September 12, 2023

MEMO TO: ADEPT-1(9) File

F R O M: Gabe Johnson, Chair
Agriculture, Diversification, Environment, and Public Transportation Committee

SUBJECT: **TRANSMITTAL OF INFORMATIONAL DOCUMENT RELATING TO RESILIENT LANDSCAPES AND SUSTAINABLE FUEL MANAGEMENT** (ADEPT-1(9))

The attached informational document pertains to Item 1(9) on the Committee's agenda.

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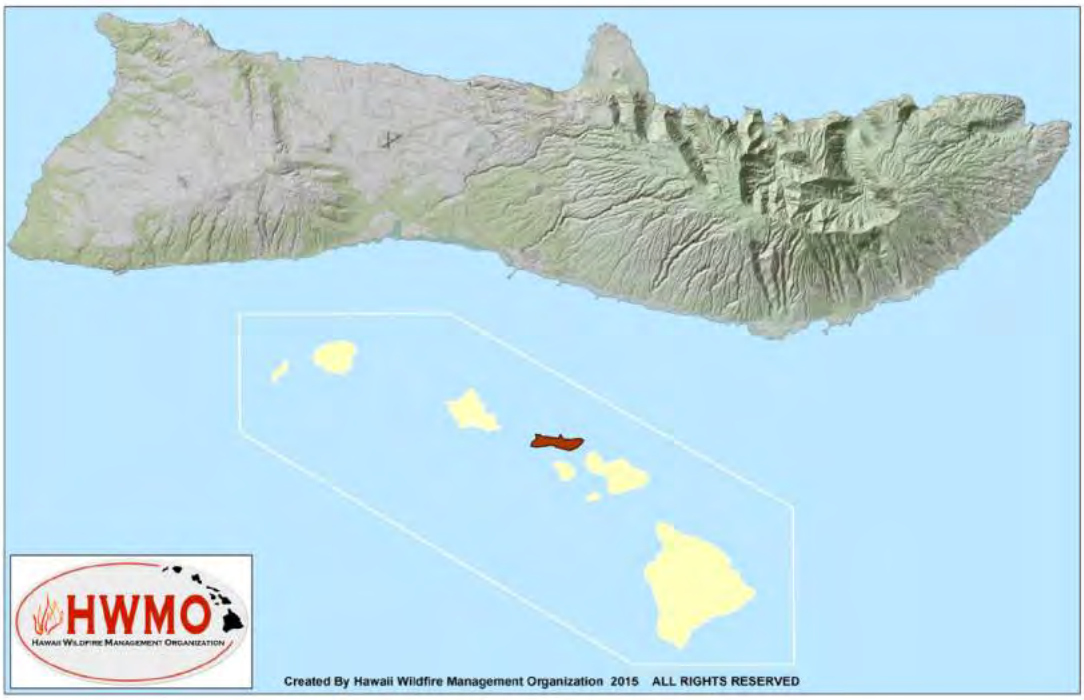
Attachment

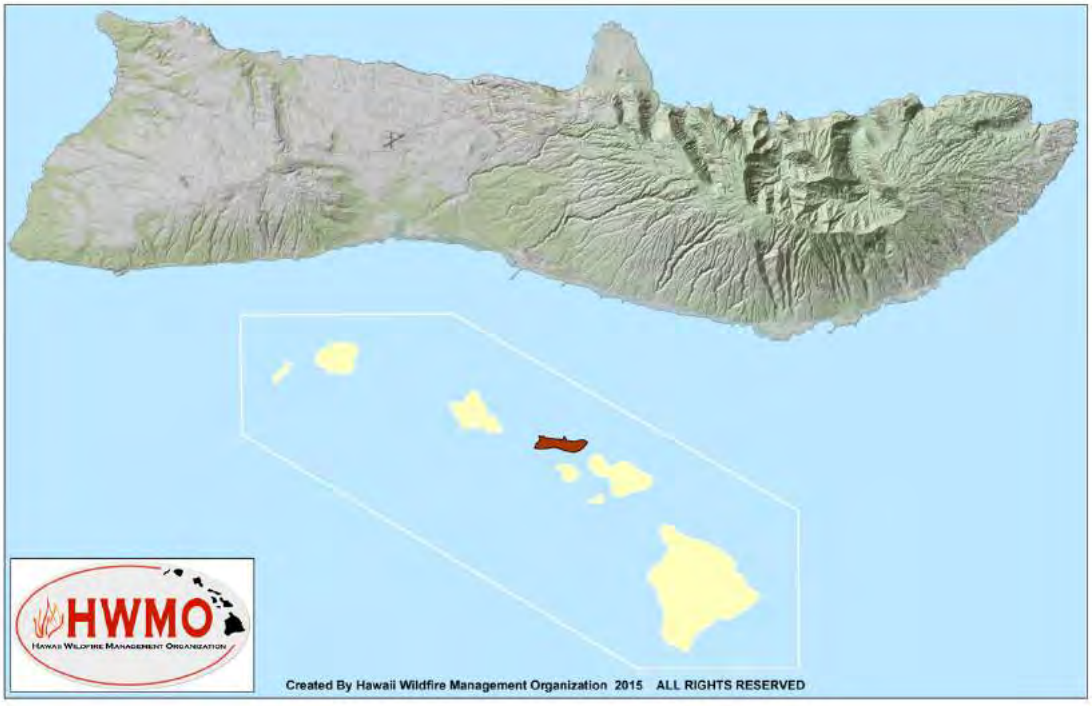
Community Wildfire Protection Plan



Moloka'i

2016

MOLOKA‘I
COMMUNITY WILDFIRE PROTECTION PLAN



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HWMO
HAWAII WILDFIRE MANAGEMENT ORGANIZATION

IN PARTNERSHIP WITH:

MOLOKA‘I FIRE TASK FORCE; DEPARTMENT OF LAND AND NATURAL RESOURCES-DIVISION OF FORESTRY AND WILDLIFE; MAUI FIRE DEPARTMENT; AND COUNTY OF MAUI CIVIL DEFENSE AGENCY

Molokai Fire Task Force

ACKNOWLEDGEMENTS

Project Developed and Coordinated by: Hawai'i Wildfire Management Organization (HWMO), a 501 (c)3 nonprofit organization dedicated to protecting communities and natural resources in Hawai'i and the Pacific from wildfire. hawaiiwildfire.org

Project Carried Out in Close Partnership with: Molokai Fire Task Force, which includes Maui Fire Department, The Nature Conservancy, State of Hawai'i (Department of Land and Natural Resources-Division of Forestry and Wildlife, Department of Hawaiian Home Lands, Highways Division, Airports Division, Department of Human Services), Moloka'i Ranch, County of Maui (Public Works, P&R, Water), Moloka'i Irrigation System, Kawela Plantation, Maui Police Department, American Medical Response, National Park Service, Moloka'i EOC, Goodfellow Bros., and various community residents and professionals.

Plan written by: Elizabeth Pickett and Pablo Beimler, HWMO.

Public Input Process Coordinated and Led by: Elizabeth Pickett and Ilene Grossman, HWMO, and Lance De Silva, DLNR-DOFAW, with assistance and participation from the Moloka'i Fire Task Force.

Maps Created by: Orlando Smith, HWMO.

Special Thanks to: Lance De Silva, Department of Land and Natural Resources- Division of Forestry and Wildlife. Clay Trauernicht, University of Hawai'i, CTAHR.

Completed using funds from: 2014-16 US Forest Service Competitive Western WUI Grant from the Cooperative Fire Program of the U.S. Forest Service, Department of Agriculture, Pacific Southwest Region. In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, or disability. (Not all prohibited bases apply to all programs.) To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326 W. Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

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MUTUAL AGREEMENT SIGNATURE PAGE
MOLOKA'I COMMUNITY WILDFIRE PROTECTION PLAN

This Community Wildfire Protection Plan was developed for Moloka'i, Hawai'i by the Hawaii Wildfire Management Organization. This plan:

- Was collaboratively developed by agencies, entities, community members, and individuals with interest or jurisdiction in Moloka'i.
- Identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will mitigate wildfire in Moloka'i, Hawai'i.
- 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:

Jeffrey Murray, Fire Chief
Maui Fire Department

7/29/2016
Date

Anna Foust
Anna Foust, Emergency Management Officer
County of Maui Civil Defense

7/29/2016
Date

David G. Smith, Administrator
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife

1/9/17
Date

GOALS AND OBJECTIVES

This Community Wildfire Protection Plan (CWPP) was developed by the Hawaiʻi Wildfire Management Organization (HWMO) in partnership with the Molokaʻi Fire Task force. Its contents are a result of input, guidance, and support from federal, state, and county agencies and representatives, private resource management entities, community members, and decision makers concerned about wildfire issues in Molokaʻi. State of Hawaiʻi Department of Land and Natural Resources- Division of Forestry and Wildlife (DLNR-DOFAW) facilitated much of the effort to coordinate stakeholders and contributors.

This plan includes 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 programs such as the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation program and the National Fire Plan (NFP).

The goals and objectives of this plan follow the intent and requirements of the *Healthy Forests Restoration Act (HFRA) of 2003 – HR 1904,* which describes a CWPP as a fire mitigation and planning tool for an at-risk community that:

- 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.
- 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.
- Recommends measures to reduce structural ignitability throughout the at-risk community.[1]

Stakeholder participants in the development of this plan agree that wildfire threats are imminent and can have widespread damage to Molokaʻi watersheds, natural resources, and human communities. The danger of fire is related to high numbers of human-caused fires, dry conditions, strong winds, and high fire potential of vegetation. In the last decade, numerous areas of Molokaʻi have burned. The CWPP is an important step toward supporting collaborative wildfire protection on Molokaʻi.

PLANNING AREA BOUNDARIES

The Molokaʻi CWPP planning area includes the entire island of Molokaʻi, which lies in Maui County, Hawaiʻi (Map 1).

The plan includes federal, state, county, and privately owned lands. The CWPP comprehensively defines the entire island of Molokaʻi as a WUI at-risk area. The simultaneous WUI designation and CWPP planning area is delineated to ensure adequate protection of natural areas and human communities from the threat of wildfire. The Molokaʻi planning area was chosen through agency meetings and addresses one of the Maui County's fire prone regions.

The Molokaʻi CWPP is part of a series of CWPPs in Maui County that also includes Western Maui, Upcountry Maui, South Maui, and Kahikinui. Additional CWPPs may be developed as communities gain interest in wildfire preparedness planning and as funds become available to complete the planning processes.

Map 1. *Molokaʻi CWPP Planning Area Map.*

PLANNING PROCESS, METHODS, AND PARTICIPANTS

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 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 by the HFRA, which requires the following actions during the planning process:

- Contact Decision Makers
- Involve Federal, State and Local Agencies
- Engage Interested Parties

This CWPP followed these guidelines and additionally satisfies the requirements of the FEMA Pre-Disaster Mitigation program and the NFP.

Photo 1. *Moloka'i Task Force representatives worked in small groups to identify and discuss wildfire related concerns and priority wildfire mitigation activities. Photo Credit: HWMO.*

PARTICIPANTS

State of Hawai'i and Local Agencies

The representatives of the State of Hawai'i and local agencies that have jurisdictional responsibilities in the vicinity of the Moloka'i CWPP planning area, and who have been involved in the development of the Moloka'i CWPP are:

Agency	Representative(s)
Maui Fire Department	Jeffrey Murray, Fire Chief
Hawai'i Department of Land and Natural Resources- Division of Forestry and Wildlife	Lance De Silva, Forest Management Supervisor I David G. Smith, Administrator Robert Hauff, State Protection Forester
County of Maui Civil Defense	Anna Foust, Emergency Management Officer
Additional agency members of the Moloka'i Fire Task Force	Maui Police Department, State Department of Hawaiian Home Lands, State Highways Division, State Airports Division, State Department of Human Services, County of Maui (Public Works, P&R, Water),

Table 1. *CWPP Participants: State of Hawai'i and Local Agencies.*

Federal Agencies

The following federal agencies (See Table 2) were consulted for area-specific and regional fire and environmental information and expertise:

Agency	Representative(s)
National Park Service (NPS)	James Courtright, National Park Service Fire Management Officer Ross Williams, National Park Service Fire Management Officer
US Fish and Wildlife Service (USFWS)	Dawn Bruns, Acting Assistant Field Supervisor Section 7 & Habitat Conservation Plans

Table 2. *CWPP Participants: Federal Agencies.*

Decision Makers

The decision-makers contacted for input and involvement in the development of the Molokaʻi CWPP are represented in Table 3.

Local Government	Name	Representing
Maui County Council	Stacey Crivello	Molokaʻi

Table 3. *CWPP Participants: Decision Makers.*

Photo 2*. Several agencies and private organizations worked together to recommend wildfire projects and next steps. Photo credit: HWMO.*

Photo 3. *Lance De Silva, DLNR-DOFAW, helped to facilitate the CWPP community and agency input. Photo credit: HWMO.*

Interested Parties

The parties from the Molokaʻi community that have shown interest in forest/fire management and contributed input into the Molokaʻi CWPP are:

Interested Parties	Affiliation
Molokaʻi Fire Task Force, non-agency private party representatives	The Nature Conservancy, Molokaʻi, Ranch, Molokaʻi Irrigation System, Kawela Plantation, American Medical Response, Molokaʻi EOC, Goodfellow Bros.
Private Citizens	General Public

Table 4. *CWPP Participants: Interested Parties.*

Photo 2*. The public at large was invited to participate in the process, and identified several concerns related to wildfire. Photo credit: HWMO.*

Photo 3. *Community ideas for wildfire protection projects were discussed among public meeting participants. Photo credit: HWMO.*

WILDFIRES IN MOLOKA‘I
BACKGROUND

Steep slopes, rough terrain, strong winds, and a large percentage of highly ignitable invasive grasses characterize the Moloka‘i landscape. This, coupled with warm weather, recurring drought conditions, changes in land use and maintenance, and a history of human-caused fires put the area at increased risk of wildfire. The proximity of development to high hazard fire-prone wildlands present hazardous conditions that now threaten Moloka‘i communities and natural resources. Overgrown vegetation close to homes, pockets of open space within subdivisions, and an increase of non-native high fire-intensity plants around developed areas pose increasing threats to commercial, community, environmental, and residential resources. Together, these factors create the fire environment that puts Moloka‘i at risk of wildfire. This section discusses those factors in detail.

FIRE ENVIRONMENT

CLIMATE

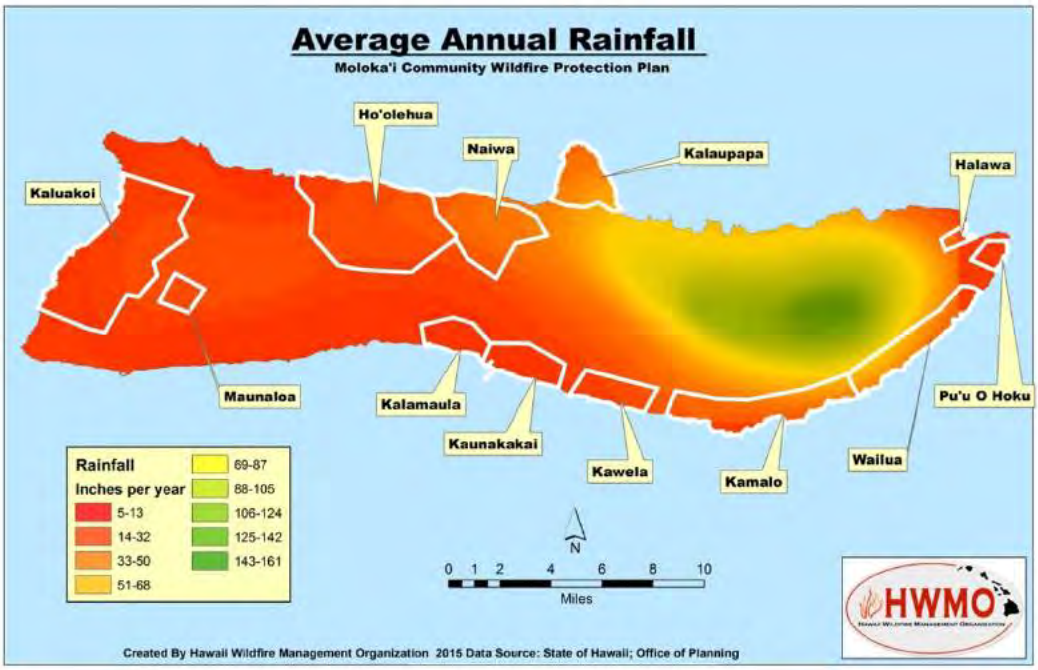
Wildfire occurrence in Moloka‘i is tied to broad climate patterns, in that more and larger fires typically occur according to a combination of low relative humidity, high winds, and/or drought conditions. Rainfall in Moloka‘i is variable over space and time and can greatly influence fire risk. For instance, there is a greater likelihood of large wildfires in the island’s lee areas, but broader areas are at risk during drought episodes. Wet periods also contribute to high hazard, in that precipitation may increase the quantity of vegetation that becomes fire fuel during drier periods. These climatic variables increase both fire risk and the frequency that mitigation measures such as firebreaks and fuels reduction need to be applied and maintained.

Daily and seasonal weather patterns also influence fire risk. Figure 1 provides monthly temperature and rainfall averages from the airport at Kaunakakai.[2] Maps 2 and 3 show typical geographic patterns of average rainfall and wind speeds across the island.

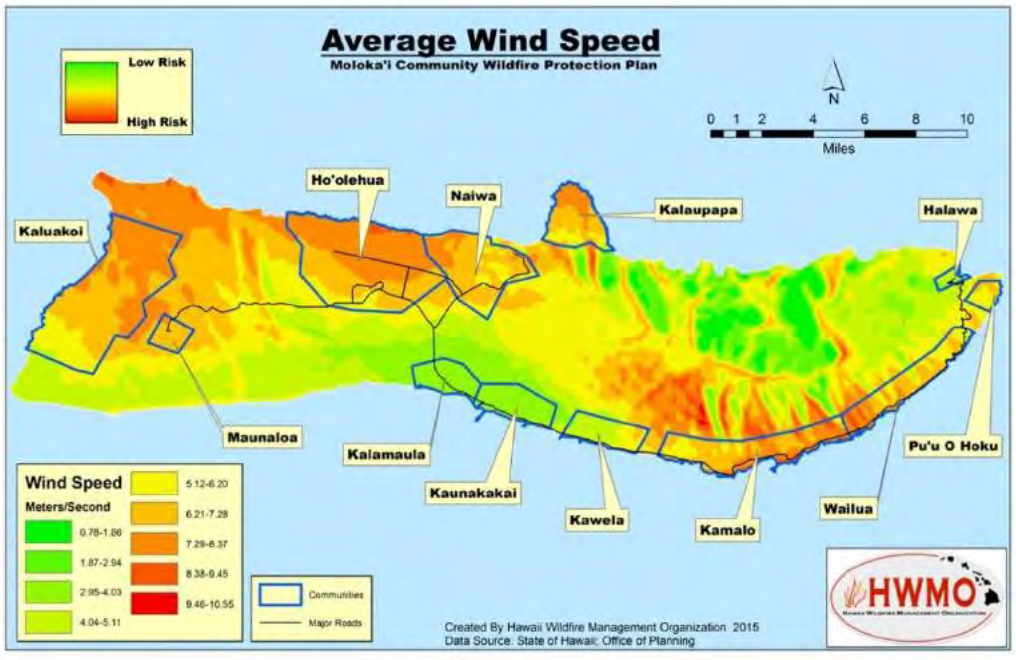
TOPOGRAPHY

Moloka‘i is characterized by a combination of residential, commercial, and agricultural areas, and rugged, often inaccessible terrain. This topography (see Map 4) creates dangerous conditions when wildfires occur and often limits the ability of emergency response agencies to effectively contain and suppress wildfires. Topography influences fire behavior, as wildfires spread more quickly as they progress upslope and drier areas burn at higher intensity. Moloka‘i’s diverse and steep topography also places constraints on emergency access and evacuation options for local communities. When wildfires spread, suppression

options are often limited by lack of access and difficult terrain, and can require costly aerial operations (i.e., bucket drops by helicopters).



Map 2. *Average annual precipitation map.*



Map 3. *Average wind speed map.*

Average Maximum Temperature

	°C	°F
Jan	25.2	77.4
Feb	25.2	77.4
Mar	25.8	78.4
Apr	26.3	79.3
May	27.5	81.5
Jun	28.3	82.9
Jul	28.9	84.0
Aug	29.6	85.3
Sep	29.7	85.5
Oct	29.0	84.2
Nov	27.5	81.5
Dec	26.0	78.8
Year	27.5	81.5

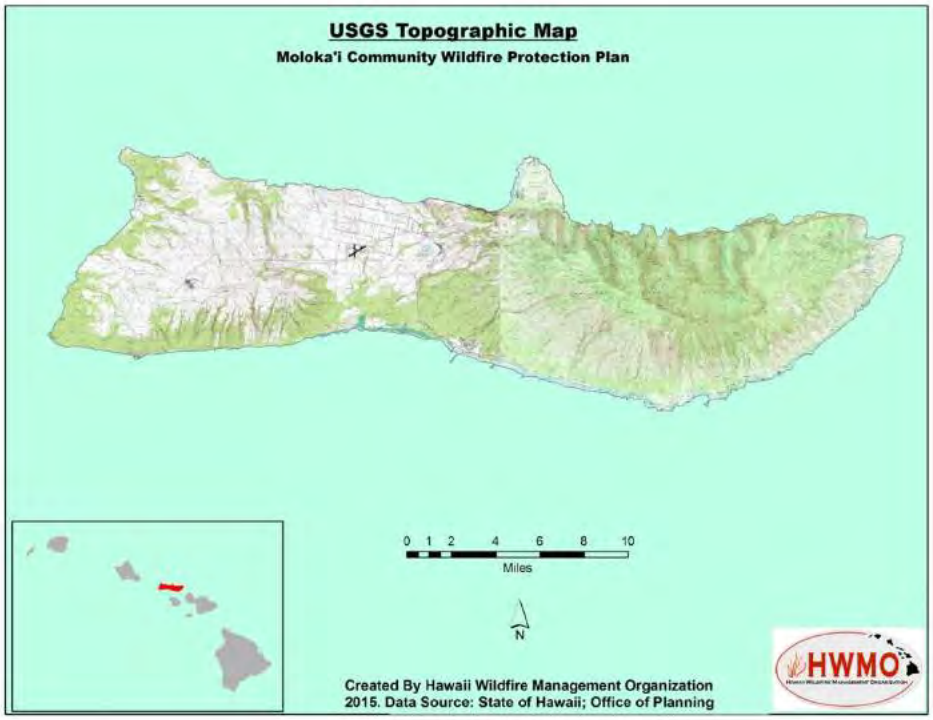
Average Minimum Temperature

	°C	°F
Jan	17.8	64.0
Feb	17.5	63.5
Mar	18.1	64.6
Apr	19.0	66.2
May	19.8	67.6
Jun	20.9	69.6
Jul	21.5	70.7
Aug	21.7	71.1
Sep	21.6	70.9
Oct	21.2	70.2
Nov	20.1	68.2
Dec	18.6	65.5
Year	19.8	67.6

Average Rainfall

	mm	inches
Jan	107.8	4.2
Feb	85.7	3.4
Mar	78.7	3.1
Apr	55.9	2.2
May	33.3	1.3
Jun	12.1	0.5
Jul	18.4	0.7
Aug	17.6	0.7
Sep	21.4	0.8
Oct	57.5	2.3
Nov	85.1	3.4
Dec	114.1	4.5
Year	688.6	27.1

***Figure 1**. Climate data from the Molokai Airport. Located at about 449 feet / 137m above sea level. Measurements represent a 25 year average.*[2]



Map 4. Topographic Map of Moloka'i CWPP planning area, based on US Geological Survey data.

VEGETATION AND NATURAL RESOURCES[10]

Moloka'i has areas that are agricultural areas, nonnative grasslands and shrublands, and mixed and native forests. Natural resources from forests to coral reefs face threats from the pressures of commercial operations, poor land-use planning and management, benign neglect, and positive feedback loops that include wildfires, which then exacerbate and perpetuate issues. For instance, over 90% of native lowland shrubland areas have been lost due to a series of land use practices (i.e. overgrazing, sugar and pineapple cultivation, and unmanaged fallow lands). This has led to invasion by nonnative species, which in many areas promotes large fires, leads to post-fire erosion that smothers coral reefs, and creates conditions on the landscape that promote further invasion by fire prone nonnative species.

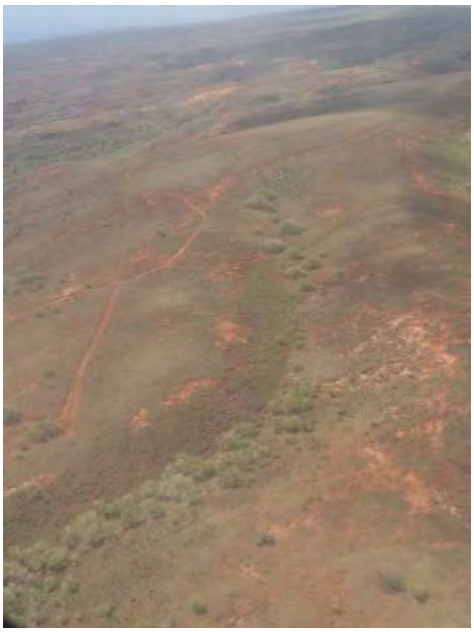


Photo 4. *Nonnative fire-prone grasses and shrublands, as well as areas of bare soil dominate are part of the fire environment of Moloka'i. Photo credit: HWMO.*

A few small areas of native lowland coastal dry forest and shrubland communities still exist in West Moloka'i, however the region is generally dominated by non-native vegetation such as Christmas berry, Kiawe, and several fire-promoting shrubs and grasses. These nonnative, fire-prone grass, shrub, and tree species provide abundant fine fuels that cure quickly in dry conditions, are easily ignitable even in humid conditions, and allow fires to spread rapidly, creating dangerous conditions for communities and fire responders. The widespread establishment of nonnative grasslands and shrublands is a leading cause of increased fire risk in Moloka'i. These species often act as uninterrupted 'wicks' that allow fires to spread from communities and roads (where ignition risk is highest) into areas that have contiguous fuels and more challenging access for firefighting efforts.

Photo 5. *Seasonal rain promotes the growth of grasses, which dry out and leave abundant and hazardous fine fire fuels. Photo credit: HWMO.*

The Kamakou Forest Reserve and the West End of the island both contain rare and endangered plant species as well as an important native dominated montane mesic forest and wet forest. Reforestation of native dryland forests is an

ongoing priority of local natural resource protection efforts. Drought episodes, fire, and invasive species are continuing challenges in these areas.

Erosion is a significant problem on the West End, with numerous bare soil areas that carry sediment into nearby waters during and after seasonal rain events. Wildfires can intensify erosion issues by removing soil-stabilizing plants and changing soil properties to become more erodible. The worst erosion and sediment pollution of nearshore waters occurs along the south shore from Punakou to Hālena, but the entire West End experiences erosion and sedimentation issues. Coral reef and marine ecosystem health are thereby quite connected to land use and management practices, as well as wildfire mitigation and post-fire soil stabilization.

Photo 6. *Erosion and land-based sediment pollution on coral reefs. Photo credit: HWMO.*

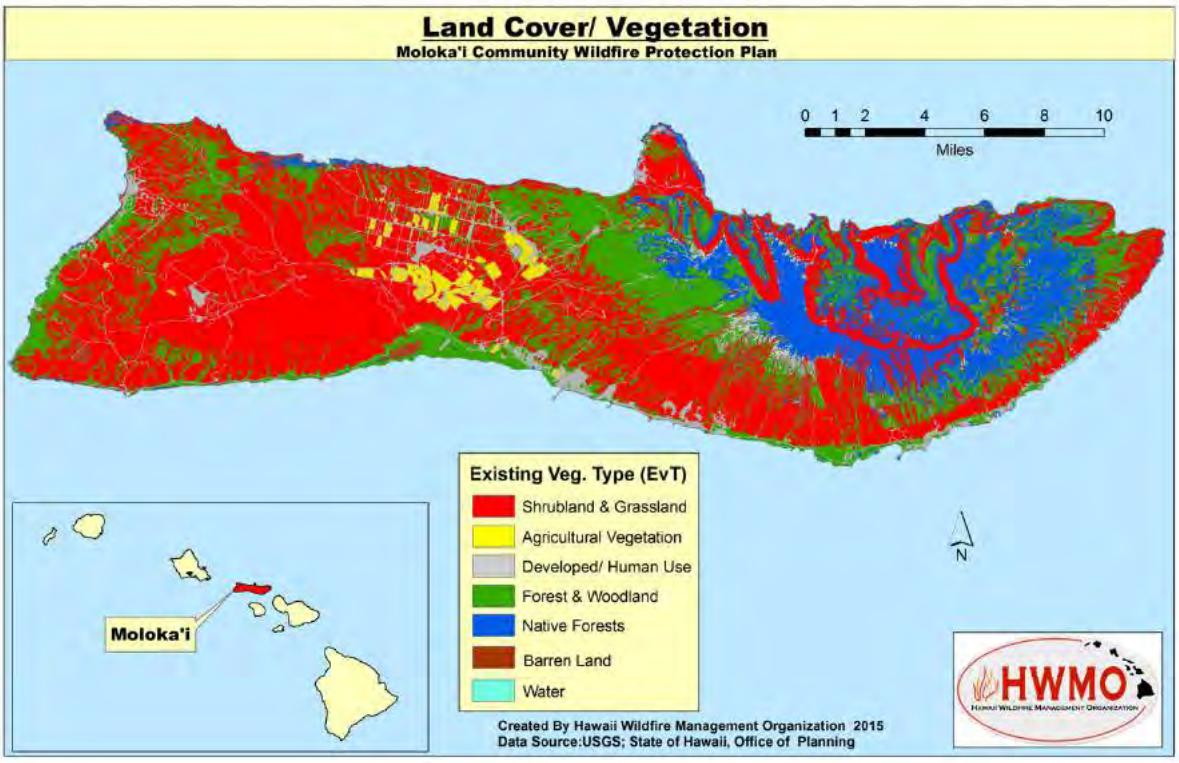
Maps 5-8 provide geographic details about the fire environment and natural resources of Molokaʻi:

Map 5- Land cover types and vegetation categories across the island.

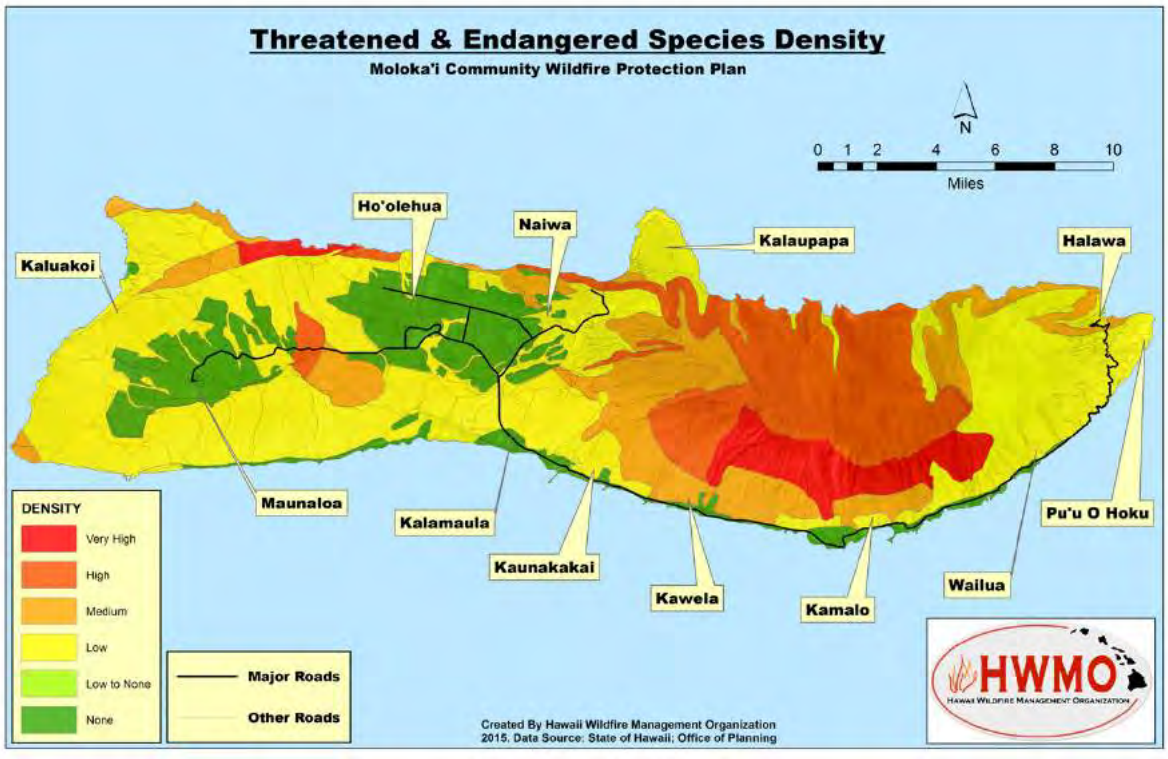
Map 6- Densities of Threatened and Endangered species.

Map 7- Areas classified by USFWS as priority habitat conservation areas.

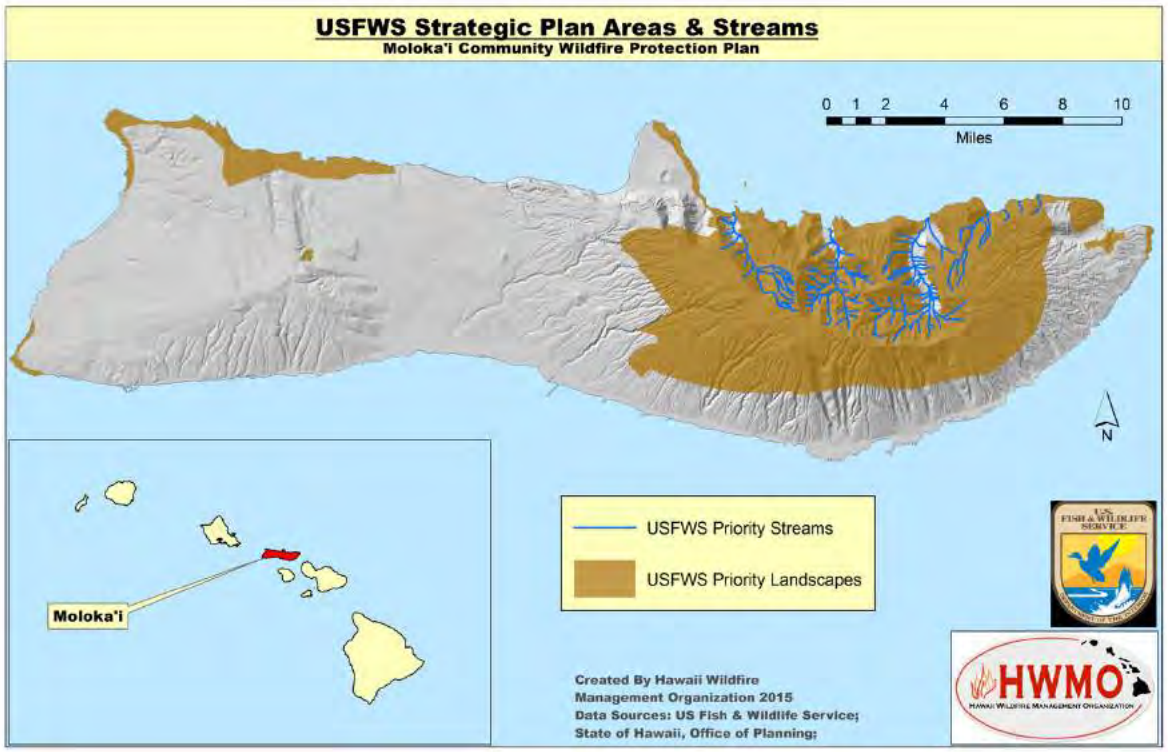
Map 8- Types of vegetation within the USFWS priority landscapes area.



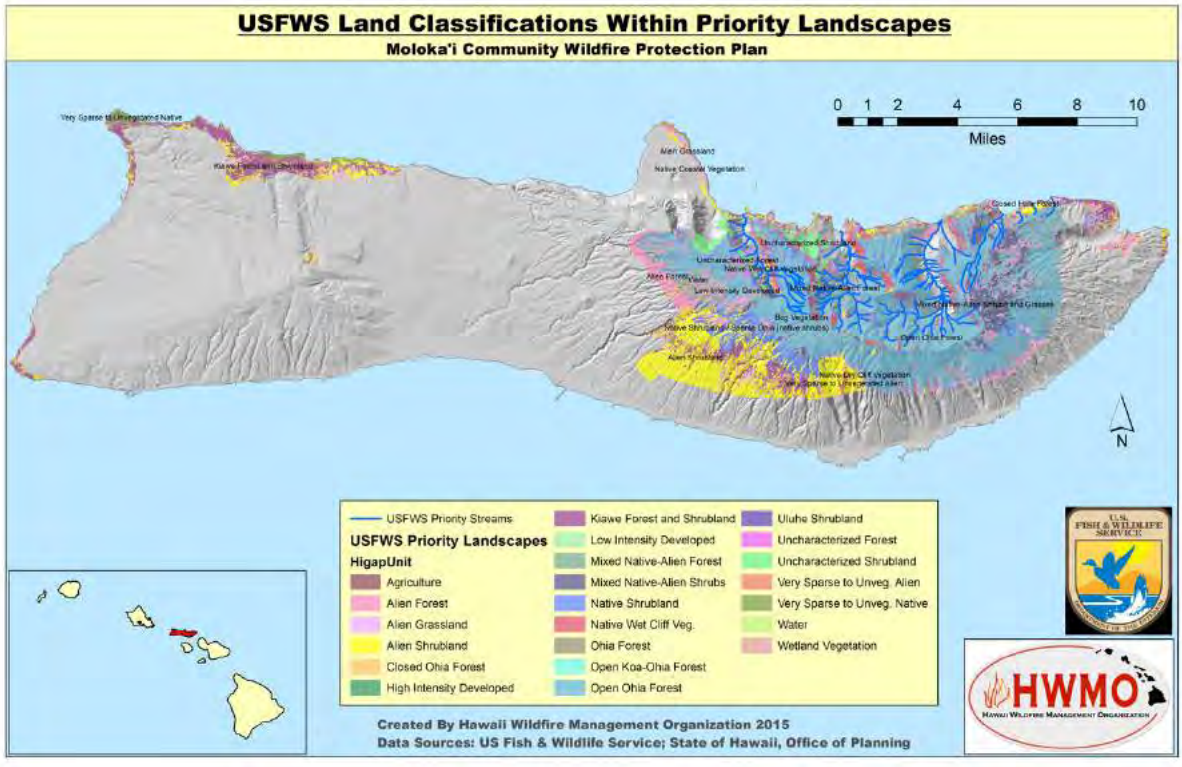
Map 5. *Land cover/ vegetation map for Moloka'i CWPP planning area.*



Map 6. *Threatened and Endangered Species densities map for the Moloka'i CWPP planning area.*



Map 7. *USFWS map of Priority Landscapes within the CWPP planning area.*



Map 8. *USFWS map of land cover type within their Priority Landscapes areas of Moloka'i.*

FIRE HISTORY

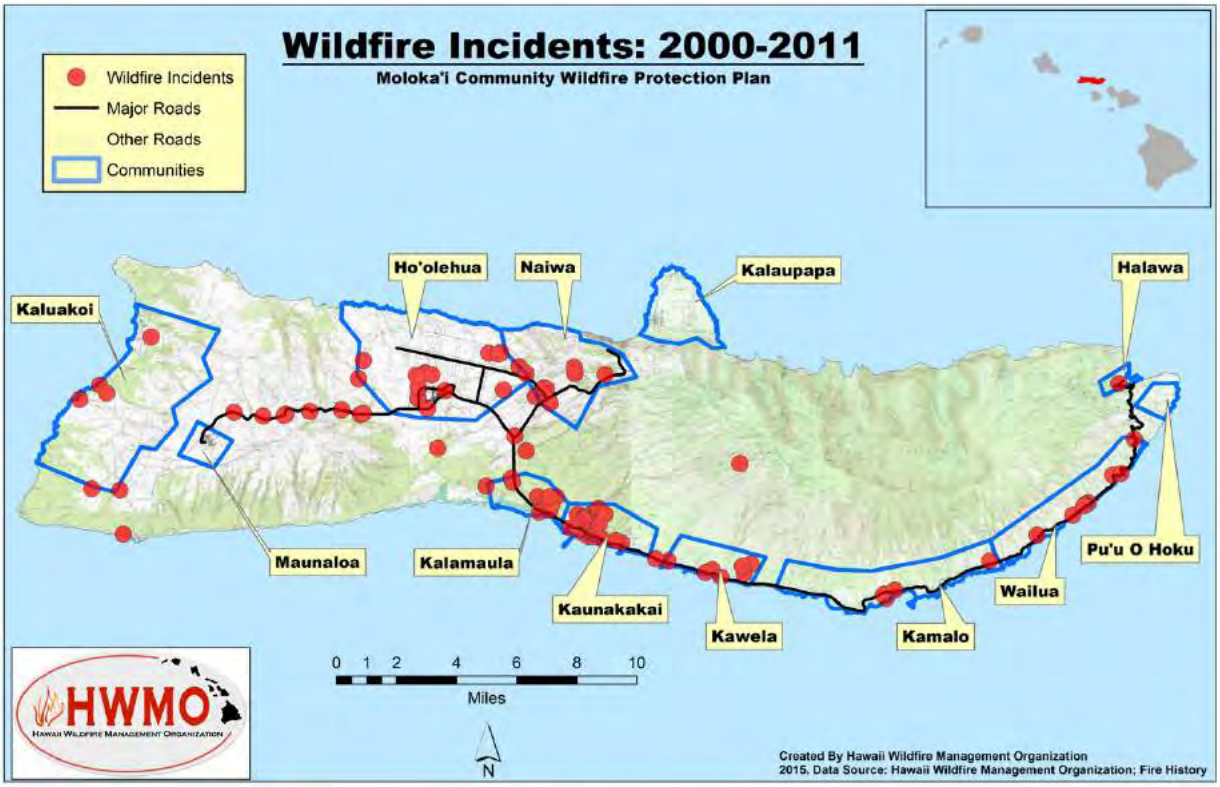
IGNITIONS

The WUI— the wildland-urban interface area along which developed areas, roads, and community infrastructure abut undeveloped land— is where the majority of wildfire ignitions occur in all of Hawai‘i. Moloka‘i CWPP is no exception. Because of this, WUI areas often experience the greatest risk of loss of property, life, and natural resource function due to wildfire. The majority of wildfires on Moloka‘i are caused by human error or arson, especially near developments, power line right of ways, and along roadsides. Additionally, sprawling dry nonnative grasslands surround many communities. These unmanaged fire fuels create a significant hazard. Once ignited along the interface, wildfire can spread rapidly through and around residential areas, threatening both property and life. Wildfires in lesser developed areas, fallow agricultural lands, and in the higher elevations also spread and threaten natural areas, and the native and protected species they may contain.

FIRE INCIDENT MAP

The Moloka‘i Wildfire Incident Map (Map 9) displays results from an HWMO-led effort to compile wildfire records from fire suppression agencies across the state, which resulted in a statewide wildfire database, as well as region-specific wildfire incident maps. It includes MFD’s documented responses to wildfires between January 2000 and January 2011 and wildfire ignition points recorded by DLNR-DOFAW from 1998-2012. The map displays ignition points, and does not indicate the final perimeter of burned areas.

Ignitions are important for understanding trends and patterns of fires. Map 9 demonstrates that WUI, roadside, and human access area fire starts are important trends across the island. While larger fires tend to occur in the drier areas with unmanaged vegetative fuels, the high frequency of ignitions along every WUI is of concern. As drought conditions become more frequent (and they are predicted to increase), there are concerns that large fires in dense unmanaged vegetation will correspondingly increase.



Map 9. *Moloka'i Fire Incident Map. Incidents recorded from 1988-2012. Note: points displayed are ignition sites only and do not indicate perimeter boundaries of burned areas.*

SIGNIFICANT FIRES

Several large wildfires (over 1000 acres) have taken place on Moloka'i. Detailed records are scant before 2000, but many since that time have received media attention or been noted for their significant impacts. Table 5 highlights the fires on record that were significant in terms of size, media coverage, or impact.

Incident Name	Location	Date	Acres	Cause	Property/ Vegetation	Notes
Molokai '98 or Kawela Flats	Kaunakakai (mauka of town)	Date Started: August 23, 1998 (4:32 p.m. first alarm) Date Contained: August 28, 1998 Date Controlled: August 29, 1998	12,453	Undetermined	Open land or field	HDF Cost: $250,975 Damage Costs: $43,502,300 Structures/ Homes Lost: 1
Kaunakakai	Kaunakakai (mauka of town) - Kikipua St.	Date Started: August 29, 2009 (12:02 p.m. first alarm) Date Contained: September 3, 2009 Date Controlled: September 7, 2009	7,800	Undetermined	Open land or field; Pine, native shrubs, kiawe, molasses grass	HDF Cost: >$75,000 Damage Costs: $1,410,000 Structures/ Homes Lost: 1
Keonelele Road	Kaunakakai - Keonelele Road	Date Started: June 4, 2007 (12:12 p.m. first alarm) Date Contained: June 6, 2007	1,000	Undetermined	Open land or field: Brush and grass	
Molokai '04	25 Moomomi Ave.	July 24, 2004 (10:40 a.m. - first alarm)	600	Accidental	Open land or field; brush or brush-and-grass mixture	
Molokai '03	Moomomi Ave.	June 25, 2003 (1:59 p.m. - first alarm)	400	Undetermined	Open land or field; brush or brush-and-grass mixture	
Molokai '08	Moomomi Ave.	March 29, 2008 (9:33 a.m. - first alarm)	350	Undetermined	Open land or field; brush or brush-and-grass mixture	
Molokai July '07	Maunaloa Hwy.	July 23, 2007 (7:30 a.m. - first alarm)	240	Undetermined	Open land or field; brush or brush-and-grass mixture	
Molokai '05	Maunaloa Hwy.	July 6, 2005 (4:17 p.m. - first alarm)	200	Undetermined	Open land or field; brush or brush-and-grass mixture	
Hoʻomalu	327 Hoomalu	January 29, 2012 (1:05 p.m. - first alarm)	150	Fireworks	Open land or field; brush or brush-and-grass mixture	
Launui	171 Launui St.	August 19, 2005 (10:31 p.m. - first alarm)	100	Undetermined	Open land or field; brush or brush-and-grass mixture	

Table 5. *Molokaʻi large and significant wildfires.*

Narrative accounts including published photos of these fires are provided below:

Molokai '98 or Kawela Flats Fire[3]

The island of Molokai's largest wildfire between 1998 and 2012 occurred in late August of 1998. Starting on August 23rd, the brushfire became destructive to native forests managed by The Nature Conservancy. The 2,775-acre Kamakou preserve lost dozens of acres of native ohia-pukiawe shrublands, one of the "few remaining intact examples" of one in the entire state. Ed Misaki, director of The Nature Conservancy's Molokai programs remarked at the time, "Walking through the burned area is very depressing. It's heartbreaking to see any part of our ancient forest destroyed by fire." Within six days, the fire was under control but a total of 12,453 acres were burned, including 1,584 acres of commercial forest.

Kaunakakai Fire 2009[4]

A combination of gusty winds, a dry landscape, and large expanses of abandoned agricultural lands created a difficult-to-control wildfire on August 29, 2009. Initially, the fire threatened dozens of homes and businesses in Kaunakakai, coming to within 20 feet of some residences. Many residents stayed to protect their homes with garden hoses despite evacuation calls from emergency responders. Maunaloa Highway, Molokai High School and Middle Schools, Kaunakakai Elementary School, and Kualapuu Elementary Public Charter School were all closed due to firefighting efforts.

Photo 7. *Fire crews battle the Kaunakakai Fire in 2009. Photo credit: Jeff Zuckernick/Honolulu Advertiser.*

Hard-to-reach valleys and gullies in the Makakupaia section of Molokai State Forest created challenging conditions for firefighters.

Photo 8. *Fire prone grasses such as these burning in the Kaunakakai 2009 fire, are both a cause and a result of wildfires on Moloka'i. They desiccate easily, spread fire rapidly, and regenerate quickly after wildfire. This leads to what is known as the grass-fire cycle. Photo credit: Honolulu Advertiser.*

The Kamakou Preserve, an important watershed home to native trees, plants, insects and birds was impacted by the fire. In total, 7,800 acres burned mostly in open fields, though 450 acres burned in commercial forest, according to DLNR-DOFAW fire records. Firefighters worked to create firebreaks to stop the fire from encroaching the forest preserves. A carport and an abandoned structure were

destroyed, but all others escaped loss or damage. One firefighter was treated for smoke inhalation during the firefighting efforts. FEMA funding was approved to cover a portion of the expensive firefighting costs.

Keonelele Road Fire 2007[5, 6, 7]

The Keonelele Road brush fire began on June 4th, 2007 on the makai side of Maunaloa Highway near mile marker 11 but quickly spread due to strong winds. "The wind (was) not helping us," explained Timmy Gapero, Police Lieutenant at the time. "It was really blazing," Gapero said. "It spread rapidly because of the winds."

Fortunately, the winds drove the fire away from homes but burned nearly 1,000 acres of brush. Some Kaluakoi residents lost power on the first night as the fire jumped Kaluakoi Road. Firefighters later to contained the 3-acre spot fire that was headed towards homes. Evening rains and additional personnel and resources from Maui helped put an end to the fire.

Photo 9. *Smoke and flames from the Keonelele Fire move across nonnative grass and shrublands. Credit: Leo Azambuja/Star-Bulletin.*

Figure 2. *Area burned by the Keokelele Fire. Credit: Honolulu Advertiser.*

WILDFIRE IMPACTS

Many of the community, economic, natural, and cultural resources in Molokaʻi are exposed to wildfire impacts. These impacts are compounded by the fact that land-based, aquatic, and marine-based natural and cultural resources all lie within close proximity across the region.

IMPACTS TO NATURAL RESOURCES

Across Hawaiʻi, recurrent wildfires result in the conversion of both native and nonnative forested areas to fire-adapted grasslands and shrublands – and are one of the reasons these fire-prone ecosystems are

expanding in many parts of the state. Wildfire is a major cause of the loss and degradation of native forest and other habitat. Most of the plant and animal species within native ecosystems in Hawai‘i do not survive and/or recover from wildfires. More generally, the conversion of forest from fire and the conversion of active agriculture into fallow unmanaged weed fields increases the potential for future and larger fires by expanding the availability of fine fuels.

Wildfire also increases the potential for erosion and sediment delivery from upland to coastal and nearshore areas. The immediate loss of vegetation after a wildfire directly exposes soils to rainfall, which can dramatically increase erosion. Wildfire can also alter the physical and chemical properties of soils, making them more prone to surface run-off which can increase downstream flooding and sediment delivery. Forest conversion to grassland due to recurrent wildfires over the long-term also alters water cycling. The replacement of deep-rooted trees by shallow, matted root systems of grasses results in a higher water table and reduces the ability of rainfall to infiltrate into the soil. This causes an increase in surface runoff during rainfall events and thus increases the risk of flooding and sediment delivery downstream.

Forest loss and increased downstream sediment delivery to nearshore reefs have important implications for cultural and civic resources, as well, in terms of tourism, recreation, food resources, and cultural practices. Sediment loading destroys reefs and impacts nearshore fisheries which are critical subsistence resources to many Maui families. Burned areas can remain closed to the public for days to months due to landslide and tree-fall danger, limiting access to areas for hiking, hunting, gathering plants, and tending cultural sites. Even when nearby fires do not have immediate or direct impacts on these resources, there are often indirect or longer term impacts. For example, suppression efforts, such as the use of bulldozers, can damage important landscape features and alter water flow patterns. Frequent fires also impact powerlines, communication infrastructure, and can lead to road closures – exacerbating already congested traffic areas.

IMPACTS TO COMMUNITIES AND MUNICIPAL ACTIVITIES

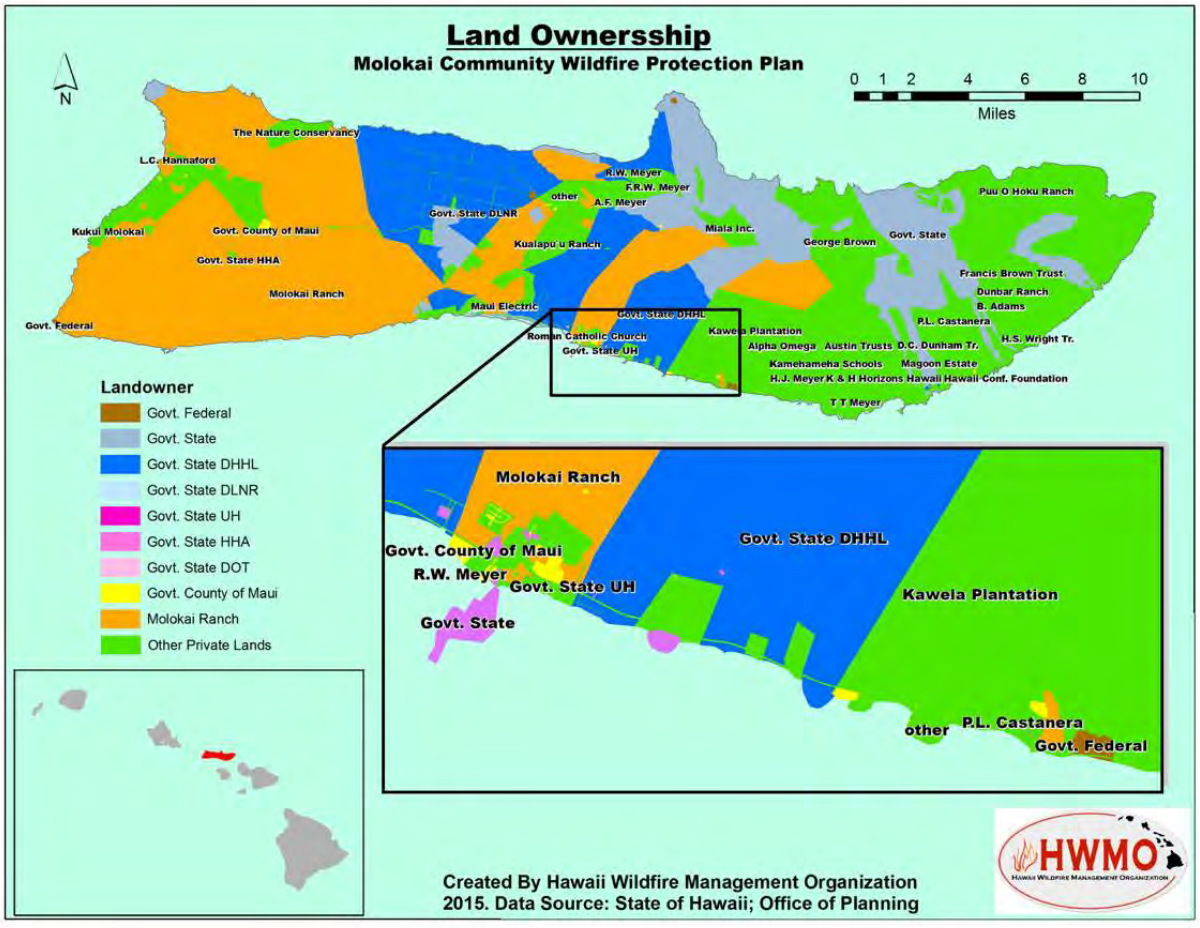
Wildfires threaten lives, homes, and human health in several ways. Many neighborhoods have unmanaged/untended fire fuels interspersed within developed areas, promoting fire spread through communities and into surrounding areas. This creates an increased hazard to lives and homes in the area. Air quality is greatly reduced from smoke during fires and for months to years after fire due to high levels of wind-born dust. This dust is due to fire-caused changes to soil that leaves it water-repellant, and therefore easily lifted into the air.

Wildfires also impact economic and municipal infrastructure and activities. Burned soil from wildfires decreases groundwater recharge, which can affect drinking water supplies. As noted above, post-fire rain

events cause erosion that damages nearshore resources (coral reefs, fisheries), which can have effects on one of the area's primary economic bases— coastal and marine-based tourism, as well as resident and visitor recreational activities. Traffic and road closures during fire events and post-fire flooding can block access routes and keep people from their homes and work, and are costly to local government.

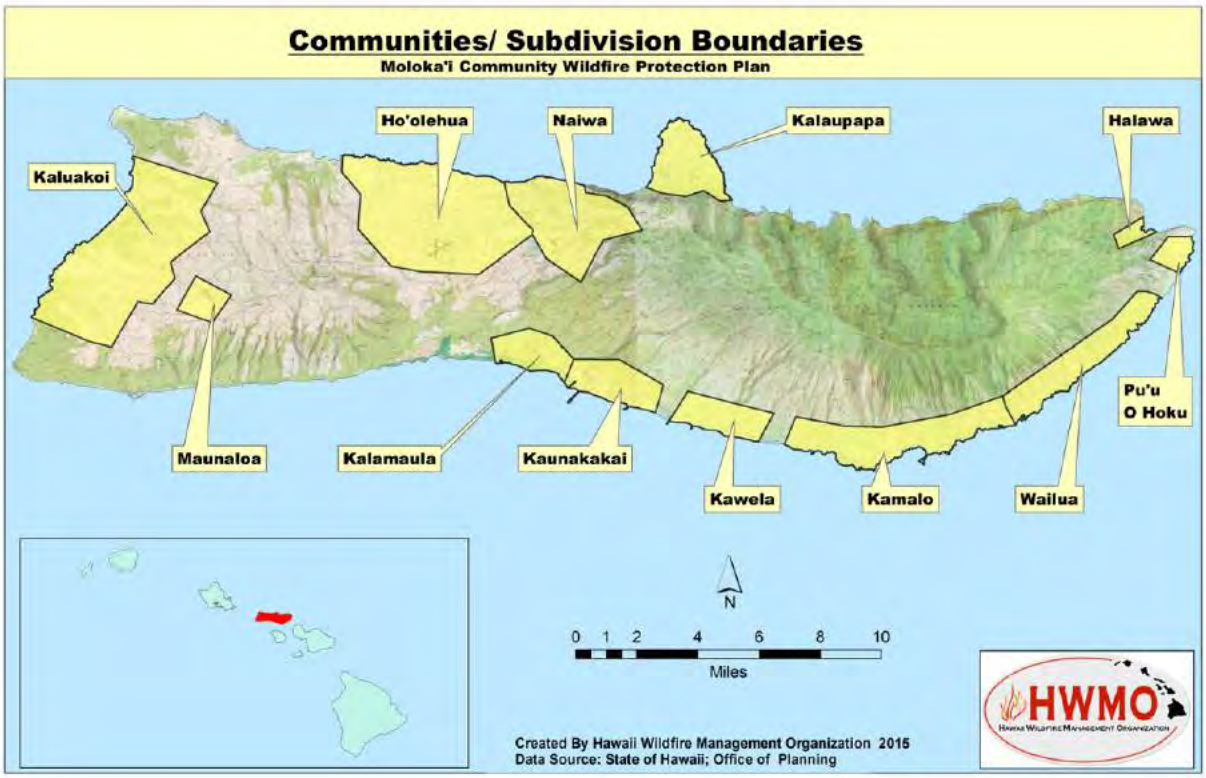
GENERAL OVERVIEW OF CWPP PLANNING AREA
MOLOKA‘I

The island of Moloka‘i includes federal, state, county, and privately owned lands (Map 10). The CWPP planning boundaries and the defined WUI at-risk area boundaries cover the entire island of Moloka‘i. The entire island was included to ensure adequate protection of both natural areas and human communities.



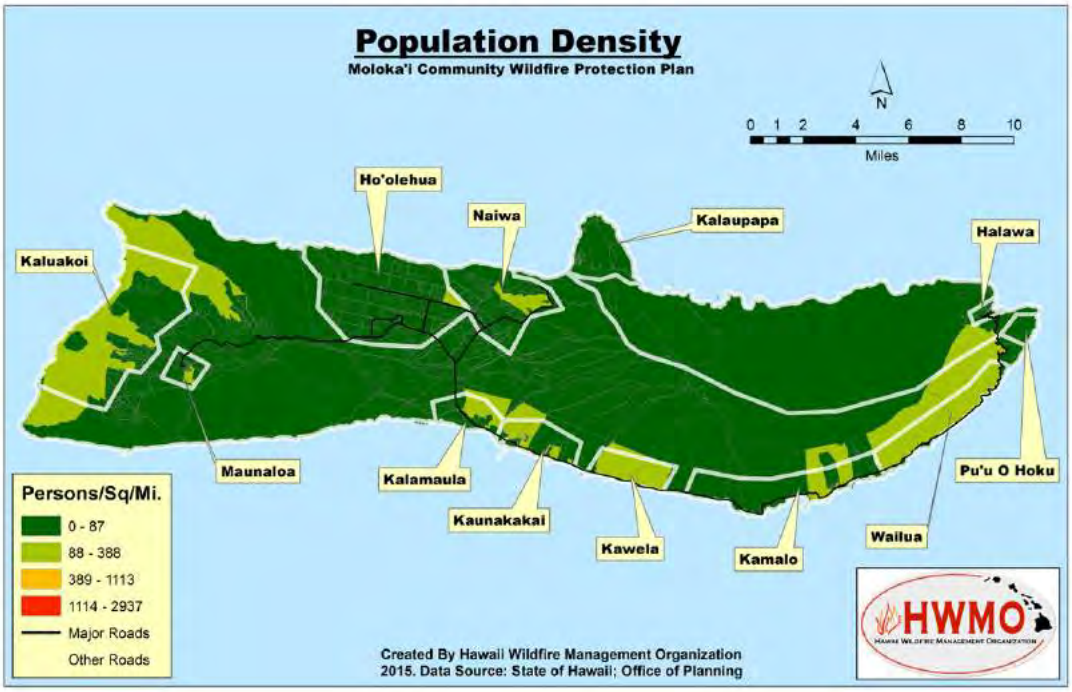
Map 10. *Land ownership map for Moloka‘i CWPP planning area.*

For the purposes of assessing hazards and wildfire threats to resources, residential areas on Moloka‘i were simplified into twelve “communities” (Map 11). The boundaries depict the areas determined by DLNR-DOFAW to have similar features in terms of wildfire hazard characteristics and have long been the boundaries used in DLNR-DOFAW‘s Communities at Risk from Wildfire maps, which are developed every few years to demonstrate wildfire threats to Hawai‘i’s (See *Communities at Risk from Wildfires* section, for more information and detailed hazard maps).

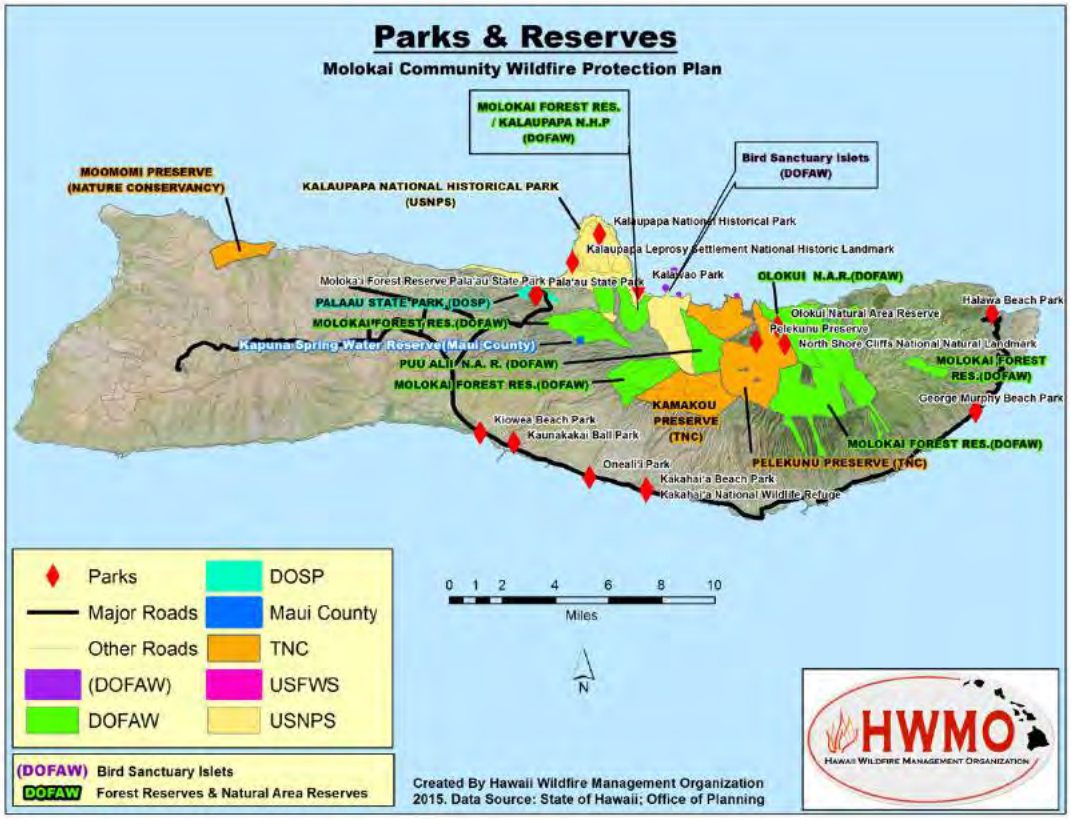


Map 11. *Simplified community delineations used within the Moloka'i CWPP planning area.*

Moloka'i exemplifies a WUI, in that it contains both undeveloped fire prone wildland areas adjacent to populated subdivisions and commercial areas (see Map 12). There are numerous community assets, resources, and infrastructural features at risk of wildfire in Moloka'i, to include civil, industrial, medical, educational, recreational, and environmental features. These are depicted on Maps 13-16. These features may or may not be directly threatened by the flames of wildfire, but all are subject to the broader impacts of wildfire, such as changes in water quality and availability, post-fire erosion and mudslides, smoke and dust, changes in access, traffic, and more.

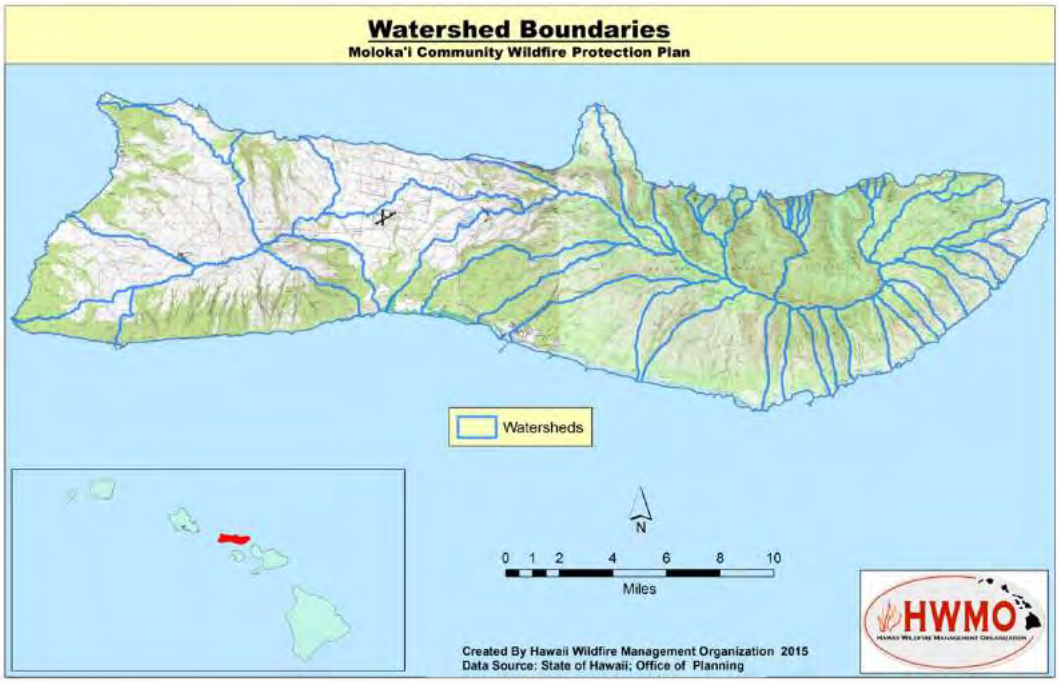


Map 12. *Moloka'i population density map.*

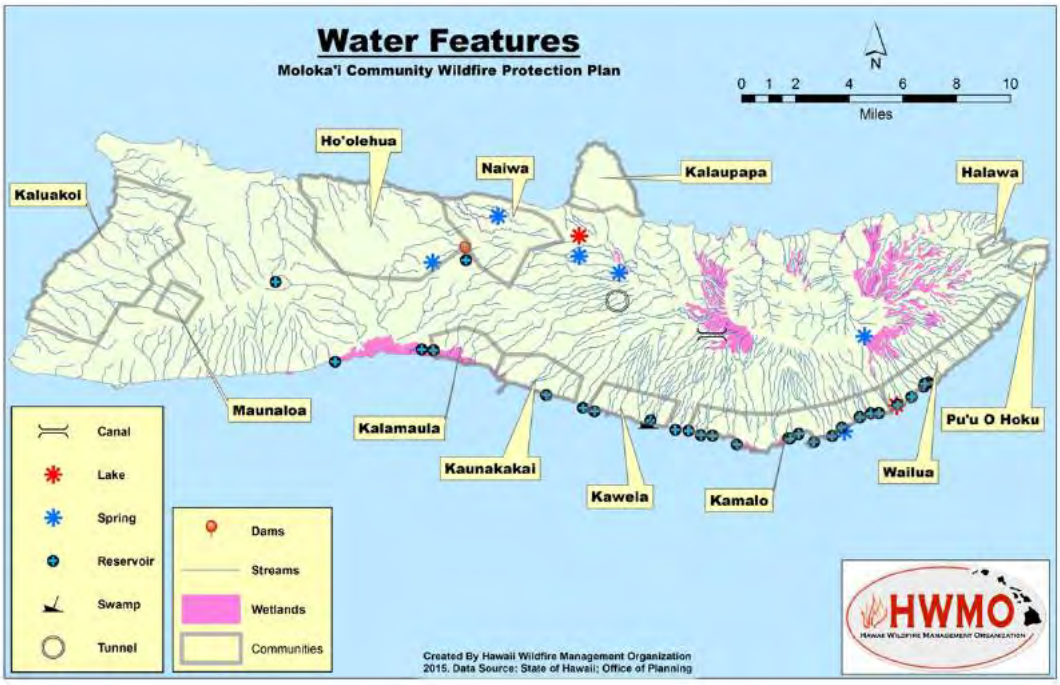


Map 13. *Parks and reserves on Moloka'i.*

Map 14. *Community/government service features on Moloka'i.*



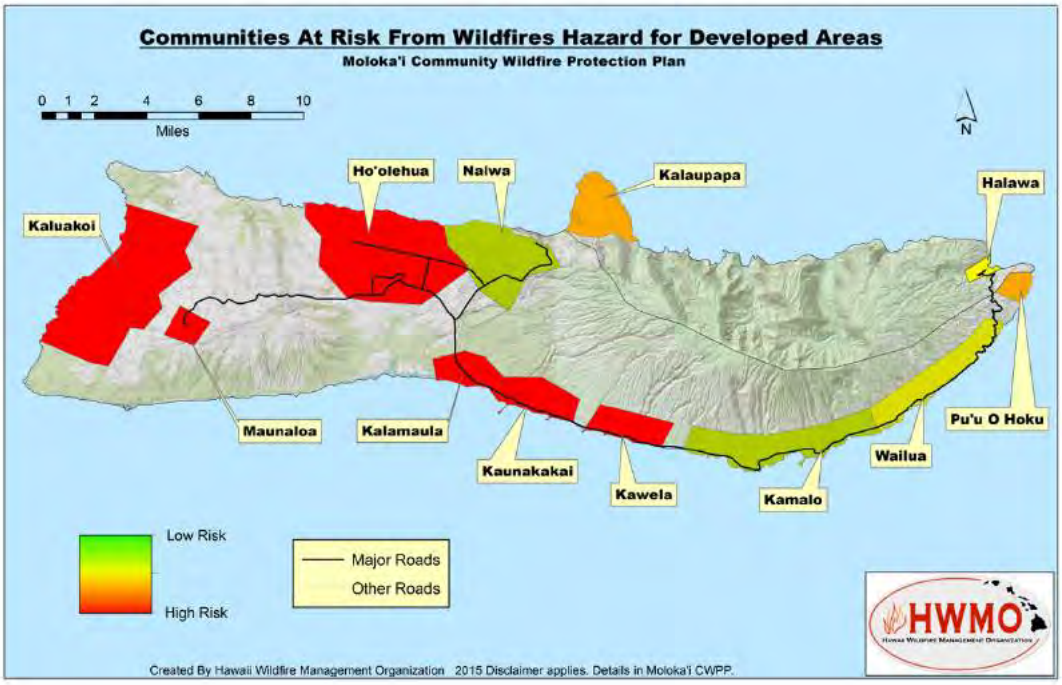
Map 15. *Watershed areas on Moloka'i.*



Map 16. *Water features in the Moloka'i CWPP planning area.*

COMMUNITIES AT RISK FROM WILDFIRE

Nationally, Communities at Risk from Wildfires (CARW) Maps delineate communities that share similar environmental conditions, land use characteristics, fuel types, hazards, and general wildfire issues, and provide ratings to characterize generalized hazards in each area. DLNR-DOFAW has been developing Hawai'i CARW maps for more than a decade, and has developed streamlined community boundaries for the purposes of the Hawai'i CARW map. In 2013, HWMO partnered with DLNR-DOFAW and the county fire departments across Hawai'i to update the Hawai'i CARW maps. The original community boundaries were replicated in the 2013 map update, with changes made to reflect current hazards and subdivision expansions. Map 17 depicts the hazard ratings for Moloka'i developed areas. It is important to note that many factors were weighed into developing the hazard level, so areas with like environmental conditions may be rated differently based on their differing assessments of hazards or protection factors, like ingress/egress, community Firewise activities, etc.



Map 17. *Moloka'i Communities at Risk from Wildfires Map- Overall weighted hazard ratings for developed areas based on 36 hazard characteristic ratings.*

WILDFIRE RISK ASSESSMENT

PURPOSE AND METHODS

The purpose of the required community risk assessment is to:

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

The methods for this plan's community wildfire risk assessment followed the guidelines established by the HFRA, which requires the following actions:

- Establish a Community Base Map (Maps 14-16 and 23).
- Develop a Community Hazard Assessment (see *Wildfire Hazard Assessment section*, Maps 18-22, and Appendix B).
- Identify Overall Community Priorities (see *Hazard Reduction Priorities* section).

The wildfire risk assessment also follows the guidelines and requirements of the FEMA Pre-Disaster Mitigation program and the NFP. Locally, we have opted to name the effort Wildfire *Hazard* Assessment, rather than Wildfire *Risk* Assessment.

WILDFIRE HAZARD ASSESSMENT

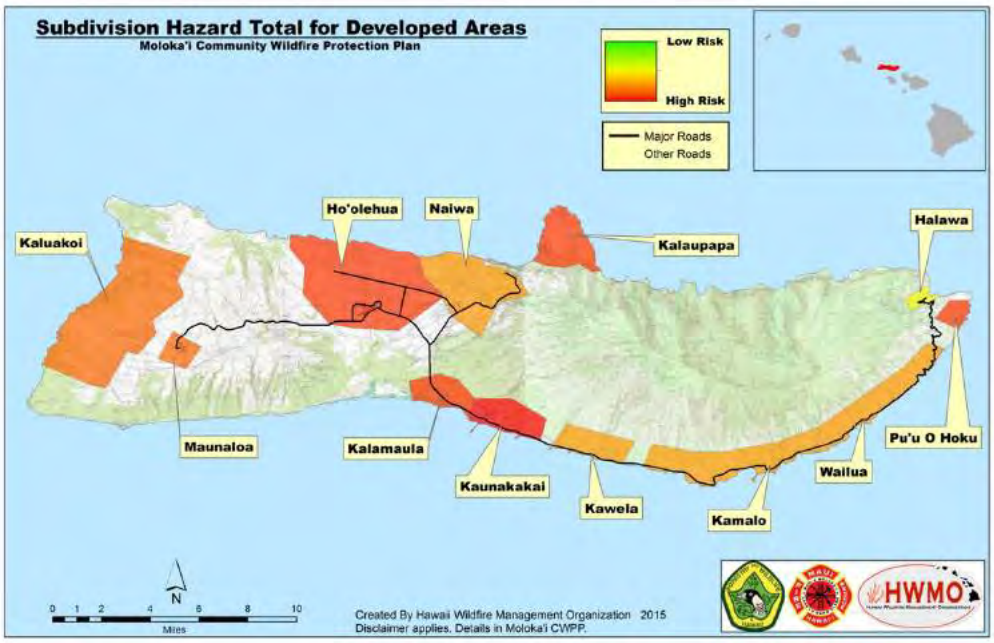
In partnership with DLNR-DOFAW and MFD, HWMO assessed the communities within Molokaʻi for 36 wildfire hazard characteristics, which have been further grouped into 5 categories. As described in detail above, community delineations for the assessment followed those for the CARW map. The five categories assessed for wildfire hazard are as follows.

- Subdivision Hazard
- Vegetation Hazard
- Building Hazard
- Fire Environment Hazard
- Fire Protection Hazard

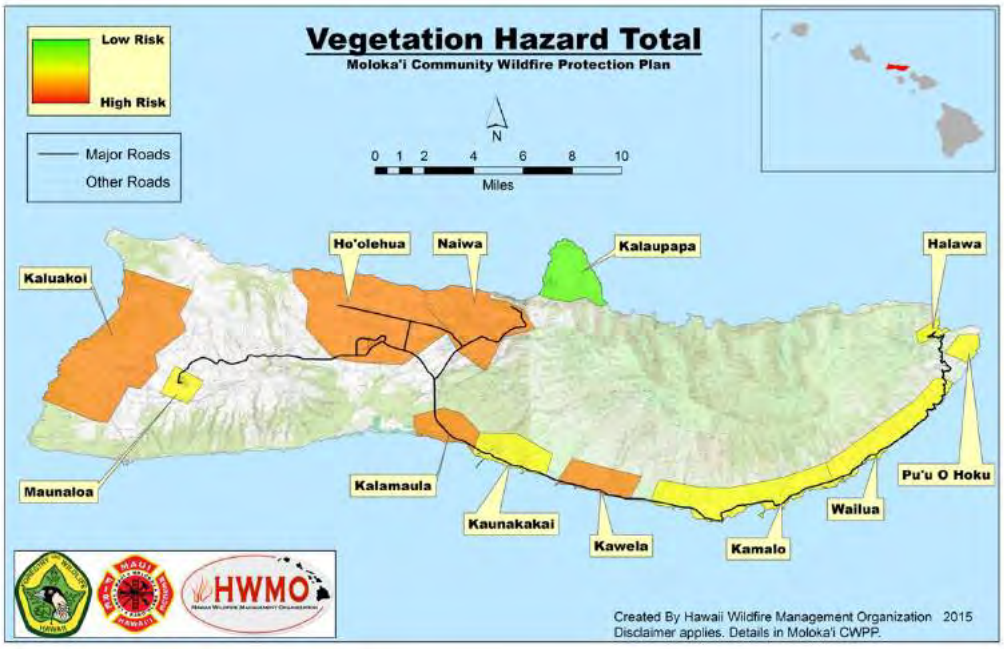
Maps are provided for each of the five categories, and demonstrate the total hazard per category based on a weighted calculation of that category's individual hazards, as detailed in Table 6.

Hazard Category	Individual Hazards Assessed (Maps for each individual hazard included in Appendix B)
Subdivision Hazard Total	• Fire Service Access • Home Setbacks • Ingress/Egress • Private Landowner Firewise landscaping & Defensible Space • Proximity of Subdivision to Wildland Areas • All Season Road Condition • Road Maintenance • Road Width • Street Signs • Structure Density • Unmanaged, Untended, Undeveloped Lands
Vegetation Hazard Total	• Defensible Space: Fuels Reduction Around Homes & Structures • Fuel Loading • Fuel Structure & Arrangement • Proximity of Flammable Fuels Around Subdivision • Vegetation Within 300' of Homes
Building Hazard Total	• Siding/Soffits • Roofing Assembly • Structural Ignitability • Under skirting Around Decks, Lanais, Post & Pier Structures • Utilities Placement; Gas & Electric
Fire Environment Hazard Total	• Average Rainfall • Prevailing Wind Speeds & Direction • Slope • Topographic Features that Adversely Affect Wildland Fire Behavior • Seasonal or Periodic High Hazard Conditions • Ignition Risk
Fire Protection Hazard Total	• Response Time • Community Planning Practices & Ordinances • Community Fire Safe Efforts & Programs Already in Place • Fire Department Structural Training & Expertise • Local Emergency Operations Group or Citizen Group • Proximity to Fire Stations • Water Source Availability • Wildland Firefighting Capacity of Initial Response Agency • Interagency Cooperation

Table 6. *Overview of hazard assessment categories and the individual hazards that comprise them.*

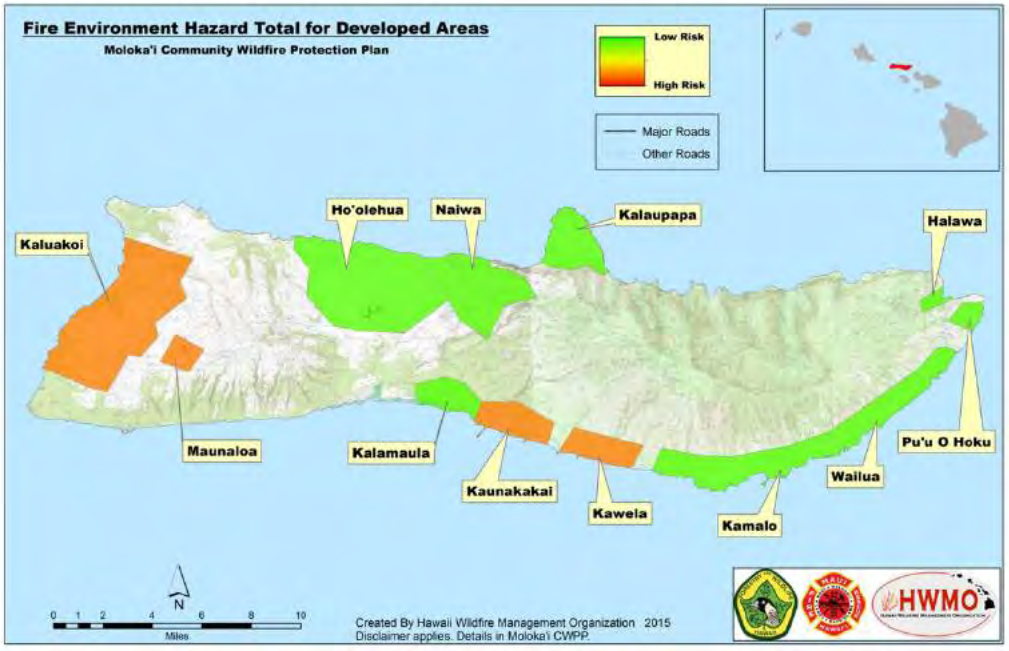


Map 18. Subdivision Hazard Total for Developed Areas of Moloka'i CWPP planning area. *Reflects hazard assessment findings related to the following categories: Fire Service Access; Home Setbacks; Ingress/Egress; Private Landowner Firewise landscaping & Defensible Space; Proximity of Subdivision to Wildland Areas; All Season Road Condition; Road Maintenance; Road Width; Street Signs; Structure Density; and Unmanaged, Untended, Undeveloped Lands.*

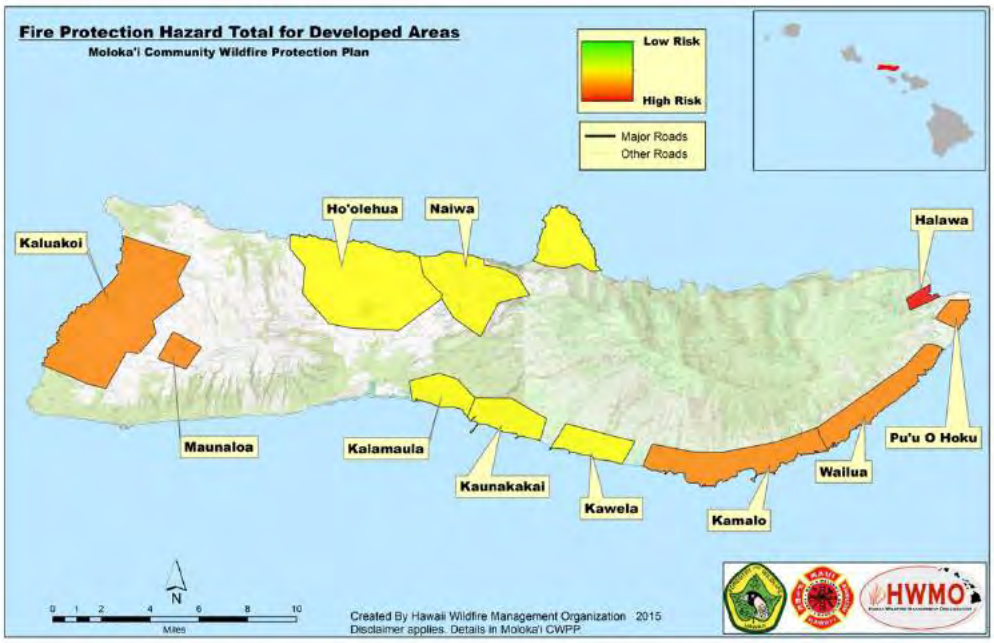


Map 19. Vegetation Hazard Total for Developed Areas of Moloka'i CWPP planning area*. Reflects hazard assessment findings related to the following categories: Defensible Space: Fuels Reduction Around Homes & Structures; Fuel Loading; Fuel Structure & Arrangement; Proximity of Flammable Fuels Around Subdivision; Vegetation Within 300' of Homes.*

Map 20. Building Hazard Total for Developed Areas of Moloka'i CWPP planning area*. Reflects hazard assessment findings related to the following categories: Siding/Soffits; Roofing Assembly; Structural Ignitability; Under Skirting Around Decks, Lanais, Post & Pier Structures; and Utilities Placement for Gas & Electric.*



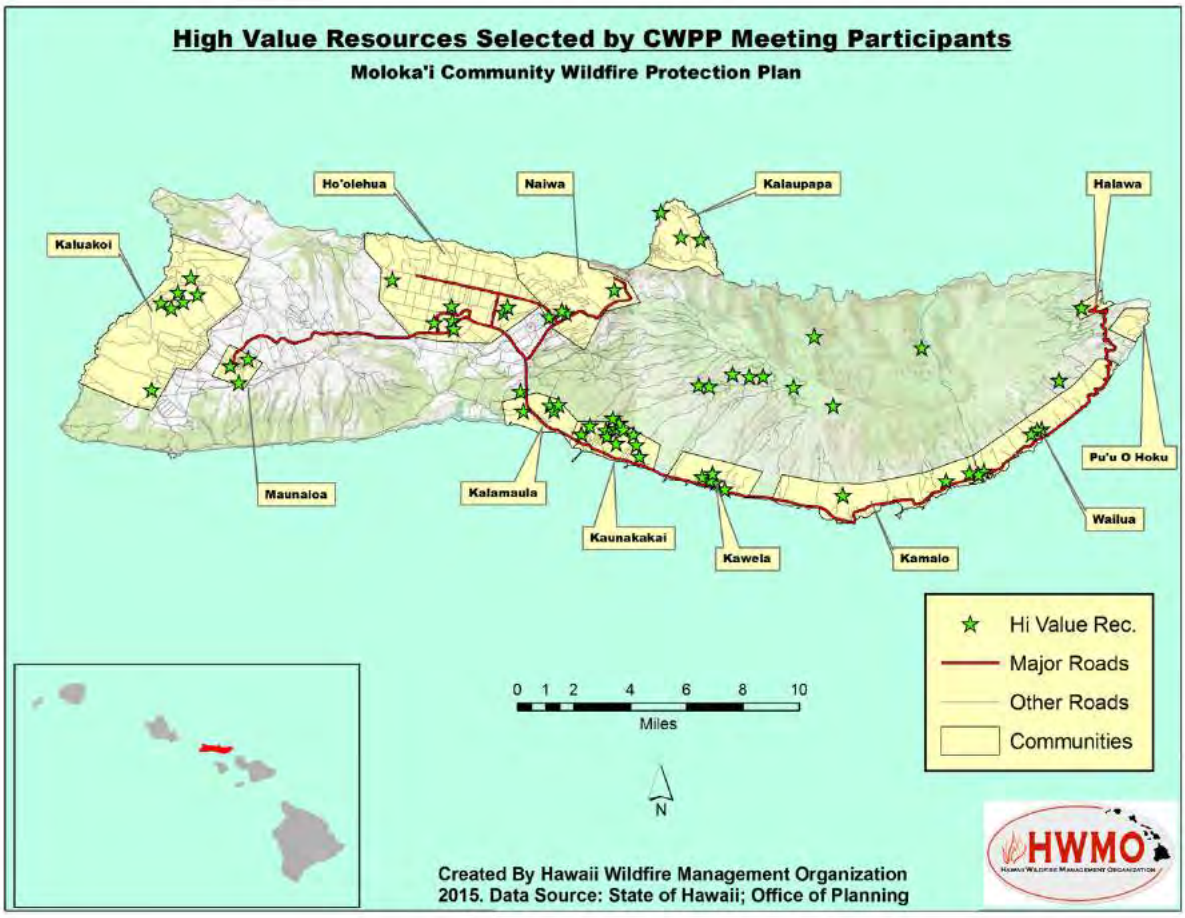
Map 21. Fire Environment Hazard Total for Developed Areas of Moloka'i CWPP planning area*. Reflects hazard assessment findings related to the following categories: Average Rainfall; Prevailing Wind Speeds & Direction; Slope; Topographic Features that Adversely Affect Wildland Fire Behavior; and Seasonal or Periodic High Hazard Conditions; and Ignition Risk.*



Map 22. Fire Protection Hazard Total for Developed Areas of Moloka'i CWPP planning area. *Reflects hazard assessment findings related to the following categories: Firefighter Response Time; Community Planning Practices & Ordinances; Community Fire Safe Efforts & Programs Already in Place; Fire Department Structural Training & Expertise; Local Emergency Operations Group or Citizen Group; Proximity to Fire Stations; Water Source Availability; and Wildland Firefighting Capacity of Initial Response Agency*

COMMUNITY VALUES

Civic, environmental, and cultural values were determined by stakeholders during input meetings. Meeting participants placed stickers on the Moloka'i map to indicate their highest priority areas, community assets and natural resources geographically. Map 23 demonstrates the points on the map selected by the public and agency participants during CWPP meetings as high priorities for mitigation and protection based on their personal, cultural, and community values and priorities, as well as overall risk of wildfire. Due to the sensitive nature of cultural resources in Hawai'i, participants were not required to name the priority resources, only to share the area or location of the valued resources by marking the map poster with stickers.



Map 23. *Stakeholder-determined High Value Priority Resources to Protect from Wildfire in the Moloka'i CWPP planning area.*

EMERGENCY MANAGEMENT

FIRE SUPPRESSION CAPABILITIES AND RESOURCES

Maui Fire Department (MFD) has two fire stations on Moloka'i. MFD resources and equipment are spread across the entire county of Maui and are made available when needed if they are not already in use. MFD has 14 fire stations across the Maui County. Table 7 provides location information for Moloka'i fire stations.

A complete list of MFD apparatus and vehicles is provided in Appendix C. DLNR-DOFAW wildland fire suppression resources that are available for use in the event of a wildfire are listed in Table 8.

Maui Fire Department (MFD) Molokaʻi-Based Fire Stations	
Fire Station Location	Address
Kaunakakai	130 Ainoa St Kaunakakai, Molokai, HI 96748 (808) 553-5601
Hoʻolehua	2190 Farrington Ave Hoʻolehua, Molokai, HI 96729 (808) 567-6525

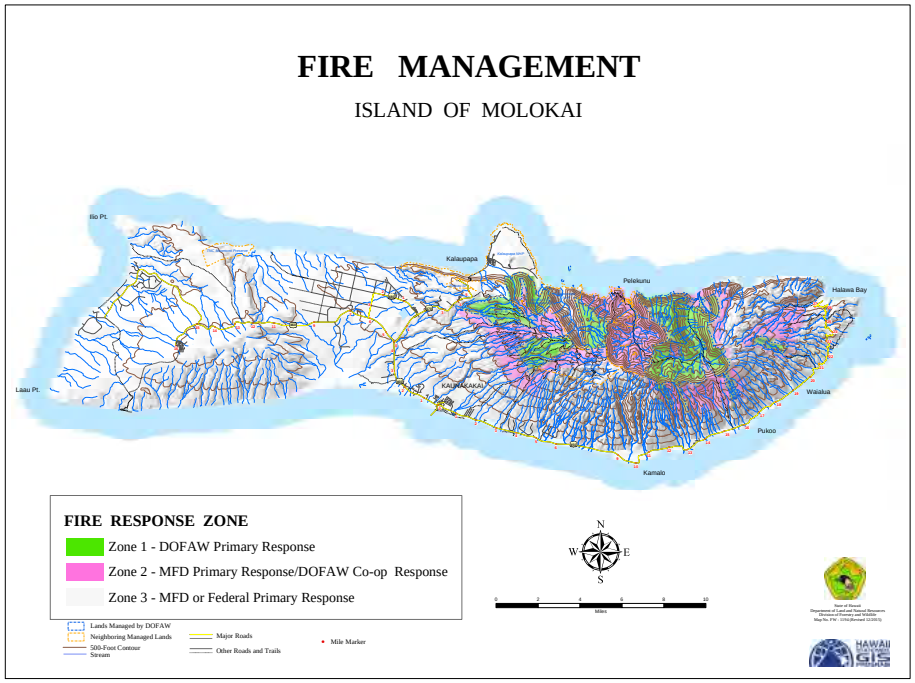
Table 7. *MFD fire stations on Molokaʻi.*

Department of Land and Natural Resources – Division of Forestry and Wildlife (DLNR – DOFAW) Suppression Resources- Maui County	
Helicopters (contract services)	Air 1 (MFD) (Type III) Air 2 (Type III) Air 3 (Type III) Huey (Type II) Huey (Type II)
Engines/Tenders/Trucks	1 x 6x6 tender (4000 gal) 1 x M62 engine (500 gal) 1 x M5 CDF engine (450 gal) 3 x Gamma Goat engine (350 gal) 3 x 4WD Trucks (Type 6 - 125 gal to 300 gal capacity) 2 x UTV units (100 gal - high psi)
Other Resources	4 x portable pumps 2 x Helicopter tanks 6' (3000 gal) 3 x Helicopter mop up tanks (300 gal) 1 x D6 dozer 2 x backhoe 1 x T320 bobcat

Table 8. *DLNR-DOFAW suppression resources.*

Initial response to the majority of wildfires (as well as all medical and other emergencies) is the responsibility of the MFD. DLNR-DOFAW responds to wildfire events on state lands and provides additional wildland firefighting assistance when state lands are threatened and/or mutual aid agreements are invoked. DLNR -DOFAW has established Memorandums of Agreement, Memorandums of Understanding, and/or Mutual Aid Agreements in place with all four county fire departments as well as with federal land management agencies, such as National Park Service, U.S. Fish and Wildlife Service, and U.S. military. According to DLNR -DOFAW[8], these "are the cornerstones by which DLNR -DOFAW's Fire Management Program is based. These. . . identify the responsibilities of each party as well as other fire management activities such as joint participation in prevention, training, and equipment acquisition."

Map 24 was developed by DLNR-DOFAW and demonstrates the independent and shared response zones of each agency in the CWPP planning area.



Map 24. *Fire suppression response zones. (Source: DLNR-DOFAW).*

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[9].

The CWPP is designed to work in conjunction with other local, county, or state plans, operational policies, assessments, and programs, etc., including but not limited to:

- Moloka'i Community Plan[10] and Update[11]
- Moloka'i Forest Reserve Management Plan[12]
- County of Maui Drought Mitigation Strategies[13]
- County of Maui Multi-Hazard Mitigation Plan[14] and Hazard Mitigation Plan Update (2015)[15]
- County of Maui Water Use and Development Plan Draft[16]
- State Drought Plan and the County Drought Mitigation Strategies[17]
- State of Hawai'i Multi-Hazard Mitigation Plan[18]
- State Division of Forestry and Wildlife Operational Policy for Wildfire Control[19]
- Hawai'i Statewide Assessment of Forest Conditions and Resource Strategy[20]

MULTIPLE-AGENCY COORDINATION

The Molokaʻi Fire Task Force was formed in the early 2000's, out of a desire to develop more cohesive collaboration among the agencies and entities whose area of jurisdiction, management, or interest dealt with wildfire in order to more efficiently and effectively address wildfire issues. Its main objective is to ensure interagency coordination and communication regarding wildfires on Molokaʻi. The group is coordinated by MFD, DLNR-DOFAW, and The Nature Conservancy, with active participation from many other team members, including: Molokaʻi Ranch, Department of Hawaiian Home Lands, County of Maui (Public Works, P&R, Water), State of Hawaiʻi (Highways Division, Airports Division, Department of Human Services), Molokaʻi Irrigation System, Kawela Plantation, Maui Police Department, American Medical Response, National Park Service, Molokaʻi EOC, Goodfellow Bros., and various community residents and retired professionals.

Additionally, there is a county-wide coordinating group established to deal with and discuss wildfire issues, mitigation, and response. Federal, state, and county agencies have organized into the Maui Wildfire Coordinating Group. The Maui Wildfire Coordinating Group coordinates the programs of the participating wildland fire agencies across Maui County and provides a forum for leadership, cooperation and the exchange of information. It also improves procedures to rapidly provide the most effective response to wildfires in the island. In coordination with County of Maui Civil Defense Agency, 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.

EVACUATION PROTOCOLS AND NEEDS

Evacuation protocols for neighborhoods and areas on Moloka'i have been determined for natural hazards such as tsunamis, and can be found in the documents listed below. However, fire safety zones for all neighborhoods and areas of Molokaʻi are yet to be determined, and are a priority action determined by the public as part of this CWPP process.

The following resources are available for disaster preparedness information:

- County of Maui Civil Defense Agency Website[21]
- Disaster Preparedness for Maui County: A Citizen's Guide[22]
- Hurricane Information and Tips[23]
- Tsunami maps information, and tips[24]

FIRE CODE

The Hawaii State Fire Code is the 2012 NFPA 1, Uniform Fire Code, which has both state and county amendments. The state amendments contribute to the State Fire Code. Each county then adopts amendments to the State Fire Code to create the County Fire Code.

Most relevant to the discussion and public input for the Molokaʻi CWPP Update is the chapter on the WUI, which is described in 2012 NFPA 1, Chapter 17.

HAZARD REDUCTION PRIORITIES
MOLOKA‘I

PURPOSE AND METHODS

Public and agency participants during the CWPP planning process identified hazard reduction priorities for Moloka‘i. The wildfire-related concerns and actions provided by stakeholders were focused toward enhancing wildfire response capabilities, addressing priority public concerns and wildfire impacts, and reducing hazards through pro-active wildfire mitigation. Community and agency discussion covered the following topics and more:

- Increasing community, decision maker, and professional 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.

HFRA guidelines were followed by including community hazard reduction priorities, hazardous fuels reductions, and recommendations to reduce structural ignitability.

STAKEHOLDER CONCERNS AND RECOMMENDED ACTIONS

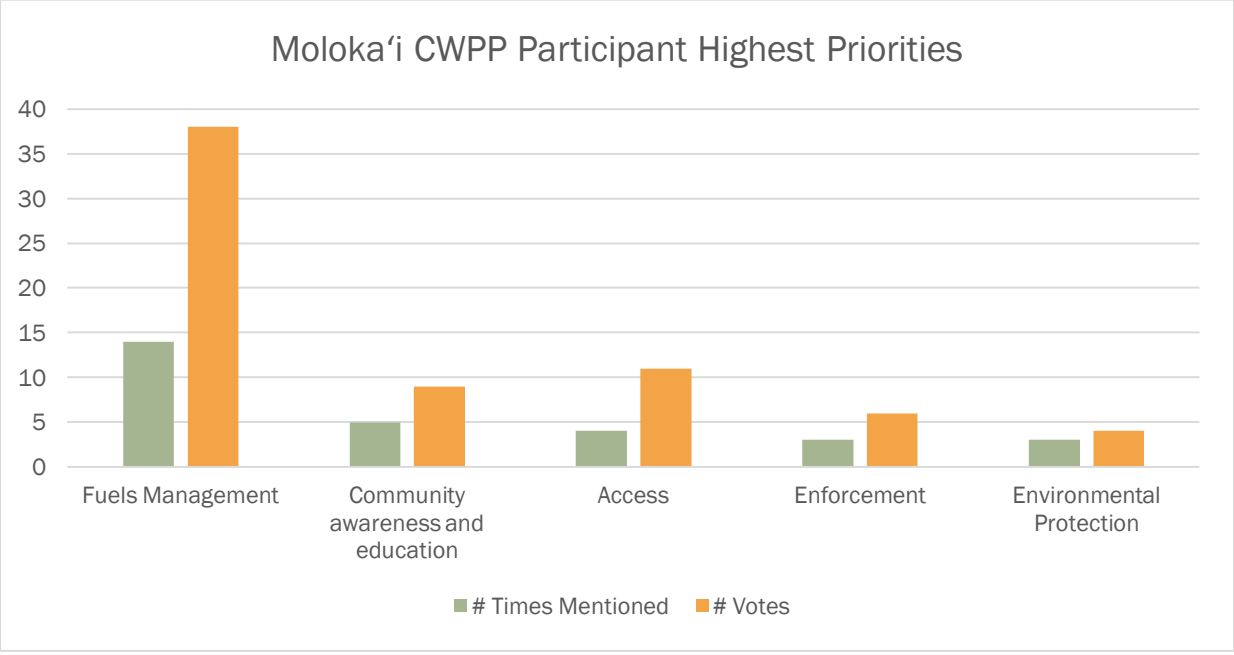


Figure 3. *Moloka‘i CWPP participant top five wildfire-related concerns.*

HWMO and the Molokaʻi Fire Task Force worked with partner agencies, natural resource managers, and others to collect input and record wildfire-related concerns and recommended actions. Together, they coordinated a community meeting, to which the public-at-large was invited to provide wildfire-related input regarding priority concerns and projects.

While Molokaʻi CWPP participant input yielded diverse and broad concerns and recommended actions, certain topics came up with greater frequency. All input was aggregated and analyzed to capture an overview of the most frequently raised concerns. Concerns were recorded two ways: 1) number of times it was mentioned as an issue, and 2) number of overall votes it received once participants were asked to vote on the comprehensive set of topics to indicate their highest priorities. Figure 3 displays the top five concerns that CWPP participants prioritized through the voting process.

THREE CATEGORIES OF STAKEHOLDER CONCERNS AND RECOMMENDED ACTIONS

Public and agency input was extensive and has been organized to align with the categories used within the National Cohesive Wildland Fire Management Strategy.[25] Refer to Appendix A for detailed public input statements per category.

The National Cohesive Wildland Fire Management Strategy (subsequently referred to as *Cohesive Strategy*) encourages communities to develop a dynamic approach to planning for, responding to, and recovering from wildland fires. It provides a framework for wildfire-related discussion, efforts, and goals across the United States. The overarching national strategy is further divided into three regions for tighter collaboration and coordination in each area. Hawaiʻi falls into the Western Region. Public input details for Molokaʻi are organized as follows, according to the following categories so that they fit into the national and regional Cohesive Strategy framework of priorities and funding opportunities.

- Fire-Adapted Communities
- Resilient Landscapes
- Safe and Effective Wildfire Response

Figure 4 indicates how much of the participant concerns for Molokaʻi fall within each category. Each category is explored more fully in subsequent sections.

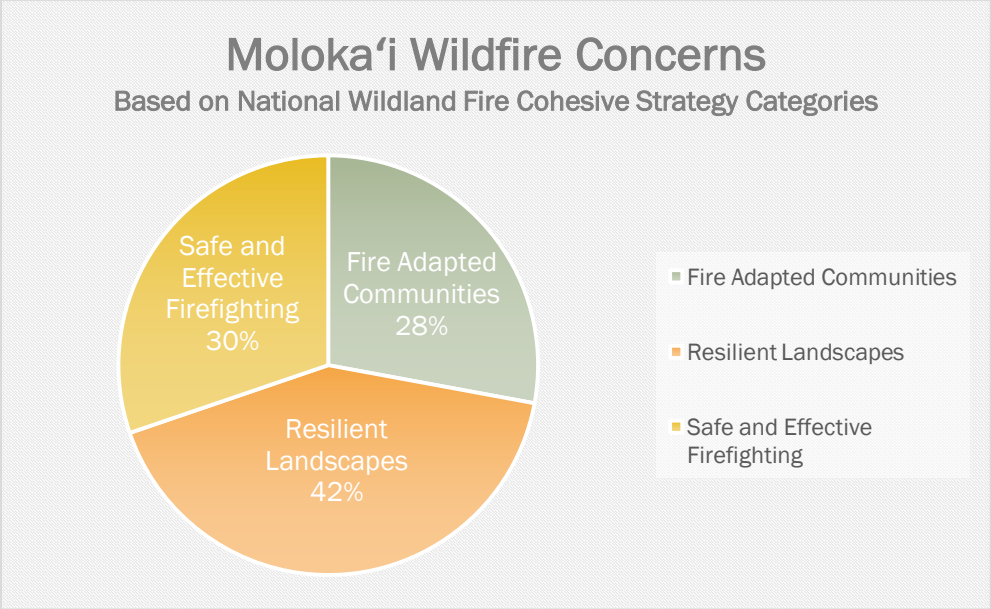


Figure 4. *Community Concerns Organized by Cohesive Strategy Categories.*

FIRE-ADAPTED COMMUNITIES

28% of Moloka‘i CWPP participant input was related to the need to work toward greater fire awareness, readiness, prevention, and general fire-adaptation by communities and residents. These goals support the concept of Fire-Adapted Communities, defined by the United States Forest Service as "a knowledgeable and engaged community in which the awareness and actions of residents regarding infrastructure, buildings, landscaping, and the surrounding ecosystem lessens the need for extensive protection actions and enables the community to safely accept fire as a part of the surrounding landscape."[26] The Wildland-Urban Interface Mitigation Committee of the National Wildfire Coordinating Group defines a Fire-Adapted Community as "a human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire."[27]

The primary goal of working toward fire adaptation is that wildfire preparedness and readiness efforts in a community become an ongoing and broadly supported part of living in, working in, and civically managing an area, and that all activities— from roadside fuels management and agriculture to development designs and community activities— work together to consistently and regularly support wildfire protection. This is opposed to the idea that wildfire preparedness is seasonal or can wait until the last minute, or that it is the responsibility of only one party (community association, fire department, etc.) to aid the community in wildfire preparedness. Generally across Hawai‘i, wildfires are addressed on an as-needed, reactive basis. With the development of this and other CWPPs across Hawai‘i, communities, organizations, and agencies are coming together to move toward becoming proactive, consistent, and collaborative. These all are

aligned with the framework and objectives for Fire-Adapted Communities. Figure 5 depicts the roles and responsibilities of all members of society toward becoming fire-adapted.

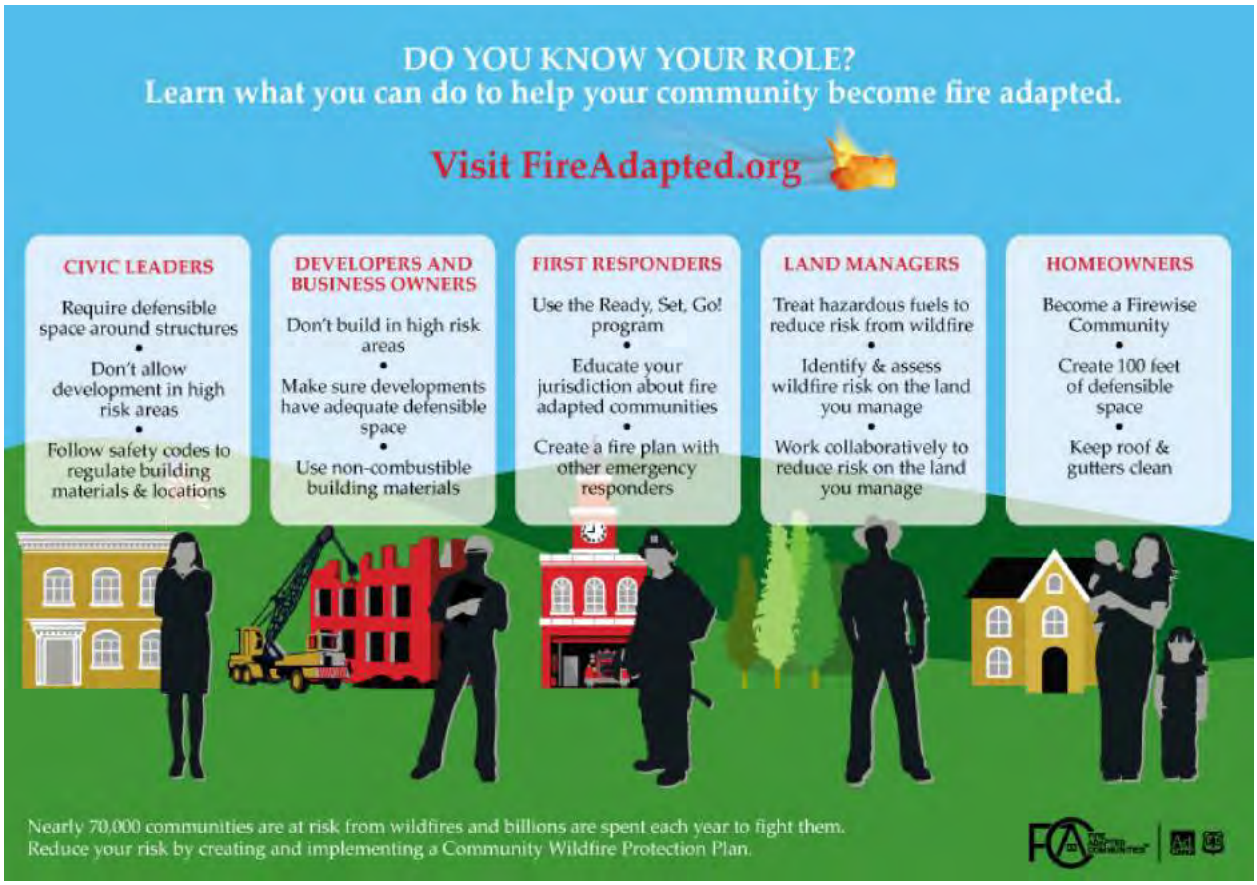


Figure 5. *Fire-Adapted Communities Infographic.*[28] *There is a role for everyone when working toward a region becoming Fire-Adapted, as seen in this infographic from the Fire-Adapted Communities website, FireAdapted.org.*

This CWPP was developed with a diversity of stakeholders with homes, businesses, personal interests, and jurisdictions on Molokaʻi. The wildfire-related concerns and recommendations demonstrate the range of responsible parties, timelines, and actions that need to be taken toward comprehensive wildfire prevention, preparedness, and protection of Molokaʻi. These are the basic tenets of becoming fire-adapted. For the purposes of analyzing and presenting the Molokaʻi CWPP stakeholder input, stakeholder concerns and recommendations related to the human side of fire adaptation are presented in this section. Managing vegetation and increasing fire suppression capacity are presented individually (See *Resilient Landscapes* and *Safe and Effective Wildfire Response* sections).

The Molokaʻi input related to the human side of wildfire preparedness is prioritized as follows:

1. Improving planning efforts (of many types and scales) to include wildfire prevention and risk reduction.

2. Increasing or ensuring enforcement of wildfire-related codes, ordinances, brush abatement, etc.
3. Increasing community awareness via outreach and education.
4. Increasing community capacity (knowledge and funding) to address wildfire issues and take action.

Figure 6 depicts the breakdown of wildfire-related concerns pertaining to better protecting Molokaʻi communities.

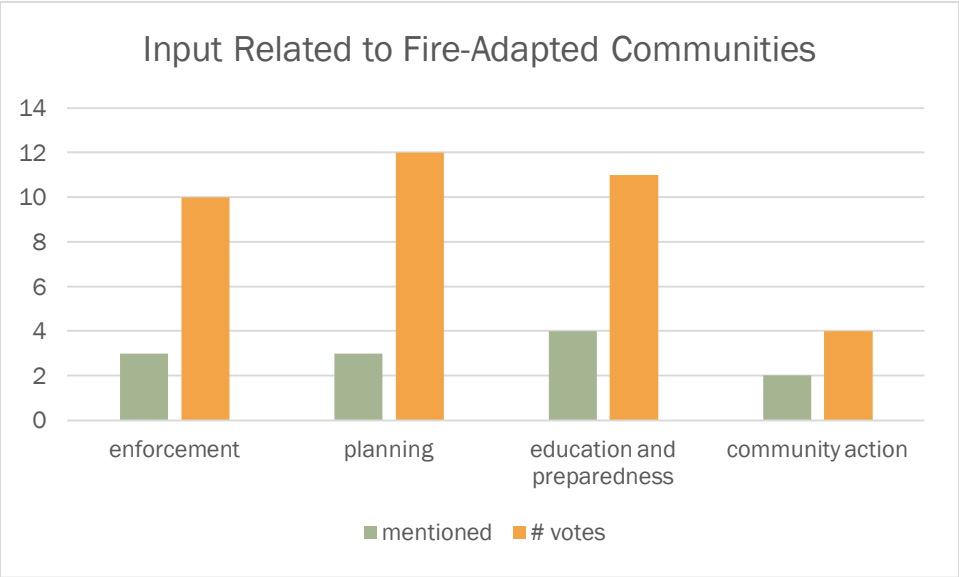


Figure 6. *Community Concerns Related to the human side of wildfire preparedness and protection, as part of working toward Fire-Adapted Communities goals.*

46% of all community-focused input was related to planning. There was an urgency and emphasis from participants regarding the general lack of inclusion of wildfire issues and protective actions in planning efforts. Participants discussed the need for detailed pre-fire and post-fire fire management plans, an established process for addressing wildfire related concerns and fuels management needs by communities, and a substantial increase in participation of planners and policy makers in wildfire protection, particularly as it pertains to community development plans.

The Molokaʻi Fire Task Force recommends the following for each of these priorities:

Planning:

1. Incorporate fire mitigation and maintenance plans during the entitlement and permitting process as a requirement for approval in moderate to high fire hazard areas to include residential homes, subdivisions, businesses, including a mandatory use of fire resistant building materials.
2. Incorporate the CWPP, its maps, data, and other Molokaʻi Fire Task Force-provided resources for making determinations for the Molokaʻi Community Plan.

Enforcement and Legislation:

1. Assist and support efforts to create stronger laws concerning violation of fire prevention and mitigation efforts.
2. Assist and support enforcement of fire safety and prevention laws.

Education and Community Action:

1. Incorporate the CWPP as part of the Molokaʻi Community Plan.
2. Support and increase community awareness and education on wildfire prevention and mitigation.

RESILIENT LANDSCAPES

The Resilient Landscapes category focuses on all input related to restoring, protecting, or maintaining landscapes. Of the three broader categories of wildfire-related concerns, Resilient Landscapes made up 43% of all community and agency input. For Molokaʻi, this primarily included the management of vegetation to reduce the ignition capacity and spread of wildfire and the protection of native species and watersheds from wildfire impacts, followed by MECO involvement and increased enforcement on those responsible for maintaining fuels. (Figure 7).

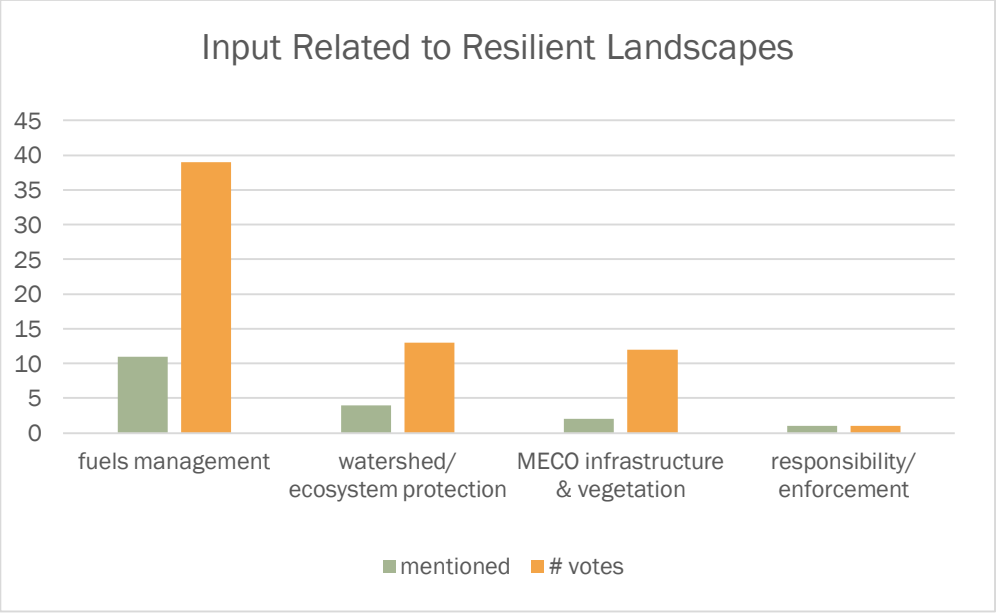


Figure 7. *CWPP participant concerns and priorities related to restoring and maintaining landscapes to reduce wildfire threats and impacts.*

Among the concerns raised by Molokaʻi participants, vegetative fuels management made up 77% of all input in the Resilient Landscape category. The priorities were:

1. Installing and/or maintaining fuelbreaks and buffers around communities.
2. Increased roadside fuels management.
3. Fuel reduction on the boundaries of large landholdings.
4. Improved community participation of vegetation management within and around residential areas.
5. Increasing MECO's involvement in fuels management.

SAFE AND EFECTIVE WILDFIRE RESPONSE

Comprehensive and effective wildfire preparedness and protection includes preventing ignitions, minimizing the ability of fire to travel across structures and landscapes, and maximizing the likelihood for fires to be suppressed quickly to keep them as small and minimally impacting as possible. Since the majority of all fires in Moloka'i (and Hawai'i in general) are human-caused, ignition prevention largely is a matter of community outreach and education (addressed in *Fire-Adapted Communities* section). Minimizing vegetative fuels and structural ignitability can help keep fires from spreading (addressed in *Resilient Landscapes* and *Reducing Structural Ignitability* sections). Once a fire is ignited, however, the responsibility for taking action rests solely on fire suppression and emergency management departments and personnel. While prevention and preparedness are key to reducing the threats and impacts of wildfire, suppression is the final piece of the protection equation that needs to be proficient, equipped, effective, and adequately supported.

Moloka'i CWPP participants provided their concerns and priorities related to wildfire response. The input resulted in the following set of priorities related to Safe and Effective Wildfire Response (Figure 8):

1. Increase water resource infrastructure and availability for suppression.
2. Improve and increasing firefighting access (through road and firebreak development and maintenance).
3. Improve access via road development and improvement (This specifically made up 23% of participant input, with an additional 8% of input focused on concurrently developing fuelbreaks that might also serve as additional access options).
4. Improve detection of wildfires.

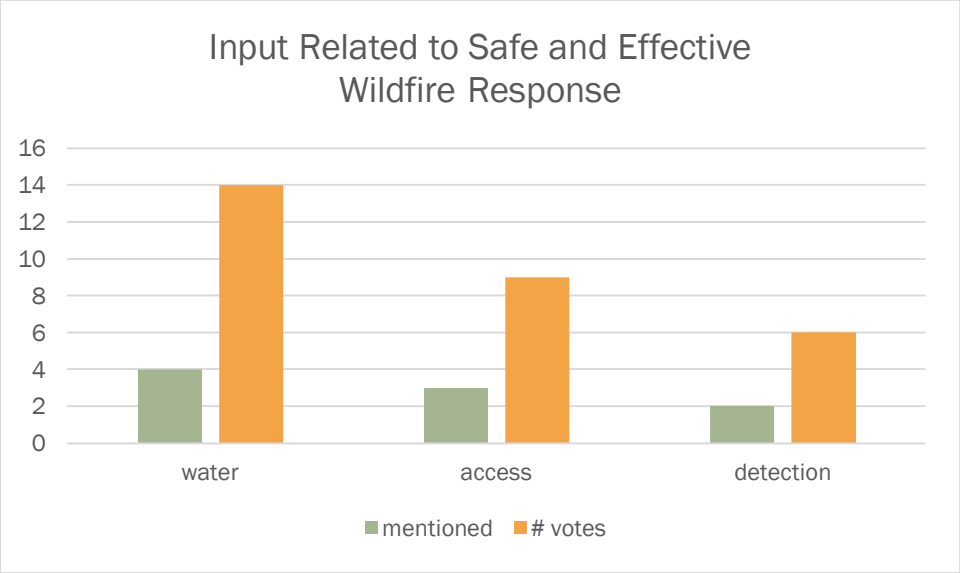


Figure 8. *Public input related to safe and effective wildfire response.*

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 Table 9.

Community Resource, Structure, or Value at Risk	Fuel Hazard Rating	Type of Treatment	Treatment Method Options
Mauka forested lands, parks, and reserves	HIGH OR EXTREME IF UNMANAGED	Mechanical, hand labor, chemical, animal, fuels conversion	Utilize well-managed grazing, weed whip, mow, hand-pull, herbicide where appropriate with follow-up vegetation removal. Reforestation and restoration. Fuels conversion and "living" or "shaded" fuelbreaks.
Homes and structures with large lots	MOD-EXTREME	Mechanical, hand labor, chemical, animal, fuels conversion	Firewise home ignition zones. Reduce fuel along property boundaries and roadsides. Convert fuels to drought-tolerant, fire-resistant (preferably native) plants. Reduce ladder fuels.
Densely arranged homes and structures	MOD-EXTREME	Mechanical, hand labor, chemical, fuels conversion	Firewise home ignition zones. Weed whip, mow, hand-pull, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant (preferably native) plants. Reduce ladder fuels.
Historical sites throughout Molokaʻi	MOD-EXTREME	Hand labor, chemical, animal, fuels conversion	Weed whip, mow, hand-pull, well managed grazing, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant plants.
Roadsides	MOD-EXTREME IF UNMANAGED	Mechanical, chemical, animal, fuels conversion	Conduct roadside fuels treatments in accordance with fuel growth (keep low), maximize width of roadside reduction areas. Convert roadside fuels to fire-resistant plants that require little or no maintenance and are less ignitable.
Resorts	LOW-MOD	Mechanical, hand labor, chemical, fuels conversion	Continue regular maintenance and irrigation. Convert fuels to drought-tolerant, fire-resistant plants.
Fallow Agricultural lands	HIGH OR EXTREME IF UNMANAGED	Mechanical, animal, chemical, re-establish active agriculture	Install fuelbreaks along roads and property boundaries, or in lines perpendicular to slope to provide access and minimize erosion. Reduce fuels in patches to create fuel mosaics. Utilize well-managed grazing. Re-establish active agriculture. Initiate reforestation and/or restoration while also maintaining fuels.

Table 9. *Hazardous Fuels Treatment Recommendations.*

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, Ready, Set, Go!, and HWMO outreach programs, summarized below.[29, 30, 31]

The following pages are written with the resident in mind, and can be removed and used independently from the CWPP as a general set of guidelines for reducing hazards in the home ignition zone. It is highly recommended that individuals and communities conduct a simple native vegetation assessment and/or consult with appropriate biologists or foresters before clearing trees and significant amounts of vegetation that may be important to protect.

Creating defensible space does not necessarily mean eliminating the presence of greenery on your property. You can still landscape around your home to make it fire-safe without compromising beauty and aesthetics. By planting native, drought-tolerant plants (xeriscaping) around your home, you can:

- Protect your home from wildland fire ignition and spread
- Beautify your property
- Perpetuate an important natural and cultural resource
- Decrease the maintenance needs of your landscaping

For the drier areas of Hawai‘i, consider that native dryland plants are specially adapted to local conditions and require less upkeep, water, and fire maintenance, saving yourself a great deal of time, money, and resources. Non-native, lush plants often drop hazardous debris and can become fire-prone in drought conditions.

DEFENSIBLE SPACE ZONES AROUND STRUCTURES

To reduce structural ignitability, it is recommended that residents think in zones around their home, and begin addressing risk reduction activities in Zone 1, working out from there to Zone 2 and beyond (Figure 9).

The following actions are recommended per zone:

Zone One extends 30 feet out from buildings, structures, decks, etc.

- Remove all dead or dying vegetation.
- Remove "ladder fuels" (low-level vegetation that allows the fire to spread from the ground to the tree canopy, see Figure 10). Create at least 6 feet of separation between low-level vegetation and tree branches. This can be done by reducing the height of low-level vegetation and/or trimming low tree branches.
- Create "fire-free" area within 5 feet of home, using non-flammable landscaping materials and/or high-moisture content, drought-resistant vegetation.
- Trim tree canopies regularly to keep their branches a minimum of 10 feet from structures and other trees.
- Remove leaf litter (dry leaves/pine needles) from yard, roof and rain gutters.
- Relocate woodpiles or other combustible materials into Zone Two.
- Remove combustible material and vegetation from around and under decks, lanai, or the entire house if foundation is post-and-pier.
- Remove or prune vegetation near windows.

Figure 9. *Defensible space zones around structures.*[28]

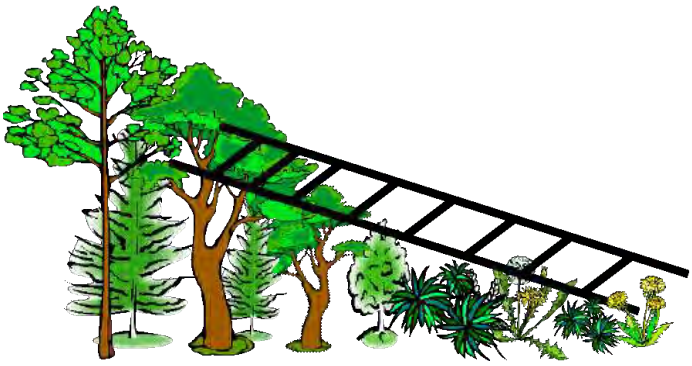


Figure 30. Ladder Fuels Diagram.[1] Ladder fuels form a pathway for ground fires to climb vegetation and become crown fires, which are much more difficult to suppress. It is important to limb low hanging branches and keep ground vegetation short so that vegetation is separated inhibiting fire from easily "climbing" up to canopy where wind is often stronger.

Zone Two extends 30 to 100 feet out from buildings, structures and decks. You can minimize the chance of fire jumping from plant to plant by removing dead material and removing and/or thinning vegetation. The minimum spacing between vegetation is three times the dimension of the plant.

- Remove "ladder fuels" (see Figure 10).
- Cut or mow annual grass down to a maximum height of 4 inches.
- Trim tree canopies regularly to keep their branches a minimum of 10 feet from other

trees/cluster of trees.

- For larger properties, consider areas outside of Zone Two as a third zone to address. Continue reducing ladder fuels, managing fuels, hardening structures, and properly storing combustible materials.

GENERAL DEFENSIBLE SPACE RECOMMENDATIONS

- As stated above, ensure you have at least a 100-foot radius of defensible space (cleared, managed, and maintained vegetation) around your home. Note that even more clearance may be needed for homes in severe hazard areas. This means looking past what you own to determine the impact a common slope or neighbors' yard will have on your property during a wildland fire.
- Cut dry weeds and grass before noon when temperatures are cooler to reduce the chance of sparking a fire.
- Landscape with drought-resistant plants that have a high moisture content and are low-growing.
- Keep woodpiles, propane tanks and combustible materials away from your home and other structures such as garages, barns and sheds.
- Ensure that trees are far away from power lines.
- Weed around the property regularly, especially areas that a lawn mower is not appropriate for (tall dry grasses, rocky terrain, etc.)
- Remove leaf litter and other debris that accumulate around the building, under vegetation, and other collection areas.
- Remove leaf litter, straw and other debris from under and around propane tanks to create 10 feet of clearance around it.
- Eliminate ladder fuels by pruning tree branches on trees around the property to within at least 6 feet of the ground, using a bypass lopper, pruner saw, or long reach/hand pruner.
- Remove flammable materials from underneath the house, decks, porches, and lanai.
- Common flammables include scrap-wood, firewood, and combustible furniture.
- Mow the lawn regularly to keep grasses shorter than 4 inches tall around the home. Do not mow in the heat of the day or when the wind is blowing. Never mow in dry vegetation.
- Non-native trees, such as ironwood constantly drop needles, leaves, branches, and other debris, so it's best to stay on top of removing them from the ground before the pile becomes a major project. Consider reforesting these areas with native trees that don't drop large amounts of debris.
- Invasive grasses such as guinea and fountain grass grow rapidly when un-managed and can dry out very quickly, creating a major fire hazard. Weed them often and consider replanting with low-lying, drought-tolerant, native ground cover.

HARDEN YOUR HOME

Creating defensible space, as detailed above, decreases the likelihood of wildfire spreading through vegetation that surrounds structures on the home site or yard. The second and equally important set of actions to reduce wildfire-caused ignitions of residences and structures is to harden the home or structure with non-combustible building materials and ignition-reducing strategies. The following is a step-by-step list of recommended actions per component of a structure or home. Some of these actions are inexpensive and some are costly. All are important. It is recommended that residents take the simple and easier steps right away, and prioritize hardening the rest of the home or structure as soon as possible. Note: relying on the ability to water the roof when fire is approaching will not necessarily provide adequate structural protection, and it puts you in danger. It also takes water and personnel resources away from firefighters, who need the water and full attention toward firefighting rather than search and rescue for late evacuators. Preparation and early evacuation are key actions recommended by the national Ready, Set, Go! Program. Prepare your home as follows:

Figure 11*. Covering vents with 1/8-inch or smaller metal mesh blocks embers from entering a home or structure.*

Figure 12. *Keep windows free of vegetation to reduce likelihood of heat-caused breakage that lets embers into your home.*

Figure 13. *Make sure your eaves are enclosed with non-combustible materials to prevent ember entry.*

Figure 14*. Rain gutters should have screens to keep leaf debris from accumulating. Maintain gutters to keep them clear and clean.*

Roof: Your roof is the most vulnerable part of your home because it can easily catch fire from wind-blown embers. Homes with wood-shake or shingle roofs are at high risk of being destroyed during a wildland fire. Build your roof or re-roof with fire-resistant materials such as composite, metal, or tile. Block any spaces between roof decking and covering to prevent ember intrusion. Clear leaves and other debris from your roof and gutters. Cut any tree branches within 10 feet of your roof.

Vents: Vents on homes are particularly vulnerable to flying embers. All vent openings should be covered with 1⁄8-inch or smaller metal mesh. Do not use fiberglass or plastic mesh because they can melt and burn. Attic vents in eaves or cornices should be baffled or

otherwise protected to prevent ember intrusion (mesh is not enough).

Figure 15. *Wood fencing can act like a fire wick straight to a home. Use non-combustible materials for all fencing and yard structures.*

Deck/Patio Cover: Use heavy timber or non-flammable construction material for decks. Enclose the underside of balconies and decks with fire-resistant materials to prevent embers from blowing underneath. Keep your deck clear of combustible items, such as baskets, dried flower arrangements and other debris. The decking surface must be ignition resistant if it's within 10 feet of the home.

Windows: Heat from a wildland fire can cause windows to break even before the home ignites. This allows burning embers to enter and start internal fires. Single-paned and large windows are particularly vulnerable. Install dual-paned windows with the exterior pane of tempered glass to reduce the chance of breakage in a fire. Limit the size and number of windows in your home that face large areas of vegetation.

Non-Combustible Enclosed Eaves: Box in eaves with non-combustible materials to prevent accumulation of embers.

Walls: Wood products, such as boards, panels or shingles, are common siding materials. However, they are combustible and not good choices for fire-prone areas. Build or remodel with fire-resistant building materials, such as plaster, cement, masonry or stucco. Be sure to extend materials from foundation to roof.

Rain Gutters: Screen or enclose rain gutters to prevent accumulation of plant debris.

Chimney: Cover your chimney and stovepipe outlets with a non-flammable screen of 1⁄4-inch wire mesh or smaller to prevent embers from escaping and igniting a fire. Make sure that your chimney is at least 10 feet away from any tree branches.

Garage: Have a fire extinguisher and tools such as a shovel, rake, bucket and hoe available for fire emergencies. Install a solid door with self-closing hinges between living areas and the garage. Install weather stripping around and under door to prevent ember intrusion. Store all combustibles and flammable liquids away from ignition sources.

Non-Combustible Fencing: Make sure to use non-combustible fencing materials, and to keep combustible fences away from homes. Wooden fences leading straight to the home act as wicks and bring the fire straight to the structure, greatly increasing the likelihood of the home igniting.

Driveways and Access Roads: Driveways should be designed to allow fire and emergency vehicles and equipment to reach your house. Access roads should have a minimum 10-foot clearance on either side of the traveled section of the roadway and should allow for two-way traffic. Ensure that all gates open inward and are wide enough to accommodate emergency equipment. Trim trees and shrubs overhanging the road to a minimum of 13 1⁄2 feet to allow emergency vehicles to pass.

Address: Make sure your address is clearly visible from the road.

Water Supply: Have multiple garden hoses that are long enough to reach any area of your home and other structures on your property. If you have a pool or well, consider getting a pump.

Inside: Keep fire extinguishers on hand and in good working order. Install smoke alarms on each level of your home and near bedrooms. Test them monthly and change the batteries twice a year.

The Moloka'i CWPP Action Plan follows the guidelines of HFRA, which includes developing an action plan along with an implementation and maintenance strategy.

was developed through an analysis of the issues identified in the hazard assessments and overall risk assessment, public and agency meetings, and through a review of other Community Wildfire Protection Plans throughout Hawai'i. Federal, state, and county land management agencies, private entities and landowners, and area residents and homeowners were invited to submit projects that provide protection and reduce risk. Public concerns and input 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. The Moloka'i Fire Task Force and HWMO intend to regularly evaluate progress on projects. Additional projects and project ideas can be attached as appendices.

NEAR-TERM ACTION PLAN

The following table details the projects that have been prioritized for the next five years.

Project	Anticipated Cost	When	Lead
Wildfire Prevention and Smokey Bear signage – Install and maintain "Smokey Bear, Prevent Wildfire Signs" throughout project area	$10,000/year	ASAP	DLNR-DOFAW
Assist interested communities in completing Firewise Communities certification process	$5,000/community	Ongoing	HWMO
Provide outreach to students at schools in fire prone communities	Varies, part of broader workplan and set of expenses	Ongoing	HWMO
Develop wildfire prevention and drought awareness and preparedness materials	Variable	In Initial Phases	HWMO, DLNR-DOFAW
Launch wildfire and drought awareness campaign	Variable	In Initial Phases	HWMO, MFD, DLNR-DOFAW
Host wildfire preparedness information and materials for residents and decision makers on website	Variable	Ongoing	HWMO, MFD, DLNR-DOFAW
Utilize social media to promote wildfire awareness	Variable	Ongoing	HWMO, MFD, DLNR-DOFAW
Green waste removal and recycle program	Variable on area and frequency of pickup	ASAP	TBD
Work with large landowners to encourage access management	TBD	TBD, various	
Fuel treatment mitigation along major roadways (treatment with foam gels, etc.)			Variable

Table 10. *Near-Term Action Plan and Projects.*

LONGER-TERM ACTION PLAN

In addition to projects that are ongoing or being initiated at the time of writing this CWPP, numerous other longer-term priority projects were proposed by participating agencies and organizations involved in the CWPP planning process. Table 11 details the proposed longer term (5+ years) projects in no priority order. Projects are to be completed as funding, personnel, and opportunities become available.

Proposed Project	Anticipated Cost	Lead
Improve national reporting of wildfires in Hawai'i	TBD	DLNR-DOFAW, USFS, HWMO
Improve initial attack capacity	Project dependent	TBD
Work to appropriately graze fallow areas where fuels are building, Fund fencing and water troughs to make lease areas more economically feasible to graze	200,000 for fencing multiple areas	TBD
Install water tanks around margins of communities to serve as dip tanks for helicopter fire suppression. Have tanks double as water troughs for ranching and conservation/restoration efforts	$20-60,000 per diptank	TBD
Increase outreach to community associations	Variable	HWMO, DLNR-DOFAW, MFD
Provide wildfire education for decision makers	TBD	HWMO, DLNR-DOFAW, MFD
Seed collection and storage for post fire replanting	TBD	DLNR-DOFAW
Work with large landowners to encourage fuels management	TBD	HWMO, DLNR-DOFAW, MFD
Maintain and add RAWS	TBD	DLNR-DOFAW
Work with partners and residents to garner support for increasing DLNR-DOFAW's budget for fire response	TBD	HWMO, DLNR-DOFAW, MFD, Public
Submit WUI proposals for projects in the CWPP area	TBD	DLNR-DOFAW
Work with state and federal land-owner assistance programs to incorporate wildland fire concerns	TBD	TBD, Possibly DLNR-DOFAW
Work with large landowners to encourage access management	TBD	TBD, various
Fuel treatment mitigation along major roadways (treatment with foam gels, etc.)	TBD	Variable
Kalaupapa NHP Settlement WUI Fuels Management	$40-50,000	National Park Service

Table 11. *Proposed Future Projects.*

CWPP IMPLEMENTATION AND MAINTENANCE

PLAN IMPLEMENTATION AND MAINTENANCE

HFRA requires that the MFD, County of Maui Civil Defense Agency, and DLNR-DOFAW all agree on the final contents of the Molokaʻi CWPP. The plan is 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 Molokaʻi 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 on Molokaʻi. Molokaʻi residents are urged to contribute time and effort toward creating defensible space, reducing structural ignitability, and working at the community level to initiate and maintain wildfire protection projects.

Molokaʻi Fire Task Force, HWMO, and the Maui Wildfire Coordinating Group will provide technical support, identify and coordinate funding when possible, and serve as a centralized resource for wildfire risk reduction efforts on Molokaʻi. Together, representatives will identify sources of funding for projects, document the successes and lessons learned from those projects, and evaluate and update the CWPP as needed and as possible.

HWMO will provide outreach and educational programs to youth and adults through school programs, community events, homeowners/community association programs, and workshops in the coming year to kickstart community involvement in implementing the actions identified in this plan. Additionally, HWMO will be working with interested communities to go through the Firewise certification process, to include forming local Firewise committees and action teams and completing comprehensive hazard assessments and plans specific to their subdivisions.

Many Molokaʻi 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 of these issues and actions will assist with fostering individual and community investment in projects.

SIGNATORY CONTACT INFORMATION

The following county and state representatives have a high level of interest in the protection of the Moloka'i area from wildfire, and have reviewed and support this CWPP. Contact information for principal government stakeholders is listed below.

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Civil Defense Agency, County of Maui

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State Department of Land and Natural Resources- Division of Forestry and Wildlife

David G. Smith, Administrator
Kalanimoku Building
1151 Punchbowl St. Room 325
Honolulu, HI 96813

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

For inquiries related to the development of this plan, to add action plan projects to this plan, or for printed copies, please contact:

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LIST OF FIGURES, TABLES, PHOTOS

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FIGURES

MAPS

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[31] **Firewise** http://www.Firewise.org

[31] **Ladder Fuels diagram**. http://people.uwec.edu/jolhm/eh3/group9/wildfirehowfireworks.htm

APPENDICES

Appendix A: Public and Agency Concerns and Recommendations

Appendix B: Wildfire Hazard Assessment Maps

Appendix C: Maui Fire Department 2016 Apparatus and Vehicle Inventory

Appendix A
Moloka'i Community Wildfire Protection Plan
Public and Agency Concerns and Recommendations

The following tables represent the cumulative priorities of CWPP participants. They are organized per category: Fire Adapted Communities, Resilient Landscapes, and Safe and Effective Wildfire Response.

Moloka'i Public and Agency Input: Fire Adapted Communities Category	
Concern (in order of priority)	*Recommended Action*
Enforcement	
Inadequate authority & enforcement of fire safety concerns	Legislation efforts to resurrect & fund State Fire Marshall's Office
Vacant lots from residential & businesses (Kawela Plantation - hot/dry/windy)	Enforcement
Arson	Develop better ways to catch them
Planning	
Inter-connect with Molokai Community Plan	Meet with planners and prioritize inclusion of CWPP
Communication between communities and agencies regarding fire plans and practices	Liaison between agencies & communities
Insufficient planning for new development in fire prone areas	Create mandatory ordinance requiring greater WUI protection
Education and Preparedness	
Unpermitted fires at home	Develop community education & outreach materials (fill the fire prevention position)
Agencies & communities need to be prepared and ready for fire	Training, general preparedness, know where/who to call (local, County, State, Federal, Trained volunteers)
Building material hazard	Community education & outreach
Lack of knowledge about potential grant funding	Provide information, technical support, follow up with applicants
Community Action	
Vacant lots from residential & businesses	Subdivisions put in fuel breaks
Lack of follow through with community projects	Provide incentives and resources to residents and communities

Appendix A- Participant Input Table 1 of 3. Fire Adapted Communities.

Moloka‘i Public and Agency Input: Resilient Landscapes Category	
Concern (in order of priority)	*Recommended Action*
Fuels Management	
Large areas of Kiawe trees on high hills - no access	Fuel break
Need fire breaks and buffers around communities	Take initial action and maintain buffers around communities
Heavy fuel loads along main roads are ignition hazard	Cut grass along the roads - keep it low
Manage vegetation - dense, dry, heavy fuel loads	Reduce fuel load levels: weed whack, remove brush
Mitigation of fire hazards and fuel loads around communities, on high hills, in the wildland-urban interface, along roads	Increase fuel management & related code enforcement activities specific to land use category & size of acreage
Mitigation of fire hazards in the wildland-urban interface	Provide tax incentives for creating buffer zones and restoring native plant habitat
Vacant lots from residential & businesses (Kawela Plantation - hot/dry/windy)	Reduce fuel load levels: weed whack, remove brush, Consider coordinating prescribed burns
Proper mitigation effort in specific areas	Change type of fire breaks & education
Watershed/Ecosystem Protection	
Protecting watershed forest from wildfire	Increase awareness
Vacant lots from residential & businesses (Kawela Plantation - hot/dry/windy)	Protection of E. Molokai watersheds and 6000 acres of common land
Controlling invasive species	Greater focus on restoring native habitat/water use reduction
Vegetation changing to more fire prone species	Game management control in high native forest areas
Saving native plants (i.e. Wiliwili)	Planting for firebreak - wind/dust control
Responsibility/ Enforcement	
Each district has different concern: Bigger lots = bigger issues, heavy trade winds; Lease land vs. fee simple	DHHL & homesteaders taking responsibility for enforcement & management
Electric infrastructure	
MECO infrastructure – power lines/old infrastructure	Vegetation management around poles
	Talk to PUC to psi MECO on (to?) mitigate issues

Appendix A- Participant Input Table 2 of 3. Resilient Landscapes.

Moloka‘i Public and Agency Input: Safe and Effective Wildfire Response Category	
Concern (in order of priority)	***Recommended Action***
Water Resources for Firefighting	
Inadequate water supply and infrastructure in high priority response areas	Develop a plan for access to major water resources throughout the island (MIS, all swimming pools)
	Upgrade water infrastructure
	Install dip tanks, pumpkins, etc. in problem areas
	Creating mid slope water supplies for aircraft response (diptanks, water sources, taps)
Low water pressure (leaks) in Kaluakol	Optimal management of water system, repair leaks
Firefighting Access	
Inadequate suppression access in remote/mauka areas	Pave infrastructure, improve conditions
	Road/fire break improvement
	Increase & improve road maintenance
Pre-fire planning and Detection	
Need earlier detection of fires	Fire detection cameras, alarms, smoke detectors
	Have a fire response plan (ex. If > 10 acres = military help; If subdivision lives are in danger = get extra help)

Appendix A- Participant Input Table 3 of 3. Safe and Effective Wildfire Response.

APPENDIX B

MOLOKA'I COMMUNITY WILDFIRE PROTECTION PLAN

WILDFIRE HAZARD ASSESSMENT MAPS

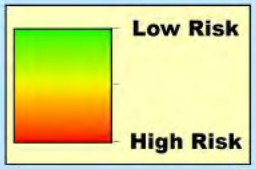
Hazard Category (Maps provided in CWPP main document)	Individual Hazard Maps (Maps provided below in the following order)
Subdivision Hazard Total	• Fire Service Access • Home Setbacks • Ingress/Egress • Private Landowner Firewise Landscaping & Defensible Space • Proximity of Subdivision to Wildland Areas • All Season Road Condition • Road Maintenance • Road Width • Street Signs • Structure Density • Unmanaged, Untended, Undeveloped Lands
Vegetation Hazard Total	• Defensible Space: Fuels Reduction Around Homes & Structures • Fuel Loading • Fuel Structure & Arrangement • Proximity of Flammable Fuels Around Subdivision • Vegetation Within 300' Of Homes
Building Hazard Total	• Siding/Soffits • Roofing Assembly • Structural Ignitability • Under Skirting Around Decks, Lanais, Post & Pier Structures • Utilities Placement; Gas & Electric
Fire Environment Hazard Total	• Average Rainfall • Prevailing Wind Speeds & Direction • Slope • Topographic Features That Adversely Affect Wildland Fire Behavior • Seasonal or Periodic High Hazard Conditions • Ignition Risk
Fire Protection Hazard Total (high capacity and capability= low hazard)	• Response Time • Community Planning Practices & Ordinances • Community Fire Safe Efforts & Programs Already In Place • Fire Department Structural Training & Expertise • Local Emergency Operations Group or Citizen Group • Proximity to Fire Stations • Water Source Availability • Wildland Firefighting Capacity of Initial Response Agency • Interagency Cooperation

SUBDIVISION HAZARD FOR DEVELOPED AREAS

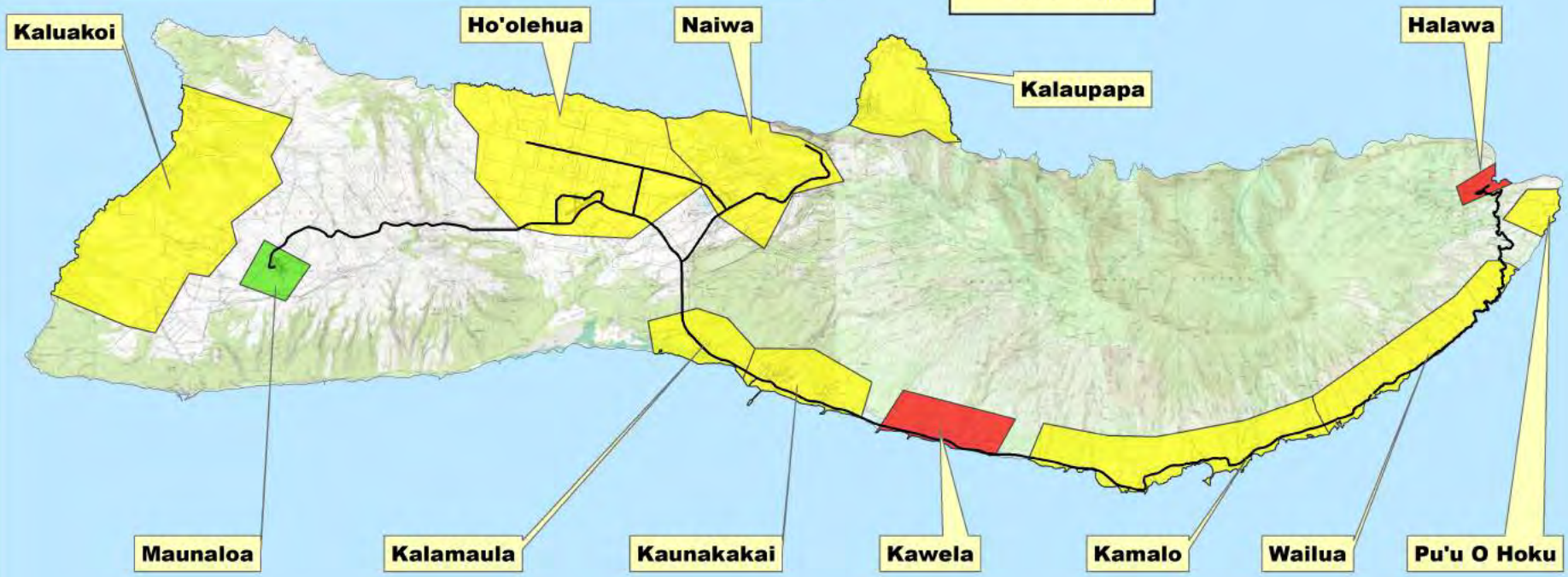
Fire Service Access Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Fire Service Access		
Low Hazard	Moderate Hazard	High Hazard
Adequate turnaround space is available for large fire equipment.	<300' with no turnaround. Short or dead-end streets will become crowded with homeowner's vehicles.	300'+ with no turnaround. Long dead-end streets will become crowded with vehicles. Two-way visibility is an issue.



Major Roads
Other Roads



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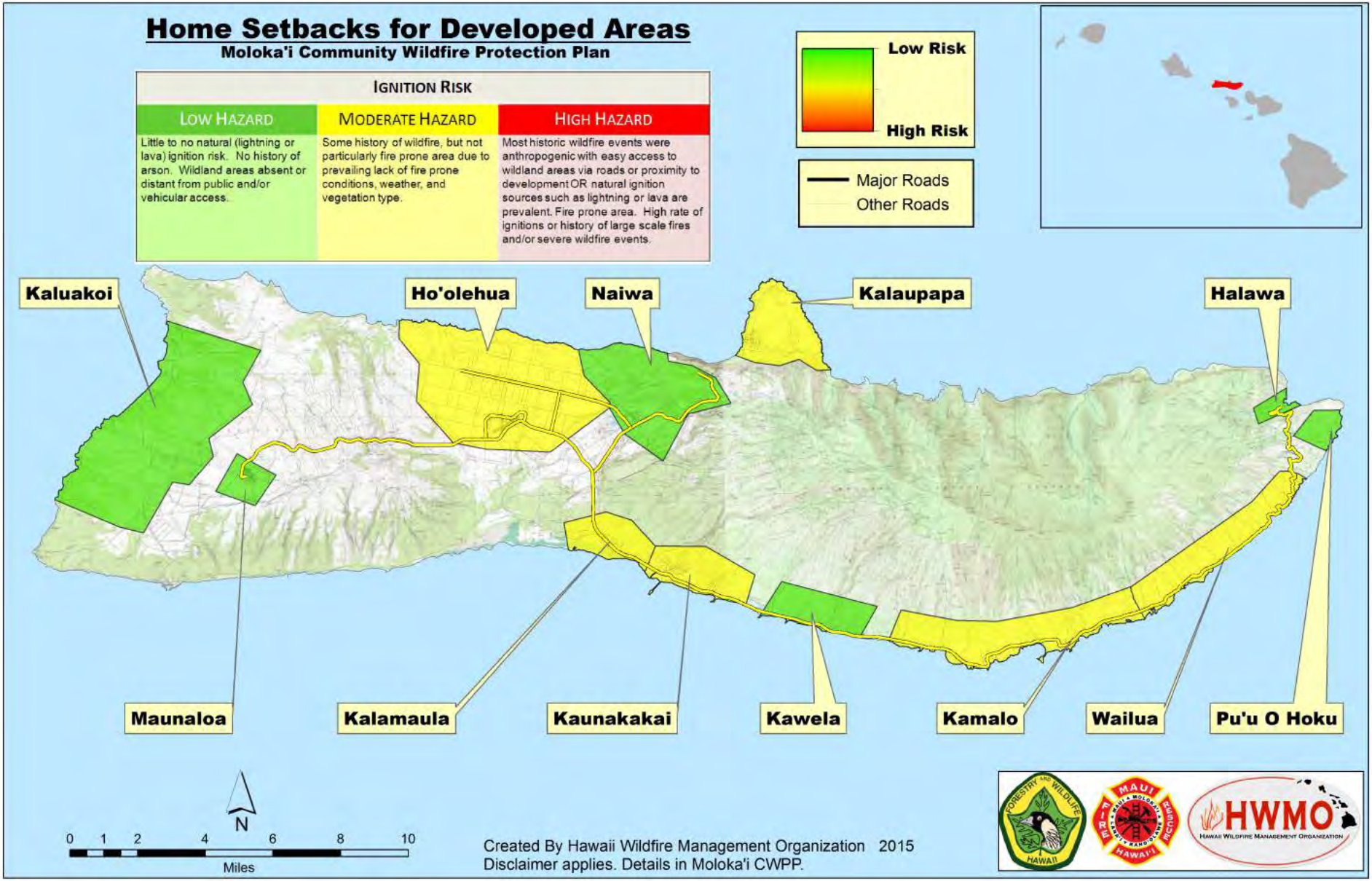
Disclaimer applies. Details in Moloka'i CWPP.

Home Setbacks for Developed Areas

Moloka'i Community Wildfire Protection Plan

Ignition Risk		
Low Hazard	Moderate Hazard	High Hazard
Little to no natural (lightning or lava) ignition risk. No history of arson. Wildland areas absent or distant from public and/or vehicular access.	Some history of wildfire, but not particularly fire prone area due to prevailing lack of fire prone conditions, weather, and vegetation type.	Most historic wildfire events were anthropogenic with easy access to wildland areas via roads or proximity to development OR natural ignition sources such as lightning or lava are prevalent. Fire prone area. High rate of ignitions or history of large scale fires and/or severe wildfire events.



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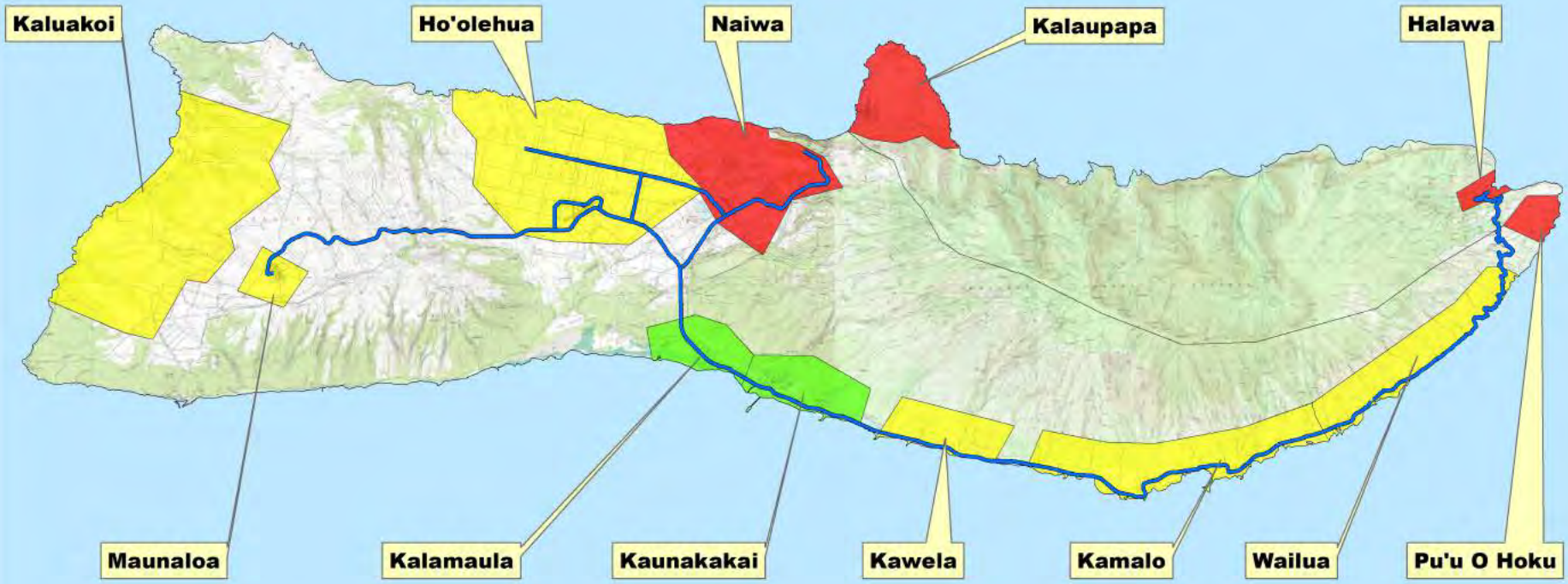
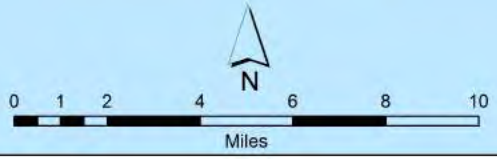
Ingress/Egress Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Ingress / Egress		
Low Hazard	Moderate Hazard	High Hazard
Multiple entrances and exits are well equipped for fire trucks with turnarounds.	Limited access routes. Two ways in and two ways out. Moderate grades.	Narrow, dead end roads or one way in, One way out. Steep grades.





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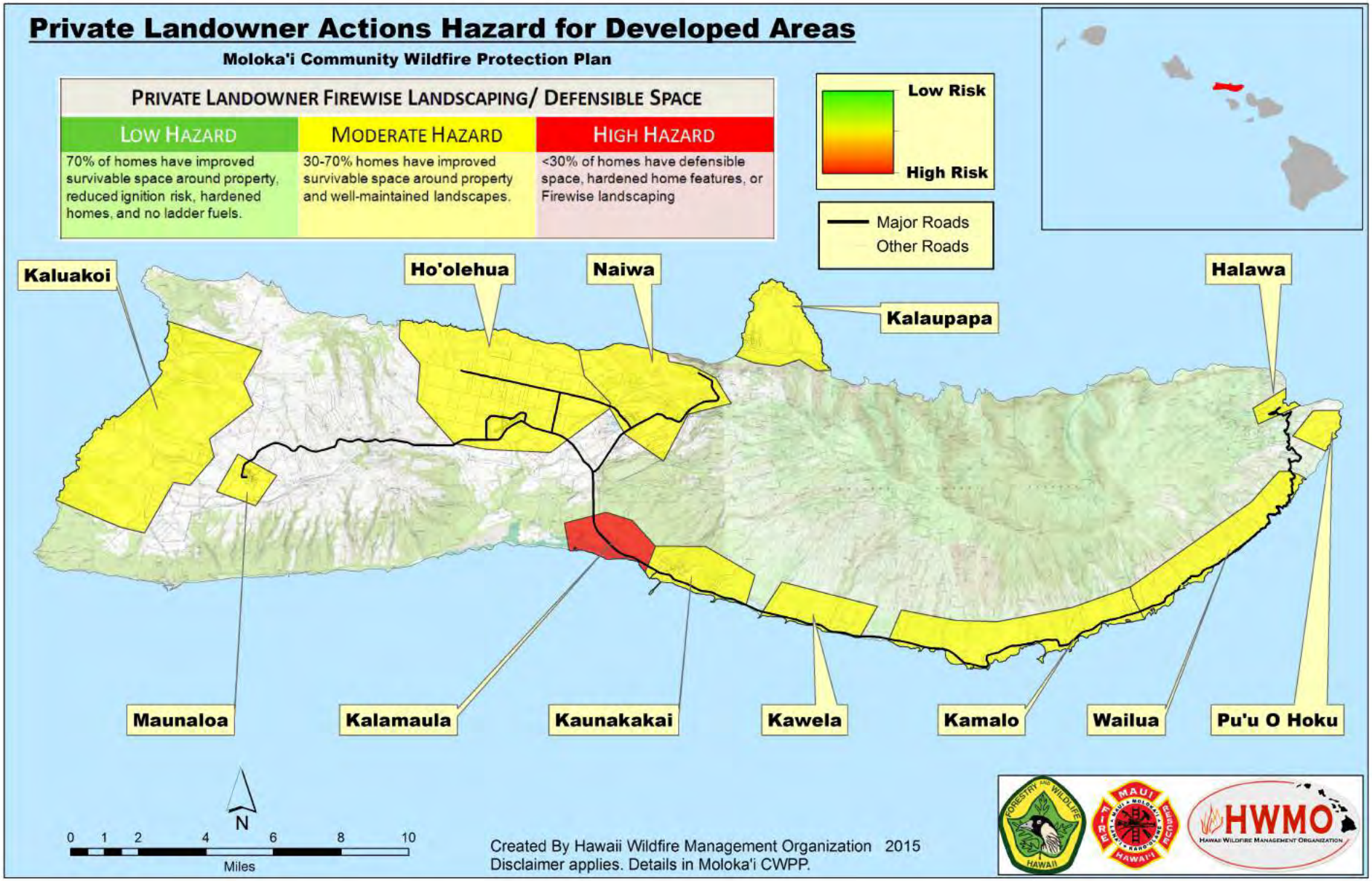
Private Landowner Actions Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Private Landowner Firewise Landscaping/ Defensible Space		
Low Hazard	**Moderate Hazard**	**High Hazard**
70% of homes have improved survivable space around property, reduced ignition risk, hardened homes, and no ladder fuels.	30-70% homes have improved survivable space around property and well-maintained landscapes.	<30% of homes have defensible space, hardened home features, or Firewise landscaping



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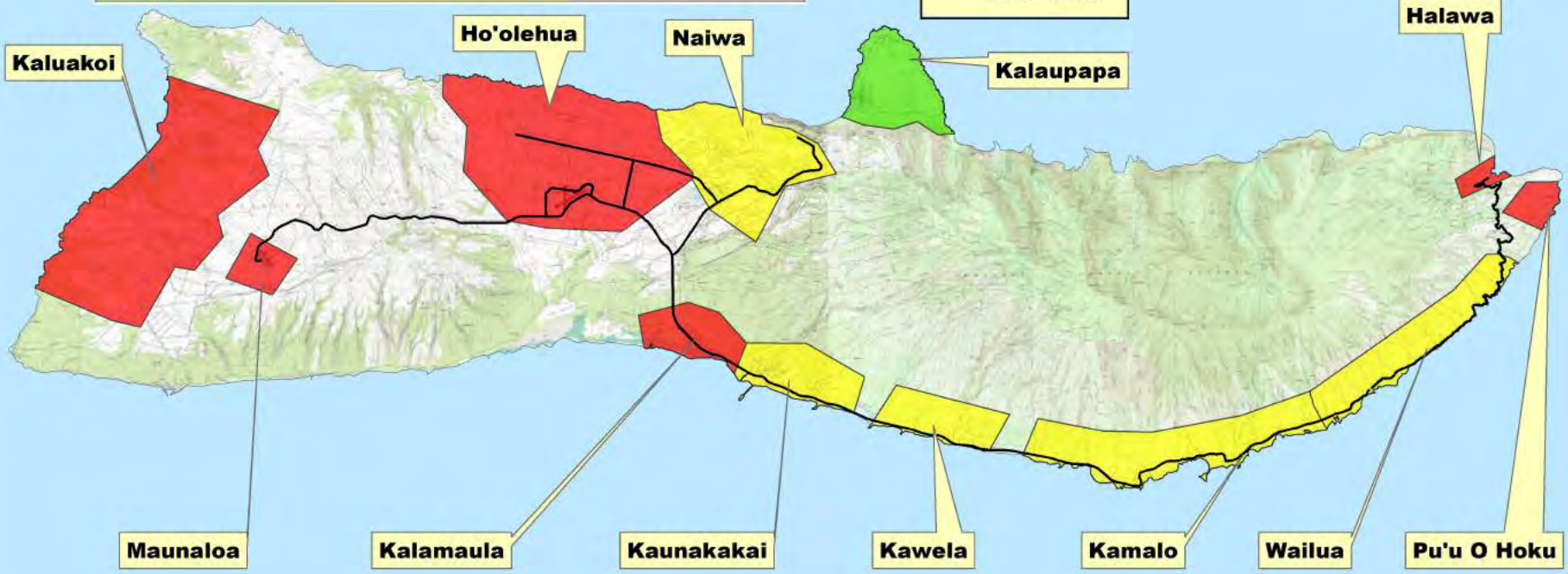
Proximity To Wildland Areas Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Proximity to Wildland Areas		
Low Hazard	**Moderate Hazard**	**High Hazard**
Wildland areas share no borders with the subdivision. Little to no undeveloped and unmaintained vegetated areas within community. Little to no ladder fuels along community boundaries.	Wildland areas adjoin subdivision on 1-2 sides.	Wildland areas surround subdivision on at least 3 sides.



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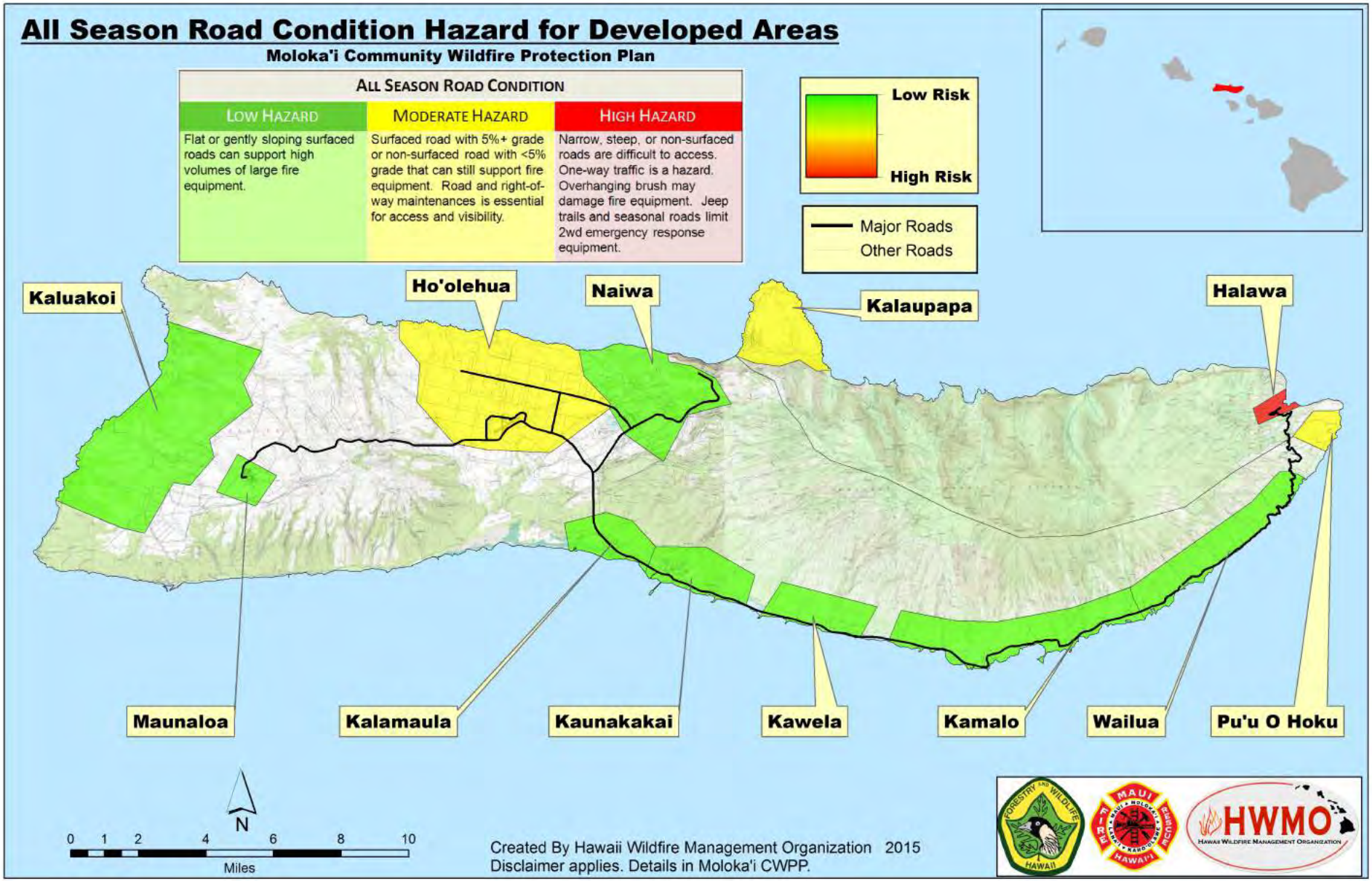
All Season Road Condition Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

All Season Road Condition		
Low Hazard	Moderate Hazard	High Hazard
Flat or gently sloping surfaced roads can support high volumes of large fire equipment.	Surfaced road with 5%+ grade or non-surfaced road with <5% grade that can still support fire equipment. Road and right-of-way maintenances is essential for access and visibility.	Narrow, steep, or non-surfaced roads are difficult to access. One-way traffic is a hazard. Overhanging brush may damage fire equipment. Jeep trails and seasonal roads limit 2wd emergency response equipment.



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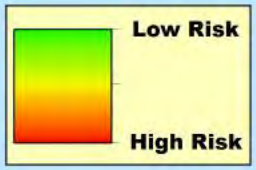
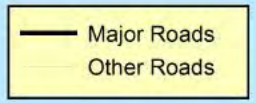
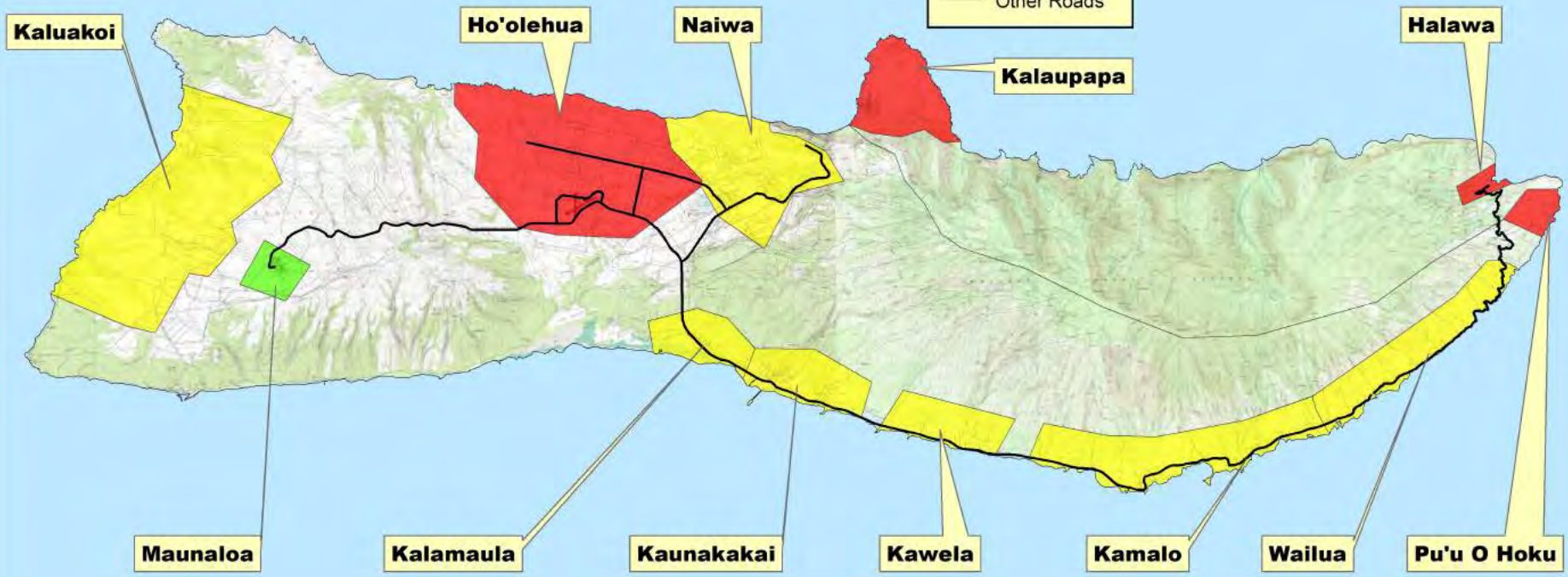
Road Maintenamce Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Road Maintenance		
Low Hazard	Moderate Hazard	High Hazard
Wide loop roads that are maintained, paved or solid surface with shoulders.	Roads maintained. Some narrow two lane roads with no shoulders.	Narrow and or single lane, minimally maintained, no shoulders.







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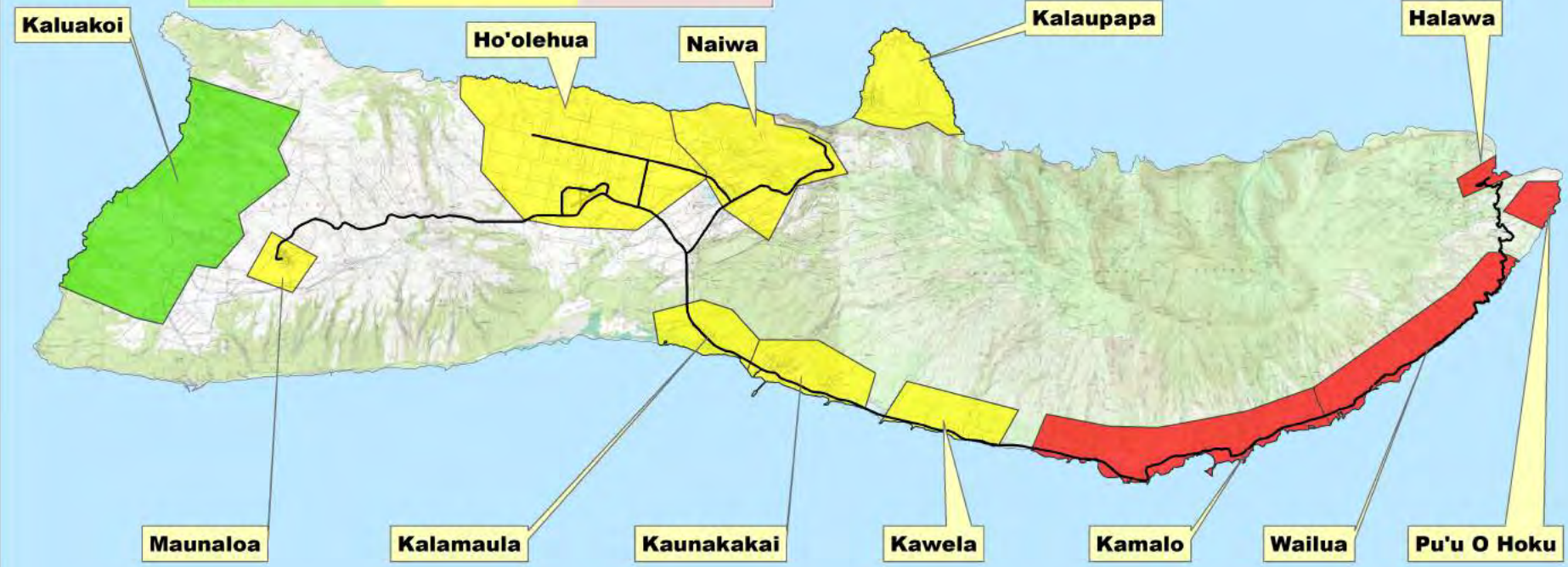
Road Width Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Road Width		
Low Hazard	Moderate Hazard	High Hazard
24'+ wide. Wide roads with drivable shoulders and good visibility allow two-way traffic. Streets in the downtown area are the widest streets in town. Interior streets are smaller and are easily blocked by parked vehicles.	20'-24' wide. Medium width roads with drivable shoulders and good visibility, support evacuation and emergency response time.	Less than 20 feet wide. Narrow roads coupled with poor visibility limit evacuation and emergency response. Traffic problems will occur. Entrapment is likely.



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Street Signs Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

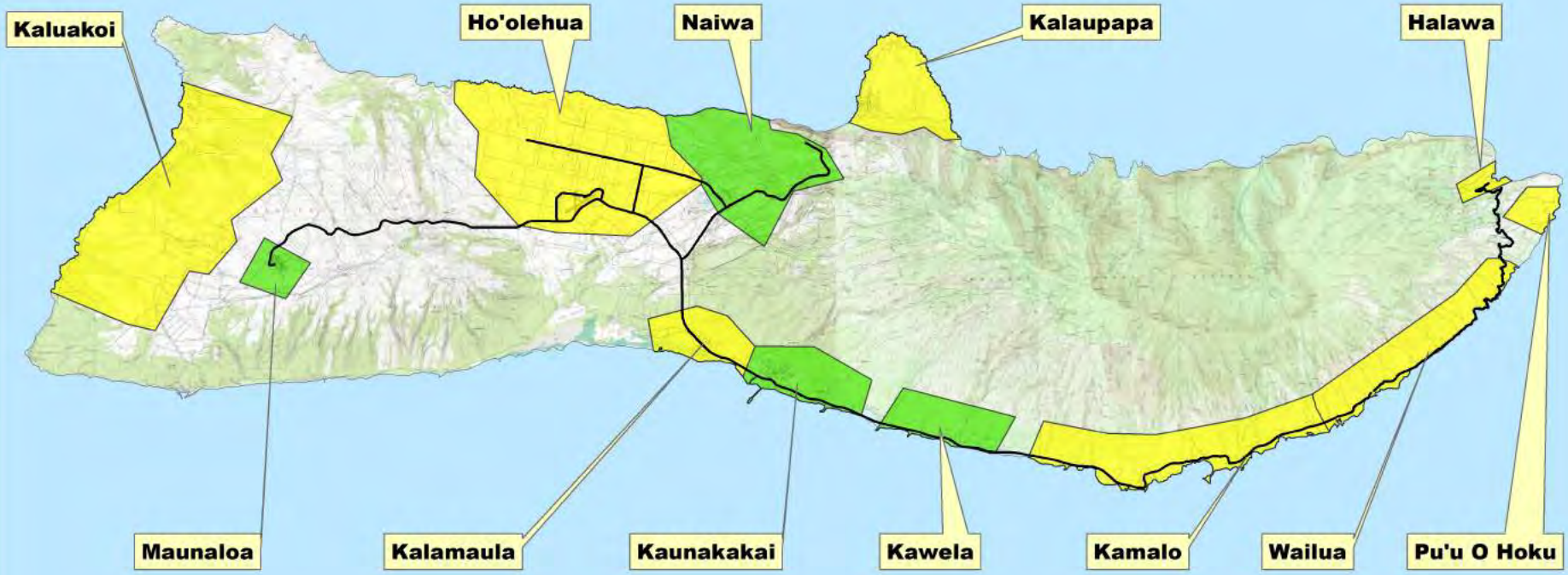
Street Signs		
Low Hazard	Moderate Hazard	High Hazard
Present. Most are at least 4' in size and are reflectorized.	Present and reflectorized with some exceptions.	Not present.

Low Risk

High Risk

Major Roads

Other Roads



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Structure Density Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

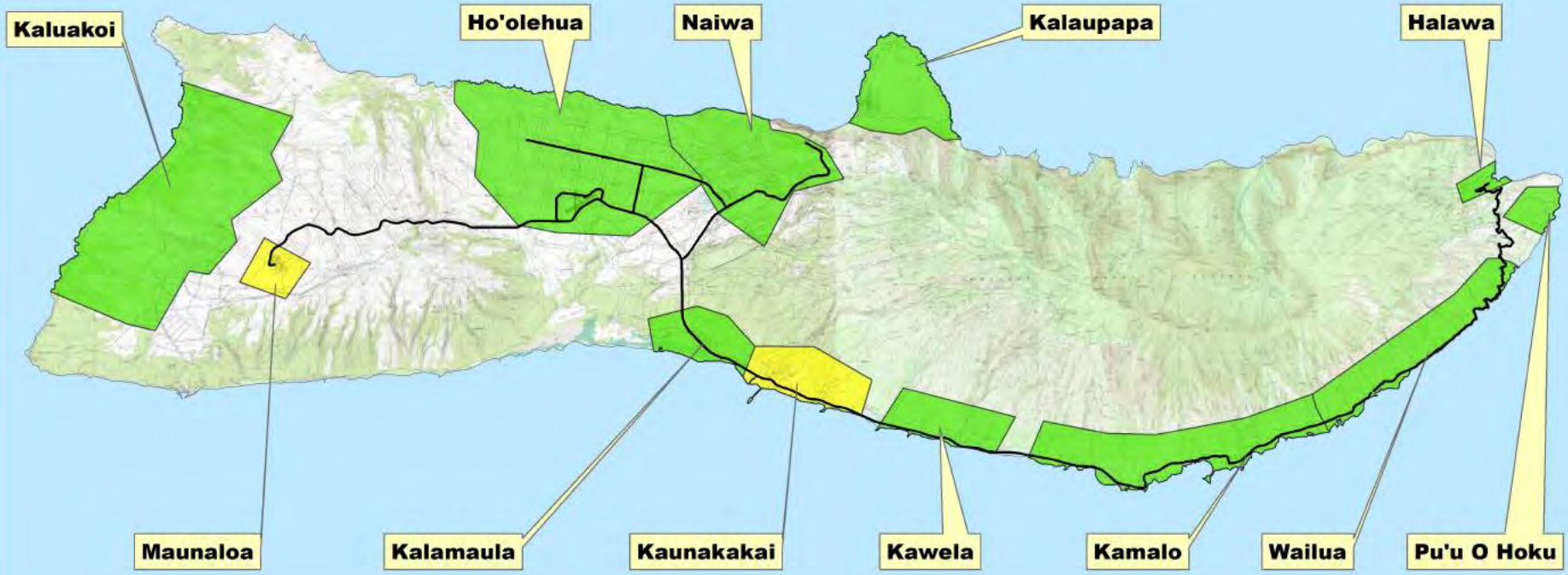
Structure Density		
Low Hazard	Moderate Hazard	High Hazard
Low structure density and low ignition probability.	Density and ignition probability are both moderate, or one is high but is balanced by the other being low.	Dense structures with high ignition probability.

Low Risk

High Risk

Major Roads

Other Roads



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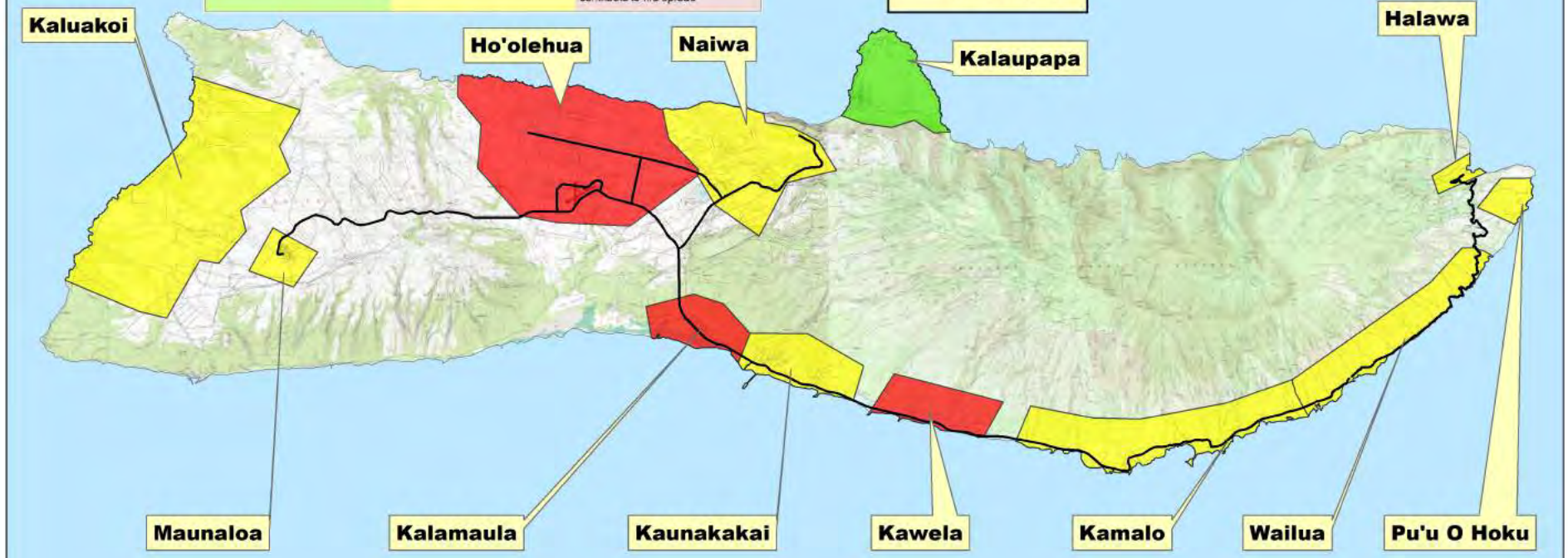
Unmanaged, Untended & Undeveloped Lands Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Untended Lands		
Low Hazard	Moderate Hazard	High Hazard
Few to no weedy vacant lots. Few to no undeveloped unmaintained vegetated areas or corridors between homes. Less than 10% of lots remain undeveloped and pose an additional wildfire hazard due to lack of maintenance and/or restricted access.	Some isolated unmaintained lots or undeveloped vegetated areas within subdivision. 10-50% of lots have not been developed and pose an additional wildfire hazard due to lack of maintenance and/or restricted access. Hazard ranking is dependent on ignition risk, size of area, and fuel type.	Abundant unmanaged, vegetated corridors and vacant lots throughout community. Agricultural lands irregularly maintained leaving dry weedy species causing increased ignition risk. Numerous ladder fuels and high risk fuels. Greater than 75% of lots have not been developed or Separation of adjacent structures that can contribute to fire spread



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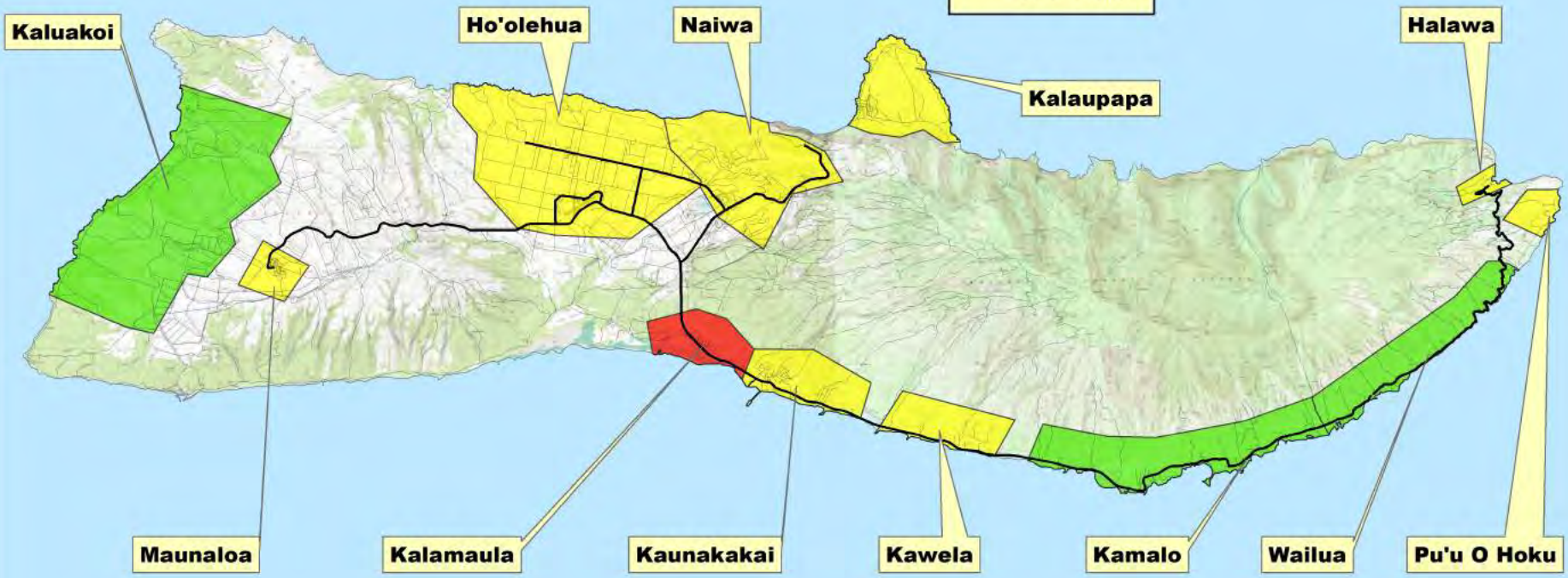
VEGETATION HAZARD FOR DEVELOPED AREAS

Defensible Space: Fuels Reduction Around Homes Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Defensible Space- Fuels Reduction Around Homes		
Low Hazard	Moderate Hazard	High Hazard
Vegetation is treated 100 feet or more from structures.	31-100 ft. of vegetation treatment from structures.	Less than 30 ft. of vegetation treatment from structures.



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Fuel Loading Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

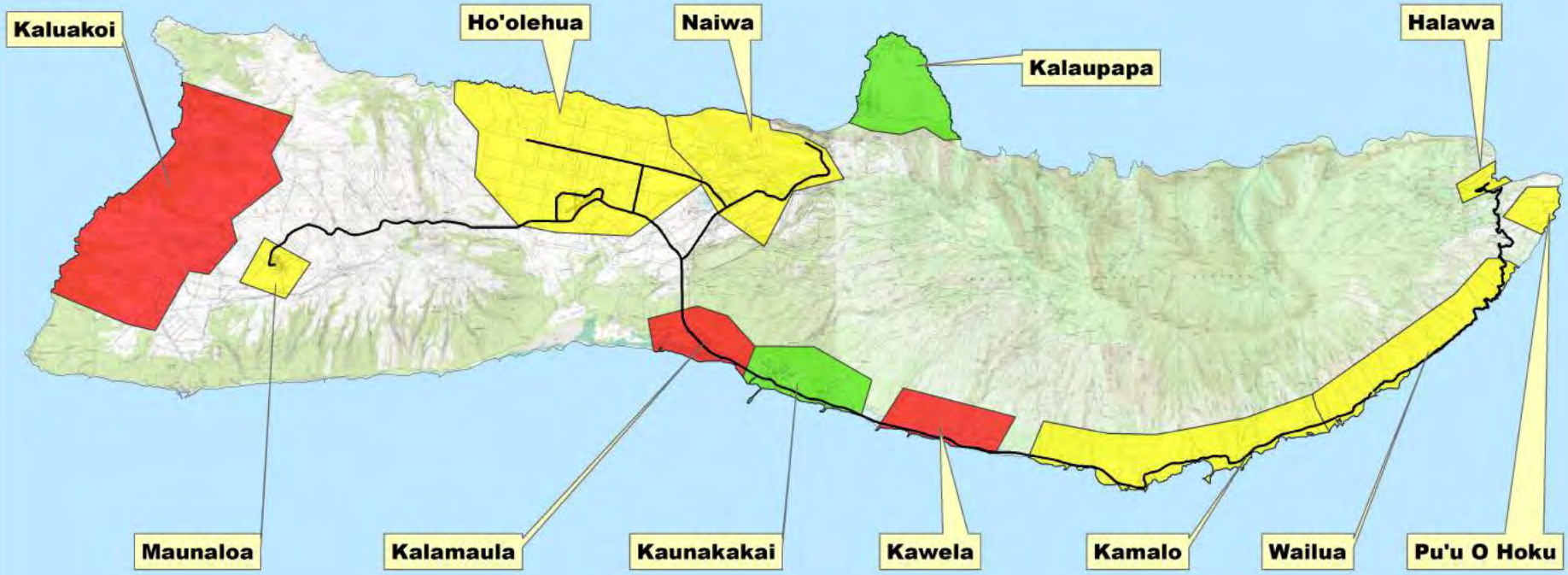
Fuel Loading		
Low Hazard	Moderate Hazard	High Hazard
0-30% vegetated cover	31-70% vegetated cover	71-100% vegetated cover

Low Risk

High Risk

Major Roads

Other Roads



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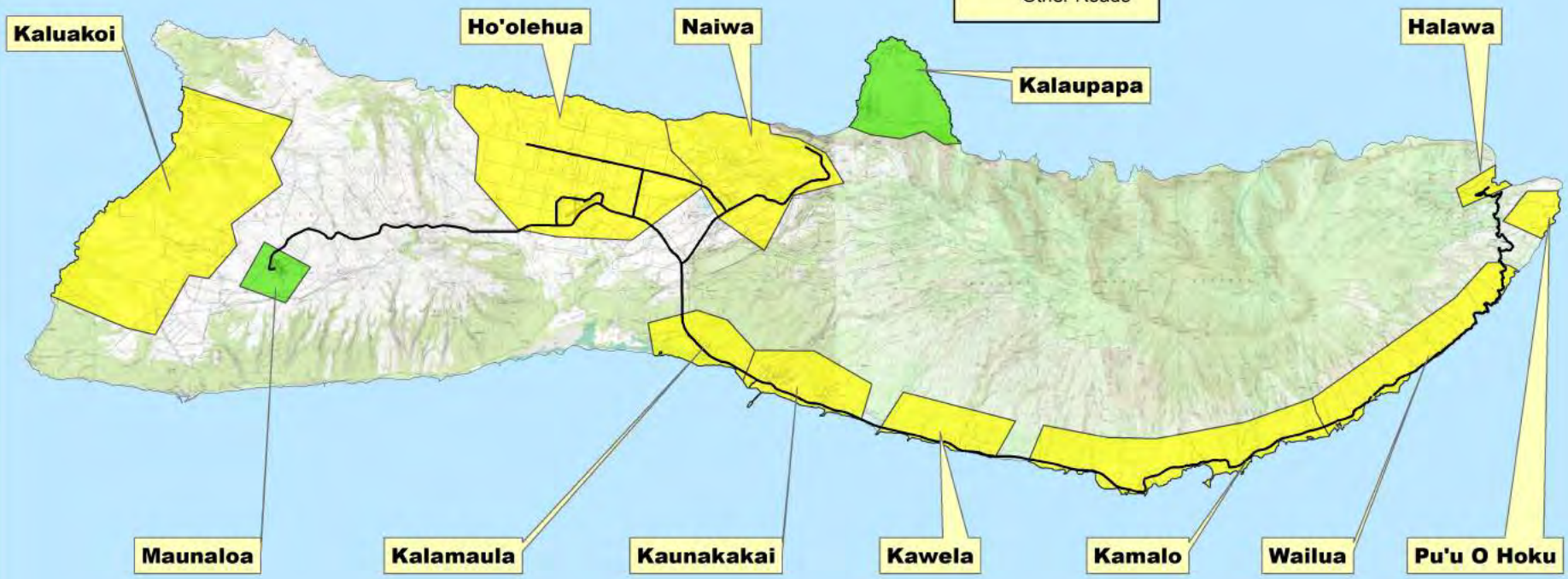
Fuel Structure & Arrangement Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Fuel Structure and Arrangement		
Low Hazard	Moderate Hazard	High Hazard
Non-contiguous or patchwork arrangement. Little to no ladder fuels.	Some areas of contiguous vegetation. Few ladder fuels.	Uninterrupted vegetation, pervasive ladder fuels.



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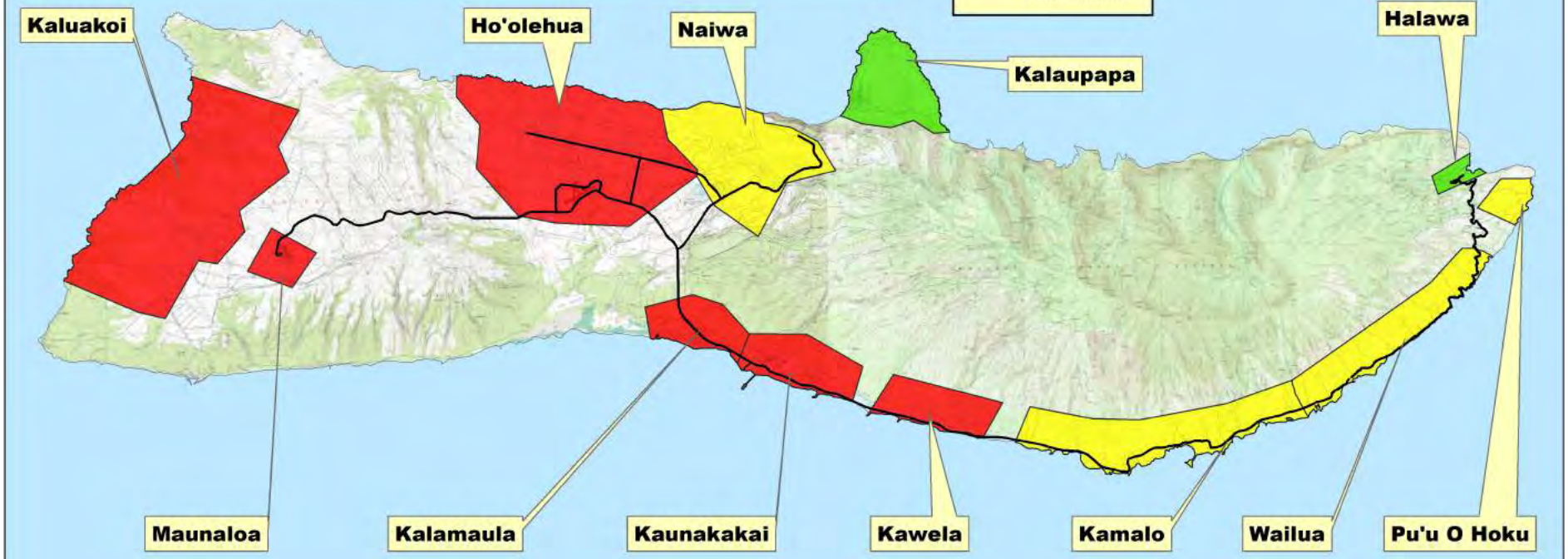
Proximity To Flammable Fuels Around Subdivision Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Proximity of Flammable Fuels Around Subdivision		
Low Hazard	Moderate Hazard	High Hazard
Greater than 100'	40-100'	Less than 40'



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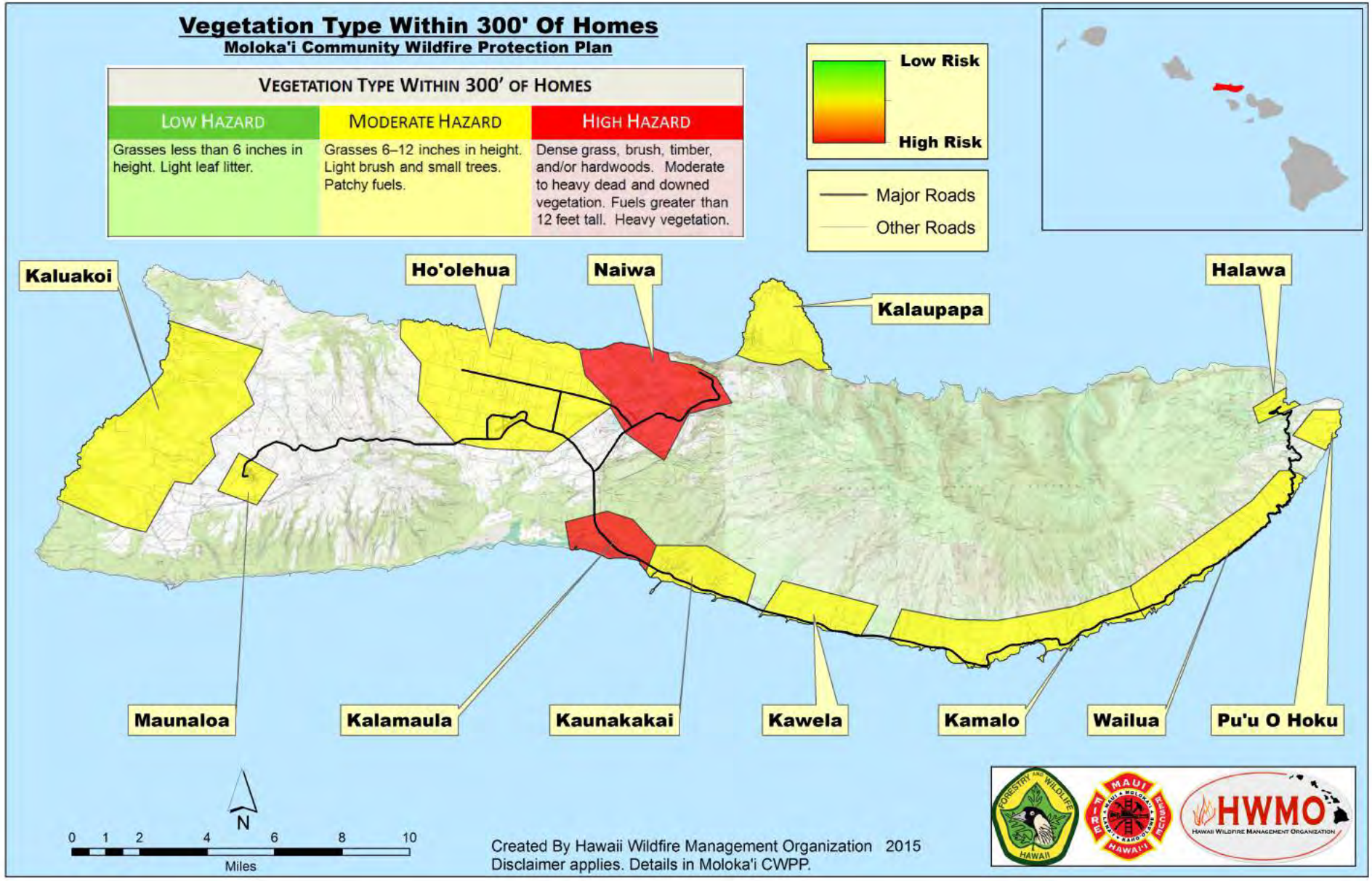
Vegetation Type Within 300' Of Homes

Moloka'i Community Wildfire Protection Plan

Vegetation Type Within 300' of Homes		
Low Hazard	Moderate Hazard	High Hazard
Grasses less than 6 inches in height. Light leaf litter.	Grasses 6–12 inches in height. Light brush and small trees. Patchy fuels.	Dense grass, brush, timber, and/or hardwoods. Moderate to heavy dead and downed vegetation. Fuels greater than 12 feet tall. Heavy vegetation.



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BUILDING HAZARD FOR DEVELOPED AREAS

Siding & Soffits Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

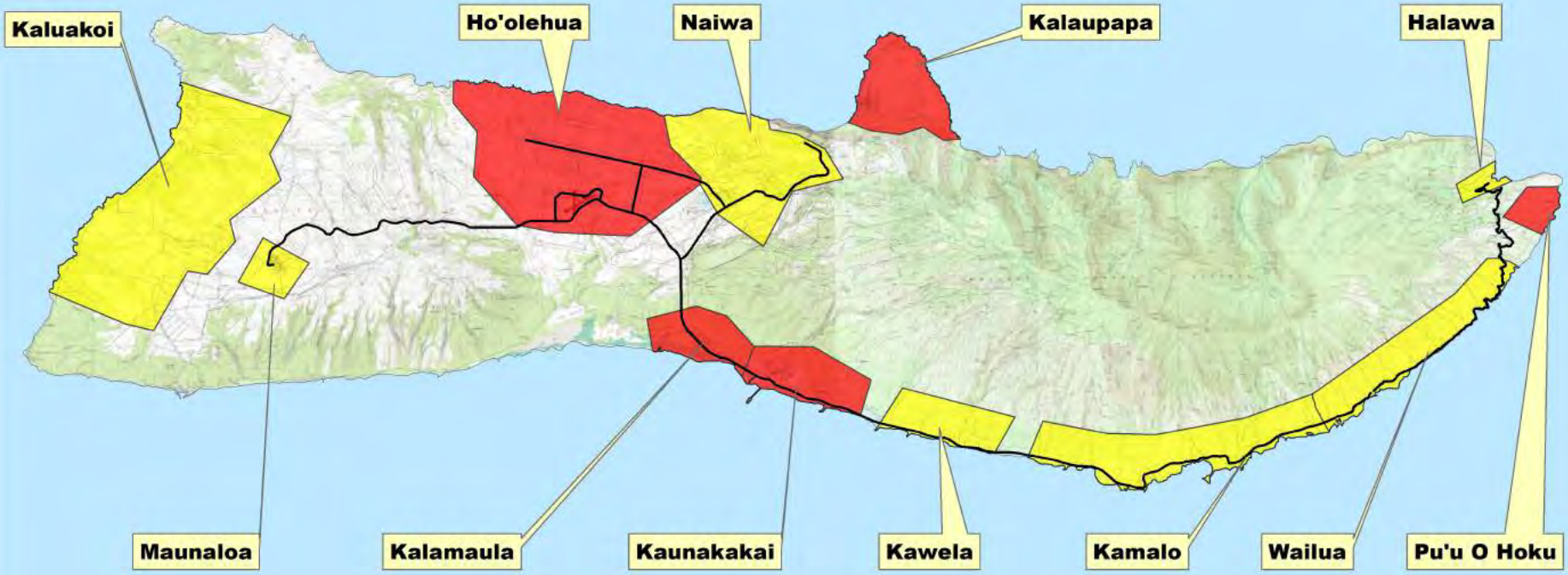
Siding and Soffits		
Low Hazard	Moderate Hazard	High Hazard
Greater than 75% of homes have fire resistant siding and soffits.	50-75% of homes have fire resistant siding and soffits.	Less than 50% of homes have fire resistant siding and soffits.

Low Risk

High Risk

Major Roads

Other Roads



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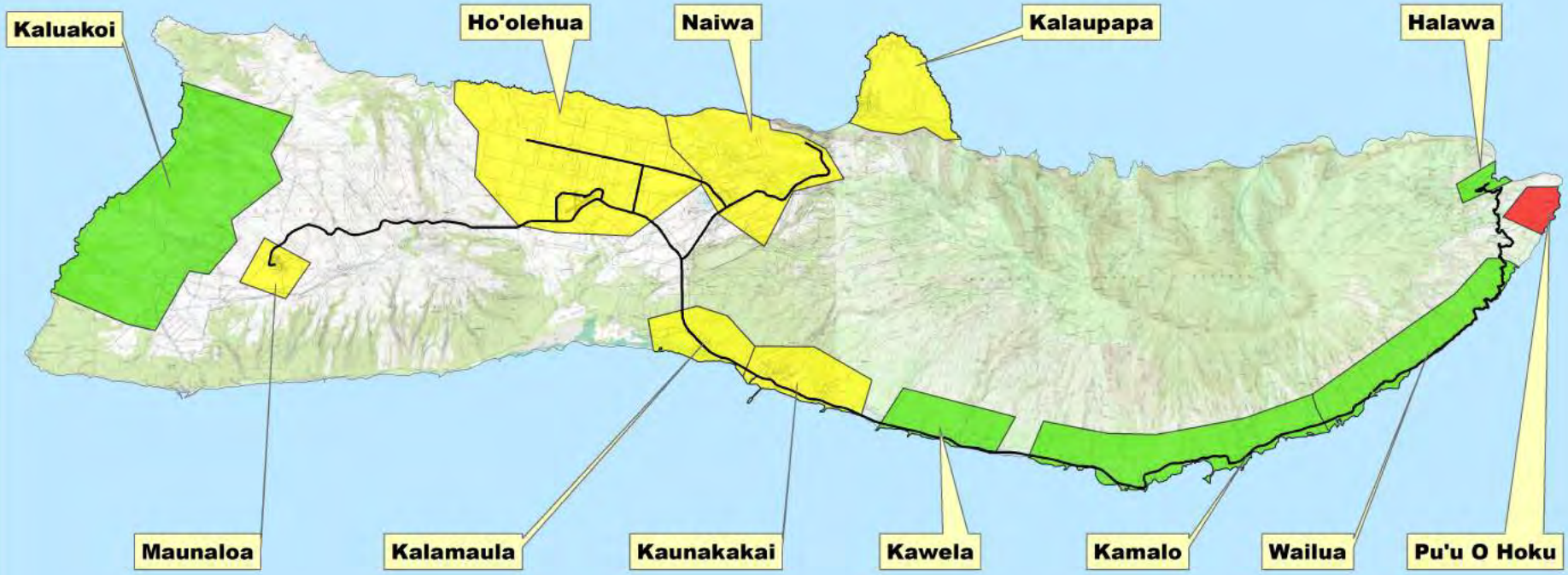
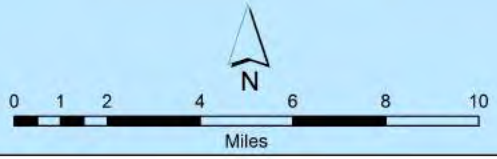
Roofing Asembly Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Roofing Assembly		
Low Hazard	Moderate Hazard	High Hazard
Greater than 75% of homes have Class A roofs (metal, asphalt, or fiberglass roofing material).	50-75% have Class A roofing.	Less than 50% of homes have Class A roofing.





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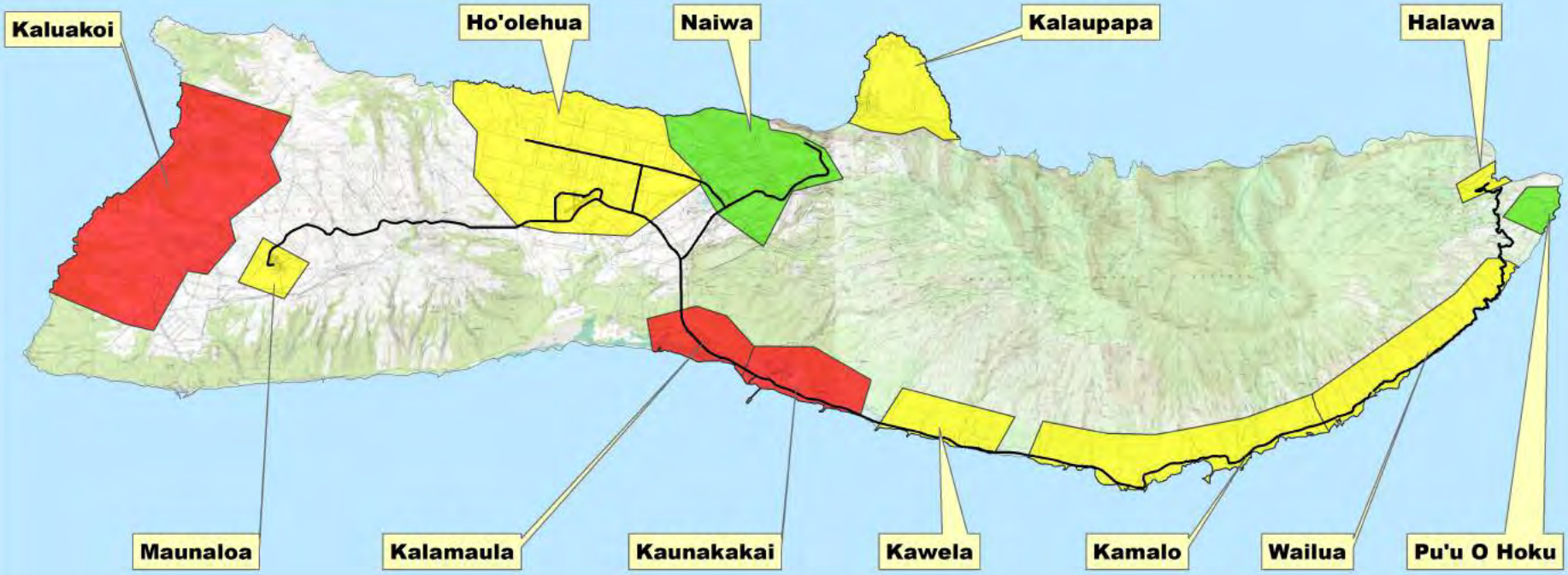
Structural Ignitability Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Structural Ignitability		
Low Hazard	Moderate Hazard	High Hazard
Greater than 75% or houses are spaced with cleared boundaries. Flammables and combustible materials stored according to fire-safe principles.	50-75% of homes store combustibles properly.	Less than 50% of homes store combustibles properly. Houses close to each other.



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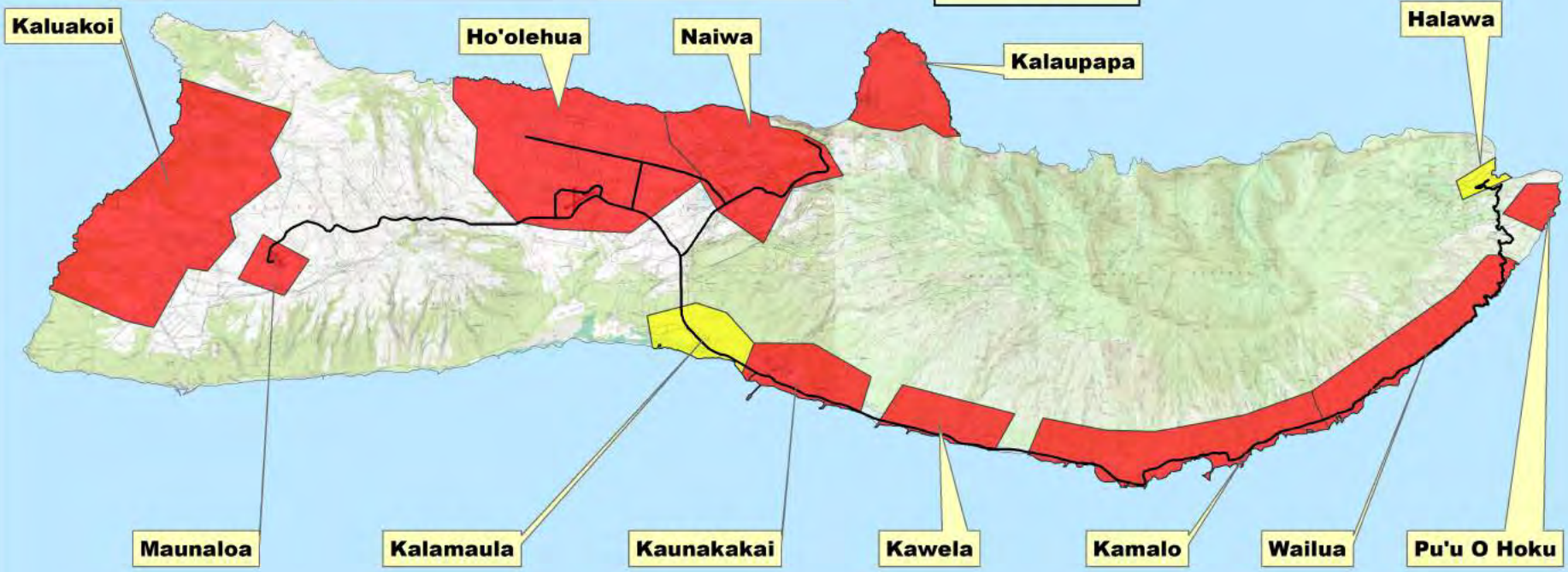
Underskirting Around Decks, Post & Pier Structures Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Underskirting Around Decks/ Post-and-Pier Structures		
Low Hazard	**Moderate Hazard**	**High Hazard**
Greater than 75% of homes have the equivalent of fine non-combustible mesh screening to protect underneath from flying embers and ignition.	50-75% of homes have the equivalent of fine non-combustible mesh screening.	Less than 50% of homes have the equivalent of fine non-combustible mesh screening.



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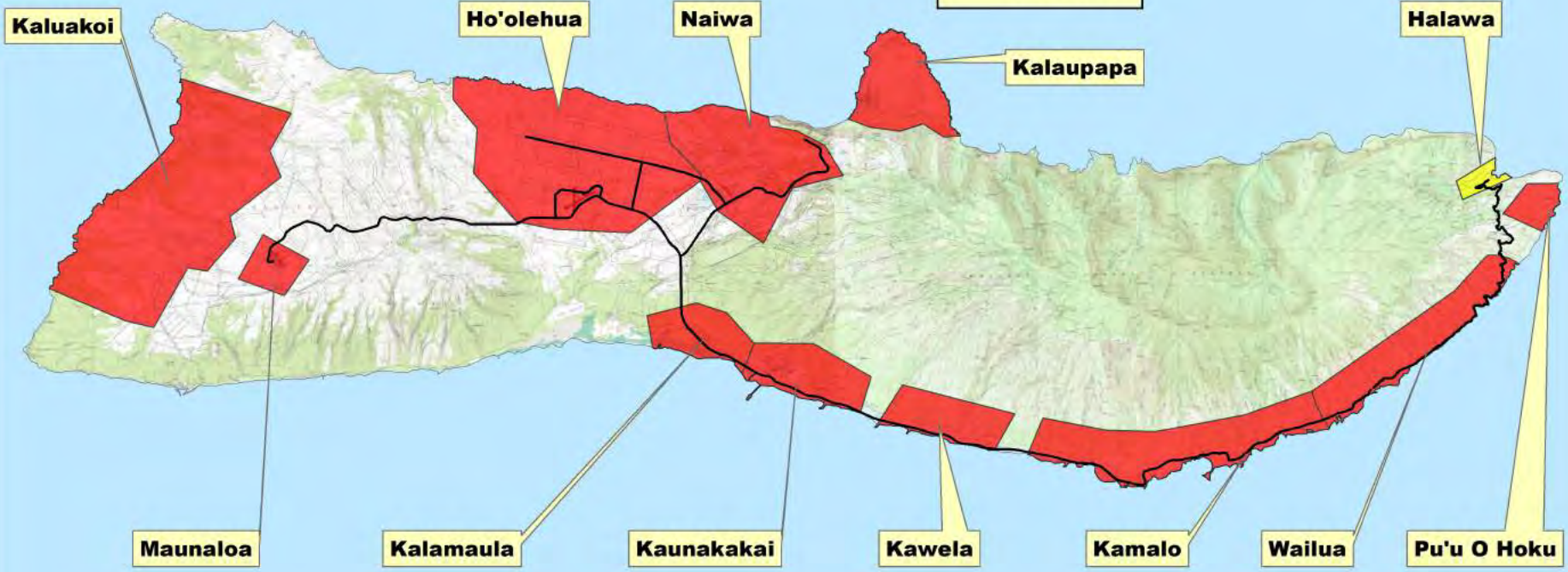
Utilities Placement: Gas & Electric Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Utilities Placement- Gas and Electric		
Low Hazard	Moderate Hazard	High Hazard
All underground or none.	One underground, one above ground.	Both above ground.



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FIRE ENVIRONMENT HAZARD FOR DEVELOPED AREAS

Average Rainfall Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

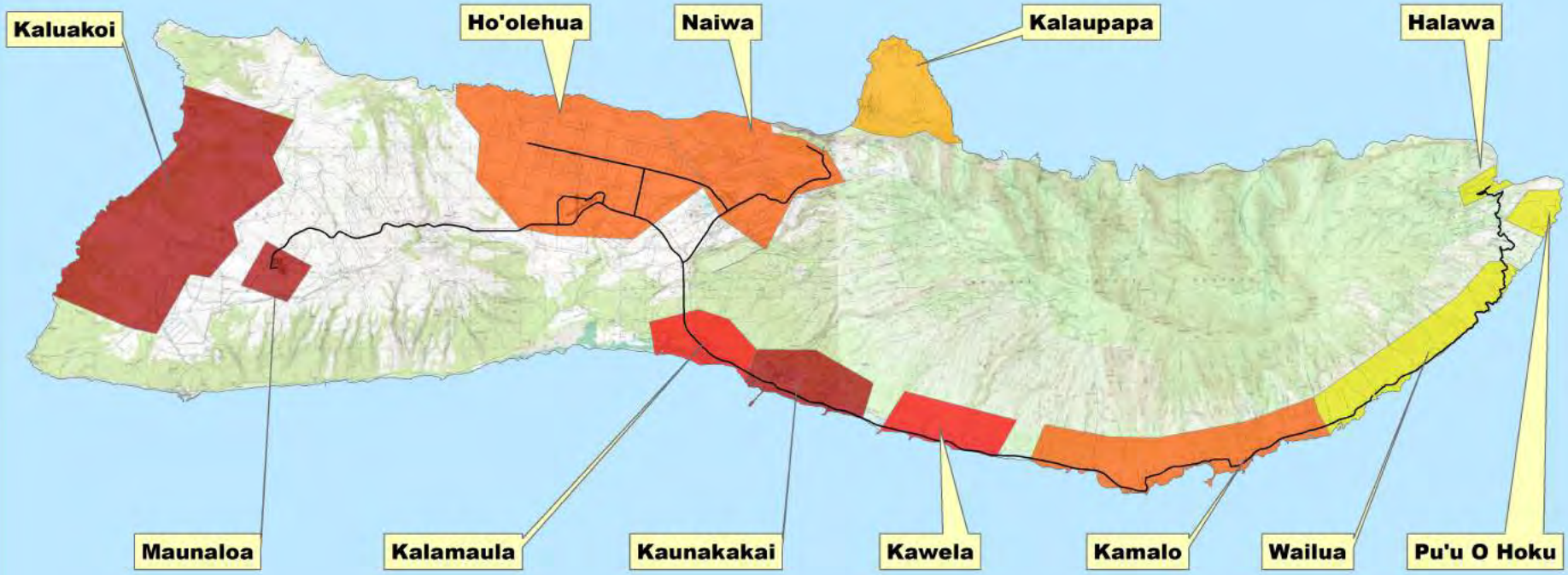
Average Rainfall		
Low Hazard	Moderate Hazard	High Hazard
High Precipitation	Moderate Precipitation	Low Precipitation

Low Risk

High Risk

Major Roads

Other Roads



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Miles

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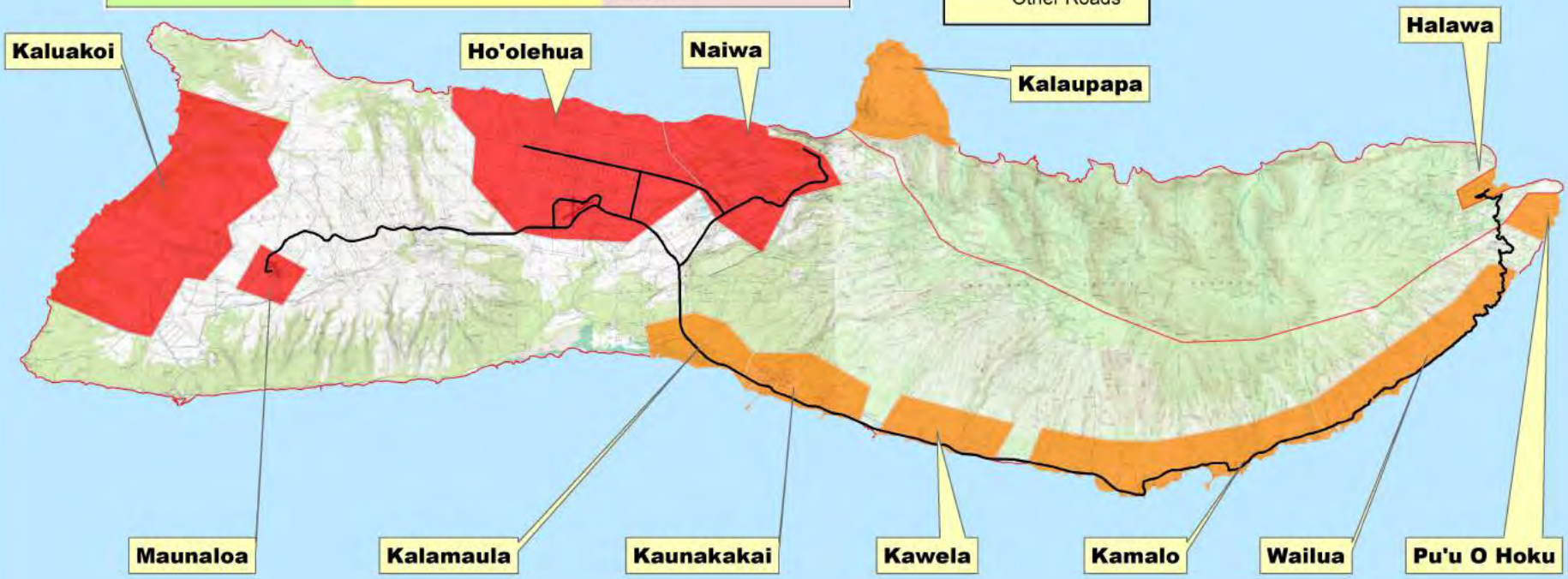
Prevailing Wind Speeds & Direction Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Prevailing Wind Speeds and Direction		
Low Hazard	Moderate Hazard	High Hazard
Wind rarely (less than 10% of time) exceeds 15 mph. Protection from predominant winds.	Wind rarely (less than 10% of time) exceeds 15 mph.	Wind frequently (50% or more of time) exceeds 15 mph or frequent exposure to predominant winds or transitional/converging wind directions.



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Miles

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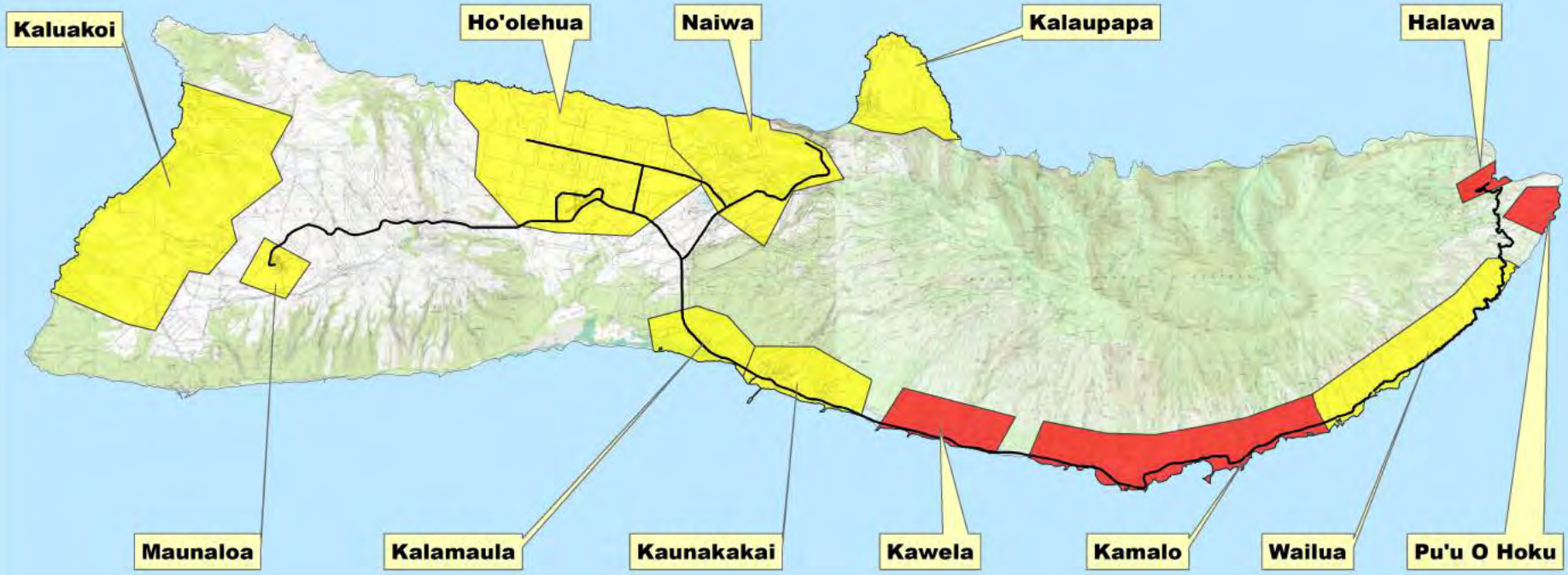
Slope Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

SLOPE		
LOW HAZARD	MODERATE HAZARD	HIGH HAZARD
Flat to slight slope (10%)	Moderate slopes (10-30%)	Steep slopes (>30%)



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Miles

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Topographic Features That Adversely Affect Wildland Fire Behavior Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

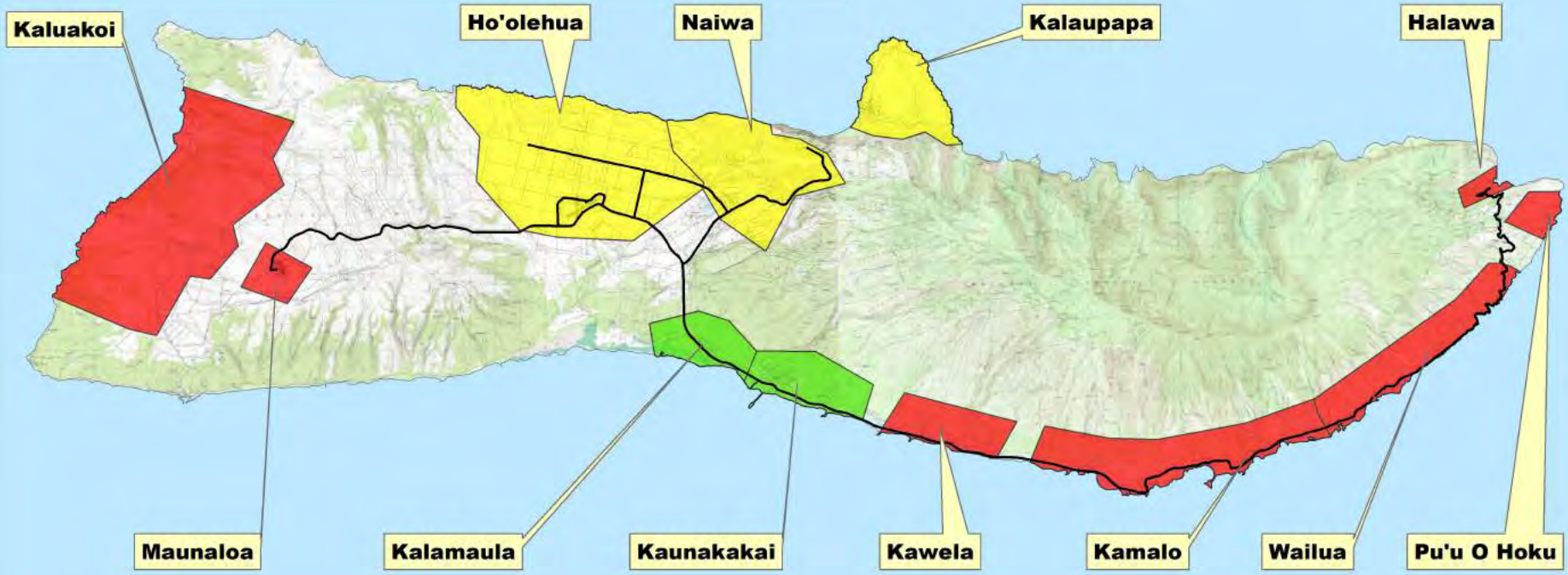
Hazardous Topographical Features		
Low Hazard	Moderate Hazard	High Hazard
None.	Minor features, such as low or occasional hills.	Major feature such as box canyon, ravines, chutes, saddles, transition zones.

Low Risk

High Risk

Major Roads

Other Roads



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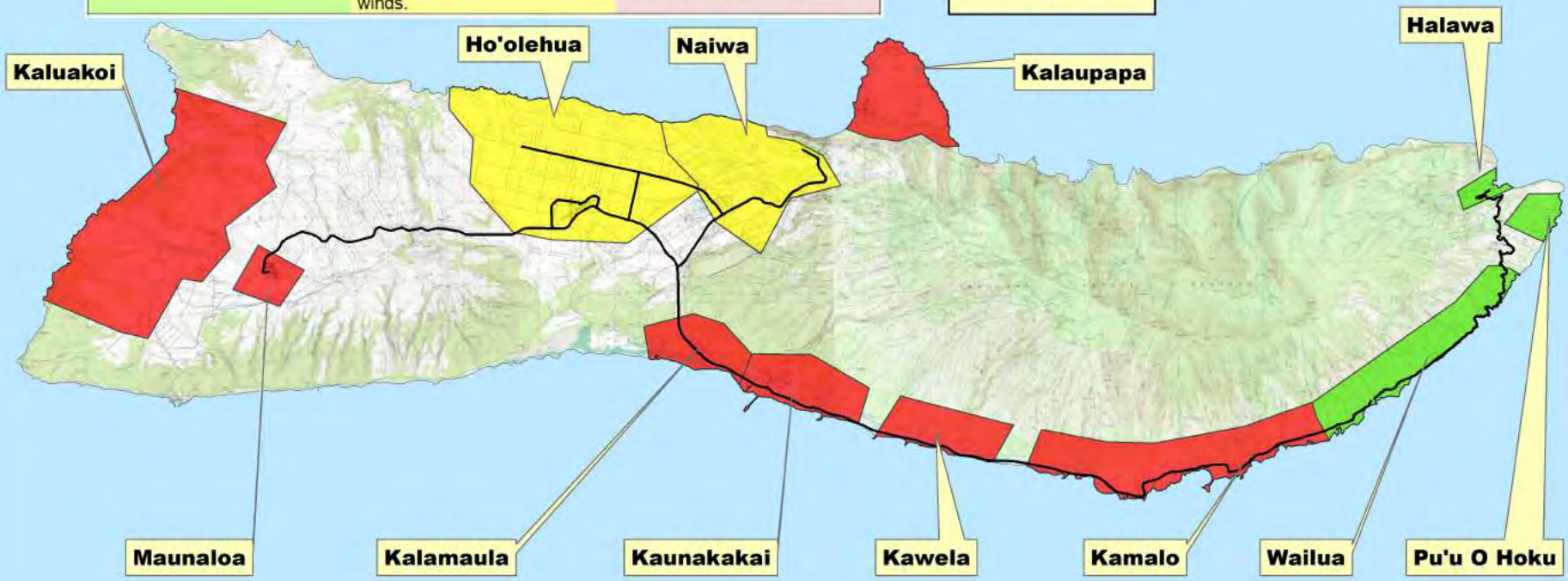
Seasonal Or Periodic High Hazard Conditions Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Seasonal Or Periodic High Hazard Conditions		
Low Hazard	**Moderate Hazard**	**High Hazard**
Area has no major seasonal increase of fire hazard.	Area is occasionally (e.g., once per decade) exposed to fire prone conditions: drought, lightning storms, desiccated vegetation, and/or strong dry winds.	Area is seasonally exposed to unusually severe fire weather, drought conditions, lightning storms, desiccated vegetation, and/or strong dry winds.



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Miles

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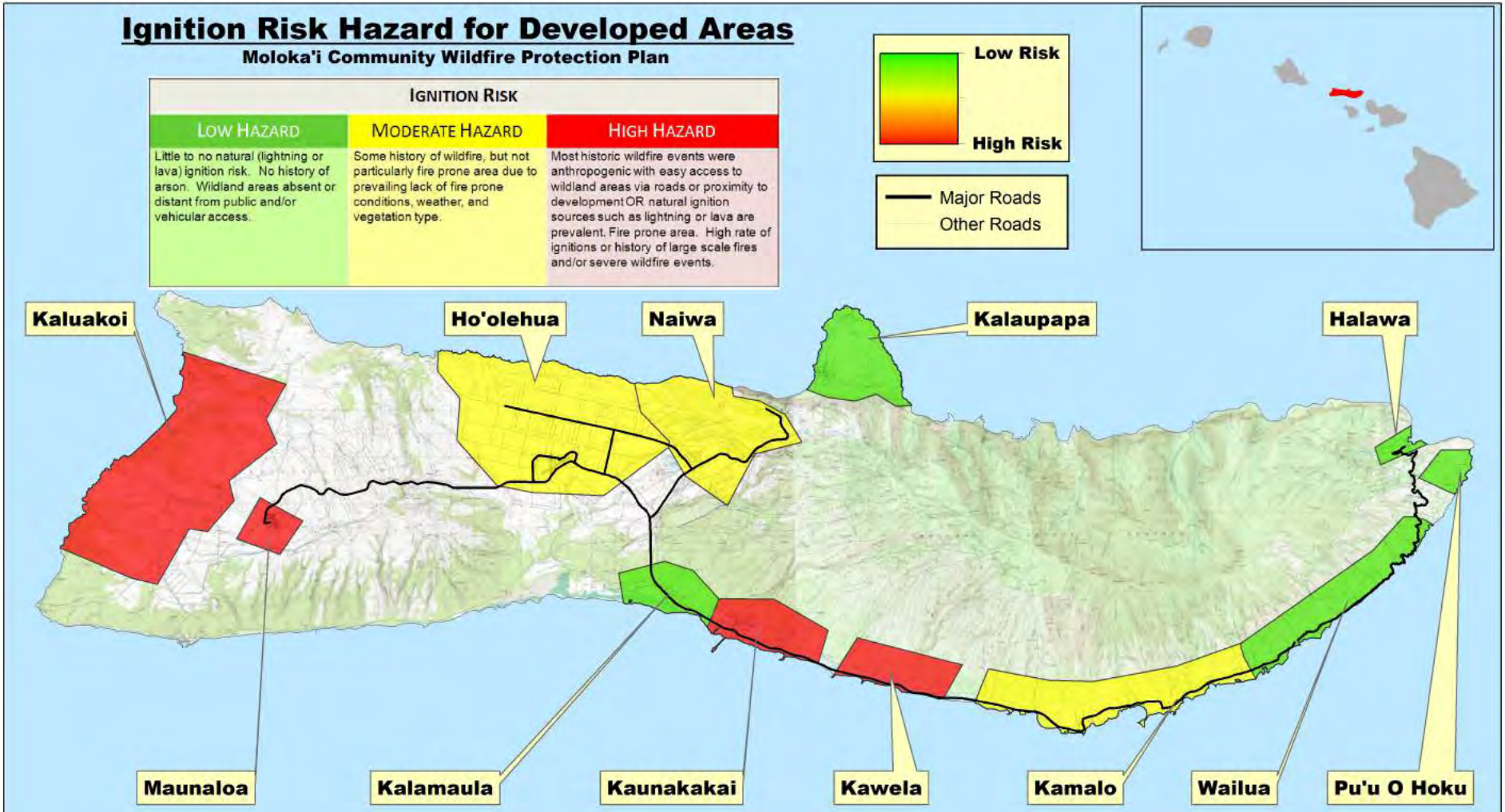
Ignition Risk Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Ignition Risk		
Low Hazard	Moderate Hazard	High Hazard
Little to no natural (lightning or lava) ignition risk. No history of arson. Wildland areas absent or distant from public and/or vehicular access.	Some history of wildfire, but not particularly fire prone area due to prevailing lack of fire prone conditions, weather, and vegetation type.	Most historic wildfire events were anthropogenic with easy access to wildland areas via roads or proximity to development OR natural ignition sources such as lightning or lava are prevalent. Fire prone area. High rate of ignitions or history of large scale fires and/or severe wildfire events.



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FIRE PROTECTION HAZARD FOR DEVELOPED AREAS

Response Time Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

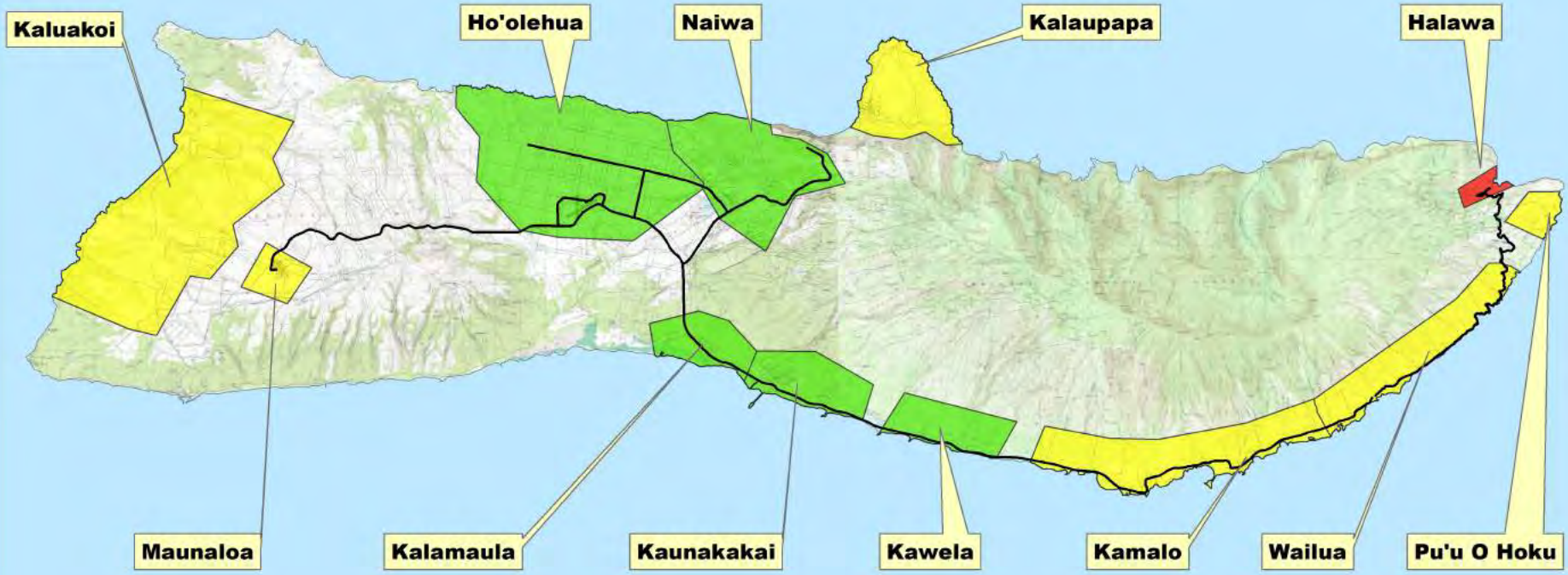
Response Time		
Low Hazard	Moderate Hazard	High Hazard
Within 15 minutes	16-30 minutes	Greater than 30 minutes

Low Risk

High Risk

Major Roads

Other Roads



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Miles

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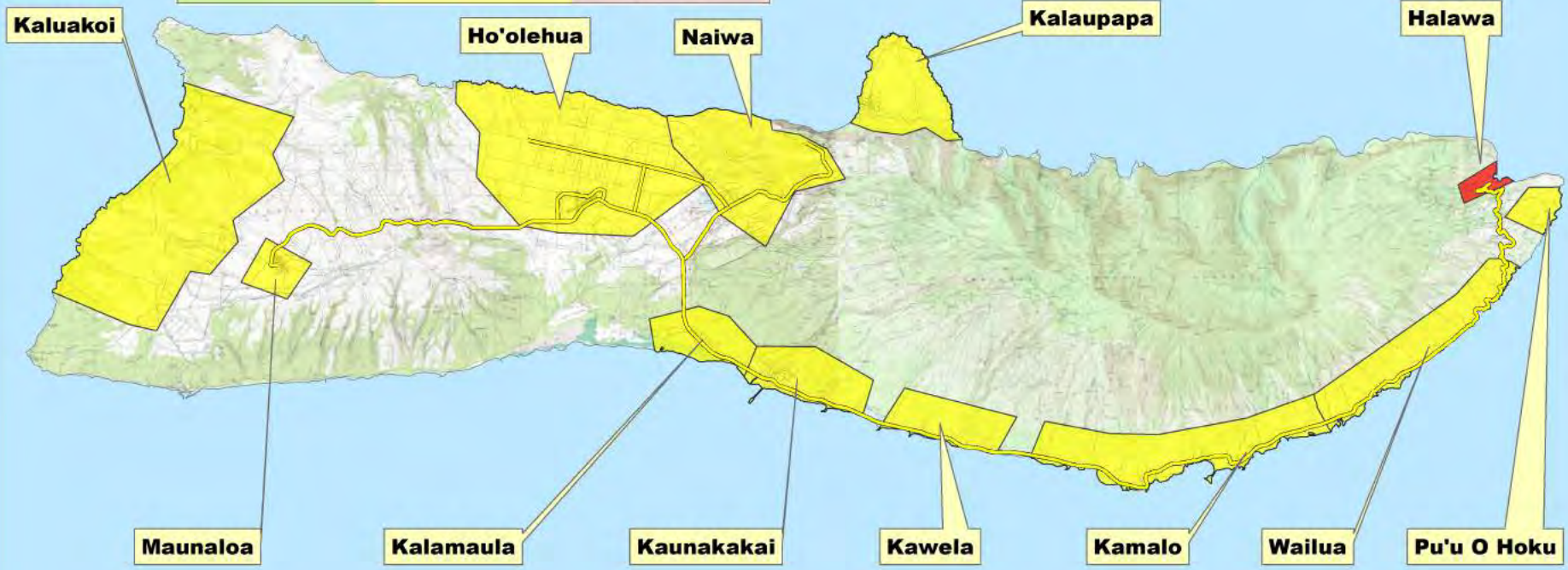
Community Planning Practices & Ordinances Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

COMMUNITY PLANNING PRACTICES AND ORDINANCES

LOW HAZARD	MODERATE HAZARD	HIGH HAZARD
County/local laws, zoning ordinances, and codes require use of fire safe residential and subdivision designs. Fire department actively participates in planning process and enforces ordinances. Residents are compliant.	Have voluntary ordinances for fire safe practices. Local officials have an understanding of appropriate wildfire mitigation strategies. Fire department has limited input to fire safe planning and development efforts and limited enforcement. Residents are mostly compliant.	No local codes, laws, or ordinances requiring fire safe building or practices. Community standards for fire safe development and protection are marginal or non-existent. Little to no effort has been made in assessing and applying measures to reduce wildfire impact. Ordinances are not enforced and/or residents are not compliant.



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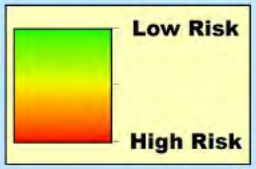
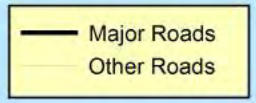
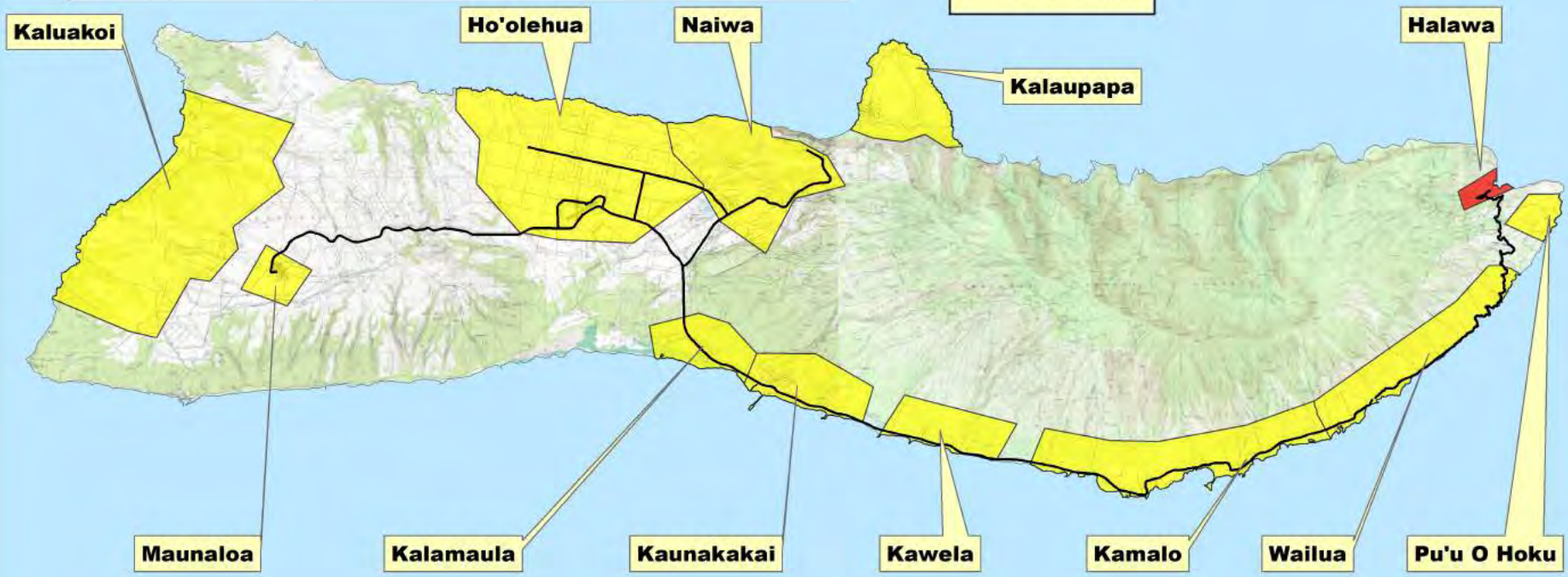
Community Fire Safe Efforts & Programs In Place Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Community Fire Safe Efforts and Programs in Place		
Low Hazard	**Moderate Hazard**	**High Hazard**
Organized and active groups provide educational materials and programs throughout the community.	Limited provision of or interest in educational efforts. Fire Department or local group does some limited prevention and public education.	No interest or participation in educational programs. No prevention education by local fire department.







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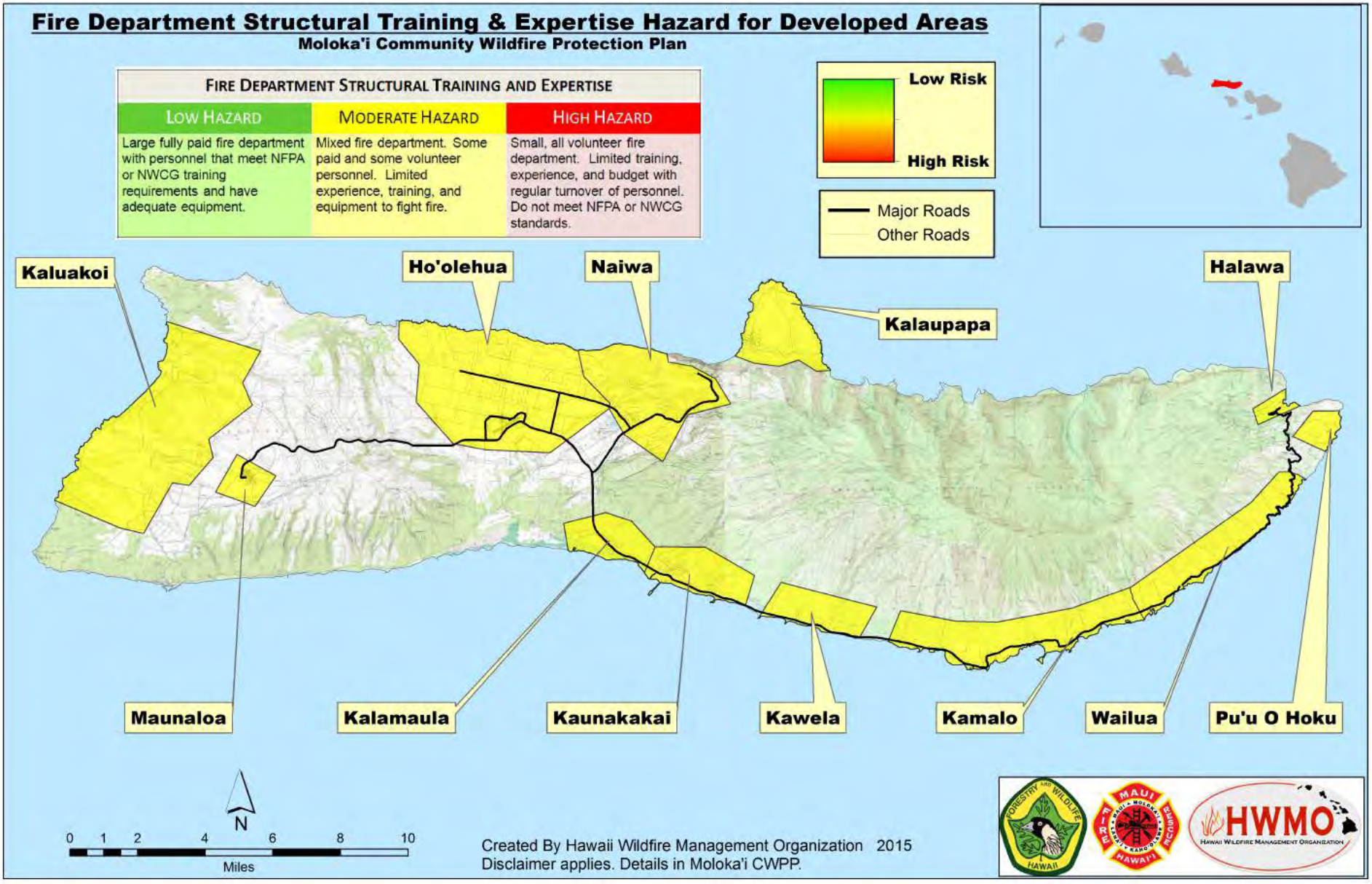
Fire Department Structural Training & Expertise Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Fire Department Structural Training and Expertise		
Low Hazard	Moderate Hazard	High Hazard
Large fully paid fire department with personnel that meet NFPA or NWCG training requirements and have adequate equipment.	Mixed fire department. Some paid and some volunteer personnel. Limited experience, training, and equipment to fight fire.	Small, all volunteer fire department. Limited training, experience, and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards.



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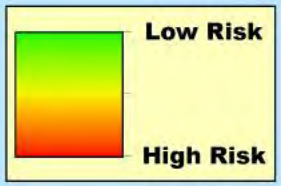
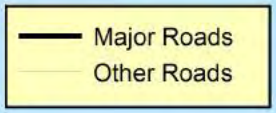
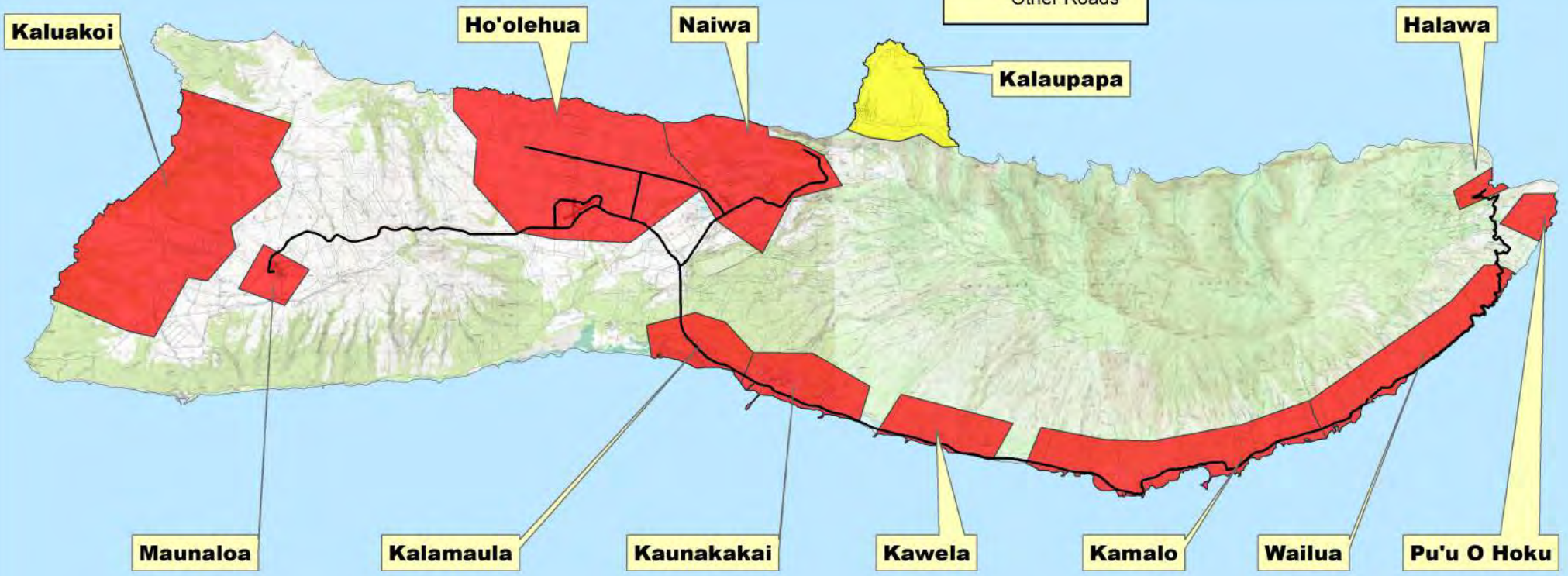
Citizen Or Local Emergency Operations Group Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Citizen or Local Emergency Operations Group		
Low Hazard	**Moderate Hazard**	**High Hazard**
Active EOG or CERT. Evacuation plan in place.	Limited participation in EOG or similar. Have some form of evacuation process.	No effective activity or strategy in place.







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Proximity To Fire Station Hazard for Developed Areas

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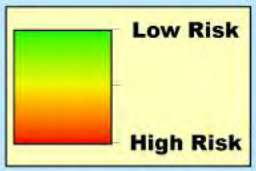
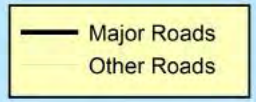
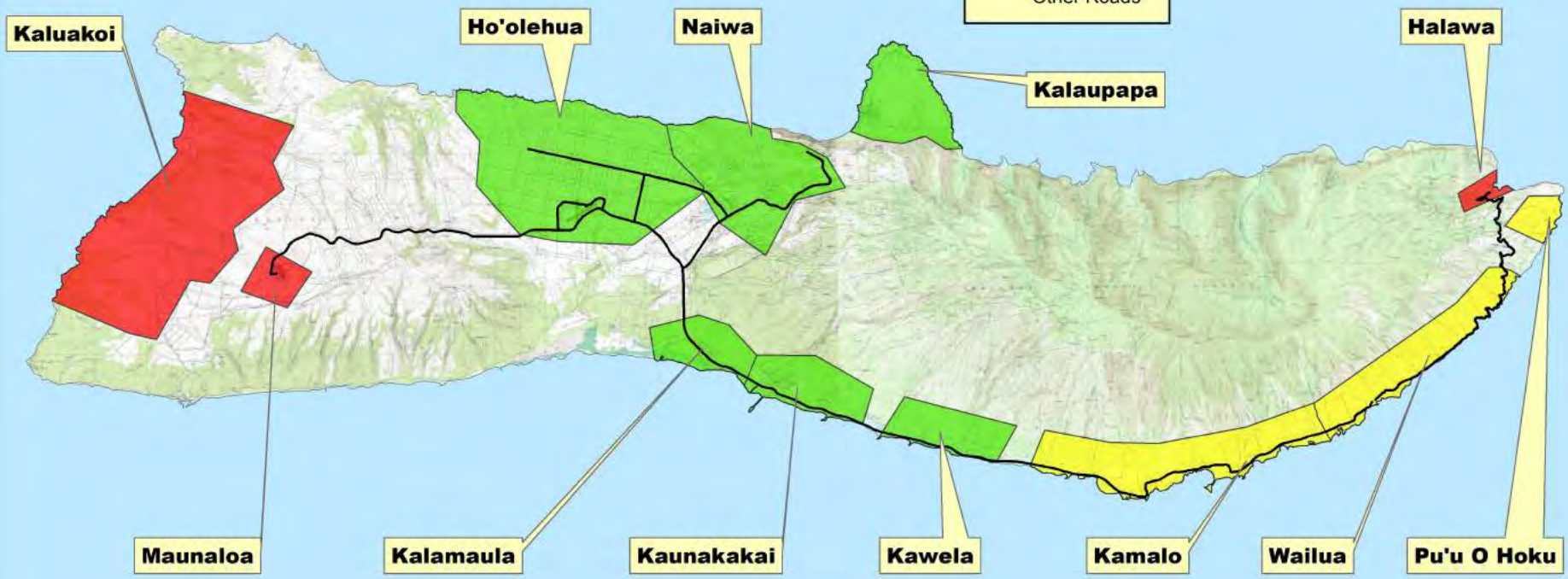
Proximity To Fire Station		
Low Hazard	Moderate Hazard	High Hazard
Less than 5 miles	6-10 miles	More than 10 miles







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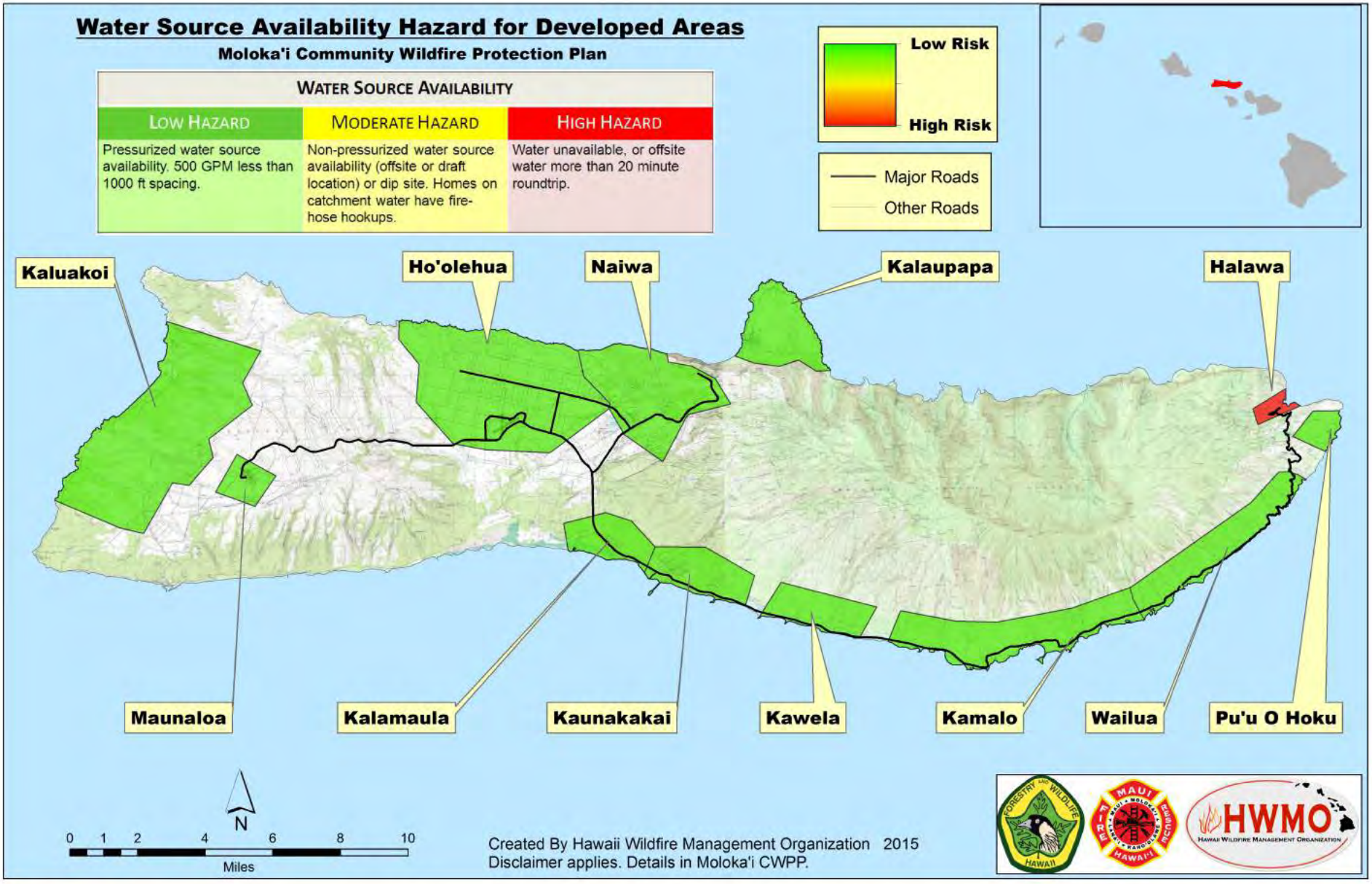
Water Source Availability Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Water Source Availability		
Low Hazard	Moderate Hazard	High Hazard
Pressurized water source availability. 500 GPM less than 1000 ft spacing.	Non-pressurized water source availability (offsite or draft location) or dip site. Homes on catchment water have fire-hose hookups.	Water unavailable, or offsite water more than 20 minute roundtrip.



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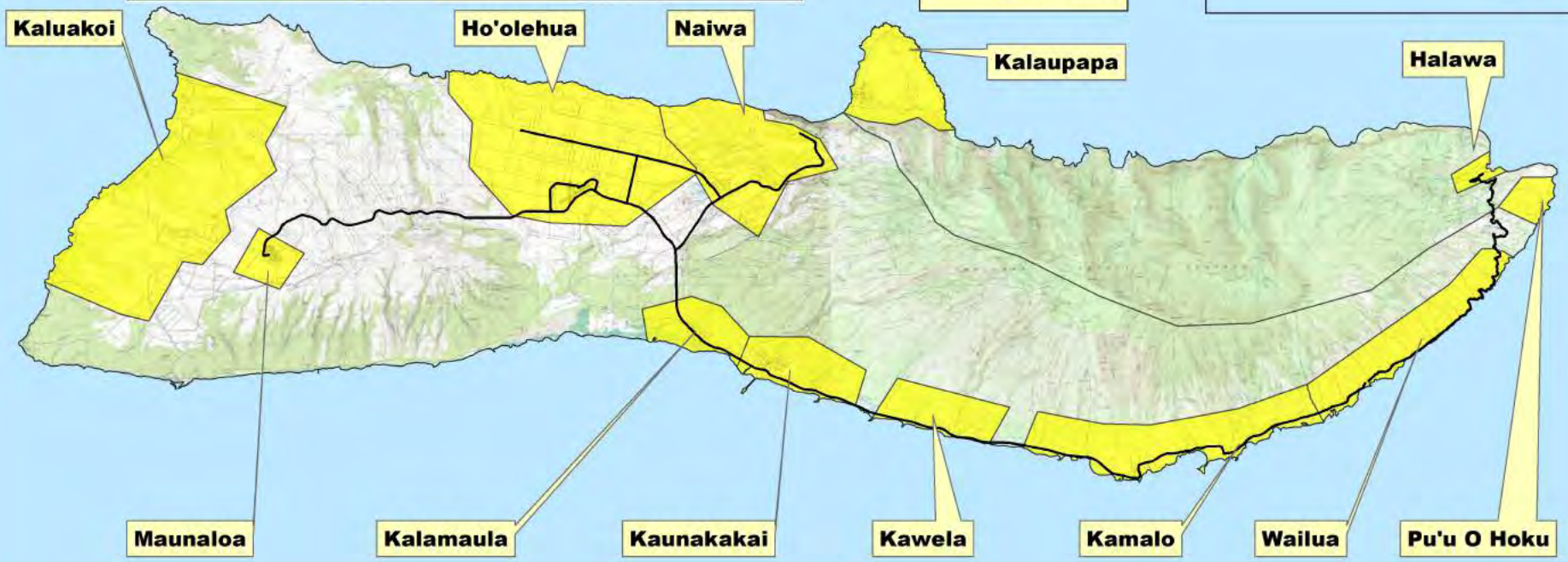
Wildland Firefighting Capacity Of Initial Response Agency Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

Wildland Firefighting Capacity of Initial Response Agency		
Low Hazard	Moderate Hazard	High Hazard
Sufficient personnel, equipment, and wildland firefighting capability and experience. Good supply of structural and wildland fire apparatus and misc specialty equipment	Limited personnel, and or equipment but with some wildland firefighting expertise and training. Smaller supply of fire apparatus in fairly good repair with some specialty equipment.	Fire department non-existent or untrained/unequipped to fight wildland fire. Minimum amount of fire apparatus, which is old and in need of repair. None or little specialty equipment.



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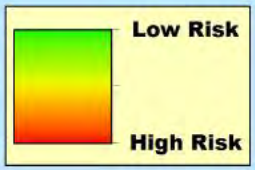
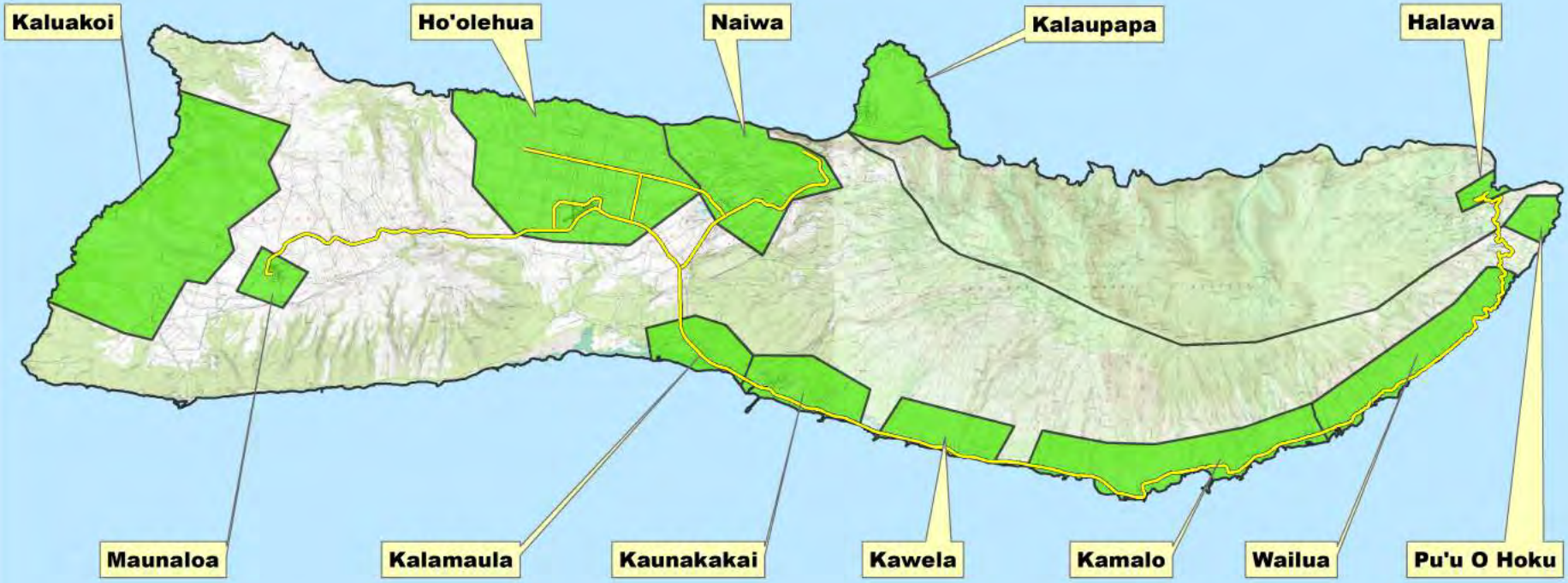
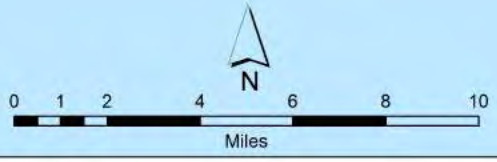
Interagency Cooperation Hazard for Developed Areas

Moloka'i Community Wildfire Protection Plan

INTERAGENCY COOPERATION		
LOW HAZARD	MODERATE HAZARD	HIGH HAZARD
Mutual aid agreements and resources available to deploy.	Mutual aid agreements but limited resource availability.	No mutual aid agreements.







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Appendix C
Moloka'i Community Wildfire Protection Plan
Maui Fire Department 2016 Apparatus and Vehicles Inventory

Make	Utilization	MFD #	Location	Mileage as of 4/6/16	Year	Target Replacement Date
EMERGENCY APPARATUS 1-5 YEARS OLD						
PIERCE LADDER 105' L3	LADDER	229	LAHAINA	10,946	2015	FY 2029
PIERCE PUMPER E14	PUMPER	228	WAILEA	10,030	2015	FY 2029
PIERCE PUMPER E5	PUMPER	215	MAKAWAO	11,553	2015	FY 2029
PIERCE/PETERBILT TANKER T14	3500 G	213	WAILEA	7,946	2014	FY 2025
W.MARK/PETERBILT TANKER T10	3500 G	212	KAHULUI	12,674	2013	FY 2022
PIERCE PUMPER E4	PUMPER	209	KAUNAKAKAI	13,957	2011	FY 2022
SVI/TATRA TANKER T3 (2500G)	6x6 TANKER	224	LAHAINA	16,855	2010	FY 2021
E-ONE/INTL TANKER T7 (2500G)	4x4 TANKER	225	HANA	5,771	2010	FY 2021
SVI/TATRA TANKER T8 (2500G)	6x6 TANKER	218	LANAI	8,726	2010	FY 2021
SVI/DODGE MINI PUMPER M11	4x4 MINI PUMPER	222	NAPILI	17,012	2010	FY 2021
SVI/DODGE MINI PUMPER M13	4x4 MINI PUMPER	223	KULA	27,974	2010	FY 2021
E-ONE/DODGE MINI PUMPER M2	4x4 MINI PUMPER	217	PAIA	31,162	2010	FY 2021
E-ONE PUMPER E2	PUMPER	216	PAIA	63,818	2010	FY 2021
E-ONE PUMPER E13	PUMPER	199	KULA	44,876	2010	FY 2021
CHEVY/TAHOE/SUV	4x4 SUV	220	BATTALION 2	61,844	2010	FY 2020
EMERGENCY APPARATUS 6-10 YEARS OLD						
SVI/SPARTAN PUMPER E3	PUMPER	200	LAHAINA	69,797	2009	FY 2020
SVI/SPARTAN RESCUE R10	RESCUE	198	KAHULUI	30,749	2009	FY 2020
SVI/FREIGHTLINER AIR/LIGHT	AIR/LIGHT	193	HEALTH/SAFETY	7,368	2009	FY 2020
PIERCE PUMPER E7	PUMPER	205	HANA	20,853	2007	FY 2018
PIERCE PUMPER E1	PUMPER	204	WAILUKU	74,840	2007	FY 2018
PIERCE/GMC MINI PUMPER M1	4x4 MINI PUMPER	203	WAILUKU	20,591	2007	FY 2018
SVI/SPARTAN HAZMAT HM10	HAZMAT	192	KAHULUI	25,044	2007	FY 2018
PIERCE WILDLAND PUMPER E11	4x4 PUMPER	180	NAPILI	46,027	2006	FY 2017
PIERCE WILDLAND PUMPER E9	4x4 PUMPER	181	HO'OLEHUA	19,854	2006	FY 2016
PIERCE WILDLAND PUMPER E8	4x4 PUMPER	202	LANAI	18,881	2006	FY 2017
PIERCE PUMPER E10	PUMPER	177	KAHULUI	81,270	2005	FY 2017
PIERCE PUMPER E6	PUMPER	178	KIHEI	84,415	2005	FY 2017
CHEVY/TAHOE/SUV	4x4 SUV	195	BATTALION 1	69,697	2008	FY 2020
EMERGENCY APPARATUS 11-15 YEARS OLD						
PIERCE/KENWORTH WILDLAND E12	4x4 PUMPER	174	PUKO'O	48,122	2004	FY 2016
PIERCE/FORD MINI PUMPER M7	4x4 MINI PUMPER	176	HANA	9,308	2004	FY 2015
PIERCE/LADDER 95' L14	TOWER	163	WAILEA	45,600	2002	FY 2013
PIERCE/OSHKOSH TANKER T4 (2800G)	RT4 6x6	183	KAUNAKAKAI	35,410	2002	FY 2016
RELIEF EMERGENCY APPARATUS 6-10 YEARS OLD						
CHEVY/TAHOE/SUV RB2	4x4 RBATT 2	197	KAHULUI	119,820	2009	Used as Bkup only

RELIEF EMERGENCY APPARATUS 11-15 YEARS OLD						
PIERCE LADDER 105' RL3	RL3	173	WAIKO	59,145	2003	Relief Apparatus
PIERCE PUMPER RE5	RE5	161	KAHULUI	101,936	2002	Relief Apparatus
PIERCE PUMPER RE14	RE14	162	WAILEA	79,100	2002	Relief Apparatus
OMCO/PETERBILT TANKER RT10 (3500G)	RT10	168	KAHULUI	64,766	2002	Relief Apparatus
RELIEF EMERGENCY APPARATUS 16+ YEARS OLD						
PIERCE PUMPER	RE13	145	KAHULUI	105,723	1994	Relief Apparatus
PIERCE PUMPER	RE8	146	LANAI	48,307	1994	Relief Apparatus
PIERCE PUMPER	RE7	143	LAHAINA	57,760	1993	Relief Apparatus
PIERCE PUMPER	RE4	159	KAUNAKAKAI	50,543	2000	Relief Apparatus
UTILITY VEHICLES 1-7 YEARS OLD						
FORD F350 Crew Cab R10UT	4x4	232	KAHULUI RESCUE	442	2015	FY 2026
FORD F350 Crew Cab UT3	4x4	230	LAHAINA	476	2015	FY 2026
FORD F150 Extra Cab UT8	4x4	239	LANAI	1,104	2015	FY 2026
FORD F150 Extra Cab UT12	4x4	241	PUKO'O	297	2015	FY 2026
FORD F150 Extra Cab UT7	4x4	242	HANA	234,781	2015	FY 2026
WILDLAND WL8	WILDLAND 8	214	LANAI	2,005	2014	FY 2025
FORD F-350 UT14	UTILITY 14	210	WAILEA	9,492	2012	FY 2023
FORD F-350 WL1	WILDLAND 1	227	KAHULUI	6,835	2011	FY 2022
CHEVY 2500 UT9	UTILITY 9	221	HO'OLEHUA	39,993	2011	FY 2022
UTILITY VEHICLES 8-14 YEARS OLD						
CHEVY 3500 HM10UT	HAZMAT UTILITY	187	KAHULUI	45,153	2006	FY 2017
FORD F-350 UT4	UTILITY 4	186	KAUNAKAKAI	64,178	2005	FY 2016
STAFF VEHICLES 1-7 YEARS OLD						
FORD F350 Crew Cab	4x4 P/U	231	TRAINING	1,623	2015	FY 2026
FORD F150 Extra Cab	4x4 P/U	240	PREVENTION	2,005	2015	FY 2026
FORD F150 Extra Cab	4x2 P/U	238	FSO	1,638	2015	FY 2026
CHEVY / SILVERADO / 4x4 w/LIFTGATE	4x4	226	MECHANICS	18,281	2010	FY 2021
FORD F150 P/U	P/U	219	HEALTH/SAFETY	53,380	2010	FY 2021
CHEVY / SILVERADO / 4x4 w/LIFTGATE	4x4	196	Educ PREVENTION	17,842	2009	FY 2020
FORD EXPLORER	4x4 SUV	208	PREVENTION	103,637	2008	FY 2016
FORD EXPLORER	4x4 SUV	207	PREVENTION	52,220	2008	FY 2019
NISSAN TITAN P/U	P/U	206	SUPPLY	84,581	2008	FY 2018
GMC ENVOY	4x4 SUV	191	TRAINING	97,537	2007	FY 2017
NISSAN FRONTIER P/U	4x4	188	PREVENTION	47,108	2007	FY 2018
NISSAN FRONTIER P/U	4x4	211	PREVENTION	113,724	2007	FY 2016
NISSAN FRONTIER P/U	4x4	190	PREVENTION	76,752	2007	FY 2018
STAFF VEHICLES 8-14 YEARS OLD						
CHEVY P/U 3500	UTILITY	179	PREVENTION	44,931	2006	FY 2017
FORD EXPLORER	SUV	184	PREVENTION	107,853	2005	FY 2016
FORD EXPLORER	SUV	185	PREVENTION	54,924	2005	FY 2016
CHEVROLET / CAVALIER	SEDAN	175	ADMIN.	57,598	2004	FY 2015
TOYOTA / PRE-RUNNER	4W DR P/U	167	SHOP	88,196	2002	Relief Apparatus
STAFF VEHICLES 15+ YEARS OLD						
FORD / CROWN VICTORIA	SEDAN	153	BC7	117,467	1999	Relief/Disposal
MFD WATERCRAFT - BOATS						
		HA #	**VIN #**			
26 FT. RADON - RESCUE BOAT	RB10	0350XC	RAD 26511H515		2015	Repower FY 2026
26 FT. RADON - RESCUE BOAT	RB4	0310 XC	RAD 26506J010		2010	Repower FY 2021
26 FT. RADON - RESCUE BOAT	RB3	0276 XC	RAD 26504B808		2008	Repower FY 2019

22 FT. AQUASPORT - RESCUE BOAT	RB4A	0136 XC	ASP A0701C87		1987	Relief Apparatus
MFD WATERCRAFT - FIRE SKIS						
		HA #	**VIN #**			
YAMAHA FXHO 1.8	FS14	0306XC	YAMA 1907H910		2010	FY 2016
YAMAHA FXHO 1.8	FS9	0307XC	YAMA 1939H910		2010	FY 2016
YAMAHA FXHO 1.8	FS10	0280XC	YAMA 4461H708		2008	FY 2014
YAMAHA FXHO 1.8 - TRAINING	FS10	0281XC	YAMA 4480H708		2008	FY 2014
YAMAHA XA 1200	FS4	0273XC	YAMA 2049I304		2004	FY 2010

Vehicles that are assigned to stations that have fewer alarms will be evaluated by the Apparatus Committee at 10 years of age to determine if the replacement year can be extended out further. Final determination will be made by the Lead Mechanic who is the subject matter expert using the following criteria:

1. Overall condition and safety
2. Corrosion of critical components like the chassis, frame, plumbing, etc.
3. Future major repairs and costs
4. Annual PUC Inspection
5. Annual Pump test
6. Changes to NFPA 1901 Standard for Automotive Fire Apparatus