

CHAPTER 6: ISLAND CONSERVATION NEEDS

Moving from a statewide perspective to an island region perspective, Chapter 6 addresses individual islands with regard to native wildlife and habitat priorities and strategies. Each island discussion will provide an overview section, identify habitats and species of importance, summarize key threats of particular importance to the island, outline island strategies linked with the seven statewide objectives, identify plans and tools to aid management, and finally, discuss existing management actions and highlight potential new areas for increased conservation management. The Northwestern Hawaiian Islands (NWHI), also included in this chapter, will be treated as an entire region and follow a similar format for discussion. This chapter addresses elements 1-5 at the island level.

KAUA‘I

Kaua‘i is the northernmost and oldest of the eight Main Hawaiian Islands (MHI) and is characterized by deep eroded canyons and valleys and steep cliffs. There is a wide diversity of unique natural communities, from montane bogs, montane wet forest, lowland mesic forest, lava tube caves, long stretches of sandy beach, and many streams and rivers. Because of the age of the island and its relative isolation, levels of endemism are higher on Kaua‘i than elsewhere in the State. Hurricanes Iwa (1982) and Iniki (1992) damaged forest cover and encouraged the spread and establishment of introduced invasive weeds. As the only island where the mongoose (*Herpestes auropunctatus*) has not become established, Kaua‘i hosts greater populations of several ground-nesting birds than other islands.

OVERVIEW

Geology and Hydrology

Most of the island was formed from the eruptions of a single shield volcano between 3.6 million and 5.6 million years ago. Since that time, rain, streams, and waves have eroded the 143,226 hectares (353,920 acres) island, creating steep sea cliffs, deep canyons and valleys that extend from the interior of the island to the coast, a mountainous interior, and a broad coastal plain with deep soil and extensive beaches. Approximately 35 percent of the island is below 150 meters (500 feet) in elevation, and approximately 24 percent is above 610 meters (2,000 feet) in elevation. Kaua‘i has 61 perennial streams, 45 of which are continuous. Wailua and Hanalei have the largest discharges, 200 and 140 million gallons per day (mgd), respectively. Kaua‘i also has three offshore islets.

Climate

Elevation ranges from sea level to 1,598 meters (5,243 feet). Kaua‘i is directly exposed to the prevailing tradewinds that deliver rain, conditions which make Mount Wai‘ale‘ale one of the wettest spots on earth, with an average 1,120 centimeters (444 inches) of rainfall per year. However, not all the island is wet: average rainfall in Kekaha on the leeward side is only 52 centimeters (20 inches) per year.

Land and Water Use

Approximately 38 percent of the island remains dominated by native vegetation, and approximately 15 percent of the island has been designated as critical habitat for Kaua‘i plants.

More than half the island (56% or 156,619 acres) is located in the State Conservation District, approximately 40 percent is in the State Agricultural (128,839 acres) or State Rural District (1,253 acres), and the remaining is in the State Urban District (100,730 acres). Twenty-five streams are diverted and 12 have altered channels. Kaua‘i has 11 impaired streams under the Environmental Protection Agency (EPA) Clean Water Act standards. The Wailua canal system is the largest man-made stream system. Waita Reservoir is a significant man-made lake that is seven meters (23 feet) deep and 171 hectares (424 acres) in size.

Human Landscape

In 2003, the County of Kaua‘i had a population of nearly 61,000 residents. The total County population amounted to almost five percent of the State population, the smallest of the four counties. Most residents live in towns around the perimeter of the island, primarily along the east and south sides of Kaua‘i, with smaller populations living in towns on the north shore. The principal economic driving forces are tourism, agriculture, and defense expenditures. Tourism counts declined during the 1990s, due largely to the destruction caused by Hurricane Iniki in 1992, but visitor numbers have since increased, with Kaua‘i hosting nearly one million visitors in 2003. Visitor accommodations are located throughout the island, but are primarily at Poipu, Princeville, and Waimea/Kapaa. Agriculture has shifted recently from primarily sugarcane, with the closure of four of five plantations, to diversified agriculture and aquaculture. Defense expenditures stem from the Pacific Missile Range Facility, located in the southwest corner of the island.

SPECIES AND HABITATS OF IMPORTANCE

Habitats on Kaua‘i are composed of montane wet communities, montane mesic communities, lowland wet communities, lowland mesic communities, lowland dry communities, and coastal communities, resulting in a diverse range of natural vegetation. While just over one-third of the island remains dominated by native vegetation, many native-dominated areas contain smaller pockets of non-native invasive species that became established following Hurricanes Iwa and Iniki. The island has a network of perennial and intermittent streams and several rivers. Unique habitat types and major associated landscapes for wildlife include the montane bogs located in the Alaka‘i Wilderness Preserve, montane wet forest, lowland mesic forest, lava tube caves, steep sea cliffs, wetlands, coastal zones, and long stretches of mountain streams. Two offshore islands, Lehua and Kaula, are particularly important for nesting seabirds. In addition, 21,266 hectares (52,549 acres) have been designated as critical habitat for 83 endangered plants on Kaua‘i. Partially overlapping with the plant critical habitat designation are the 110 hectares (272 acres) designated for the Kaua‘i cave wolf spider (*Adelocosa anops*) and Kaua‘i cave amphipod (*Spelaeorchestia koloana*) and the 20 kilometers (12 miles) of stream segments and 1,812 hectares (4,479 acres) of adjacent riparian area designated as critical habitat for the Newcomb’s snail (*Erinna newcombi*). Recovery habitat has been identified for the puaiohi (*Myadestes palmeri*), ‘akikiki (*Oreomystis bairdi* [Kaua‘i creeper]), and the presumed extinct Kaua‘i ‘akialoa (*Hemignathus procerus*), Kaua‘i nuku pu‘u (*Hemignathus lucidus hanapepe*), Kaua‘i ‘ō‘ō (*Moho braccatus* [‘ō‘ō ‘ā‘ā]), kāma‘o (*Myadestes myadestinus* [large Kaua‘i thrush]), and ‘ō‘ū (*Psittirostra psittacea*). Three offshore islands support more than 15 species of breeding seabirds, including the largest ‘ā (*Sula leucogaster* [brown booby]) colony in the State.

Appendix A provides information on what wildlife Species of Greatest Conservation Need are present on Kaua‘i and its associated offshore islands. Species endemic to Kaua‘i include the

puaiohi, ‘akikiki (Kaua‘i creeper), ‘anianiau (*Hemignathus parvus* [lesser ‘amakihi]), ‘akeke‘e (*Loxops caeruleirostris* [Kaua‘i ‘ākepa]), Newcomb’s snail, the Kaua‘i cave wolf spider, and the Kaua‘i cave amphipod. Other forest birds include the ‘i‘iwi (*Vestiaria coccinea*), ‘apapane (*Himatione sanguinea*), and Kaua‘i ‘elepaio (*Chasiempis sandwichensis sclateri*). Waterbirds and migratory shorebirds utilize remnant wetlands, with 80 percent of the State’s koloa maoli (*Anas wyvilliana* [Hawaiian duck]) population, and 50 percent of the State’s nēnē (*Branta sandvicensis* [Hawaiian goose]) population found on Kaua‘i. Two Hawaiian endemic seabirds, the ‘a‘o (*Puffinus auricularis newelli* [Newell’s shearwater]) and ‘ua‘u (*Pterodroma sandwichensis* [Hawaiian petrel]), and the ‘akē‘akē (*Oceanodroma castro* [band-rumped storm-petrel]) are believed to nest on upper elevation sea cliffs. Kaua‘i is also home to a diverse number of terrestrial invertebrates, most of which have been poorly studied. Notable invertebrates include several endemic species of native bees in the genus *Hylaeus* and of native damselflies in the genus *Megalagrion*. In addition, diversity within most families of beetles (Coleoptera) is among the highest in the State. In recent years, the number of ‘ilio-holo-i-ka-uaua, or Hawaiian monk seals (*Monachus schauinslandi*), basking on Kauai’s beaches has increased. Finally, Kaua‘i is believed to have historically supported populations of the endangered Blackburn’s sphinx moth (*Manduca blackburni*).

SUMMARY OF KEY THREATS TO SPECIES AND HABITATS

Many general threats to native wildlife are discussed in Chapter 4 (Statewide Conservation Needs) and Chapter 5 (Marine Conservation Needs). Threats more acute or specific to Kaua‘i are listed below.

- Populations of feral pigs (*Sus scrofa*) and goats (*Capra hircus*) that distribute introduced invasive plants (such as strawberry guava [*Psidium cattleianum*]) and eat, trample, or uproot native plants, degrading habitat, contributing to soil erosion, and impairing stream quality;
- Habitat-modifying invasive plants, including kāhili ginger (*Hedychium gardnerianum*), Australian tree fern (*Sphaeropteris cooperi*), and strawberry guava;
- Populations of feral cats (*Felis silvestris*) that kill waterbirds and ground-nesting seabirds;
- Introduced smallmouth bass, a predatory fish that eat a number of native stream fishes and invertebrates and may also compete with some of them;
- Potential introduction of non-established pests, such as the mongoose;
- Restricted mosquito-free habitat, making Kauai’s forest birds highly vulnerable to habitat degradation;
- Stream diversions, dams, or channelizations;
- Insufficient in-stream flows to insure the biological integrity of many stream systems;
- Development of formerly undeveloped areas and increased urbanization leading to loss and degradation of terrestrial, freshwater, and marine habitat (e.g., increased nutrients in coastal areas leads to non-native algal blooms which affect fish populations and coral habitats, sedimentation from development near stream corridors);
- Hybridization between koloa maoli (Hawaiian duck) and introduced mallards;
- Limited information on genetically modified organisms (GMO) research by private agricultural engineering firms on State and private lands and the possible interaction of GMOs with native wildlife;
- Recreational overuse in some areas along the Nā Pali Coast and in the Po‘ipū area;

- Human interactions with monk seals which are much more common off Kaua‘i than off the other Main Hawaiian Islands.

ISLAND STRATEGIES

In addition to the statewide strategies identified in association with the seven conservation objectives in Chapter 4 (Statewide Conservation Needs) (main bullet), additional island-specific strategies for Kaua‘i include the following (sub-bullet):

- Maintain, protect, manage, and restore native species and habitats in sufficient quantity and quality to allow native species to thrive.
 - Support existing conservation management and implement future needs as identified below in ‘Management Needs’ section;
 - Implement conservation actions identified in the ‘Potential Areas for Enhanced Conservation Management’ subsection;
 - Develop and/or implement recovery plans for threatened and endangered species on Kaua‘i;
 - Protect remaining lava tube and cave habitats;
 - Increase active management in, or acquisition of, extremely rare habitats on Kaua‘i;
 - Increase the total acreage of ungulate-free and predator-free areas;
 - Implement fire suppression measures and protocols for post-fire restoration;
 - Decrease in number of stream diversions and channelized streams;
 - Work with Commission on Water Resource Management to ensure net increase in number of streams with biological integrity and Instream Flow Standards sufficient to sustain viable native fish and invertebrate populations;
 - Collaborate in efforts to reduce pollution threats from recreational boats and cruise ships;
 - Develop management plans for all Marine Managed Areas;
 - Support the Local Action Strategies project to deal with non-point source pollution in Hanalei Bay and support expansion of successful methods to other areas.
- Combat invasive species through a three-tiered approach combining prevention and interdiction, early detection and rapid response, and ongoing control or eradication.
 - Improve early detection and rapid response capacity for species not yet established in the islands (e.g., brown treesnake, West Nile virus, Argentine fire ant) or present in the MHI but not yet established on Kaua‘i (e.g., mongooses);
 - Increase efforts to prevent establishment of priority invasive plants in pristine areas (e.g., kāhili ginger, Australian tree fern) and to eradicate from areas with recovery potential;
 - Decrease in the overall number of streams negatively impacted by invasive species;
 - Support efforts to strengthen marine alien species prevention and control.
- Develop and implement programs to obtain, manage, and disseminate information needed to guide conservation management and recovery programs.
 - Improve dissemination of research and data regarding native species populations and habitat condition;
 - Conduct surveys and inventories for invertebrates in currently managed areas;

- Assess impact of eco-tourism activities on terrestrial and aquatic native wildlife and associated habitats.
- Strengthen existing and create new partnerships and cooperative efforts.
 - Continue implementation of the successful Save Our Shearwaters (SOS) program and complete and implement the SOS Procedures Plan;
 - Continue development of an island-wide Habitat Conservation Plan (HCP) addressing the take of seabirds on Kaua‘i;
 - Expand partnership with hunting community to reduce ungulate population;
 - Collaborate with NOAA to ensure the protection of marine mammal populations.
- Expand and strengthen outreach and education to improve understanding of our native wildlife resources among the people of Hawai‘i.
 - Maintain existing outreach and educational programs at managed conservation areas;
 - Improve conservation education of visitors and the tourism industry on the appropriate use of natural areas, particularly sensitive habitats and areas.
- Support policy changes aimed at improving and protecting native species and habitats.
 - Organize an interagency working group to develop vision and policy analysis for stream conservation actions;
 - Assess ways to support increased enforcement capacities, including cross-deputization between agencies;
 - Evaluate all current Marine Managed Areas for purpose and management effectiveness and consider need for new Marine Managed Areas;
 - Improve integration of policies to address linkages between terrestrial and marine habitats and their shared conservation threats and needs.

PLANS AND TOOLS TO AID MANAGEMENT

Management plans and tools exist to address some of the threats listed in the Summary of Key Threats to Species and Habitats section and include the following:

- Species Conservation Plans prepared by the USFWS, including the Regional Seabird Conservation Plan (2005), U.S. Pacific Islands Regional Shorebird Conservation Plan (2004), the Draft Revised Recovery Plan for the Nēnē (Hawaiian goose) (2004), the Draft Recovery Plan for the Kaua‘i Cave Arthropods (2004), the Draft Recovery Plan for the Newcomb’s Snail (2004), the Draft Revised Recovery Plan for Hawaiian Forest Birds (2003), the Hawaiian Endangered Bird Partnership for Captive Propagation Five Year Workplan (2002), the Draft Revised Recovery Plan for Hawaiian waterbirds (1999), and the Recovery Plan for the Hawaiian Hoary Bat (1998);
- Critical habitat designations by the USFWS for the Kaua‘i cave arthropods, for Newcomb’s snail, and for threatened and endangered plants on Kaua‘i.
- Management Plans for the State Natural Area Reserves (NAR): Kuia NAR (1989) and Hono o Na Pali NAR (1989);
- The Division of Forestry and Wildlife’s (DOFAW) Draft Management Guidelines, which coarsely rate vegetation quality and provide guidelines for land use (public hunting, recreation, and forest products) for State lands managed by DOFAW;
- The Kaua‘i Watershed Alliance Management Plan (2005);
- The National Tropical Botanical Gardens (NTBG) have developed a master plan for Limahuli Garden and Preserve;

- A summary of research and information on individual offshore islands, prepared by the Offshore Island Restoration Committee, and found at <http://www.botany.hawaii.edu/gradstud/eijzenga/OIRC/>;
- The Interim State Strategic Plan for Invasive Species Prevention, Control, Research, and Public Outreach;
- Coastal Zone Management plans, including Hawai‘i Implementation Plan for Polluted Runoff Control (2000), Hawai‘i Unified Watershed Assessment (1998);
- Hawaii’s Local Action Strategy to Address Land-based Pollution Threats to Coral Reefs (2004);
- Bishop Museum has a comprehensive database of invertebrates;
- The Audubon Society maintains a Sightings database of bird species observed in the State;
- The Pacific Basin Information Node maintains a database of information on species and habitats in Hawai‘i;
- The Hawai‘i Biodiversity and Mapping Program (formerly the Hawai‘i Natural Heritage Program) maintains a database of rare species and habitats.

MANAGEMENT NEEDS

Current Management of Species and Habitats

The following section addresses the current management actions and future needs of key habitats on Kaua‘i. The discussion of future management needs is highlighted within each current managed area. Some areas on Kaua‘i are already under active management or protection through designation as a State Natural Area Reserve (NAR), State Wilderness Preserve, or National Wildlife Refuge (NWR). The Kaua‘i Watershed Alliance (KWA) was recently formed to identify and implement conservation actions needed to preserve Kauai’s watershed resources on both public and private land, and the natural and cultural resources within these watersheds. In addition, other partnerships, such as the Save Our Shearwaters program, the Kaua‘i Endangered Bird Recovery Team (KEBRT), the Kaua‘i Invasive Species Committee (KISC), and the partnership formed to develop a Seabird Habitat Conservation Plan have been formed to address specific species conservation needs.

Hono o Na Pali NAR (3,150 acres), DOFAW

Species: Forest birds, pueo, seabirds, ‘ōpe‘ape‘a (Hawaiian hoary bat), terrestrial invertebrates, freshwater fishes, freshwater invertebrates, 46 rare plant taxa.

Habitats: Montane wet communities, lowland mesic communities, lowland wet communities, coastal communities, continuous perennial streams (Hanakāpī‘ai, Hanakoa, Waiahuakua streams).

Current Management: Management plan exists. Ungulate control through public hunting year-round, invasive weed species removal, monitoring.

Future Needs: Update management plan. Increased ungulate (particularly goat) control, increased invasive weed monitoring and control, rare plant monitoring, baseline survey work in Waiahuakua stream.

Ku‘ia NAR (1,636 acres), DOFAW

Species: Forest birds, pueo, seabirds, ‘ōpe‘ape‘a, terrestrial invertebrates, 28 rare plant taxa.

Habitats: Montane mesic system, lowland mesic system.

Current Management: Management plan exists. Small-scale fencing, ungulate control through public hunting seasons, invasive weed species removal, monitoring.

Future Needs: Construction of proposed fencing, increased ungulate control, increased invasive weed species removal, outplanting, monitoring. Identify areas of intact lowland mesic forest for protection.

Alaka‘i Wilderness Preserve (9,939 acres), DOFAW

Species: Forest birds, pueo, koloa maoli, terrestrial invertebrates, rare plant taxa.

Habitats: Montane wet communities.

Current Management: Ungulate control through public hunting, invasive weed (including kāhili ginger, Australian tree fern) control.

Future Needs: Fencing and ungulate control, increased invasive weed species removal, monitoring.

Kaua‘i Watershed Alliance (142,000 acres), Public-Private Partnership (County of Kaua‘i Department of Water, DLNR-DOFAW, DLNR-State Parks, DLNR-Land, Kamehameha Schools, McBryde Sugar Company, Ltd., Grove Farm Company, Inc., Līhu‘e Land Company, Kealia Ranch, LLC, B.A. Dyer, and Princeville Development, LLC)

Species: Forest birds, seabirds, pueo, ‘ōpe‘ape‘a, terrestrial invertebrates, freshwater fishes, freshwater invertebrates, rare plant taxa.

Habitats: Montane wet communities, lowland wet communities, lowland mesic communities, lowland dry communities.

Current Management: Management plan exists. Planned management includes fencing, ungulate control through variety of methods, suppression, containment, and eradication of priority and secondary weeds, monitoring (ungulate activity, weed distribution, vegetation cover, stream turbidity).

Future Needs: Adequate funding to implement management plan.

Hanalei NWR (917 acres), USFWS

Species: Waterbirds, ‘ōpe‘ape‘a.

Habitats: Lowland wet communities (wetlands).

Current Management: Management plan in development. Endangered species management (habitat enhancement, predator control, invasive weed control, monitoring).

Future Needs: Continued management for wildlife needs.

Hulē‘ia NWR (241 acres), USFWS

Species: Waterbirds, ‘ōpe‘ape‘a.

Habitats: Lowland wet communities (wetlands).

Current Management: Management plan in development. Endangered species management (habitat enhancement, predator control, invasive weed control, monitoring).

Future Needs: Continued management for wildlife needs.

Kīlauea Point NWR (199 acres), USFWS

Species: Waterbirds, seabirds, nēnē, migratory shorebirds.

Habitats: Coastal communities.

Current Management: Management plan in development. Feasibility study underway regarding acquisitions to Refuge. Endangered species management (habitat enhancement, predator control, invasive weed control, monitoring), outreach and education.

Future Needs: Acquire and manage additional habitat once Feasibility Study complete.

Kawaiele Wildlife Sanctuary (37 acres), DOFAW

Species: Waterbirds, migratory shorebirds, seabirds, migratory waterfowl.

Habitats: Coastal communities.

Current Management: Eliminate tilapia from ponds, habitat restoration through native plantings, public education, and monitoring of bird and plant populations.

Future Needs: Complete addition of adjacent 105 acres (Mānā Plains Wetland Sanctuary) to create Mānā Plains Forest Reserve, continued habitat restoration and management, monitoring.

Limahuli Preserve (1,005 acres), NTBG

Species: Forest birds, seabirds, pueo, rare plants.

Habitats: Lowland wet communities.

Current Management: Outplanting of native plants, fencing and ungulate removal, predator control.

Future Needs: Continue existing management.

State Seabird Sanctuary (3 offshore islets: Lehua, Ka‘ula, and Moku ‘Ae‘ae), DOFAW

Species: Nesting seabirds: ‘ua‘u kani (wedge-tailed shearwater), ‘ou (Bulwer’s petrel), ‘ā (red-footed booby), ‘ā (brown booby), ‘ā (masked booby), mōlī (Laysan albatross), ka‘upu (black-footed albatross), noio (black noddy), noio-kōhā (brown noddy), manu-o-Kū (fairy tern), Christmas shearwater, ‘a‘o (Newell’s shearwater), koa‘e ‘ula (red-tailed tropicbird), koa‘e kea (white-tailed tropicbird), ‘iwa (great frigatebird), ‘akē‘akē (band-rumped storm petrel).

Habitats: Coastal communities.

Current Management: Surveys and monitoring, planned eradication of rats and rabbits on Lehua, and habitat restoration.

Future Needs: Continued monitoring of seabird populations, follow-up monitoring of predator populations to prevent re-establishment.

Kaua‘i Resource Conservation Program, Public-Private Partnership

Species/Habitats: All species and habitats present in Kōke‘e State Park and surrounding State lands affected by invasive species issues.

Current Management: Invasive species removal and control.

Future Needs: Adequate funding for ongoing control actions.

Kaua‘i Endangered Bird Recovery Team, DOFAW, USFWS, UH

Species/Habitats: Montane-nesting forest birds and seabirds, particularly endangered and critically endangered species and their habitats.

Current Management: Implementation of Draft Revised Recovery Plan for Hawaiian Forest Birds, Draft Five-year Implementation Plan for puaiohi and ‘a‘o (Newell’s Shearwater).

Future Needs: Adequate funding to implement endangered species recovery plan and implementation plans.

Kaua‘i Invasive Species Committee, Public-Private Partnership

Species/Habitats: All species and habitats affected by invasive species issues.

Current Management: Invasive species prioritization, control, and removal island-wide.

Future Needs: Increased invasive plant and animal prevention capacity, improved detection and rapid response capacity, and additional resources to address established threats to native habitats.

Save Our Shearwaters, DOFAW, USFWS, Kaua‘i Island Utility Cooperative

Species: ‘A‘o (Newell’s Shearwater), ‘ua‘u (Hawaiian petrel), ‘akē‘akē (band-rumped storm-petrel).

Current Management: Recovery and release into the wild of downed seabirds. During its first 26 years the program recovered more than 29,000 Newell’s shearwaters, 220 Hawaiian petrels, and 15 band-rumped storm petrels, as well as a few wedge-tailed shearwaters and white-tailed tropicbirds. Overall, 92 percent of the birds have been released back into the wild.

Future Needs: Finalize and implement Save Our Shearwaters Implementation Guidelines and Operation Manual.

Hawaiian Islands Humpback Whale National Marine Sanctuary (about 900,000 acres), Co-Managed by NOAA and DLNR

Species: Humpback whale.

Habitats: Marine ecosystem.

Current Management: Management plan exists. Humpback whale 100-yard (91 meter) approach rule and other regulations protecting humpback whales and their habitat, increased fines for violating provisions of the Endangered Species Act, lead agency for the MHI component of the Structure of Populations, Levels of Abundance and Status of Humpbacks (SPLASH) project to determine population size, volunteer whale counts and other community events, and other educational activities, research support, and enforcement.

Future Needs: Review other marine species, including seabirds, and habitats for inclusion in Sanctuary, and increase research, education, and enforcement actions.

Four Fishery Management Areas (FMA), DAR (Hanamā‘ulu Bay, Nāwiliwili Harbor, Port Allen, Waimea Bay).

Species: Some or all regulated fish species.

Habitats: Marine and estuary ecosystems.

Current Management: Limited take, gear, size, season, and/or area restrictions.

Future needs: Evaluate all FMAs for purpose and management effectiveness and consider need for new Marine Managed Areas.

Two Bottomfish Restricted Areas (BRA), DAR

Species: Seven bottomfish species.

Habitats: Marine ecosystem.

Current Management: No Take of bottomfish.

Future needs: Evaluate all BRAs for purpose and management effectiveness and consider need for new Marine Managed Areas.

Potential Areas for Enhanced Conservation Management

In addition to maintaining and enhancing existing conservation actions, additional efforts are needed for the long-term conservation of Kauai's native wildlife. The following section identifies areas where enhanced conservation management would significantly benefit native species or their habitats. Areas are discussed in habitat order from the mountains to the sea.

Montane Wet Forest

Species: Puaoiki, ‘akikiki, ‘i‘iwi, Kaua‘i ‘elepaio, ‘anianiau, Kaua‘i ‘amakihi, ‘akeke‘e (Kaua‘i ‘ākepa), ‘apapane, pueo, ‘a‘o (Newell’s shearwater), terrestrial invertebrates, freshwater invertebrates, rare plants.

Basis for Priority Designation: Identified in Forest Bird Recovery Plan as core area for conservation; DOFAW Management Guidelines recognized as highest quality native vegetation; identified for protection in Kaua‘i Watershed Alliance Management Plan. Last remaining suitable habitat for puaoiki, ‘akikiki; last known habitat for Kaua‘i ‘akialoa, Kaua‘i nuku pu‘u, Kaua‘i ‘ō‘ō, kāma‘o, and ‘ō‘ū; habitat for ‘akeke‘e (Kaua‘i ‘ākepa) and ‘apapane.

Potential Conservation Actions: Coordinate and implement existing management plans (Draft Revised Recovery Plan for Hawaiian Forest Birds, Draft Five-year Implementation Plan for Puaoiki and Newell’s Shearwater, Kaua‘i Watershed Management Plan, DOFAW Management Guidelines). Increase funding and staffing for implementation of identified actions, fencing, ungulate (pig and goats) removal, predator control, invasive weed control, habitat restoration through native plantings, and monitoring.

Wetland Habitat (including Kīlauea River, Hanalei River Valley and taro fields, Lumaha‘i Valley, Wainiha River Valley and taro fields, Ha‘ena State Park wetlands and lo‘i, Mānā Plains, Waimea River and taro fields, Hanapēpē Coastal Ponds (Hanapēpē Salt Ponds, Kaumakani Gulch Ponds, Olokele Settling Ponds), Lāwa‘i Kai Estuary, Kōloa district reservoirs (Waita Reservoir), Waiopili Stream, Hulē‘ia stream and associated watershed, Līhu‘e area wetlands (including Nāwiliwili wetlands, Pualu wetlands), Hanamā‘ulu wetlands, Wailua River and associated watershed (including Opaeka‘a wetlands), Kapa‘a area wetlands)

Species: Ae‘o (Hawaiian stilt), ‘alae ke‘oke‘o (Hawaiian coot), ‘alae ‘ula (Hawaiian moorhen), koloa maoli (Hawaiian duck), nēnē (Hawaiian goose), shorebirds, including the kōlea (Pacific golden plover), ‘akekeke (ruddy turnstone), hunakai (sanderling), freshwater fishes, freshwater invertebrates.

Basis for Priority Designation: Identified in Hawaiian Waterbird Draft Revised Recovery Plan as core or supporting wetlands or identified by biologists as important potential wetland habitat. With demise of sugar, wetland habitat is being reduced as former irrigation ditches are no longer maintained.

Needed Conservation Actions: Implement Waterbird Recovery Plan. Protect, restore, and manage additional wetland habitat through coordination with private or public landowners, removal of invasive plants, and institution of predator control. Remove

threat of feral mallard and kola maoli (Hawaiian duck) hybridization by supporting research, outreach, regulation/legislation, and control of feral mallards. Research on ecosystem function of taro *lo‘i* to identify management actions that support both taro growth and quality wildlife habitat. Expand outreach efforts to neighboring landowners to encourage voluntary protection (conservation easements) or implementation of best management practices. Continue existing waterbird surveys.

Kōloa Lava Tube/Cave Ecosystem

Species: Kaua‘i cave wolf spider, Kaua‘i cave amphipod.

Basis for Priority Designation: Designated as critical habitat for endangered cave wolf spider and cave amphipod, may be only known habitat. Areas near these caves are under consideration for development.

Potential Conservation Actions: Support for current protection of existing inhabited cave on private land, continued monitoring of population.

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