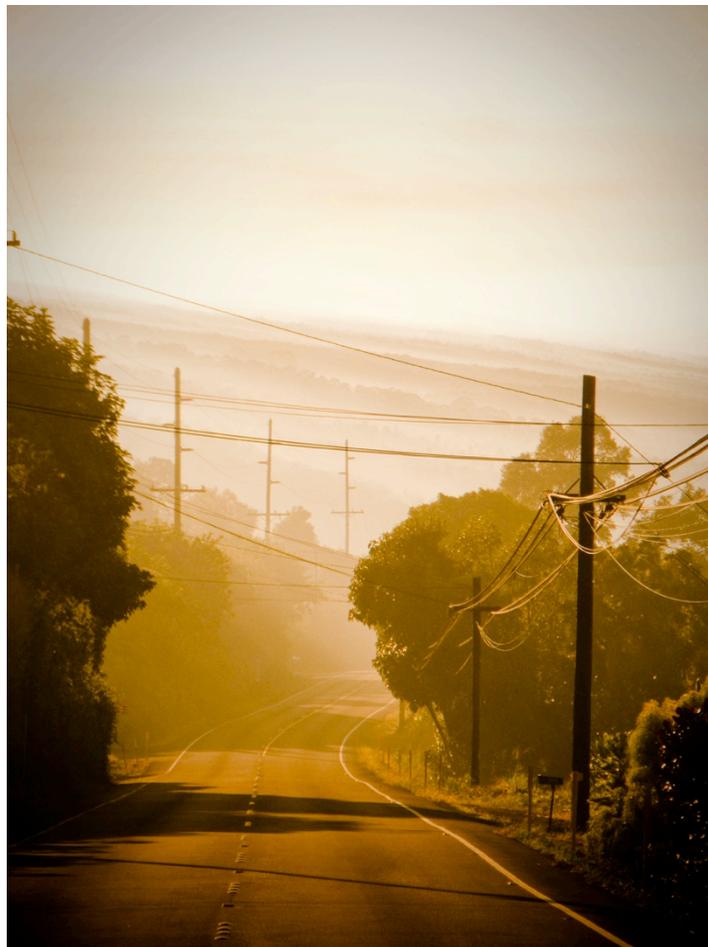


SOUTH KONA COMMUNITY WILDFIRE PROTECTION PLAN

Sponsored by the Hawaii Wildfire Management Organization
a 501(c)(3) nonprofit organization



Smoke from 2009 Kealakekua upland fire spread throughout South Kona.
Photo Courtesy: Jesse Acosta, DLNR-DOFAW

March 2010

Written by Elizabeth Pickett Fee and Miles Nakahara
Hawaii Wildfire Management Organization

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TABLE OF CONTENTS

<u>PAGE</u>	
3	SIGNATURE PAGE
4	INTRODUCTION Goals and Objectives of CWPP Planning Area Boundaries
6	BACKGROUND South Kona Community and WUI landscape Wildfire History in South Kona
10	EMERGENCY MANAGEMENT Fire Suppression Capabilities and Resources Training Resources and Needs Emergency Management Documents and Plans Multiple-Agency Agreements Evacuation Protocols and Needs Next Steps- Needs and Recommendations
12	PLANNING PROCESS CWPP Process and Methods Decision Makers Federal Agencies State and Local Agencies Interested Parties
15	WILDFIRE RISK ASSESSMENT Purpose and Methods Communities at Risk from Wildfires Community Base Map Community Risk Assessment Overall Community Priorities Community Concerns
21	HAZARD REDUCTION PRIORITIES Purpose and Methods Priority Actions for South Kona Hazardous Fuels Reduction Reducing Structural Ignitability
26	ACTION PLAN South Kona CWPP Action Plan Plan Implementation and Maintenance Finalize Plan
28	REFERENCES



South Kona Community Wildfire Protection Plan Mutual Agreement Page

The Community Wildfire Protection Plan (CWPP) developed for South Kona, Hawaii by the Hawaii Wildfire Management Organization (HWMO):

- Was collaboratively developed. Interested parties and federal land management agencies managing land in the vicinity of South Kona, Hawaii have been consulted.
- This plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will mitigate wildfire in South Kona, Hawaii.
- This Plan recommends measures to reduce the ignitability of structures throughout the planning area.

The following entities mutually agree with the contents of this Community Wildfire Protection Plan:

Paul Conry
Administrator, Division of Forestry and Wildlife

Date

Darryl Oliveira
Fire Chief, Hawaii Fire Department

Date

Quince Mento
Administrator, Hawaii County Civil Defense

Date

INTRODUCTION

Goals and Objectives of the South Kona CWPP

This Community Wildfire Protection Plan (CWPP) was developed by the Hawaii Wildfire Management Organization (HWMO) with guidance and support from South Kona community members, decision makers, and local/state agencies concerned about fire issues in South Kona. The Hawai'i County Fire Department, the Hawai'i County Civil Defense, the National Park Service, and the Hawaii Department of Land and Natural Resources were primary partners in developing this plan.

The goals and objectives of this plan follow the intent and requirements of the *Healthy Forests Restoration Act (HFRA) – HR 1904*, which describes a CWPP as a fire mitigation and planning tool for an at-risk community that:

- A) Is developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and State Agency responsible for forest management, in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community.
- B) Identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure.
- C) Recommends measures to reduce structural ignitability throughout the at-risk community.ⁱ

This plan addresses elements of fire protection, hazard assessment, wildfire mitigation priorities, and community outreach and education. The process used to develop this plan engaged a diversity of agencies and individuals concerned with the at-risk area, following the guidelines and requirements of federal grants programs such as the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation program and the National Fire Plan (NFP).

Planning Area Boundaries

The South Kona CWPP covers an area approximate to the Hawaii County district boundaries of South Kona, stretching for nearly 30 miles between the North Kona district in the north and the Ka'u district in the south. The planning area is bordered on the west by the coastline and on the east by the higher elevations of Hualalai and Mauna Loa where the density of fuels is less. The CWPP planning boundaries are the same as the wildland-urban interface (WUI) at-risk areas, which include surrounding lands to ensure adequate protection of WUI areas. Parts of the South Kona CWPP boundaries coincide with boundaries of other CWPP-covered areas: Hawaii Volcanoes National Park and Ocean View, Hawaii. See map below for planning area boundaries.

BACKGROUND

South Kona Community and Landscape

South Kona stretches for approximately 30 miles between Kailua-Kona and Ka'u, on the leeward side of Hawaii Island. The South Kona area is home to almost 11,000 people (2000 U.S. Census Bureau) and includes Kealahou, Captain Cook, Honaunau, Napo'opo'o, Ke'ei, Miloli'i, Ho'okena, Papa Bay, Kona Paradise, and other smaller communities and farm areas. Steep slopes and rough terrain dominate most of South Kona, with residential areas, businesses, community infrastructure, cultural resources, and farms spread throughout the district and ranging from sea level to upland areas. The region is primarily rural with low-density development. Over half of these residents depend on rain catchment and hauling or delivery of potable water.

*Environment and Natural Resources*ⁱⁱ

South Kona is situated along the western slopes of both Hualalai and Mauna Loa volcanoes, and is geologically young. Elevations range from sea level to over 13,000 feet at the top of Mauna Loa. In South Kona, the land is particularly steep. Individual sections, some fairly large in area, have slopes greater than 10%,

The South Kona region is unique due to the wide range of climatic conditions over a relatively small distance, providing diverse physical environments that vary considerably between the coastline and high elevations. Lava fields with mixed shrubs and grasses characterize the low-lying coastal areas. The prime agricultural belt lies between 700 – 2,000 ft elevation. Upland forests and high elevation grasslands are found above Mamalahoa Highway.

South Kona is protected from the prevailing northeast trade winds due to its position on the leeward slopes of Mauna Loa and Hualalai. It is more greatly affected by diurnal thermal winds, which are experienced as an alternating land-sea system of air circulation resulting from the differential heating of the land and ocean. On-shore breezes prevail in the morning and early afternoon, while offshore breezes develop in the late afternoon and evening. The average rainfall varies from less than 30 inches per year along the coast to more than 100 inches on the slopes around and directly above the prime agricultural belt (700-2,000 ft), decreasing dramatically to 50 inches at the 5,000 ft elevation level.

Lower elevation temperatures range between 70 F in the winter to the 90 F in the summer. Inland higher elevation areas experience cooler trends than the coast, with temperatures decreasing with elevation.

Differences in climate, topography, and soils have resulted in unique natural ecosystems. The classification of terrestrial ecosystems is based on the elevation at which they occur. Before human settlement the North and South Kona districts were made up of the following ecosystems:

- Subalpine forest, woodland, and shrub land
- Montane dry and mesic forest and woodland
- Wet forest and woodland
- Lowland and dry and mesic forest, woodland, and shrub land
- Lowland dry shrub land and grassland

In the past several hundred years of human habitation, pristine native ecosystems have diminished. Human activity and introduction of non-native plants and animals have displaced many of the historic plant and animal communities. Today, invasive grasses and shrubs and human-caused fire starts contribute to a cycle of hazardous wildfire conditions and increased post-burn conversion to non-native fire-promoting species. Despite the widespread alteration of native ecosystems, a few areas in South Kona remain as habitat for rare and endangered species and are protected. Upland areas are less disturbed and contain abundant 'ohia and koa forests.

Natural Water Resources

Water resources in the Kona area are associated with groundwater reserves. The North and South Kona districts overlie the Hualalai and Southwest Mauna Loa Aquifers. There are no perennial streams in the Kona area. However, several well defined drainage channels or watercourses are found within the high rainfall areas situated on the slopes of Mauna Loa and Hualalai. Kona streams are significantly affected by the seasonal rainfall pattern. There are multiple watersheds and ahupua'a within the South Kona District.

Ho'okena is the southernmost region of South Kona served by municipal water. Residents south of Ho'okena depend on rain catchment and hauling for potable water.

Population and Land Use

South Kona has limited slow growth, with greater population stability and a higher rate of homeownership than its neighbor district of North Kona. According to the 2000 U.S. Census Bureau, moderate growth in both population and housing construction has occurred in the district of South Kona.

Seventy-six percent of South Kona land use is designated as Agricultural, 8.3 % is zoned Open, and 0.25 % is zoned for single-family residence. There is no land set aside specifically for industrial uses in South Kona, and only 15 acres are zoned as resort. Many of the industrial activities are located on Agricultural zoned lands and approved through the issuance of Special Permits. With the majority of land use being agricultural, many residents are farmers growing coffee, macadamia nuts, avocado, and a variety of fruits and vegetables. Cattle ranching is also a significant economic activity, with several active ranches in the region. The region has several parks and natural area reserves managed by the State and The Nature Conservancy.

South Kona is home to the Kona Coffee Belt, located above Kealahou. The coffee belt is a narrow belt of land approximately 2 miles wide running parallel to the Kona coast from 700 feet elevation to 2,000-foot elevation. South Kona produces much of the island's coffee crop. There are approximately 650 farms cultivating coffee on the western slopes of Mauna Loa and Hualalai mountains in the Kona district. Approximately, 3,500 acres of land is utilized for Kona coffee farming, producing about 3.8 million pounds a year, valued at about \$14 million (County of Hawaii, 2006).

Macadamia nuts are also an important agricultural product to South Kona. The district is home to MacFarms of Hawaii and Kapua Orchards, the primary producers of macadamia nuts. During the 2003 and 2004 growing season, Hawaii produced 53 million pounds of macadamia nuts with

a significant amount coming from South Kona (Kona-Kohala Chamber of Commerce, 2005). Other agricultural activities such as fruits, plants and flowers, and specialty and diversified food crops are also expanding the agricultural base in Kona.

Additional South Kona activities include food packing and processing, and ancillary agricultural services. Other service related industrial uses such as warehousing, garages and auto body shops are located in clusters along Mamalahoa Highway. Because of its topographic condition, however, level land necessary for development in South Kona is limited in the mauka (upland) areas.

Wildfire History in South Kona

Steep slopes, rough terrain, and a prevalence of fire-promoting fuels characterize the South Kona landscape. This, coupled with warm weather, recurring drought conditions, and a history of human-caused fire starts puts South Kona at risk of wildfire. The area is extremely isolated and the closest water source can be up to 20 miles away. Catchment systems are the only source of water between Hookeena and Waiohinu in the Ka'u district. The distances to water resources and the high cost of hauled water are problematic for residents, business owners, and farmers, and hinder fire suppression capabilities in the area.

Local fire fighting agency records document numerous fire starts along the main highway that spread through unmanaged fuels in the untended lands along the road and between homes. This is a fire issue because houses tend to be spread out, allowing significant fire spread through the areas in between roads and buildings. Structural fires often occur in old coffee plantation homes from candles and deteriorating home electrical components, also spreading through the patchwork of unmanaged vegetation. While the bulk of wildfires begin in the wildland-urban interface (WUI) areas, occasional but devastating fires occur in the upland forested and grassland regions. These fires threaten nearby community infrastructure, neighborhoods, grazing lands, and valuable native flora and fauna.

South Kona was recently reminded that upland wildfire is a significant threat. It took weeks for firefighters to extinguish the 1800 acre wildfire which began at Kealakekua Ranch on December 27, 2009. Grasses ignited by lightning were fueled by mature 'ohi'a and koa trees, hard woods which can burn for weeks. These long burning fuels and rhizomous



Photo 1. 2009-2010 Upland fire in South Kona. Photo Courtesy: Jody Fergerstrom.

grasses that can smolder and carry fire underground made the fire extremely challenging to put out. The rugged terrain at the 4,400-foot elevation where the fire broke out, along with lack of access to water, abundant fuel sources, dry conditions, and warm weather causing smoldering to reignite all combined to create difficult and hazardous conditions for the dozens of firefighter who worked 24-hour shifts to battle the blaze and protect the community. Smoke from the fire, trapped by Kona's temperature inversion layer, created health hazards for fire fighters and the entire South Kona

community.

A fire history map of South Kona was created that documents Hawaii County Fire Department's response to fires over 5 acres between January 1998 and January 2010. Records of all County response fires since 1998 in South Kona can be found in the appendix. Additional upland fires have taken place on private lands, with significant community-wide effects. See the fire history map below. Note the high frequency of fires near roads and neighborhoods on the WUI boundaries.

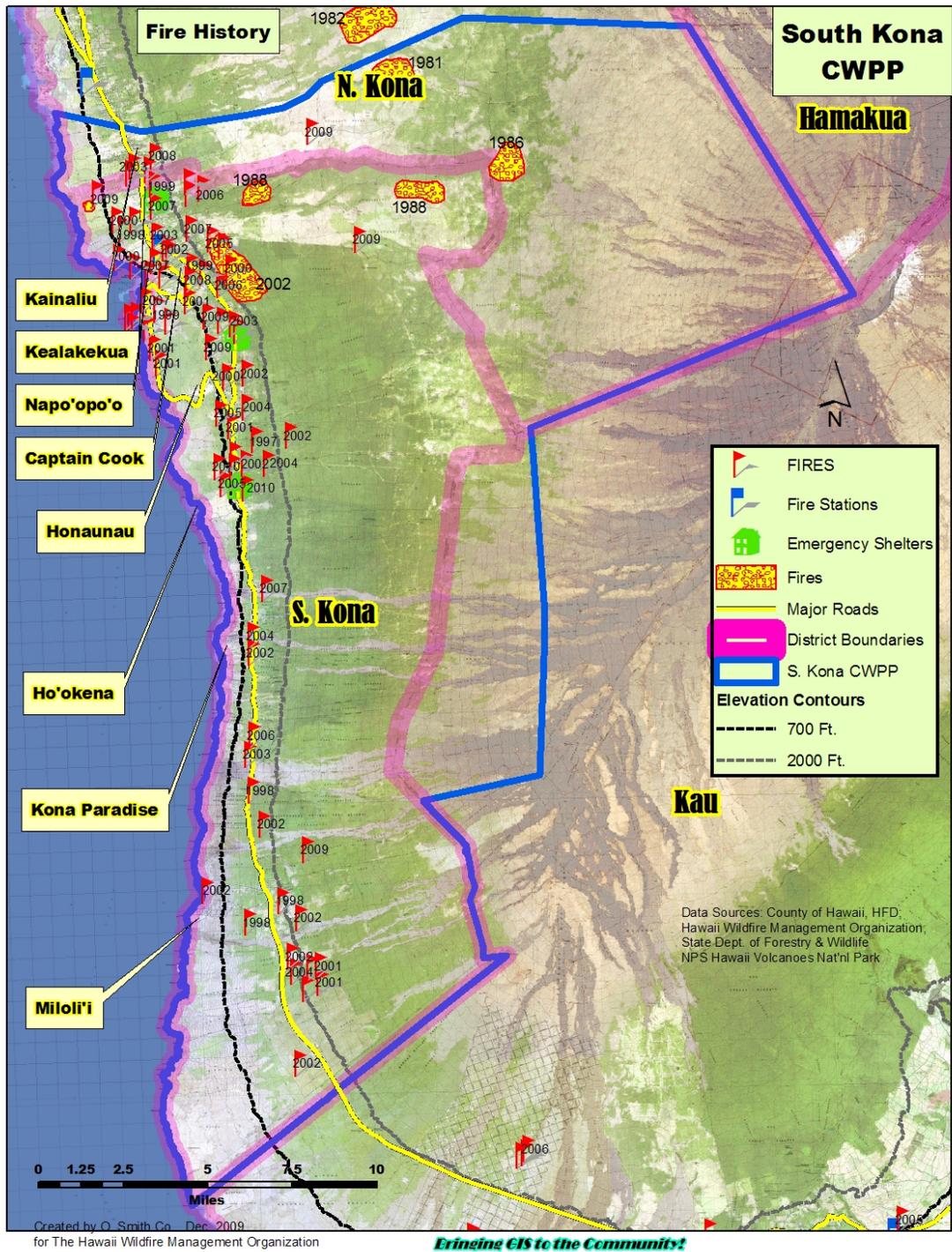


Figure 2. Fire History Map.

EMERGENCY MANAGEMENT

Fire Suppression Capabilities and Resourcesⁱⁱⁱ

Initial response to most fire, medical, and associated emergencies is the responsibility of the Hawaii County Fire Department. State Department of Land and Natural Resources (DLNR), Federal, and landowner crews provide additional wildland fire fighting assistance.

Although the County Fire Department has the following equipment, its resources are spread across the entire island of Hawai'i. All of the equipment is not available for use in one specific district at one time due to geographic distance.

For wildfire and rural use, the County Fire Department is equipped with ten water tenders deployed around the island, which have a total capacity of 13,850 gallons. In addition, they have acquired two special "brush" trucks for wildfire use. They operate a rescue helicopter and an ambulance helicopter that can drop water when necessary. When more air support is needed, small and medium size private helicopters are hired. The National Guard maintains five large helicopters (Blackhawks) in Hilo, which have water bucket capabilities and have occasionally been hired by the State. In addition to DLNR support, federal firefighters may be available from their station in the National Parks and the Army's Pohakuloa Training Area.

Training Resources and Needs

Recommendations for additional training for firefighters include:

- Basic Wildland Fire Training and Refresher Courses
- Initial Attack Incident Command
- Basic Fire Behavior
- Helicopter Operations
- Strategy and Tactics (S-336)
- Basic and intermediate Incident Command System (ICS)
- Wildland Fire Chainsaws (S-212)

Emergency Management Documents and Plans

The CWPP is non-regulatory and cooperative in nature. The plan provides (1) a foundation for increased communication, coordination and collaboration among agencies and the public, (2) identification and prioritization of areas for hazardous fuel reduction projects and wildfire mitigation actions, and (3) assistance meeting federal and state planning requirements and qualifying for assistance programs^{iv}.

The CWPP works in conjunction with other County and State plans and programs including but not limited to:

County of Hawaii:

Kona Community Development Plan.¹

Hawaii County Multi-Hazard Mitigation Plan.²

County of Hawaii Drought Mitigation Strategies^v

Ka'u to South Kona Water Master Plan^{vi}

State of Hawaii:

State Drought Plan and the County Drought Mitigation Strategies^{vii}

State of Hawaii Multi-Hazard Mitigation Plan^{viii}

Multiple-Agency Agreements

The federal, state, and local fire agencies of the Big Island have organized into the Big Island Wildfire Coordinating Group (BIWCG). Members include:

- National Park Service
- U.S. Fish and Wildlife Service
- U.S. Army,
- Hawai`i County Civil Defense
- Hawai`i Fire Department
- Department of Transportation - Airports Division, Hawaii District.
- Hawaii Department of Land and Natural Resources (DLNR) – Division of Forestry and Wildlife

BIWCG was established to further inter-agency cooperation, communications and coordination, and to implement directions and standards for incident management activities. BIWCG coordinates the programs of the participating wildland fire agencies on the big island of Hawai'i and provides a forum for leadership, cooperation and the exchange of information^{ix}. It also improves procedures to rapidly provide the most effective response to wildfires in the island. In coordination with Civil Defense, drought and other fire-hazard conditions are constantly monitored and actions such as burning bans and closures are instituted when needed. The public is informed of these restrictions by radio announcements and newspaper notices.²

The agencies represented in BIWCG have participated in the South Kona CWPP as direct partners and/or as Board members of the Hawaii Wildfire Management Organization.

Evacuation Protocols and Needs

Evacuation protocols for neighborhoods and areas in South Kona have been determined for natural hazards such as tsunamis, and can be found in the documents listed above. However, fire safety zones for all neighborhoods and areas of South Kona are yet to be determined, and are a priority action determined by the community as part of this CWPP process.

Next Steps- Needs and Recommendations

Priority next steps recommended by the involved agencies regarding wildfire are:

- Increase fire fighting resources
- Develop a Type III Team for multi-agency wildfire/fire management
- Develop interagency training program
- Implement an interagency Fire Danger Rating System

PLANNING PROCESS

CWPP Process and Methods

The process of developing a CWPP helps to clarify and refine priorities for the protection of life, property, and critical infrastructure in the South Kona wildland-urban interface areas. Local residents, landowners, fire suppression agencies, and community leaders have participated in valuable discussions regarding wildfire history, resources at risk, areas of concern, and priority mitigation actions.

The methods used to create this CWPP followed the guidelines established for the HFRA, which requires the following actions during the planning process:

- Step 1- Convene Decision Makers
- Step 2- Involve Federal Agencies
- Step 3a- Involve State and Local Agencies
- Step 3b- Engage Interested parties

Decision Makers

The decision-makers for this Community Wildfire Protection Plan are represented in the following table:

Requirement	Agency or Organization	Name
Local Fire Chief	Hawai'i County Fire Department	Darryl Oliveira
Local/County Government	Hawai'i County Civil Defense Department	Quince Mento
State Forestry Agency	Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	Paul Conry Wayne Ching

Federal Agencies

The representatives of the federal agencies involved in managing the land and fires in the vicinity of the South Kona area are:

Agency	Representative(s)
National Park Service	Joe Molhoek, Fire Management Officer
US Army	Eric Moller, USAG-HI, Deputy Fire Chief
US Fish and Wildlife Service	Dawn Greenlee, Fish and Wildlife Biologist

State and Local Agencies

The representatives of the state/local agencies that have jurisdictional responsibilities in the vicinity of the South Kona areas are:

Agency	Representative(s)
Hawai'i County Fire Department	Darryl Oliveira, Fire Chief Dennis Iyo, Battalion Chief Marshall Luke, Battalion Chief Mike Tomich, FEO
Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife	Wayne Ching, State Protection Forester Roger Imoto, Hawaii Island Forestry & Wildlife Manager Jay Hatayama, Protection Forester

Interested Parties

The parties from our community that have shown interest in forest/fire management and have been involved in this CWPP are:

Interested Parties	Affiliation (if any)
Kona Community Development Plan, Action Committee	Hawaii County
Large Landowners	Kamehameha Schools, Hokukano and Kealakeua Ranches, The Nature Conservancy TNC
Private Citizens	
Local Associations and Organizations	Hawaii Wildfire Management Organization, Big Island Wildfire Coordinating Group
Public At Large	

Meetings were held with agency representatives, community members, and interested parties at:

- Hawaii Wildfire Management Organization Office in Kamuela, Hawaii on September 3, 2009, October 1, 2009, January 7, 2010, February 4, 2010, and March 4, 2010.
- Keauhou Fire Station on February 19, 2010.
- Hawaii County Fire Department Dispatch Office in Hilo, Hawaii on February 23, 2010.
- County Planning Department Community Meeting Room on February 24, 2010.
- Konawaena Elementary School on March 11, 2010.



Photo 2. HWMO, local firefighters, and other interested parties review fire history map and discuss local wildfire issues at the Keauhou Fire Station. *Photo Courtesy: HWMO.*



Photo 3. Miles Nakahara of HWMO, explains the CWPP process to South Kona residents and collects public input. *Photo Courtesy: HWMO.*

Public Service announcements regarding wildfire risk and the CWPP were published in the West Hawaii Today newspaper and Hawaii 24/7 news website. Public comments were accepted beginning February 4, 2010.

Valuable public input regarding community concerns and priority actions was acquired on the March 11, 2010 meeting at Konawaena Elementary School. The meeting was attended by Community Development Plan committee members, homeowners association members, County Fire Department representatives, local firefighters, and South Kona area residents. Attendees of the meeting enthusiastically supported the CWPP plan and its objectives, noting that South Kona residents are very concerned with local wildfire issues and eager to begin reducing the risk of wildfire.

HWMO intends to post the plan on its website for public use.

WILDFIRE RISK ASSESSMENT

Purpose and Methods

The purpose of the community risk assessment is to:

1. Provide site-specific information to the community to promote wildfire awareness;
2. Help identify and prioritize areas for treatment; and
3. Determine the highest priority uses for available financial and human resources.

The methods for the community wildfire risk assessment followed the guidelines established for the HFRA, which requires the following actions:

- Step 4- Establish a Community Base Map
- Step 5a- Develop a Community Risk Assessment
- Step 5b- Identify Overall Community Priorities

The wildfire risk assessment follows the guidelines and requirements of the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation program and the National Fire Plan (NFP).

Community Base Map

Using GIS technology and local expertise, HWMO has developed a base map of the community and adjacent landscapes of interest. The map is a visual aid from which community members and agencies identified values and resources at risk in the South Kona Area.

After considering the location of the inhabited areas, the critical human infrastructure, the areas of community importance, and the risk of wildfire, the community identified a wildland-urban interface (WUI) zone around community assets.



Photo 4. Local firefighters discuss hazards and fire history patterns revealed through mapping. Photo Courtesy: HWMO.



Photo 5. Smoke from upland fires spreads to lowland areas of South Kona via wind. Photo Courtesy: Jesse Acosta, DLNR-DOFAW.

The community and local agencies determined that areas upslope from the major highway must be included in the CWPP boundaries. These upslope areas have access roads (multiple ignition points) and include older settlement areas, historical buildings, irreplaceable natural and cultural resources. Also, the smoke from fires in this upland area creates safety (visibility) and health

hazards because the prevailing winds move the smoke into the lower elevations. Wildfires in these higher elevations also create post-fire flooding and erosion conditions that threaten communities down slope. In many cases, fires 8-15 miles away from the main highway have put community resources at risk, as witnessed in the recent South Kona fires (2009 Hokukeno and Kealakekua fires). See Community Base Map below.

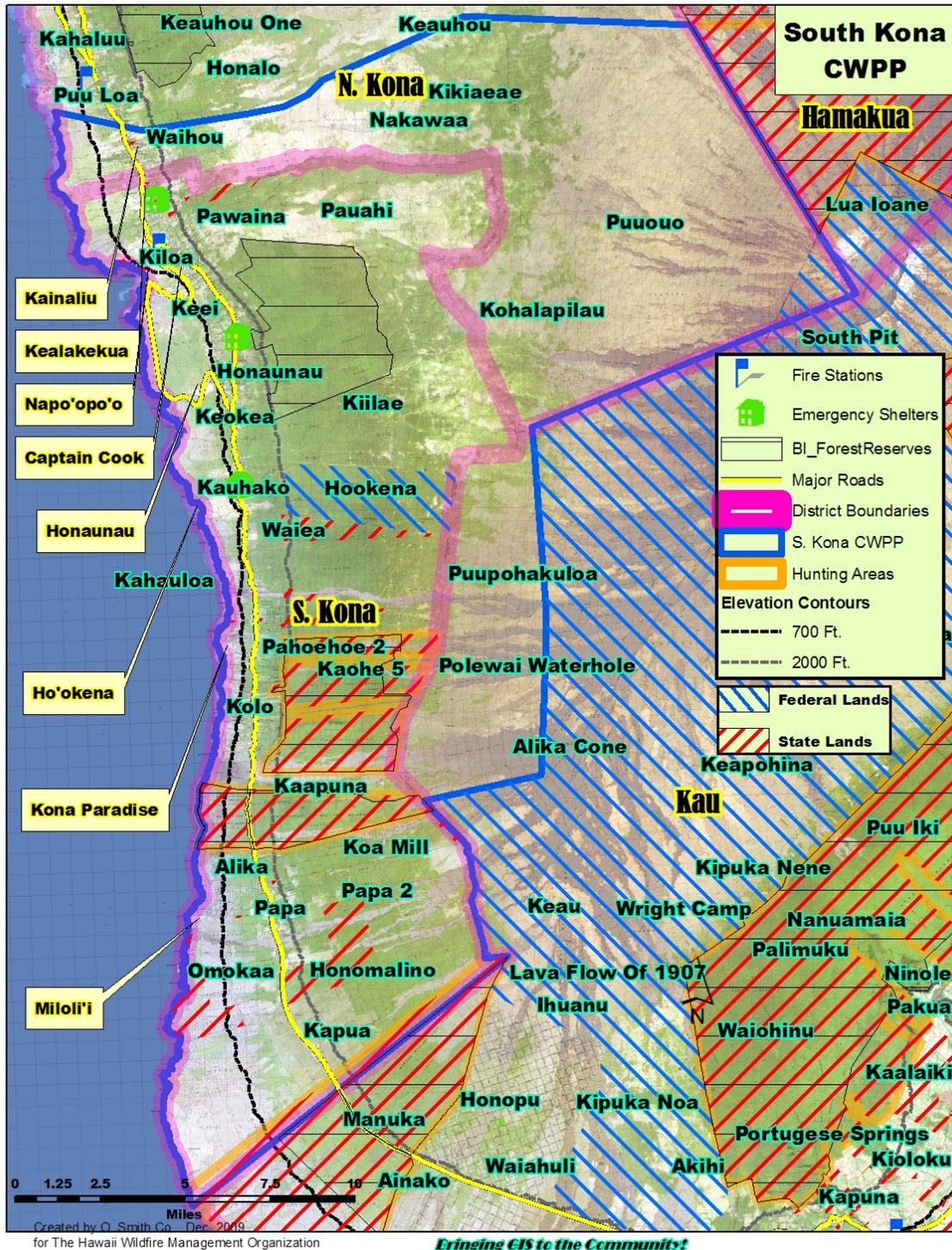


Figure 3. Community Base Map.

Community Risk Assessment

As designated on the Community Bas Map (Figure 3 above), the following table lists the community assets, resources, and values at risk. With fire fighting agencies and landowners, HWMO assessed these resources for relative risk of wildfire and assigned a hazard ranking of low (LOW), moderate (MOD), or High (HIGH) for the following categories:

- *Fuel Hazards* – An evaluation of vegetation conditions within the community and on adjacent lands.
- *Risk of Wildfire Occurrence* – An evaluation of the probability of fire ignition within the community and surrounding lands, based on fuels, weather, topography, likelihood of ignition.
- *Structural Ignitability*- An evaluation of the vulnerability of structures within the community to ignition from firebrands, radiation, and convection.

The fourth category, *Local Preparedness and Fire Suppression Capacity*, describes the capacity of fire suppression resources, proximity to water resources, accessibility and proximity to adequate roads, defensible space, etc. Capacity is assigned a ranking of poor (POOR), moderate (MOD), or excellent (EXCELLENT). The ranking for capacity is inversely proportional to hazard, e.g. poor preparedness and suppression capacity creates a high hazard.

Community Resource, Structure, or Value at Risk	RANKED BY HAZARD			RANKED BY CAPACITY	OVERALL RISK
	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness & Suppression Capacity	
Homes at lower elevation areas	MOD-HIGH	MOD	HIGH	POOR	MOD-HIGH
Homes at mid-elevation (agricultural belt) areas	MOD	MOD	HIGH	MOD	MOD
Homes and structures at higher elevation areas	HIGH	*	HIGH	POOR (no water, limited access)	MOD-HIGH
Businesses including historic buildings along Mamalahoa Hwy and associated economic, scenic, and historical values	LOW-MOD	LOW	HIGH	MOD	MOD
Historical sites throughout South Kona and associated cultural values	MOD-HIGH	MOD-HIGH	MOD	MOD	MOD
Agricultural grazing lands and associated cultural, economic, and scenic values	*	MOD-HIGH	MOD	POOR-MOD (no water, limited access)	MOD-HIGH
Farms- Coffee, Mac Nuts, etc. and associated cultural, economic, and scenic values	LOW	LOW	MOD	POOR-MOD (no water, limited access)	LOW-MOD
Mauka forested lands, parks, and reserves, and associated cultural, scenic, recreational, and environmental values	*	MOD-HIGH	MOD	POOR (no water, limited access, difficult terrain)	HIGH

Community Resource, Structure, or Value at Risk	RANKED BY HAZARD			RANKED BY CAPACITY	OVERALL RISK
	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness & Suppression Capacity	
Coastal areas and parks, and associated cultural, scenic, recreational, and environmental values	LOW-MOD	MOD	MOD	MOD	MOD
Schools (Konawaena Elementary, Konawaena Middle School, Konawaena High School, Honaunau Elementary, Ho'okena Elementary, Honaunau ECE)	LOW-MOD	LOW-MOD	MOD	MOD	LOW-MOD
Kona Community Hospital	LOW-MOD	LOW-MOD	MOD	MOD	LOW-MOD

* Fuels and risk are dependent on 1) the season, and 2) fuels management practices, i.e. grazing, mechanical/chemical treatments, etc. Fuels and risk are LOW- MOD if fuels are properly managed and it is a wet year; fuels and risk are HIGH if fuels are not managed and it is a dry year.

Communities at Risk from Wildfires

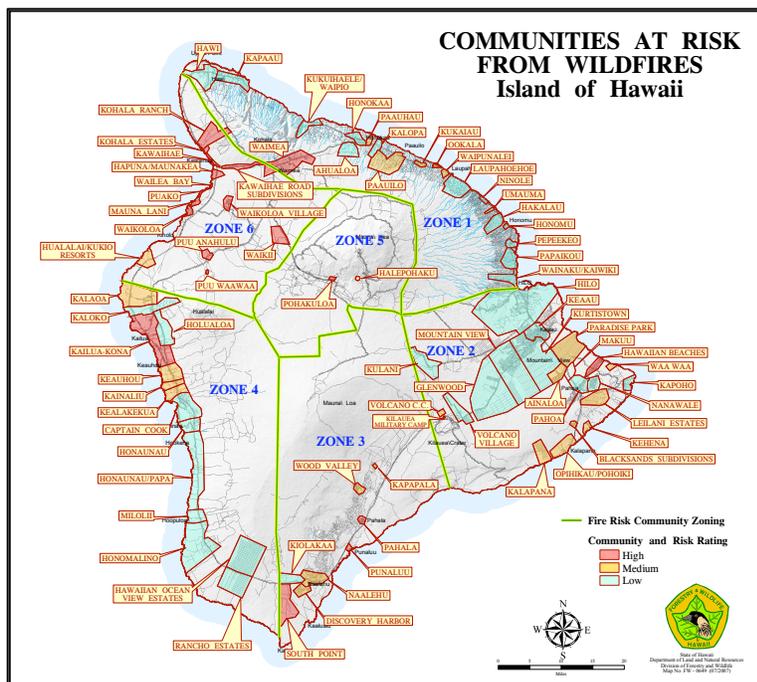


Figure 4. DOFAW Communities at Risk From Wildfires Map, 2005.

The delineation of areas and resources at risk in South Kona builds on the *Communities at Risk from Wildfires, Island of Hawaii* assessment, mapped in 2005 by the Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW), (Figure 4, left). At that time, only the communities from Keauhou to Kealahou received an elevated community risk rating (ranked in 2005 as medium risk). Updated hazard rankings for South Kona (table above) and fire history (Figure 2) demonstrate elevated risk to a variety of community resources, structures, and values throughout the entire South Kona area. Community priorities are based on the updated risk assessment, and address threatened

resources according to overall risk ranking rather than by specific towns or neighborhoods.

Overall Community Priorities

Community value and cultural value were determined for each community resource, structure, or value at risk. The following table demonstrates the value of each resource to the community, and its priority level for mitigation/protection based on its value and overall risk of wildfire.

Community Resource, Structure, or Value at Risk	Overall Risk (from above)	Community Value	Cultural Value	Overall Priority
Homes at lower elevation areas	MOD-HIGH	HIGH	HIGH	HIGH
Homes at mid-elevation (agricultural belt) areas	MOD	HIGH	HIGH	HIGH
Homes and structures at higher elevation areas	MOD-HIGH	HIGH	HIGH	HIGH
Businesses including historic buildings along Mamalahoa Hwy	MOD	VERY HIGH	VERY HIGH	HIGH
Historical sites throughout South Kona	MOD	HIGH	VERY HIGH	HIGH
Agricultural grazing lands	MOD-HIGH	VERY HIGH	HIGH	HIGH
Farms	LOW-MOD	VERY HIGH	HIGH	HIGH
Mauka forested lands, parks, and reserves	HIGH	VERY HIGH	VERY HIGH	VERY HIGH
Coastal areas and parks	MOD	VERY HIGH	VERY HIGH	HIGH
Schools and Hospital	LOW-MOD	VERY HIGH	HIGH	HIGH

Community Concerns

In addition to prioritizing resources to protect, community and agency representatives developed a list of concerns regarding wildfire issues. They are listed below in order of priority:

1. Insufficient water infrastructure to adequately and quickly suppress wildfires, including dip tanks.
2. Inadequate fire suppression and support resources, such as rapid and on-site mapping capabilities and GPS technologies, vehicles, water tankers.
3. Regional and local planning and development standards do not require community and subdivision designs to consider and/or mitigate fire risk:
 - a. Design, materials, and placement of structures and landscaping promote/do not mitigate fire risk.
 - b. Roads and highways are not always constructed with wide shoulders, fire lanes, emergency ingress/egress, or fuel mitigation in mind.
4. Fuel loading along roadsides, in community open areas, around and between individual homes and farms.
5. Lack of public awareness of the wildfire threat, to include lack of appropriate awareness by elected officials, planning agencies, land managers, scientists, and homeowners regarding:

- a. Fire history and fire hazards.
 - b. Fire-mitigating landscaping techniques.
 - c. Fuels management tools and methods.
 - d. Common human-caused fire starts, such as roadside ignitions, fireworks, catalytic converters, and arsonists.
6. Need to increase/integrate communication (protocols, equipment, pre- and post- fire planning) between state, federal, and county agencies, particularly to maximize initial attack capabilities and to utilize specialized wildland expertise and training for wildfire situations.
 7. Need to reduce and/or control invasive species that possess inherent fire or ignition properties, e.g. ignite easily and/or carry fire easily.
 8. Arson- Not well known whether there is amnesty for reporting nor what civil liabilities and penalties exist for arsonists.
 9. Lack of emergency access staging areas and safety zones/areas within subdivisions for evacuation purposes.
 10. Inadequate community egress and firefighting vehicle ingress during a wildfire. Need to identify evacuation routes/roads within subdivisions.

HAZARD REDUCTION PRIORITIES

Purpose and Methods

Priority action items have been developed from a number of sources, including input from community and agency participants in the planning process, noted deficiencies in local firefighting capabilities, and issues identified through the risk assessment. These actions address the following goals:

1. Enhance wildfire response capabilities.
2. Reduce risk and hazards through pro-active wildfire mitigation, including:
 - Increasing stakeholder knowledge about wildfire risk through education and outreach.
 - Encouraging the treatment of structural ignitability.
 - Prioritizing fuel reduction projects.
 - Increasing opportunities for collaboration and coordination to implement wildfire mitigation projects.
3. Address the list of community concerns.

These priority action items follow the guidelines for HFRA, which requires:

- Step 6a- Community Hazard Reduction Priorities
 - Priority Actions (General)
 - Hazardous Fuels Reduction
- Step 6b- Recommendations to Reduce Structural Ignitability

Priority Actions for South Kona

Action items addressing wildfire issues are listed below, in order of priority:

1. Install pre-staged static water and helicopter dip tanks.
2. Acquire adequate resources for first responders:
 - a. Appropriate technology resources for mapping at each fire station and on-location.
 - b. Water tanker/tenders (minimum 2000-gallon tanker/tender with high wheelbase for off-highway capabilities).
3. Wise development in fire prone areas. Create development standards and implement community planning that requires the mitigation of wildfire risks at the regional, community/subdivision, roads/highways, and individual structure levels.
4. Reduce fuel load and/or appropriately convert fuels along road sides, in community open areas, around individual homes:
 - a. Appropriate conversion would include transition to vegetation with low ignition potential and low ability to carry fire, especially native plants. This can be accomplished through installing/ establishing living fuel breaks.
 - b. Reduction of fuels could be by carried out through managed grazing, mechanical reduction, prescribed fire, herbicide or combinations of all treatments.
 - c. Encourage/educate large landowners to reduce fuels on private property.
 - d. Identify opportunities to assist vulnerable populations (elderly, disabled) in creating defensible space around homes and property.

5. Continue fire prevention education and outreach, including arson prevention education:
 - a. Hold community workshops.
 - b. Implement the fire danger rating system.
 - c. Provide individual home and neighborhood assessments.
 - d. Increase public service announcements during high fire hazard periods.
 - e. Develop wildland fire materials for youth and implement educational programs in local schools.
6. Increase communication capabilities between state, federal, and county agencies, particularly to maximize initial attack capabilities in wildfire events:
 - a. Integrate current and future communication equipment utilized by federal, state, and county fire suppression personnel to increase effective firefighting response.
 - b. Develop protocols for multi-agency involvement to utilize available specialized wildland fire expertise and equipment/resources.
7. Reduce and/or control invasive species that increase fire risk and, where appropriate, convert to vegetation as described in priority number three.
8. Advocate for increased penalties for arson and some level of amnesty for reporting fire.
9. Develop emergency staging areas within communities and promote awareness of such areas within the community, including holding mock disaster drills.
10. Create/improve secondary access roads for those communities with only one means of ingress/egress; identify evacuation route roads within subdivisions, especially in neighborhoods where secondary access roads are not available.

Hazardous Fuels Reduction

A CWPP must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure. Based on the fuel hazard ratings acquired during the hazard assessment, recommendations for the type and method of vegetative fuels reduction treatments for high fuel hazard areas are listed in this table.

Community Resource, Structure, or Value at Risk	Fuel Hazard Rating	Type of Treatment	Method of Treatment
Agricultural grazing lands	HIGH IF UNMANAGED	Mechanical	Continue properly managed grazing
Mauka forested lands, parks, and reserves, and	HIGH IF UNMANAGED	Mechanical, hand labor, chemical	Continue properly managed grazing, weed whip, mow, hand-pull, and herbicide where appropriate. Conduct post-fire restoration as appropriate.
Homes and structures at higher elevation areas	HIGH	Mechanical, hand labor, chemical, fuels conversion	Continue properly managed grazing, weed whip, mow, hand-pull, and herbicide where appropriate. Convert fuels to landscaping with drought-tolerant, fire-resistant plants.
Homes at lower elevation areas	MOD-HIGH	Mechanical, hand labor, chemical, fuels conversion	Weed whip, mow, hand-pull, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant plants.

Community Resource, Structure, or Value at Risk	Fuel Hazard Rating	Type of Treatment	Method of Treatment
Historical sites throughout South Kona	MOD-HIGH	Mechanical, hand labor, chemical, fuels conversion	Weed whip, mow, hand-pull, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant plants.
Roadsides	MOD-HIGH IF UNMANAGED	Mechanical, hand labor, chemical	Continue roadside treatment: mowing, herbicide spray, weed whip. Where appropriate convert fuels to fire-resistant plants that do not require little or no maintenance.

The photos below provide examples of hazardous fuels and wildfire risk in the South Kona area.

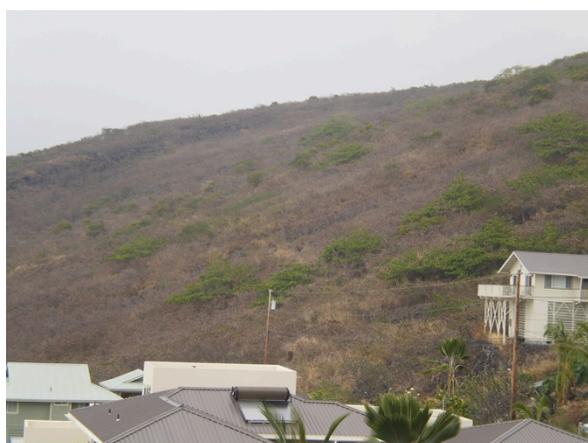


Photo 6. The wildland-urban interface in the coastal communities of South Kona has steep terrain, limited access for suppression, dry hazardous fuels, and little to no water resources. Wildfires can spread quickly, threatening lives and homes.



Photo 7. Unmanaged vegetation in between houses (pictured above) can carry wildfires rapidly through neighborhoods.

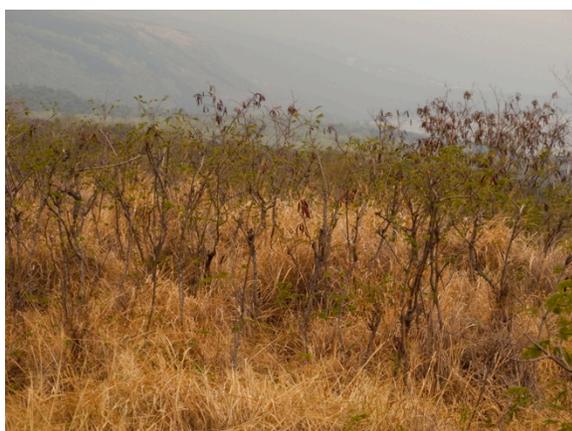


Photo 8. (Left) Low-elevation fuels in South Kona include grasses and shrubs. Seedpods from burning *Haole Koa* (in foreground) create flying embers that can ignite areas miles away. Note the hazy conditions in background, caused by smoke blown toward the coast from upland fires.



Photo 9. Green waste dumping along roadsides substantially increases fire hazard and likelihood of roadside ignition.



Photo 10. (Above) Evidence of fire in unmanaged roadside fuels is found throughout the South Kona area. Pictured above: Napo'opo'o Road.



Photo 11. (Above) Continued roadside fuels management on Highway 11 is a priority wildfire mitigation action for South Kona.



**Photo 12. (Left)
Photo 13. (Right)**

Reducing fuels around homes, in vacant lots, and along roadsides is also a priority action for wildfire mitigation in South Kona. Wildfire can spread easily and rapidly through unmanaged fire fuels on personal properties such as these.



Reducing Structural Ignitability

A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures. Individuals and community associations can reduce structural ignitability throughout their community by taking the following measures recommended by the Firewise program as outlined below. However, because the most endangered dryland forest in the world and critical habitat are in Kona, it is highly recommended that individuals and communities consult with dryland foresters or biologists before clearing trees and significant amounts of vegetation.

Recommendations for reducing structural ignitability:

- Create a buffer zone of defensible space around a property of at least 30 feet or to the property line if the house has less than 30 feet of yard. Remove flammable vegetation and combustible growth within 30 feet of the house.
- Prune tree limbs 6 – 10 feet above the ground.
- Space trees and shrubs ten feet apart in the yard.
- Make sure that plants closest to the house are low-lying.
- Whenever possible use fire-resistant Native Hawaiian species. Succulent plants are also good choices for converting fire fuels into Firewise landscaping.
- Routinely remove dead leaves and other organic matter from the yard.
- Sweep and/or clean gutters, eaves, and roofs regularly to prevent the build-up of leaves and other matter.
- Use fire-resistant building materials for the roof, siding, and decks, such as metal, stucco, tile, brick, and cement.
- Install firebrand-proof ceiling vents to prevent structure fires caused by wind-blown firebrands.

ACTION PLAN

The South Kona CWPP Action Plan follows the guidelines for HFRA:

- Step 7a- Develop and Action Plan
- Step 7b- Develop an Implementation and Maintenance (Assessment) Strategy
- Step 8- Finalize Plan

South Kona CWPP Action Plan

The South Kona CWPP Action Plan was developed through an analysis of the issues identified in the risk assessment, community and agency meetings, and through a review of other Community Wildfire Protection Plans. Federal, State, and County agencies, and private landowners were invited to submit projects that provide protection and reduce risk. The community concerns and action items listed above served as the basis for the projects listed below that will guide hazard reduction efforts in the future.

Landowners and agencies are invited to continue to submit projects that provide community protection and mitigate wildfire risk. HWMO and the Big Island Wildfire Coordinating Group intend to meet annually to evaluate progress on projects and mutually agree on treatment priorities. Additional projects will be displayed as appendices in updated versions of this plan.

The following table lists initial projects suggested to address community hazard reduction priorities.

Project	Agency	Funding Needs	Time-table	Community Recommended
Install of pre-staged static water and helicopter dip tanks	Multiple Agencies: federal, state, county, and private	Cooperative Funding \$828,000	2011-2013	Yes
Reduce and/or convert fuel load along roadsides, community open areas, and individual homes	Multiple Agencies: county	Cooperative Funding \$850,000	2010 - 2014	Yes
Create development standards and conduct community planning that requires the mitigation of wildfire risks	Multiple Agencies: county and state	Cooperative Funding \$150,000 for outreach, any needed impact studies and education		Yes
Increase mapping technologies and capabilities for fire agencies	Multiple Agencies: federal, state, county, and private	Cooperative funding: \$100,000	2010-2013	Yes
Install street signage identifying evacuation routes	Multiple Agencies: federal, state, county, and private	Cooperative Funding \$50,000	2010 - 2014	Yes

Project	Agency	Funding Needs	Time-table	Community Recommended
Develop emergency staging areas within communities, promoting awareness of such areas within the community, including holding mock disaster drills	Multiple agencies: private	Cooperative Funding \$33,000 for planning and outreach	2010 - 2012	Yes
Reduce, control, and or convert of invasive species	Multiple Agencies: federal, state, county, and private	Cooperative Funding \$1,500,000 includes maintenance, grazing, and conversion projects	2008 - 2012	Yes
Continue fire prevention education and outreach, including arson prevention education	Multiple agencies: federal, state, county, and private	Cooperative Funding \$30,000	2010 - 2014	Yes
Increase effective integrated communication and initial attack protocol between federal, state, and county fire suppression agencies	Multiple agencies	Cooperative Funding \$150,000	2010 - 2014	Yes

Plan Implementation and Maintenance

The Healthy Forest Restoration Act (HFRA) requires that the Hawai'i County Fire Department, the Hawai'i County Civil Defense Department, and the Hawaii Department of Land and Natural Resources all agree on the final contents of the South Kona CWPP. The plan will be signed by each agency in order to meet HFRA and FEMA requirements. Because of the non-regulatory nature of the CWPP, the relevance and effectiveness of the South Kona CWPP will rely heavily upon community initiative and involvement. Expertise, technical support, and implementation assistance will be provided by the appropriate agencies and organizations involved in fire issues in the South Kona Area.

Hawaii Wildfire Management Organization, in cooperation with the Big Island Wildfire Coordinating Group, will provide technical support, identify and coordinate funding, and serve as a centralized resource for wildfire risk reduction efforts for South Kona. Together, representatives will prioritize and recommend funding for projects, document the successes and lessons learned from those projects, and evaluate and update the CWPP as needed.

Many South Kona CWPP action items will require continuing support for wildfire risk mitigation projects. This will involve actively pursuing funding for projects, staying informed and in contact with one another, and updating the CWPP regularly so that it remains a "living" document. Continuing to build community awareness and fostering community ownership of these issues and actions will assist with creating support for individual and community investment in projects.

Finalize Plan

The following County, State, and Federal representatives have a high level of interest in the protection of the South Kona area from wildfire, and have reviewed and support this CWPP. Contact information for principal government stakeholders is listed below.

Federal:

Pohakuloa Training Area (U.S. Army)

Eric Moller, Deputy Fire Chief
USAG-HI, DES, FES
Box 4607, Hilo, HI 96720
(808) 969-2447/2448
eric.moller@us.army.mil



Hawaii Volcanoes National Park

Joe Molhoek, Pacific Island Fire Mgmt. Officer
PO Box 52, HNP, HI 96718
(808) 985-6042
Joe_Molhoek@nps.gov



State:

**Department of Land and Natural Resources:
Division of Forestry and Wildlife**

Wayne F. Ching, State Protection Forester
1151 Punchbowl St., Room 325, Honolulu, HI 96813
(808) 587-4173
Wayne.F.Ching@hawaii.gov



County:

Hawaii Fire Department

Fire Chief Darryl Oliveira
25 Aupuni St., Hilo, HI 96720
(808) 981-8394
Hcfdfl@co.hawaii.hi.us



County:

Hawaii County Civil Defense

Quince Mento, Civil Defense Administrator
920 Ululani St., Hilo, HI 96720
(808) 961-8229
qmento@co.hawaii.hi.us



The Signature Page presented at the beginning of this document demonstrates the required multi-agency participation and acknowledgement of this plan.

REFERENCES

- ⁱ **Healthy Forests Restoration Act of 2003– HR 1904. US Federal Register.**
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:h1904enr.txt.pdf
- ⁱⁱ **Kona Community Development Plan. 2008**
<http://www.hcrc.info/community-planning/north-and-south-kona-cdp/cdp-final-drafts/>
- ⁱⁱⁱ **Hawaii County Multi-Hazard Mitigation Plan, 2003**
<http://co.hawaii.hi.us/cd/mmp/main.html>
- ^{iv} **Adapted from Linn County Community Wildfire Protection Plan, ECONorwest, September, 2007**
https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/5795/Linn_County_Wildfire_Plan.pdf?sequence=1
- ^v **County of Hawaii Drought Mitigation Strategies, 2004**
<http://hawaii.gov/dlnr/drought/preparedness/HawaiiDroughtMitigationStrategies.pdf>
- ^{vi} **Ka‘u to South Kona Water Master Plan, 2004**
http://www.co.hawaii.hi.us/info/projectsarchive/k2skwmp/finalrpt/WMPFinal_Sept2004.pdf
- ^{vii} **State Drought Plan and the County Drought Mitigation Strategies**
<http://hawaii.gov/dlnr/drought/preparedness.htm>
- ^{viii} **State of Hawaii Multi-Hazard Mitigation Plan, 2007**
http://www.scd.state.hi.us/HazMitPlan/executive_summary.pdf
- ^{ix} **Big Island Wildfire Coordinating Group**
http://www.state.hi.us/dlnr/dofaw/fmp/biwcg_charter.htm#Duties