along the trail... because he was the Superintendent of Roads for this district and for the Monarchy. Because he

also did a lot plant experiments to see what plants would grow out here, he's the one that started the oranges and the coffee. So along Hanakoa and Hanakāpī'ai [trail] you'll still see coffee trees. But the blight hit the oranges and blight hit the coffee. They wanted to be able to bring out the produce out of Kalalau. I believe they thought it was easier to come out this way -- one of the reasons they came this way was because Nu'alolo was almost impossible to get in and out of except by sea. So that you had Kalalau, Hanakoa, Hanakāpī'ai, all of which were heavy with oranges and coffee. So his instructions were to build a trail that was wide enough for a fully loaded *burro* to move comfortably, which makes good sense [FBW].



Photos 52 - 54. Trail signs in Hā'ena State Park.



#### 4.3.7 Park Lands: Taylor Camp

Elizabeth Taylor's brother brought this piece of property that's right there on the bay, and the State condemned this particular end of the road in the early sixties or so - scattered all the owners and the taro farmers to the four winds, locked it down. This guy Taylor, in anger allowed these -- I don't want to stereotype or anything like that, but allowed a commune to begin to form that went unchecked for a long time. I remember the hepatitis epidemics one after another, almost non-stop epidemic level hepatitis with all the various strains, the significant trashing of everything and the whole subculture that happened there... Taylor Camp occupied all of this [looking at map] - this was all Taylor Camp. Well, actually it goes further out; it's actually all of this.... Taylor Camp just refers to that particular time in history when it was overrun by the commune [RW].

Photo 55. Kalalau-Hanakāpī'ai Trail

#### 4.3.7 Park Lands: The Future (Master Plan)

We know the helicopter pad's got to go in there; we know that certain portions of this is going to have to be data recovered as you might be taking out a couple *lo'i* in order to actually put in the basic infrastructures that you need right there. RW

A lot of this stuff in here - the vegetation is kamani - there's a botany aspect to it too, so that's a separate 'House' too. There's a whole *lā'au lapa'au* aspect that could be done here too, which actually creates a whole other separate 'House of Botany' - again, a completely different discipline, and under different goals and objectives, but still important to the big picture. RW

Prior to the commune it was the Taro Mill - the footprint is still there so, I think, interpretive-wise that's still pretty cool. I think even to allow the Hui Maka'āinana to have the potential, if they should want to, to grind the taro in the original footprint, or close to it if you wanted to keep it. We can let SHPD decide on that one, whether we can use the original platform or build one right next to it. But the taro production and the taro mill, they are capabilities - could be there if they needed it - I know it's a long range plan but this is what it's all about. It's long range [RW]

###

#### 4.4.0 Water Resources and Use

The Hawaiian word for fresh water is *wai*; the Hawaiian word for wealth is *wai wai*. This is because of the value the ancient Hawaiians placed on fresh water. For taro farmers water was a crucial resource and a lot of effort was employed and strategies used in order to get it to the *lo'i*. Fresh water was also crucial in the lifecycle of stream inhabitants such as the *o'opu* and *ōpae*, as well as some of the marine life that depended on the benefits of *muliwai* or brackish water areas.

#### 4.4.1 Fishponds and Fishpond Fauna

The big *meke* was over there and had plenty water inside down there by Kē'ē. That's the only local ones down there, that one. And then of course up, the one below the water tank, the one past the Wichman's...going down Kē'ē. All inside there, I don't know if had *meke* inside there or what because by the time we been go had all grass inside there - *honohono* and *pukamole* and all that. I don't know if had taro patch inside there because we never go walk all inside there because it was always like that - like now get the Jobs Tears - more worse [TH].

We use to get *o'opu*, *akupa*, and I think crayfish; that's all I went see in there [fishponds], I don't know if had mullet. And of course had bull frog. The crayfish had plenty down there. We use to eat the crayfish, catch em, rinse em out in the 5 gal. water and *pau* we fry em in shoyu, even the sand crab we do that too, fry em and eat em, and that time was *ono* because get big meat right inside the leg eh just like how the crab you know [TH].

These can also end up being working fishponds too. And so that could be another aspect under the fisheries in not only managing the *kai* fisheries but the *wai* fisheries also. So those are there as far as expansion capabilities. It would be nice to have it as a larger master plan ....and step by step work up to it [RW].



Photo 56. Part of former fishpond and marshlands

#### 4.4.2 `Auwai

There were two main `auwai that came off of Limahuli Stream and this one here came down, this was the primary one [CW].

It was after the partition - I think they were bulldozing that when they were trying to clean up the Taylor Camp scene over there. So they've totally destroyed the `auwai system. And when they cut the water off to the `auwai system then the *lo`i* became useless. It became overgrown with all the trees. Then when we went in to try and clean it, to map it with Alan Carpenter and Mo Major - it was a huge job just trying to get it clean enough that we could actually go in there and do mapping. So what you see today is the result of a lot of work. A lot of years and years of work just to get the *lo`i* exposed - we've had to run a pipe down there to get the water back because the *auwai* system was destroyed [CW].

The water is going to be coming from Limahuli Stream. Right now, I know, it's tapped up above the road. In Limahuli it actually comes down through the *auwai*, crosses underneath the culvert, and reenters into the `auwai that starts to feed the *lo`i* that are actually down there. That water has been flowing for awhile now. We may want to take another look at the water supply Hui Maka`āinana expanding their footprint. Right now the last time I saw it there were four big *lo`i*, however I know that Thomas Hashimoto had two or three other *lo`i* in the areas ...and I know he wanted to open up too. So I think in visioning a larger master plan for the actual footprint that Hui Maka`āinana can expand their *lo`i*, with the foot-trails that are coming through there ... that we keep it pretty safe ... the terrain itself is not necessarily really difficult. Although slightly undulating, the view plains through here are absolutely stunning [RW].



Photo 57 Modern `auwai system.

#### 4.4.3 Hā`ena Watershed and Water Sources

Limahuli is the primary watershed, the primary watershed or valley within the ahupua`a. Mānoa does have a perennial stream through most of the upper Mānoa Valley, but there are times when it dries up by the time it reaches down by the dry cave [CW].

Before times everybody would just drink the water out of Limahuli Stream ... our house...our water comes from an ancient spring called "Kawaialoha". That spring has provided our homes with water since before my grandmother moved out there. The guy who had the property before her was Philip Palama, and before Palama was Walter McBride. And Walter McBride had put in a system that took the water from that spring and brought it by pipe down to the house.... I know that that place where our home was, was supposedly *kapu* that was a *kapu* area. In ancient times before he put that pipe in from Kawaialoha, it was supplied by a spring called Waikapū. You've got to ask Uncle Bruce about that, he's got all the scoop on that [CW].



Photos 58 and 59. Limahuli and Mānoa Streams

#### 4.4.4 Limahuli Fauna

We had a Filipino caretaker there for awhile. He must have been only four and a half feet tall...we would fish and come in to Limahuli and then deep fry them (*o`opu*) in the woks over a fifty-five gallon drum that was cut out for the fire that the wok sat on. This went on for years. These are some of my happiest moments [RW].

#### 4.4.5 Hā`ena Floods

Flooding...I've seen this end of the road in the most vicious storms you can imagine. I know on the higher side the way the water comes you're on the safer side - the lower side, no. Of course on the lower parts flooding is a problem in the heavy rains [RW].

#### 4.5.0 Marine Resources and Use

The sea is a great resource for people with access to its bounty and Hā`ena was and is an exceptional marine resource according to the ethnographic consultants. However, it is a fragile resource sometimes abused by visitors.



Photos 60-62. Kē`ē Reef sign; Kē`ē Reef trespassers; Kē`ē Beach

#### 4.5.1 Fishing Lifestyle

Everybody most time they stay home sleep, not us we fish night and day because night time is a different way of fishing. Like if we work the whole day, evening time we go fish, catch fish for the family. You like catch fish you go down the beach one time you wack em out in one pop, you take em home, share with all the people, take enough for us eat. We can do that every day because there was lotta fish around the place [TH].

[People say] "What uncle, you no go surf?" If I go do that, my dad would tell me "Now what? Go eat the board." You know what I mean? Everytime like that. I hear the people always say, always tell me, *hana ka lima ai ka waha*. If you no work you no eat, if you lazy you no going get food. You gotta work with your hands and make something. That's what I hear all the time. If you no do nothing they going tell you, ah *moloa* that boy, he lazy, we hear all that [TH].

Turtle, fish, but we no catch plenty, enough only, because we can always catch fresh kind. We know where the fish stay, we can go take our net and one blast we coming home with one net fish. That's how it use to be with my life when I was young. That's what made me interested in all the areas where I go fish [TH].

## 4.5.2 Fishing Grounds

We use to fish from Hanalei to there [Kalalau]. But you know, before was little bit different too because everybody we knew who the *konohiki* was for that area eh. Like in Waimea, my grandfather near the road, then you had Chandler, then you had Tai Hook, and then you had Haumea, all fishermen in that area. Then Hā`ena was La`a, Mahuiki, my dad, and Hanohano. Before everybody respect each other so they no full around that kind. Like Hanalei was Goo - Goo and Dias. Then down in Kalihiwai was the old man Naka, nobody go fool around down there because they respect; unless they ask for help. Waimea had old man Kimokeo Kanehe, Chandler, Haumea, Tai Hook. All them were fishing right in that area by the beach. They had all Apana right there, coastline. They had their land there, they own the land, so they can fish right all through there [TH].

All the stuff that I show you, the maps that I have was originals from my dad. And he knew the place. Like today I go tell em the people who go fish inside there, they don't know. I can tell em over and over they no can remember. Like how I remember all that names. There may be people I went miss, I know that, I use to know the names, but I no go over there often so I forget. Lucky I remember that much because my brothers don't know that much too. Me the one went fish around with my dad, because my brothers went go in the service by that time, 1950 they went go away [TH].

## 4.5.3 Fishing Methods

Hanalei we use to use *ku* net to *ku* the `ōpelu, the *ahi* - *ahi* use to come we surround the *ahi* and catch em [TH].

When I had my family and I use the fish I go catch and sell em for subsistence to help me with money. At that time I use to sell the fish. And my dad did that when we were young too, selling the fish to the *Pake* – the *moi*, *āhole*, mullet – that's what the *Pake* like eat eh. That's how I learned to go catch fish. And we knew the grounds. That's how we learned everything that had to do with fishing [TH].

Photo 63. Uncle Tom's throw nets



That's why they don't realize how important we are passing down the message for the younger people. Sometimes like the old times, people don't wanna do that because people sell the information and make money out of it. That's where the wrong is. That's why the old people, they ask them, ah no, no, no, no, because they think like that. For me, I don't care because I'm not greedy for money. That's the reason why I share my *mana`o* with everybody, and I'll be sharing with Kepa Maly. Because of him that's the reason why I came up with everything, all the names, place names. Yah, I gave him all what I went remember and only very few I went miss because that's not my place for go, only those places where I went go fish where all the *moi*, *āhole*, where I go all the time. That's where I go back and back and back, and my dad use to say you go up there get big pile *moi*. I know where to go, I go straight over there go look [TH].

He [Uncle Tom Hashimoto] was mainly a throw net fisherman. He'd throw his own nets [CW].

I prefer to carry the second net anyways - I'm a team player - like to just follow Thomas around - carry the net. Whenever he threw his first net, I'd gather it up. If I had to go over the edge, I went over the edge. But I'd gather it up, drag it back to the beach, unloaded it and then drag his net back hopefully in time before he threw the second one. But I would go back and forth. I got to know the reef really good. As any fisherman knows, there are some taxes you have to pay. The spines of the *holi holi* hurt [RW].

Thomas is not a pole fisherman. We would surround the `ō`io when it would come into the bay. There were times when we would catch at least over a thousand pounds, and we shared with

everyone - everyone between Hā`ena and Wainiha - all the old families. That's because different families had different parts that you needed. Thomas had the deep nets and the boats. But John-John Haumea, for example, had the bag net that we needed. Once the fish were surrounded we needed to corral them up to a smaller net and then drag them in. But I know John-John had to have that....John-John Haumea who used to live right there at the Wainiha Bridge [RW].

Thomas had eight foot, twelve foot, twenty foot, twenty-four feet deep by a hundred yards long or more as you can piece these nets together. Because of the way we worked in Hā`ena our property has stunning views of the ocean, and it was a constant thing that we lift our heads up and scan the ocean - always. And when we saw the black spot, or the cloud, the work would stop. Then I remember him telling us stories that while they were working they would set the fishing lines out and tie them to one of those tin garbage cans, and when the *uluu* bit the garbage cans would be bouncing down the beach warning everybody there was a hookup. So all work stopped. Once the garbage can hit the water, the water stopped it and then they were able to retrieve it, and then pull the *uluu*'s in. But that was their way of fishing while they working. For us we weren't so restricted as such, so we had a chance to always check it [RW].

He [John] had the bag net that Thomas didn't have. Once the fish is surrounded we needed a smaller net to actually pull the purse strings on the bottom of it, and then that was the net that we actually dragged ashore - dragged closer in and actually up onto the beach. But all the times we ever did it, he never sold one of the fish. It was all given out to the different families that helped in pulling the nets in...it was a classic *hukilau* kind of thing. Absolutely. In Hā`ena - even in my day - which is the seventies and eighties when we were doing all of this [RW].

#### 4.5.4 Fish Catches

In 1966 before I went in the service we caught something like 96 *ahi*, 100 lb fish. You know what the price? 19 cents! We sold `em to Kip Mulley in Waimea, and we use a big dump truck to haul all that fish. We sold 60 and gave the rest away. Two guys one fish. Nobody gave fish like that away. They cut em all up. With us two guys one fish. 100 lb fish we give em. Go cut your own fish. That's what we did. And that was traditional because my dad he always tell us when you guys get one good catch, people come there, share. I still do that til today [TF].

From Lumahai to Hā`ena I use to catch all the moi down there. Big school, big like this house, you throw one net on top. For years I did that til today. Only me the one go catch the moi because I know the grounds, if he run away from me I go look for em because I know where he go run. I go get em. But lately I not doing it because I like replenish the fish [TH].

One time in 1970s we went go catch *kala*, I look inside I see the color - green inside there - so we make that kind net like I tell you, 500 mesh across, so we went in there, myself, my kid brother, Richard's two brothers, we went go inside there, shucks we had 92 *kala* in that *kuuna*. So I go home and ask my dad, "Daddy you guys ever catch plenty *kala* in one time?" He tell me yeh, Muliwai we caught 110, but look out, this is way after now, that was back in the 1920s! But us in the 1970s we was doing that we was catching!! And I use to go catch *kala* myself, I go with my small dingy catch 60-70 *kala* myself, and the biggest job for me was to go put em in my car eh. I gotta haul em up and put em in my car. And go sell em. That time I use to use that for subsistence but I use to go sell em dollar one *kala*, I made some money for my family! That's how I use to clothe my family, feed my family, plus my wages. I never stopped doing nothing, that's why I dunno how to surf like people like that [TH].

Most time I was going there for the moi and all the places I went name that's what made me learn that because my dad would go in the area and say, hey, going down there get big pile moi over there. I go straight over there. I go over there I look the big pile inside the wave already from far I look already. I go there and wrap em. Like this year, for all the years, that's the most moi I went catch - this year. I been catch maybe 600-700 lb this year, throw net. But not the kind for the kill

kind, its just accident I run into em I catch em. But not sell though - give all my friends, my kids. They like the fish [TH].

Over here we use to catch, 18 lb `ō`io - big like this! Just like baby shark. In fact the one I caught this year was 10 lb - not too many, but mostly I would say maybe about 10-12 lb because all this kind size eh. I had few big ones. And I had some smooth side ones like that, that's the kind I like to dry - we been dry some [TH].

There was always so much fish there in those days. The amount of fish in Hā`ena when we were growing up was so much more than there is today. Really, it's pretty amazing. I used to go diving and see the giant schools of moi swimming around ....big kind moi! Like as wide as this table...three feet. And the *kala* - every time before there's party, people go bang, bang and the *kauna* in those sand channels between *na papa*...and oh, the *kala*! That was always good fun...everybody went as one gang and go bang, bang at night in there. Now you hardly see *kala* like that, no more *moi* like that...big ones already.... Those were the main ones. When we were growing up I used to like to whip too - go catch *papio*. Uncle Tom - we were always spoiled because Uncle Tom was the base fisherman and he would always - we hardly even go fish - he just bring the fish for us or we go bag-boy - go carry his bag for him [CW].

Now I'm *kapu* to *moi*, I'm now *kapu* to all baby fish...because the supply of *moi* is running out. I've personally *kapu*'ed myself on that [RW].

#### 4.5.5 Cooking, Preparing Fish, Etc.

Well before, most of the time we use to *pulehu* [*kala*], and make soup, cook em with shoyu and oil. It's *ono* that way. Of course they make soup only with water and salt. That time we real Hawaiian, and we use to eat all that because we had that at the time, we eat with the poi [TH].

The mullet, we use to eat em raw - what we use to do the mullet we use to cut em straight through and put em in shoyu and chili pepper, have you tried that? Yeh we cut em straight through just like the cucumber, straight through, and throw em in - put a little salt and shoyu and chili pepper inside there, ho *ono*. You eat with the hot rice, *ono*. You eat em like sashimi, like that. The meat by that time turn black yeh, from the shoyu, it's *ono*, you eat that you know, get that little bite from that chili pepper, that's how we use to eat em. We use to eat em raw and steam. That's how - we use to steam the mullet and the moi. Of course we fry em, we dry em. We dry the mullet and then we go fry em and that's *ono* again! At that time you gotta salt most of the fish because no more ice box. At a later date, then get ice box [TH].

My grandma - we get the salt from the Hanapēpē people, the Aukona family like that. That no worry because they give em by the barrel, so you always got. And then what we use to do we use to salt the fish and the turtle and whatever, and you know the kind you go mix poi, the crock, that's how we use to salt the things because inside there no can come rusty the crock [TH].

Yeh, they get that salt cabbage and black beans, that's how my wife make. You can throw green onion inside there but overcook if going steam um. So we only put the black beans and the salt cabbage, that's it. That's our way, and of course you going put ginger and garlic inside there. Chop em all up. My wife no can eat shoyu so we just steam em like that, then you put on your own fish what you going eat because the black beans salted eh. So that's where your salt is, right there. You like put shoyu, you put on top your own after you take your share...we steam em with the oil. We make that and we go make even the nenui, taste *ono* too. Cook em with black beans, or sometime for fast action cook em with shoyu and oil, garlic, just steam cook. That's it. Only the water from the fish stay in there but mostly going be oil and shoyu. That's how I cook em [TH].

Well, you can put em [*limu*] in the soup, when you boil moi and stuff like that. Even the stew you throw that inside, that's *ono* [TH].

The *kala* everybody used to just pulehu that thing. The *moi*, we always liked to just fry it. Mostly we just would fry it. Sometimes you steam it but takes too long to steam it! [CW]

#### 4.5.6 Open Turtle Season

The turtle go eat all the *limu* and the fish no more food. [*Limu*] grow way on top just like one pasture on top the *napapa*. Before not like that, now the turtle he go on top the *napapa* he no scared you. Now get too much. Before that the *honu* dig out when we use to pound em. But you know what the fine for that though - you go catch the *honu* - \$55,000! Big fine when you go full around with that. That's why nobody like go touch that turtle, they go get em night time some.... They should open the season: one a month for one family you know what I mean, whoever eat that thing. And us we eat that thing, make good steak that -- mo bettah than beef steak because soft eh the meat. Like us we use to go catch em, cut em all up, salt em or make barbeque. That's the best, you put the turtle and the beef steak over there, they going eat the turtle because that thing going melt in your mouth. And then you gotta get good hand to cut the thing too because if not your whole house like if you go eat that turtle and your hand no good like when you talk to me I can smell you. I can smell turtle on you. And the people outside the road can smell the turtle cooking because the hand no good. The hand get lots to do with that kind meat you know [TH].

Before we use to make that kind Kalalau cook, and how they use to live they use to clean all the turtle guts eh, we put the wing inside there, we cook em with the turtle fat, no need put oil inside there. And what we used to use for make em just like the garlic, we use to use the orange leaf. We throw the orange leaf inside there. It's ono! By the time everything all *palahe*, you just slam that thing right on your rice or whatever in your bowl. We eat that way. After you warm em up everything all *palahe* eh, the meat and the liver and all that man it's *ono*. We use to do that, we call it the Kalalau cook. Kalalau cook we use to make one big pot and put all that things in there [TH].

#### 4.5.7 Limu Gathering

All over get good *limu*. Well, most places get the *limu kohu*, and the only place get the other *limu*, but not too much now is at Kanaha. That's the only place. They get *limu pepehe*, *manauea*, *lipoa* – little bit not plenty. Before the fish go eat that, but you no can eat the fish. Smell. Too strong, but if only little bit, not too bad...I know where get so. So when I go catch the fish over there, I smell *lipoa*, I know where the fish came from. But we go eat, but not too much, only that particular place get [TH].

Our place no more that kind stuff like that. the only one that use to come plenty on the sand was *limu pa`apa`a*. The flat *limu* the one just like paper. When the *limu pa`apa`a* stay the *moi* go hide because get plenty small crabs that live in that thing, like Waimea. That's when they go *kokone* over there and catch *moi* and `ō`io inside that, when they see the *pa`apa`a* on the beach. That's the only *limu* that I see plenty on the beach, well use to get that and the *limu kala* but not anymore because the turtle eat em all. Like before we use to go fish, we use to go look *nenue*, get plenty *limu* rub against your leg, they eat your leg you gotta go with pants so that the *limu* no rub your leg when the wave come. Today no more that kind, the turtle eat em all. That's why the *kala* today no fat the *kala*, because no more their food [TH].

*Kala* and *lipoa* almost the same, but the *limu kala* is more thick and tough. The *lipoa* is short, but same color – brown. The *limu kala*, well I wouldn't say get smell – get some kind particular smell. Like certain *limu* get smell eh, like the *limu kohu* you know what I mean? The other *limu* no more smell, and then of course get the *lu`au*, the \_\_\_ *limu*, *limu `ele`ele*. The `ele`ele get a little smell like the dark hairy one, that's the `ele`ele. Get plenty other different kind *limu* yet, but these are the ones that they [turtle] eat all the time [TH].

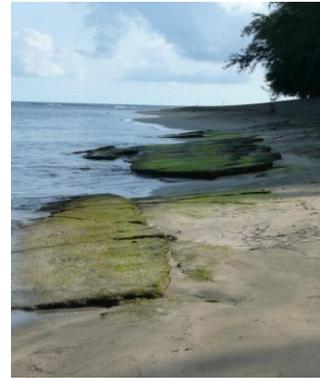
#### 4.5.8 Gathering `Opihi

Get [*`opihi*] but the screw-up when they market. That's where we lose em. When they start marketing that thing that's when we lose em [TH].

#### 4.5.9 Beach Erosion

The beaches were bigger than. We're seeing shore line erosion now. The beaches are significant ...in my mind they're significantly smaller than they were. You can see that in just the land falling down and the erosion that we're witnessing now [CW].

Photo 64. Kē`ē Beach at low tide



#### 4.5.10 Tsunami Impact

The other really significant event that I think had contributed to Hā`ena being really underdeveloped and really maintaining its rural lifestyle, were the tsunamis in 1946 and 1957. Those had a really profound effect on the people alive at that time because of the incredible damage that was done by those tsunamis. When I was growing up I remember all of the coastal areas of Hā`ena...just seeing the slabs of where the houses were...nobody wanted to rebuild along the coast. Because almost within in ten years you had two severe tsunamis, so it was fresh in everybody's memory. But by 1967 the most recent tsunami was ten years away. It was beginning to fade in the memory of the people, and as new people came they had never witnessed or understood the power of those tsunamis. So really, '67 was the beginning of a lot of change [CW].

#### 4.5.11 Surfing

It was in the early '70s that I got to come and actually live out there in Hā`ena with my grandmother. Those were really amazing years because it was still very undeveloped, still rural. Change was beginning, the surfers were catching on. The surfers had caught on to that Kaua`i has awesome waves, and we were getting surfers from California and other places [CW].

#### 4.5.12 Shark Grounds

My understanding of the shark home is actually in Makua in the outer edge. That is the hereditary home of the shark god. These are definitely his cruising grounds; they're definitely his front yard here. But my understanding is the currents are very deep off of Makua - the currents never cease even on the calmest of days, the currents always swirl in there and it goes deep onto the reef. I have never been able to swim, even on the calmest of days, in that corner of the reef. I can show it to you where Makua comes. Makua Reef is the Tunnel's area - off of Tunnel's [RW].

The ocean comes in in a big way there. I've also been there on the *heiau* and I've watched a whale shark go by on numerous occasions. There's one that does his regular route, so those are absolutely massive. Another time I saw it on the trail above this *heiau*, when you get into some higher grounds - I was able to watch it approach from very far away, come right off-shore right here at the *heiau* and I could tell by the scale of the people and the whale shark that it was an absolutely massive animal. So I know that he makes his annual cruise through there, this particular whale shark. I'm sure other people must have seen it. My brother was there also on one of the occasions too and saw it cruise right off beach itself, the lagoon [RW].

###

## 4.6.0 Cultural Resources and Use

This category includes traditional Hawaiian cultural resources and practices and other ethnic resources and practices. The traditional Hawaiian cultural resources and practices, includes the Pre-Contact Era, as well as cultural practices after Contact (post-1778). Cultural resources can be the tangible remains of the ancient past or the traditional *wahi pana* or sacred places, or any cultural gathering place. One of the most significant traditional Hawaiian cultural resources is the *heiau* or places of worship. Other places of great significance for all cultures are the burial places of loved ones. Unfortunately with the massive transformation of the landscape as a result of the many western industries [i.e., provisioning, sandalwood, cattle, sugar, tourism, urban development] coupled with the secretive nature of ancient burial practices, most of the ancient burial places are unknown or forgotten and are easily disrupted and disturbed by modern subsurface activity.

### 4.6.1 Burial Sites in the Park and Vicinity

There's lot of issues, small issues, there's lots of em. Like in Hā`ena they had that burial thing -- the iwi. That was a big thing, but you know what, those guys, they stupid, that's not their iwi. That's burials over there all along the coastline. We use to go fishing night time all spooky, the whole place. We know that. And my dad said they tried \_\_\_ in Naue, that whole flat over there, guarantee all iwi, that's why they been find that one over there. And these people who think oh because the place name is Kounui, ah they say the Kounui family was buried there... ah bull shit, they don't know, they not sure. Now they all confused now. Even Jeff Chandler, same thing, Jeff Chandler he went talk -- that's the family.... That's warriors. And I know the place. No more other people that older than me in Hā`ena. I'm trying to help out, giving information while I'm in a good state of mind [TH].

I guess way back in the 1300s – 1600s when they tried to come over here and conquer this place. They never did conquer this place because every time they tried the warriors over here would kill em. That's why they call the place Waikoko because that's where they use to kill em. Waikoko means blood water eh. Over there that's where they use to slaughter those kind people or they go chase em with their own kind canoe and kill em, take em down there to bury because big flat and sand. [They came from] off island I think coming over here to conquer this place. Like they did in Honolulu up by the mountain and dump em all down...the kind place like that, over there and like on top the Pali. They make that song like over the Pali yeh. That's how Kamehameha became the conqueror of the islands because he did that. That's why a lot of people don't know that the people buried in those graves over there. Now they do excavations so they gotta find something, but again I blame the real estate people because all these Hawaiian lands, get that kind stuff on these Hawaiian lands; and no more marker [TH].

Kē`ē get too, you know why? Kē`ē was a staging point for the people when they going back to Kalalau and maybe the \_\_\_ come pickup, drop, they no can go eh and if the people die they going bury em right there. But over there had plenty *paepae*, the other side of the *pali*, they had plenty stone kind formation around so you know that get grave yard but some places no more you know. Like where they had the cesspool they went go dig over there they went find bones over there, right by the toilet -- the new one, all over there, even in the front. I see people sleep on the ground over there, they sleeping on the buried bones [TH].



Photo 65. HSP Comfort Station

All that whole coastline - I no care. That's why when we go fishing over there spooky - use to be spooky for us night time, but we no care. We throw em off, like if we going down and run into em

we tell em you know what, my dad *po'e kaua*, Freddie Makua going *iluna* go up, but we still going down, so the thing he head up there where we not going, we going down so the spook *pau*. That's how we use to do it. And then when we go *holoholo* fish night time, we no say nothing, we only tell we going *holoholo* but not where, we just go, even day time if we going hunt, same thing, we just go we say we going *holoholo* but we no tell where otherwise this kind they wait for you. That time was haunted with devils when we go fish night time [TH].

I know there is one kid who got into trouble and thought he could hide out at the end of road in the *halau* area and that no one would come and find him. He said that he lasted a few hours there after dark...he said there were so much noises and voices and nothing and nobody could be seen and he couldn't take it [FBW].

[The *iwi* is of people who used to live here and] I think warriors too. That's what I think, that's why plenty eh? All along that coastline, even over here [looking at map], Kaloli, Kaloli inside here along this bank over here sometime you see the bones fully framed standing up-side-down, sideways, whatever. Just like they been throw em inside one hole like that -- that's all sand eh. So when the sand goes the high waters go eat em, eat em, then you see em all falling down...you see the whole frameworks well within the sand. All that place like that, even the Rice's, the one we were talking about. Before when they went bulldoze the place before 1946, they went bulldoze all that place make em flat eh [TH].

And then I'd say, 'Okay, why don't we have the Burial Commission get land from the DLNR, half acre or acre, several different places, pick up the bones, carefully envelope them with the prayers and take them to this piece of property which then becomes a memorial park. Inter the bones there again and put a plaque with the names of the people from the *ahupua'a*...their names are in the Great Mahele ...because those are possible ancestor of those bones...and those are the one names that we have...the most...the deepest listing of names that we have. But you get these fringe people...mainlanders come in...and they're going to tell us how to do things...and they come and make all of this great fuss [FBW].

We have Darren Mahuiki here who knows where his family is buried, and he got permission from the owner of that little corner...and you'll see it over here, it's marked 'Burial Place' now...and he has turned that into a garden And that is where his family bones are. The Smith family who are in the Park, they took where their family was buried and they turned that into a garden too. The Hashimoto's have their family, at least two generations that I know of, that are in the little hillock back behind the house. So these are three families here in Hā`ena who know where their family bones are, and they are taking care of them. And I would be the first one down there to fight off anybody going in there and moving those bones and disturbing them. That's one thing with the State Park thing, as far I'm concerned, that need to be kept in place and marked. Here are three families who know where their bones are and are keeping them, and doing something about it [FBW]

If you go there, just to let you know my great-grandmother is buried over there, her name is Ka`aumoana Moa Niau...the one says Moa, her whole name is Ka`aumoana Moa Niau. Come from Ni`ihau, get plenty family there, Niau -- my mother's relatives.... Kaenaku-- you know the first one, that's the daughter of Mokuohai -- I don't know the rest [CM].

## 4.6.2 Traditional Hawaiian Sites and Legends in Hā`ena

### 4.6.2.1 Heiau and Hula Platform

The Kauluopā`oa [*heiau*] and Keahualaka [*hula* platform], you could see it from the beach [CW].

As a side note that very few people know is that in the '80s with *Halau Hula o Mililani* we went up to the *heiau* at night. We made torches and placed the torches where the big *pahu* drums are said to be facing the altar. What happens is that the dancers cast a forty foot shadow up on the wall and that is clearly visible from every area around....so the images of many dancers dancing on the cliff walls ... combined with the various acoustics. There are certain places along in here that if you stand in this one spot...the acoustics... you can hear the entire cliff wall far away. You step one inch on either side of it, you can't hear it. I can show them to you when the sea is calm. When the sea is calm it's much easier, as you walk along the beach you can...you'll actually be walking along these acoustic windows...they're short but you know exactly where to stand to hear somebody way far away in the back of the cliffs. So there are some acoustics on here ...which are common in many *heiau*...Hauola over in Waimea, Kekaha side is clearly an amphitheater...as many of them were. The chanting style of passing over mountains ... and the long distance too...I'm sure was practiced here [RW].

People were still living there yet [when I was growing up], the people would go teach hula over there [by the *heiau*] -- the old lady Wahinekouli, she was the teacher over there; and then the old man Kila went go.... [Hula people] still go over there clean up that place and go *uniki* over there [TH].

I know people have [gone up to the *heiau*], but I can't give you specifics on that. I just know that there are people like me who have gone up there and left their *ho`okupu*...and said thank you for what's happened and what's going on. It's a place that's rich with all kinds of ghost stories too [FBW].

I think the archaeology at this particular point will take its own particular course. The *heiau* is itself .....especially when it comes to the hula...you need to separate it out for both hula and for the *heiau*...they're two separate things. Even though they could be under one house ....but yet even then that house is divided into two separate categories...one is for the *heiau* itself and the other one is for the dance platform. They're two separate functions. Although it's all in the same because as you go up you're making your *ho`okupu* to the *heiau* itself, and then the *hula pā* is the secondary aspect of it. Once you've cleared the way through the *heiau* itself, now you're on the *pā*, and then now you do what you need to do to Laka. But there is a little bit of a gauntlet that needs to be run, and the protocols to the main *heiau* have to take place [RW].



Photo 66. Ke-Ahu-a-Laka

My understanding is when Kē`ē originally shows up in the material it's during the Mo`ikeha and La`amaikahiki saga. In that La`amaikahiki promised to Mo`ikeha that upon his death he would come back from Raiatea pick up his bones, intern them there at Taputapuata of which he had a hereditary role there with his grandfather, Maweke. When Mo`ikeha passed away his bones were kept in Kē`ē, right there at the end of the road for safe keeping, until La`amaikahiki's return. La`amaikahiki comes there, picks up his bones, goes to O`ahu, sires that royal line, and then goes back to Taputapuata. So that is my understanding where it first shows up in literature, the oldest. Already back then the school was evident as a place of history -- the school for historians. There's always been a center of history -- this would have been your PhD in all the various chants. I think a really good, more modern, but still shows you that even in the 1880's we have really good description of historical ... I'm jumping ahead a little bit but I'm just showing that even as it comes up to the early 1890's -- it's still very highly respected [RW].

My particular involvement, of course, has always been *heiau*. I understand that Auntie Kai Zuttermeister has a connection here also with the Kaulua Pā`ao, also the *hula pā* at the top. I think

there are only one, two, or three places in Hawai'i where the actual *hula pā* is incorporated in the *heiau* itself, so it makes it rather rare, very rare [RW].

I am aware of Kekahuna doing the map itself with Theodore Kelsey - the dynamic duo - can't think of Kekahuna without knowing about Theodore Kelsey. That was another part of it. I know that in the thirties the Kaua'i Historical Society hired...and I'll get the name again...it might have been Thomas' father or one of the more prominent residents. I'll have to look it up again. But we have all the pay stubs and all the materials, the monthly reports as we got from...at the same time the Historical Society had someone else working on the Wailua Complex - Poliahu, Holoholoku, Hikiakala also - full time hire. And for years the Kaua'i Historical Society maintained it. I was getting up to Kauai, Auntie Kauai Zuttermeister, which Roselle Bailey comes in and from my understanding there is a falling out over this heiau between the two. But I always wanted to be able to, obviously it's too late now, talk to Auntie Kauai Zuttermeister. I've always been meaning to go through her particular notes and papers on anything having to do with this...which I have yet to do. And I don't even know if you can or not...depending on the kind of notes she kept [RW].

Pā'ao was Lohi'au's best friend and retainer, and took over his responsibilities when Hi'iaka brought him back to life took him to the Moku o Hawai'i, where Pele rejected him, and he came back and lived a normal life. His sister, Kilioe was a sorceress and also the primary teacher in the school at the time. The whole Naupaka legend begins with her. She was rather a dangerous woman; you broke a *kapu* that was it! Accordingly, the stone right there in front of the *heiau* on the beach, right here, is Kilioe. That big one with all the - when they say they put the piko into it, that stone is Kilioe. Kilioe guards the grave that Lohi'au is in. He's behind the stone, in the hallow part of the hill as you go under - the chambers underneath and behind the stone, according to the 'olelo that I understand [RW].

Do you know who Henry Kekahuna is or was? He was a very famous historian, he was the mapper. He did a map of Ka Ulu o Pā'oa, and he did a whole kind of narrative on the side of the map about it. That was really interesting, if you haven't seen that you should let me know, I think we got a copy of it at Hā'ena...at Limahuli. We should have it [CW].

#### **4.6.2.2 Pele Connections**

There is a chronology, (1) there is a genealogical chronology of the paramount chiefs, (2) there's a second chronology in the historical sequence which just shows up in our records, but there are many aspects to it, many portions in the history. So we're starting out in the 12<sup>th</sup> century with La'amaikahiki and Mo'ikeha, and Pele and Hi'iakaikapoliopole also begins there at Hā'ena also. Having grown up with the Pele stories from my youngest age, and being a soldier for Lohi'au, my relationship with Pele has been quite spiritual...but because of the whole Pele, Hi'iaka, Lohi'au connections as to the beginnings there, is a critical point in history for understanding the importance of this particular site [RW].

The first legend of Pele is set at Mana...that's the Pā'ū o Hi'iaka legend. They come into Mana, and the first battle with Pele and her sister takes place on Kalaheo side, at Kukui-o-Lono. And you have the legend of Pele and the 'ōhelo berries. And of course the whole Pele, Hi'iaka, Lohi'au story, but that one gets very complex because you not only have Pele, Hi'iaka, Lohi'au, but you have Lohi'au's sister, Kahua. And you have the Chiefess in charge of the *hula halau*, Kili'oe, and Kili'oe is turned to stone by Hi'iaka and she's still down there at the end of the road. And my grand-daughter's piko was placed there -- she's taking care of it. So it's still kind of in use by some of us. And then Limaloa is Lohi'au and Kahua's brother. All of the Limaloa legends in my (???)... mirage that used to be...Limaloa catching the *uhu* off Hilo and there's the story of how he gets put into the mirage is part of the (???)...Just so that you know, you know where Lohi'au's site is...that stone wall...my mother saved it [FBW].

### 4.6.2.3 Other Legends

I never talk to my mother or my dad. My dad would know about all this, the legends. Like they talk about the Piliwale sisters above the dry cave...they all stone figures up there. Some day when you come here I show you.... Way on the side of the hill, Pōhaku Kāne stay over here some place you know. We look right from there eh. This is the start...that stone right up there, that's the one. And then Mānoa, the Piliwale sisters are up here somewhere because it's on the looking up it's on the right side right above the \_\_\_\_, you go look all that stone figures up there, get three pointed kind like that....[can see] right from the park -- the same side, and look straight up [TH].

We can go through the various stories. I know we have the Kihawahine activities going on with the Mo`o goddesses that were luring strangers into wet caves [RW].

My only one [mo`olelo] are the two dogs, but they're down over along the beach in front here, and in front of this County park. Because you know right in front of our house was that Hale o Pōhaku, which was a dog heiau. According to Tommy Hashimoto, the people who used to work down along in here and along in the park area, when they would ride home in the evenings a little white dog would come out...out of the woods and trot along with them until they got to the point where Hale Pōhaku was and the dog would disappear. I saw him once...really adorable little dog...kind of spotty face. And the other dog is the big black one, and he's supposed to come when there's going to be something bad happening...but he comes from the other side. He comes over this way and he kind of disappears around the dry cave. But he seems to be much bigger when you see him in the distance, than when he comes towards you. He just seems to slowly get smaller in size....odd looking thing [FBW].

## 4.6.3 Traditions

### 4.6.3.1 `Ōahi Ceremony

The stories that I heard when I was growing up...it was like a fire throwing ceremony from the top of Makana. And that was really one of the things that drew people to Hā`ena in the ancient days to see this amazing sight. To my knowledge the `Ōahi ceremony was only performed in two places in the whole *pae`āina*, and that was Limahuli off the top of Makana and at Kamaile down at Nu`alolo. Probably it had to do with the geological formations, the direction of the wind, and the up currents of the wind, but it was a ceremony where they used *papala* or *hau*, both of which were really light woods that were very flammable -- both have like a hollow pith or core. And while on fire they could be thrown and be caught in the updraft of the wind -- it must have been pretty spectacular. My understanding was that it wasn't like it was every full moon or something like that [when they did it] -- I don't even know if it was even related to things like the Makahiki or the four seasons [CW].



Photo 67. Pu`u Makana

I never did [see people throwing fireballs off of Makana], but my mother did. She said it was 1912. And I've seen a date somewhere recently where somebody said it was later than that, but I don't think so, I think it was 1912. I know La`a Mahuiki was one of the people, but he was a kid at the time because my mother was twelve. Of course, I think at that age what you remember are the brands floating -- the sticks with the sparks coming out the back. And it never occurred to her because she was afraid to ask how it came about. It's like me, I look back and the people that I remember, I wish that I knew what I knew now so I could ask the kind of questions that I should have asked! [FBW]

My grandmother remembers the `Ōahi taking place. She was there the last time the fires flew from Makana. That was in 1910-11... it was one of the Maka's or Mahuiki's who went up and did that.

My uncles probably remember it easily. I guess I don't really want to go into all the lore and history of it, because I think my father would be able to go through a bunch of it [RW].

Another reference is 'the sparks from the `Ōahi creating a feather cloak as it enveloped and draped over the whole bay.' So as you had the sparks in the shape of a feather cloak, you had all the people in the canoes, you had all the people on the beach, you had all the dancing, it made for a phenomenal spectacle [RW].

We knew that there were numerous ceremonies that everybody would gather here along the beach and in canoes [RW].

#### 4.6.3.2 Kē`ē Pu`uhonua and Halau

The references that we have in the Historical Society - one particularly beautiful one was done by Emory's daughter in the forties and it's coming from Hanohano Pa - John Hanohano Pa. In it and earlier, we have references by his mother and his grandparents, also records from them. She distills it, but even then the entire Nā Pali Coast understood that if they were able to reach Kē`ē Beach right there in front of the heiau, they were safe [RW].

There are stories of robbers and bandits along the coastline, and canoes making a mad dash for the safety of that end of the road there [RW].

All the Kalalau, the Nā Pali Coast, went to school - especially the women - all went to school there [Kē`ē] - they were all trained. And speak very highly of it already even in the 1880s and '90s and 1910 the school continues to operate it seems like. But you can make up your own mind when you start reading this material [RW].

#### 4.6.3.3 Gathering Rights

Take the gathering rights -- the gathering rights belong to the ahupua`a. You didn't have gathering rights in any other ahupua`a. And this is where you will find people like Tommy Hashimoto who will not fish in Wainiha. He doesn't go along the reef in Naue because that's Wainiha, not Hā`ena. He fishes only in Hā`ena because that's where technically he and his family belong within this ahupua`a, so he doesn't go around the whole island [FBW].

#### 4.6.3.4 Fish Gods

The fish-forming stone is, although to a lot of people they don't know it, but to me it's rather common. But mostly those fish stones were given as gifts to the mountain. What would you give the mountain is a gift of the sea. What do you give the sea is a gift of the mountain -- the exchange between sea and mountain, right? So you're bringing up these basalt fishes up to the mountain, you're bringing up the coral up to the mountain for your *ho`okupu* - as your gift to the deities that live up there. And in return you bring the stone and the material from the very top of the mountain to the edge of the sea. That's how you're making that connection. The fish were an important part, you see it in Maupiti, you see it in French Polynesia, you see it in other places - the occurrence of the fish, the basalt fish [RW].



Photo 68. Possible fish god stone

The old man Hanohanopa`a, he supposedly had one rock he used to pray, and the fish would just come and they would line up. But after he was gone, I don't know, I don't think there's anybody like that any more [CW].

#### 4.6.3.5 Hā`ena Rains

And the noe noe! How do you know which one you're under going? And you can see it...there's one rain that I like to see is Lilinoe but it may be Noe....this very fine fine rain that soaks you immediately...you get wetter quicker with this fine rain than you do with the big raindrop. And I look at that and I think here are three main kinds of rains and I don't which one is which! [FBW]

#### 4.6.3.6 Hā`ena Boundaries

For me, I don't feel right until I get across Mānoa Stream. To me that's the boundary, right by the dry cave. Once I'm across that stream I'm in the zone...I'm in a whole other world...I will **not** cross that stream for **any** reason until I'm ready. So that's just my particular thing, once I'm across the stream I do not cross it until it's absolutely necessary. I stay from the dry cave to the end of the road, that's my turf. That's where my heart is, that's the center of my universe, that is my ahupua`a, and I have a sense of responsibility with the years of work that I've put into it [RW].



Photo 69. Mānoa Stream going over road

#### 4.6.4 Ali`i of Hā`ena

Hā`ena was unique in that when the Mahele took place, the main ahupua`a of Hā`ena was given to Abner Paki who was not *kama`aina* to Kaua`i. He had, as far as my research has shown, he had really no relationship at all to the place. It was more of a political bone that was tossed to him. So the true Ali`i from there...there is no record of it...Mahele records show that Kekela was the *konahiki* at the time of the Mahele, but she was from O`ahu, she had been brought over. So we don't really have a record of who the traditional chiefs of that area were [CW].

Kekela that was the High Chiefess here, she was sent down by Kamehameha as one of the messengers to Kaumuali`i, and Kaumuali`i took one of the messengers by the name of Kihei, and gave him Kalihiwai Ahupua`a. So he stayed here and when Kekela came, he gave her Hā`ena. And Hā`ena has always been ruled by a chiefess, who is independent of the ruling chief. When the ruling chief changed, the Hā`ena chiefess was never deposed the way that the *konahiki* in other *ahupua`a* were. And at the time of the Mahele, she came to Hā`ena and made sure that everyone who lived here made a claim. Where as Abner Pākī told the people in Lumahai that he would take care of them, so only three people made any claims in Lumahai. Kekela lived most of the time, I think in Honolulu. Her home was...my mother's house is built over the platform of Kekela's house. It's built over the chiefesses's house site -- there's a stone platform underneath. She deliberately built the house over it so it wouldn't get damaged. I don't remember [any more about her], but you can track her down by going through Kamakau -- I'm sure there are other places; I've never really followed her. My interest has lain with the place names and with the history up until the end of the Kaua`i Kingdom, so called. So anything from 1824 forward I haven't really gone through. Information kind of spreads over that period, and I've never gone back to track her down [FBW].

I know that the last Chiefess of the area was Kekela. Chiefess - rule by women - is another important part of it. I need to preface with the Kaua`i chiefess, Kekela. She's all over the Mahele books and I'm sure there's probably some research to be done. My grandmother's home was actually on her compound...is on her compound. Everything that is there is still there and absolutely pristine, untouched. We had Emory come in - my grandmother hired Emory in the early sixties or so to do some work in the back of our gardens and the reports are there. I know all of Emory's carbon dates are in question, but he had some old ones [RW].

That [where Juliet Rice lived] was supposedly where the Ali'i lived and that's why that area was *kapu*. I know before my grandmother was allowed to live there she had to talk to the old folks ... she had to go talk to the *kupuna* and get permission to go over there -- to the ones that were passed already -- to the spirits. According to Uncle Tom there were *kahuna* in that area, powerful ones. But by the time we guys were growing up they were all gone already... She told us before there was no electricity; the spirits out there were strong. And even Uncle Tom, he said they go fishing like that, they see the hala tree on fire and they come over there and no more fire...they see fireballs...all kinds of heavy stuff up there. Now you don't see that kind of stuff [CW].

#### 4.6.5 Kē`ē – Nā Pali Connections

That particular connection - and that's Wahinekipi, which is Hanohano Pa's mother and grandmother, grandfather also - it's a male name too, Wahinekipi, but it's coming from 'Rebel Woman' which was the name give to Pi'ilani, who was Ko'olau's wife. So we see Ko'olau's wife, the family name there [Kē`ē] and Kalalau - when they were all evicted in 1893 because of their role in helping Ko'olau. The Provisional Government immediately after the overthrow banned everyone from Kalalau and dumped them on the beach right here at the end of the road. And there they made their way in through Kaua'i. Some stayed in Hā`ena, others moved on, others moved off island and went elsewhere. But the entire Nā Pali Coast essentially came in on the beach right here and then entered into the new society, if you want to call it that, from Kē`ē Beach. It was because of their role in helping Ko'olau, the leper. Without going into that whole story, you know, the point that I am trying to make is the interconnecting of the Nā Pali with this whole bit and the far reaching respect that the school actually had [RW].

#### 4.6.6 Kekahuna: Park Mapper

The [Lohi`au] *heiau* is right on the corner where the trail start. That's where it is. I went work on that project, the *heiau* project with the old man Kekahuna from O`ahu. He was just like one archaeologist eh. He draw all that, just like one archaeologist. He put down everything. You like look at that map you go to Kaua'i Museum they got em. In fact I think stay in Honolulu too. You go look. That man was an intelligent man that...go look on top that map went explain everything. Was me and my Uncle Ralph Kanehe, old man Kekahuna, and the *haole* old man use to be -- all stay on that map, that drawing. You go look at it, get all the information right from there. I know that, because he gave me one, but every time they make this kind paper they give us this kind. That's why this one they laminate eh? That's why it will last forever. I get plenty of this too [TH].

#### 4.6.7 Cultural Identity and Balance

Establishing our Kaua'i identity, naturally, is a big deal for me. We do have our unique aspects, as each island needs to pursue their own specific cultural identity. Yes, we all belong to the same tree but we have our gifts also. And each island has a very distinct separate history because they have different genealogies. They have their own uniqueness that each island needs to seek and then adopt, and then relive them. And naturally, here on Kaua'i we have a big movement going back to seek our own cultural identity, and that part of the *kapu* is very important because now we're far more inclusive. So, no, I don't mind when women help us build rock walls. They did in Nu'alolo Kai, right? It's all incorporating. And when we do all the religious ceremonies, it's all male and female. It's not right unless the *kauna pule* that's both male and female. Here it just doesn't seem right to have a ceremony without the balance. Neither does it seem right for us to do the genealogy and leave the women out of it. So I do the male part, the women do the female part as we come up through the [genealogy]. But we're developing the female side of it right now. Having suggested to many of the women here that they need to get a lot more serious in collecting the female aspects of it...so you can see the duality when we do our genealogies [RW].

###

#### 4.7.0 Thoughts/Concerns about Hā`ena State Park

Change often meets with resistance, especially change of lifestyle brought about by outside entities. People who grew up on the lands often don't want to see it changed, especially if it provided resources, recreation and respite. They also understand that things don't stay the same, and change could occur with cultural sensitivity. The consultants shared their *mana`o* about the future of this area; some of their thoughts are stated below.

##### 4.7.1 Heiau and Hula Pā

Just like one of my dreams with this Park here down at the end of the road. I would love to see the *halau*, the *hula halau* area, and Ka Ulu o Pā`oa -- I'd like to see it restored and used. My idea was over by the parking lot put in some sort of a building so that any *hula halau* in the State can perform on the *halau* platform with the understanding that they put on a program for the public which would be taped and begin a *hula* historical record -- a depository -- so that these things that are so ephemeral are not completely lost. Because I think of `Iolani Luahine -- we have only one or two clips of her dancing and yet she was absolutely ...she was incredible! The minute she started, a possession took place. It was just incredible. And then, I think, there is so little of what she did, and I think this is one of the best places where you could set up something like that. I think you could end up with something that would be for a nonprofit organization running that sort of thing. And then, of course, you'd have a source of income being able to charge something to go to the performance. The *halau*, in order to be able to use the place, the actual school, would be, I think, somewhat of a good thing. I would think if I were a *kumu hula* to one of the most famous *hula halau* areas is some place that I could actually get to with my crew, would be something I'd want to do. And a few have done it in the past. But it's too dangerous right now. And too many people are going into it and lifting stones, and taking stones. Our former Postmistress used to dread getting these boxes addressed to 'whoever is in charge of the *halau*', because she said people would take these stones and then send them back. I don't know...something happened to them...she said you could just feel this mana! To me the only way you're going to save this, is to use it [FBW]

Again to me that should be directed to the practitioner's who use that [*hula* platform and *heiau*]. To me I think it should be cleaned up because when it's overgrown, the way it is now, the roots ... the trees and stuff...they're busting up all the rock walls. In my opinion, they're desecrating it. The challenge is that when you clean it all off, then all the tourists are going to want to go up there. So how do you control ...it's always a two-edged sword ...that kind of thing. So I think the master plan has to address ways of protecting cultural areas from just being considered public domain. The whole western [mentality] is so..."It's a State park and I'm a U.S. citizen, then I should be allowed to go anywhere I want in the State." That's not how this park should be operating. But I do think it would be ...it should be better maintained...it should be cleaned and better maintained. It's a really impressive site, like I said when we were growing up you could see all that -- I think Uncle Tom was the last one to really clean it really, really well for the Historical Society. It must have been like twenty years ago the Limahuli Garden was working, we were cleaning it, volunteering and going down there and cleaning it CW].

I think the archaeology at this particular point will take its own particular course. The *heiau* is itself, especially when it comes to the *hula* - you need to separate it out for both *hula* and for the *heiau* - they're two separate things. Even though they could be under one house, but yet even then that house is divided into two separate categories - one is for the *heiau* itself and the other one is for the dance platform. They're two separate functions. Although it's all in the same because as you go up you're making your *ho`okupu* to the *heiau* itself, and then the *hula pā* is the secondary aspect of it. Once you've cleared the way through the *heiau* itself, now you're on the *pā*, and then now you do what you need to do to Laka. But there is a little bit of a gauntlet that needs to be run, and the protocols to the main *heiau* have to take place [RW].

#### 4.7.2 Lohi`au Site

The Lohi`au is another one. It's overgrown its right by the trail head. It's an area that kind of needs to be cleaned up. I think it would be great to have it cleaned up and have better interpretive materials. The whole park needs interpretive materials, it's really lacking, and it's one reason that most of the people come there. They just think it's a place to go swimming or lie on the beach, or throw their rubbish away in the bushes. They don't understand that in the ancient days this was like one of the Seven Wonders of the World with the `Oahi ceremony and the heiau...this was a very special sacred area that in ancient days people made pilgrimages to come here [CW].



Photo 70. Lohi`au's house site covered with vegetation

#### 4.7.3 Master Plan: Cultural Methods/Protocol Recommendations

**Multi-discipline Houses/Kuleana** I really don't want to reiterate the recommendations we made on behalf of the County of Kaua'i Historic Preservation Review Commission. That motion and stuff is out there, that I think we'll address piece by piece as it comes as a Commission. But I think that my main point is that some of the cultural methods that you may want to consider in this whole thing. Number One, this is multi-disciplinary. You have the hale's, we'll call them hale's for now - the Houses - you have the house where all the....this area should be reserved as an archaeological preserve. And so therefore, for educational purposes, the archaeology should be allowed, but that's separate in its own particular field. You have the fishing, so another house is controlling...their only duty is to manage the fisheries of Hā`ena. Another house is going to be Marine Biology, which is the study of reefs...that needs to go on. Another house would be the taro, such as Hui Maka`ānana, which is the taro growing aspects of it right there. Then another house will be the house that actually is the *heiau* itself. So briefly, I know there's a couple of more houses and more disciplines that we're dealing with, but essentially you have these separate disciplines right here. Each is their own particular entity. I think it's pretty ridiculous to even assume that one group can handle all aspects of this...so there's room for different groups...their *kuleana* are very separate, but yet all of them are focused and the goals are all the same - making Hā`ena the jewel it deserves to be.

Number two, the cultural, educational, spiritual, philosophical reserve or preserve where all of that [the various Houses and their *kuleana*] is perpetuated. So there's a unique opportunity by laying the fundamental groundwork for the separation yet the unification of these separate houses. I think it would be well worth considering over a long range period. It keeps the arguments and everybody focused on their job, instead of one guy who is in every single camp, this just doesn't work in the long run. So, therefore, although I was there at the beginning of Hui Maka`ānana o Makana, their function is quite clear in the taro productions and the expansion of the taro lands,

and all the aspects of the taro growing that are going out there. They can expand into other areas, but whether they would be the group that would handle all the protocols and everything with the *heiau* that's different, that needs to be a specialized group...a specialized *kahuna pule* - the house itself - the protocols that need to go on in the *heiau* and all the activities need to be overseen by some very experienced people [RW].

**Fishing House.** At this particular point I'm not going to put in any individual, I could say that, for example, Jeff Chandler, he's a fisherman. He has a great deal of knowledge that could be added to the world of fishing. For example, he would definitely be in the House of the Fisherman. His ideas and his participation in the fisheries, conferences and meetings, and everything like that, along with Thomas Hashimoto, they know what to do in regard to managing the fishing resources. I think he would be really good with that [RW].

**Botany House.** A lot of this stuff in here - the vegetation is *kamani* - there's a botany aspect to it too, so that's a separate house too. There's a whole *la'au lapa'au* aspect that could be done here too, which actually creates a whole another separate house of botany....again, a completely different discipline, and under different goals and objectives, but still important to the big picture [RW].

**Mason House.** We were able to do that in the new Loko Kai restoration Project, in that we created the Mason House in all the restoration work. The Mason House included both males and females. It was their job to decide how the stone walls were going to be built. Once they knew exactly what they were going to do, then they told the Kahuna Pule House, and then they're the ones who decided how to open the door....keep it open....keep everyone spiritually safe...and close the door after we're done. It was their job to protect the masons while they're working. The Third House was the Na Pali Coastal Ohana which both the masons and the Kahuna Pule knew exactly what to do, and then it was our job that both of them got exactly what they needed whenever they needed it [RW].

**State Parks House.** The Fourth House was State Parks, which oversaw the whole thing to begin with. In the long run that methodology really helped focus the work and the energy. It kept people from being in too many places...and into discussions where they don't really belong. It facilitated things in the long run much better and made for a stronger more cohesive unit [RW].

**Cultural Methodology.** I think the main point that I really wanted to make is to consider the culture methodology and the way you organize the different disciplines. I think it's going to help you a great deal in the end. It's worked for us. Our cultural methodology and problem solving and work ties everyone together, keeps everyone focused, keeps the arguments, keeps everybody out of each other's hair, keeps everybody out of where they do not belong, but also gives everybody a sense of responsibility and a place - a sense of importance and a sense of a very specific responsibility. People need this to grow, but at the same time it's symbiotic, if we don't seek the symbiotic relationships we're not following the lessons we're supposed to [RW].

The cultural protocols that demand this particular approach just because of the site you're dealing with. You're dealing with one of the most important religious, cultural, historical centers. Our ancestors deserve the best. Naturally when you're dealing with these elements it is much safer to be operating on a much higher elevation of ethics and protocols. And in the long run it's much safer for everyone. But at the same time it ends up as a spiritual experience because in the end it is a ceremony that binds us together. Now once we've experienced the ceremony together we have something in common. So the ceremony is actually critical. As far as I'm concerned, the more ceremonies that go on up there the better, but that elevated protocol is critical in keeping everyone safe and respectful [RW].

#### 4.7.4 Master Plan: General Issues

I think by thinking that Hā`ena State Park is only at the end of the road is misleading. I think we have a duty to incorporate the entire footprint of the property for a long range plan. Although we're in expansion phases, you can break it up into many different phases. It breaks it up into more of a size – components - like building a wall [RW].

**Lohiau Complex Site.** The areas of concern - my grandmother, Juliet Rice Wichman was there when the County was going to bulldoze Lohi`au complex. She actually started right there in front of our house as we have the Pōhaku Kāne, the brother, the stone which is a fishing shrine is right in front of our house. The sister, which was on the reef, is now broken. She's in forty feet of water. But the County was going to bulldoze the boulder away; my grandmother laid in front of the bulldozer and stopped it. The bulldozer went down to the Lohi`au house site, was going to take it apart, my grandmother laid in front of it and stopped it from getting destroyed.... The Lohi`au house site is poorly mapped. And that the road is actually coming way too close to it. The car bumper is almost touching the thing...so you need to put a larger buffer around that.... A larger buffer needs to be established around the Lohi`au house site [RW].



Photo 71. End of the road turn-around

**Burial/Turn-Around Issue.** In order for us to do the turn-around areas you're in the most sensitive of the burial areas. As you start to get that footprint between the Lohi`au house site and the bathroom you have a very tiny maneuvering room right there and also, quite frankly, problematic [RW].

**Comfort Station Issue.** We always have these problems with comfort stations in sacred zones, culturally we give up a lot for this. In that some of us are quite aware of the circumstances of the archaeology of the bathroom - it made a lot of people uncomfortable. So I'd hate to see more of it going on, and that the existing footprint right now needs to stay. But still close within it are the preserves, because we have burials that are right in there, below and around the bathroom area. But we can presume that it's going to run along a particular strip along the dune. So that's why I'm thinking that people can either walk along the beach, or they can walk along the path that brings you a little bit closer to the loko [RW].



Photo 72. Comfort Station

**Foot Traffic/Pathways.** Although we know we're dealing with a sacred area, there are certain sectors that are clearly more sacred than others. The pathway in which the human traffic is going through is absolutely critical that it goes around features not too close and not too far, and without going through any of the walls. So there is a sensitive approach that you really need to put the overall paths in there. Because anybody who has any understanding of Hawaiiiana and they see the path not properly placed within the landscape, will cause problems. But I think in that sensitivity right there...right from the get-go will help things a great deal.



Photo 73. Footpath through dune

We know where the burial areas are, we know this by the hard way....well, we knew it already...but then again people needed to learn the hard way exactly where it was. So I think cross-culturally enough people know where they are right now. So we know where the pathways can be leading. I think I made the suggestion that the pathways are leading along the edge of the

loko, on the belief that most of the burials are there within the dunes. And they may not be right on the edge of the loko, but at the same time these are beautiful views...and also not only enhances culturally but also within the visitor...from the visitor's standpoint to the beauty of it is going to be really cool [RW].

**Fishponds.** These can also end up being working fishponds too. And so that could be another aspect under the fisheries in not only managing the kai fisheries but the wai fisheries also. So those are there as far as expansion capabilities. It would be nice to have it as a larger master plan ....and step by step work up to it [RW].



Photo 74. Fishpond Area

**Parking Lot/ Auwai Impact.** What this plans shows...and maybe this is another concern...it shows the *auwai* being restored and running through the parking lot. While that might sound good, the problem would be drainage and what's going to happen with all the runoff from this paved parking lot - assuming it's paved - maybe there's other ways to deal with it. But if you got all kinds of oil and brake fluid, dust, asbestos dust from brake pads...washing in to the *auwai* from the parking lot...that would have hundreds of cars a day parked in it...it could be really bad for the health...I mean you're talking about food production [CW].

**auwai-Lo'i Expansion.** The water is going to be coming from Limahuli Stream. Right now, I know, it's tapped up above the road. In Limahuli it actually comes down through the *auwai*, crosses underneath the culvert, and reenters into the *auwai* that starts to feed the *lo'i*' that are actually down there. That water has been flowing for awhile now. We may want to take another look at the water supply Hui Maka'ānana expanding their footprint. Right now the last time I saw it there were four big *lo'i*, however I know that Thomas Hashimoto had two or three other *lo'i* in the areas...and I know he wanted to open up too. So I think in visioning a larger master plan for the actual footprint that Hui Maka'ānana can expand their *lo'i*'s, with the foot-trails that are coming through there...that we keep it pretty safe...the terrain itself is not necessarily really difficult; although slightly undulating, the view plains through here are absolutely stunning [RW].

**Parking Lot/Lo'i Issues.** On the other hand, I guess, if you graded it away from that and maybe had a permeable surface paving...you know not everybody is going green...we know that hardscape is not a good thing...the more permeable surfaces we can create the better. The problem with a lot of these, though, is intensity of use. This park gets a huge intensity of use. So things like grass-green, grass paving, and materials like that would not be functional...the high rainfall we get in Hā'ena. But maybe there's...they have permeable cement and permeable asphalt...there's gravel paved systems. There's different things that could be looked at. This is probably the logical

place, because it already has been destroyed and disturbed, to keep a parking lot. But I think environmentally how we deal with those issues in terms of the *lo'i*, I think, is going to be really important because the *lo'i* are going to be a really important part of the cultural landscape of the Park [CW].



Photo 75. Parking Lot in Hā'ena State Park.

I think one can easily vision the areas that Hui Maka'ānana o Makana can expand to taro patches. I think we can begin to envision what the experience of our visitors is going to be when they arrive there. That immediate connection into the taro patches to begin with, I think is going to be important. Having a trail that actually loops around the ocean front and actually makes a full circle from the internal parking lot, which we know is going to have to be expanded and is not enough [RW].

**Level of Recreation Use.** Actually a lot of effort went into this Plan. The biggest compromise we had with this Plan was the State continuing to say that it had to be a “recreational” park, and trying to define what “recreational” meant because of the funding that they had received when they bought it. What’s good about this plan is that it more or less preserved and sought to restore the primary cultural features within in the park and to protect the *iwi kupuna* in the dune system. So I’d say probably the only thing that, maybe, I would have a concern with in here would be the level of recreational use. I’m trying to remember, I think there were bike paths and stuff like that. I think people need to have access throughout the park, I’m not sure that we gotta necessarily have bike paths throughout the park. I’d say that’s just something we’d probably want to re-look at...the location of those paths and access ways [CW].

**Tourist Guides.** Like before, when the guy was drawing this thing up, the Master Plan, the first time they were talking they were gonna take guides - going get guides for take the tourists inside there go look the taro, go look the canoe, had the canoe down the beach, they had the canoe house on the beach side below the taro patch, and all that. I don’t know because when these guys get meeting about this Master Plan thing eh, I don’t go *maha’oi*. All Jeff and Kawika, Chipper, all those guys they go look. I know they had one meeting not too long about this Master Plan thing. For me I’m willing to dakine, but if they make funny kind like that eh they kill my fight too, even with this fishery thing too you know. They gotta cooperate too. Chipper went get me involved with that [TH].

**Walking vs Driving.** This Plan actually has a gate right here, so cars have to stop here. But this is such a short walk people should be able to just walk down. It’s really beautiful. In fact, when there’s no vehicles driving here--the problem there isn’t a shoulder on the side of the road so it’s dangerous to walk on the road now with the cars on it [CW].

How you’re going to transfer everybody from the parking lots...quite the distance. I don’t know if it’s 300 or 400 yards or more - quite a bit more than that between the parking lot - it’s a long walk for people [RW].

**Base Yard/Helipad.** The location of the base yard...I think once they have a little bit better of the footprint in mind, we need to take a better look at it. They are pretty close to a cliff line right there, and they’re on the high side. The toll booth thing and exactly the placement and how that’s going to happen, that’s still yet to come. The helicopter pad is pretty important. I was there when there was a helicopter crash...rotated on the reef in front of the *heiau*. And for the FAA we collected and kept the helicopter from being washed out to sea, so they could investigate the cause of the accident. Helicopters, I’ve seen them make several emergency landings in this area. Although I understand we will probably have to chop out a taro patch to put a helicopter field in there, but yet the emergency pad right there - we need it.... We know the helicopter pad’s got to go in there...we know that certain portions of this is going to have to be data recovered as you might be taking out a couple lo’i in order to actually put in the basic infrastructures that you need right there [RW].

I feel the loss of the Hawaiian things that can be kept; I don’t see that we need to be over captured by *hula* and the modern *auwana* rather than the *kahiko*. I don’t see why we have to go the “Hawaiian-Jamaican” style thing. But in Hā`ena, maybe I’m asking too much, I don’t know of any of it can be totally recovered, but I think a lot of it could be. But I’d like to see a lot more respect for these places. You know the DLNR is supposedly in charge of all of these things, but I’d like to see a lot more respect from them. I would like to see them really working with the people who are trying to keep things going. Like maintaining the *heiau* there.... It’s like the end of the road here, I hate to argue, but it would be great if they would close off the road, which I understand they have - at the parking lot where the heliport is and let people walk in from there. It’s a quarter of a mile at most. And then, ‘Oh, you can’t do that, people are not going to do it!’ Well, if they really don’t want to do it, then fine, let them turn around and go home! [FBW]

**Resource Structure.** One of the things, though, that this Plan doesn't show on it is there's a house in this area in here, which this guy Rusty used to live in this house long time ago. It's really really run down. I'm not sure if it's at the point where you could still salvage it or not, you might be able to, but I think this Plan is kind of completely absent on it...and there's a road that goes down to there. And I think it is an under-recognized resource because within the context of this Park and the cultural use of this Park, I think you're going to need to have places like that that are kind of like retreat centers where cultural groups could come...whether they stay there over night or not. But it's kind of like Kōke'e there's an outdoor education center up there and the nature center...I think having something like that in the Park here could be really important. Also the Hui Maka`āinana o Makana which has been the...we established a curatorship program with the State back in 1999 for the archaeological ...primarily for the *lo`i* complex. It would be really good for them to have a place where they could have meetings and functions related to their curatorship of the cultural sites within the park. So that is something that I would like to see changed or enhanced on this plan [CW].

**Caretaker Structure.** Now things get dangerous. The nights...I know the idea of the full position of a caretaker and that particular house...probably thinking that closer to the entrance. The caretaker is a traditional part of our culture, to have the caretaker close in. Security twenty-four hours a day would be nice, although I'm hard pressed at this particular time to actually point at the type of vandalism one would expect right there. However, the presence 24/7 in the zone is really good [RW].

**Taylor Camp.** I'm not really comfortable with not including the beach area that's in front of Taylor Camp into the whole scope of the park. I think you're defeating the purpose in the Master Plan by only taking a tiny portion which is the actual end of the road, and ignoring three-quarters of the land footprint in the planning process [RW].

**Rockfall Liability Issue.** Addressing the liability issues, I don't think we're going to get into this particular point, but I do know that it's serious with the rockfalls....that a good section of the road that you're walking or driving, is right next to a cliff. Therefore, the suggestion of leading the paths out and away from the parking lot and towards the ocean and doing the loop and so it keeps people into more of the open plains rather than along the edge of the cliff. Although the traffic, whether it's going to be shuttle buses - whatever the nature of the concessions they have in mind, I'm not really sure of how they are going to be doing it, they're going to still be using the road as a footprint [RW].



Photo 76. Rockfall

**Park Concessions.** I know there's discussions on the different natures of concessions, but then again that's concessions whether it's neighborhood driven or beyond at this particular point - naturally the first choice would be within the *ahupua`a* of Hā`ena and then Wainiha after that, and then expand out. I wouldn't mind seeing - I understand that the reason why SHPD, or being the State Parks, need the money that these parks can generate with the revenues, it would be nice for the first five years that fifty percent of the revenues stay in the park, after that then maybe twenty-five percent depending on the infrastructure. I think it's pretty reasonable to start the ball with expecting a hundred percent revenue to stay in the park. But some sort of arrangement as to a percentage based on years, either going up or going down over the years, needs to be discussed and broken down into the various - the methodology just in that alone, right! But to begin a discussion, I think fifty percent of it needs to stay or a certain length of time to allow some of the infrastructure to get settled in by the volunteer groups [RW].

#### 4.7.5 Park Volunteer Issues

I know in the past the volunteer groups have been a blight on State Parks in that they've done...they have not been hospitable to any volunteer group so far that is willing to work on the

State Parks. It's been a hostile environment and I can attest to that. I sure hope some of the attitudes are going to change. Diplomatic management of these volunteer groups is absolutely critical.... I've been working on *heiau*, on State *heiau*, for how long now and I'm still treated like an enemy although I've done nothing to deserve this treatment. It's difficult. And it's really hard for me to bring in the pillars of the community to work on these things in a hostile environment created by State Parks. So I think the attitude has to change. We all know State Parks is broke but then again, at the same time, the hatred for the really good people - I know there's monkeys in there - the monkeys run free but the good people who are following the rules are constantly stymied and life is a lot more difficult. That attitude has got to change; otherwise it's never going to work. And naturally everything starts from above; the premise of which State Parks embarks on this community cooperation is going to be very important - that the State government is willing to undertake a project that is culturally rooted. 'Cause in my experience it's what lasts a long time. If it is within the psyche of the Hawaiian culture, we as a community will buy it because this is the way we live our lives. You put in a western methodology into this; you're going to have problems because it's very short-sighted. And at the same time, everybody is one large family but we all have our different jobs too. So it becomes more of a larger collective, but I do know the importance of State Parks to have somebody who has the diplomatic skills and the cultural knowledge and the historical knowledge in which to navigate this Hawaiian cultural psyche. We still live by the old ways in many respects. Our sense of hospitality hasn't changed one bit from the beginning of time. And we still carry on this hospitality to a very high degree, although a lot more difficult today to live because - these are the clashes of cultures. Generosity is considered a weakness but it isn't in the Hawaiian world. Generosity means wealth. There's room for many of the multi-disciplinary things, and I think that's the beauty and long range jewel that this park can have [RW].

**Permitting Process/Volunteer Issues.** The other one too, of course, which is the different varying jurisdictions that should be brought into one house. I think you have four or five different government jurisdictions here going on within the State Parks, consolidated into one. It would make it a lot easier in the permitting process which is essentially...the permitting process is what kills any volunteer activity in the end. It's just much too bureaucratic, much too time consuming as you go through all the different agencies. If you kept to one, I think, you'd be able to do things more on a timely basis. And it's the nature with volunteers that they're ready and willing to go right now, but to continually stand them down...you'll lose them. And then the momentum that comes out of communities are strong for a moment, they taper off for a little bit, they pick up again....it's like a tide...the tide comes in ...the tide goes out. But it's a continuous process....while the tide is coming in then lots of activities are occurring [RW].

#### 4.7.6 Kapu Issue

I think you can get yourself confused with all the *kapu*. It all depends on your religious upbringing. Most of its Christian; those *kapu* are done by Christians...all Hawaiians, right. The Christians feared it, so the element of fear that permeates our culture has everything to do with that. That complete disassociation....you know, 'you touch heiau you're evil, you will die'. That's a Christian influence, that's not a Hawaiian influence. I have to preference here that the *kapu* here on Kaua'i is very different than it is on the Moku o Hawai'i. We have cookie-cut all Hawaiians into the Big Island Hawaiian mode, and no such thing is the case here.

I think it's in page 97 in Bennett's, 'Archaeology of Kaua'i', goes into depth as he explains all the unique characteristics culturally, artistically, spiritually, and in our *kapu* - Kaua'i's cultural identity. And in it he clearly states that the *kapu* here was far more inclusive of all classes. The people sought the balance between male and female. The females were involved in war, they're involved in art, in the artistry and all aspects of it, and they're also involved in religion. The whole point of it was to seek the balance between male and female. There were not these European patriarch notions that people are so caught up with. No such thing here, clearly a lot more matriarchal, on this island. So our *kapu* are different. Essentially what it is, is that it is a reminder to men that they cannot bleed each other on royal sacred grounds. There is a place to fight and

there is a place where you cannot spill man blood. The spilling of man blood on a *heiau* is the most profane thing in the world. Somehow we've gotten all confused in thinking that because of women's *ma'i*, that's profane. But that's actually ridiculous, because they've lost sight of the real intent of it. Men cannot bleed on the *heiau*. And naturally having worked on it for so many years, every time somebody catches a little bleeder or stuff like that, I'm always very quick to get them off. Under my watch nobody bleeds on the *heiau*. They've gotten off as quickly as possible. It's fairly rare that it happens here, but still I'm always watching out for that. So there was far more of an effort to seek the balance between male and female here on Kaua'i. Those *kapu* did not exist that everybody seems to be so overly caught up in.

So ultimately this is how I see the world. This is how I see the way the culture blends, balances and moves in through all of that. Not exclusive, much more inclusive of all classes and people. I'm saying this because it's important to - there are so many *kapu* running around - everybody's got a *kapu* of everything. But the bottom line really is that in 1819 after the death of Kamehameha, all the references that I was aware of at that particular part by Hawaiians, it was always mentioned as the 'lifting of the *kapu*' - even Malo. You know Malo doesn't use the word "break" until way later; it's always 'the lifting of the *kapu*'. I think he says it really good, I think Edith McKenzie in the back of her book writes that particular letter, 'Due to the industriousness and the hard work of the *maka'ainana*, the privileges that were once Ali'i are now everyone's. The *kapu* was lifted.' They lifted the *kapu*, so show me any culture in the world that came to terms with forty years of foreign impact to their gods and said they no longer work we have to put them to bed. They actually put them to bed. They lifted the *kapu*. The breaking of the *kapu* is an early Christian attempt to make them feel better like they did it, but they didn't. And it's not so simple as Ka'ahumanu sitting down with Liholiho eating, that's just a gross simplification of what really happened. Yes, there were some diehards, but the *kapu* was lifted. So in that particular time all the *kapu* that was running around was lifted, and made *noa*. Now in my mind it is up to us as a people, as we put back the *kapu*...but there is no real formal way and no real understanding by most people of just the fact that of the breaking of the *kapu* or lifting, just how much of a difference that really means. I'm saying this because I'm trying to explain my cultural viewpoint, of which I preface everything else on, of which I hand everything else on, on those basic premises. Seek the balance - far more inclusive of all cultures and class. The role of the male and female is clearly laid out in all of this, and we need to work a lot harder in reestablishing those [RW].

###

## 4.8.0 Anecdotal Stories

### 4.8.1 Kekela-Wichman House

I've got one story...another one of my spooky ones. My mother's house is just above... immediately above the house was the old 'around the island trail'. And when she first got the house, the house behind her as it turned out was built on this trail...lies the cookhouse, which was just the dining room and a kitchen. During the War the Army had taken over the house, and they'd gotten a whole bunch of beautiful stuff for the roof, only they put it on the floor instead of on the roof...so that everything from the floor up ...so my mother had to rebuild the house. And when she rebuilt it, she kept the cookhouse and turned it into two bedrooms. So that at one end you had a spring door that faced out towards the dry caves and a door between what was the kitchen and the old dining room and then a door leading out immediately to the house - you could go out either door or through. In my room - I took the old kitchen - that was about as far as you could get from everybody. I had my bed up against the window so that I could look out at the ocean. I kept having this feeling at night that people were walking past - you know that feeling - I thought I saw somebody out of the corner of my eye. I'm breaking my sleep all the time, so I moved the bed across the doorway to the dining room. And one night, I heard the screen door open and looked up to see who was there and nothing. But footsteps across the lauhala mat and I could see something stepping on to the mattress and footprints going down and I looked on the other side of me and somebody sitting on my chest, breathing on to my face. And then lifting off the weight, footsteps back to the floor, the door opens and shut and it open and shut again just a couple of minutes later.

I was really getting out of there. I never slept in that room again! I don't know what it was, but in the dining area my brother and sister-in-law put their oldest baby in there in the crib to get out of the way and the child would wake up just screaming and shortly after they'd put him down in there the baby would scream. After that incident mother just tore the place down - took both the kitchen and the dining room down because nobody would stay there. It was on the trail.

At her house she had several times somebody coming in and sprinkling salt and sprinkling around with ti leaves...there was just too much going on. But she was meant to be here.... We were living in Līhu'e and she had gotten the place fixed up to move out - this was early '48 - the summer of '48. I don't know why we were supposed to wait for awhile, but everything was ready and about 9:00 that night, moonlit, my mother looked at me and said, 'Let's go.' 'Let's go out.' No problem for me so we got into the car and we came out. At that time you had to stop along the road at the bottom of the stone wall, so we stopped there and as she stepped out of the car. The sky had gotten overcast but as she stepped out of the car this little rectangle of moonlight appeared and she stepped into it and it followed her. She opened the gate and I'm following right behind her and never got into the moonlight and this moonlight took her to the door of the house. But she walked from the road all the way up into the house in moonlight and I did not. It was weird! But just as she got to the door, we heard a voice out on the balcony. ("Uuuu, Uuuuu") That was weird...I told her the next morning at breakfast, "Were you aware that you walked in moonlight and I didn't?" She wasn't aware of it; she just said that she's got immense feeling of being welcomed. What that was, I don't know! Somebody's saying, 'Welcome to the place' [FBW].

#### 4.8.2 Tsunami

I was 12 years old then. It was April Fools, April 1st, I was getting ready to go to school right before 7, and my brother was outside by the lanai, look down toward the corner, looking down, and he saw the water splashing on the coconut trees, right where the big white house, the football guy own now. Well it's kinda blocked by the fishtail farm that's why you couldn't see the house now, but anyway it's right close there in the Makua area. So we went down there, we went run down to the next place because the old man Hanohano and \_\_\_ they all live right next to us below us, so we went go tell them about the boat and the net. We had the boat and the net down at the Rice's. So we all went down there. When we got down there, the water was receding but we never know what the hell was going on. We were busy unloading the net because it was full with water in the big boat so we unloaded the net and drying em. We didn't know what the hell was going happen. By that time, the channel was all empty with water. Then we looked outside the bay, we could see Namoku right in the center of the bay, kinda on the outside. And then the water was dropping off from there like \_\_\_. We still never think nothing. So we kept on doing the net. Until we heard the wreck sound up above us, the wreck sound, bulldozing all the house up by the Rice's. When we looked up, we saw the waves grinding, grinding, grinding all these houses that were up there because there were a bunch of em, coming toward us. That's when we started to run, we left everything, we ran in the corner, and just about that time the Rice's had the place graded with the bulldozer, so went bulldoze all the guava trees against the kamani trees, we call them, but anyway, yeh the false kamani trees, so we climbed on that rubbish pile that was about 15 feet, and climbing the trees, the two old men went climb on the rubbish, and they went hold on to the tree and the water went catch them over there. But we were up in the tree. So after the water went recede, the big haul that they had right down came right on the side of us because was open inlet. Because they went bulldoze everything and nothing could hold em back - right on the side of us. After the water went recede we ran home. By that time our house was against the pear tree and the plum trees in back of our place. We went home go look for my mom, call, call, call but the house was up against the trees. Call, call, but no more. Then we hear one faint soft calling us far up. So we went over the hill - we went follow the sound - we went over the hill because my sister she get that little hill eh, so we went right behind there, my mom was there all nude because her pajamas went all rip from the barbed wire, and she was pregnant with my brother. She was all scratched. So I went go home grab one sheet so I could wrap my mom, let her wrap herself, because she and Julia they were all bust up inside the lantana and barbed wire behind our house, but they were safe - all scratch up. By that time, before the second wave came, we was on our

way across the fence way in the back of us, you know where the \_\_\_ trail is? Below that there was a fence line, we went go climb on the fence line and swing across the place. That's kinda far you know, from here to in the back of my truck, I think that low in the back of the hill. So we went swing that part and we just got above that place, water came, sweeping down, by that time everybody was safe, we went climb on the hill to that Robinson's fence line and look down, there was no buildings, that YMCA was all flat. YMCA had about 8 cottages, and the theater and stuff was all flat, the stone theater over there was all flat and the kitchen, no more, all the roofs were all back against the hillside. So you can imagine how big that thing was. And then, we climbed further up; we look, all the hala trees were gone in back of the hillside. That's how that wave went wipe out all that hala because from the YMCA going to the Colony Resort that whole area was all hala trees, that's why they call that place Hala \_\_. 1946, the wave wiped that whole place out. But little bit been grow back, little bit. Most of the thing went smash, just like the wave went pound right on em, just like one bulldozer went right through that place. That's what happened.

In this area right here where the Rice place, that's where the water was coming down and we were over here and the wave went come around and wrap just like one back lash when we seen em pushing all these houses. But when we went run was one far run you know! We had to run fast because the wave was just coming down. They all flat - the water came from here and just like came this way. But actually when the water went reach here, this whole place here was all empty because here get the apapa, over here get the *apapa* - was dropping down from there. Over here was just like mountain, all the *apapa* was just like mountain, if the water was 40 feet, the mountain was standing 40 feet out there. That's how it was - was spooky.

And then we seen em again in **1957** when we went run away when all this thing was taking place. We seen that, because we waiting for the waves come. It was 8 o'clock, quarter to 8, came that time. That was the estimated time...from the Aleutians down to our place. That was the time of the arrival of the wave, and we were watching that in 1957...and we never know what the hell would happen. We were watching from Keaumele...right here this area. That's where the Wichman's are - Keaumele. Keaumele is right on that corner. Right in the back there we were standing up there and watching that [TH].

#### **4.8.3 Pohakupukane and Pohakuloa.**

Pohakupukane stay on the hill. Pōhakuloa stay right on the road right by the Wichman driveway, but stay covered with - you cannot see that because get sunflower growing right around em. It's right on the side of the road by the rubbish pile. That's Pōhakuloa. And then the sister I don't know what the name - stay inside the water - someplace inside, out here somewhere, inside a puka someplace out here. Whether the thing is the same distance, I don't know. I just assuming that the place you know, like the distance from Pōhakuloa to Pōhakupukane, maybe the same distance for this in the water. You know the legend for that eh? Was something about she didn't wanna stay on the land by-and-by the bird would shit on her, and then the brothers told her oh if you going in the ocean, the eel and all the fish going live under you. She never care. Or something like that. But Pōhakupukane I don't know. But actually they no belong here eh? These stones they come from Tahiti I hear. That's what the story was...you gotta look at the legend [TH].

#### **4.8.4 Lohiau Stone Wall**

Just so that you know, you know where Lohi`au's site is...that stone wall. My mother saved it. She was at home, right next door here. John Hanohano came to her and said that the County trucks were on their way to take the rocks from the [Lohi`au] house site. So he took her down there and she walked in and just leaned against the wall. And they brought out the bulldozers and the trucks and all that kind of stuff, and she refused to move. She said, 'You're going to take me first, before you touch one rock!' And she stood them off. And they finally called up Lihu`e and got some supervisor out here, who talked to her and turned around and ordered all the people to leave. 'Leave it! Leave it alone!' But it was there, they had the bulldozers and everything to do it with [FBW].

## 5.0 SUMMARIES AND ASSESSMENTS

This cultural impact assessment is based on two guiding documents: Act 50 and OEQC Guidelines (see Appendices A and C).

**5.1.0 Act 50 State of Hawai`i 2000** H.B. NO. 2895 H.D.1 was passed by the 20<sup>th</sup> Legislature and approved by the Governor on April 26, 2000 as *Act 50*. The following excerpts illustrate the intent and mandates of this Act:

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit" in Hawai`i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

### 5.2.0 Summary of Findings

The following summaries are based on the information presented in the previous sections: the traditional and historical literature review in Section 3.0 and the ethnographic data and analyses in Section 4.0. References are not cited here unless it is new information and not already cited in the text above. These summaries condense the information above, but also serve to focus on a few significant individuals and events in Kaua`i's history in relation to the *ahupua`a* of Hā`ena in the traditional *moku* of Halele`a.

#### 5.2.1 Summary of Significant People and Events: Project Area or Vicinity

##### 5.2.1.1 Ancient or Mythical People

Hā`ena figures significantly in the legends of Hawai`i volcano goddess Pele and her sister Hi`iakaikapoliopole (Hi`iaka). Pele falls in love with the local chief Lohi`au and requests that her sister go to Kaua`i to bring him back to Hawai`i Island. The house ruins of Lohi`au still exists in Hā`ena today, as does the hula platform associated with him, where he paid tribute to Laka. What is not clear, is when, in relation to the ali`i below, Pele, Hi`iaka and Lohi`au are in Hā`ena. Other people during this period are Lohi`au's sister Kahuanui, his friend and companion Pā`oa, the Piliwale sisters, a *kupua* named Kapalae and mo`o wahine Kilioe and Kalanamainu`u who guarded the spirit body of Lohi`au in the cave and fought with Hi`iaka and her companion Wahine`ōma`o when they tried to take his spirit body.

The Menehune are said to be legendary as well, yet they appear to be a very real part of Kaua`i's history and said to have finally left the island from Hā`ena, as did the subsequent Mai`a people who were also connected to the early people of Kaua`i.

### 5.2.1.2 Significant Ancient Events

The significant ancient events connected to the project area (vicinity) include the origin of the *hula* -- the *hula halau* or school that included use of the lands of Kē`ē for practices, ceremonies and habitation; the spirit visit of Pele where she follows the sounds of the *hula* drum to Kē`ē, and manifested as a beautiful woman whom Lohi`au fell in love with; the visit by Hi`iaka sent by Pele to fetch Lohi`au who had died of a broken heart when Pele left Kē`ē; and the exodus of the Menehune and the Mai`a. Other than Lohi`au's house, the *hula* platform (*Ke Ahu A Laka*) and the heiau (*Ka Ulu o Paoa*), any evidence on the landscape connected to these events within the project area was most likely destroyed over time by both natural (storms surges, tsunami) and human means.

### 5.2.1.3 Ali`i nui

Kaua`i was first settled by descendants of Kumu-honua and Lalo-honua -- thirty-six generations before Papa was born. Chief Ka-māwae-lua-lani-moku traveled to Kaua`i with his wife, Kahiki-lau-lani, and her two paddlers Kō-nihinihi and Kō-nahenahe. Because of his good deeds, the great number of his descendants, and the prosperity of his reign, people began to call this island Kau-a`i (*Place of Abundance*). Then a few generations after Papa and Wakea (second son of Kahiko and Kū-pūlana-kehau) and also well before the descendants of Nana`ulu came to Kaua`i from the south of Hawai`i around the 6<sup>th</sup> century along with other families from Tahiti or Samoa who brought their Polynesian traditions, a voyaging canoe commanded by Kū`alu-nui-kini-akua landed on the west shores of Kaua`i, at the mouth of the Waimea River. His counselor named Pi`i-`ali`i came with him. They settled in Waimea along its bountiful river and surrounding valleys. Over time they expanded into nearby canyons, valleys and coasts, from Nāpali to Kōloa. Kū`alu-nui-paukū-mokumoku followed his father as leader of the people of Kona, Kaua`i and it was during his reign that he sent for a group of people called *Menehune* from his homeland. They helped to construct *heiau*, fishponds and irrigation systems for raising taro. His son Ola was responsible for having the *Menehune* construct the ditches of Pali-uli.

Over time other settlers inhabited all the Hawaiian Islands. Many genealogies of Hawaiian *ali`i* indicate that Nana`ulu and `Ulu (ca A.D. 830) were prominent ancient ancestors who settled all over the Pacific Islands. Around A.D. 1090 Puna-nui-ka-`āina arrived on Kaua`i, said to have come from the Marquesas Islands. Puna-nui-ka-`āina arrived when the chief with the deadly riddles, Ka-iki-pa`a-nānea, was ruler of Waimea. Puanui chose to settle along the banks of the Wailua River and this land came to be called Puna. This was the beginning of two chiefdoms on Kaua`i; Puna in the east, and Kona on the west.

Marriages between chiefly families on all islands are very common as families and alliances are strengthened. During the 1300s the Kona chiefdom is defeated by the Puna chiefdom. Mo`ikeha arrives on Kaua`i and enters a contest which he wins; his prize is the daughter of the Puna chief. His father-in-law orders the construction of Holoholokū (birthing stones of Wailua), for the birth of Moikeha's children. Mo`ikeha became the first ali`i aimoku of Kaua`i. When Mo`ikeha passed away his bones were kept in Kē`ē, at the end of the road for safe keeping, until La`amaikahiki's return.

Early in the 1400s the two chiefdoms were united during the reign of Kūkona, father of Mano-ka-lani-pō and Palekaluhi. Mano-ka-lani-pō married Nae-kapu-lani, the daughter of Kaua`i Kona chief Makali`i-nui-ku-a-ka-wai-ea. During the reign of Kūkona, Hawai`i Island chief Ka-lau-nui-o-Hua defeated Maui chief Ka-malu-o-Hua, Moloka`i chief Ka-haku-o-Hua, and O`ahu chief Hua-i-pou-leilei [their names imply they were related] and set out with his hostage chiefs to Kaua`i where he planned to defeat Kūkona. However, Ka-lau-nui-o-Hua was in turn defeated by Kūkona. The hostages were set free after promising never to attack Kaua`i again; the Hawai`i chief remained a prisoner for a while, but he too was later freed.

With Kaua`i kingdoms united, the new royal residence was set up at Wailua, but Waimea remained significant. It was during the reign of Mano-ka-lani-pō that Kaua`i prospered during its Golden Age; this was the period of fishponds and monumental *heiau* and complex irrigated *lo`i* or pond fields. This continued on to the mid-1500s and mid-1600s; this was also the beginning of the Kawelo line of *ali`i nui* on Kaua`i.

O`ahu *ali`i nui* Kū-ali`i was a descendant of the Kawelo line on his grandmother's side. During the battles of the Kawelo cousins Kawelo-lei-makua (Kawelo) and Kawelo-`Aikanaka ( `Aikanaka) in the late 1600s, Kawelo ceded Kaua`i to Kū-ali`i if they should both die. Kawelo defeated the forces of `Aikanaka who escaped and hid in a cave. He was later found and supposedly thrown off the cliffs of Hanapēpē. However, Kawelo was also supposedly thrown off the cliff as well by his warriors who were afraid he was going crazy. Kū-ali`i came to Kaua`i and declared himself the ruling chief and installed his son Pele-i`ō-hōlani as governor. After Kū-ali`i died in Kailua, O`ahu in A.D. 1730, Pele-i`ō-hōlani left Kaua`i to become the ruling chief of O`ahu. He left his daughter Ka`apuawai as governor of Kaua`i.

Ka`apuawai died before Pele-i`ō-hōlani so the government of Kaua`i passed to Ka-maka-helei who owed allegiance to her grandfather Pele-i`ō-hōlani. She married Kiha, a Kaua`i chief, and had three children: a daughter, Lele-māhoa-lani, a son, Keawe, and another daughter, Ka-lau-i-pihana. Pele-i`ō-hōlani sent his grandson Ka-neoneo to Kaua`i to ensure the island would remain loyal to him. Ka-neoneo and Ka-maka-helei were first cousins and Ka-maka-helei set Kiha aside and took Ka-neoneo for her husband.

During this time, Maui ruling chief Kahekili won several skirmishes with Pele-i`ō-hōlani who then sent for Ka-neoneo to help him on O`ahu. This left Ka-maka-helei vulnerable. Kahekili took advantage of this and sent his half-brother Ka`eo-kūlani to Kaua`i to woo Ka-maka-helei; she married Ka`eo and they later had Ka-umu-ali`i, who was to become the last ruling chief of Kaua`i.

#### **5.2.1.4 Ancient Practices**

Changes occurred during 1300-1600s that brought about a uniquely Hawaiian culture, documented by the material culture found in archaeological sites. Kaua`i developed a unique form of poi pounder such as *pōhaku ku`i poi* (ring and stirrup pounders), double-grooved stone club heads, and a broad anvil *kapa* beater. The early culture evolved as the population grew, and many of the changes were related to significant socio-economic changes.

There are several ancient practices connected to the project area and vicinity. As stated above, the *hula* was an ancient practice connected to Kē`ē, and greater Hā`ena, as were the ancient practices of fishing, fishpond aquaculture, taro cultivation, sand dune burials and cave burials. Lohi`au was said to be buried in a cave until retrieved by Hi`iaka and the bones of Mo`ikeha were buried in Kē`ē until La`amaikahiki returned to collect them and take them to Kahiki. Ancient *`iwi* (bones) are still in Kē`ē sand dunes although relative dating has not been done of their vicinity. Ancient voyaging practices can also be implied to be connected to the area because, according to the *mo`olelo*, the Menehune and Mai`a departed from Hā`ena to sail back to their homelands. And the ancient ceremony of throwing fire brands (*ōahi*) off the mountain was performed at the top of Mauna Makana - the project area is located at the northern base of this mountain.

#### **5.2.1.5 Historic People**

One of the first significant historic people to land on Kaua`i shores was Captain James Cook who landed at the mouth of Waimea River, the same place as Kaua`i's first legendary Polynesian settlers, centuries before. His contact with the people of Kaua`i would have far reaching and devastating effects. Cook gave Ka-maka-helei and Ka`eo and others gifts, including goats, sheep and a new breed of pig. Cook's

men also gave the people of Kaua`i venereal disease. Many more foreign ships made contact with the island people of Kaua`i; some stayed and became residents. In 1820, the first missionaries landed in Hawai`i; they brought Humehume back with them. He was the oldest son of Kaumuali`i, who had been sent by his father to the mainland to obtain an education. Since he had not been heard from in years, it was assumed that he was dead. Kaumuali`i later converted and gave the missionaries lands to build a church and school.

Kaumuali`i was later coerced into ceding Kaua`i to Kamehameha I who had conquered the other island kingdoms, but Kaumuali`i was allowed to continue to rule Kaua`i. A couple of years after the death of Kamehameha I, his son and heir Liholiho (Kamehameha II) visited his cousin Kaumuali`i on Kaua`i. Kaumuali`i was subsequently “kidnapped” by Liholiho and taken to O`ahu, never to return to Kaua`i or to his family. He was also coerced into marrying his cousin Ka`ahumanu, former queen of Kamehameha I and *kuhina nui* or regent to Liholiho. Kaumuali`i died a few years later.

During the reign of Kamehameha III, lands were assigned to and claimed by lesser chiefs and *konohiki* in what was called *The Great Mahele* (ca. AD 1846-1856). The lands of Hā`ena with the exception of *kuleana* lands, were awarded to Abner Pākī, grandson of Maui mo`i Kamehameha Nui (older brother of Kahekili and Ka`eo), father of Princess Bernice Pauahi Bishop and cousin of Ka-umu-ali`i. Pākī's *konohiki* was E. Kekela, sister of Pākī's mother, and wife of half-brother of Kamehameha I. After her husband's death, she became the wife of Kamaholelani, ohana of Kau`muali`i. After Pākī's death (1855) the lands went to his daughter Princess Pauahi. In 1858 Princess Pauahi sold her Hā`ena lands to W. H. Pease.

#### 5.2.1.6 Historic Events

Historic events connected to Hā`ena would have included the awarding of the ahupua`a to Abner Pākī, which were managed by his aunt and *konohiki* Kekela; the visit by Hawai`i Island *ali`i* Moku`ohai who claimed lands at Hā`ena. The awarding of *kuleana* lands to Haole (#7998- `Ili of Kē`ē) by Mokuohai in 1846, formerly cultivated by Ho`oleali`i; Kanehakili (#7996 - `Ili of Kapihae) by Kekela in 1839; Nanahu (#8200B `Ili of Naia, located between Loko Naia and Loko Kē`ē); Moku`ohai (#8200C/RP #7091 - `Ili of Kē`ē /Naia) by Kekela in 1840 and 1844 (his grandchild and heir Kaenaku inherited it); Naiwa (#10941/RP #6388 - `Ili of Kamookhalu) by *konohiki* pre-839 and Kekela in 1839; Pea (#10675 - `Ili of Pa`akala) a tenant during pre-Kekela). After the death of W.H. Pease (1866) his lands were purchased by William H. Kinney (1872); and in 1875, Hā`ena was conveyed to Hui Kū`ai `Āina o Hā`ena (Andrade 2008:99).

#### 5.3.0 Summary of Interviewee Concerns/Mana`o

- ❖ The lower slope of the dunes had houses/hale...artifacts found when Mo and Alan did their inventory survey.
- ❖ Hā`ena is really old and any loss is significant...this is well-known.
- ❖ The age of the settlement is significant; the Menehune and Mu/Mai`a people left for their homeland from Kē`ē Beach as this was the doorway out...the safety area of Nāpali. It's [Hā`ena/Kē`ē] old...should get archaeological carbon dating; would be significant to know.
- ❖ I would think if I were a *kumu hula* to one of the most famous *hula halau* areas is some place that I could actually get to with my crew [students], would be something I'd want to do. And a few have done it in the past. But it's too dangerous right now. And too many people are going into it and lifting stones, and taking stones.... To me I think it should be cleaned up because when it's overgrown, the way it is now, the roots ... the trees and stuff...they're busting up all the rock

walls. In my opinion, they're desecrating it. The challenge is that when you clean it all off, then all the tourists are going to want to go up there. So how do you control...it's always a two-edged sword...that kind of thing.

- ❖ The Lohi`au is another one. It's overgrown its right by the trail head. It's an area that kind of needs to be cleaned up. I think it would be great to have it cleaned up and have better interpretive materials.
- ❖ The Lohi`au house site is poorly mapped...other things are not mapped.
- ❖ The road is actually coming way too close to it [Lohi`au site]. The car bumper is almost touching the thing...so you need to put a larger buffer around that.... A larger buffer needs to be established around the Lohi`au house site.
- ❖ In order for us to do the turn-around areas you're in the most sensitive of the burial areas. As you start to get that footprint between the Lohi`au house site and the bathroom you have a very tiny maneuvering room right there and also, quite frankly, problematic.
- ❖ Although we know we're dealing with a sacred area, there are certain sectors that are clearly more sacred than others. The pathway in which the human traffic is going through is absolutely critical that it goes around features not too close and not too far, and without going through any of the walls. So there is a sensitive approach that you really need to put the overall paths in there. Because anybody who has any understanding of Hawaiiana and they see the path not properly placed within the landscape, will cause problems. But I think in that sensitivity right there...right from the get-go will help things a great deal.
- ❖ The whole Park needs interpretive materials, it's really lacking, and it's one reason that most of the people come there. They just think it's a place to go swimming or lie on the beach, or throw their rubbish away in the bushes. They don't understand that in the ancient days this was like one of the Seven Wonders of the World with the `Ōahi ceremony and the heiau...this was a very special sacred area that in ancient days people made pilgrimages to come here.
- ❖ I think it's pretty ridiculous to even assume that one group can handle all aspects of this...so there's room for different groups...their *kuleana* are very separate, but yet all of them are focused and the goals are all the same.
- ❖ The wetland is there already – breathing...no need to convert anything; no need to clean it up; there will be a problem if effluence is pumped into the wetland....
- ❖ Comfort Station/Wetlands is really rich culturally; if they trench for a septic system it will go through quite a bit.
- ❖ The existing [CS] footprint right now needs to stay, but still close within it are the preserves - we have burials that are right in there, below and around the bathroom area.
- ❖ Sewage draining [into “wetlands”] is serious stuff; it will punch through the cultural layers to the burials...this will be highly contentious with the Hā`ena group...they all know about the burials and cultural layers.
- ❖ Comfort Station [is]...at edge of the fishpond...10-15 feet, plus right on water table.
- ❖ What this Plans shows...and maybe this is another concern...it shows the `auwai being restored and running through the parking lot. While that might sound good, the problem would be drainage and what's going to happen with all the runoff from this paved parking lot, assuming it's paved, maybe there's other ways to deal with it. But if you got all kinds of oil and brake fluid, dust, asbestos dust from brake pads...washing in to the `auwai from the parking lot...that would have

hundreds of cars a day parked in it...it could be really bad for the health....I mean you're talking about food production

- ❖ We just came back from Kē`ē, we had a grave site in Kē`ē, right near the sand dunes. I can't even recognize all that today. Ka`ilio nui yes, all around there. I guess that's old grave sites, because you folks remember sometimes when a big wave or *nalu*, you could see the skeletons.... I remember walking down, going down Kē`ē, pass Ka`ilio nui and then all these skeletons on the beach.
- ❖ Having a trail that actually loops around the ocean front and actually makes a full circle from the internal parking lot, which we know is going to have to be expanded and is not enough.
- ❖ I'd say probably the only thing that, maybe, I would have a concern with in here would be the level of recreational use. I'm trying to remember, I think there were bike paths and stuff like that. I think people need to have access throughout the park, I'm not sure that we gotta necessarily have bike paths throughout the park. I'd say that's just something we'd probably want to re-look at...the location of those paths and access ways.
- ❖ How you're going to transfer everybody from the parking lots...quite the distance. I don't know if it's 300 or 400 yards or more - quite a bit more than that between the parking lot - it's a long walk for people.
- ❖ The location of the base yard...I think once they have a little bit better of the footprint in mind, we need to take a better look at it. They are pretty close to a cliff line right there, and they're on the high side.
- ❖ Although I understand we will probably have to chop out a taro patch to put a helicopter field in there, but yet the emergency pad right there - we need it.... We know the helicopter pad's got to go in there...we know that certain portions of this is going to have to be data recovered as you might be taking out a couple *lo`i* in order to actually put in the basic infrastructures that you need right there.
- ❖ The toll booth thing and exactly the placement and how that's going to happen, that's still yet to come.
- ❖ I'd like to see a lot more respect for these places. You know the DLNR is supposedly in charge of all of these things, but I'd like to see a lot more respect from them. I would like to see them really working with the people who are trying to keep things going. Like maintaining the *heiau* there.
- ❖ It's like the end of the road here, I hate to argue, but it would be great if they would close off the road, which I understand they have - at the parking lot where the heliport is and let people walk in from there. It's a quarter of a mile at most. And then, 'Oh, you can't do that, people are not going to do it!' Well, if they really don't want to do it, then fine, let them turn around and go home!
- ❖ In the past the volunteer groups have been a blight on State Parks in that they've done...they have not been hospitable to any volunteer group so far that is willing to work on the State Parks. It's been a hostile environment and I can attest to that. I sure hope some of the attitudes are going to change. Diplomatic management of these volunteer groups is absolutely critical.... The premise of which State Parks embarks on this community cooperation is going to be very important - that the State government is willing to undertake a project that is culturally rooted.... You put in a western methodology into this; you're going to have problems because it's very short-sighted.
- ❖ I do know the importance of State Parks to have somebody who has the diplomatic skills and the cultural knowledge and the historical knowledge in which to navigate this Hawaiian cultural psyche. We still live by the old ways in many respects. Our sense of hospitality hasn't changed one bit from the beginning of time. And we still carry on this hospitality to a very high degree,

although a lot more difficult today to live because - these are the clashes of cultures. Generosity is considered a weakness but it isn't in the Hawaiian world. Generosity means wealth. There's room for many of the multi-disciplinary things, and I think that's the beauty and long range jewel that this Park can have.

#### 5.4.0 Guideline Criteria in Relation to Project Lands

According to the State of Hawai'i Environmental Council Guidelines, the types of cultural resources, practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, religious and spiritual customs.

#### 5.4.1 Cultural Practices/Resources in Project Area

There were/are several cultural resources and cultural practices in the Hā'ena State Park lands as indicated below:

<u>Cultural Resources</u>	<u>Cultural Practice</u>	<u>Continuing Practice/Use</u>
Ka-Ulu-O-Paoa	ceremony/ritual	ho'okupu <i>wahi pana</i>
Ka-Ahu-O-Laka	hula/uniki	ho'okupu/hula/ <i>wahi pana</i>
Lohi'au Complex	house site/misc	<i>mo'olelo/wahi pana</i>
Sand Dune Burials	burials	<i>wahi pana</i>
<i>Loko Kē'ē</i> /Naia	aquaculture/ <i>ali'i</i> resource	want restoration
Taro <i>Lo'i</i>	food resource	some restored/more wanted
' <i>Auwai</i> System	Agriculture irrigation system	modified/in use
Pu'u Makana	' <i>Ōahi</i> Ceremony/Practice	<i>mo'olelo/wahi pana</i>
Waiakanaloa Cave	Sacred Waters of Kanaloa	<i>wahi pana</i> /healing waters
Waiakapala'e Cave	Mo'o mo'olelo	<i>mo'olelo/wahi pana</i>
Kalalau Trail	<i>huaka'i</i>	access trail
Kē'ē Beach Trail	ceremonial	access trail to <i>hula pā</i>
Limahuli Stream	multi-practices	multi-uses
Kē'ē Beach	multi-practices	multi-uses

#### 5.5.0 Cultural Impact Assessment

##### 5.5.1 Cultural Resources

This category entails sites or places associated with significant events and/or people important to the native Hawaiian patterns of prehistory; embody distinctive characteristics; or are likely to yield information important for research on the prehistory of Hawai'i. It also includes sites that yield resources important for native Hawaiian Cultural Practices, past and present; and items that are part of a cultural context. *Wahi Pana* or sacred places are important cultural resources to native Hawaiians regardless that the original sites that may have been there no longer exist.

The project lands were once a part of an ancient Hawaiian ahupua'a life-system as well as a support system for the *ali'i* who lived there and the *hula halau*. The physical evidence of multi-use ancient or traditional cultural practices still exists (e.g. Lohi'au's *hale*, *hula* platform, *heiau*, fishponds and *lo'i*), which not only indicate traditional land-use of the area, but that it (Kē'ē) was/is considered a *wahi pana*. The evidence also indicates that Hā'ena was not only well established, but part of ancient Hawaiian life-systems that included the traditional gods, goddesses, other significant deities, *ali'i nui*, officiating *kahuna* and people who lived and cared for the land. The *hale* or house complex of Lohi'au confirms that portions of Hā'ena were *ali'i* lands with all the necessary traditional infrastructure and required support

systems. According to several sources, there are burial grounds for ancient as well as historic Hawaiians. The project area also included fishponds, considered resource/property of the *ali`i nui* and an extensive taro *lo`i -`auwai* system with documented *ko`ele* or taro patches set aside for *ali`i nui*.

### **5.5.2 Cultural Practices**

This category includes items that are essential to the practices that have cultural value to either native Hawaiians or other ethnic groups. Burials are considered a very significant cultural practice and both cave and sand dune burials are located within the project lands. The whole area of Kē`ē, Hā`ena, was once part of the original *hula halau* connected to Laka, and honored by Hā`ena *ali`i nui* Lohi`au whose *hale* or house is located at the base of Pu`u Makana, to current *kumu hula*. Other traditional practices included *`ōahi* (firebrand throwing), crop cultivation (e.g. taro, sweet potato and banana), salt water and stream fishing, marine gathering (e.g. seaweed or *limu*, limpets or *`opihi*, *wana*, *he`e* or octopus and sea cucumber), stream gathering of crayfish and *kupe`e*, forest gathering of medicinal plants, food plants and craft plants. Many of these latter practices continue to today.

### **5.5.3 Historic Resources**

This category entails sites associated with significant events and/or people important to the broad patterns of history [post Western contact], which includes other ethnic groups; embodies distinctive characteristics of an historic era or master; or are likely to yield information important for research on the history of Hawai`i. There are historic burials within the project lands, but while people are no longer being buried there, their families continue to honor them, a filial practice that has been continuous. The poi mill foundation is all that exists of a historic cultural practice, however, some of the Hā`ena people would like to see it restored to be used in conjunction with ancient and historic taro *lo`i* that have been restored and re-cultivated within the last twelve years. The ancient fishponds were also used in historic times, but often modified to include non-traditional species such as introduced fish, ducks and rice. And although both Kē`ē fishponds were dis-continued years ago, some Hā`ena people would like to see them restored and utilized again as a community food and education resource.

## **5.6.0 Summary of Cultural Impact Assessment/Recommendations**

### **5.6.1 Cultural Resources (Land, Water and Marine) Impact**

The lands within Hā`ena State Park were impacted by natural and human activities of the 19<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> centuries. However, many cultural resources still exist as indicated above and many are associated with cultural practices that continue today. The Hā`ena State Park Master Plan should include preservation plans for the cultural resources, burial treatment plans for ancient and historic burials, interpretive plans, and cultural access strategies.

### **5.6.2 Cultural Practices/Access (Land) Impact**

While there haven't been any recent (continuing) burials in the project area or functioning use of the fishpond, according to some of the consultants, traditional/ancient sand dune burials may be impacted by any modifications to the vicinity; lack of beach trail maintenance will impact cultural access to the *hula pā* for *hula halau*; and traditional unrestored *lo`i* may be impacted by the creation of permanent parking lots or helipads in the old *lo`i* areas. Therefore the Hā`ena State Park Master Plan should include strategies to keep current trails clear; to create culturally sensitive trails and buffers to ancient burial grounds; and to protect unrestored *lo`i kalo*, *`auwai* and fishponds.

### 5.6.3 Historic Resources (Land) Impact

This category overlaps Cultural Resources in that sand dune burials continued into the historic period, as did the use of fishponds, taro *lo`i*, *`auwai* systems, *hula pā* and Kalalau trail. While some of these resources may have been damaged by historic tsunamis, they still qualify as historic resources (religious/spiritual and subsistence example). There are a number of historic burial plots framed by concrete or other markers within Hā`ena State Park and remnants of a historic poi mill. There are also at least two historic structures (wooden houses) located in Hā`ena State Park or immediate vicinity that could be considered “historic” (over 50 years). The Hā`ena State Park Master Plan should include preservation plans to protect historic burials and provide access for families; the two historic wooden structures should be assessed on their integrity and possible future uses.

### 5.5.4 Historic Practices (Land and Water) Impact

The historic practice of sand dune burials was discontinued; the historic use of the fishpond aquaculture was also discontinued in Hā`ena. The restoration and continued practice of growing *kalo* (taro) has been revitalized in recent years in Hā`ena State Park and elsewhere in Hawai`i. Fishpond aquaculture has also been revitalized around Hawai`i and there is some hope that this will happen in Hā`ena State Park as well, for subsistence and cultural purposes. Several marine cultural practices continue today with some modifications. Limited fishing continues although hampered somewhat by the extensive use of the visiting tourist who use the beaches and snorkel in the protected Kē`ē lagoon. Use of the reef is discouraged so there is little likelihood of *limu* gathering there, although limited gathering of *`opihi* may still continue on shore-line.

### 5.7.0 Interviewees Master Plan Recommendations

When the ethnographic survey for the Master Plan/EIS CIA was conducted, the Comfort Station was already in the very early stages of construction however, modifications for the Wetlands had not started. While a limited number of people were interviewed, they shared their many concerns regarding Hā`ena State Park and a long list of recommendations for the Hā`ena State Park Master Plan, which are re-capped below.

- ❖ **Restore/Use Cultural Sites** One of my dreams with this park here down at the end of the road. I would love to see the *halau*, the *hula halau* area, and *Ka Ulu o Paoa* -- I'd like to see it restored and used. My idea was over by the parking lot put in some sort of a building so that any *hula halau* in the State can perform on the *halau* platform with the understanding that they put on a program for the public which would be taped and begin a *hula* historical record -- a depository -- so that these things that are so ephemeral are not completely lost.... I think you could end up with something that would be for a nonprofit organization running that sort of thing. And then, of course, you'd have a source of income being able to charge something to go to the performance. The *halau*, in order to be able to use the place, the actual school, would be, I think, somewhat of a good thing.... To me the only way you're going to save this, is to use it...to me that should be directed to the practitioner's who use that [*hula* platform mad *heiau*].
- ❖ A larger buffer needs to be established around the Lohi`au house site.
- ❖ **Special Use Cultural Park** I think the Master Plan has to address ways of protecting cultural areas from just being considered public domain. The whole western [mentality] is so...”It’s a State park and I’m a U.S. citizen, then I should be allowed to go anywhere I want in the State.” That’s not how this Park should be operating. But I do think it would be...it [*hula pā/heiau*] should be better maintained...it should be cleaned and better maintained - it’s a really impressive site.
- ❖ **Interpretation** The whole Park needs interpretive materials, it’s really lacking.

- ❖ **Sand Dune Field School** Maybe open the [project area sand dunes] area for field school...it's a rich eco-system.
- ❖ **Multi-Disciplinary Approach** I think that my main point is that some of the cultural methods that you may want to consider in this whole thing. Number One, this is multi-disciplinary.
- ❖ **Archaeology Preserve** This area [the park] should be reserved as an archaeological preserve and so therefore, for educational purposes, archaeology should be allowed, but that's separate in its own particular field.
- ❖ **Fishing House.** You have the fishing, so another house is controlling [fishing] - their only duty is to manage the fisheries of Hā`ena.... At this particular point I'm not going to put in any individual, I could say that, for example, Jeff Chandler, he's a fisherman. He has a great deal of knowledge that could be added to the world of fishing. For example, he would definitely be in the House of the Fisherman. His ideas and his participation in the fisheries, conferences and meetings, and everything like that, along with Thomas Hashimoto, they know what to do in regard to managing the fishing resources. I think he would be really good with that.
- ❖ These can also end up being working fishponds too and so that could be another aspect under the fisheries in not only managing the kai fisheries but the wai fisheries also. So those are there as far as expansion capabilities. It would be nice to have it as a larger Master Plan ....and step by step work up to it
- ❖ **Marine Biology House** Another house is going to be Marine Biology, which is the study of reefs; that needs to go on.
- ❖ **Taro House** Another house would be the taro, such as Hui Maka`ainana, which is the taro growing aspects of it right there.
- ❖ **Lo`i Expansion/Water Supply** We may want to take another look at the water supply Hui Maka`ainana expanding their footprint. Right now the last time I saw it there were four big *lo`i*, however I know that Thomas Hashimoto had two or three other *lo`i* in the areas...and I know he wanted to open up too. So I think in visioning a larger Master Plan for the actual footprint that Hui Maka`ainana can expand their *lo`i*, with the foot-trails that are coming through there...that we keep it pretty safe...the terrain itself is not necessarily really difficult; although slightly undulating, the view plains through here are absolutely stunning.
- ❖ **Botany House** A lot of this stuff in here - the vegetation is *kamani* - there's a botany aspect to it too, so that's a separate house too. There's a whole *la`au lapa`au* aspect that could be done here too, which actually creates a whole another separate house of botany....again, a completely different discipline, and under different goals and objectives, but still important to the big picture
- ❖ **Protocol House** Then another house will be the house that actually is the *heiau* itself.... The group that would handle all the protocols and everything with the *heiau* that's different, that needs to be a specialized group...a specialized *kahuna pule* - the house itself - the protocols that need to go on in the *heiau* and all the activities need to be overseen by some very experienced people.
- ❖ **Mason House** We were able to do that in the new Loko Kai restoration Project, in that we created the Mason House in all the restoration work. The Mason House included both males and females. It was their job to decide how the stone walls were going to be built. Once they knew exactly what they were going to do, then they told the Kahuna Pule House, and then they're the ones who decided how to open the door....keep it open....keep everyone spiritually safe...and close the door after we're done. It was their job to protect the masons while they're working. The Third House was the Nā Pali Coast Ohana which both the masons and the Kahuna Pule knew exactly what to

do, and then it was our job that both of them got exactly what they needed whenever they needed it.

- ❖ **State Parks House.** The Fourth House was State Parks, which oversaw the whole thing to begin with. In the long run that methodology really helped focus the work and the energy. It kept people from being in too many places...and into discussions where they don't really belong. It facilitated things in the long run much better and made for a stronger more cohesive unit
- ❖ **Fundamental Groundwork** Number two, the cultural, educational, spiritual, philosophical reserve or preserve where all of that [the various Houses and their *kuleana*] is perpetuated. So there's a unique opportunity by laying the fundamental groundwork for the separation yet the unification of these separate houses. I think it would be well worth considering over a long range period. It keeps the arguments and everybody focused on their job, instead of one guy who is in every single camp, this just doesn't work in the long run.
- ❖ **Cultural Methodology** The main point...is to consider the culture methodology and the way you organize the different disciplines. I think it's going to help a great deal in the end.... Our cultural methodology and problem solving and work ties everyone together, keeps everyone focused, keeps the arguments, keeps everybody out of each other's hair, keeps everybody out of where they do not belong, but also gives everybody a sense of responsibility and a place - a sense of importance and a sense of a very specific responsibility. People need this to grow, but at the same time its symbiotic, if we don't seek the symbiotic relationships we're not following the lessons we're supposed to.
- ❖ **Ceremony/Cultural Protocols** The cultural protocols that demand this particular approach just because of the site you're dealing with. You're dealing with one of the most important religious, cultural, historical centers. Our ancestors deserve the best. Naturally when you're dealing with these elements it is much safer to be operating on a much higher elevation of ethics and protocols. And in the long run it's much safer for everyone. But at the same time it ends up as a spiritual experience because in the end it is a ceremony that binds us together. Now once we've experienced the ceremony together we have something in common. So the ceremony is actually critical. As far as I'm concerned, the more ceremonies that go on up there the better, but that elevated protocol is critical in keeping everyone safe and respectful
- ❖ **Continuing Negotiation** That place [Kē`ē] is horrible for traffic...no easy solution. Guarantee that negotiation won't do a bit of good because the State has a bad rap...years of nothing and a bad attitude...just won't cut it on Kaua`i. But they have to negotiate with the people in good faith.
- ❖ **Relocate Comfort Station** There is rancor of the residents regarding the Comfort Station; put it somewhere else--anywhere along the dunes is bad.... State is aware - no one wants the Comfort Station there...it should be moved to the parking lot area....
- ❖ **Parking Lot** If you graded it away from that and maybe had a permeable surface paving...we know that hardscape is not a good thing...the more permeable surfaces we can create the better. The problem with a lot of these, though, is intensity of use. This park gets a huge intensity of use. So things like grass-green, grass paving, and materials like that would not be functional...the high rainfall we get in Hā`ena. But maybe they have permeable cement and permeable asphalt...there's gravel paved systems - there's different things that could be looked at. This is probably the logical place, because it already has been destroyed and disturbed, to keep a parking lot. But I think environmentally how we deal with those issues in terms of the *lo`i*, I think, is going to be really important because the *lo`i* are going to be a really important part of the cultural landscape of the park.
- ❖ **Retreat Resource** One of the things, though, that this Plan doesn't show on it is there's a house in this area in here, which this guy Rusty used to live in this house long time ago. It's really really run down. I'm not sure if it's at the point where you could still salvage it or not, you might be able

to, but I think this Plan is kind of completely absent on it...and there's a road that goes down to there. And I think it is an under-recognized resource because within the context of this Park and the cultural use of this Park, I think you're going to need to have places like that that are kind of like retreat centers where cultural groups could come...whether they stay there over night or not. I think having something like that in the Park here could be really important. Also the Hui Maka`āinana Makana which we established a curatorship program with the State back in 1999 for the archaeology - primarily for the *lo`i* complex. It would be really good for them to have a place where they could have meetings and functions related to their curatorship of the cultural sites within the park. So that is something that I would like to see changed or enhanced on this Plan

- ❖ **Full-time Caretaker/Kahu** The nights...I know the idea of the full position of a caretaker and that particular house...probably thinking that closer to the entrance. The caretaker is a traditional part of our culture, to have the caretaker close in. Security twenty-four hours a day would be nice, although I'm hard pressed at this particular time to actually point at the type of vandalism one would expect right there. However, the presence 24/7 in the zone is really good.
- ❖ **Additional Beach Focus** I'm not really comfortable with not including the beach area that's in front of Taylor Camp into the whole scope of the park. I think you're defeating the purpose in the Master Plan by only taking a tiny portion which is the actual end of the road, and ignoring three-quarters of the land footprint in the planning process.
- ❖ **Safety/Loop Trail** Addressing the liability issues, I don't think we're going to get into this particular point, but I do know that it's serious with the rockfalls...that a good section of the road that you're walking or driving, is right next to a cliff. Therefore, the suggestion of leading the paths out and away from the parking lot and towards the ocean and doing the loop and so it keeps people into more of the open plains rather than along the edge of the cliff. Although the traffic, whether it's going to be shuttle buses - whatever the nature of the concessions they have in mind, I'm not really sure of how they are going to be doing it, they're going to still be using the road as a footprint.
- ❖ **Concessions/Revenues** I know there's discussions on the different natures of concessions, but then again that's concessions whether it's neighborhood driven or beyond at this particular point - naturally the first choice would be within the *ahupua`a* of Hā`ena and then Wainiha after that, and then expand out. I wouldn't mind seeing - I understand that the reason why SHPD, or being the State Parks, need the money that these parks can generate with the revenues, it would be nice for the first five years that fifty percent of the revenues stay in the park, after that then maybe twenty-five percent depending on the infrastructure. I think it's pretty reasonable to start the ball with expecting a hundred percent revenue to stay in the park. But some sort of arrangement as to a percentage based on years, either going up or going down over the years, needs to be discussed and broken down into the various - the methodology just in that alone, right! But to begin a discussion, I think fifty percent of it needs to stay or a certain length of time to allow some of the infrastructure to get settled in by the volunteer groups.

### 5.8.0 ADDITIONAL RECOMMENDATION

It is highly recommended that a Cultural Advisory Committee or Group be formed, hopefully including the interviewees, who would provide cultural expertise during the Master Plan/EIS process and during any later Park development projects. They can also provide direction in the likely event that more burials are uncovered during any future sub-surface activity within Hā`ena State Park.



Photo 77. Native plant in the park

## REFERENCES CITED/REVIEWED

- n.a.  
1994 *The Island of Kaua`i* . Hawaiian Service, Inc., Honolulu, Hawai`i.
- Alexander, W. D.  
1891 "A Brief History of Land Titles in the Hawaiian Kingdom." *Hawaiian Annual for 1891*. (In Sterling 1998:63).
- Andrade, Carlos  
2008 *Hā`ena: Through the Eyes of the Ancestors*. University of Hawai`i Press, Honolulu, Hawai`i.
- Arago, Jacques  
1823 *Narrative of a Voyage Round the World...During the Years 1817...1820*. Vol I. Treuttel and Wurtz, London, England.
- Armitage, George T.  
1944 Pōhaku-loa, Long Stone of Kaua`i In *Ghost Dog and other Hawaiian Legends*
- Armstrong, R. Warwick [Ed]  
1983 *Atlas of Hawai`i*. University of Hawai`i, Honolulu, Hawai`i.
- Baker, Kekaulike and Baker, Haunani  
1989 "The Great Mahele: 1848." *Ke`opi`o O Puna*, Pahoā.
- Barrere, Dorothy and Marion Kelly  
1978 *Kē`ē, Hā`ena: Mythology and Sites with Extensive Notes on the Hula*. Prepared for the Department of Land and Natural Resources, Division of State Parks by the Department of Anthropology, Bishop Museum, Honolulu, Hawai`i.
- Beaglehole, J. C.  
1999 *The Journals of Captain Cook*. For the Hakluyt Society, 1955-67 New York, N.Y., Penguin Books  
  
1974 *The Life of Captain James Cook*. Stanford University Press. Stanford, California.
- Beckwith, Martha W.  
1940 *Hawaiian Mythology*. Yale University Press, New Haven, Connecticut. [1970]  
  
1951 *The Kumulipo: A Hawaiian Creation Chant*. University of Hawai`i Press, Honolulu, Hawai`i. [1990]
- Bellwood, Peter  
1978 *The Polynesians: Prehistory of an Island People*. Thames and Hudson Ltd., London, England.
- Bennett, Wendell Clark  
1931 *Archaeology of Kaua`i* . Bernice P. Bishop Museum Bulletin 80. Bishop Museum Press, Honolulu, Hawai`i.
- Bingham, Hiram A. M.  
1847 *A Residence of 21 Years in the Sandwich Island*. Hezekiah Huntington, Hartford, Connecticut.
- Charlot, Jon  
1983 *Chanting the Universe: Hawaiian Religious Culture*. Emphasis International, Honolulu, Hawai`i.

- Chinen, Jon J.  
1958 *The Great Mahele: Hawai'i's Land Division of 1848*. University of Hawai'i Press, Honolulu, Hawai'i.
- Colum, Padric  
1925 *The Bright Islands*. Yale University Press, New Haven, Connecticut.  
1965 *The Fire Goddess In Legends of Hawai'i* Yale University Press, New Haven, Connecticut.
- Cook, James P.  
1776-1779 *A Voyage to the Pacific Ocean-in His Majesty's Ships the Resolution and Discovery; in the years 1776, 1777, 1778, 1779 and 1780*, Vol II, G. Nicol and T. Cadell 1784 pp 192, 193, 244.
- Cordy, Ross  
1973 "Traditional History of O'ahu Political Units: Its Use for Explaining the Origin of Complex Rank Cultural Systems in the Hawaiian Islands." Ms. January.  
1996 "The Rise and Fall of the O'ahu Kingdom: A Brief Overview of O'ahu's History." In *Oceanic Culture History: Essays in Honor of Roger Green*, pp591-613. New Zealand Journal of Archaeology Special Publication.
- Coulter, Jon Wesley  
1971 *Population and Utilization of Land and Sea in Hawai'i, 1835*. Bernice P. Bishop Museum Bulletin 88, Krauss Reprint Co., New York [Originally published by BPBM 1931]
- Day, A. Grove  
1984 *History Makers of Hawai'i*. Mutual Publishing, Honolulu, Hawai'i. [On file at SHPD Library]  
1992 *Hawai'i and Points South: True Island Tales*. Mutual Publishing, Honolulu, Hawai'i.
- Daws, Gavan  
1974 *Shoal of Time: History of the Hawaiian Islands*. University of Hawai'i Press, Honolulu, Hawai'i.
- Dye, T.S.  
2002 "Archaeological Assessment for a Residential Lot at Hā'ena, Kaua'i (TMK:5.9.02:62)" for Marilyn M. Browning of Calabasas, California.
- Earle, Timothy  
1978 *Economic and Social Organization of a Complex Chiefdom: The Halele'a District, Kaua'i, Hawai'i*. Anthropological Papers, Museum of Anthropology, University of Michigan, No. 63. Ann Arbor, Michigan.
- Emerson, Nathaniel B.  
1965 [1909] *Unwritten Literature of Hawai'i*. Charles E. Tuttle, Rutland, Vermont.  
1978 *Pele and Hiiaka: a myth from Hawai'i*. C. E. Tuttle, Rutland, Vermont.
- Emory, Kenneth P.  
1929 "Ruins at Kee, Hā'ena, Kaua'i: Famous Court of Lohiau" In *Hawaiian Annual for 1929*. Thos. G. Thrum, compiler and publisher, Honolulu, Hawai'i.
- Feher, Joseph [Compiled by Edward Jostring (Part I) and O.A. Bushnell (Part II) [Text By]  
1969 *Hawai'i: A Pictorial History*. Bishop Museum Special Publication No. 58. Bishop Museum Press, Honolulu, Hawai'i.

- Fornander, Abraham
- 1880 *An Account of the Polynesian Race: Its Origins and Migrations and the Ancient History of the Hawaiian People to the Times of Kamehameha I.* Truer and Company, Legate Hill.
- 1915 *Fornander Collection of Hawaiian antiquities and folk-lore ... gathered from original sources by Abraham Fornander, with translations revised and illustrated with notes by Thomas G. Thrum.* Bishop Museum Press, Honolulu, Hawai'i.
- 1917 *Fornander Collection of Hawaiian Antiquities and Folk-Lore: Memoirs of the Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History* Vol IV, Part II. Bishop Museum Press, Honolulu, Hawai'i.
- 1959 *Selections from Fornander's Hawaiian Antiquities and Folklore.* Samuel H. Elbert, editor, Jean Charlot, illustrator. University of Hawai'i Press, Honolulu, Hawai'i.
- Green, Laura S.
- 1926 "The Shark Gods of Ka'ū" *In Folk-tales from Hawai'i.* Vassar College, Poughkeepsie, New York.
- 1929 *The Legend of Kawelo.* Vassar College, Poughkeepsie, New York.
- Greene, Linda W.
- 1993 A Cultural History of Three Traditional Hawaiian Sites on the West Coast of Hawai'i Island: Pu'ukoholā Heiau, National Historic Site, Kawaihae, Hawai'i, Kaloko-Honokōhau, National Historical Park, Kaloko-Honokōhau, Hawai'i, Pu'uhonua o Hōnaunau, National Historical Park, Hōnaunau, Hawai'i / by Linda Wedel Greene. National Park Service, Denver, Colorado.
- Griffin, P. Bion
- 1984 "Where Lohi'au Ruled: Excavations At Ha'ena, Halele'a, Kaua'i" *Hawaiian Archaeology*, Vol. 1(1) 1. University of Hawai'i, Honolulu, Hawai'i.
- Griffin, P. Bion, Richard M. Bordner, Hallett H. Hammatt, Maury E. Morgenstein and Catherine Stauder
- 1977 *Preliminary Archaeological Investigations at Hā'ena, Halele'a, Kaua'i Island.* Prepared for Barlow Chu by Archaeological Research Center Hawai'i, Inc., Lāwa'i, Kaua'i.
- Haig, Brian D.
- 1995 "Grounded Theory as Scientific Method" *Philosophy of Education Society* [1996-2001], University of Cambridge. [http://www.ed.uiuc.edu/EPS/PES-Yearbook/95\\_docs/haig.html](http://www.ed.uiuc.edu/EPS/PES-Yearbook/95_docs/haig.html)
- Hammatt, Hallett H. and Virgil W. Meeker
- 1979 *Archaeological and Ethnohistorical Investigation at Hā'ena, Halele'a, Kaua'i Island.* Prepared for Barlow Chu by Archaeological Research Center Hawai'i, Inc., Lāwa'i, Kaua'i.
- Hammatt, Hallett H., Myra J. Tomonari-Tuggle and Charles F. Streck
- 1978 *Archaeological Investigations at Hā'ena State Park, Halele'a, Kaua'i Island: Phase II: Excavations of Beach Localities and Visitors Facilities Area.* Prepared for the State of Hawai'i, DLNR, Division of State Parks by Archaeological Research Center Hawai'i, Inc., Lāwa'i, Kaua'i.
- Handy, E. S. Craighill
- 1940 *The Hawaiian Planter*, B.P. Bishop Museum Bulletin 161, Bishop Museum Press, Honolulu, Hawai'i. (also 1985)
- Handy, E.S. Craighill and Handy, Elizabeth Green [with Mary Kawena Pukui]
- 1972 *Native Planters in Old Hawai'i: Their Life, Lore, and Environment.* Bernice P. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu, Hawai'i. [1940 original *The Hawaiian Planter*]

- [HSPLS] Hawai`i State Public Library System (DOE) [Lillian Ching; Masae Gotanda, Ed]  
 1989 *Hawaiian Legends Index* [Volumes I, II, III]. Board of Education, DOE, Honolulu, Hawai`i.
- Henry, Teuira  
 1995 *Voyaging Chiefs of Hawai`i*. Kalamakū Press. Honolulu, Hawai`i.
- Hommon, Robert J.  
 1976 *The Formation of Primitive States in Pre-Contact Hawai`i*. Ph.D. Dissertation, University of Arizona, Tucson, Arizona.  
 1986 "Social Evolution in Ancient Hawai`i." In *Island Societies* [Ed] Patrick Vinton Kirch. Cambridge University Press, New York, New York.
- ʻŪi, John Papa [Translated by Mary Kawena Pukui; Edited by Dorothy B. Barrère]  
 1982 *Fragments of Hawaiian History*. Bishop Museum Press, Honolulu, Hawai`i. [Original 1959. Translations of newspaper articles (*Kuokoa*) written in 1866-1870].
- Joestring, Edward  
 1984 *Kaua`i: The Separate Kingdom*. University of Hawai`i Press and Kaua`i Museum Association, Limited.
- Juvik, Sonia P. and Juvik, James O.  
 1998 *Atlas of Hawai`i*. University of Hawai`i Press, Honolulu, Hawai`i. [3<sup>rd</sup> edition]
- Kalākaua, His Hawaiian Majesty King David  
 1990 *The Legends and Myths of Hawai`i: The Fables and Folklore of a Strange People*. Mutual Publishing, Honolulu, Hawai`i. [Original 1888 Charles L. Webster and Co., New York]  
 1990 "Hawaiian Legends: Introduction" pp 11-65 [Original 1887]  
 1990 "Hina, The Helen of Hawai`i" pp 68-94 [Original 1888]  
 1990 "The Story of Laiekawai" pp 455-489
- Kamakau, Samuel Mānaiakalani  
 1987 *Ka Po`e Kahiko: The People of Old*. Bishop Museum Special Publication 51. Bishop Museum Press. [From articles in *Ku`oko`a* and *Ke Au `Oko`a* from 1866 to 1871. Translated in 1931-34 by Mary Kawena Pukui; Arranged and edited by Dorothy B. Barrère in 1964.]  
 1991 *Tales and Traditions of the People of Old: Nā Mo`olelo a Ka Po`e Kahiko*. Bishop Museum Press, Honolulu, Hawai`i. [From newspaper articles of 1868 and 1870, translated from newspapers *Ka Nupepa Kuokoa* and *Ke Au Okoa* by Mary Kawena Pukui; Edited by Dorothy B. Barrère]  
 1992 *Ruling Chiefs of Hawai`i*. [Revised] Kamehameha Schools Press, Honolulu. [From newspaper articles of 1842 and 1870.] Original 1961.
- Kame`eleihiwa  
 1992 *Native land and foreign desires: how shall we live in harmony?* Bishop Museum Press, Honolulu, Hawai`i.
- Kent, Noel J.  
 1983 *Hawai`i: Islands Under the Influence*. Monthly Review Press, New York, New York.
- Kikuchi, William K., Kikuchi, Delores L., Stauder, Catherine, Cleeland, Byron and Frazier, Frances  
 1978 "The Bicentennial of the Discovery of the Hawaiian Islands by Captain James Cook 1778-1978 Part II: The Western Discovery of the Hawaiian Islands 18 January 1778" In *Archaeology of Kaua`i* v7, No.1, Issue 21, January, Līhu`e, Kaua`i.

- Kirch, Patrick V.  
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory.* University of Hawai'i Press, Honolulu, Hawai'i.
- Klieger, P. Christiaan  
1998 *Moku'ula: Maui's Sacred Island.* Bishop Museum Press, Honolulu, Hawai'i.
- Knudsen, Eric A.  
1946 *Teller of Hawaiian Tales.* Mutual Publishing, Honolulu.  
"The phantom goat of Honopu" pp82-85  
"The love of a chief" pp99-102  
"Na Oahi o Kaua'i" pp143-146
- Kolb, Michael  
1989 "A Research Design for Pi'ilanihale Heiau." (Ms) On file at SHPD. [Submitted February 1, 1989]  
1991 *Social Power, Chiefly Authority, and Ceremonial Architecture, in an Island Polity, Maui, Hawai'i.* [Dissertation-Ms] University of California, Los Angeles, California.
- Krauss, Bob and Gleasner, Bill  
1978 *Kaua'i.* Island Heritage Limited, Honolulu, Hawai'i.
- Kuykendall, Ralph S.  
1938 *The Hawaiian Kingdom Volume I 1778-1854.* University Press of Hawai'i, Honolulu, Hawai'i.
- Kuykendall, Ralph S. and Day, A. Grove  
1976 *Hawai'i: A History from Polynesian Kingdom to American State.* Prentice-Hall, Englewood.
- Lawrence, Mary Stebbins  
1912 "The love of a chief" In *Stories of the Volcano Goddess.* Crossroads Bookshop, Honolulu, Hawai'i.
- Leib, Amos P. and Day, A. Grove  
1979 *Hawai'i Legends in English: An Annotated Bibliography.* Second Edition. The University Press of Hawai'i, Honolulu, Hawai'i.
- Luomala, Katherine  
1986 *Voices on the Wind: Polynesian Myths and Chants.* [Revised Edition] Bishop Museum Special Publication 75. Bishop Museum, Honolulu, Hawai'i.
- Macdonald, Gordon A.; Abbott, Agatin T.; and Peterson, Frank L.  
1983 *Volcanoes in the Sea: The Geology of Hawai'i.* University of Hawai'i Press, Honolulu, Hawai'i.
- Major, Maurice and Alan Carpenter  
2001 "Supplemental Archaeological Inventory: Hā'ena State Park, Kaua'i TMK: 5-9-06:14 and 5-9-08:1 through 19." Prepared for State of Hawai'i, Department of Land and Natural Resources, Division of State Parks.
- Malo, David  
1971 *Hawaiian Antiquities.* Bishop Museum Press, Honolulu. [Original 1903-- translated by N.B. Emerson from Malo's works of early 1800s.]
- Maly, Kepa and Onaona  
2003 "Hana Ka Lima, 'Ai Ka Waha' A Collection Of Historical Accounts And Oral History Interviews With Kama'āina Residents And Fisher-People Of Lands In The Halele'a-Nāpali Region On The

Island Of Kaua'i." Prepared for *Nature Conservancy, The National Tropical Botanical Gardens – Limahuli Gardens and Hui Maka'āinana o Makana*

- McKinzie, Edith Kawelohea [Edited by Ishmael W. Stagner, II]  
1983 *Hawaiian Genealogies: Volume I*. University of Hawai'i Press, Honolulu, Hawai'i.
- 1986 *Hawaiian Genealogies: Volume II*. University of Hawai'i Press, Honolulu, Hawai'i.
- Mills, Peter R.  
1996 Transformations of a Structure : The archaeology and ethnohistory of a Russian fort in a Hawaiian chiefdom, Waimea, Kaua'i. Thesis, UC-Berkeley, California.
- 2002 *Hawai'i's Russian Adventure*. University of Hawai'i Press, Honolulu, Hawai'i.
- Moffat, Riley M. and Fitzpatrick, Gary L.  
1995 *Surveying the Mahele*. Editions Limited, Honolulu, Hawai'i.
- Murabayashi, Edwin T.  
1973 *Kaua'i Lands Classified by Physical Qualities for Urban Usage – L.S.B. Circular No. 17*, September. Land Study Bureau, University of Hawai'i, Honolulu, Hawai'i.
- Nakuina, Emma Metcalf  
1904 "Pele and Lohiau" *In Hawai'i, its People, their Legends*. Hawai'i Promotion Comm, Honolulu, Hawai'i.
- Olson, Storrs L. and James, Helen F.  
1982 "Fossil Birds from the Hawaiian Islands: Evidence for Wholesale Extinction by Man before Western Contact." *Science* Vol. 217.
- Pacific Worlds  
1995/2004 Hā'ena [www.pacificworlds.com/Hā'ena](http://www.pacificworlds.com/Hā'ena)
- Pandit, Naresh R.  
1996 "The Creation of Theory: A Recent Application of the Grounded Theory Method." *The Qualitative Report*, Volume 2, Number 4, December.  
<http://www.nova.edu/ssss/QT/QR2-4/pandit.html>
- Pukui, Mary Kawena  
1983 *ʻŌlelo Noʻeau: Hawaiian Proverbs and Poetical Sayings*. Bernice P. Bishop Museum Special Publication No. 71. Bishop Museum Press, Honolulu, Hawai'i.
- 1994 "How the Menehune saved their fish" *In Tales of the Menehune*. KS Press, Honolulu, Hawai'i.
- Pukui, Mary Kawena, Elbert, Samuel E. and Mookini, Esther T.  
1974 *Place Names of Hawai'i*. University of Hawai'i Press, Honolulu, Hawai'i.
- Rice, William Hyde  
1977 *Hawaiian Legends*. Bishop Museum Press, Honolulu, Hawai'i.  
"The Goddess Pele"  
"The stones of Kane"  
"The Menehunes"  
"The story of Ola"
- Riley, Thomas J. and Jeffery Clark  
1979 *Archaeological Testing and Excavations at Hā'ena, Kaua'i*. Department of Anthropology, University of Hawai'i, Manoa and University of Illinois, Urbana-Champaign

- Riley, T. J. and K. Ibsen-Riley  
1979 "Taylor Camp, Hawaii: The life and death of a hippy community" *Field Museum of Natural History Bulletin* 50, 18.22.
- Rolett, Barry V.  
1989 *University of Hawai'i Archaeological Research on Bellows Air Force Station: Report of the 1989 Field School and a Proposal for Further Research in 1990*. Dept of Anthropology-University of Hawai'i, Honolulu, Hawai'i.
- Silva, Carol  
1995 *A Historical and Cultural Report of Hā'ena State Park, Halele'a, Kaua'i*. Draft report prepared for the State of Hawai'i, DLNR, Division of State Parks, Honolulu, Hawai'i.
- Skinner, Charles M.  
1900 *Myths & Legends of our New Possessions & Protectorate*. J. B. Lippincott Company, Philadelphia, Pennsylvania.
- Speakman, Cummins E.  
2001 *Mowee: A history of Maui the Magic Isle*. update by Jill Engledow Mutual Publishing, Honolulu, Hawai'i.
- Sterling, Elspeth P.  
1964 *Index to Hawai'i Historical Review Volume I (Numbers 1-12)*. [On file at UHM Hamilton Library-Hawaiian Collections].
- (TKC) The Keith Companies – Hawai'i, Inc. and Earthplan Planning and Design  
2001 "Hā'ena State Park master Plan and Environmental Impact Statement" prepared for Division of State Parks, Department of land and Natural Resources, State of Hawai'i.
- Thrum, Thomas G.  
1907 "Legends resembling Old Testament history" *In Hawaiian Folk Tales: A Collection of Native Legends*. A. C. McClung and Company, Chicago, Illinois.  
  
1908 *Hawaiian Almanac and Annual for 1909*  
  
1923 "Kila the undaunted" *In More Hawaiian Folk Tales; A Collection of Native Legends and Traditions, compiled by Thomas G. Thrum*. A. C. McClure & Co., Chicago, Illinois.
- Tuggle, H. David  
1997 "Archaeological Research of Areas Proposed for Development of Military Family Housing and Expansion of Military Training at Bellows Air Force Station, O'ahu: Task 1:Literature Review of the Cultural Resources of the Bellows Area." International Archaeological Research Institute, Inc. Honolulu, Hawai'i.
- Tuggle, H. David and Spriggs, Matthew  
2001 "The Age of the Bellows Dune Site 018, O'ahu, Hawai'i, and the Antiquity of Hawaiian Colonization." *In Asian Perspectives*, Vol 39, No. 11-2. pp. 165-188. University of Hawai'i Press, Honolulu, Hawai'i.
- Vancouver, George  
1798 *A Voyage of Discovery to the North Pacific Ocean and Around the World...Performed in the Years 1790-95*. London, England.
- Waihona Aina Corporation  
2000 Mahele Database, Honolulu, Hawai'i. [www.waihona.com](http://www.waihona.com)

- Wailuku Sugar Company (WSC)  
 1962 *Wailuku Sugar Company Centennial 1862 November 1962: A Century of Progress in Sugar Cane Cultivation*. Maui Publishing Co., Ltd., Wailuku, Maui.
- Westervelt, W.D.  
 1915 *Legends of old Honolulu*. G.H. Ellis Press, Boston, Massachusetts.  
<http://www.sacred-texts.com/pac/hloh/index.htm>
- 1963 *Hawaiian legends of old Honolulu, collected and translated from the Hawaiian by W. D. Westervelt*. Charles E. Tuttle Co, Rutland, Vermont.
- 1999 “Pele’s long sleep” and “Lohiau” *In Hawaiian Legends of Volcanoes*
- 2001 “Laukaieie” *In Legends of Gods and Ghosts*
- Wichman, Frederick B.  
 1984 *Kaua`i Tales*. Bamboo Ridge Press, Honolulu, Hawai`i.
- 1997 *More Kaua`i Tales*. Bamboo Ridge Press, Honolulu, Hawai`i.  
 “Ka-wai-o-Palai”  
 “Nā Kia Manu a me Nā Mai`a”
- 1998 *Kaua`i Ancient Place-Names and Their Stories*. University of Hawai`i Press, Honolulu, Hawai`i.
- 2003 *Nā Pua Ali`i O Kaua`i : Ruling Chiefs of Kaua`i*. University of Hawai`i Press, Honolulu, Hawai`i.
- Williamson, Eleanor et al.  
 1984 “Preface” In *Olelo No`eau*. Pukui. Bishop Museum Publication No. 71. Bishop Museum Press, Honolulu, Hawai`i.
- Yent, Martha  
 1980 *Preliminary Archaeological Testing of House 4, Ha`ena State Park, Halele`a, Kaua`i*. Honolulu: Division of State Parks, Department of Land and Natural Resources, State of Hawaii.
- Yent, Martha and Jason Ota  
 1983 *Fieldcheck of duner erosion and exposed cultural materials at Hā`ena State Park, Hā`ena, Kaua`i, TMK: 5-908:18*. Memorandum to State Parks Administrator Roy Sue, State of Hawai`i, DLNR, Division of State Parks. May 2, 1983.

**APPENDIX A**

**Act 50 - 2000**  
A BILL FOR AN ACT RELATING TO  
ENVIRONMENTAL IMPACT STATEMENTS  
[UNOFFICIAL VERSION]

HOUSE OF REPRESENTATIVES H.B. NO, 2895 H.D.1  
TWENTIETH LEGISLATURE, 2000  
STATE OF HAWAII

A BILL FOR AN ACT  
RELATING TO ENVIRONMENTAL IMPACT STATEMENTS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawai'i's culture, and traditional and customary rights.

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit" in Hawai'i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

SECTION 2. Section 343-2, Hawai'i Revised Statutes, is amended by amending the definitions of "environmental impact statement" or "statement" and "significant effect", to read as follows:

"Environmental impact statement" or "statement" means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic [and] welfare, social welfare, and cultural practices of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects.

The initial statement filed for public review shall be referred to as the draft statement and shall be distinguished from the final statement which is the document that has incorporated the public's comments and the responses to those comments. The final statement is the document that shall be evaluated for acceptability by the respective accepting authority.

"Significant effect" means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals as established by law, or adversely affect the economic [or] welfare, social welfare[.], or cultural practices of the community and State."

SECTION 3. Statutory material to be repealed is bracketed. New statutory material is underscored.

SECTION 4. This Act shall take effect upon its approval.

**Approved by the Governor as Act 50 on April 26, 2000**

## APPENDIX B

### Scope of Work (SOW)

#### **Cultural Impact Assessment** [in accordance with OEQC Guidelines]

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua'a;
2. identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

#### **Methods**

The specific tasks listed below expand on the above scope of work:

- ◆ Conduct historical and cultural background research (i.e., business records, land records; archival documents, literature, reports, letters, photographs, journals, or newspaper files) to locate material that will provide broad patterns of the history of the project area such as subsistence, religious, recreational, and commercial uses of the land; as well as settlement and residential patterns of the area and region; major family groups that inhabited, used or controlled lands within the project area and region; documented legends, myths, or traditional histories associated with the area; and descriptions of traditional practices, customs and beliefs associated with identified traditional cultural practices;
- ◆ Prepare a semi-structured ethnographic research instrument that will include questions that will generate general biographical information, association with and knowledge of the project area, its history and use
- ◆ Prepare a consent form to be used as written agreement with any individual interviewed concerning the review of content and use of information recorded during the interview
- ◆ Identify individuals knowledgeable with the project area.
- ◆ Conduct and record ethnographic interviews with knowledgeable individuals. If feasible individuals shall participate in field inspections (Makana to be given)
- ◆ Transcribe recorded interviews (Approximate time, 6-8 hrs/per hr of recording)
- ◆ Prepare a report that will include an overview of the archival material, and an analysis of the ethnographic data.

## **APPENDIX C**

### **Guidelines for Assessing Cultural Impacts**

Adopted by the Environmental Council, State of Hawai'i  
November 19, 1997

#### **I. INTRODUCTION**

It is the policy of the State of Hawai'i under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

#### **II. CULTURAL IMPACT ASSESSMENT METHODOLOGY**

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants [consultants], including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices.

The types of cultural resources The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua`a;
- 2 identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials are likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant [consultant] may provide information only on the condition that it remain in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

### **III. CULTURAL IMPACT ASSESSMENT CONTENTS**

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

- 1.A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.
- 2.A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

3. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

4. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

5. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.

6. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

7. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.

8. An explanation of confidential information that has been withheld from public disclosure in the assessment.

9. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

10. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

11. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

**APPENDIX D  
CONSENT FORM**

**Agreement to Participate in this Cultural Impact Study/Assessment**

Project Title:           **Hā`ena State Park CIS/A  
Hā`ena, Kē`ē and Limahuli**

Investigator:           Maria “Kaimi” Orr, M.A. [(808) 375-3317]  
Kaimipono Consulting Services LLC  
[kaimi@lava.net](mailto:kaimi@lava.net)

---

You are being asked to participate in a cultural impact study/assessment [CIS/A] conducted by an independent investigator contracted by *PBR Hawai`i & Associates, Inc* as part of a larger Master Plan and Environmental Impact Statement they are conducting for Hā`ena State Park. The investigator will explain the purpose of this study, the procedures to be used, the potential benefits and possible risks of participating. You may ask the investigator any question(s) in order to help you to understand the study or procedures. A basic explanation of the study is written below. If you then decide to participate in the study, please sign on the second page of this form. You will be given a copy of this form to keep.

**I. Nature and Purpose of the Study**

The purpose of this cultural impact study/assessment is to gather information about the project lands of Hā`ena, through interviews with individuals who are knowledgeable about this area, and/or about traditional and historic information such as cultural practices, legends, songs, chants or other information. The objective of this study is to facilitate in the identification and location of any cultural resources and cultural practices in the area mentioned above, in accordance with applicable historic preservation laws, regulations, and guidelines, including: *Office of Environmental Quality Control [OEQC] Guidelines and Act 50 HB2895 [A.D.2000], HRS Chapter 343.*

**II. Explanation of Procedures**

After you have voluntarily agreed to participate and have signed the consent page, the investigator will tape record your interview and have it transcribed later. The investigator may also need to take notes and/or ask you to spell or clarify terms or names that are unclear. Data from the interview [ethnographic research] will be used in the CIS/A report.

**III. Discomforts and Risks**

Foreseeable discomforts and/or risks may include, but are not limited to the following: having to talk loudly for the recorder; being recorded and/or interviewed; providing information that may be used in reports which may be used in the future as a public reference; knowing that the information you give may conflict with information from others; your uncompensated dedication of time; possible miscommunication or misunderstanding in the transcribing of information; loss of privacy; and worry that your comment(s) may not be understood in the same way you understand them. It is not possible to identify all potential risks.

**IV. Benefits**

This study will give you the opportunity to express your thoughts (*mana`o*), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

## V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected **if you so desire**. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain “off-the-record.” In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

## VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

## VII. Waiver

### Part I: Agreement to Participate

I, \_\_\_\_\_, understand that Maria “Kaimi” Orr, an independent investigator contracted by *PBR Hawai`i & Associates, Inc.* will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. **I also understand that if I don’t return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.**

\_\_\_\_\_ I am willing to participate.

\_\_\_\_\_ I am willing to participate, under the following conditions:

---

**Signature**

**Date**

---

**Print Name**

**Phone**

---

**Address**

**ZipCode**

---

**Email Address**

**MAHALO NUI LOA**

**APPENDIX E**  
**Ethnographic Instrument**  
**Ethnographic Survey**

*Basic Research Instrument for Oral History Interviews*

This research instrument includes basic information as well as research categories which will be asked in the form of open primary questions which allow the individual interviewed (Consultant) to answer in the manner he/she is most comfortable. Secondary or follow-up questions are asked based on what the Consultant has said and/or to clarify what was said. The idea is to have an interview based on a “talk-story” form of sharing information. Questions will NOT be asked in an interrogation style/method, NOR will they necessarily be asked in the order presented below. This research instrument is merely a *guide* for the investigator and simply reflects general categories of information sought in a semi-structured format. Questions will be asked more directly when necessary.

The Consultants were selected because they met one or more of the following criteria:

- ❖ Had/has Ties to Project Area/Vicinity
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Known Hawaiian Traditional Practitioner
- ❖ Referred By Other Cultural Resource People
- ❖ Referred By Client Staff

**[NOTE: This part of the interview, #1-4 is mutual sharing and rapport building. Most of the information for research categories “Consultant Background” and “Consultant Demographics” come from this section, but not exclusively.]**

1. *To start please tell me about yourself...Name? Where/When you were born?*

[This information can be addressed in a couple of ways. After the investigator first turns on the tape recorder, the following information will be recorded: Day/Date/Time/Place of Interview; Name of Consultant (if authorized by Consultant); Name of Investigator; Initial Questions: Have you read the Agreement to Participate? Do you have any questions before we begin? Will you please sign the Consent Page. The investigator will explain again the purpose of the interview.

The investigator will then ask the Consultant to “Please tell me about yourself--when/where were you born? Where did you grow up? Where did you go to school?” This general compound question allows the Consultant to share as much or as little as he/she wants without any pressure. Some of the information for #1 may already be known to the investigator.]

2. *History: Your `ohana/family background; Hawaiian connection (if any)?*

[Much of the information for questions #2, 3, and 4 usually comes from the “monologue” answer to Question #1. If it does not, then these questions will be asked. The answers in this section usually establish how the Consultant meets the criteria; how the Consultant developed his/her information base, etc.]

3. *Youth: Where lived? Grew up?* [This may have been answered in #1]

4. *Schooling? Where? When?* [This may have been answered in #1]

**[NOTE: The next part of the interview, #5-7 reflects information sought for the following research categories: Land, Water, Marine, Cultural Resources and Use as well as Significant People and Events. The questions**

are open-ended so as NOT to “put words in the mouths” of the Consultants. The answers will help in assessing if any cultural properties or practices (or access to them) will be impacted by the proposed project.]

5. *Please tell me what you know about the lands of Hā`ena, Ke`e and Limahuli?*

[NOTE: Generally when people share information about a specific topic/place, they usually state where their information came from. If it isn't volunteered, it is asked as a follow-up question(s). A map of the project area should be available to confirm that investigator and consultant are talking about the same place. Photos would also help if a field trip is not possible. The best scenario would be to be “on-site” at some part of the interview...although this is not always practical.]

6. *What are your recollections and/or personal experiences of this area?*

7. *Do you know any stories/legends/songs/chants associated with these areas?*

[NOTE: Possible follow-up questions if information not in their answers:

- How are you or your family connected to the lands of Hā`ena, Ke`e and/or Limahuli?
- What year(s) were you and/or your family associated with these lands?
- What was this place/area called when you were growing up? When you were working here?
- Can you describe what the area looked like--what kinds of natural and/or man made things?
- To your knowledge what kind of activities took place in this location?
- Do you know of any traditional gathering of plants, etc in the area?
- Please describe any other land/water use? Resources?
- What was the historic land use? Agriculture? Habitation? Dwellings? Military? Ranching?
- **[Have map ready for marking.]**
- Do you know about any burials in the project area? [last resort question]
- Do you know of any cultural sites in the project area or vicinity? [last resort question]

8. *Is there anyone you know who can also tell me about the project area?*

[NOTE: Usually in the course of the interview, Consultants suggest other people to interview.]

9. *As soon as the tape of this interview is transcribed I will send you two sets. Please review your transcript and make any corrections and/or additions, then sign both copies of the Release Forms thereby allowing the information to be used by the investigator, PBR Hawai`i & Associates, Inc. and Hā`ena State Park. Then mail one set back in the enclosed stamped-addressed envelope.*

10. *If your revised transcript is not returned within **two weeks** of date of receipt, it will be assumed that you are in concurrence with the transcript material and your information will then be incorporated into any draft reports. However, you can still make changes during the draft review process.*

**MAHALO NUI LOA**

**APPENDIX F  
RELEASE FORM**

**Part II: Personal Release of Interview Records**

I, \_\_\_\_\_, have been interviewed by *Maria "Kaimi" Orr* of *Kaimipono Consulting Services LLC*, an independent investigator contracted by *PBR Hawai'i & Associates, Inc.* I have reviewed the transcripts of tape recordings of the interview and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

**CLARIFICATION OR CORRECTIONS:**

*I further agree that KCS and/or PBR Hawai'i may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report to be made public, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."*

**SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:**

<b>Signature</b>	<b>Date</b>
<b>Print Name</b>	<b>Phone</b>
<b>Address</b>	
<b>Zipcode</b>	

**MAHALO NUI LOA**

## APPENDIX G

### Ali'i Aimoku of Kaua'i

The monarchs of island Kaua'i like those of the other Hawaiian Islands, claim descent from Wakea and Papa. Nanaulu, a descendant in the fourteenth generation from Wakea, was the ancestor of Moikeha, 1st Alii Aimoku of Kaua'i, but his dynasty was supplanted after two generations. The second or Puna dynasty was established by La'amaikahiki, eleventh in descent from Puna who was twenty-fourth in descent from Wakea. O'ahu and Kaua'i are the most ancient. The last Ali'i Aimoku of Kaua'i of the old uninterrupted line of Puna was Kawelo'a'maihunali'i. After his death the kingship of Kaua'i fell on Kūali'i, the Ali'i Aimoku of O'ahu and cousin of Kawelo'a'maihunali'i. In 1810, King Kaumuali'i, the 23rd Ali'i Aimoku of Kaua'i, ceded his kingdom to King Kamehameha I of Hawai'i, in an effort to avoid bloodshed. Thereafter, he ruled as a tributary, until kidnapped by King Kamehameha II and taken to Honolulu in 1821. After his death in 1824, his son and heir, George Humelemea attempted to re-establish his independence on Kaua'i, but was also eventually captured and taken to Honolulu. Ironically, the rights to the crown of the Hawaiian Islands now rest with Kaumuali'i's heirs the Kawanānākoas after the death of the Kamehamehas and Kalakauas.

### List of Aii Aimoku of Kaua'i

- Ali'i nui [Moikeha](#) 1st Alii Aimoku of Kaua'i
- Ali'i nui [Haulanuiiakea](#) 2nd Alii Aimoku of Kaua'i
- Ali'i nui [La'amaikahiki](#) 3rd Alii Aimoku of Kaua'i
- Ali'i nui [Ahukini-a-Laa](#) 4th Alii Aimoku of Kaua'i
- Ali'i nui [Kamahano](#) 5th Alii Aimoku of Kaua'i
- Ali'i nui [Luanu'u](#) 6th Alii Aimoku of Kaua'i
- Ali'i nui [Kukona](#) 7th Alii Aimoku of Kaua'i
- Ali'i nui [Manokalanipo](#) 8th Alii Aimoku of Kaua'i
- Ali'i nui [Kamakamano](#) 9th Alii Aimoku of Kaua'i
- Ali'i nui [Kahakuakane](#) 10th Alii Aimoku of Kaua'i
- Ali'i nui [Kuwalupaukamoku](#) 11th Alii Aimoku of Kaua'i
- Ali'i nui [Kahakumakapaweo](#) 12th Alii Aimoku of Kaua'i
- Ali'i nui [Kalanikukuma](#) 13th Alii Aimoku of Kaua'i
- Ali'i nui [Kahakumakalina](#) 14th Alii Aimoku of Kaua'i
- Ali'i nui [Kamakapu](#) 15th Alii Aimoku of Kaua'i
- Ali'i nui [Kawelomahamahaia](#) 16th Alii Aimoku of Kaua'i
- Ali'i nui [Kawelomakualua](#) 17th Alii Aimoku of Kaua'i
- Ali'i nui [Kaweloiakanaka](#) 18th Alii Aimoku of Kaua'i
- Ali'i nui [Kawelo'a'maihunali'i](#) 19th Alii Aimoku of Kaua'i
- Ali'i nui [Kuali'i](#) ? - 1730 20th Alii Aimoku of Kaua'i and 19th [Alii Aimoku of O'ahu](#)
- Ali'i nui [Peleioholani](#) 1730 - 1770 21st Alii Aimoku of Kaua'i and 22nd Alii of O'ahu
- Ali'i nui [Kamakahahele](#) 1770 - 1794, 22nd Alii Aimoku of Kaua'i
- Ali'i nui [Kaumuali'i](#) 1794 - 1810, 23rd Alii Aimoku of Kaua'i

[http://en.wikipedia.org/wiki/Ali'i\\_Aimoku\\_of\\_Kaua'i](http://en.wikipedia.org/wiki/Ali'i_Aimoku_of_Kaua'i) (2009)

**APPENDIX H**  
**SIGNED CONSENT FORMS**

**(Copies)**

IV. Benefits

This study will give you the opportunity to express your thoughts (mana`o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

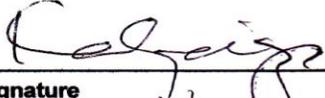
VII. Waiver

Part I: Agreement to Participate

I, \_\_\_\_\_, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

\_\_\_\_\_ I am willing to participate.  
\_\_\_\_\_ I am willing to participate, under the following conditions:

	11/20/08
Signature	Date
Kapu Kinivuala-Alquiza	335-6466
Print Name	Phone
P.O. Box 49 Hanalei, HI	96716
Address	ZipCode
Kapu.alquiza@hawaiiantel.net	
Email Address	

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, \_\_\_\_\_, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

- \_\_\_\_\_ I am willing to participate.
\_\_\_\_\_ I am willing to participate, under the following conditions:

Handwritten signature and date (11/22/08), printed name (Thomas Ashimoto), phone number (808-1206), address (P.O. Box 412, Kilauea), and email address field.

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Clarence A. Medeiros Jr. understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

I am willing to participate.  
 I am willing to participate, under the following conditions:

Clarence A. Medeiros Jr. 5-20-10  
Signature Date  
Clarence A. Medeiros, Jr. 325-2074  
Print Name Phone  
86-3672 Govt. Main Road Captain Cook, HI 96704  
Address ZipCode  
CAMedeiros86@gmail.com  
Email Address

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Chipper Wichman understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

I am willing to participate.  
 I am willing to participate, under the following conditions:

Chipper Wichman 11/21/08  
 Signature Date  
Chipper Wichman 651-41266  
 Print Name Phone  
3535 Papalina Rd 96741  
 Address ZipCode  
wichman@ntbg.org  
 Email Address

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Frederic B. Wichman, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

I am willing to participate.  
 I am willing to participate, under the following conditions:

<u>Frederic B. Wichman</u>	<u>11/21/08</u>
Signature	Date
<u>FREDERIC B WICHMAN</u>	<u>826-7449</u>
Print Name	Phone
<u>P.O. Box 1850</u>	<u>Manala, HI 96714</u>
Address	ZipCode
<u>fwichman@etaha.net</u>	
Email Address	

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Randy Wichman, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

- I am willing to participate.
- I am willing to participate, under the following conditions:

Randy Wichman Signature NOV. 20 '08 Date

RANDY WICHMAN Print Name 482 0516 Phone

PO BOX 3740 Address 96766 ZipCode

RFWICHMAN@gmail.com Email Address

MAHALO NUI LOA

**APPENDIX I  
SIGNED RELEASE FORMS**

**(Copies)**

**Part II: Personal Release of Interview Records**

I, Frederick B. Wichman, have been interviewed by Maria "Kaimi" Orr of Kaimipono Consulting Services LLC, an independent investigator contracted by PBR Hawaii & associates, Inc. I have reviewed the transcripts of tape recordings of the interview and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

**CLARIFICATION OR CORRECTIONS:**

I further agree that KCS and/or PBR Hawaii may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report to be made public, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."

**SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:**

*I ask that the sections I have marked as "Please delete" not be used in any way.*

<u>Frederick B. Wichman</u>	<u>2/26/09</u>
Signature	Date
<u>Frederick B. Wichman</u>	<u>826-7449</u>
Print Name	Phone
<u>P.O. Box 1050</u>	
Address	
<u>Hanalei Hawaii</u>	<u>96714</u>
	Zipcode

**MAHALO NUI LOA**

**Part II: Personal Release of Interview Records**

I, Clarence A. Meekins, Jr., have been interviewed by Maria "Kaimi" Orr of Kaimipono Consulting Services LLC, an independent investigator contracted by PBR Hawaii & associates, Inc. I have reviewed the transcripts of tape recordings of the interview and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

**CLARIFICATION OR CORRECTIONS:**

As indicated on corrected draft dated 3/16/2008 which was e-mailed to you on 12/9/2008

I further agree that KCS and/or PBR Hawaii may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report to be made public, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."

**SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:**

<u>Clarence A. Meekins, Jr.</u>	<u>5-28-10</u>
<b>Signature</b>	<b>Date</b>
<u>Clarence A. Meekins, Jr.</u>	<u>328-2074</u>
<b>Print Name</b>	<b>Phone</b>
<u>86-3672 Govt. Main Road</u>	
<b>Address</b>	
<u>Captain Cook, HI 96704</u>	<u></u>
	<b>Zipcode</b>

**MAHALO NUI LOA**



Photo 78. Kumu Hula and haumana end ceremony on hula pa.

P A U



# Appendix B





# **Marine Natural Resources and Recreation Assessment, Hā`ena State Park, Kaua`i, Hawai`i**

**Prepared for  
PBR Hawai`i  
1001 Bishop Street, Suite 650  
Honolulu, HI 96813**

**Prepared by  
SWCA Environmental Consultants  
201 Merchant Street, Suite 2310  
Honolulu, HI 96813**

**February 2010  
TABLE OF CONTENTS**

## TABLE OF CONTENTS

1.0	Background	3
2.0	Introduction and Setting	3
3.0	Beach Erosion	9
4.0	Water Quality	9
5.0	Marine Biological Resources	10
6.0	Endangered Marine Species and Habitats	15
7.0	Recreational Resources and Assessment	19
7.1	Principal Existing Recreational Uses	19
7.2	Visitor Impacts	25
7.3	Park Management Requirements	30
7.4	Sustainability of Recreational Uses	30
7.5	Complementary and Conflicting Use Issues	31
7.6	Impacts of Increased Recreational Uses	34
8.0	Design Considerations and Resource Management Concepts	34
8.1	Water Quality Issues	34
8.2	Shoreline Erosion	34
8.3	Marine Resource Issues and Conservation	35
8.4	Mitigation of Conflicting Uses	36
8.5	Shoreline Access	36
9.0	Interpretive Concepts for Outdoor Recreational Use	37
10.0	Literature Cited	38

## LIST OF FIGURES

1.0	Hā'ena State Park and Shoreline Sub Areas	5
2.0	Shallow Water Benthic Habitats – Zone	6
3.0	Shallow Water Benthic Habitats – Geomorphology	7
4.0	Shallow Water Benthic Habitats – Habitat	8
5.0	Draft Shoreline Erosion Map for Hā'ena State Park	12
6.0	Marine Management Areas at Hā'ena State Park	17
7.0	Reef Environment and Surf Breaks Map	23

## LIST OF TABLES

1.0	State of Hawai'i Department of Health water quality monitoring data	10
2.0	List of marine shore fishes observed within and adjacent to Hā'ena State Park	13
3.0	CRAMP shallow water (1m) video-transect data of coral cover	14
4.0	CRAMP mid-water (10m) video-transect data of coral cover	15
5.0	Macroalgae observed at Ka'ilio Point, Hā'ena (Abbott and Hunter 2000).	18

## 1.0 Background

In March 2008, PBR Hawai'i tasked SWCA Environmental Consultants with the description of the marine resources of the Hā'ena State Park. The project encompasses 64 acres within the park boundaries and the adjacent nearshore waters and Kē'ē Beach. Information to be provided includes a description of the physical characteristics including shoreline erosion; inventory of biological resources, and an assessment of recreational resources and current visitor impacts. Included in these tasks is a discussion of special design considerations, resource management concepts, and interpretive concepts for marine recreation use.

The overall goal of the project is to plan for a public park that accommodates recreational opportunities, preserves the significant natural, cultural, and scenic resources, and enhances the natural park setting. The objectives of this project include refinement of the draft Community Preferred Master Plan prepared in 1999 by The Keith Companies, Inc., and providing information to support preparation of an EIS for the future development of Hā'ena State Park. The intent is to balance public usage of the park's recreational resources with the protection and preservation of the natural and scenic features and significant cultural resources within, and associated with, the park area.

SWCA conducted extensive literature reviews, and performed brief reconnaissance surveys of marine resources at the park, and compiled geospatial data to prepare resource maps. The report was prepared by Tiffany Thair, B.A., John Ford, M.S., Robert A. Kinzie III, Ph.D., and Ryan Taira, B.A.

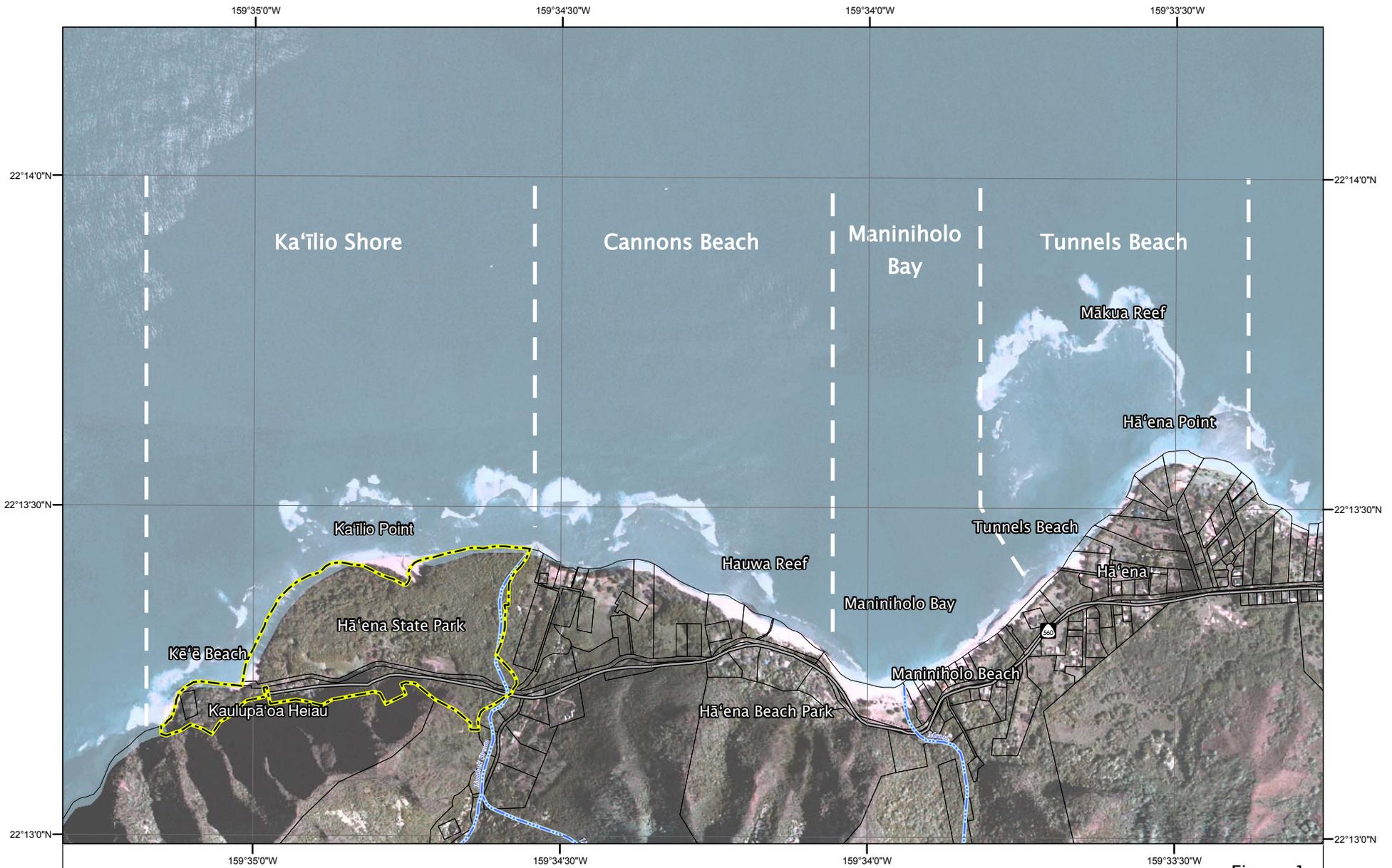
## 2.0 Introduction and Setting of the Coastal Environmental at Hā'ena State Park

Hā'ena State Park is located within Ka'ilio Shore sub-area of Hā'ena (Clark 1992). Four coastal sub-areas are recognized between Kē'ē and Hā'ena Point (Figure 1). The beaches of these areas are fringed with scattered beachrock slabs along the water line. The mouth of Limahuli Stream, a small intermittent stream, and freshwater seeps bisect the beach within the Park boundaries. The backbeach area consists of low sand dunes roughly 4 to 8 ft high that are overgrown with ironwood and false kamani trees. The roots of ironwood in many areas are exposed due to erosion by the action of storm waves. Immediately seaward of Kē'ē Beach, located within the Ka'ilio Shore, is a shallow lagoon that provides one of the most popular swimming areas in Hawai'i (Clark 1999). The lagoon is formed by a shallow fringing reef platform that joins the shore roughly 200 feet to the east of highway's end at Kē'ē Beach.

Clark (1992) provided a comprehensive description of the reef structure within the Park boundaries which remains accurate today. In 2003 and 2007, the Center for Coastal Monitoring and Assessment (CCMA), National Ocean Service, Biogeography Branch, in cooperation with Analytical Laboratories of Hawai'i, published detailed maps of the reef and benthic marine habitat at Hā'ena State Park (Figures 2-4). Sand and reef pavement comprise the dominant marine geomorphologic structures between Kē'ē Beach and Maninihola Bay to the east. From Maninihola Beach west to Hā'ena Point the reef consists of aggregate reef, scattered coral and rock, and rubble with small patches of reef pavement. The reef pavement is covered with macro-algae, coralline algae, and corals; however, the sandy lagoon floors and channels are uncolonized.

Ocean conditions at the Park are typical of exposed northern coasts in Hawai'i. Between October and May, North Pacific storm swells bring dangerously high surf in excess of 10 feet to the area (Clark 1992). When trade wind swells are prevalent between June and September, surf heights and swells at Hā'ena generally reduced (Clark 1992). North east trade winds are present between 90-95 percent of the year and almost always generate some surf activity on the outer reef margins. Predominant long shore currents run east to west outside the reef. Dangerous rip currents are created in reef channels by storm waves and tidal conditions. Haraguchi (1979) suggested tidal currents ranging from 0.1 to 1.0 knots, and Clark (1992) suggested that such current velocities were not usually a concern for nearshore ocean recreation

activities. Nevertheless, life guards at Kē'ē Beach strongly objected to SWCA biologists' plan to conduct snorkel surveys of the outer reef during a day with unusually calm conditions in November 2008.



- Legend**
- Hā'ena State Park
  - Streams

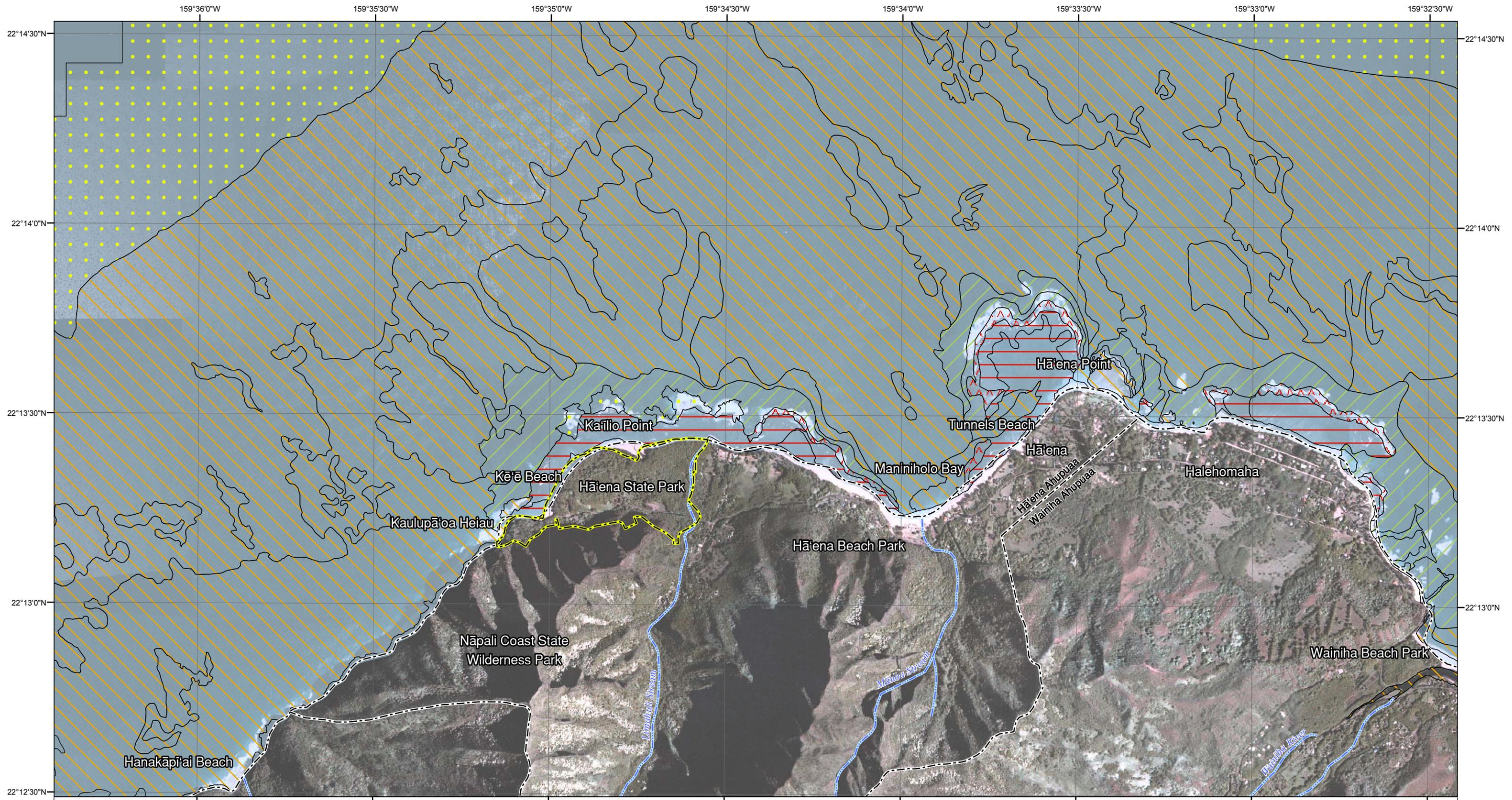
**Figure 1**  
Hā'ena State Park and Shoreline Sub-Areas

0 250 500 1,000  
ft

0 50 100 200  
m

**SWCA**  
ENVIRONMENTAL CONSULTANTS

Source: State of Hawaii GIS; NOAA; PDC; Clark, J. 1992. Beach and ocean recreation study, Hā'ena, Kaua'i. Contract report prepared for Division of State Parks, Department of Land and Natural Resources, State of Hawaii, Honolulu. 49pp

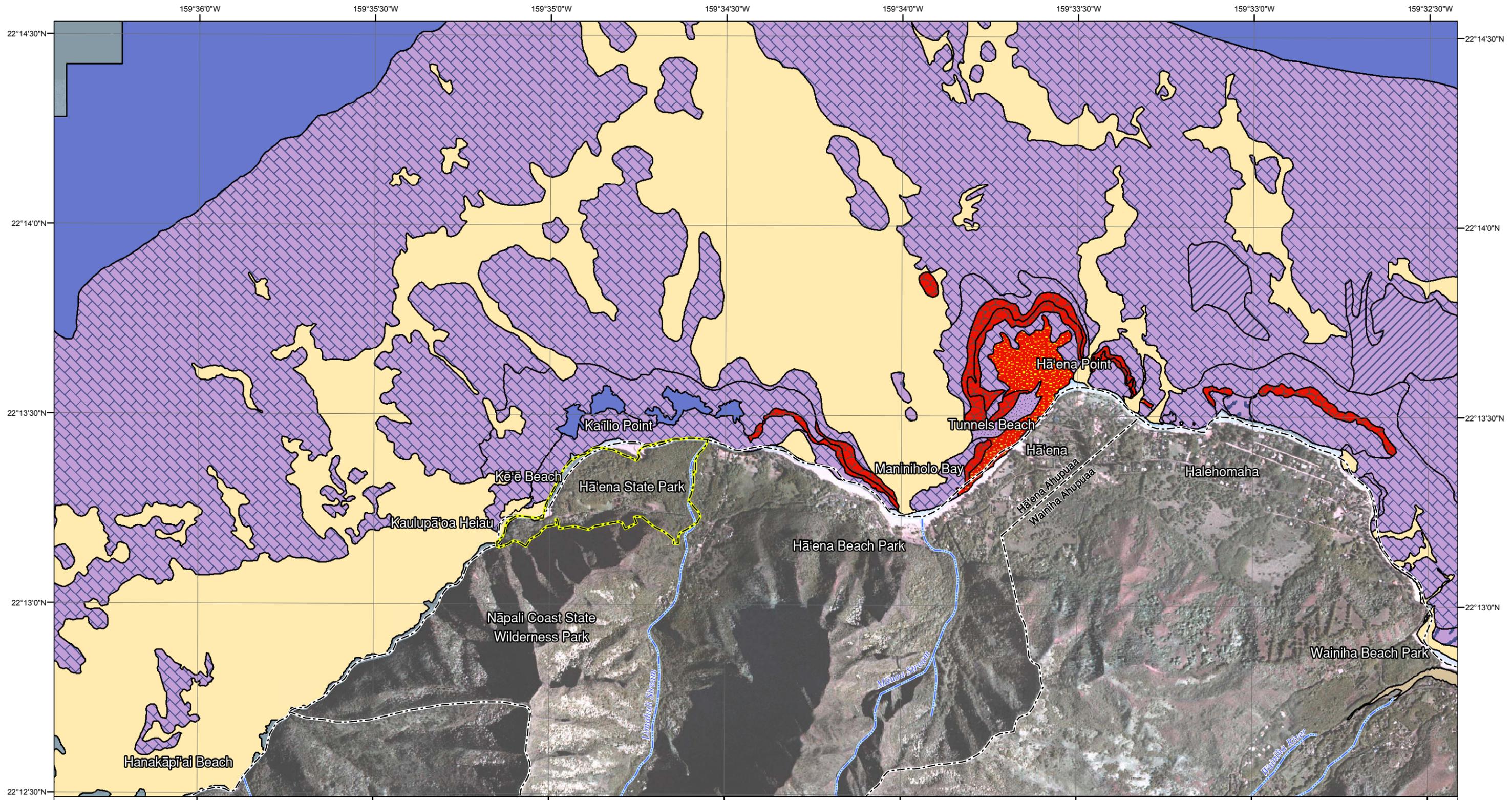


Legend	
	Hā'ena State Park
	Ahupuaa
	Streams
	Bank/Shelf
	Fore Reef
	Land
	Reef Crest
	Reef Flat
	Unknown

**Figure 2**  
**Shallow-Water Benthic Habitat - Zone**



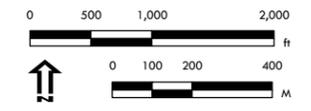
Source: State of Hawaii GIS, NOAA, PDC



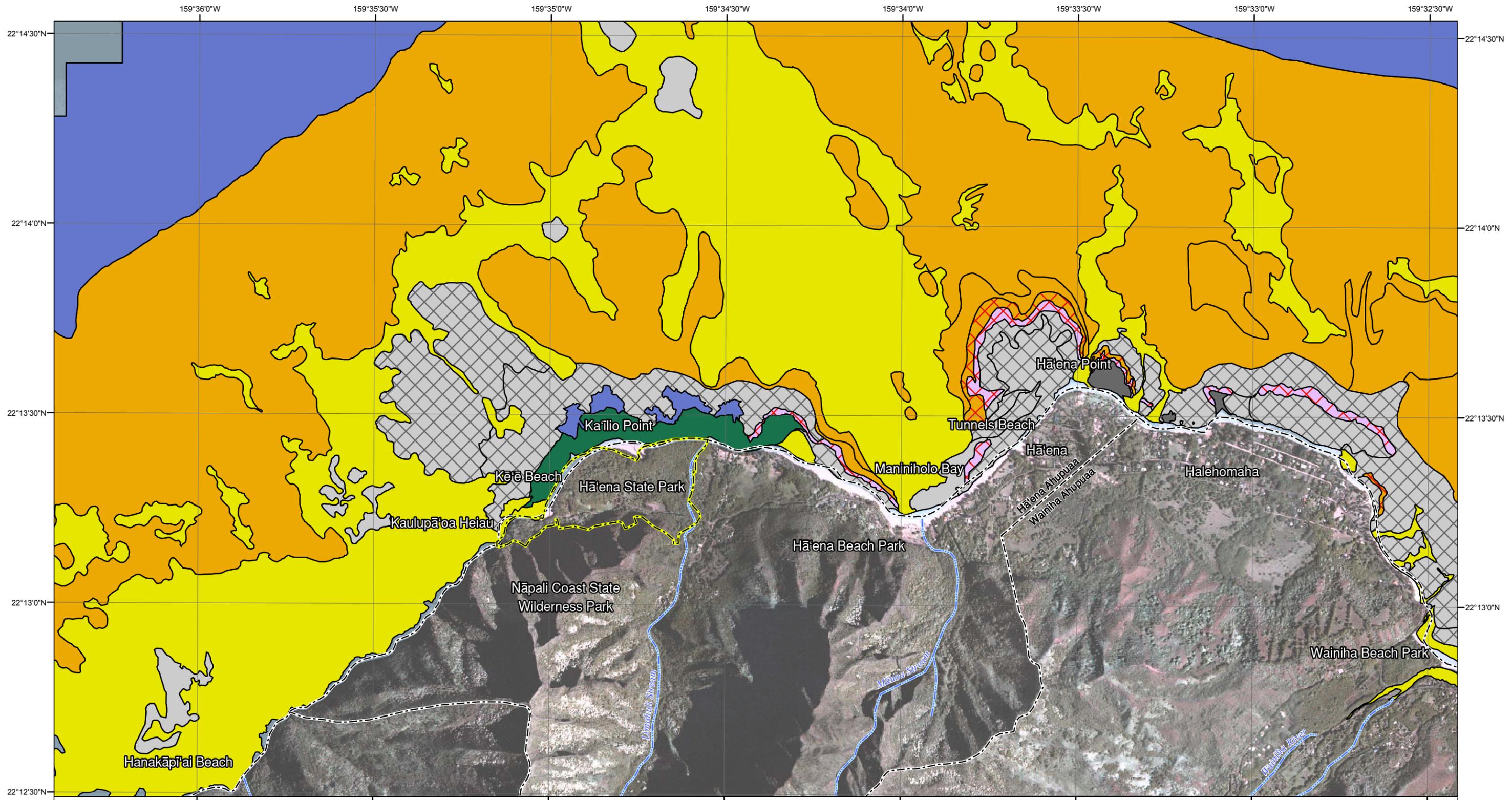
**Legend**

Hā'ena State Park	<b>Benthic Habitat - Geomorphological Structure Types</b>	Pavement with Sand Channels
Ahupuaa	Aggregate Reef	Rock/Boulder
Streams	Aggregated Patch Reef	Rubble
	Mud	Sand
	Pavement	Scattered Coral/Rock
		Unknown

**Figure 3**  
Shallow-Water Benthic Habitat - Geomorphology



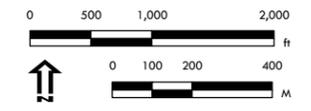
Source: State of Hawaii GIS, NOAA, PDC



**Legend**

- |                   |   |                       |
|-------------------|---|-----------------------|
| Hā'ena State Park | <b>Benthic Habitat – Biological Cover</b> | Turf, 10%–<50%        |
| Ahupuaa           | Coral, 10%–<50%                           | Turf, 50%–<90%        |
| Streams           | Coralline Algae, 10%–<50%                 | Turf, 90%–100%        |
|                   | Coralline Algae, 50%–<90%                 | Uncolonized, 90%–100% |
|                   | Macroalgae, 10%–<50%                      | Unknown               |

**Figure 4**  
Shallow-Water Benthic Habitat - Habitats



Source: State of Hawaii GIS, NOAA, PDC

### 3.0 Beach Erosion

Kē'ē Beach and shoreline of Hā'ena State Park are exposed to high surf during the winter months and occasionally during the summer months. Storm waves are responsible for erosion of sand dunes behind the beach. Waves sweeping across the beach undermine ironwood trees, exposing their roots and occasionally toppling them onto the beach. High surf also generates a powerful rip current that runs out the narrow channel at the west end of the lagoon to the open ocean creating a hazard for swimmers and divers.

To determine the extent of erosion and beach loss, the Hawai'i Shoreline Study, an initiative of the University of Hawai'i (UH) Coastal Geology Group (<http://www.soest.hawaii.edu/coasts/>), provides information on shoreline change data to assist in decision-making for actions affecting the coastal zone. The Surfrider Foundation maintains valuable links to beach erosion resources on its website (<http://www.surfrider.org/>).

The shoreline at Hā'ena State Park is subject to a number of natural hazards including tsunami, storm surge, high winds, coastal erosion, sea-level rise, and high waves. Evaluating changes to the configuration of shorelines helps define zones of avoidance for conservation of sensitive areas, and identify appropriate means to mitigation and control beach loss.

The UH erosion study area, bounded by Nāpali coast on the west and Hā'ena Point on the east, encompasses a total of 166 transects. Here the shoreline consists of carbonate sand, exposed beach rock, and basalt boulders deposited by stream discharge. The fringing reefs at Kē'ē, Limahuli, and Hā'ena cause waves to break in various directions along the shore. Figure 5 illustrates the draft results of beach loss studies conducted by the UH Coastal Geology Group in the vicinity of Kē'ē Beach and Hā'ena State Park. The UH Coastal Geology Group estimated that the overall rate of beach erosion between Kē'ē Beach and Hā'ena State Park is -0.9 ft/yr. Along the eastern-most portion of Hā'ena State Park sand is eroding at an average rate of -1.2 ft/yr, while the central area around Limahuli Stream mouth is eroding at an average rate of -1.0 ft/yr.

The western-most area by Kē'ē Beach is eroding at an average rate of -0.6 ft/yr. Figure 5 also illustrates the location of historic beach configurations mapped from previous aerial imagery and registered to a common coordinate system through the use of geographic information systems (GIS) technology.

### 4.0 Water Quality

The marine waters of the Hā'ena State Park are considered Class AA coastal waters by the State Department of Health (DOH) (HAR 11-54). Class AA waters possess high ecological and recreational value. It is the objective of Class AA waters that these remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent possible, the wilderness character of these areas is to be protected.

Within the defined reef at Hā'ena, Class AA waters are bounded by areas less than 18 meters (60 feet) in depth. Uses to be protected in the class of waters include oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment. Until recently, the coastal waters of Hā'ena State Park were not actively monitored by DOH. However, in late 2005, the DOH Clean Water Branch (CWB) and the Hanalei Watershed Hui (HWH) joined in the protection of Kaua'i beaches through a partnership between DOH and the community based organization. Hanalei Watershed Hui's involvement allowed DOH to increase the number of beaches that it monitors on Kaua'i, and the frequency at which they are sampled. Hā'ena Beach Park is one of the beaches covered under this agreement.

Table 1 illustrates the results of initial water quality sampling at Hā'ena State Park. DOH (2008) noted that state standards for enterococci were attained at Hā'ena. The reported parameters for temperature, salinity, dissolved oxygen, pH, and turbidity reflect clean coastal waters within Hawai'i DOH water quality

standards for Class AA waters. Coliform and enterococci levels are not reported here, but were found to be within state standards for Class AA waters.

**Table 1. State of Hawai'i Department of Health water quality monitoring data collected at Kē'ē Lagoon within Hā'ena State Park.**

Date	Time	Temp (C)	Salinity (PPT)	DO (mg/l)	DO (%)	pH	Turbidity (NTU)
1/18/2005	8:29:00 AM	24.09	34.52	6.13	93.2	8.17	5.47
8/4/2005	8:41:00 AM	24.84	34.41	5.06	78	7.92	0.7
8/10/2005	8:46:00 AM	26.16	34.4	5.38	85.1	7.97	0.84
8/17/2005	8:50:00 AM	25.73	34.53	4.58	71.9	7.95	0.69
8/31/2005	8:59:00 AM	26.82	34.44	5.26	83.9	8	0.79
9/8/2005	8:53:00 AM	25.95	34.39	5.8	91.1	8.12	1.61
9/14/2005	8:52:00 AM	26.02	34.17	5.99	94	8.12	3.27
9/21/2005	8:52:00 AM	26.13	33.66	5.59	87.9	8.07	2.47
9/28/2005	8:34:00 AM	25.61	33.78	5.74	89.3	8.16	1.08
12/12/2006	8:03:00 AM	24.78	35	6.12	91.2	8.03	2.37

## 5.0 Marine Biological Resources

Clark (1992) presented a general description of marine resources within the Park boundaries. The results of five previous marine studies of Kē'ē Beach and reef (The Keith Companies 2001; Stepath 1999); Limahuli Beach and reef (Jokiel and Brown 2000); and nearby Hanalei Bay (Friedlander and Parrish 1998) were cited to prepare a description of the nearshore marine environment. These studies were supplemented with a brief snorkel reconnaissance of the Kē'ē Lagoon and inner reef flat conducted on November 3, 2008 by SWCA biologists Dr. Robert Kinzie and John Ford. Additional anecdotal information on species observed by others was obtained from oral histories recorded by Maly and Maly (2003), and related records of interviews with area residents and fishermen (PBR database).

Eighty (80) fish species representing 26 families have were reported from nearshore waters along the north shore of Kaua'i by the four previous surveys referenced above (Table 2). Species abundance and diversity within the Kē'ē Lagoon and reef flat is lower than that found at the outer reef/offshore sites (Jokiel and Brown 2000, Stepath 1999, this study), with only 46 species of fishes occurring here. Kē'ē Lagoon and reef flat provide an excellent habitat for juvenile reef fishes. Fish assemblages in the Limahuli offshore study site had the greatest number of individuals and highest biomass observed on fish transects around Kaua'i in 1999 (Friedlander 2000). Wrasses, surgeonfishes, and damselfishes comprised the majority of the species observed in the lagoon and along the reef flat at Kē'ē. Small schools of weke'ula (*Mulloidichthys vanicolensis*), hinalea lau-wili (*Thalassoma duperrey*), ma'i'i'i (*Acanthurus nigrofuscus*), omaka (*Stethojulis balteata*), and manini (*Acanthurus triostegus sandvicensis*) were commonly observed within the lagoon and reef flat. For many species, juveniles appeared to be very common along the reef flat.

Fish diversity is much greater on the seaward side of the reef crest and studies conducted nearby, off Limahuli Stream and in Hanalei Bay, recorded over 160 species of fishes in these areas (Jokiel and Brown 2000, Friedlander and Parrish 1998). Friedlander (2000) found that fish biomass at the Limahuli offshore site to be more than twice that observed at the site with the second largest biomass (Ho'ai Bay near Po'ipu offshore) and an order of magnitude greater than the inshore habitat at Limahuli. Among 60 reefs

monitored by the Hawai'i Coral Reef Assessment & Monitoring Program (CRAMP), the shallow reef station (1m) at Limahuli ranked 58 in species richness, 51 in density, 57 in biomass, and 57 in diversity. Limahuli 10m ranked 5 in species richness, 24 in density, 8 in biomass, and 21 in diversity. The most abundant species were the hinalea lauili (*Thalassoma duperrey*) and the kole (*Ctenochaetus strigosus*) at the 3m and 10m reefs respectively. The species with the highest biomass were the manini (*Acanthurus triostegus*) and the māikoiko (*Acanthurus leucopareius*) at the 3m and 10m reefs respectively (Jokiel and Brown 2000).

# Haena, Kauai, Hawaii

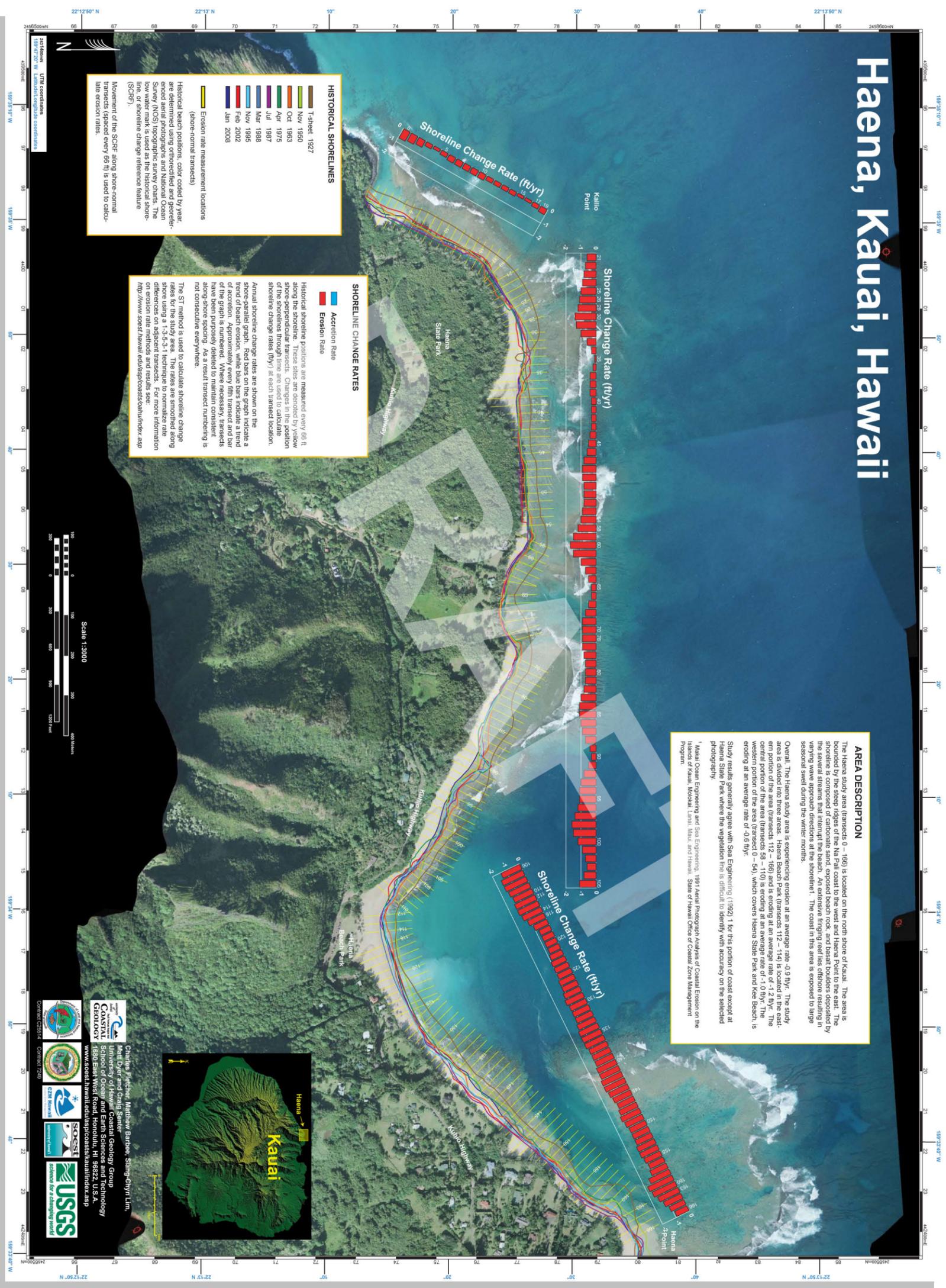


Figure 5. Draft shoreline erosion map for Hāena Beach Park available through SOEST at the University Of Hawaii and the Hawaii Coastal Erosion Website (<http://www.soest.hawaii.edu/coasts/kaui/index.asp>), illustrating the estimated degree of beach erosion at Kéé and Limahuili Beaches and historic shorelines.)

**TABLE 2. List of marine shore fishes observed within and adjacent to Kē'ē Lagoon and Reef Flat, Hā'ena State Park**

Fish Species	Hawaiian or Common Name	SWCA	Stepath (1999)	The Keith Companies (2001)		CRAMP Data (1998-2004)		Friedlander et al 2003
		Present/Absent A=adult/J=juvenile	Index of Relative Dominance (IRD)	Present/Absent Shallow Inshore	Present/Absent Seaward Slope	#/125 sq m 1m depth	#/125 sq m 10 m depth	Top 20 Fish IRD (Rank)
<i>Abudefduf abdominalis</i>	mamo	A	2					60.13 (14)
<i>Abudefduf sordidus</i>	kupipi	A	2	✓				
<i>Acanthurus achilles</i>	paku'iku'i		2					
<i>Acanthurus blochii</i>	pualu	A					1.5	
<i>Acanthurus dussumieri</i>	palani			✓			1.0	
<i>Acanthurus leucopareus</i>	maikoiko	A	5		✓		34.5	147.27 (7)
<i>Acanthurus nigrofuscus</i>	ma'i'i		168	✓		2.0	11.5	512.07 (1)
<i>Acanthurus nigrororus</i>	maiko			✓	✓			
<i>Acanthurus olivaceus</i>	n'ena'e			✓		0.5	10.0	85.23 (11)
<i>Acanthurus triostegus</i>	manini	A	757	✓	✓	18.5	2.5	88.87 (10)
<i>Anampses cuvier</i>	opule			✓			1.5	
<i>Aulostomus chinensis</i>	nunu			✓			0.5	
<i>Bodianus bilunulatus</i>	a'awa					0.5	1.0	
<i>Calotomus carolineus</i>	ponuhunuhu	A,J					0.5	
<i>Catherhines dumerilii</i>	o'ili						1.0	
<i>Canthigaster amboinensis</i>	Ambon toby						2.5	
<i>Canthigaster jactator</i>	Hawaiian whitespotted toby	A				1.0	6.0	
<i>Centropyge potteri</i>	Potter's angelfish						1.5	
<i>Cephalopholis argus</i>	roi						1.0	40.99 (17)
<i>Caranx melampygus</i>	omilu	J		✓	✓			
<i>Chaetodon auriga</i>	kikakapu						1.0	
<i>Chaetodon fremblii</i>	kikakapu	A					0.5	
<i>Chaetodon miliaris</i>	lauwiliwili			✓				
<i>Chaetodon multicinctus</i>	kikakapu						3.0	
<i>Chaetodon quadrimaculatus</i>	lauhau	A				0.5		
<i>Chaetodon unimaculatus</i>	lauhau						1.0	
<i>Chlorurus perspicillatus</i>	uhu ululi	A,J		✓	✓			66.40 (13)
<i>Chlorurus sordidus</i>	uhu	A,J						155.29 (6)
<i>Chromis hanui</i>	chocolate-dipped chromis						0.5	
<i>Chromis ovalis</i>	oval chromis			✓			8.0	
<i>Chromis vanderbilti</i>	blackfin chromis			✓				28.29 (20)
<i>Cirrhitoys fasciatus</i>	pili'ko'a		2	✓				
<i>Cirrhitoys pinnulatus</i>	po'poo'a			✓			0.5	
<i>Conger cinereus</i>	puihi uha	Dead on beach						
<i>Coris flavovittata</i>	hilu		2					
<i>Coris venusta</i>	hinalea		28	✓		4.0		
<i>Ctenochaetus strigosus</i>	kole			✓	✓		46.5	408.95 (3)
<i>Entomacrodus marmoratus</i>	pao'o	A						
<i>Fistularia commersonii</i>	nunu peke	J	35					
<i>Gomphosus varius</i>	hinalea i'iwi	J	9					
<i>Halichoeres ornatus</i>	ohua	A				0.5	3.0	
<i>Kuhlia xenura</i>	aholehole				✓			
<i>Kyphosus sp</i>	nenu	A	2	✓	✓		26.0	
<i>Labroides phthirophagus</i>	Hawaiian cleaner wrasse	A					4.5	
<i>Lutjanus kasmira</i>	ta'ape						1.0	
<i>Melichthys niger</i>	humuhumu 'ele 'ele						10.5	487.72 (2)
<i>Monotaxis grandoculis</i>	mu				✓		0.5	
<i>Mulloidichthys vanicolensis</i>	weke 'ula		5	✓	✓		5.0	
<i>Mulloidichthys flavolineatus</i>	weke'a'a	A, J		✓	✓			
<i>Myripristis sp.</i>	mempachi			✓	✓			
<i>Naso literatus</i>	umaumalei	A						216.65 (5)
<i>Naso unicornis</i>	kala	A		✓	✓		1.5	34.42 (18)
<i>Paracirrhites arcatus</i>	pili'ko'a			✓			3.0	
<i>Paracirrhites forsteri</i>	hilu pili'ko'a			✓			1.0	
<i>Parupeneus bifasciatus</i>	munu						0.5	
<i>Parupeneus cyclostomus</i>	moano kea						2.0	
<i>Parupeneus multifasciatus</i>	moano	A		✓		0.5	11.5	42.38 (16)
<i>Paurupeneus pleurostigma</i>	malu						1.0	
<i>Parupeneus porphyreus</i>	kumu	A	2	✓	✓			
<i>Pervagor spilosoma</i>	o'ili 'uwi'uwi			✓				
<i>Plageotremus goslinei</i>	Gosline's fangblenny	A	2				1.0	
<i>Platybelone argalus</i>	aha	A		✓				
<i>Plectroglyphidodon imparipennis</i>	bright-eyed damselfish	A	354			1.5		
<i>Plectroglyphidodon johnstonianus</i>	blue-eyed damselfish			✓			0.5	
<i>Priacanthus meeki</i>	aweoweo				✓			
<i>Pseudocheilinus octotaenia</i>	eightstripe wrasse						1.0	
<i>Rhinecanthus rectangulus</i>	humuhumu nukunuku a pua'a	A	21	✓		3.0		33.28 (19)
<i>Scarus psittacus</i>	uhu							67.86 (12)
<i>Scarus rubroviolaceus</i>	palukaluka	A,J					0.5	101.68 (8)
<i>Scorpaenopsis sp.</i>	scorpionfish				✓			
<i>Spratelloides delicatulus</i>	piha	A		✓				
<i>Stegastes fasciolatus</i>	Pacific Gregory		209	✓	✓		9.0	52.83 (15)
<i>Stethojulis balteata</i>	omaka	A	168	✓		28.0	1.5	
<i>Sufflamen bursa</i>	humuhumu lei						3.5	
<i>Thalassoma ballieui</i>	hinalea luahine						2.5	
<i>Thalassoma duperrey</i>	hinalea lauwiili	A,J	412	✓	✓	46.0	21.5	338.27 (4)
<i>Thalassoma purpuraceum</i>	hou		2	✓	✓			
<i>Thalassoma trilobatum</i>	awela	A,J	442			1.0		
<i>Zanclus cornutus</i>	kihikihi	A			✓		1.0	
<i>Zembrasoma flavescens</i>	lau'ipala							92.10 (9)

Fish biomass at the Limahuli offshore site was dominated by large mobile herbivores, mainly surgeonfishes, triggerfishes, and parrotfishes. On the shallow Limahuli reef flat, small wrasses and surgeonfishes made up most of the fish biomass. Friedlander (2000) attributed the high standing stock of fishes observed at this site to the high spatial complexity of the habitat and the relatively light fishing pressure. During winter when high waves pound the exposed north shore of Kaua'i, fishing pressure is further reduced. This situation creates a de facto marine preserve along the north shore for nearly six months each year by excluding fishers from access to nearshore waters within the Park. Little comparable information on the marine invertebrates of Kē'ē Lagoon and reef is available from previous studies; however, the CRAMP studies have monitored benthic invertebrates at Limahuli (Jokiel and Brown 2000) (Table 3). Coral cover rank is 36 among 60 reefs studied statewide. Coral cover was found to be very similar between the 2 sampling periods. Coverage by macro-algae was found to be relatively low; however, there was a high percentage of crustose coralline algae and turf algae present. Despite the proximity to the mouth of Limahuli Stream, a low percentage of fine sediments with low content of terrigenous material was found in this high wave energy environment. No rare or unusual species were observed.

The CRAMP coral cover rank for mid-water (10m or 33 ft) habitat at Limahuli is 31 among the 60 reefs studied statewide (Table 4). As with the shallow station, coral cover was very similar between the 2 sampling periods, and macro-algae coverage was found to be relatively low. As with the shallow reef station, there was a high percentage of crustose coralline algae and turf algae.

**Table 3. CRAMP shallow water (1m) video-transect data of coral cover for Limahuli Reef of percent cover over between 1999 and 2004. Source: Paul Jokiel, HIMB.**

Video Transect data (1m): % Cover: Coral Species	6/7/1999		7/15/2000		6/3/2002		9/7/2004	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0	0	0
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0
<i>Leptastrea purpurea</i>	0	0	0	0	0	0	0	0
<i>Montipora flabellata</i>	2.2	1.5	2.0	1.4	3.2	1.8	1.9	1.4
<i>Montipora patula</i>	0.8	0.8	0.9	1.1	0.1	0.2	0.3	0.7
<i>Montipora studeri</i>	0	0	0	0	0	0	0	0
<i>Montipora capitata</i>	0.0	0.1	0	0	0.1	0.3	0.0	0.1
<i>Pavona duerdeni</i>	0	0	0	0	0	0	0.0	0.1
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0
<i>Pavona varians</i>	0	0	0	0	0	0	0	0
<i>Pocillopora damicornis</i>	0	0	0	0	0	0	0	0
<i>Pocillopora eydouxi</i>	0	0	0	0	0	0	0	0
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0
<i>Pocillopora meandrina</i>	0.1	0.2	0.5	0.6	0.9	1.6	0.1	0.1
<i>Porites brighami</i>	0.7	1.0	1.1	0.6	1.4	1.5	0.1	0.1
<i>Porites compressa</i>	0	0	0.3	1.1	0.2	0.6	0	0
<i>Porites evermanni</i>	0	0	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0	0	0	0
<i>Porites lobata</i>	11.1	7.2	9.7	3.7	16.8	10.6	14.8	8.1
<i>Porites rus</i>	0	0	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0
<b>Total Coral</b>	<b>14.9</b>	<b>7.5</b>	<b>14.5</b>	<b>5.1</b>	<b>22.8</b>	<b>11.4</b>	<b>17.2</b>	<b>8.5</b>
<b>Species Richness</b>	<b>7</b>		<b>6</b>		<b>8</b>		<b>9</b>	
Macro-algae	1.0	1.3	0.3	0.5	0.4	0.5	0.2	0.1

Abbott and Hunter (2000) conducted a statewide study to document the location, abundance, and distribution of alien and invasive algae species. A primary objective of their research was to map the distribution of the most prominent alien and invasive species of algae in the state to enable managers to track rates of expansion and invasion of new sites in the future. One of their field research sites included Ka'ilio Point at Hā'ena. No invasive species of marine algae were found on the reef during their studies.

A complete list of algae observed by Abbott and Hunter (2000) within 0 – 5 m (0 – 16 ft) depth in 2000 and 2002 surveys appears in Table 5.

**Table 4. CRAMP mid-water (10m) video-transect data of coral cover for Limahuli Reef of percent cover over between 1999 and 2004. Source: Paul Jokiel, HIMB.**

Video Transect data (10 m): % Cover: Coral Species	8/4/1999		7/11/2000		6/3/2002		9/7/2004	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0	0	0
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0
<i>Leptastrea purpurea</i>	0	0	0	0	0.20	0.63	0	0
<i>Montipora flabellata</i>	1.8	2.4	1.1	1.2	0.7	1.3	0.4	0.6
<i>Montipora patula</i>	14.5	7.4	17.5	8.8	22.2	8.4	20.6	9.1
<i>Montipora studeri</i>	0	0	0	0	0.2	0.7	0	0
<i>Montipora capitata</i>	0.1	0.1	0.5	0.8	0.1	0.1	0.2	0.2
<i>Pavona duerdeni</i>	0	0	0.0	0.1	0.1	0.1	0.0	0.1
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0
<i>Pavona varians</i>	0.0	0.1	0.2	0.3	0.0	0.1	0.3	0.5
<i>Pocillopora damicornis</i>	0	0	0	0	0	0	0	0
<i>Pocillopora eydouxi</i>	0	0	0.2	0.7	0.6	1.9	0	0
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0
<i>Pocillopora meandrina</i>	0.6	0.7	0.6	0.8	0.6	0.9	0.9	0.9
<i>Porites brighami</i>	0.0	0.1	0.0	0.0	0	0	0	0
<i>Porites compressa</i>	0.1	0.3	0.0	0.1	0	0	0	0
<i>Porites evermanni</i>	0	0	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0	0	0.1	0.1
<i>Porites lobata</i>	2.4	6.3	0.1	0.3	0.3	0.6	0.3	0.5
<i>Porites rus</i>	0	0	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0
<b>Total Coral</b>	<b>19.5</b>	<b>6.7</b>	<b>20.4</b>	<b>8.9</b>	<b>25.1</b>	<b>8.2</b>	<b>22.7</b>	<b>8.7</b>
<b>Species Richness:</b>	<b>8</b>		<b>9</b>		<b>10</b>		<b>9</b>	
Macro-algae	0.3	0.8	0.2	0.3	0	0	0.1	0.1

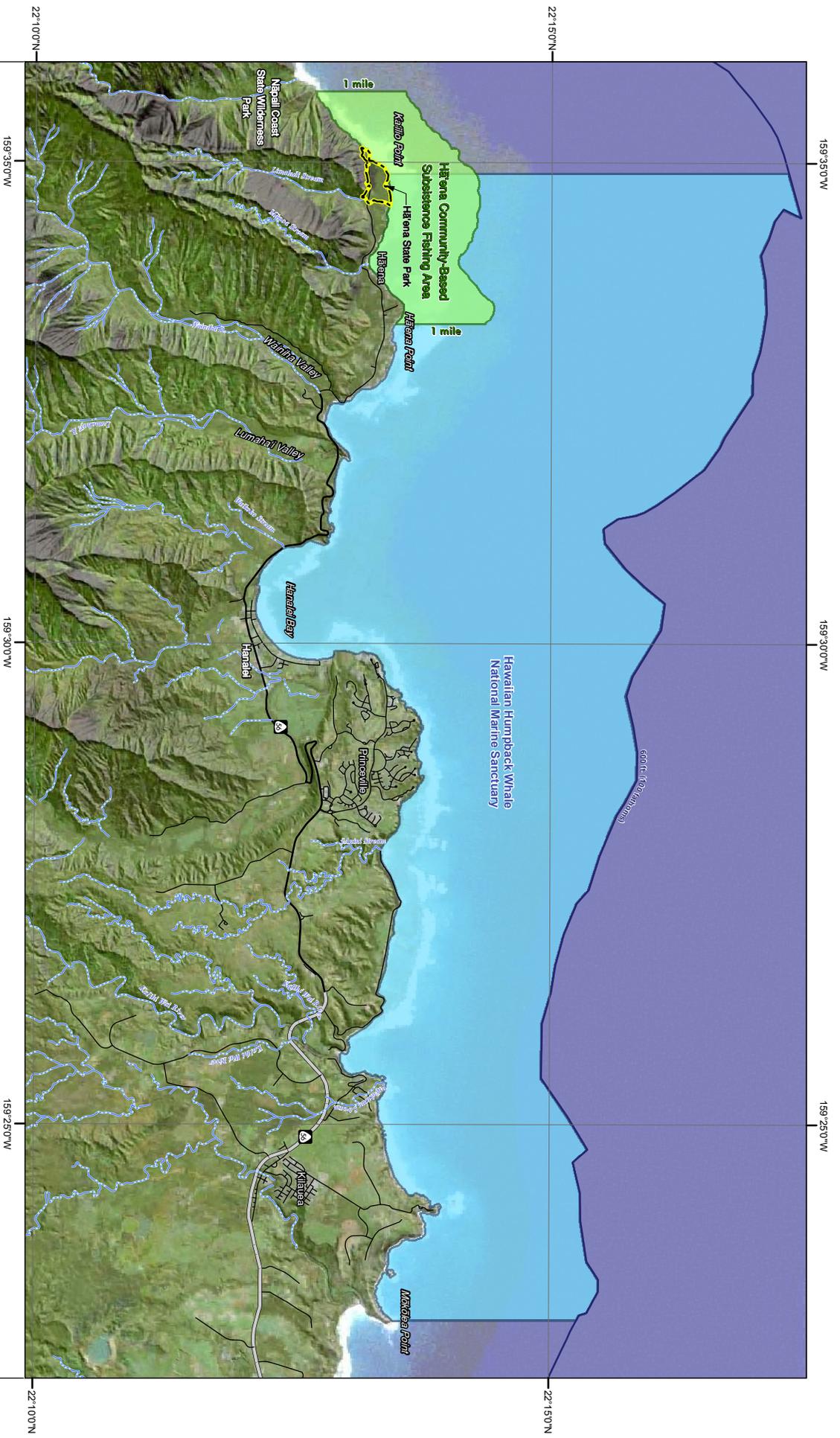
## 6.0 Endangered Marine Species and Habitats

Endangered humpback whales (*Megaptera novaeangliae*) are found seasonally in the offshore waters of Kaua'i's north shore. The marine waters at Hā'ena State Park lie within the Hawaiian Humpback Whale National Marine Sanctuary established under Subtitle C of Public Law 102-587, as amended by Pub. L. 104-283. The sanctuary boundaries of the Kaua'i unit consist of the submerged lands and waters seaward from the shoreline, cutting across the mouths of rivers and streams to the 100-fathom (183 meter) isobath from Ka'ilio Point eastward to Mōkōlea Point (Figure 6).

Among the goals and objectives of the National Marine Sanctuaries Program are to support and coordinate long-term scientific research on the resources on these marine areas; to enhance public awareness and wise use of the areas; and to give particular attention to the protection of the area's natural resource and ecosystem values.

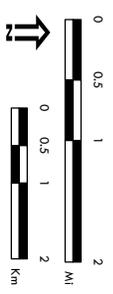
The Hawaiian monk seal (*Monachus schauinslandi*), was listed as an endangered species pursuant to the Endangered Species Act (ESA) on November 23, 1976 (41 FR 51612) and remains listed as endangered. Hawaiian monk seals, regular residents of the Northwest Hawaiian Islands, began appearing more frequently on Kaua'i and Ni'ihau beaches in the 1960's. The National Marine Fisheries Service (NMFS) believes that the total Hawaiian monk seal population is at its lowest level in recorded history and it is estimated that about 1,200 individuals are alive today. They are distributed predominantly in six Northwestern Hawaiian Islands (NWHI), with subpopulations at French Frigate Shoals, Laysan and Lisianski Islands, Pearl and Hermes Reef, and Midway and Kure Atoll. Small numbers also occur at Necker, Nihoa, and in the Main Hawaiian Islands (MHI). In 2005, the total number of individual monk seals in the MHI was estimated to be 77.

The number of monk seals born in the MHI has increased since the mid-1990 (<http://www.fpir.noaa.gov/>). In 2006 and 2007 there were 12 and 13 pups born, respectively, within the MHI. Scientists believe that Hawaiian monk seals are beginning to repopulate the MHI. Only a few females are actually known to have given birth on popular public beaches.



- Legend**
- Hā'ena Community-Based Subsistence Fishing Area
  - Hawaiian Monk Seal National Marine Sanctuary Boundary
  - Hā'ena State Park
  - 600' Bathymetric Contour

**Figure 6**  
Marine Management Areas at Hā'ena State Park



Source: State of Hawaii GIS; NOAA; PDC  
 Whale Sanctuary: 15 CFR 992.41  
 Subsistence Fishing Area: S.B. 2501 Act 241 June 26, 2006 revising HRS 188 Part II



Table 5. Macroalgae observed at Ka'ilio Point, Hā'ena (Abbott and Hunter 2000).

REEF FLAT		0 – 5 m (0 –16 ft) DEPTH	
GREEN ALGAE	<i>Bornetella sphaerica</i> <i>Bryopsis pennata</i> <i>Caulerpa taxifolia</i> <i>Cladophoropsis herpestica</i> <i>Codium arabicum</i> <i>Dictyosphaeria cavernosa</i> <i>Dictyosphaeria versluysii</i> <i>Enteromorpha sp.</i> <i>Halimeda discoidea</i> <i>Microdictyon setchellianum</i> <i>Neomeris vanbosseae</i> <i>Siphonocladus tropicus</i>	GREEN ALGAE	<i>Boodlea composita</i> <i>Caulerpa racemosa</i> <i>Caulerpa taxifolia</i> <i>Chaetomorpha antennia</i> <i>Codium edule</i> <i>Dictyosphaeria cavernosa</i> <i>Dictyosphaeria versluysii</i> <i>Enteromorpha flexuosa</i> <i>Halimeda discoidea</i> <i>Neomeris annulata</i> <i>Ulva fasciata</i> <i>Valonia aggagrophila</i>
BROWN ALGAE	<i>Dictyota acutiloba</i> <i>Dictyota ceylanica</i> <i>Dictyota friabilis</i> <i>Padina sp.</i> <i>Turbinaria ornata</i> <i>Vaughaniella stage</i>	BROWN ALGAE	<i>Colpomenia sinuosa</i> <i>Dictyota friabilis</i> <i>Lobophora variegata</i> <i>Padina japonica</i> <i>Rosenvingea intricata</i> <i>Sargassum echinocarpum</i> <i>Sargassum polyphyllum</i> <i>Stytopodium hawaiiensis</i> <i>Turbinaria ornata</i>
RED ALGAE	<i>Dictyota acutiloba</i> <i>Dictyota ceylanica</i> <i>Dictyota friabilis</i> <i>Padina sp.</i> <i>Turbinaria ornata</i> <i>Vaughaniella stage</i> <i>Acanthophora spicifera</i> <i>Actinotrichia fragilis</i> <i>Amansia glomerata</i> <i>Amphiroa valonioides</i> <i>Centroceras clavulatum</i> <i>Ceramium flaccidum</i> <i>Galaxaura marginata</i> <i>Gelidiella acerosa</i> <i>Griffithsia heteromorpha</i> <i>Herposiphonia crassa</i> <i>Herposiphonia delicatula</i> <i>Herposiphonia nuda</i> <i>Hypnea spinella</i> <i>Jania adhaerens</i> <i>Jania pumila</i> <i>Laurencia crustiformans</i> <i>Laurencia sp.</i> <i>Pterocladia capillacea</i> <i>Stenopeltis setchelliae</i> <i>Tolypocladia glomerulata</i> <i>Womersleyella pacifica</i>	RED ALGAE	<i>Asparagopsis taxiformis</i> <i>Botryocladia skottsbergii</i> <i>Dasya irridescens</i> <i>Falkenbergia</i> <i>Galaxaura marginata</i> <i>Galaxaura rugosa</i> <i>Gracilaria sp.</i> <i>Gracilaria sp.</i> <i>Haliptilon subulatum</i> <i>Laurencia mcdermidae</i> <i>Martensia fragilis</i> <i>Melanamansia glomerata</i> <i>Polysiphonia sp.</i> <i>Potriera hornemanii</i> <i>Pterocladia capillacea</i> <i>Rhodymenia leptophylla</i> <i>Spyridia filamentosa</i>

In 1995, 21 male monk seals, and no females, were relocated from the NWHI and released off of the Big Island of Hawai'i. Since their release, only six of these seals have been recently observed and reported. Research has also shown that the monk seals rarely migrate from the NWHI to the MHI. NMFS estimates that there are 31-40 monk seals on Kaua'i today. It is not unusual to find a monk seal resting on any north shore Kaua'i beach. Signs are posted along the beaches at various locations on the shore at Hā'ena State Park warning visitors not to harass resting seals.

The nearshore marine waters and beaches of Hā'ena State Park are not designated as critical habitat for any marine species. However, in July of 2008, the National Marine Fisheries Service (NMFS) received a petition from conservation groups to review and establish revised "critical habitat" for the monk seal.

The Endangered Species Act (ESA) in turn prohibits any changes or "destruction or adverse modification" by Federal activities (those that are federally funded or permitted) to these areas that will diminish its value as important habitat for the survival and recovery of the species. It is important to note that critical habitat designation does not turn an area into a reserve, refuge, Marine Protected Area (MPA) or a park. Public access and usage in areas that are designated as critical habitat are not affected. NMFS is currently reviewing and evaluating the recommendations contained in the petition.

Although threatened Green sea turtle (*Chelonia mydas*) nesting in the Hawaiian Archipelago is mostly limited to French Frigate Shoals (FFS) in the NWHI, they are common around all eight of the main Hawaiian Islands (MHI) (NMFS & USFWS 2007). Green sea turtles are frequently seen grazing upon algae in shallow nearshore reef waters around the north shore of Kaua'i, including the waters of Hā'ena State Park. Although there have been no recent reports of sea turtles nesting on the beach at Hā'ena, there have been 17 reported sea turtle nests on Kaua'i in the past year alone (Heacock, pers. comm.). The sandy beaches within the Hā'ena State Park are suitable for sea turtle nesting, and the possibility of a future turtle nesting there cannot be dismissed.

## **7.0 Recreational Resources and Assessment**

### **7.1 Principal Existing Recreational Uses**

The beautiful beaches, reef formations, cultural features, and verdant landscape of Kaua'i offer various recreation activities to locals and visitors on the island. The Hā'ena State Park, from Kē'ē Beach to the mouth of Limahuli Stream attracts a large number of visitors each year. The area is a popular spot for scenic shoreline sightseeing and ocean-related recreation. Selected recreation sites and reefs within the Hā'ena State Park boundaries are depicted in Figure 7.

The popularity of this region for recreation has increased dramatically over the past several decades. It has been estimated that Hā'ena State Park receives roughly 1,500 visitors during low periods (February) and approximately 10,600 visitors during high peak periods (August) (TKC and Earthplan 2001). Stepath (1999) counted approximately 1,250 people visiting the Kē'ē area for recreation daily during his study in June and July 1999. He found that people use the lagoon and reef flat area is highest between 10 a.m. and 6 p.m. with a peak usage at 4 p.m.

Other popular recreation areas adjacent to Hā'ena State Park include Cannons Beach, Maniniholo Beach, and Tunnels Beach. Use of the beach and nearshore waters at Hā'ena State Park are regulated by the Hawai'i Administrative Rules (HAR) for Shore Waters and Shores, Chapter 2: North Shore Kaua'i Ocean Recreation Management Area.

#### **7.1.1 Shoreline Sightseeing**

The scenic shoreline resources at Hā'ena State Park make the area an important sightseeing spot for visitors to the island. The shoreline offers views of tropical vegetation, steep mountains, sandy beaches,

ocean waters, colorful sunsets, and the Nāpali coastline. These features make it a destination point for many tourists (TKC and Earthplan 2001, Sprout and Sprout 2004, Klein 2007).

#### 7.1.2 Beachcombing

Due to the frequency and severity of heavy surf on the northern portion of Kaua'i, shells and other marine debris are often dislodged from the reefs and carried to shore. As a result, many of the beaches in the area are popular beachcombing spots for collecting driftwood, beach glass, micro-mollusks, cats' eyes, and puka shells. Ka'ilio Shore at the east end of the beach adjacent to Limahuli Stream is one of the best shell collecting sites (Clark 1992).

#### 7.1.3 Sunbathing

Sunbathing is a popular activity throughout the Hawaiian Islands. Sunbathing occurs at many beaches along Hā'ena State Park. The most level and widest beach section within the park is at Ka'ilio Point near Limahuli Stream. From this point, the beach narrows and becomes steeper before widening again at the lagoon. Kē'ē Beach is popular with tourists for sunbathing. Stepath (1999) found that sunbathing was the most common activity at Kē'ē Beach in June and July of 1999. Sunbathing is difficult at some areas on this part of the island during periods of heavy trade winds (Clark 1992). Clark (1992, 1999) found that visitors preferred Kē'ē Beach over Ka'ilio Point due to the convenience of showers, restrooms, and paved parking.

#### 7.1.4 Hiking

Although there are no maintained hiking trails within the Hā'ena State Park, the trailhead to the famous 11-mile Kalalau Trail is located in the project area at the end of Kūhiō Highway. This trail provides access to the Nāpali Coast State Wilderness Park, which had 423,100 recreation visits in 2007 (DBEDT 2008). Kalalau Trail traverses five steep valleys before terminating at Kalalau Beach. The first two miles of the trail, from Hā'ena State Park to Hanakāpī'ai Beach is a popular day hike for visitors. Day-use hiking permits are required for users hiking beyond Hanakāpī'ai valley and camping permits are required for overnight hikers (Division of State Parks 2008).

#### 7.1.5 Swimming

There are two ocean swimming areas in the vicinity of the project area located at Pohofokeiki and Kē'ē Beach. Pohofokeiki Channel is located where Limahuli Stream meets the shoreline. It was formed by the freshwater discharge of Limahuli Stream, which created a narrow waterway through the reef offshore. The channel offers a protected swimming area under calm ocean conditions. The water is slightly colder and less saline in the channel due to the freshwater discharge from Limahuli Stream. The suggested swimmer level for this site is "intermediate and advanced swimmers eight year of age and older" (Clark 1992). Some visitors or residents occasionally use the lower reaches of Limahuli Stream as a freshwater dipping and wading area. The level of use of Limahuli Stream for this activity is not known (TKC and Earthplan 2001).

Kē'ē Lagoon is located at the west end of Kē'ē Beach and is considered to be of statewide importance for recreational swimming. The lagoon's sandy bottom slopes gradually toward the sea to a depth of roughly 10 ft. It is connected to the open ocean by a deep, narrow channel through the reef (referred to as Puka Ulua). This swimming area is protected by the west end of Ka'ilio Reef making it suitable for all ages and swimming levels. Because of the calm, protected conditions, it is very popular with tourists and families with children. However, during periods of high surf, there is a powerful rip current that runs out the narrow channel (Clark 1999). As of 2008, there are at least two lifeguards on duty at this beach from 9A.M. to 5P.M. everyday of the year, including holidays (Yuen, PBR, pers. comm.)

### 7.1.6 Picnicking

Visitors and local residents use the beach at Hā'ena State Park for picnicking. Currently, there are no tables or barbecue areas;

### 7.1.7 Shorefishing

Although no statistics on shorefishing could be found for the Park, Hamnett et al (2004) noted that approximately 109,055 households in the state, or 31 percent of all households, enjoyed recreational fishing in 2004. Twenty-six percent of this total used pole and line fishing. The shoreline along Hā'ena State Park is an important recreational fishing area. Pole fishing is popular off the point at Kē'ē. At low tide, pole fishing also occurs off the west end of Kē'ē Lagoon. Throw-net fishing is conducted on the reef margins of the lagoon. Free dive spear fishing (without the use of SCUBA) is also popular in the area. The frequency of shoreline fishing activity increases during spring and summer when the ocean is calm more often. Fishers typically arrive at the Hā'ena State Park very early in the morning or after dark (Clark 1992).

The most valuable information on traditional fishing in the vicinity of the comes from the personal interviews of local fishermen and kupuna (Maly and Maly 2003). Several prominent local fishers from Hā'ena related stories to Maly and Maly (2003) of their fishing experience in the nearshore waters for honu (sea turtle), akule (bigeye scad), moi (Pacific threadfin), 'ama 'ama (mullet), 'ōio (bonefish), nenu (rudderfish), aholehole (flagtail), 'āweoweo (Hawaiian bigeye), manini (convict tang), kala (bluespine unicornfish), 'oama (juvenile goatfish), kumu (whitesaddle goatfish), pāpio and ulua (various species of jacks), he'e (octopus), ula (lobsters), 'a'ama (crab), and several kinds of limu (seaweed). Kahala (amberjack) and 'ōpelu (mackerel scad), 'Ahi (yellowfin tuna), ono (wahoo), aku (skipjack tuna), mahi-mahi (Dorado) were commonly caught offshore from Hā'ena.

A simple Google query of "fishing" + "Hā'ena" returns 52 pages of travel guides, vacation rentals, and real estate advertisements that entice visitors to the north shore of the Garden Isle, but with little substantive information about fishing and fisheries of the North Shore. Concern about the impact of visitors on reef resources of Hā'ena led to the enactment of a new law creating a community-based subsistence fishery area. On June 26, 2006, Hawai'i Governor Linda Lingle signed into law Act 241 to help protect the fish stocks and coral reef habitats within the ahupua'a of Hā'ena. The Act took effect on June 30, 2007. The act states that the waters of Hā'ena have been an important subsistence fishery resource for native Hawaiians and local families of the ahupua'a, and that the area's natural beauty attracts thousands of visitors each year to the 'end of the road' at Hā'ena State Park. It is believed that the influx of visitors has resulted in adverse impacts to fish stocks and the integrity of the coral reef habitats in the area. The purpose of the Act is to allow inhabitants of the ahupua'a to develop and enforce traditional regulations for the maintenance of the fishery within the Hā'ena ahupua'a. The approximate boundaries of the new subsistence fishing area are shown in Figure 6. Commercial activities, issuance of a commercial marine license, aquarium fishing permits, gill net fishing, spear fishing with SCUBA, must still be considered for approval by DLNR in consultation with the inhabitants of the ahupua'a.

In 2002, DOH statistics reported a single case of ciguatera poisoning from consumption of a knifejaw (*Oplegnathus* sp.) caught at Hā'ena.

### 7.1.8 Snorkeling and SCUBA Diving

Kē'ē Beach is a primary snorkeling and diving area for Kaua'i. Snorkeling and diving occur in the protected Kē'ē Lagoon and back reef, and less often outside the reef. This activity includes organized groups of divers from clubs and classes as well as individual divers. The overhangs, tunnels, and unique reef features attract many divers. These features, in combination with excellent water visibility and protection from heavy surf, make the lagoon a popular snorkeling and diving spot (Clark 1992). Outside

of the reef, intermediate and advanced snorkeling and diving also occur during calm conditions. Reef features in this area are similar to those in the lagoon, but fish diversity and abundance is higher (Clark 1992). The quality of diving decreases in the winter due to high surf and turbidity (Nielsen 2005).

Cannon's Reef is a popular shore diving site just east of Hā'ena State Park. Water depths at this site range from 5 to 70 ft (1.5-21 m). This diving spot is suitable for beginner to intermediate divers and is considered a good snorkeling location (Nielsen 2005).



**Legend**  
 Hā'ena State Park

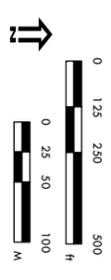
Kāulupā'oa Heiau

Hā'ena State Park

KOHOLA HWY

Māninihōlo Bay

**Figure 7**  
**Reef Environment and Surf Breaks Map**



Sources: State of Hawaii GIS; Microsoft  
 Clark, J., 1992. Beach and ocean recreation study, Hā'ena, Kaua'i. Contract report prepared for Division of State Parks, Department of Land and Natural Resources, State of Hawaii, Honolulu. 43pp.

### 7.1.9 Surfing, Bodysurfing, and Body Boarding

Hā'ena State Park shoreline is also a popular site for surfing, bodysurfing, and body boarding, surfing being the most popular of the three (TKC and Earthplan 2001). DBEDT (2008) has defined a surfing site as "a specific wave-breaking zone caused by a shoal and having sufficient consistency to be identified as a surfable riding area, either seasonally or in a combination of seasons."

Surfing breaks located in the area are described in detail in the *Beach and Ocean Recreation Study* conducted by Clark (1992). Several surfing breaks occur offshore of the park (Figure 7). Three surfing sites break off Ka'ilioiki Reef: "Insanities", "Mad Dogs", and "Reefers". Another less popular surfing spot, "Blue Hole", is located off Ka'ilionui Reef.

These sites are infrequently surfed because the waves break very close to the reef margin and can be dangerous. The level of surfing at these sites ranges from intermediate, when waves are 2 to 5 ft (0.6 to 1.5 m) high, to advanced and expert when waves are 6 ft (1.8 m) and higher (Clark 1992).

Two other surfing breaks are located just east of Limahuli Stream, but are accessible from the Hā'ena State Park shoreline. "Winchell's" is located off Pu'u Kahuaiki Reef to the east of Pu'u Kahuanui Reef. "Bobo's" is a surfing break that forms on the forereef slope fronting Pu'u Kahuanui Reef. These breaks are suitable for intermediate to advanced and expert surfers, depending on wave height (Clark 1992).

### 7.1.10 Windsurfing

Statewide, "Reefers" is an important sailboarding and wave-jumping spot for windsurfers, and is considered one of the best wave-jumping sites on the north shore. During periods of moderate surf (2 to 5 ft) this spot is appropriate for intermediate windsurfers, while conditions are suitable for advanced and expert windsurfers during higher surf (6 ft and higher). "Reefers" attracts between 30 and 40 windsurfers during good conditions and is exclusively used during high tide. Windsurfing activity generally increases during high northeast trade winds (Clark 1992).

### 7.1.11 Boating and Kayaking

Kē'ē Lagoon is the primary take off and landing point for sea kayakers touring the Nāpali shoreline. The activity includes both individual kayakers and groups of kayakers. The lagoon offers a sand-bottom, wave protected location at the shoreline to easily enter and exit the ocean through the "Puka Ulua" channel. Poholoikeiki Channel is also used as a take off and landing site by kayakers during calm seas (Clark 1992). Commercial boating is seasonal along the north shore of Kaua'i due to wave impacts and surf events, mostly occurring in summer. The closest boat launch ramp is the Hanalei Bay Offshore Mooring Area and Pier adjacent to the town of Hanalei in the northeast corner of Hanalei Bay (DBOR 2008).

### 7.1.12 Biking

Biking is becoming a more popular activity throughout the state and also serves as a means of transportation for some visitors (TKC and Earthplan 2001). Forest reserve roads, resort bike paths, and old agricultural roads are often used as bike trails on Kaua'i (Sprout and Sprout 2004). *Bike Plan Hawai'i* (1994), a State master plan for bikeways, is proposing a bike route that extends from the west side of Kaua'i to the north shore. Due to the narrow roads in this area, bicycle access and safety will require special consideration (County of Kaua'i Planning Department 2000).

### 7.1.13 Off the Road Vehicle (ORV) Use

The 2001 draft park plan noted that ORVs were known to drive through the sand dunes and across the sandy beaches at Ka'ilio Point flattening dunes and impacting strand species (Clark 1992, DLNR 1999). However, this activity has essentially ceased since 2007 when a gate blocking vehicular access to the dunes was installed. Four-wheel ATVs are also used by lifeguards and can be driven along the sandy beaches as necessary in the pursuit of their duties.

### 7.1.14 Visiting Historical/Cultural Sites

Historical and cultural sites have the potential to be recreational and educational areas for both local residents and tourists. The cultural resources at the Hā'ena State Park are considered to be some of the most complete and well preserved features throughout the Hawaiian Islands. The Hā'ena Archaeological Complex is listed on the State and National Registers of Historic Sites. The Complex is bounded by the Pacific Ocean on the north and west, Limahuli Stream on the east, and the pali (cliff) base on the south. Feature types found within the Hā'ena Archaeological Complex include heiau, house platforms, rock shelters, agricultural complexes, enclosures, subsurface cultural deposits, cemeteries, wet caves, and source areas for volcanic glass (TKC and Earthplan 2001).

Tourists and residents can visit Keahualaka, a flat hula platform, and Kauluapā'oa Heiau, a temple dedicated to Laka, the goddess of the hula. These cultural sites are located southwest of Kē'ē Beach and are managed by the State Historic Preservation Division (SHPD) on land owned by the County. Both sites are presently used by hula halau from across the state for various ceremonies (Clark 1999).

Two wet caves situated in the Hā'ena State Park are also premier designations for visitors and residents. These ancient sea caves were formed during a higher stand of sea. Waiakanaloa Wet Cave is located mauka of Kuhio Highway in the face of the pali and Waikapala'e Wet Cave is located slightly to the east within the pali face. These deep, dark caves contain pools of cold water (Yamamoto 2006). "Spiritual" cave visits, using incense and other paraphernalia, are popular visitor activities within the caves (TKC and Earthplan 2001).

### 7.1.15 Wildlife Observation

Whale watching and bird watching also takes place occasionally within the park boundaries. The peak time to see endangered North Pacific Humpback whales in Hawaiian waters is late November through early May (Yamamoto 2007). Several tour operators offer whale watching tours within the boundaries of the Hawaiian Humpback Whale National Marine Sanctuary (Figure 6).

## 7.2 Visitor Impacts

### 7.2.1 Traffic Congestion and Parking Issues

Two of the most popular visitor destination areas on Kaua'i are located within the boundaries of Hā'ena State Park. Both the Kalalau Trail head and Kē'ē Beach are located at the end of the highway. The end of the highway serves as a turnaround point for all vehicles reaching this point. There are only three parking areas within the Park, one is located adjacent to the sea caves at Hā'ena Point, another was recently created near the taro ponds west of the sea caves, and the third is located at the end of the highway at Kē'ē Beach. On the lot at the end of the highway is paved. As these fill, many visitors parallel park along the seaward side of the highway margin. A high density of visitors to the area decreases the amount of available parking for local residents, and reduces the quality of user experiences (Needham et al. 2008).

### 7.2.2 Non-point and Point-Source Pollution

Point-source pollution is pollution from any confined or discrete conveyance such as pipes, ditches, channels, wells, or vessels. This type of pollution is also referred to as “end-of-pipe discharge” because it is often discharged from sewage treatment plants and factories close to nearshore waters (DBEDT and DOH 2000). At the Hā'ena State Park, recreational and commercial boats can create point source pollution in the offshore waters. The amount of point source pollution from these sources is unknown and likely varies during the year depending on the number of boats.

*Hawai'i's Implementation Plan for Polluted Runoff Control* (2001) defines non-point source pollution as “water pollution that comes from many diffuse sources rather than from a specific point, such as an outfall pipe, and is often the result of human activities.” Pollutants are carried by rainwater on the surface or through the ground to the stream and oceans. These pollutants can include fertilizers, herbicides, insecticides, oil, grease, sediment, and pathogens (DBEDT and DOH 2000). Non-point source pollution is related to the amount of impervious surfaces in an area. Impervious surfaces (including roads, parking lots, sidewalks, and roofs) prevent water and pollutants from passing through the ground and percolating into the soil, expressing them into nearby aquatic environments (Schueler 1994).

At the Hā'ena State Park, pollutants from motor vehicles, trash, and other debris not properly disposed of can be carried to nearshore and freshwater areas in storm, flood, or wash water across impervious surfaces. Sewage seepage from the restroom facilities could also enter these aquatic environments (Stepath 1999). Dipping or wading in the Limahuli Stream may contribute to soil erosion, sedimentation, and temporary impacts to water quality (TKC and Earthplan 2001).

According to the *Hawai'i Coastal Nonpoint Pollution Control Management Plan* (1996), non-point source pollution has a greater impact on nearshore waters than point-source pollution. Non-point source pollution can result in increased turbidity, sediment accumulation on coral reefs, fish kills, and destruction of aquatic habitats. Excess nutrients can also lead to eutrophication or algae blooms in coastal waters (DBEDT and DOH 2000). Toxic chemicals and pollutants can pose a risk to marine plants and animals (County of Kaua'i Planning Department 2000) and increase the risk of human diseases during aquatic recreation (DBEDT and DOH 2000).

Clean coastal water is an important component of the tourism industry in Hawai'i. More than 80% of visitors to the Islands engage in recreation activities in coastal and marine areas (Needham et al. 2008). Coastal leisure and recreation activities (swimming, diving, surfing, etc) are also vital to native Hawaiian cultural practices and local resident recreation (DBEDT and DOH 2000). Most local residents engage in ocean recreation on a regular basis (Friedlander et al. 2008). One intent of Class AA marine water quality designation at Hā'ena State Park is to protect the area in as pristine condition as possible to help insure the protection of the coral reef ecosystem offshore as well as the visitor experience to the Park.

### 7.2.3 Sunscreen

Some chemicals contained in commercial sunscreens can adversely impact coral reefs by promoting viral infections of endosymbiotic zooxanthellae, which are essential for the survival of coral species. The chemical compounds in sunscreen can cause dormant viruses present in zooxanthellae to continually replicate until the zooxanthellae are expelled and the coral is bleached (Buddemeier et al. 2004, Danovaro et al. 2008, and Than 2008). Sunscreens may also decrease the penetration of UV radiation, impacting marine organisms that depend on light for various functions (Eichenseher 2006, Blitz and Norton 2008). Furthermore, sunscreen agents have been shown to bioconcentrate in freshwater or brackish aquatic species (Daughton and Ternes 1999). The impact of sunscreen on the coral reef environment at the Hā'ena State Park is not known; however, according to scientific interviews by Juran (2007), the impact of sunscreen at the park is believed to be minimal compared to other sites around the state.

## 7.2.4 Fishing

The impact of recreational and subsistence fishing in Hawai'i has been difficult to quantify because neither recreational and subsistence fishers are required to have licenses or report their catch to the Hawai'i Division of Aquatic Resources (Friedlander et al. 2008, Zeller et al. 2008). Recently, however, there is a growing body of scientific evidence to suggest that fishing may have the greatest overall effect on the diversity and abundance of nearshore fishes on coral reefs in Hawai'i and the Pacific (Grigg 1994, Stepath 1999, Birkeland and Friedlander 2001, Williams et al 2008, Singh et al 2008).

Fishers of all kinds tend to target specific species, many of which are top carnivores. Today, these resources are scarce. In studies of shore fish populations throughout the main Hawaiian Islands, Friedlander et al (2003) found that fish standing stock and diversity were higher in areas protected from fishing pressure and in areas of greater substrate complexity. In a similar island-wide study of 89 coral reef survey sites, Williams et al (2008) found 'clear and consistent negative associations between human population density and biomass of fishes in a range of functional and taxonomic groupings'.

Declines were evident among fishes targeted by fishers, but not among non-target groups of fishes in hard bottom and mid-depth habitats. Standing stock of highly desired target species (e.g. surgeonfishes, wrasses, parrotfishes, snappers, goatfishes, big-eyes, jacks, squirrelfishes, barracuda, moi, milkfish, and hawkfish) in accessible and populous locations were significantly lower than in areas where public access was prevented and also in lightly populated or remote areas. Williams et al (2008) concluded that a number of lines of evidence point to fishing pressure as the prime driver for these negative trends.

Indiscriminate use and discard of inexpensive monofilament gillnets has had a major effect on reef fish throughout the state of Hawai'i (Endreson et al, undated). Lay gillnets take unwanted as well as target species and can lead to habitat destruction and fatal entanglement of endangered species. Objections to this controversial method of fishing have raised an emotional debate in Hawai'i (e.g. <http://www.ulua-fishing.com/forum>; <http://gillnetskill.blogspot.com/>). A general consensus to outlaw the indiscriminate use of lay gillnets (Fair Catch 2006) resulted in the enactment of new DLNR Administration Rules signed by Governor Linda Lingle in March 2007 which severely restrict the use of lay gillnets in Hawai'i.

Night spear fishing, particularly with SCUBA, has also been implicated as being detrimental to fish populations (e.g. Stepath 1999). No studies could be found that quantify the catch by free dive and SCUBA spearfishers at Hā'ena State Park or elsewhere in the state. In May 1981, a visitor disappeared while spearfishing with SCUBA at the Park, presumably the victim of shark attack.

Fishing can also adversely affect endangered marine species. During the period 1982-2007, there have been 49 documented cases of interactions between fishers and monk seals in the Main Hawaiian Islands (MHI) (Katekaru 2008). Twenty-seven of these cases were reported from Kaua'i, two of which were from Hā'ena State Park. These cases usually involved the accidental hooking by ulua fishers using slide-bait tackle.

Chaloupka et al (2008) investigated cause-specific temporal and spatial trends in sea turtle strandings in the Hawaiian Archipelago. The most common known cause of the green turtle strandings was tumor-forming disease (28%) followed by hook-and-line fishing gear-induced trauma (7%), gillnet fishing gear-induced trauma (5%), boat strike (2.5%), and shark attack (2.7%). Miscellaneous causes comprised 5.4 percent of strandings whereas 49 percent of green turtle strandings could not be attributed to any known cause (Chaloupka et al 2008). They concluded that the Hawaiian green turtle stock continues to recover following protection since the late 1970s despite exposure to disease, nets, and hook-and-line fishing gear.

### 7.2.5 Diving

Damage to coral reef as a result of diving has been documented worldwide (Rouphael and Inglis 1995, Tratalos and Austin 2001, and Tabata 1992). Divers and snorkelers can physically damage reef corals, invertebrates, and algae by standing on the reef, accidentally kicking coral with their fins, or stirring up silt that suffocates coral. Contact with corals can facilitate disease transmission. Physical damage to coral species can be long lasting since due to generally slow tissue regeneration (Davenport and Davenport 2006).

### 7.2.6 Fish Feeding

Some divers and snorkelers feed fish at Kē'ē Lagoon in order to attract large schools of fish. Feeding fish can disrupt normal distribution and abundance patterns (DLNR 1999, SPC Fisheries 2004) and alter normal reproductive output of marine species (Sweatman 1996). Fish feeding may modify natural feeding cycles of fish (Roberts 2006), and have negative effects on prey populations by minimizing feeding on algae (Milazzo et al. 2005, Hollier 2009).

Feeding large fish can attract predators that scare off smaller fish, thereby reducing local biodiversity (Davenport and Davenport 2006). This activity has been shown to interfere with natural instincts and behaviors essential for fish survival (Roberts 2006). Studies conclude that feeding fish alters fish behavior towards humans; fish become conditioned to associate humans with food, often causing fish to become aggressive to humans and inducing attacks (DLNR 1999, SPC Fisheries 2004, Roberts 2006, Hollier 2009).

### 7.2.7 Reef Walking

During periods of low tide and calm waters, it is possible to walk on the exposed and shallow reef flats at the Hā'ena State Park. Visitors walk on the reef to view tide pools (Yamamoto 2006) and some divers transverse the coral reef to dive off the outer portion of the reef at Kē'ē Beach (Stepath 1999), resulting in the same impacts discussed in Section 7.2.5 above. Walking on the reef has the potential to degrade areas of the reef flat by trampling corals. This can result in mortality and an overall reduction in coral cover (Woodland and Hooper 1977, Stepath 1999, Juran 2007, Rodgers and Jokiel 2007). Trampling can directly or indirectly affect coral tissue, growth rates, reproductive success, and community structure (Liddle and Kay 1987, Rodgers and Jokiel 2007).

A decrease in coral cover can also impact fish populations, which are dependent on coral for shelter (Rodgers and Cox 2003), as well as algal populations (Davenport and Davenport 2006). Impacts to coral reefs can be severe, even with relatively low levels of trampling (Brown and Taylor 1999, Rodgers and Jokiel 2007). The ability of corals to withstand trampling depends on coral morphology, branch geometry, and mechanical properties (Rodgers and Jokiel 2007).

In Hawai'i, studies have found a clear pattern of decreasing coral cover with increased visitor use (Rodgers 2001, Rodgers and Cox 2003, Rodgers et al. 2003). Stepath (1999) conducted a study at Hā'ena State Park which studied the impact of humans walking on the reef flat. The peak time of reef walking was at 1:30PM. Stepath (1999) concluded that trampling may be decreasing coral cover in the nearshore waters of the Park.

### 7.2.8 Sand Dunes

Within the vicinity of Hā'ena State Park, the shoreline is backed by low coastal sand dunes. These ridges or mounds of sand are formed by an accumulation of wind blown sand that is trapped by strand plants at the Park. Sand dunes are dynamic features that erode during periods of high waves (usually October to May) and accrete when heavy wave action subsides (usually May to October). Sand dunes function as

natural, elevated buffers that protect marine shorelines against erosion, flooding, high waves, storms, tsunamis, and other coastal hazards (Clark 1992, University of Hawai'i Sea Grant Extension Service and County of Maui Planning Department 1997, University of Hawai'i 2006).

Some recreational activities are known to affect coastal dunes in Hawai'i. The continuous trampling by vehicles and pedestrians on the dunes causes erosion and sand movement. Vogt (1979) found that fewer than 10,000 pedestrians walking over sand dunes during a single season can eliminate dune vegetation and result in erosion (Tabata 1980). Dune vegetation has little resistance to trampling due to the extremely low soil penetration and is slow to recover (Davenport and Davenport 2006).

ORVs also flatten dunes and impact strand species (DLNR 1999). ORVs drive through the sand dunes and across the sandy beaches at Ka'ilio Point (Clark 1992). Both motor vehicles and pedestrian traffic can lead to sediment disruption and erosion. ORVs destroy sand coastal vegetation that helps to stabilize the dunes. ORVs can also disturb sand dune and shore ecosystems for use by wildlife including birds, turtles, worms, and crustaceans (Schlacher et al. 2008).

### 7.2.9 Invasive Species

An invasive species is defined as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health” (Executive Order 13112). Isolated island ecosystems, such as Hawai'i, are vulnerable to the establishment of alien or non-native species due to a variety of factors. Islands typically have high habitat diversity, favorable climate, high resource availability, low biotic resistance, small populations, and limited social capital (Denslow et al. 2008). It is estimated that over 5,000 alien species have established in the Hawaiian Islands. Of this total, roughly 343 are marine species (Belt Collins Hawai'i LTD 2008).

Invasive species affect island ecosystems in a variety of ways. They compete with native flora and fauna, carry diseases, affect trophic structure, change fire regimes, alter nutrient cycling patterns, modify surface runoff of water, and alter biodiversity (Vitousek 1990, D'Antonio and Vitousek 1992, Vitousek 1992, and Belt Collins Hawai'i LTD 2008). The ability of invasive species to reach new areas is influenced by the number of individuals involved in a release event and the number of release events, also referred to as *propagule pressure* (Lockwood et al 2005). Propagule pressure increases in areas with high visitation (Leung and Mandrak 2007), such as recreational parks. In particular, recreational boating, diving, snorkeling, and fishing increases the risk of introducing non-native species through hulls, wetsuits, bait, or other equipment (Meliane and Hewitt 2005). Recreational hiking can also introduce invasive species, especially plants, by passive dispersal on hiker's shoes and clothing. Ironwood (*Casuarina equisetifolia*), false kamani (*Terminalia catappa*) are invasive terrestrial plant species found within the park boundaries that compete with native vegetation.

Two non-native reef fish species introduced by the Hawai'i Department of Land and Natural Resources Division of Aquatic Resources to supplement coastal sport fisheries are present in the nearshore waters of the Park. Although the predatory grouper roi (*Cephalopholis argus*) and the blue line snapper ta'ape (*Lutjanus kasmira*) successfully established large populations throughout the main Hawaiian Islands, their impact upon preferred local species has not been well-understood and is the subject of controversy. Roi feed on small fishes over shallow reefs, while ta'ape feeds over sand flats during the night (Dierking 2007, Birkeland and Dierking 2007).

Invasions by non-native limu (seaweed) in some areas of Hawai'i have been shown to blanket coral reefs, kill coral, and reduce water exchange within the reef (Hadfield and Koehl 2007). However, none of the four noxious invasive algae species known from Hawai'i were found at Hā'ena during surveys conducted there a decade ago by University of Hawai'i investigators Isabella Abbott and Cynthia Hunter ([www.hawaii.edu/ssri/hcri/text/research/results/kauai/haena.html](http://www.hawaii.edu/ssri/hcri/text/research/results/kauai/haena.html)). Some native algae species have the potential to become invasive, or to dominate the marine substrata to the exclusion of other species, in

areas that receive excessive nutrient input or have been altered in some other way in which to foster the growth of a single species of algae. There is no evidence that this has become a problem at Hā'ena.

### 7.3 Park Management Requirements

The natural beauty and cultural features at the Hā'ena State Park depend on the proper management and use of the park. Management policies derived from the *Hā'ena State Park Master Plan and Draft Environmental Impact Statement* (2001) include the following:

- Prevent and rectify existing anthropogenic erosion;
- Upgrade wastewater facilities;
- Eliminate or control exotic plant species;
- Utilize non-chemical plant management techniques when feasible; and
- Identify and protect fragile habitats;

*Kaua'i's Economic Development Plan 2005-2015* (2004) states that the island's parks require "improvements and better maintenance" in order to meet recreational demands. In particular, roads are inadequate for residents and visitors. The plan suggests dedicated user fees be initiated at all state parks to support maintenance and improvement costs.

DLNR, DAR, and Hawai'i Ecotourism Association (2005) suggest that coastal and marine recreation areas can be managed by reducing human uses or reducing the impact of human use. The strategy specifically identifies the following management techniques for coastal and marine recreation areas:

- Restrict access: reduce the level of use by determining a site's carrying capacity and setting limits on number of users or banning certain types of activities or behaviors;
- Relocate use: create artificial reefs for recreation users (in suitable areas);
- Education: modify human behavior through signage, brochures, videos, tours, etc.; and
- Mechanisms for compliance: design physical infrastructure to encourage certain limits or behaviors or institute legal or voluntary compliances with tangible consequences.

### 7.4 Sustainability of Recreational Uses

With proper management, most of the recreational uses currently occurring at the Hā'ena State Park can be sustainable. The sustainability of a recreational use depends on the carrying capacity of the recreational area. Within a recreational context, carrying capacity can be defined as "the amount of visitor use that can be appropriately accommodated within a park or outdoor recreation area" while providing "sustained quality recreational experiences" (Lankford et al. 2005). The carrying capacity of a recreational use is determined by evaluating the following issues:

- Physical capacity: the amount of space available for the recreational use;
- Ecological or biological capacity: the ability of natural resources to withstand the recreational use;
- Facility capacity: the degree that the recreational area is able to support visitor needs during the recreational use; and
- Social capacity: the ability of the recreational use to provide an acceptable recreation experience (Lankford et al 2005).

DLNR, DAR, and Hawai'i Ecotourism Association (2005) recommended development of a carrying capacity tool to help determine optimal levels of activity for the various users at various sites. Management actions stemming from such a study might include limits on commercial operating permits and regulated visitor and vehicle entry. The report also advances the concept of establishing an ecological carrying capacity to take into account the various recreational activities and the unique physical conditions at a particular reef site; to provide a sound scientific basis for proactive management;

and to allow managers to identify optimal levels of use and set limits of use and set limits for various sites before projected increases in use occur. Additional recreational impacts to reefs and local action strategies (RIS-LAS) of pertinent to Hā'ena State Park can be found in DLNR, DAR, and Hawai'i Ecotourism Association (2005).

A study of this kind may be beneficial to identify the sustainability of existing recreational uses within the Park boundaries. To be successful, a carrying capacity study should be adequately funded and should be conducted with the collaboration of stakeholder groups in particularly controversial projects (NOAA 2007).

## 7.5 Complementary and Conflicting Use Issues

There is a growing number of eco-tourists and adventure-tourists who seek remote locations in Hawai'i, such as Hā'ena and Nāpali, for recreation and adventure. Many Hawai'i residents also visit these remote areas in search of greater resources, such as free diving spearfishers, who travel throughout the state to find populations of their preferred game fishes. These remote areas traditionally had small populations of local residents, many of whom rely upon the environment for sustenance (Friedlander et al. 2008). As visitor and resident populations on the north shore of Kaua'i, conflicts among and between recreational users are likely to increase.

### 7.5.1 Ahupua'a 'Ohana vs. Visitor and Other Residents

Ahupua'a 'ohana (family) are former Hā'ena residents and their descendents who have ancestors from the ahupua'a of Hā'ena and therefore have close ties to the land. Some private land was condemned from the ahupua'a 'ohana for the park establishment. Many members of the Hā'ena 'ohana are upset about the existing conditions of the park. Their specific complaints include rubbish on the beaches and trails, spiritual rituals conducted by visitors, souvenir vending, disturbing fishermen, harassing marine life, inappropriate public activities, commercial activities, and failure to heed traditional community protocols. Many believe these activities degrade the natural resources and cultural significance of the area (TKC and Earthplan 2001).

Some ahupua'a 'ohana members also feel that walking on the reef and using suntan oil in the area have a negative impact on the marine species, specifically limu (algae) that they collect for food. Because of the density of visitors to the park, the local 'ohana claim that can not practice cultural activities or enjoy the environment as they did in the past (Stepath 1999, TKC and Earthplan 2001). In turn, the ahupua'a 'ohana believe that denying them access affects their physical, mental, and spiritual health (Juran 2007).

### 7.5.2 Residents vs. Visitors

Residents in the Hā'ena area use Hā'ena State Park for various recreational activities, such as picnicking, camping, fishing, and windsurfing. Though residents consider the park, and especially Kē'ē Beach, to be their personal recreation area (TKC and Earthplan 2001), some will not go to the area because of the large number of tourists. Other property owners have denied public access to the beach (Juran 2007). According to a 2002 tourism study (Kaua'i Economic Development Board 2004), Kaua'i residents are more strongly opposed to increased tourism activity than the residents of any other island in the state.

Traffic congestion and parking are major user conflicts between residents and visitors. This congestion is the result of the popularity of Kē'ē Beach and the location of the entry point to the Kalalau trail head at the end of the highway (TKC and Earthplan 2001). A State Park Visitors Survey conducted in 2006, found between as many as 451 cars parked at the Hā'ena State Park per day. Of this total, only 13 percent were thought to be locally owned (Hā'ena State Park Visitors Survey 2006).

Residents tend to prefer Kē'ē Beach area to other sub-areas of the Park (Figure 1), and enjoy the lax enforcement and rules, vehicle access, and convenient location. Residents have requested better comfort stations and other amenities at the park. Visitors have requested improvements for security and safety, as well as upgrading existing comfort stations (TKC and Earthplan 2001).

Some residents believe that visitors should be paying fees to offset impacts to the Hā'ena State Park. All State Parks receive money through the State Parks Special Fund which is generated through camping fees, cabin rentals, concessions leases, and recreational leases (DLNR 2003). Funding may be allocated from the Hawai'i Tourism Authority's Transient Accommodations Tax (TAT) Trust Fund depending on the amount of money in the fund (DLNR 2003). Therefore, if visitors to the Hā'ena State Park are not staying at nearby hotels, residents argue that they are not paying for enjoyment of the area.

### 7.5.3 Recreation vs. Conservation

Resource conservation is outlined as an important issue in the State Comprehensive Outdoor Recreation Plan (2003). The unique natural environment of Hawai'i is one of the main attractions for tourists. Preserving nearshore ecosystems in Hawai'i is critical to the tourism industry (Rodgers and Jokiel 2007). However, the need to conserve can constrain public access if the activity has the potential to endanger resources.

Solving this conflict requires a balance between allowing public access for recreation and restricting some public use to protect resources (DLNR 2003). As at other coastal recreation areas in the state, there is a need to measure and monitor recreation carrying capacity and to establish indicators to ensure that coastal resources (as well as user experiences) do not deteriorate (Needham et al. 2008).

### 7.5.4 Commercial Use vs. Private Use

Hā'ena State Park is widely promoted in visitor's guides, adventure travel books, equipment rental facilities, hotels, and tour companies (TKC and Earthplan 2001). Commercial activities occurring in the park boundaries include weddings on Kē'ē Beach, kayak tours of Nāpali Coast, spiritual enlightenment tour groups, SCUBA diving instruction, and other commercial operators. Residents and native Hawaiians generally do not support having commercial activities at the Hā'ena State Park arguing that they degrade and exploit resources (TKC and Earthplan 2001). Furthermore, many residents or visitors would prefer to enjoy park without commercial operators, while others require a vendor to provide them with the necessary equipment (TKC and Earthplan 2001).

All private enterprises are required to have a state issued Special Use Permit from the Division of State Parks to conduct these activities on State owned lands. Commercial permits can provide a way to ensure compliance with legal requirements (DLNR, DAR, Hawai'i Ecotourism Association 2005); however, most commercial businesses which occur at Hā'ena State Park are not sanctioned by the State (TKC and Earthplan 2001).

### 7.5.5 Ecotourism vs. Development

Ecotourism is one of the fastest growing sectors of the tourism industry. According to the International Ecotourism Society, ecotourism is "responsible travel to natural areas that conserves the environment and improves the well-being of local people" (Blangy and Mehta 2006). Ecotourism in Hawai'i can be nature or culture based (<http://www.hawaiiecotourism.org/Default.aspx?pageId=117830>). This type of tourism is designed to prevent negative social and environmental impacts that can be associated with tourism (DLNR 2003). Development has the potential to adversely impact natural and cultural resources on which the ecotourism industry relies on.

“Hard-core” eco-tourists typically seek isolated destinations with minimal development. Thus, development has the potential to compromise the ecotourism experience of these individuals (TKC and Earthplan 2001). However, more developed facilities still have the potential to attract some eco-tourists seeking nature and culture-based activities (DLNR 2003). In addition, there are increasing concerns about sustainability and carrying capacities of ecotourism (Rodgers and Jokiel 2007). Because of their interest in remote areas, eco-tourists are also a means of passive dispersal by non-native invasive species.

#### 7.5.6 Homeless/Squatters vs. Park Visitors

Homelessness remains an issue throughout the state as a result of nation-wide economic problems, mental illnesses, and cuts in state social programs (DLNR 2003). Squatters and homeless were evicted from the Hā'ena State Park during the Taylor's Camp era in the 1970s. However, squatters still reside in various locations throughout the isolated valleys of the adjacent Nāpali Coast and can be frequently seen at the Hā'ena State Park. Beach encampments can impact the visual image of the island, restrict users' access to facilities, create sanitation problems, and contribute to park maintenance needs (DLNR 2003, Gererna-Morales 2007). The presence of these individuals can ultimately impact the tourism industry; the Hawai'i Tourism Authority has stated that tourists have commented that seeing homeless people in parks or at the beaches makes them felt uncomfortable (Gererna-Morales 2007).

#### 7.5.7 Windsurfers vs. Other Recreational Pursuits

Windsurfing has been shown to disrupt other recreational users at parks throughout the state (CSV Consultants 2007). Windsurfers often come close to others at high speeds. Beginning windsurfers often find control of their boards difficult and represent a greater risk to others in the water than expert windsurfers. In turn, park users, such as swimmers, sunbathers, snorkelers, and divers, can obstruct windsurfing zones and launching areas (CSV Consultants 2007).

At the Hā'ena State Park, Clark (1992) identifies only a “minor conflict” between windsurfers and fishermen. Throw-net fishing primarily occurs during low tides when the reefs are more exposed. Low tides often coincide with strong, consistent trade winds, which are ideal conditions for windsurfing. When these activities happen together, windsurfers can scare away schools of fish for throw net and pole fishermen (TKC and Earthplan 2001).

#### 7.5.8 ORVs vs. Beach Users

ORVS can degrade the visual appearance of the beach by damaging vegetation and sand dunes. In addition, the noise and safety hazards associated with vehicle use on the beach conflict with other beach users and can detract from visitor experiences at the park (TKC and Earthplan 2001).

#### 7.5.9 Traditional Fishing vs. Recreational Fishing

In 2006, HRS 18-22.6 designated a community based subsistence fishing area at the shoreline of the Hā'ena district “for the purpose of reaffirming and protecting fishing practices customarily and traditionally exercised for purposes of native Hawaiian subsistence, culture, and religion (SB2501). Enacted in 2007, the subsistence fishing area law was modeled after other community-based subsistence areas elsewhere in the state (e.g. Mo'omomi, Moloka'i). Because the Hā'ena area is relatively new, specific management protocols are still being discussed amongst community members (Heacock, DAR, pers. comm.). It is anticipated that the self-policing of the area as called for by the act will include protocols for recreational fishers and visitors to seek permission to fish within the area from local stewards of the resource, seasonal and take limits, limits on gear, and so forth.

The only area on the north shore of Kaua'i where nearshore marine life is protected from fishing pressure is the Kilauea Point National Wildlife Refuge managed by the U.S. Fish and Wildlife Service. This area,

along with the more remote portions of the Nāpali Coast, may serve as defacto marine preserves because of their inaccessibility.

Reef waters of Hā'ena State Park also serve as a defacto preserve during winter months when high waves and strong currents limit fishing opportunities. Preserves provide safe havens for fish development and sources of stock enhancement following periods of increased fishing pressure on adjacent areas.

## 7.6 Impacts of Increased Recreational Uses

An increase in recreational uses at the Hā'ena State Park would place greater demands on existing facilities infrastructure, and on the physical, ecological, and societal capacity of the area (See Section 7.4). Attracting more recreational users would further increase current traffic congestion and parking issues for both visitors and residents. More users would also have the potential to impact stream and nearshore water quality by increasing the amount of non-point and point-source pollution in the area. The reef ecosystem would be significantly impacted by an increase in unregulated recreational activity at the Park. Potential impacts to the coral reef ecosystem as a result of increased recreation in the nearshore area include: decreased coral coverage, altered coral growth, decreased fish populations, reduced local biodiversity and increased propagule pressure of invasive species. Without an enforceable Park management plan, an uncontrolled increase in current recreational activities at the Hā'ena State Park would lead to further dune erosion and the removal of dune vegetation; create untenable traffic congestion and conflicts; increase the level of pollutants in non-point source stormwater runoff; conflicts between recreational and subsistence fishers, and between other and various users of the Park's marine waters; loss of the unique socio-cultural character of the Park and surrounding neighborhood; reduced level of enjoyment by visitors and residents alike; and ultimately as a 'worst case', the potential economic collapse of the area as a visitor destination.

## 8.0 Design Considerations and Resource Management Concepts

### 8.1 Water Quality Issues

Several design considerations can be assessed to help maintain Class AA coastal water quality standards at Hā'ena State Park as visitations increase. These include following actions:

- Conduct a high-resolution assessment of Park topography and evaluate alternate storm drainage features to minimize or slow runoff into the ocean
- Upgrade sanitation facilities and conduct regular inspection and maintenance of sanitation systems at the public restrooms to prevent sewage seepage or spillage into the ocean or groundwater
- Create parking areas remote from the Park and allow only pedestrian or shuttle bus access
- Carefully design parking areas and apply best management practices to prevent the runoff of contaminants to streams and coastal waters
- Conduct regular maintenance of, and apply best management practices to, the Kalalau Trail to prevent unnecessary soil erosion, siltation, high turbidity, and possible coral mortality within the Kē'ē Lagoon and reef
- Provide and regularly maintain an appropriate number of trash and recycling receptacles to reduce the amount of plastic and other solid waste that blows or gets washed into the ocean in storm runoff.

### 8.2 Shoreline Erosion

Sandy beaches are at the heart of the multi-billion dollar visitor economy in Hawai'i that provides the greatest share of the state's jobs and income. When erosion threatens the built environment a common reaction is to armor the shoreline with a seawall or revetment. Armoring may impound sand thereby

impacting the sediment budget of a beach and exacerbating the erosion. Shoreline armoring also increases wave turbulence and reflection. It is common to find that the construction of one seawall on a beach leads to proliferation of additional seawalls. Armoring a chronically eroding coast leads to beach loss (Fletcher, et al. 1997). Beach loss because of seawall construction on eroding shorelines has been estimated to be 25% on O'ahu and 20% on Maui (<http://www.surfrider.org/>). In an era of accelerating sea-level rise (Church and White 2006) the threat of chronic erosion and beach loss is growing and the use of shoreline data becomes a potentially significant coastal management tool in the effort to conserve beaches for future generations.

The Kaua'i Shoreline Erosion Management Study (DHM et al 1999) developed management recommendations and plans for selected Kaua'i shoreline areas including the area between Hā'ena and Wainiha. The recommendations developed from this and related studies for preservation and restoration of sandy beaches and setbacks to compensate for coastal erosion at the Hā'ena State Park are consistent with the policies and guidelines of HRS 205A Hawai'i Coastal Zone Management, Hawai'i Coastal Erosion Management Plan (DLNR 1997), DLNR Office of Conservation and Coastal Plans and the County of Kaua'i General Plan (2000), and Kaua'i County Council Ordinance 863: Shoreline Setback and Coastal Protection Ordinance. Erosion prevention and control actions specifically relevant to the Park include:

- Delineate and manage specific erosion prone areas by 'littoral cells'. Littoral cells are self-contained beach compartments that are geographically bounded by specific physical features (e.g. groins, piers, points of land) that either provide or remove sand from the cell.
- Establish shoreline setbacks of no less than 60 feet for Hā'ena
- Prohibit shore protection structures
- Remove unpermitted shoreline structures
- Preservation of public shorelines in natural state
- Give non-structural remedies (e.g. beach nourishment) preference over structural work
- Develop and update a shoreline structure inventory

Design of future Hā'ena State Park facilities should employ the recent data and maps developed by the University of Hawai'i (UH) Coastal Geology Group (<http://www.soest.hawaii.edu/coasts/>) to calculate appropriate setbacks.

### 8.3 Marine Resource Issues and Conservation

Coral reef ecosystems have high gross primary productivity, yet the net productivity and potential fisheries yields on coral reefs are relatively low (Birkeland 2001). Populations of fishes and invertebrates on coral reefs can be fished out quickly and if severely depleted, may not return. Coral reef species are particularly vulnerable to overfishing partly because of their life-history adaptations. Because of the life-history traits of the targeted species and because of the nature of the ecosystem processes, we must be careful about expecting too much from coral reefs. The fisheries yield of coral reefs should not be expected to keep pace with the growing human population and its demand for protein (Birkeland 2001). Overfishing also can have a deleterious impact upon ecosystem function and marine community structure. While pelagic fisheries might be managed on a species-by-species basis, coral-reef fisheries must be managed on an ecosystem basis.

Four years of CRAMP monitoring data and several independent studies of the reefs within the Park suggest the nearshore waters of Hā'ena State Park from Kē'ē Beach to Hā'ena Point contain largely undisturbed coral reef resources that provide habitat for healthy populations of fishes and invertebrates of subsistence and recreational value. These populations can be sustained provided that they are actively managed through carefully organized stewardship programs. Excessive fishing pressure, particularly upon a limited number of target species, can lead to dramatic adverse changes in community structure. Serious reduction or collapse of fish resources at Hā'ena and/or significant damage to the reef habitat would reduce its overall importance as a visitor destination area and would deprive the local community

of a valuable subsistence resource (Birkeland 2001). Stepath (1999) has highlighted the potential problems associated with excessive and inappropriate uses of the Park waters.

Improvements to the Park facilities through the master planning process may consider the following measures to help protect and sustain the long-term viability of the marine environment. These considerations are adapted in part from the Coral Reef Ecosystem Fishery Management Plan (CREFMP) for the western Pacific which is the first ecosystem-based fishery management plan for U.S. waters:

- Encourage the development of management guidelines and protocols for the Community-Based Subsistence Fishery Area established for Hā'ena by Hawai'i state law within a structured administrative framework;
- Establish a permit system as part of this program that requires catch reporting to allow the evaluation of changes over time in catch per unit effort and size distribution of the resource allows management to improve (Birkeland 2001);
- Establish a program of long-term scientific monitoring of fish and invertebrate populations trends within Park marine waters;
- Allow sufficient flexibility and insure long-term monitoring to employ the principal of adaptive management and allow changes to be made to permitting processes and management actions, as deemed appropriate based upon the results of long-term monitoring and catch statistics;
- Establish a means of enforcing the permitting system for recreational fishing within the Park waters.

Consideration might also be given to the establishment of a marine protected area (MPA) adjacent to or within a portion of the Park to serve as a fishery stock replacement area.

#### 8.4 Mitigation of Conflicting Uses

Community consensus is the best mechanism to achieve a lasting solution of recreational user conflicts. Establishment of a Park users-group consisting of stakeholders, local residents, and government agencies should meet to discuss ways in which the conflicting uses discussed in the previous sections can be mitigated. User group meetings can be led by an independent moderator or by an agency or non-profit group. Segregation of conflicting uses might be considered on a rotating user basis by day and/or month, or weather and sea-condition basis, permit, or other system.

#### 8.5 Shoreline Access

HRS 115-4 and 115-5 provide that the public has a right of access all State beaches and shorelines situated below the "upper reaches of the wash of the waves." In general, counties have the primary authority and duty to develop and maintain public shoreline access. The State's primary role in the shoreline area is to preserve and protect coastal resources within the conservation district and support public access along and below the shoreline (HRS Chapter 205A). Because of the steep shoreline along the Nāpali Coast west of the Park, the portion of the shoreline where pedestrian access becomes feasible begins at Kē'ē Beach and extends eastward along the shore to Hā'ena Point.

- Shoreline access points can be placed to control access for specific recreational and subsistence uses, and should be limited to pedestrian access.
- No public vehicular traffic should be allowed on the beach within the Park.

## 9.0 Interpretive Concepts for Marine Recreational Use

A number of community-based and non-governmental (NGO) organizations, as well as government-private and NGO partnerships support periodic monitoring and educational studies of the lagoon and reef at Hā'ena State Park. These include Windward Community College (CRAMP), Makai Watch, Save our Seas, Reef Check, The Nature Conservancy, Mālāma Hawai'i, Community Conservation Network, Hawai'i Wildlife Fund, Sea Grant Program, Hawai'i Department of Land and Natural Resources Division of Aquatic Resources. Many of these activities are in turn supported by grants from government agencies and the private sector including those from Tesoro, Harold K.L. Castle Foundation, National Fish and Wildlife Foundation, NOAA, Hawai'i Tourism Authority, and others.

The State of Hawai'i Coastal Zone Management Program (CZMP) has prepared an Ocean Resources Management Plan (ORMP), as required by Chapter 205A of Hawai'i Revised Statutes (HRS), through collaboration with government agencies and stakeholders. The ORMP draws on traditional Hawaiian ecosystem management principles, relies on community and private sector involvement, promotes an adaptive learning approach, identifies responsibilities and a schedule for implementation, and emphasizes interagency collaboration and public-private partnerships. Hā'ena is one of several ORMP stewardship sites being studied over the next five years.

Each of these organizations can be considered a stakeholder in the development of interpretive, education, and management programs for Hā'ena State Park. Following the successful model of Hanauma Bay on O'ahu, consideration should be given to the establishment of a "Friends of Hā'ena State Park" organization. Such a non-profit organization can help develop and sustain a visitor education program, coordinate park cleanups by volunteer service groups, coordinate use of the park by different marine recreation groups (e.g. dive clubs, surfing contests, kayaking, etc.), provide formal and informal docent services, assist the Hawai'i Division of State Parks with management, and help alleviate user conflicts. A service group such as this might also serve as the point-of-contact for the community-based subsistence fishing area for those wishing to shorefish or spearfish within the Park.

Educational signage, a docent program, lectures, films, and interactive kiosks are all valuable approaches to consider for enhancement of visitor and resident enjoyment of Hā'ena State Park. More information on the Hanauma Bay carrying capacity study can be found in Lankford et al (2005). Friends of Hanauma Bay website is: <http://www.friendsofhanauabay.org/history.html>.

## 10.0 Literature Cited

- Abbott, I., C. L. Hunter. 2000. Ecological success of alien/invasive marine algae in Hawai'i. Available at: <http://www.botany.hawaii.edu/GradStud/smith/websites/alien-overview.htm>. Last accessed 07/10/09.
- Belt Collins Hawai'i LTD. 2008. Statewide Large-Capacity Inter-Island Ferry, Draft Environmental Impact Statement. Prepared for State of Hawai'i Department of Transportation, Harbors Division.
- Blangy, S. and H. Mehta. 2006. Ecotourism and Ecological Restoration. *Journal for Nature Conservation* 14(3-4):233-236.
- Blitz, J.B. and S.A. Norton. 2008. Possible environmental effects of sunscreen run-off. *Journal of American Academy of Dermatology*. 59(5):898.
- Birkeland, C. 2001. Can ecosystem management of coral reefs be achieved? Pp. 15-19 in *Global Trade and Consumer Choice: Coral Reefs in Crisis*, Papers presented at the symposium held at the 2001 Annual Meeting of the American Association for the Advancement of Science.
- Birkeland, C. and A.M. Friedlander. 2001. The importance of refuges to reef fish replenishment in Hawai'i. Honolulu: Audubon Society. 19 pp.
- Birkeland, C. and J. Dierking. 2007. Population level impact of the introduced grouper roi (*Cephalopholis argus*) on native reef fishes in Hawai'i. HCRI Project Final Report.
- Brown, E., E. Cox, P. Jokiel, K. Rodgers, W. Smith, B. Tissot, S. Coles, and J. Hultquist . 2004. Development of Benthic Sampling Methods for the Coral Reef Assessment and Monitoring Program (CRAMP) in Hawai'i. *Pacific Science* 58 (2): 145-158
- Brown, P.J. and R.B. Taylor. 1999. Effects of trampling by humans on animals inhabiting coralline algal turf in the rocky intertidal. *J. Exp. Mar. Biol. Ecol.* 235:45-53.
- Buddemeier, R.W., J.A. Kleypas, and R.B. Aronson. 2004. Coral Reefs and Global Climate Change: Potential Contributions of Climate Change to Stresses on Coral Reef Ecosystems. Pew Centre for Global Climate Change: Arlington, VA. 42 pp.
- Chaloupka, M., T.M. Work, G.H. Balazs, S.K.K. Murakawa and R. Morris. 2008. Cause-specific temporal and spatial trends in green sea turtle strandings in the Hawaiian Archipelago (1982-2003). *Marine Biology* 154(5):1431-1793.
- Church, J. A. and N. J. White., 2006. 20th century acceleration in global sea-level rise, *Geophys. Res. Lett.*, 33(1), L01602.
- Clark, J. 1992. Beach and Ocean Recreation Study, Hā'ena, Kaua'i. Division of State Parks, Department of Land and Natural Resources.
- Clark, J. 1999. Hawai'i's Best Beaches. University of Hawai'i Press.
- County of Kaua'i Planning Department. 2000. Kaua'i General Plan.
- CSV Consultants. 2007. Report to the Hawai'i Department of Land and Natural Resources: Recommended Strategies for Addressing Ocean Recreation User Conflicts.

D'Antonio, C. M. and P.M. Vitousek. 1992. Biological Invasions by exotic grasses, the grass fire cycle, and the global change. *Annual Review of Ecology and Systematics* 23:63-87.

Danovaro, R., L. Bongiorno, C. Corinaldesi, D. Giovannelli, E. Damiani, P. Astolfi, L. Greci, and A. Pusceddu. 2008. Sunscreens Cause Coral Bleaching by Promoting Viral Infections. *Environmental Health Perspectives*. 116(4): 441-447.

Daughton, C.G., T.A Ternes. 1999. Pharmaceuticals and personal care products in the environment: agents of subtle change? *Environ Health Perspect*. 107(6):907-38.

Davenport, J., J.L. Davenport. 2006. The impact of tourism and personal leisure transport on coastal environments: a review. *Est Coast Shelf Sci* 67:280–292.

Department of Business, Economic Development, and Tourism (DBEDT). 2008. 2007 State of Hawai'i Data Book. Available at: <http://hawaii.gov/dbedt/info/economic/databook/db2007/>. Accessed December 22, 2008.

DBEDT and Department of Health (DOH). 2000. Hawai'i's Implementation Plan for Polluted Runoff Control. Available at: <http://hawaii.gov/health/environmental/water/cleanwater/prc/implan-index.html>. Accessed January 7, 2009.

Denslow, J.S, S.C. Space, and P.H. Thomas. 2008. Invasive Exotic Plants in the Tropical Pacific Islands: Patterns of Diversity. *Biotropica*.

Department of Land and Natural Resources (DLNR). 1999. The Coastal Erosion Management Plan (COEMAP). Department of Land and Natural Resources, Coastal Lands Program. Honolulu, HI. 89 pp.

DLNR. 1999. Current Line (Newsletter, Division of Aquatic Resources): Vol. 3; No. 2 (August 1999). State of Hawai'i (Dept. of Land and Natural Resources).

DLNR, DAR, and Hawai'i Ecotourism Association. 2005. Hawai'i's Local Action Strategy to Address Recreational Impact to Reefs.

DOH Clean Water Branch. 2008. 2006 State of Hawai'i Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117), Chapter 1 Marine Waters. 48pp.

DHM Inc., Edward K. Noda & Associates, Inc., and Moon, O'Connor, Tam & Yuen. 1990. Kaua'i Shoreline Erosion Management Study. Contract report prepared for the Hawai'i Coastal Zone Management Program office, Honolulu, HI.

Dierking, J. (2007) Effects of the introduced predatory fish *Cephalopholis argus* on native reef fish populations in Hawai'i. Ph.D. dissertation, Zoology Department, University of Hawai'i at Manoa, Honolulu, Hawai'i, USA: 115 pp.

Division of Boating and Ocean Recreation (DBOR), Hawai'i Department of Land and Natural Resources (DLNR). DOBOR Facilities. Available at: <http://www.hawaii.gov/dlnr/dbor/borfacilities.htm>. Accessed December 22, 2008.

Division of State Parks, DLNR. Hawai'i State Parks website. Available at: <http://www.hawaiistateparks.org/parks/hawaii/>. Accessed December 22, 2003.

Eichenseher, T. The cloudy side of sunscreens. *Environ Sci Technol* 40(5):1377-1378.

Endreson, B., W. Aila, L. Paul. Undated. Destructive Fishing Methods: Lay Gillnets. Pacific Fisheries Coalition White Paper: <http://www.pacfish.org/wpapers/gillnets.html>

Fair Catch. 2006. Statewide Survey: Hawai'i's Attitudes on the Ocean and Lay Gill Net Restrictions. Available at: <http://www.faircatchhawaii.org/images/pdf/PublicOpinion.pdf>

Fletcher, C.H., Mullane, R.A., and Richmond, B.M., 1997. Beach loss along armored shorelines of Oahu, Hawaiian Islands. *Journal of Coastal Research*, v. 13, p. 209-215.

Friedlander, A.M. 2000. Development of standard fish survey technique. Pp. 23-34 In: Hawai'i Coral Reef Initiative Coral Reef Assessment and Monitoring Program (CRAMP) Final Report 1998-1999. Jokiel, P.L. and E.K Brown. (Eds.) Prepared for National Ocean Service, National Oceanic and Atmospheric Administration, Silver Springs, MD. 45pp.

Friedlander, A., G. Aeby, R. Brainard, E. Brown, K. Chaston, A. Clark, P. McGowan, T.

Montgomery, W. Walsh, I. Williams, and W. Wiltse. 2008. The State of Coral Reef Ecosystems of the Main Hawaiian Islands. Pp. 219-261 in Waddell, J.E. and A.M. Clarke (eds.) The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008. NOAA Technical Memorandum NOS NCCOS 73. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD.

Friedlander, A.M., E.K. Brown, P.L. Jokiel, W.R. Smith, and K.S. Rodgers. 2003. Effects of habitat, wave exposure, and marine protected area status on coral reef fish assemblages in the Hawaiian archipelago. *Coral Reefs* 22:291-305.

Friedlander, A.M. and J.D.Parrish, 1998a. Habitat characteristics affecting fish assemblages on a Hawaiian coral reef. *J. Exp Mar Biol Ecol* 224:1-30.

Friedlander, A.M. and J.D. Parrish. 1998b. Temporal dynamics of the fish assemblages on an exposed shoreline in Hawai'i. *Environ Biol Fish* 53:1-18.

Gererna-Morales, R. 2007. Hawai'i's housing boom takes toll on the homeless. *Post-gazette*. 11 January 2007.

Grigg, R. 1994. Effects of sewage discharge, fishing pressure and habitat complexity on coral ecosystems and reef fishes in Hawai'i. *Marine ecology*. 103(1-2):25.

Hadfield, M.G. and M.A.R. Koehl. 2007. Effects of Invasive Algae on Larval Transport into Coral Reefs. Pacific Biosciences Research Center.

Hamnett, M.P., M. Liu, and D.B. Johnson. 2004. Fishing, Ocean Recreation, and Threats to Hawai'i's Coral Reefs. <http://www.hawaii.edu/ssri/hcri/files/education/fishingbrochure.pdf>. Accessed January 13, 2009.

Hollier, D. 2009. A Fish Diet. *Hawai'i Business*. January 2009.

Jokiel, P.L. and E.K Brown. 2000. Hawai'i Coral Reef Initiative Coral Reef Assessment and Monitoring Program (CRAMP) Final Report 1998-1999. Prepared for National Ocean Service, National Oceanic and Atmospheric Administration, Silver Springs, MD. 45pp.

Juran, M. 2007. Community Base Marine Management, Hā'ena Ahupua'a, Kaua'i, Hawai'i: Listening to Community Members and Respected Scientists to Better Understand the Implications of Community-Based Marine Management on Our Near-Shore Fisheries.

- Katekaru, A. 2008. Transmittal of final Biological Opinion under Section 7 of the Endangered Species Act on the effects of implementation of new bottom fishing regulations in Federal waters of the Main Hawaiian Islands (Amendment 14) on listed marine species. Letter to Chris Yates, Assistant Regional Administrator, Protected Resources Division, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu.
- Kaua'i Economic Development Board. 2004. Kaua'i's Economic Development Plan 2005-2015, Kaua'i's Comprehensive Economic Development Strategy (CEDS) Report.
- Klein, R. 2007. Fodor's Kaua'i, 1<sup>st</sup> Edition. Random House, Inc.: New York.
- Lankford, S.V., Y. Inui, A. Whittle, R. Luna, and D. Tyrone. 2005. Sustainability of Coastal/Marine Recreation: Modeling Social Carrying Capacity for Hanauma Bay, Hawai'i. Prepared for University of Hawai'i Sea Grant College Program, SOEST.
- Leung, B. and N.E. Mandrak. 2007. The risk of establishment of aquatic invasive species: joining invisibility and propagule pressure. *Proceedings of the Royal Society*. 274:2603-2609.
- Liddle, M.J. and A.M. Kay. 1987. Resistance, survival and recovery of trampled corals on the Great Barrier Reef. *Bio. Conservation*, 42:1-18.
- Lockwood, J.L., P. Cassey, and T. Blackburn. 2005. The role of propagule pressure in explaining species invasions. *Trends in Ecology and Evolution* 20(5):223-228.
- Maly, K. and O. Maly. 2003a. "Hana ka Lima, 'Ai Ka Waha" A Collection of Historical Accounts and Oral History Interviews with kama'āina residents and fisher-people of Lands in the Halele'a-Nāpali Region on the Island of Kauai. Contract report prepared for NTBG and The Nature Conservancy: 506 pp.
- Maly, K. and O. Pomroy-Maly. 2003b. Ka Hana Lawai'a a me na Ko'a o na Kai'Ewalu. A History of Fishing Practices and Marine Fisheries of the Hawaiian Islands. Honolulu, HI. Contract report prepared for NTBG and The Nature Conservancy: 506 pp.
- Meliane, I. and C. Hewitt. 2005. Gaps and priorities in addressing marine invasive species. IUCN Information Document. 9pp.
- Milazzo, M. F. Badalamenti, T. Vega Fernandez, and R. Chemello. 2005. Effects of fish feeding by snorkelers on the density and size distribution of fishes in a Mediterranean marine protected area. *Marine Biology* 146:1213-1222.
- National Marine Fisheries Service and U.S. Fish & Wildlife Service. 2007. Green Sea Turtle (*Chelonia mydas*). 5-Year Review: Summary and Evaluation. 105 p.
- Needham, M.D., J.F. Tynon, R.L. Ceurvorst, R.L. Collins, W.M. Connor, and M.J.W. Culnane. 2008. Recreation carrying capacity and management at Waikiki – Diamond Head Shoreline Fisheries Management Area on Oahu, Hawai'i. Final project report for Hawai'i Coral Reef Initiative – Research Program. Corvallis: Oregon State University, Department of Forest Ecosystems and Society. 95pp.
- Nielsen, F.M. 2005. Franko's Dive Map of Kaua'i: Details on the North, East, and South Shores plus the Islands of Ni'ihau and Lehua.
- NKN Project Planning (2006). Final Environmental Assessment for Hā'ena County Beach Park Improvements. 34pp + Appendices.

NOAA 2007. NOAA Coral Reef Conservation Program (CRCP) External Program Review.  
<http://www.coralreef.noaa.gov/review.html>

Roberts, D. 2006. Florida Fishing Weekly. Marine Fish Feeding: Why the FWC Thinks It's Bad for Everyone. Florida Fish and Wildlife Conservation Commission.

Rodgers, K.S. 2001. A quantitative evaluation of trampling effects on Hawai'i's coral reefs. Masters Thesis. University of Hawai'i, Dept. of Geography. Honolulu, Hawai'i. pp.163

Rodgers, K.S. and E. Cox. 2003. The Effects of Trampling on Hawaiian Corals along a Gradient of Human Use. *Biological Conservation* 112(3):383-89.

Rodgers, K.S. and P.L. Jokiel. 2007. Evaluation of the 'Āhihi-Kīna'u Natural Area Reserve Marine Resources.1. Human Impact Evaluation on Nearshore Environments. Hawai'i Coral Reef Assessment and Monitoring Program.

Rodgers, K., C. Newton, and E.F. Cox. 2003. Mechanical Fracturing of Dominant Hawaiian Corals in Relation to Trampling. *Environmental Management* 31:377-384.

Rouphael, T., Inglis, G. 1995. The Effects of Qualified Recreational SCUBA Divers on Coral Reefs. CRC Reef Research Centre. Technical Report No. 4. CRC Reef Research Centre, Townsville.

Schlacher, T.A., D. Richardson, I. McLean. 2008. Impacts of off-road vehicles (ORVs) on macrobenthic assemblages on sandy beaches. *Environmental Management* 41(6):878-892.

Schueler, T.R. 1994. The importance of imperviousness. *Watersh. Protect. Techn.* 1(3):100-111.

Singh, A., H. Wang, W. Morrison, H. Weiss. 2008. Fish biomass structure at pristine coral reefs and degradation by fishing. Unpublished manuscript, Georgia Institute of Technology. 17pp.

SPC Fisheries. 2004. Divers Feeding Fishes: A Continuing Issues in MPA Management. SPC Fisheries Newsletter #111.

Sprout, J. and J. Sprout. 2004. Kaua'i Trailblazer: Where to Hike, Snorkel, Bike, Paddle, Surf. Diamond Valley Company.

Stepath, C. 1999. Ke'e Lagoon and Reef Flat Users Baseline Study. Unpublished marine biological survey report.

Sweatman, H.P.A. 1996. Impact of tourist pontoons on fish assemblages on the Great Barrier Reef. CRC Reef Research Centre Ltd Technical Report No. 5 Townsville; CRC Reef Research Centre Ltd, 54 pp.

Tabata, Raymond S. July 1992. Hawai'i's Recreational Dive Industry Sea Grant Marine Economics Report. Ocean Resources Branch. DBEDT State of Hawai'i. Contribution No. 98.

Tabata, R.S. 1980. The Native Coastal Plant of Oahu, Hawai'i. pp 321- 346. In Smith, C. W. (Ed.). June 4-6, 1980. Proceedings of the Third Conference in Natural Sciences, Hawai'i Volcanoes National Park. Cooperative National Park Resources Studies Unit, University of Hawai'i at Manoa.

Tratalos, J.A., Austin, T.J., 2001. Impacts of recreational SCUBA diving on coral communities of the Caribbean island of Grand Cayman. *Biological Conservation* 102:67-75.

Than, K. 2008. Swimmers' Sunscreen Killing Off Coral. National Geographic News. 29 January 2008. Available at: <http://news.nationalgeographic.com/news/2008/01/080129-sunscreen-coral.html>. Accessed January 5, 2009.

The Keith Companies- Hawai'i, Inc. (TKC) and Earthplan Planning and Design (Earthplan). 2001. Hā'ena State Park Master Plan and Draft Environmental Impact Statement. Prepared for Division of State Parks Department of Land and Natural Resources.

Vogt, G. 1979. Adverse effects of recreation on sand dunes: A problem for coastal zone management. *Coastal Zone Management Journal* 6(1): 37-68.

University of Hawai'i, Sea Grant Extension Service and County of Maui Planning Department. 1997. Beach Management Plan for Maui. Available at: <http://hawaii.gov/dlnr/occl/manuals-reports/BeachManagementPlan.pdf/view>. Accessed December 19, 2008.

University of Hawai'i, Sea Grant College Program. 2006. Natural Hazard Considerations for Purchasing Coastal Real Estate in Hawai'i: A Practical Guide of Common Questions and Answers.

Vitousek, P.M. 1990. Biological invasions and ecosystem processes: towards an integration of population biology and ecosystem studies. *Oikos* 57:7-13.

Vitousek, P.M. 1992. Effects of alien plants on native ecosystems. Pages 29-41 in C.P. Stone, C.W. Smith, and J.T. Tunison (eds.), *Alien plant invasions in native ecosystems of Hawai'i: management and research*. Cooperative National Park Resources Studies Unit, University of Hawai'i, Honolulu. 887 pages.

Williams, I.D., W.J. Walsh, R.E. Schroeder, A.M. Friedlander, B.L. Richards, and K.A. Stamoulis. 2008. Assessing the importance of fishing impacts on Hawaiian coral reef fish assemblages along regional-scale human population gradients. *Environmental Conservation* 35(3):261-272.

Woodland, D.J. and J.N.A. Hooper. 1977. The Effects of Human Trampling on Coral Reefs. *Biol. Conservation*, 11:1-4.

Yamamoto, L. 2006. Lonely Planet Kaua'i. Lonely Planet: London. Yuen, K. Personal communication.

Zeller, D. M. Darcy, S. Booth, M.K. Lowe, and S. Martell. 2008. What about recreational catch? Potential impact on stock assessment for Hawai'i's bottomfish fisheries. *Fisheries Research (Amsterdam)* 91(1): 88-97.





# Appendix C



# **Rockfall Hazard Assessment Haena Park Kauai, Hawaii**

Prepared for

State of Hawaii  
Department of Land and Natural Resources  
Division of State Parks  
1151 Punchbowl Street, Room 310  
Honolulu, Hawaii 96813

Prepared by

Earth Tech AECOM  
841 Bishop Street, Suite 500  
Honolulu, Hawaii 96813-3920

December 2008

## **OVERVIEW**

---

Earth Tech AECOM, Inc. (Earth Tech) has prepared this rockfall assessment for the State property within Haena Park along the mauka side of Kuhio Highway in accordance with Federal Highway Administration (FHWA) publications and construction industry standards. The purpose of the assessment is to evaluate rockfall potentials and hazards and to recommend rockfall mitigation methods best suited for this site. It is Earth Tech AECOM's opinion that it is impossible to speculate with great certainty as to when any of the rockfall areas referenced in this report could result in an actual rockfall event; however, it is possible to identify the areas that show a potential for rockfall hazard.

This rockfall study was performed in two consecutive phases: a) geological survey of the site and rockfall hazard identification, and b) engineering planning study of the rockfall condition and development of preliminary rockfall protection design alternatives and cost estimates. During the geological survey phase, areas with potential for rockfall or landslide were identified and site-specific descriptions were obtained. The geological conditions of the site and the key rockfall features are presented in a report format including color photographs. The engineering planning phase identifies engineering solutions in terms of alternative designs for reducing potentials of rockfall hazards. A preliminary construction cost estimate is provided for each alternative design. All work is based on the research data and the recommended procedures by FHWA, United States Department of Transportation, and the engineering and construction standards accepted by the industry.

Many rockfall features and many recent rockfall activities were found during field investigation. Some of the recent rockfalls occurred right next to and ended on the Kuhio Highway close to the Wet Cave. The area around the Wet Cave is the most hazardous rockfall area because: 1) many rockfall features exist there; 2) very high probability for rockfalls to reach the roadway or Wet Cave; and 3) almost constant presence of visitors in this area. The Wet Cave area is rated rockfall hazard Class A entailing a high hazard rating. Rockfalls are less likely to reach the roadway or beach at other places.

The annual probability of loss of life from rockfall along Kuhio Highway and the beach within Haena Park is estimated at  $1.3 \times 10^{-3}$ , higher than the recommended tolerable level of  $10^{-5}$  for general public. Therefore rockfall mitigation is recommended for Haena Park to reduce rockfall risk to park users.

The recommended permanent engineering mitigation design alternative for Haena Park is a combination of rockfall impact fence and anchored wire mesh system due to its easiness of construction, least disturbance to environment, and relatively low cost, with a cost of 9.8 million dollars and a construction period of eight months.

For temporary rockfall mitigation design, scaling is recommended due to its ease of construction, least disturbance to environment, and cost-effective in rockfall hazard reduction, with a cost of \$750,000 and a construction period of four months to scale the high hazard area around the Wet Cave and all the identified boulder sites in this report. An additional 1.5 million dollars and a construction period of six months are needed to scale other areas. Only rocks that are likely to reach the roadway or other protected structures need to be scaled.

# TABLE OF CONTENTS

---

OVERVIEW	i
ACRONYMS AND ABBREVIATIONS	v
1.0 INTRODUCTION	1-1
1.1 Scope of Services	1-1
1.2 Implementation Plan	1-1
2.0 GEOLOGICAL SURVEY OF THE SITE AND ROCKFALL HAZARD IDENTIFICATION	2-1
2.1 Rock Formations–Foundation of Rockfall	2-1
2.2 Weathering and Erosion Processes–Cause of Rockfall	2-1
2.3 Precipitation–Timing of Rockfall	2-2
2.4 Rockfall Hazard Rating System	2-2
2.5 Rockfall Computer Simulation	2-5
2.6 Rockfall Sites and Potential Rockfall Hazards at Haena Park	2-11
2.7 Rockfall Risk Estimation for the Haena Park Site	2-14
3.0 ENGINEERING PLANNING STUDY	3-1
3.1 Rockfall Engineering Mitigation Methods	3-1
3.2 Recommended Rockfall Mitigation Design at Haena Park	3-4
3.3 Similar Rockfall Projects and Experienced Contractors	3-5
4.0 REFERENCES	4-1

## APPENDIXES

Appendix A Rockfall Simulation Data

Appendix B Cost Estimates

## FIGURES

Figure 1-1: Site plan of Haena Park rockfall assessment project.	1-2
Figure 2-1: Rockfall simulation results for profile P1.	2-7
Figure 2-2: Rockfall simulation results for profile P2.	2-8
Figure 2-3: Rockfall simulation results for profile P3.	2-9
Figure 2-4: Rockfall simulation results for profile P4.	2-10
Figure 2-5: Rockfall simulation results for profile P5.	2-11
Figure 3-1: Draped Wire Mesh	3-6
Figure 3-2: Anchored Wire Mesh	3-7
Figure 3-3: Impact Fence	3-8
Figure 3-4: Combination Impact Fence & Wire Mesh Drape System	3-9
Figure 3-5: Catchment Ditch	3-10
Figure 3-6: Retaining Wall	3-11

## TABLES

Table 2-1: Representative Identified Potential Rockfall Outcrops at Haena Park, Kauai.	2-13
--	------

**PHOTOS**

Photo 2-1. Round boulder on steep slope at B1.	2-15
Photo 2-2. Highly fractured and weathered steep slope with many loose rocks at B3.	2-16
Photo 2-3. An overhanging and standing boulder with large opened back fracture at B4.	2-16
Photo 2-4. A completely overhanging boulder with steep back fracture dipping out of slope at B5.	2-17
Photo 2-5. Loose boulders on talus slope at B7.	2-17
Photo 2-6. Root wedging enlarged fractures at B12.	2-18
Photo 2-7. A recent fallen boulder at B14.	2-18
Photo 2-8. Recent fallen boulders. Notice the fresh impact marks on the trees.	2-19
Photo 2-9. Old impact marks on the tree and stopped boulders.	2-20
Photo 2-10. A rock perched on tree branches at B17.	2-21
Photo 2-11. A recent rockfall boulder on steep slope with potential for further fall.	2-21
Photo 2-12. An overhanging boulder partly supported by rotten tree roots at B19.	2-22
Photo 2-13. An overhang loose boulder on steep slope at B19.	2-22
Photo 2-14. A loose boulder on steep slope.	2-23
Photo 2-15. Rocks stopped by a tree.	2-23
Photo 2-16. Recent rockfall boulders and fresh impact marks on trees.	2-24
Photo 2-17. Recent rockfall boulders perched on tree roots and fresh impact marks on trees.	2-24
Photo 2-18. The source of the recent rockfall at B21.	2-25
Photo 2-19. An overhanging fractured rock with potential for wedge failure.	2-25
Photo 2-20. Fractured and overhanging rocks at B21.	2-26
Photo 2-21. Opened columnar joint of a dike. Kuhio Highway is at the left of the photo at B21.	2-27
Photo 2-22. A major fracture separates a small ridge from the main rock slope at B21.	2-28
Photo 2-23. Overhanging and fractured rocks at B23.	2-28
Photo 2-24. A protruding rock sitting on a steep fracture dipping out of slope at B25.	2-29
Photo 2-25. An overhanging loose rock sitting on top of a ledge at B26.	2-30
Photo 2-26. Overhanging loose boulders on a steep talus slope.	2-30
Photo 2-27. Overhanging loose boulders on a steep talus slope at B30.	2-31
Photo 2-28. An overhanging fractured rock on a high cliff face.	2-32
Photo 2-29. An overhanging and fractured block on top of a high cliff face.	2-33
Photo 2-30. A major fracture separates a large block on a high rock cliff.	2-34

Photo 2-31. A recent rockfall source and a large overhanging rock with back fractures.	2-35
Photo 2-32. An overhanging portion of a high cliff.	2-35
Photo 2-33. Loose boulders perched on a steep ridge.	2-36
Photo 2-34. An overhanging large bolder on the very top of a high slope.	2-36
Photo 2-35. The thick lava flow layer on the very top of the high slopes.	2-37

## ACRONYMS AND ABBREVIATIONS

---

AGS	Australian Geomechanics Society
CRSP	Colorado Rockfall Simulation Program
FHWA	Federal Highway Administration
ft.	feet/foot
GPS	global positioning system
lf	linear feet
mph	miles per hour
RHRS	Rockfall Hazard Rating System
USDOT	United States Department of Transportation

# **Section 1.0**

## **Introduction**

## 1.0 INTRODUCTION

Faced with potential for rockfalls on the mauka side of Kuhio Highway at Haena Park, the Department of Land and Natural Resources, State of Hawaii, tasked Earth Tech AECOM to perform a study of the present rockfall condition for the site (Figure 1-1). Earth Tech AECOM geotechnical engineers and geologists performed the field investigation using visual means and methods. Rockfall locations identified in this report are based on coordinates shown on a hand-held global positioning system (GPS) unit with +/- 30 ft accuracy under normal condition. These identified sites are representative samples of potentially hazardous rocks. Similar types of rocks may exist along the project site which were not identified and documented in this report. Topographic surveying and sub-surface investigation were not a part of the scope of this study. The specific conditions described in this report pertain to those present at the time of field investigation.

### 1.1 SCOPE OF SERVICES

The scope of services included the following tasks: (1) conduct field reconnaissance; (2) assess and delineate the falling rock hazards; (3) identify and articulate options to mitigate the potential hazard; (4) identify and articulate the risks associated with each option; (5) identify products required for each option; (6) identify locations (in Hawaii if applicable) where the options have been implemented; (7) provide budgetary cost estimates for work required under each option; and (8) identify experienced contractors qualified to perform the work.

### 1.2 IMPLEMENTATION PLAN

The project was implemented in two phases, as follows:

1. Geological survey of the site and rockfall hazard identification:

Earth Tech AECOM performed a visual assessment of the geological formation and rock outcroppings along accessible areas of the mountain slope.

A geological report was prepared to identify the key features of the site geology and to locate rock outcroppings including GPS readings and color photography. The study methodology is based on applying suitable methods recognized by the Federal Highway Administration (FHWA), United States Department of Transportation (USDOT), and the prevailing construction standards used in the industry.

2. Engineering planning study of the rockfall condition and development of preliminary rockfall protection design and cost estimates:

Performed an engineering study for identifying alternative mitigation procedures and to prescribe a recommended methodology based on accepted engineering practice and sound economics to reduce rockfall hazards.

A budgetary cost estimate was provided for each design option.



Figure 1-1: Site plan of Haena Park rockfall assessment project.

## **Section 2.0**

# **Geological Survey of the Site and Rockfall Hazard Identification**

## **2.0 GEOLOGICAL SURVEY OF THE SITE AND ROCKFALL HAZARD IDENTIFICATION**

### **2.1 ROCK FORMATIONS—FOUNDATION OF ROCKFALL**

Knowing local geology knowledge is essential to understanding the potential hazards of rockfall events and the associated mitigation methods.

The island of Kauai consists of a single shield volcano, which is deeply eroded and partly veneered with much later volcanics. The rock formation exposed at Haena Park belongs to the Napali Formation (or Napali Member), the oldest exposed shield volcano formation above ocean water (Stearns 1985; MacDonald et al. 1983). Talus, formed by fallen rocks piled against the high cliffs, is another major rock formation exposed at the project site.

The Napali Formation consists of mainly basaltic lava flows with two morphology types: 'a'a and pahoehoe. 'A'a flows are formed by dense (low volatile content) and viscous lava. As the viscous lava flows, it constantly shears apart its top crust formed by cooling to produce the top rough and jagged clinkers. At the front of a'a flows, the top clinkers—carried along by the flowing lava like on a conveyor belt—tumble down and are buried by the advancing lava over them, forming the bottom clinkers. A typical 'a'a flow unit, therefore, consists of three layers: the top and bottom clinker layers and the middle interior. Vesicles in the middle interior are commonly stretched or of irregular shapes. Due to differential erosions—the fast erosion of the weak, very vesicular, and poorly cemented clinkers and the slow erosion of the dense interior, a'a interiors are often overhang and prone to rockfall.

Pahoehoe flows are formed by fluidal lava (low viscosity) with high volatile content. Consequently, pahoehoe flows commonly are thin characterized by smooth, billowy, hummocky, or ropy surfaces and contain large amount of spherical vesicles. Pahoehoe flows are essentially tunnel or tube lava flows: once crusted over on the surface due to cooling, the fluidal lava is less likely to shear apart its crust and thenceforth flows within a tunnel or tube of its own making. A main feeding channel or lava tube, usually thick, is typically associated with a pahoehoe flow unit.

### **2.2 WEATHERING AND EROSION PROCESSES—CAUSE OF ROCKFALL**

Weathering and erosion are chiefly responsible in creating rockfall.

Several natural mechanisms contribute to the alteration and breakdown of rocks. Mechanical weathering represents breaking up of rocks by physical disintegration without changing their chemical composition. Chemical weathering involves an alteration in chemical composition and the formation of new minerals. Examples of mechanical or physical weathering are stream and wave erosion, the wedging action of growing plant roots and stems, or the fragmentation of rock faces caused by enlargement of fractures due mainly to gravity. Clay minerals and hydrated iron oxides are typical products of chemical weathering. Due to high temperature and rainfall and abundant vegetation, conditions for chemical weathering are nearly optimum at the Haena Park site.

Breaking up of the rock by mechanical weathering greatly aids chemical weathering because it increases the area of rock surface exposed to chemical action. Chemical weathering, in return, reinforces mechanical weathering. For example, chemical weathering normally increases the volume of weathered rocks as compared to the original volume of the unweathered rock, setting up stress between the outer more weathered and inner less weathered portions, and causing the rock to break apart. The mutual reinforcement of chemical and physical weathering effects is an ongoing process, the degree and rate of which will largely determine the stability of rock in the area.

'A'a flows are especially prone to boulder rockfall due to their differential erosion. The thick and dense interiors of 'a'a flows are relatively resistant to weathering due to their large thickness and low permeability (low porosity). The clinkers, on the other hand, are rapidly eroded away by both

chemical and mechanical weathering. Consequently, overhangs of thick 'a'a interiors are seen almost at every 'a'a flow outcrop. These overhangs are unstable because: (1) the top and bottom supporting layers of the overhangs are poorly cemented and often deeply weathered clinkers; (2) the dense interiors have columnar joints formed naturally by the thermal contraction of lava during cooling; (3) overhangs exert extra stresses on vertical joints and fractures that may increase over time, enlarging the fracture and/or joint spaces. Because it is unlikely for the interior and the clinkers to have similar weathering rates, the only natural way to eliminate a'a interior overhangs is through rock falls or slides. Once dislodged, boulders of the dense interior could roll far due to their large potential energy (large size) and the focus of the energy (without breaking up into small pieces of rocks).

Massive pahoehoe flows (main feeding channels) embedded in thin pahoehoe flows behave similarly as 'a'a interiors. Massive pahoehoe flows are relatively resistant to weathering due to the lack of internal bedding, low permeability, and large thickness. Thin pahoehoe flows, on the other hand, are prone to weathering due to their thin bedding and large amount of vesicles. The piling style of thin pahoehoe in which small oval toes stacked together with little welding-in-between creates adverse geologic structure. Although thin pahoehoe layers themselves are much less prone to boulder rockfall as they easily splinter into small and often flat pieces, their fast differential erosion, however, leads to the overhang of their main feeding channel that could create spectacular rockfall events.

Both a'a and pahoehoe flows are subject to jointing and fracturing where focused weathering occurs. Fracturing and jointing in basalt flows are most commonly initiated as contraction cracks during cooling of lavas. Joints and fractures are enlarged by weathering and gravitational stresses.

Spheroidal weathering is a common form of weathering in which concentric shells of progressively weathered material form around a core of less weathered basalt. Because edges and corners of fractured basalt are exposed to weathering through two or more surfaces, the increased weathering there results in rounding of blocks. Spheroidal weathering produces spherical rocks that could roll easily on a slope.

Over-steepened talus slopes consisting of soil and boulders are prone to rockfall. Rainfalls induce the erosion of soil materials, leaving behind loose and overhanging boulders. During exceptionally heavy rains when the quantity and speed of surface runoff reach certain limits under which the cohesion and gravity of the soil material can be overcome, great quantities of material can be eroded away in relatively a short period of time.

### **2.3 PRECIPITATION—TIMING OF ROCKFALL**

Water does not only promote weathering but also a determinant factor in the timing of rockfall events. Due to hydraulic pressure and erosion, rockfall events tend to occur more frequently during or after heavy rains in Hawaii.

The average yearly rainfall for Haena Park is quite high at about 122 inches per year according to data at rainfall station PH Wainiha 1115 about 1.7 miles away with similar elevation. The precipitation data were taken from the Hawaii State Climate Office at website: <http://lumahai.soest.hawaii.edu/Hsco/ppt.htm>. The weather station information was taken from the National Climatic Data Center at website: <http://www.ncdc.noaa.gov/oa/climate/surfaceinventories.html#A>.

### **2.4 ROCKFALL HAZARD RATING SYSTEM**

A rockfall mitigation procedure begins with an understanding of the structural geology and relative orientation of the discontinuities of a slope, the water run-off condition, and the site geometry. To assess potential rockfall hazards, the FHWA and the DOT have sponsored extensive research to develop a series of rockfall mitigation methods and a systematic procedure for rating rockfall

conditions. The results of this research were presented in a series of publications and guidelines *Rockfall Hazard Mitigation Methods* (Publication No. FHWA SA-93-085, March 1994) and *Rockfall Hazard Rating System* (Publication No. FHWA SA-93-057, November 1993). These manuals introduce a multitude of up-to-date techniques and materials to mitigate each condition, hence providing a sense of uniformity during assessment, design, and maintenance. The basic concept behind the DOT/FHWA Rockfall Hazard Rating System is summarized below.

Rockfall rating groups the hazard conditions into three classes, as described below:

- Class A — High estimated potential for rockfall on adjacent property(ies) with high historical rockfall activity. A Class A rating means that the chances of rock falling in a site is moderate to high, and that when the rockfall occurs, it will certainly reach adjacent property(ies). An example of a Class A condition is where rocks on the cut slope overhang the adjacent property(ies) and in areas, between the rockfall property and adjacent property(ies), where little or no rock catchment ditch is present.
- Class B — Moderate estimated potential for a rock to fall on adjacent property(ies) with moderate historical rockfall activity. As the rockfall risk is reduced, a Class B rating indicates that although a rockfall is probable, the chances of it reaching the adjacent properties are low to moderate. A possible scenario for Class B is a condition where a rockfall from the slope is clearly possible, and the catchment ditch is large enough to prevent most of the rocks from reaching the adjacent property(ies).
- Class C — Low estimated potential for rockfall on adjacent property(ies) with low historical rockfall activity. Class C rating pertains to a condition in which there is a low chance for a rockfall event, but should one occur, there is low to no chance for the rocks to reach other properties.

To evaluate a rockfall condition for a given property, certain criteria must be evaluated. These criteria are identified below:

- Slope height
- Ditch or catchment effectiveness
- Structural condition, Case One slopes (movement along discontinuities)
- Rock friction
- Structural condition, Case Two slopes (differential erosion or oversteepening leads to rockfall)
- Difference in erosion rates
- Volume of rockfall event
- Climate and the presence of water on slope
- Rockfall history
- Slope topography

**Slope Height** evaluates the risk associated with the vertical height of a slope. Slope height represents the highest elevation from which a rock could roll down the slope. This value is reasonably estimated from existing topographic maps, through use of a GPS unit, or from trigonometric relationships. High slopes are associated with high rockfall hazard because they have more materials available for rockfall and higher potential energy for rock acceleration. A larger rockfall potential energy is associated with an increased hazard.

The slopes at Haena Park are high, at places over 1000 ft.

**Ditch Effectiveness** estimates the effectiveness of a catchment ditch or zone in restricting falling rocks from reaching adjacent property(ies). The risk related to a rockfall situation varies based on how effectively a catchment ditch or zone can avert the rocks from reaching the adjacent property(ies). The risk of rocks reaching other property(ies) is lower where a good catchment is in place, regardless of the volume of rock that has fallen. Conversely, the risk heightens where there is limited or no catchment available to stop the falling rocks.

Rockfall catchment varies along the project site. Portions of the mauka side of the Kuhio Highway at Haena Park have relatively wide flat area with dense trees, providing almost adequate rockfall catchment. Other portions, however, have narrow or no flat areas, providing little rockfall catchment.

**Structural Condition.** For the purpose of the rockfall assessment, the geologic conditions of slopes are evaluated based on two distinct cases. Where both rockfall cases are present, the condition that is more severe should be considered.

Case 1. Structural Condition represents slopes for which discontinuities, bedding planes, and joints are the dominant features. Movement within the discontinuities of the slope is the major cause of rockfall for the Case 1 category. "Movement occurs along these joints where the resistance to movement is significantly less than the intact strength of the rock itself. When the joints are oriented adversely to the slope, the potential for rockfall is greater. Adverse joints are those that singularly or in combination with other joints make planar, circular, block, wedge or topping failures kinematically possible" (Pierson and van Vickle 1993, p. 49).

Rockfall movement along structural joints is controlled by the roughness of the joint planes. The degree of roughness ranges from rough and irregular to slickensided. "Friction along a joint, bedding plane, or other discontinuity is governed by the macro and micro roughness of surfaces. Macro roughness is the degree of undulation of the joint relative to the direction of possible movement. Micro roughness is the texture of the surface. On slopes where the joints contain hydrothermally altered or weathered material, movement has occurred causing slickensides or fault gouge to form, or the joints are open or filled with water, the rockfall potential is greater" (Pierson and van Vickle 1993, p. 52).

Case 2. This case represents slope conditions in which differentially eroded rock units and over-steepened slopes are dominant features. Over-steepening of slopes and unsupported rock overhangs increase the risk of rockfall. As described in the RHRS manual, "Rockfall is commonly caused by erosion that leads to a loss of support either locally or throughout a slope. The types of slopes that may be susceptible to this condition are layered units containing more easily erodible units that undermine more durable rock; talus slopes; highly variable units, such as conglomerates, and mudflows, that weather differentially, allowing resistant rocks and blocks to fall; and rock/soil slopes that weather allowing rocks to fall as the soil matrix material is eroded" (Pierson and van Vickle 1993, p. 55).

Where the slope is composed of different rock/soil materials, which exhibit significant differences in composition and characteristics, the rate of erosion may vary within different layers and zones. Progress of soil erosion under these conditions could result in loss of support of portions of the slope, increasing the risk for rockfall.

**Block Size or Volume of Rockfall Event** is evaluated based on individual blocks of rock or a volume of rocks of various sizes. "Larger blocks or volumes of falling rock produce more total kinetic energy and greater impact force than smaller events... the larger the blocks or volume the greater the hazard created..." (Pierson and van Vickle 1993, p.62).

During field investigations, both large and small boulders were identified within this property posing potential hazard.

**Climate and Presence of Water on Slope.** This category evaluates the effects of climate including precipitation, and the presence of water on the slope surface. "Water ... contributes to the weathering and movement of rock materials and a reduction in overall slope stability. This category evaluates the amounts of precipitation ..." (Pierson and van Vickle 1993, p. 65).

Generally a rainfall of 122 inches per year at the site is considered high.

**Rockfall History** at a site is an important indicator of future rockfall activities. Sites with a history of frequent rockfall are more likely to experience future rockfall events. The magnitude of historical rockfalls is also an indicator of future rockfall behavior at a site.

During site investigation, recent rockfall activities were apparent, some of them occurred right adjacent to Kuhio Highway.

Based on the above rating criteria, the rockfall section at the mauka side of Kuhio Highway at Haena Park consists of both Class A and Class B rockfall ratings.

## 2.5 ROCKFALL COMPUTER SIMULATION

Rockfall is initiated by unbalanced forces as a result of gravity, weathering, erosion, excavation, fracture development, hydraulic pressure, plant or ice wedging, seismic or blasting vibration, or impact by moving objects. After initiation, the fate of rockfall depends on initial momentum, elevation, steepness and roughness of slope, slope material, and the shape and size of the falling rocks. The elevation and size determine potential energy and the shape, slope, and slope material determine the potential acceleration of rockfall.

The Colorado Rockfall Simulation Program (CRSP) version 4.0 (Jones et al. 2000), jointly developed by Colorado School of Mines, Colorado Department of Transportation, and Colorado Geological Survey, simulates rocks tumbling down a slope. The program is based on mathematical models, probability factors, and many rockfall experiments. CRSP can predict the statistical distribution of speed and bouncing height and is a guide and reference for recommending and designing rockfall mitigation. The model takes into account slope profile, rebound and friction characteristics of the slope, and rotational energy of the rocks. The program, together with its values for normal coefficient of restitution ( $R_n$ ) and the tangential coefficient of frictional resistance ( $R_t$ ), has been calibrated by many rockfall events here in Kauai. The model is one of the most widely used and is the recommended tool for the geologist and engineer in analyzing and mitigating rockfall hazards.

CRSP simulations are used to approximate the bouncing height, velocity, kinetic energy, and traveling distance of possible rockfalls. The simulation profiles (cross sections) are based on field measurements taken during investigation. The shape of each boulder is assumed spherical with a 4-foot (ft.) diameter, similar to the large boulders found on the slope. Because CRSP does not include the effect of trees, slope roughness was increased to simulate the effect of tree trunks in stopping falling rocks as dense trees exist at the project site. For each assumed slope profile and boulder, the program mathematically rolls the same boulder down the same slope profile one thousand times and each time it mathematically produces a new slope roughness resulting in a new traveled path by that boulder. It would then issue a percentage for the number of times the hypothetical boulder reaches the end of the run and the jumping height and speed of the boulder at each location of the profile.

Rockfall simulations were performed for five slope profiles on the mauka side of Kuhio Highways at Haena Park (Figure 1-1). Due to the high elevation and difficulty in access, the top slope profiles were obtained from Google Earth Pro. The bottom of the slope profiles were measured using a measuring tape and a clinometer.

Figure 2-1 shows the simulation results for profile P1 from the gate of the secondary parking lot to the mountain peak (Figure 1-1). A high rock cliff is about 140 feet away from the paved road of Kuhio

Highway, and a relatively flat catchment area exists between the cliff and the road (Figure 1-1 and Figure 2-1). Based on results of this mathematical simulation, about 3% rockfalls reach the road, with a maximum bouncing height of 0.4 foot at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P1 would entail Class B rockfall rating.

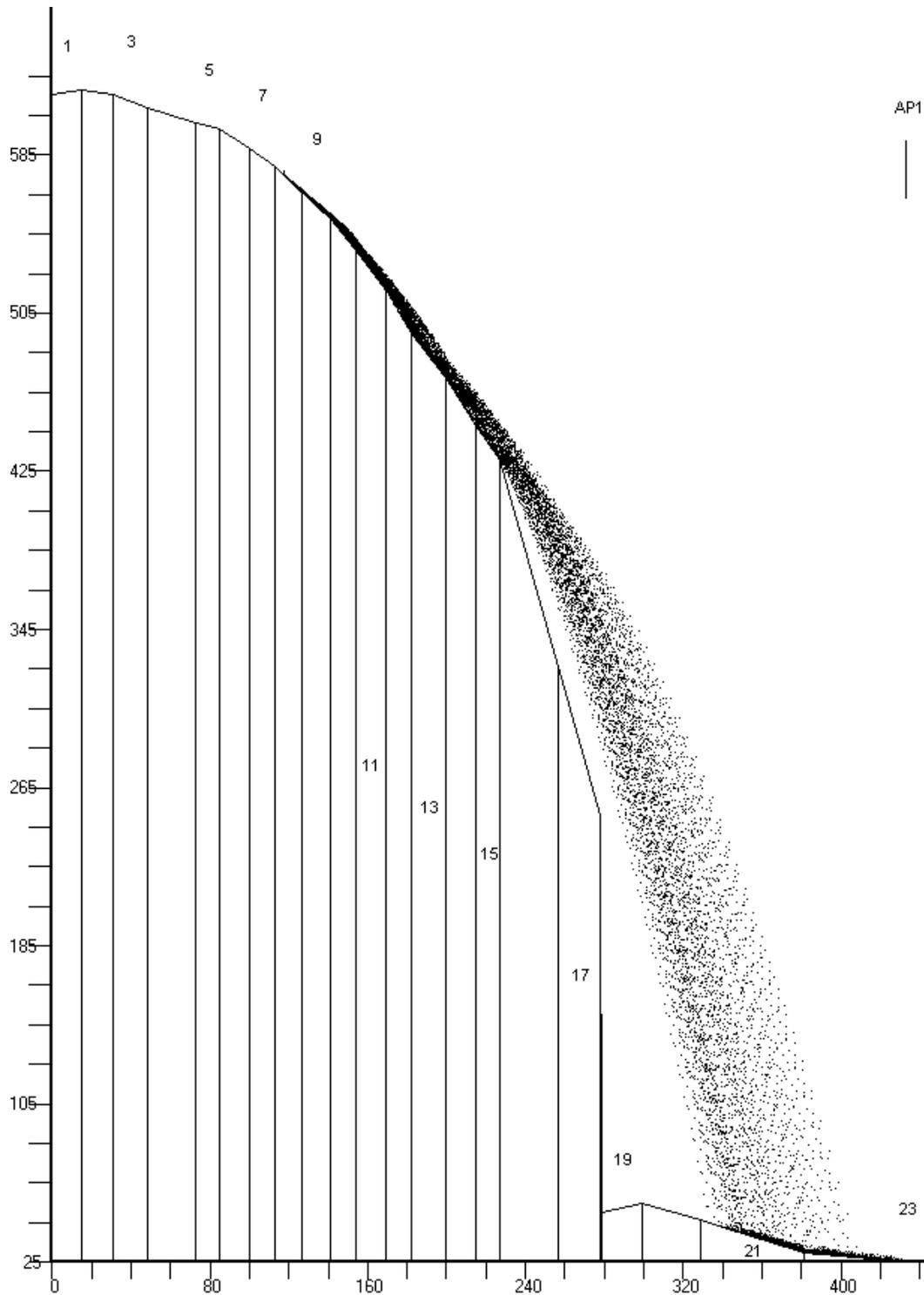
Figure 2-2 shows the simulation results for profile P2. Unlike profile P1, profile P2 has a long and steep talus slope leading to a high rock cliff (Figure 1-1 and Figure 2-1). About 63% of simulated rockfalls originated from the top of the mountain are anticipated to reach the road, with a maximum bouncing height of 9 feet at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P2 would entail Class A rockfall rating.

Figure 2-3 shows the simulation results for profile P3 at the start of the beaching parking lot (Figure 1-1). Profile P3 has a relatively flat catchment area and a steep talus slope before a high rock cliff (Figure 1-1 and Figure 2-3). About 4% of simulated rockfalls originated from the top of the mountain are anticipated to reach the road, with a maximum bouncing height of 1.6 feet at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P3 would entail Class B rockfall rating.

The Wet Cave (Waikanaloe Wet Cave, right next to the road) exists between profiles P2 and P3, in between locations of boulders B21 and B20 shown in Figure 1-1. Here high rock cliff is right next to the paved road. Most, if not all, rockfalls would reach the road. This rockfall section including the Wet Cave is considered Class A rockfall rating.

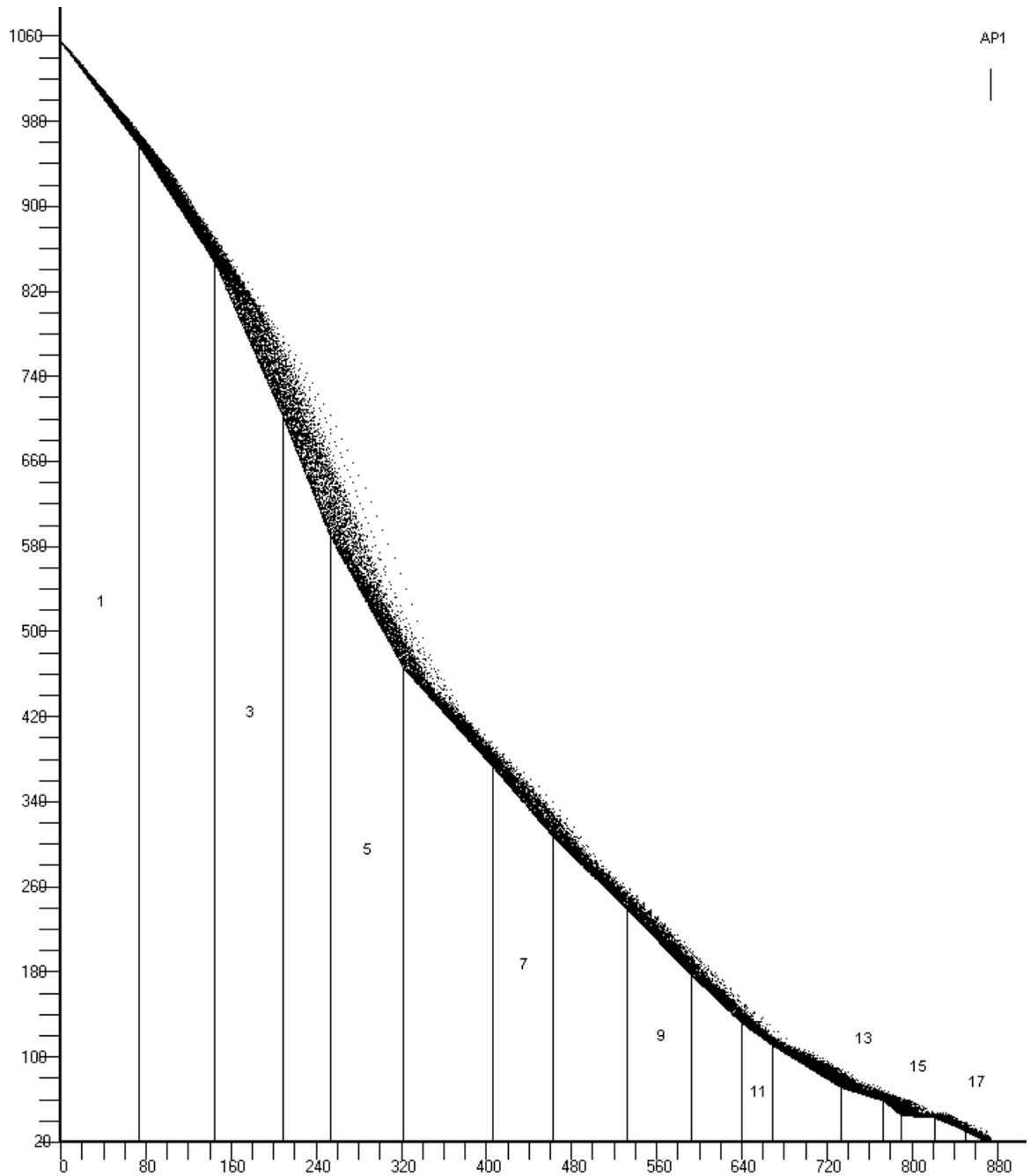
Figure 2-4 shows the simulation results for profile P4 at the start of the Kalalau trail (Figure 1-1). Profile P4 has a relatively flat catchment area and then a short steep talus slope before a ridge (Figure 1-1 and Figure 2-4). About 0.5% of simulated rockfalls originated from the top of the mountain reach the road, with little or no bouncing at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P4 would entail Class B rockfall rating.

Figure 2-5 shows the simulation results for profile P5 starting from the most populated beach area (Figure 1-1). Profile P5 has some relatively flat catchment areas and a long talus slope before a high ridge (Figure 1-1 and Figure 2-5). Profile P5 crosses the Kalalau trail which helps to stop falling rocks due to its depression formed by erosion along the trail. No simulated rockfalls originated from the top of the mountain would reach the beach area (See Appendix A for detailed simulation information). Rockfalls started from the steep slope right next to the beach, however, could reach the beach area. This rockfall section represented by profile P5 would entail Class B rockfall rating.



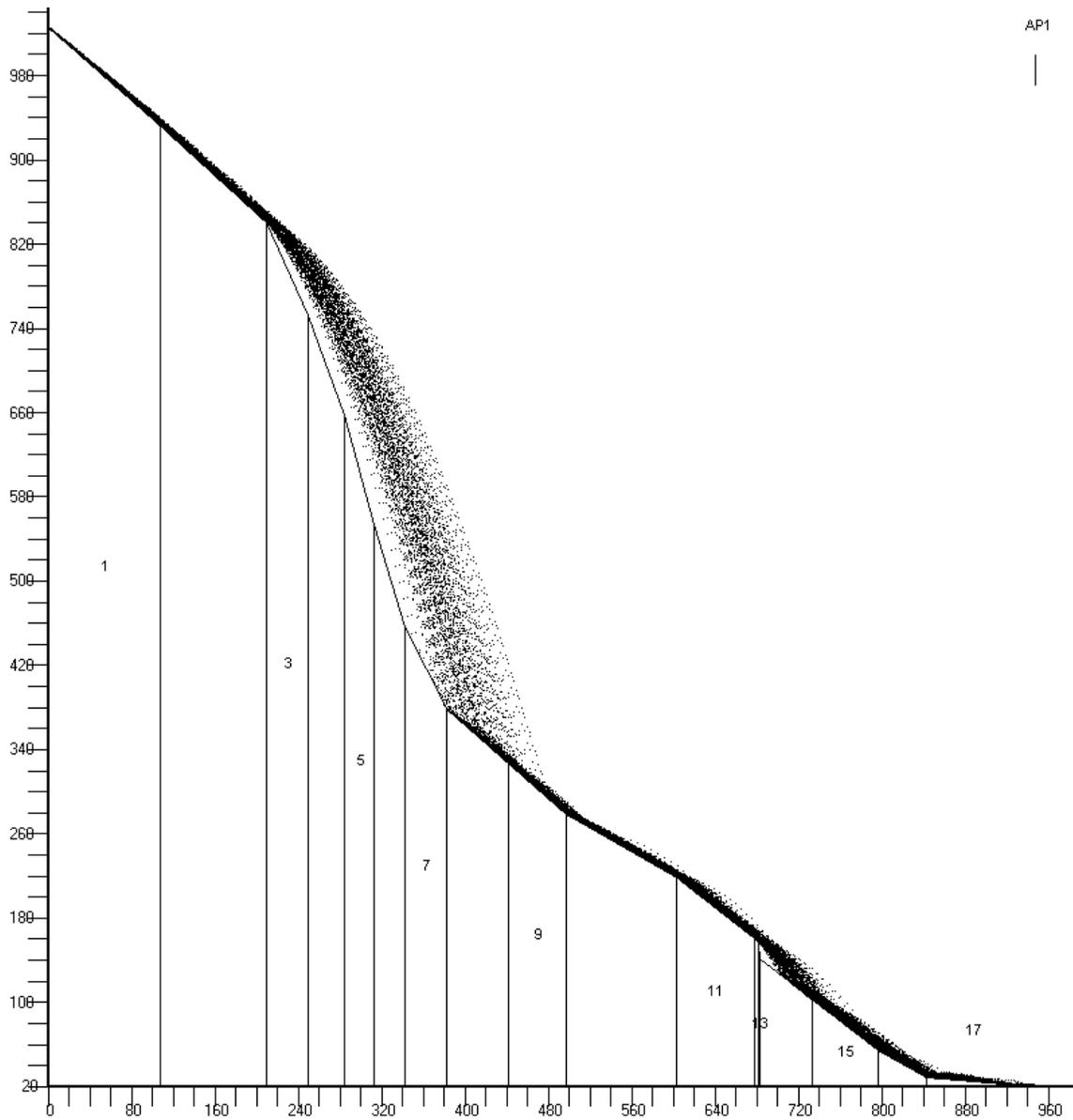
**Figure 2-1: Rockfall simulation results for profile P1.**

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 23) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. About 3% rockfalls reach the road, with a maximum bouncing height of 0.4 foot. See Appendix A for detailed simulation information.



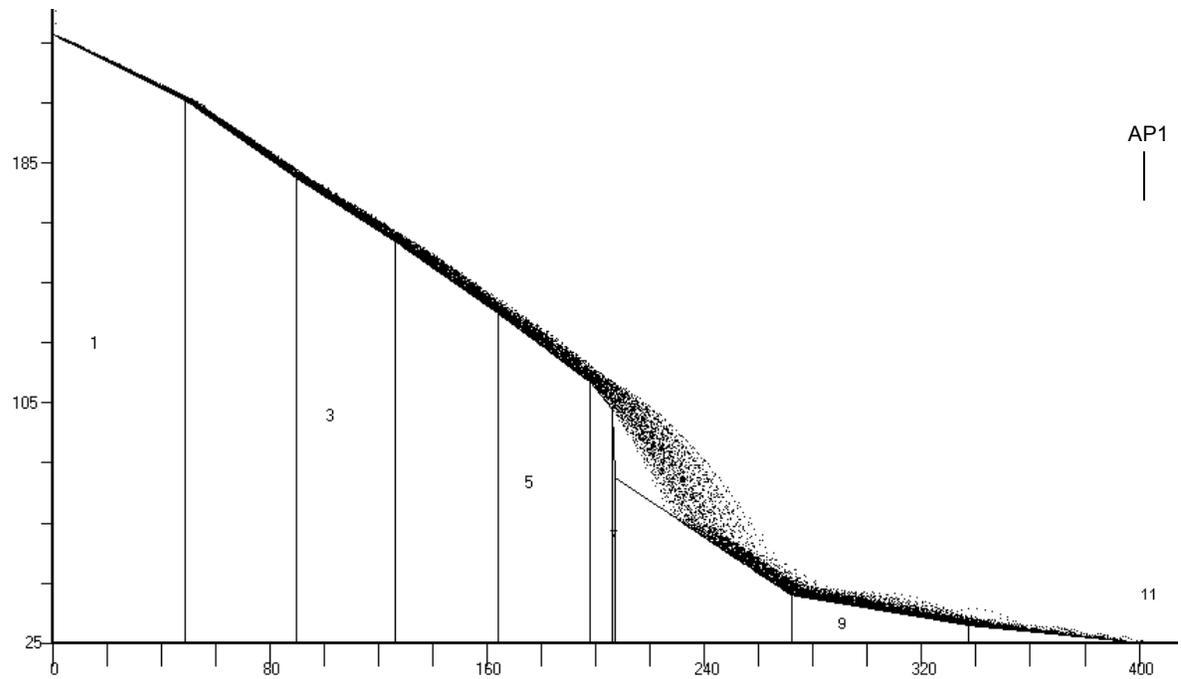
**Figure 2-2: Rockfall simulation results for profile P2.**

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 17) are slope section references. Upper slope was obtained from Google Earth Pro and lower slope profile was measured. About 63% rockfalls reach the road, with maximum bouncing height of 9 feet. See Appendix A for detailed simulation information.



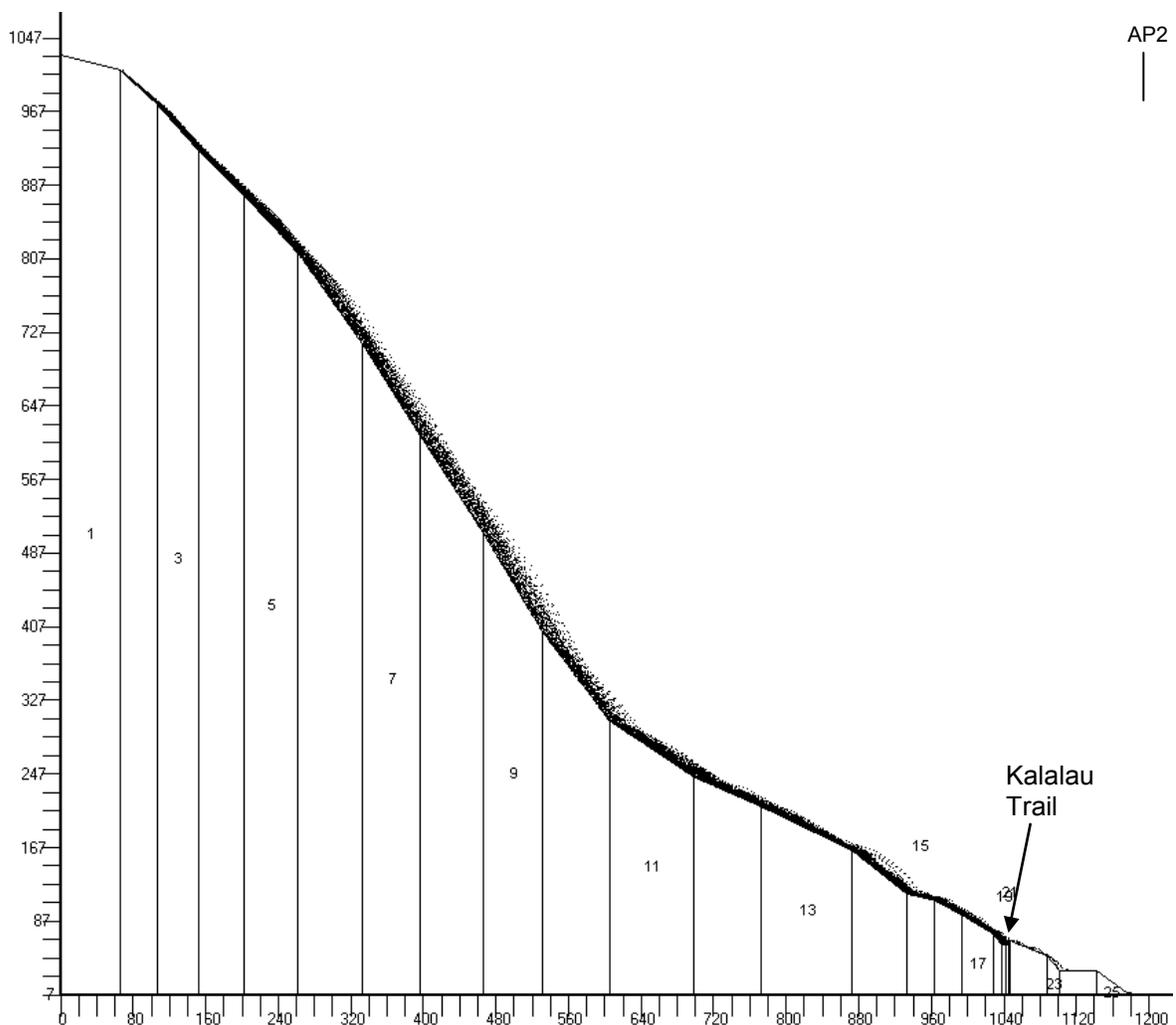
**Figure 2-3: Rockfall simulation results for profile P3.**

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 17) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. About 4% rockfalls reach the road, with maximum bouncing height of 1.6 feet. See Appendix A for detailed simulation information.



**Figure 2-4: Rockfall simulation results for profile P4.**

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 11) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. About 0.5% rockfalls reach the road, with maximum bouncing height of 0.0 foot. See Appendix A for detailed simulation information.



**Figure 2-5: Rockfall simulation results for profile P5.**

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP2 is analysis point at beach positions, respectively. The numbers (1, 3, 5, ..., 25) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. No simulated rockfalls reach the beach position. See Appendix A for detailed simulation information.

**2.6 ROCKFALL SITES AND POTENTIAL ROCKFALL HAZARDS AT HAENA PARK**

Due to the time-consuming nature of rappelling and safety issues regarding high mountains and the requirement of this planning study, the high cliffs and high ridge tops were only observed from a distance where they could be viewed from nearby vantage points.

Three factors determine the hazard level of potential rockfall outcrops: how likely they are going to fall (chance of rockfall); once they fall, how likely they are going to hit the target to be protected (chance of hitting target); and how large their size or volume (rockfall size or volume) would be.

For chance of rockfall, the following four categories are considered:

- Category 1: Imminent potential for rockfall (could fall anytime). There are no visible signs of competent support and the rocks could fall any time. Observed rock characteristics include but not limited to: 1) loose boulders or completely

separated rocks lacking toe and interlocking support and sitting on planes dipping out of slope with dipping angles significantly greater than friction angles; 2) rounded loose boulders sitting on steep soil slope with little embedment and weakened soil support that is subjected to great potential for further erosion; 3) overhang with opened release joints without observed competent interlocking; 4) loose boulders or fractured rocks sitting in a position that is at or very close to toppling or losing balance; 5) failing key supporting stones.

- Category 2: Short term potential for rockfall. There are visible signs of support that will diminish relatively quickly with time (within several to a dozen years. Time scale is used symbolically and should not be understood or interpreted as actual time length) but nonetheless most likely prevents immediate rockfall at present. Loose boulders or fractured rocks have short term rockfall potential when having one or more of the following characters: 1) supported by soil or mixture with soil that is being subjected to rapid erosion; 2) supported by old, dying, or dead vegetation; 3) supported by interlocking that is unlocking due to continuously opening fractures; 4) weakening key supporting stones that show signs of stress like sliding and fracturing; 5) in the process of making small-scale adjustments through local rotating or sliding towards a position of eventual rockfall.
- Category 3: Medium term potential for rockfall. There are visible signs of stable support that prevent rockfall at present and diminish within medium length of time period (within dozens of years). The boulders or rock outcrops are currently in a stable position but are working their way to eventual rockfall due to stress, erosion, weathering, root wedging, hydraulic pressure, and other de-stabilizing forces.
- Category 4: Long term potential for rockfall. There are visible signs of solid support that will diminish within a long period of time (up to or more than a hundred years). De-stabilizing forces will take many years to develop new rockfall features.

Categories in between the above four categories are also used. For example, Category 1.5 simply indicates the chance of rockfall is between Category 1 and Category 2.

Representative rock outcrops, their sizes, locations, and categories are listed in Table 2-1 and their relative locations are plotted in Figure 1-1.

Photo 2-1 shows round boulder on steep slope at B1. Photo 2-2 shows highly fractured and weathered steep slope with many loose rocks at B3, with a recent rockfall source. Photo 2-3 shows an overhanging and standing boulder with large opened back fracture at B4. Photo 2-4 shows a completely overhanging boulder with steep back fracture dipping out of slope at B5. Photo 2-5 shows loose boulders on talus slope at B7. Photo 2-6 shows root wedging that enlarged fractures at B12. Photo 2-7 shows a recent fallen boulder at B14. Photo 2-8 shows recent fallen boulders with fresh impact marks on the trees. Photo 2-9 shows old impact marks on a tree and stopped boulders. Photo 2-10 shows a rock perched on tree branches at B17. Photo 2-11 shows a recent rockfall boulder, with fresh impact marks and tree barks on it, on steep slope with potential for further fall at B18. Photo 2-12 shows an overhanging boulder partly supported by rotten tree roots at B19. Photo 2-13 shows an overhang loose boulder on steep slope at B19. Photo 2-14 shows a loose boulder on steep slope at B20 above Kuhio Highway. Photo 2-15 shows rocks stopped by a tree just above Kuhio Highway at B21. Photo 2-16 shows recent rockfall boulders and fresh impact marks on trees at B21. Photo 2-17 shows recent rockfall boulders perched on tree roots and fresh impact marks on trees at B21. Photo 2-18 shows the source of the recent rockfall at B21. Photo 2-19 shows an overhanging fractured rock with potential for wedge failure at B21. Photo 2-20 shows fractured and overhanging rocks at B21. Photo 2-21 shows an opened columnar joint of a dike at B21. Photo 2-22 shows a major fracture separating a small ridge from the main rock slope at B21. Photo 2-23 shows overhanging and fractured rocks at B23. Photo 2-24 shows a protruding rock sitting on a steep fracture dipping out of slope at B25. Photo 2-25 shows an overhanging loose rock sitting on top of a ledge at B26. Photo 2-26 shows overhanging loose boulders on a steep talus slope just above a very popular beach area at B30. Photo 2-27. Overhanging loose boulders on a steep talus slope at B30.

Photo 2-28 shows an overhanging fractured rock on a high cliff face (photo taken from vantage point V1). Photo 2-29 shows an overhanging and fractured block on top of a high cliff face (photo taken from vantage point V2). Photo 2-30 shows a major fracture separating a large block on a high rock cliff (photo taken from vantage point V2). The block dropped a little distance as indicated by the shifts of major layers across the fracture. Photo 2-31 shows a recent rockfall source and a large overhanging rock with back fractures (photo taken from vantage point V2). Photo 2-32 shows an overhanging portion of a high cliff (photo taken from vantage point V3). Photo 2-33 shows loose boulders perched on a steep ridge (photo taken from vantage point V1). Photo 2-34 shows an overhanging large bolder on the very top of a high slope (photo taken from vantage point V5). Photo 2-35 shows the thick lava flow layer on the very top of the high slopes (photo taken from vantage point V5).

Table 2-1: Representative Identified Potential Rockfall Outcrops at Haena Park, Kauai.

Location	Category	Size	Number of rocks	Latitude (°)	Longitude (°)
B1	1.5	4 x 3 x 2.6	1	22.21842	-159.58562
B2	2.5	25 x 22 x 15	1	22.21852	-159.58552
B3	2.5	3 x 2 x 1.7	1	22.21840	-159.58553
B4	1.5	8 x 8 x 6	1	22.21845	-159.58558
B5	1	7 x 7 x 3.7	1	22.21943	-159.58398
B6	3	2 x 1 x 0.5	1	22.21970	-159.58347
B7	2.5	4.2 x 3 x 3	1	22.22028	-159.57973
B8	3	4 x 4 x 3.5	2	22.22015	-159.58233
B9	3	3.5 x 2.2 x 1.8	1	22.21998	-159.58228
B10	2.5	3 x 1.2 x 4	2	22.21955	-159.58238
B11	3	2.5 x 1.8 x 3.8	1	22.21963	-159.58252
B12	2	1.5 x 1.2 x 2	1	22.21980	-159.58258
	2.5	3.5 x 3 x 3	1		
B13	2.5	3 x 3.8 x 3	2	22.21918	-159.58270
B14	2	6 x 7 x 3.5	1	22.21923	-159.58258
B15	3	3 x 1.8 x 4	1	22.21925	-159.58195
B16	3	3.3 x 1.8 x 1.7	1	22.21942	-159.58287
B17	2	2 x 1.2 x 1.2	1	22.22030	-159.58118
B18	2	2.5 x 1.9 x 1.2	1	22.22032	-159.58107
	2	2 x 3 x 1.8	2		
	3	8 x 11 x 8	1		
B19	2.5	3 x 5 x 7	1	22.22040	-159.58118
B20	2	2 x 2 x 2	2	22.22047	-159.58090
B21	2	6 x 8 x 3	1	22.22047	-159.58058
	2.5	2 x 1.7 x 2	2		
	3	30 x 60 x 20	1		
B23	1.5	5 x 5 x 2	1	22.22067	-159.57982
B24	2	4 x 3.8 x 3.7	1	22.22060	-159.57977
B25	2	3 x 12 x 10	1	22.22050	-159.57975
B26	2	1.7 x 0.8 x 2	1	22.22002	-159.57975
B27	2.5	2.5 x 1.4 x 1.4	1	22.21942	-159.57990
B28	3	3 x 1.5 x 1	1	22.22035	-159.57825
B29	1.5	2 x 3 x 1	2	22.22027	-159.57790
B30	1	2 x 1.8 x 2	3	22.22028	-159.58343

Note: Size is length x height x depth; Latitude and Longitude are in NAD 83.

## 2.7 ROCKFALL RISK ESTIMATION FOR THE HAENA PARK SITE

The risk estimation of rockfalls and landslides involves the integration of their frequency and consequences. Because the United States has yet to develop a guideline for rockfall and landslide risk management, the guideline developed by the Australian Geomechanics Society (AGS) that has been used by many countries is used as a reference (AGS 2000).

For loss of life, the risk can be calculated from:

$$R_{(DI)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)}$$

Where  $R_{(DI)}$  is the risk (annual probability of loss of life (death));  $P_{(H)}$  is the annual probability of the hazardous events (the landslides or rockfalls);  $P_{(S:H)}$  is the probability of spatial impact by the hazard (e.g. probability of landslides impacting structures (locations) taking into account travel distance);  $P_{(T:S)}$  is the temporal probability (e.g. probability of the structure being occupied);  $V_{(D:T)}$  is the vulnerability (probability of loss of life of individuals given the impacts).

For existing slopes, the suggested tolerable risk for loss of life is  $10^{-4}$  for persons most at risk and  $10^{-5}$  for average persons; for new slopes, the suggested tolerable risk for loss of life is  $10^{-5}$  for persons most at risk and  $10^{-6}$  for average persons (AGS 2000).

For property, the risk can be calculated from:

$$R_{(Prop)} = P_{(H)} \times P_{(S:H)} \times V_{(Prop:S)} \times E$$

Where  $R_{(Prop)}$  is the risk (annual loss of property value);  $P_{(H)}$  is the annual probability of the hazardous event;  $P_{(S:H)}$  is the probability of spatial impact by the hazard (i.e. of the landslide impacting the property, taking into account the travel distance) and for vehicles, for example, the temporal probability;  $V_{(Prop:S)}$  is the vulnerability of the property to the spatial impact (proportion of property value lost);  $E$  is the element at risk (e.g. the value or net present value of the property).

A full risk analysis involves consideration of all landslide and rockfall hazards for the site and all the elements at risk. Unless extensive geotechnical testing and observations over a very long period are available, this risk calculation depends heavily on the estimator's experience and availability of data and is meant only as a first order approximation.

To estimate the rockfall risk or annual loss of life, we use  $P_{(H)} = 0.5$  (one major rockfall every two years along the 3050 ft long rockfall section);  $P_{(S:H)} = 14\% \times 15 \text{ ft.} / 3050 = 0.00069$ , namely 14% rockfalls reach or pass the road (average of the five rockfall simulation profiles) and each rockfall impacts 15 ft width (car length) of the 3050 ft width;  $P_{(T:S)} = 3050 \text{ ft} / 5280 \text{ ft per mile} / 15 \text{ mph} / 24 \text{ hour} \times 3859 \text{ vehicle per day} \times 2 \text{ persons each vehicle} = 12.38$ , and  $V_{(D:T)} = 0.3$  as vehicles are likely not to be buried by a rockfall (AGS 2000). Therefore the annual probability of loss of life at this site of the road is  $0.5 \times 0.00069 \times 12.38 \times 0.3 = 1.3 \times 10^{-3}$ , higher than the recommended tolerable level of  $10^{-5}$  for general public. Rockfall mitigation is recommended for Haena Park to reduce rockfall risk to park users.



Photo 2-1. Round boulder on steep slope. At B1.



Photo 2-2. Highly fractured and weathered steep slope with many loose rocks. At B3. The foreground is a recent rockfall source.



Photo 2-3. An overhanging and standing boulder with large opened back fracture. At B4.



Photo 2-4. A completely overhanging boulder with steep back fracture dipping out of slope. At B5.



Photo 2-5. Loose boulders on talus slope. At B7.



Photo 2-6. Root wedging enlarged fractures. At B12.



Photo 2-7. A recent fallen boulder. At B14.



Photo 2-8. Recent fallen boulders. Notice the fresh impact marks on the trees.



Photo 2-9. Old impact marks on the tree and stopped boulders.



Photo 2-10. A rock perched on tree branches. At B17.



Photo 2-11. A recent rockfall boulder on steep slope with potential for further fall. Notice the fresh impact marks and tree barks on the boulder. At B18.



Photo 2-12. An overhanging boulder partly supported by rotten tree roots. At B19.



Photo 2-13. An overhang loose boulder on steep slope. At B19.



Photo 2-14. A loose boulder on steep slope. Notice Kuhio Highway down below. At B20.



Photo 2-15. Rocks stopped by a tree. Notice the traffic on Kuhio Highway below. At B21.



Photo 2-16. Recent rockfall boulders and fresh impact marks on trees (pointed by the arrows). Notice Kuhio Highway below. At B21.



Photo 2-17. Recent rockfall boulders perched on tree roots and fresh impact marks on trees (pointed by the arrows). Notice Kuhio Highway below. At B21.



Photo 2-18. The source (pointed by the arrow) of the recent rockfall. At B21.



Photo 2-19. An overhanging fractured rock (pointed by the arrow) with potential for wedge failure. Notice fractured rocks on the cliff face at left of the photo. At B21.



Photo 2-20. Fractured and overhanging rocks. At B21.

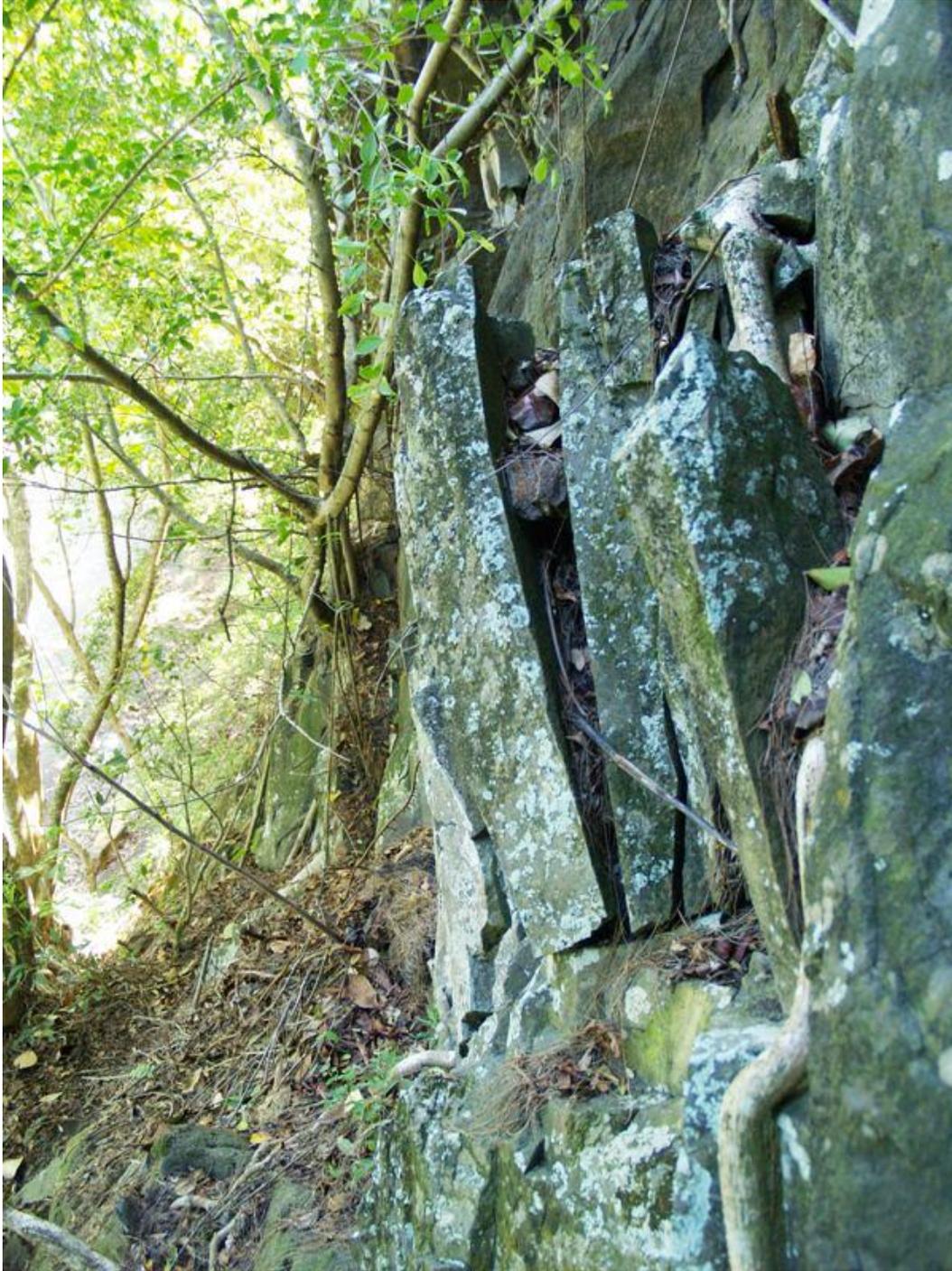


Photo 2-21. Opened columnar joint of a dike. Kuhio Highway is at the left of the photo. At B21.



Photo 2-22. A major fracture (pointed by the arrows) separates a small ridge (left of photo) from the main rock slope. At B21.



Photo 2-23. Overhanging and fractured rocks. At B23.



Photo 2-24. A protruding rock (pointed by the arrow) sitting on a steep fracture dipping out of slope. At B25.



Photo 2-25. An overhanging loose rock (pointed by the arrow) sitting on top of a ledge. At B26.



Photo 2-26. Overhanging loose boulders on a steep talus slope. The upper left corner of the photo is a very popular beach area. At B30.



Photo 2-27. Overhanging loose boulders on a steep talus slope. At B30.



Photo 2-28. An overhanging fractured rock (pointed by the arrows) on a high cliff face (photo taken from vantage point V1).

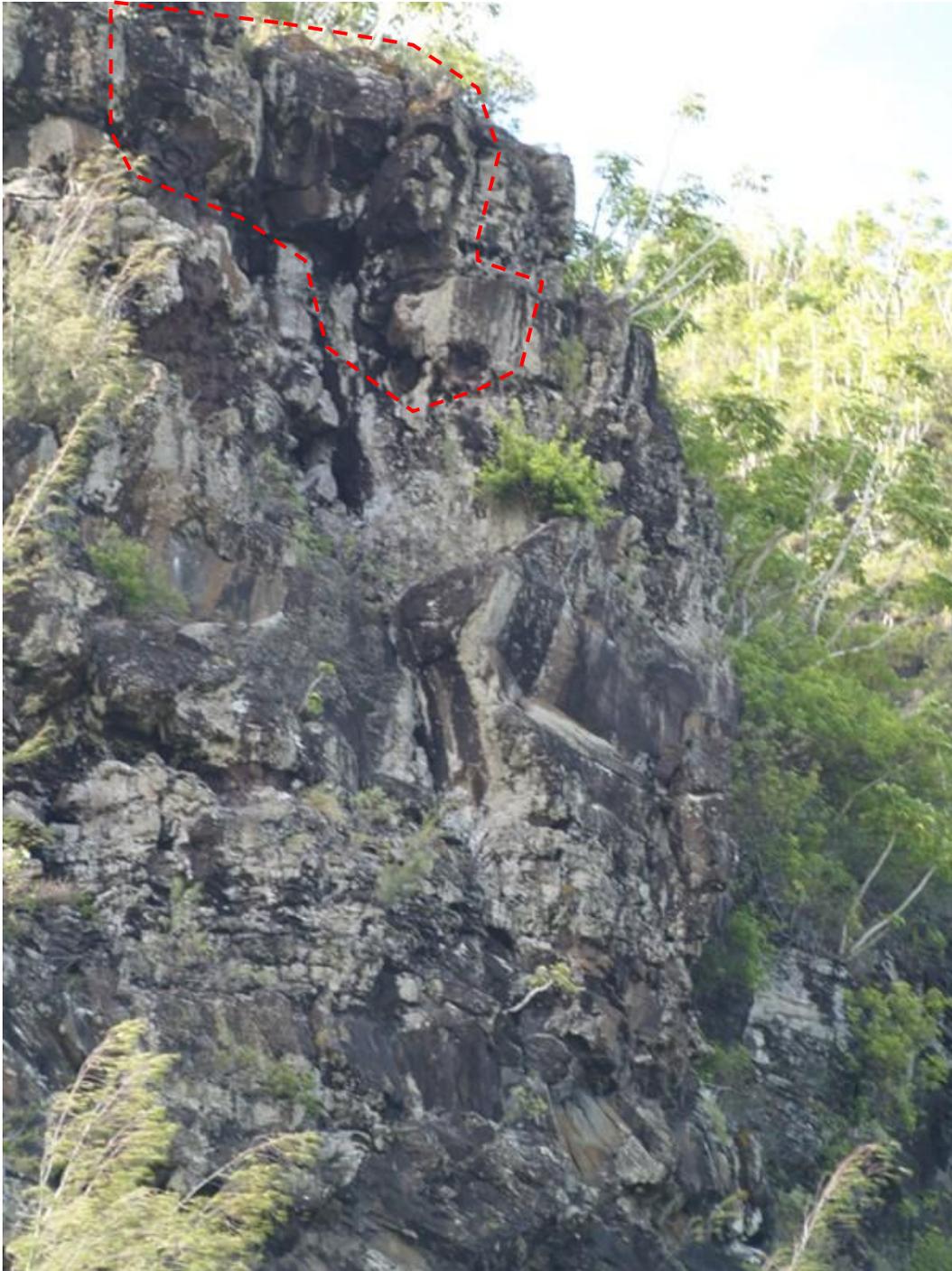


Photo 2-29. An overhanging and fractured block (indicated by the dashed lines) on top of a high cliff face (photo taken from vantage point V2).

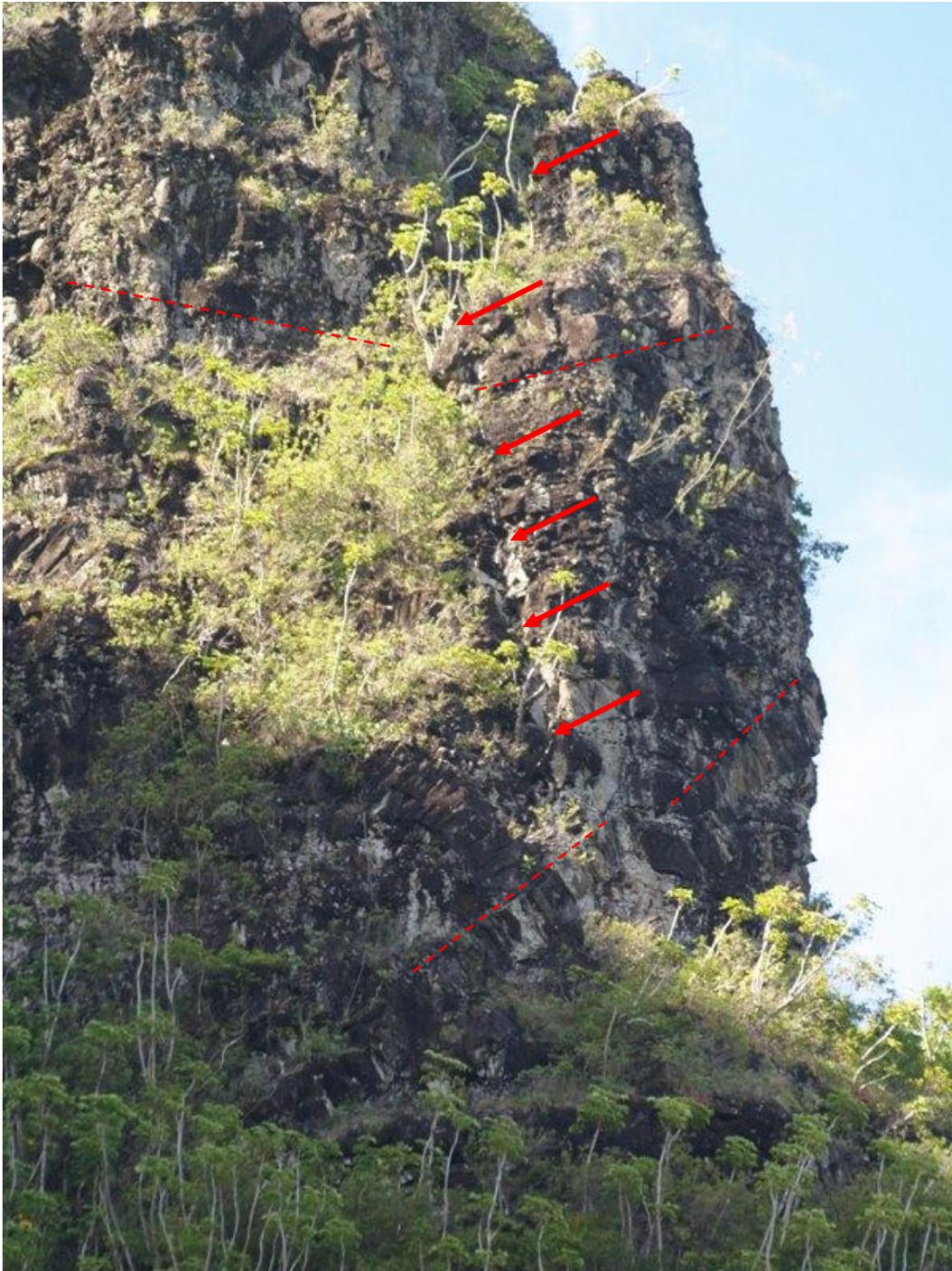


Photo 2-30. A major fracture (pointed by the arrows) separates a large block on a high rock cliff. The block dropped a little distance as indicated by the shifts of major layers across the fracture (the top dashed lines indicate a thick lava flow layer and the bottom dashed lines indicate a dike) (photo taken from vantage point V2).



Photo 2-31. A recent rockfall source (pointed by the arrows) and a large overhanging rock with back fractures (indicated by the dashed lines) (photo taken from vantage point V2).



Photo 2-32. An overhanging portion of a high cliff (photo taken from vantage point V3).



Photo 2-33. Loose boulders perched on a steep ridge (photo taken from vantage point V1).



Photo 2-34. An overhanging large boulder (pointed by the arrow) on the very top of a high slope (photo taken from vantage point V5).



Photo 2-35. The thick lava flow layer on the very top of the high slopes (photo taken from vantage point V5).

## **Section 3.0**

# **Engineering Planning Study**

### **3.0 ENGINEERING PLANNING STUDY**

#### **3.1 ROCKFALL ENGINEERING MITIGATION METHODS**

This section provides typical narratives and schematic drawings for engineered rockfall mitigation solutions. These solutions are among the most widely used rockfall mitigation methods in the industry.

There are two general ways of approaching engineering mitigation solutions: permanent and temporary. Permanent mitigation solutions provide high level of protection against falling rocks for the entire site with the intent to remain effective for many years (the design life of the system used). The first six mitigation methods described below, from wire mesh drape system to retaining wall, are permanent design alternatives. Temporary design alternatives usually provide emergency or cost-effective rockfall hazard reduction, usually do not provide full hazard protection coverage of a rockfall site, and may need to be re-visited or repeated periodically as new rockfall features develop. The use of temporary methods must be based strictly on the results of a risk management process initiated by the owner of the project. Temporary methods are preferred by property owners when there is a need for emergency rockfall hazard reduction, permanent mitigation is cost prohibitive, or funding for permanent mitigation is not available. Scaling of rocks described below is a temporary rockfall mitigation method.

##### **1. DESIGN ALTERNATIVE NO. 1- WIRE MESH DRAPE SYSTEM**

Design Alternative No. 1 provides for the installation of wire mesh or ringnet drape system over entire slope that could send falling rocks to roadways or other protected structures. As shown in Figure 3-1, the draped wire mesh or ringnet should be anchored at the top of the slope and extend to the bottom. Falling debris are restrained behind the drape. Debris would be deposited into a small catchment area at the base.

This design alternative requires periodic inspection and maintenance. The mesh should be inspected for corrosion and damage from falling debris. Steel components may need to be repaired or replaced. Rockfall debris should be cleared from behind the mesh and from the catchment area.

The main benefit of this design alternative is that the mesh covering offers a high level of rockfall protection. This system can be installed in places where limited catchment area prevents the use of other systems like the rockfall impact fence and catchment ditch zone. This system is cost effective for small slopes with limited catchment area. The drawbacks of this design alternative are visual impact and the high initial construction cost.

Wire mesh drape system is not suitable for Haena Park: 1) it is cost-prohibitive at a cost of 206.5 million dollars (see Appendix B for cost estimate) and a construction time of 8 months, and 2) although vegetation would grow through mesh openings, portions of the mesh covering bare rocks may become visible creating an aesthetic drawback.

##### **2. DESIGN ALTERNATIVE NO. 2- ANCHORED WIRE MESH SYSTEM**

Design Alternative No. 2 provides for the installation of anchored wire mesh over the entire slope that could otherwise send falling rocks onto roadways or other protected structures. After cleaning, scaling and leveling, the terrain surface is covered by a high strength steel wire mesh and tensioned with pre-installed anchors typically spaced 8 to 10 feet apart throughout the coverage area, as shown in Figure 3-2. The anchors pull the mesh tightly against the slope. This system is designed to prevent rockfalls by restraining the loose material in place. If the slope has large scale landslide potential, the anchors can be designed to stabilize the slope.

This design alternative requires periodic inspection and some maintenance where required. As with all anchored wire mesh systems, the steel components must be inspected for signs of corrosion, fatigue, and damage. Parts may require repair or replacing if damaged.

The benefit of using this design alternative is that it stabilizes slope and restrains loose material in place. The wire mesh held tightly against the slope improves soil retention and vegetation growth for a natural green appearance making the wire mesh virtually invisible. The system can be integrated to accommodate trees and other existing slope features. Furthermore, this system requires no catchment zone, and therefore can be installed practically at any area where other mitigation systems are ineffective. The drawbacks of this alternative are high initial construction cost and that the area beneath the wire mesh becomes unusable.

Anchored wire mesh system is not suitable for Haena Park: 1) it is cost-prohibitive at a cost of 340.4 million dollars (see Appendix B for cost estimate) and a construction time of about 12 months, and 2) although vegetation grows through mesh openings, the mesh could become visible where covering rock outcrops. This may be unacceptable for a State park that is renowned for its natural beauty.

### **3. DESIGN ALTERNATIVE NO. 3- IMPACT FENCE SYSTEM**

Impact fence system provides for the installation of a rockfall impact fence along the shoulder or toe of slope to intercept rolling rocks from upslope (see Figure 3-3). The fence provides blanket rockfall protection for large areas. The system can be designed to absorb various levels of energy and jumping heights produced from falling rocks for specific site conditions.

This design alternative requires periodic maintenance to repair the fence. Braking elements need to be checked and replaced, if necessary, after each major impact. Rocks embedded in the fence should be removed.

Large slopes can be mitigated with a single fence installed at the base thus making this design alternative beneficial. The main drawback is the catchment area required. Sites with launching features or little shoulder room may require widening or realignment to accommodate the fence. Additional drawbacks include periodic maintenance costs and some visual impact.

Impact fence system is suitable for most areas of Haena Park with a cost of 8.6 million dollars (see Appendix B for cost estimate) and a construction time of about 6 months. The impact fence will mostly be hidden from view by trees and other vegetation so its adverse aesthetic impact is limited.

### **4. DESIGN ALTERNATIVE NO. 4- COMBINATION IMPACT FENCE AND DRAPE OR ANCHORED WIRE MESH SYSTEM**

This alternative is a combination of Design Alternative No. 2 and No. 3. It includes installation of a rockfall impact fence in strategic locations to intercept falling rocks and a draped or anchored wire mesh system over steep slopes that are right next to protected structures with no catchment zone in between for the installation of an impact fence (see Figure 3-4). The fence would provide blanket rockfall protection intercepting rolling rocks from upslope, and the anchored wire mesh system would inhibit rockfalls just above protected structures.

This system is most beneficial for areas with limited shoulder having high continuous natural slopes. The drawback is the higher construction cost and some visual impact.

Impact fence and anchored wire mesh system is suitable for Haena Park with a cost of 9.8 million dollars (see Appendix B for cost estimate) and construction time of about 9 months. The impact fence will mostly be hidden from view by trees and other vegetation so its adverse aesthetic impact

is limited. The anchored wire mesh system is mainly installed at the area around the Wet Cave where high steep cliffs are right next to roadway and popular visitor areas.

## **5. DESIGN ALTERNATIVE NO. 5- CATCHMENT DITCH**

Design Alternative No. 5 provides for the construction of a catchment ditch along the shoulder, as shown by Figure 3-5. The ditch should be designed based on site conditions to provide adequate catchment zone. Roads with little shoulder width will require partial cutting of the slope or realignment of the road in order to accomplish the designed effects.

This design alternative requires low maintenance. The ditch should be cleared of rockfall debris periodically.

This design alternative is beneficial because large slopes can be mitigated with a single catchment ditch along the base. Also, the ditch improves drainage capacity. The drawback is associated with the large catchment zone area and rock excavation required. Additionally, existing utilities along the shoulder may require modification or relocation.

Catchment ditch is suitable for Haena Park with a cost of 6.8 million dollars (see Appendix B for cost estimate) and a construction time of about 8 months. An anchored wire mesh system is needed at the area around the Wet Cave where high steep cliffs are right next to roadway and popular visitor areas with no room for a catchment ditch. Impact fences may be needed in locations where a catchment ditch is not effective in intercepting falling rocks. The position and dimension of the catchment ditch should be verified by rockfall simulation at each location.

## **6. DESIGN ALTERNATIVE NO. 6- ROADWAY REALIGNMENT**

Design alternative No. 6 provides for construction of a new realigned roadway parallel to the existing road where the existing roadway is too close to the mountain. The new roadway will be constructed on the makai side of the existing road using fill material and mechanically stabilized earth (MSE) walls as necessary. The existing road will be used as a rock catchment area. An impact protection fence will be installed in areas where the new road is still in close proximity to the rockfall path. See Figure 3-6. This design alternative requires some ground excavation and backfilling. With the roadway pushed away from the mountain side, the access to the caves could easily become limited for public safety and hazard control.

The construction cost to realign the roadway and installation of the necessary safety features is estimated at \$15.5 M (see Appendix B for cost estimate) with a construction time of about 12 months.

The benefits of this design alternative include low maintenance, longevity, and simplicity and effectiveness of design. The drawback is increased construction costs. This design alternative is very suitable for Haena Park.

## **7. DESIGN ALTERNATIVE NO. 7- ROCK SCALING (TEMPORARY FIX)**

During scaling, rock outcrops that are ready to fall are removed from the slope by using hands, prying bars, and hydraulic jacks or airbags for large rocks. Scaling is most cost-effective when there are no structures to be protected at the base of the slope where the scaled rocks are allowed to run down the slope freely. The only significant structure at Haena Park is the paved road surface which, if damaged during scaling, can be easily repaired by patching the impact holes made by scaled rocks. Alternatively, metal plates or other road covers can be used to reduce damage to the paved road at additional cost.

After a thorough scaling, the rockfall hazard is generally maintained at a low level for quite a few years because the geological processes associated with natural production of rockfalls are generally slow requiring many years to generate a rock outcrop that is ready to fall. Exceptions, however, exist. For example, if a new water channel develops on a steep soft soil slope with embedded boulders, new rockfall hazards will be created after almost every surface runoff. The slopes at Haena Park consist of nearly horizontal lava flow layers with limited weathering and talus slopes with limited fine or soil material. The geological processes associated with natural production of rockfalls at Haena Park are reasonably slow.

The steep slopes around the Wet Cave are the most hazardous at Haena Park and should be scaled first. Profile P2, which is close to the Wet Cave, has the highest percentage (63%) of the potential rockfalls anticipated to reach the roadway should be scaled immediately following the Wet Cave. The other four simulated profiles have low percentage (less than 5%) of rockfalls reaching roadway or beach and should be scaled if additional funding is available. The cost of scaling is \$750,000 for two crews of three scalors each crew to work for 75 days (daily cost \$10,000) to scale the Wet Cave area and above, including profile P2, and the identified boulder sites (B1 to B30). Scaling of large rocks in other areas that have a reasonable chance of reaching roadway or beach or other structures is recommended if additional funding is available, with an estimated additional cost at 1.5 million dollars.

During rock scaling operation, it is highly recommended that the contractors' scope of work is directed and validated on site by geologists or engineers experienced in rock scaling.

## **7. OTHER MITIGATION METHODS**

There are many other rockfall mitigation methods. Rock demolition, bolting, cable lashing, pedestal support, and local netting can be used independently or in combination with other mitigation methods. High-cost methods like constructing concrete canopy, or elevated roadways above rock fallout zones can also be used if specific conditions that warrant the high costs.

### **3.2 RECOMMENDED ROCKFALL MITIGATION DESIGN AT HAENA PARK**

Mitigation design alternatives are based on factors such as public safety, construction cost, and sound engineering principles. The recommendations were provided to develop preliminary construction cost data used to establish project development and funding. The final remedial design may vary from the preliminary design based on other factors including detailed rockfall protection characteristics, land acquisitions, community needs, environmental issues, aesthetics, and local politics.

For permanent rockfall mitigation design, the combination of impact fence and anchored wire mesh system is recommended due to its easiness of construction, least disturbance to environment, and relatively low cost, with a cost of 9.8 million dollars and a construction period of eight months.

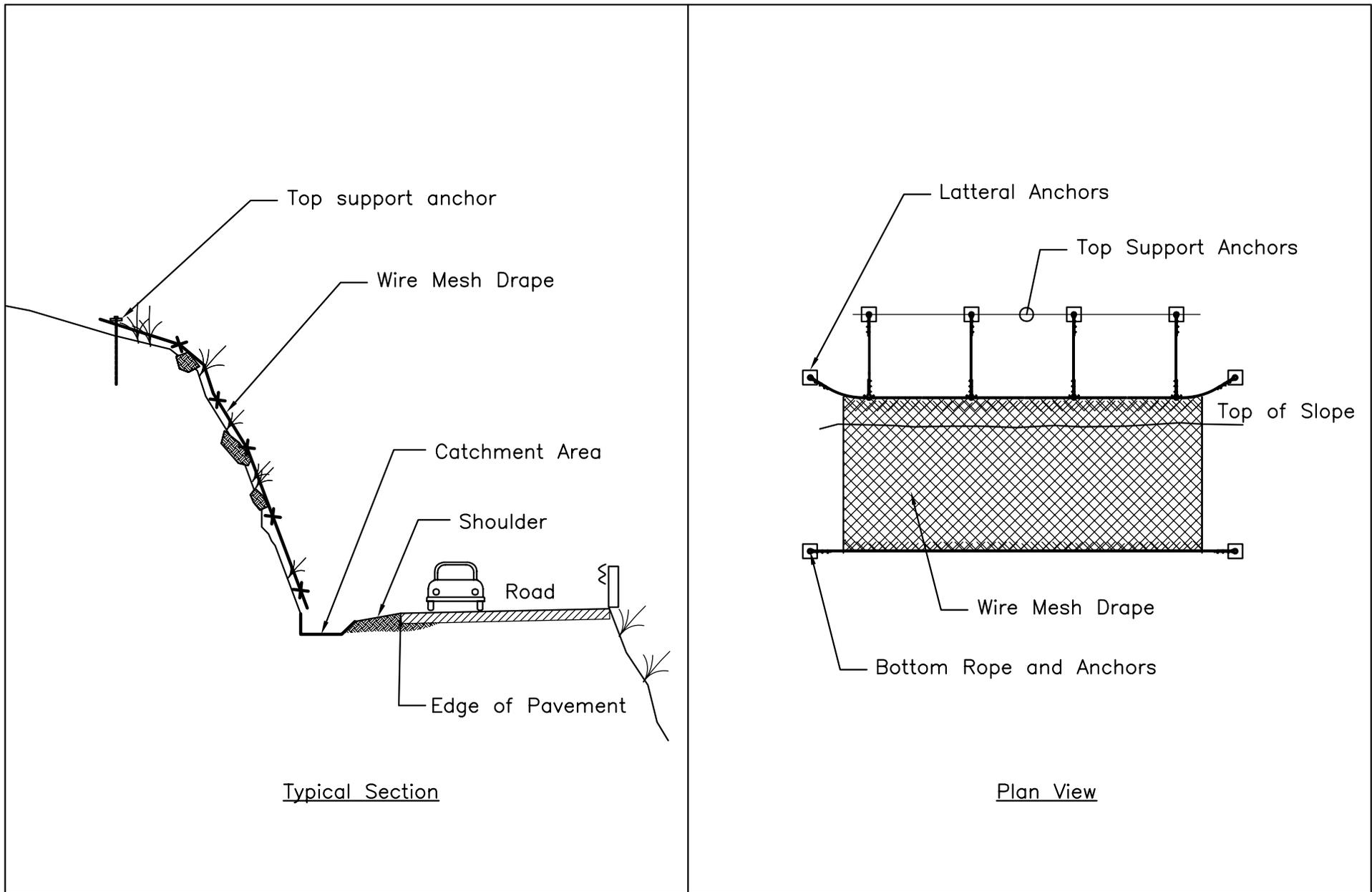
For temporary rockfall mitigation design, scaling is recommended due to its ease of construction, least disturbance to environment, and cost effectiveness in rockfall hazard reduction, with a cost of \$750,000 and a construction period of four months to scale the high hazard areas around the Wet Cave and profile P2 and the identified boulder sites. It should be noted that rock scaling is a temporary solution and should only be used to reduce rockfall potentials. For Rockfall preventions, any of the permanent mitigation methods should be considered. An additional 1.5 million dollars and a construction period of six months are needed to scale other areas. Only rocks that are likely to reach the roadway or other protected structures will be scaled.

### **3.3 SIMILAR ROCKFALL PROJECTS AND EXPERIENCED CONTRACTORS**

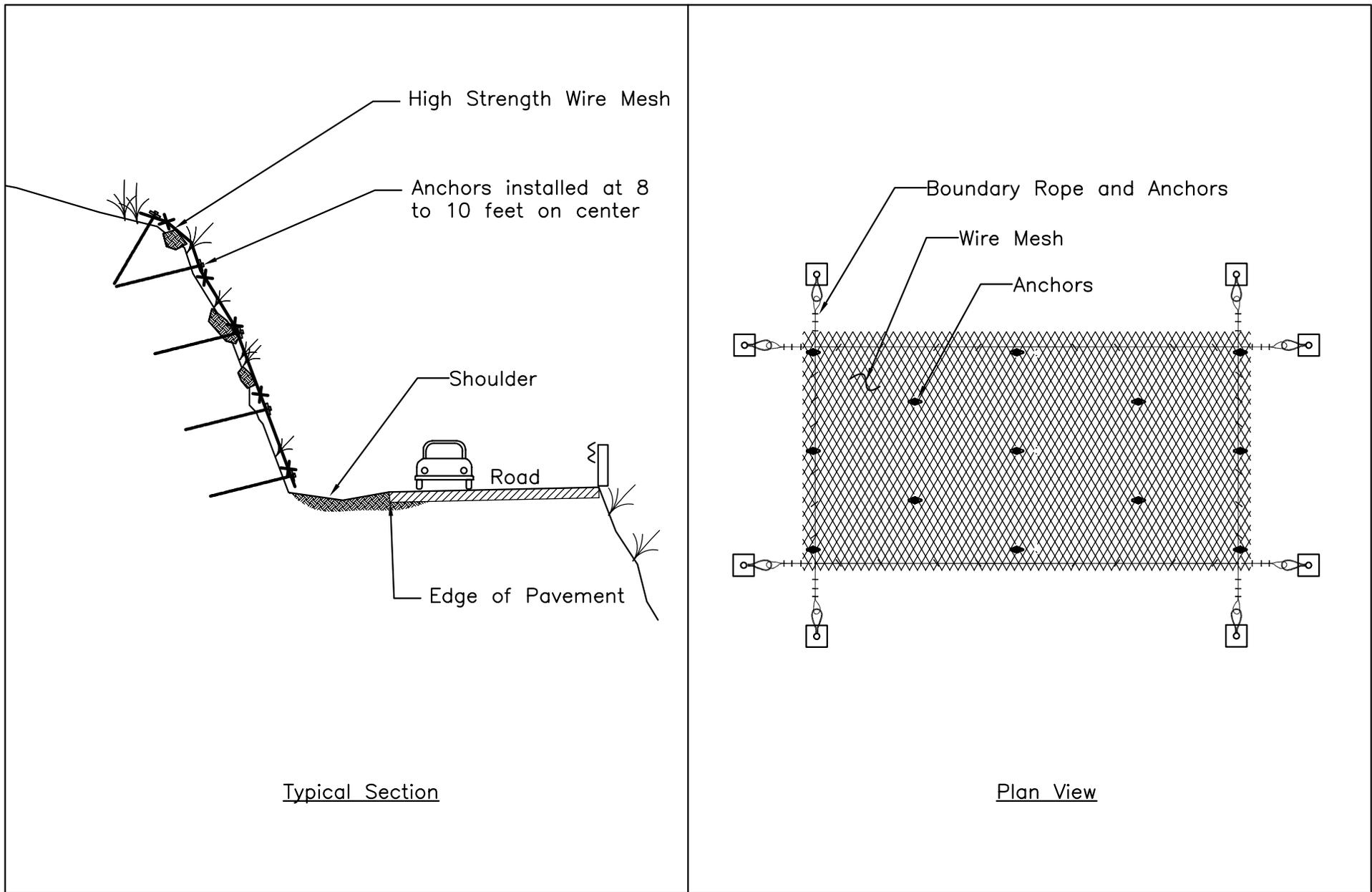
A rockfall protection fence and roadway realignment method was used at Waimea Bay in June 2000 to protect Kamehameha Highway from potential rockfalls and at the Old Puunui Quarry site to protect residents from the upslope boulders. The special rockfall protection fence was designed and manufactured by GeoBrugg. Rockfall catchment ditch, rock demolition, bolting, and cable netting have been performed in various locations on Oahu including at Waimea Bay, at Makapuu during a major scaling and netting of the mountain slopes, and at Lalea of Hawaii Kai. The recently completed Kailua Road project used a combination of rockfall impact fence, both draped and anchored mesh systems, rockfall catchment ditch, rock scaling, rock bolting, local netting, and cable lashing. The latest major scaling operation performed in Hawaii was the scaling of 130 bunkers at Waikele. Tens of thousands of boulders, some of them over ten tons, were scaled from the slopes above the bunkers. A large number of boulders were scaled easily by hand, reflecting their high rockfall potential.

The following general contractors are among those who have been involved with rock scaling/demolition/bolting and/or rockfall fence/net/ditch installation in Hawaii:

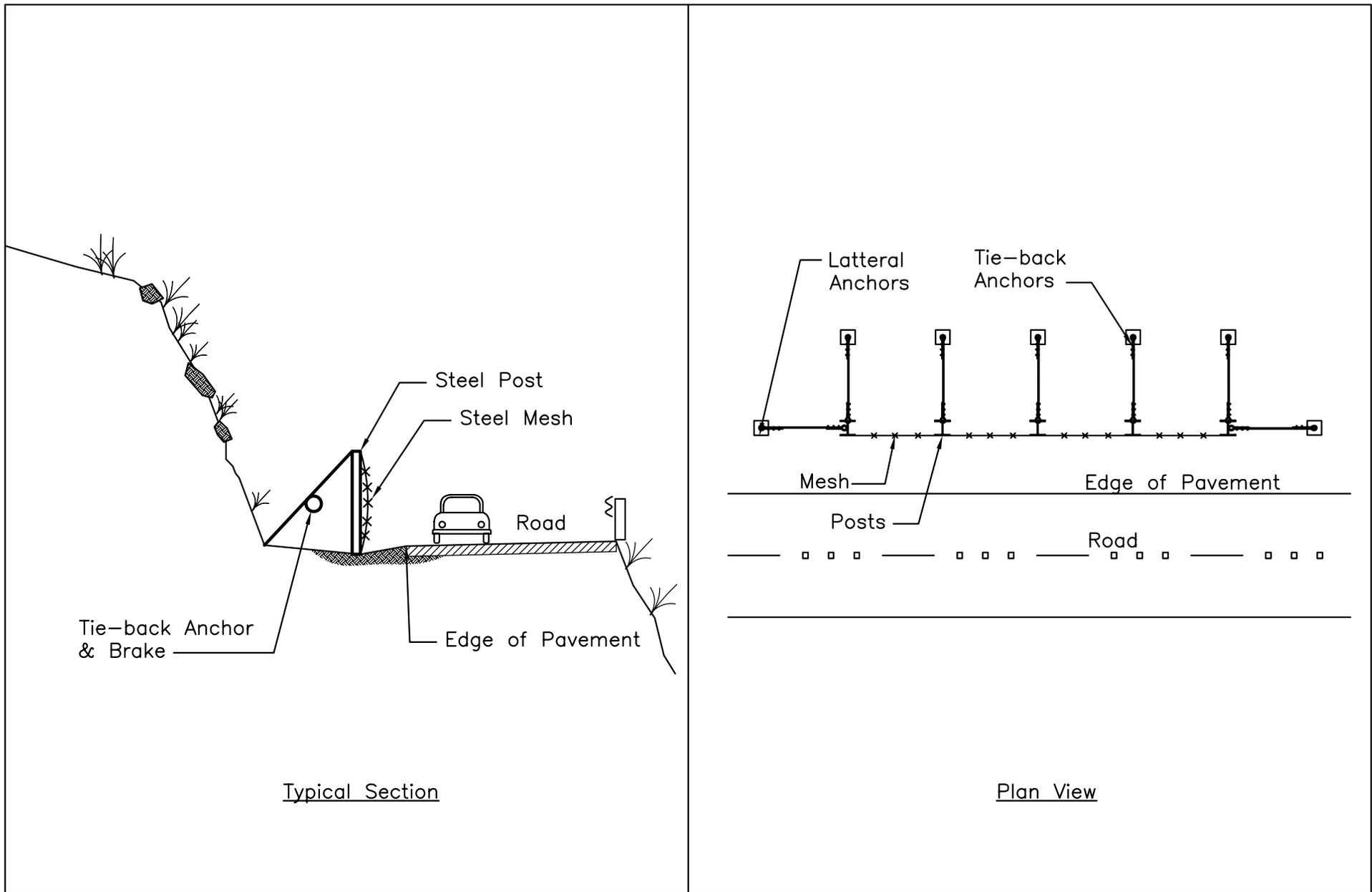
- Prometheus Construction
- High Tech Rockfall Construction
- Janod Contractors
- Royal Contracting Co. Ltd.
- Kiewit Pacific Co.
- Good Fellow Brothers, Inc.



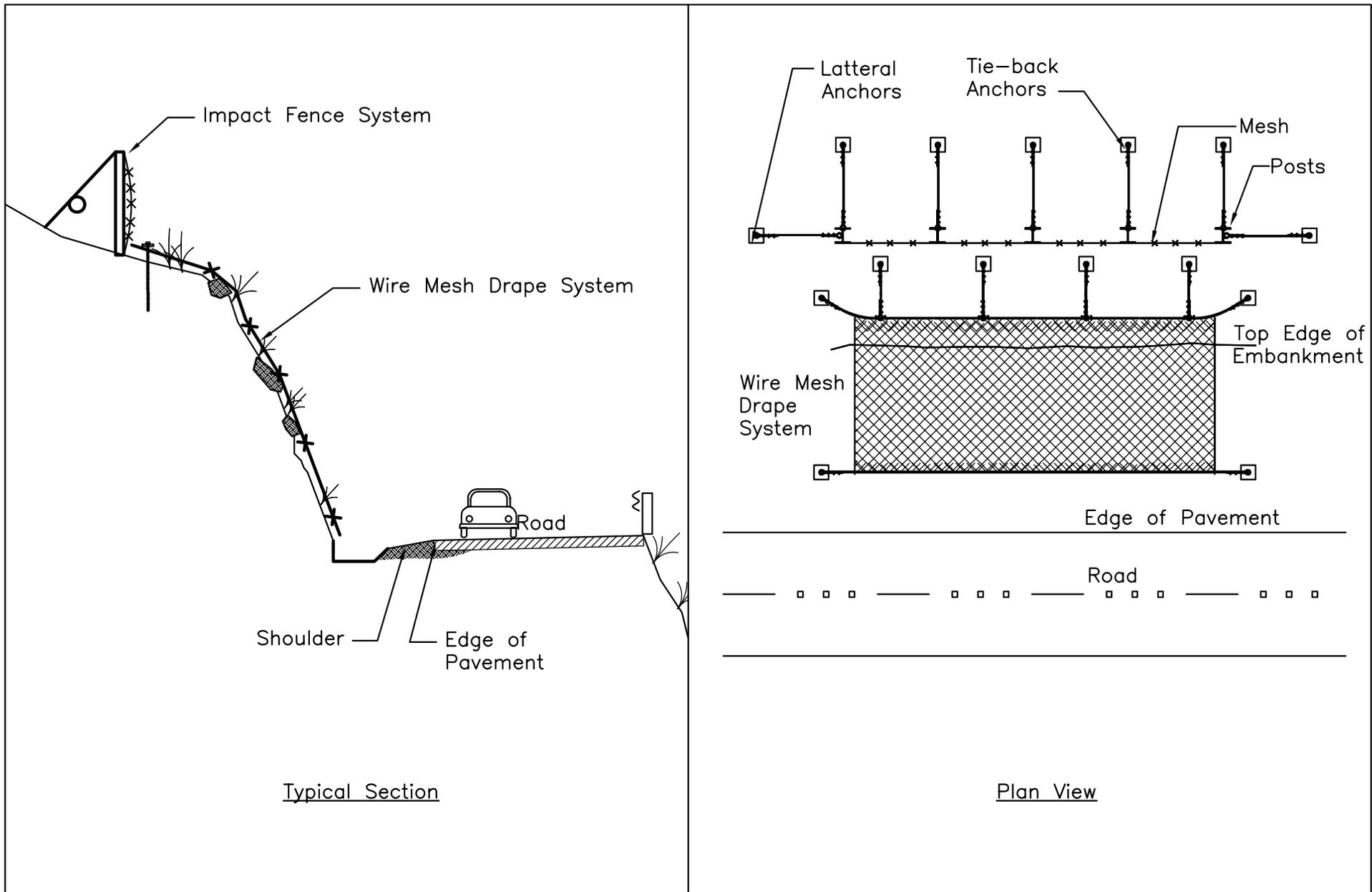
**Figure 3-1**  
**Design Alternative No. 1**  
**Wire Mesh Drape System**



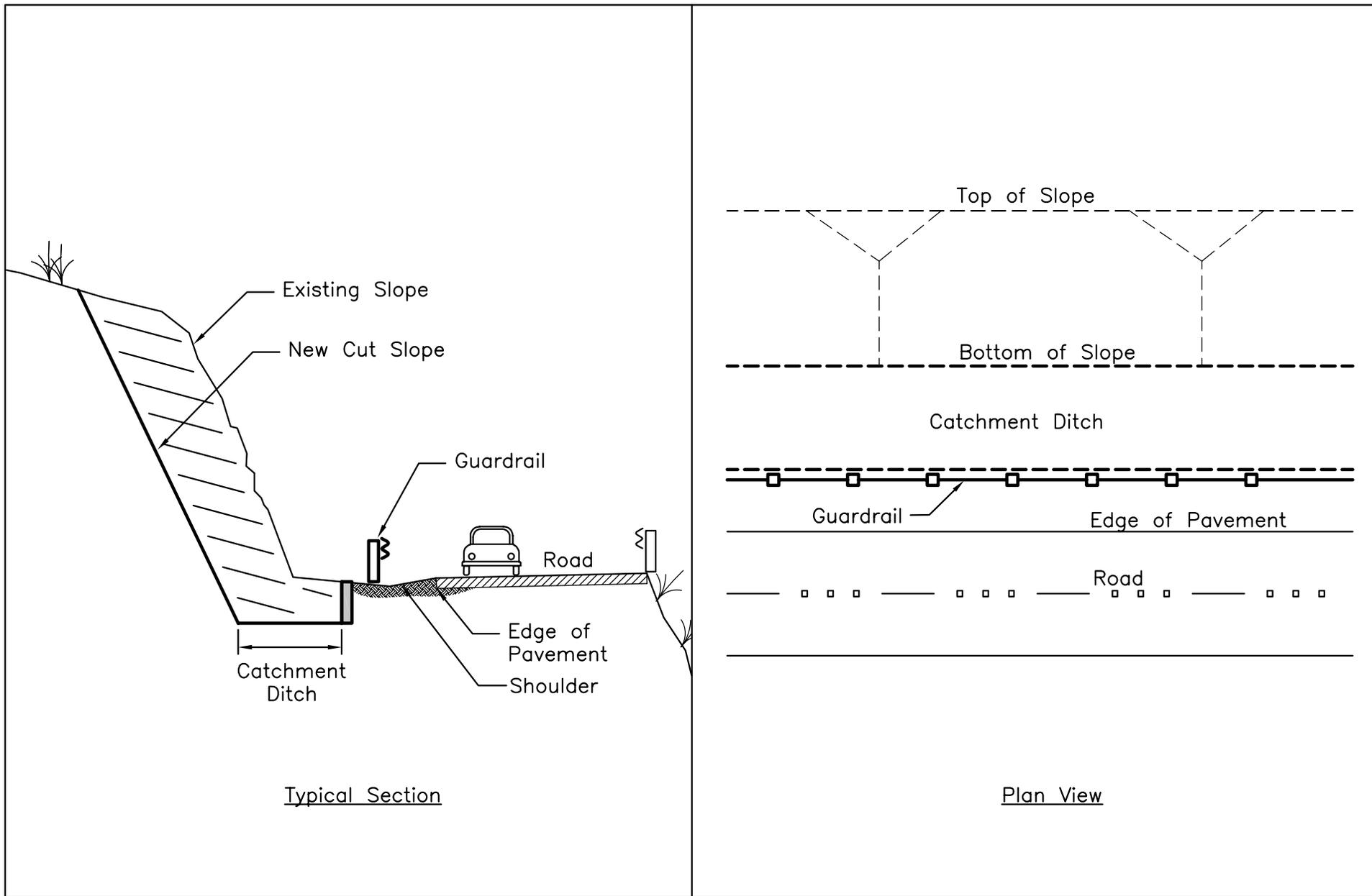
**Figure 3-2**  
**Design Alternative No. 2**  
**Anchored Wire Mesh**



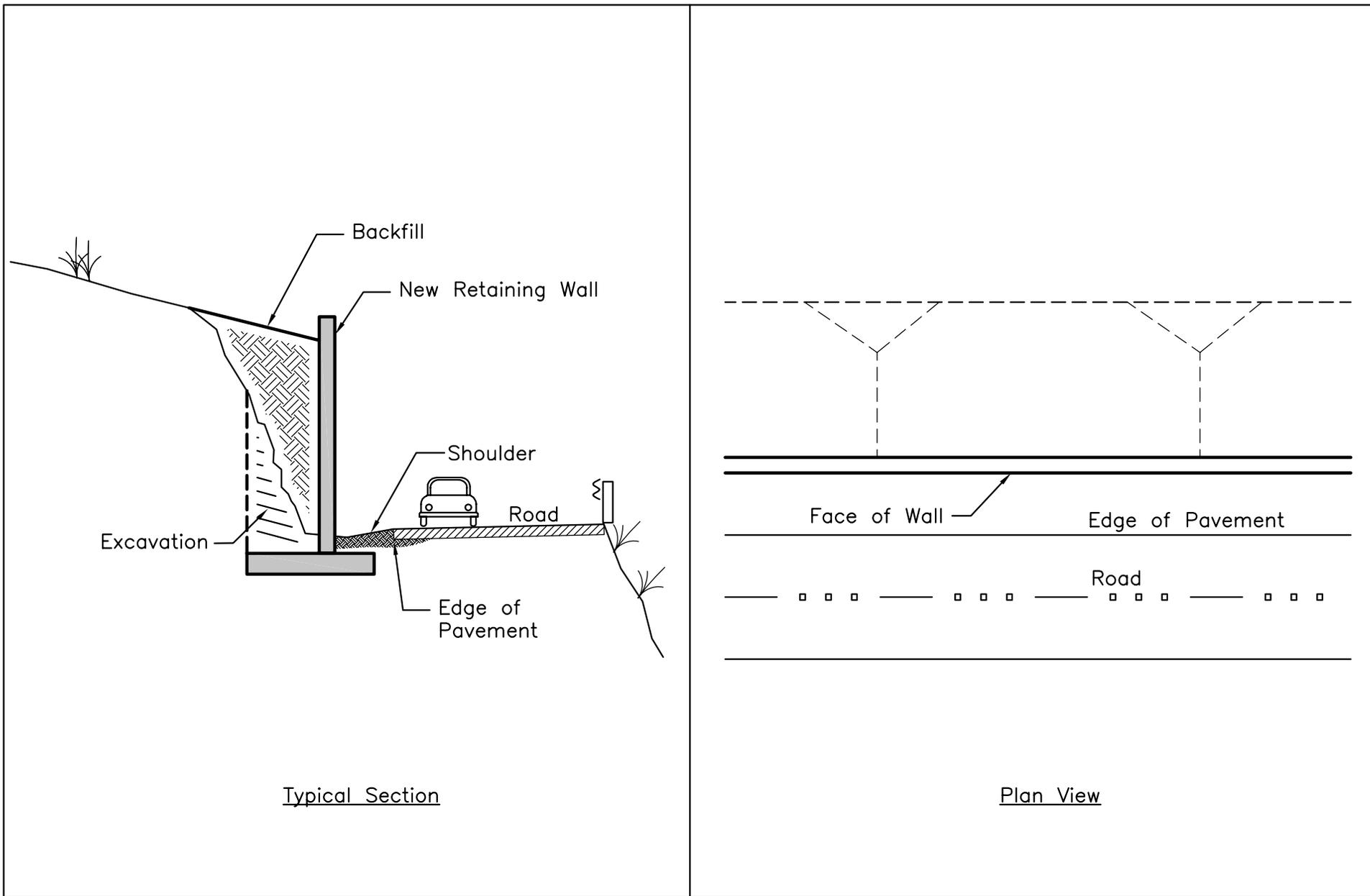
**Figure 3-3**  
**Design Alternative No. 3**  
**Impact Fence System**



**Figure 3-4**  
**Design Alternative No. 4**  
**Combination Impact Fence & Wire Mesh Drape**



**Figure 3-5**  
**Design Alternative No. 5**  
**Catchment Ditch**



**Figure 3-6**  
**Design Alternative No. 6**  
**Retaining Wall**

#### 4.0 REFERENCES

- Australian Geomechanics Society. 2000. *Landslide Risk Management Concepts and Guidelines*. Sub-committee on Landslide Risk Management. March.
- C. O. Brawner Engineering Ltd (Brawner). 1994. *Rockfall Hazard Mitigation Methods: Participant Workbook*. NIH Course #13219. Publication No. FHWA SA-93-085. Prepared for the U.S. Department of Transportation, Federal Highway Administration: National Highway Institute. March.
- Jones, C. L., J. D. Higgins, and R. D. Andrew. 2000. *Colorado Rockfall Simulation Program (version 4.0 for Windows)*. Colorado Department of Transportation.
- MacDonald, G. A., A. T. Abbott, and F. L. Peterson. 1983. *Volcanoes in the Sea, The Geology of Hawaii*. 2nd ed. Honolulu: Univ. of Hawaii Press.
- Pierson, L. A. and R. van Vickle. 1993. *Rockfall Hazard Rating System – Participants' Manual*. Prepared for the U.S. Department of Transportation, Federal Highway Administration: National Highway Institute. Publication No. FHWA SA-93-057. November.
- Stearns, H. T. 1985. *Geology of the State of Hawaii*. 2nd ed. Palo Alto, CA: Pacific Books.

**Appendix A**  
**Rockfall Simulation Data**

**Rockfall simulation input and output data for profile P1**

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

## Input File Specifications

Units of Measure: U.S.  
 Total Number of Cells: 23  
 Analysis Point 1 X-Coordinate: 433  
 Analysis Point 2 X-Coordinate:  
 Analysis Point 3 X-Coordinate:  
 Initial Y-Top Starting Zone Coordinate: 575  
 Initial Y-Base Starting Zone Coordinate: 575

Remarks:

## Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	616	15	618
2	.8	.8	.2	15	618	31	616
3	.8	.8	.2	31	616	48	609
4	.8	.8	.2	48	609	73	601
5	.8	.8	.2	73	601	85	598
6	.8	.8	.2	85	598	100	588
7	.8	.8	.2	100	588	113	579
8	.8	.8	.2	113	579	127	566
9	.8	.8	.2	127	566	141	553
10	.8	.8	.2	141	553	154	537
11	.8	.8	.2	154	537	169	517
12	.8	.8	.2	169	517	182	495
13	.8	.8	.2	182	495	200	472
14	.8	.8	.2	200	472	215	448
15	.8	.8	.2	215	448	227	431
16	.8	.8	.2	227	431	257	326
17	.8	.8	.2	257	326	278	251
18	1.5	.8	.2	278	251	279	50
19	1.5	.8	.2	279	50	299	55
20	1.5	.8	.2	299	55	329	46
21	1.5	.8	.2	329	46	381	30
22	1.5	.8	.2	381	30	433	25
23	1.5	.8	.2	433	25	434	25

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

Total Number of Rocks Simulated: 200  
 Starting Velocity in X-Direction: 1 ft/sec  
 Starting Velocity in Y-Direction: -1 ft/sec  
 Starting Cell Number: 1

Ending Cell Number: 23  
 Rock Density: 145 lb/ft<sup>3</sup>  
 Rock Shape: Spherical  
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

Analysis Point 1: X = 433, Y = 25

Total Rocks Passing Analysis Point: 7

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	11.79	16246	0.27
75%	14.67	25104	1.26
90%	17.27	33072	2.14
95%	18.83	37855	2.67
98%	20.57	43223	3.26

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 21.12	Maximum: .41	Maximum: 45403
Average: 11.79	Average: .29	Average: 16246
Minimum: 8.48	G. Mean: .27	Std. Dev.: 13119
Std. Dev.: 4.27	Std. Dev.: 1.45	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

Velocity Units: ft/sec    Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	No rocks	past end of cell			
3	No rocks	past end of cell			
4	No rocks	past end of cell			
5	No rocks	past end of cell			
6	No rocks	past end of cell			
7	No rocks	past end of cell			
8	22	18	1.42	1	0
9	32	27	2.01	3	0
10	43	37	3.44	6	2

11	55	44	4.1	8	3
12	63	54	5.08	14	6
13	73	54	7.3	11	3
14	80	62	7.13	17	7
15	81	65	7.35	19	7
16	107	87	9.6	81	59
17	126	104	10.93	126	84
18	127	105	10.99	325	282
19	145	121	12.19	286	219
20	173	146	13.94	229	124
21	173	55	64.11	94	11
22	21	12	4.27	0	0
23	16	10	3.59	1	0

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	5

340 To 350 ft	11
350 To 360 ft	14
360 To 370 ft	16
370 To 380 ft	12
380 To 390 ft	37
390 To 400 ft	38
400 To 410 ft	29
410 To 420 ft	20
420 To 430 ft	11
430 To 434 ft	0

**Rockfall simulation input and output data for profile P2**

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

## Input File Specifications

Units of Measure: U.S.  
 Total Number of Cells: 18  
 Analysis Point 1 X-Coordinate: 874  
 Analysis Point 2 X-Coordinate:  
 Analysis Point 3 X-Coordinate:  
 Initial Y-Top Starting Zone Coordinate: 1055  
 Initial Y-Base Starting Zone Coordinate: 1055

Remarks:

## Cell Data

Cell No.	S.R.	Tang.	C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	1055	74	957	
2	.8	.8	.2	74	957	144	848	
3	.8	.8	.2	144	848	209	702	
4	.8	.8	.2	209	702	253	590	
5	.8	.8	.2	253	590	322	466	
6	.8	.8	.2	322	466	406	373	
7	.8	.8	.2	406	373	462	308	
8	.8	.8	.2	462	308	532	239	
9	.8	.8	.2	532	239	593	177	
10	.8	.8	.2	593	177	640	132	
11	.8	.8	.2	640	132	669	111	
12	1.5	.8	.2	669	111	734	71	
13	1.5	.8	.2	734	71	773	59	
14	1.5	.8	.2	773	59	790	45	
15	1.5	.8	.2	790	45	821	43	
16	1.5	.8	.2	821	43	851	31	
17	1.5	.8	.2	851	31	870	20	
18	1.5	.8	.2	870	20	874	20	

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

Total Number of Rocks Simulated: 200  
 Starting Velocity in X-Direction: 1 ft/sec  
 Starting Velocity in Y-Direction: -1 ft/sec  
 Starting Cell Number: 1  
 Ending Cell Number: 18  
 Rock Density: 145 lb/ft<sup>3</sup>  
 Rock Shape: Spherical  
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

Analysis Point 1: X = 874, Y = 20

Total Rocks Passing Analysis Point: 127

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	18.55	51397	0.33
75%	27.36	101360	4.93
90%	35.28	146299	9.08
95%	40.04	173278	11.56
98%	45.38	203558	14.35

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 67.31	Maximum: 8.91	Maximum: 450329
Average: 18.55	Average: .9	Average: 51397
Minimum: 2.87	G. Mean: .33	Std. Dev.: 73997
Std. Dev.: 13.05	Std. Dev.: 6.82	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

Velocity Units: ft/sec    Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	68	55	5.4	12	4
2	102	77	11.34	25	9
3	135	107	17.08	75	27
4	155	121	20.59	113	33
5	167	103	23.54	80	15
6	133	81	14.94	22	7
7	123	87	14.21	32	8
8	128	79	13.68	22	6
9	113	83	13.96	23	6
10	118	79	12.81	22	6
11	117	71	13.02	18	3
12	92	59	11.53	17	6
13	73	40	11.33	10	2
14	76	46	10.7	17	7
15	62	23	12.17	4	1

16	63	23	12.29	7	1
17	66	27	11.47	11	1
18	67	19	13.05	9	0

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 350 ft	0
350 To 360 ft	0
360 To 370 ft	0
370 To 380 ft	0
380 To 390 ft	0
390 To 400 ft	0
400 To 410 ft	0
410 To 420 ft	0
420 To 430 ft	0
430 To 440 ft	0

440 To 450 ft	0
450 To 460 ft	0
460 To 470 ft	0
470 To 480 ft	0
480 To 490 ft	0
490 To 500 ft	0
500 To 510 ft	0
510 To 520 ft	0
520 To 530 ft	0
530 To 540 ft	0
540 To 550 ft	0
550 To 560 ft	0
560 To 570 ft	0
570 To 580 ft	0
580 To 590 ft	0
590 To 600 ft	0
600 To 610 ft	0
610 To 620 ft	0
620 To 630 ft	0
630 To 640 ft	0
640 To 650 ft	0
650 To 660 ft	0
660 To 670 ft	0
670 To 680 ft	0
680 To 690 ft	0
690 To 700 ft	0
700 To 710 ft	0
710 To 720 ft	0
720 To 730 ft	0
730 To 740 ft	0
740 To 750 ft	0
750 To 760 ft	0
760 To 770 ft	0
770 To 780 ft	0
780 To 790 ft	0
790 To 800 ft	2
800 To 810 ft	22
810 To 820 ft	28
820 To 830 ft	5
830 To 840 ft	5
840 To 850 ft	2
850 To 860 ft	0
860 To 870 ft	0
870 To 874 ft	9

**Rockfall simulation input and output data for profile P3**

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

## Input File Specifications

Units of Measure: U.S.  
 Total Number of Cells: 18  
 Analysis Point 1 X-Coordinate: 948  
 Analysis Point 2 X-Coordinate:  
 Analysis Point 3 X-Coordinate:  
 Initial Y-Top Starting Zone Coordinate: 1026  
 Initial Y-Base Starting Zone Coordinate: 1026

Remarks:

## Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	1026	107	933
2	.8	.8	.2	107	933	209	841
3	.8	.8	.2	209	841	249	752
4	.8	.8	.2	249	752	284	657
5	.8	.8	.2	284	657	313	554
6	.8	.8	.2	313	554	342	457
7	.8	.8	.2	342	457	382	379
8	.8	.8	.2	382	379	442	327
9	.8	.8	.2	442	327	497	279
10	.8	.8	.2	497	279	603	219
11	.8	.8	.2	603	219	678	161
12	.8	.8	.2	678	161	682	157
13	1.5	.8	.2	682	157	683	142
14	1.5	.8	.2	683	142	733	103
15	1.5	.8	.2	733	103	797	55
16	1.5	.8	.2	797	55	843	29
17	1.5	.8	.2	843	29	933	21
18	1.5	.8	.2	933	21	948	20

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

Total Number of Rocks Simulated: 200  
 Starting Velocity in X-Direction: 1 ft/sec  
 Starting Velocity in Y-Direction: -1 ft/sec  
 Starting Cell Number: 1  
 Ending Cell Number: 18  
 Rock Density: 145 lb/ft<sup>3</sup>  
 Rock Shape: Spherical  
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

Analysis Point 1: X = 948, Y = 20

Total Rocks Passing Analysis Point: 8

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	18.14	37200	0.31
75%	21.32	49063	7.55
90%	24.19	59732	14.06
95%	25.9	66137	17.97
98%	27.83	73326	22.36

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 25.35	Maximum: 1.63	Maximum: 66587
Average: 18.14	Average: .69	Average: 37200
Minimum: 10.45	G. Mean: .31	Std. Dev.: 17568
Std. Dev.: 4.71	Std. Dev.: 10.72	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

Velocity Units: ft/sec    Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	60	49	4.59	8	2
2	78	62	6.9	12	4
3	102	83	8.36	65	46
4	125	104	9.32	121	80
5	144	122	10.12	181	118
6	167	141	10.97	224	138
7	190	161	22.91	213	90
8	194	71	49.02	95	8
9	85	57	7.71	12	3
10	78	53	7	11	2
11	82	61	7.98	16	3
12	84	62	8	15	4
13	84	62	8.04	29	18
14	98	64	18.09	29	6
15	99	52	11.49	16	5

16	71	44	10.15	13	3
17	30	17	8.13	2	0
18	25	18	4.71	2	0

## CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 350 ft	0
350 To 360 ft	0
360 To 370 ft	0
370 To 380 ft	0
380 To 390 ft	0
390 To 400 ft	0
400 To 410 ft	0
410 To 420 ft	0
420 To 430 ft	0
430 To 440 ft	0

440 To 450 ft	0
450 To 460 ft	0
460 To 470 ft	0
470 To 480 ft	0
480 To 490 ft	0
490 To 500 ft	0
500 To 510 ft	0
510 To 520 ft	0
520 To 530 ft	0
530 To 540 ft	0
540 To 550 ft	0
550 To 560 ft	0
560 To 570 ft	0
570 To 580 ft	0
580 To 590 ft	0
590 To 600 ft	0
600 To 610 ft	0
610 To 620 ft	0
620 To 630 ft	0
630 To 640 ft	0
640 To 650 ft	0
650 To 660 ft	0
660 To 670 ft	0
670 To 680 ft	0
680 To 690 ft	0
690 To 700 ft	0
700 To 710 ft	0
710 To 720 ft	0
720 To 730 ft	0
730 To 740 ft	0
740 To 750 ft	0
750 To 760 ft	0
760 To 770 ft	0
770 To 780 ft	0
780 To 790 ft	0
790 To 800 ft	0
800 To 810 ft	0
810 To 820 ft	0
820 To 830 ft	0
830 To 840 ft	0
840 To 850 ft	0
850 To 860 ft	3
860 To 870 ft	14
870 To 880 ft	31
880 To 890 ft	28
890 To 900 ft	25
900 To 910 ft	31
910 To 920 ft	31
920 To 930 ft	17
930 To 940 ft	8
940 To 948 ft	4

**Rockfall simulation input and output data for profile P4**

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

## Input File Specifications

Units of Measure: U.S.  
 Total Number of Cells: 11  
 Analysis Point 1 X-Coordinate: 403  
 Analysis Point 2 X-Coordinate:  
 Analysis Point 3 X-Coordinate:  
 Initial Y-Top Starting Zone Coordinate: 258  
 Initial Y-Base Starting Zone Coordinate: 258

Remarks:

## Cell Data

Cell No.	S.R.	Tang.	C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	228	49	206	
2	.8	.8	.2	49	206	90	180	
3	.8	.8	.2	90	180	126	159	
4	.8	.8	.2	126	159	164	135	
5	.8	.8	.2	164	135	198	112	
6	.8	.8	.2	198	112	206	103	
7	1.5	.8	.2	206	103	207	80	
8	1.5	.8	.2	207	80	272	41	
9	1.5	.8	.2	272	41	337	31	
10	1.5	.8	.2	337	31	403	25	
11	.8	.8	.2	403	25	404	25	

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

Total Number of Rocks Simulated: 200  
 Starting Velocity in X-Direction: 1 ft/sec  
 Starting Velocity in Y-Direction: -1 ft/sec  
 Starting Cell Number: 1  
 Ending Cell Number: 11  
 Rock Density: 145 lb/ft<sup>3</sup>  
 Rock Shape: Spherical  
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

Analysis Point 1: X = 403, Y = 25

Total Rocks Passing Analysis Point: 1

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	6.63	4516	0.02
75%	6.63	4516	0.69
90%	6.63	4516	1.3
95%	6.63	4516	1.66
98%	6.63	4516	2.07

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 6.63	Maximum: .02	Maximum: 4516
Average: 6.63	Average: .02	Average: 4516
Minimum: 6.63	G. Mean: .02	Std. Dev.: 0
Std. Dev.: 0	Std. Dev.: 1	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

Velocity Units: ft/sec    Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	26	21	2.04	1	0
2	39	32	2.77	3	1
3	44	36	3.44	4	1
4	52	42	4.09	5	1
5	59	46	4.73	6	2
6	63	50	5.26	10	4
7	64	50	5.33	32	27
8	80	38	9.18	9	2
9	33	17	7.16	5	0
10	7	7	0	0	0
11	5	5	0	0	0

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0

30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	4
290 To 300 ft	16
300 To 310 ft	25
310 To 320 ft	26
320 To 330 ft	26
330 To 340 ft	25
340 To 350 ft	20
350 To 360 ft	26
360 To 370 ft	12
370 To 380 ft	12
380 To 390 ft	5
390 To 400 ft	2
400 To 404 ft	0

**Rockfall simulation input and output data for profile P5**

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

## Input File Specifications

Units of Measure: U.S.  
 Total Number of Cells: 26  
 Analysis Point 1 X-Coordinate: 1155  
 Analysis Point 2 X-Coordinate: 1196  
 Analysis Point 3 X-Coordinate:  
 Initial Y-Top Starting Zone Coordinate: 1010  
 Initial Y-Base Starting Zone Coordinate: 1010

Remarks:

## Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	1029	66	1012
2	.8	.8	.2	66	1012	106	976
3	.8	.8	.2	106	976	152	925
4	.8	.8	.2	152	925	203	876
5	.8	.8	.2	203	876	261	814
6	.8	.8	.2	261	814	333	715
7	.8	.8	.2	333	715	397	615
8	.8	.8	.2	397	615	466	509
9	.8	.8	.2	466	509	531	402
10	.8	.8	.2	531	402	605	305
11	1.5	.8	.2	605	305	698	244
12	1.5	.8	.2	698	244	772	212
13	1.5	.8	.2	772	212	873	164
14	1.5	.8	.2	873	164	933	117
15	1.5	.8	.2	933	117	963	110
16	1.5	.8	.2	963	110	994	94
17	1.5	.8	.2	994	94	1029	73
18	1.5	.8	.2	1029	73	1038	62
19	1.5	.8	.2	1038	62	1043	62
20	1.5	.8	.2	1043	62	1046	66
21	1.5	.8	.2	1046	66	1047	66
22	1.5	.8	.2	1047	66	1088	49
23	1.5	.8	.2	1088	49	1102	33
24	1.5	.8	.2	1102	33	1142	33
25	1.5	.8	.2	1142	33	1176	10
26	1.5	.8	.2	1176	10	1196	7

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Total Number of Rocks Simulated: 100

Starting Velocity in X-Direction: 1 ft/sec  
 Starting Velocity in Y-Direction: -1 ft/sec  
 Starting Cell Number: 1  
 Ending Cell Number: 26  
 Rock Density: 165 lb/ft<sup>3</sup>  
 Rock Shape: Spherical  
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Analysis Point 1: X = 1155, Y = 24

NO ROCKS PAST ANALYSIS POINT 1

CRSP Analysis Point 2 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Analysis Point 2: X = 1196, Y = 7

NO ROCKS PAST ANALYSIS POINT 2

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Velocity Units: ft/sec    Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	38	32	2.75	4	1
3	62	51	4.97	9	2
4	71	58	6.84	11	3
5	86	68	9.36	14	5
6	105	84	10.88	34	10
7	124	92	15.2	39	11
8	140	100	15.31	37	14
9	151	106	19.99	50	14
10	146	91	17.19	32	9
11	89	54	14.32	17	5
12	70	39	11.47	10	2
13	55	31	10.05	8	1

14	75	42	10.43	19	3
15	43	21	8.6	4	1
16	46	25	8.13	8	1
17	47	28	6.7	6	2
18	54	35	6.43	12	5
19	51	24	13.96	9	1
20	37	34	0	2	1
21	38	35	0	1	0
22	34	25	0	2	0
23	44	35	0	7	4
24	No rocks	past end of cell			
25	No rocks	past end of cell			
26	No rocks	past end of cell			

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0

340 To 350 ft	0
350 To 360 ft	0
360 To 370 ft	0
370 To 380 ft	0
380 To 390 ft	0
390 To 400 ft	0
400 To 410 ft	0
410 To 420 ft	0
420 To 430 ft	0
430 To 440 ft	0
440 To 450 ft	0
450 To 460 ft	0
460 To 470 ft	0
470 To 480 ft	0
480 To 490 ft	0
490 To 500 ft	0
500 To 510 ft	0
510 To 520 ft	0
520 To 530 ft	0
530 To 540 ft	0
540 To 550 ft	0
550 To 560 ft	0
560 To 570 ft	0
570 To 580 ft	0
580 To 590 ft	0
590 To 600 ft	0
600 To 610 ft	0
610 To 620 ft	0
620 To 630 ft	0
630 To 640 ft	0
640 To 650 ft	0
650 To 660 ft	0
660 To 670 ft	0
670 To 680 ft	0
680 To 690 ft	0
690 To 700 ft	0
700 To 710 ft	0
710 To 720 ft	0
720 To 730 ft	0
730 To 740 ft	0
740 To 750 ft	0
750 To 760 ft	0
760 To 770 ft	0
770 To 780 ft	0
780 To 790 ft	0
790 To 800 ft	0
800 To 810 ft	0
810 To 820 ft	0
820 To 830 ft	0
830 To 840 ft	0
840 To 850 ft	0
850 To 860 ft	0
860 To 870 ft	0
870 To 880 ft	0
880 To 890 ft	0

---

890 To 900 ft	0
900 To 910 ft	0
910 To 920 ft	0
920 To 930 ft	0
930 To 940 ft	0
940 To 950 ft	0
950 To 960 ft	5
960 To 970 ft	2
970 To 980 ft	0
980 To 990 ft	0
990 To 1000 ft	0
1000 To 1010 ft	0
1010 To 1020 ft	0
1020 To 1030 ft	0
1030 To 1040 ft	5
1040 To 1050 ft	85
1050 To 1060 ft	0
1060 To 1070 ft	0
1070 To 1080 ft	0
1080 To 1090 ft	0
1090 To 1100 ft	0
1100 To 1110 ft	0
1110 To 1120 ft	2
1120 To 1130 ft	1
1130 To 1140 ft	0
1140 To 1150 ft	0
1150 To 1160 ft	0
1160 To 1170 ft	0
1170 To 1180 ft	0
1180 To 1190 ft	0
1190 To 1196 ft	0

## **Appendix B Cost Estimates**



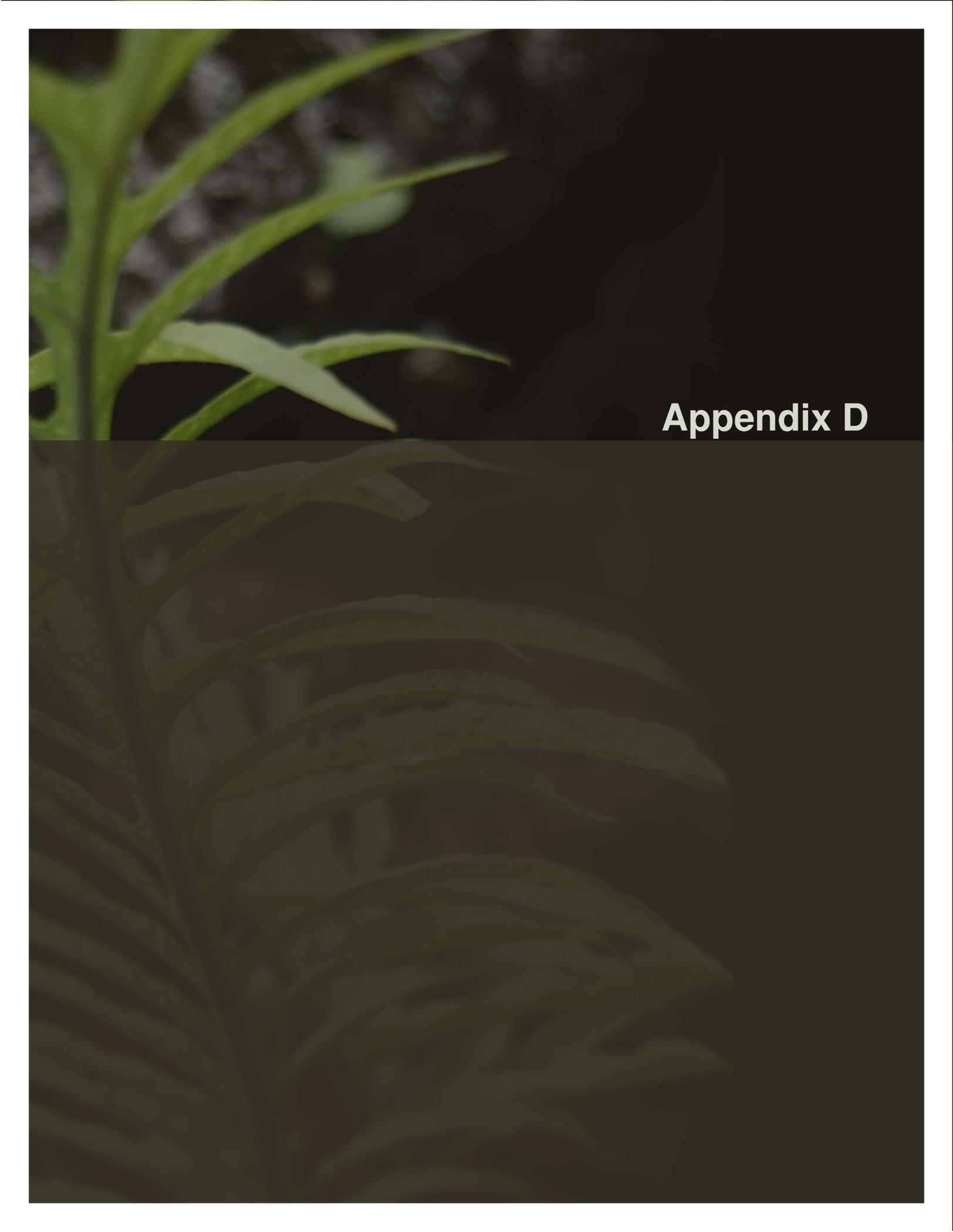
<b>Preliminary Cost Estimate</b>					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 2 <b>Anchored Wire Mesh System</b>		
Length: 3050 FT		Covered Area: 4843760 SF			
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000	100,000	
General clear and grub	SF	4843760	2.0	9,687,520	
Rock Scaling (2 Crews of 3)	HRS	40	1,100	44,000	
Rock Demolition	DAYS	5	6,000	30,000	
Draped Mesh System	SF	4843760	48	232,500,488	
Traffic Control	HRS	830	105	87,150	
Signage	LS	1	10,000	10,000	
On Site Disposal of Debris	CY	1020	5	5,100	
Erosion Control/Hydromulching	SF	4843760	0.8	3,875,008	
Subtotal				246,339,267	
Contingencies ( @ 10%)				24,633,927	
O & P ( @ 20%)				49,267,853	
Hawaii Tax ( @ 4.712%)				15,089,758	
Bonding ( @ 1.5%)				5,029,962	
Total Construction Cost				\$ 340,360,767	
				Rounded	\$ 340,360,000

<b>Preliminary Cost Estimate</b>					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 3 <b>Impact Fence System</b>		
Length:	3050 FT	Covered Area:	4843760	SF	
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000	100,000	
General clear and grub	SF	61000	2.0	122,000	
Rock Scaling (2 Crews of 3)	HRS	200	1,100	220,000	
Rock Demolition	DAYS	20	6,000	120,000	
Rockfall Impact Fence	LF	3050	1,800	5,490,000	
Traffic Control	HRS	830	105	87,150	
Signage	LS	1	10,000	10,000	
On Site Disposal of Debris	CY	1020	5	5,100	
Erosion Control/Hydromulching	SF	61000	0.8	48,800	
Subtotal				6,203,050	
Contingencies ( @ 10%)				620,305	
O & P ( @ 20%)				1,240,610	
Hawaii Tax ( @ 4.712%)				379,974	
Bonding ( @ 1.5%)				126,659	
Total Construction Cost				\$ 8,570,598	
				Rounded	\$ 8,570,000

<b>Preliminary Cost Estimate</b>					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 4		
<b>Impact Fence and anchored Wire Mesh System</b>					
Length:	3050 FT	Covered Area:	4843760	SF	
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000	100,000	
General clear and grub	SF	61000	2.0	122,000	
Rock Scaling (2 Crews of 3)	HRS	200	1,100	220,000	
Rock Demolition	DAYS	20	6,000	120,000	
Rockfall Impact Fence	LF	3050	1,800	5,490,000	
Anchored Mesh System	SF	18300	48	878,400	
Traffic Control	HRS	830	105	87,150	
Signage	LS	1	10,000	10,000	
On Site Disposal of Debris	CY	1020	5	5,100	
Erosion Control/Hydromulching	SF	61000	0.8	48,800	
Subtotal					7,081,450
Contingencies ( @ 10%)					708,145
O & P ( @ 20%)					1,416,290
Hawaii Tax ( @ 4.712%)					433,781
Bonding ( @ 1.5%)					144,595
Total Construction Cost					\$ 9,784,261
				Rounded	\$ 9,780,000

<b>Preliminary Cost Estimate</b>					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 5 <b>Catchment Ditch</b>		
Length:	3050 FT	Covered Area:	4843760	SF	
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000	100,000	
General clear and grub	SF	61000	2.0	122,000	
Rock Scaling (2 Crews of 3)	HRS	40	1,100	44,000	
Rock Demolition	DAYS	5	6,000	30,000	
Excavation	CY	11861	200	2,372,222	
Concrete Retaining Wall	CY	791	1,500	1,186,111	
Anchored Mesh System	SF	18300	48	878,400	
Traffic Control	HRS	830	105	87,150	
Signage	LS	1	10,000	10,000	
On Site Disposal of Debris	CY	1020	5	5,100	
Erosion Control/Hydromulching	SF	61000	0.8	48,800	
Subtotal					4,883,783
Contingencies ( @ 10%)					488,378
O & P ( @ 20%)					976,757
Hawaii Tax ( @ 4.712%)					299,161
Bonding ( @ 1.5%)					99,721
Total Construction Cost					\$ 6,747,801
				Rounded	\$ 6,750,000

<b>Preliminary Cost Estimate</b>				
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 6 <b>Realign Roadway</b>	
Length:	3050 FT	Covered Area	4843760	SF
Item	Quantity		Engineer's Estimate	
	Unit	Qty	\$/U	Total
Mobilization/ De-mobilization	LS	1	250000	250,000
General clear and grub	SF	100000	2.0	200,000
Rock Scaling (2 Crews of 3)	HRS	500	1,100	550,000
Roadway Realignment	LF	1200	6,000	7,200,000
Rockfall Impact Fence	LF	1500	1,800	2,700,000
Traffic Control	HRS	2050	105	215,250
Signage	LS	1	10,000	10,000
On Site Disposal of Debris	LS	1	40,000	40,000
Erosion Control/Hydromulching	SF	61000	0.8	48,800
Subtotal				11,214,050
Contingencies ( @ 10%)				1,121,405
O & P ( @ 20%)				2,242,810
Hawaii Tax ( @ 4.712%)				686,928
Bonding ( @ 1.5%)				228,978
Total Construction Cost				\$ 15,494,171
			Rounded	\$ 15,490,000



# Appendix D



***Biological Survey  
Hā'ena State Park  
Island of Kaua'i***

**By Ron Terry, Ph.D. and Patrick Hart, Ph.D.  
Geometrician Associates, LLC  
February 2009**

## **1. INTRODUCTION**

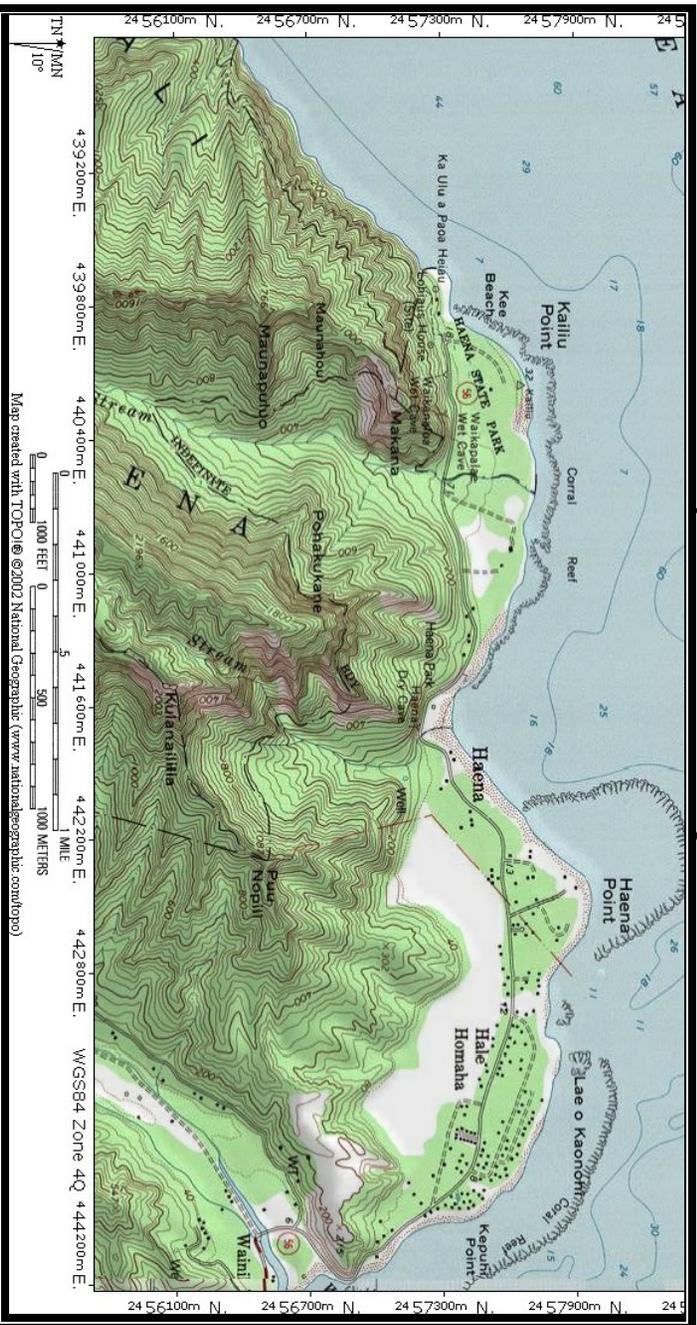
This report describes the results of a biological survey of approximately 64 acres within the boundaries of Hā'ena State Park on the Island of Kaua'i (Figs. 1-2). The objectives of the survey were to provide:

- A one-time physical survey of the flora and fauna of the 64-acre Ha'ena State Park (including the portion of Limahuli Stream below Kūhio Highway) documenting all plants, birds, reptiles, amphibians, mammals, freshwater fish, and marine reptiles or mammals fauna observed on the beach strand, with a complete species list. The survey was not intended to include invertebrates or marine flora, or marine fauna other than those listed above.
- A review of previous surveys or articles related to the flora, fauna, and habitats of Ha'ena State Park and Limahuli Stream.
- A comprehensive report of survey results, observations, and findings pertaining to the areas and biota specified above, with narrative describing each major plant community, stream habitats, sensitive habitats, unusual or significant species, occurrences, and the value of the area for conservation of native biota.
- A discussion of potential effects from increased recreation activities on wildland resources including invasive species, soil erosion, native plant and animal populations, endangered species, native plant communities, and sensitive habitats.
- A GIS map of existing plant communities, significant species occurrences, and demarcated cultivated and wetland areas.

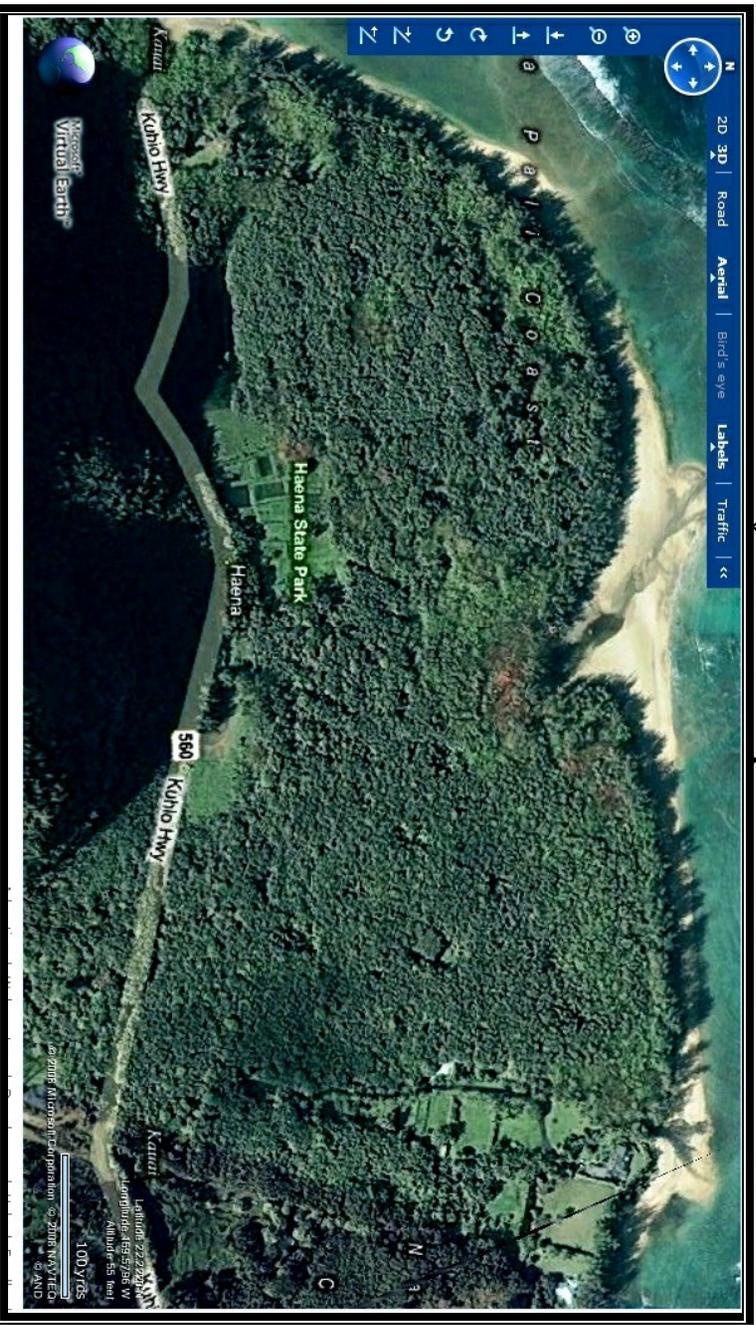
The area was surveyed on foot by biologists Ron Terry and Pat Hart on January 17-19, 2009. This survey also relies heavily on the botanical report conducted by Bishop Museum botanist Kenneth M. Nagata in 1991 as part of earlier planning efforts at Hā'ena State Park.

The project site is located on the north coast of Kaua'i in the district of Hanalei. It is bordered by Limahuli Stream on the east, the *pali* (cliff) separating Hā'ena and Hanakapi'ai on the south and the ocean on the north and west. The elevation ranges from sea level to approximately 200 feet above sea level on the *pali*. The property is mostly fairly flat, with substantial slopes restricted to the mauka side of Kūhio Highway, where talus slopes eventually give way to *pali*. The biologists walked irregular but densely spaced transects in order to get a full picture of the vegetation on the site. Although vegetation was dense, the limited size of Ha'ena State Park and numerous orientation features allowed the area to be reasonably fully covered and surveyed. Several looping excursions into the cliffs above the property were made where safety permitted. As the property boundary on the *pali* side was not known and it was not safe to survey in most areas of the cliffs, some areas

**Figure 1**  
Project Location USGS Map



**Figure 2**  
Project Location Airphoto



within the boundaries of the park were likely not surveyed. Plant species were identified in the field and, as necessary, collected and keyed out in the laboratory. Special attention was given to the possible presence of any federally (USFWS 2009) listed threatened or endangered plant species. Bird, reptile, amphibian and fish species were identified by sight and/or sound. In this report, on the first instance of the mention of a species, the common and scientific names are both given. Thereafter, only the common name is used, with occasional repetitions of the scientific name for clarity.

### *Limitations*

No biological survey of areas such as this can claim to have detected every species present. Some plant species are cryptic in juvenile or even mature stages of their life cycle. Dry conditions can render almost undetectable plants that extended rainfall may later invigorate and make obvious. Thick brush can obscure even large, healthy specimens. Only a fraction of birds that might be present in an area over the course of a year will be detected during a survey because of season, time of day, or other factors. Reptiles and amphibians can also be cryptic and may not be in evidence despite a thorough survey. Marine species that make only occasional use of the site may not be present on the days of the survey. The findings of this survey must therefore be interpreted with proper caution; in particular, there is no warranty as to the absence of any particular species. Furthermore, during the time of the survey, access was not possible into the Allerton Estate heiau area, and the general descriptions provided herein are based on previous work, with no attempt to list the species that might be present there. As this area has been completely cultivated, it is unlikely that any significant native species were omitted.

## **2. FLORA AND VEGETATION**

### *Vegetational Influences*

The geologic substrate in this area is alluvial beach and dune sand on the flats, behind which is the *pali*, which is formed from lavas of the Napali member of the Waimea Canyon Basalt formation (MacDonald et al 1986; UH-Hilo 1998). A distinct volcanic dike is visible making a vertical scar on the *pali*, evidence that the Hā'ena area is on a rift zone of the volcano that formed the island. Elevation varies from sea level to 200 feet above sea level. Annual rainfall in this area of Kaua'i is about 40 inches, according to the *Atlas of Hawai'i*, 3<sup>rd</sup> ed.

Given the rainfall, elevation, geologic substrate, and existing vegetation, prior to human disturbance, the general area probably supported a Coastal Mesic Forest dominated by hala (*Pandanus odoratissimus*) and 'ohi'a lehua (*Metrosideros polymorpha*) (Gagne and Cuddihy 1990). Nagata (1991) believed that alahe'e (*Psydrax odorata*), papala-kepau (*Pisonia* spp.), and hau (*Hibiscus tiliaceus*) may also have been prominent components. The herb layer was likely made up of various ferns and herbs that are still present as elements of today's vegetation.

This broad vegetation type was a matrix in which local conditions produced variants. Most obvious is the strand community on the shoreline, which today is represented mostly by pohuehue (*Ipomoea pes-caprae*) and naupaka (*Scaevola taccada*). This community probably contained a wide diversity of species such as nanea (*Vigna marina*), pohinahina (*Vitex rotundifolia*), nehe (*Lipochaeta integrifolia*), akiaki grass (*Sporobolus virginicus*) and pa'u-o-Hi'iaka (*Jacquemontia ovalifolia*). Native trees such as hau, hala, milo (*Thespesia populnea*) and kou (*Cordia subcordata*) were also

probably present. This strand community was probably much wider than today and extended back into the dunes. It is also possible that marsh ecosystems dominated by sedges such as *Cyperus javanicus* and *C. polystachyos* were also present.

Centuries of disturbance by agricultural and settlement completely changed the vegetation. The forests were cleared and the natural hydrology rearranged to support terraced wet taro (*Colocasia esculenta*) agriculture, with diverse gardens of a variety of Polynesian crops including breadfruit (*Artocarpus altilis*), ti (*Cordyline fruticosa*) sugarcane (*Saccharum officinarum*), ‘ohi‘a ai (*Syzygium malaccense*) and many others. Useful native plants such hala and hau were allowed to flourish in appropriate environments. In the 19<sup>th</sup> century, Western crops such as mango (*Mangifera indica*), various types of citrus (*Citrus* spp.), papaya (*Carica papaya*) and guava were added to the agricultural mix.

The area now within Hā’ena State Park experienced a gradual abandonment later in the 19<sup>th</sup> and early 20<sup>th</sup> century, and parts of it were incorporated in various estates, an informal countercultural camping area, and then a State Park. Over time, some of the existing species disappeared, others simply persisted in place (e.g., breadfruit), and others became feral (e.g., guava). New, aggressive invasive species such as Java plum (*Syzygium cumini*) began to become dominant.

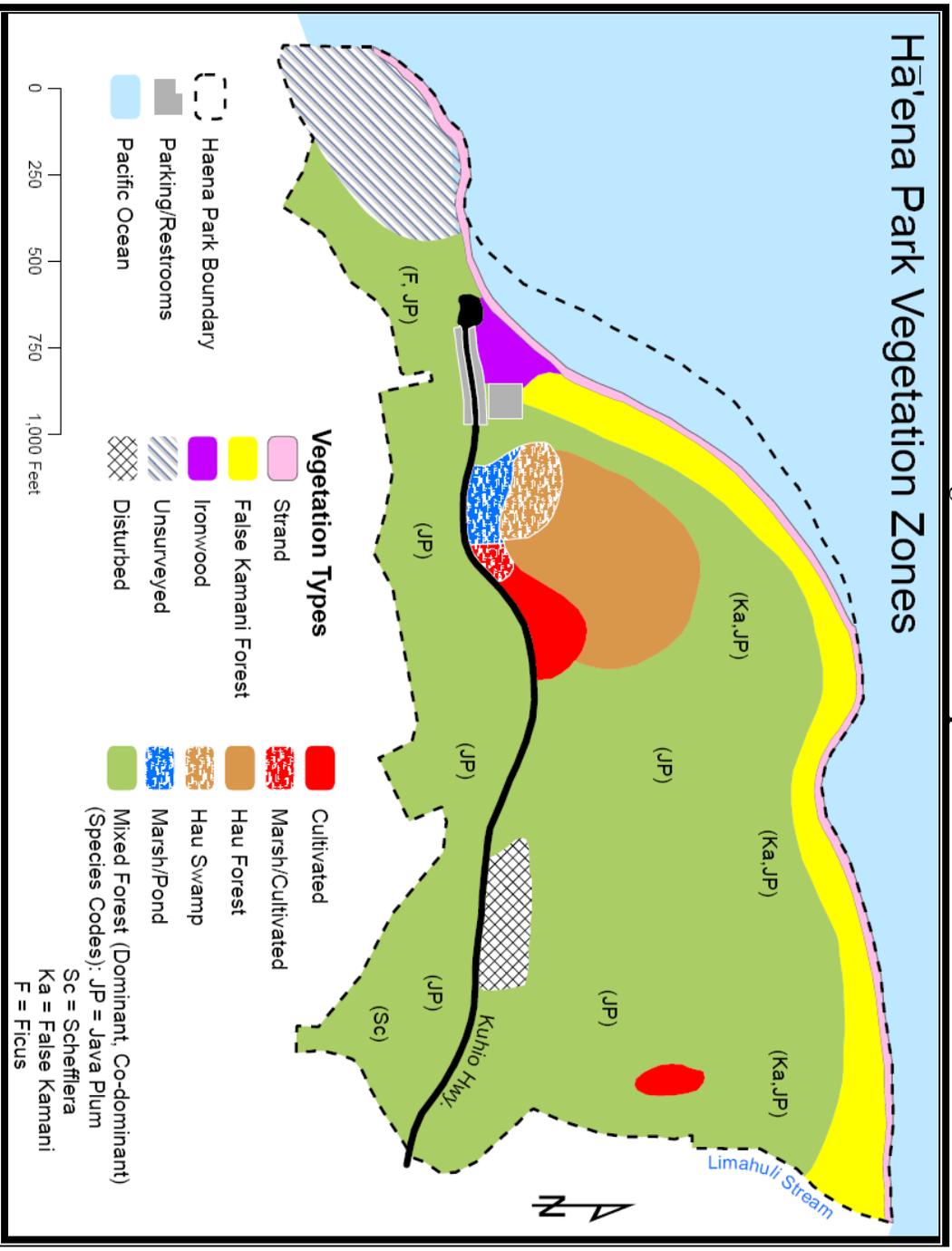
Ripperton and Hosaka described the vegetation of the general region in 1942 as shrubs and closed forest (Zone D, low phase) dominated largely by guava (*Psidium guajava*). Other characteristic species in this zone included sensitive plant (*Mimosa pudica*), Spanish clover (*Desmodium incanum*), ni‘ani‘au fern (*Nephrolepis exaltata hawaiiensis*) and such grasses as Hilo grass (*Paspalum conjugatum*), carpet grass (*Axonopus compressus*) and basket grass (*Oplismenus hirtellus*). ‘Ohi‘a lehua, most common in the upper portions of this zone, extended down to sea level in certain areas. Hala and kukui (*Aleurites moluccana*) are abundant in certain localities.

By the time of the 1991 Nagata survey, the vegetation was very similar to what it is today, with exceptions that are noted below in the section entitled “Vegetation Change.” Our strong presumptions beginning the survey were that few if any rare, threatened or endangered species would be expected. Nevertheless, favorable micro-habitats such as rock outcrops and the *pali* mauka of Kūhio Highway might harbor more natives and thus merited as close an inspection as safely feasible. In general, the altered vegetation represents a degradation of habitat for native animal species, but environments such as the strand, Limahuli Stream, and the *pali* might offer good if not pristine habitat.

### *Current Vegetation*

A number of basic vegetation types, all heavily influenced by human activity, are present at Hā’ena State Park (Figure 3). These vegetation types are not true “communities” because they have not co-evolved. Instead, they are haphazard collections of a few hardy natives, remnant cultivated plants, and various alien plants that are constantly in flux. Very little of the vegetation is in even temporary equilibrium, and both species composition and vegetational structure appear to be constantly changing. Figure 3 is therefore presented with the caution that it is an approximate snapshot of an area that has undergone drastic change and will continue to do so, whether or not the future brings purposeful human intervention. The map is diagrammatic and the boundaries between zones are approximate. The eleven zones are described below.

Figure 3  
Vegetation Zones Map

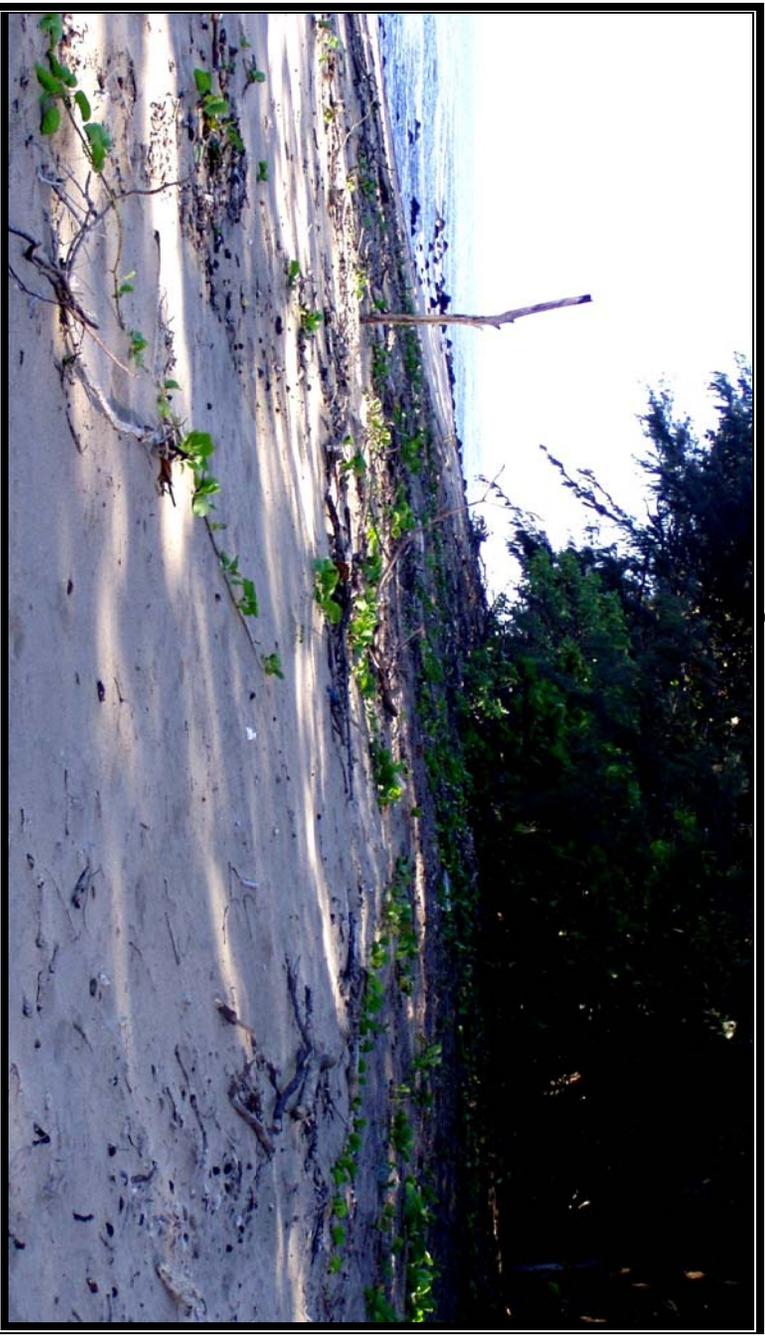


Source: Fieldwork by R. Terry and P. Hart, January 2009

### Strand Zone

The strand, here defined as the zone seaward of the tree line, is poorly developed (Figures 3 and 4). When present it consists mostly of the indigenous pohuehue (*Ipomoea pes-caprae*), the possibly indigenous grass kukaipua'a (*Digitaria setigera*), and seedlings of such alien trees as ironwood (*Casuarina equisetifolia*), tree heliotrope (*Tournefortia argentea*) and false kamani (*Terminalia catappa*). Few other species are found in this community. Beach naupaka (*Scaevola taccada*), generally regarded as a typical strand species, occurs uncommonly. As discussed above, a typical healthy strand ecosystem in a climatic and geological setting such as this would be much more diverse. The density of ironwood and particularly false kamani shading out the strand from the land side and heavy wave action scouring strand vegetation away from the ocean side has depauperized the strand. The section below on management recommendations values discusses opportunities for restoration of this area.

**Figure 4**  
**Strand Zone Vegetation**



#### False Kamani Forest Zone

This zone dominates the areas a variable distance of 75 to 150 feet mauka of the strand and consists of false kamani trees 30 to 40 feet tall, with a few remnant ironwoods and the occasional emergent Java plum (Figures 3 and 5). The canopy cover is typically closed and the resulting dense shade precludes the development of any significant ground cover. The shrub and herb layers, when present, consist mostly of false kamani seedlings. According to the 1991 Nagata report, ironwood was once co-dominant here. Although the fringe of the strand exhibits a row of ironwoods, most of the old ironwood trees have died (many stumps and treefalls are present), perhaps as result of damage from Hurricane Iniki, and false kamani has taken over. The False Kamani Forest grades into a variant of the Mixed Forest zone that is dominated by Java plum and false kamani.

#### Ironwood Zone

There is only a small remnant of area outside the strand fringe that is truly dominated or co-dominated by ironwood (Figures 3 and 6). In this area the understory consists of a thick carpet of ironwood “needles” and a poorly developed shrub and herb layer of wedelia (*Wedelia trilobata*) and pothos (*Epipremum pinnatum*). This is found near the end of the road, lifeguard stand and new restroom, and may be the result of managing the forest here. According to a posted sign at the park, this area is being restored with native species.

**Figure 5**  
**False Kamani Zone Vegetation**



**Figure 6**  
**Ironwood Zone Vegetation**



## Mixed Forest Zone

The Mixed Forest zone is the largest vegetation zone in the park. This zone consists of most of the areas classified by Nagata (1991) as either Java Plum Forest or Mixed Forest (Figures 3 and 7). In our classification, these two zones have been lumped, but the vegetation zone map (Figure 3) includes a number of point symbols indicating which species are dominant or co-dominant. These two zones have been combined because the characteristics that apparently distinguished them in 1991 do not appear today to be nearly as distinct. Areas that had once been dominated almost completely by Java plum now host a number of other species, including false kamani, hau, Chinese banyan (*Ficus microcarpa*), octopus tree (*Schefflera actinophylla*), kukui, African tulip (*Spathodea campanulata*), guava, waiawi (*Psidium cattleianum*), Christmas berry (*Schinus terebinthifolius*), cinnamon (*Cinnamomum zeylanicum*) and Madagascar olive (*Noronhia emarginata*). There are still limited areas in which Java plum is completely dominant, and the forest matches the description given by Nagata:

Typically the forest consists of Java plum trees at least 30 feet tall with 50-100% canopy cover. In some areas false kamani is co-dominant in the upper canopy and occasionally forms a secondary canopy as well. The density and composition of the understory varies considerably. In some areas the understory is open with a sparse shrub layer of Java plum saplings and a well-developed herb layer of awapuhi [note: in 2009 this species was not observed] ...laua'e...basketgrass, or pothos. In other areas the understory is dense and consists of a well-developed shrub layer of mostly Java plum saplings and guava. In certain areas the indigenous...*Nephrolepis exaltata* is the dominant species in the herb layer.

The Mixed Forest, as the name implies, is highly variable. As noted in Nagata (1991), there are many small sunny patches in which shrubs such as guava and sourbush (*Pluchea symphytifolia*) replace Java plum and other trees and the understory consists of Hilo grass (*Paspalum conjugatum*), laua'e (*Phymatosorus grossus*), honohono (*Commelina diffusa*), and Job's tears (*Coix lachryma-jobi*), among others. Two native trees, hau and hala, appear to be holding their own. Vines such as morning glory (*Ipomoea indica*) and water lemon (*Passiflora laurifolia*) are still present, but moon flower (*Ipomoea alba*), noted as present by Nagata, was not observed.

In the Mixed Forest mauka of Kūhio Highway, the soils are better drained than the flats and the landscape is covered with talus from the *pali*. Christmas berry is more abundant along the talus mauka of Kūhio Highway. The ground cover here is dominated by basketgrass, pothos, and several ferns. In shady, steep areas there a few of the indigenous 'ala'alawainui (*Peperomia leptostachya*), and the endemic ko'oko'olau (*Bidens forbesii*) and akoko (*Chamaesyce celastroides* var. *lorifolia*) are present in sunny patches.

As detailed by Nagata (1991), the Mixed Forest (and indeed the entire park) contains numerous ornamental species that are either remnant and in decline or are invasive and spreading. Firmly established species that are remnants of old plantings include Turk's cap, solitaire palm (*Ptychosperma elegans*), small shell ginger (*Alpinia mutica*), red ginger (*A. purpurata*), shell ginger (*Zingiber zerumbet*), spiral flag (*Costus speciosus*), and five fingers (*Syngonium auritum*).

**Figure 7**  
**Mixed Forest Zone Vegetation**



## Cultivated Areas Zone

Nagata (1991) called three portions of the project site Cultivated Areas: the Allerton Estate, including Ka Ulu a Paoa Heiau and Lohi'au's Hula Platform (the numerous no-trespassing signs and a lack of arranged access prevented us from surveying this area in 2009); a small cabin within the Mixed Forest near Limahuli Stream (which is no longer actively cultivated and which the forest is steadily overtaking); and an informal, overflow parking area along Kūhio Highway. In this survey, we reclassified the overflow parking area as Disturbed Vegetation but added the taro farming area in the center of the park (Figures 3 and 8) near the wetlands as a third cultivated area. The Cultivated Area zone is a miscellaneous category that completely lacks any vegetation community characteristics. A large number of species are present. Although not surveyed by us in 2009, Nagata found the Allerton Estate to have a great number of ornamental and food species, many of which are presumably still present. Nagata described the vegetation here thus:

The Allerton Estate, Ka Ulu a Paoa Heiau and Lohi'au's Hula Platform...contain the majority of the species. The lawns consist of a mixture of Nib grass, goosegrass (*Eleusine indica*), kyllinga (*Cyperus kyllinga*), Asiatic pennywort (*Centella asiatica*), synedrella (*Synedrella nodiflora*) and *Hemigraphis repens*. Among the numerous ornamentals are hybrid roses (*Rosa* x), colored ti (*Cordyline* x), allamanda (*Allamanda cathartica*), crape myrtle (*Lagerstroemia indica*) and oleander (*Nerium oleander*). Several such as pothos, taro vine, mango, king palm (*Archontophoenix alexandrae*) and tithonia (*Tithonia diversifolia*) have become naturalized and are spreading into the adjacent Mixed Forest.

As in the Nagata survey, a number of food plants and ornamentals are still found around the cabin near Limahuli Stream. Notable are *Citrus* spp., Otaheiti apple or vi (*Spondias dulcis*), coconuts (*Cocos nucifera*), small shell ginger, spiral flag, hybrid roses, common heliconia (*Heliconia humilis*), and banana (*Musa x paradisiaca*).

In addition to taro, the taro farming area includes in its vegetation a number of weeds typical of farms, similar to those listed below for the overflow parking area. Towards the pond end of the cultivated area, plants tolerant of saturated soils such as honohono and Job's tear's begin to predominate.

## Disturbed Vegetation Zone

Nagata's "cultivated" area near Kūhio Highway continues to be used as an overflow parking area. Here, a large variety of weeds are present, including goosegrass (*Eleusine indica*), wedelia, finger grass (*Chloris* spp.), partridge pea (*Chamaecrista nictitans*), *Desmodium* spp., sensitive plant, Jamaican vervain (*Stachytarpheta jamaicensis*), and plantain (*Plantago* spp.). Koa haole (*Leucaena leucocephala*) and Guinea grass (*Panicum maximum*) are common at the periphery.

**Figure 8**  
**Cultivated Area Zone Vegetation**



**Figure 9**  
**View of Pond, Marsh and Swamp**



### Marsh/Pond and Marsh/Cultivated Zones

One area classified by Nagata (1991) as “Grassland” appears to have changed markedly. The area roughly delineated in his 1991 map is now occupied by a combination of small areas that we have designated Cultivated Area (the taro farm discussed above), Marshland/Pond, and a transitional vegetation type called Marshland/Cultivated. In 1991, according to Nagata:

The Grassland occupies a series of low-lying taro terraces which is irrigated by a single auwai and although the substrate was dry during the time of the survey it probably becomes rather marshy during the wet season.

There were no permanent areas of standing water noted in the 1991 report. In January of 2009, after a month of heavy rains, a pond and marshy wetlands occupying perhaps an acre were apparent (Figures 3 and 9). Native Koloa or Hawaiian Ducks (*Anas wyvilliana*) were utilizing the ponds daily, and the singing of bullfrogs (*Rana catesbeiana*) was evident. Fringing the ponds were wetlands marshes, which extended back east towards the cultivated area. Several soil pits dug during the survey revealed the presence of mucky, sulfidic soils indicating frequent saturation and reducing conditions, meaning that the inundated condition is not unusual. The eastern edge of the marsh can be, and probably is at times, cultivated for taro, and is thus distinguished as its own, transitional Marsh/Cultivated Zone, grading into the taro farm in the Cultivated Area. Additional investigation is required to delineate the boundaries of the wetlands per definitions of Section 404 of the Clean Water Act (U.S. Department of the Army 1987), but the soil, hydrological, and vegetation indicators all appear to be present at least in the core area around the pond.

Species present in the marshy area included Job’s tears, honohono, ‘ape (*Alocasia macrorrhiza*), Hilo grass (*Paspalum conjugatum*) and California grass (*Urochloa mutica*), among others.

### Hau Swamp and Hau Forest Zones

The marsh wetlands are bordered on the shoreline side by the Hau Swamp zone (Figures 3 and 9). This closed canopy, low-lying area is almost 100 percent tangled hau branches. Further investigation of inundation and soil conditions would be required to determine if this zone qualifies as a jurisdictional wetlands under Section 404 of the Clean Water Act and to delineate the wetlands boundaries, but initial indications are that it should be so classified. As the terrain steps up in elevation slightly, the Hau Swamp grades into the Hau Forest and Mixed Forest zones.

### Other Areas

Not classified within their own zones are the *pali* (the extent to which the *pali* lies within the park was not known during our survey) and miscellaneous areas such as the restroom, roadsides and parking areas. The vegetation of the latter types is typical of the weeds found in the Cultivated and Disturbed zones. A portion of the park appears to include the *pali*. One ascent of the *pali* near the former Lohiau’s House was made, but it was mostly surveyed with binoculars during a number of excursions to the base and from the road. Similar to Nagata’s 1991 observations, the vegetation along the cliff face consist mostly of scrub ironwood, Java plum, Christmas berry, waiawi, octopus tree, with a shrub and herb layer of Jamaican vervain, Pluchea, air plant (*Kalanchoe pinnata*), and scarlet orchid (*Epidendrum x obrienianum*). This area included the highest density of native plants, including ahinahina, ko’oko’olau, akoko, ‘ala’alawainui, moa, ‘ohi’a lehua, and the sedge *Carex meyenii*.

## Flora

Appendix 1 contains a full list of plant species found at the park, which is not included in the main body of this report because of its length. We recorded a total of 117 flowering plants and 9 ferns or fern allies. Most of the plant species found were alien; 15 were indigenous and six were Hawai'i endemics. The remaining plants are alien, including several species considered invasive. No listed or proposed threatened or endangered plant species (USFWS 2009) were found.

The Nagata survey, which accessed the Allerton Estate and probably recorded there a number of alien species not found anywhere in our 2009 survey, found a total of 218 flowering plants and 9 ferns or fern allies.

### *Significant Species*

#### Native Species

As was true when Nagata surveyed the park in 1991, native species are of minor importance in the floristic composition. They comprise approximately 17 percent of the total number of species but account for very little of the total cover and are not abundant except in restricted areas near the cliff, on the strand, and in the hau forest and swamp. None are classified as threatened or endangered or considered rare. Most are common throughout the major Hawaiian Islands. Two of the six endemics are restricted to Kaua'i: *Bidens forbesii* is a common lowland species on the north shore and *Artemisia kauaiensis* is found throughout the sea cliffs of Kaua'i.

Most of the native species are widely scattered in small numbers. Of the 15 native species, only Koali (morning glory) and the ni'ani'au fern are widely common, with hala and hau scattered but locally abundant. Pohuehue is considered abundant in the Strand zone. Except in the *pali* area, all of the endemic species are uncommon in the park.

#### Species of Cultural Significance

Ten species of early Polynesian introduction are found in the surveyed area: mountain apple, sugar cane, banana, noni, ti, coconut, breadfruit, 'ape, taro, and kukui. Of these, all but breadfruit, which is only sparingly naturalized but persists after cultivation, have spread in various vegetation types throughout Hawai'i. Although all are culturally significant, their distribution in the project site cannot easily be correlated with historical Hawaiian land uses in the park, as Nagata pointed out in 1991. Most of the species are found in small numbers in the Mixed Forest both within and outside the system of taro lo'i. Many of the plants are growing inside the terraces indicating naturalization after the abandonment of the terraces. Nagata found that ti was the only Polynesian alien species recorded from Ka Ulu a Paoa Heiau and Lohi'aus Hula Platform. The planting of ti in sites of such religious and cultural significance can be considered traditional but it was not known whether they resulted from ancient, or more modern, plantings. Several large specimens of kukui and breadfruit are present in the site, indicating rather old plantings. In general, the distributions of these Polynesian plants do not appear to be useful in interpretation of traditional land use.

## *Invasive Species*

The Hawai‘i-Pacific Weed Risk Assessment (HP-WRA) is a research project by scientists from the University of Hawai‘i and the USDA Forest Service to identify plants that pose a high weed risk in Hawai‘i and other Pacific Islands. ([http://www.botany.hawaii.edu/faculty/daehler/wra/full\\_table.asp](http://www.botany.hawaii.edu/faculty/daehler/wra/full_table.asp)). The HP-WRA score is a prediction on how invasive a species will become, and does not attempt to balance the costs and benefits of introduced species in terms of potential economic, ecological, public health, medicinal, historic, community, cultural, tourism, and esthetic values. The HP-WRA ratings have no regulatory authority and the HP-WRA list is not an official State list of invasive plants.

In the status column of Appendix 1, species listed as posing a high weed risk are identified, either as species likely to be invasive (INV, which included 7 species) or already determined to be invasive (INV-H, which included 6 species) based on published information on the species’ current impacts in Hawai‘i. The species already determined to be invasive are strawberry guava (*Psidium cattleianum*), guava (*Psidium guajava*), octopus tree (*Schefflera actinophylla*), Christmas berry (*Schinus terebinthifolius*), Guinea grass (*Panicum maximum*), and Hilo grass (*Paspalum conjugatum*). Although not listed among the 13 species, Java plum (*Syzygium cumini*) should probably be considered highly invasive, and based on its rapid initial inroads into the forest in no more than 17 years, the Madagascar olive (*Noronhia emarginata*), which is currently on the HP-WRA list as a species to evaluate, may soon merit classification as invasive in Hawai‘i. With the exception of Madagascar olive (which we observed scattered in other locations along the North Shore of Kaua‘i), the other invasive plants are long established. We did not observe any indication that they are notably expanding their range or densities or pose a threat to adjacent, uninfested areas.

## *Vegetational Change*

The vegetation of Hā‘ena State Park has been undergoing disturbance and transformation since human settlement over a millennium ago. As Nagata pointed out in 1991, major alteration began with the construction of the terrace system. Some areas may have been left intact but eventually the native forests were probably transformed utterly by centuries of use. Human use since the early 19<sup>th</sup> century has also been periodically intensive, as evidenced by ornamental species, ruins of structures, and trash piles. In the end, no original plant communities of the type discussed at the beginning of the report remain.

Even in the short interval between the last vegetation survey in 1991 and the current one in 2009, vegetation change has been occurring. A subtle change has been the convergence of the Java Plum and Mixed Forest into a diverse, if alien-dominated, Mixed Forest. It is likely that the relative importance of various species in terms of abundance and cover has changed, but this is difficult to characterize. An obvious change is the appearance of *Noronhia emarginata* or Madagascar olive, which was not present in the 1991 survey and is now a prominent component, at least in terms of abundance. The large number of juveniles trees of this species portend that it will be a major component of the forest in the near future. The most striking change was the decline of ironwood in the area mauka of the shoreline, where it was recently described as co-dominant. As observed earlier in this report, many, if not most, of the old ironwood trees have died, perhaps as result of damage from Hurricane Iniki, and false kamani has taken over. Perhaps because of the increasing shade from the kamani trees (along with heavy wave action), the strand vegetation, described by Nagata as already sparse, appears to have declined in size and diversity even further.

### 3. FAUNA

#### *Birds*

Thirteen species of birds were detected during the survey (Table 1), including the federally endangered Hawaiian Duck (Koloa Maoli; *Anas wyvilliana*), two indigenous shorebirds (Kolea; *Pluvialis fulva* and ‘Ulili; *Heteroscelus incanus*), and an indigenous seabird (Koa‘e Kea; *Phaethon lepturus dorotheae*). All other birds were non-native introductions. Japanese White-eyes (*Zosterops japonicus*) were particularly abundant in the mixed forest, as were White-rumped Shammas (*Copsychus malabaricus*) and Red Jungle Fowl (*Gallus gallus*). No native land birds were observed on the project site, nor would they be expected to be found in the area due to the low elevation, lack of native forest habitat and the abundance of disease-carrying mosquitoes. A large number of native species, some endangered, are known from areas mauka, and it is possible that occasional sightings of native forest birds are made at the park. Many species of shorebirds, waterbirds, and seabirds, some of which are federally listed endangered species, might be expected to make occasional use of the project site.

In addition to the Pacific Golden Plovers and Wandering Tattlers that were observed, other shorebirds that likely make occasional use of the project site but were not seen during the surveys include the Ruddy Turnstone (*Arenaria interpres*), Bristle-thighed Curlew (*Numenius tahitiensis*), Sanderling (*Calidris alba*), and various other Sandpipers. The Black-crowned Night-heron (‘Auku‘u; *Nycticorax nycticorax hoactli*), an indigenous wetland bird, would also be expected to make use of the area. Other native water birds that may make use of the wetland areas include the federally endangered Black-necked Stilt (Ae‘o; *Himantopus mexicanus knudseni*), the federally endangered Hawaiian Coot (‘Alae ke‘oke‘o; *Fulica alae*), the federally endangered Hawaiian Moorhen (‘Alae ‘ula; *Gallinula chloropus sandvicensis*) and the federally endangered Nene (*Branta sandvicensis*).

Many species of seabirds would be expected to make use of the airspace over the park. Species that were not seen in our limited surveys include Noddies (*Anous sp.*), Terns (*Sterna sp.*), Frigate Birds (‘Iwa; *Fregata minor palmerstoni*), Shearwaters (*Puffinus sp.*), Albatross (*Phoebastria sp.*), Boobies (*Sula sp.*), Petrels (*Pterodroma sp.*) and Red-tailed Tropicbirds (*Phaethon rubricauda melanorhynchos*). Most notably, three species of rare seabirds undoubtedly fly over the park on their way to nests in mountains of Kaua‘i: the federally endangered Hawaiian Petrel (‘Ua‘u; *Pterodroma phaeopygia sandwichensis*), the federally threatened Newell’s Shearwater (‘A‘o; *Puffinus auricularis newelli*), and the Band-rumped Storm-Petrel (*Oceanodroma castro*), which is listed as endangered by the State of Hawai‘i. Radar surveys indicate that the north shore of Kaua‘i has large populations of these latter three species (N. Holmes *per. comm.*).

Although these threatened and endangered seabirds are not likely to utilize the park’s resources for feeding, resting or nesting, developments that involve structures or lighting can affect these birds. The principal potential impact is the increased threat that birds will be downed after becoming disoriented by exterior lighting, if this is provided at the park.

**Table 1**  
**Bird Species Identified On/Near Ha'ena State Park**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Status</b>
<i>Acridotheres tristis</i>	Common Myna	Alien Resident
<i>Copsychus malabaricus</i>	White-rumped shama	Alien Resident
<i>Pluvialis fulva</i>	Pacific Golden-Plover	Indigenous Visitor
<i>Cardinalis cardinalis</i>	Northern Cardinal	Alien Resident
<i>Paroaria coronata</i>	Red Crested Cardinal	Alien Resident
<i>Streptopelia chinensis</i>	Spotted Dove	Alien Resident
<i>Phaethon lepturus dorotheae</i>	White tailed Tropicbird	Indigenous
<i>Heteroscelus incanus</i>	Wandering Tattler	Indigenous Visitor
<i>Gallus gallus</i>	Red Junglefowl	Alien Resident
<i>Anas wyvilliana</i>	Koloa	Endemic
<i>Geopelia striata</i>	Zebra Dove	Alien Resident
<i>Carpodacus mexicanus</i>	House Finch	Alien Resident
<i>Zosterops japonicus</i>	Japanese White-Eye	Alien Resident

### *Mammals, Reptiles and Amphibians*

Aside from feral cats (*Felis catus*), no wild mammal species were detected during the course of this survey. It is highly likely that mice (*Mus* spp.) and rats (*Rattus* spp.) are present. The biologists encountered various pet domestic dogs (*Canis f. familiaris*) but no indication that wild dogs are present in the area. Although the biologists did not see wild pigs (*Sus s. scrofa*) or goats (*Capra h. hircus*), they are known to be present in this part of Kaua'i. None of these alien mammals have conservation value and all are deleterious to native flora and fauna.

As with all of Kaua'i, Hā'ena State Park may also be used by the State's only endemic mammal, the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), which is listed as an endangered species. Hawaiian hoary bats are cryptic and little is known of their habits or habitat in Kaua'i, but they often seen in the Hanalei area. They can be regularly observed foraging on insects attracted by the lights of a gas station on the highway in Princeville (R. David, 2008, pers. comm. to R. Terry).

Endangered Hawaiian monk seals (*Monachus schauinslandi*) primarily inhabit the remote Northwestern Hawaiian Islands, which because of the relative lack of disturbance are excellent habitat for the seals to swim and dive for fish, spiny lobsters, octopuses, and eels. Monk seals spend most of their time in the ocean, but come ashore to rest on beaches and even utilize fringe vegetation as shelter from storms. They are increasingly being seen in the main Hawaiian Islands, and are frequently observed (and have been observed by our team at different times) at Hā'ena State Park. Monk seals can become agitated and sometimes aggressive if people approach too closely or are too loud. Disturbing them may also interrupt resting periods and may even cause a mother seals to abandon their pups. Feeding monk seals may adversely change their natural foraging instincts. Hawaiian monk seals are also susceptible to diseases spread by the feral mammals sometimes present in parks, such as leptospirosis (transmitted mainly through feral mammal urine in water) and toxoplasmosis (associated with feral cats).

**Table 2**  
**Mammal, Reptile and Amphibian Species Identified in/Near Ha'ena State Park**

Scientific Name	Common Name	Status
All species in January 2009 survey		
<i>Rana catesbeiana</i>	Bullfrog	A
UnID'd (Family: <i>Scincidae</i> )	Skink	A
<i>Anolis carolinensis</i>	Green Anole	A
UnID'd (Family: <i>Gekkonidae</i> )	Gecko	A
<i>Felis catus</i>	Cat	A
Native species detected in previous documented surveys		
<i>Lasiurus cinereus semotus</i>	Hawaiian Hoary Bat	E, End
<i>Monachus schauinslandi</i>	Hawaiian Monk Seal	I, End
<i>Chelonia mydas</i>	Green Sea Turtle	I, Th
<i>Eretmochelys imbricata</i> *	Hawksbill Turtle	I, End

Notes: Alien (A), Indigenous (I), Endemic (I), Endangered (End), Threatened (Th); \* not confirmed

Three species of reptile, a skink not identified to the species level, a green anole (*Anolis carolinensis*), and a gecko not identified to the species level, as well as one species of amphibian, the bullfrog (*Rana catesbeiana*), were detected during the survey. These species are all common on Kaua'i. There are undoubtedly other species of lizard and frog present in or near the park. The infamously noisy coqui frog (*Eleutherodactylus coqui*) is not yet present on Kaua'i.

#### *Limahuli Stream Fishes*

A number of stream surveys have been conducted for Limahuli Stream in its lower, middle and upper reaches. The Hawai'i Stream Research Center (UH-HSRC) was established in 1996 through a partnership between Limahuli Garden (The National Tropical Botanical Garden) and the Hawai'i Division of Aquatic Resources (DAR) to develop and implement a Long Term Ecological Research (LTER) Program monitoring biological structure and function in Limahuli Stream at the ahupua'a-watershed scale. An unpublished report from 2001 by Mike Kido of DAR supplied as part of background material for this survey discussed the findings to date on Limahuli Stream. It appears to be a continuous, perennial system, with an average flow from 1994 to 1999 measured at 6.3 million gallons per day, stabilized by substantial groundwater flow at times when drought limits surface runoff. It drops from an elevation of about 2,000 feet over a distance of less than four miles. The riparian zones adjacent to Limahuli Stream are dominated by invasive tree species that provide heavy shade and contribute substantial organic material in the form of plant litter, which flows to ocean during floods. Ha'ena State Park includes only the very lowest 1,000-foot stretch of Limahuli Stream. This portion is critical, however, because it provides the connection between the stream and the ocean for a number of fish species that are diadromous, meaning they must spend part of their life cycle in the sea and part in a stream.

Five species of endemic and indigenous Hawaiian gobies (o'opu) may inhabit this stream, including the o'opu alamo (*Lentipes concolor*), o'opu nopili (*Sicyopterus stimpsoni*), o'opu naniha (*Stenogobius hawaiiensis*), o'opu akupa (*Eleotris sandwicensis*) and o'opu nakea (*Awaous guamensis*). These o'opu live their adult lives and lay their eggs in the streams, but upon hatching, the larvae drift out to sea where they develop as plankton for a number of months before returning to fresh water. The alamo'o, nopili, and nakea may be found furthest up Limahuli Stream because their sucker-like pectoral fins allow them to climb waterfalls, whereas naniha and akupa lack this ability and would only inhabit the sections of the stream nearest the ocean.

According to the Kido report referenced above, several years of population monitoring studies showed

...a relatively fixed species distribution pattern over time along the “mauka to makai” stream continuum despite variation in species population densities and ranges of species overlap. This is the first documented evidence for a stable population distribution pattern for native fish and invertebrates along the continuum of a Hawaiian stream. Native ‘o‘opu populations in Limahuli Stream are relatively robust overall; however, densities of the herbivorous ‘o‘opu-nopili (*Sicyopterus stimpsoni*) are significantly lower than that in neighboring Hanakapiai Stream at similar elevations. A plausible cause is the light limitation induced by the aggressive alien riparian canopy which lowers primary production levels and regulates algal diversity.

According to Kido, although a number of alien invertebrates are present in Limahuli Stream, alien fish species had been limited, at least until 2001, to periodic invasions near the stream mouth by the alien poeciliid fishes swordtails (*Xiphophorus helleri*) and guppies (*Poecilia reticulata*). The source of these intrusions are poeciliid populations in the *auwai* system that withdraws water from Limahuli Stream just mauka of Kūhio Highway and empties into the stream near its mouth after passing through old taro lands. Poeciliids were also found to in the ponds and marshes near the cultivated areas. As these poeciliid fishes are known vectors of pathogenic parasites that infect native ‘o‘opu species, DAR has researched chemical control.

For the current inventory, our limited survey of Limahuli Stream below Kūhio Highway over the course of two hours on January 18 identified only one species of juvenile fish, which appeared to be aholehole (*Kuhlia sandvicensis*)<sup>1</sup>. No ‘o‘opu were apparent. During January, alamo‘o and nopili hatchlings, which have hatched far upstream and traveled downstream as larvae, are developing within the ocean, in preparation for swimming upstream during February to May. Nakea breed in areas just above the stream mouth from August to November and may create swarms, but by January the hatchlings are also in the ocean. It is therefore unsurprising that these three species of ‘o‘opu were not observed. As discussed above, naniha and akupa cannot climb waterfalls and might be more likely to be found near the mouth of Limahuli Stream year-round (Yamamoto and Tagawa 2000).

---

<sup>1</sup> The number of aholehole species in Hawai‘i and their proper names are currently the subject of discussion. This report will utilize the traditional common and scientific names, and because only fry were observed, does not attempt to determine the precise species. See Randall, J.E. and Randall, H.A., 2001. “Review of the Fishes of the Genus *Kuhlia* (Perciformes: Kuhliidae) of the Central Pacific.” *Pacific Science* 55(3) [http://www.hawaiiifishes.com/fish\\_of\\_month/past\\_fom/fom\\_05\\_05.htm](http://www.hawaiiifishes.com/fish_of_month/past_fom/fom_05_05.htm) for discussion and

**Table 3**  
**Fish Species Identified in Limahuli Stream**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Status</b>
IN January 2009 Survey		
<i>Kuhlia sandvicensis</i>	Aholehole	I
IN previous documented surveys*		
<i>Lentipes concolor</i>	O'opu alamo	E
<i>Stenogobius hawaiiensis</i>	O'opu naniha	E
<i>Awaous guamensis</i>	O'opu nakea	I
<i>Sicyopterus stimpsoni</i>	O'opu nopili	E
<i>Eleotris sandwicensis</i>	O'opu akupa	E
<i>Xiphophorous helleri</i>	Swordtails	A
<i>Poecilia reticulata</i>	Guppies	A

Notes: Alien (A), Indigenous (I), Endemic (E)

\*Records from Division of Aquatic Resources, and unpublished report by Mike Kido of DAR supplied to Geometrician Associates by PBR Hawaii Inc.

#### **4. MANAGEMENT RECOMMENDATIONS**

##### *Sensitive Resources and Areas*

As discussed above, no listed or proposed threatened or endangered plant species (USFWS 2009) were found at Hā'ena State Park, and none are likely to be found. Several endangered seabird species fly over the park on their way to nesting sites in the mountains. The endangered Hawaiian hoary bat probably utilizes the area for foraging and may roost in trees or large shrubs.

Other than perhaps portions of the cliff, which while not dominated by native species, contain a diverse assemblage of natives, no areas of botanically significant vegetation are present at the park. As Nagata (1991) noted, although some native species are present, they are widely scattered and do not present ecologically meaningful patterns. Because of the relatively scarcity of native plants, the habitat value for native animals is not significant. The vegetation does perform other ecological functions, such as helping to absorb rainfall and thus avoid erosion and sedimentation, as well as retarding the rate of coastal erosion. This report does not evaluate the cultural significance of the vegetation, but it is important to note the general persistence of at least some of the culturally important native or Polynesian-introduced plants, despite being largely overwhelmed by invasive alien species. Limahuli Stream is an important resource for the conservation of native fishes (and other organisms) and merits protection.

##### *Effects of Recreation Activities on Biological Resources*

As Hā'ena State Park develops and visitor use grows there will be more pressure on its reef, shoreline, stream and botanical resources. In general, because the biological value of most of property aside from the shoreline and Limahuli Stream is modest, such threats are limited. However, the stream and the shoreline will continue to require protection, and if parts of the park are restored, the areas needing protection will expand.

Another impact faced by all parks is that they act as concentrated points for dropping off unwanted pet animals and releasing pests such as rats, coqui frogs, and non-native plant species. The public nature of parks and their general lack of security may make members of the public less reluctant to engage in these inappropriate activities deliberately and also make it likely that occasional accidental acts may occur. Hā'ena State Park is the gateway to the Na Pali trail and Kalalau Valley, and a large proportion of its visitors come from North America, Europe, Asia and Australia. Their hiking boots and camping gear may contain seeds, spores, and even live alien organisms.

### *Potential Restoration Opportunities*

Although the current vegetation may not currently have great conservation value, there is potential to improve the species structure of the vegetation by removing aliens and planting native species, at least in selected environments. While some of the alien species detected in the survey are invasive at least to some degree, none are currently restricted to Hā'ena State Park and thus pose a risk of spreading regionally outward from the park. Therefore, the considerations related to removing invasives center on its utility towards restoring native vegetation and the cost and difficulty of maintenance.

Probably the most important opportunity is in the coastal areas occupied by the Strand, Ironwood and False Kamani Forest zones. According to research by PBR Hawaii Inc., historical photos indicate that the false kamani trees invaded since the tsunami of 1946 and 1960, prior to which the entire area was open coastal dunes. Restoration of a native dune ecosystem consisting of plants such as pohuehue, naupaka, nanea, pohinahina, nehe, pa'u-o-Hi'iaka, akiaki grass, milo, hala and kou, would provide an improved and more authentic vegetation. Nagata (1991) pointed out that ironwood and false kamani have been widely used for erosion control and are currently performing this function at least to some degree, and seem well-suited for the task. However, native species are also adapted to coastal environments and such an effort, if carefully conducted, would likely not increase and might in fact reduce coastal erosion. Restoration of these dunes would also improve habitat for common native shorebirds, including Kolea, 'Ulili, Ruddy Turnstone, Bristle-thighed Curlew, Sanderling, and Sandpiper.

Another area with potential for beneficial impact is restoration of the riparian areas around Limahuli Stream. A large proportion of the lands below 2,000 feet in elevation in Hawai'i is agricultural. Where streams flow through these areas, the surrounding riparian forest is becoming highly invaded by a number of alien tree species, particularly rose-apple (*Syzygium jambos*), waiawi, and to a lesser degree, Java plum (*Syzygium cumuni*), as at Hā'ena State Park. These trees are especially problematic in lowland riparian areas where they form a dense, closed canopy forest that effectively prevents sunlight from reaching the ground (Smith 1985). The deep shade produced by these trees likely prevents the establishment of a mid-canopy and ground cover layer in the forest. Because of this, much of the land beneath these forests consists of bare soil that erodes easily and likely produces large amounts of sedimentation into streams during rains. Dense shade may also prevent the growth and establishment of native riparian plant species. In streams, reduced sunlight limits the growth of benthic algae (Larned and Santos 2000), which are a major food source for many rare and federally endangered native fish (Fitzsimons et al. 2003) and invertebrates (Brasher 1997). A reduction in this important food source, coupled with increased sediment loading, could ultimately result in decreased habitat quality of streams.

Less critical but perhaps still of interest in the long run would be a program to restore selected areas of the talus slopes and cliff faces. As discussed above, these areas already offer the most pristine

native habitat and diversity of native species. The difficulty and hazard of working or visiting this environment, however, may dictate against a project such as this being implemented.

The restoration of threatened and endangered (T&E) plants species provides the opportunity to not only assist directly in native plant conservation but also to educate the public. State and private landowners may utilize T&E species as long as they obtain these plants from licensed nurseries and keep records that demonstrate this.

Restoring habitat that encourages repopulation by endangered *animal* species is another matter. It brings with it the responsibility to protect these animals once they are established. In order to provide for maximum compliance with State and federal endangered species laws, the State must enter into a "Safe Harbor Agreement" prior to undertaking the habitat improvement. This is a voluntary arrangement between the U.S. Fish and Wildlife Service and a cooperating non-federal landowner under the authority of Section 10(a)(1) of the Endangered Species Act of 1973, 16 U.S.C. 1536(b)(4), 1539(a)(1). Under the Safe Harbor Agreement and an associated enhancement of survival permit, the non-federal property owner implements actions that will result in a net conservation benefit for species listed under the Act without the risk of further restrictions pursuant to section 9 of the Act, which prohibits take of listed species. The property owner also receives assurances related to modifications of the SHA or termination of the permit. Such agreements allow a landowner to promote threatened and endangered species on their property without liability for incidental takes that may occur. It might be possible to restore the small wetlands on the property with the purpose of creating native bird habitat that encourages native endangered waterbirds such as Nene, Koloa (which already utilize the pond), or Black-necked Stilts. However, the wetlands area is so small that it would be of limited value. Furthermore it is located directly adjacent to the road, where endangered birds might be harassed, injured or killed directly or indirectly by people or their pets. For both practical and legal reasons, we advise against modifying this small wetlands to attract endangered birds.

Landscape design including plantings, signage and trails can be designed to not only access, beautify, and interpret places within the park, but also to protect certain environments. If the park undertakes restoration of the strand, convenient trails should be established to direct foot traffic along paths that minimize trampling of vegetation. Signage can educate visitors and help protect plants. Limahuli Stream should be protected from use as a trash can or toilet through signage. If restored, the wetlands should be protected through fringing vegetation that encourages viewing but discourages direct entry. Although it is unlikely that many visitors will clamber up the steep, slippery and vegetation-tangled talus areas to access the cliffs (aside from the established trail accessing the Wai-a-ka-pala'e Wet Cave and the Rock Shelter features), any new trails in this area should consider both visitor hazard and native plant preservation.

### *Specific Management Recommendations*

The following management measures are recommended to minimize impacts to biological resources:

- Park planning, particularly the location of trails and destinations, warning signage, and security personnel training and duties, must take into account balancing recreation and ecosystem protection.
- Signage and other educational material should be developed and distributed to advise the visiting public about the value of native species and not to drop off pests or unwanted pets.
- Park personnel, DLNR experts, and volunteers should monitor the park periodically for invasive species.

- Landscaping should avoid invasive species, as well as employ native species to the greatest degree consistent with project goals. Given the alien character of the vegetation and the presence of many invasive species, landscaping with natives could substantially improve on the existing botanical environment and bird habitat.
- When restoring with threatened and endangered plant species, ensure that all plant material is obtained from licensed nurseries and that records are kept to demonstrate this.
- Landscape design including plantings, signage and trails should be designed to protect the strand, stream and wetlands environments.
- In order to prevent impacts to Hawaiian hoary bats, State Parks should restrict any cutting of large shrubs or trees to periods outside the April to August pupping period for Hawaiian hoary bats.
- To reduce the potential for interactions between nocturnally flying threatened or endangered seabirds, any external lighting planned to be used during construction or within the completed project must be shielded so that light shines only downward.
- The park should continue cooperation with federal, State of Hawai‘i, and non-profit organizations that help protect Hawaiian monk seals from natural and human threats.
- The park should continue to cooperate with the Division of Aquatic Resources to keep new alien fish out of *auwai* and stream and in ridding stream of periodic invasions of swordtails, guppies, and other alien fish.

## REFERENCES

- Brasher, A. M. 1997. *Life history characteristics of the native Hawaiian stream snail Neritina granosa (hihiwai)*. Cooperative National Park Resources Studies Unit Hawaii Technical Report 114, 46p.
- Fitzsimons, J. M., M. G. McRae, H. L. Scheoenfuss, and R. T. Nishimoto. 2003. "Gardening behaviour in the amphidromous Hawaiian fish *Sicyopterus stimpsoni* (Osteichthyes: Gobiidae)." *Ichthyological Exploration of Freshwaters* **14**:185-191.
- Gagne, W., and L. Cuddihy. 1990. "Vegetation," pp. 45-114 in W.L. Wagner, D.R. Herbst, and S.H. Sohmer, eds., *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- Handy, E.S.C. & E.G. Handy. 1972. *Native Planters in Old Hawaii*. Bernice P. Bishop Museum Bull. 233. Honolulu.
- Hawai'i State of Department of Agriculture. 1979. Foreign Noxious Weed Survey. A cooperative function of Hawaii Dept. of Agriculture & U.S. Dept. of Agriculture
- Larned, S. T., and S. R. Santos. 2000. "Light- and nutrient-limited periphyton in low order streams of Oahu, Hawaii." *Hydrobiologia* **432**:101-111.
- Macdonald, G.A., A.T. Abbott, and F.L. Peterson. 1986. *Volcanoes in the Sea: The Geology of Hawaii*. 2nd ed. Honolulu: University of Hawai'i Press.
- McKeown, S. 1996. *A Field Guide to Reptiles and Amphibians in the Hawaiian Islands*. Honolulu: Diamond Head Publishing.
- Nagata, K. M. 1991. Botanical Survey, Hā'ena State Park, Hā'ena, Kaua'i. Prep. for Division of State Parks, Hawai'i DLNR, Honolulu.
- Palmer, D.D. 2002. *Hawai'i's Ferns and Fern Allies*. Honolulu: University of Hawai'i Press.
- Ripperton, J.C. & E.Y. Hosaka. 1942. "Vegetation Zones of Hawaii." *Hawai'i Agric. Exp. Sta. Bull.* No. 89. Honolulu.
- Smith, Clifford W. 1985. "Impact of alien plants on Hawai'i's native biota." In: Charles P. Stone and J. Michael Scott, eds. *Hawai'i's Terrestrial Ecosystems: Preservation and Management*. Cooperative National Park Resources Studies Unit, University of Hawaii, Manoa. p. 186.
- University of Hawai'i at Hilo, Dept. of Geography. 1998. *Atlas of Hawai'i*. 3rd ed. Honolulu: University of Hawai'i Press.
- U.S. Department of the Army (Army Corps of Engineers [USACOE]). 1987. Corps of Engineers *Wetlands Delineation Manual*. Prep. By Environmental Laboratory, Department of the Army, Vicksburg, MS.

- U.S. Fish and Wildlife Service (USFWS). 2009. *USFWS Threatened and Endangered Species System (TESS)*. Washington: GPO. [http://ecos.fws.gov/tess\\_public/StartTESS.do](http://ecos.fws.gov/tess_public/StartTESS.do)
- W. L. Wagner, D.R. Herbst, and S.H. Sohmer, eds. 1990. *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- Yamamoto, M.N., and A.W. Tagawa. 2000. *Hawai'i's Native and Exotic Freshwater Animals*. Honolulu: Mutual Publishing.

**Appendix 1**  
**Plant Species Identified in/Near Ha'ena State Park**

<b>Scientific Name</b>	<b>Family</b>	<b>Common Name</b>	<b>Life Form</b>	<b>Status*</b>
<i>Adiantum raddianum</i>	Pteridaceae	Maidenhair fern	Fern	A
<i>Ageratum conyzoides</i>	Asteraceae	Maile honohono	Grass	A
<i>Aleurites moluccana</i>	Euphorbiaceae	Kukui	Tree	P
<i>Alocasia sp.</i>	Araceae	'Ape	Herb	P
<i>Alpinia mutica</i>	Zingiberaceae	Small shell ginger	Herb	A
<i>Alpinia purpurata</i>	Zingiberaceae	Red ginger	Herb	A
<i>Alpinia zerumbet</i>	Zingiberaceae	Shell ginger	Herb	A, INV
<i>Archontophoenix alexandrae</i>	Arecaceae	King palm	Tree	A, INV
<i>Artemisia kauaiensis</i>	Asteraceae	'Ahinahina	Shrub	E
<i>Artocarpus altilis</i>	Moraceae	Breadfruit	Tree	P
<i>Artocarpus heterophyllus</i>	Moraceae	Jack fruit	Tree	A
<i>Bidens forbsii</i>	Asteraceae	Ko'oko'olau	Shrub	E
<i>Blechnum appendiculatum</i>	Blechnaceae	Blechnum	Fern	A
<i>Bougainvillea sp.</i>	Nyctaginaceae	Bougainvillea	Shrub	A
<i>Canavalia cathartica</i>	Fabaceae	Mauna Loa	Vine	A
<i>Carex meyenii</i>	Cyperaceae	Carex	Sedge	I
<i>Carica papaya</i>	Caricaceae	Papaya	Tree	A, INV
<i>Casuarina equisetifolia</i>	Casuarinaceae	Ironwood	Tree	A
<i>Cenchrus echinatus</i>	Poaceae	Common sandbur	Grass	A
<i>Chamaecrista nictitans</i>	Fabaceae	Partridge Pea	Herb	A
<i>Chamaesyce celastroides</i>	Euphorbiaceae	Akoko	Shrub	E
<i>Chloris barbata</i>	Poaceae	Swollen finger grass	Grass	A
<i>Chloris radiatae</i>	Poaceae	Radiate finger grass	Grass	A
<i>Christella dentata</i>	Thelypteridaceae	Pai'i'iha	Fern	A
<i>Cinnamomum verum</i>	Lauraceae	Cinnamon tree	Tree	A, INV
<i>Citrus sp.</i>	Rutaceae	Citrus	Tree	A
<i>Clidemia hirta</i>	Melastomataceae	Coster's curse	Shrub	A, INV
<i>Clusia rosea</i>	Clusiaceae	Autograph tree	Tree	A
<i>Cocos nucifera</i>	Arecaceae	Niu	Tree	P
<i>Colocasia esculenta</i>	Araceae	Taro	Herb	P
<i>Coffea arabica</i>	Rubiaceae	Coffee	Shrub	A
<i>Coix lachrymal-jobi</i>	Poaceae	Job's tears	Grass	A
<i>Commelina diffusa</i>	Commelinaceae	Honohono	Herb	A
<i>Cordia subcordata</i>	Boraginaceae	Kou	Tree	I
<i>Cordyline fruticosa</i>	Agavaceae	Ki	Shrub	P
<i>Costus speciosus</i>	Costaceae	Spiral flag	Herb	A
<i>Crinum asiaticum</i>	Amaryllidaceae	Spider lily	Herb	A
<i>Cynodon dactylon</i>	Poaceae	Bermuda grass	Grass	A
<i>Cyperus papyrus</i>	Cyperaceae	Papyrus	Sedge	A
<i>Cyperus polystachyus</i>	Cyperaceae	None	Sedge	I
<i>Desmodium incanum</i>	Fabaceae	Desmodium	Herb	A
<i>Desmodium sandwicense</i>	Fabaceae	Spanish clover	Vine	A
<i>Desmodium tortuosum</i>	Fabaceae	Florida beggarweed	Herb	A
<i>Dieffenbachia sp.</i>	Araceae	Dumb cane	Shrub	A

**Appendix 1, continued**  
**Plant Species Identified in/Near Ha'ena State Park**

<b>Scientific Name</b>	<b>Family</b>	<b>Common Name</b>	<b>Life Form</b>	<b>Status*</b>
<i>Digitaria setigera</i>	Poaceae	Kukaipua'a	Grass	I?
<i>Doryopteris decipiens</i>	Pteridaceae	Kumuniu	Fern	E
<i>Elephantopus mollis</i>	Asteraceae	Elephant's foot	Shrub	A
<i>Eleusine indica</i>	Poaceae	Wire grass	Grass	A
<i>Emilia fosbergii</i>	Asteraceae	Pualele	Herb	A
<i>Epidendrum x obrienianum</i>	Orchidaceae	Scarlet orchid	Herb	A
<i>Epipremnum pinnatum</i>	Araceae	Pothos	Vine	A
<i>Ficus microcarpa</i>	Moraceae	Chinese banyan	Tree	A
<i>Gladiolus x hortulanus</i>	Iridaceae	Gladiolus	Herb	A
<i>Heliconia humilis</i>	Musaceae	Common heliconia	Shrub	A
<i>Hibiscus sp.</i>	Malvaceae	Hibiscus	Shrub	A
<i>Hibiscus tiliaceus</i>	Malvaceae	Hau	Tree	I
<i>Ipomoea indica</i>	Convolvulaceae	Koali	Vine	I
<i>Ipomoea pes-caprae</i>	Convolvulaceae	Pohuehue	Vine	I
<i>Ipomoea triloba</i>	Convolvulaceae	Little bell	Vine	A
<i>Kalanchoe pinnata</i>	Crassulaceae	Air plant	Shrub	A
<i>Lepisorus thunbergianus</i>	Polypodiaceae	pakahakaha	Fern	I
<i>Leucaena leucocephala</i>	Fabaceae	Koa haole	Tree	A
<i>Livistona chinensis</i>	Arecaceae	Chinese fan palm	Tree	A
<i>Macadamia ternifolia</i>	Proteaceae	Macadamia	Tree	A
<i>Macroptilium lathyroides</i>	Fabaceae	Cowpea	Vine	A
<i>Malvaviscus penduliflorus</i>	Malvaceae	Turk's cap	Shrub	A
<i>Mangifera indica</i>	Anacardiaceae	Mango	Tree	A
<i>Melinis minutiflora</i>	Poaceae	Molasses grass	Grass	A
<i>Metrosideros polymorpha</i>	Myrtaceae	'Ohi'a lehua	Tree	E
<i>Mimosa pudica</i>	Fabaceae	Sensitive plant	Herb	A
<i>Morinda citrifolia</i>	Rubiaceae	Noni	Tree	P, INV
<i>Musa x paradisiaca</i>	Musaceae	Banana	Shrub	P
<i>Nephrolepis exaltata hawaiiensis</i>	Nephrolepidaceae	Ni'ani'au	Fern	E
<i>Noronhia emarginata</i>	Oleaceae	Madagascar olive	Tree	A
<i>Oplismenus hirtellus</i>	Poaceae	Basket grass	Grass	A
<i>Pandanus tectorius</i>	Pandanaceae	Hala	Tree	I
<i>Panicum maximum</i>	Poaceae	Guinea grass	Herb	A, INV-H
<i>Paspalum conjugatum</i>	Poaceae	Hilo grass	Grass	A, INV-H
<i>Paspalum vaginatum</i>	Poaceae	Seashore paspalum	Grass	A, INV
<i>Passiflora edulis</i>	Passifloraceae	Lilikoi	Vine	A
<i>Passiflora laurifolia</i>	Passifloraceae	Yellow water lemon	Vine	A
<i>Peperomia leptostachya</i>	Piperaceae	'Ala'alawainui	Herb	I
<i>Persea americana</i>	Lauraceae	Avocado	Tree	A
<i>Phlebodium aureum</i>	Polypodiaceae	Rabbit's foot fern	Fern	A
<i>Phymatosorus grossus</i>	Polypodiaceae	Laua'e	Fern	A
<i>Plantago lanceolata</i>	Plantaginaceae	Narrow leaved plantain	Herb	A
<i>Plantago major</i>	Plantaginaceae	Common plantain	Herb	A
<i>Plectranthus parviflorus</i>	Lamiaceae	'Ala'alawainui	Herb	I

**Appendix 1, continued**  
**Plant Species Identified in/Near Ha'ena State Park**

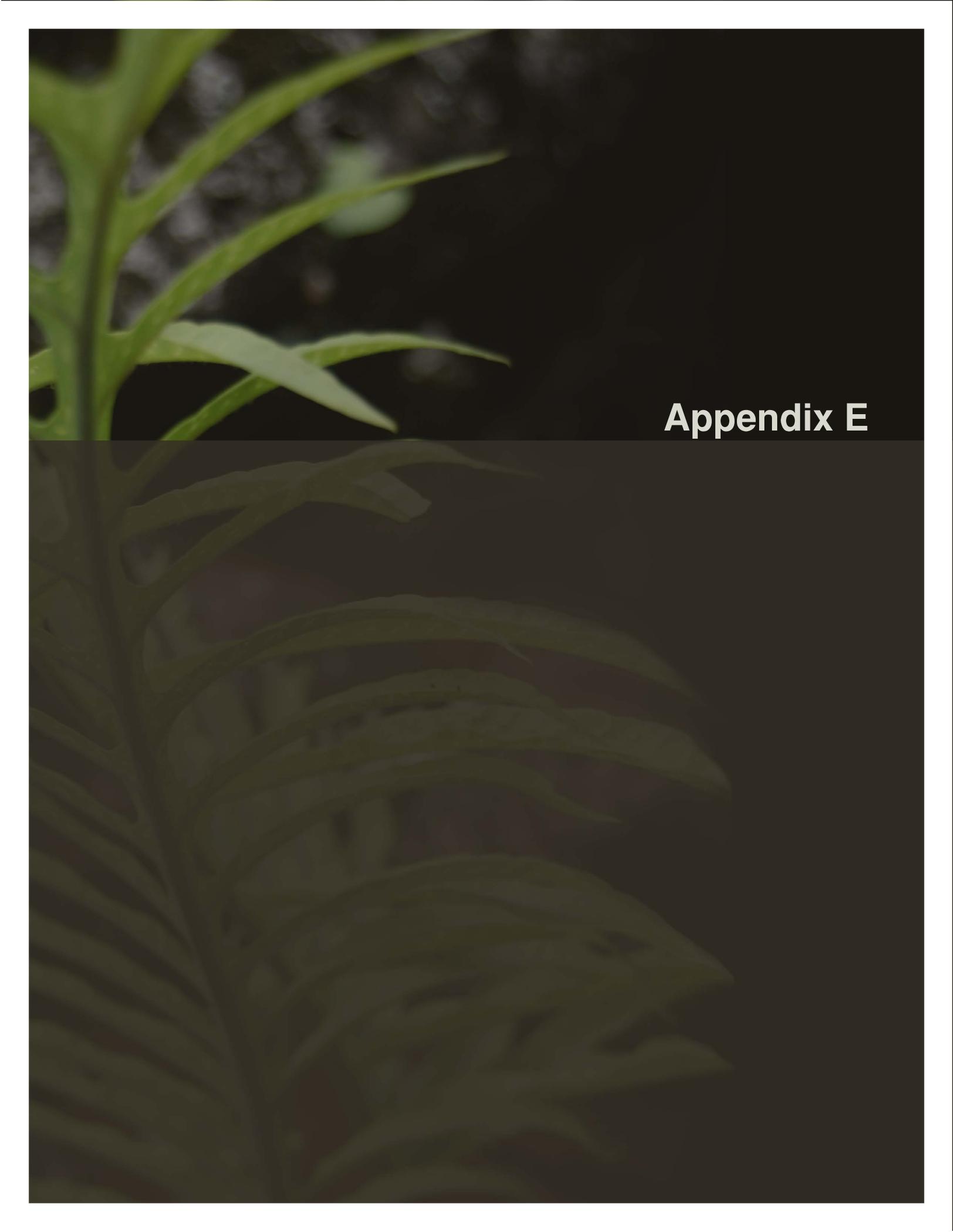
Scientific Name	Family	Common Name	Life Form	Status*
<i>Pluchea symphytifolia</i>	Asteraceae	Sourbush	Shrub	A
<i>Plumeria sp.</i>	Apocynaceae	Plumeria	Tree	A
<i>Polyscias sp.</i>	Araliaceae	Panax	Tree	A
<i>Psidium cattleianum</i>	Myrtaceae	Strawberry guava	Tree	A, INV-H
<i>Psidium guajava</i>	Myrtaceae	Guava	Tree	A, INV-H
<i>Psilotum nudum</i>	Psilotaceae	Moa	Fern ally	I
<i>Ptychosperma elegans</i>	Arecaceae	Solitaire palm	Tree	A
<i>Rhapis excelsa</i>	Arecaceae	Bamboo palm	Tree	A
<i>Ricinus communis</i>	Euphorbiaceae	Castor bean	Tree	A
<i>Rivina humilis</i>	Phytolaccaceae	Coral berry	Shrub	A
<i>Rosa sp.</i>	Rosaceae	Rose	Shrub	A
<i>Saccharum officinarum</i>	Poaceae	Sugar cane	Grass	P
<i>Sacciolepis indica</i>	Poaceae	Glenwood grass	Grass	A
<i>Samanea saman</i>	Fabaceae	Monkeypod	Tree	A
<i>Scaevola taccada</i>	Goodeniaceae	Naupaka	Shrub	I
<i>Schefflera actinophylla</i>	Araliaceae	Octopus tree	Tree	A, INV-H
<i>Schinus terebinthifolius</i>	Anacardiaceae	Christmas berry	Tree	A, INV-H
<i>Senna pendula</i>	Fabaceae	Senna	Shrub	A
<i>Setaria gracilis</i>	Poaceae	Yellow foxtail	Grass	A
<i>Sida acuta</i>	Malvaceae	Sida	Shrub	A
<i>Solanum americanum</i>	Solanaceae	Popolo	Shrub	I
<i>Spathodea campanulata</i>	Bignoniaceae	African Tulip tree	Tree	A
<i>Spathoglottis plicata</i>	Orchidaceae	Philippine ground orchid	Herb	A
<i>Sphenomeris chinensis</i>	Lindsaeaceae	Pala'a	Fern	I
<i>Spondias dulcis</i>	Anacardiaceae	Otaheite apple	Tree	A
<i>Sporobolus indicus</i>	Poaceae	West Indian dropseed	Grass	A
<i>Stachytarpheta jamaicensis</i>	Verbenaceae	Jamaica vervain	Shrub	A
<i>Synedrella nodiflora</i>	Asteraceae	Nodeweed	Herb	A
<i>Syngonium auritum</i>	Araceae	Five fingers	Vine	A
<i>Syzygium cumini</i>	Myrtaceae	Java plum	Tree	A
<i>Syzygium jambos</i>	Myrtaceae	Rose apple	Tree	A
<i>Syzygium malaccense</i>	Myrtaceae	Mountain apple	Tree	P
<i>Terminalia catappa</i>	Combretaceae	False kamani	Tree	A
<i>Thespesia populnea</i>	Malvaceae	Milo	Tree	I
<i>Tournefortia argentea</i>	Boraginaceae	Tree heliotrope	Tree	A
<i>Urochloa mutica</i>	Poaceae	California grass	Grass	A
<i>Verbena litoralis</i>	Verbenaceae	Owi	Herb	A
<i>Wedelia trilobata</i>	Asteraceae	Wedelia	Herb	A

Notes: Non-Polynesian-introduced Alien (A), (P) Polynesian-introduced, Indigenous (I), Endemic (I), Endangered (End)

INV, Likely to be invasive in Hawai'i and on other Pacific Islands as determined by the Hawai'i-Pacific Weed Risk Assessment of the USDA Forest Service, based on published sources describing species biology and behavior in Hawaii and/or other parts of the world.

INV-H Documented to cause significant ecological or economic harm in Hawai'i, as determined from published information on the species' current impacts in Hawai'i.





# Appendix E





DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT  
FORT SHAFTER, HAWAII 96858-5440

June 15, 2009

REPLY TO  
ATTENTION OF:

Regulatory Branch

File Number POH-2009-00067

Eric Guinther, President  
AECOS, Inc.  
45-939 Kanehameha Hwy., Suite 104  
Kaneohe, Hawaii 96744

Dear Mr. Guinther:

This is in response to your October 31, 2008 letter requesting verification of a completed wetland delineation located in TMK 459008001. The wetland delineation was submitted in advance of an application for a Department of the Army (DA) permit to construct a comfort station and teach field at Ha'ena State Park located at the end of State Route 56 (Kuhio Highway), Ha'ena, Kauai, Hawaii.

From the information furnished in the report "A wetland delineation for a comfort station individual wastewater treatment system modification at Ha'ena State Park, Kauai" prepared by AECOS, Inc and dated October 30, 2008 and an on-site field inspection conducted on May 29, 2009 by Ms. Meris Banitilan-Smith of my staff, we have determined the following:

The delineated western area (AECOS SP-1 and SP-3) is not a wetland, as defined by the Corps wetlands definition. During the field inspection, areas sampled within the delineated area were found absent of one requisite wetland parameter, vegetation. The western border of the sampled area was dominated by *Terminalia catappa* (false kamani), which is not listed in "National List of Plant Species that Occur in Wetlands: Hawaii (Region H)" (Porter B. Reed Jr., 1988). Accordingly, this area is considered "uplands" and therefore is NOT subject to Corps regulatory jurisdiction.

Conversely, we have determined that the delineated eastern area (AECOS SP-2) is a wetland as we have confirmed the presence of all three (3) requisite wetland parameters. The October 30, 2008 wetland delineation report states that the proposed wastewater treatment system will "avoid the wetlands" (Page 1, ACOES, Inc., File 1179.doc). Should any work occur more than 15 feet eastward (down slope) of the remnant fishpond wall, a revised wetland delineation will need to be submitted and subsequently verified by the Corps of Engineers.

Enclosed with this letter is an approved jurisdictional determination (JD) form for the western upland area (AECOS SP-1 and SP-3). The approved JD is valid for a period of five (5) years from the date of this letter unless new information supporting a revision is provided to us before the expiration date. Additionally, a Notification of Administrative Appeal Options and

RECEIVED JUN 17 2009

Process and Request for Appeal form is provided for the approved jurisdictional determination (see section marked "Approved Jurisdictional Determination").

Nothing in this letter shall be construed as excusing you from compliance with other Federal, State, or local statutes, ordinances, or regulations that may affect any proposed work.

We appreciate your cooperation with the Corps of Engineers' Regulatory Program. If you have any questions concerning this determination or other questions regarding our Regulatory program, please contact Ms. Meris Banitilan-Smith at 808-438-7023 (Fax: 808-438-4060) or by electronic mail at Meris.Banitilan-Smith@usace.army.mil. Please refer to file number POH-2009-067 in future correspondence regarding this parcel.

Sincerely,

George P. Young, P.E.  
Chief, Regulatory Branch

Enclosures

Copy Furnished (w/o encls):  
Dr. Wendy Wiltse, U.S.E.P.A., Honolulu Branch, P.O. Box 50003, Honolulu, HI 96850

**APPROVED JURISDICTIONAL DETERMINATION FORM**  
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

**SECTION I: BACKGROUND INFORMATION**  
A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): June 3, 2009

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Honolulu District, POH-2009-067, Haena State Park Wetland Delineation

C. PROJECT LOCATION AND BACKGROUND INFORMATION:  
State: Hawaii County/parish/borough: Kauai City: Haena  
Center coordinates of site (lat/long in degree decimal format): Lat. 21.2229257° Pick List, Long. -159.575005555° Pick List  
Universal Transverse Mercator: UTM Zone 4, NAD 83

Name of nearest waterbody: Un-named Stream  
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Pacific Ocean  
Name of watershed or Hydrologic Unit Code (HUC):  
 Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.  
 Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determination. Date: June 3, 2009  
 Field Determination. Date(s): May 29, 2009

**SECTION II: SUMMARY OF FINDINGS**

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There are no "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]  
 Waters subject to the ebb and flow of the tide.  
 Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.  
Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There are no "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):<sup>1</sup>

- TNWs, including territorial seas
- Wetlands adjacent to TNWs
- Relatively permanent waters<sup>2</sup> (RPWs) that flow directly or indirectly into TNWs
- Non-RPWs that flow directly or indirectly into TNWs
- Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
- Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
- Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
- Impoundments of jurisdictional waters
- Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: \_\_\_\_\_ linear feet: \_\_\_\_\_ width (ft) and/or \_\_\_\_\_ acres.  
Wetlands: \_\_\_\_\_ acres.

c. Limits (boundaries) of jurisdiction based on: 1987 Delineation Manual

Elevation of established OHWM (if known): \_\_\_\_\_

2. Non-regulated waters/wetlands (check, if applicable):<sup>3</sup>

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.  
Explain: The site did not meet the three requisite parameters as indicated in the 1987 Wetland Delineation Manual.

<sup>1</sup> Boxes checked below shall be supported by completing the appropriate sections in Section III below.  
<sup>2</sup> For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).  
<sup>3</sup> Supporting documentation is presented in Section III.F.

**SECTION III: CWA ANALYSIS**

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1 only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1; otherwise, see Section III.B below.

1. TNW Identify TNW:

Summarize rationale supporting determination:

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody<sup>4</sup> is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used to determine whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: \_\_\_\_\_ Pick List  
Drainage area: \_\_\_\_\_ Pick List  
Average annual rainfall: \_\_\_\_\_ inches  
Average annual snowfall: \_\_\_\_\_ inches

(ii) Physical Characteristics:

(a) Relationship with TNW:  
 Tributary flows directly into TNW.  
 Tributary flows through Pick List tributaries before entering TNW.

Project waters are Pick List river miles from TNW.  
Project waters are Pick List river miles from RPW.  
Project waters are Pick List aerial (straight) miles from TNW.  
Project waters are Pick List aerial (straight) miles from RPW.  
Project waters cross or serve as state boundaries. Explain:  
Identify flow route to TNW:  
Tributary stream order, if known:

<sup>4</sup> Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.  
<sup>5</sup> Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(iv) **Biological Characteristics. Channel supports (check all that apply):**  
 Riparian corridor. Characteristics (type, average width):  
 Wetland fringe. Characteristics:  
 Habitat for:  
 Federally Listed species. Explain findings:  
 Fish/spawn areas. Explain findings:  
 Other environmentally-sensitive species. Explain findings:  
 Aquatic/wildlife diversity. Explain findings:

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**  
 (a) **General Wetland Characteristics:**  
 Properties: \_\_\_\_\_ acres  
 Wetland size: \_\_\_\_\_  
 Wetland type. Explain:  
 Wetland quality. Explain:  
 Project wetlands cross or serve as state boundaries. Explain:  
 General Flow Relationship with Non-TNW:  
 Flow is: **Pick List**. Explain:

Surface flow is: **Pick List**  
 Characteristics:  
 Subsurface flow: **Pick List**. Explain findings:  
 Dye (or other) test performed:  
 Directly abutting  
 Not directly abutting  
 Discrete wetland hydrologic connection. Explain:  
 Ecological connection. Explain:  
 Separated by berm/barrier. Explain:

(c) **Wetland Adjacency Determination with Non-TNW:**  
 Proximity (Relationship) to TNW  
 Project wetlands are **Pick List** river miles from TNW.  
 Project waters are **Pick List** aerial (straight) miles from TNW.  
 Flow is from: **Pick List**.  
 Estimate approximate location of wetland as within the **Pick List** floodplain.

(H) **Chemical Characteristics:**  
 Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics, etc.). Explain:  
 Identify specific pollutants, if known:

(H) **Biological Characteristics. Wetland supports (check all that apply):**  
 Riparian buffer. Characteristics (type, average width):  
 Vegetation type/percent cover. Explain:  
 Habitat for:  
 Federally Listed species. Explain findings:  
 Fish/spawn areas. Explain findings:  
 Other environmentally-sensitive species. Explain findings:  
 Aquatic/wildlife diversity. Explain findings:

3. **Characteristics of all wetlands adjacent to the tributary (if any)**  
 All wetland(s) being considered in the cumulative analysis: **Pick List**  
 Approximately ( ) acres in total are being considered in the cumulative analysis.

(b) **General Tributary Characteristics (check all that apply):**  
**Tributary is:**  Natural  Artificial (man-made). Explain:  
 Manipulated (man-altered). Explain:

**Tributary properties with respect to top of bank (estimate):**  
 Average width: \_\_\_\_\_ feet  
 Average depth: \_\_\_\_\_ feet  
 Average side slopes: **Pick List**.

**Primary tributary substrate composition (check all that apply):**  
 Silts  Sands  Concrete  
 Cobbles  Gravel  Muck  
 Bedrock  Vegetation. Type/% cover:  
 Other. Explain:

**Tributary conditions/stability (e.g., highly eroding, sloughing banks). Explain:**  
 Presence of run/riffle/pool complexes. Explain:  
 Tributary geometry: **Pick List**  
 Tributary gradient (approximate average slope): \_\_\_\_\_ %

(c) **Flow:**  
 Tributary provides for: **Pick List**  
 Estimate average number of flow events in review area/year: **Pick List**  
 Describe flow regime:  
 Other information on duration and volume:  
 Surface flow is: **Pick List**. Characteristics:  
 Subsurface flow: **Pick List**. Explain findings:  
 Dye (or other) test performed:

Tributary has (check all that apply):  
 Bed and banks  
 OHWM\* (check all indicators that apply):  
 clear, natural line impressed on the bank  
 changes in the character of soil  
 abutting  
 vegetation matted down, bent, or absent  
 leaf litter disturbed or washed away  
 sediment deposition  
 water staining  
 other (list):  
 Discontinuous OHWM. Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):  
 High Tide Line indicated by:  
 oil or scum line along shore objects  
 survey to available datum;  
 physical markings;  
 vegetation lines/changes in vegetation types.  
 tidal gauges  
 other (list):

(H) **Chemical Characteristics:**  
 Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.). Explain:  
 Identify specific pollutants, if known:

\*A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been eroded by geologic processes). Where there is a break in the OHWM that is related to the watershed's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

For each wetland, specify the following:

Directly abut? (Y/N)      Size (in acres)      Directly abut? (Y/N)      Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

### C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold or distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Regulates* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs. Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D.
2. Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs. Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D.
3. Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW. Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D.

### D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. TNWs and Adjacent Wetlands. Check all that apply and provide size estimates in review area:  
 TNWs: linear feet      width (ft), Or,      acres.  
 Wetlands adjacent to TNWs:      acres.
2. RPWs that flow directly or indirectly into TNWs.  
 Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide date and rationale indicating that tributary is perennial.  
 Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g. typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally.

Provide estimates for jurisdictional waters in the review area (check all that apply):

Tributary waters: linear feet      width (ft).  
 Other non-wetland waters:      acres.  
Identify type(s) of waters:

### 3. Non-RPWs that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

Tributary waters: linear feet      width (ft).  
 Other non-wetland waters:      acres.  
Identify type(s) of waters:

### 4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.  
 Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide date and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW.

- Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW.

Provide acreage estimates for jurisdictional wetlands in the review area:      acres.

### 5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area:      acres.

### 6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area:      acres.

### 7. Impoundments of jurisdictional waters<sup>8</sup>

- As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.  
 Demonstrate that impoundment was created from "waters of the U.S.," or  
 Demonstrate that water meets the criteria for one of the categories presented above (1-6), or  
 Demonstrate that water is isolated with a nexus to commerce (see E below).

### E. ISOLATED INTERSTATE OR INTRA-STATE WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):<sup>9</sup>

- which are or could be used for interstate or foreign travel for recreational or other purposes.  
 from which fish or shellfish or could be taken and sold in interstate or foreign commerce.  
 which are or could be used for industrial purposes by industries in interstate commerce.  
 Interstate bound waters. Explain.  
 Other factors. Explain.

Identify water body and summarize rationale supporting determination:

<sup>8</sup> See Footnote # 3.

<sup>9</sup> To complete this analysis refer to this key in Section III.D.6 of the Instructional Guidebook.

<sup>10</sup> For impoundment or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following *Regulates*.

**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL**

Applicant: State of Hawaii DLNR	File Number POH-2009-067	Date: 15 Jun 2009
Attached is:		
<input type="checkbox"/> INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	See Section below	
<input type="checkbox"/> PROFFERED PERMIT (Standard Permit or Letter of permission)	A	
<input type="checkbox"/> PERMIT DENIAL	B	
<input checked="" type="checkbox"/> APPROVED JURISDICTIONAL DETERMINATION	C	
<input type="checkbox"/> PRELIMINARY JURISDICTIONAL DETERMINATION	D	
<input type="checkbox"/>	E	

**SECTION I -** The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://usace.army.mil/inet/functions/cw/cecwo/reg> or Corps regulations at 33 CFR Part 331.

- A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.
- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
  - **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

Provide estimates for jurisdictional waters in the review area (check all that apply):

Tributary waters: linear feet width (ft).

Other non-wetland waters: acres.

Identify type(s) of waters:

Wetlands: acres.

**F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):**

If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.

Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.

Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).

Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain:

Other: (explain, if not covered above):

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

Non-wetland waters (i.e., rivers, streams): linear feet width (ft).

Lakes/ponds: acres.

Other non-wetland waters: acres.

Wetlands: acres.

List type of aquatic resource:

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

Non-wetland waters (i.e., rivers, streams): linear feet width (ft).

Lakes/ponds: acres.

Other non-wetland waters: acres.

Wetlands: acres.

List type of aquatic resource:

**SECTION IV: DATA SOURCES.**

**A. SUPPORTING DATA. Data reviewed for JD (check all that apply) - checked items shall be included in case file and, where checked and requested, appropriately reference sources below:**

Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant/A wetland delineation for a comfort station individual wastewater treatment system modification at Haena State Park, October 30, 2008, AECOS, Inc.

Data sheets prepared/submitted by or on behalf of the applicant/consultant.

Office concurs with data sheets/delineation report.

Data sheets prepared by the Corps: Site Visit was conducted by Meris Bamilan-Smith. 2 delineation sheets were prepared for the west end of the site.

- Corps navigable waters' study:
- U.S. Geological Survey Hydrologic Atlas.
- USGS NHD data.
- USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name:
- USDA Natural Resources Conservation Service Soil Survey. Citation:
- National wetlands inventory map(s). Cite name:
- State/local wetland inventory map(s):
- FEMA/FIRM maps: (National Geodetic Vertical Datum of 1929)
- 100-year Floodplain Elevation is: \_\_\_\_\_
- Photographs:  Aerial (Name & Date): \_\_\_\_\_
- or  Other (Name & Date): \_\_\_\_\_
- Previous determination(s). File no. and date of response letter: \_\_\_\_\_
- Applicable/supporting case law: \_\_\_\_\_
- Applicable/supporting scientific literature: \_\_\_\_\_
- Other information (please specify): \_\_\_\_\_

**SECTION II - REQUEST FOR APPEAL OR OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:

Meris Baniilan-Smith, (808) 438-7701  
U.S. Army Corps of Engineers, Honolulu District  
CEPOH-EC-R, Bldg 230  
Fort Shafter, HI 96858-5440

Thom Lichte (808) 438-0397  
U.S. Army Corps of Engineers  
CEPOD-RBT, Bldg 525  
Fort Shafter, HI 96858-5440

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Date:

Telephone number:

Signature of appellant or agent.

**A wetland delineation for a new comfort station project at  
Hā'ena State Park, Kauai.<sup>1</sup>**

October 30, 2008

**DRAFT**

AECOS No. 1179

Eric Guinther and Susan Burr  
AECOS Inc.  
45-939 Kamehameha Highway, Suite 104  
Kaneohe, Hawaii 96744  
Phone: (808) 234-7770 Fax: (808) 234-7775 Email: guinther@aecos.com

**Introduction**

On May 27, 2008, an inspection was made by AECOS biologists of an area of low ground to the east of a comfort station (restroom facility) under construction on parcel TMK: (4) 5-9-08: 01, at Hā'ena State Park on the north shore of Kauai (Fig. 1). The purpose of the visit was to establish whether or not—and if so, then precisely where—a wetland existed here so that plans for the comfort station leach field would avoid the wetlands. The visit coincided with a survey team (Esaki Surveying & Mapping, Inc.) and the location of three wetland soil test pits and seven ("A" through "G") marking flags were established immediately after the biologists completed their work.

**Site Description**

Hā'ena State Park is located at the very end of State Rte. 56 (Kūhiō Highway) on Kauai in Hā'ena. The park occupies the last section of coastal plain extending along Kauai's northern coast. Beyond, to the west, the mountainous terrain drops steeply into the sea as a *pali* (cliff). This cliff extends along the inland side of the road through the park. Limahuli Valley lies inland to the south, its stream crossing the coastal plain along the eastern boundary of the state park.

The inland portion of the coastal plain within the state park is a lowland lying between the pali (and the road) and coastal dunes. Parts of this lowland are clearly wetlands based upon vegetation. Indeed, portions are developed into pondfields or *lo'i* in which *kalo* (taro; *Colocasia esculenta*) is being farmed (Fig. 2). Further, the

<sup>1</sup>This report was prepared for Strategic Solutions, Inc. to be used as needed for permitting/compliance for the Hā'ena State Park Comfort Station Improvements. This report will become part of the public record for the permitting process.

subject area is shown by the National Wetlands Inventory (NWI) to have a wetland present (PFO3C<sup>2</sup>; USFWS, 2008). Although the majority of the existing wetland area is open, and maintained in that state for agricultural purposes, the western end supports more dense vegetation, in particular a dense area of *hau* (*Hibiscus tiliaceus*) and a closed canopy forest of mostly false *kamani* or tropical almond (*Terminalia catappa*) and Java plum (*Syzygium cumini*). Therefore, the primary question becomes precisely where is the western edge (end of wetland closest to the construction project) of this wetland.

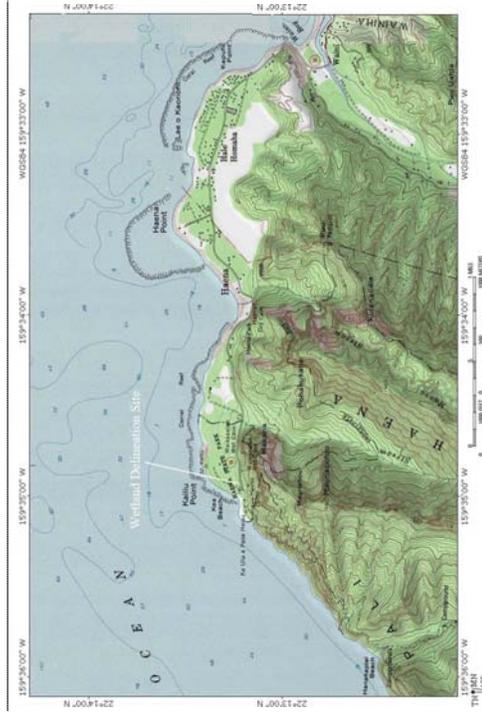


Figure 1. Location of wetland delineation site at Ha'ena State Park, Kauai.

## Methods

This wetland delineation was completed by Eric Guinther and Susan Burr of AECOS Inc. Methodology followed the official delineation manual (ACOE, 1987). Soil descriptions utilized Munsell soil color charts (Munsell, 1994). The wetland status of identified plants comes from Reed (1988) as required, although we point out that this source is botanically out of date (see Puttock and Imada, 2004). Plant species not listed (NL) in Reed are counted as upland (UPL) plants.

<sup>2</sup> PFO3C = Palustrine, broad-leaved evergreen forest, seasonally flooded wetland.

For this effort, a total of three soil pits were dug along a transect extending from the forested uplands (1179-SP-3 and 1179-SP-1) to an area of mostly grasses and some sedges (1179-SP-2) lying between the false *kamani*/Java plum forest and the *hau* grove seen in Fig. 2. Standing water was observed within the *hau*, so this area was considered wetland without closer inspection.



Figure 2. View of *kalo* lot at Ha'ena State Park, looking west towards the project area (within dense forest, center background).

## Wetland Delineation Results

The first observation area and first soil pit (AECOS 1179-SP-1) were undertaken within the forest, in an area of false *kamani* trees with little understory present due to the deep shade. A few vines (golden pothos or *Epipremnum pinnatum* 'Aurum') occur running up the trees and growing across the ground. The pit was dug to a depth of 8 inches (21 cm) without encountering saturated soil or free water. However, the low chroma of the soil suggests a hydric soil.

We then moved further out towards the *hau* stand, developing a test pit (AECOS 1179-SP-2) in an open area of grass (*Paspalum conjugatum*) and dayflower (*Commelina diffusa*) between the false *kamani* forest and the *hau*. This soil was

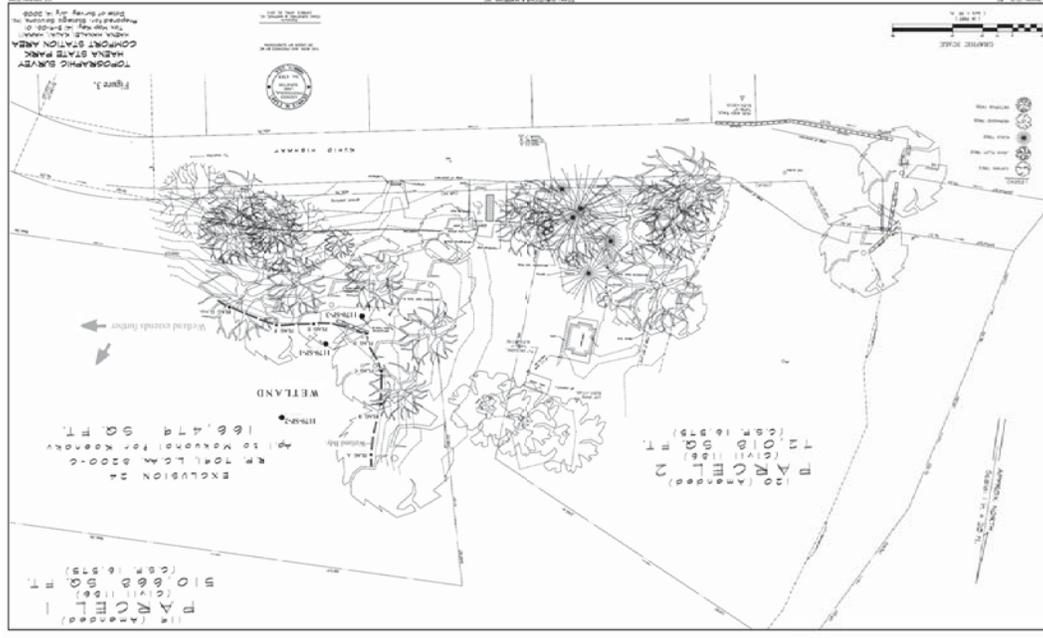
clearly hydric at the surface (10YR 3/1) and standing water was present nearby within the *haui*.

A third soil pit (1179-SP-3) was developed inland of the first and roughly 2 m (8 ft) behind a low line of boulders thought to be part of an old wall. The ground here was dominated by pathos vine, wedelia (*Sphagnetocola trilobata*), and tree seedlings; the upper story vegetation was mostly large false *kamani* and Java plum trees. The soil resembled that seen in the other two pits, with hydric tendencies. However, here the vegetation was clearly upland. Further, evidence of flooding in the area in the form of litter deposits of mostly *Terminalia* seeds constitutes a strong hydrology indicator. The upper extent of this wrack was against the base of the line of boulders, excluding 1179-SP-3 but including 1179-SP-1 in the wetland.

### Conclusions

The surveyed location within Hāena State Park does contain a wetland more or less as indicated on the soil survey (Foote, et al., 1972) and NWI maps. In the project area, this wetland is jurisdictional within a boundary that closely coincides with remnants of a former, presumably ancient, fishpond wall. This broken line of boulders also corresponds to a high water line for the larger basin. The wetland may not extend fully up to the wall for the reason that the forest area supports an “upland” vegetation. However, this designation is a technicality based upon the requirements of the process as established by ACOE (1987). Logically, the area is dominated by a tree not considered (or previously misidentified) by Reed (1988) but now regarded as a facultative wetland species (FAC; Puttock & Imada, 2004). Therefore, it is a logical conclusion that the wetland extends into this forest and up to the wall. The scattered remnants of a former wall coincide with a modest slope change. The wall and change in slope were utilized to place the 7 marking flags shown plotted in Fig. 3 and presenting our interpretation of the wetland boundary in the project vicinity.

No areal extent for this wetland was calculated because the intent of the comfort station project is to design around (away from) the wetland boundary as delineated and not enter or alter the wetland in any way.



**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
(1987 COE Wetlands Delineation Manual)

Project/Site: Haena State Park, Kauai Applicant/Owner: State of Hawaii Investigator: Guinther/Burr UTM: _____	Date: May 27, 2008 County: Kauai State: Hawaii  Community ID: _____ Transect ID: No. 1 Plot ID: AECOS 1179-SP-1
Do Normal Circumstances exist on the site?    Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Is the site significantly disturbed (Atypical Situation)?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the area a potential Problem Area?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> (if needed, explain on reverse side.)	

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Terminalia catappa</i>	T	NL	<i>Epipremnum pinnatum</i> <i>Aureum</i>	V	NL
2. _____	_____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____	_____
Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC): 0%					
Remarks: Heavily shaded, monotypic stand of false kamani that extends into the upland, where additional tree species occur (see AECOS SP-3). This tree is misidentified in Reed (1988) as <i>Terminalia carolinensis</i> , a species not recorded from Hawaii.					

**HYDROLOGY**

Recorded Data (Describe in Remarks): <input type="checkbox"/> Stream, Lake, or Tide Gauge <input type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Recorded Data Available	Wetland Hydrology Indicators: Primary Indicators: <input type="checkbox"/> Inundated <input type="checkbox"/> Saturated in Upper 12 inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input checked="" type="checkbox"/> Drainage Patterns in Wetlands Secondary Indicators (2 or more required) <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC Neutral Test <input checked="" type="checkbox"/> Other (Explain in Remarks)
Field Observations  Depth of Surface Water: _____ n/a _____ (cm)  Depth to Free Water in Pit: _____ >21 _____ (cm)  Depth to Saturated Soil: _____ >21 _____ (cm)	Remarks: Dense drift area of false kamani seeds mark high water mark and occur along inside edge of old fishpond wall.

Footo, D. E., et al. 1972. *Soils survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service.

Munsell® Color. 1994. *Munsell soil color charts. Revised edition*. Macbeth Div. of Kollmorgan Instruments Corp., New Windsor, NY.

Purtock, C. F., and C. Imada. 2004. Wetland status list for Hawaiian plants. Final report for U.S. Fish and Wildlife Service, Honolulu.

Reed, P. B. J. 1988. National list of plant species that occur in wetlands: Hawaii (Region H). Biological Report 88(26.13): 88 pp.

U.S. Army Corps of Engineers (ACOE). 1987. *Corps of Engineers Wetlands Delineation Manual*. Vol. Tech. Rept. Y-87-1. Environmental Laboratory, Dept. of the Army, Waterways Experiment Station, Corps of Engineers.

U.S. Fish and Wildlife Service (USFWS). 2008. Wetlands Geodatabase, available online at <http://wetlandstws.er.usgs.gov/NWII/index.html> (last visited October 30, 2008)

**SOILS**

Map Unit Name (Series and Phase): _____		Drainage Class: Field Observations _____	
Taxonomy (Subgroup): _____		Confirmed Mapped Type?    Yes <input type="checkbox"/> No <input type="checkbox"/>	
<b>Profile Description:</b>			
Depth (cm)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)
0-2	O	black	Texture, Concretions, Structure, etc.
2-7	A	10YR 2/2 and 7Y	organic matter
7-19	B	10YR 3/3	clay loam
19-21	B	10YR 4/4	40%: fine, distinct 25%: medium, distinct 25%: medium, faint
		7.5YR 4/4	clay loam
		7.5YR 3/1	clay loam
<b>Hydric Soil Indicators:</b>			
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors			
<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)			
Remarks: Maps to "Mz" or marsh, surrounded by Mokuieia fine sandy loam (Young, et al., 1979). <b>Keaukaha soils have a 20 cm (8 in) organic layer consisting of very dark brown (10YR 2/2) muck, which overlays pahoehoe lava.</b>			
<b>WETLAND DETERMINATION</b>			
Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is this Sampling Point Within a Wetland?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Hydric Soils Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks: Identified on NWI maps (USFWS, 1984); conditions at survey somewhat dry for late wet season. Although <i>Terminalia catappa</i> is not listed in Reed (1988) and therefore by default an upland species, this conclusion cannot be reasonably supported given the hydrology and soils at this soil pit location; a more useful version of the Hawaii plant wetland status codes (Puttock & Imada, 2004) lists <i>T. catappa</i> as FAC.			

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
(1987 COE Wetlands Delineation Manual)

Project/Site: Haena State Park, Island of Kauai  
 Applicant/Owner: State of Hawaii  
 Investigator: Guinther/Burr  
 UTW: \_\_\_\_\_

Date: May 27, 2008  
 County: Kauai  
 State: Hawaii

Community ID: \_\_\_\_\_  
 Transect ID: No. 1  
 Plot ID: AECOS 1179-SP-2

Do Normal Circumstances exist on the site? Yes  No   
 Is the site significantly disturbed (Atypical Situation)? Yes  No   
 Is the area a potential Problem Area? Yes  No   
 (If needed, explain on reverse side.)

**VEGETATION**

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Paspalum conjugatum</i>	H	FAC+	1. <i>Cyperus javanicus</i>	H	FACW
2. <i>Commelina diffusa</i>	H	FACW	2. <i>Psidium guajava</i>	T	FACU
3. _____	_____	_____	3. _____	_____	_____
4. _____	_____	_____	4. _____	_____	_____
5. _____	_____	_____	5. _____	_____	_____
6. _____	_____	_____	6. _____	_____	_____
7. _____	_____	_____	7. _____	_____	_____
8. _____	_____	_____	8. _____	_____	_____

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC): 100%

Remarks: In open area between false kamani forest and hau forest, the latter with standing water on surface.

**HYDROLOGY**

Recorded Data (Describe in Remarks):  
 Stream, Lake, or Tide Gauge  
 Aerial Photographs  
 Other  
 No Recorded Data Available

Field Observations  
 Depth of Surface Water: \_\_\_\_\_ n/a \_\_\_\_\_ (cm)  
 Depth to Free Water in Pit: \_\_\_\_\_ >17 \_\_\_\_\_ (cm)  
 Depth to Saturated Soil: \_\_\_\_\_ >17 \_\_\_\_\_ (cm)

Wetland Hydrology Indicators:  
 Primary Indicators:  
 Inundated  
 Saturated in Upper 12 inches  
 Water Marks  
 Drift Lines  
 Sediment Deposits  
 Drainage Patterns in Wetlands  
 Secondary Indicators (2 or more required)  
 Oxidized Root Channels in Upper 12 inches  
 Water-Stained Leaves  
 Local Soil Survey Data  
 FAC Neutral Test  
 Other (Explain in Remarks)

Remarks: Soil moist throughout, but not saturated

**SOILS**

Map Unit Name (Series and Phase): \_\_\_\_\_  
 Drainage Class: \_\_\_\_\_  
 Field Observations: \_\_\_\_\_  
 Confirmed Mapped Type? Yes  No

Taxonomy (Subgroup): \_\_\_\_\_

Profile Description:

Depth (cm)	Horizon	Matrix Colors (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance / Size / Contrast	Texture, Concretions, Structure, etc.
0 - 9	A	_____	none	_____	sandy clay loam
9 - 17	B	7.5YR 4/4	7.5YR 4/1	5%, horizontal bedding evident	sandy clay loam
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Hydric Soil Indicators:  
 Histosol  
 Histic Epipedon  
 Sulfidic Odor  
 Aquic Moisture Regime  
 Reducing Conditions  
 Gleyed or Low-Chroma Colors  
 Concretions  
 High Organic Content in Surface Layer in Sandy Soils  
 Organic Streaking in Sandy Soils  
 Listed on Local Hydric Soils List  
 Listed on National Hydric Soils List  
 Other (Explain in Remarks)

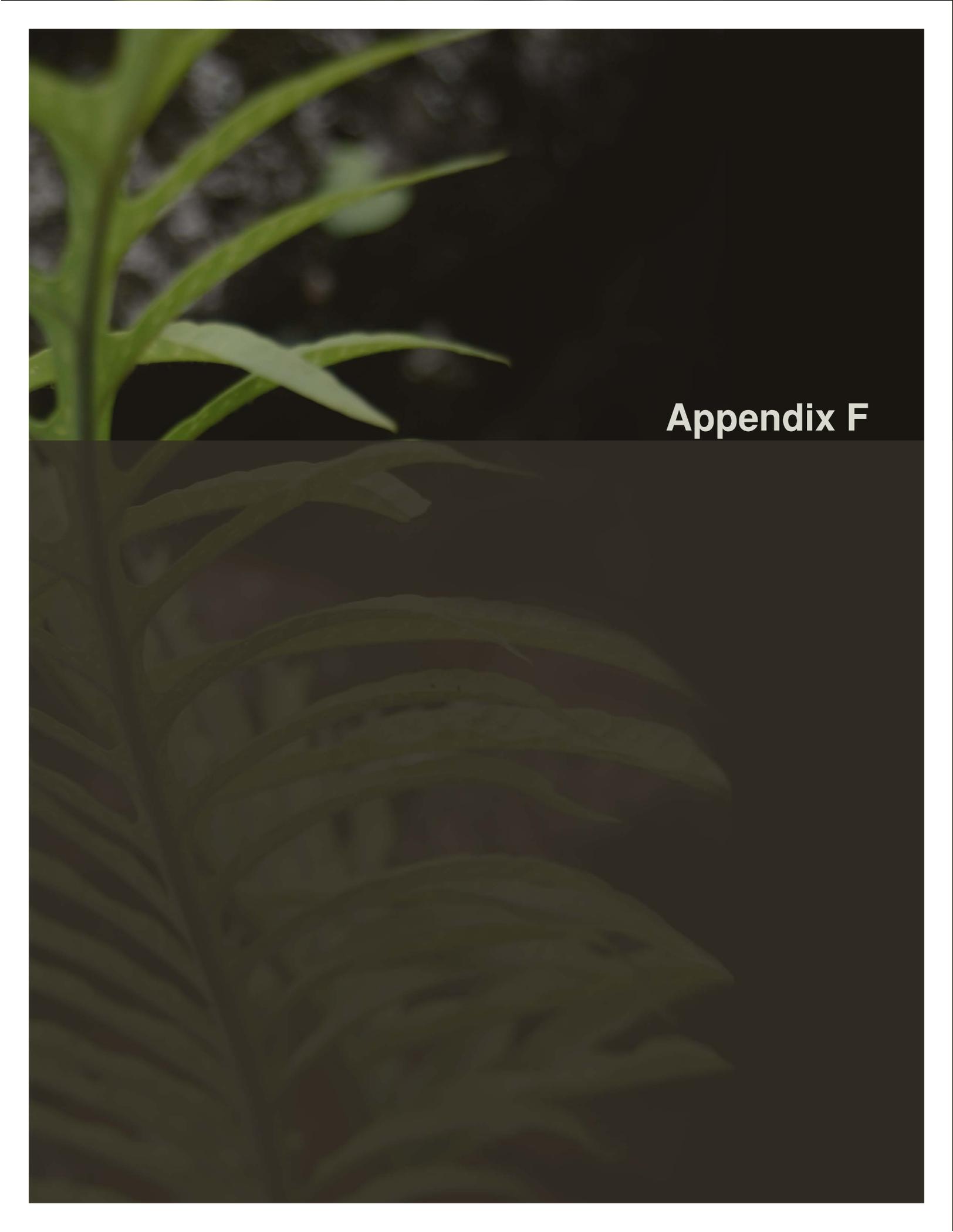
Remarks: Reducing conditions observed in top layer (0-9") by positive a, c dipyrill test. Keaukaha soils have a 20 cm (8 in) organic layer consisting of very dark brown (10YR 2/2) muck, which overlies pahoehoe lava.

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present? Yes  No   
 Wetland Hydrology Present? Yes  No   
 Hydric Soils Present? Yes  No   
 Is this Sampling Point Within a Wetland? Yes  No

Remarks: Survey point is within an ancient fishpond.





# Appendix F



**DRAFT**

**TRAFFIC IMPACT ASSESSMENT REPORT**

**Ha'ena State Park**

**Ha'ena, Kauai, Hawaii**

**I. INTRODUCTION**

This report documents the findings of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts resulting from the proposed Haena State Park Master Plan. Hereinafter, the Haena State Park shall be referred to as “Haena Park”.

**A. Background**

Haena Park offers a wealth of cultural history and relatively intact archaeological and cultural treasures, which include the Kee hula site, loi (for taro cultivation), heiau, cemeteries, and the Waikanaloa and Waikapalae wet caves.<sup>1</sup> As such, the park has been designated a historic landmark and has belonged to the State and National Registers of Historic Sites since 1984.<sup>2</sup>

As of 1998, approximately 80-95 percent of persons visiting Haena Park were tourists.<sup>3</sup> Allowed recreational activities include hiking<sup>4</sup>, camping, hula, hunting, fishing, kayaking, snorkeling, windsurfing, body boarding, and surfing.<sup>5</sup>

This TIAR will serve as part of a Master Plan, designed to supersede the Haena State Park Master Plan and Draft Environmental Impact Statement (2001). Although never implemented, the 2001 plan identified four (4) alternatives designed to preserve and enhance cultural resources. After a series of community meetings, the “Community Preferred Master Plan,” included but was not limited to: the restoration of portions of the

---

<sup>1</sup> The Keith Companies, *Haena State Park:– Master Plan and Draft Environmental Impact Statement*. (2001). III-5.

<sup>2</sup> The Keith Companies. III-4.

<sup>3</sup> County of Kauai Planning Department, *Kauai General Plan*. (2000). 4-16.

<sup>4</sup> The Kalalau trailhead – entry to 11-mile on-foot-only hike along Na Pali coast – is located within Haena Park.

<sup>5</sup> The Keith Companies. I-2.

loi in conjunction with the removal of “noxious species, informational kiosks, a helicopter landing, potential for new pedestrian and walking pathways, recreational Kalo farming, an all-weather-type surfaced pathway throughout the park, provision of additional parking, and the limiting of vehicular access to the park via a gate.

**B. Location**

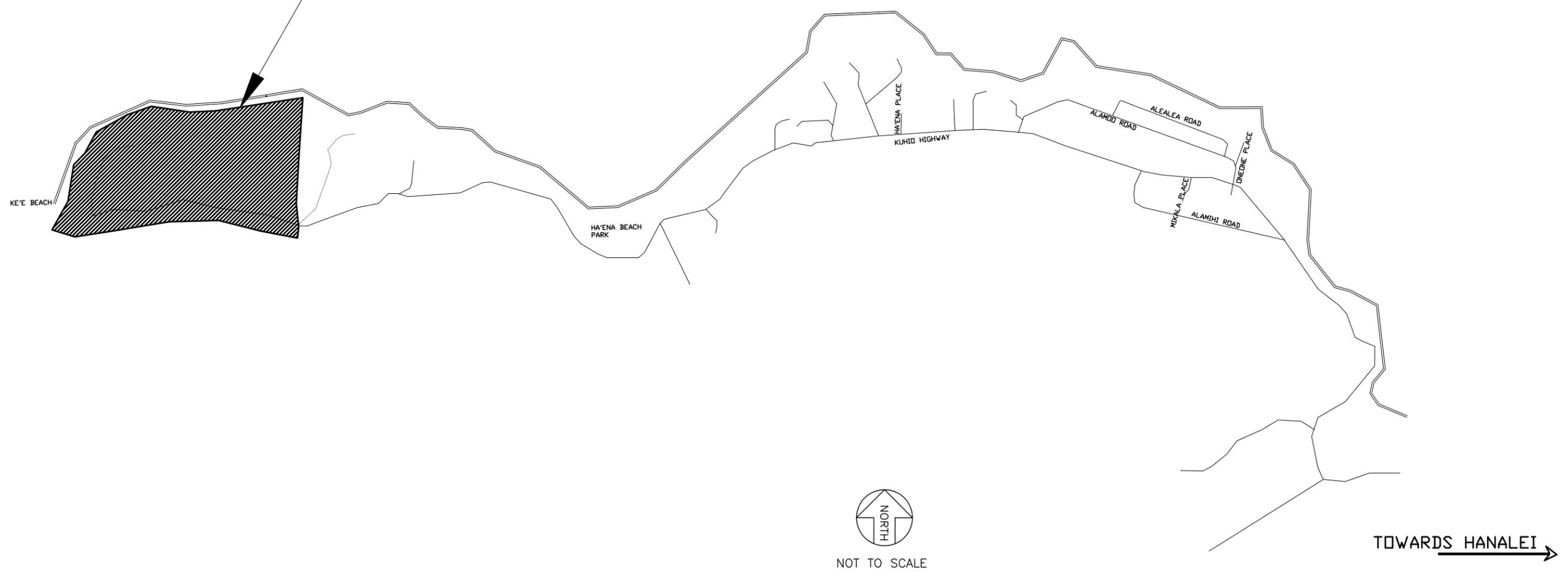
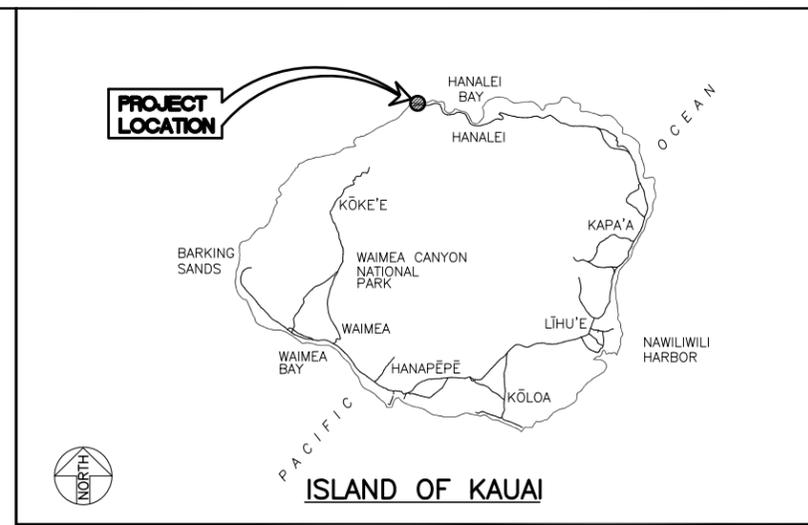
Ha’ena State Park is situated on approximately 65.7 acres of land located on the north shore of the island of Kauai. The park is bordered to the east by the Limahuli Stream, to the south by cliffs and by the Pacific Ocean to the north and west.

Sole access to Haena Park is provided via Kuhio Highway, which terminates at Ke’e Beach. Figure 1 shows the location of the Ha’ena State Park.

**LEGEND**

— EXISTING ROAD

# HA'ENA STATE PARK



NOT TO SCALE

TOWARDS HANAIEI →

HA'ENA STATE PARK

**ATA** AUSTIN, TSUTSUMI & ASSOCIATES, INC.  
ENGINEERS, SURVEYORS HONOLULU, HAWAII

FIGURE

1

LOCATION MAP

### **C. Project Description**

[Awaiting master plan]

### **D. Study Methodology**

This study will address the following:

1. Existing traffic operating conditions at key locations within the study area.
2. Base Year \_\_\_\_ (buildout year for Ha'ena State Park improvements) traffic projections (without Ha'ena State Park improvements).
3. Identify potential traffic mitigation measures for the Base Year \_\_\_\_ Traffic.
4. Trip generation and traffic assignment characteristics.
5. Determination of the impact of Project-generated traffic.
6. Recommendations for roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by Ha'ena State Park improvements.

## **II. EXISTING CONDITIONS**

### **A. Roadway System**

As previously stated, sole ingress and egress to Haena Park is provided via Kuhio Highway, which in the vicinity of the park is a winding two-lane roadway that runs east-west and terminates near Ke'e Beach. Ten (10) one-lane bridges slow traffic between Princeville and Haena. The Maui County General Plan (2000) stated the county's intent to maintain them; the bridges are valued for their historic significance and "traffic slowing" effect.<sup>6</sup>

Haena Park currently provides two parking lots. The first is approximately 750 feet west of the Haena Park entrance, and the second is at the "end of the road," where Kuhio Highway terminates near Kee beach. Due to the limited number of stalls, vehicles park along the road leading up to the beach. No sidewalks are provided for pedestrians.

---

<sup>6</sup> County of Kauai Planning Department, *Kauai General Plan*. (2000). 2-11.

## **B. Existing Traffic Conditions Analysis and Observations**

Along Kuhio Highway and leading up to the park, no significant congestion was observed. However, in the areas between Princeville and Haena Park, a maximum of 4-vehicle queues were observed to form while vehicles waited to traverse the numerous narrow 1-lane bridges. Otherwise, traffic flowed smoothly, though cautiously, due to the relatively low volume.

Upon entering the Haena Park driveway (Kuhio Highway), vehicles generally travel slowly to avoid pedestrians and oncoming vehicles. An incoming driver will first encounter an unpaved parking lot on the right, approximately 750 feet from the entrance. Generally, visitors that use this parking lot must walk approximately 1500 feet along the roadway to reach the Park, as no sidewalk is provided. At the end of the road, there is a turnaround area wherein a limited number of parking stalls are provided. Due to the stalls' comparatively favorable location, congestion occurs as vehicles wait for them to be vacated. Some visitors were observed waiting for over five (5) minutes for a stall.

The 24-hr traffic count data was collected via pneumatic tubes laid at the Haena Park entrance between August 14, 2008 and August 18, 2008; this included a long weekend for Statehood Day. According to 1993 data from County of Kauai Lifeguards, Kee Park experiences its highest attendance during month of August.<sup>8</sup>

The Weekend Peak hour of traffic was observed to occur between 12:00 PM and 1:00 PM. However, a relatively large influx and efflux of traffic occurred between 10:45 AM and 3:45 PM. The weekday AM and PM commuter peak hours of traffic were assumed to be between 8 AM and 9 AM and between 3 PM and 4 PM, respectively.

Approximately 1550 vehicles per day were counted entering and exiting Haena Park (775 entering, 775 exiting). During the peak hour of traffic (Sunday, August 17 between 12:00 PM and 1:00 PM), 107 vehicles entered and 85 exited. In terms of traffic capacity analysis, this is a relatively small number, given that a standard two-lane highway generally has an ideal theoretical capacity of 1700 passenger vehicles per hour per direction of travel. As noted earlier, existing

---

<sup>8</sup> The Keith Companies. V-5.

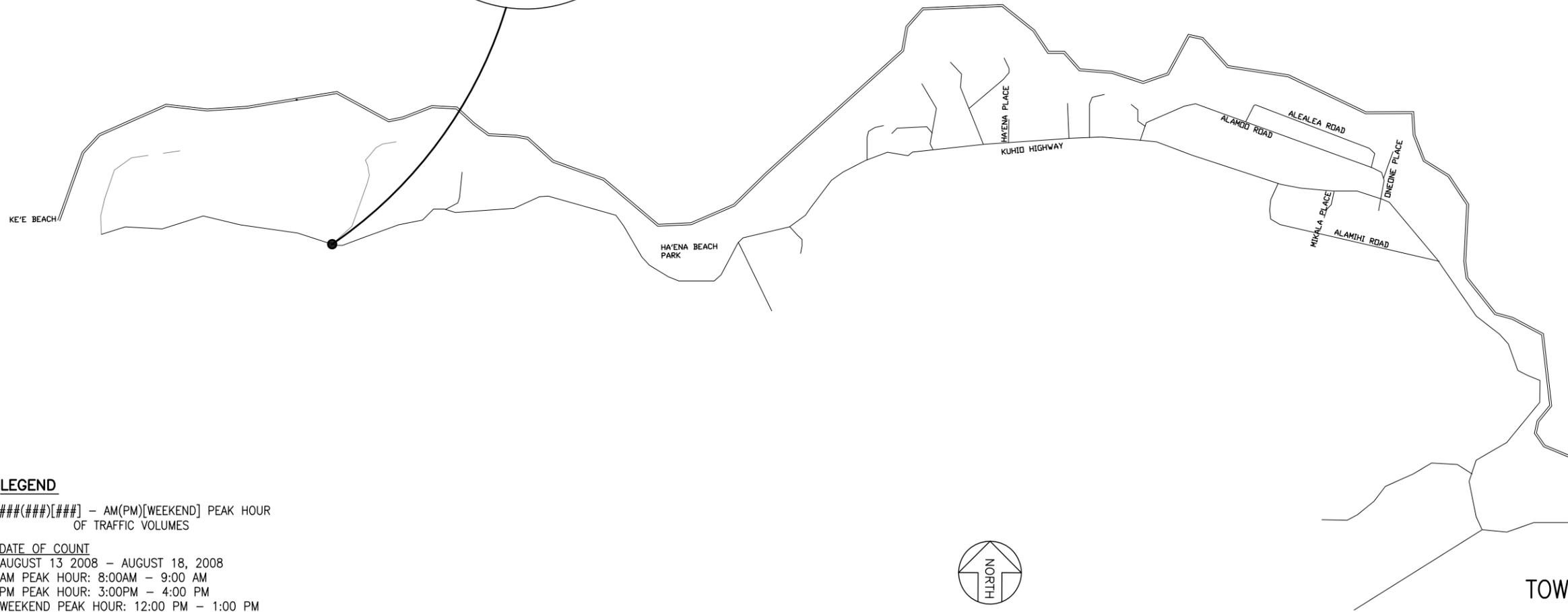
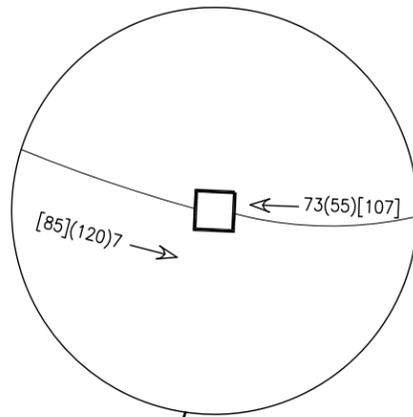
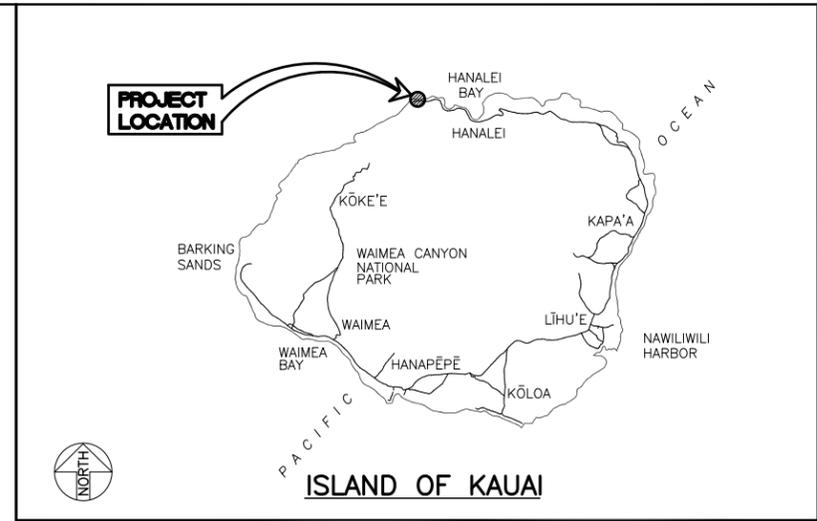
congestion internal to Haena Park is primarily a result of visitors waiting for parking stalls and slow operating speeds.

See Figure 2 for existing traffic volumes. See Figure 3 for data collection results.

**LEGEND**

— EXISTING ROAD

**PROJECT LOCATION**



**LEGEND**

###(###)[###] - AM(PM)[WEEKEND] PEAK HOUR OF TRAFFIC VOLUMES

DATE OF COUNT

AUGUST 13 2008 - AUGUST 18, 2008  
 AM PEAK HOUR: 8:00AM - 9:00 AM  
 PM PEAK HOUR: 3:00PM - 4:00 PM  
 WEEKEND PEAK HOUR: 12:00 PM - 1:00 PM  
 \* INCLUDES 3-DAY WEEKEND (FRIDAY, AUGUST 15 HOLIDAY)

NORTH  
 NOT TO SCALE

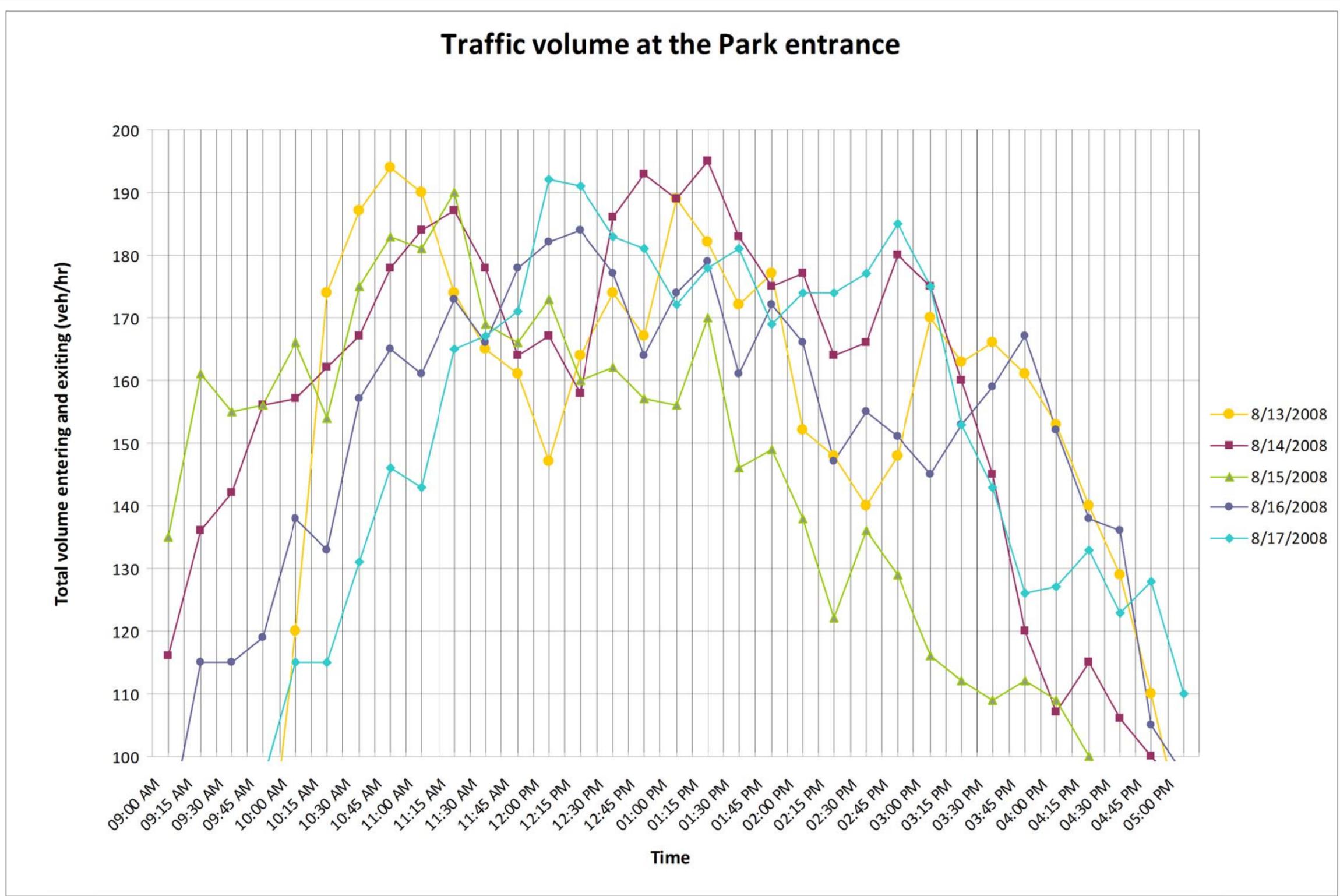
HA'ENA STATE PARK

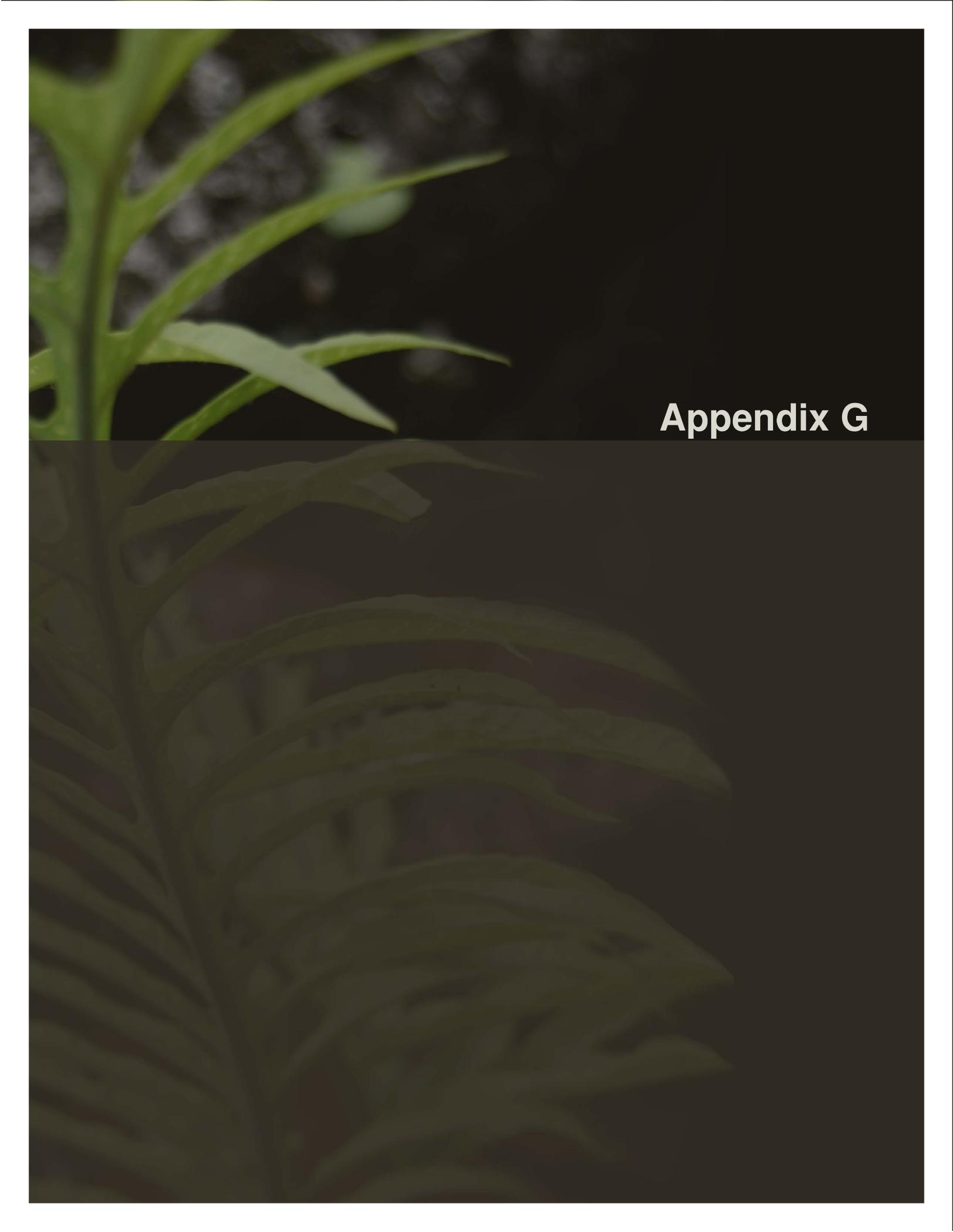
**ATA** AUSTIN, TSUTSUMI & ASSOCIATES, INC.  
 ENGINEERS, SURVEYORS HONOLULU, HAWAII

**EXISTING VOLUME AT PARK ENTRANCE**

FIGURE

**2**





# Appendix G



## **I. INTRODUCTION**

### **A. Project Location and Description**

Haena State Park is located on the north shore of Kauai, at the end of Kuhio Highway. It is bounded by the Na Pali Cliffs to the west, the base of Makana to the south, Limahuli Stream to the east and the Pacific Ocean to the north.

There are three (3) TMK parcels within the Park boundary. The parcel north of Kuhio Highway is identified by TMK 5-9-008:001 and encompasses approximately 52 acres. South of Kuhio Highway, parcels TMK 5-9-001:022 and 025 encompass approximately 180 acres.

The parcels identified by TMK 5-9-008:001 and 5-9-001:022, are owned by the State of Hawaii. The third parcel, TMK 5-9-001:025 contains the Kauluapaoa Heiau and Keahualaka hula platform, is owned by the County of Kauai and managed by the State Historic Preservation Division (SHPD), Department of Land and Natural Resources (DLNR). Haena State Park utilizes approximately 65.7 acres of the coastal area for recreational uses.

The Park experiences heavy usage throughout the week and is considered one of the highest utilized parks in the State. It is used by the public for picnics, snorkeling, swimming and hiking. It is estimated approximately 708,400 visitors experienced the many geological and cultural features of this unique park in 2007.

## **II. EXISTING SITE CONDITIONS**

### **A. Soils**

Based on Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, five soil classes are present at Haena State Park. Its western coastline consists of Mokuleia fine sandy loam (Mr), while its northern coast is defined as Beach (BS). Marsh (MZ), Hanalei silty clay (HnA) and Hanalei silty clay with deep water table (HrB) are present further inland.

Beach soil extends up to 150 feet inland from the northern coast. This soil consists of light-colored sands resulting from the breakdown of coral and seashells.

Mokuleia fine sandy loam extends up to 800 feet inland from the western coast. Its surface layer contains 16 inches of fine sandy loam and its subsurface contains 34 to 48 inches of single-grain and loamy sand. This soil exhibits moderately rapid permeability in its surface layer and rapid permeability in its subsurface.

Marsh soil is present approximately 800 feet inland from the western coast of Haena State park. This soil type covers small, low-elevation areas where water

stands at the ground surface. Grasses, bulrushes and other herbaceous plants thrive in these areas.

Hanalei silty clay (HnA) soil is present in the western and inland portions of the Park. Its surface layer contains 13 inches of dark-gray, silty clay, of which the top 10 inches contain brown and red mottles. Its subsoil contains 13 inches of dark-gray and dark grayish-brown silty clay loam. The water table in this soil type is typically less than 3 feet below the ground surface. This soil experiences moderate permeability and is strongly acidic in its surface layer.

Hanalei silty clay with deep water table is present in the eastern and inland portions of the Park. This soil is similar to Hanalei silty clay; however it contains fewer mottles and is located in areas where the water table is greater than 3 feet below the ground surface.

Soil test borings and percolation tests were not performed specifically for this preliminary engineering report. Instead, the previously performed percolation test results at the existing comfort station are referenced to preliminarily size the disposal fields. A percolation rate of 4.14 minutes/inch was obtained in December 2009 for the constructed wetland project at the existing Ke'e comfort station.

## **B. Topography**

The ground elevation in the area north of Kuhio Highway ranges from approximately 70.0 feet above mean sea level (MSL) at the entrance to the Park to sea level at the coast line. This area is where the majority of recreational and cultural activity and usage is currently occurring as the area is relatively level.

The ground elevation south of the Kuhio Highway rises sharply with steep slopes and forms the cliffs of Na Pali, beyond the shoulder of the roadway.

The 100-year base flood elevation ranges from sea level to elevation 24.0 feet above MSL.

## **C. Site Access, Roadways, Parking and Safety**

Kuhio Highway is owned by the State of Hawaii, Department of Transportation (DOT) and provides the only access to and through Haena State Park. Prior to entering the Park, Kuhio Highway is a two lane roadway with gravel and AC pavement shoulders. Entry to the park requires crossing Limahuli Stream over a single lane, 10-foot wide x 12-foot long x 12-inch thick concrete bridge. Past the bridge, Kuhio Highway again becomes a two lane road, measuring approximately 24 feet wide, and continues approximately 0.5 miles to the end of the park at Ke'e Beach. The actual pavement structure within the roadway is not known, but is assumed to be a minimum of 2-1/2 inches of AC pavement over 8 inches of base course. It is in fair condition with some cracking and potholes in concentrated areas.

The paved shoulder lanes were added in 1985 under DOT Project No. 560A-01-86M, which resurfaced approximately 1.43 miles of Kuhio Highway. The guardrails were added in 2002 under DOT Project No. 560A-03-99 because the steep slopes on either side of Kuhio Highway and winding roads posed a threat to driver's safety. Kuhio Highway continues in an east-west direction through the southern portion of the Park until its termination at Ke'e Beach. The 2.0 foot shoulder pavement structure consists of a minimum of 1.5 inches of AC pavement over 6 inches of base course.



**Figure 1: Haena State Park Entrance Crossing Limahuli Stream**

Currently, pedestrian access to Haena State Park is limited. Within the Park, there are no pedestrian walkways along Kuhio Highway. Pedestrians typically walk on the side of the road or in the paved shoulder lane. However, there are many areas where rock slopes, vegetation, and/or guard rails force pedestrians to walk in the paved vehicular lanes.

Although a few hiking trails are scattered around the south areas of the site, there is only one marked pedestrian trail along the coast area traversing within the Park. It is an approximately 10-foot wide dirt trail beginning at the end of Kuhio Highway. The path is delineated with logs. The trail was intended to lead to other areas of the Park along the shoreline, but overgrown vegetation and fallen trees have blocked the path beyond the existing comfort station. Observations reveal visitors tend to walk in a direct path between the end of the paved road and the beach, in lieu of the dirt trail and do not venture into the overgrown areas.

Bicyclists encounter the same dangers as pedestrians due to similar reasons. There are currently no designated biking lanes or pathways in Haena State Park.

There are two authorized parking areas within Haena State Park, one approximately 800 feet from the entrance to the Park and one at the end of Kuhio

Highway. The parking lot near the entrance to the Park consists of a dirt and gravel clearing, approximately 30,000 square feet (sf) in area with a 12-foot wide driveway entrance from Kuhio Highway. The parking area is approximately 3.0 to 4.0 feet below the highway. Parking stall markings are non-existent and their absence causes inefficient usage of the designated parking areas. The parking area near Ke'e Beach is off-street parking, consisting of an approximately 10-foot wide cleared dirt strip to the north and south of Kuhio Highway. Although two parking areas are available, there is a shortage of parking stalls during high usage. Limited parking exacerbates the pedestrian and bicyclist safety problem. Currently, "No Parking" signs are present throughout Haena State Park along Kuhio Highway. However as parking fills up within the designated areas, visitors disregard posted signs and park in "No Parking" zones along the shoulder lanes. These vehicles force pedestrians to walk in vehicular lanes.

A helicopter landing area is currently located to the east of the gravel parking lot. The area is grassed, fenced and well maintained. Typically, it is used for emergency rescues and fires.

#### **D. Drainage and Stormwater Management**

The coastal areas of Haena State Park are located within the 100 year flood plain. Also, most of the Park is classified as estuarine and marine wetlands.

The only perennial stream within the Park is Limahuli Stream, but during periods of heavy rainfall, there are several intermittent streams flowing north through natural swales in the Park. During these times, storm water runoff is typically full of sediment, soil, stream fish, logs, plants and other debris material. The runoff creates a muddy plume at the stream outfall, but is part of the naturally occurring drain pattern in Haena State Park.

Drainage improvements on the site consist of five 18-inch RCP drain culverts that allow storm water to cross beneath Kuhio Highway from south to north. It is estimated approximately 56.8 cubic feet per second (cfs) and 37.9 cfs of runoff from approximately 14.2 acres above Kuhio Highway flows down Maunahou into the five culverts, during the 10-year and 2-year storm, respectively. See Appendix A for drainage calculations. Three 3'x4' drain inlets are located on the south edge of the roadway to collect runoff originating from the south and discharge through endwalls located along the north edge of Kuhio Highway. The other two culverts have concrete headwalls located on the south edge of the road and discharge through endwalls located immediately north of Kuhio Highway. The drain culverts satisfy the requirements set forth in the County of Kauai Department of Public Works Storm Drainage Standard.

The remainder of the site discharges stormwater runoff directly into the Pacific Ocean. It is estimated that approximately 7,300 cfs of runoff flows directly to the ocean during a 50-year storm. This includes the runoff from the west end of Maunahou that flows over Kuhio Highway and the entire area of the Park below Kuhio Highway. During heavy rain storms the entire Park is inundated with rushing waters from this surge of rainwater. The existing drainage improvements

do not have the capacity and were not designed to handle the larger storm events.



**Figure 2: Typical Existing Drain Inlet along Kuhio Highway**  
**Figure 3: Typical Existing Drain Outlet along Kuhio Highway with 3" Water Line and 3/4" Telephone Lines**

## E. Water System

### 1. Potable Water

The Kauai Department of Water provides potable water to the site through a 4-inch PVC water line that terminates at the entrance to the Park with a 1-inch water meter (Water Meter No. 083000140). Water is gravity fed from a 0.1 million gallon (MG) reservoir 1.1 miles away, located at ground elevation 126.5 feet above MSL. The spillway elevation is at 144 feet above MSL. In 1996, a standpipe pressure test was conducted by the Kauai Department of Water near Limahuli Stream. The test revealed a static pressure of 27 pounds per square inch (psi) and a 6 psi residual pressure at 103 gallons per minute (gpm) on the 4-inch pipe.

Within Haena State Park, a 3-inch galvanized iron pipe runs along the edge of Kuhio Highway in an east-west direction until its terminus at the Ke'e beach comfort station. Most of the 3-inch galvanized iron pipe within the Park is installed above ground. Buried pipe depths are unknown, but assumed to have a minimum cover of 3.0 feet. Existing 2-inch and 1-inch water laterals are assumed to have 1.5 feet of cover. At the parking lot entrance, the 3-inch water line is embedded under 1-inch of AC pavement.

Recorded water usage from October 2003 to November 2006 is documented to average 2,125 gallons per day (gpd).

At the comfort station, the existing water fixtures are currently being replaced under DLNR Job No. H10C663A with the following:

1. 2" PVC water lateral serving 3 water closets, 1 urinal, 2 lavatories, 1 drinking fountain with a drywell, and 2 hose bibs
2. 1" PVC water lateral serving an outdoor shower

These improvements were under construction in September 2008, but have since been completed. It is anticipated these new fixtures will decrease water demands by 4 gpm.



Figure 4: Ke'e Beach Comfort Station and Existing Leach Field Location

There is no fire protection water system within the Park. If needed, bucketing seawater is used. The last fire hydrant/standpipe on the potable water system is outside of the Park, 75 feet away.

## 2. Non-Potable Water

A non-potable, irrigation, gravity fed HDPE pipe diverts an average of 760,000 gpd of water from Limahuli Stream. The diversion was installed south of Kuhio Highway and discharges into the taro patches north of Kuhio Highway and west of the parking lot. The irrigation water line begins as an 8-inch HDPE line at elevation 95.9 feet above MSL and transitions to a 6-inch HDPE line at elevation 57.5 feet above MSL. It crosses Kuhio Highway through one of the 18-inch RCP drain pipes.

## F. Wastewater System

The original comfort station at Ke'e Beach was constructed in 1979 under DLNR Job No. 54-KP-11. It consisted of 3 water closets, 1 urinal and 2 lavatories. These fixtures drained into a 6.0 to 8.0 foot diameter cesspool, approved by DOH.

In 2001, the cesspool was replaced by a 2,500 gallon septic tank and approximately 2,700 square foot (sf) leach field located to the north and east of the comfort station. Record drawings for the construction of the individual wastewater system replacement were not available.

In 2008, the existing comfort station was demolished and replaced, under DLNR Project No. H10C663A. The new comfort station retains the same fixture count as its predecessor; 3 water closets, 1 urinal and 2 lavatories, which is estimated to generate 2,016 gpd.

The outdoor shower is located to the south of the comfort station. Greywater from the showers is allowed to drain and infiltrate into the surrounding soils.

In the Fall of 2010, the wastewater system for Ke'e Beach comfort station will be modified and upgraded to add a subsurface constructed wetland to further treat and improve water quality of the wastewater before discharging into the ground, at the request of the community. The planned system consists of 4-inch diversion valves and piping; 2-1,500 gallon primary treatment fiberglass tanks with battery-operated alarm control and panel; 968 sf of constructed wetland and 1,358 sf of infiltration field and appurtenances. The existing septic tank and leach field will continue to serve as an emergency backup system in the event the constructed wetlands system goes down.

Electric power is currently not available anywhere within Haena State Park and has been a limiting factor in the development of other wastewater treatment options.

In addition to the existing wastewater system for the comfort station, an abandoned cesspool was found at the old house site near Limahuli Stream. The existing Allerton House and Caretaker's cottage should also have abandoned cesspool(s). If any of these facilities are renovated the wastewater systems should also be upgraded or abandoned completely.

The comfort station renovation drawings call for the installation of a 30-inch diameter drywell to service a relocated drinking fountain near Ke'e beach. This drywell was not constructed as of September 2008.

#### **G. Electrical and Communication**

There is no electrical service currently available on-site. Service stops at the entry to the Park.

A 3/4-inch telephone line runs along the same alignment as the 3-inch water line. It services a payphone and an emergency phone at the end of the Park, near the existing comfort station.

#### **H. Solid Waste**

Trash receptacles and recycle bins are available and maintained in the Ke'e beach area.

### **III. MASTER PLAN IMPROVEMENTS**

#### **A. Site Access, Roadways, Parking and Safety**

The Master Plan greatly improves the safety and experience of the Park for visitors by closing down Kuhio Highway beyond the existing parking lot. By allowing only emergency and maintenance vehicles beyond this point, pedestrians and bicycles can safely navigate the Park and enjoy its beauty without having to co-exist with vehicular traffic.

The proposed Plan also provided for a delineated parking areas and controlled access. The existing parking lot should be raised, leveled, stabilized and resurfaced with a pervious, geogrid surface to allow for drainage while not increasing runoff. It should be striped to maximize parking spaces and control traffic flow.

Well marked, stabilized pedestrian trails are proposed throughout the Park to provide access and visual appreciation to cultural sites, while protecting these significant sites from being disturbed. These trails, like the parking lot should be stabilized with a geogrid base.

The helicopter pad will remain where currently sited. No planned improvements are anticipated.

#### **B. Recommended Areas for Development**

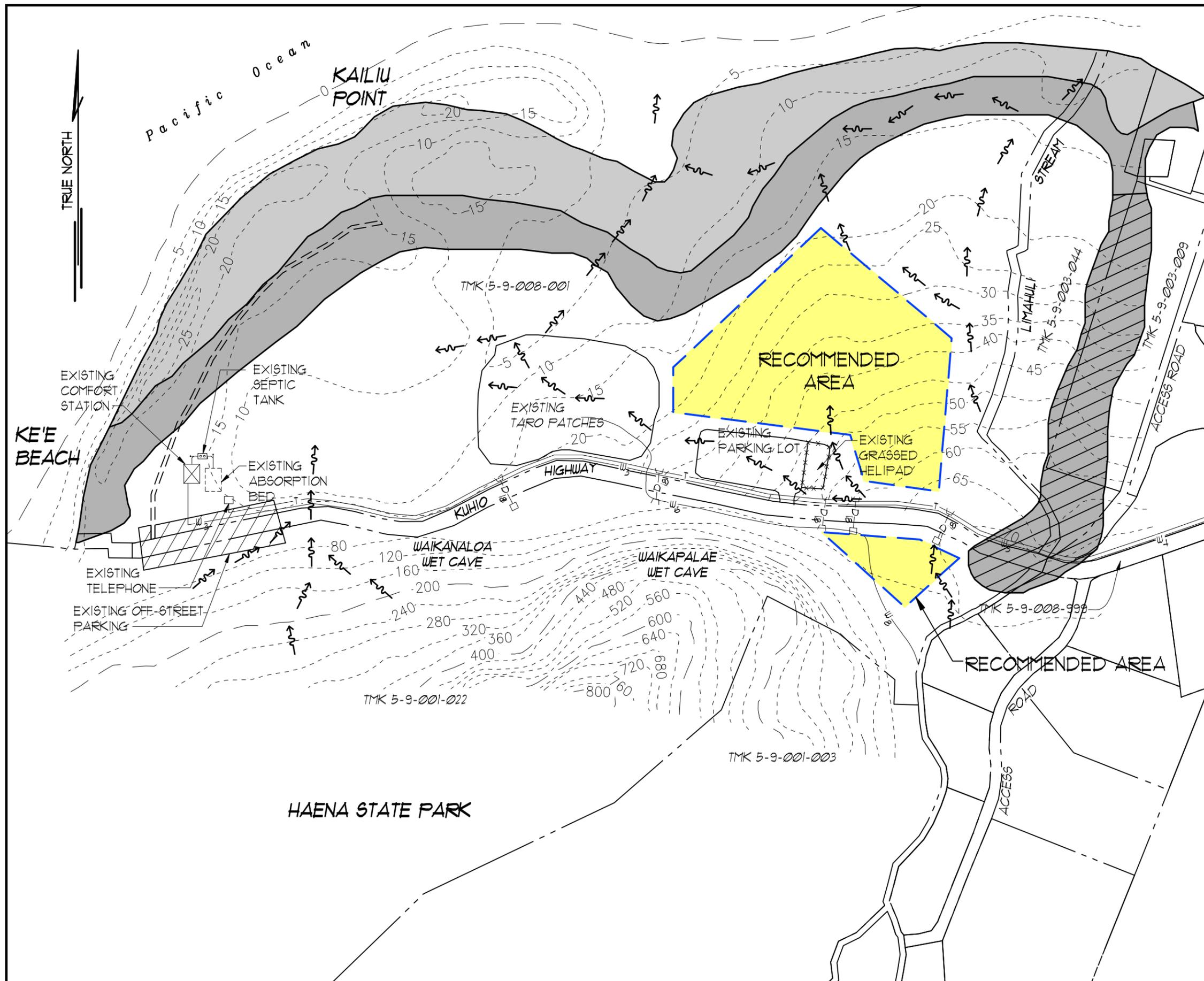
Areas recommended for development are based on avoiding existing low-lying and coastal areas subject to flooding and utilizing areas where the terrain is sloped less than 10% to avoid massive excavation. These areas include:

- 1.) The 100-year flood zone, which reaches elevations of 18 feet along the coastline, and
- 2.) The coastal 10-year flood zone with wave velocity hazards, which reaches elevations of 21 feet.

In addition, interior areas with elevations less than 15 feet above mean sea level and areas adjacent to stream flood plain zones were eliminated.

However, the location of Limahuli stream within the previous Master plan and on TMK maps differs from the location shown on FEMA maps, the Kauai Online Hazard Assessment (KOHA) database, and the Hawaii National Flood Insurance Program (NFIP) database. The Department of Land and Natural Resources (DLNR) is currently working out this issue with the Environmental Protection Agency (EPA) Region 9. Until this issue is resolved, it is not recommended that development be considered in the vicinity of Limahuli Stream.

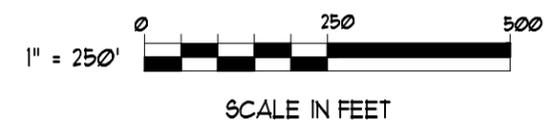
Figure 5 shows the limited area where these conditions apply and development can occur.



**LEGEND**

-  10-YEAR COASTAL FLOOD PLAIN WITH ADDITIONAL WAVE HAZARDS (FEMA)
-  100-YEAR FLOOD PLAIN (FEMA)
-  100-YEAR FLOOD PLAIN WITHOUT DETAILED STUDY (FEMA)
-  SEASONAL WATER CHANNEL WITH FLOW DIRECTION
-  ---25--- CONTOURS WITH ELEVATION
-  RECOMMENDED AREA FOR DEVELOPMENT
-  -D-□ EXISTING DRAINAGE CULVERT
-  -D-C EXISTING DRAINAGE CULVERT

**GRAPHIC SCALE**



HAENA STATE PARK  
 MASTER PLAN  
**FIGURE: 5**  
**RECOMMENDED AREA**  
**FOR DEVELOPMENT MAP**  
 SCALE: 1"=250' JANUARY 2011

### **C. Drainage and Stormwater Management**

Due to the minimal land disturbances recommended within the Park, the drainage systems will not be significantly affected. However, drainage discussions with the community included:

1. Restoration of the auwai (natural drainage patterns) where possible, including the one that flowed alongside Kuhio Highway, through the existing parking lot. This system is shown to be relocated north of the parking lot on the Master Plan;
2. Utilizing bioswales to define drainage courses and direct runoff away from proposed improvements and cultural sites; and
3. Reconfiguration of existing drainage inlets to a more natural state as done by the old Hawaiians. A natural state can be created by lowering the grates and lining it with stones. This should not create a traffic hazard because traffic along the interior roadway will decrease after implementation of the master plan. Pipe bollards should be placed around depressed inlets to warn pedestrians and maintenance traffic.

During moderate to heavy rainfall, stormwater management becomes very difficult. The wetland and lois typically serve as natural retention basins, but during surges of runoff, there is no way to protect coastal waters from sediment and debris. Constructed green spaces, native plants, bio-retention cells and bioswales can be used to help minimize the amount of stormwater and sediment leaving the site.

Haena State Park contains many ephemeral streams that flow only after moderate rainfall. The courses of these streams vary and are not delineated on available maps. If the addition of impervious area is minimized, diversion of stormwater around buildings should have a minimal effect on ephemeral streams.

### **D. Water System**

#### **1. Potable Water**

The existing 3-inch water main with the Park should be sufficient for the proposed Master Plan as the population and activities within the Park will not increase. Relocation and maintenance of the water system may be required during the design phase, including adding backflow preventers.

#### **2. Non-Potable Water**

The use of non-potable water for irrigation and other possible alternatives is highly recommended. Beside the use of stream water, water reclamation from treated wastewater and greywater as well as rainwater catchment systems could support non-potable water needs. These alternatives should be explored during design.

## **E. Wastewater System**

The proposed wastewater system is discussed under a separate cover, Wastewater Preliminary Engineering Report for Haena State Park Master Plan, dated November 2010. Recommendations are summarized as follows:

During the community meetings, it was agreed that any proposed wastewater system should treat the wastewater effluent for potential reuse, to protect the grounds and surrounding environment of the Park from any on-site disposal. It is believed by being good stewards of the Park, the environment will be preserved for future generations.

Therefore, at a minimum, aerobic treatment units with absorption beds should be considered. Beyond this, water resource management and reuse options should be seriously taken into consideration during design.

Also discussed at the community meeting were the following to be considered in the design:

1. Providing R-2 water quality effluent at the Orientation and Cultural Center, with additional treatment for reuse.
2. Placing the absorption bed under the parking lot to provide separation of effluent from ground water and avoid contamination of the loi patches.
3. Providing aeration to the existing constructed wetlands primary treatment tanks through the use of a photovoltaic system.
4. Considering compost toilets only for low usage areas, if at all.

## **F. Electrical and Communication**

Electrical service currently terminates at the entrance to Haena State Park. In order to provide electrical service to the new Orientation and Cultural Center, approximately 1,000 feet of overhead electrical line must be installed. Kauai Island Utility Cooperative (KIUC) provided a budgetary construction cost of \$33,000 to install 1,000 feet of 1-phase, 2-wire primary conductor that will service the Orientation and Cultural Center (cost is KIUC cost only and does not include connections to the building). 3-phase service terminates at Hanalei and is not feasible for this project.

Due to the winding nature of Kuhio Highway, overhead electrical poles will require anchoring at all corners. Easements will need to be granted to KIUC before the line extension can be executed.

We recommend overhead electrical power be extended from the Park entrance to the Orientation and Cultural Center. Beyond that point, photovoltaic systems and other sustainable power sources should be utilized.

**APPENDIX A  
CALCULATIONS**

By Michael Bungcayao Date 11/16/10 Project Haena State Park MP Project No. 1000711\*00

Checked By Ramon Sera Date 11/17/10 Sheet 1 3

**Find:**

Flow entering the five (5) existing culverts, crossing Kuhio Highway within Haena State Park (2-year, 1-hour storm and 10-year, 1-hour storm)

**References:**

1. County of Kauai – Department of Public Works – Storm Drainage Standard, February 1972
2. County of Kauai – Department of Public Works – Storm Drainage Standard, July 2001\*

\*Section references within calculations refer to the July 2001 edition unless otherwise noted.

**Assumptions:**

1. Run-Off coefficients (Attachment 2) were calculated from the February 1972 version for a conservative, representative estimate.
2. Assume watercourse slope = 50%
3. Intensity of the 10-year storm was calculated from the February 1972 version. Intensity of the 10-year storm not provided in Reference 2.

**Calculation:**

Drainage Area = 14.17 Acres (Local Drainage System) [§ 1.7(m)]  
Although Tm = 2 years per Reference 2, [§ 3.3(c)(1)]  
Q will be calculated for both Tm = 2 years and Tm = 10 years  
Also, Rational Method shall be used (Q = CIA) [§ 3.3(d)(1)]

Where:

Q = Flow Rate, in cubic feet per second  
C = Runoff Coefficient  
I = Rainfall Intensity, in inches per hour for a duration equal to time of concentration  
A = Drainage Area, in acres

Run-Off Coefficient, C (Attachment 2): [See Assumption 1]

For all zones –

Moderate Infiltration	0.07
Extreme Relief	0.08
Good Vegetal Cover	0.03
Agricultural	0.15
Total C = 0.07 + 0.08 + 0.03 + 0.15	
= 0.33	

Area, A (Attachment 1 and 1A):

Zone 1 Area = 3.43 Acres
Zone 2 Area = 4.05 Acres
Zone 3 Area = 2.55 Acres
Zone 4 Area = 1.76 Acres
Zone 5 Area = 2.38 Acres
Total Area = 3.43+4.05+2.55+1.76+2.38
= 14.17 Acres

Intensity, I: [§ 4.4.3]

Strip Length –

Zone 1 Strip Length = 1,251	Feet
Zone 2 Strip Length = 1,405	Feet
Zone 3 Strip Length = 824	Feet
Zone 4 Strip Length = 1,066	Feet
Zone 5 Strip Length = 742	Feet

By Michael Bungcayao Date 11/16/10 Project Haena State Park MP Project No. 1000711\*00

Checked By Ramon Sera Date 11/17/10 Sheet 2 3

For All Zones –

Using Plate 1, (Attachment 3) –

First 300 feet of strip length, use *Forest with Heavy Ground Litter and Meadow*

Remaining Length, use *Grassed Waterway*

Velocity for first 300 feet = 1.8 feet per second

Velocity for remaining length = 11 feet per second

Time of Concentration, Tc:

$$\text{Zone 1 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{1,251 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 253 \text{ seconds}$$

$$\text{Zone 2 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{1,405 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 267 \text{ seconds}$$

$$\text{Zone 3 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{824 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 214 \text{ seconds}$$

$$\text{Zone 4 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{1,066 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 236 \text{ seconds}$$

$$\text{Zone 5 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{742 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 207 \text{ seconds}$$

\*Minimum Tc = 300 seconds (5 minutes)

Therefore for all zones, Tc = 5 minutes

For All Zones –

Using Plate 2, (Attachment 3)

Intensity correction factor = 2.7

Intensity, I –

From Plate 3, (Attachment 4)

Intensity of 1-hr Rainfall for a 2 year storm = 3 inches

2-year storm corrected intensity = 3 inches \* 2.7

= 8.1 inches

From Plate 1, (Attachment 4A)

Intensity of 1-hr Rainfall for a 10 year storm = 4.5 inches

10-year storm corrected intensity = 4.5 inches \* 2.7

= 12.2 inches

Flow Rate, Q = CIA

$$\text{Zone 1, 2-year storm flow rate} = 0.33 * 8.1 * 3.43$$

$$= 9.2 \text{ cubic feet per second}$$

$$\text{Zone 2, 2-year storm flow rate} = 0.33 * 8.1 * 4.05$$

$$= 10.8 \text{ cubic feet per second}$$

$$\text{Zone 3, 2-year storm flow rate} = 0.33 * 8.1 * 2.55$$

$$= 6.8 \text{ cubic feet per second}$$

$$\text{Zone 4, 2-year storm flow rate} = 0.33 * 8.1 * 1.76$$

$$= 4.7 \text{ cubic feet per second}$$

$$\text{Zone 5, 2-year storm flow rate} = 0.33 * 8.1 * 2.38$$

$$= 6.4 \text{ cubic feet per second}$$

2-year, 1 hour storm – Total Flow in all 5 Zones = 9.2 + 10.8 + 6.8 + 4.7 + 6.4 cubic feet per second  
= 37.9 cubic feet per second

## Kennedy/Jenks Consultants

By Michael Bungcayao Date 11/16/10 Project Haena State Park MP Project No. 1000711\*00

Checked By Ramon Sera Date 11/17/10 Sheet 3 3

$$\begin{aligned} \text{Zone 1, 10-year flow rate} &= 0.33 * 12.15 * 3.43 \\ &= 13.8 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 2, 10-year flow rate} &= 0.33 * 12.15 * 4.05 \\ &= 16.2 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 3, 10-year flow rate} &= 0.33 * 12.15 * 2.55 \\ &= 10.2 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 4, 10-year flow rate} &= 0.33 * 12.15 * 1.76 \\ &= 7.1 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 5, 10-year flow rate} &= 0.33 * 12.15 * 2.38 \\ &= 9.5 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{10-year, 1 hour storm - Total Flow in all 5 Zones} &= 13.8 + 16.2 + 10.2 + 7.1 + 9.5 \text{ cubic feet per second} \\ &= 56.8 \text{ cubic feet per second} \end{aligned}$$

Corral Reef

Kailiu Point

TRUE NORTH  
SCALE: 1" = 500'

Kee Beach

ZONE 2  
A = 4.05 ACRES  
C = 0.33  
I<sub>2</sub> = 8.1 INCHES  
Q<sub>2</sub> = 10.8 CFS

ZONE 3  
A = 2.55 ACRES  
C = 0.33  
I<sub>2</sub> = 8.1 INCHES  
Q<sub>2</sub> = 6.8 CFS

ZONE 4  
A = 1.16 ACRES  
C = 0.33  
I<sub>2</sub> = 8.1 INCHES  
Q<sub>2</sub> = 4.7 CFS

ZONE 1  
A = 3.43 ACRES  
C = 0.33  
I<sub>2</sub> = 8.1 INCHES  
Q<sub>2</sub> = 9.2 CFS

ZONE 5  
A = 2.38 ACRES  
C = 0.33  
I<sub>2</sub> = 8.1 INCHES  
Q<sub>2</sub> = 6.4 CFS

HAENA STATE PARK MASTER PLAN  
CIVIL BASELINE REPORT

DRAINAGE AREAS  
2-YEAR STORM

Corral Reef

Kailiu Point

TRUE NORTH  
SCALE: 1" = 500'

Kee Beach

ZONE 2  
A = 4.05 ACRES  
C = 0.33  
 $I_{10}$  = 12.15 INCHES  
 $Q_{10}$  = 16.2 CFS

ZONE 3  
A = 2.55 ACRES  
C = 0.33  
 $I_{10}$  = 12.15 INCHES  
 $Q_{10}$  = 10.2 CFS

ZONE 4  
A = 1.76 ACRES  
C = 0.33  
 $I_{10}$  = 12.15 INCHES  
 $Q_{10}$  = 7.1 CFS

ZONE 1  
A = 3.43 ACRES  
C = 0.33  
 $I_{10}$  = 12.15 INCHES  
 $Q_{10}$  = 13.8 CFS

ZONE 5  
A = 2.38 ACRES  
C = 0.33  
 $I_{10}$  = 12.15 INCHES  
 $Q_{10}$  = 9.5 CFS

HAENA STATE PARK MASTER PLAN  
CIVIL BASELINE REPORT  
  
DRAINAGE AREAS  
10-YEAR STORM  
  
ATTACHMENT 1A  
NOVEMBER 2010

# Table 1

## GUIDE FOR THE DETERMINATION OF RUNOFF COEFFICIENTS FOR BUILT-UP AREAS\*

WATERSHED CHARACTERISTICS	EXTREME	HIGH	MODERATE	LOW
INFILTRATION	NEGLIGIBLE 0.20	SLOW 0.14	MEDIUM 0.07	HIGH 0.0
RELIEF	STEEP (> 25%) 0.08	HILLY (15 - 25%) 0.06	ROLLING (5 - 15%) 0.03	FLAT (0 - 5%) 0.0
VEGETAL COVER	NONE 0.07	POOR (< 10%) 0.05	GOOD (10 - 50%) 0.03	HIGH (50 - 90%) 0.0
DEVELOPMENT TYPE	INDUSTRIAL & BUSINESS 0.55	HOTEL - APARTMENT 0.45	RESIDENTIAL 0.40	AGRICULTURAL 0.15

\*NOTE: The design coefficient "c" must result from a total of the values for all four watershed characteristics of the site.

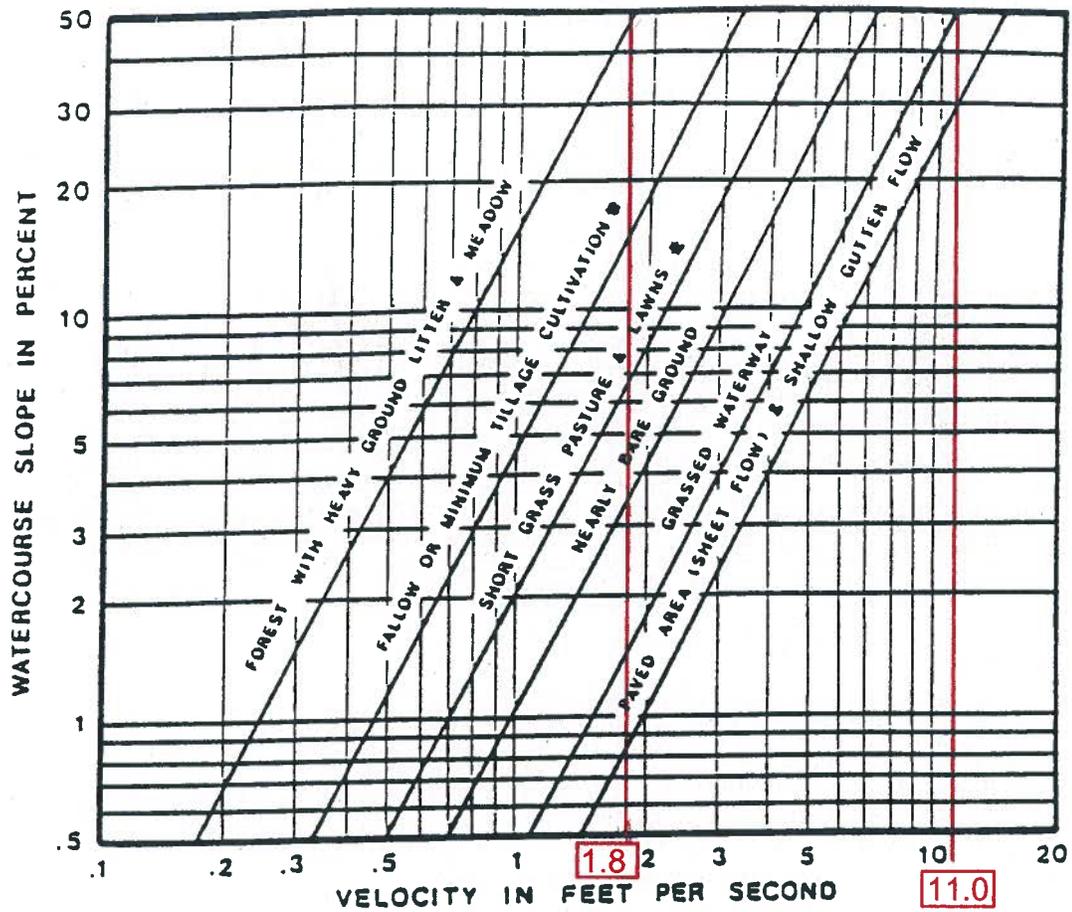
# Table 2

## APPROXIMATE AVERAGE VELOCITIES OF RUNOFF FOR CALCULATING TIME OF CONCENTRATION

TYPE OF FLOW	VELOCITY IN FPS FOR SLOPES (in percent) INDICATED			
	0-3%	4-7%	8-11%	12-15%
<b>OVERLAND FLOW:</b>				
Woodlands	1.0	2.0	3.0	3.5
Pastures	1.5	3.0	4.0	4.5
Cultivated	2.0	4.0	5.0	6.0
Pavements	5.0	12.0	15.0	18.0
<b>OPEN CHANNEL FLOW:</b>				
Improved Channels	Determine Velocity by Manning's Formula			
Natural Channel* (not well defined)	1.0	3.0	5.0	8.0

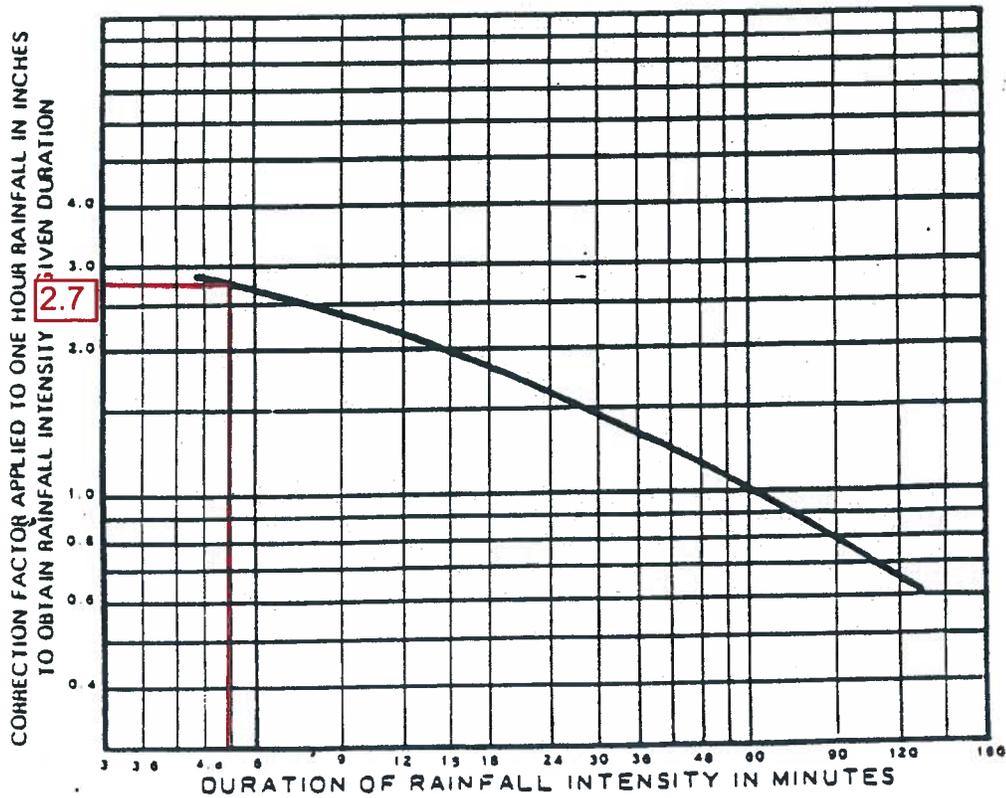
\*These values vary with the channel size and other conditions so that the ones given are the averages of a wide range. Wherever possible, more accurate determinations should be made for particular conditions by Manning's formula.

# PLATE 1



ESTIMATE OF AVERAGE FLOW VELOCITY FOR USE WITH THE RATIONAL FORMULA.

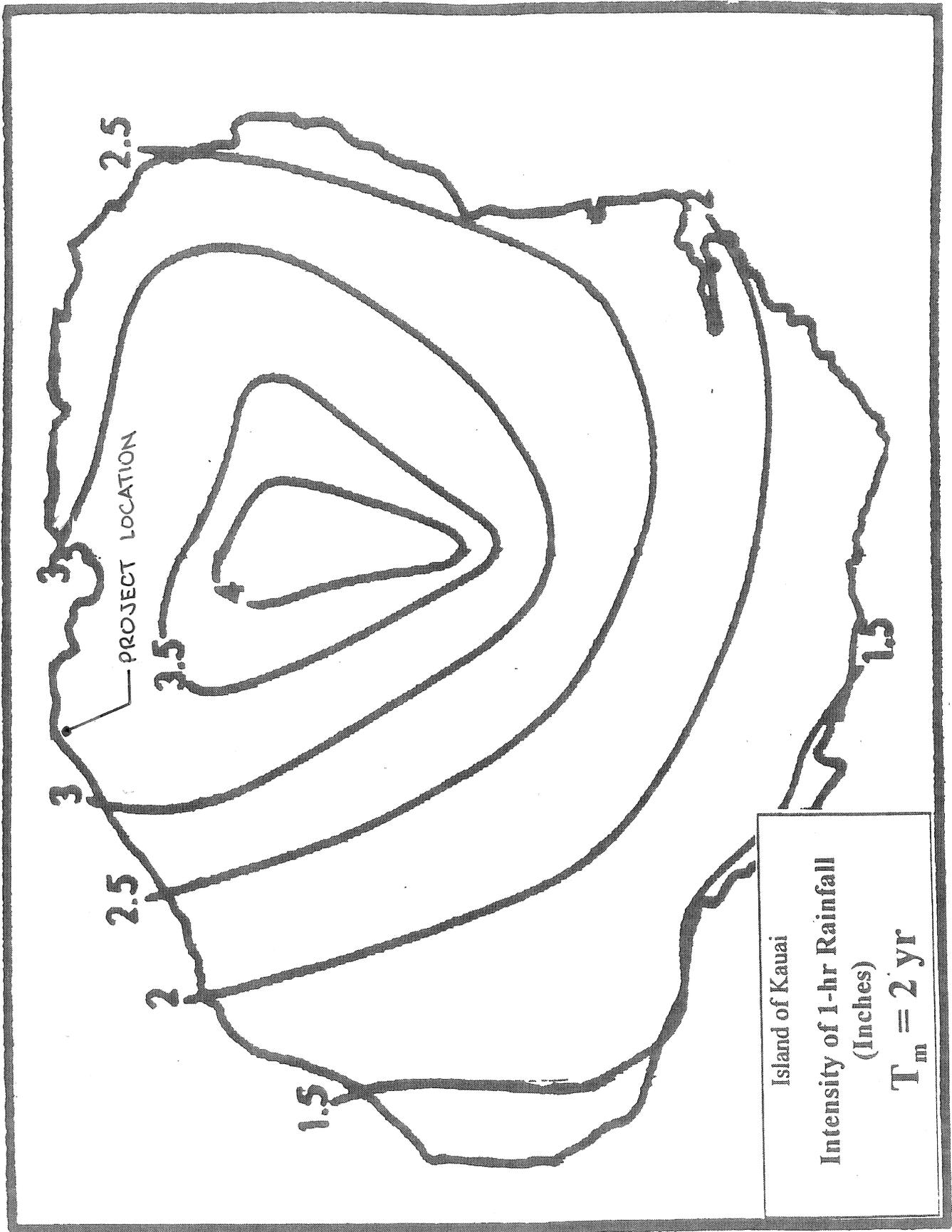
# PLATE 2

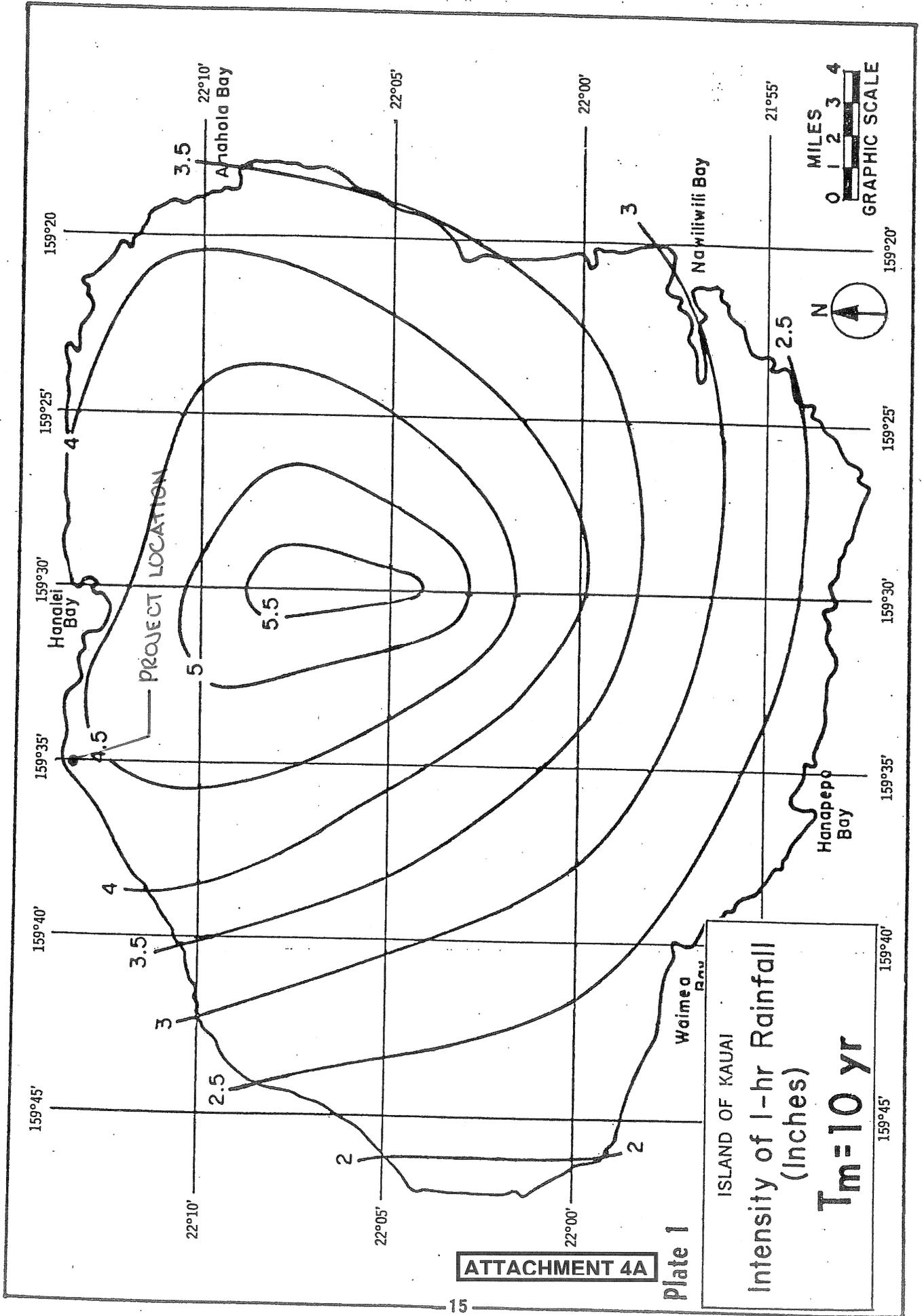


CORRECTION FACTOR FOR CONVERTING 1 HR. RAINFALL TO RAINFALL INTENSITY OF VARIOUS DURATIONS

TO BE USED FOR AREA LESS THAN 100 ACRES

PLATE 3





ATTACHMENT 4A

Plate 1

ISLAND OF KAUAI  
 Intensity of 1-hr Rainfall  
 (Inches)  
 T<sub>m</sub> = 10 yr





# Appendix H



---

**APPENDIX H: VISITOR SURVEY (JURAN, 2006)**

Haena State Park Visitor Survey August 2006

1. I/We am/are visiting from: a. this Island b. another Island c. North America  
d. other (please list) \_\_\_\_\_
2. I/We am/are staying: a. in a hotel b. a condo/timeshare c. vacation rental  
d. other (please list) \_\_\_\_\_
3. I/We are staying in (location/town) \_\_\_\_\_
4. How many are traveling in your party? \_\_\_\_\_
5. I/We decided to come to Haena State Park/Kee Beach because I: a. read about it in a guidebook  
b. heard about it from a friend c. drove to the end of the road and stopped d. been there before
6. I find the parking situation in the Park to be: a. easy b. challenging c. overwhelming d. ridiculous
7. If there were an alternative mode of transportation into the Park, would  
you use it? Yes No
8. Do you see the Park as having a: a. small number of cars/people b. a moderate number of cars/people  
c. heavy amounts of cars/people d. overloaded number of cars/people
9. Do you see the resources of the Park and the Waters that surround it as:  
a. pristine b. lightly impacted c. moderately impacted d. heavily impacted
10. Would you like to see signs explaining the significant natural and cultural resources of the area?  
Yes No

**Questions, Comments, Concerns regarding the area and it s' resources...**

Haena State Park Visitor Survey August 2006

1. I/We am/are visiting from: a. this Island b. another Island c. North America  
d. other (please list) \_\_\_\_\_
2. I/We am/are staying: a. in a hotel b. a condo/timeshare c. vacation rental  
d. other (please list) \_\_\_\_\_
3. I/We are staying in (location/town) \_\_\_\_\_
4. How many are traveling in your party? \_\_\_\_\_
5. I/We decided to come to Haena State Park/Kee Beach because I: a. read about it in a guidebook  
b. heard about it from a friend c. drove to the end of the road and stopped d. been there before
6. I find the parking situation in the Park to be: a. easy b. challenging c. overwhelming d. ridiculous
7. If there were an alternative mode of transportation into the Park, would  
you use it? Yes No
8. Do you see the Park as having a: a. small number of cars/people b. a moderate number of cars/people  
c. heavy amounts of cars/people d. overloaded number of cars/people
9. Do you see the resources of the Park and the Waters that surround it as:  
a. pristine b. lightly impacted c. moderately impacted d. heavily impacted
10. Would you like to see signs explaining the significant natural and cultural resources of the area?  
Yes No

**Questions, Comments, Concerns regarding the area and it s' resources...**

Heena SP VRS, Inc  
 Annual for July

Date	Time	Day of the Week	# of Cars in Lot	# Thought to be	# of Cars on the Dunes/Back Rd	# Thought to be Local	# of Cars in OverFlow Lot
04 July	9:10 a.m.	Tuesday	71	16	22	8	2
04 July	11:20 a.m.	Tuesday	85	16	108	14	n/a
04 July	1:40 p.m.	Tuesday	90	17	72	7	34

08 July	8:50 p.m.	Saturday	62	16	8	0	n/a
---------	-----------	----------	----	----	---	---	-----

09 July	9:00 a.m.	Sunday	61	13	4	0	n/a
---------	-----------	--------	----	----	---	---	-----

10 July	1:30 p.m.	Monday	80	7	100	1	18
10 July	4:20 p.m.	Monday	69	8	66	5	6

11 July	9:15 a.m.	Tuesday	50	9	7	1	n/a
11 July	2:00 p.m.	Tuesday	88	6	91	10	20

15 July	8:40 a.m.	Saturday	41	13	3	0	1
---------	-----------	----------	----	----	---	---	---

16 July	9:15 a.m.	Sunday	36	8	14	3	n/a
16 July	1:35 p.m.	Sunday	74	13	87	7	10

17 July	12:30 p.m.	Monday	81	15	121	5	n/a
---------	------------	--------	----	----	-----	---	-----

# Thought to be Local	Total # of Cars	Total # of Cars Thought to be Local	% of Visitors Thought to be Local
0	95	24	25.26%
n/a	193	30	15.54%
0	196	24	12.24%
<b>Daily Observed Total</b>	<b>484</b>	<b>78</b>	<b>16.12%</b>
n/a	70	16	22.86%
<b>Daily Observed Total</b>	<b>70</b>	<b>16</b>	<b>22.86%</b>
n/a	65	13	20.00%
<b>Daily Observed Total</b>	<b>65</b>	<b>13</b>	<b>20.00%</b>
2	198	10	5.05%
1	141	14	9.93%
<b>Daily Observed Total</b>	<b>339</b>	<b>24</b>	<b>7.08%</b>
n/a	57	10	17.54%
1	199	17	8.54%
<b>Daily Observed Total</b>	<b>256</b>	<b>27</b>	<b>10.55%</b>
0	45	13	28.89%
<b>Daily Observed Total</b>	<b>45</b>	<b>13</b>	<b>28.89%</b>
n/a	50	11	22.00%
0	171	20	11.70%
<b>Daily Observed Total</b>	<b>221</b>	<b>31</b>	<b>14.03%</b>
n/a	202	20	9.90%
<b>Daily Observed Total</b>	<b>202</b>	<b>20</b>	<b>9.90%</b>

18 July	8:50 a.m.	Tuesday	64	16	7	2	n/a
18 July	11:55 a.m.	Tuesday	84	19	112	7	28

30 July	9:30 a.m.	Sunday	76	8	11	3	n/a
---------	-----------	--------	----	---	----	---	-----

n/a	71	18	25.35%
0	224	26	11.61%
<b>Daily Observed Total</b>	<b>295</b>	<b>44</b>	<b>14.92%</b>

n/a	87	11	12.64%
<b>Daily Observed Total</b>	<b>87</b>	<b>11</b>	<b>12.64%</b>

**Monthly Observed Total 2064**

**Monthly Observed Local Total 277 13.42%**

Shane's Visitor  
 Count for June

Date	Time	Day of the Week	# of Cars in Lot	# Thought to be	# of Cars on the Dunes/Back Rd	# Thought to be Local	# of Cars in OverFlow Lot
02 June	9:50 a.m.	Friday	68	8	29	0	n/a
02 June	1:10 p.m.	Friday	83	12	79	6	n/a
02 June	2:55 p.m.	Friday	80	19	60	6	6

03 June	1:10 p.m.	Saturday	82	12	61	5	n/a
---------	-----------	----------	----	----	----	---	-----

04 June	8:50 a.m.	Sunday	42	10	6	4	n/a
04 June	4:30 p.m.	Sunday	71	11	53	6	n/a

05 June	9:00 a.m.	Monday	35	10	2	0	n/a
05 June	10:40 a.m.	Monday	71	11	50	4	n/a
05 June	1:00 p.m.	Monday	79	9	92	2	16

10 June	9:15 a.m.	Saturday	73	13	19	7	n/a
10 June	12:20 p.m.	Saturday	86	16	80	6	18

11 June	9:00 a.m.	Sunday	58	11	6	3	n/a
11 June	11:30 a.m.	Sunday	81	10	76	9	n/a
11 June	1:10 p.m.	Sunday	81	16	86	14	n/a

12 June	8:45 a.m.	Monday	61	6	11	4	1
---------	-----------	--------	----	---	----	---	---

# Thought to be Local	Total # of Cars	Total # of Cars Thought to be Local	% of Visitors Thought to be Local
n/a	97	8	8.25%
n/a	162	18	11.11%
0	146	25	17.12%
<b>Daily Observed Total</b>	<b>405</b>	<b>51</b>	<b>12.59%</b>
n/a	143	17	11.89%
<b>Daily Observed Total</b>	<b>143</b>	<b>17</b>	<b>11.89%</b>
n/a	48	14	29.17%
n/a	124	17	13.71%
<b>Daily Observed Total</b>	<b>172</b>	<b>31</b>	<b>18.02%</b>
n/a	37	10	27.03%
n/a	121	15	12.40%
0	187	11	5.88%
<b>Daily Observed Total</b>	<b>345</b>	<b>36</b>	<b>10.43%</b>
n/a	92	20	21.74%
2	184	24	13.04%
<b>Daily Observed Total</b>	<b>276</b>	<b>44</b>	<b>15.94%</b>
n/a	64	14	21.88%
n/a	157	19	12.10%
n/a	167	30	17.96%
<b>Daily Observed Total</b>	<b>388</b>	<b>63</b>	<b>16.24%</b>
1	73	11	15.07%
<b>Daily Observed Total</b>	<b>73</b>	<b>11</b>	<b>15.07%</b>

16 June	9:20 a.m.	Friday	48	7	3	0	n/a
16 June	2:30 p.m.	Friday	86	7	64	2	9

17 June	9:30 a.m.	Saturday	47	8	4	0	n/a
17 June	11:30 a.m.	Saturday	76	13	50	5	n/a

18 June	9:00 a.m.	Sunday	65	16	8	1	n/a
18 June	2:00 p.m.	Sunday	76	10	99	1	n/a

24 June	12:00 p.m.	Saturday	86	14	100	11	n/a
---------	------------	----------	----	----	-----	----	-----

25 June	9:10 a.m.	Sunday	58	11	8	1	n/a
25 June	3:15 p.m.	Sunday	78	12	85	10	11

30 June	9:30 a.m.	Friday	69	9	8	0	n/a
30 June	10:50 a.m.	Friday	80	8	73	2	3

**Monthly Observed Total**  
**Monthly Observed Local Total**

n/a	51	7	13.73%
2	159	11	6.92%
<b>Daily Observed Total</b>	<b>210</b>	<b>18</b>	<b>8.57%</b>

n/a	51	8	15.69%
n/a	126	18	14.29%
<b>Daily Observed Total</b>	<b>177</b>	<b>26</b>	<b>14.69%</b>

n/a	73	17	23.29%
n/a	175	11	6.29%
<b>Daily Observed Total</b>	<b>248</b>	<b>28</b>	<b>11.29%</b>

n/a	186	25	13.44%
<b>Daily Observed Total</b>	<b>186</b>	<b>25</b>	<b>13.44%</b>

n/a	66	12	18.18%
1	174	23	13.22%
<b>Daily Observed Total</b>	<b>240</b>	<b>35</b>	<b>14.58%</b>

n/a	77	9	11.69%
0	156	10	6.41%
<b>Daily Observed Total</b>	<b>233</b>	<b>19</b>	<b>8.15%</b>

**3096**

**404**

**13.05%**

Home SP visitor  
counts by  
region

Date	Time	Day of the Week	# of Cars in Lot	# Thought to be	# of Cars on the Dunes/Back Rd	# Thought to be Local	# of Cars in Overflow Lot
05 May	8:45 a.m.	Friday	12	1	1	1	0
05 May	11:15 a.m.	Friday	69	3	14	0	0

06 May	10:00 a.m.	Saturday	36	6	5	1	0
06 May	11:30 p.m.	Saturday	74	10	24	0	0
06 May	1:15 p.m.	Saturday	80	13	44	3	0
06 May	3:10 p.m.	Saturday	61	12	39	5	0

07 May	9:00 a.m.	Sunday	24	8	1	1	0
07 May	4:00 p.m.	Sunday	73	12	33	6	0

13 May	8:40 a.m.	Saturday	30	5	5	4	0
13 May	10:30 a.m.	Saturday	62	10	10	3	0
13 May	12:00 p.m.	Saturday	79	14	35	4	0
13 May	2:50 p.m.	Saturday	88	11	56	15	14
13 May	5:00 p.m.	Saturday	58	9	22	6	6

14 May	8:50 a.m.	Sunday	32	6	3	1	1
14 May	10:30 a.m.	Sunday	57	5	20	2	n/a
14 May	11:30 a.m.	Sunday	64	5	30	3	n/a
14 May	5:00 p.m.	Sunday	64	11	32	7	5

16 May	9:40 a.m.	Tuesday	71	5	16	3	2
16 May	12:00 p.m.	Tuesday	78	2	80	3	11

# Thought to be Local	Total # of Cars	Total # of Cars Thought to be Local	% of Visitors Thought to be Local
0	13	2	15.38%
0	69	3	4.35%
<b>Daily Observed Total</b>	<b>82</b>	<b>5</b>	<b>6.10%</b>
0	41	7	17.07%
0	98	10	10.20%
0	124	16	12.90%
0	100	17	17.00%
<b>Daily Observed Total</b>	<b>363</b>	<b>50</b>	<b>13.77%</b>
0	25	9	36.00%
0	106	18	16.98%
<b>Daily Observed Total</b>	<b>131</b>	<b>27</b>	<b>20.61%</b>
0	35	9	25.71%
0	72	13	18.06%
0	114	18	15.79%
4	158	30	18.99%
2	86	17	19.77%
<b>Daily Observed Total</b>	<b>465</b>	<b>87</b>	<b>18.71%</b>
0	36	7	19.44%
n/a	77	7	9.09%
n/a	94	8	8.51%
2	101	20	19.80%
<b>Daily Observed Total</b>	<b>308</b>	<b>42</b>	<b>13.64%</b>
0	89	8	8.99%
2	169	7	4.14%

16 May	4:15 p.m.	Tuesday	67	6	61	4	5
--------	-----------	---------	----	---	----	---	---

19 May	9:00 a.m.	Friday	41	3	6	5	1
--------	-----------	--------	----	---	---	---	---

20 May	9:20 a.m.	Saturday	63	11	6	2	0
--------	-----------	----------	----	----	---	---	---

21 May	9:40 a.m.	Sunday	61	5	4	4	n/a
21 May	11:30 a.m.	Sunday	74	6	63	9	n/a

22 May	11:20 a.m.	Monday	74	6	56	2	n/a
--------	------------	--------	----	---	----	---	-----

30 May	9:30 a.m.	Tuesday	62	6	20	0	n/a
--------	-----------	---------	----	---	----	---	-----

**Monthly Observed Total**  
**Monthly Observed Local Total**

0	133	10	7.52%
<b>Daily Observed Total</b>	<b>391</b>	<b>25</b>	<b>6.39%</b>

0	48	8	16.67%
<b>Daily Observed Total</b>	<b>48</b>	<b>8</b>	<b>16.67%</b>

0	69	13	18.84%
<b>Daily Observed Total</b>	<b>69</b>	<b>13</b>	<b>18.84%</b>

n/a	65	9	13.85%
n/a	137	15	10.95%
<b>Daily Observed Total</b>	<b>202</b>	<b>24</b>	<b>11.88%</b>

n/a	130	8	6.15%
<b>Daily Observed Total</b>	<b>130</b>	<b>8</b>	<b>6.15%</b>

n/a	82	6	7.32%
<b>Daily Observed Total</b>	<b>82</b>	<b>6</b>	<b>7.32%</b>

**2271**  
**295**      **12.99%**

Date	Day	Time	Number of People Seen
6 May	Saturday	3:30-4:00 p.m.	21
6 May	Saturday	4:00-4:30 p.m.	22
<b>Total # of People Seen</b>			<b>43</b>
<b>Total Time Spent On Trail</b>			<b>3:30 p.m.-4:30 p.m.</b>

Date	Day	Time	Number of People Seen
7 May	Sunday	9:30-10:00 a.m.	0
7 May	Sunday	10:00-10:30 a.m.	14
7 May	Sunday	10:30-11:00 a.m.	50
7 May	Sunday	12:30-1:00 p.m.	1
7 May	Sunday	1:00-1:30 p.m.	4
7 May	Sunday	1:30-2:00 p.m.	2
7 May	Sunday	2:00-2:30 p.m.	7
7 May	Sunday	2:30-3:00 p.m.	23
7 May	Sunday	3:00-3:30 p.m.	35
7 May	Sunday	3:30-4:00 p.m.	9
<b>Total # of People Seen</b>			<b>145</b>
<b>Total Time Spent On Trail</b>			<b>9:30 a.m.-4:00 p.m.</b>

Date	Day	Time	Number of People Seen
13 May	Saturday	3:45-4:00 p.m.	20
13 May	Saturday	4:00-4:30 p.m.	19
		4:30-5:00 p.m.	23
<b>Total # of People Seen</b>			<b>39</b>
<b>Total Time Spent On Trail</b>			<b>3:45 p.m.-5:00 p.m.</b>

Date	Day	Time	Number of People Seen
------	-----	------	-----------------------

Date	Day	Time	Number of Beach Users	Number of Swimmers	Total
16 April	Sunday	10:30 a.m.	26	n/a	26
16 April	Sunday	11:00 a.m.	73	18	91
16 April	Sunday	11:30 a.m.	67	46	113
16 April	Sunday	12:40 p.m.	128	43	171
16 April	Sunday	2:45 p.m.	101	38	139
16 April	Sunday	4:50 p.m.	72	17	89

Date	Day	Time	Number of Beach Users	Number of Swimmers	Total
17 April	Monday	11:00 a.m.	100	48	148
17 April	Monday	1:00 p.m.	195	58	253
17 April	Monday	5:00 p.m.	71	12	83

Date	Day	Time	Number of Beach Users	Number of Swimmers	Total
23 April	Sunday	4:00 p.m.	117	21	138

Date	Day	Time	Number of Beach Users	Number of Swimmers	Total
29 April	Saturday	3:10 p.m.	121	37	158

Date	Day	Time	Number of Beach Users	Number of Swimmers	Total
30 April	Sunday	8:50 a.m.	9	3	12
30 April	Sunday	2:00 p.m.	73	6	79
30 April	Sunday	5:00 p.m.	79	18	97

Date	Time	Day of the Week	Number of Cars in Lot	Number Thought to be Local	Number of Cars on the Dunes	Number Thought to be Local	Total Number of Cars
02 April	8:30 a.m.	Sunday	22	14	n/a	n/a	22
02 April	1:15 p.m.	Sunday	50	10	n/a	n/a	50
02 April	3:00 p.m.	Sunday	25	5	n/a	n/a	25
02 April	4:30 p.m.	Sunday	27	6	n/a	n/a	27
<b>Daily Observed Total</b>							<b>124</b>

03 April	12:00 p.m.	Monday	55	4	4	0	59
03 April	2:00 p.m.	Monday	72	5	3	0	75
03 April	4:30 p.m.	Monday	22	2	0	0	22
<b>Daily Observed Total</b>							<b>156</b>

08 April	10:00 a.m.	Saturday	56	8	0	0	56
08 April	11:30 a.m.	Saturday	n/a	n/a	12	2	12
08 April	2:30 p.m.	Saturday	82	10	33	2	115
08 April	5:20 p.m.	Saturday	51	2	14	7	65
<b>Daily Observed Total</b>							<b>248</b>

09 April	9:00 a.m.	Sunday	22	5	2	2	24
09 April	3:30 p.m.	Sunday	82	8	33	2	115
<b>Daily Observed Total</b>							<b>139</b>

10 April	8:30 a.m.	Monday	4	1	0	0	4
10 April	9:30 a.m.	Monday	15	0	0	0	15
10 April	12:30 p.m.	Monday	69	1	8	0	77
<b>Daily Observed Total</b>							<b>96</b>

14 April	9:30 a.m.	Friday	20	0	2	1	22
14 April	12:30 p.m.	Friday	69	0	18	3	87
<b>Daily Observed Total</b>							<b>109</b>

15 April	9:00 a.m.	Saturday	41	7	6	1	47
15 April	10:30 a.m.	Saturday	66	5	18	3	84
15 April	1:00 p.m.	Saturday	84	4	34	4	118
15 April	2:30 p.m.	Saturday	76	4	46	8	122
15 April	4:15 p.m.	Saturday	58	4	22	3	80
<b>Daily Observed Total</b>							<b>451</b>

16 April	9:00 a.m.	Sunday	23	2	5	2	28
16 April	11:00 a.m.	Sunday	75	10	20	2	95
16 April	12:40 p.m.	Sunday	75	7	38	5	113
16 April	2:45 p.m.	Sunday	73	10	32	5	105
16 April	4:40 p.m.	Sunday	50	9	18	4	68

Daily Observed Total 409

17 April	11:00 a.m.	Monday	71	8	22	3	93
17 April	1:00 p.m.	Monday	84	7	38	4	122
17 April	3:00 p.m.	Monday	75	8	26	4	101
17 April	5:00 p.m.	Monday	41	7	15	2	56
<b>Daily Observed Total</b>							<b>372</b>

18 April	10:10 a.m.	Tuesday	67	5	6	0	73
18 April	4:20 p.m.	Tuesday	53	3	21	1	74
<b>Daily Observed Total</b>							<b>147</b>

22 April	8:45 a.m.	Saturday	24	7	0	0	24
22 April	4:00 p.m.	Saturday	71	15	30	2	101
<b>Daily Observed Total</b>							<b>125</b>

23 April	10:45 a.m.	Sunday	70	12	23	1	93
23 April	12:45 p.m.	Sunday	79	11	36	1	115
23 April	2:40 p.m.	Sunday	65	14	30	4	95
<b>Daily Observed Total</b>							<b>303</b>

29 April	8:50 a.m.	Saturday	36	5	0	0	36
29 April	9:45 a.m.	Saturday	48	5	6	3	54
29 April	1:30 p.m.	Saturday	72	9	31	4	103
29 April	2:40 p.m.	Saturday	69	13	26	5	95
29 April	4:50 p.m.	Saturday	47	7	12	1	59
<b>Daily Observed Total</b>							<b>347</b>

30 April	8:50 a.m.	Sunday	30	4	0	0	30
30 April	11:45 a.m.	Sunday	69	5	2	2	71
30 April	1:45 p.m.	Sunday	71	7	36	1	107
30 April	5:00 p.m.	Sunday	56	3	16	0	72
<b>Daily Observed Total</b>							<b>280</b>

Total Number of Cars Thought to be Local	Percentage of Visitors Thought to be Local
14	63.64%
10	20.00%
5	20.00%
6	22.22%
<b>35</b>	<b>28.23%</b>
4	6.78%
5	6.67%
2	9.09%
<b>11</b>	<b>7.05%</b>
8	14.29%
2	16.67%
12	10.43%
9	13.85%
<b>31</b>	<b>12.50%</b>
7	29.17%
10	8.70%
<b>17</b>	<b>12.23%</b>
1	25.00%
0	0.00%
1	1.30%
<b>2</b>	<b>2.08%</b>
1	4.55%
3	3.45%
<b>4</b>	<b>3.67%</b>
8	17.02%
8	9.52%
8	6.78%
12	9.84%
7	8.75%
<b>43</b>	<b>9.53%</b>
4	14.29%
12	12.63%
12	10.62%
15	14.29%
13	19.12%

56	13.69%
----	--------

11	11.83%
11	9.02%
12	11.88%
9	16.07%
43	11.56%

5	6.85%
4	5.41%
9	6.12%

7	29.17%
17	16.83%
24	19.20%

13	13.98%
12	10.43%
18	18.95%
43	14.19%

5	13.89%
8	14.81%
13	12.62%
18	18.95%
8	13.56%
52	14.99%

4	13.33%
7	9.86%
8	7.48%
3	4.17%
22	7.86%

Date	Day	Time	Number of People Seen
14 April	Friday	11:15-11:40 p.m.	23
14 April	Friday	11:40-12:15 p.m.	60
<b>Total # of People Seen</b>			<b>83</b>
<b>Total Time Spent On Trail</b>			11:15 a.m.-12:15 p.m.

Date	Day	Time	Number of People Seen
15 April	Saturday	10:30-11:00 a.m.	50
15 April	Saturday	11:00-11:30 a.m.	23
15 April	Saturday	11:30-12:00 p.m.	36
15 April	Saturday	12:00-12:30 p.m.	27
15 April	Saturday	12:30-1:00 p.m.	22
<b>Total # of People Seen</b>			<b>158</b>
<b>Total Time Spent On Trail</b>			10:30 a.m.-1:00 p.m.

Date	Day	Time	Number of People Seen
18 April	Tuesday	11:00-11:30 a.m.	42
18 April	Tuesday	11:30-12:00 p.m.	20
18 April	Tuesday	1:00-1:30 p.m.	10
18 April	Tuesday	1:30-2:00 p.m.	4
18 April	Tuesday	2:00-2:30 p.m.	29
18 April	Tuesday	2:30-3:00 p.m.	4
18 April	Tuesday	3:00-3:30 p.m.	29
18 April	Tuesday	3:30-4:00 p.m.	23
<b>Total # of People Seen</b>			<b>161</b>
<b>Total Time Spent On Trail</b>			11:00 a.m.-4:00 p.m.

Date	Day	Time	Number of People Seen
22 April	Saturday	11:30-12:00 p.m.	16
22 April	Saturday	12:00-12:30 p.m.	10
22 April	Saturday	2:30 p.m.-3:00 p.m.	17

22 April	Saturday	3:00-3:30 p.m.	21
		<b>Total # of People Seen</b>	<b>64</b>
		<b>Total Time Spent On Trail</b>	10:45 a.m.-3:30 p.m.

Date	Day	Time	Number of People Seen
29 April	Saturday	11:30-12:00 p.m.	41
29 April	Saturday	12:00-12:30 p.m.	16
29 April	Saturday	12:30-1:00 p.m.	26
		<b>Total # of People Seen</b>	<b>83</b>
		<b>Total Time Spent On Trail</b>	10:30 a.m.-1:00 p.m.



# Appendix I



---

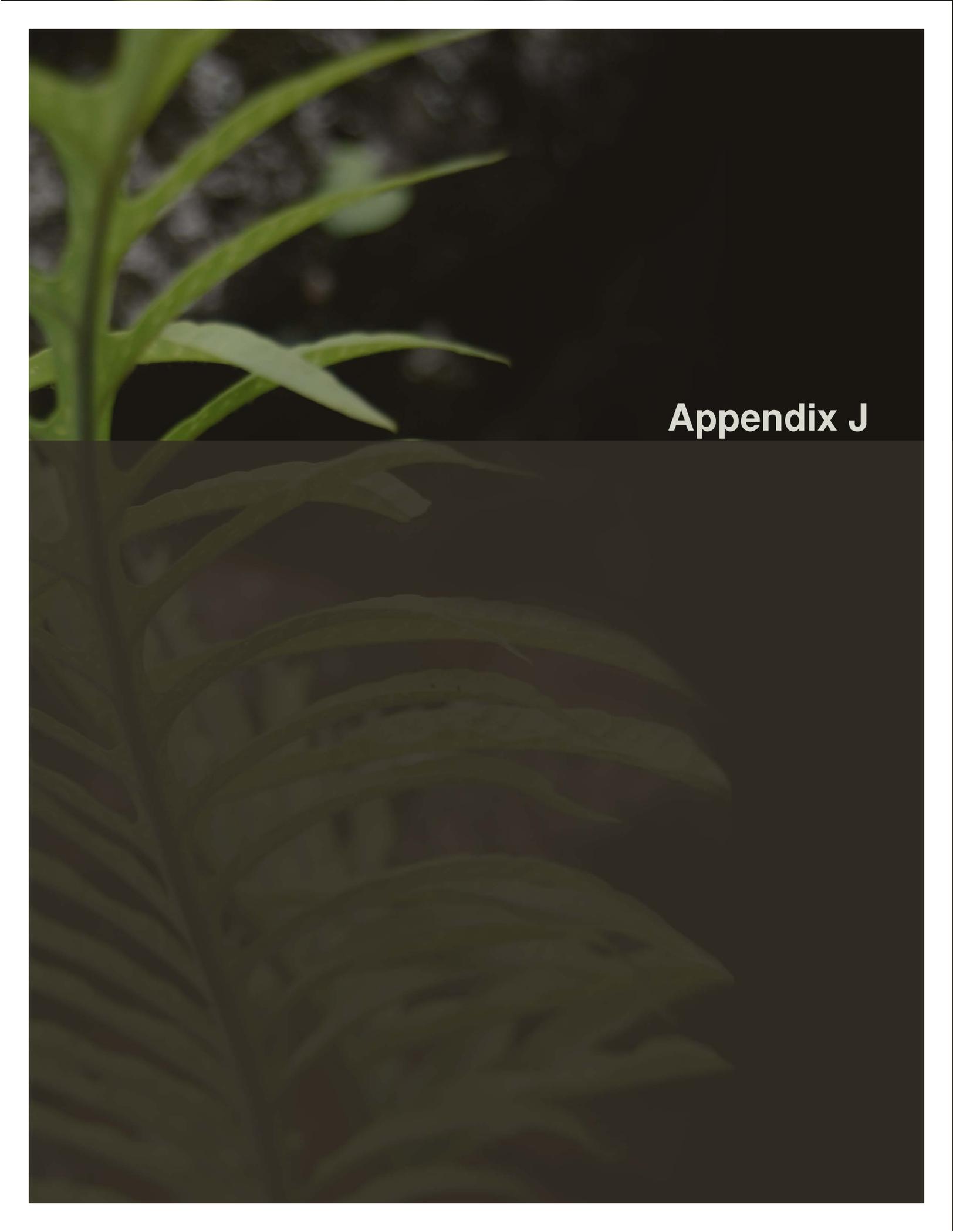
---

**APPENDIX I: OMNITRAK VISITOR SURVEY DATA (HTA 2007)**

2007 STATE PARK	HAENA PARK	
	Resident	Visitor
	28	255
<b>COUNTRY OF RESIDENCY</b>		
Hawai'i	100%	
N. AMERICA (NET)		95%
U.S Mainland		92%
Canada		3%
Japan		1%
Other		5%
<b>PARTY SIZE</b>		
OVERALL MEAN	4.5	4.3
Adults (W/ "0")	3.2	3.5
Adults (W/O "0")	3.2	3.5
Children (W/ "0")	<b>1.3</b>	0.7
Children (W/O "0")	2.6	2.1
<b>NO. OF VISITS</b>		
1	39%	<b>70%</b>
2 to 5	30%	27%
6 to 9	13%	3%
10 to 49	9%	1%
50 to 99	4%	
100+	4%	
Mean	<b>19.1</b>	1.8
<b>PARK VISIT MOTIVATION</b>		
Outing with family/friends	<b>63%</b>	31%
Ocean/water activity	19%	<b>46%</b>
Hike trails/walk	7%	7%
Scenic view	4%	7%
Party/Celebration	4%	0%
Other	4%	1%
See flora/fauna		2%
Event by an orgnization you belong to		1%
Guided tour stop		0%
Use restrooms		0%
Famous landmark		4%
<b>SOURCE OF INFORMATION</b>		
Past personal experience	<b>62%</b>	26%
Advice from friends/relatives	31%	38%
Books/Magazines/Brochures	23%	<b>46%</b>
TV	4%	4%
By chance	4%	3%
Internet		10%
Hotel Concierge/Activiy Desk		10%
Travel agent		0%
Tour company		1%
Newspaper		0%
<b>TRANSPORTATION</b>		
Private Vehicle	<b>69%</b>	42%
Rental car	19%	<b>55%</b>
Walk, on foot	8%	1%
Public bus	4%	1%

Tour bus/van/shuttle		1%
<b>LENGTH OF PARK STAY</b>		
Less than one hour	14%	5%
One to two hours	11%	19%
Two to five hours	50%	55%
Five to ten hours	7%	9%
More than ten hours	4%	1%
Average	5.3	3.6
<b>PARK ACTIVITIES</b>		
Ocean/water recreation	65%	81%
Picnic/Outing	46%	39%
Scenic views/Photograph	42%	<b>71%</b>
Hike/Walk	35%	30%
Use restroom	27%	32%
See park flora/fauna	23%	23%
Visit Historical/cultural site	8%	7%
Other	8%	2%
Camp	4%	0%
Fish/Hunt		1%
<b>OVERALL SATISFACTION</b>		
Average	8.0	<b>8.7</b>
<b>ATTRIBUTE SATISFACTION</b>		
Scenic views	9.4	9.5
Ocean/water experience	8.9	9.2
Flora/fauna	8.0	<b>8.8</b>
Overall experience	8.0	<b>8.7</b>
Hiking experience	7.8	8.7
Historical/cultural site	7.3	8.1
Directional signage	6.7	6.6
Interpretive signs/brochure	6.7	7.3
Security	6.4	6.5
Overall Maintenance	5.7	<b>7.2</b>
Cabins/Campgrounds	5.4	6.2
Restroom facilities	5.4	5.5
Food Concessions	3.9	4.9
Parking	3.5	4.2
<b>IMPORTANCE OF ...</b>		
<b>INTERPRETIVE SIGNS/BROCHURE</b>		
IMPORTANT		33%
Very Important		11%
Somewhat Important		<b>22%</b>
NOT IMPORTANT	<b>100%</b>	67%
Not Too Important		22%
Not Important At All	<b>100%</b>	44%
Average	1.0	2.0
<b>RESTROOM FACILITIES</b>		
IMPORTANT	100%	80%
Very Important		80%
Somewhat Important	100%	
NOT IMPORTANT		20%
Not Too Important		20%
Not Important At All		

Average	3.0	3.6
<b>SECURITY</b>		
IMPORTANT	100%	71%
Very Important		43%
Somewhat Important	100%	<b>29%</b>
NOT IMPORTANT		29%
Not Too Important		14%
Not Important At All		14%
Average	3.0	3.0
<b>DIRECTIONAL SIGNAGE</b>		
IMPORTANT	100%	<b>25%</b>
Very Important	100%	<b>25%</b>
Somewhat Important		
NOT IMPORTANT		75%
Not Too Important		50%
Not Important At All		25%
Average	4.0	2.3
<b>FOOD CONCESSIONS</b>		
IMPORTANT		29%
Very Important		4%
Somewhat Important		25%
NOT IMPORTANT		71%
Not Too Important		29%
Not Important At All		42%
Average	-	1.9
<b>PARKING</b>		
IMPORTANT		100%
Very Important		75%
Somewhat Important		25%
NOT IMPORTANT	100%	
Not Too Important		
Not Important At All	100%	
Average	1.0	<b>3.8</b>
<b>CABINS/CAMPGROUNDS</b>		
IMPORTANT	50%	20%
Very Important		
Somewhat Important	50%	20%
NOT IMPORTANT	50%	80%
Not Too Important		27%
Not Important At All	50%	53%
Average	2.0	1.7



# Appendix J



---

---

## APPENDIX J: OPEN HOUSE QUESTIONNAIRE RESPONSES

### 1. *What are your concerns relative to cultural and archaeological resources at Hā'ena State Park?*

- Hā'ena State Park has the potential to become a working model of community stewardship within Hawaii's State Park system. The rich cultural history of this renowned area and the abundant natural resources of the Limahuli Ahupua'a should be the cornerstone of Hā'ena State Park's vision. Within that vision, Hā'ena State Park needs to evolve into a Hawaiian cultural park that provides benefits to both the local community and park visitors. The cultivation of kalo in the ancient lo'i through community stewardship (and the future rebuilding of the on-site poi mill), would be a tremendous resource for both the local community and visitors; both in food production, the perpetuation of the Hawaiian culture and the instilling of the values of mālama 'āina and mālama pono in our keiki.
- That without sound planning that this precious area will be over run. We tend to run over, the things we love. Ha'ena State Park looks tired and overrun.
- That the park should be accessible to the Hawaiian People and that they should be the ones determining its use and its future. These resources were taken from the Hawaiians, and should be returned to their use intact and in place.
- Tourist trying to access Heiau - seems inappropriate.
- Restoration and preservation of resources is of utmost importance.
- That they are protected and at the forefront of the plans implementation.
- I would like to maintain kama'āina access to the he'eau at Kē'ē Beach. It has become a sacred spot to many of us who live on Kauai although we are not Native Hawaiians
- I am very excited about the Kē'ē Master Plan. This is exactly what this park needs to clean it up and make it accessible to community use. The misuse and neglect of this park needs to stop and we need to make this park something we are proud of. I think the Plan makes good use of avoiding the cultural and archaeological sites while at the same time providing many recreational uses. NO motor vehicles of any kind should be allowed.

### 2. *What are your concerns relative to recreational uses at Hā'ena State Park?*

- The recreational resources of Hā'ena State Park are extremely important to both the local community and visitors. The

---

---

opportunities for locals to fish, swim, surf, windsurf and enjoy the beach are becoming more and more limited as hotels and private estates close off access to these resources around the island. Fishing: the fishing resources are critical to the local community. Access via bikepath, or occasional vehicle access. Bike path: A bike path connecting features of the park was a critically important feature of the 2001 community preferred plan that needs to be included in any future plan. The bike path will be how local fishermen, surfers, windsurfers and families will access the recreational areas. Windsurf access: good windsurfing spots are rare, and one of the best on Kaua'i exists within the park (at Kailionui, commonly known as 'Reefers'). Access via the bike path. Surfing: like windsurfing, the surfing spots in the state park are a valuable resource for the local community and visitors. Windsurfing and surfing offer a healthy, family activity (that we so desperately need in our community). Access via bike path.

- Allowing the historic as well as the new recreational uses to co-exist together and harmoniously. e.g. throw net and sea kayaking. Allow camping in some area of the park, to take pressure off Hā'ena County Beach Park.
- Recreational use should not interfere with the cultural needs, including privacy of the native peoples. There are plenty of places in the world for recreation; this area should be for Hawaiians. There's plenty places other than Hā'ena to play.
- Too much traffic on Kalalau Trails - Permits should be required for Kē'ē-to-Hanakāpī'ai Segment, very little enforcement of existing rules in park by DOCARE.
  - No vehicles on beaches - not even fishermen
- 2) Allow surfing, windsurfing, kite surfing, etc.
- 3) Create a marine preserve sanctuary extending to tunnels. Limited to line-fishing.
- It is important to me that they are SECONDARY to cultural use and actually minimized.
- No Motorcycles, helicopters, or other loud recreational vehicles. Heavy fines for not cleaning up after your dog (or pony).
- I am really excited about how this Plan will open more space for recreational use, especially for the community. For the last 30 years I have camped, fished, surfed, windsurfed, beachcombed, or just enjoyed a sunset walk in this area. I hope to continue to enjoy these recreational resources here and the addition of a bike path around the park is a dream come true. I would like to see an extensive walk/bike path as well as continued access for surfing/windsurfing.

---

---

3. *What are your concerns relative to coastal and marine resources in the nearshore environment adjacent to Hā'ena State Park?*

- The fishing resources should be managed via the community based subsistence fishing rules and the mana'o of the kūpuna of this ahupua'a. The recreation resources (surfing, windsurfing, swimming diving, etc...) are extremely valuable to the community and visitors. Access to these activities should be via the bike path.
- That there is no education in place to inform, instruct for people to respect the resources they are enjoying. No enforcement of rules. I could be wrong, but I believe you are allowed to egress at Kē'ē on a kayak or canoe, but you are not allowed to launch from Kē'ē. If the above is correct, it is never enforced during the summer when kayakers are gaining access from Kē'ē lagoon.
- That they be reserved for and managed by the Hawaiian families of Hā'ena in the original Ahupua'a fashion. This is as it should be.
- Overfishing and heavy fishing pressure by non-local fisherman. Tourist trampling the reef flat from sunup to sundown, 365 days a year - no wonder the reef is dying! Runoff from parking area runs directly onto Kē'ē Beach and into Lagoon - taints water!
- Marine preserve
- That they are protected and actively and sustainably managed in a culturally appropriate manner.
- Heavy fines for walking on the coral and taking of protected species. Native burial sites should be protected. Beach access must be kept open Conservation areas protected from vacation rentals Beach setbacks maintained and strengthened, especially as oceans level rises.
- The Hā'ena State Park is probably the most popular park in the State. Many people come here to swim and snorkel and unfortunately this often leads them onto the reef, one of our most important marine resources. The park service needs to continue to educate locals and visitors alike about the vulnerability of our inshore environment and not walking on the reef. This should include fisherman also. Due to the parks' present isolation, a lot of illegal fishing goes on here. I would not be opposed to a making this area a marine reserve and allowing the marine environment to have more of a chance to make a comeback.

4. *What are your concerns relative to terrestrial (land-based) natural resources found at Hā'ena State Park? This includes but not limited to flora, fauna, native ecosystems, etc.*

- 
- 
- Native plants should be propagated and the area slowly restored to its pre-contact state. The park should have walking paths (and bike paths where possible) with interpretive signs that connect all the features of the park. (ie: visitors should be able to park and then walk safely on a designated path or boardwalk to the cold pond, wet caves and all throughout the park.)
  - Trail maintenance and infrastructure is dismal. No fostering of the native plants.
  - The Hawaiian people of the Hā'ena ahupua'a should have total access, including to the uplands of Limahuli, for gathering and hunting, and should be the overseers of the area.
  - Native plants are being replaced by non-native plants, especially invasive species. Water resources being degraded due to poor drainage infrastructure.
  - Maintenance of watershed and good drainage
  - Protect, preserve and reinvigorate them. Make them the center and forefront of the plan.
  - Unfortunately, the park has already been inundated by invasive species over the past 50 years so not many indigenous plants still exist here. Any native ecosystems need to be clearly marked so as not to be disturbed by trampling feet. If done correctly, this can also be very educational with possible reforestation of the park with more native plants.

5. *What are your concerns relative to traffic and parking at Hā'ena State Park?*

- Parking and traffic are one of the main issues that the vision of the park needs to address. Traffic and parking are of primary concern to the local community, who feel that the number of cars must be limited. The 108 parking stalls included in the 2001 community preferred master plan are the right number for the park. What needs to be addressed is the problem of overflow. The plan needs to insure that overflow parking does not back-up along the road, causing safety issues and encroaching into the community. Right now, when the parking lot fills up, rental cars will park all along the side of the road, sometimes well past the entrance to the park, effectively making it a one-lane road and creating traffic jams and dangerous situations. (If a shuttle system is implemented in the future, it is critical that the parking for the shuttle not be located in Hā'ena. Any shuttle system in the future must originate in Princeville or Hanalei where it would help to reduce traffic on all the one-lane bridges and the tight, winding road to Hā'ena. It makes no sense to have visitors drive all the way to Hā'ena to park and get on a

---

---

shuttle. Also, no one wants to see more of Hā'ena's rural pastureland paved over for a parking lot.)

- Traffic is overwhelming the resource. On a busy summer day, parking is overflowing all the way to Limahuli and see it one day making it serpentine way all the way to Hā'ena Cty. Beach Park.
- There should be no parking further than the Blue Room and no driving on the beach with any vehicle.
- Too much traffic, not enough parking. Needs to be gate at park entrance and system for only admitting cars when parking is available. Parking needs to be limited on the supply end though and not always expanded to meet demand!
  - 1) More/better parking is needed
  - 2) Charge for parking
  - 3) Charge for park use
- It is bad. A very difficult situation. The plan addresses it well. Minimize driving and parking in the park.
- I think that the traffic situation at Ke'e Beach and Tunnels Beach is appalling. I believe that auto traffic for non residents past Princeville should be limited to Small Bus and/or jitney service, with a parking lot somewhere in the Princeville area. The costs could be borne by the charges for transportation. Hanalei would become a center for walking and biking and many would bike to Kē'e Beach. Bike rental in Hanalei would flourish. Construction vehicles could pay a tariff to go beyond Princeville. The plan would create many jobs as well.
- Traffic and parking are probably my biggest concern. The Master Plan makes a good attempt at keeping the cars all in one parking area and keeping access to the park by foot or bike. My only concern is that this will not be ample parking. We may need to look into an additional parking/shuttle option for those extremely busy summer days. Or maybe, once the parking is full, the park is closed to cars. I think a charge for parking might be appropriate.

6. *What are your concerns relative to Hā'ena State Park facilities and signage?*

- Interpretive signs should be included along the walking and bike paths. A permit station should be located at the start of the Nāpali Coast Trail to allow on-site camping permits for Nāpali State Park.
- Not enough signage to inform, instruct and educate the visitor
- Lack of facilities in general, very little signage at trailhead. What about signs urging people to respect the culture and respect the locals?? Facilities need improvements, especially parking. Road

- 
- 
- needs shoulders or walkway alongside for safety. Cellphone coverage?
- Signs should be kept to a minimum as well as facilities
  - That they be culturally appropriate, visually appealing in keeping with the natural surroundings and green (sustainable technology)
  - I want to keep Hā'ena State Park as undeveloped as humanely possible; minimal signage, minimal construction. However, for sanitary reasons, the bathroom facilities must be of the highest quality and well maintained.
  - I think the present facilities are totally inadequate to meet the needs of so many users. The addition of another comfort station next to parking lot is very necessary in my opinion. This is the most popular park in the State and we need to address keeping it sanitarily clean.

7. *What are your concerns relative to natural hazards at Hā'ena State Park?*

- The main natural hazard in the Hā'ena State Park is the ocean, especially in winter. Signage should pull no punches with regards to how dangerous the ocean is. Now that there is a lifeguard station at Kē'ē, much of the natural hazard dangers have been addressed.
- Swimmers, snorkelers and kayakers leaving the protection of Kē'ē lagoon without knowing the hazards of the open ocean.
- They should be left as natural as how they were found by the invaders
- No tsunami signs. Rockfall hazards are natural - just need to warn of them
- Removal of non-native invasive plants along shoreline to restore natural dune ecosystem
- Be ready for the tsunami in locating facilities
- I believe that paths can be upgraded without major construction and that small signs can be posted where there is danger, but we cannot make Hā'ena State Park safe and accessible to everyone or it will lose its essential quality. There is no way to prevent foolish people from doing stupid acts and it is counterproductive to try.
- The road from the Helipad to the wet cave is right along the lower cliff of Makana. It is just amazing more rocks haven't fallen from here. This maybe something that has to be addressed with some kind of netting to protect people below.

8. *Do you have suggestions as to how to address any or all of the concerns that you identified above?*

- 
- Look closely at the 2001 Community Preferred Master Plan for answers and listen to the community: we are the ones who have lived here for generations and know where the problems and the solutions lie.
  - Start charging admission for cars and for parking Offer a "years pass", where a discount is figured in for frequent patrons. Charge a token price for folks venturing on the trail Monies collected should not go into General Fund, but target to project to maintain the park, trails, bathrooms, etc. We have the wonderful role model of Limahuli nearby, to use as a template. Having life guards or ranger screening sea kayakers departing Ke'e. Making sure they have camping permits, safety gear, e.g. life preservers, bilge pumps, etc. Gift shop and interpretative center manned by the old house site at Ke'e. Should be self sustaining. Shuttle buses from present parking area or other off park location.
  - GIVE THE LAND BACK TO THE HAWAIIAN COMMUNITY
  - Master planning Talking to the community, especially the local community!
  - The plan [2001 Community Preferred Master Plan] looks good
  - Mostly keep hands off. Avoid thinking in terms of creating a commodity at Hā'ena. We have one of the most spectacular sites in the world and developing it would be akin to taming the lions and tigers in Africa so they stop eating the tourists.
  - I feel that the Master Plan does a pretty good job at addressing most concerns. I am most adamant about keeping this park accessible to the community. For the people in Ha'ena, this is one of our most valuable recreational resources. I would be overjoyed to someday be able to ride bikes with my wife and son around the park and not the worry of being run down trying to ride on the road.

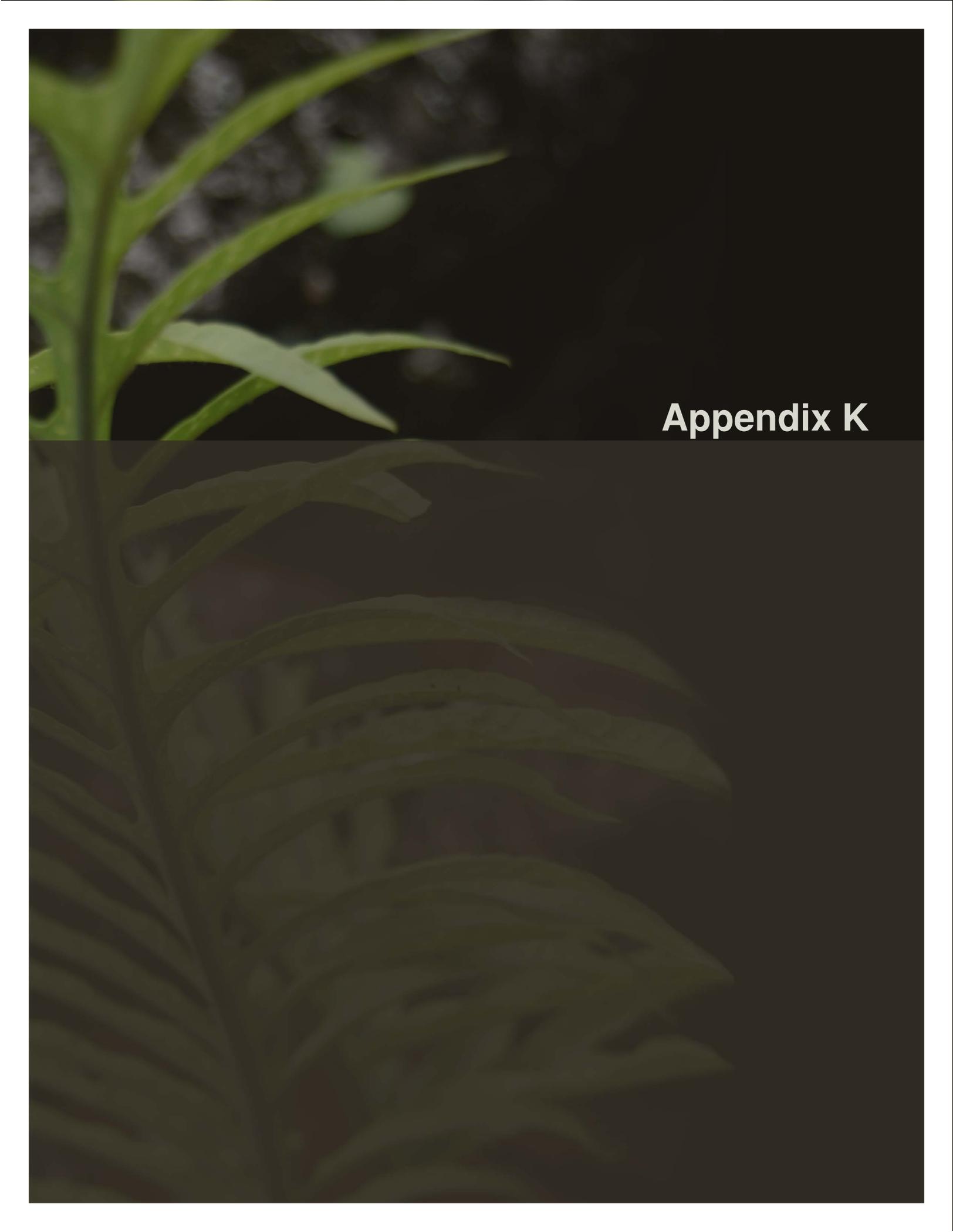
**9. *Additional comments/suggestions***

- Mahalo for the opportunity to voice my mana'o.
- We could look at the Kilauea Lighthouse as a template for ideas of how they made it a reality.
- The United States STOLE this land, and things won't be right until it is returned.
- Footpath throughout park.
- See attached map.
- Help the local boyz with lo'i restoration. They work hard but can't work for free.
- I think the information should present a living culture rather than an "ancient civilization."

- 
- 
- I like the bike path and the interpretive signage hopefully some can focus on proper snorkeling activities.
  - Dredge the fishpond and reconnect the makaha and stream flow. Stock and operate(?) for moi, awa(?), aholehole production.
  - State plantings should be limited to the following: niu, uala, kalo, milo, akulikuli, 'ae'ae, kukui kou, olona, makaloa, wauke, mai'a, ko, ilima, pohina, pohuehue, naupaka, coastal native plants.
  - Add planned and proposed constructed wetlands to comfort station sites. Electric shuttle bus based at first parking lot powered by microhydro generator.
  - I am sorry that I am unable to assist. I have just completed an exhaustive community effort and am going to rest. However there are many whose assistance you can enroll and in doing so will gather the wisdom and experience of what is best for this Island. Contact the Sierra Club, Mālama Kauai and 1000 Friends of Kauai for starters. Mahalo for your interest.
  - I see the Plan also includes a caretaker cottage and base yard. I agree there inclusion is necessary. I also might suggest that care of the park be 'privatized' to spark a little more enthusiasm and pride in the caretaking of this beautiful area. The possible addition of a park gate that is closed after sunset to all vehicles may also help to avoiding misuse. Possibly have a check-in/registration site for Na Pali Coast Camping permits, this may help to keep away illegal camping abuse of Kalalau Valley. Restoration of the Poi Mill would add to the history and continued stewardship of the surrounding lo'i would help to enhance the cultural feeling.

**APPENDIX K: COMMUNITY MARK-UPS OF 2001 COMMUNITY  
PREFERRED MASTER PLAN**

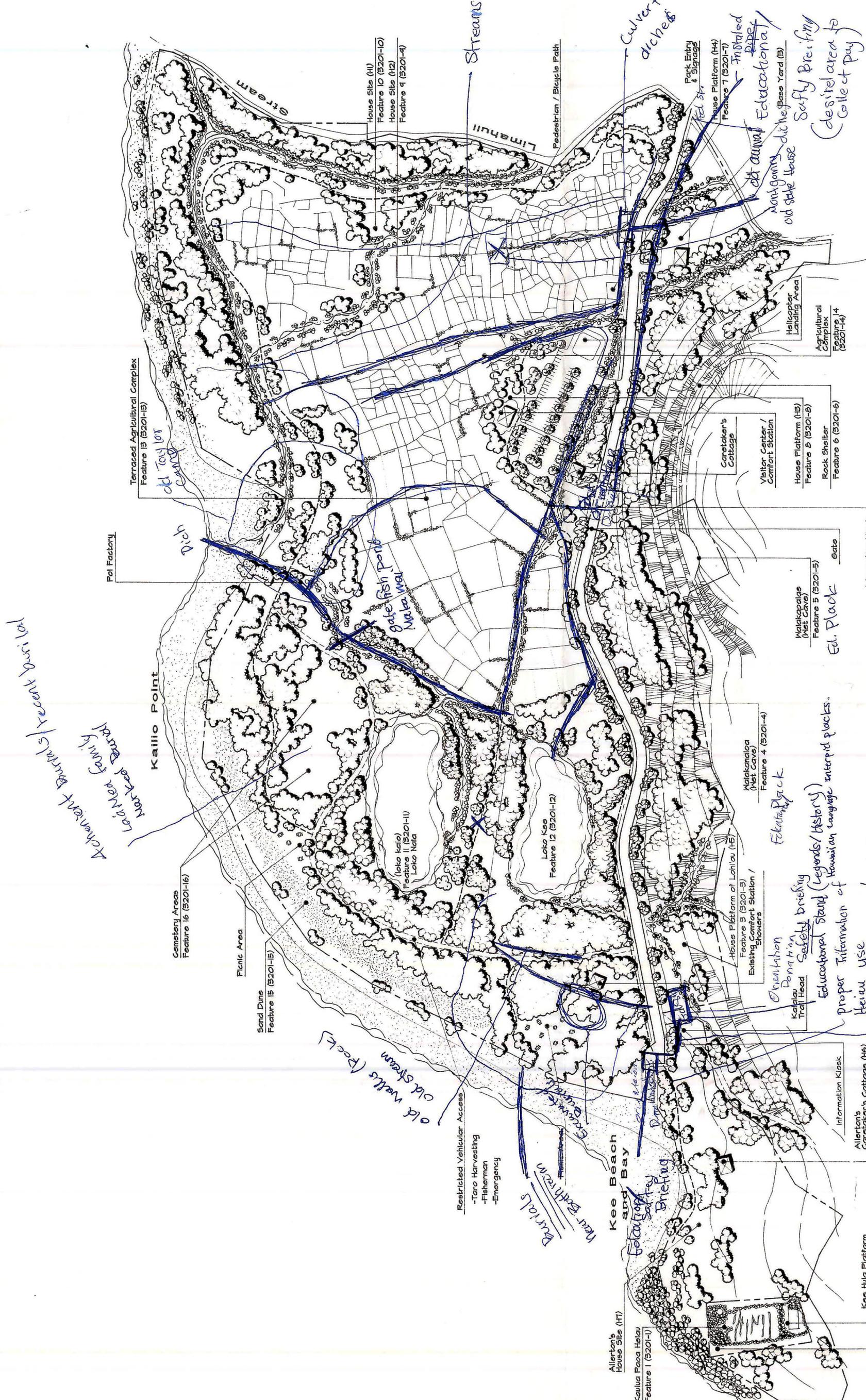




# Appendix K



Adjacent Burials / recent burials lot  
 Lohiwa Family  
 Marked burial



Streams  
 Culvert ditches  
 Pedestrian / Bicycle Path  
 House Site (H1)  
 Feature 10 (S201-10)  
 House Site (H2)  
 Feature 9 (S201-4)  
 Park Entry & Signage  
 House Platform (H4)  
 Feature 7 (S201-7)  
 Installed  
 Educational  
 old animal  
 north-south  
 old state house  
 Safe Briefing  
 (desire area to collect pay)

Terraced Agricultural Complex  
 Feature 13 (S201-13)  
 old toy lot  
 Pol Factory  
 Gate fish pond  
 Naha Naha  
 Caretaker's Cottage  
 Visitor Center / Comfort Station  
 House Platform (H5)  
 Feature 8 (S201-8)  
 Rock Shelter  
 Feature 6 (S201-6)  
 Helicopter Landing Area  
 Agricultural Complex  
 Feature 14 (S201-14)

Kaliio Point  
 Picnic Area  
 Sand Dune  
 Feature 15 (S201-15)  
 Cemetery Areas  
 Feature 16 (S201-16)  
 Loko Koo  
 Feature 12 (S201-12)  
 Loko Koo (Loko Koo)  
 Feature 11 (S201-11)  
 Loko Naha  
 Malakamaloo (Net Cave)  
 Feature 4 (S201-4)  
 Education  
 Education  
 House Platform of Lohiwa (H5)  
 Feature 3 (S201-3)  
 Existing Comfort Station / Showers  
 Kalalau Trail Head  
 Safety briefing  
 Educational Stand (Legends/History)  
 proper information of Hawaiian language interpreted placards.  
 Heiau Use  
 Heiau practitioners / Cultural practitioners  
 Kalalau Trail Head  
 Safety Briefing / Education Information  
 Donation Box  
 Information Kiosk  
 Ed. Plank  
 Eato

Restricted Vehicular Access  
 -Taro Harvesting  
 -Fisherman  
 -Emergency  
 Burials  
 Kee Beach and Bay  
 Kee Hula Platform  
 Feature 2 (S201-2)  
 Killas, Pohaku Piko  
 Allerton's Caretaker's Cottage (H6)  
 Information Kiosk  
 Allerton's Caretaker's Cottage (H6)

Allerton's House Site (H7)  
 Feature 1 (S201-1)  
 Kavua Paoo Heiau  
 Kee Hula Platform  
 Feature 2 (S201-2)  
 Killas, Pohaku Piko

**MASTERS PLAN**  
**HAENA STATE PARK**  
 HAENA, KAUAI, HAWAII

**COMMUNITY PREFERRED**

Education Information  
 Safety Briefing / Education Information  
 Donation Box

**THE KEITH COMPANIES**  
 Hawaii Division  
 4474 Rice Street, #202, Lihue, Kauai, HI 96766



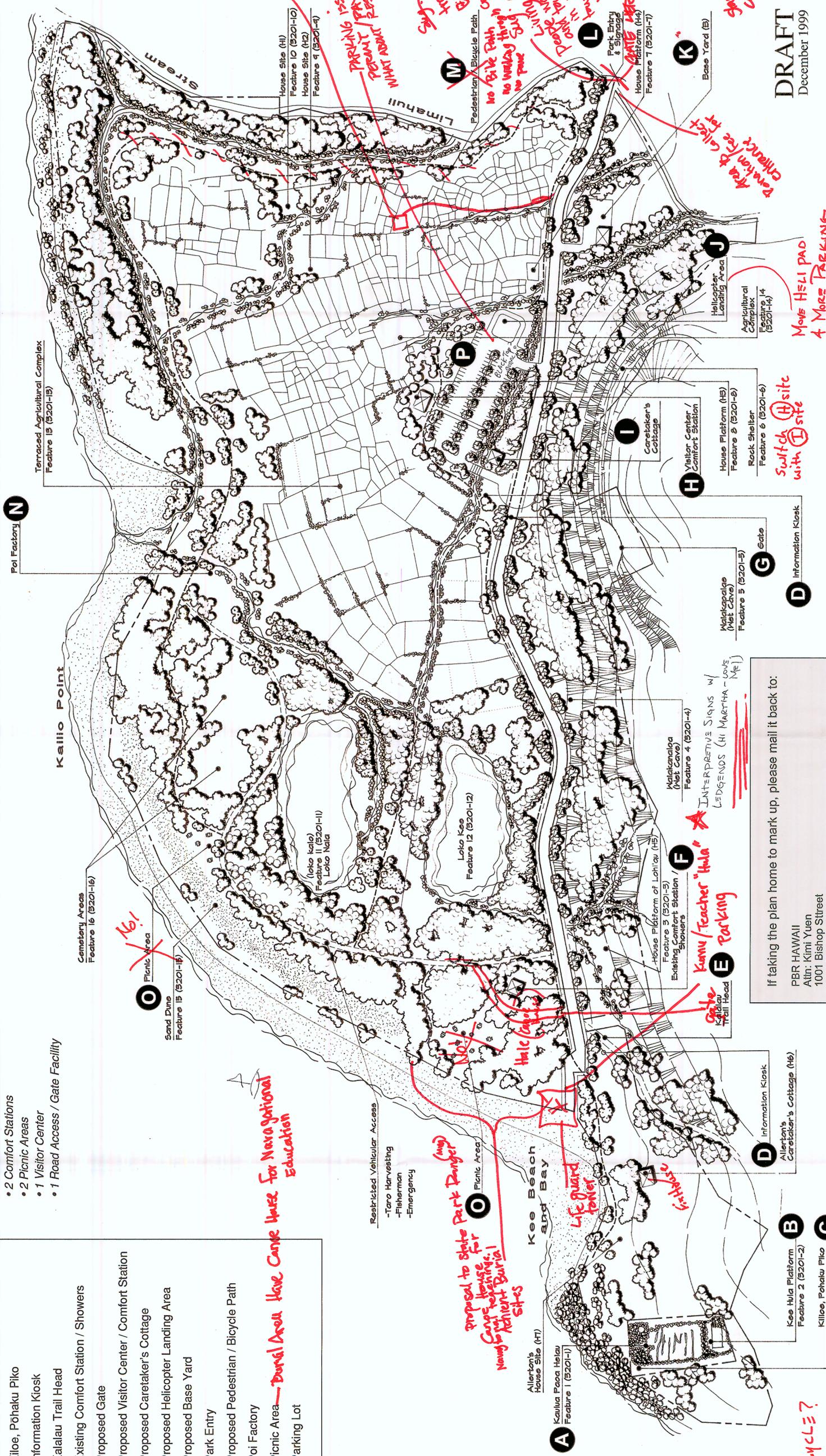
Ka'imi Heimosura  
 Aha Forest

192408  
KA'IMI  
ATTIA  
MEHANA

PLEASE FEEL FREE TO MARK UP THE PLAN & PROVIDE COMMENTS:

- 1999 VERSION OF THE COMMUNITY PREFERRED MASTER PLAN**
- A** Ka Ulu a Paoa Heiau
  - B** Ke'e Hula Platform - Ke Ahu a Laka
  - C** Kiloe, Pohaku Piko
  - D** Information Kiosk
  - E** Kalalau Trail Head
  - F** Existing Comfort Station / Showers
  - G** Proposed Gate
  - H** Proposed Visitor Center / Comfort Station
  - I** Proposed Caretaker's Cottage
  - J** Proposed Helicopter Landing Area
  - K** Proposed Base Yard
  - L** Park Entry
  - M** Proposed Pedestrian / Bicycle Path
  - N** Poi Factory
  - O** Picnic Area - *Daniel Aron have Camp here for Navigational Education*
  - P** Parking Lot

- PLAN HIGHLIGHTS**
- 108 Parking Stalls
  - 1,050 Feet of Public Roads
  - 7,300 Feet of Public Paths
  - 2,700 Feet of Restricted Access
  - 2 Comfort Stations
  - 2 Picnic Areas
  - 1 Visitor Center
  - 1 Road Access / Gate Facility



If taking the plan home to mark up, please mail it back to:

PBR HAWAII  
Attn: Kimi Yuen  
1001 Bishop Street  
ASB Tower, Suite 650  
Honolulu, HI 96813

Or you can drop it off at the Visitor's Center at Limahuli Gardens

**COMMUNITY PREFERRED MASTER PLAN**  
**HAENA STATE PARK**  
HAENA, KAUAI, HAWAII

**DRAFT**  
December 1999

60431000  
Date: 6/1/96

More info on Cultural (S) area  
No like  
no like over the  
Idea: base  
Keep with  
Aunani Center