Community Wildfire Protection Plan

South Maui

2016

SOUTH MAUI
COMMUNITY WILDFIRE PROTECTION PLAN

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HWMO
HAWAII WILDFIRE MANAGEMENT ORGANIZATION

IN PARTNERSHIP WITH:
DEPARTMENT OF LAND AND NATURAL RESOURCES- DIVISION OF FORESTRY AND WILDLIFE; MAUI FIRE DEPARTMENT; AND COUNTY OF MAUI CIVIL DEFENSE AGENCY

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

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Public Input Process Coordinated and Led by: Elizabeth Pickett and Ilene Grossman, HWMO, with assistance and participation from agency partners and community members.

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

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MUTUAL AGREEMENT SIGNATURE PAGE
SOUTH MAUI COMMUNITY WILDFIRE PROTECTION PLAN

This Community Wildfire Protection Plan was developed for South Maui, Hawai‘i by the Hawai‘i Wildfire Management Organization. This plan:

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

Date

_____ _____

Anna Foust, Emergency Management Officer
County of Maui Civil Defense

Date

_____ _____

David G. Smith, Administrator
State of Hawai‘i
Department of Land and Natural Resources-
Division of Forestry and Wildlife

Date

GOALS AND OBJECTIVES

This Community Wildfire Protection Plan (CWPP) was developed by the Hawai'i Wildfire Management Organization (HWMO) with 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 South Maui. State of Hawai'i Department of Land and Natural Resources- Division of Forestry and Wildlife (DLNR-DOFAW) was the primary partner in developing this plan.

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]

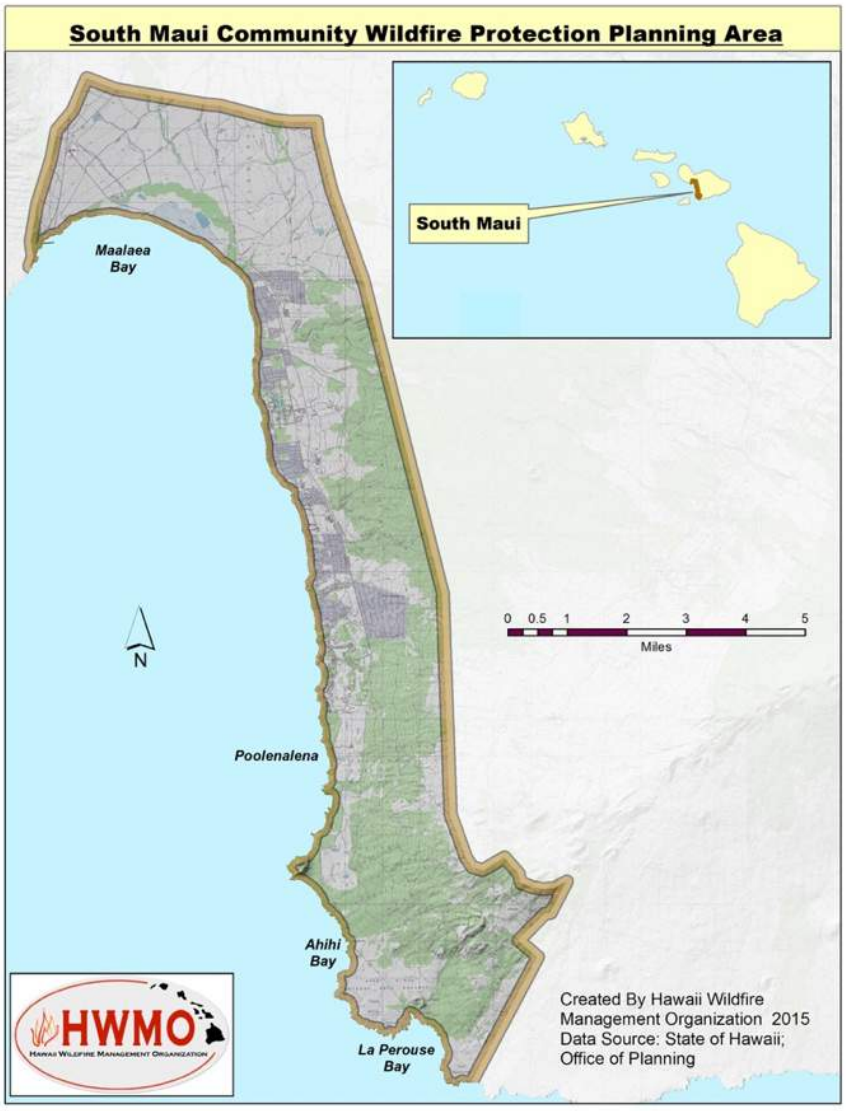
Stakeholder participants in the development of this plan agree that wildfire threats are imminent and can have widespread damage to South Maui watersheds, natural resources, and human communities. The danger of fire is related to high numbers of human-caused fires, dry conditions, strong winds, and high fire potential of vegetation. In the last decade, numerous areas of South Maui have burned. The CWPP is a first step toward increased public-private collaboration toward wildfire preparedness and protection.

PLANNING AREA BOUNDARIES

The South Maui CWPP planning area covers the central-southwestern coastal area of Maui commonly referred to as South Maui, Hawai'i. The planning area spans the community and landscape areas from Mā'alaea to Ahihi-Kinau (See Maps 1 and 11). The plan includes federal, state, county and privately owned lands. The South Maui area was chosen through stakeholder meetings and addresses one of Maui's most fire prone regions.

The South Maui CWPP is part of a series of CWPPs in Maui County. The South Maui CWPP planning boundaries connect to other Maui-based CWPP boundaries, comprehensively defining the entire island of Maui as a wildland-urban interface (WUI) at-risk area. The concurrent WUI and CWPP planning designation includes communities and their surrounding lands to ensure adequate protection of natural areas and associated human communities from the threat of wildfire. The South Maui planning boundaries were chosen through stakeholder meetings and addresses one of the Maui County's fire prone regions.

CWPPS exist for Western Maui, Upcountry Maui, Kahikinui, and Molokai'i. Additional CWPPs may be developed as communities gain interest in wildfire preparedness planning and as funds become available to complete the planning process. The South Maui CWPP planning area boundaries are demonstrated in Map 1.



Map 1. (Right). *South Maui 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 WUI 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 Agencies
- Involve 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.

PARTICIPANTS

State and Local Agencies

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

Table 1. *CWPP Participants: State and Local Agencies.*

Federal Agencies

The following federal agencies were consulted for area-specific and regional fire and environmental information and expertise:

Agency	Representative(s)
US Fish and Wildlife Service	Dawn Bruns, Acting Assistant Field Supervisor Section 7 & Habitat Conservation Plans Andrew Kikuta, Fire Management Specialist, Hawai'i and Pacific Islands

Table 2. *CWPP Participants: Federal Agencies.*

Decision Makers

The decision-makers contacted for input and involvement in the development of the South Maui CWPP are represented in the following table. Neither provided specific input, however Councilperson Baisa responded with support for both the CWPP effort and for increasing wildfire response and preparedness capacity in the area.

Local Government	Name	Representing
Maui County Council	Don Couch, Council Chair Gladys Baisa, WR Chair	South Maui Pukalani-Kula- Ulupalakua

Table 3. *CWPP Participants: Decision Makers.*

Interested Parties

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

Interested Parties	Affiliation
Local Associations and Large Landowners	Leeward Haleakala Watershed Partnership
Private Citizens	General Public

Table 4. *CWPP Participants: Interested Parties.*

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WILDFIRES IN SOUTH MAUI
BACKGROUND

The South Maui landscape is characterized by residential areas surrounded by highly ignitable fire prone grasses on its upland side and the Pacific Ocean on its coastal boundary. 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. Unmanaged fire prone vegetation, periods of high winds, warm weather, recurring drought conditions, and a history of human-caused fires create the fire environment that puts South Maui at risk of wildfire. This section discusses those factors in detail.

FIRE ENVIRONMENT

CLIMATE

Wildfire occurrence in South Maui is tied to broad climate patterns, in that more and larger fires typically occur in the drier areas or areas affected by drought conditions. South Maui is typically warm (January average 82° F, July average 88°F) and dry. Rainfall in South Maui is generally very low (less than 10 inches of rain per year, see Map 4), leading to highly hazardous conditions. The likelihood of large wildfires during drought further increases wildfire risk. Additionally, precipitation events tend to increase the quantity of available vegetative fuels, which can increase both fire risk and the frequency that mitigation measures such as firebreaks and fuels reduction projects need to be maintained. Daily weather patterns also influence fire risk. Key factors indicating high fire danger in Hawai‘i are low relative humidity (RH), high temperature, and high wind speeds.

TOPOGRAPHY

The South Maui CWPP planning area is characterized by a combination of residential, agricultural, and wildland areas. It stretches along a coastal region of the downslope edge of two volcanic mountain areas and the saddle between them: Haleakalā, the 10,023-foot shield volcano that comprises much of the Island of Maui, the West Maui Mountains to the northwest, and the central plains connecting the two.

Topography plays a key role in wildfire behavior and post-fire impacts in South Maui and its surrounding (and contributing) environs. Wildfires spread more quickly as they progress upslope and burn at higher intensity. Following wildfires, surface water from rain quickly travels downslope and increases soil erosion, causing downslope flooding and adding sediment to nearshore waters. These post-fire impacts can affect traffic and transportation routes, tourism and economic activities, and harm natural resources by way of runoff that smothers coral reefs and reduces water quality.

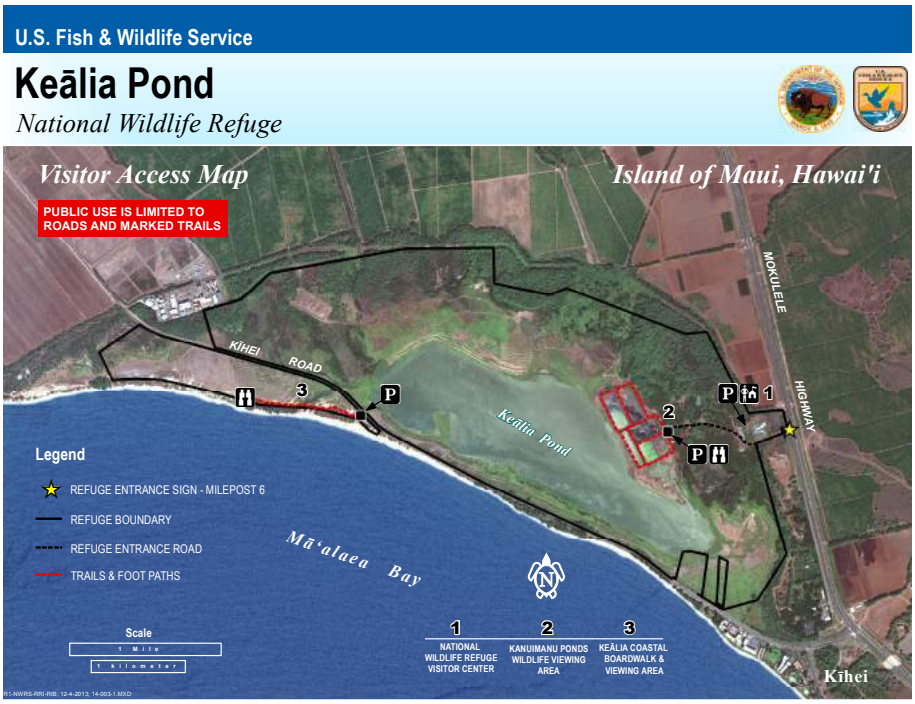
Additionally, fires can travel from community edges and roads upslope to agricultural and forested areas that are difficult to access for fire suppression due to often inaccessible terrain (see Map 6). Once wildfires spread into steep, upland areas, the difficult terrain and lack of roads frequently limit fire response to costly aerial operations (i.e., bucket drops by helicopters). Preventing ignitions generated in the South Maui region is of high priority to protect the nearby residential and commercial areas, as well as to protect upslope lands and resources.

VEGETATION AND NATURAL RESOURCES

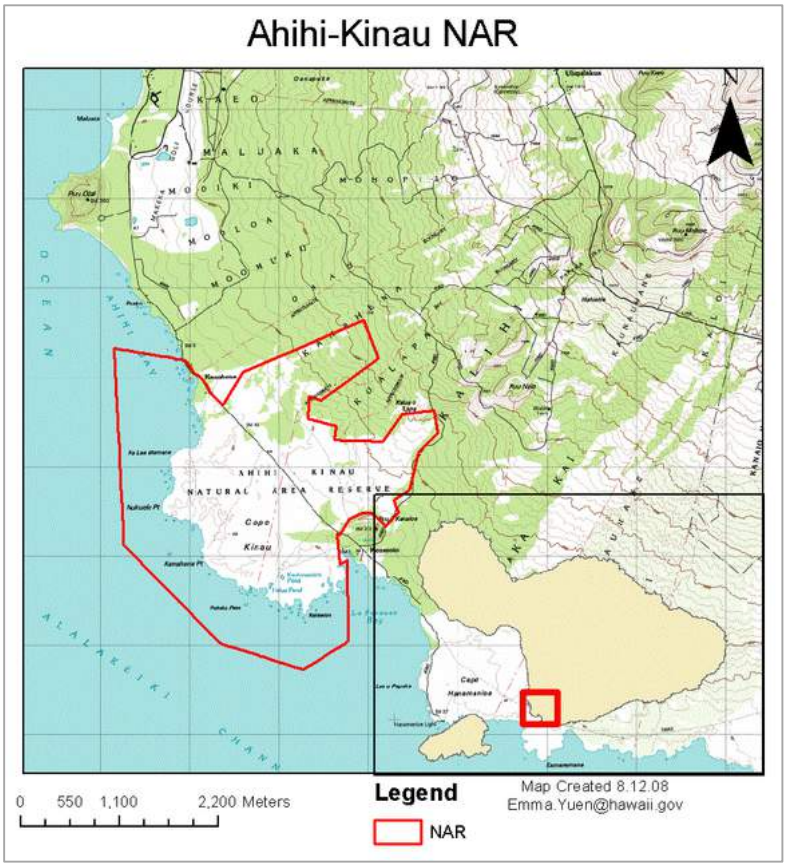
The South Maui CWPP region has areas that are residential, agricultural, wetlands, and nonnative grasslands and shrublands, and mixed and native forests (Map 7). The widespread establishment of nonnative grasslands and shrublands is a leading cause of increased fire risk in South Maui. Nonnative grasslands and shrublands 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. Grass fires can also become canopy fires when fire travels into treetops via low hanging tree branches. This increases the difficulty of firefighting efforts, as canopy fires can spread quickly due to increased exposure to wind. The nonnative, fire prone species provide abundant fine fuels that cure rapidly in dry conditions, are easily ignitable even in humid conditions, and allow fires to spread rapidly which create dangerous conditions for fire responders.

There are two highly managed protected natural resource areas within the South Maui CWPP region—Keālia Pond National Wildlife Refuge (Map 2) and ʻĀhihi-Kīnaʻu Natural Area Reserve (Map 3):

Keālia Pond National Wildlife Refuge is operated by the US Fish and Wildlife Service (USFWS). It is a coastal salt marsh along the south-central coast of the Hawaiian Island of Maui. The refuge is located between the towns of Kīhei and Māʻalaea, spanning across both sides of North Kihei Road, Route 31. The wetland is also a 691-acre (2.80 km^2) bird sanctuary, home to 30 species of waterfowl, shorebirds, and migratory ducks, including the *ʻaukuʻu* (black-crowned night heron, *Nycticorax nycticorax hoactli*) and the endangered *āeʻo* (Hawaiian stilt, *Himantopus mexicanus knudseni*) and *ʻalae kea* (Hawaiian coot, *Fulica alai*). There is a 2,200-foot boardwalk and kiosk with self-guided interpretive exhibits that was designed to provide visitors an opportunity to learn about the many native and visiting birds that visit the wetlands. This wetland sits in the middle of dry, fire prone kiawe forest and grasslands with agricultural operations nearby.[2] It is bounded on the north by transmission lines from the local utility. In 2004, an escaped cane fire crossed over onto refuge property and consumed 47 acres.



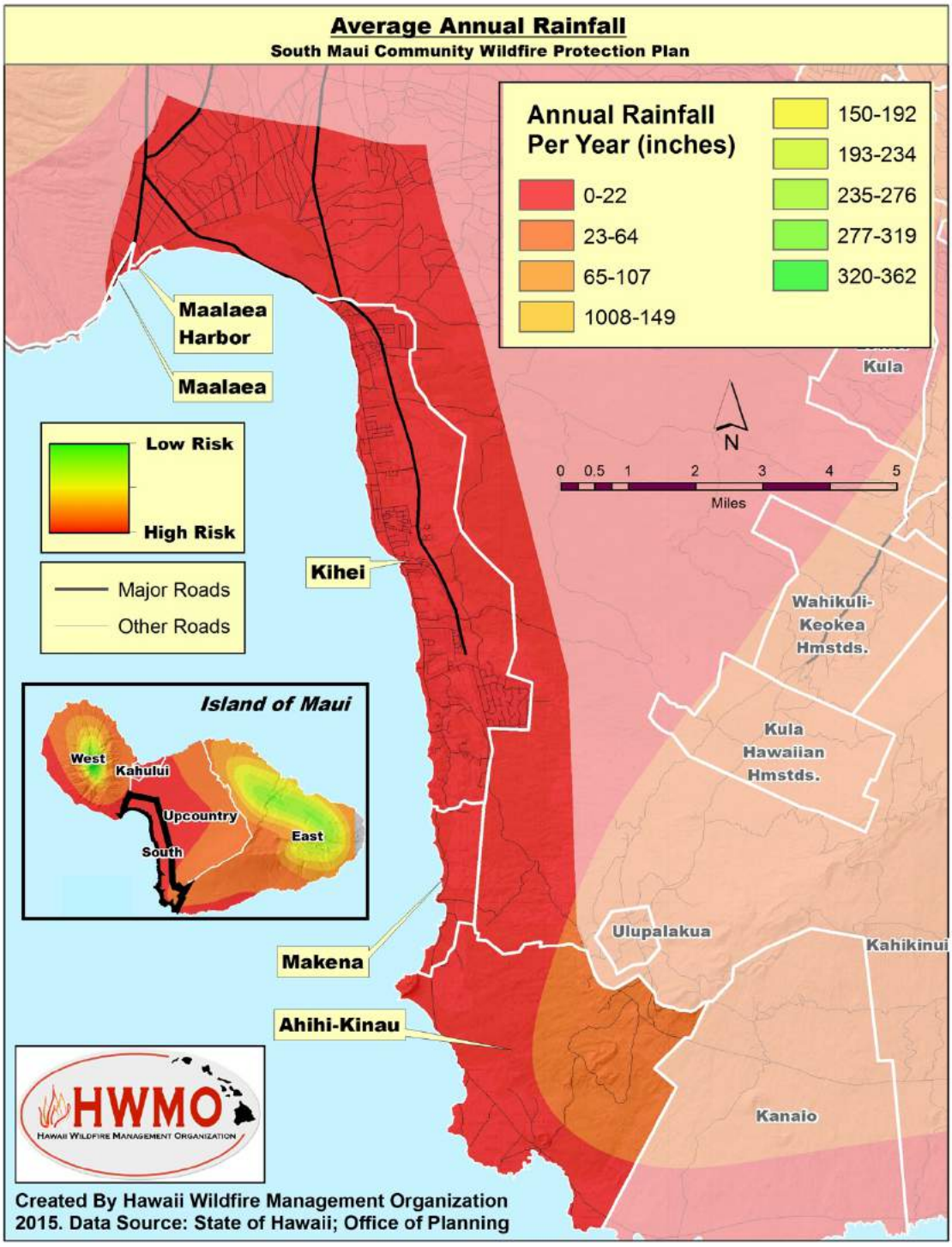
Map 2. *Keālia Pond National Wildlife Refuge. Source: U.S. Fish and Wildlife Service.*



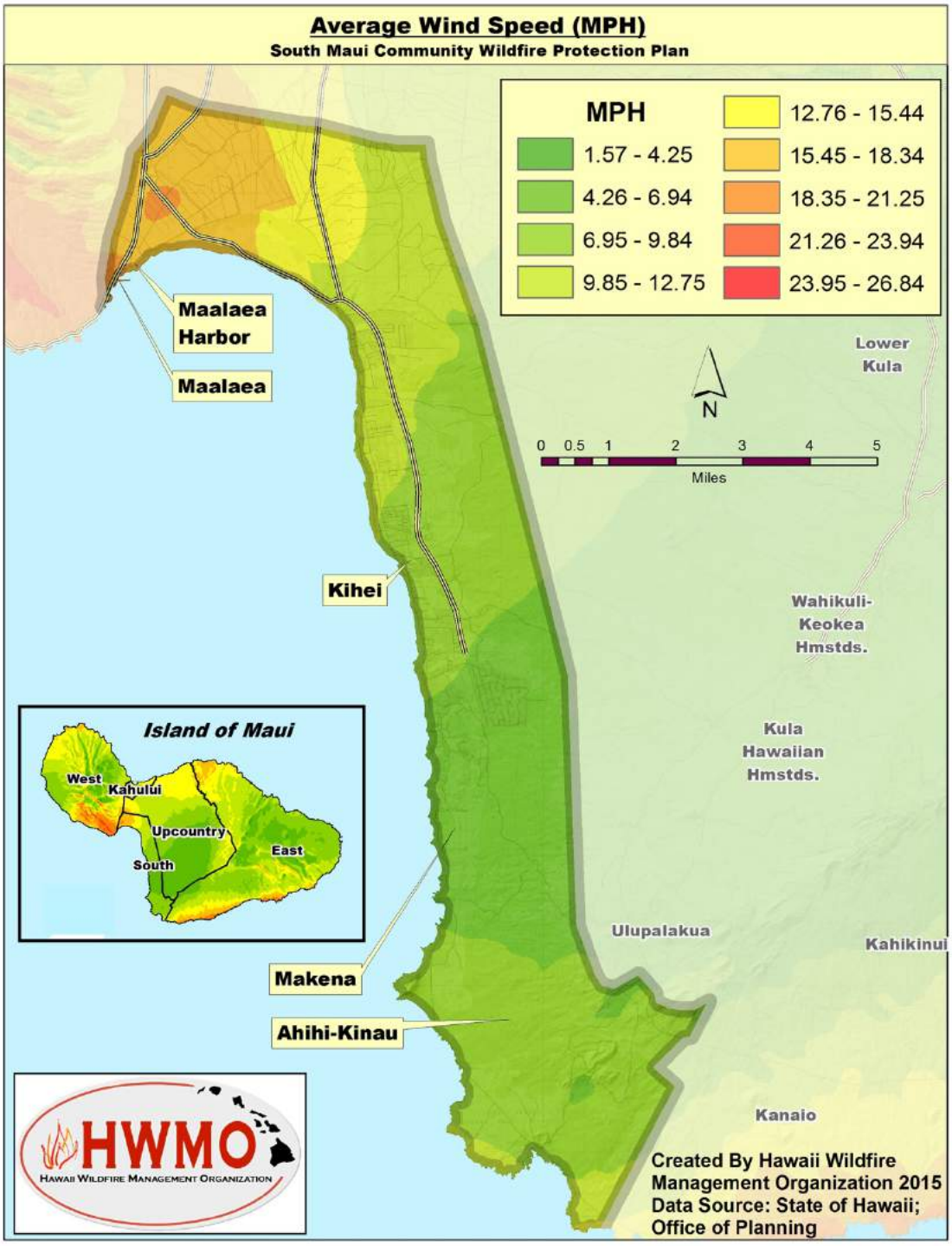
Map 3. *'Āhihi-Kīna'u Natural Area Reserve. Map source: DLNR*

The ʻĀhihi-Kīnaʻu Natural Area Reserve (NAR) is part of the DLNR-DOFAW Natural Area Reserve system, and includes a coastal lava field and surrounding waters on the southwest coast of the island of Maui, Hawaii. The reserve is located at the end of Makena Road, south of Makena State Park and north of La Perouse Bay. It consists of 1,238 acres (501 ha) on land and 807 acres (327 ha) of ocean along 3 miles (4.8 km) of the southwestern coastline of the CWPP area. The reserve includes many land-based cultural and geologic sites, rare and fragile anchialine ponds, lava fields from the last eruption of Haleakala 200-500 years ago, and unlike other NARS, a protected marine component. Native plant communities exist in kipuka (pockets) and include naio, wiliwili and native cotton. However, these are severely imperiled by the encroachment of weeds, feral ungulates such as goats, and wildfire. Preserving the integrity of the anchialine pools is also a major management focus. Main threats to these wetlands include non-native invasives such as fish or prawns, algal mat formations, and human disturbance. The surrounding coral reef systems shelter a complex assemblage of organisms, most of them endemic to the Hawaiian archipelago.[3] Both nearshore and offshore resources are at risk of the effects of fire, which can perpetuate and spread invasive species, and post-fire erosion, which contributes to land-based pollution and sedimentation of anchialine and nearshore waters.

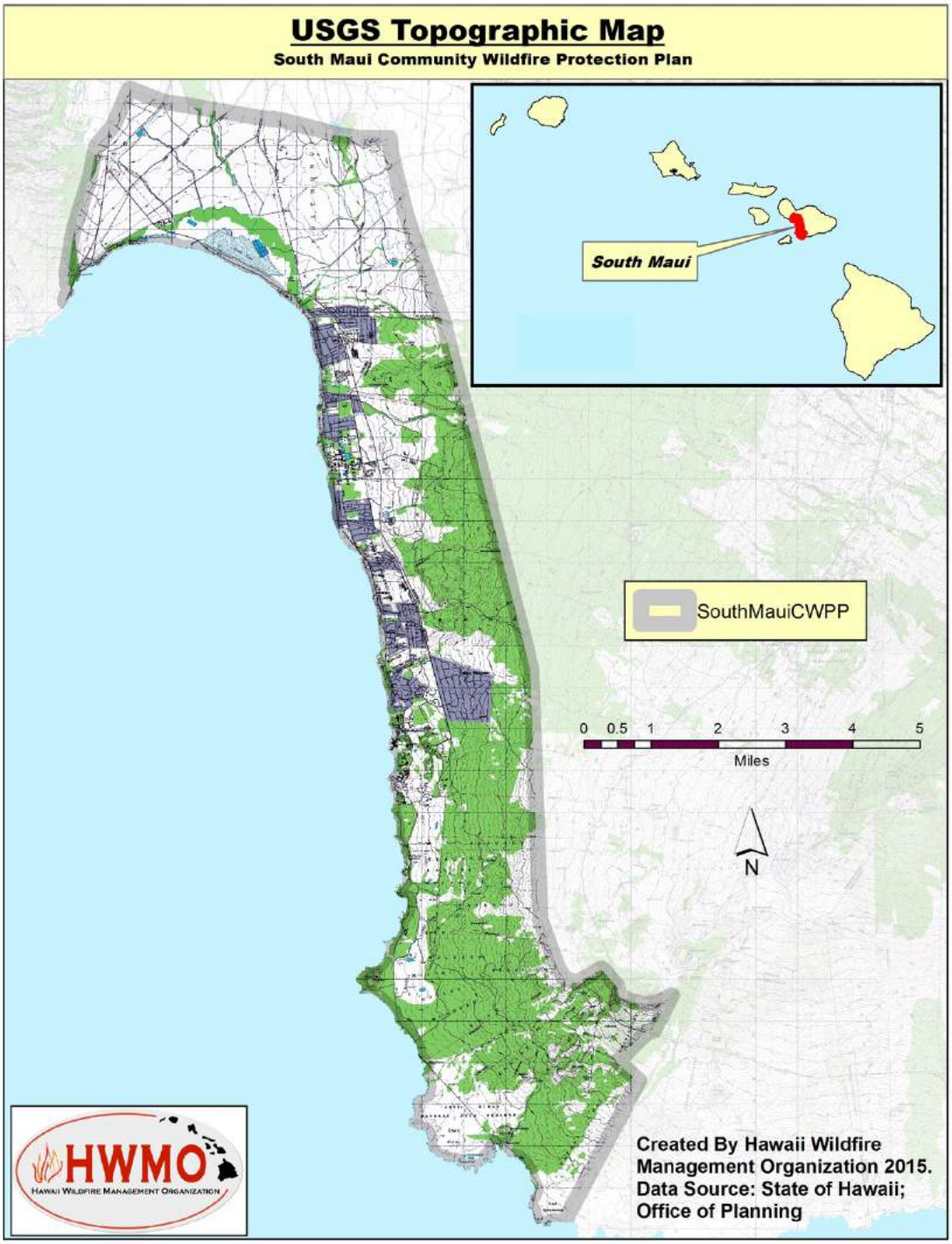
Maps 4- 10 demostrate various components of the South Maui fire environment, to include climate, topographic, and natural resource variables.



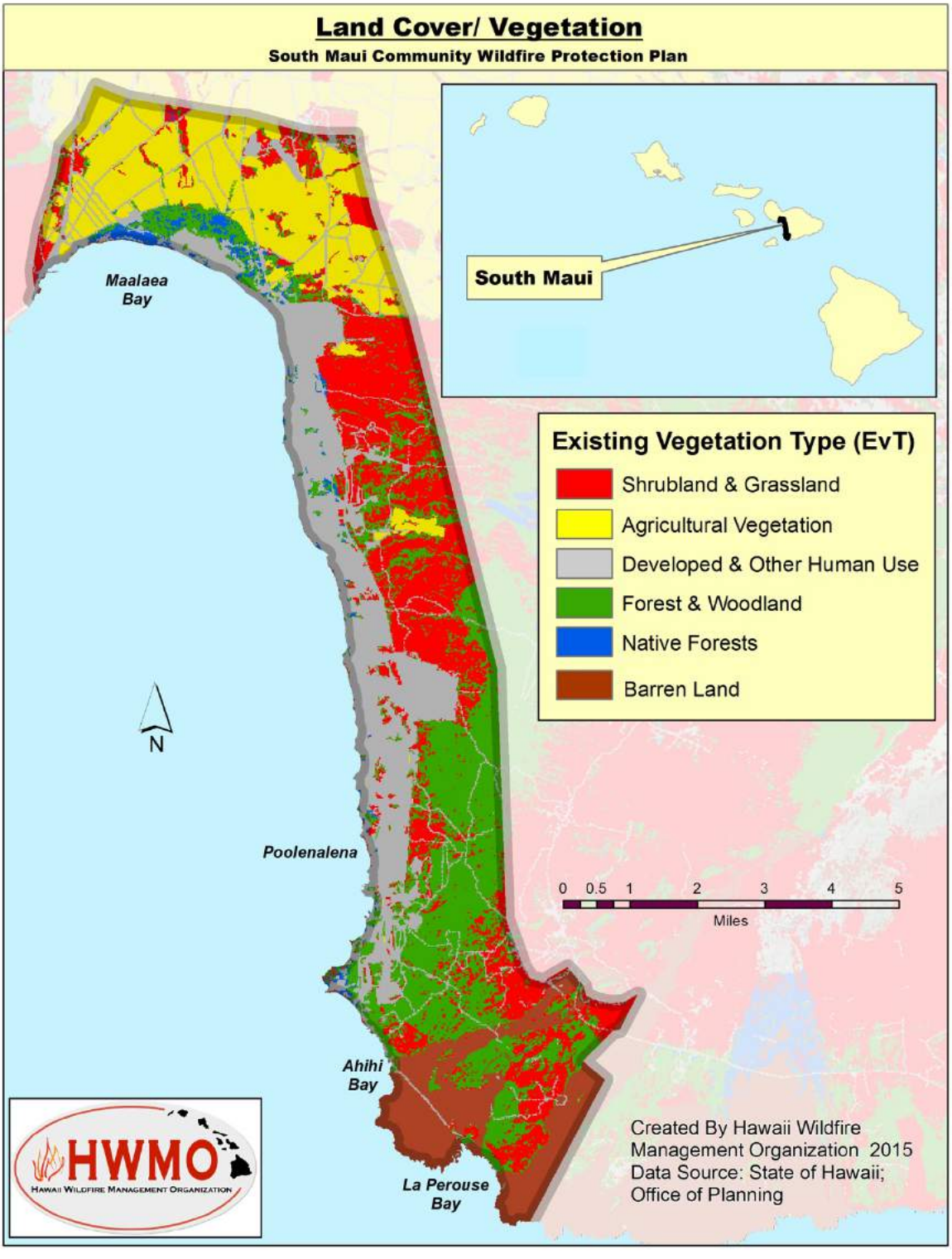
Map 4. *Average Annual Precipitation Map.*



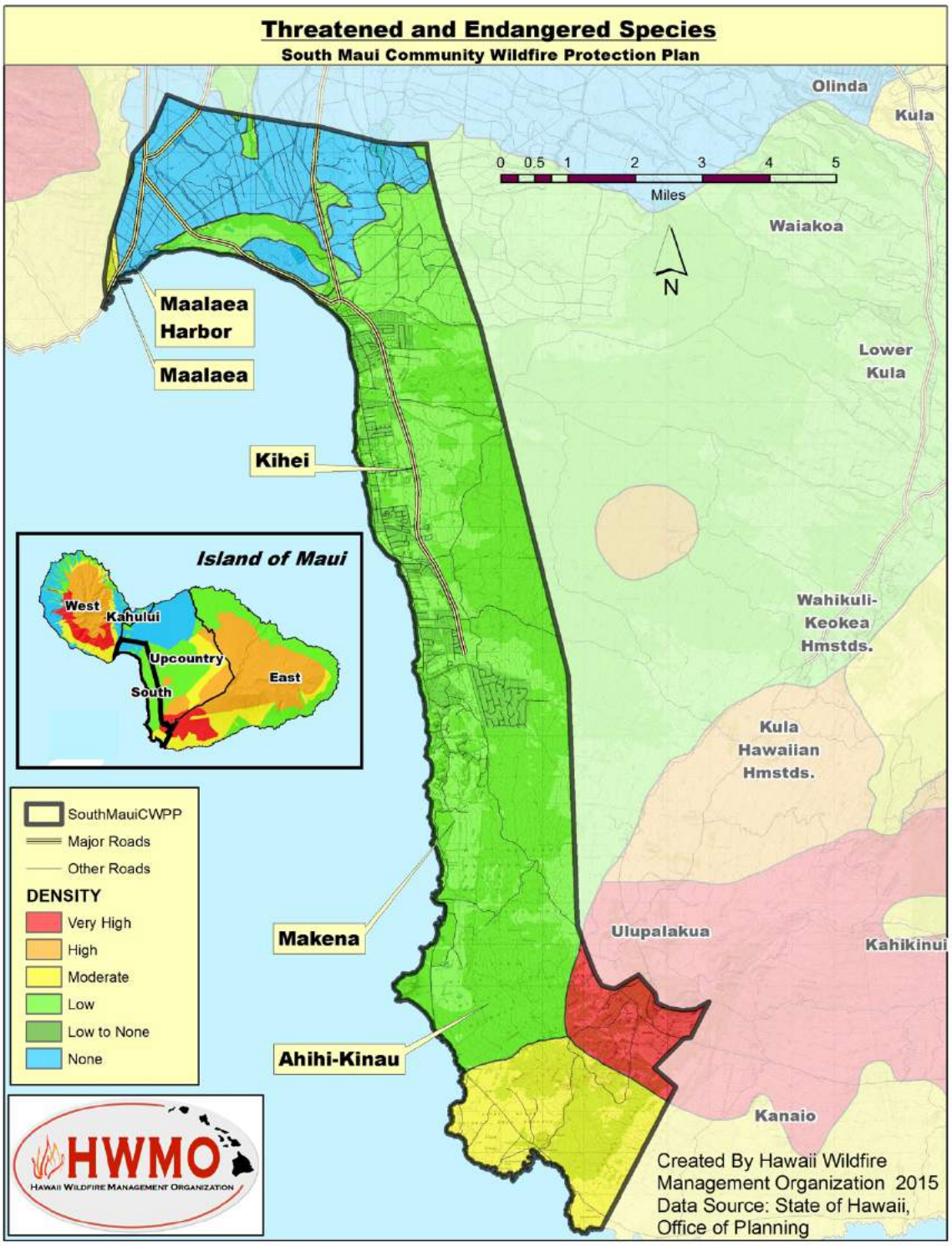
Map 5. *Average Wind Speed Map.*



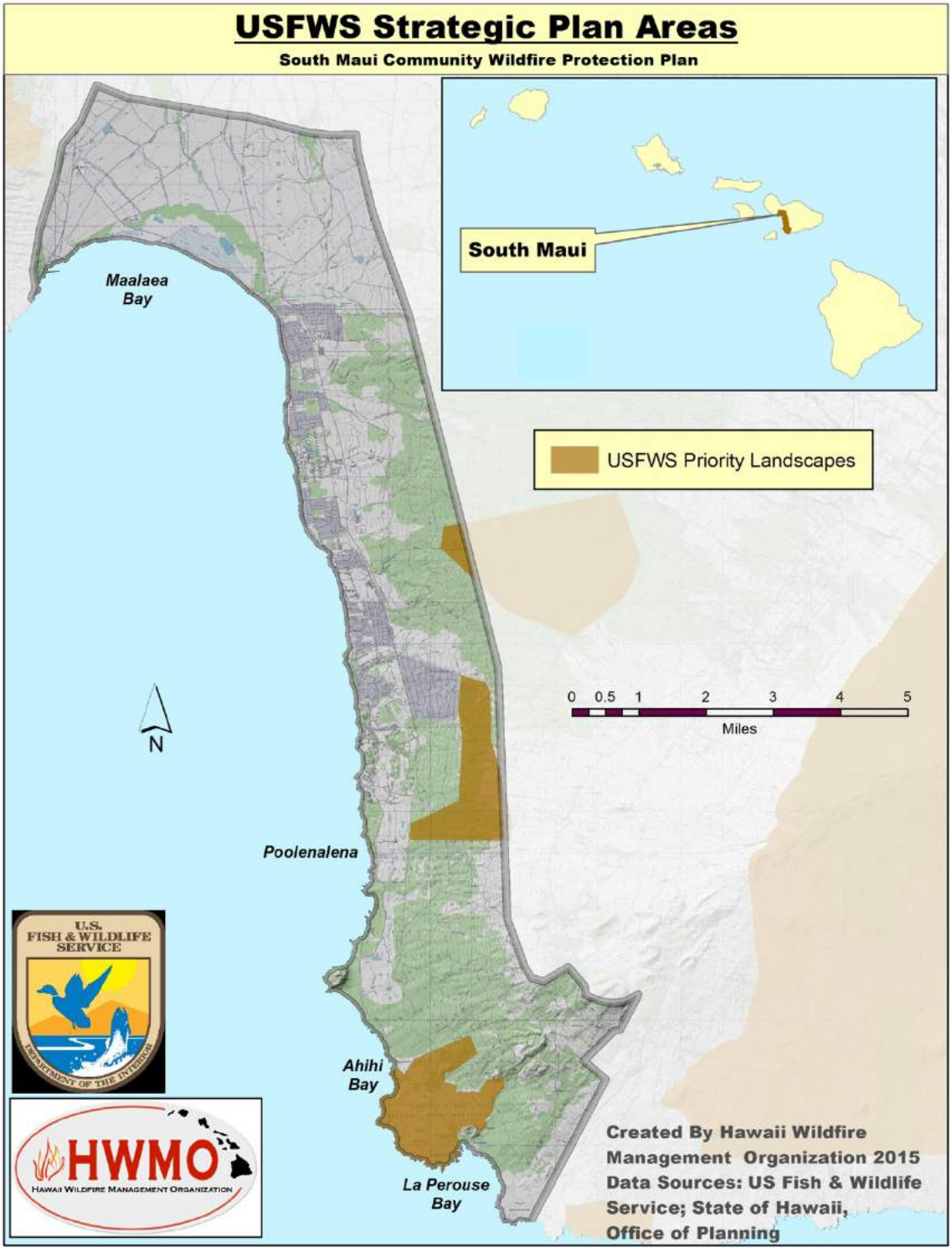
Map 6. *Topographic Map of South Maui CWPP planning area, based on US Geological Survey data.*



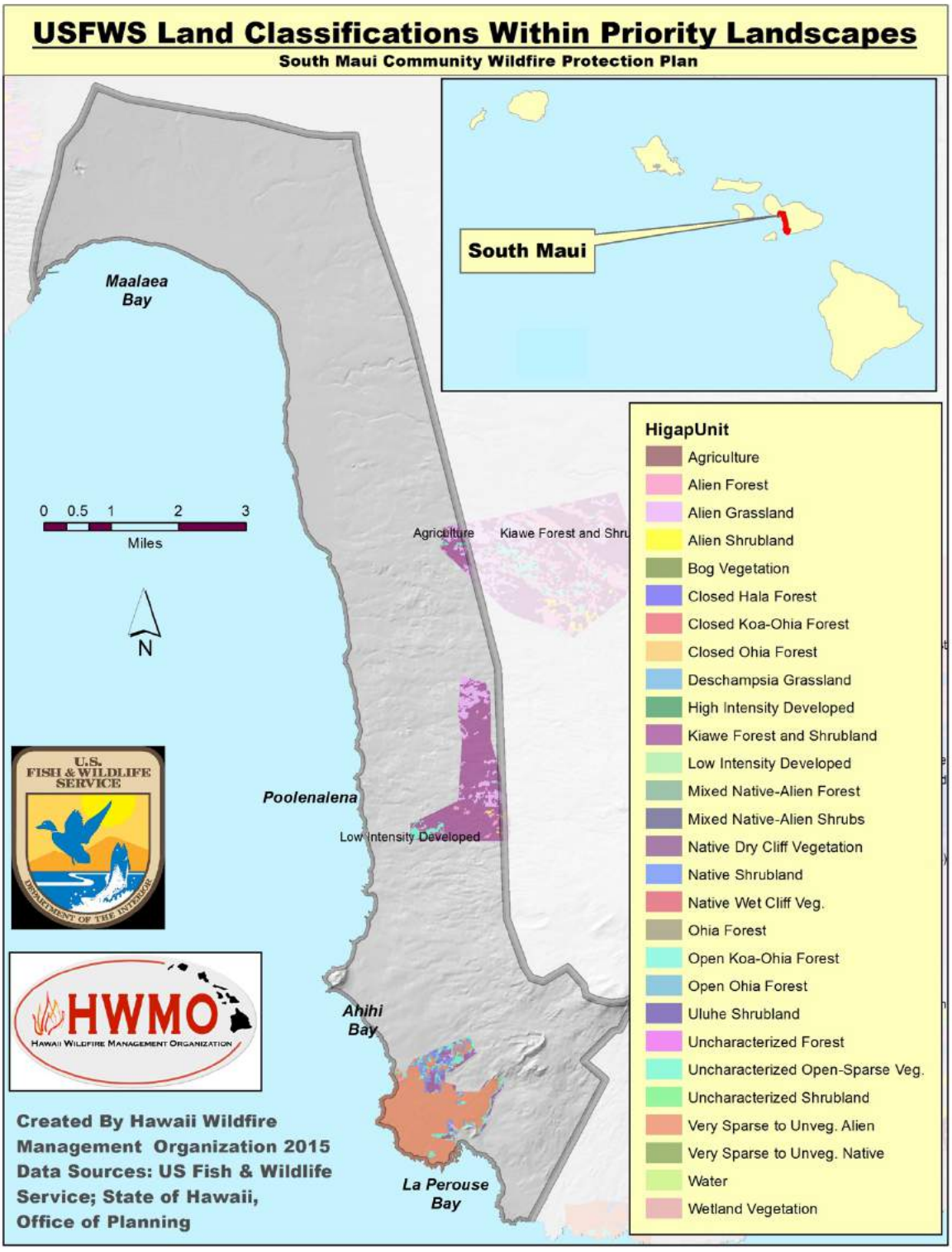
Map 7. *Land cover/ Vegetation Map for South Maui CWPP planning area.*



Map 8. *Threatened and Endangered Species Densities Map for the South Maui CWPP planning area.*



Map 9. *USFWS map of Priority Landscapes within the CWPP planning area.*



Map 10. *USFWS map of land cover type within their Priority Landscapes areas of South Maui.*

FIRE HISTORY

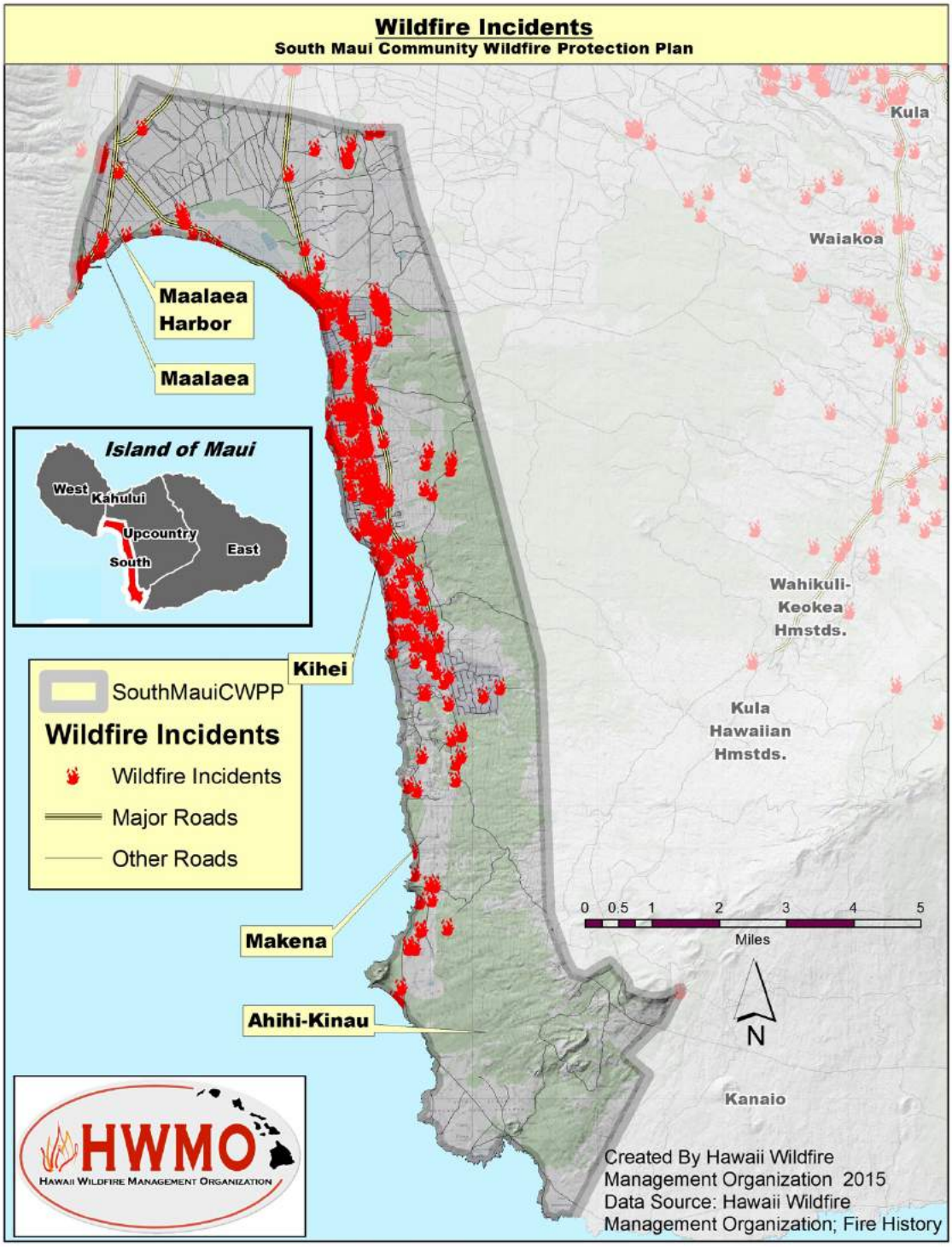
IGNITIONS

The WUI— the wildland-urban interface along which developed areas, roads, and community infrastructure abut undeveloped land— is where the majority of wildfire ignitions occur in all of Hawai‘i. The South Maui CWPP planning area 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 Maui 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 in South Maui. Once ignited along the interface, wildfire can spread rapidly through and around residential areas, threatening both property and life. Wildfires in lesser developed areas and fallow lands, can spread to higher elevations and threaten natural areas, and the native and protected species they may contain.

FIRE INCIDENT MAP

The South Maui Wildfire Incident Map (Map 11) 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. Included on the map are 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 11 demonstrates that WUI, roadside, and human access area fire starts are important trends across Maui. 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 11. *South Maui Wildfire Incident Map. Incidents recorded from 1998-2012. Note: points displayed are ignition sites only and do not indicate perimeter boundaries of burned areas.*

SIGNIFICANT FIRES

Numerous large wildfires (over 100 acres) have taken place in the South Maui region. 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 Started	Acres	Cause	Property/ Vegetation	Notes
Mā‘alaea Powerline	Mā‘alaea - Honoapiilani Highway and North Kihei Road - Between Waikapu Valley and Manawaipueo Gulch	June 6, 2010 (6:34 a.m. - first alarm)	6,200	Heat from power equipment	Property Type: Open land or field Vegetation: Buffel grass, kiawe	HDF Cost: $25,001-25,0000 Damage Costs: $2,500 Structures/Homes Lost: 1 (700 meters exclosure fence was damaged)
Mā‘alaea ’06 or Pali ’06	Mā‘alaea - Honoapiilani Highway, mile marker 7-10 - Ukumehameha Unencumbered State Land - Mā‘alaea/Lahaina Pali Trail	August 20, 2006 (10:05 a.m. - first alarm)	3,973	Undetermined	Property Type: Open land or field Vegetation: Buffel grass, kiawe	HDF Cost: $55,000 Damage Costs: $794,600 Structures/Homes Lost: 2 homes, 8 other structures
Kihei-Maui Meadows	Maui Meadows Subdivision (adjacent to it) - 300 Kilohana Drive	August 23, 2008 (4:25 p.m. - first alarm)	300	Incendiary	Property Type: Open land or field Vegetation: Buffel grass, kiawe	HDF Cost: $10,001-15,000 Damage Costs: $90,000 Structures/Homes Lost: 1
Kihei May 2003	Kihei (near Kihei Regional Park) - Halekuai St.	May 23, 2003 (2:45 p.m. - first alarm)	60	undetermined	Property Type: Open land or field Vegetation: Brush or brush-and-grass mixture	
Kihei October 2003	Ohukai Street	October 4, 2003 (2:32 p.m. - first alarm)	40	Intentional - flame/torch	Property Type: Open land or field Vegetation: Brush or brush-and-grass mixture	
Kihei May 2006	Kilohana St.	May 12, 2006 (12:18 p.m. - first alarm)	30	Accidental spark, ember, or flame from operating equipment	Vegetation: Open land or field; brush or brush-and-grass mixture	
Kihei August 2008	On Piilani Highway	August 25, 2008 (2:28 p.m. - first alarm)	25	Undetermined	Vegetation: Open land or field; brush or brush-and-grass mixture	
Kihei October 2005	2542 Omiko Place	October 13, 2005 (11:22 a.m. - first alarm)	15	Undetermined	Vegetation: Open land or field; brush or brush-and-grass mixture	

Kihei November 2012	On Mokulele	November 27, 2012 (10:34 a.m. - first alarm)	12	Accidental spark, ember, or flame from operating equipment	Vegetation: Open land or field; brush or brush-and-grass mixture	
Kihei May 2009	543 Kaiolohia	May 31, 2009 (12:27 p.m. - first alarm)	10	Undetermined	Vegetation: Open land or field; brush or brush-and-grass mixture	
Kihei July 2010	2701 Mokulele	July 31, 2010 (10:29 a.m. - first alarm)	10	Accidental; heat spread from another fire	Vegetation: Open land or field; forest, woods, undeveloped	
Kihei Arson October 2015	End of Kaiwahine Street, next to Hale Piʻilani Park	October 20, 2015 (2:35 a.m. - fire crews on scene)	2	Arson	Vegetation: Open land or field; grass	Came within 100 feet of nearest homes

Table 5. *South Maui Large and Significant Wildfires.*

Narrative accounts first published by local media and published photos of some notable fires in South Maui are provided below:

Māʻalaea Powerline Fire[4, 5, 6, 7]

On the morning of June 6, 2010, Māʻalaea residents awoke to a brush fire that would end up consuming over 6,200 acres of land— the largest wildfire in South Maui between January 2000 and December 2012. The wildfire threatened neighboring communities, forcing about 100 people to evacuate including residents, shoreline campers, scenic lookout visitors, and Kaheawa Wind Farm employees. A stretch of Honoapiʻilani Highway was also closed due to the fire, which started from power equipment on the mauka side of the highway between the Waikapu Valley and Manawaipueo Gulch. Nearly 700 meters of exclosure fencing was damaged, but no homes or structures were lost. Large plumes of smoke reduced air quality significantly, while post-fire run-off and erosion muddied nearshore waters.

The fire was a reminder of the threat wildfires pose in Maui, where the mountain ridges abut the coast. Unmanaged grass and brush along with steep hillsides created a recipe for a dangerous fire that

Photo 1. *Māʻalaea Fire on June 10, 2010. Photo Credit: Wendy Osher/Maui Now*

Photo 2. *Upslope smoke viewed from the highway below. Photo credit: Joni DeMello/Maui Now.*

was difficult to manage and control. Although the magnitude of the fire made it stand out and gain national attention, the area has experienced several wildfire incidents that have almost all been human-caused. Since the 2010 fire, buffelgrass, kiawe and other fire-prone invasive plants have grown back and have ignited numerous times off the busy highway, especially near the scenic lookout pull-out.

Photo 3. *Residents dealt with smoke that affected air quality and visibility from the Mā'alaea fire. Photo credit: County of Maui.*

Mā'alaea '06/ Pali '06 Fire [8, 9, 10]

Four years prior to the Mā'alaea Powerline fire, the same slopes along the Pali section of the Honoapiilani Highway burned in a wildfire that scorched 3,973 acres. This was the second largest fire in South Maui between January 2000 and December 2012. Two homes and numerous structures were destroyed. No injuries or lives were lost. The destructive fire surrounded the then-newly built Kaheawa Wind Farm, but did not affect the twenty turbines.

The wildfire clogged the major transportation route between West Maui and the rest of the island and disrupted air traffic. Maui News reported that tourists trying to get to the Kahului Airport from the resort areas in West Maui and emergency vehicles attempting to travel to and from Maui Memorial Hospital and the west side of the island were prevented from doing so during the fire. Several commercial airline flight crews were airlifted to the airport by helicopter to make their departures.

Photo 4 (above left). *The 2006 Ma'alaea/Pali fire burned 3,973 acres. Photo credit: County of Maui.*
Photo 5 (above right). *Firefighters dowsed flames with water bucket drops. Photo credit: County of Maui.*

Kihei-Maui Meadows Fire [11, 12, 13, 14]

Kihei's largest fire between January 2000 and December 2012 started on August 23, 2008 and eventually burned around 300 acres of buffel grass and kiawe trees. The wildfire threatened several homes in Maui Meadows, preventing homeowners from returning to their homes. Embers from the fire caused minor damage to a home downslope of the fire. Fire suppression efforts ran into a few challenges, including an injured firefighter and damage to six vehicles when the fire came close to Wailea Fire Station's parking lot fence. On August 27th, residents were forced to evacuate for a second time.

Photo 6. *The wall of flames was visible from Piʻilani Highway. Photo credit: Maui News.*

"Our crews did a really great job in protecting the homes in the area," said then-Deputy Fire Chief Robert Shimada. "We appreciate the help of the heavy equipment crews from the Department of Public Works and Goodfellow Brothers and are especially grateful to those in Maui Meadows (who) allowed our firefighters to use their swimming pools for quick and safe night access to water so that our air operations could continue." The fire was ruled an arson fire after Maui police arrested a 15-year-old Kihei boy who admitted to starting the fire with a lighter.

WILDFIRE IMPACTS

Many of the community, economic, natural, and cultural resources in South Maui 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 Hawaiʻi 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.

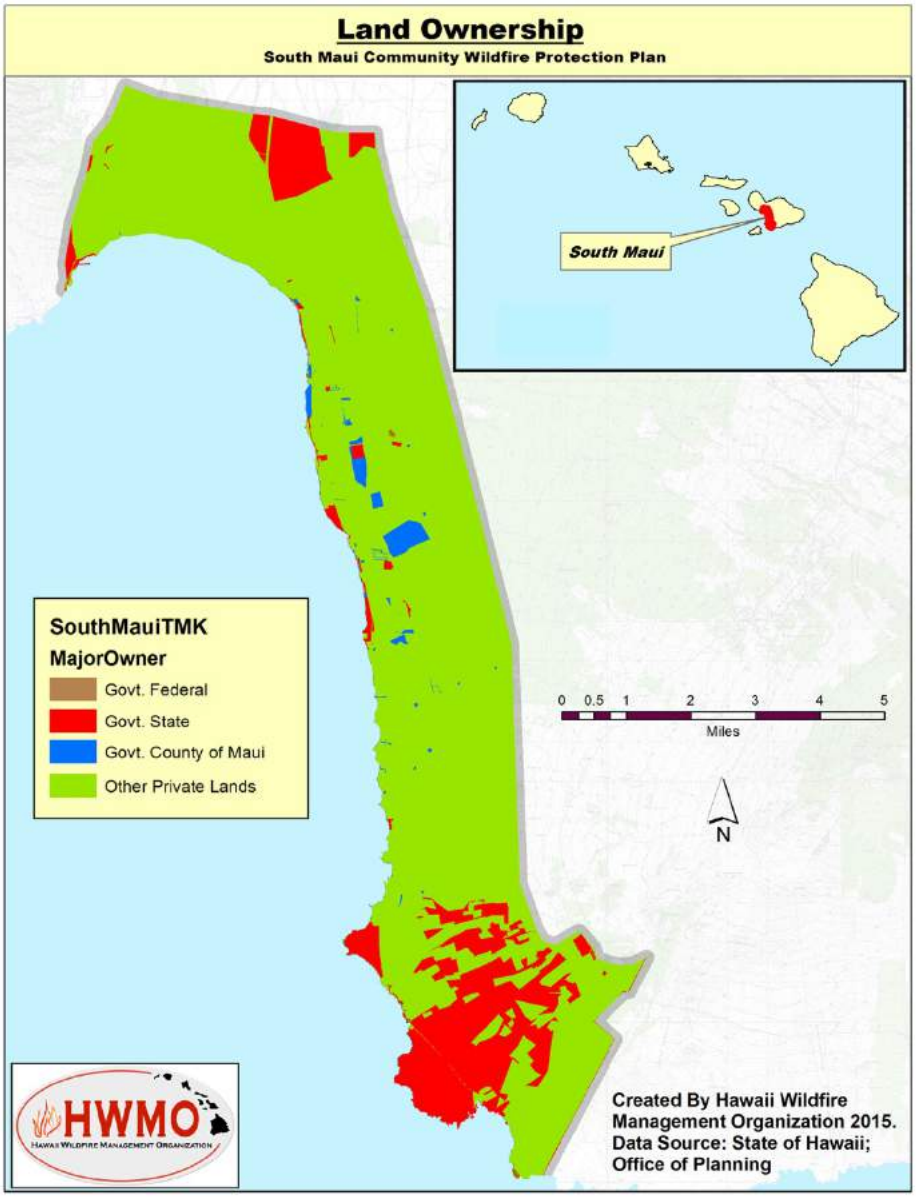
IMPACTS TO COMMUNITIES AND MUNICIPAL ACTIVITIES

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.

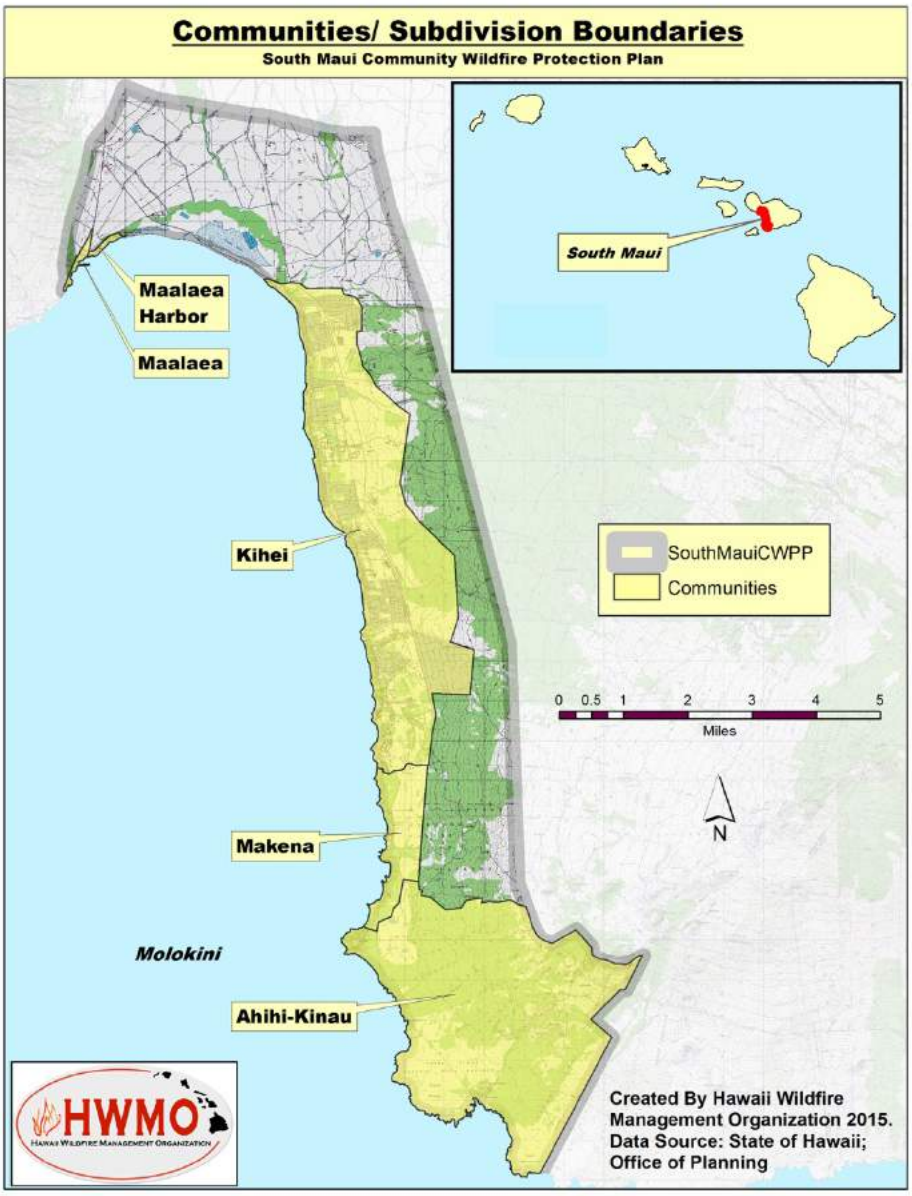
GENERAL OVERVIEW OF CWPP PLANNING AREA
SOUTH MAUI

The area comprising South Maui, as defined in this plan, includes federal, state, county, and privately owned lands (Map 12). The CWPP planning boundaries also simultaneously define this region's WUI boundaries. It is delineated to include communities and their surrounding lands to ensure adequate protection of both natural areas and human communities. The CWPP boundaries were chosen through stakeholder meetings and addresses one of Maui's priority fire prone regions.



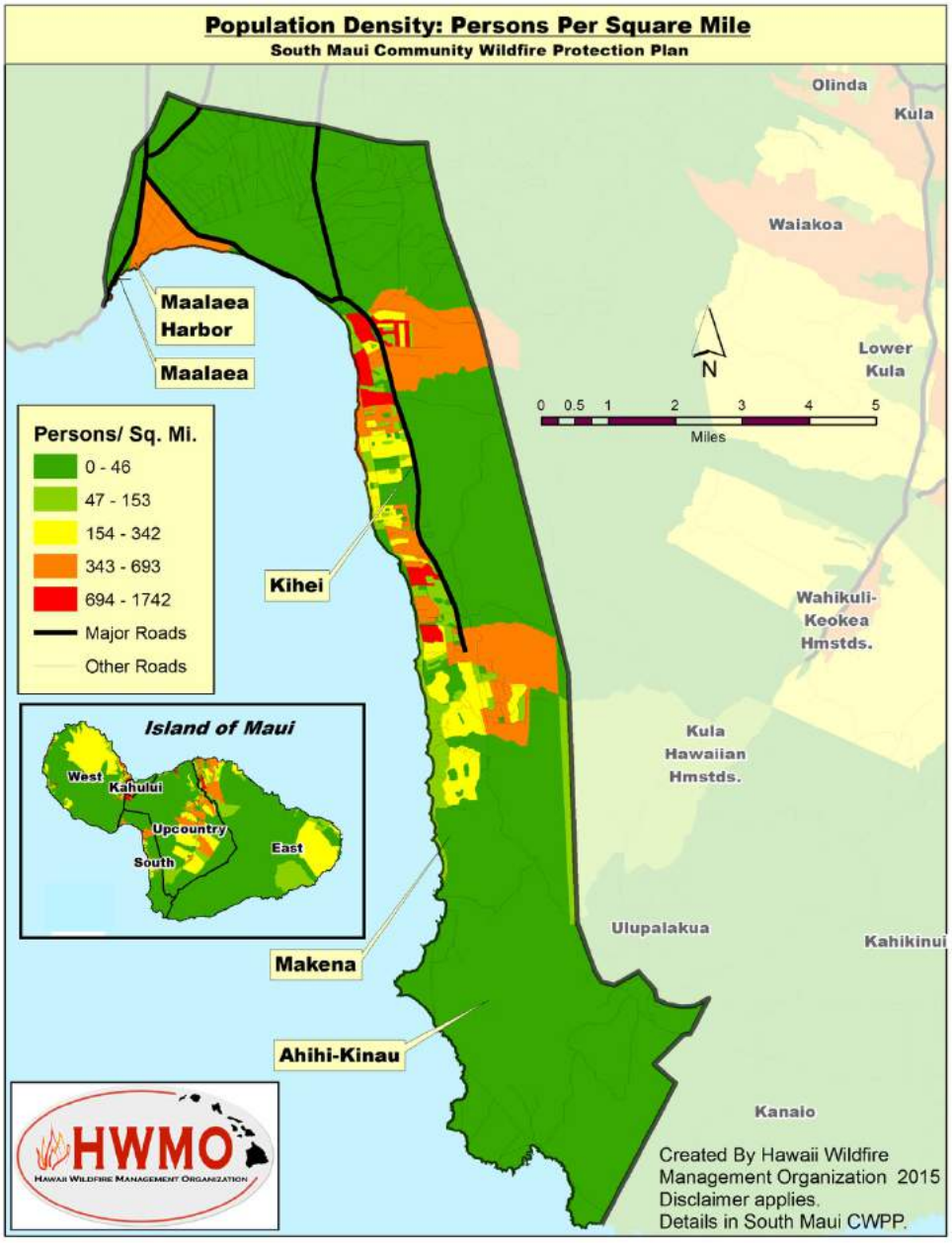
Map 12. *Land Ownership Map for South Maui CWPP planning area.*

For the purposes of assessing hazards and wildfire threats to resources, residential areas within the South Maui CWPP planning area were simplified into fifteen "communities" (see Map 13). 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 the DLNR-DOFAW's Communities at Risk from Wildfire maps, which are updated every few years to assess and depict wildfire threats to developed areas and communities. See next section, *Communities at Risk from Wildfires*, for more information and hazard assessment summary maps.

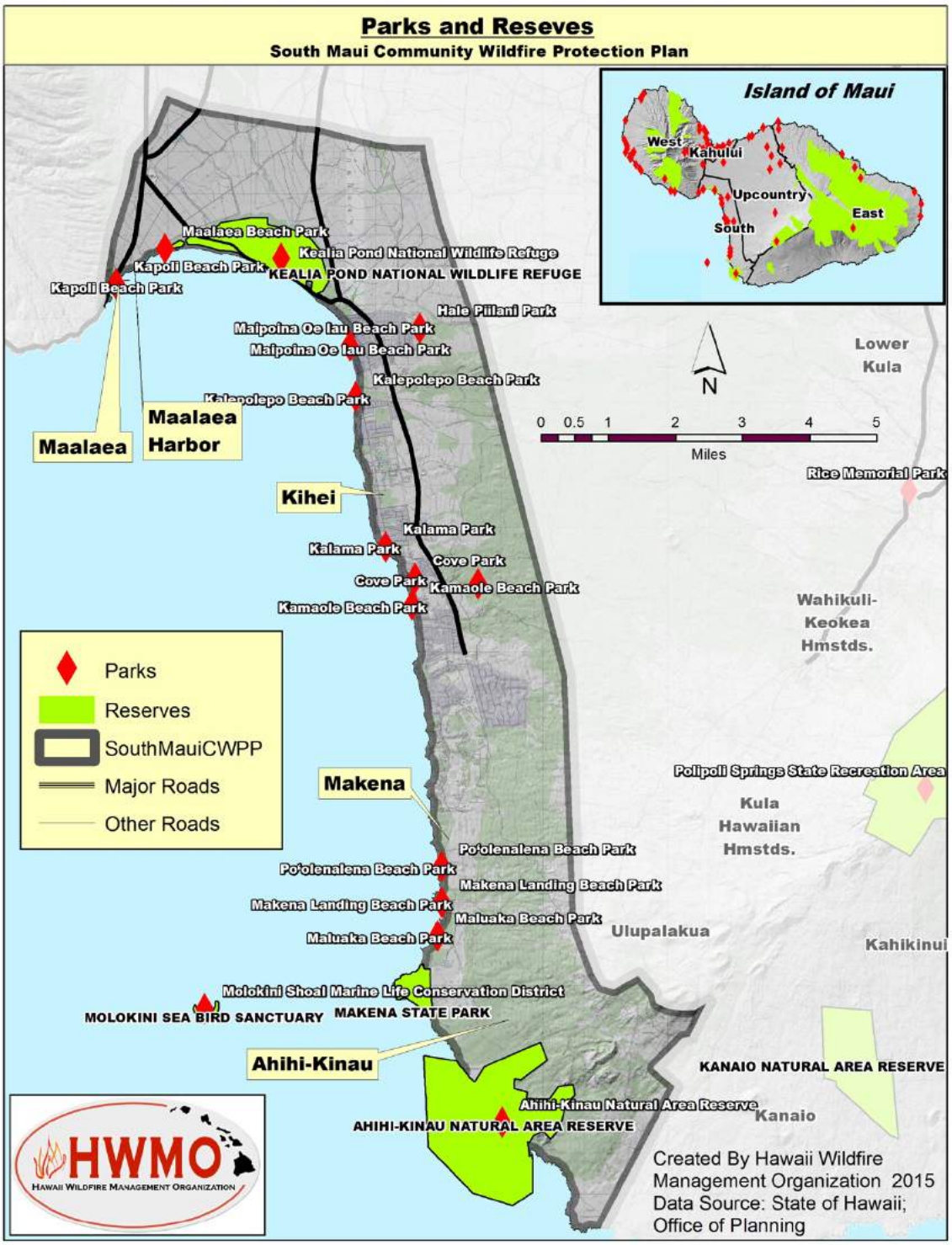


Map 13. *Simplified community delineations used within the South Maui CWPP planning area.*

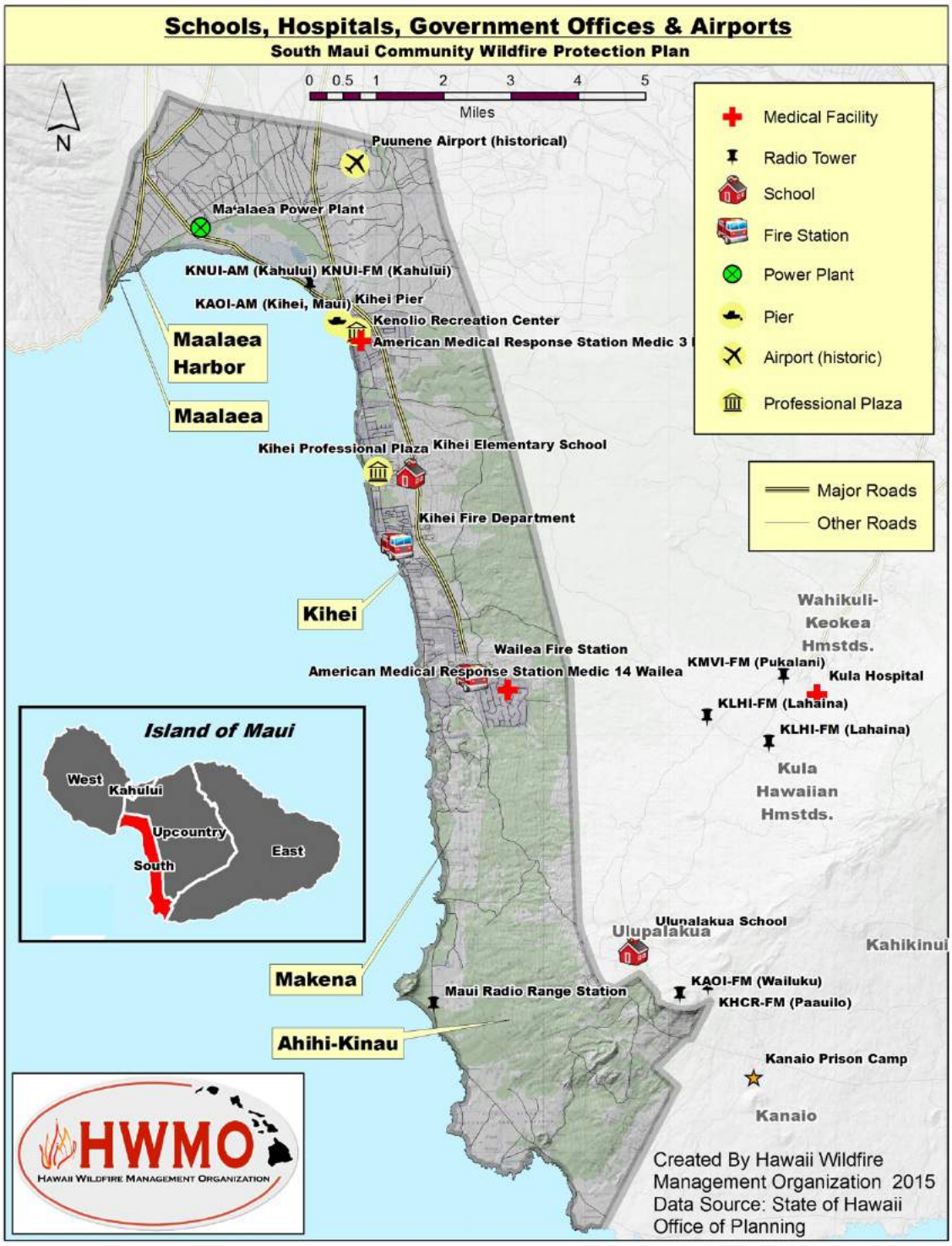
South Maui exemplifies a WUI, in that it contains both undeveloped fire prone wildland areas adjacent to populated subdivisions and developed areas (Map 14). There are numerous assets, resources, and infrastructural features at risk of wildfire in South Maui, to include community, economic, medical, educational, recreational, and environmental features. These are depicted on Maps 15-18. These features are both directly threatened by wildfire, as well as 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.



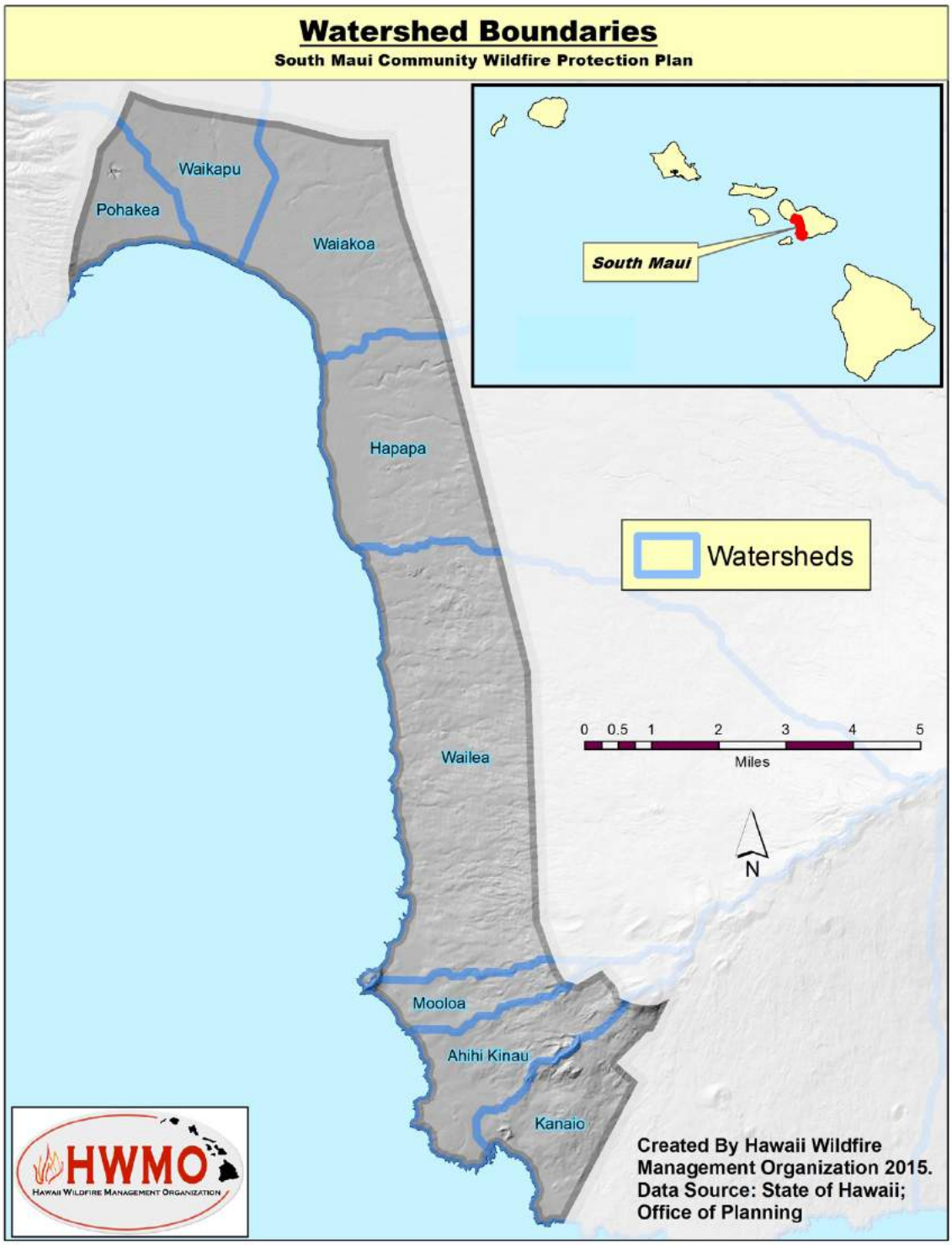
Map 14. *South Maui Population Density Map.*



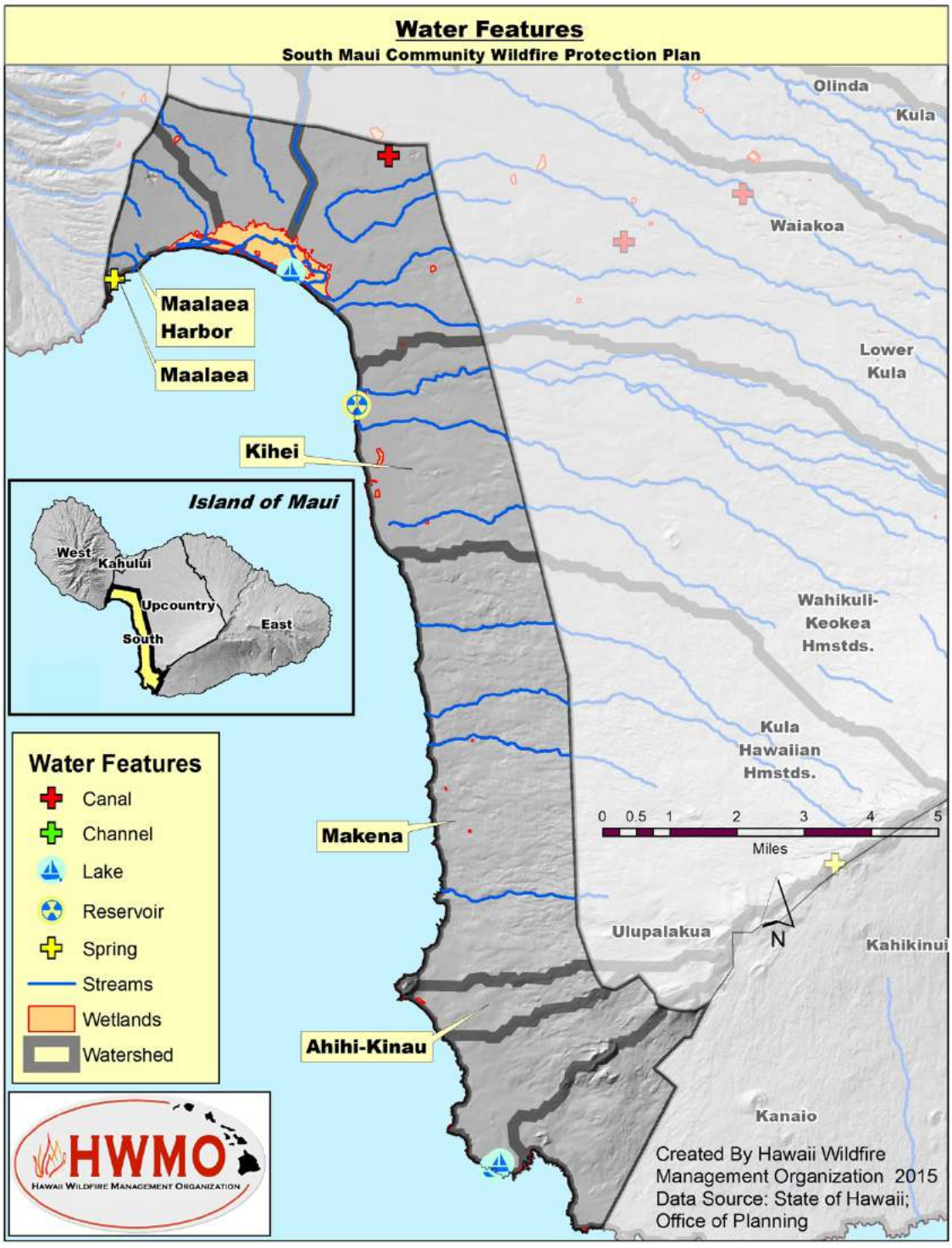
Map 15. *Parks and Reserves in South Maui CWPP planning area.*



Map 16. *Community/government service features in the South Maui CWPP planning area.*



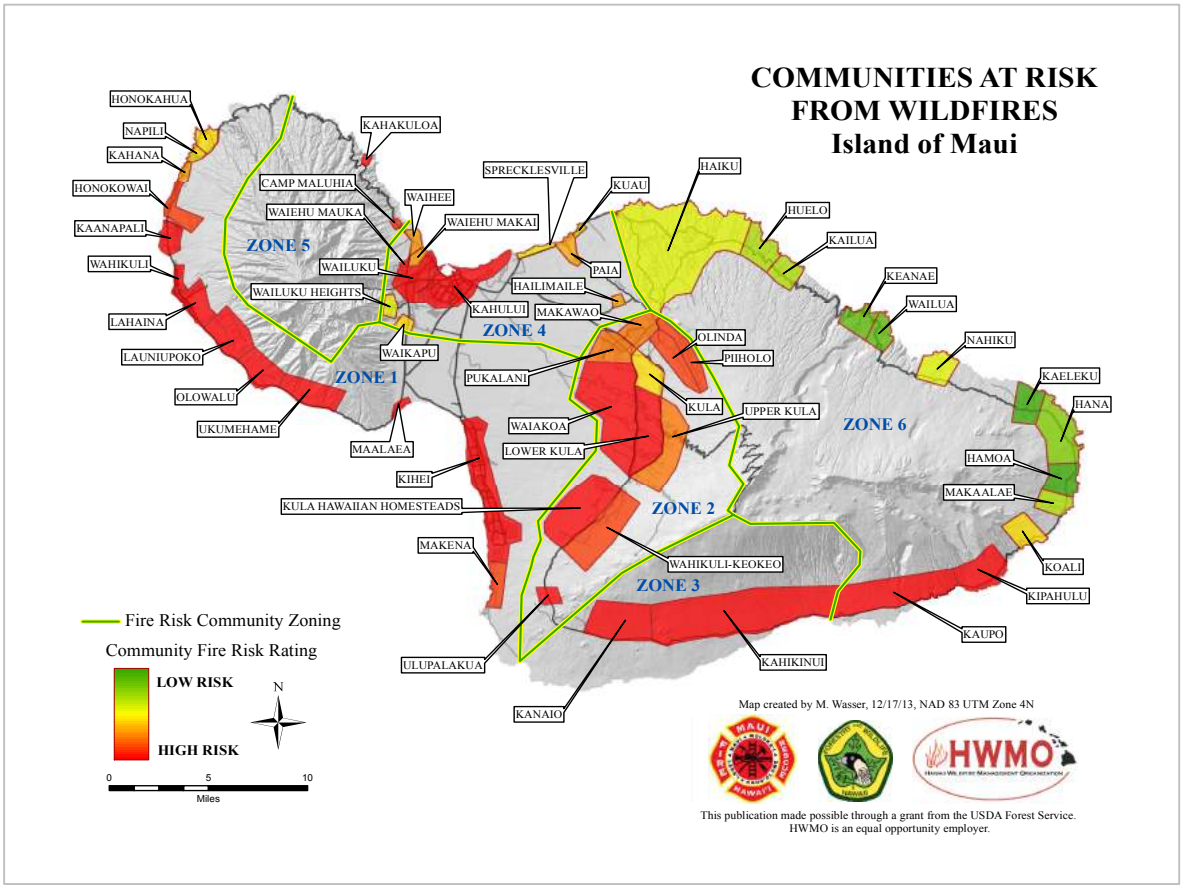
Map 17. *Watershed areas with in the South Maui CWPP planning area.*



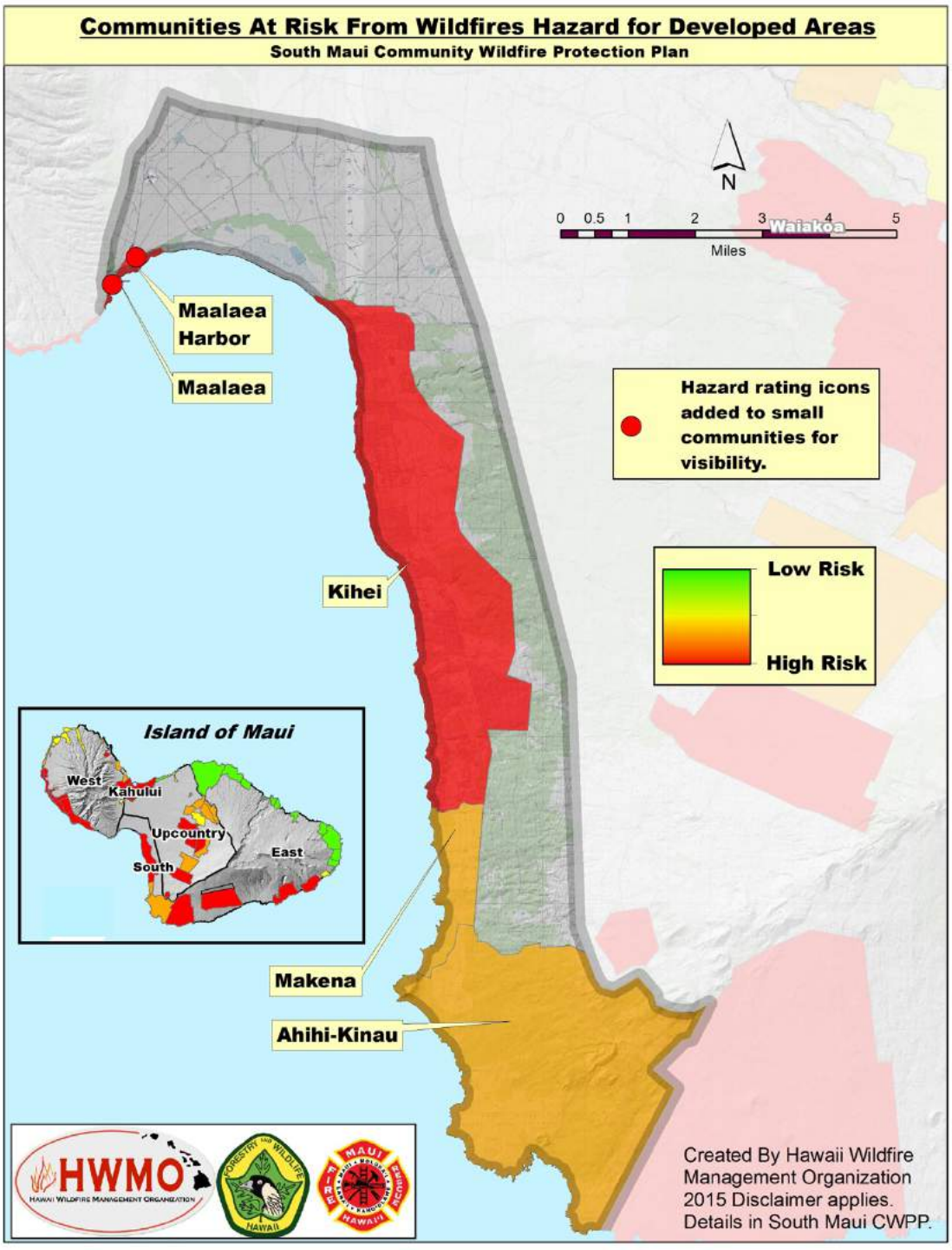
Map 18. *Water features in the South Maui CWPP planning area.*

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 statewide CARW maps. The original community boundaries were replicated in the 2013 map update, with changes made to reflect current hazards and subdivision expansions. Map 19 provides the Island of Maui’s overall CARW map for context. Map 20 depicts the hazard ratings for South Maui’s 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 other hazard or protection factors, like ingress/egress, community Firewise activities, etc.



Map 19. *Island of Maui 2013 Communities at Risk from Wildfires Map.*



Map 20. *South Maui Communities at Risk from Wildfires Map- Hazard ratings for developed areas.*

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 15-18 and 26).
- Develop a Community Hazard Assessment (see *Wildfire Hazard Assessment section*, Maps 21-25, and Appendix B).
- Identify Overall Community Priorities (see *Hazard Reduction Priorities* section and Figures 2, 3, and 5-9).

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

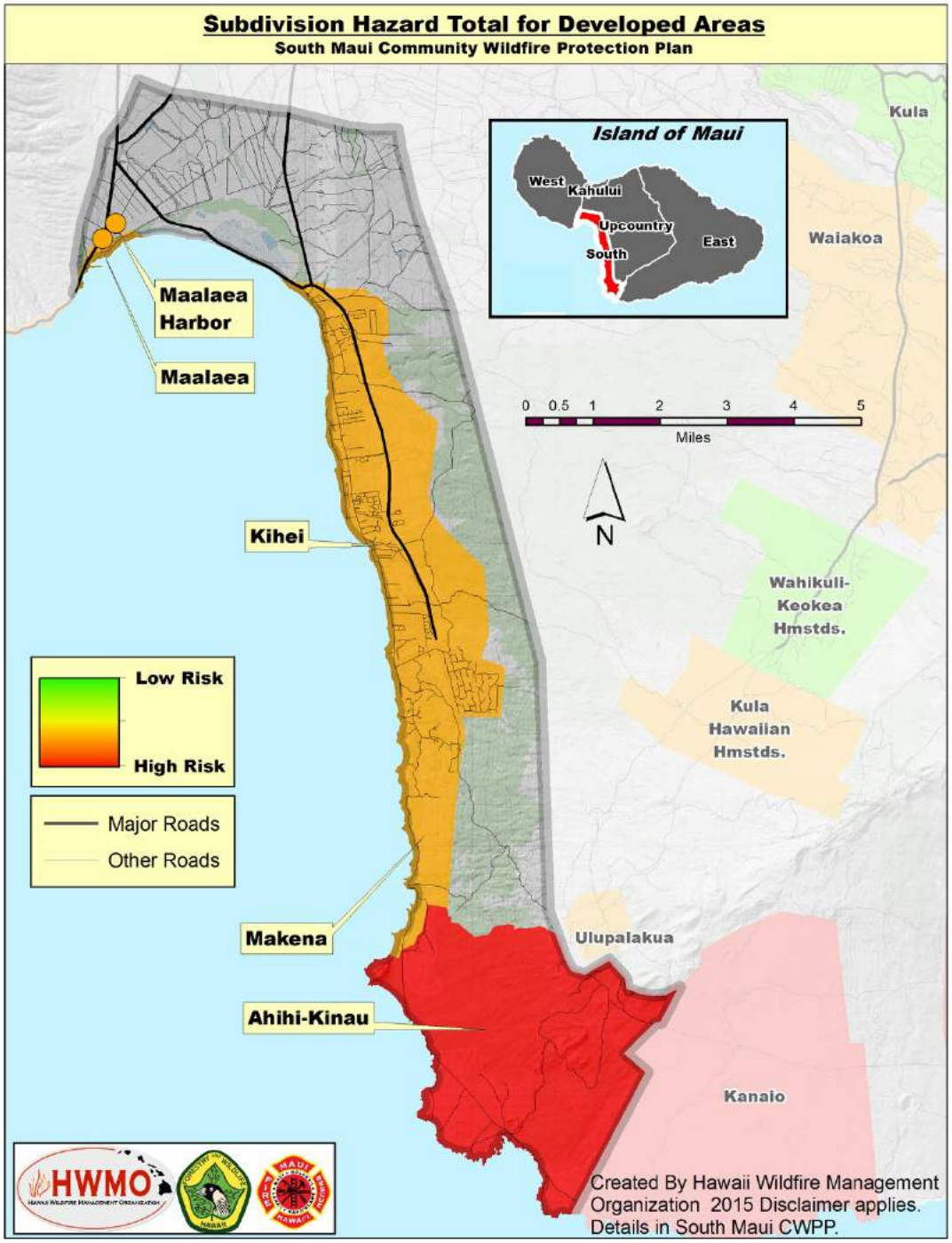
In partnership with DLNR-DOFAW and MFD, HWMO assessed the communities within South Maui for 36 wildfire hazard characteristics, which have been further grouped into 5 categories. As described in detail above, community delineations for the assessment followed those for the CARW map. The five categories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

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

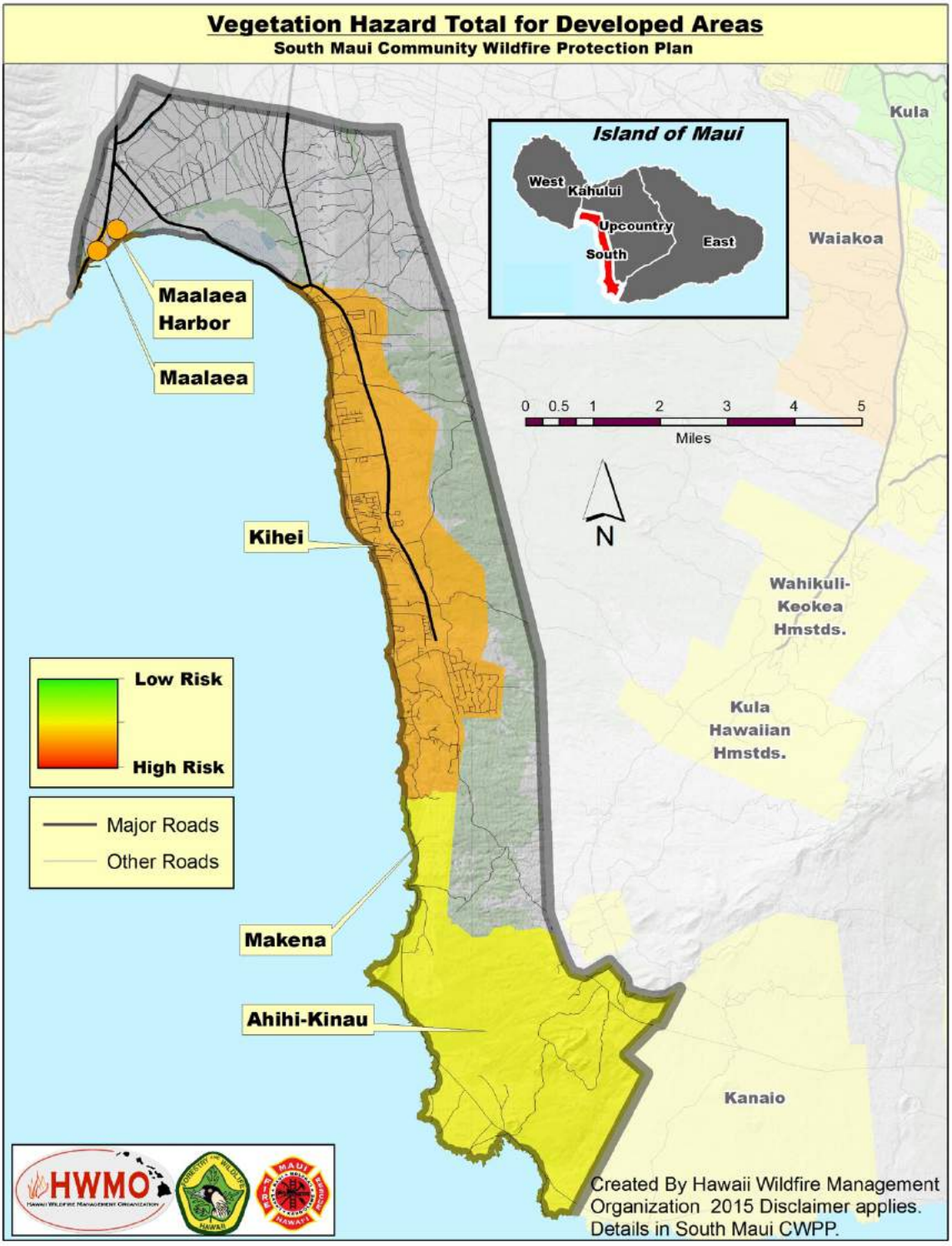
Maps are provided for each of the five categories, and demonstrate the total hazard per category based on a weighted calculation of that category's individual hazards, as detailed in Table 6.

Hazard Category (See Maps 21-25)	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

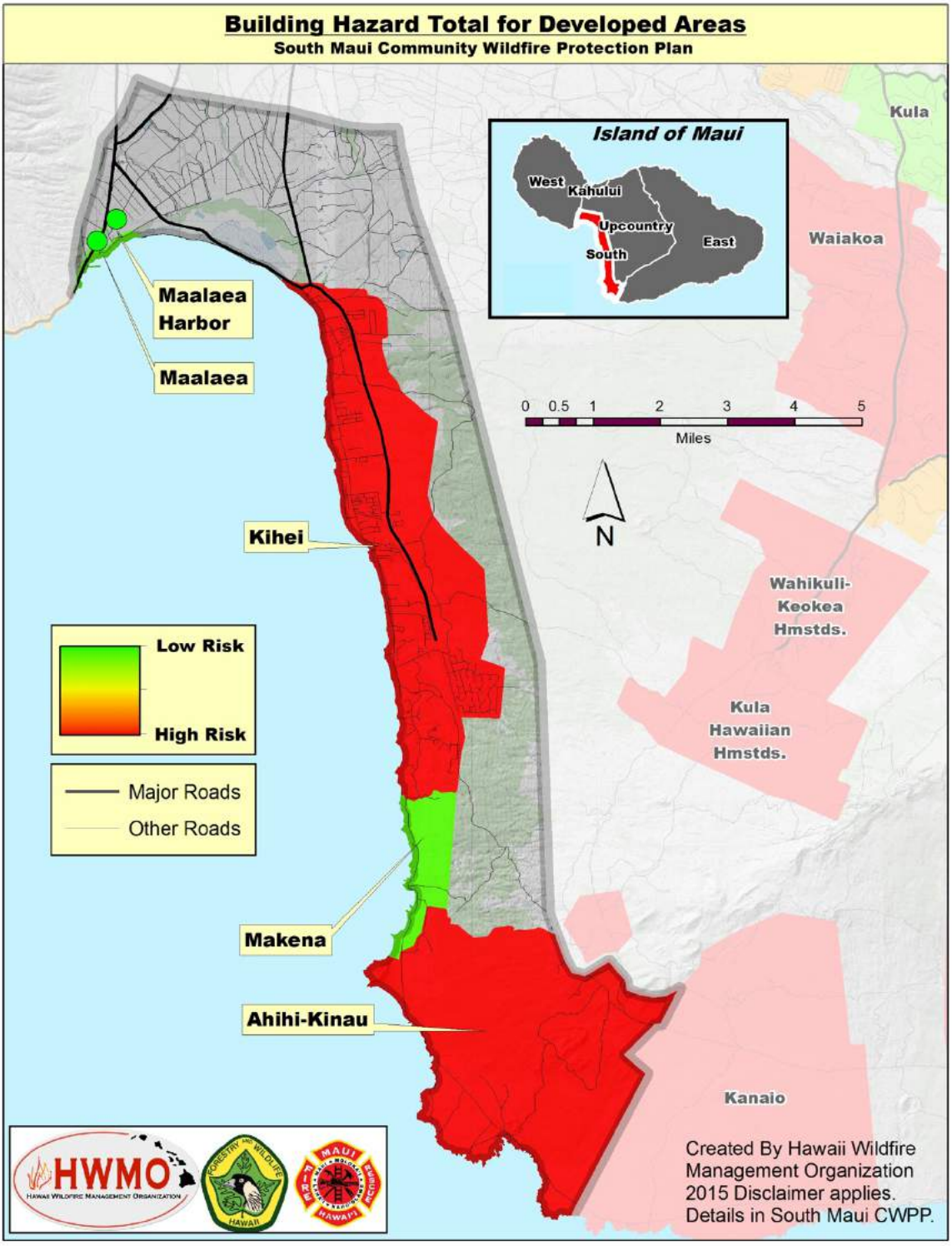
Table 6. *Overview of hazard assessment categories and the individual hazards that comprise them.*



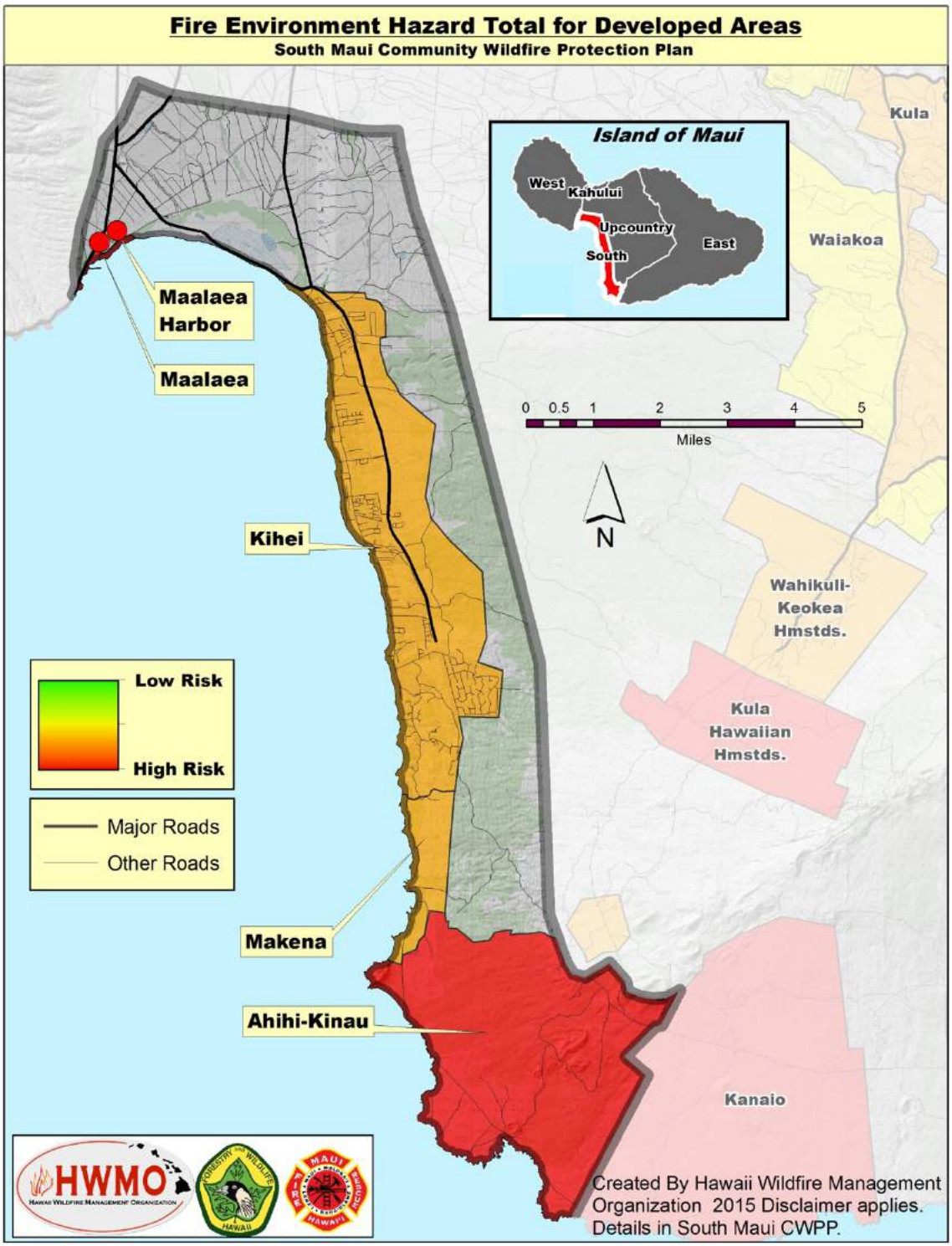
Map 21. Subdivision Hazard Total for Developed Areas of South Maui CWPP planning area. *Reflects hazard assessment findings related to the following categories: Fire Service Access; Home Setbacks; Ingress/Egress; Private Landowner Firewise landscaping & Defensible Space; Proximity of Subdivision to Wildland Areas; All Season Road Condition; Road Maintenance; Road Width; Street Signs; Structure Density; and Unmanaged, Untended, Undeveloped Lands.*



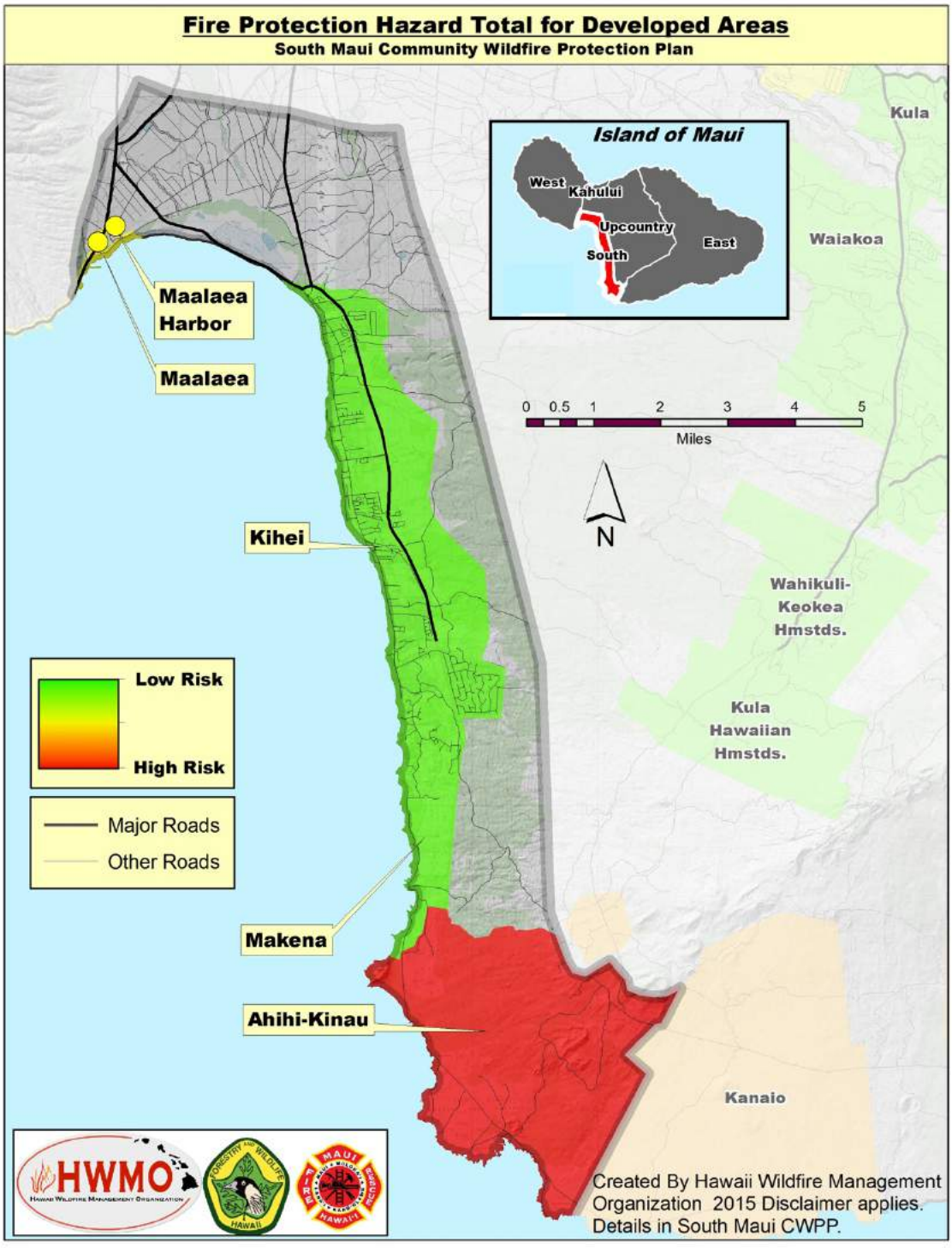
Map 22. Vegetation Hazard Total for Developed Areas of South Maui CWPP planning area*. Reflects hazard assessment findings related to the following categories: Defensible Space: Fuels Reduction Around Homes & Structures; Fuel Loading; Fuel Structure & Arrangement; Proximity of Flammable Fuels Around Subdivision; Vegetation Within 300' of Homes.*



Map 23. Building Hazard Total for Developed Areas of South Maui 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 24. Fire Environment Hazard Total for Developed Areas of South Maui 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 25. Fire Protection Hazard Total for Developed Areas of South Maui 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 value were determined for the South Maui CWPP planning area by stakeholders during input meetings. Map 26 demonstrates the points on the map selected by the public and agency participants during CWPP meetings as high priorities for mitigation and protection. These were based on 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 26. *Stakeholder-determined high value priority resources to protect from wildfire in the South Maui CWPP planning area.*

EMERGENCY MANAGEMENT

FIRE SUPPRESSION CAPABILITIES AND RESOURCES

Maui Fire Department (MFD) resources and equipment are spread across all of Maui County and are made available when needed if they are not already in use. MFD has 14 fire stations across the county. There are 10 fire stations on the Island of Maui, two of which are within the CWPP planning area. Table 7 provides location information for South Maui 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 in the South Maui CWPP planning area are listed in Table 8.

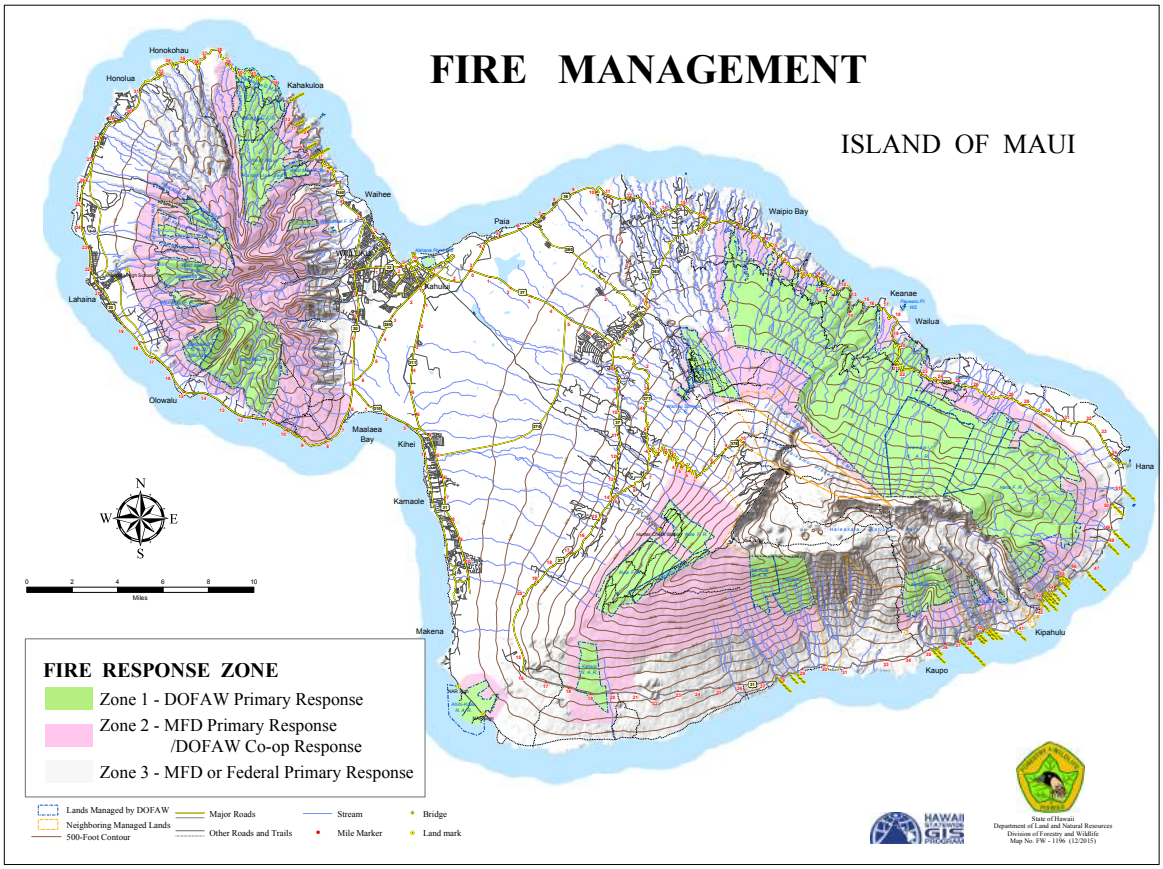
MFD South Maui Fire Stations	
Fire Station Location	Address
Kihei	11 Waimahaihai St., Kihei, Maui, HI 96753
Wailea-Makena	300 Kilohana Dr., Kihei, Maui, HI 96753

Table 7. *MFD fire stations within South Maui CWPP area.*

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. Map 27 was developed by DLNR-DOFAW and demonstrates the independent and shared response zones of each agency in the CWPP planning area.

Department of Land and Natural Resources – Division of Forestry and Wildlife (DLNR – DOFAW) Suppression Resources	
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.*



Map 27. *DLNR-DOFAW fire suppression response zones. (Source: DLNR-DOFAW)*

EMERGENCY MANAGEMENT DOCUMENTS AND OTHER 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.[15] The CWPP is designed to work in conjunction with other local, county, and state plans, operational policies, assessments, programs, etc., including but not limited to:

County of Maui:

County of Maui Drought Mitigation Strategies[16]
County of Maui Multi-Hazard Mitigation Plan[17] and Hazard Mitigation Plan Update (2015)[18]
County of Maui Water Use and Development Plan Draft[19]
Maui Island Plan[20]

State of Hawai‘i:

State Drought Plan and the County Drought Mitigation Strategies[21]
State of Hawai‘i Multi-Hazard Mitigation Plan[22]
Waihou Spring State Forest Reserve Management Plan[3]
State Division of Forestry and Wildlife Operational Policy for Wildfire Control[23]
Hawai‘i Statewide Assessment of Forest Conditions and Resource Strategy[24]

Natural resource protection efforts and management plans in the region:

Leeward Haleakalā Watershed Restoration Partnership[25]
‘Āhihi-Kīna‘u Natural Area Reserve Management Plan[26]
Keālia Pond U.S. Fish and Wildlife Refuge[2]

MULTIPLE-AGENCY AGREEMENTS

In Maui County, there is a coordinating group established to deal with and discuss wildfire issues, mitigation, and response. Federal, state, and local fire agencies have organized into the Maui Wildfire Coordinating Group. The Maui Wildfire Coordinating Group coordinates the programs of the participating wildland fire agencies on Maui 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.

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[27], 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."

EVACUATION PROTOCOLS AND NEEDS

Evacuation protocols for neighborhoods and areas in South Maui 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 South Maui 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[28]
- Disaster Preparedness for Maui County: A Citizen's Guide[29]
- Hurricane Information and Tips[30]
- Tsunami maps information, and tips[31]

STATE FIRE CODE

The Hawai'i 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 South Maui CWPP Update is the chapter on the WUI, which is described in 2012 NFPA 1, Chapter 17.

HAZARD REDUCTION PRIORITIES
SOUTH MAUI

PURPOSE AND METHODS

Public and agency participants during the CWPP planning process identified hazard reduction priorities for South Maui. 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 risk and hazards through pro-active wildfire mitigation. Public and agency discussion covered the following topics and more:

- Increasing stakeholder knowledge about wildfire risk through education and outreach;
- Encouraging the treatment of structural ignitability;
- Prioritizing fuel reduction projects; and
- 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

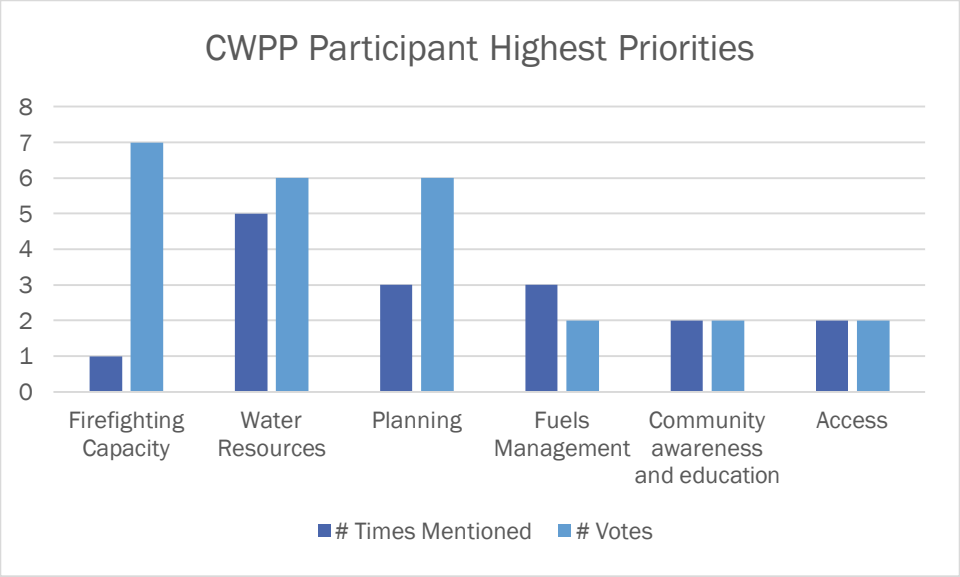


Figure 1. *South Maui CWPP Participant Highest Wildfire-Related Priorities.*

HWMO held several meetings for the general public and with fire response agencies and natural resource managers to collect input and record wildfire-related concerns and recommended actions. Additional

input was solicited from decision makers, large landowners, and other stakeholders as noted in the Planning Process chapter of this document.

While South Maui 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 entire set of topics to indicate the highest priorities. Figure 1 displays both. While some topics, such as firefighting capacity did not come up on their own many times, once they were mentioned, participants prioritized increasing firefighting capacity as a top goal. Improving water resources, wildfire-related planning, and fuels management were also top concerns. Finally, increasing community awareness and education and improving firefighting access were also prioritized.

THREE CATEGORIES OF STAKEHOLDER CONCERNS AND RECOMMENDED ACTIONS

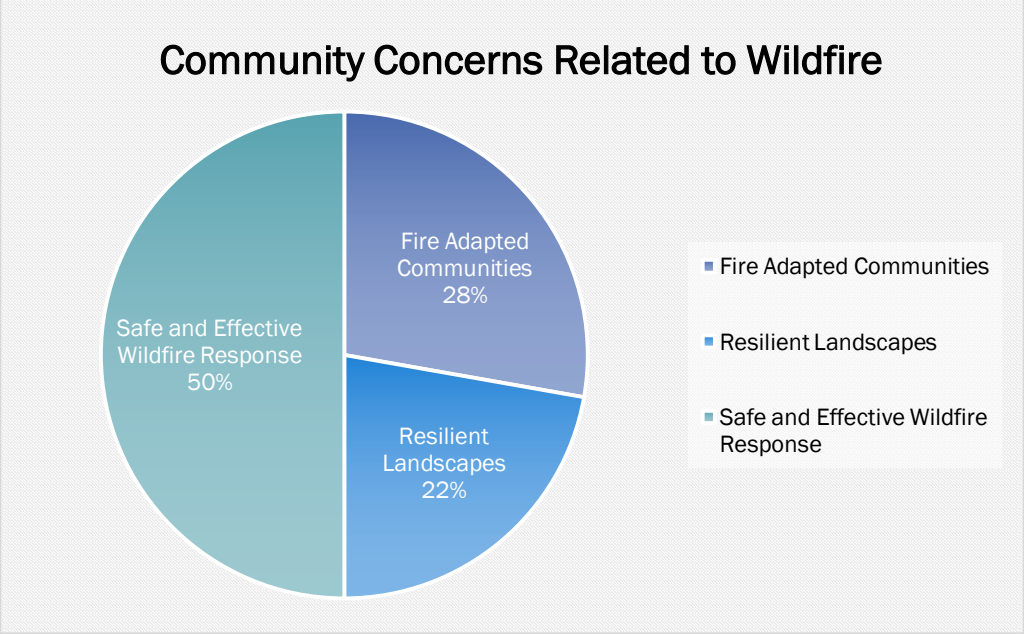


Figure 2. *Community Concerns Organized by Cohesive Strategy Categories.*

Public and agency input was extensive and has been organized to align with the categories used within the National Cohesive Wildland Fire Management Strategy.[32]

The National Cohesive Wildland Fire Management 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. Hawai'i falls into the Western Region. Public input details for South Maui are organized according to the following categories so that they fit into the national and regional framework of priorities and funding opportunities.

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

Figure 2 indicates how much of the participant concerns for South Maui falls within each category.

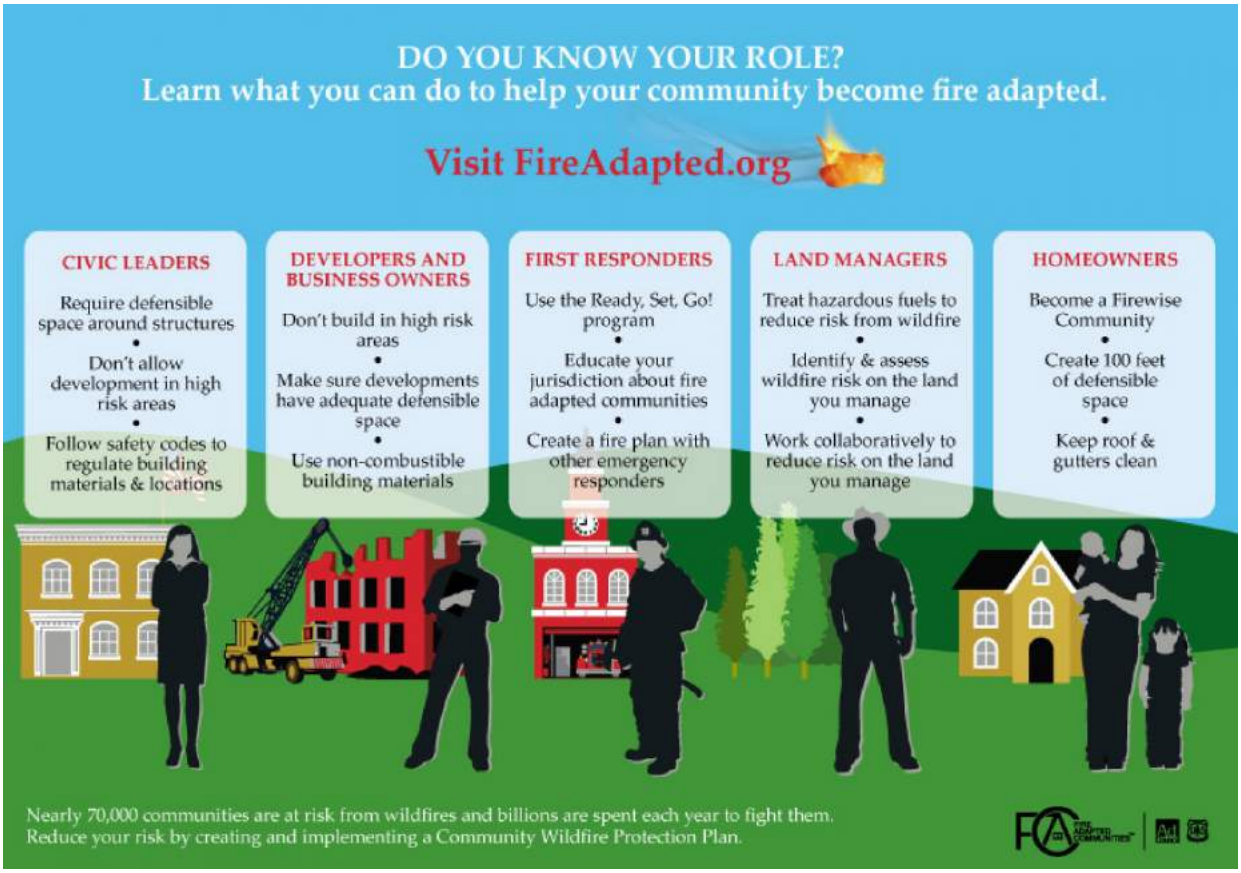


Figure 3. *Fire-Adapted Communities Infographic.*[33] *There is a role for everyone when working toward a region becoming Fire-Adapted, as seen in this infographic from the Fire-Adapted Communities website, FireAdapted.org.*

FIRE-ADAPTED COMMUNITIES

28% of South Maui CWPP participant input was related to the need to work toward increasing 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."[34] 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 co-exist with wildland fire."[35]

South Maui Input Related to Fire-Adapted Communities	
High Priority Concern	**Community Recommended Action**
Lack of proactive residential and commercial involvement in fire preparedness, prevention, and planning.	Increase outreach and motivation through workshops, programs, incentives.
Lack of community awareness - Kihei is very aware of fire problem but not what to do personally.	Maui Meadows (MM) - 900 homes - very active HOA - need community education.
Need increased community awareness for yard waste dumping protocols and options.	Reminders in newspaper, radio, etc.; Chipper days.
There is increasing development of communities/subdivisions near wildland areas.	Input into planning process - Firewise Communities. Conduct peer reviews of development plans.
Lack of fuel break/fire breaks around subdivisions especially mauka of highway (ex. Maui Meadows).	Work with Hale Ranch, Kaomoulu Ranch and homeowners associations on designating possible locations for fuel/fire breaks.
Lack of community capacity.	Maui Meadows and all South Maui communities need help to add in fire planning, vegetation management, and building homeowner preparedness activities.
Lack of proactive planning to reduce wildfire impacts on communities, to include traffic, evacuation, homeowner landscaping, business involvement, etc.	Encourage decision makers to assist in wildfire protection activities, provide workshops and resident trainings, outreach, and green waste removal/chipper programs.

Table 9. *Input related to South Maui moving toward the goals of Fire-Adapted Communities.*

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 are all aligned with the framework and objectives for Fire-Adapted Communities. Figure 3 depicts the roles and activities of all members of society toward becoming fire-adapted.

This CWPP was developed with a diversity of stakeholders with homes, businesses, personal interests, and jurisdictions in the South Maui CWPP planning area. The wildfire-related concerns and recommended actions demonstrate the range of responsible parties, timelines, and actions that need to be taken toward comprehensive wildfire prevention, preparedness, and protection of South Maui. These are the basic tenets of becoming fire-adapted. South Maui CWPP stakeholder input related to the human side of fire adaptation is presented in Table 9. Managing vegetation and increasing fire suppression capacity are presented individually (See *Resilient Landscapes* and *Safe and Effective Wildfire Response* sections). The following table details the highest voted concerns and recommended actions provided by South Maui CWPP participants related to Fire-Adapted Communities.

RESILIENT LANDSCAPES

The Resilient Landscapes category of CWPP participant input focuses on all input related to restoring, protecting, or maintaining landscapes. For South Maui, this includes the protection of native species and watersheds from wildfire impacts and the management of vegetation to reduce the ignition capacity and spread of wildfire. The concerns and recommended actions are detailed in Table 10.

South Maui participants raised concerns related to the need for increased roadside vegetative fuels management, fuel reduction on the boundaries of large landholdings, and improved community participation of vegetation management within and around residential areas.

South Maui Input Related to Resilient Landscapes	
High Priority Concern	**Community Recommended Action**
High growth of wildland areas, unmanaged fuels.	Make fuels management the number one priority for the community on all levels from decision makers to residents and landowners. Use grazing, weed whacking, dozer breaks, controlled burns.
Need a dedicated fuelbreak buffers and a commitment to long term maintenance.	Work with county and others to commit to and carry out a fuelbreak buffer projects right away with a maintenance plan.
Kihei needs a buffer to protect from wildland fuels.	Maui Meadows needs a fire break on mauka side (Possibly could tax homes $100 each to maintain the fire break).
Lack of fuel break/fire breaks around subdivisions - esp. mauka of highway (ex. Maui Meadows).	Work with Hale Ranch, Kaomoulu Ranch and homeowners associations on designating possible locations for fuel/fire breaks.
Lack of community and resident capacity to increase vegetation management for fire protection.	Need decision maker support and funds for vegetation management- landowners don't necessarily have the capacity to manage for public safety reasons even if they want to. Need financial assistance and public funds to protect the community.

Table 10. *Input related to South Maui moving toward the goals of Resilient Landscapes.*

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 South Maui (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 (see *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.

South Maui CWPP participants demonstrated an understanding of this and provided their concerns and priorities related to wildfire response. Table 11 details the highest voted concerns and recommended actions provided by South Maui CWPP participants related to Safe and Effective Wildfire Response.

South Maui Input Related to Safe and Effective Wildfire Response	
High Priority Concern	**Community Recommended Action**
Need more firefighting equipment.	CDF mini trucks for Kihei & Wailea.
Need to maintain access roads by maintaining and managing vegetative fuels.	Dedicated fire breaks that are maintained.
	Do controlled burns to manage fuel.
Lack of water resources (dip tanks & reservoirs in between South Kihei and Upcountry).	Revisit South Haleakala SCD Plan on water catchment infrastructure. Catch excess runoff from up mauka.
	Kaonoulu, Kamiole Reservoirs to catch run off from rains near gulches. Maintain and use these for fire prevention and suppression activities.
	Coordinated the ability to tap into the Kihei water treatment plant when needed for fire suppression.
	Tap into well system when needed for fire suppression.

Table 11. *Input related to South Maui moving toward the goals of 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 12.

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 South Maui	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 12. *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.[36, 37, 38]

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.

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 5). 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 4. *Defensible space zones around structures.*[28]

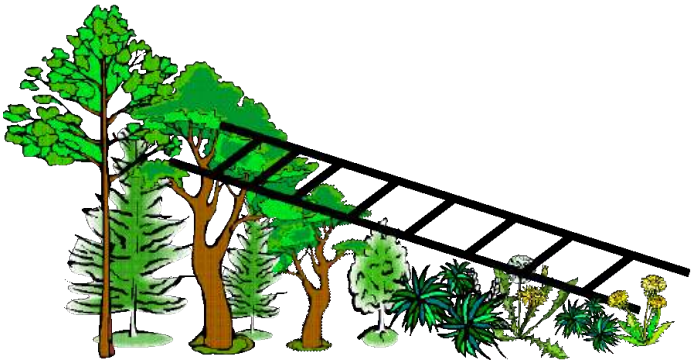


Figure 5*. Ladder Fuels Diagram.*[1] *Ladder fuels form a pathway for ground fires to climb vegetation and become crown fires, which are much more difficult to suppress. It is important to limb low hanging branches and keep ground vegetation short so that vegetation is separated inhibiting fire from 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 5).
- 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 6**. Covering vents with 1/8-inch or smaller metal mesh blocks embers from entering a home or structure.*

***Figure 7.** Keep windows free of vegetation to reduce likelihood of heat-caused breakage that lets embers into your home.*

***Figure 8.** Make sure your eaves are enclosed with non-combustible materials to prevent ember entry.*

***Figure 9**. 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 10. *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.

ACTION PLAN
SOUTH MAUI COMMUNITY WILDFIRE PROTECTION PLAN

The South Maui CWPP Action Plan follows the guidelines of HFRA, which includes developing an action plan along with an implementation and maintenance strategy, and finalizing the plan.

The South Maui CWPP Action Plan 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 of Hawai'i, and County of Maui 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 Maui Wildfire Coordinating Group and HWMO intend to regularly evaluate progress on projects. Additional projects will be attached as appendices and/or included in updated versions of this plan.

NEAR-TERM ACTION PLAN

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

Project	Anticipated Cost	When	Lead
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

Vegetation Management around powerline infrastructure	Variable		MECO
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 13. *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 14 details the longer-term proposed 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	$20,000/each	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.)		Variable

Table 14. *Proposed future projects.*

CWPP IMPLEMENTATION AND MAINTENANCE

The HFRA requires that the MFD, County of Maui Civil Defense Agency, and DLNR-DOFAW all agree on the final contents of the South Maui 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 South Maui CWPP will rely heavily upon community initiative and involvement. Expertise, technical support, and implementation assistance will be provided by the appropriate agencies and organizations involved in fire issues in the South Maui area, and area residents are urged to contribute their time and effort to implement the priority residential and community-based actions toward creating defensible space and reducing structural ignitability.

HWMO, in cooperation with 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 in South Maui. Together, representatives will seek to identify sources of funding for projects, document the successes and lessons learned from any implemented 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 South Maui 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 of Maui and State of Hawai'i representatives have a high level of interest in the protection of the South Maui 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
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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 supplementary action plan projects, or for printed copies, please contact:

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Website: Hawaiiwildfire.org

LISTS OF TABLES, FIGURES, MAPS, PHOTOS

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[27] **DLNR-DOFAW Mutual Aid Agreements**. http://dlnr.hawaii.gov/forestry/fire/mutual-aid/

[28] **County of Maui Civil Defense Agency Website** http://www.co.maui.hi.us/index.aspx?nid=70

[29] **Disaster Preparedness for Maui County: A Citizen's Guide** http://co.maui.hi.us/documents/10/disaster.PDF

[30] **Hurricane Information and Tips**. County of Maui.
http://www.co.maui.hi.us/documents/10/HURRICANE%20INFORMATION%20AND%20PREPAREDNESS%20TIPS.PDF

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[32] **National Cohesive Wildland Fire Management Strategy** http://www.forestsandrangelands.gov/strategy/

[33] **Fire-Adapted Communities Infographic. Do you know your role?** http://fireadaptednetwork.org/about/learn-about-wildfire-resilience/

[34] **Frequently Asked Questions – Fire-Adapted Communities.** USDA Forest Service, Fire and Aviation. 2014.
http://www.fs.fed.us/fire/prev_ed/fac/faqs.pdf

[35] **National Wildfire Coordinating Group. 2014. Glossary of Wildland Terminology.** PMS 205.
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[36] **Ready, Set, Go!** http://www.wildlandfirersg.org

[37] **Hawai'i Wildfire Management Organization**. Ready, Set, Go! Personal Wildland Fire Action Guide- Hawai'i Edition. http://www.hawaiiwildfire.org

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

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

APPENDICES

Appendix A: Community Photos

Appendix B: Wildfire Hazard Assessment Maps

Appendix C: Maui Fire Department 2016 Apparatus and Vehicle Inventory

APPENDIX A
SOUTH MAUI COMMUNITY WILDFIRE PROTECTION PLAN
COMMUNITY PHOTOS

The following photos were taken during a visual assessment of South Maui, during which we documented community resources at risk, hazards, and examples of existing protective features in the South Maui CWPP planning area.

Photo assessments were completed for the following areas:

- ʻĀhihi-Kinaʻu
- Kihei
- Wailea-Makena
- Maʻalaea Residential and Harbor

ʻĀhihi-Kinaʻu

Road facing Kihei

Haleakalā in background with lava fields in foreground

Makena Road homes

Kanahena Cove with narrow streets

Overgrown roadside residential vegetation need to be managed

Makena Road- narrow with blind spots and roadside fuels

Makena State Park- dry grasses and kiawe trees create ladder fuels

Puʻu above Makena State Park

Makena Staet Park access road has heavy roadside fuels

Vegetation overgrowing powerlines is a high hazard

La Perouse Bay- parking lot with smoke in background from fire in Kahikinui

La Perouse Bay sedimentation in water

Kihei

Park and ride area with continuous fuels right up to cars

Highway 310 near Park and Ride, mowed shoulder on one side

Maui Electric base yard - entrance area with ladder fuels

Kealia Pond with West Maui Mountains in background

Kealia Pond Boardwalk

Market area with ABC Store and farmers market across from Kihei Sands - dense kiawe forest with fuelbreak

Kenolio Park ballfield and structure

Fulebreak next to road across from Kenolio Park

Apartments across from Kenolio fuelbreak area with tall kiawe

Kihei Wharf canoe area and hotels/condos

Keonoulu St- edge of Maui Lu Resort, hazardous roadside fuels

Kihei Bay Vista- empty lot with hazardous fuels

Keonoulu Street

Several homes use xeriscaping and noncombustible materials

Nohokai St.- ladder fules with tall kiawe next to parking lot

Roadside fuels and parking behind Longs Drugs and Azeka Mauka

Bulldozed area with tall kiawe and wood piles

Kihei U.S. Post Office

Unmanaged vegetation next to Kihei Elementary School

Kihie Community Center

Lokelani Intermediate School

Unmanaged fuels across from South Maui Community Park

Open field

Roadside fuels on Halehuai Street

Welakahao intersection with main road, heavy fuels and power lines

Kalama Park

Kihei Fire Station

Kihei Public Library

Walaka Street roadside fuels

Kihei Boat Launch with unmanaged vegetation

Auhana St. neighborhood- dry grasses with no shoulder

Kihei wildland-urban interface and Pi'ilani Hwy.

Abandoned lot with unmanaged vegetation

Kaonoulu St neighborhood- example of well kept landscaping

Mehealani St. neighborhood- firebreak

Mahealani St. neighborhood- gulch between homes with tall dry grasses

Wailea-Makena

Keawakapu Beach neighborhood - tall hedge of bougainvillea and other shrubs

Keawakapu Beach neighborhood - row of palms and green lawns on shoulder

Keawakapu Beach

Unmanaged vegetation across from Wailea Kahi

Kai Malu - lawn next to sidewalk bordered by unmanaged vegetation

Poolenalena Beach – grasses and kiawe along walkways

Poolenalena Beach - ekoa and kiawe along roads

Makena Landing – roadside fuels

Makena Landing - homes across from beach with fuels leading up to homes on slope

Keawalani Church neighborhood - homes behind roadside fuels

Makena Alanui (south end) - roadside fuels

Mapu Pl neighborhood - WUI

Ma‘alaea- Residential and Harbor

Road right off of entrance - row of kiawe

Grass and kiawe ladder fuels on residential road right off of main highway

Busy Honoapiilani Highway leads right into community

Home nestled in green but dense shrubs and palms with aloe on road

Rush hour traffic headed towards Lahaina

Ma‘alaea Harbor- DAR yard palms and tall overhanging branches

Area behind restaurants - some grasses mowed on berms

Between harbor and highway intersect - some roadside fuels management

Highway 30 wide shoulder with mowed grasses

APPENDIX B

SOUTH MAUI COMMUNITY WILDFIRE PROTECTION PLAN

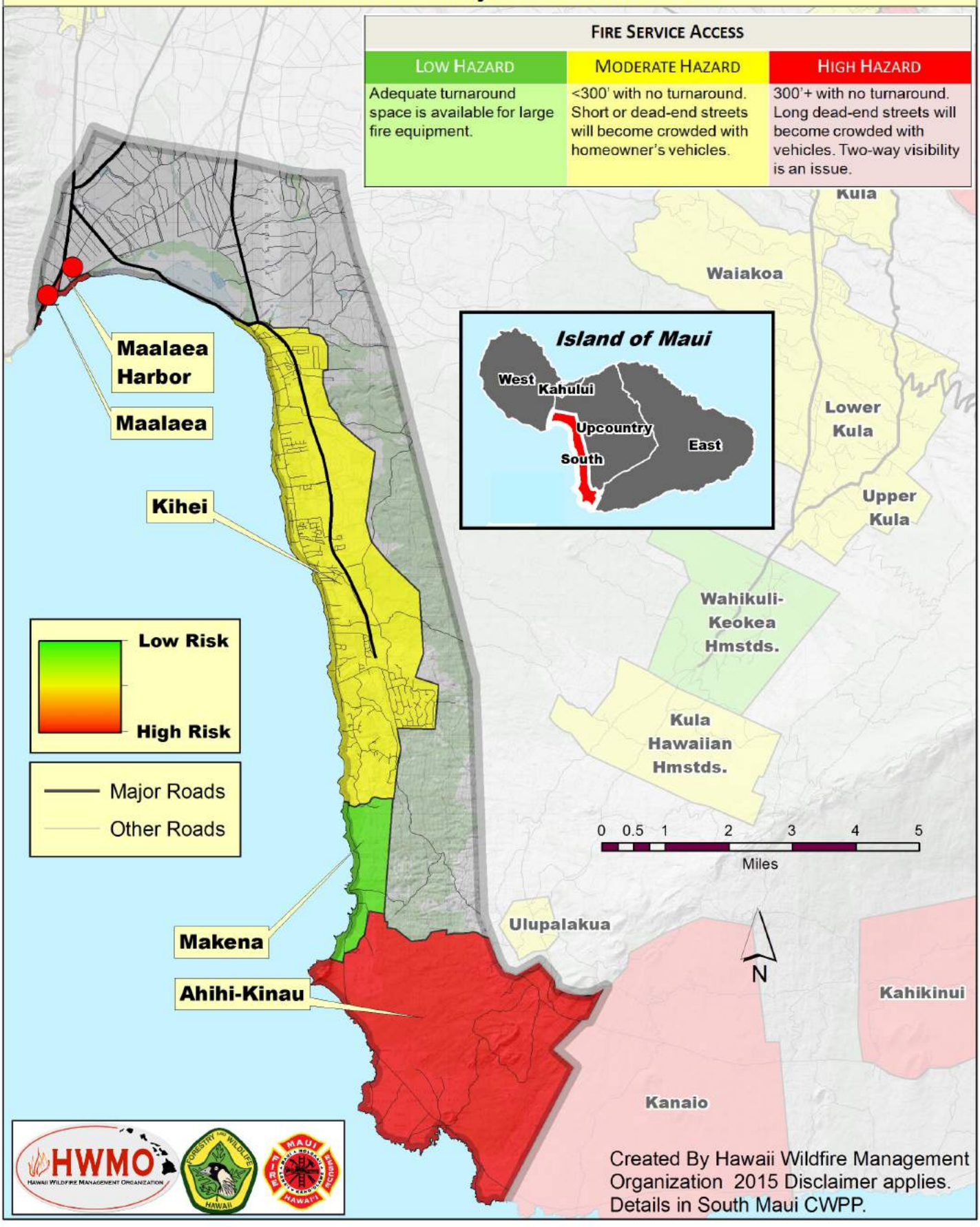
WILDFIRE HAZARD ASSESSMENT MAPS

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

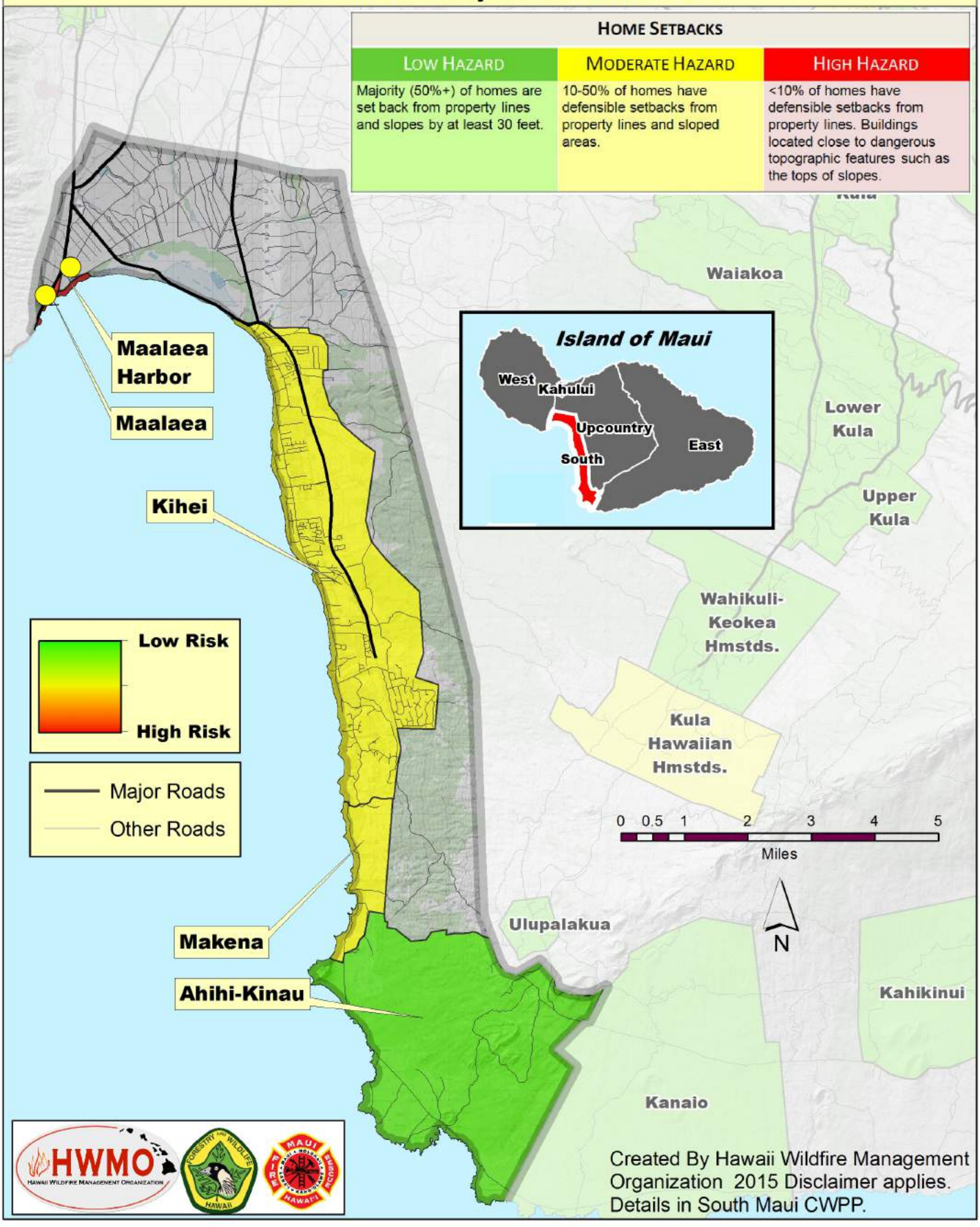
Fire Service Access Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



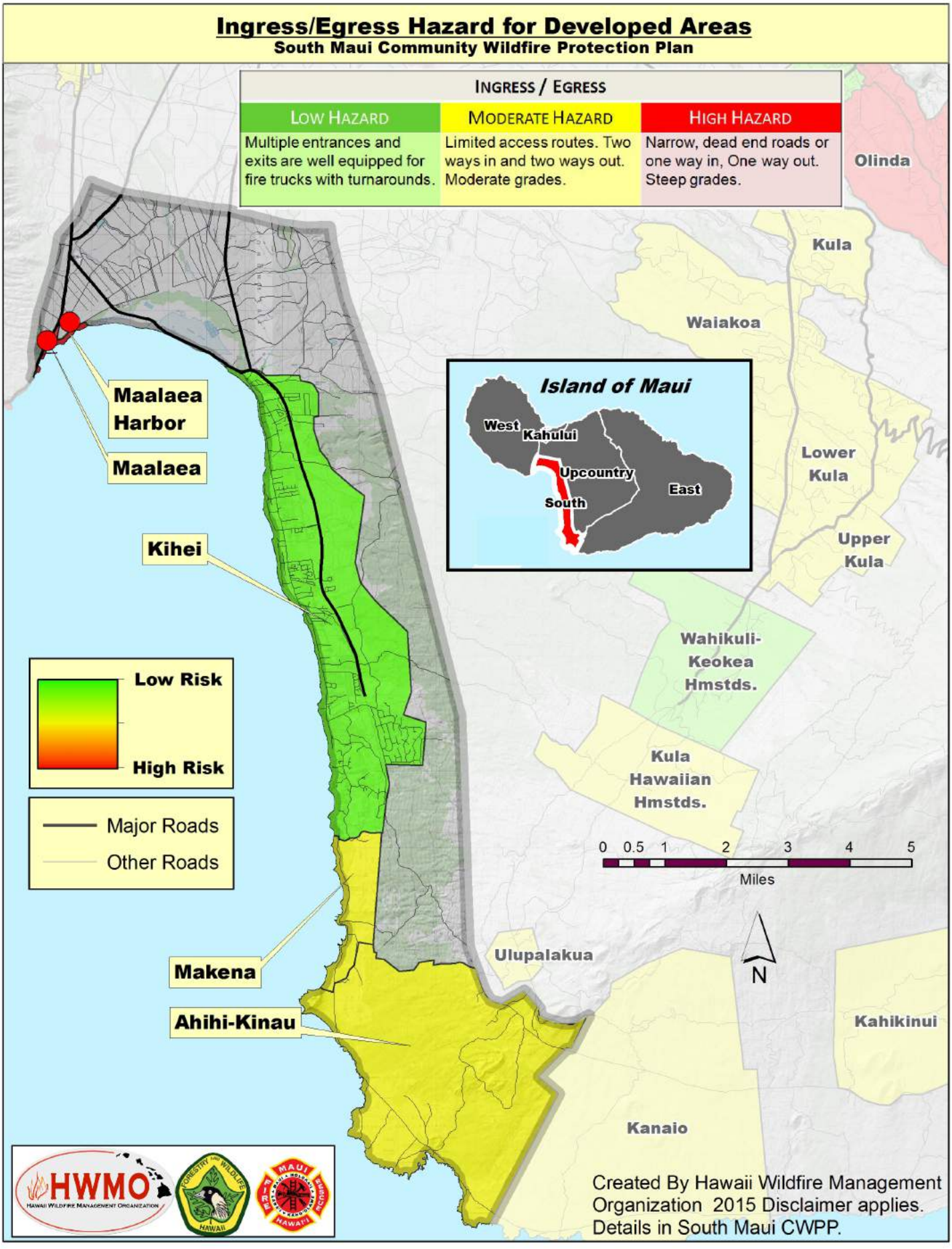
Home Setbacks Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



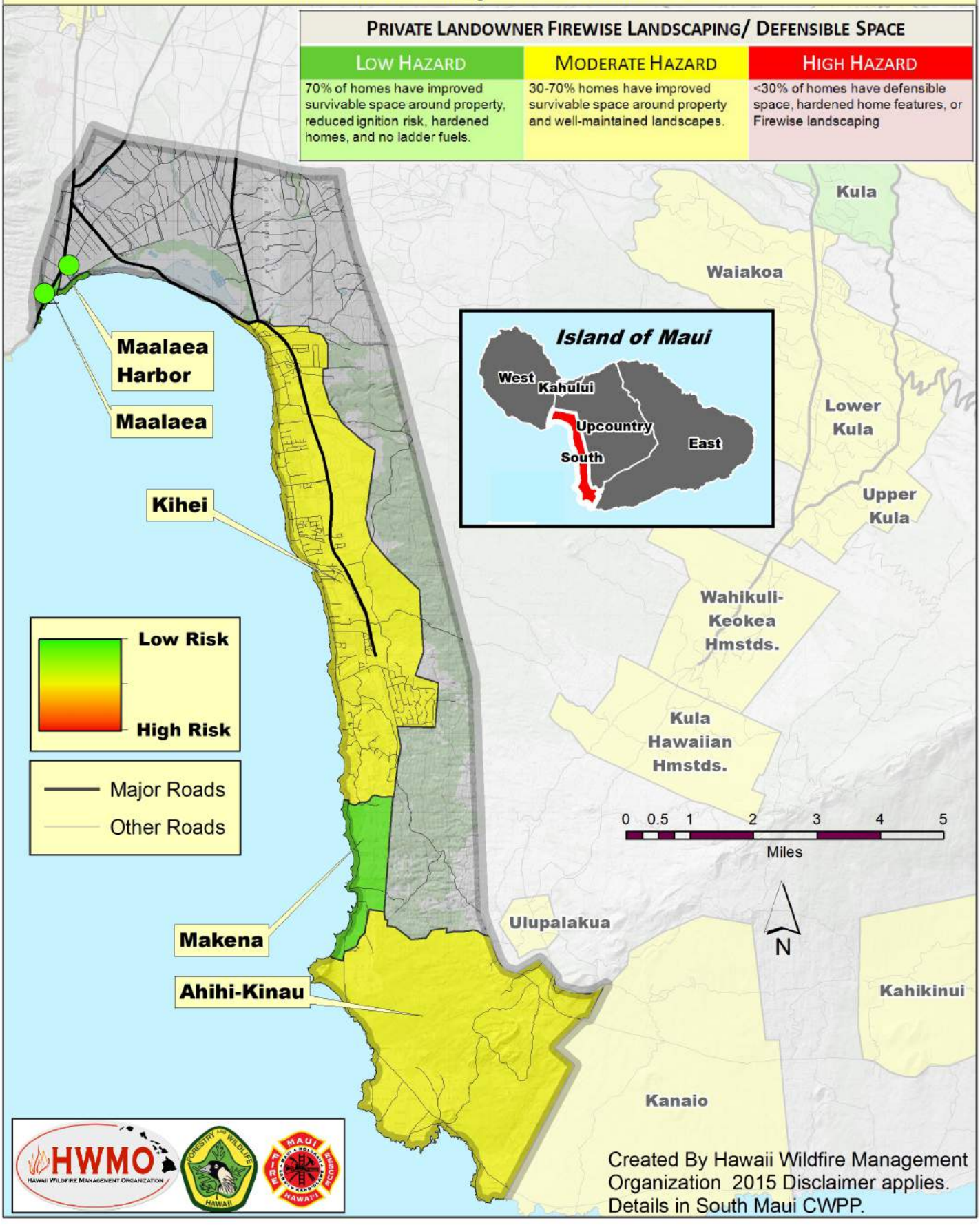
Ingress/Egress Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



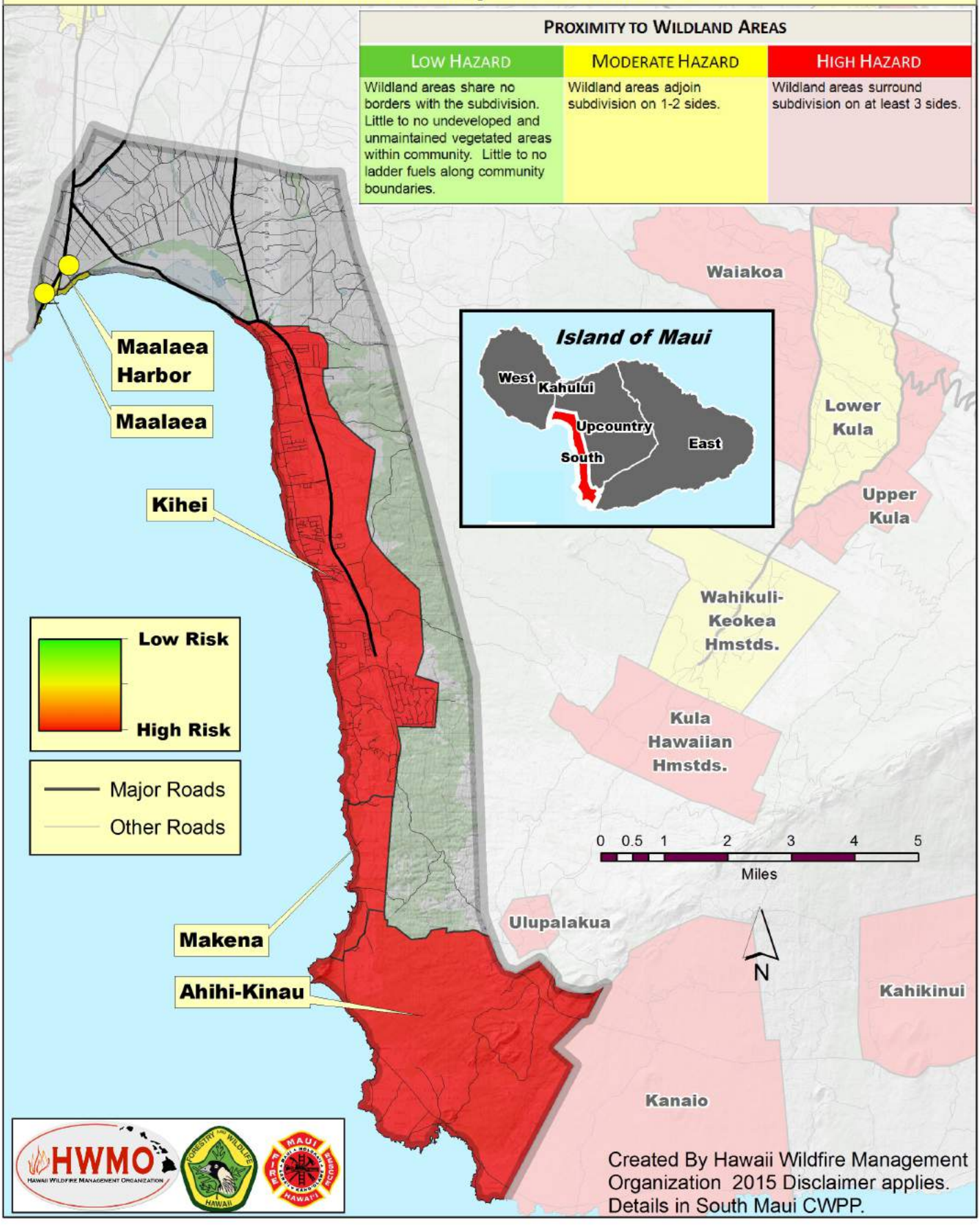
Private Landowner Actions Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



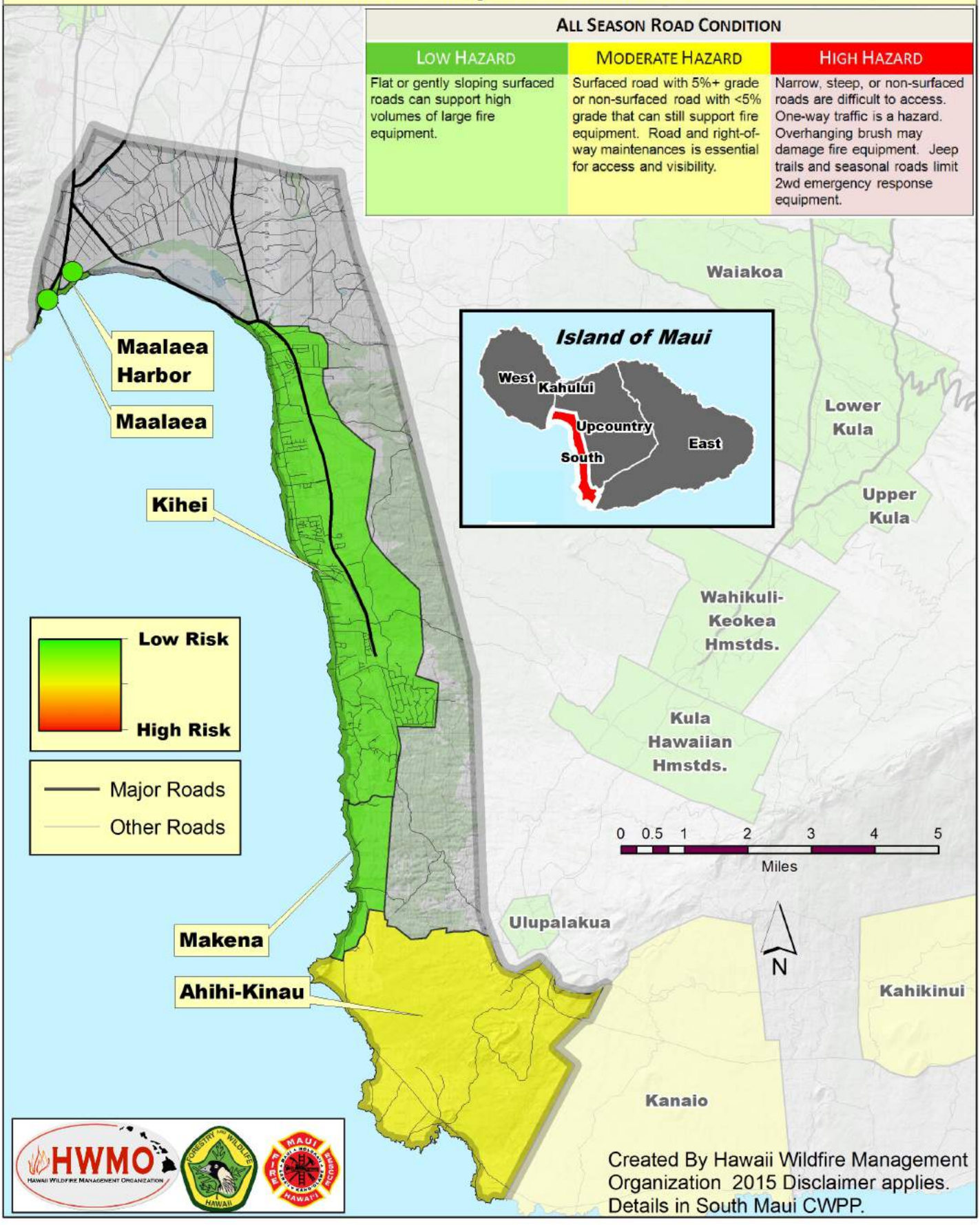
Proximity of Subdivision To Wildland Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



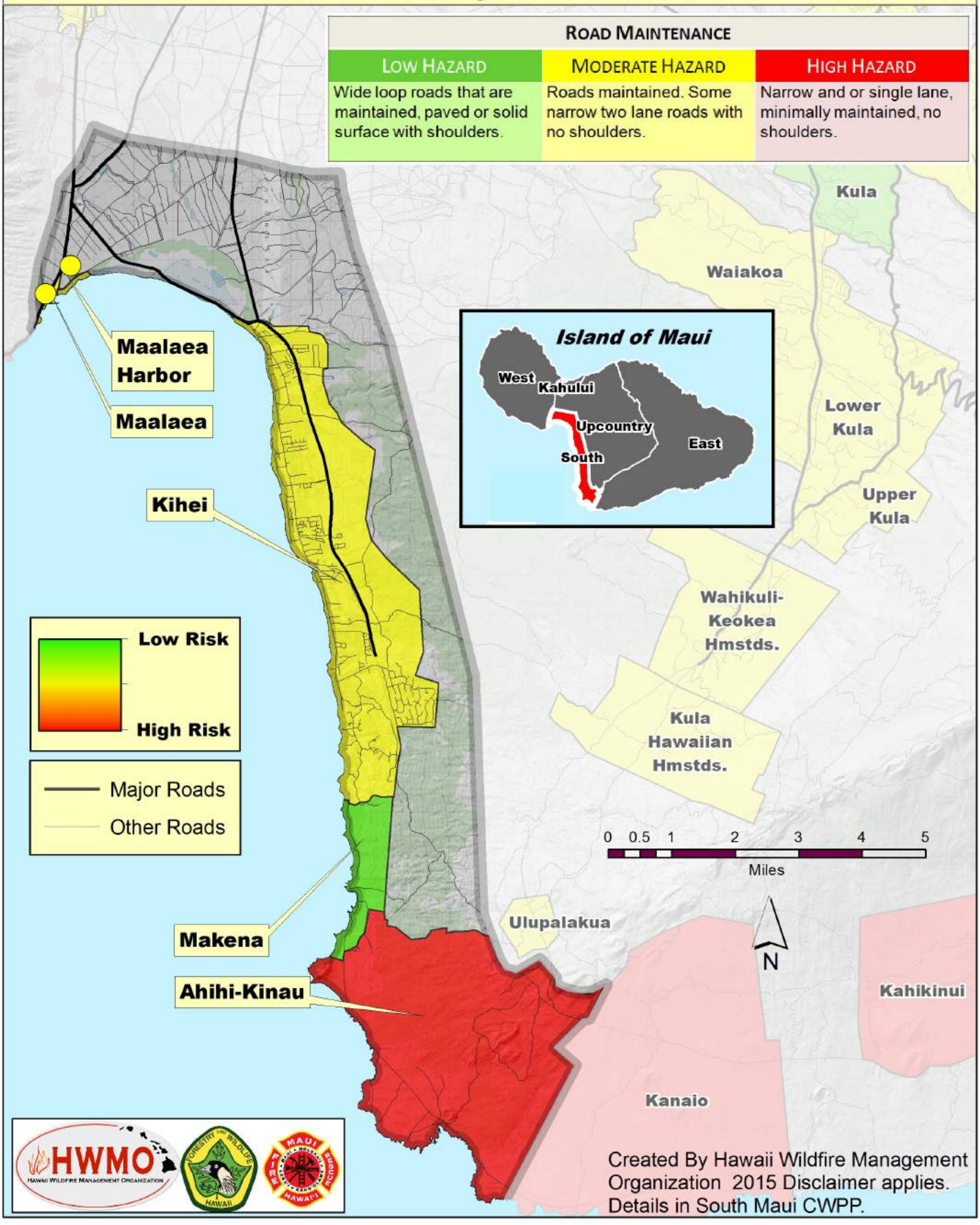
All-Season Road Condition Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



Road Maintenance Hazard for Developed Areas

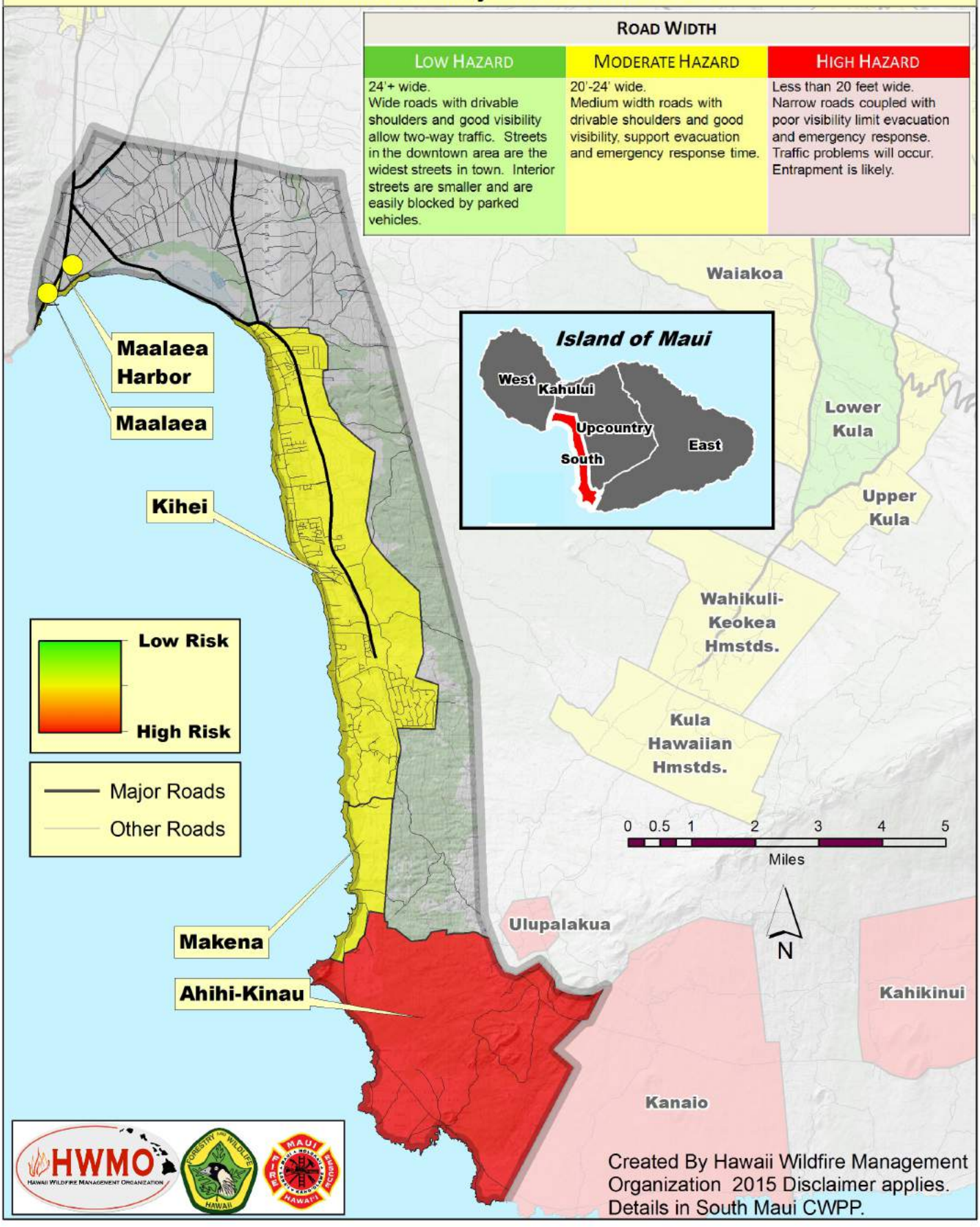
South Maui Community Wildfire Protection Plan



Created By Hawaii Wildfire Management Organization 2015 Disclaimer applies. Details in South Maui CWPP.

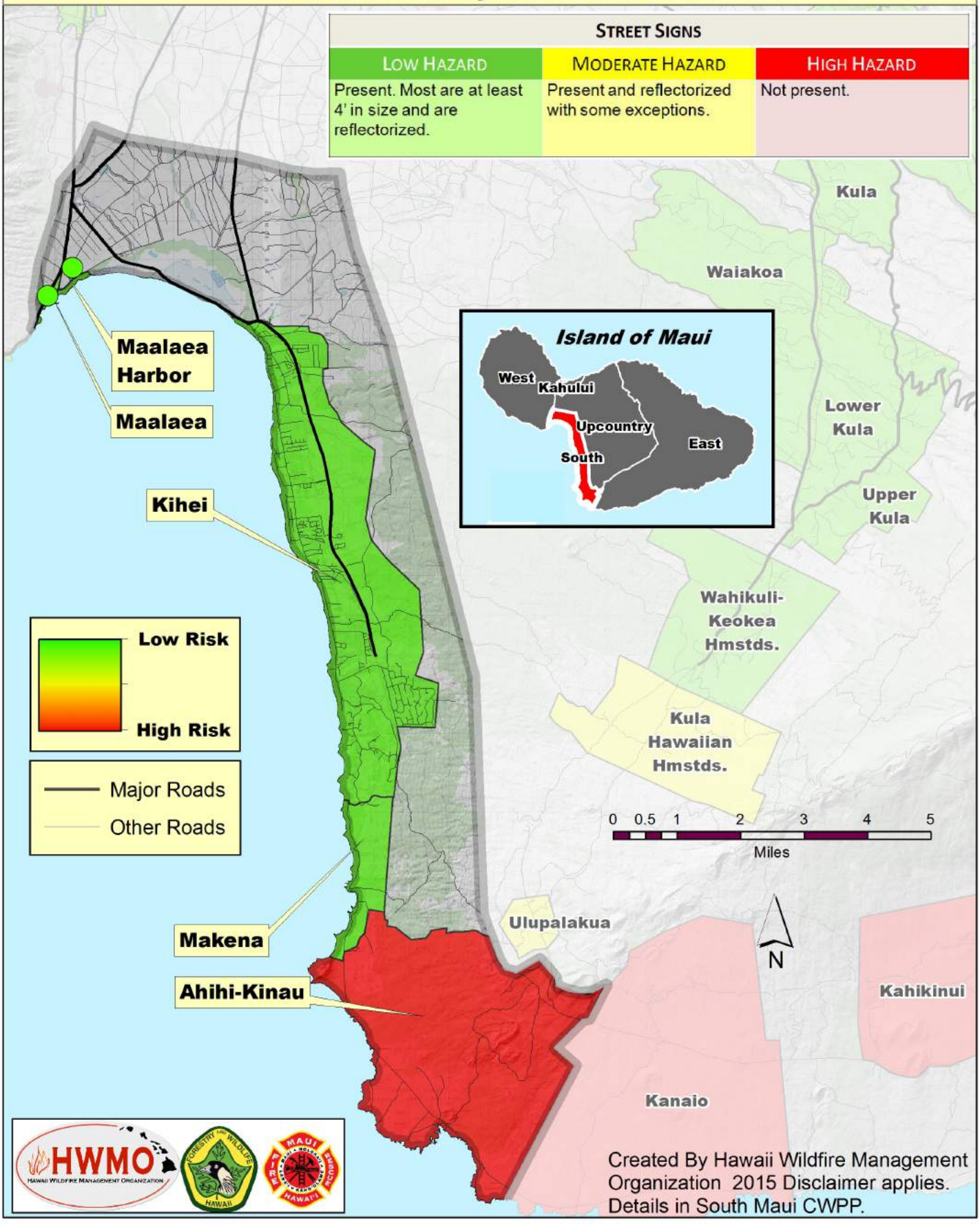
Road Width Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



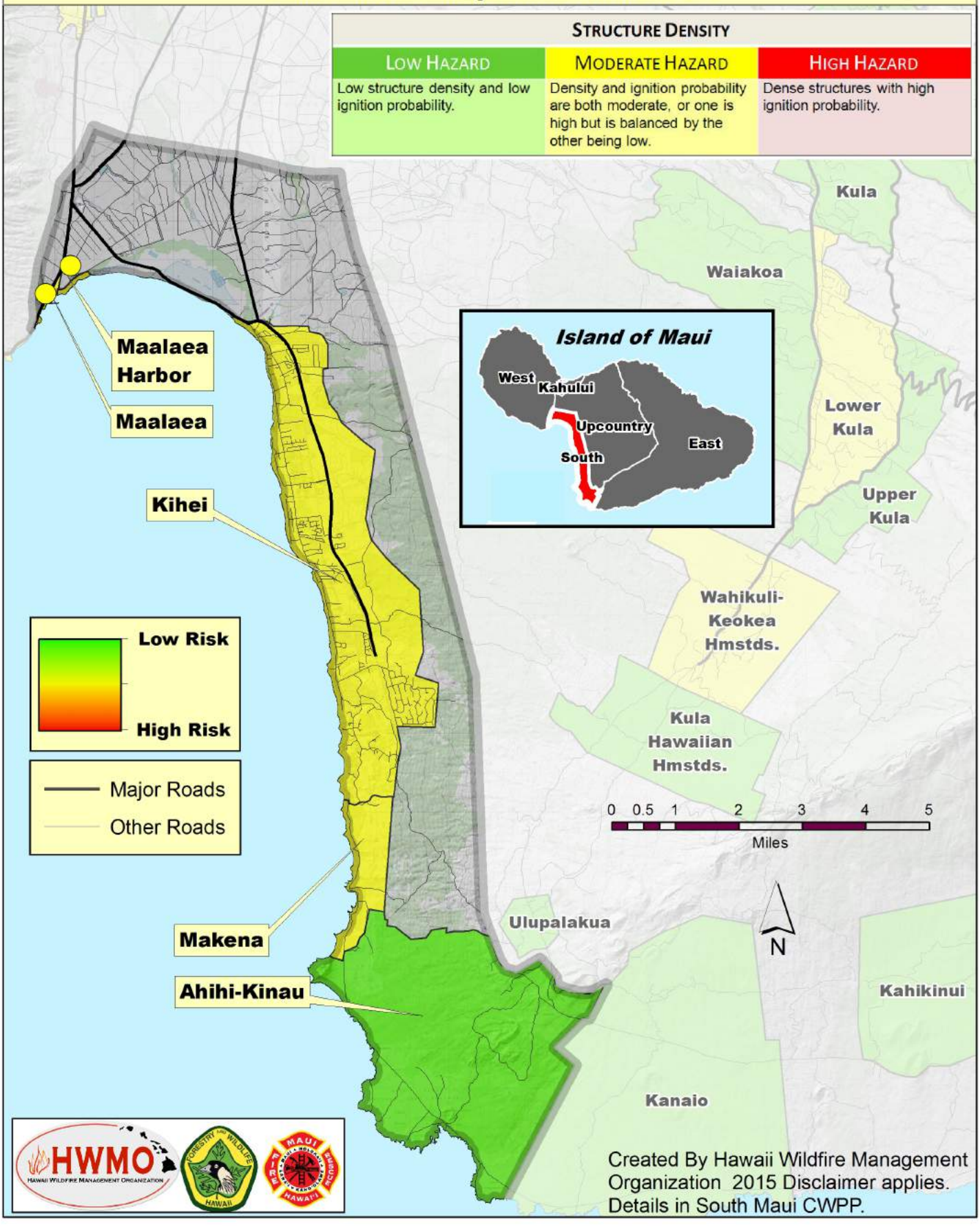
Street Signs Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



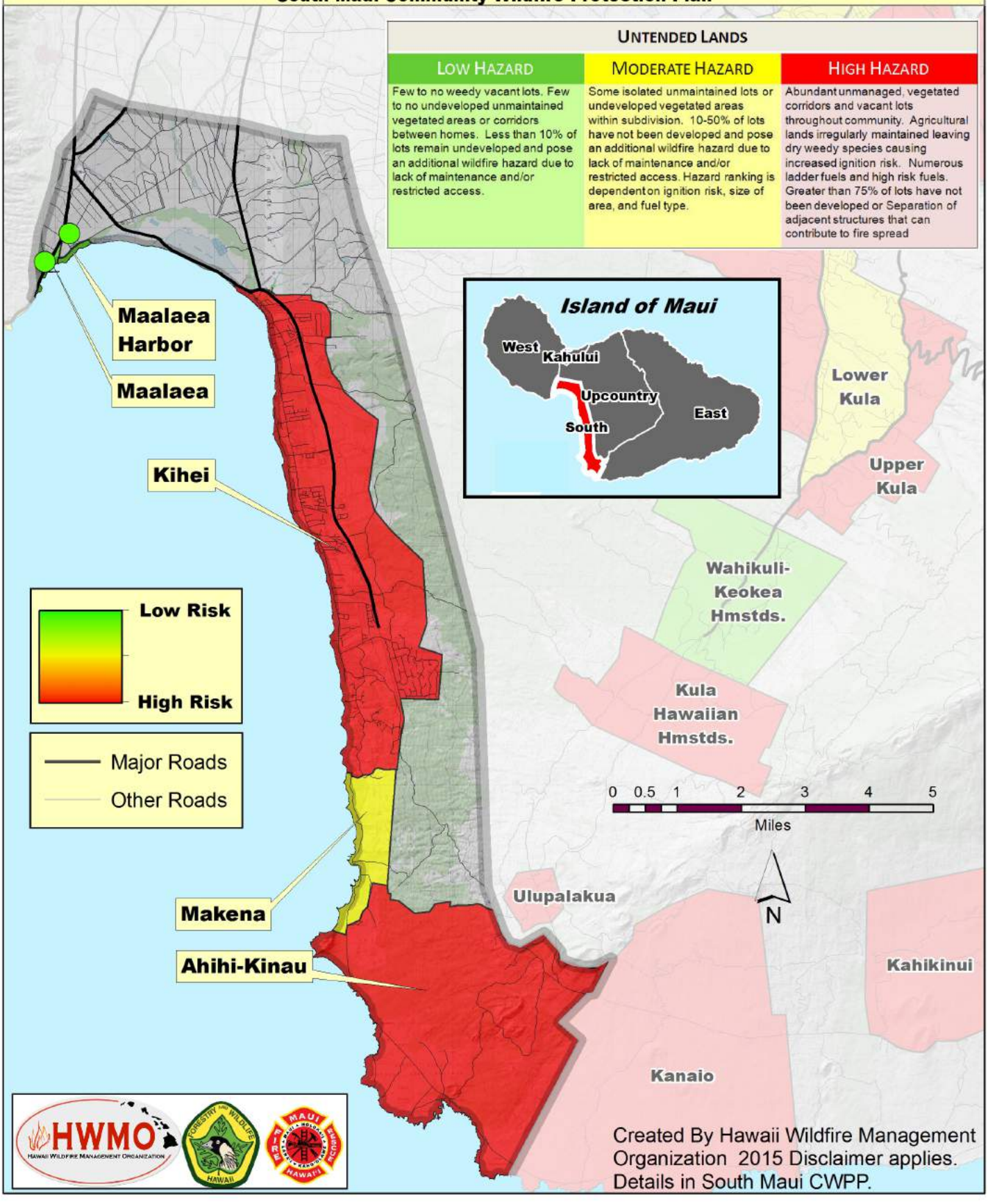
Structure Density Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



Unmanaged, Untended, Undeveloped Lands
Hazard for Developed Areas

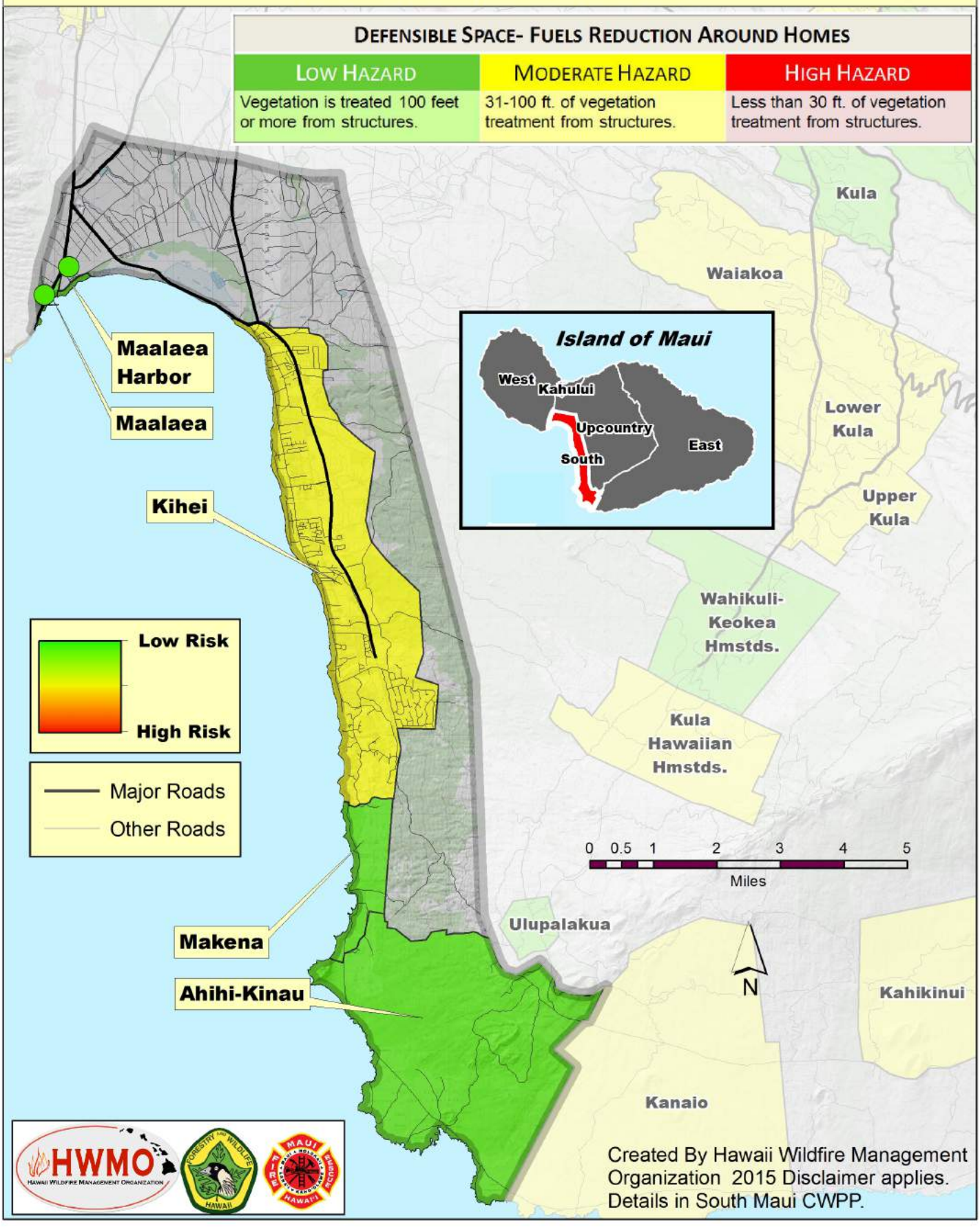
South Maui Community Wildfire Protection Plan



VEGETATION HAZARD FOR DEVELOPED AREAS

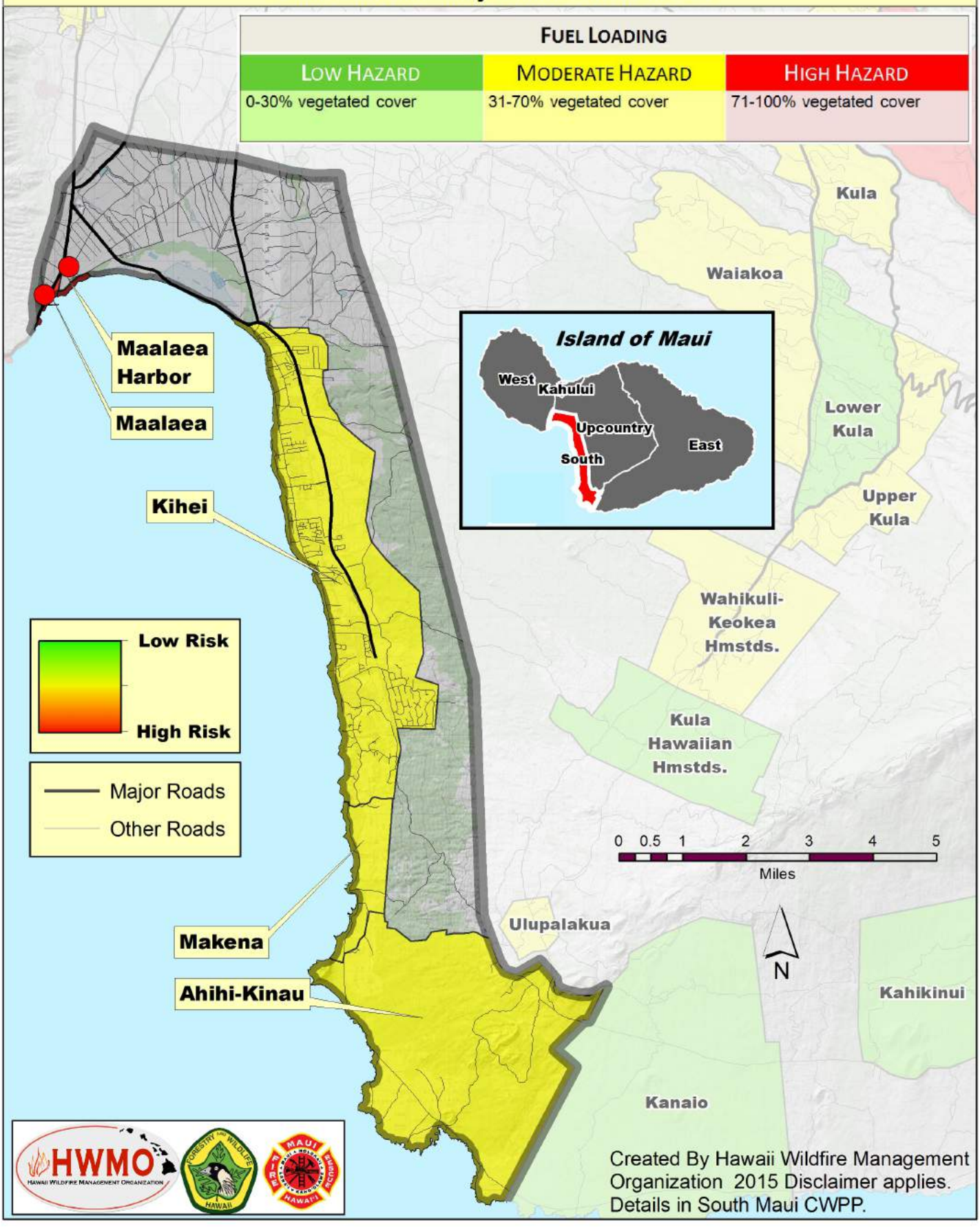
Defensible Space/ Fuels Reduction Around Homes and Structures Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



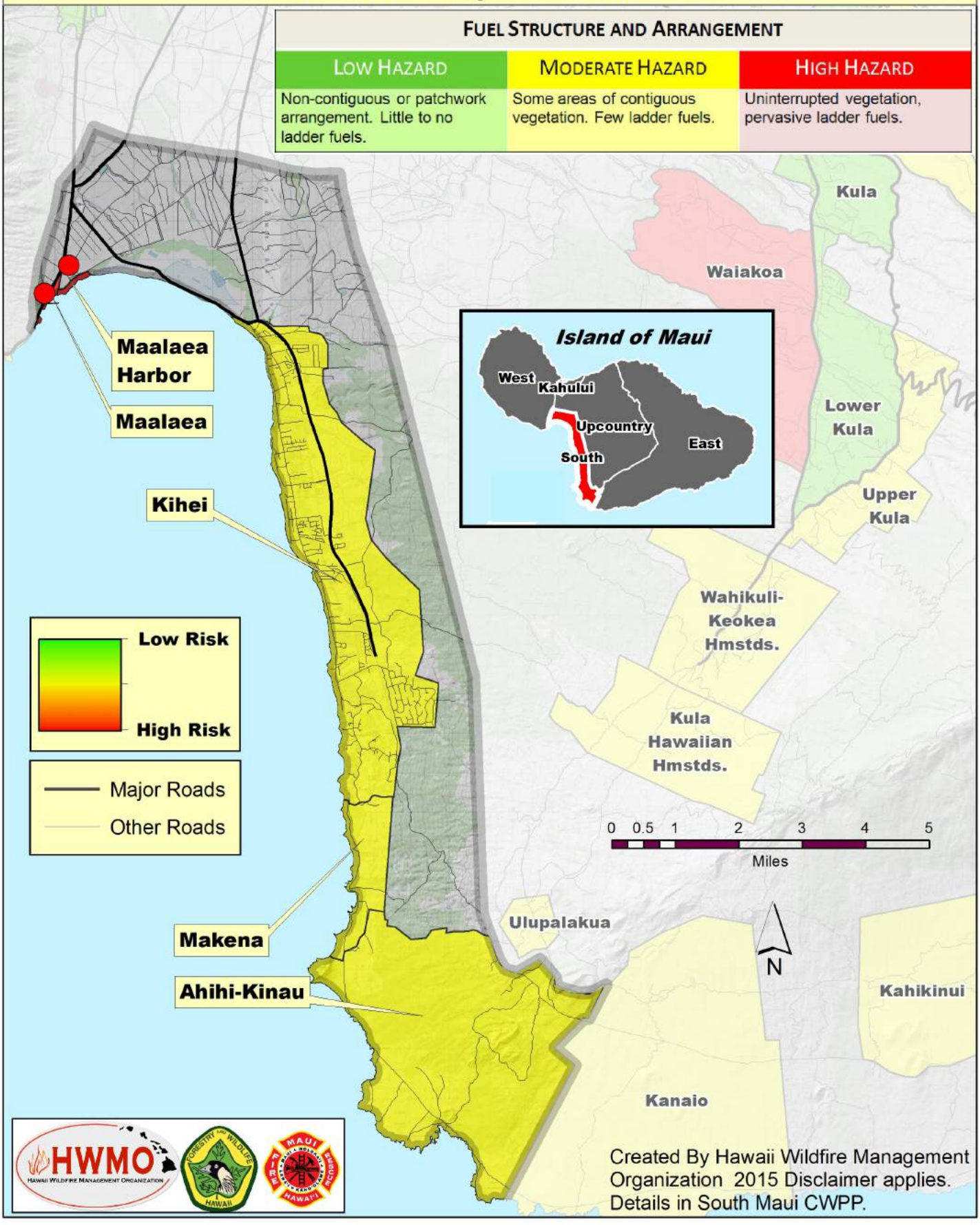
Fuel Loading Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



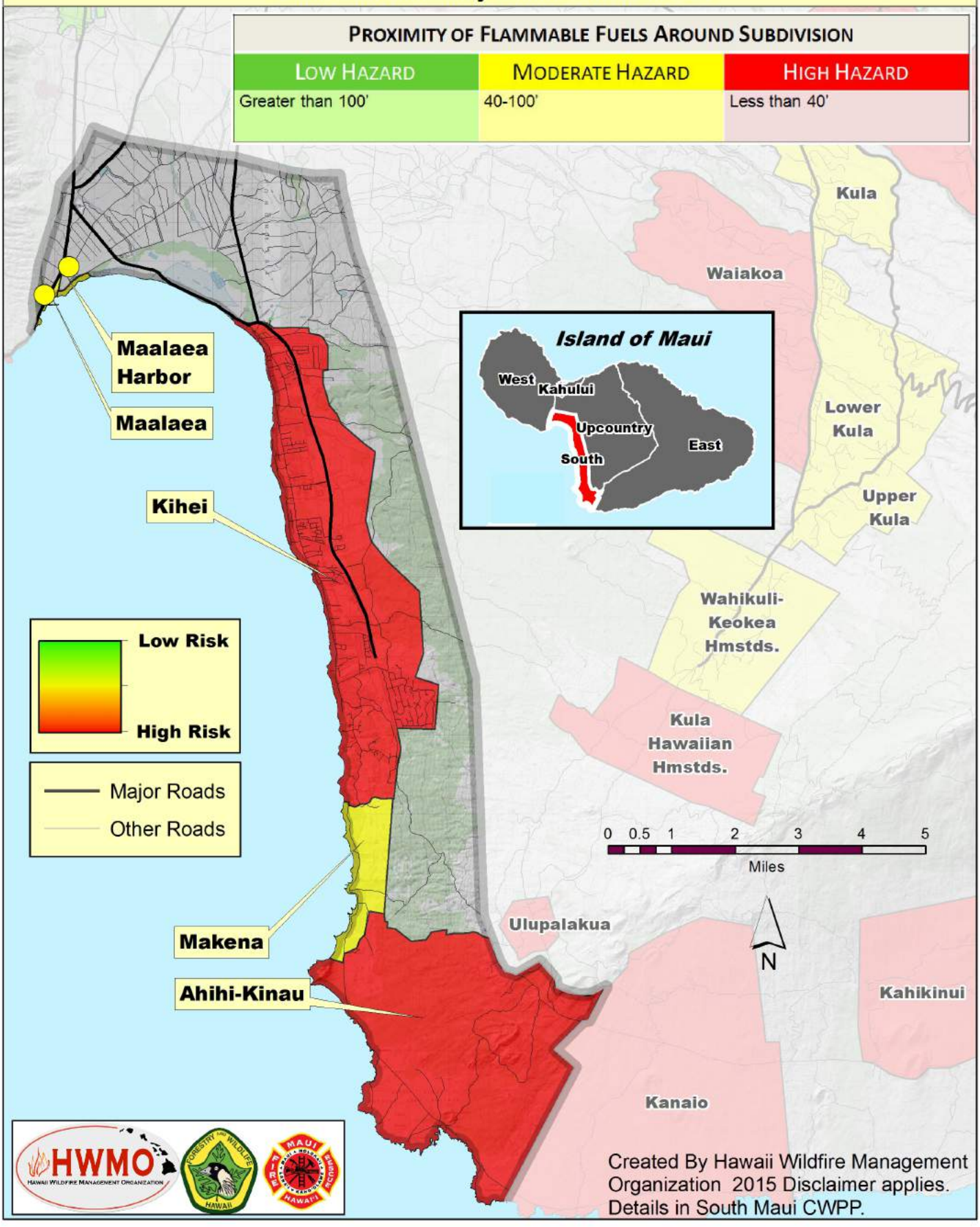
Fuel Structure and Arrangement Hazard for Developed Areas

South Maui Community Wildfire Protection Plan

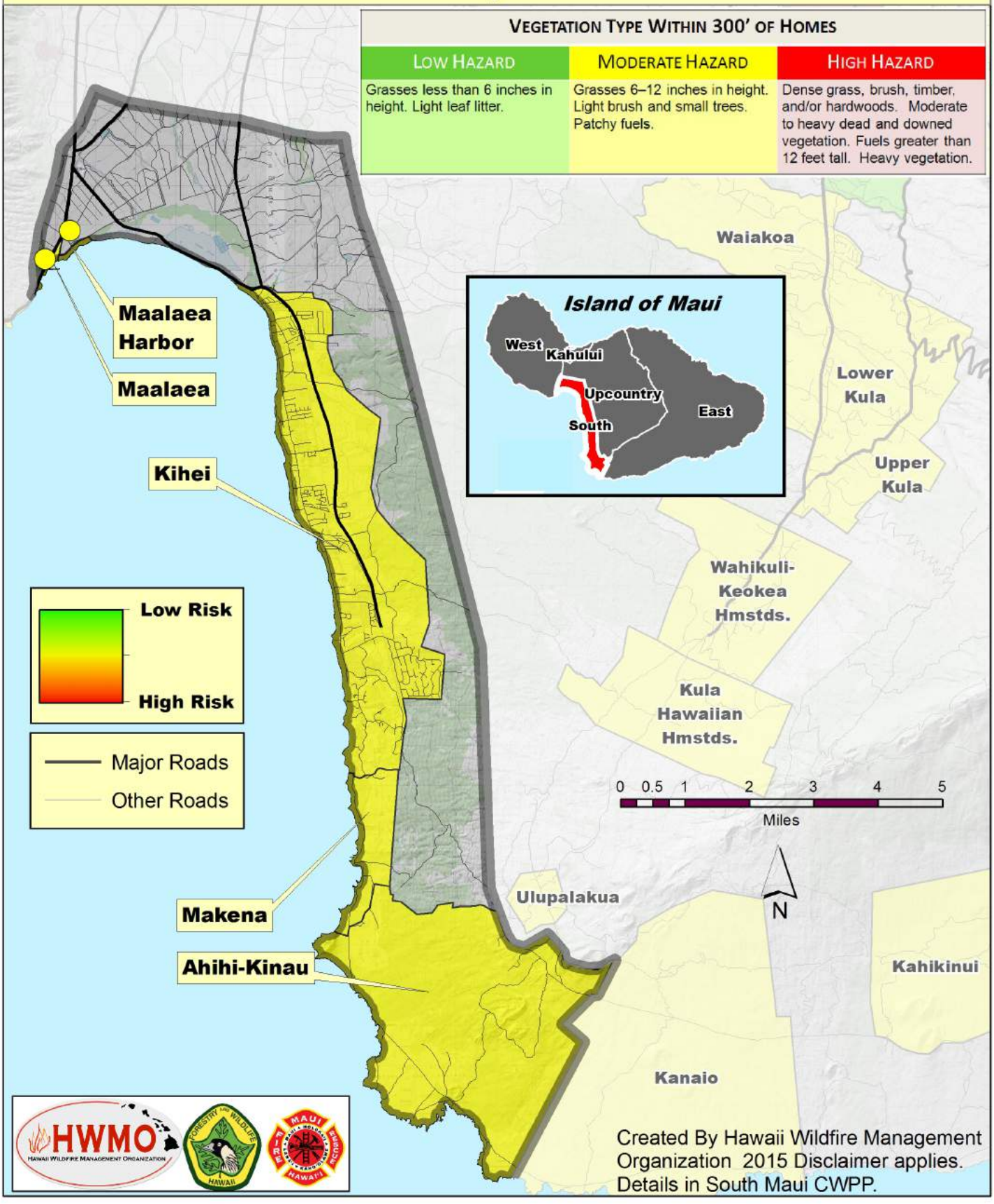


Proximity of Flammable Fuels Around Subdivision Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



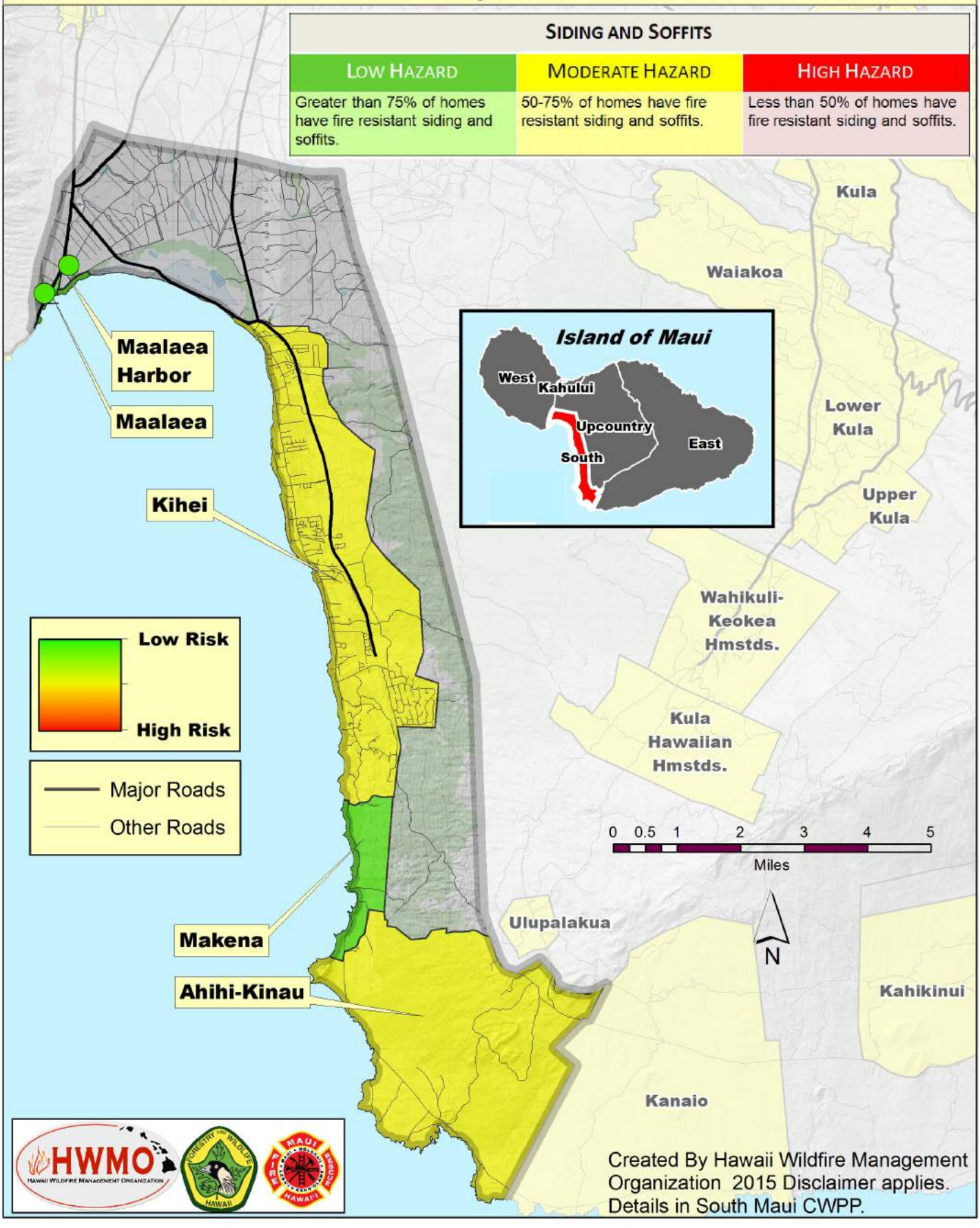
Type of Predominant Vegetation Within 300' of Homes
Hazard for Developed Areas
South Maui Community Wildfire Protection Plan



BUILDING HAZARD FOR DEVELOPED AREAS

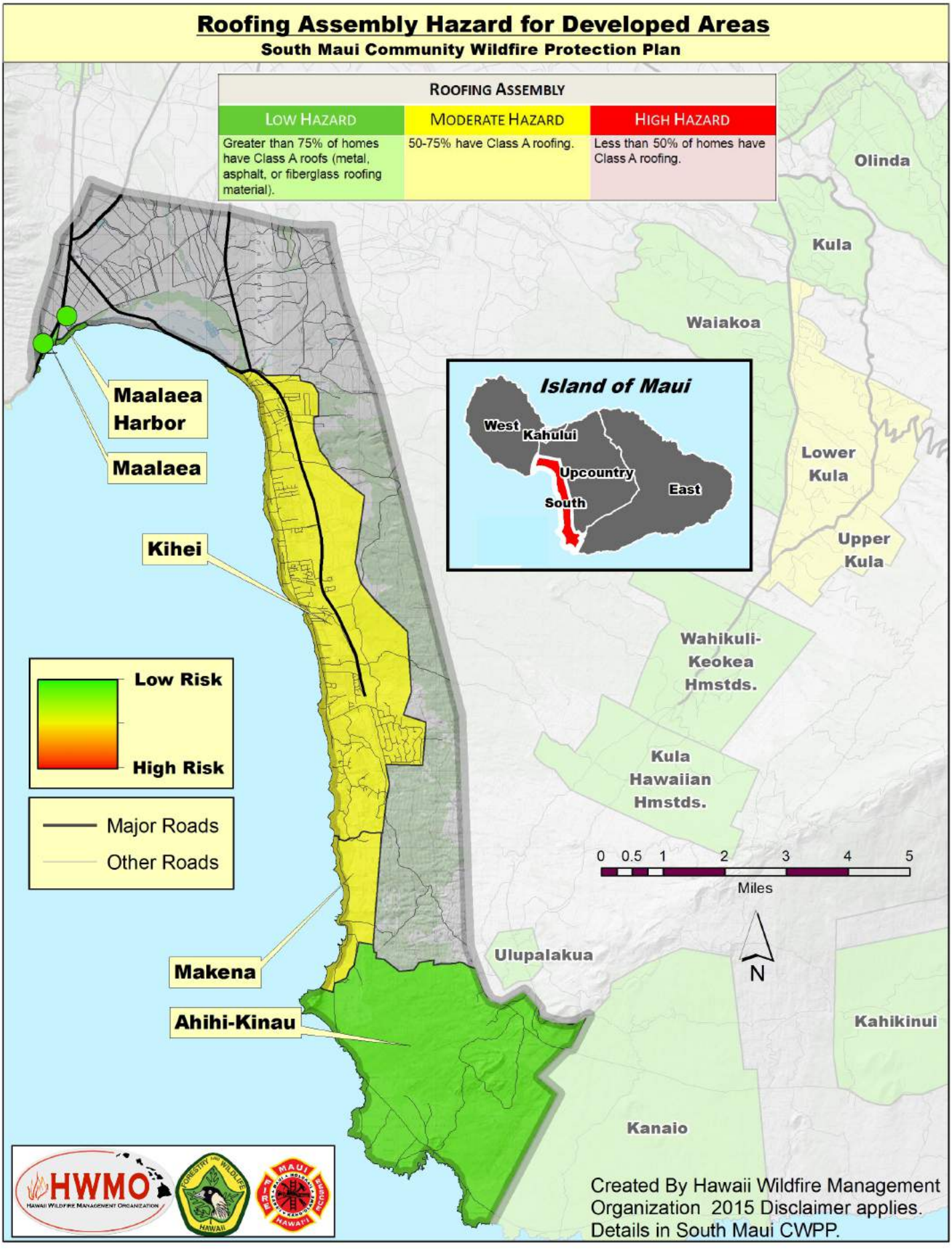
Siding/ Soffits Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



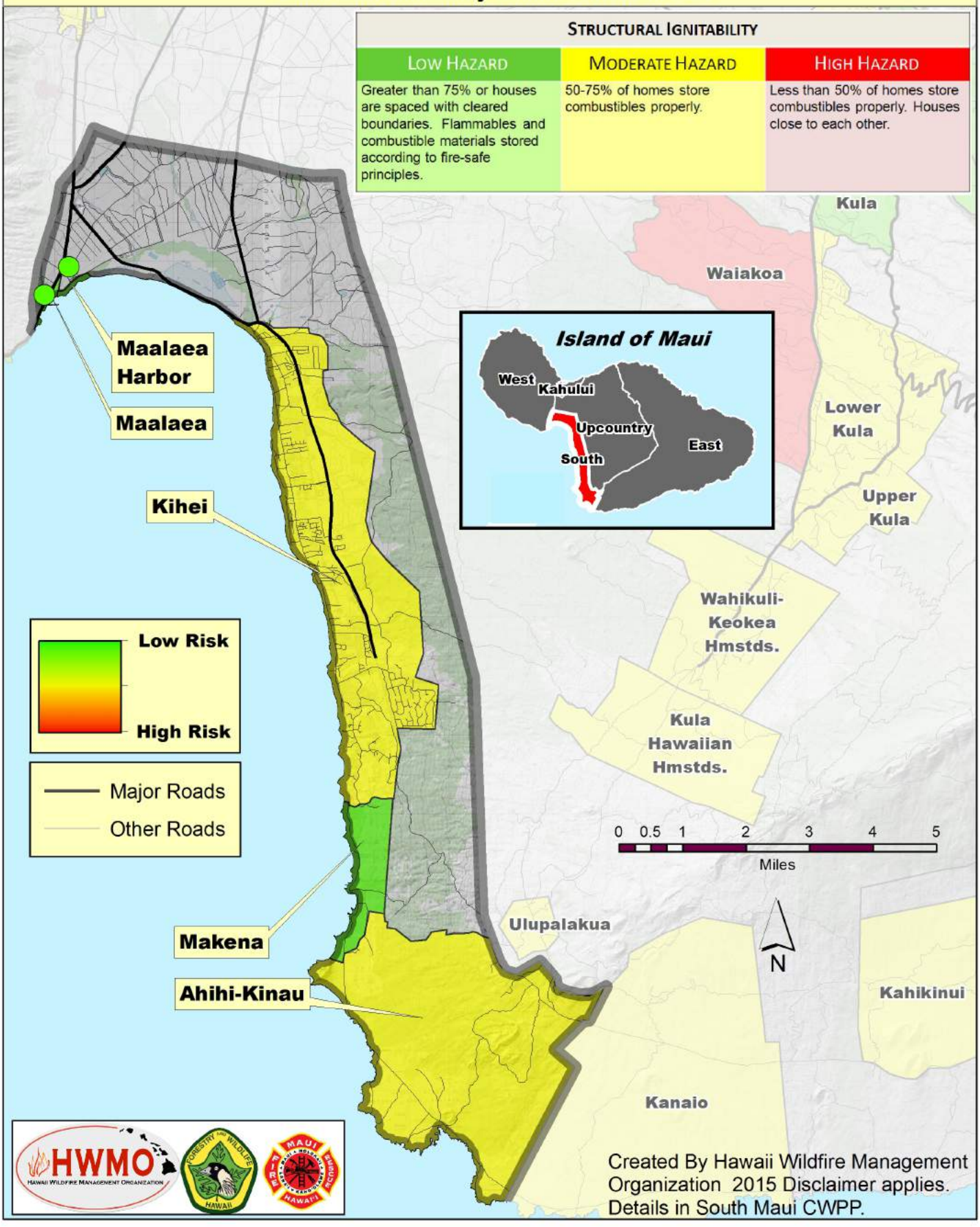
Roofing Assembly Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



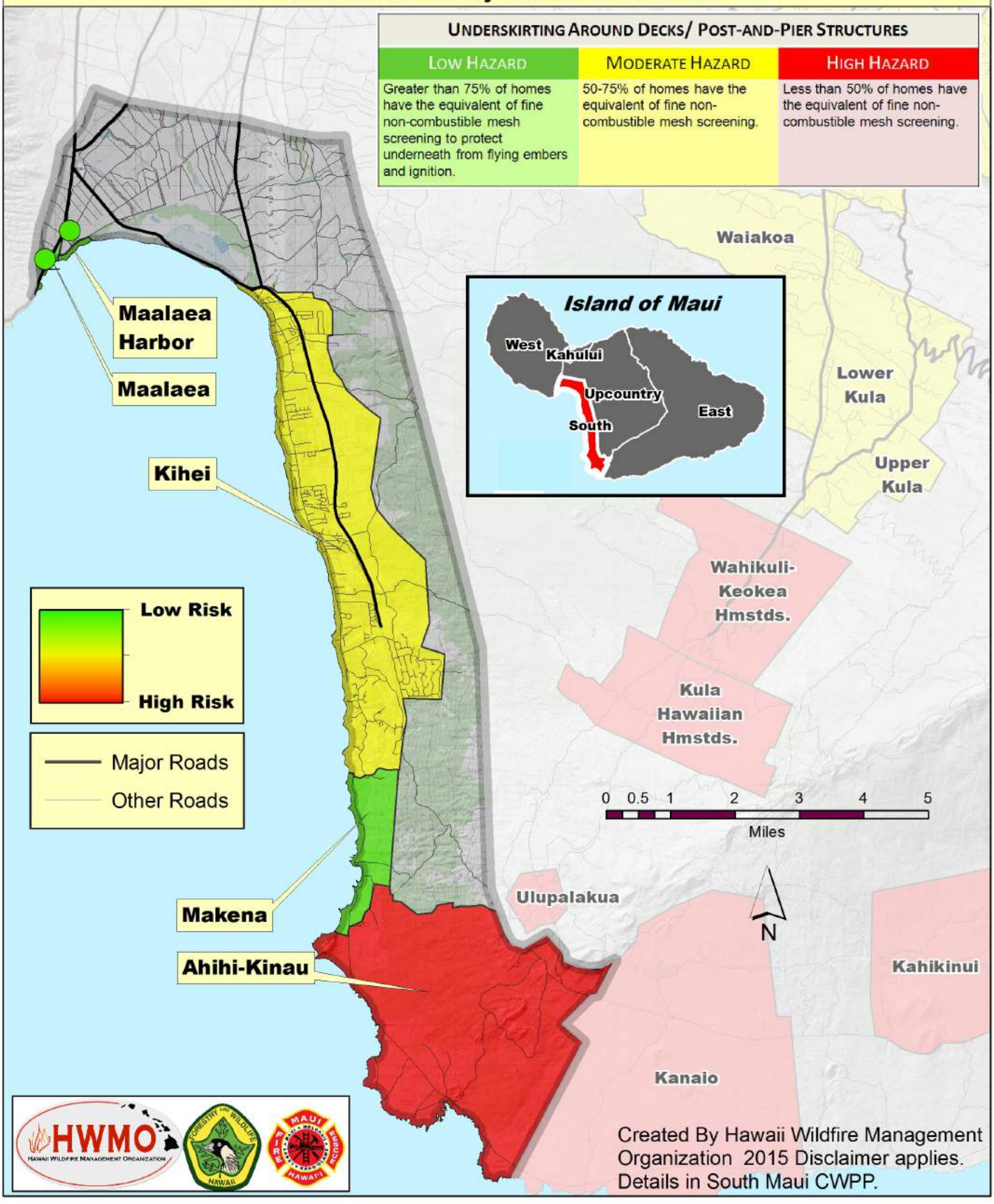
Structural Ignitability Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



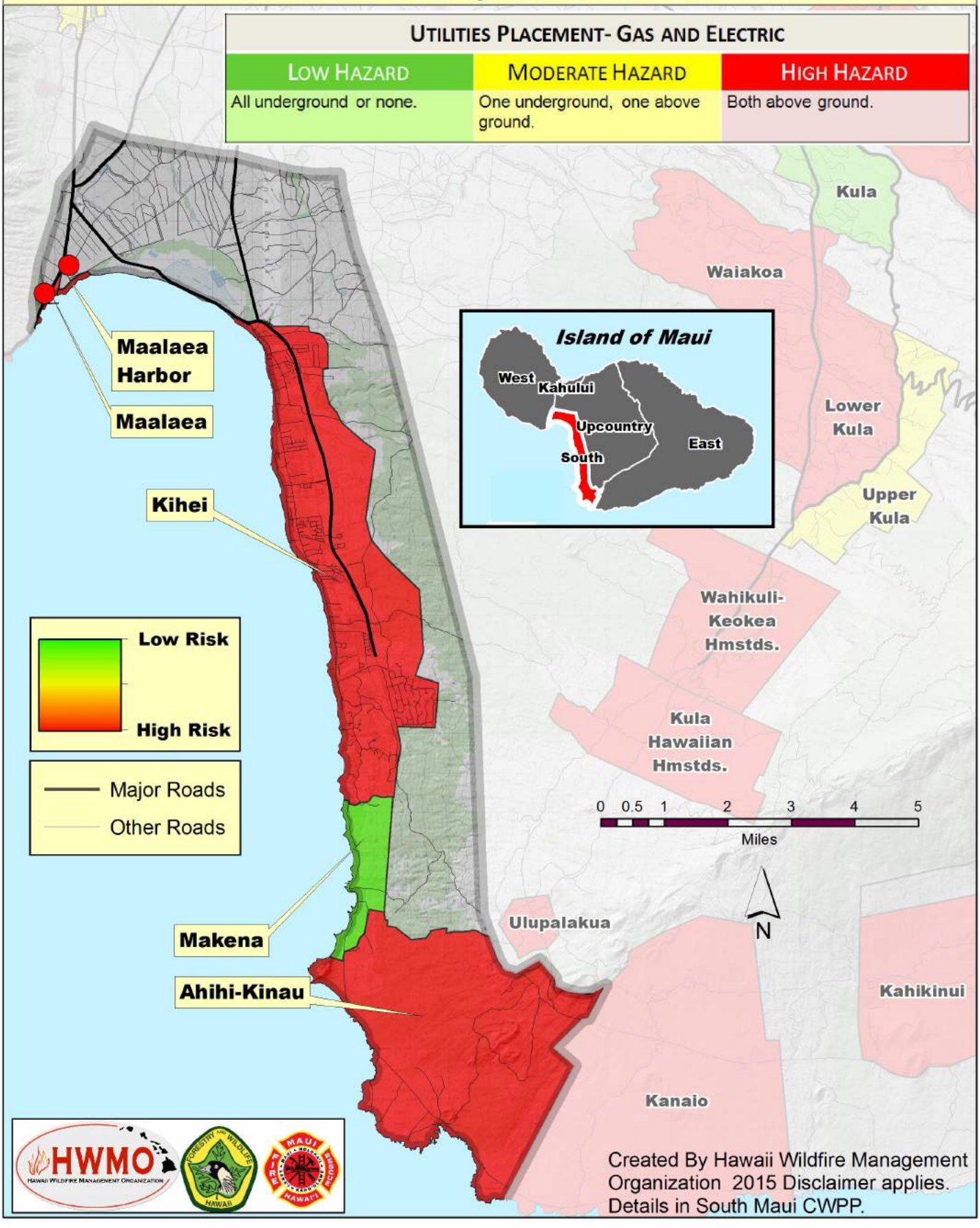
Underskirting Around Decks, Lanais, Post & Pier Structures
Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



Utilities Placement: Gas and Electric Hazard for Developed Areas

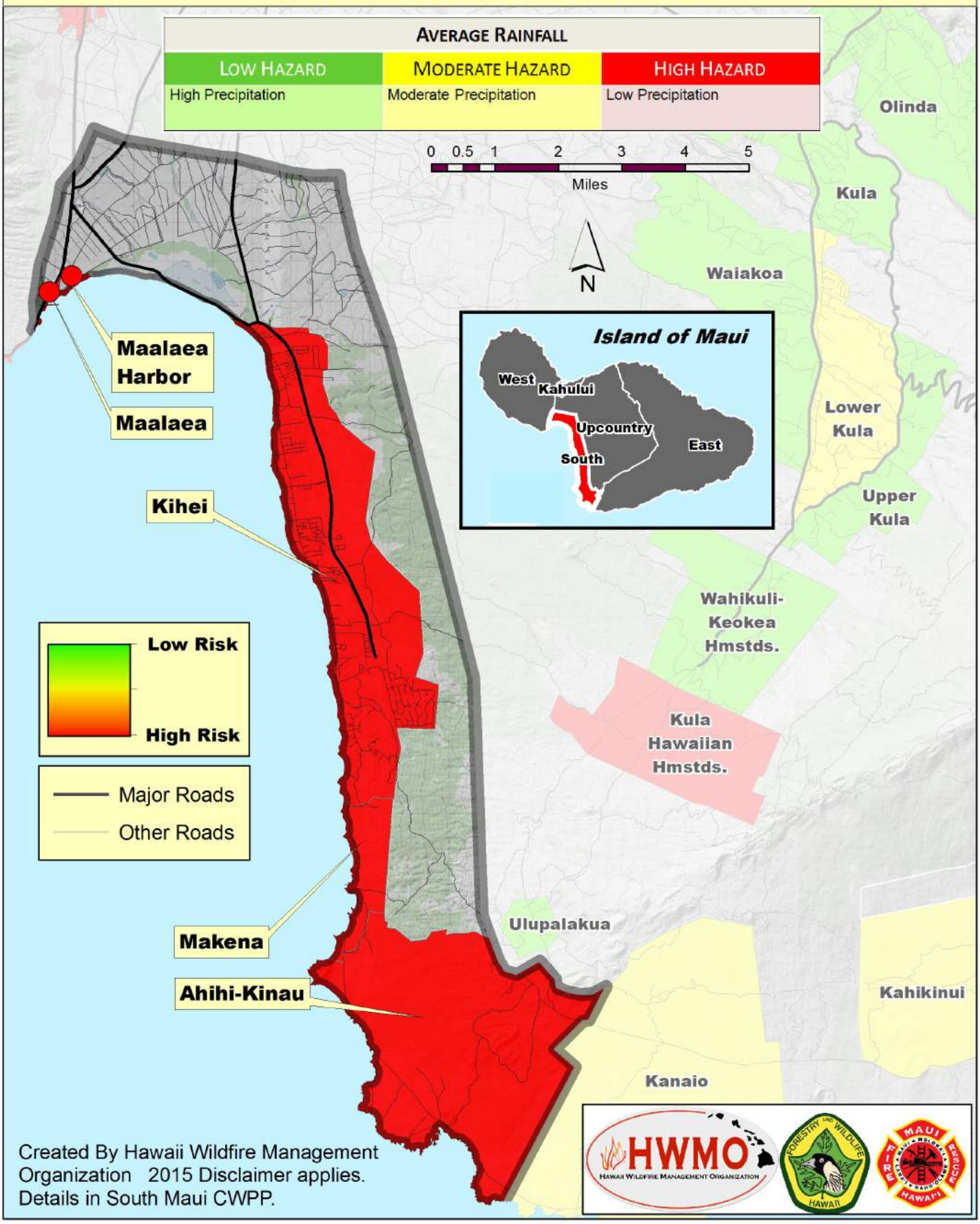
South Maui Community Wildfire Protection Plan



FIRE ENVIRONMENT HAZARD FOR DEVELOPED AREAS

Average Rainfall Hazard for Developed Areas

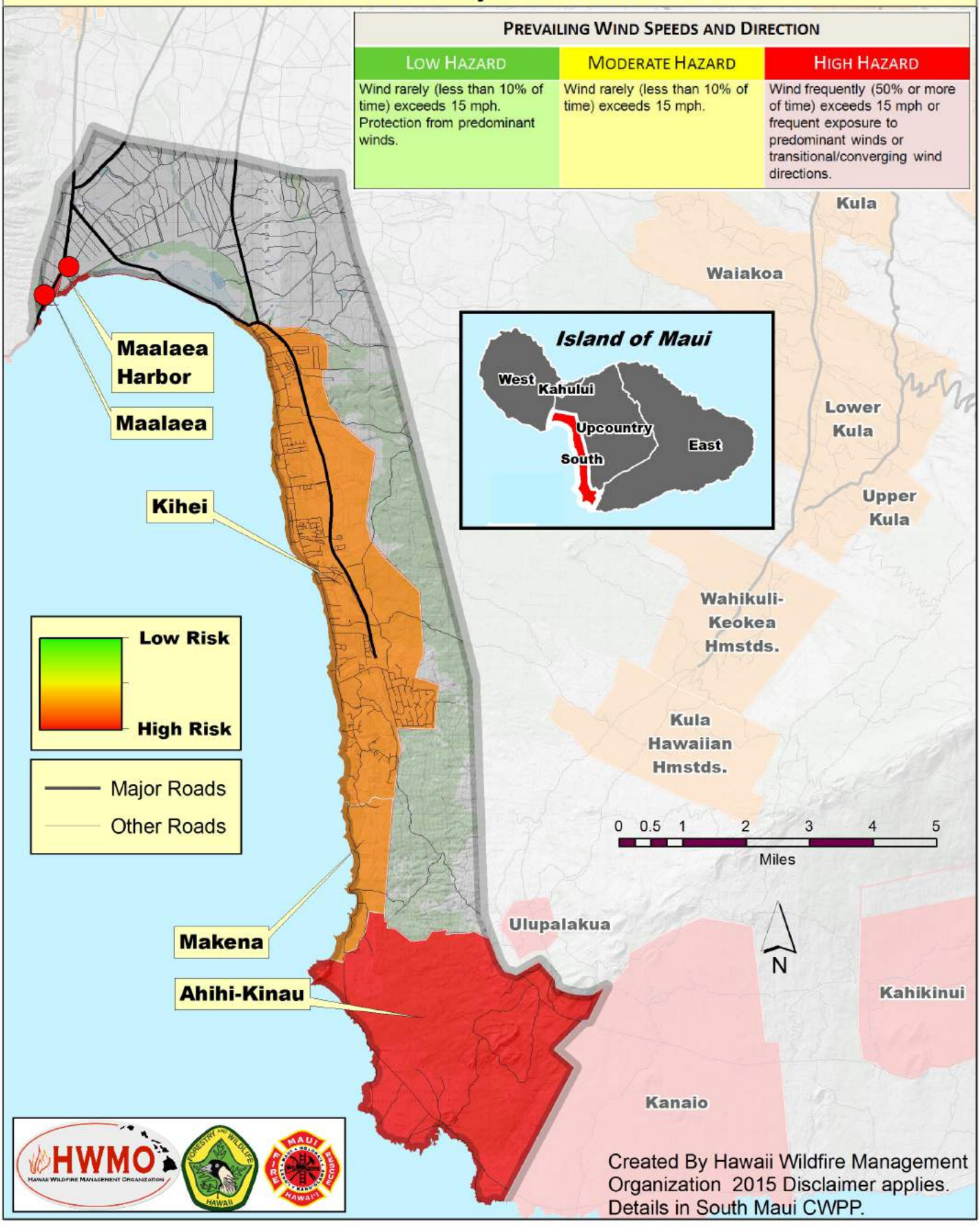
South Maui Community Wildfire Protection Plan



Created By Hawaii Wildfire Management Organization 2015 Disclaimer applies. Details in South Maui CWPP.

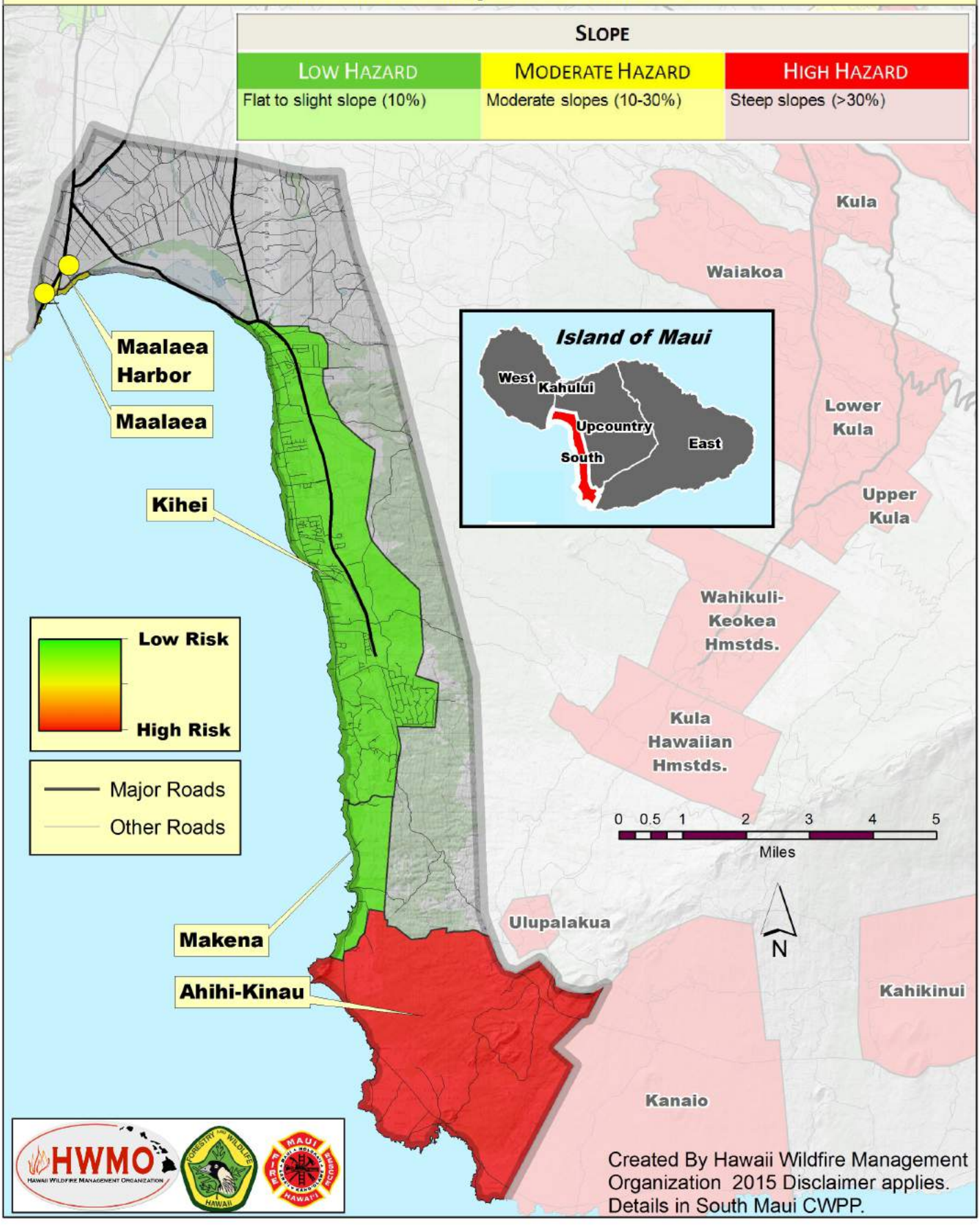
Prevailing Wind Speed and Direction Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



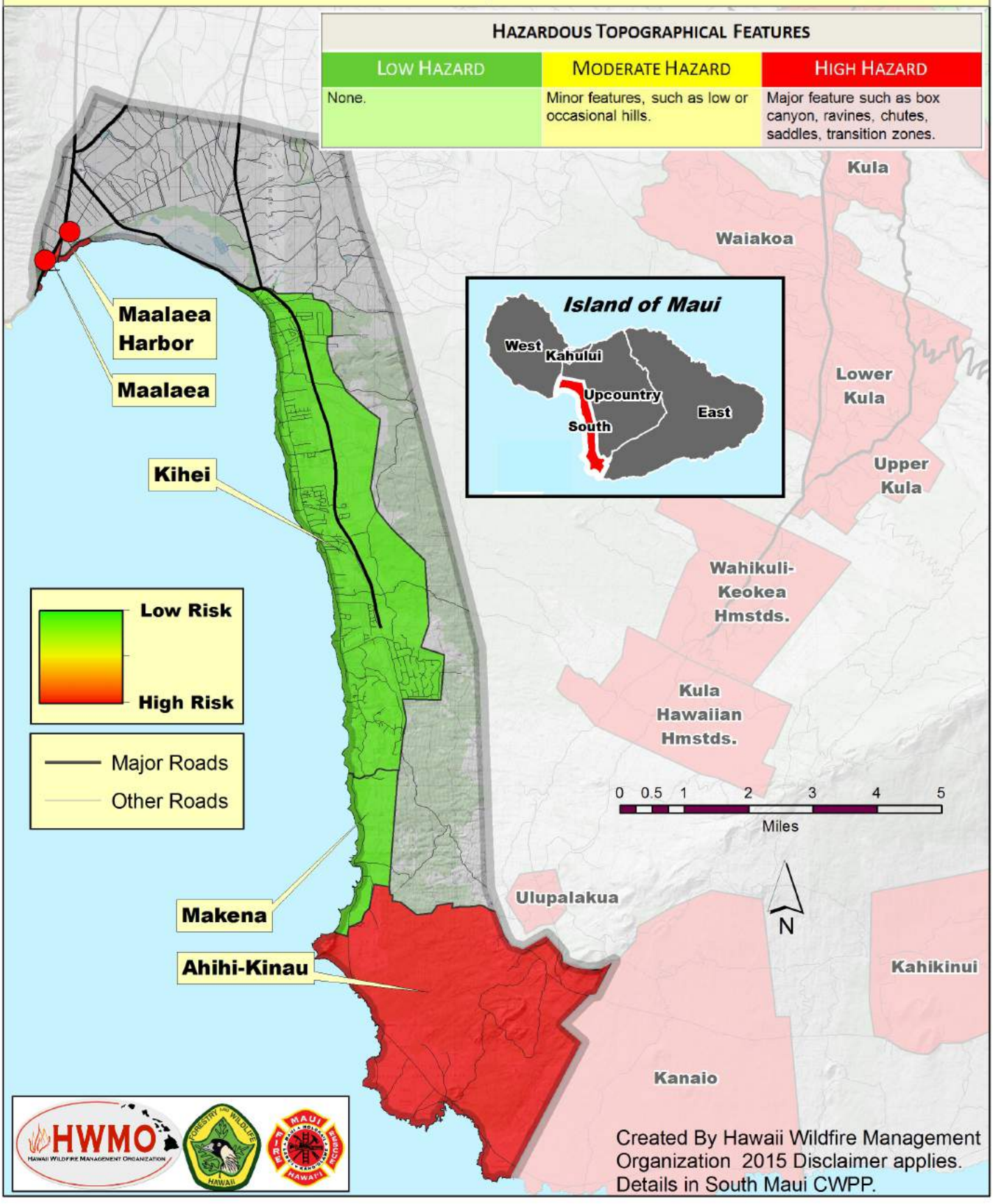
Slope Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



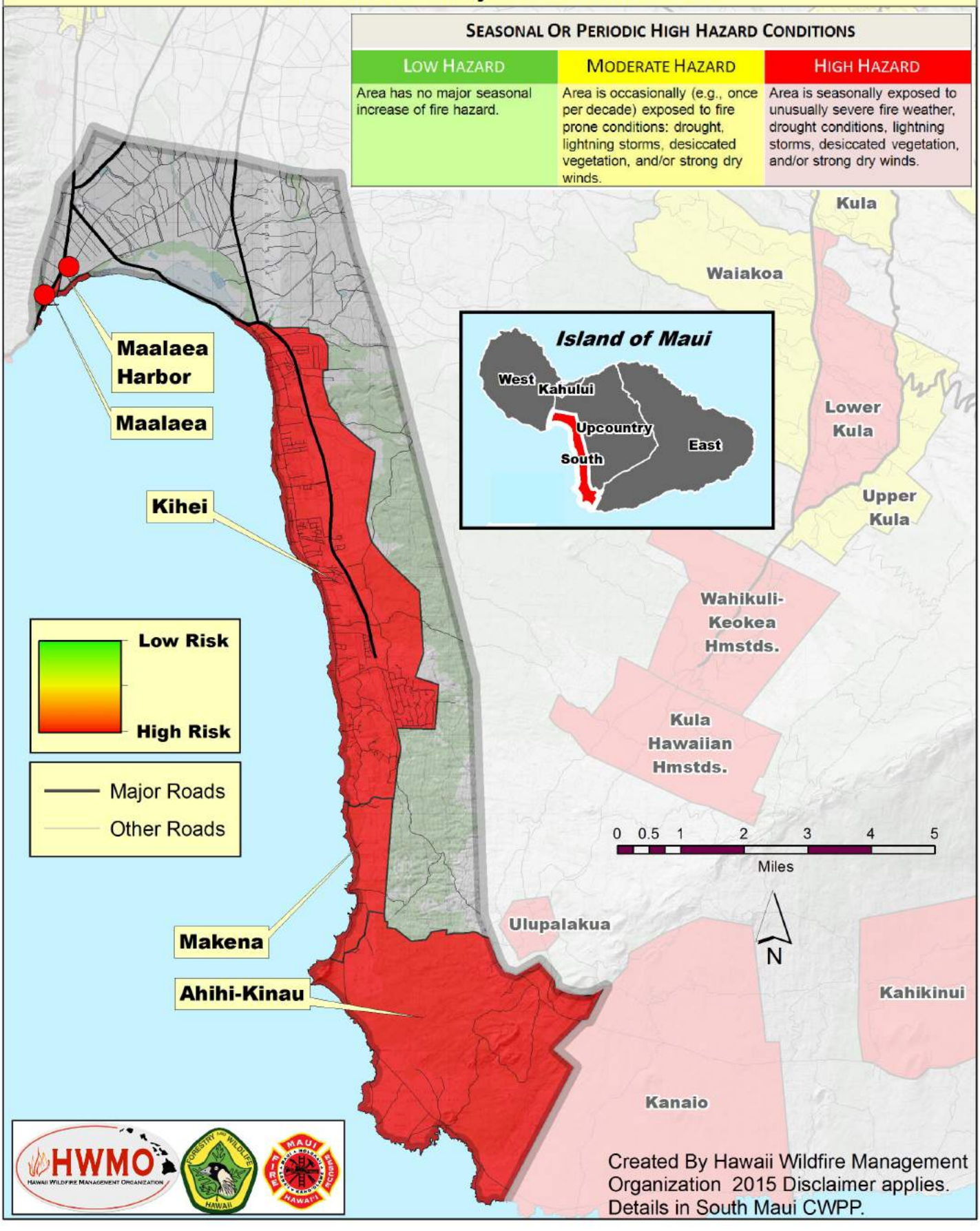
Topographic Features That Adversely Effect Wildland Fire Behavior
Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



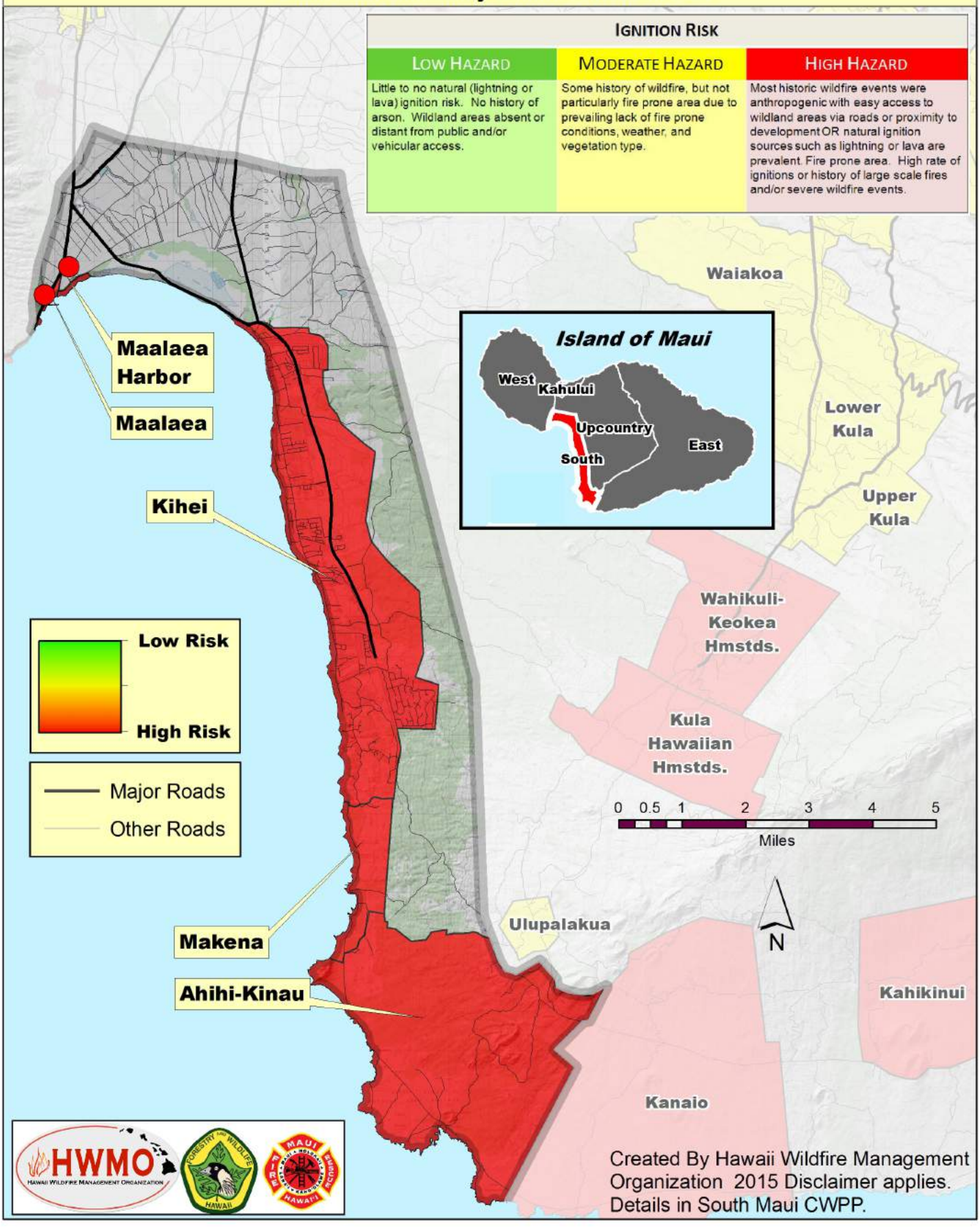
Seasonal Or Periodic High Risk Conditions Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



Ignition Risk Hazard for Developed Areas

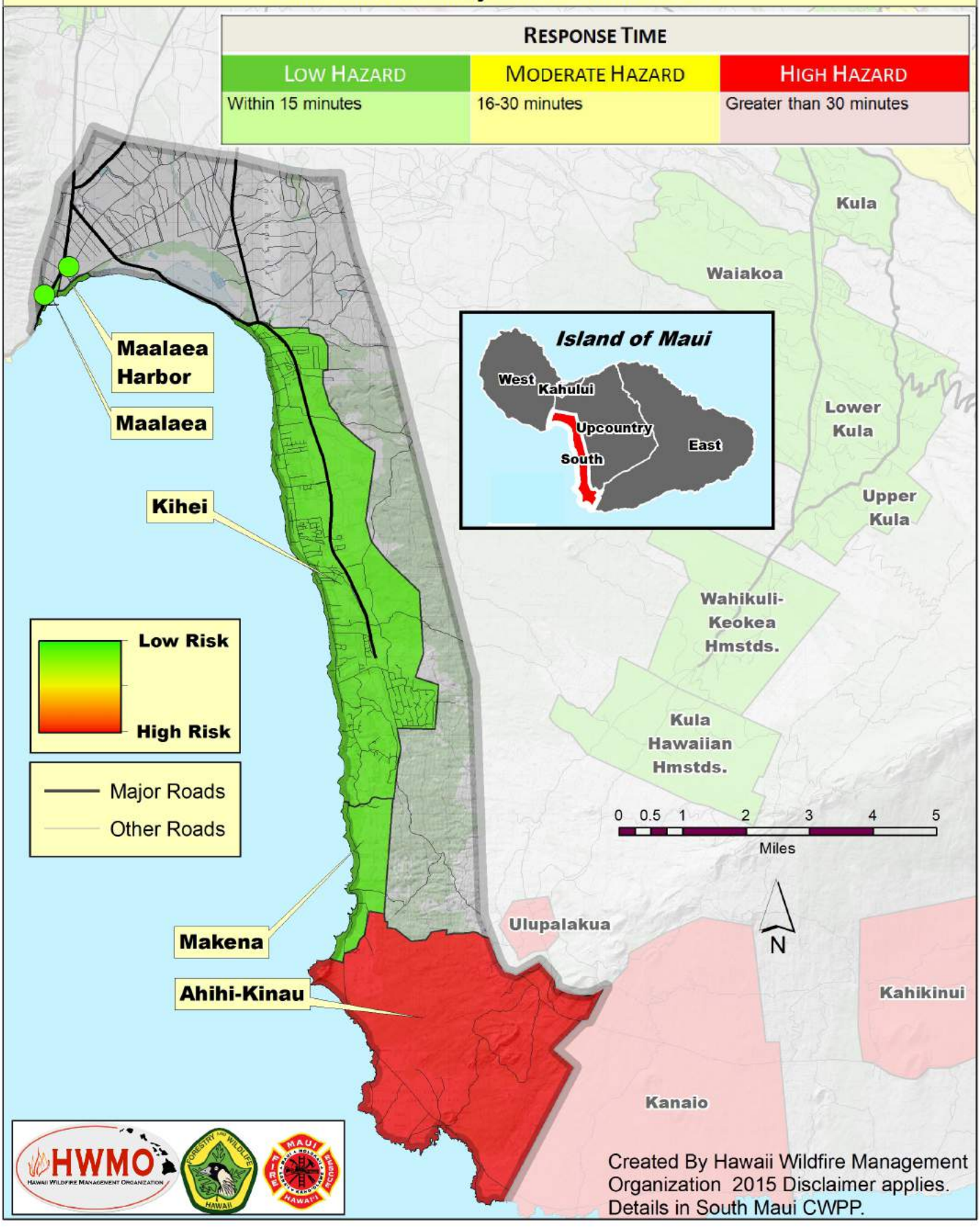
South Maui Community Wildfire Protection Plan



FIRE PROTECTION HAZARD FOR DEVELOPED AREAS

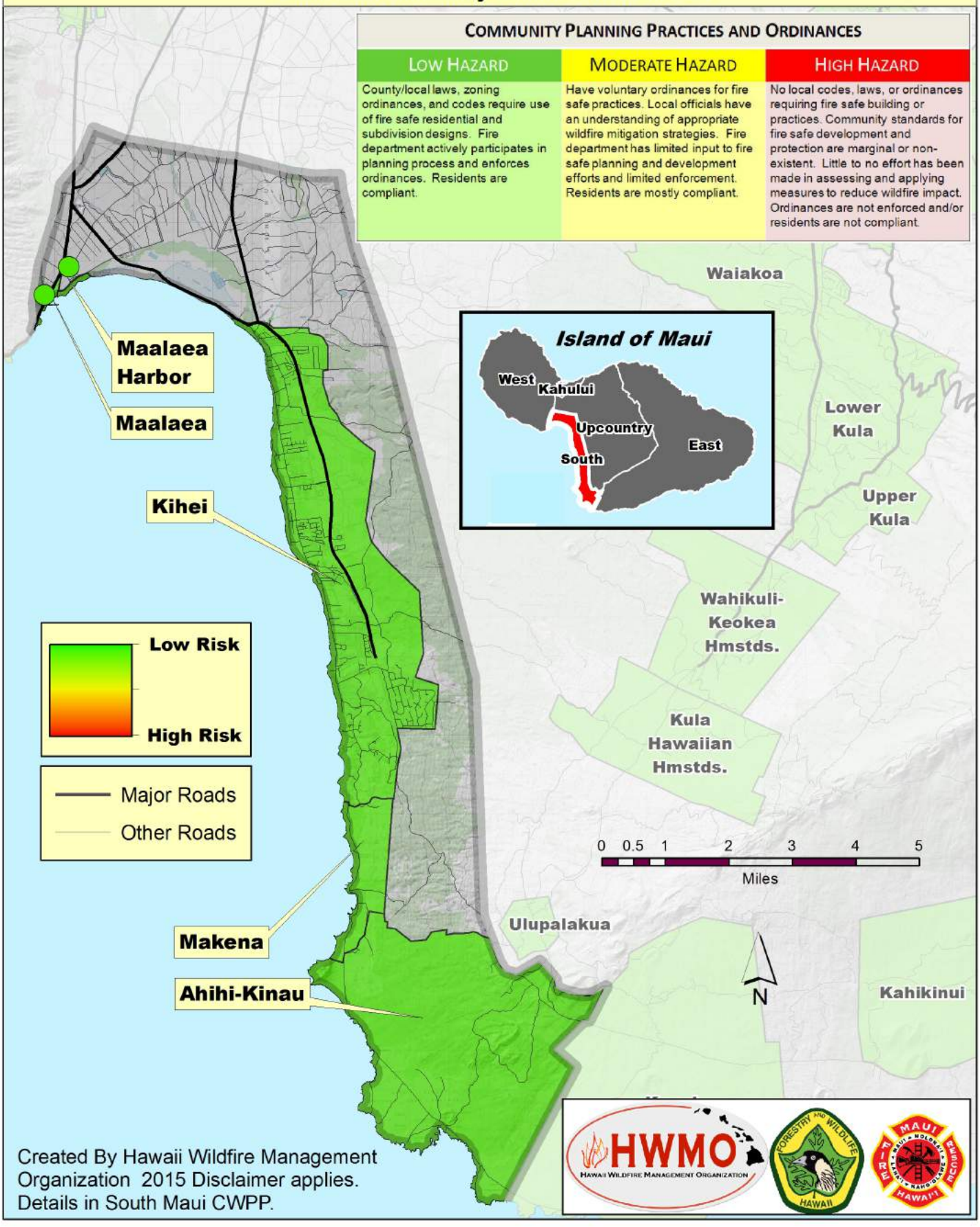
Response Time Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



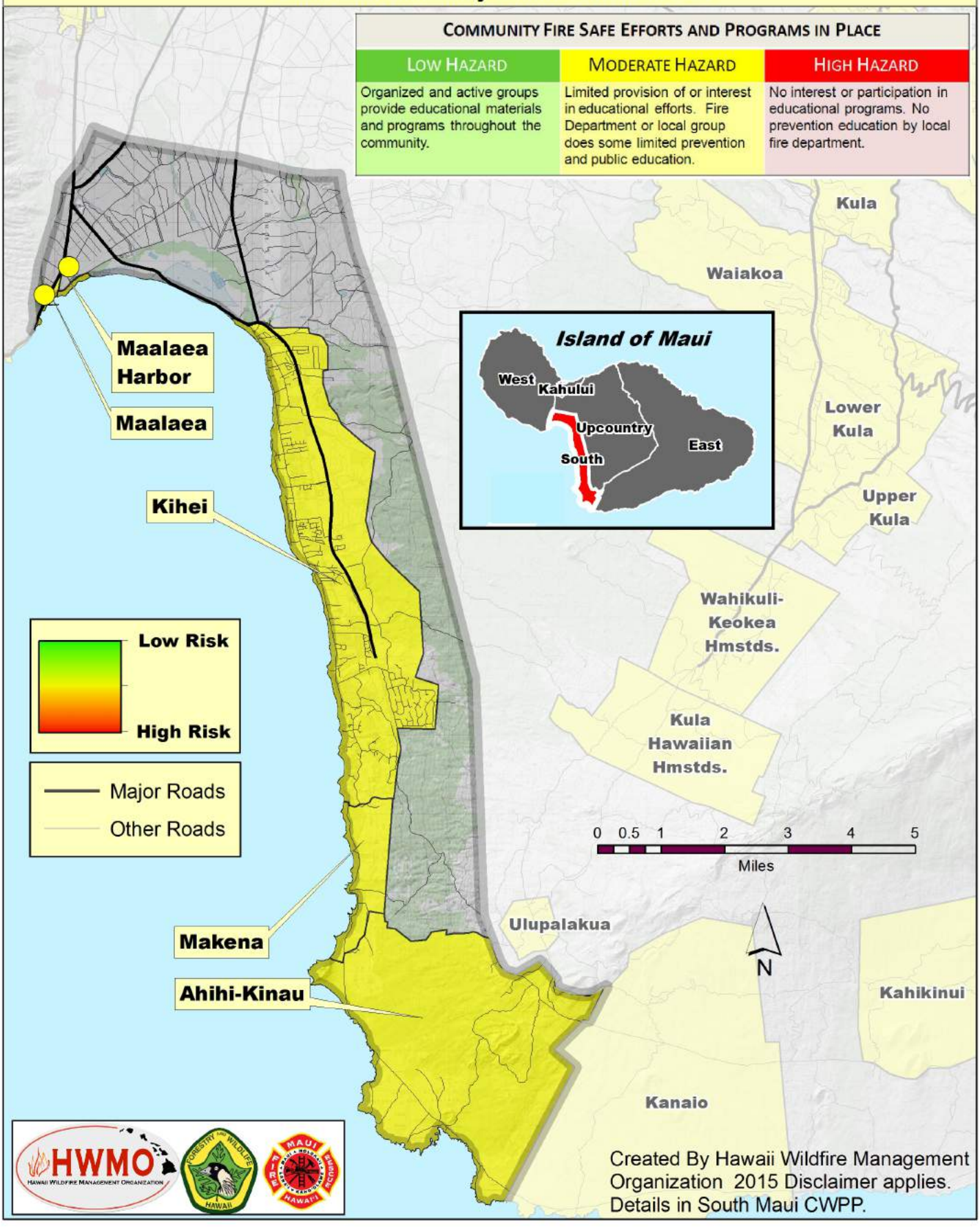
Community Planning Practices and Ordinances Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



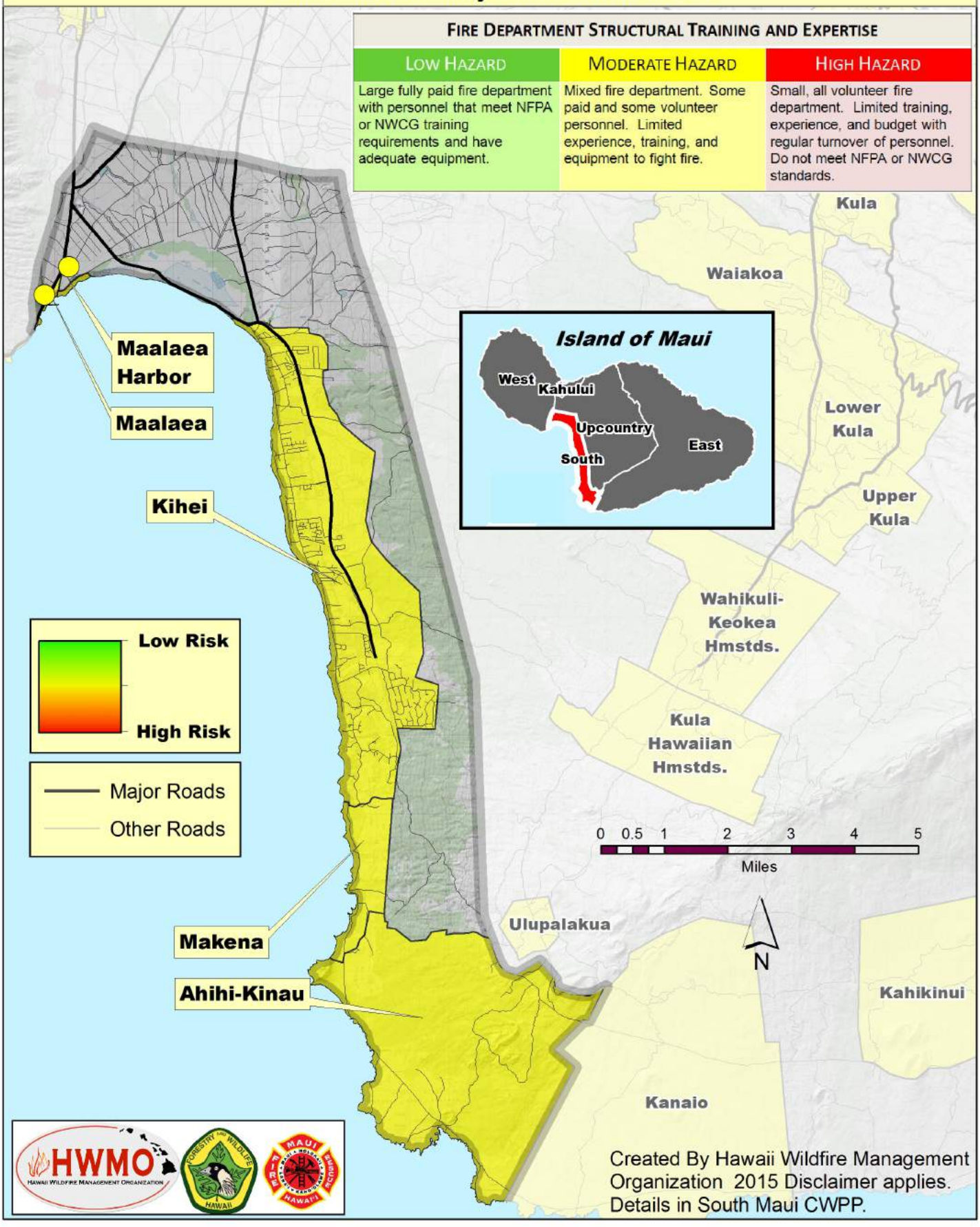
Community Fire-Safe Efforts & Programs Already In Place Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



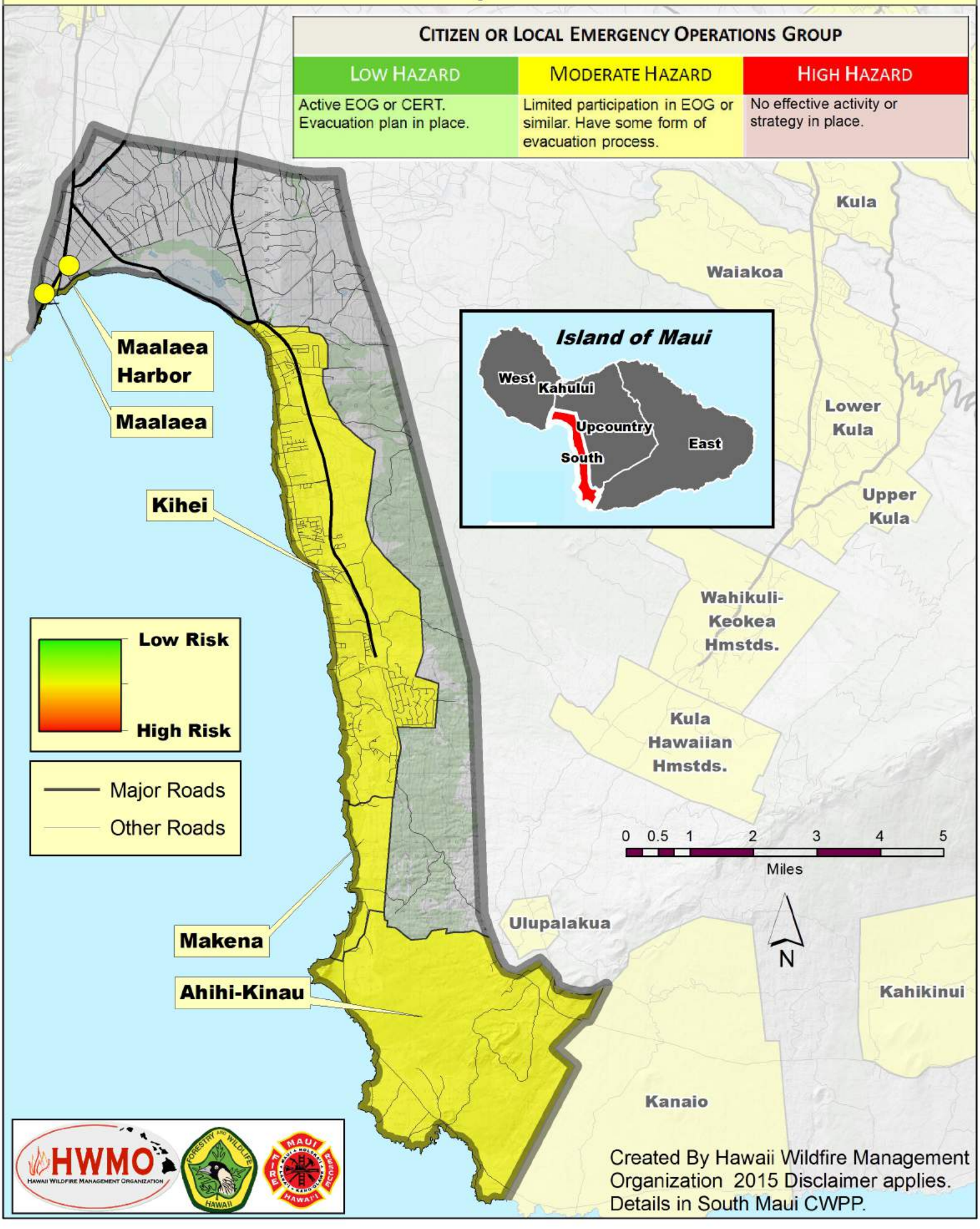
Fire Department Structural Training Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



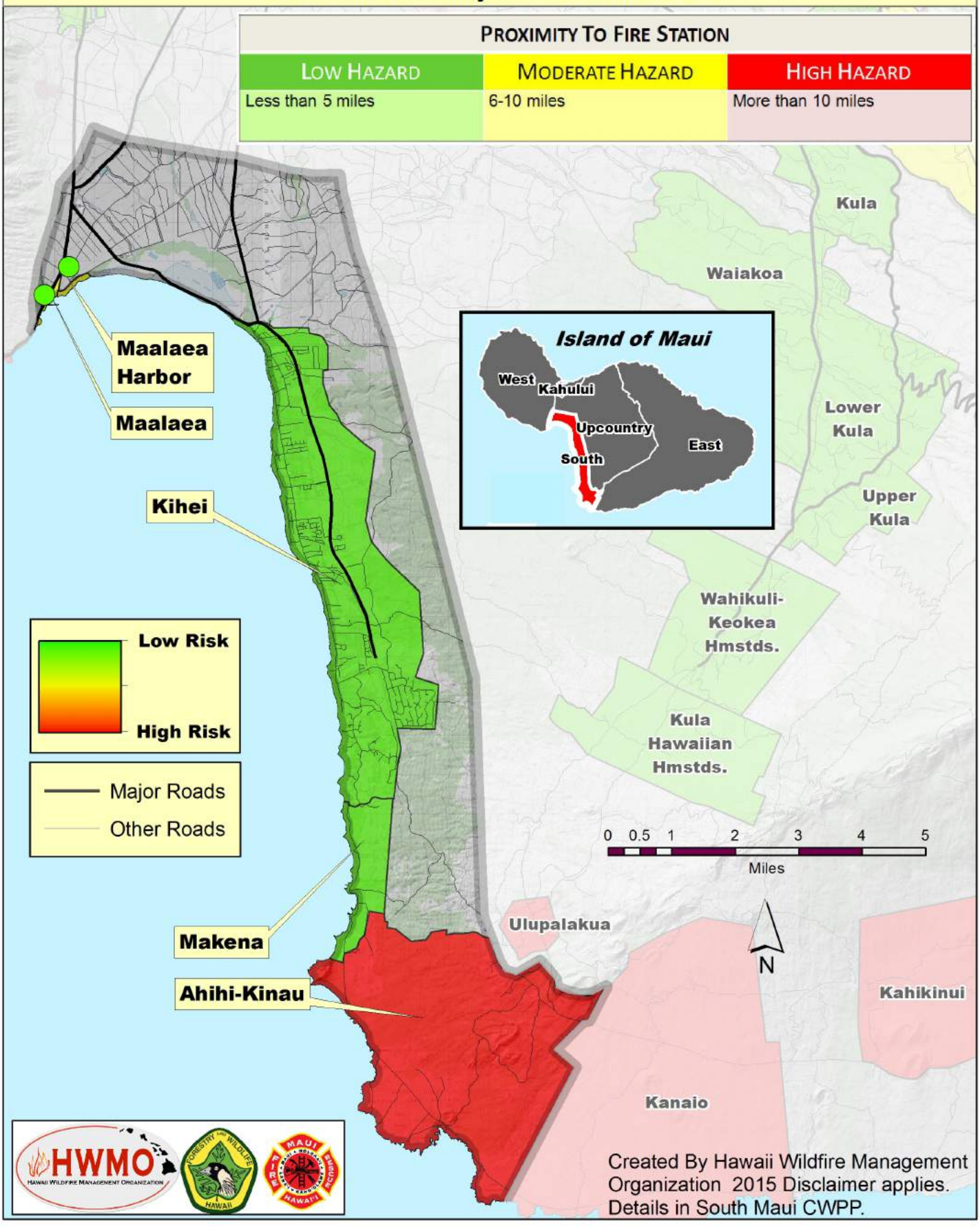
Local Emergency Operations Group Or Similar Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



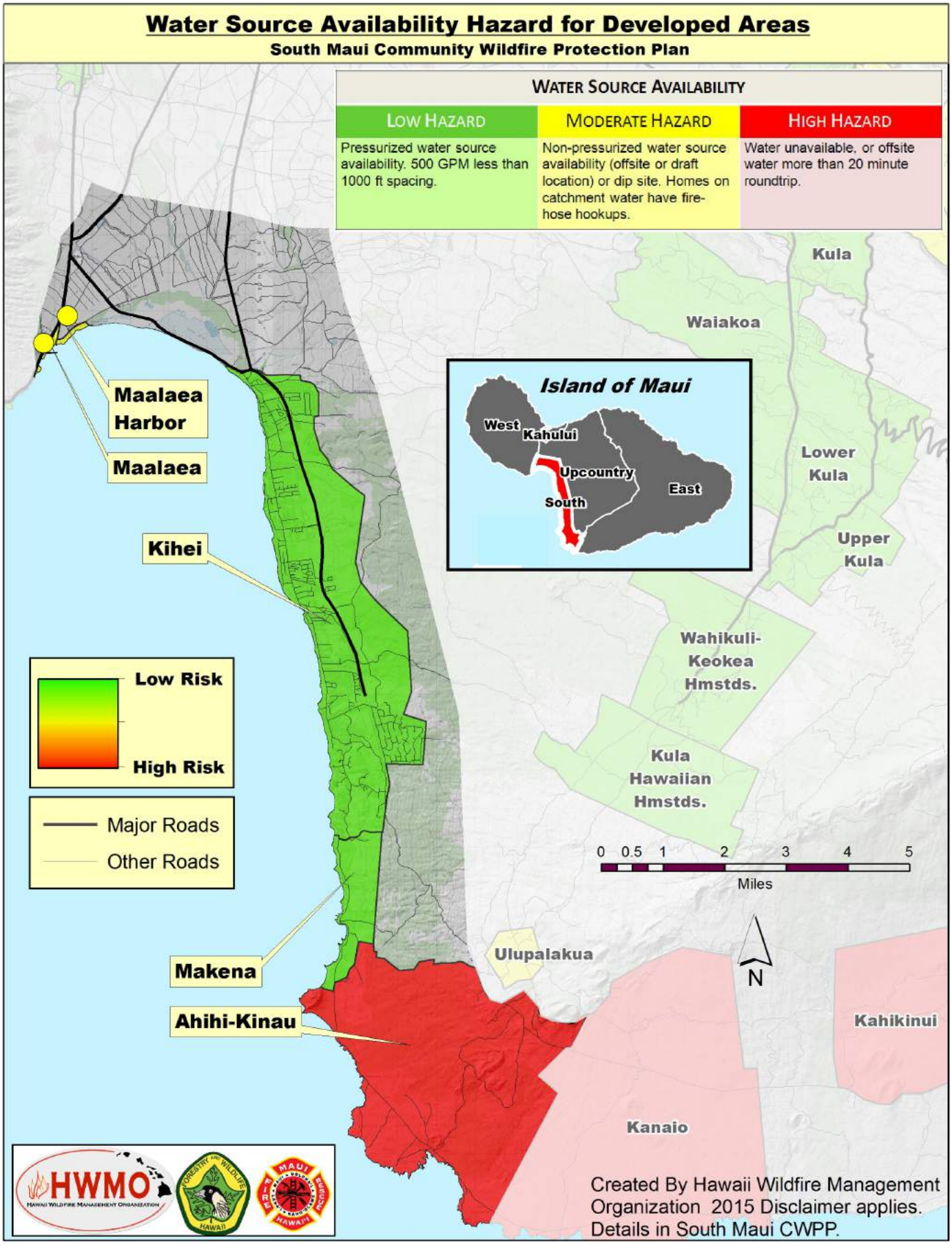
Proximity To Fire Station Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



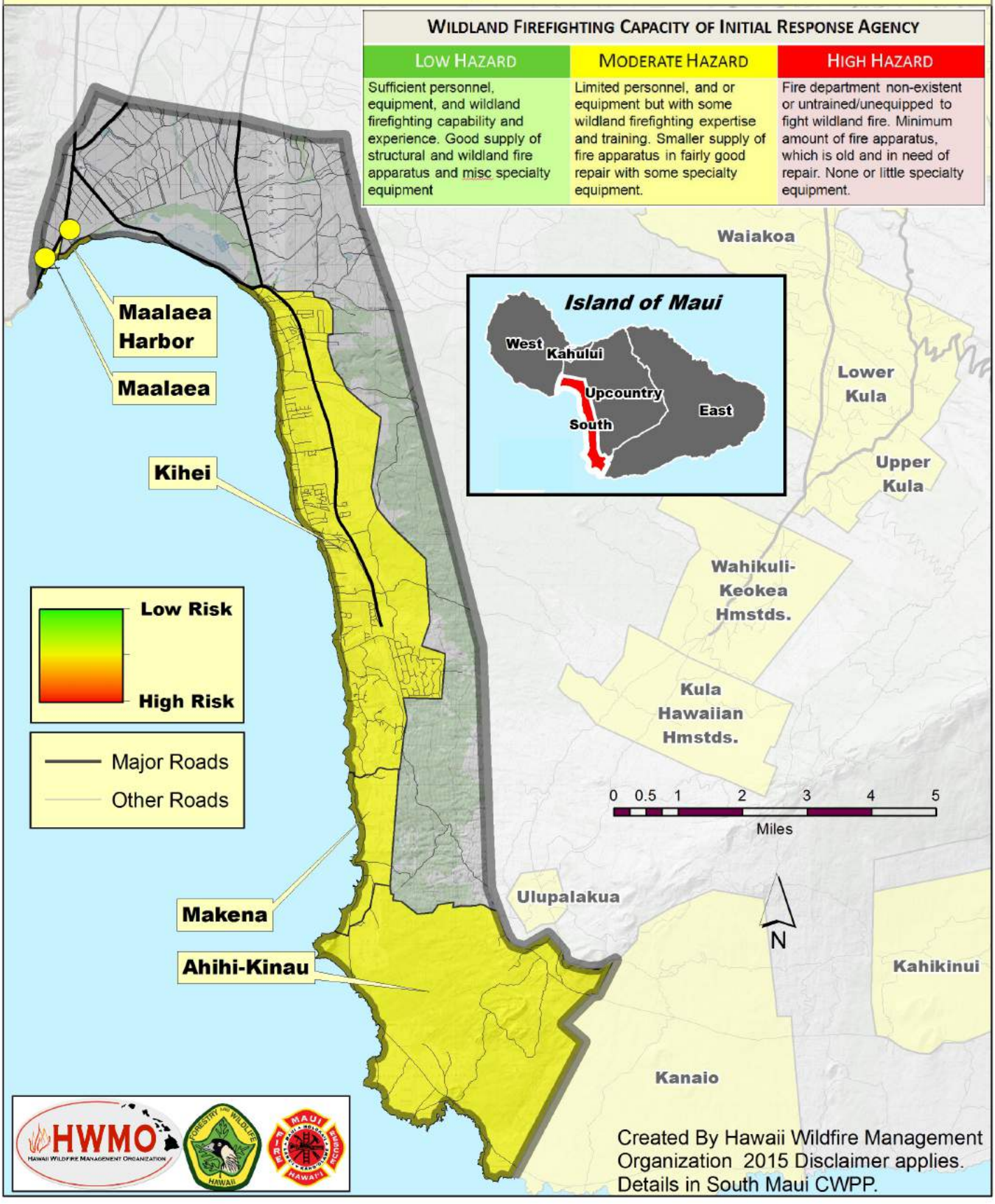
Water Source Availability Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



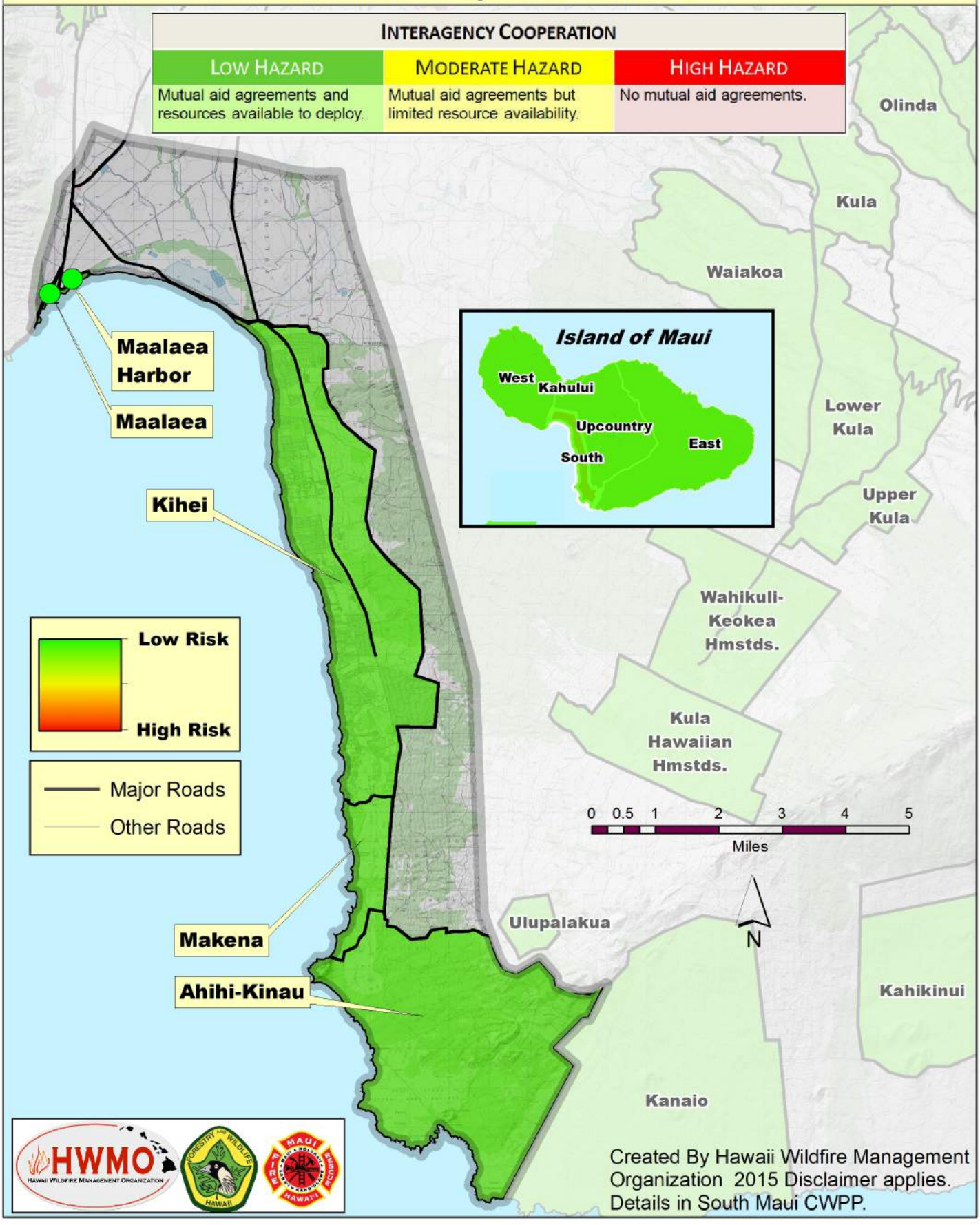
Wildland Firefighting Capacity Of Initial Response Agency
Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



Interagency Cooperation Hazard for Developed Areas

South Maui Community Wildfire Protection Plan



Appendix C
South Maui 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