

# WESTERN MAUI COMMUNITY WILDFIRE PROTECTION PLAN



## **Coordinated and Developed by:**

Hawaii Wildfire Management Organization, a 501(c)3 nonprofit organization dedicated to protecting Hawaii's communities and natural resources from wildfire.

## **Approved and Signed by:**

Maui County Civil Defense, Maui Fire Department, State of Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife



## **Written by:**

Elizabeth Pickett and Ilene Grossman  
Hawaii Wildfire Management Organization  
© 2014

## **Funded by:**

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

2. NOAA Coral Reef Conservation Program. Provided through State of Hawaii Department of Land and Natural Resources Division of Aquatic Resources in collaboration with the Ridge 2 Reef Initiative.

# TABLE OF CONTENTS

<b>Page</b>	
<b>4</b>	LIST OF FIGURES
<b>5</b>	LIST OF TABLES
<b>5</b>	LIST OF PHOTOS
<b>6</b>	<b>SIGNATURE PAGE</b>
<b>7</b>	<b>INTRODUCTION</b>
	GOALS AND OBJECTIVES OF CWPP
	PLANNING AREA BOUNDARIES
<b>9</b>	<b>BACKGROUND</b>
	WILDFIRE HISTORY IN WESTERN MAUI
	Fire Environment
	Ignitions
	Fire history and map
<b>11</b>	GENERAL OVERVIEW OF WESTERN MAUI CWPP PLANNING AREA
<b>12</b>	ENVIRONMENT AND NATURAL RESOURCES
	Climate
	Ecosystems and Vegetation
	Soils
	Natural Resources Management
	Threatened and Endangered Species
	Water Resources
<b>31</b>	WHERE PEOPLE LIVE
	Wildland-Urban Interface Communities
	Leeward Communities
	Leeward Urban Center- Lāhainā
	Leeward Subdivision Descriptions
	Windward Communities
	Windward Urban Center- Wailuku
	Windward Subdivision Descriptions
<b>39</b>	COMMUNITY RESOURCES
	Schools
	Emergency Services
	Municipal Infrastructure
	Park Facilities and Forest Reserves
<b>43</b>	<b>EMERGENCY MANAGEMENT</b>
	FIRE SUPPRESSION CAPABILITIES AND RESOURCES
	EMERGENCY MANAGEMENT DOCUMENTS AND PLANS
	MULTIPLE-AGENCY AGREEMENTS
	EVACUATION PROTOCOLS AND NEEDS

<b>46</b>	<b>PLANNING PROCESS</b>
	CWPP PROCESS AND METHODS
	PARTICIPANTS
	Decision Makers
	Federal Agencies
	State and Local Agencies
	Interested Parties
	PUBLIC MEETINGS AND OUTREACH
	PUBLIC SERVICE ANNOUNCEMENTS
<b>50</b>	<b>WILDFIRE RISK ASSESSMENT</b>
	PURPOSE AND METHODS
	SUBDIVISION HAZARD ASSESSMENTS
	COMMUNITY VALUES
	OVERALL RISK ASSESSMENT TABLE
	COMMUNITIES AT RISK FROM WILDFIRES MAP
<b>61</b>	<b>HAZARD REDUCTION PRIORITIES</b>
	PURPOSE AND METHODS
	FIRE RESPONSE AND NATURAL RESOURCE MANAGER CONCERNS AND
	RECOMMENDED ACTIONS
	PUBLIC CONCERNS AND RECOMMENDED ACTIONS
	Fire Protection Categories
	National Cohesive Wildland Fire Management Strategy Categories
	HAZARDOUS FUELS REDUCTION
	REDUCING STRUCTURAL IGNITABILITY
<b>80</b>	<b>ACTION PLAN</b>
	WESTERN MAUI CWPP IMMEDIATE ACTION PLAN
	RECOMMENDED NEXT STEPS
	Immediate Projects
	Future Projects
	CWPP PLAN IMPLEMENTATION AND MAINTENANCE
	FINALIZE PLAN
<b>84</b>	<b>REFERENCES</b>
<b>87</b>	<b>APPENDIX</b>
	APPENDIX LIST
	APPENDIX A. Soils Map Key
	APPENDIX B. Western Maui Hazard Assessment Maps - These maps are titled “West Maui” vs. “Western Maui” since they were developed as part of a statewide effort and had a slightly different name for that purpose
	APPENDIX C. Hazard Assessment Rating Key
	APPENDIX D. Public Input Organized by Fire Protection Category

## LIST OF FIGURES

<u>Page</u>		
8	<b>Figure 1.</b>	Western Maui CWPP Planning Area Map
10	<b>Figure 2.</b>	Maui Wildfire Incidents Map
11	<b>Figure 3.</b>	Population Density Map
15	<b>Figure 4.</b>	Average Wind Speed Map
16	<b>Figure 5.</b>	Average Annual Rainfall Map
17	<b>Figure 6.</b>	Solar Radiation Map
18	<b>Figure 7.</b>	Soils Map
22	<b>Figure 8a.</b>	Map of WMMWP boundaries, Partner landholdings, key management areas, and major landmarks
22	<b>Figure 8b.</b>	WMMWP map legend
25	<b>Figure 9.</b>	U.S. Fish and Wildlife Service Threatened and Endangered Species Strategic Landscape Areas to Protect in Maui Map
26	<b>Figure 10.</b>	Threatened and Endangered Plant Habitat Map
28	<b>Figure 11.</b>	Water Features Map
29	<b>Figure 12.</b>	Maui Aquifers Map
30	<b>Figure 13.</b>	Hazard Assessment Map – Fire Protection Rating - Water Source Availability
32	<b>Figure 14.</b>	Western Maui Community Subdivisions Boundary Map
40	<b>Figure 15.</b>	Community Base Map— Leeward/ Lāhainā Area Schools, Hospitals, Government Offices & Airport Map
41	<b>Figure 16.</b>	Community Base Map— Windward/Wailuku Area Schools, Hospitals, Government Offices, & Airport Map
42	<b>Figure 17.</b>	Community Base Map— Parks and Preserves
52	<b>Figure 18.</b>	Community Subdivision Wildfire Hazard Rating Map
53	<b>Figure 19.</b>	Vegetation Wildfire Hazard Rating Map
54	<b>Figure 20.</b>	Building Wildfire Hazard Rating Map
55	<b>Figure 21.</b>	Fire Environment Hazard Rating Map
56	<b>Figure 22.</b>	Fire Protection Hazard Rating Map
57	<b>Figure 23.</b>	Community-Generated High Value Resources Map
60	<b>Figure 24.</b>	Communities at Risk from Wildfires Map
62	<b>Figure 25.</b>	Agency Ranked Concerns & Actions in Wildfire Prevention Category
63	<b>Figure 26.</b>	Agency Ranked Concerns & Actions in Wildfire Pre-Suppression Category
64	<b>Figure 27.</b>	Agency Ranked Concerns & Actions in Wildfire Suppression Category
65	<b>Figure 28.</b>	Agency Ranked Concerns & Actions in Wildfire Post-Fire Category
66	<b>Figure 29.</b>	Percentage of Public Recommendations Organized by Fire Protection Category
67	<b>Figure 30.</b>	Community Concerns Organized by Cohesive Strategy Categories
73	<b>Figure 31.</b>	Community Recommendations Organized by Concern Category
75	<b>Figure 32.</b>	Defensible space zones around structures
75	<b>Figure 33.</b>	Ladder Fuels Diagram
77	<b>Figure 34.</b>	Screened Vents
78	<b>Figure 35.</b>	Windows Clear of Vegetation
78	<b>Figure 36.</b>	Enclosed Eaves
78	<b>Figure 37.</b>	Gutter Guards or Screens
78	<b>Figure 38.</b>	Non-Combustible Fencing



## LIST OF TABLES

<u>Page</u>		
43	Table 1.	Maui Fire Department CWPP Planning Area-Specific Suppression Resources
44	Table 2.	Division of Forestry and Wildlife (DLNR – DOFAW) Suppression Resources
46	Table 3.	CWPP Participants: State and Local Agencies
47	Table 4.	CWPP Participants: Decision Makers
47	Table 5.	CWPP Participants: Federal Agencies
47	Table 6.	CWPP Participants: Interested Parties
51	Table 7.	Overview of Categorical and Individual Wildfire Hazards Assessed for CWPP
58	Table 8.	Overall Risk Assessment Table
62	Table 9.	Agency and Resource Manager Priorities: Prevention
63	Table 10.	Agency and Resource Manager Priorities: Pre-Suppression
64	Table 11.	Agency and Resource Manager Priorities: Suppression
65	Table 12.	Agency and Resource Manager Priorities: Post-fire Response
68	Table 13.	Public Input— Fire Adapted Communities
71	Table 14.	Public Input— Restore and Maintain Landscapes
72	Table 15.	Public Input— Improve Wildfire Response
74	Table 16.	Hazardous Fuels Treatments
80	Table 17.	Next Steps: Immediate Projects
81	Table 18.	Next Steps: Future Projects

## LIST OF PHOTOS

<u>Page</u>		
10	Photo 1.	Kīhei View of Mā‘alaea Fire <sup>1</sup>
10	Photo 2.	Burned area overview of Mā‘alaea Fire <sup>1</sup>
10	Photo 3.	Fire on Lāhainā Pali Trail <sup>1</sup>
10	Photo 4.	Lāhainā Fires- Pana‘ewa to Launiupoko <sup>1</sup>
31	Photo 5.	West Maui Mountains (leeward view) with agricultural field in foreground
31	Photo 6.	West Maui Mountains (windward view).
31	Photo 7.	Example of unmanaged vegetation at the wildland-urban interface
31	Photo 8.	Wildland-urban interface example (Wailuku Heights)
31	Photo 9.	Aerial view of Lāhainā <sup>2</sup>
48	Photo 10.	West Maui Fire Task Force CWPP process photo
48	Photo 11.	West Maui Mountains Watershed Partnership CWPP process photo
48	Photo 12.	CWPP meeting photo
49	Photo 13.	CWPP public meeting focus group
49	Photo 14.	CWPP public meeting focus group
49	Photo 15.	CWPP meeting photo
49	Photo 16.	CWPP meeting photo
49	Photo 17.	CWPP meeting photo
74	Photo 18.	Vegetation around home
74	Photo 19.	Fallow field vegetation

## **WESTERN MAUI COMMUNITY WILDFIRE PROTECTION PLAN MUTUAL AGREEMENT PAGE**

The Community Wildfire Protection Plan (CWPP) developed for Western Maui, Hawai'i by the Hawaii Wildfire Management Organization (HWMO):

- Was collaboratively developed by agencies, entities, and individuals with interest or jurisdiction in Western Maui.
- Identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will mitigate wildfire in Western 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**  
**Maui County Civil Defense Agency**

---

**Date**

---

**Lisa Hadway, Administrator**  
**State of Hawaii Department of Land and**  
**Natural Resources Division of Forestry and Wildlife**

---

**Date**

# INTRODUCTION

## GOALS AND OBJECTIVES OF THE WESTERN MAUI CWPP

This Community Wildfire Protection Plan (CWPP) was developed by the Hawaii Wildfire Management Organization (HWMO) with guidance and support from Federal, State, and County of Maui agencies and representatives, private resource management entities and efforts, community members, and decision makers concerned about wildfire issues in Western Maui. State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW), Maui Fire Department, West Maui Fire Task Force (WMFTF), and the West Maui Mountains Watershed Partnership were the primary partners in developing this plan.

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

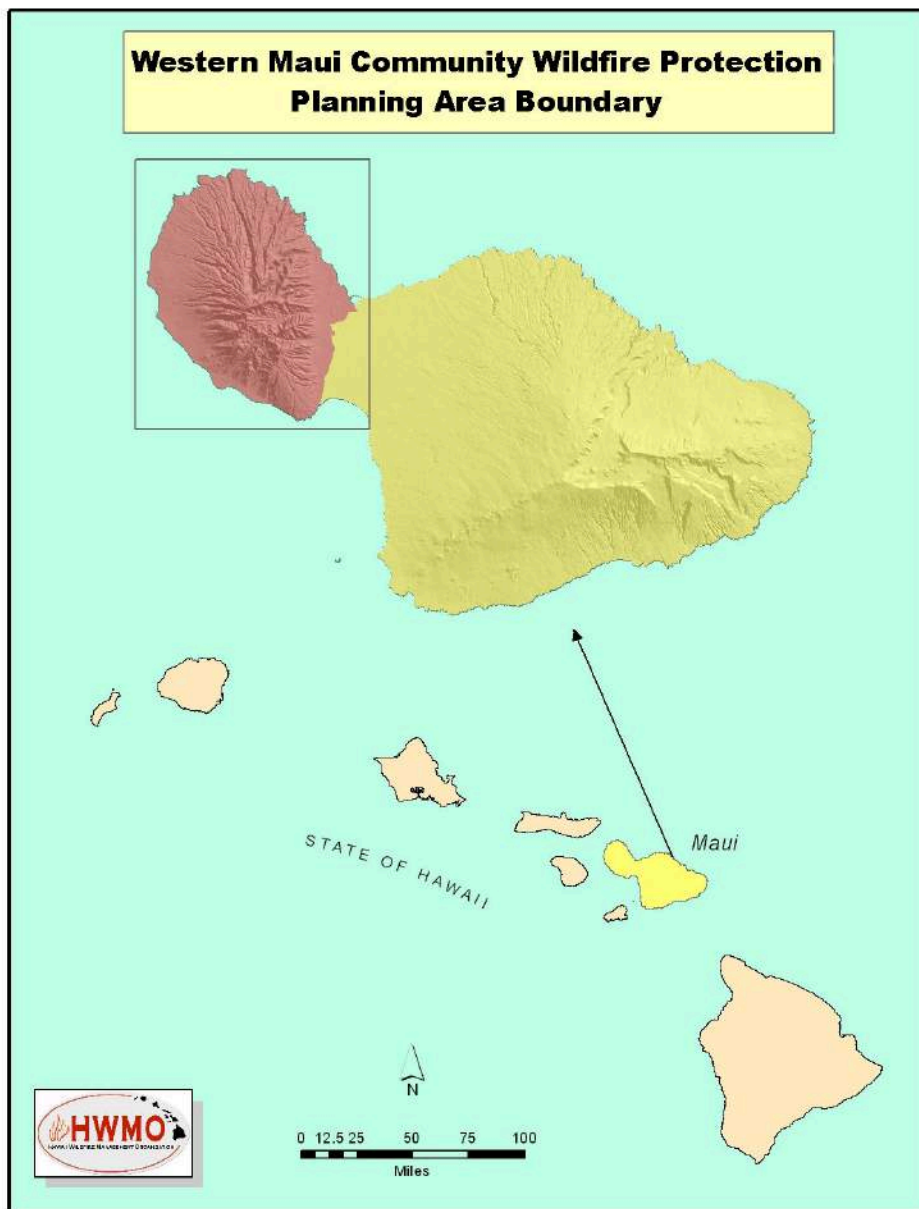
The goals and objectives of this plan follow the intent and requirements of the *Healthy Forests Restoration Act (HFRA) – HR 1904*, which describes a CWPP as a fire mitigation and planning tool for an at-risk community that:

- 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.<sup>3</sup>

Stakeholders have uniformly agreed that wildfire threats are imminent and can have widespread damage to Western Maui watersheds, human communities, and associated downslope coral reef ecosystems. The danger of fire is related to arid conditions, frequent high winds and high fuel potential of vegetation. In the last decade, portions of Western Maui have burned every couple of years, due to the recurring fire cycle, unmanaged grass fuels, and human-caused ignitions. Wildfires strip the land of vegetation and render the soil susceptible to erosion through runoff, leading to sedimentation of streams and nearshore waters. The CWPP is the first step in the fire prevention and post-fire restoration planning process. After the development of this Western Maui CWPP, there will be another pre- and post-fire plan developed specifically for the Wahikuli-Honokōwai Watershed due to a funding opportunity through the Ridge to Reef Initiative. The development of post-fire restoration guidelines and fire prevention planning are identified as priorities for the Wahikuli-Honokōwai Watershed Management Plan, and are identified by stakeholders as a priority type of planning for all of Western Maui.

## PLANNING AREA BOUNDARIES

The Western Maui CWPP encompasses the entire western head of the island of Maui. This includes the West Maui Mountains and Mauna Kahalewai watershed areas, spanning from Wailuku south to Mā'alaea, north and west through Lāhainā and Honokōhau, and south and east through Waihe'e and Waichu. The plan includes State of Hawai'i, Maui County, Department of Hawaiian Homelands (DHHL), and privately owned lands. The CWPP planning boundaries are the same as the wildland-urban interface (WUI) at-risk areas, which include surrounding lands to ensure adequate protection of WUI areas and associated human communities. This area was chosen through stakeholder meetings and is based on Maui Fire Department response district boundaries. CWPPs may be developed for other parts of Maui as communities gain interest in wildfire preparedness planning and as funds become available to complete the planning process. See the map below for planning area boundaries.



*Figure 1. Western Maui CWPP Planning Area Map*

# BACKGROUND

## WILDFIRE HISTORY IN WESTERN MAUI

### Fire Environment

Steep slopes, rough terrain, strong trade winds, and a large percentage of highly ignitable invasive grasses characterize the Western Maui landscape. This, coupled with warm weather, recurring drought conditions, and a history of human-caused fire starts puts the area at increased risk of wildfire. The proximity of development to fire-prone wildlands present hazardous conditions that now threaten every Western Maui suburban and rural community.

Abundant fire fuels and heavy winds in the lowland coastal areas promote rapid spread of fires, quickly endangering historical sites, recreational areas, forested watersheds, grazing lands, homes, and community infrastructure. Overgrown vegetation close to homes, pockets of open space within subdivisions, fallow agricultural fields, and an increase of non-native high fire-intensity plants around developed areas pose increasing threats to commercial, community, environmental, and residential resources.

### Ignitions

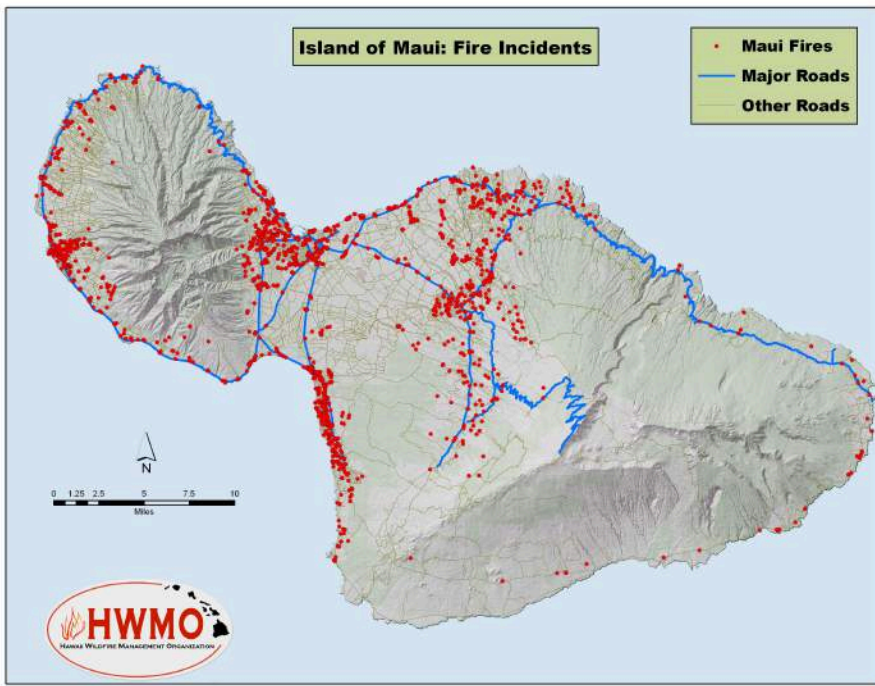
The wildland/urban interface (WUI)—the area where developed areas, roads, and community infrastructure abuts undeveloped land—is where the majority of wildfire ignitions occur in all of Hawai'i. Western Maui is no exception. Because of this, WUI areas often experience the greatest risk of loss of property, 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, invasive, fire-prone grasslands surround many communities. Once ignited along the interface, wildfire can spread rapidly through residential areas, threatening both property and life. In coastal areas, increased erosion after fire degrades nearshore resource quality through increased sedimentation that damages coral reef ecosystems. Wildfires in the higher elevations threaten natural areas and watershed forests, creating changes to soil that affect groundwater infiltration and drinking water. Upland fires also threaten numerous protected species.

Both the shoreline and upland areas have access roads (multiple ignition points) and include older settlement areas, historical buildings, and irreplaceable cultural and natural resources. Many of these roads are unpaved. Unmanaged fire fuels (primarily grasses and shrubs) in these areas create a significant hazard, as vehicles are common sources of fire ignition. Once ignited, these fires spread rapidly and threaten nearby community infrastructure, neighborhoods, grazing lands, and valuable native flora and fauna.

### Fire History & Map<sup>4</sup>

The map below displays results from an HWMO-led effort to compile wildfire records from all fire suppression agencies across the state, which resulted in a quality-controlled wildfire database and region-specific wildfire incident maps. The Maui Wildfire Incident Map (Figure 2 below) includes: 1) Maui Fire Department's documented responses to wildfires between January 2000 and January 2012 and 2) wildfire ignition points recorded by State of Hawaii Division of Forestry and Wildlife (DOFAW) since 1998. 1,854 wildfire ignitions were mapped out of a total of 2,707 total fire records. Unmapped fires are a result of unavailable or ambiguous fire location information on firefighting records. It is important to note that the map below displays ignition points, and does

not indicate the size of wildfires or the final perimeter of burned areas. Ignitions are important for understanding trends and patterns of fires. From the map below it is clear that WUI, roadside, and human access area fire starts are important trends across Maui. While larger fires tend to occur in the drier areas such as Lāhainā, Launiupoko, and Māʻalaea, the high frequency of ignitions on the windward side is also of concern. As drought conditions become more frequent (and they are predicted to increase) ignitions on the windward side will likely result in large fires due to dense overgrown vegetation. Photos 1, 2, 3, 4 below depict some of the larger fires that have occurred in the Western Maui CWPP planning area.



**Figure 2.** *Maui Wildfire Incident Map. Red dots depict fire ignition locations, not fire size or total burned area. Note the trends of ignition occurring in human-accessed areas. Also note that the largest fires (see photos below) may take place in areas with fewer ignitions, but a higher risk of wildfire spread due to weather and vegetation conditions.*

**Photo 1** (Upper left). *Kihei View of Māʻalaea Fire.*

**Photo 2** (Bottom left). *Burned area overview of Māʻalaea Fire.*

**Photo 3** (Upper right). *Fire on Lāhainā Pali Trail.*

**Photo 4** (Lower right). *Lāhainā Fires- Kuia-Kauaula ahupuaʻa.*





## GENERAL OVERVIEW OF WESTERN MAUI CWPP PLANNING AREA

Maui is the second largest island in the state and was formed by two volcanoes merging— Haleakalā to the East and Pu‘u Kukui to the west. The island is 48 miles long and 26 miles wide with a total of 728 square miles. Western Maui encompasses an area of 161 square miles or 103,188 acres.<sup>5</sup> The resident population was 58,311 according to the 2010 census (see Figure 3 Population density map). 48% of the region is forested, 4% urban (commercial and residential), and 48% in agriculture (cropland - some fallow, pasture, and rangeland). The forested region is part of the West Maui Mountains that dominate the landscape with lush, green valleys and protected areas. The mountains were once about 7,000 feet high. The volcano, Pu‘u Kukui, now 5,788 feet, collapsed and eroded forming a wide caldera from which several deep valleys radiate: ‘Īao, Kahakuloa, Ukumehame, Olowalu and Honokōhau. The region historically has been a significant agricultural area from prior to Western contact.

Currently, tourism is the primary industry, recently changed from an agricultural industry that declined over the last 20 years as sugar and pineapple plantations closed. Kā‘anapali, Nāpili and Wailea are Maui’s main tourist hubs and include several golf resorts. During the heavy tourist seasons, the visitor population can rise to nearly 40,000 people on the leeward coast.

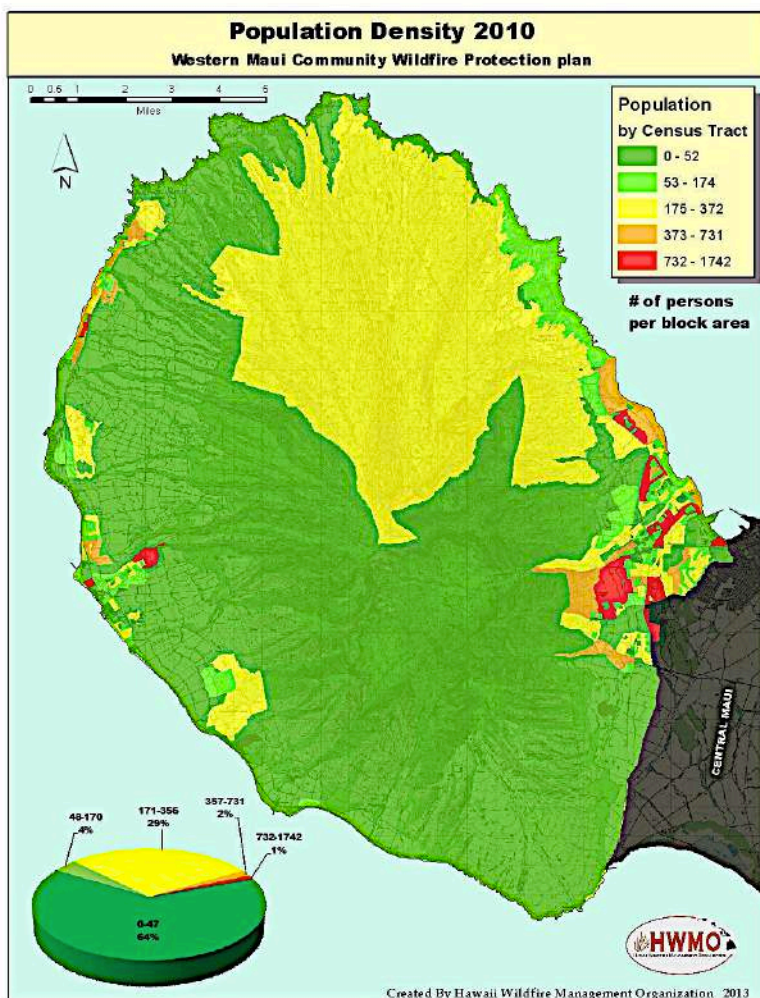


Figure 3. Population Density Map (based on 2010 Census)

## ENVIRONMENT AND NATURAL RESOURCES<sup>6</sup>

The forested West Maui Mountains dominate this landscape with the summit peak Pu‘u Kukui reaching 5,788 ft. and dropping to sea level along the coast. Non-native grasslands, forest, sugar cane, and agriculture characterize the undeveloped areas of the region below the forested mountains.

### Climate

The Western Maui CWPP planning area has a wide range of climatic conditions within a relatively small area, providing diverse physical environments from the coastline to high elevations. The leeward side of Western Maui is protected from the prevailing northeast trade winds due to its position in the dry leeward shadow of the West Maui Mountains (see Figure 2). The wind speed is highest along the northern and southern sections and follows the mountain ridgeline. Lower elevation coastal temperatures range between approximately 57° F in the winter to over 90° F in the summer. Inland and upland higher elevation areas experience cooler trends than the coast, with temperatures decreasing with elevation.

Annual rainfall varies from 16 inches on the leeward coast to 400 inches at the summit of Pu‘u Kukui, one of the wettest places on Earth (see Figure 3). West Maui Mountains provide drinking water (80% of Department of Water Supply ground and surface water) for all of Western Maui and Central Maui, as well as, east to Pā‘ia and south to Mākena. Solar radiation is highest along the leeward coast and decreases as elevation increases (see Figure 4).

### Ecosystems & Vegetation

Differences in climate, topography, and soils have resulted in unique ecosystems across the Western Maui CWPP planning area. The climate contributes to vegetation diversity between the windward and leeward coasts and at the different elevation levels. The classification of terrestrial ecosystems is based on the elevation at which they occur. In general, mixed native forests are found at higher elevations. Areas considered prime agricultural lands are concentrated mauka of the highways. Mixed shrubs and grasses characterize the low-lying coastal, makai areas. The developed areas have ornamental landscaping. In the past several hundred years of human habitation, pristine native ecosystems have diminished.

Human activity, particularly agriculture (i.e. sugar cane, pineapple, ranching) and introduction of non-native plants and animals have displaced many of the historic plant and animal communities. Today, exotic fire-prone grasses and shrubs coupled with human-caused fire starts contribute to a cycle of hazardous wildfire conditions and increased post-burn conversion to non-native fire-promoting species. Despite the widespread alteration of native ecosystems at lower elevations, most of the upland areas remain as habitat for rare, threatened, and endangered species and are protected as forest preserves.

The protected forest ecosystems are categorized into three general forest types with dominant vegetation including:<sup>4</sup>

- **Wet forest:** The *Lobelia gloriamontis* is the watershed's signature plant and co-evolved with the curved beaks of the Hawaiian honeycreepers. Other species found in the wet forest include many species of native ferns (ex. ‘Uluhe), two species of silverswords, grasses, ‘Ohi‘a lehua,



‘Uki ‘Uki sedge, endemic species of Hibiscus (*Hibiscus kokia* ssp. *Kokia*), the endangered *Sanicula purpurea* and many others.

- **Mesic forest:** The mesic forest section (between wet and dry) is very narrow on the West Maui Mountains. There are many species in this region including the rare and endangered Kauila, or *Colubrina oppositifolia*, the A‘ali‘i (*Dodonaea viscosa*), the ‘Olapa tree (*Cheirodendron trigynum*) (Rare), ‘Iliahi (Hawaiian Sandalwood), Uluhe (*Dicranopteris emarginata*), Wawaē‘iole (*Lycopodium cernuum*) fern usually found with ‘Uluhe, and Mamane (a member of the pea family).
- **Dry forest:** Wiliwili (*Erythrina sandwicensis*) tree, native shrubs such as A‘ali‘i (*Dodonaea viscosa*), Pukiawe (*Styphelia tameiameia*) and native grasses such as Kawelu (*Eragrostis* sp.) and Pili (*Heteropogon contortus*).

Other non-forest plant communities also exist, including lowland mesic shrubland, lowland wet shrubland, montane wet sedgelands, montane wet mixed communities, and montane wet shrubland.

### Soils<sup>7,8</sup>

Hawai‘i has the most soil orders of any other state in the US. As a state, Hawai‘i has eleven of the twelve soil orders and Maui County has seven of them.

The Western Maui CWPP planning area has these seven main soil orders:

- Mollisol (leeward central coastal region)
- Inceptisol (Nāpili /Kapalua area)
- Oxisol (Lāhainā series), Ultisol (Honolua series)
- Andisol (southern section), Entisol (coastal Wailuku region)
- Andisol/Histosol (mountain north end, lower elevations)
- Hydrandepts and Tropaquads (mountains north end, high elevation)
- Olokui and Amalu (mountains south end, high elevation)

See Figure 7- Soils Map, and Appendix A- Soils Map Key. The following is a general description of typical characteristics of these soils:

**Mollisol** - Moderately weathered, fertile soils. The average annual rainfall is between 25 and 40 inches, and the average annual temperature is approximately 73 degrees F. Mollisols form by the accumulation of calcium-rich organic matter. The surface horizon of Mollisols is deep and rich in calcium, magnesium, and organic matter. It is a silty clay, dark reddish brown, mildly alkaline and has a soft texture. These soils are more than 50% saturated with calcium, magnesium, nitrate, and magnesium. The soil is well-drained with slow to medium runoff and moderate permeability but can contain swelling clays that have poor drainage. Mollisols are naturally highly productive soils for irrigated sugarcane. Natural vegetation on Mollisol soils includes ilima, kiawe, lantana, among others.

**Inceptisol** - Poorly developed, young soils. The Kahana series is located in the uplands of Western Maui, at elevations between 100 and 1,200 ft. and occupies approximately 2,700 acres of land. The average annual precipitation is between 30 and 45 inches, and the average annual temperature is 73 degrees F. It is a silty clay, dark reddish brown, and strongly acidic soil. While Kahana soils may require irrigation, liming, and nutrient additions, it is generally very suitable for crop production

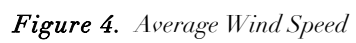
(pineapple, irrigated sugarcane production, with some use as pastureland). Natural vegetation on this soil includes guava, koa haole, lantana, and other trees.

***Oxisol*** - Highly weathered, tropical soils. The Lāhainā series is located in the intermediate uplands of Western Maui and occupies 21,000 acres with elevations ranging from 10 to 1,500 ft. The average annual rainfall falls between 20 and 35 inches, with average temperatures of 73 degrees F. These soils are silty clay, dark reddish brown, workable, nonsticky with medium acidity. The Lāhainā series has slow to rapid runoff, moderate permeability, and good drainage and is resistant to erosion. Nutrient cations, such as calcium, magnesium, nitrate, potassium, and possibly phosphorus must be added to the soil. Organic matter can be added to increase the availability of phosphorus. Agricultural Use includes pineapple and irrigated sugarcane. Natural vegetation includes cactus, kiawe, lantana, and koa haole.

***Ultisols*** - Old Soils – Honolua series – ranges on other parts of the island from sea level to 1,200 ft. The average annual rainfall for Ultisols is 50 to 80 inches, and the average annual temperature is 72 degrees F. The texture is clay, silty clay and the color is dark brown. Generally, base-cations, such as calcium, magnesium, nitrate, and potassium have been leached. The clay in Ultisols is considered to be very strongly acidic with low fertility. However, Ultisols usually contain clay that is not sticky and is very workable. With sufficient fertilizer and lime additions, these soils may be very productive. The natural vegetation supported by Ultisols are grasses, guava, and lantana.

***Hydrandepts and Tropaquads*** (rHT) North end of West Maui mountains high elevation areas. Peat (top layer 0-3 in.), silty clay loam, silty clay (0-37 in.), cobbly loam (37 – 69 in.) Wildlife habitat.

***Olokui and Amalu series*** (rRT) Rough mountainous land soils dominate the mountainous region with shallow, poorly draining soil. These soils are characterized by rocky, steep slopes and drainage channels. Rainfall is between 70-400 inches per year. Wildlife habitat.





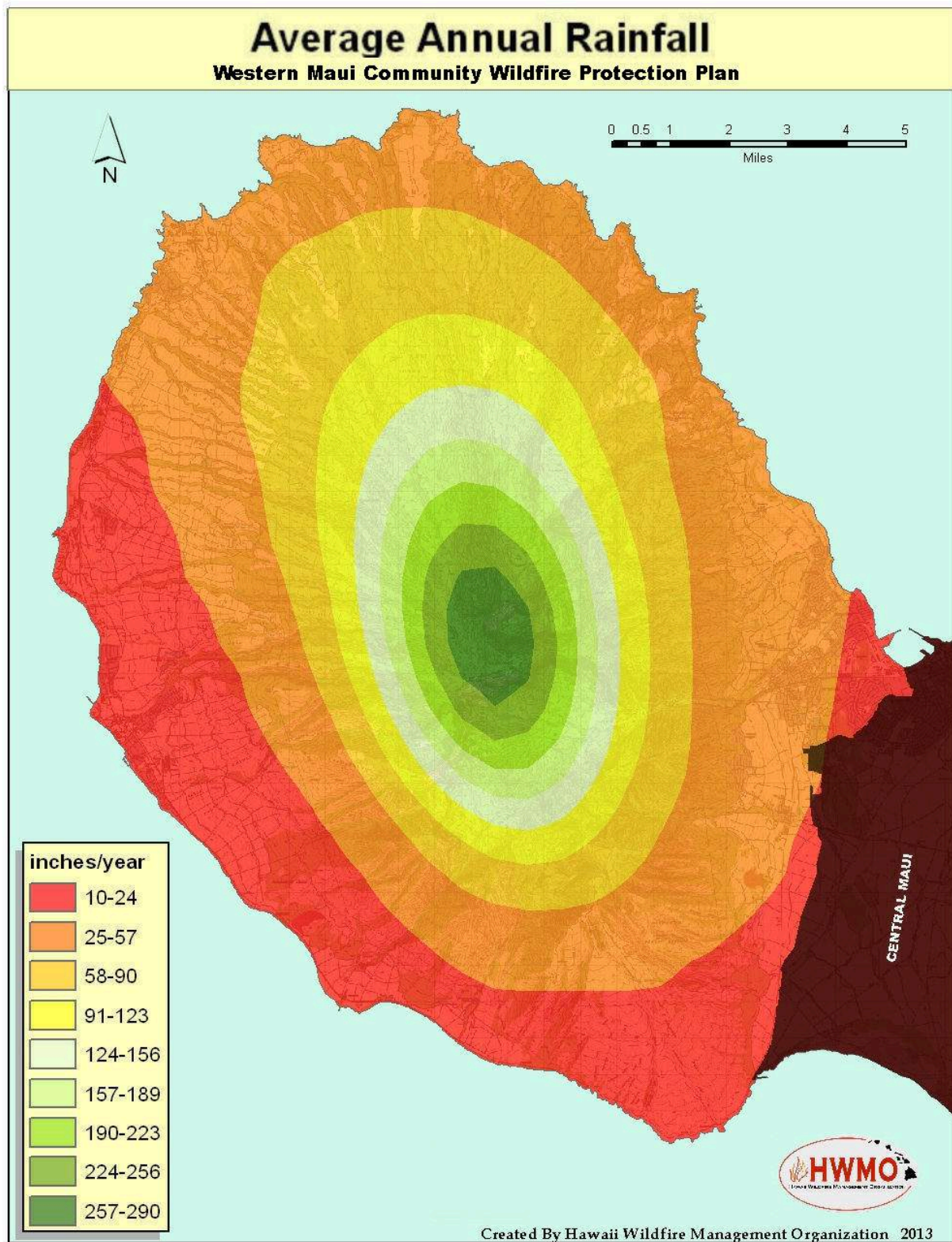


Figure 5. Average Annual Rainfall

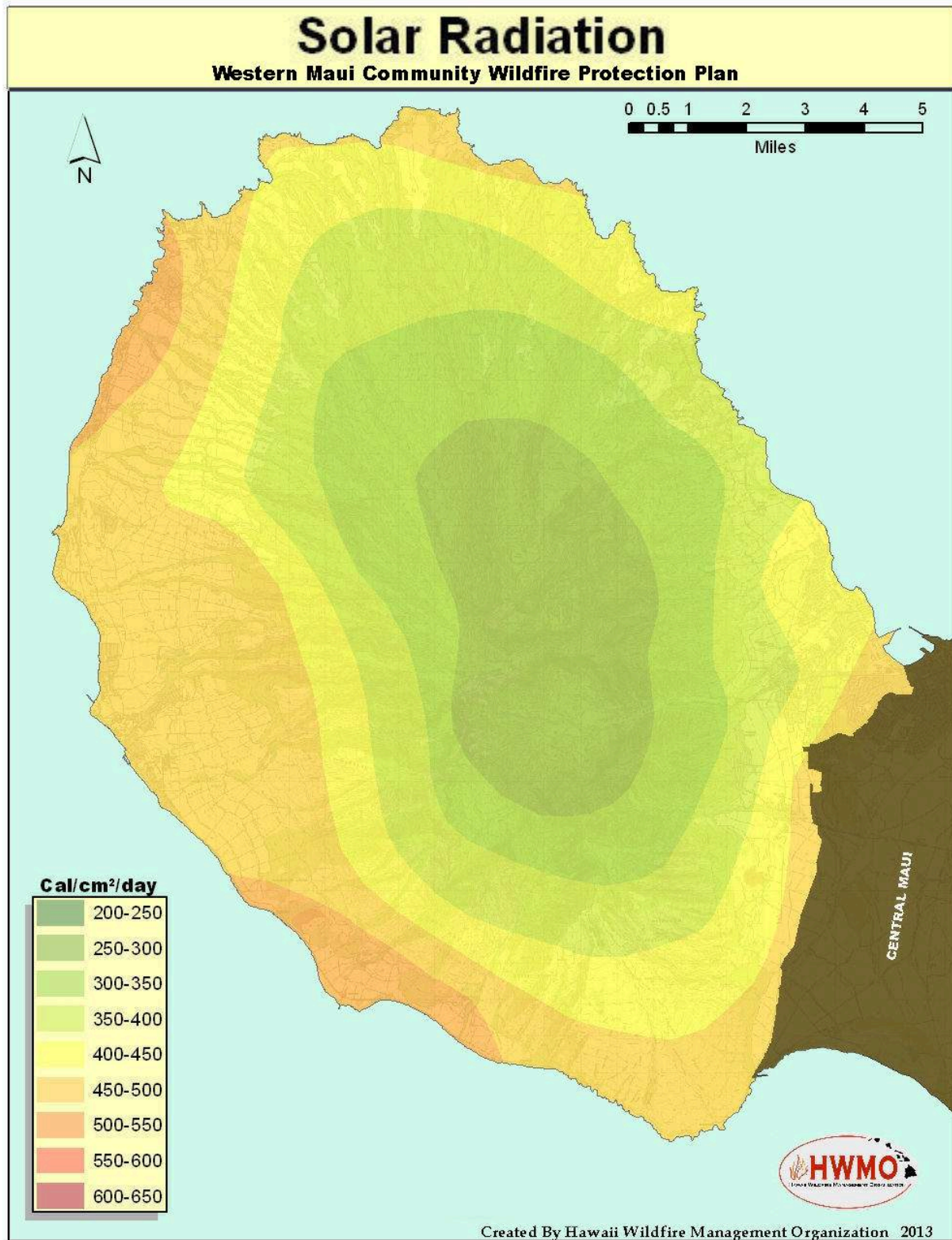


Figure 6. Solar Radiation



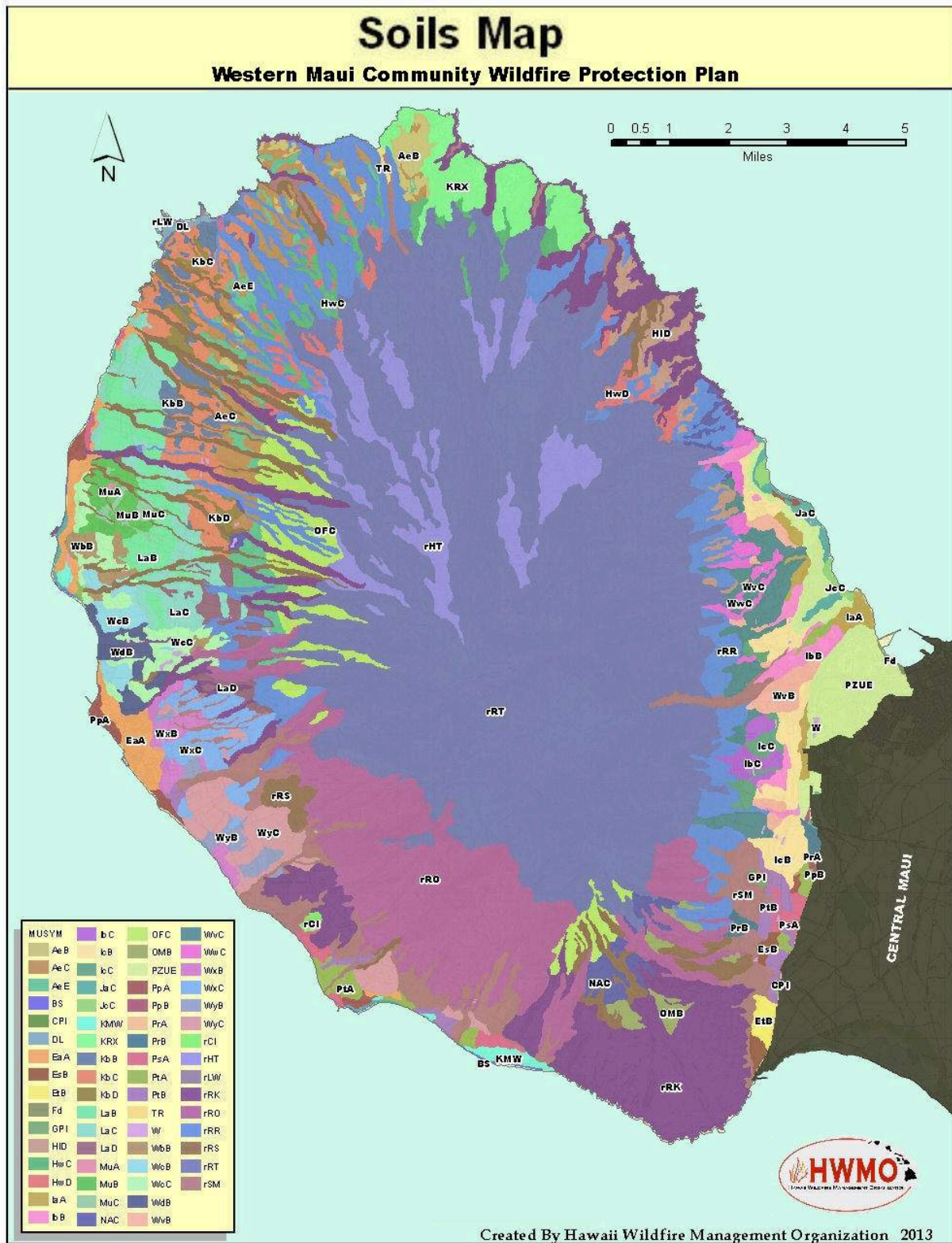


Figure 7. Soils Map

## Natural Resources Management

There is an established partnership to manage the mountains and watersheds of the West Maui Mountains that dominate this western region of Maui. The common goal of the **West Maui Mountains Watershed Partnership (WMMWP)**<sup>4</sup> is to protect large areas of forested watersheds for conservation and water recharge. Similar to the ahupua'a system of managing land from mauka to makai (summit to sea) within watershed and ownership boundaries, this partnership protects more than 50,000 acres of habitat for 126 rare species, with 17,989 acres protected by fences, and 33,051 acres of primarily native species forests. The partnership is an alliance of public and private landowners including County of Maui, State Department of Land and Natural Resources, Kahoma Land Company LLC, Kamehameha Schools, Kā'anapali Land Management Corp., Mākila Land Company LLC, Maui County Board of Water Supply, Maui Land & Pineapple Co. Ltd., The Nature Conservancy of Hawai'i, and Wailuku Water Company, LLC. See Figure 8a/8b for WMMWP Landowner/Partner Map.

Other Western Maui Ecosystem Protection efforts include:

### *DLNR-DOFAW Programs*

**A. State Forest Reserves**<sup>9</sup> – The state Forest Reserve System was created in 1903 to protect mauka forests and water resources for the surrounding communities. There are currently 580,000 acres within the State Forest Reserve system managed to protect, restore and monitor those forests. Generally the reserves are open to the public for recreational use and hunting while providing watershed, rare species, cultural resources and fire protection. Maui & Moloka'i have nine State Forest Reserves encompassing 80,000 acres. The West Maui Forest Reserve contains twelve parcels totaling 11,400 acres. The largest parcel is in the southern end of the West Maui Mountains. See Figure 17 Community Base Map- Parks and Reserves for State Forest Reserves locations.

**B. Natural Area Reserves System (NARS) West Maui**<sup>10</sup> - The statewide Natural Area Reserves System was established to preserve in perpetuity specific land and water areas which support communities, as relatively unmodified as possible, of the natural flora and fauna, as well as geological sites, of Hawai'i. The system presently consists of 20 reserves on five islands, encompassing 123,431 acres of the State's most unique ecosystems. The diverse areas found in the NARS range from marine and coastal environments to lava flows, tropical rainforests, and even an alpine desert. Within these areas one can find rare endemic plants and animals, many of which are on the edge of extinction. The Natural Area Reserve within the Western Maui CWPP planning area encompasses lowland and montane native communities ranging from dry grasslands to wet 'ohi'a forests. The reserve also includes bogs, montane lakes, forest bird habitat, and rare and endangered plants. The areas are extremely important watershed sites that contain the headwaters of perennial streams. This reserve is made up of four non-contiguous sections: Honokōwai, Kahakuloa, Pana'ewa, and Līhau. Out of 315 total plant taxa represented across the NARS sections, 81 are rare. See Figure 17 Community Base Map- Parks and Reserves for NARS locations.

Details of each NARS section within Western Maui are as follows:

- **Honokōwai Section:** 750 acres. One of four sections that make up the West Maui Natural Area Reserve, the Honokōwai Section is on the wet upper northern slopes of the West Maui Mountains. The native communities include two kinds of rare bogs, as well as wet forests, shrublands, and a montane lake. This section has watershed value and includes many rare plants.

- **Kahakuloa Section:** 3,275 acres. The Kahakuloa Section lies on wet, windward slopes of the West Maui Mountains. The plateau of Eke Crater is still undisturbed by feral ungulates. This section includes the upper reaches of two perennial streams, and includes a rare montane bog surrounded by 'ohi'a wet forests. This section also has watershed value and includes many rare plants.
- **Pana'ewa Section:** 1,717 acres. Pana'ewa includes a rare montane bog, as well as representative 'ohi'a forests and shrublands. This section also includes rare plants.
- **Lihau Section:** 960 acres. The driest of the four sections of the West Maui Natural Area Reserve, Lihau is a steep-sloped volcanic remnant that extends from dry leeward lowlands to a wet summit with cliffs on all sides. The 1988 survey indicated that the summit of Lihau remains ungulate-free. A rare grassland and shrubland occur near the lower boundaries.

*C. Natural Area Partnerships Program (NAPP)*<sup>7</sup> - Hawai'i's native species and natural communities do not recognize property lines, and for the State to comprehensively protect them, a program was needed to encourage the management of private lands that contain some of Hawai'i's most intact ecosystems and endangered species. To this end, the State Legislature and the Governor established the Natural Area Partnership Program (NAPP) in 1991 by authorizing the Department of Land & Natural Resources (DLNR) to "provide state funds for the management of private lands that are dedicated to conservation". The Natural Area Partnership Program provides state funds on a two-for-one basis with private funds for the management of private lands that are dedicated to conservation. With over 30,000 acres enrolled, this innovative program complements the protection efforts on State lands - a partnership essential for the success of conservation in Hawai'i.

- *Pu'u Kukui Watershed Preserve*<sup>112</sup> - Pu'u Kukui Watershed Preserve is one of the largest privately owned nature preserves in the state. Maui Land & Pineapple Company, Inc. was the first private landowner participant with the DLNR NAPP Program. The preserve is made up of over 8,600 acres and stretches from 480 feet to the summit of Pu'u Kukui at 5,788 feet. As the second wettest spot on earth, Pu'u Kukui serves as a significant water source for West Maui residents and communities. The Pu'u Kukui Watershed Preserve contains 15 plant communities that vary from lowland shrublands to montane forests and bogs. One of these communities is considered rare, as it occurs in fewer than 20 sites worldwide: 'ohi'a mixed montane bog. It is also home to at least 36 species of rare plants; three taxa endemic to West Maui. Pu'u Kukui means "hill of enlightenment" and is the summit of Mauna Kahalewai, the West Maui mountains that are mauka of the Kapalua Resort.
- *Kapunakea Preserve*<sup>13</sup> is a 1,264 acre Nature Conservancy Preserve established in 1992 to protect the 11 different plant communities (including 24 rare plant species and several native bird species) that range from dry lowland forest at 1,600 ft. to wet forests and montane bogs at 5,400 ft. The Preserve is part of the DLNR's NAPP Program and the West Maui Mountains Watershed Partnership.

*West Maui Ridge to Reef (R2R) Initiative*<sup>14</sup> is an all-encompassing approach across multiple agencies, organizations and jurisdictions to address adverse impacts to coral reefs in West Maui. The Hawaii Coral Reef Strategy identified the coral reef ecosystem along the West Maui region as a priority management area. The goal in the area is to restore and enhance the health and resiliency of West Maui coral reefs and near shore waters through the reduction of land-based pollution threats from the summit of Pu'u Kukui to the outer reef. State of Hawaii Department of Land and Natural Resources (DLNR) and the U.S. Army Corps of Engineers (USACE) are sponsoring the development of the plan for the West Maui Watershed Ridge to Reef Initiative. The proposed



24,000-acre West Maui Watershed study area extends from Kā'anapali northward to Honolulu and from the summit of Pu'u Kukui to the outer reef. It includes the watersheds of Wahikuli, Honokōwai, Kahana, Honokahua, and Honolulu.

***Hawaiian Islands Land Trust (HILT)***<sup>15</sup> - is a non-profit organization committed to working with private landowners, community groups, community leaders and government partners to protect Hawai'i's precious places. Using a variety of tools, HILT helps landowners integrate conservation into their land use plans in perpetuity. According to HILT, "This collaborative work today helps to avert inappropriate land use tomorrow—and the benefits of conservation are triumphs that resound for all generations to come."

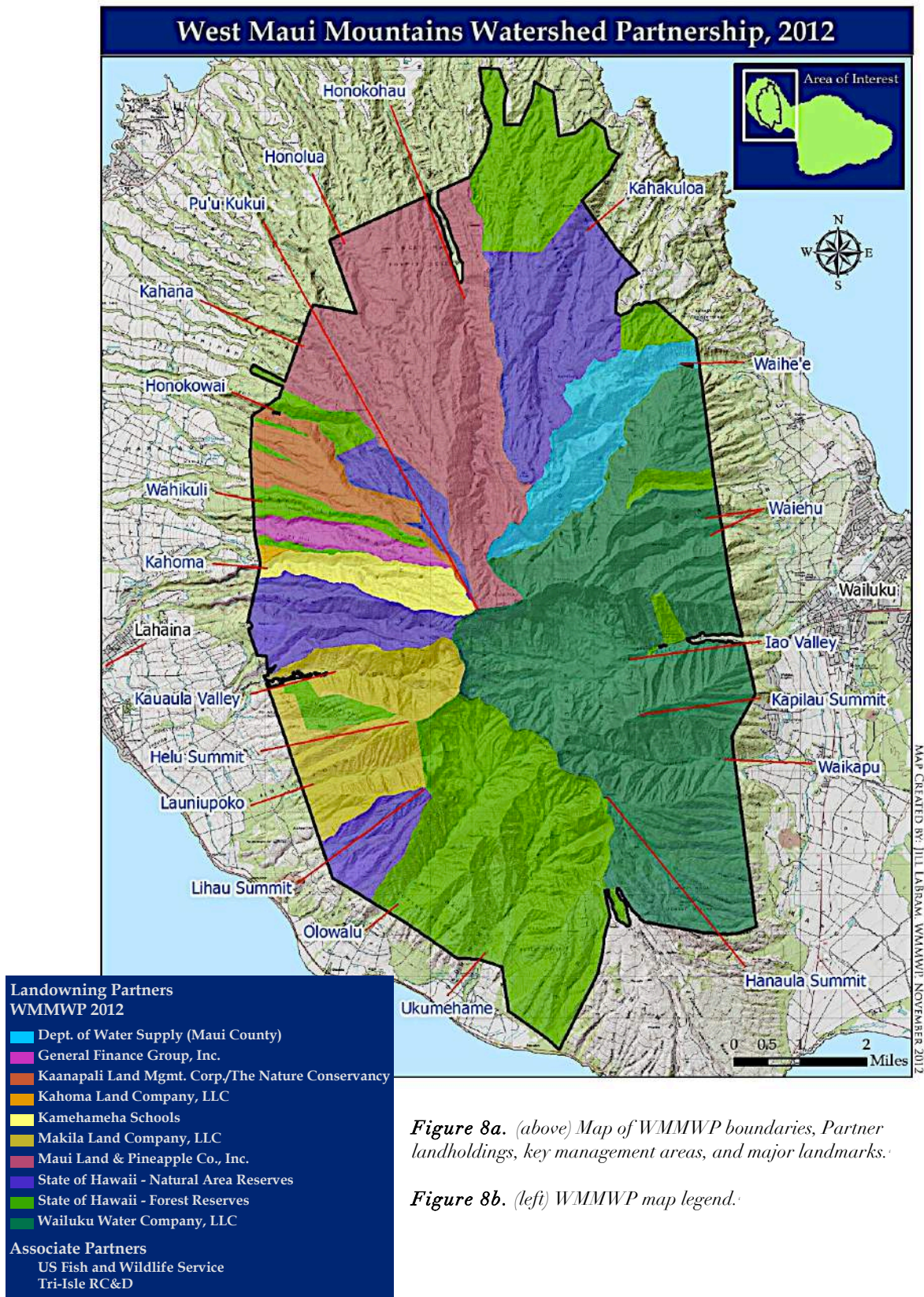
***Maui Cultural Lands - Project Malama Honokōwai***<sup>16</sup> – implements cultural restoration projects in Honokōwai Valley.

***Makai Watch Program***<sup>17</sup> - The goal of the Makai Watch Program (Kā'anapali/Kahekili, Maui) is to enhance the management of near-shore marine resources by providing community members opportunities for direct involvement in management activities.

***Save Honolulu Coalition***<sup>18</sup> - On 6/28/13 the Governor allocated funds to purchase 280 acres from Honolulu Valley to Honokōhau including Līpoa Point. The land will be made into a State park managed by Hawaiian Islands Land Trust, Save Honolulu Coalition and 'Aha Moku Kā'anapali.

***Surfrider Foundation, Maui Chapter***<sup>19</sup> - This non-profit organization is dedicated to the protection and preservation of the world's oceans, waves and beaches. It was founded in 1984 and has 60 chapters around the world. The Maui Chapter focuses its efforts on preserving beach access, near shore water quality, and protecting recreational and cultural sites through CARE: Conservation Activism, Research and Education.

---



**Figure 8a.** (above) Map of WMMWP boundaries, Partner landholdings, key management areas, and major landmarks.

**Figure 8b.** (left) WMMWP map legend.

## Threatened & Endangered Species<sup>20,21, 22</sup>

There are 427 threatened and endangered (T & E) species in the State of Hawai'i. This is the highest number of listed threatened and endangered species of any state in the nation. Those in Maui are scattered throughout diverse ecosystems. Twelve of them are endemic (unique and restricted to a particular region) to Maui. The Western Maui CWPP planning area contains approximately 25 of Hawai'i's protected T & E species. The U.S Fish and Wildlife Service provided information regarding potential threats to threatened and endangered species habitat due to wildfire or potential wildfire prevention (i.e. fuels reduction) activities. These recommendations aim to minimize potential impacts to threatened and endangered species, and should be followed for all projects completed as a result of the Western Maui CWPP process:

“To minimize impacts to breeding bats, avoid cutting trees during the bat pupping season, minimize removal/cutting of tree tobacco and avoid soil disturbance near Blackburn's sphinx moth host plants like tree tobacco unless you take certain precautions to ensure no pupae are in the soil. Any increased threat of wildfire (or fuels reduction) to listed species, their habitat, or critical habitat that may result should be minimized and project plans should include measures to ensure burned areas are restored and impacts of fire to the species are offset. Noise from construction or operation that may adversely affect listed vertebrates should be avoided, especially during breeding seasons.

Below, we describe some Best Management Practices and avoidance recommendations for several species that may be affected. Please note these recommendations do not address all listed species in Hawai'i and may not include the full suite of measures we would recommend for any specific project. We recommend project proponents, early in the planning process, request a complete species list for their particular project area and request technical assistance from us so that we may help them incorporate the appropriate avoidance and conservation measures into their project.

### Sea turtles

Any beach in the main Hawaiian Islands is potential nesting habitat for the endangered hawksbill turtle (*Eretmochelys imbricata*) and threatened green turtle (*Chelonia mydas*), collectively referred to as sea turtles. Sea turtles are susceptible to artificial lighting that is visible from the beach, barriers on the beach, disturbance of the nest site by humans and predators. Sea turtles come ashore to nest on beaches from May through September, peaking in June and July. Optimal nesting habitat is a dark beach free of human and non-native animal disturbance and free of barriers that restrict their movement. Lighting can disorient turtles away from the ocean. We recommend installation of shielded lighting around all shoreline development to reduce the direct and ambient lighting of beach habitats within and adjacent to the project site

### Hawaiian hoary bat

The endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) roosts on all main Hawaiian Islands in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be

disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to breeding Hawaiian hoary bats.

### **Blackburn's sphinx moth**

Adult Blackburn's sphinx moths (*Manduca blackburni*) feed on nectar from native plants, including beach morning glory (*Ipomoea pescaprae*), iliee (*Plumbago zeylanica*), and maiapilo (*Capparis sandwichiana*). Blackburn's sphinx moth larvae feed upon the native aiea (*Notbocestrum* sp.), which is found in dry to moist forests at elevations ranging from 1,500 to 5,000 feet, but also the non-native tree tobacco (*Nicotiana glauca*), which occupies disturbed areas such as open fields and roadway margins. If a project is planned for an area within the historical range of the Blackburn's sphinx moth in Maui Nui the following guidelines are examples of conservation measures that we may recommend for a specific project.

Blackburn's sphinx moth pupae may occupy the soil in the vicinity of larval host plants for a year or longer; therefore, close coordination with the Service, well in advance of ground-breaking, should be sought when a project has the potential to disturb habitat occupied by Blackburn's sphinx moth host plants. We recommend that a qualified biologist survey all project areas where disturbance of the ground or alteration of the vegetation may occur in addition to the area adjacent to these project areas for the presence native and non-native Blackburn's sphinx moth host plants. The locations and densities of the host plants should be mapped and the biologist should document the size and condition of the host plants, the presence of Blackburn's sphinx moth larvae, and any signs of larval feeding damage on plant leaves. We recommend these surveys for the Blackburn's sphinx moth and its potential host plants be conducted during the wettest portion of the year (usually November-April), approximately four to eight weeks following a significant rainfall event. In some cases, multiple surveys may be recommended.

Because adult Blackburn's sphinx moths may fly distances greater than 6 miles (10 kilometers) and range over large areas of the landscape, removal of Blackburn's sphinx moth host plants has the potential to adversely affect the moths. Projects should be sited to minimize impacts to the Blackburn's sphinx moth's native habitat. Loss of native and degraded Blackburn's sphinx moth habitat will need to be offset with implementation of projects to restore and conserve Blackburn's sphinx moth habitat on- or off-site. The Service can help the applicants identify the appropriate amount and location of offsetting restoration during project development. We recommend project proponents contact us early in their planning process so that we may provide this technical assistance.

### **Habitat Occupied by Listed Plants**

A qualified botanist should conduct botanical surveys prior to project implementation to document any listed plant species in the proposed development area. Botanical surveys should be conducted during the wettest part of the year when target species may be more prevalent. Projects should be situated to minimize disturbance to listed plants and habitat suitable for listed plants. Unavoidable permanent impacts to plant habitat should be offset by restoring and conserving, in perpetuity, habitat to improve the recovery potential for the species impacted by the proposed project. Unavoidable impacts to listed plants can be offset by propagating the listed plants and common native plants and outplanting them to areas that are

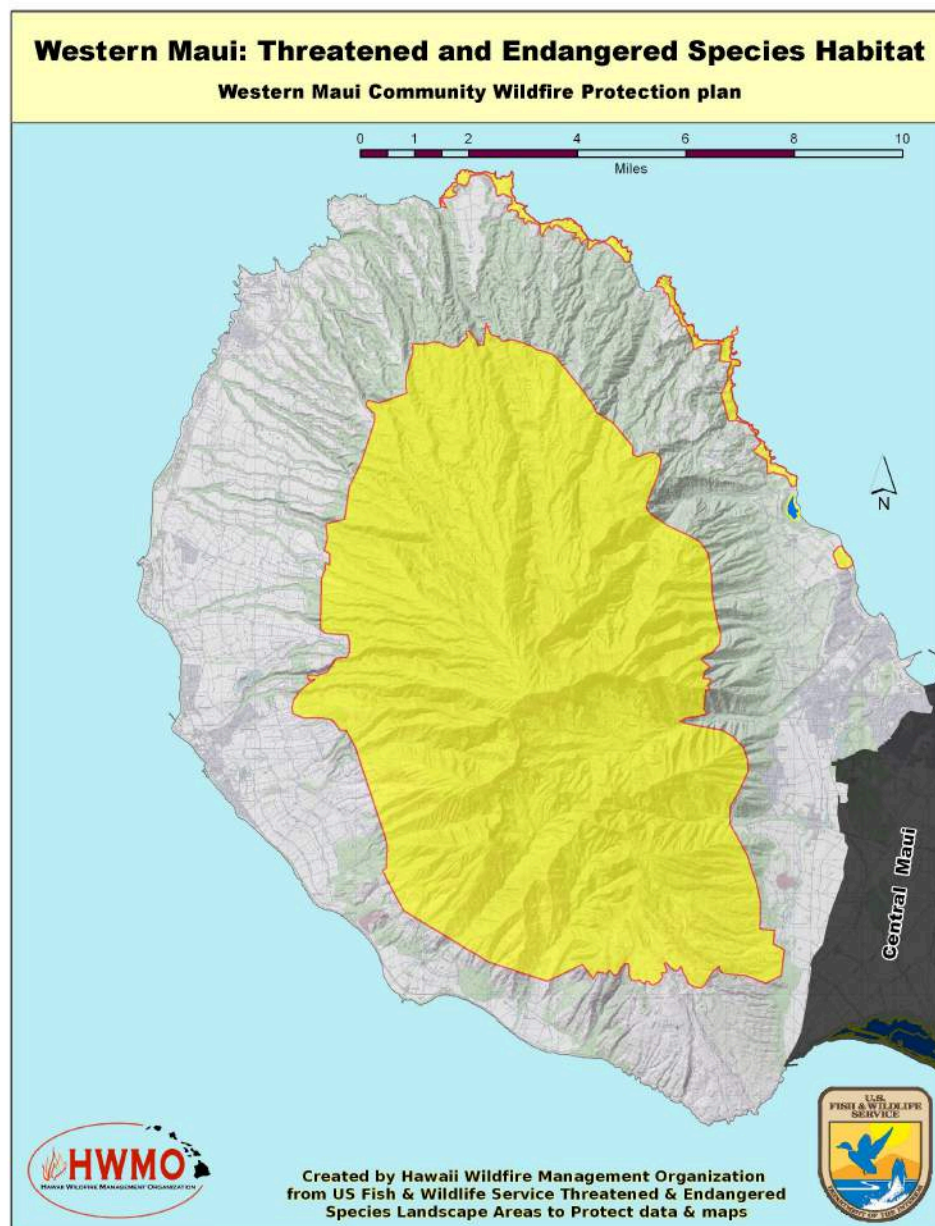


protected from ungulate browsing, wildfire, competition from invasive species, and other disturbances.”

#### Use of Native Plants

Hawai‘i’s native ecosystems are heavily impacted by exotic invasive plants. Whenever possible we recommend using native plants for landscaping purposes.”<sup>14</sup>

The map below (Figure 9) shows the U.S. Fish and Wildlife Service Threatened and Endangered Species Strategic Landscape Areas identified for protection. The following map demonstrates Threatened and Endangered Species and the associated habitat areas and types for the Western Maui CWPP planning area.



**Figure 9.** U.S. Fish and Wildlife Service Threatened and Endangered Species Strategic Landscape Areas to Protect in Maui.

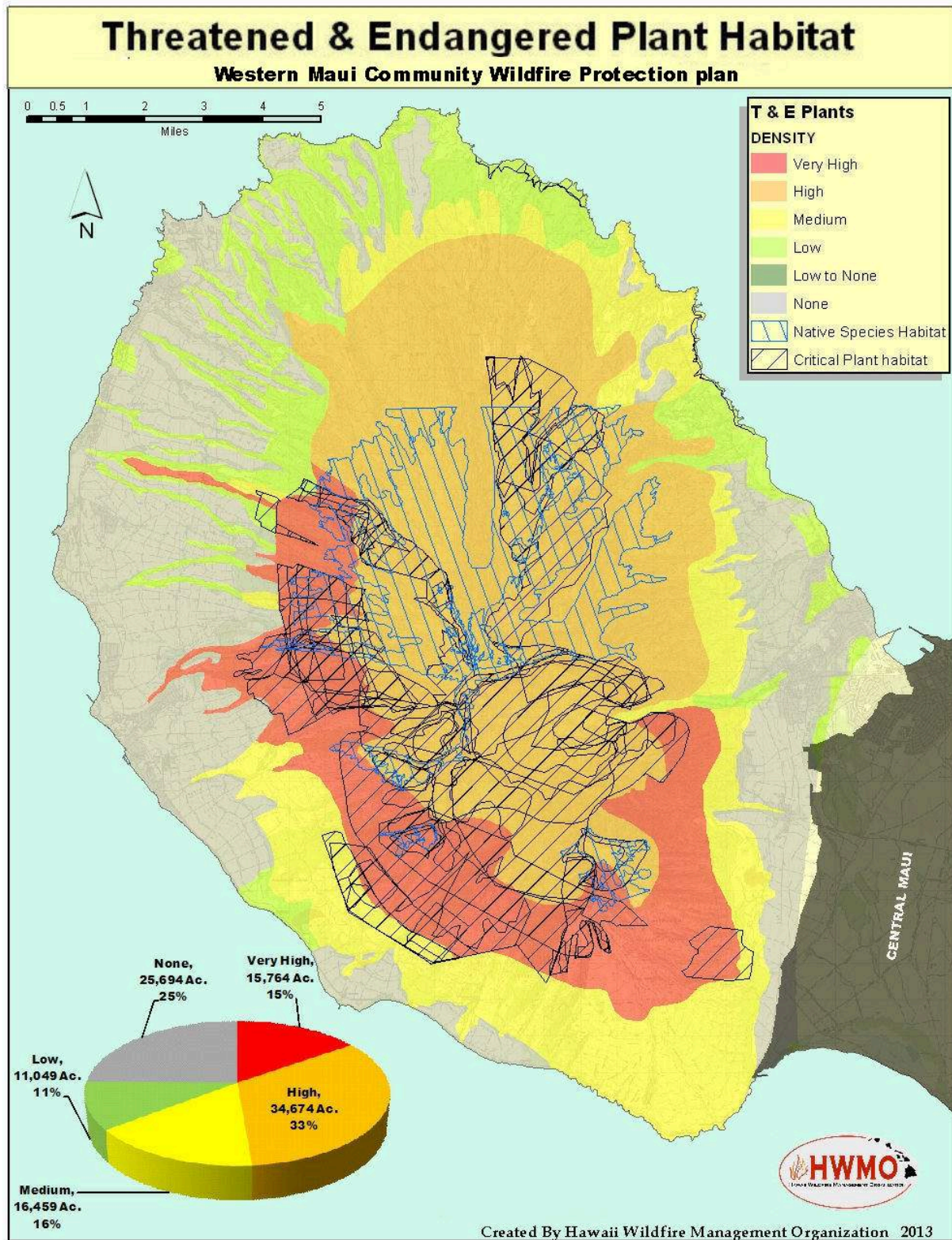


Figure 10. Threatened and Endangered Plant Habitat Map



## **Water Resources<sup>23</sup>**

Maui's population has doubled over the past 20 years and water demand continues to grow ahead of water supply. Large agricultural landowners have controlled most of the island's water resources for the last century. Resorts and housing have replaced much of the former agricultural water needs but there was not public access for this domestic water need. As a result, the large landowners formed private water companies. Approximately 12% of Maui's domestic water supply comes from private water systems (as of 2005). Maui uses about 70% ground water and 30% surface water for domestic use. Maui is the state's biggest user of surface water, the majority of which is used for agriculture, diverted into irrigation ditches.

The West Maui Mountains provide the majority of drinking water (80% of Department of Water Supply ground and surface water) for Western Maui and Central Maui (Kahului, Wailuku, Waihe'e, Mā'alaea, Kīhei and Pā'ia). Both Lāhainā and Wailuku's water source is a mix of groundwater and surface water. The aquifers produce a varying amount of water with 'Īao aquifer producing the most in the Western Maui CWPP planning area (see Figure 12). There are two Water Treatment Plants in the leeward side of Western Maui. One is situated above Lāhaināluna High School and the other one is in the Honokōwai area.

There are 14 reservoirs in Western Maui that could be used for Fire Suppression and no dip tanks. (Water Features are shown in Figure 11). The Maui County Department of Water Supply is currently mapping fire hydrant locations to be used for fire preparedness planning and response. This information will be available to the Maui Fire Department, DOFAW, and other agencies involved with emergency response. The hydrant locations cannot be shared with the general public so cannot be included in this plan.

There is a complex agricultural infrastructure of irrigation ditches and pipes that could be maintained and retrofitted with adaptive housings to increase the suppression capacity and water resource options for Maui Fire Department and DOFAW firefighters. This topic came up often through conversations related to the CWPP. As land use continues to shift away from agriculture, the legacy water infrastructure could serve an important function as a water resource with appropriate attention and funding.

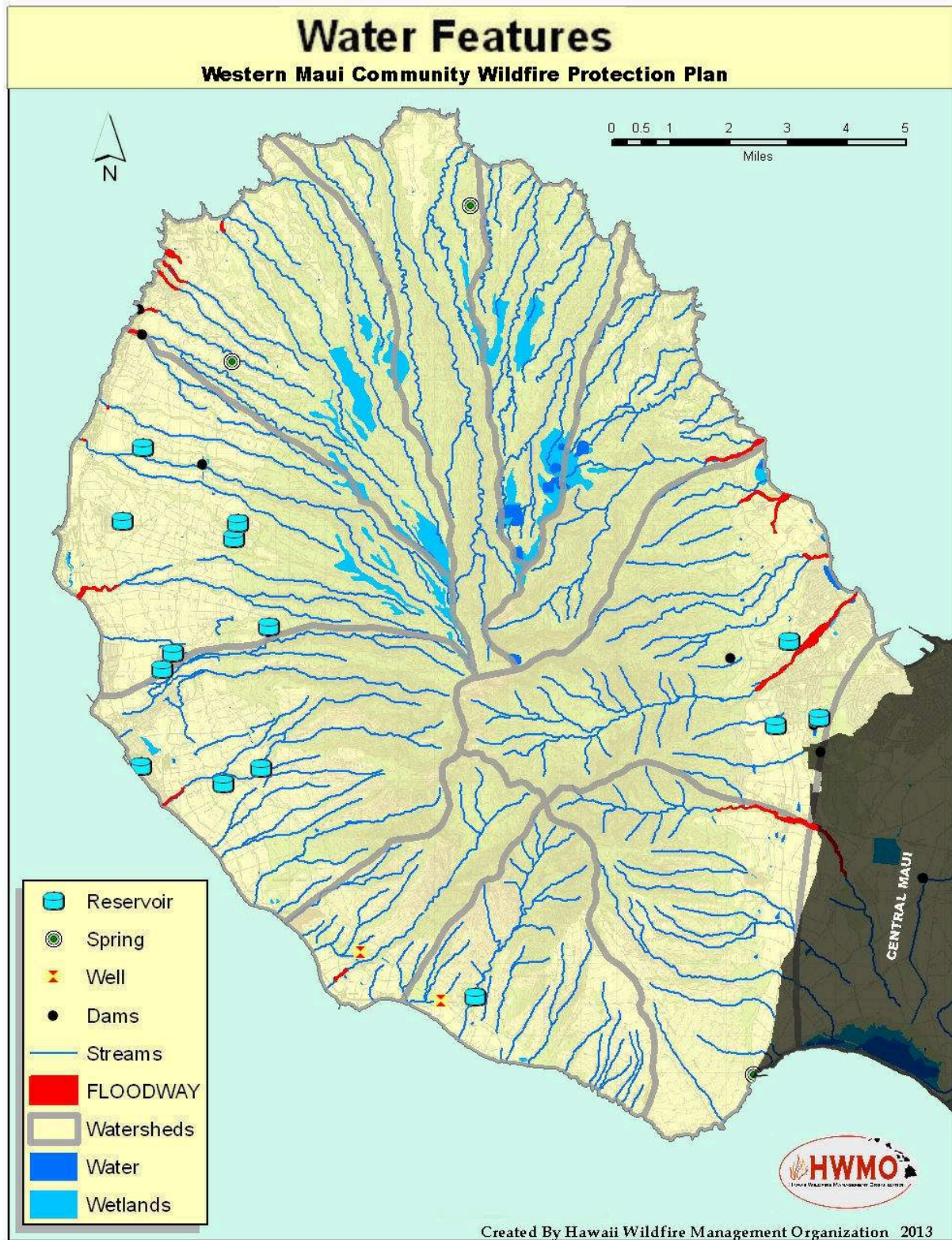
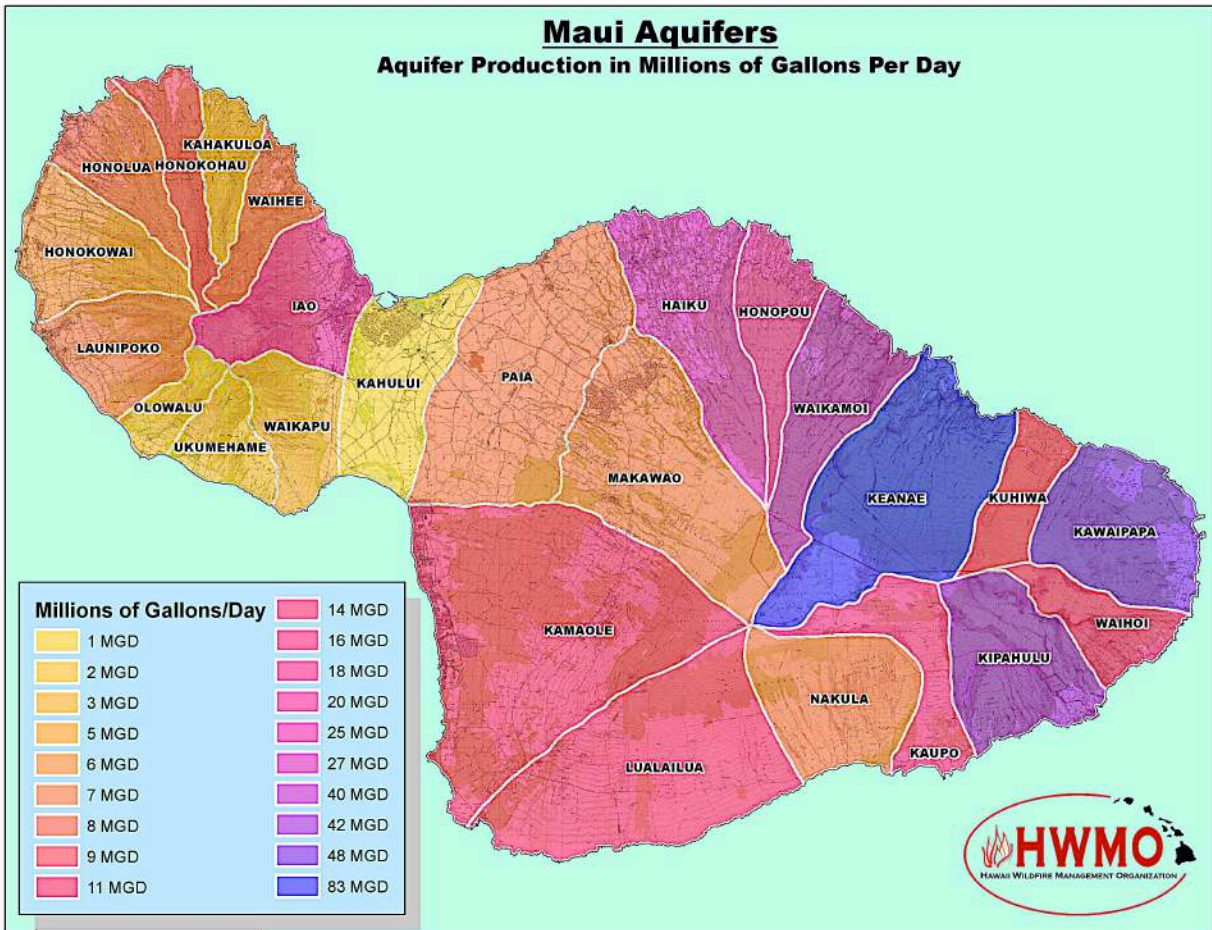


Figure 11. Water Features Map





**Figure 12.** Maui Aquifers Map

In terms of water source availability, most Western Maui subdivisions are considered “Low Hazard” and have a pressurized water source available at 500 gallons per minute at less than 1,000 ft. spacing. Camp Maluhia, and Honokōhau are "High Hazard" areas with fire protection water unavailable or offsite more than 20 minutes away round trip. See Water Source Availability Map in Figure 13 for subdivision fire protection ratings based on Western Maui location.

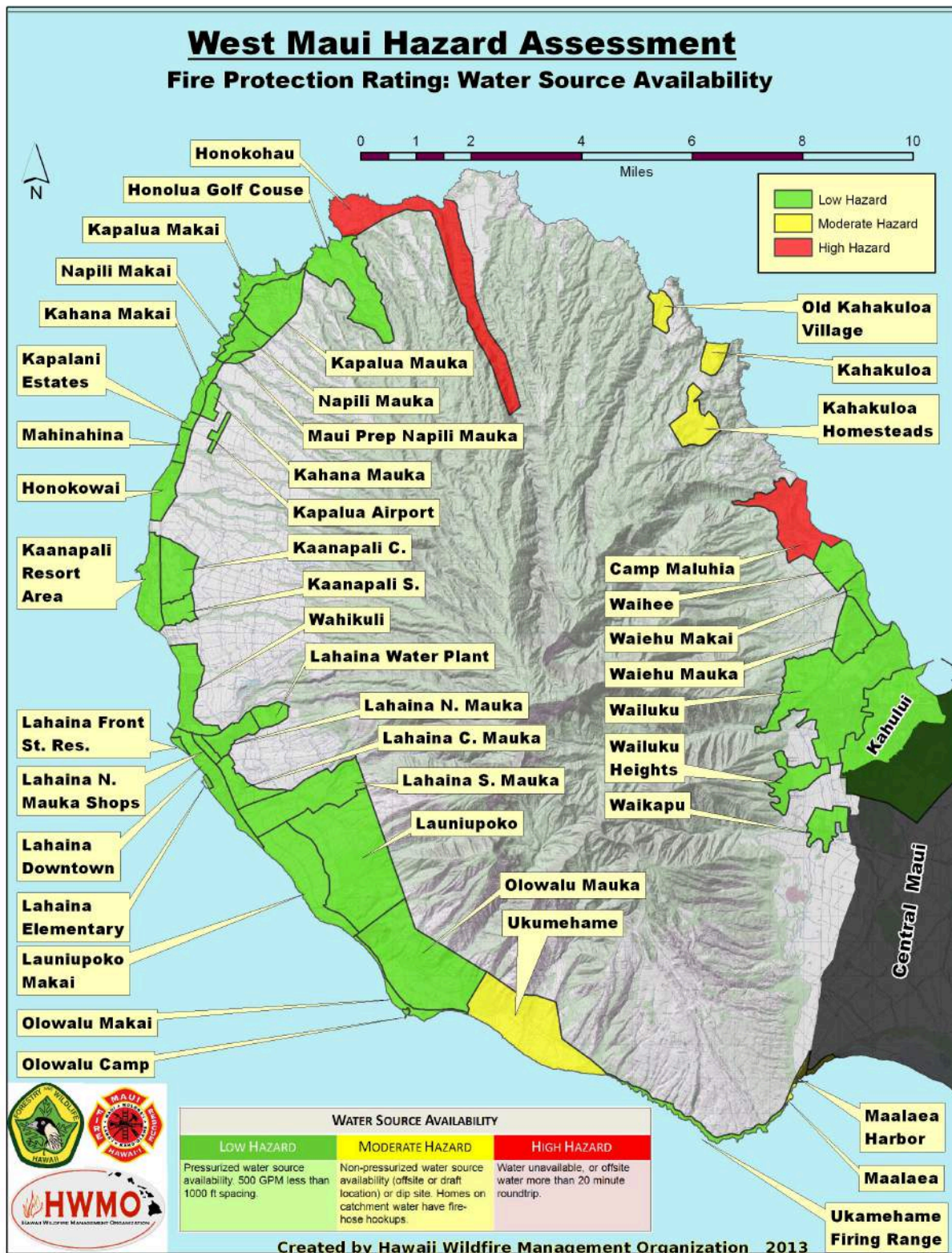


Figure 13. Hazard Assessment Map – Fire Protection Rating - Water Source Availability



## WHERE PEOPLE LIVE

In the Western Maui CWPP planning area, the majority of people live in the Wailuku region (windward side, Kahului is not included in this report) and Lāhainā area (leeward side). The majority of schools, stores, and government offices are centered around these two cities. Smaller communities are spread throughout the CWPP planning area and are discussed in detail below. The resident population within the planning area was 58,311 according to the 2010 census.

### Wildland-Urban Interface Communities

All of Western Maui is considered a Wildland-Urban Interface (WUI) due to the small total area and extensive lowland and mid-elevation areas that abut undeveloped mountain slopes. Wildfires from wildland areas threaten communities, and publicly accessed areas are frequent ignition locations for fires that threaten wildland environments. Western Maui contains diverse and rich community, cultural, and natural resources. Subdivisions and residential areas within the CWPP plan are spread widely throughout the area, and are serviced by two main urban centers, Lāhainā and Wailuku. The smaller communities are described on either the windward (or Wailuku side) or leeward (Lāhainā side) sides of Western Maui (see Figure 14 for residential areas and subdivisions as divided for the purposes of the CWPP and its hazard assessments).



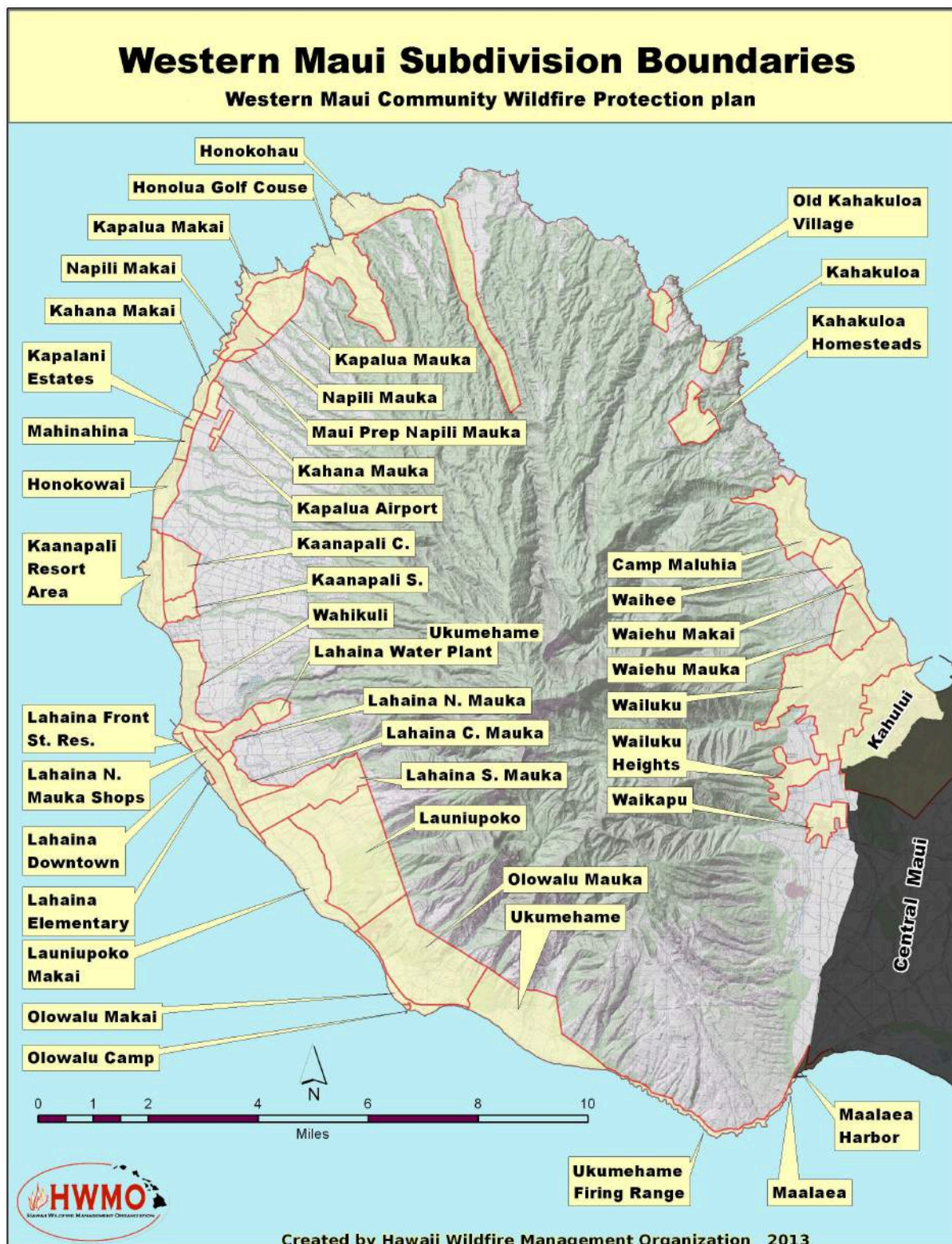
**Photo 5** (top right). West Maui Mountains (leeward view) with agricultural fields in foreground.

**Photo 6** (second from top). West Maui Mountains (windward view).

**Photo 7** (third from top, right). Example of unmanaged vegetation at the wildland-urban interface.

**Photo 8**. (bottom right). Wildland-urban interface example (Wailuku Heights) that shows proximity of major roads and wildland areas to communities on the wildland-urban interface.

**Photo 9** (above). Aerial view of Lāhainā with clear view of the wildland environment that abuts the developed area of the town and adjacent residential areas.



*Figure 14. Western Maui Community Subdivisions Boundary Map, as delineated for the purposes of the Western Maui CWPP.*



## **Leeward Communities<sup>23</sup>**

The leeward side of Western Maui became a tourist mecca in the mid-1960s and is considered the island's most bustling resort area. The region has seen significant growth in virtually all aspects of the community. Resident population has increased from 5,524 in 1970, to 10,284 in 1980, to 14,574 in 1990. More dramatic are the increases in visitor units over the same period, from 1,826 in 1970, to 5,357 in 1980, to 9,285 in 1990. There are over 30 hotels including famous Kā'anapali and Kapalua beach resorts, miles of beaches, snorkeling and dive spots, whale watching tours, ferry access to Lānaʻi and Molokaʻi, tour operators, boat tours, pineapple tours and many other tourist attractions.

## **Leeward Urban Center – Lāhainā**

### ***Lāhainā History<sup>24</sup>***

Lāhainā has a rich history. *Lele* was the ancient name of Lāhainā, which means "cruel sun" in the Hawaiian language, describing the sunny dry climate. Lāhainā is the former capitol of the Hawaiian kingdom from 1820 to 1845 and home to important royal sites. It was the royal capital of Maui Loa, 5th Moi of Maui, after he ceded the royal seat of Hāna to Kamehameha the Great. King Kamehameha III, son of Kamehameha I, preferred the town to bustling Honolulu. He built a palace complex on a 1 acre (0.40 ha) island, Moku'ula, in a fishpond near the center of town.

The first lighthouse was built here and the town became an important commerce and trade center in the 19th century. Lāhainā hosted whaling ship crews in the early 1800s and was considered the missionary headquarters soon thereafter. There were frequent conflicts between the whaling community and Christian missionaries living there. On more than one occasion the conflict was so severe that it led to the shelling of Lāhainā by whale ships. In 1824, at the request of the chiefs, Betsey Stockton started the first mission school open to all students. The town had many brackish ponds and springs and was a productive taro growing area.

Lāhainā is now a popular tourist destination with many stores and restaurants in historic buildings at the water's edge and the Front Street ranked one of the "Top Ten Greatest Streets." Banyan Tree Square features the extremely large banyan tree (*Ficus benghalensis*) planted on April 24, 1873, by William Owen Smith to commemorate the 50th anniversary of the arrival of Christian missionaries. It is also the site of the reconstructed ruins of Lāhainā Fort, originally built in 1832. Of particular historical and community importance are Banyan Tree Park and Old Lāhainā Courthouse, which contains Lāhainā Heritage Museum.

## **Leeward Subdivision Descriptions**

### ***Lāhainā***

Lāhainā town is the prominent hub of activity on the leeward side along with the resort areas of Nāpili -Kapalua and Kā'anapali. For the purposes of the CWPP, the northern boundary is near to the Mala boat ramp area near Jodo Mission Buddhist Park and North Lāhainā residences. The commercial and developed area includes schools, parks, historic structures, businesses, shopping, churches, cemeteries, and satellite government offices. Two independent medical providers, (Kaiser Permanente facility and Maui Medical Group) are located here. There is both a harbor and boat ramp in Lāhainā. Lāhainā averages only 13 inches of rain per year, much of which occurs between December and February. Lāhainā is densely populated along the coast and up Lāhaināluna Road. The town is set against a dramatic backdrop of active and fallow agricultural fields and the West

Maui Mountains.

South of town is Puamana, a more residential coastal community. This area contains Lāhainā Recreational Park, and the Lāhainā Aquatic Center above the Puamana section.

For the purpose of the CWPP, everything along Lāhaināluna Road is defined as Lāhainā mauka. This area contains a school complex and residential communities that were historically tied to agriculture and the associated mill. Formerly employed by sugar and pineapple operations, many residents have adapted to contemporary employment options in nearby resorts and service industries. The hillside “L” above town is maintained and burned annually, and has become a modern community-cultural practice. Additionally, David Malu’s grave (important figure in Hawaiian culture) is mauka (upland) of the “L.”

The wildland environment mauka of the highway includes fallow banana fields, active rangeland, diversified agriculture, and ecotourism (ziplines, ATV tours, waterslide). Additionally, there is State Forest Reserve, the Pana‘ewa section of the Natural Area Reserve, and privately owned Forest Reserve conservation land.

#### *Honokōhau*

Honokōhau is a rural valley community that is distinguished from its neighboring resort community of Kapalua. The distinction begins to take place near Honolulu Bay. The coastal zone and riparian conservation lands are part of the Ridge to Reef Initiative, which covers lands and nearshore waters from Honolulu to Wahikuli. The wildland environments adjacent to and upland from Honokōhau include fallow pineapple fields, small grazing operations, active pineapple harvesting, and smaller kuleana lands that contain diversified agriculture, kalo (taro) farming, and subsistence agriculture. Of note in this region is the Pu‘u Kukui Watershed Preserve, privately owned by Maui Land & Pineapple, which is part of Natural Area Partnership Program (NAPP) and has a conservation easement. Pu‘u Kukui Preserve borders Honokōwai watershed.

#### *Honokahua*

Honokahua is the proper place name for the region southwest and adjacent to Honokōhau. Included in Honokahua is the Kapalua resort, which has become the modern way to refer to the area, but borrows its name from a nearby bay. This area is home to Honolulu-Mokulē‘ia Marine Life Conservation District, which is one of the few marine preserves in Maui (and the only one in Western Maui). There are golf courses, fallow agricultural fields, small-scale residential diversified agricultural plots, kalo planting, kuleana lands, and some rangelands in the mauka portion of the area.

#### *Nāpili-Kapalua*

The Nāpili-Kapalua area is comprised mostly of resorts (makai) and fallow agricultural land (mauka). Upland of Kapalua Golf, The Plantation Course, is a small community called Honolulu Ridge, which is a low-density residential area (in contrast to the higher density Kapalua resort on the makai end).

#### *Kahana-Māhinahina-Honokōwai*

The Kahana-Māhinahina-Honokōwai area is a more residential area that includes a complex of resort and condo units. Its residents are diverse, being a mix of year-round working residents and seasonal residents, vacation rentals, and timeshares. The adjacent and upland wildland environments include

fallow agricultural lands, the Honokōwai section of Natural Area Reserve, a State Forest Reserve parcel, and The Nature Conservancy's Kapunakea Preserve, which also goes into the Kā'anapali area and is part of the State Natural Area Partnership Program (NAPP).

Many resort hotels and condominiums lie along the coast in this region, which includes a three-mile stretch of beach known for being a favorite among tourists and residents. The resort areas contain lodging, shops, dining, and recreational shoreline activities. These resort areas are landscaped and see numerous visitors each year. There is a golf course in the middle and upscale upland residences. Above the resort areas and the highway is Kā'anapali Coffee Farms, an agricultural subdivision with low-density scattered large lots with upscale homes designed to belong to an agricultural coffee cooperative. The adjacent wildland environments include fallow cornfields, active coffee farming, and fallow sugar cane (although sugar cane in recent history only went as far north as Honokōwai stream with pineapple dominating the areas north of that).

### *Wahikuli*

The northern section of Wahikuli is Leialī Parkway, a Department of Hawaiian Homelands (DHHL) subdivision that was established in 2004. South of this is an older residential community that contains homes built in the 1950s and earlier. The southern end of Wahikuli contains the Cannery Mall area and a commercial/industrial area. Diverted perennial Kahoma stream is the approximate boundary line. The Wahikuli area is home to many coastal parks.

Located upland of the highway is the Lāhainā Civic Center, a multipurpose sports and recreation facility. It houses many municipal operations and facilities, such as county satellite offices, a courthouse, fire department, post office, and police station. There are fallow lands adjacent to this area. The mauka wildland environments include fallow sugar cane, active cattle ranching, rangeland, horses, a privately owned forest reserve parcel, and conservation-zoned watershed land forest reserve.

### *Launiupoko*

The makai area of Launiupoko contains actively grazed rangeland, some fallow areas, and diversified agriculture on several residential parcels. There is a residential community located at the base of Launiupoko Valley that was developed before many other areas on the leeward side. Additional residential developments above Lanuiopoko Beach Park include the Mahanalua Nui, Mākila, and Pu'unoa subdivisions. Also in the mauka area are a State Forest Reserve parcel and a privately owned large landholding.

### *Olowalu*

Olowalu is currently a small community but is in the community planning and entitlement stages. It will likely become much larger once development plans are implemented. Makai of the highway, Olowalu contains upscale large lots and a conservation area that is part of State unencumbered land. Also along the coast are Olowalu camp, with a slightly higher density of residences/development, and Olowalu Point, which is the location of the historic sugar mill and commonly referred to as 'Olowalu Landing.'

The upland region of Olowalu contains the Olowalu stream basin and an active cultural resource protection effort. The upland area includes diversified agriculture, a cinder pit for mining, a paintball course, an old decommissioned dump and a current transfer station for trash, yard waste, and

recycling. The residential lots in this area are higher density than those in the makai part of Olowalu. Its wildland environments include fallow land (formerly sugarcane) that is now intermittently used as rangeland. The mauka region above Olowalu is comprised of the Līhau section of the State Natural Area Reserve.

### *Ukumehame*

Ukumehame takes its name from the huge valley that can be seen directly behind it which carves a spectacular "V" in the West Maui Mountains. There is development infrastructure in place for future development, however there are only a small number of residences in the valley and subdivision as of early 2014.

The makai portion of Ukumehame contains coastal beach parks and the Ukumehame firing range. Na Ale Hele maintains the Lāhainā Pali Trail, which connects Ukumehame and Southern Waikapū. The mauka portion is State-owned Forest Reserve and is the site of a Nēnē (endemic Hawaiian goose) release area and effort.

### *Mā'alaea*

Mā'alaea is a small condo resort community with a marina and harbor. It lies adjacent to active sugar cane fields. The area houses Maui Ocean Center, Haycraft Beach Park, and Na Ale Hele's Lāhainā Pali Trail, which extends from Ukumehame to Southern Waikapū. The wildland environments of Mā'alaea and Southern Waikapū contain active grazing in the lowlands on privately owned land and sugar plantations. The mauka area contains a wind farm owned by First Wind, as well as State Conservation District land. This area has fallow rangeland. Higher up mauka is Maunawainui Plant Sanctuary within the State Forest Reserve, Mauka of that land is privately owned. Residents here use both Wailuku and Lāhainā as their urban center, as Mā'alaea sits between them.

## **Windward Communities**

### **Windward Urban Center – Wailuku** <sup>16, 25, 26</sup>

#### ***Wailuku History***

During pre-contact Hawai'i, this area housed Maui's largest population and center of power. The Ūao Valley is the site of King Kamehameha's victory in 1790. In the mid-1800s, New England missionaries came to the island with their religious beliefs, Western tools, and agricultural methods. The sugar cane industry and sugar mill was established in the Wailuku region in the 1860s. Ditches were dug to bring water from the mountains to irrigate the growing sugarcane industry. As the sugar cane industry grew, so did Wailuku with movie theaters, vaudeville, bowling alleys, hotels, poi factory, beautiful homes and offices. In the late 1960's sugar cane values fell yet Wailuku continues to be a commercial and government center.

There are two ancient heiau near Wailuku, the Haleki'i and Pihana Heiau. They are the most accessible of the remaining pre-contact Hawaiian structures of religious and historical importance in the Wailuku-Kahului area. Haleki'i is considered to be a chief's compound with thatched hale and a family heiau. Pihana heiau is considered a luakini or human sacrifice heiau and the "major" heiau in the area.

#### **Windward Subdivision Descriptions**



### *Wailuku*

Wailuku and Kahului are the prominent urban centers on the Windward side, but only Wailuku is included in the Western Maui CWPP planning area. Wailuku is a commercial center, Maui's county seat, and government center. It houses numerous government offices, commercial office buildings, and residences. There are a wide variety of businesses and many historical and cultural attractions in Wailuku including: Ka'ahumanu Church, the Bailey House, Pihana Kalani Heiau, Tropical Gardens of Maui, and the 'Iao Theater. In the early 20th century Wailuku was the main tourist destination on Maui. Based at the foot of the West Maui Mountains, Wailuku is the gateway to 'Iao Valley, once a sacred burial ground for Hawaiian chiefs and home to the 'Iao Needle. The population of Wailuku was 15,313 at the 2010 census.

The north end of Wailuku includes South Waiehu –Paukūkalo Park area. For the purposes of the Western Maui CWPP, Kahikili Hwy is approximately the dividing line. The two heiau mentioned above are located in this area. Southern Wailuku, namely Wailuku Heights and its surrounds, was originally developed during the agricultural era. This area contains Wailuku Heights Park, a historic downtown that houses the historic and cultural sites and events mentioned above, community parks with ball fields and recreation facilities, schools, cemeteries, and a hospital complex. The wildland environment includes post-agricultural fallow sugar cane.

Mauka Wailuku includes 'Iao Valley State Park and Kepaniwai State Park. In the high-density valley of 'Iao Valley there is diversified, mixed agricultural. Above the highway, there is active kalo farming adjacent to streams and mixed agricultural zoned residential areas, such as in Wailuku Country Estates. Mauka Wailuku also contains scattered rooster farms. Home to the State Forest Reserve Parcel called Black Gorge, the uplands above Wailuku are rich with State Conservation District lands, forest reserves, and prime watershed land and resources.

### *Waikapū*

Waikapū has an active community association and a park (Waikapū Park) with playing fields, baseball diamonds, and more. South Waikapū has a cement aggregate mine, golf courses, sugar farms, ecotourism (ziplines), mixed agriculture, organic vegetables, and Maui Tropical Plantation, making it an agricultural showcase destination. The mauka area is home to Texas longhorn cattle, kalo farms, and privately owned forest reserve. The northern Waikapū watershed area is used for agricultural activities, to include the active management of herds of horses, goats, sheep.

### *Waiehu*

For the purposes of the CWPP, Waiehu makai is considered anything makai of Kahikili Hwy up to the town of Waihe'e. This area includes a golf course and two subdivisions- Waiehu Kou and Department of Hawaiian Homelands land. This is an older community with traditional neighborhoods, Waiehu Beach Park, and recreational sport fields. Mauka of the highway, kalo is being farmed adjacent to streams. The mauka portion of Waiehu contains macademia nut orchards, mixed use agriculture, rooster farms, and recently active cattle ranchland. The mauka Forest Reserve above contains both State and privately held parcels.

### *Waihe'e*

Waihe'e, commonly referred to as the Village of Waihe'e, is a rural community that stretches from the center of the village north and includes several homes along the road and river basin to the basin of the Waihe'e river. The makai area contains Waihe'e Beach Park and the Hawaiian Islands Land Trust (HILT) Coastal Dunes and Wetlands Refuge, which utilizes active sheep and cattle on the

historical pasture portion of the land. Mauka of the highway, there is mixed use agriculture, active macademia nut plantation operations, and active kalo farming. The mauka conservation land includes both State and private parcels, as well as the Maui Forest Preserve, for which the County of Maui has undivided interest.

#### *Kahakuloa region*

Maluhia and Kahakuloa Village both sit on the north windward side of the Western Maui CWPP planning area. These are more rural areas with smaller and less frequent residential clusters. The highway along this coastline contains hairpin turns and steep cliffside drops to the ocean, making the area less frequented by island visitors and much more isolated.

The Maluhia area has mixed agriculture and active cattle ranching. It contains cultural resources, heiau, and the Na Ala Hele Waihe'e Ridge Trail. The Maluhia Boy Scout Camp is located here, as well as State Forest plantation and game bird hunting areas. The subdivision of Maluhia Country Ranches was established in the early 2000s and contains large agricultural zoned parcels 2 acres and larger. The Cliffs at Kahakuloa and Seashorse Ranch are additional subdivisions in the area.

Kahakuloa Village also has mixed agriculture, as well as kalo farming. Kahakuloa Village is a small isolated community. Most residents work in and around the village. There are no gas stations or restaurants in this area. It is an area steeped in tradition and cultural practices. The southeast side of Kahakuloa is actively ranched. The northwest side is State Game Management area. The mauka environs contain the Kahakuloa section of West Maui Natural Area Reserve and State Forest Reserve. On the northwest Kahakuloa coast is the famous Nakalele Blowhole.

Within each of the above areas are subdivisions titles used in the Hazard Assessment Maps used to delineate the Wildfire Hazards in each community. Subdivisions covered by the Western Maui CWPP planning area are delineated in Figure 14 above.

## COMMUNITY RESOURCES

### Schools<sup>27</sup>

The CWPP planning area includes Hawai'i Department of Education's' Baldwin-Kekaulike-Maui Complex and Hāna-Lāhaināluana-Lāna'i-Molokai Complex. Total enrollment is 3,228 for the 2012-2013 school year for the Lāhaināluna High School Complex that includes: Princess Nahienaena Elementary School, Kamehameha III Elementary School, Lāhainā Intermediate School and Lāhaināluna High School. The total enrollment for the Baldwin-Kekaulike-Maui Complex is 9,499 and includes the following schools: Baldwin High School Wailuku, Kahului Elementary School, Lihikai Elementary School, 'Īao Intermediate School, Pōmaika'i Elementary School, Maui High School, Maui Waena Intermediate School, Waihe'e Elementary School, and Wailuku Elementary School.

Private schools enrollment includes Maui Preparatory Academy (Nāpili) 166 students and St. Anthonys (Wailuku) 354 (K-12) students. The University of Hawai'i Maui College has 4,527 students enrolled as of 2011. See Figures 15 and 16, which map the locations of all schools on both the windward (east) and leeward (west) sides of the Western Maui CWPP planning area.

### Emergency Services

Emergency management resources for the CWPP area are detailed in the Emergency Management chapter of this document. They include police, fire, and medical services. Wailuku has two hospitals and other medical centers. There are two Urgent Care facilities and a Medical Center in Wailea, north of Lāhainā. There is a Fire Station in Lāhainā, Nāpili, and Wailuku. There is a Police Department in both Lāhainā and Wailuku. See Figures 15 and 16 below for exact locations.

### Municipal Infrastructure

Both Lāhainā and Wailuku have fire stations, banks, post offices, many stores, restaurants and grocery stores. The region has electricity and telephone service, as well as cable television and high-speed broadband. Cell phone towers seem to be only in Wailuku area but all cell phone providers have good coverage in Western Maui except on the North end of the island near the Blowhole to Honokōhau where coverage is spotty. There is County water distributed to most residences in this region, yet there are some people who live in remote areas and rely on catchment water. For location details see Figures 15 and 16 below.

### Park Facilities and Forest Reserves<sup>28, 29</sup>

State Park facilities operated by the Department of Land and Natural Resources (DLNR) within the CWPP planning area include two state monuments: Haleki'i-Pihana Heiau State Monument near and 'Īao Valley State Monument; Ukumehame Beach State Park and Launiupoko State Park. The West Maui State Forest Reserves and Natural Area Reserves (NARS) make up large areas on northern and southern sections of the West Maui Mountains and smaller long sections along leeward and one on the windward side of the mountains. The County of Hawai'i manages and owns facilities at D.T. Fleming Park, Hanaka'ō'ō Park, Kamehameha Iki, Kelaweā Mauka Makai Park, Lāhainā Aquatic Center, Lāhainā Banyan Court, Lāhainā Civic Center, Lāhainā Recreation Center, Launiupoko Beach Park, Malu Ulu Olele Park, Nakalele Lighthouse, Nāpili Park, Pāpalaua Wayside Park, Paunau Park, Pōhaku Park, Wahikuli Terrace Park, Ukumehame Beach Park, Waihe'e Park. Numerous shoreline areas are accessed for recreational activities throughout the CWPP plan area. See Figure 17 for Park locations.

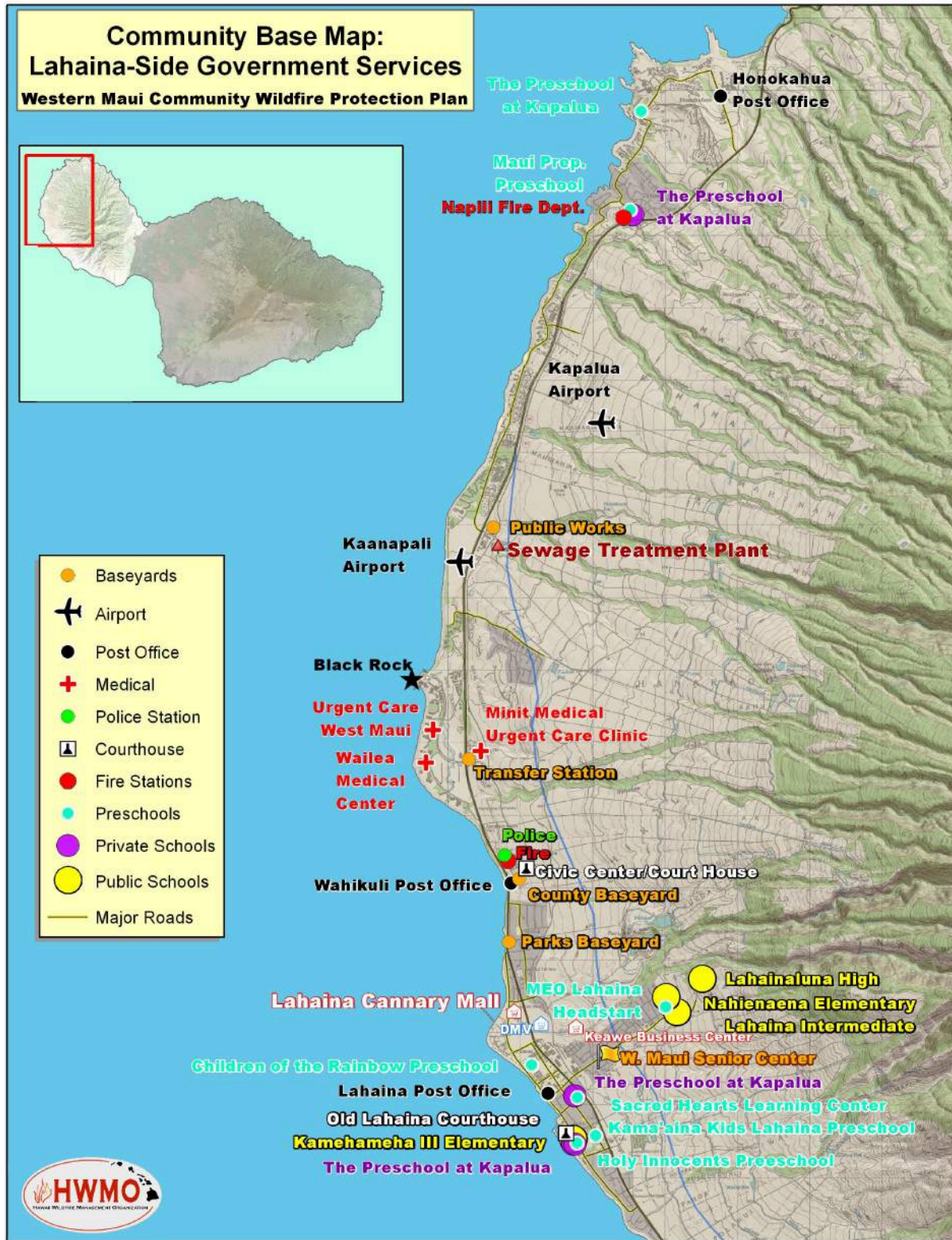


Figure 15. Community Base Map— Leeward/Lāhainā Area Schools, Hospitals, Government Offices & Airport Map



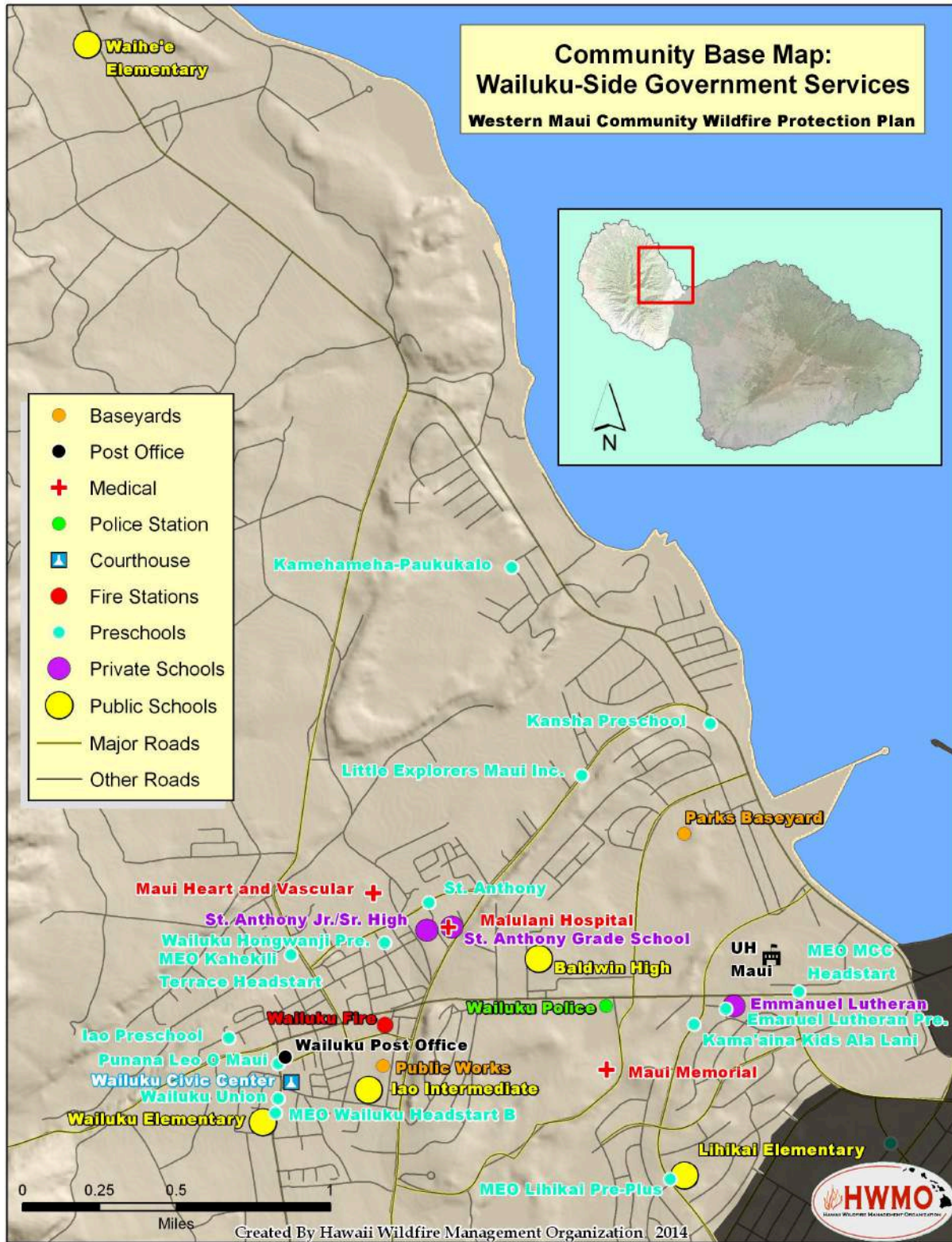


Figure 16. Community Base Map – Windward/Wailuku Area Schools, Hospitals, Government Offices, & Airport Map





# EMERGENCY MANAGEMENT

## FIRE SUPPRESSION CAPABILITIES AND RESOURCES

Initial response to the majority of wildfires (as well as all medical and other emergencies) is the responsibility of the Maui Fire Department. State Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife responds to wildfire events on State lands and provides additional wildland fire fighting assistance when State lands are threatened and/or mutual aid agreements are invoked.

Maui Fire Department has the following equipment available for round-the-clock use in the Western Maui CWPP planning area. Additional resources and equipment are spread across the entire County of Maui and are made available when needed if they are not already in use.

Maui Fire Department CWPP Planning Area-Specific Suppression Resources	
Lāhainā Fire Station:	E-3 1500 gpm, pump n roll, 750 gal capacity w/ 30 gal foam concentrate tank, CAFS capable, off road. T-3 500 gpm, pump n roll, 2000 gal capacity, 30 gal foam concentrate tank, CAFS capable, off road. 9 - 11 personnel per day on duty.
Nāpili Fire Station:	E-11 1000 gpm, pump n roll, 700 gal capacity, 30 gal foam concentrate, CAFS capable, off road. M-11 250 gpm, pump n roll, 300 gal capacity, 20 gal foam tank, off road. 4-5 personnel per day on duty.
Wailuku Fire Station:	E-1 1250 gpm, 750 gal capacity, 30 gal foam tank, CAFS capable, limited off road. M-1 250 gpm, pump n roll, 300 gal capacity, 20 gal foam tank, CAFS capable, off road. 4-5 personnel per day.

**Table 1.** Maui Fire Department CWPP Planning Area-Specific Suppression Resources

The following DLNR-DOFAW wildland fire suppression resources are available for use in the event

of a wildfire in the Western Maui 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 2.** *Division of Forestry and Wildlife (DLNR – DOFAW) Suppression Resources*

## EMERGENCY MANAGEMENT DOCUMENTS AND PLANS

The CWPP is non-regulatory and cooperative in nature. The plan provides (1) a foundation for increased communication, coordination and collaboration among agencies and the public, (2) identification and prioritization of areas for hazardous fuel reduction projects and wildfire mitigation actions, and (3) assistance meeting federal and state planning requirements and qualifying for assistance programs<sup>30</sup>.

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

### Maui County:

West Maui Community Development Plan<sup>16</sup>  
County of Maui Drought Mitigation Strategies<sup>31</sup>  
County of Maui Multi-Hazard Mitigation Plan<sup>32</sup>  
County of Maui Water Use and Development Plan Draft<sup>33</sup>  
Maui Island Plan<sup>34</sup>

### State of Hawai'i:

State Drought Plan and the County Drought Mitigation Strategies<sup>35</sup>  
State of Hawai'i Multi-Hazard Mitigation Plan<sup>36</sup>



## **MULTIPLE-AGENCY AGREEMENTS**

Within the Western Maui CWPP planning area, there are two coordinating groups 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 Civil Defense, drought and other fire-hazard conditions are constantly monitored and actions such as burning bans and closures are instituted when needed. The public is informed of these restrictions by radio announcements and newspaper notices.

The West Maui Fire Task Force is the second coordinating group in the area, and consists of fire response agencies, resource management entities and initiatives, municipal agencies, and private landowners. Both the West Maui Fire Task Force and the Maui Wildfire Coordinating Group were established to further inter-agency cooperation, communications and coordination, and to implement directions and standards for incident management activities in Western Maui.

HWMO has worked in direct partnership with the West Maui Fire Task Force to develop the Western Maui CWPP. CWPP collaborators within the Task Force include:

- Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife and Division of Aquatic Resources
- West Maui Mountains Watershed Partnership
- Maui Fire Department
- Maui County Department of Public Works
- Ridge to Reef Initiative
- Maui County GIS Division
- Maui County Planning Department
- Maui County Mayor's Office
- Pu'u Kukui Preserve (Maui Land and Pineapple Company)
- West Maui Land Development Company

## **EVACUATION PROTOCOLS AND NEEDS**

Evacuation protocols for neighborhoods and areas in Western 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 Western 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:

- DISASTER PREPAREDNESS FOR MAUI COUNTY: A CITIZEN'S GUIDE  
<http://co.maui.hi.us/documents/10/disaster.PDF>
- Hurricane Information and Tips  
<http://www.co.maui.hi.us/documents/10/HURRICANE%20INFORMATION%20AND%20PREPAREDNESS%20TIPS.PDF>
- Tsunami maps information, and tips  
<http://www.co.maui.hi.us/documents/10/Tsunami1.PDF>

# PLANNING PROCESS

## CWPP PROCESS AND METHODS

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

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

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

This CWPP also followed these guidelines and additionally satisfies the requirements of the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation program and the National Fire Plan (NFP).

## PARTICIPANTS

### State and Local Agencies

The representatives of the state and local agencies that have jurisdictional responsibilities in the vicinity of the Western Maui CWPP planning area, and who have been involved in the development of the Western Maui CWPP are:

Agency	Representative(s)
Maui County Fire Department	Jeffrey Murray, Fire Chief Paul Haake, Kelan Puaa, Fire Captains Eddie Taomoto, Battalion Chief James Kino, Retired Battalion Chief
Maui County GIS Division, Maui County Department of Public Works	Rebecca King Eugene (Mike) Tihada
Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	Wayne Ching, State Protection Forester Lance De Silva, Maui DOFAW Forestry Manager Lisa Hadway, Administrator, DLNR-DOFAW
Department of Hawaiian Homelands	Mona Kapaku, Maui District Operations Manager

**Table 3.** CWPP Participants: State and Local Agencies

### Decision Makers

The decision-makers contacted for input and involvement in the development of the Western Maui CWPP are represented in the following table. HWMO met with each individually, and many were also involved in agency-focused or public meetings as well.

Requirement	Agency or Organization	Name
Local/County Government	Maui County Civil Defense Agency, Mayor's Office, County Council Members	Anna Foust, Zeke Kalua, Michael Victorino, Elle Cochrane

**Table 4.** *CWPP Participants: Decision Makers*

### Federal Agencies

No federal agencies are involved in managing the land and fires in the Western Maui CWPP planning area. However, the following federal agencies were consulted for area-specific and regional fire and environmental information and expertise:

Agency	Representative(s)
National Park Service	James Courtright, Fire Management Officer
US Fish and Wildlife Service	Dawn Bruns – Acting Assistant Field Supervisor Section 7 & Habitat Conservation Plans Andrew Kikuta – Fire Management Specialist

**Table 5.** *CWPP Participants: Federal Agencies*

### Interested Parties

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

Interested Parties	Affiliation (if any)
Large Landowners	Maui Land and Pineapple Company, The Nature Conservancy, West Maui Land Development Company
Local Associations and Organizations	West Maui Mountains Watershed Partnership, Ridge to Reef Initiative, West Maui Taxpayer's Association, Waiehu Kou 3 Homeowners Association, Hawaii Wildfire Management Organization
Private Citizens, Public At Large	Convergent Conservation (Landscape Company) staff, Homeowners, Resort Representatives, Business Owners

**Table 6.** *CWPP Participants: Interested Parties*

### Public Meetings & Outreach

In addition to individual meetings with decision makers and private landowners, group meetings were held with agency representatives, organizations, and the public as follows:

- November 19, 2013 - West Maui Fire Task Force meeting
- November 20, 2013 - West Maui Mountains Watershed Partnership meeting
- January 22, 2014 - Two public meetings at Lāhainā Civic Center (1 pm & 5:30 pm)
- January 23, 2014 - Two public meetings at Wailuku Community Center (1 pm & 5:30 pm)
- January 28, 2014 - Public meeting at Kapalua Village Community Center (5:30pm)
- January 29, 2014 - Public meeting at Waihe'e Elementary School (5:30pm)



**Photo 10.** (above left) West Maui Fire Task Force initiated the CWPP development for Western Maui. Pictured here- participants pose together after providing input and expertise early in the CWPP process.

**Photo 11.** (above right) West Maui Mountains Watershed Partnership members are pictured here, prioritizing concerns and recommended actions for addressing wildfire concerns.

Valuable public and agency input was acquired during each of the above meetings. The meetings were supported and facilitated by HWMO staff, and attended by: homeowner's association members, Maui Fire Department representatives, West Maui Fire Task Force members, West Maui Taxpayers Association, Department of Hawaiian Homelands (DHHL) staff and beneficiaries, and numerous residents from subdivisions throughout the Western Maui CWPP planning area.

The meeting agenda included a short slide presentation by Elizabeth Pickett, HWMO Executive Director, about the CWPP planning process and wildfire history and impacts in the Western Maui CWPP planning area. The presentation was followed by a public input process that consisted of facilitated small group sessions during which participants discussed and listed priority wildfire concerns and recommended actions (based on information provided covering fire history and trends in the area, available wildfire suppression resources, subdivision hazard assessment results, wildfire impacts on communities and natural resources, and their own experience and expertise). Small group sessions were then summarized and presented to the larger group. All participants received three stickers to place next to their top three concerns/actions listed on the small group input posters. Finally, each person was given three more stickers to place on the enlarged Western Maui map in order to indicate their most valued areas and/or community resources (home, park, cultural site, stream, etc.).



**Photo 12.** HWMO Executive Director began each community meeting with an overview of the CWPP planning process and information to consider when providing input about wildfire concerns and recommended actions.

Attendees of the meeting enthusiastically supported the CWPP plan and its objectives, noting that Western Maui residents are very concerned with local wildfire issues and eager to begin reducing the risk of wildfire. HWMO is facilitating continued dialogue between residents and agencies regarding wildfire issues, and will post the plan on its website for public use.



All participating parties have been invited to review the plan before it is finalized. The plan will be revisited as needed and updated with new projects and priorities.

### Public Service Announcements

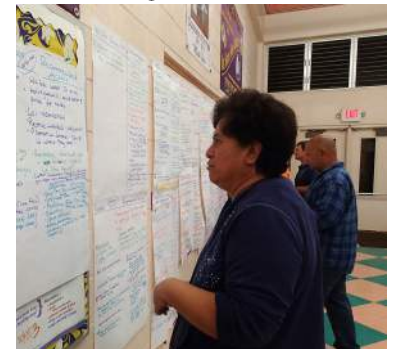
Public Service announcements regarding wildfire risk and the CWPP were published in Wailuku and Lāhainā newspapers. Radio ads were purchased through Pacific Radio Group and aired during peak times on two popular stations. HWMO staff members were interviewed on a talk radio show hosted by the Governor's liaison to Maui. Community meetings were posted on the following web sites: Maui NOW, Maui News, Lāhainā News, Calendar Maui, Lāhainā Town Action Committee's Facebook page, and County Council member Elle Cochrane's web site. The PSA was also emailed to West Maui Taxpayers Association members. Public comments were accepted beginning in November 2013.



**Photo 13.** (above left) As part of the public input process, public participants who attended the CWPP meetings worked in small groups to identify wildfire concerns and to prioritize recommended actions.

**Photo 14.** (above right) Some groups even developed immediate action plans, such as the group that attended the meeting in Kapalua.

**Photo 15** (below left) Lāhainā participants select areas and resources of high value on the community base map.



**Photo 16 and Photo 17.** (above middle and right) Community meeting participants review HWMO-provided wildfire background information and public statements from other meetings to better inform their own input.

# WILDFIRE RISK ASSESSMENT

## PURPOSE AND METHODS

The purpose of the community risk assessment is to:

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

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

- Step 4- Establish a Community Base Map (see Background Chapter, Figures 15, 16, 17)
- Step 5a- Develop a Community Hazard Assessment (see below and Appendices B and C)
- Step 5b- Identify Overall Community Priorities (see Hazard Reduction Priorities Chapter, below)

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

## SUBDIVISION HAZARD ASSESSMENTS

HWMO staff traveled every road in the Western Maui CWPP Planning area to assess 35 wildfire hazard characteristics. Maps demonstrating hazard levels for each hazard characteristic are included in Appendix B. Totals of these 35 maps were combined in each category to comprise the following 5 maps: Subdivision Hazard; Vegetation Hazard; Building Hazard; Fire Environment Hazard; and Fire Protection Hazard (Figures 18-22). Assessment scoring rubrics for each hazard characteristic is also included in Appendix C. Maui County GIS provided their maps and GIS data layers to support the mapping effort.

Subdivisions covered by the hazard assessments follow the boundaries established by HWMO and DOFAW for the purposes of this CWPP. They are demonstrated in Figure 14.

The following table (Table 7) provides an overview of the hazards assessments conducted by HWMO, as well as which hazards were grouped together to create overall maps per Hazard Category. Overall maps are included below (See Figures 18-22). Individual hazard maps are included in Appendix B.

Category Hazard Rating (Maps included below)	Individual Hazards per Category (Maps included in Appendix B, Rating Key in Appendix C)
Subdivision Hazard Total	<ul style="list-style-type: none"> <li>• Fire Service Access</li> <li>• Home Setbacks</li> <li>• Ingress/Egress</li> <li>• Private Landowner Firewise landscaping &amp; Defensible Space</li> <li>• Proximity of Subdivision to Wildland Areas</li> <li>• All Season Road Condition</li> <li>• Road Maintenance</li> <li>• Road Width</li> <li>• Street Signs</li> <li>• Structure Density</li> <li>• Unmanaged, Unattended, Undeveloped Lands</li> </ul>
Vegetation Hazard Total	<ul style="list-style-type: none"> <li>• Defensible Space: Fuels Reduction Around Homes &amp; Structures</li> <li>• Fuel Loading</li> <li>• Fuel Structure &amp; Arrangement</li> <li>• Proximity of Flammable Fuels Around Subdivision</li> <li>• Vegetation Within 300' of Homes</li> </ul>
Building Hazard Total	<ul style="list-style-type: none"> <li>• Siding/Soffits</li> <li>• Roofing Assembly</li> <li>• Structural Ignitability</li> <li>• Under skirting Around Decks, Lanais, Post &amp; Pier Structures</li> <li>• Utilities Placement: Gas &amp; Electric</li> </ul>
Fire Environment Hazard Total	<ul style="list-style-type: none"> <li>• Average Rainfall</li> <li>• Prevailing Wind Speeds &amp; Direction</li> <li>• Slope</li> <li>• Topographic Features that Adversely Effect Wildland Fire Behavior</li> <li>• Seasonal or Periodic High Hazard Conditions</li> <li>• Ignition Risk</li> </ul>
Fire Protection Hazard Total	<ul style="list-style-type: none"> <li>• Response Time</li> <li>• Community Planning Practices &amp; Ordinances</li> <li>• Community Fire Safe Efforts &amp; Programs Already in Place</li> <li>• Fire Department Structural Training &amp; Expertise</li> <li>• Local Emergency Operations Group or Citizen Group</li> <li>• Proximity to Fire Stations</li> <li>• Water Source Availability</li> <li>• Wildland Firefighting Capacity of Initial Response Agency</li> </ul>

**Table 7.** Overview of Categorical and Individual Wildfire Hazards Assessed for CWPP



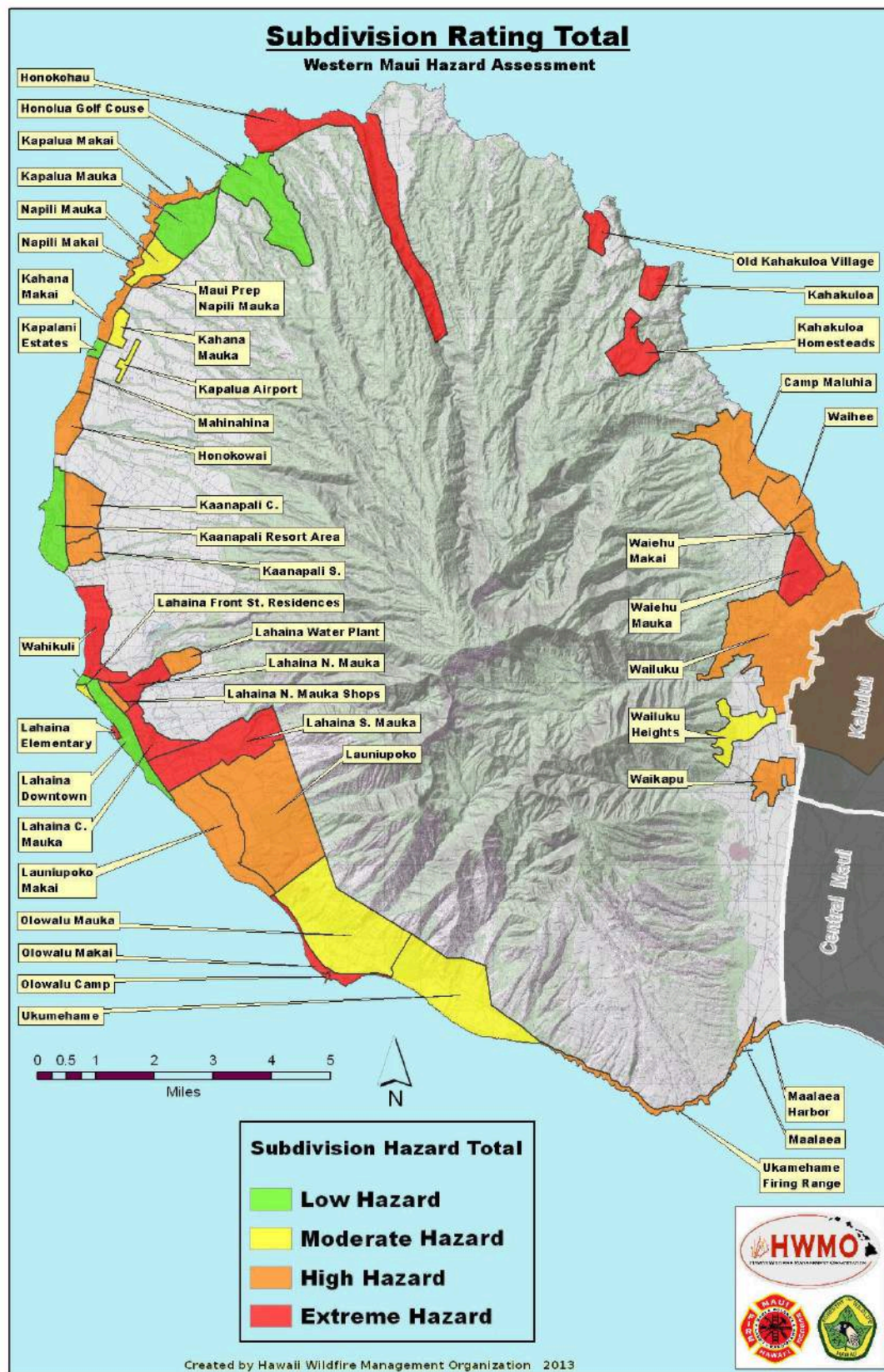


Figure 18. Community Subdivision Wildfire Hazard Rating Map



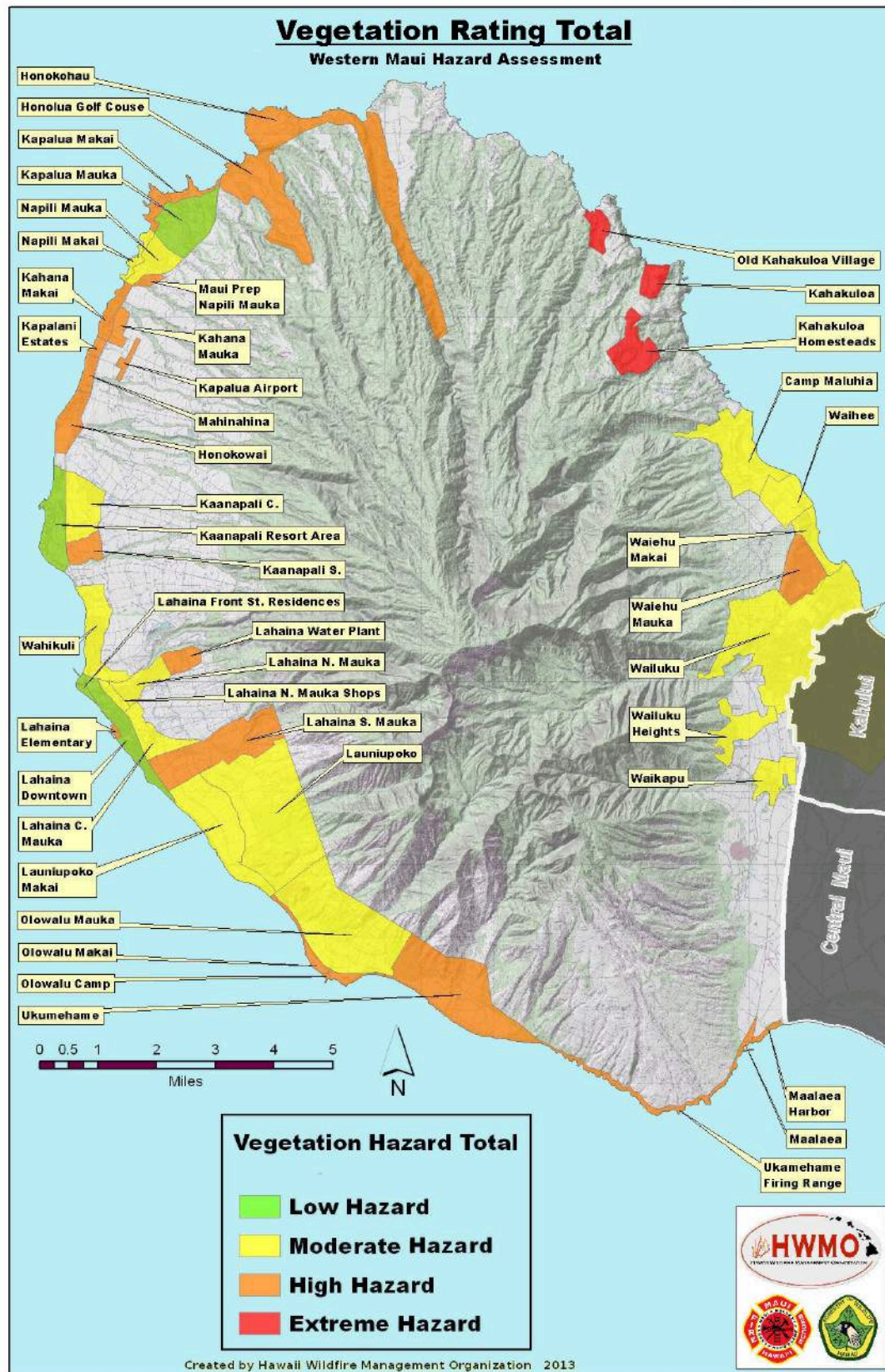


Figure 19. Vegetation Wildfire Hazard Rating Map



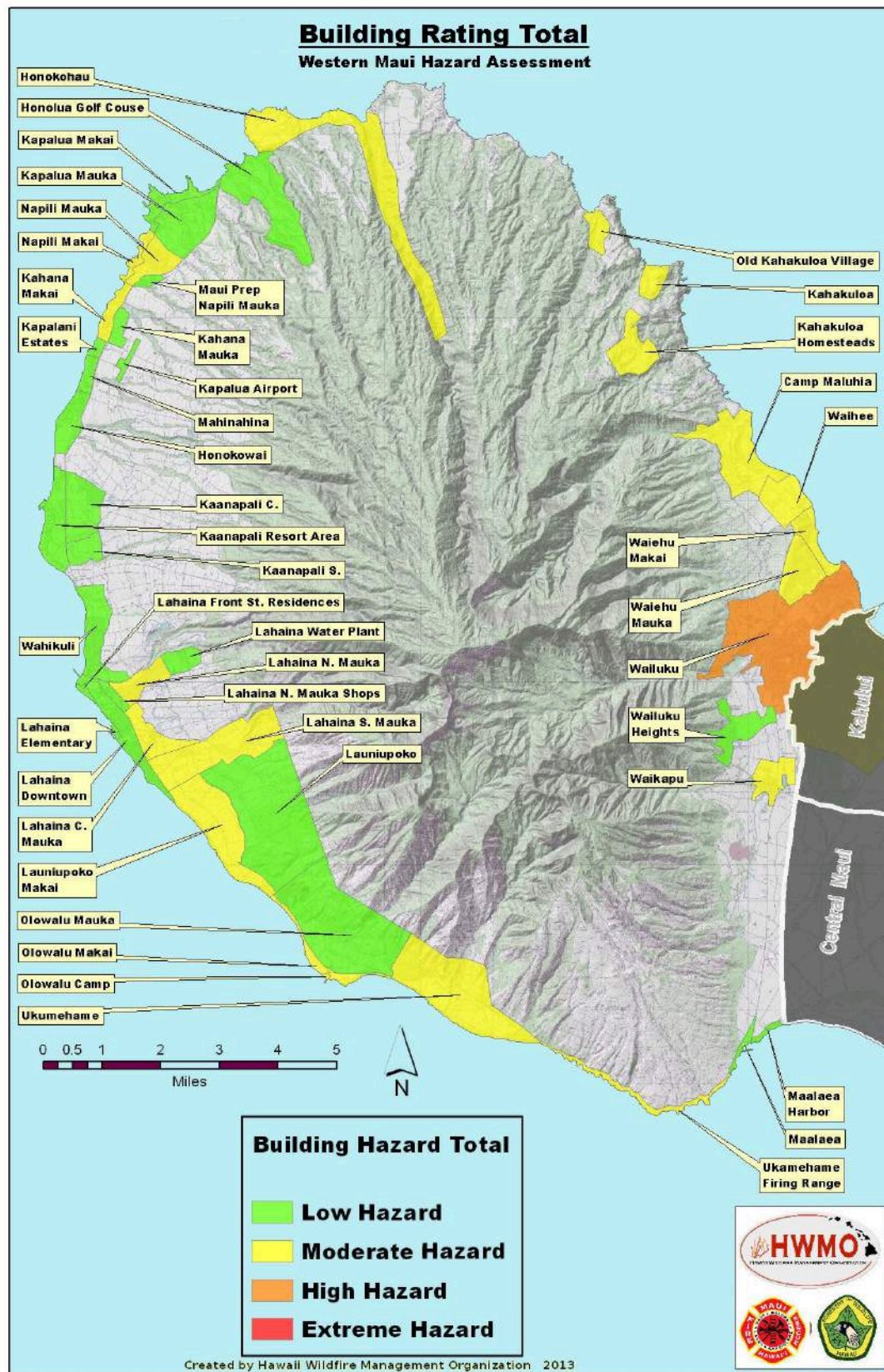


Figure 20. Building Wildfire Hazard Rating Map



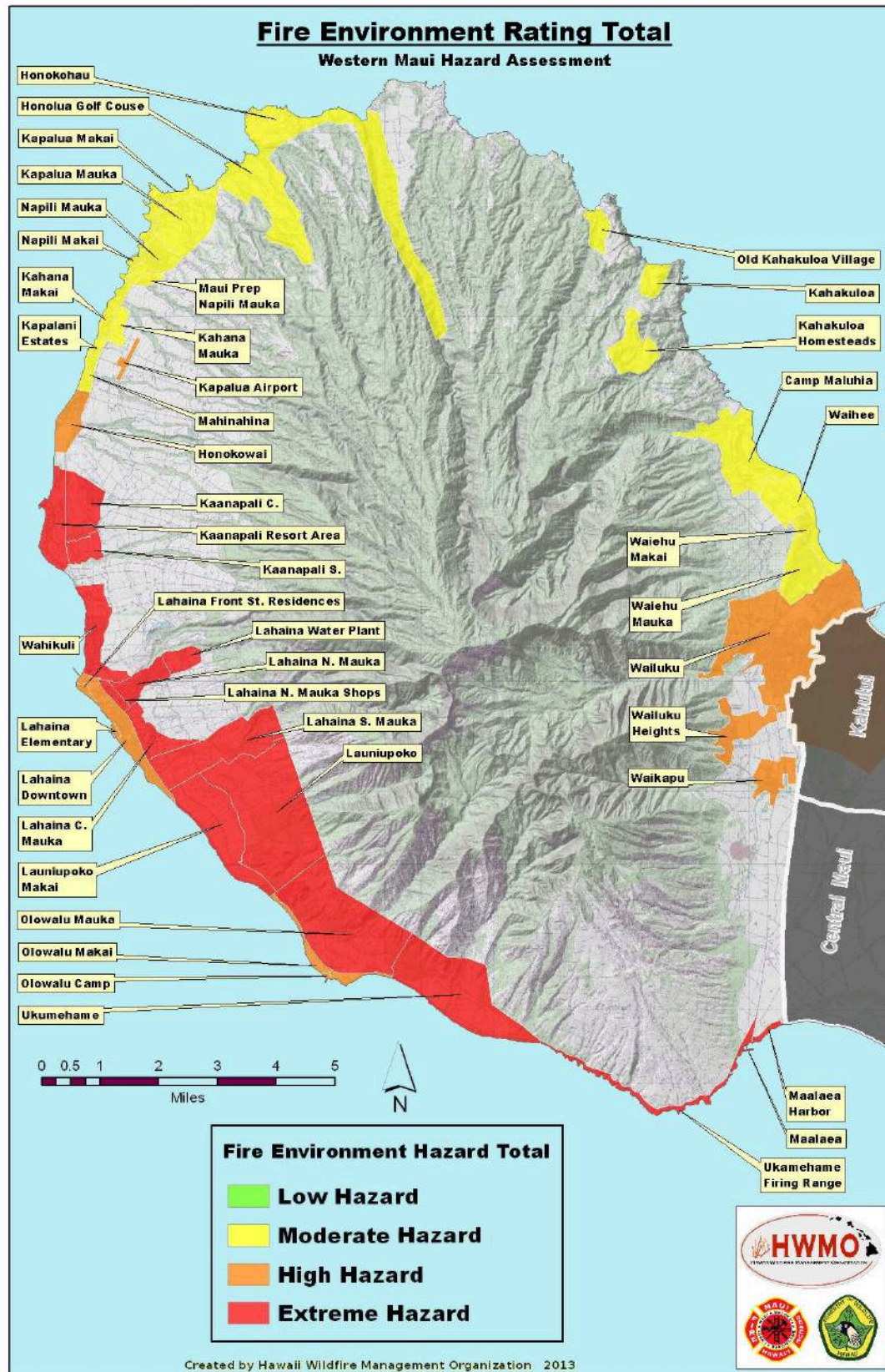


Figure 21. Fire Environment Hazard Rating Map



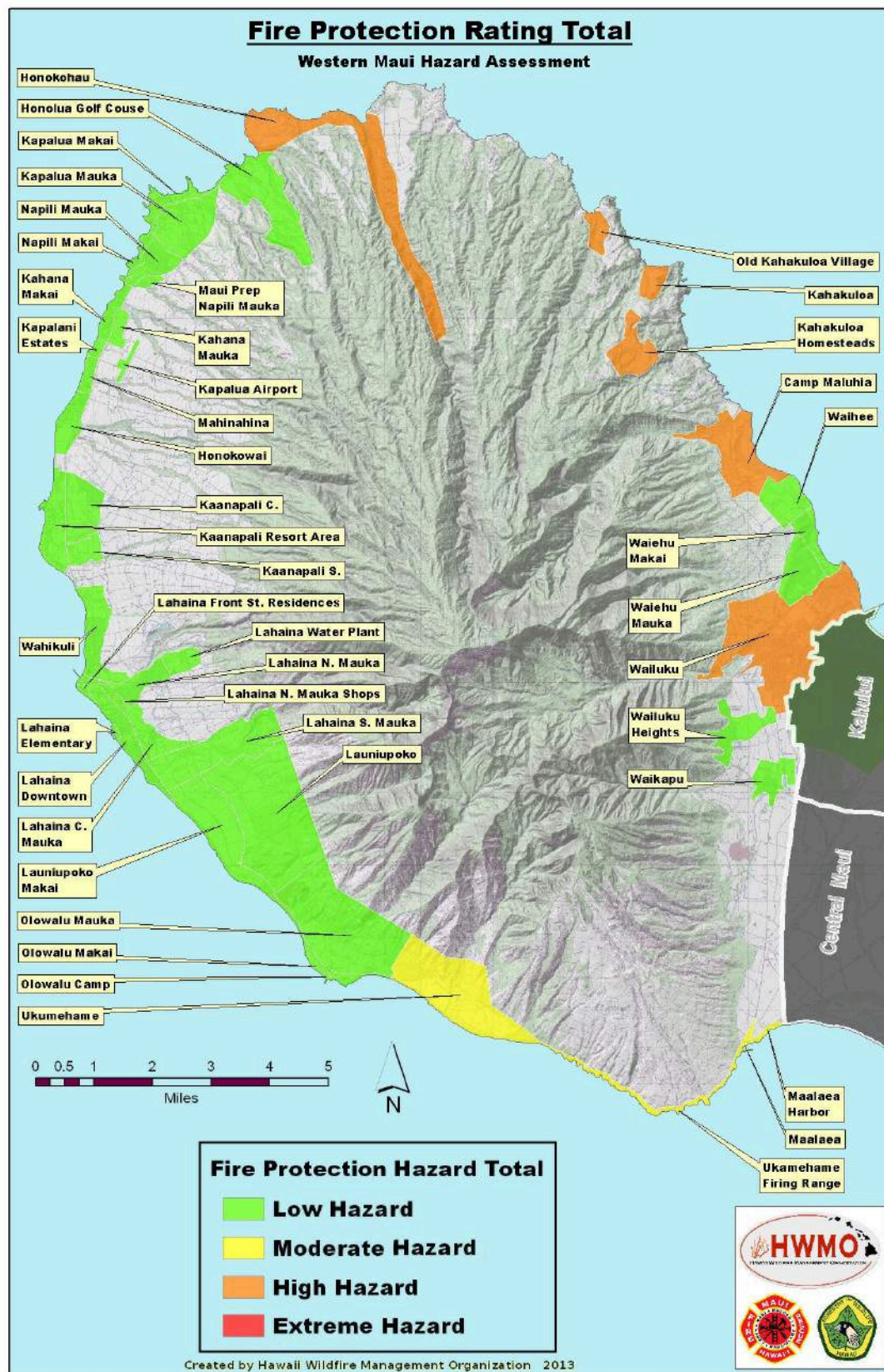
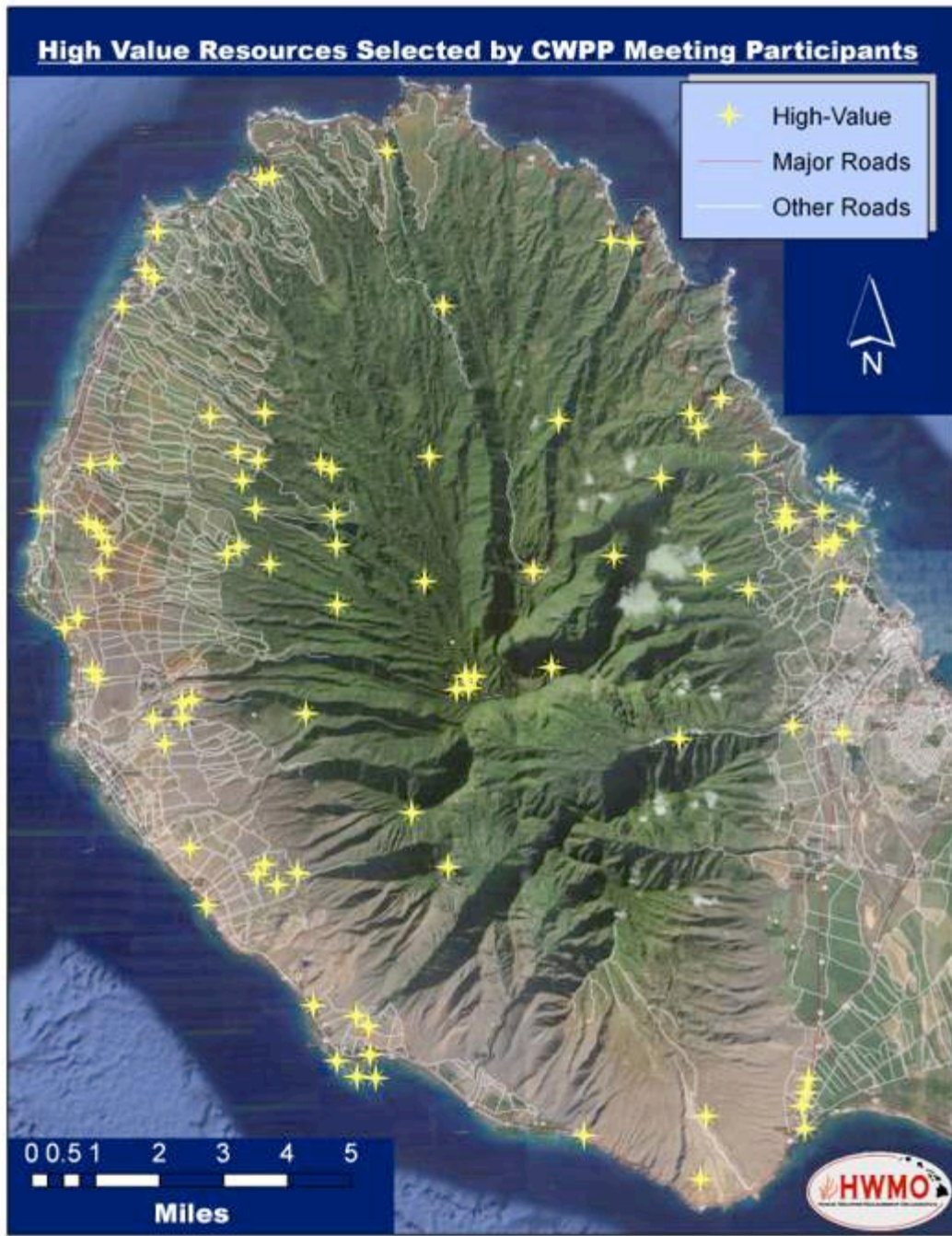


Figure 22. Fire Protection Hazard Rating Ma



## COMMUNITY VALUES

Community value and cultural value were determined for the Western Maui CWPP planning area. The following map demonstrates the points on the map determined by the public and agency participants during CWPP meetings as high priorities for mitigation/protection based on their personal and community value and overall risk of wildfire. Due to the nature of cultural resources in Hawai'i, participants were not required to name the priority resource, only to share the area it occupies by marking on the map. See Community-Generated High Value Resources Map, Figure 23.



*Figure 23. Community-Generated High Value Resources Map*

## OVERALL RISK ASSESSMENT TABLE

As designated on the maps above, the following table lists each subdivision's risk level. With fire fighting agencies and landowners, HWMO assessed these resources for relative risk of wildfire and assigned a *hazard* ranking of low (Low), moderate (Moderate), high (High), or extreme (Extreme) for the following categories (also mapped above in Figures 18-22):

- ***Subdivision Hazard*** – The overall rating for the subdivision based on accessibility, density, proximity to wildland areas, and land use.
- ***Vegetation Hazard*** – The overall rating for vegetation based on general amount of fuels and proximity of fuels to subdivisions and homes.
- ***Building Hazard*** – The overall rating for buildings based on building design, materials, and utilities placement.
- ***Fire Environment Hazard*** – Rates the fire environment by rainfall, wind, slope, topography, seasonal conditions and ignition risk.
- ***Fire Protection Hazard*** – Rating based on response time; community planning and ordinances; fire department preparedness; emergency response preparedness; proximity to fire stations; and water access.

Subdivision	Ranked by Wildfire Response Hazard Rating					Overall Risk
Subdivision	Subdivision Hazard	Vegetation Hazard*	Building Hazard	Fire Environment Hazard*	Fire Protection Hazard	Overall Risk
Honokōhau	Extreme	High	Moderate	Moderate	High	Moderate
Honolua Golf Course	Low	High	Low	Moderate	Low	Moderate
Kapalua Makai	High	High	Low	Moderate	Low	Moderate
Kapalua Mauka	Low	Low	Low	Moderate	Low	Moderate
Nāpili Mauka	Moderate	Moderate	Moderate	Moderate	Low	Moderate
Nāpili Makai	High	Moderate	Moderate	Moderate	Low	Moderate
Maui Prep Nāpili Mauka	High	High	Low	Moderate	Low	High
Kahana Mauka	Moderate	High	Low	Moderate	Low	High
Kahana Makai	High	High	High	Moderate	Low	High
Kapalani Estates	Low	High	Low	Moderate	Low	High
Kapalua Airport	Moderate	High	Low	High	Low	High
Māhinahina	High	High	Low	Moderate	Low	Extreme
Honokōwai	High	High	Low	High	Low	Extreme
Kā'anapali Central	High	Moderate	Low	Extreme	Low	Extreme
Kā'anapali Resort Area	Low	Low	Low	Extreme	Low	High
Kā'anapali South	High	High	Low	Extreme	Low	Extreme
Wahikuli	High	Moderate	Low	Extreme	Low	Extreme
Lāhainā Front St. Residences	Low	Low	Low	High	Low	Extreme
Lāhainā Water Plant	High	High	Low	Extreme	Low	Extreme
Lāhainā North Mauka	Extreme	Moderate	Moderate	Extreme	Low	Extreme

Subdivision	Ranked by Wildfire Response Hazard Rating					Overall Risk
Subdivision	Subdivision Hazard	Vegetation Hazard*	Building Hazard	Fire Environment Hazard*	Fire Protection Hazard	Overall Risk
Lāhainā North Mauka Shops	High	Moderate	Low	Extreme	Low	Extreme
Lāhainā Downtown	Low	Low	Low	High	Low	Extreme
Lāhainā Elementary	Extreme	High	Low	High	Low	Extreme
Lāhainā Central Mauka	Extreme	Moderate	Moderate	Extreme	Low	Extreme
Lāhainā South Mauka	Extreme	High	Moderate	Extreme	Low	Extreme
Launiupoko Makai	High	Moderate	Moderate	Extreme	Low	Extreme
Launiupoko	High	Moderate	Low	Extreme	Low	Extreme
Olowalu Mauka	Moderate	Moderate	Low	Extreme	Low	Extreme
Olowalu Makai	Extreme	High	Moderate	High	Low	Extreme
Olowalu Camp	Extreme	High	Moderate	High	Low	Extreme
Ukumehame	Moderate	High	Moderate	Extreme	Moderate	Extreme
Ukumehame Firing Range	High	High	Moderate	Extreme	Moderate	
Mā‘alaea	High	High	Low	Extreme	Moderate	Extreme
Mā‘alaea Harbor	High	High	Low	Extreme	Moderate	Extreme
Waikapū	High	Moderate	Moderate	High	Low	Moderate
Wailuku Heights	Moderate	Moderate	Low	High	Low	Low
Wailuku	High	Moderate	High	High	High	Extreme
Waichu Mauka	Extreme	High	Moderate	Moderate	Low	Extreme
Waichu Makai	High	Moderate	Moderate	Moderate	Low	High
Waihe‘e	High	Moderate	Moderate	Moderate	Low	High
Camp Maluhia	High	Moderate	Moderate	Moderate	High	Extreme
Kahakuloa Homesteads	Extreme	Extreme	Moderate	Moderate	High	Extreme
Kahakuloa	Extreme	Extreme	Moderate	Moderate	High	Extreme
Old Kahakuloa Village	Extreme	Extreme	Moderate	Moderate	High	Extreme

**Table 8.** Overall Risk Assessment Table

\* Fuels and risk for these areas/resources are dependent on 1) the season (and corresponding plant moisture content) and 2) fuels management practices, i.e. grazing, mechanical/chemical treatments, etc. Fuels and risk are reduced when fuels are properly managed and during wet seasons; fuels and risk are increased if fuels are not managed and/or conditions are dry.

## COMMUNITIES AT RISK FROM WILDFIRES MAP

In 2013, in partnership with the State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) and all County Fire Departments, HWMO updated the Communities at Risk from Wildfires Map for each island in the State of Hawai'i. Previous DOFAW Communities at Risk from Wildfires Maps (last DOFAW update was in 2007) delineated areas on each island that share similar environmental conditions, land use characteristics, fuel types, hazards, and general wildfire issues. These divisions were replicated in the 2013 map update (below) with slight changes made to community boundaries and recoding of ratings to reflect current hazards and subdivision expansions. The areas relevant to the Western Maui CWPP are labeled as: Honokahua; Nāpili; Kahana; Honokōwai; Wāhikuli; Lāhainā; Launiupoko; Olowalu; Ukumehame; Mā'alaea; Waikapū; Wailuku Heights; Wailuku; Waiehu Mauka; Waiehu Makai; Waihe'e; Camp Maluhia and Kahakuloa. Community priorities are based on the updated hazard rankings, overall risk assessment (Table 8 above) and fire history (Figure 2).

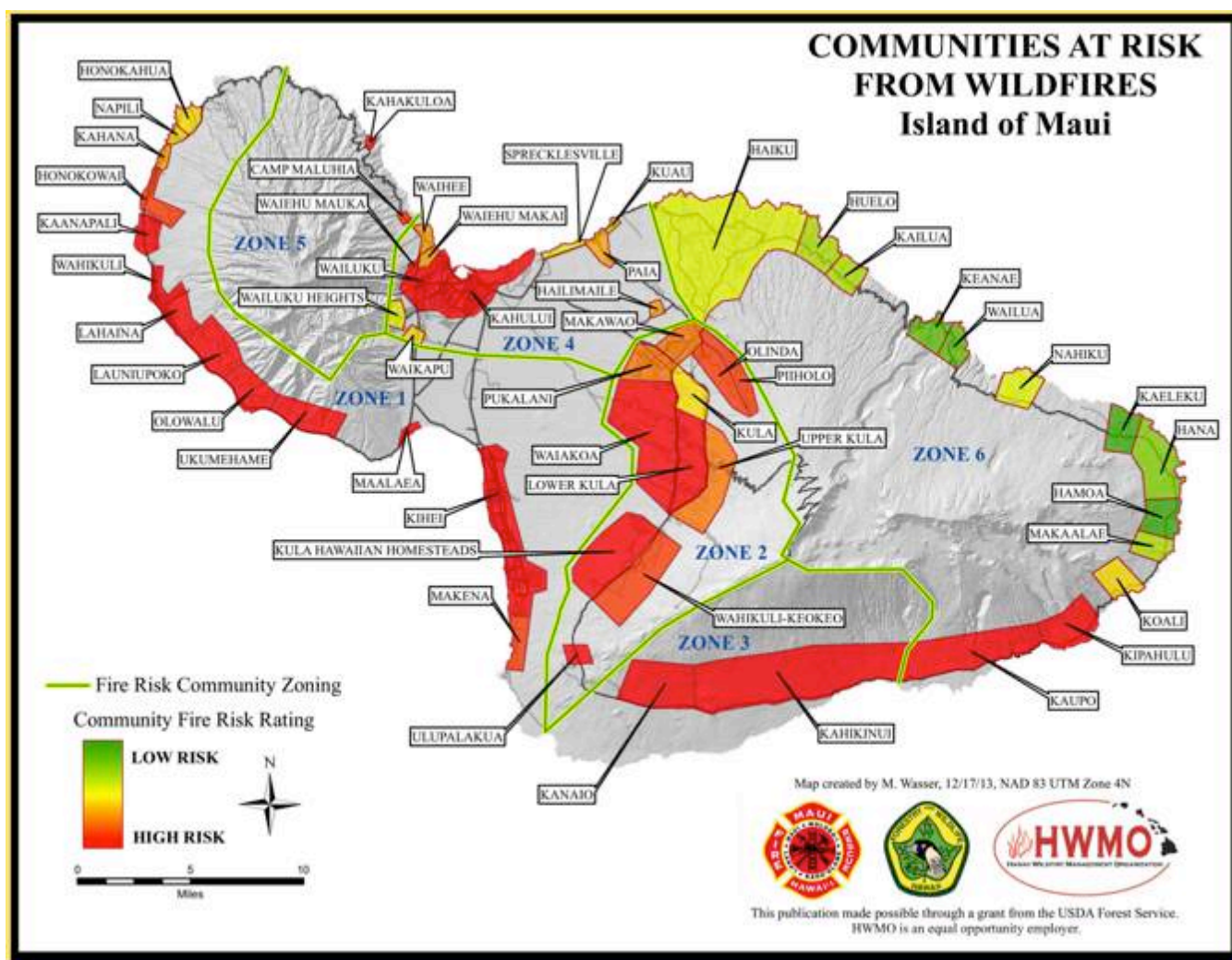


Figure 24. Communities at Risk from Wildfires Map. HWMO 2013



# HAZARD REDUCTION PRIORITIES

## PURPOSE AND METHODS

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

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

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

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

## FIRE RESPONSE AND NATURAL RESOURCE MANAGER CONCERNS AND RECOMMENDED ACTIONS

A total of 8 meetings were held to allow interested public participants to provide their wildfire concerns and recommended actions. HWMO held six meetings for the general public and two meetings for fire response and natural resource managers. Additional meetings were held with decision makers and large landowners as noted in the *Planning Process* chapter above.

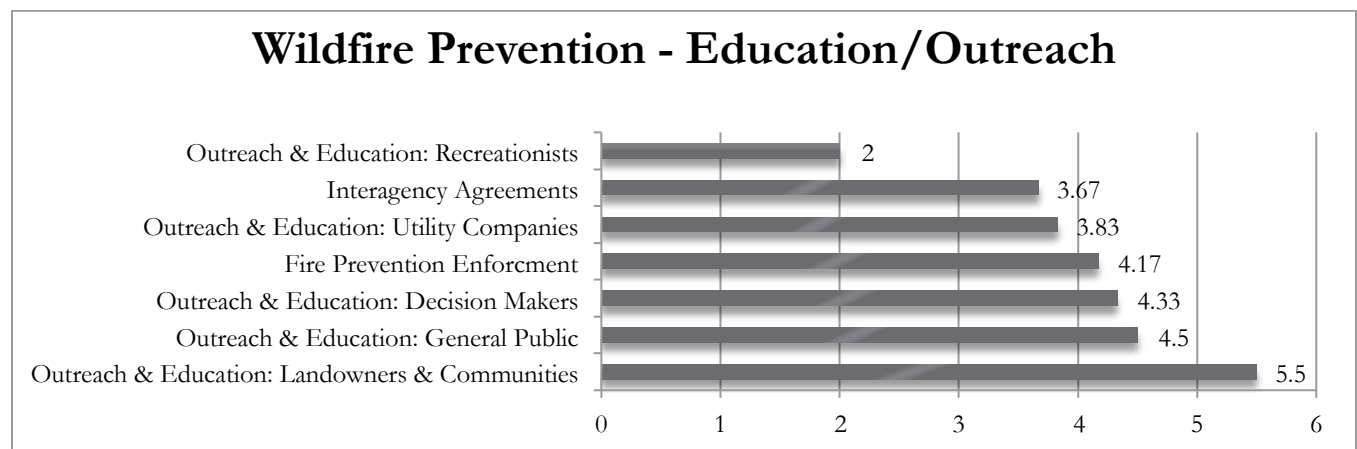
Agency partners provided input at both public meetings and at separate meetings for the West Maui Fire Task Force and West Maui Mountains Watershed Partnership. Following those meetings, participants were asked to complete an online survey to rank their recommendations in priority order. The results of their ranked wildfire concerns and recommended actions are organized by the following fire protection categories and detailed in the tables below for each category, graphed in Tables 9-12 and Figures 25-28 below.

**Fire Protection Categories** (colors below correspond to tables and figures below)

1. **Prevention** - Education/Outreach
2. **Pre-Suppression** - On the ground projects to alter/reduce fire spread and impact, and to make firefighting easier
3. **Suppression** - Training, equipment, resources
4. **Post-Fire Response** – Emergency stabilization and ecosystem rehabilitation and restoration

Agency and Resource Manager Prioritized Concerns and Recommended Actions	
Fire Protection Category: Prevention	
Wildfire Concern (in priority order)	Recommended Actions
1. Outreach & Education: Homeowners, Landowners & Communities (HOAs, subdivisions)	<ul style="list-style-type: none"> <li>• Evacuation Protocol</li> <li>• Fire history</li> <li>• Fire prevention</li> <li>• Brush abatement program</li> </ul>
2. Outreach & Education: General Public	<ul style="list-style-type: none"> <li>• Increasing fire threat with climate change</li> <li>• Fireworks prevention</li> <li>• Catalytic converter fire prevention</li> <li>• Brush abatement/fire</li> </ul>
3. Outreach & Education: Decision Makers (County planning staff, County Council, Politicians)	<ul style="list-style-type: none"> <li>• Firewise planning &amp; design principles</li> </ul>
4. Fire Prevention Enforcement (Requirements, Ordinances, Fines):	<ul style="list-style-type: none"> <li>• Landowners with fallow lands require a fuel management plan</li> <li>• Utility companies</li> </ul>
5. Outreach & Education: Utility Companies	<ul style="list-style-type: none"> <li>• MECO</li> <li>• Wind farms</li> <li>• Water utilities</li> </ul>
6. Interagency Agreements:	<ul style="list-style-type: none"> <li>• National Guard Fund training; Longer helicopter lines</li> <li>• Private - Govt.; Govt. - Govt. (State - State; County - County)</li> <li>• Homeowners/Landowners Preapprove work &amp; funds</li> <li>• DLNR - Office of Conservation and Coastal Lands (OCCL): Requirements &amp; Permits; Agree on practices</li> </ul>
7. Outreach & Education: Recreationists	<ul style="list-style-type: none"> <li>• Campers</li> <li>• Dirt Bike Users/Areas</li> </ul>

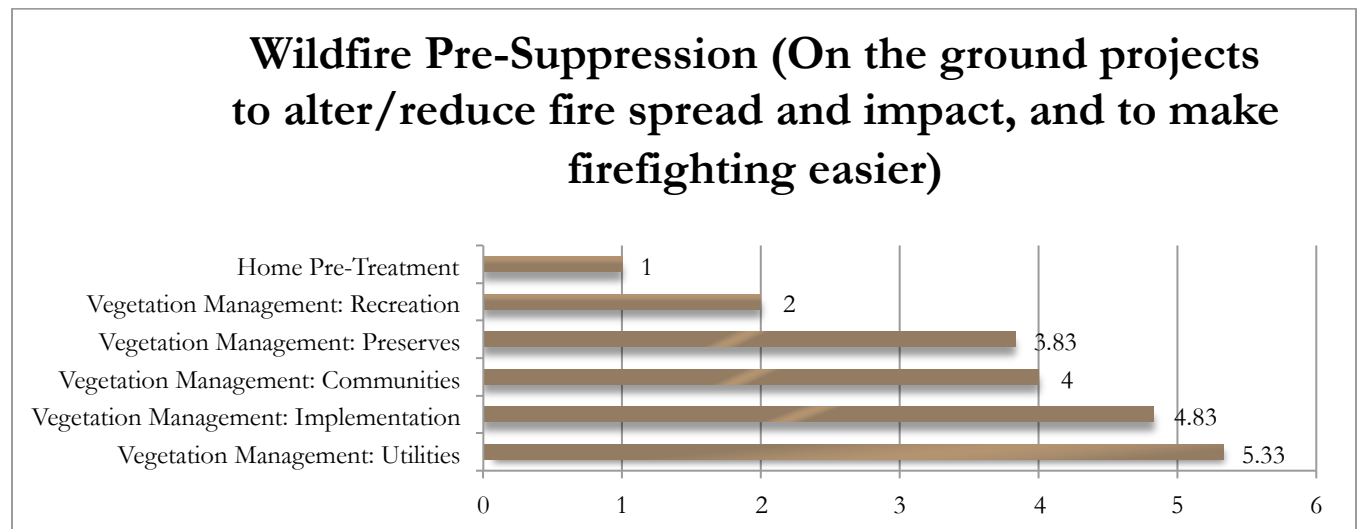
**Table 9.** Agency and Resource Manager Priorities: Prevention



**Figure 25.** Agency Ranked Concerns & Actions in Wildfire Prevention Category. Values are based on an online survey ranking exercise – larger numbers indicate a higher frequency of topic being ranked as a high priority.

Agency and Resource Manager Prioritized Concerns and Recommended Actions Fire Protection Category: Pre-Suppression	
Wildfire Concern (in priority order)	Recommended Action
1. Vegetation Management/Maintenance: <i>Utilities</i>	<ul style="list-style-type: none"> <li>Utilities must adhere to fire prevention standards</li> <li>Be held accountable for starting fires</li> <li>Map electricity transmission lines to guide firebreak development</li> <li>Vegetation management coordinators</li> </ul>
2. Veg. Management/Maintenance: <i>Implementation</i>	<ul style="list-style-type: none"> <li>Western Maui &amp; County Implement County planning requirements for community fire buffers</li> <li>Prioritized fire break map</li> <li>Native forest restoration as living fuel break</li> <li>Effluent water use for fuel break</li> <li>Fuel/firebreak maintenance</li> <li>Prescribed burns</li> </ul>
3. Vegetation Management/Maintenance: <i>Communities</i>	<ul style="list-style-type: none"> <li>Individual homes</li> <li>Community fuel reduction planning</li> <li>Brush abatement program</li> <li>Green waste dumps/fuel breaks/thinning individual yards</li> <li>New development plans to include fuel breaks/greenbelt</li> </ul>
4. Vegetation Management/Maintenance: <i>Preserves</i>	<ul style="list-style-type: none"> <li>Buffer/corridor along Forest Reserves &amp; watershed lands fences</li> <li>Priority fuelbreak map; Native forest restoration as living fuel breaks</li> <li>Endangered/threatened species buffers map</li> </ul>
5. Vegetation Management/Maintenance: <i>Recreation</i>	<ul style="list-style-type: none"> <li>Dirt Bike areas need to be delineated and managed</li> </ul>
6. Home Pre-treatment	<ul style="list-style-type: none"> <li>Fire retardant spray, etc.</li> </ul>

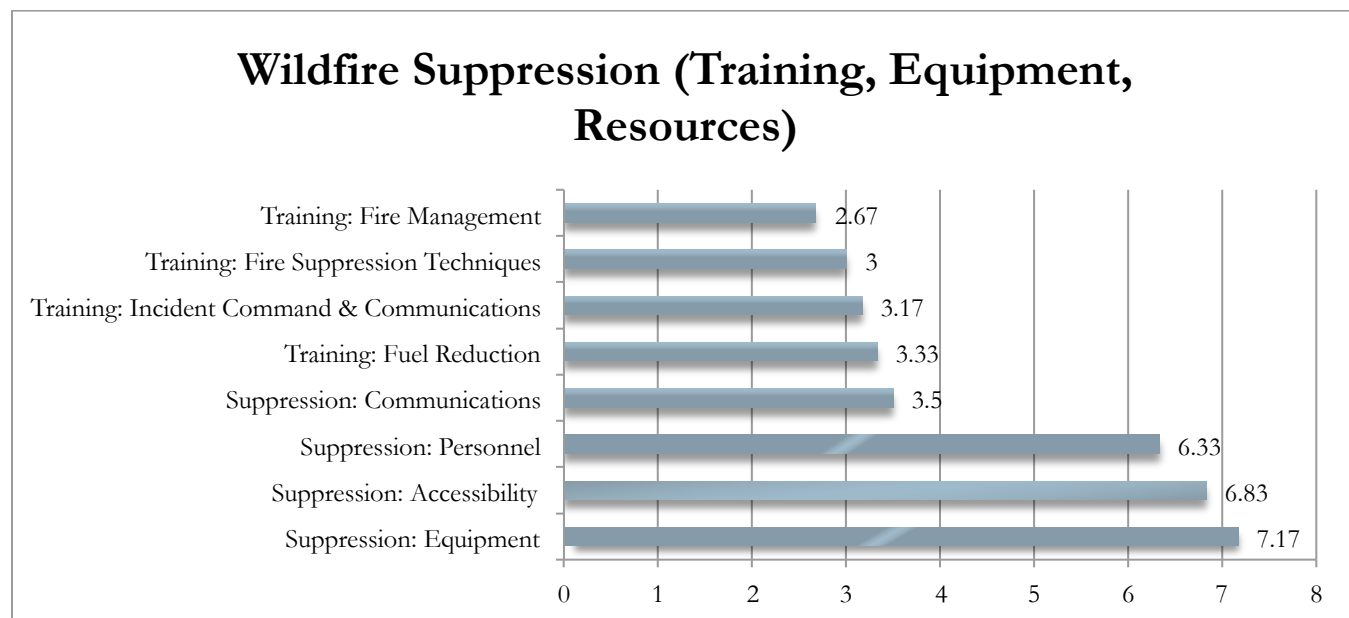
**Table 10.** Agency and Resource Manager Priorities: Pre-Suppression



**Figure 26.** Agency Ranked Concerns & Actions in Wildfire Pre-Suppression Category. Values are based on an online survey ranking exercise — larger numbers indicate a higher frequency of topic being ranked as a high priority.

Agency and Resource Manager Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Suppression</u>	
Wildfire Concern (in priority order)	Recommended Action
1. Suppression: Equipment	<ul style="list-style-type: none"> <li>• Seek funds to expand equipment reserve</li> <li>• Increase capable vehicles</li> <li>• Improve onsite fuel refill options</li> <li>• More large dip tanks</li> </ul>
2. Suppression: Accessibility	<ul style="list-style-type: none"> <li>• Road maintenance</li> <li>• Maps</li> <li>• Contact information</li> <li>• Need access for key individuals</li> <li>• Vehicle access agreements for emergency use (i.e. helicopters from tour companies)</li> </ul>
3. Suppression: Personnel	<ul style="list-style-type: none"> <li>• Increase manpower</li> </ul>
4. Suppression: Communications	<ul style="list-style-type: none"> <li>• Fire starts need to be called in right away</li> </ul>
5. Training: Fuel Reduction	<ul style="list-style-type: none"> <li>• Increase training on fuels management strategies</li> </ul>
6. Training: Incident Command & Communications	<ul style="list-style-type: none"> <li>• Increase training of Basic and Intermediate Incident Command System (ICS)</li> </ul>
7. Training: Fire Suppression Techniques (bulldozer, chainsaw, other tools)	<ul style="list-style-type: none"> <li>• Increase training for: <ul style="list-style-type: none"> <li>○ Basic Wildland Fire Training and Refresher Courses</li> <li>○ Initial Attack Incident Command</li> <li>○ Basic Fire Behavior</li> <li>○ Strategy and Tactics (S-336)</li> <li>○ Wildland Fire Chainsaws (S-212)</li> <li>○ Helicopter Operations</li> </ul> </li> </ul>
8. Training: Fire Management	<ul style="list-style-type: none"> <li>• Prescribed burns</li> <li>• Innovative/new firefighting tactics</li> </ul>

**Table 11.** Agency and Resource Manager Priorities: Suppression

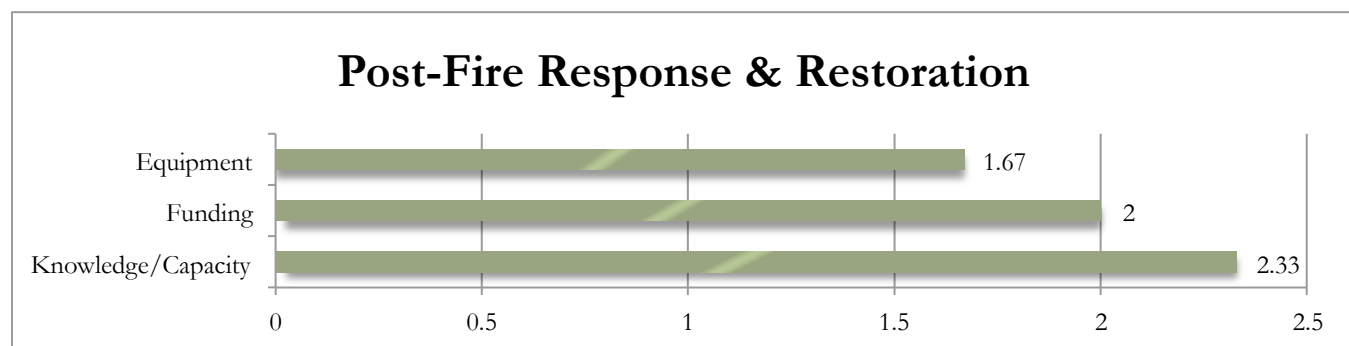


**Figure 27.** Agency-Ranked Concerns & Actions in Wildfire Suppression Category. Values are based on an online survey ranking exercise—larger numbers indicate a higher frequency of topic being ranked as a high priority.



Agency and Resource Manager Prioritized Concerns and Recommended Actions	
Fire Protection Category: <u>Post-fire Response</u>	
Wildfire Concern (in priority order)	Recommended Action
1. Knowledge/Capacity:	<ul style="list-style-type: none"> <li>• Pre-fire preparedness with completion of a post-fire restoration plan</li> <li>• Develop local post-fire team</li> <li>• Compile post-fire restoration methods case study examples</li> <li>• Restoration team to complete post-fire team plan</li> <li>• Landowner support/training</li> <li>• Recommend seed banking practices</li> <li>• Organize people to help with planting/watering</li> </ul>
2. Funding:	<ul style="list-style-type: none"> <li>• Seek funds to pay for local post-fire team or BAER team (Bare Area Emergency Response during and after fire)</li> <li>• Seeks funds for erosion control</li> <li>• Seek funds to complete restoration work</li> </ul>
3. Equipment:	<ul style="list-style-type: none"> <li>• Develop site specific seed storage</li> <li>• Coordinate equipment for rapid response</li> <li>• Organize helicopters for seed dispersal</li> <li>• Purchase bladders for watering planted areas</li> </ul>

**Table 12.** Agency and Resource Manager Priorities: Post-fire Response



**Figure 28.** Agency Ranked Concerns & Actions in Wildfire Post-Suppression/Post-Fire Category. Values are based on an online survey ranking exercise — larger numbers indicate a higher frequency of topic being ranked as a high priority.

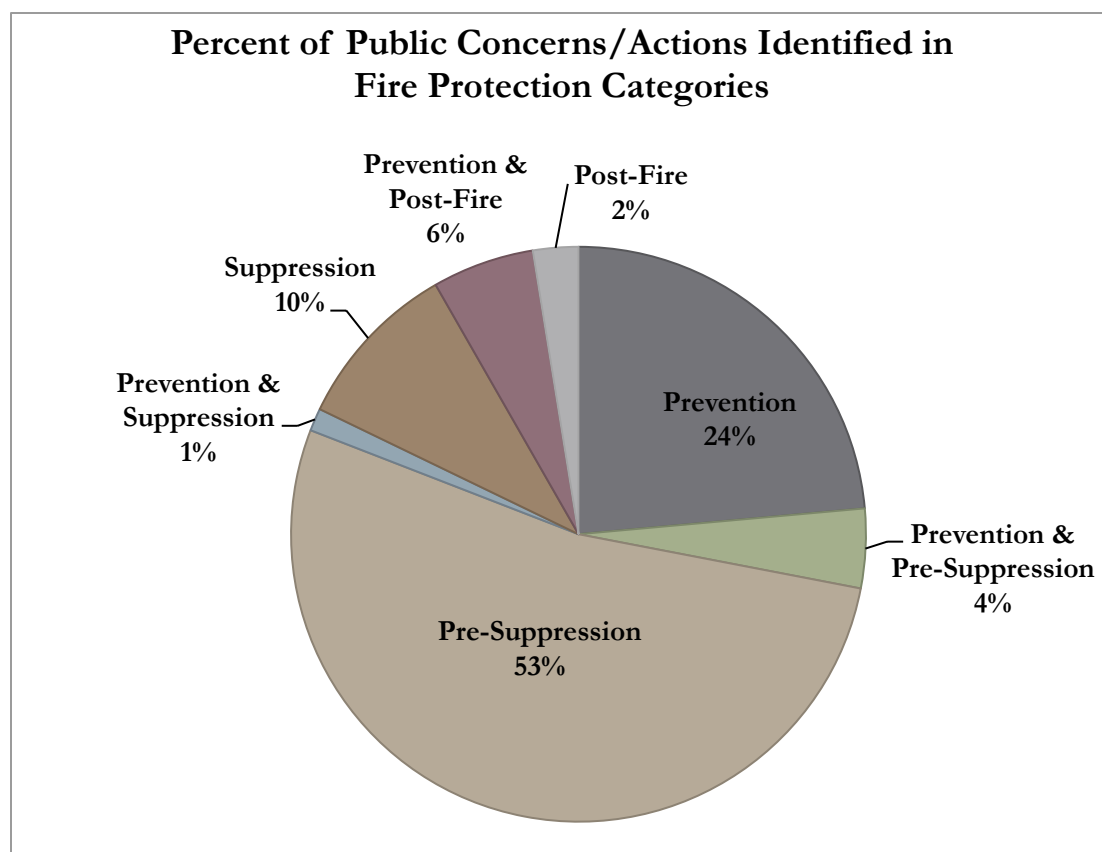
## PUBLIC CONCERNS AND RECOMMENDED ACTIONS

As described in the Planning Process- Public Meetings & Outreach section above, six public meetings yielded public-prioritized input regarding wildfire-related concerns and recommended actions. The input was extensive and has been organized in two ways:

1. **Fire Protection Categories** – for comparability to agency and resource manager input above. These results are briefly summarized below. Full details are provided in Appendix D.
2. **National Cohesive Wildland Fire Management Strategy Categories** – to align with the national effort that is working toward improving wildfire issues from all angles by providing a common language and framework among public and private wildfire operations. Western Maui public input details are organized according to these categories so that they fit into the national framework of priorities and funding opportunities.

### Fire Protection Category

The broad list of concerns and recommended actions were organized into Fire Protection Categories (Fire Protection Category descriptions are above), with some of the public input straddling combinations of two categories, as indicated below in Figure 29. The majority of concerns and recommended actions were within the Pre-Suppression category (53%), followed by Prevention (24%), and then Suppression (10%). Appendix D contains every line item statement contributed by the public organized into these categories.



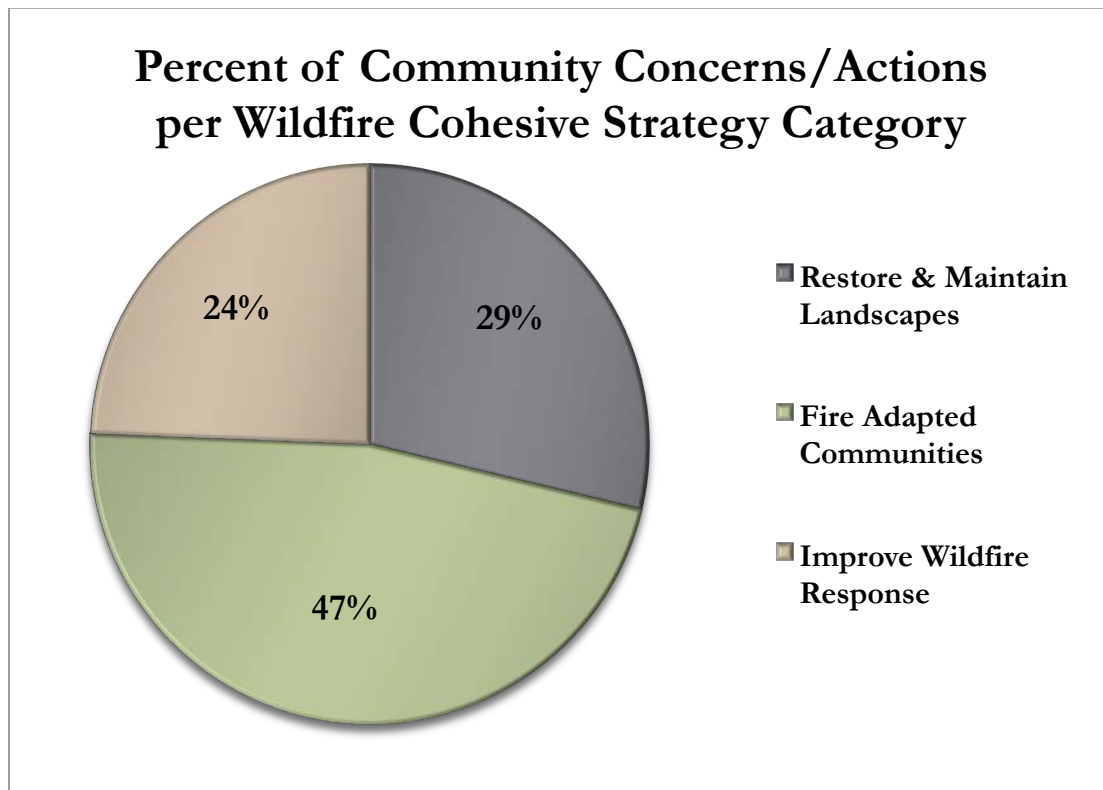
**Figure 29.** *Percentage of Public Recommendations Organized by Fire Protection Category*

### National Cohesive Wildland Fire Management Strategy<sup>37</sup> Categories

The National Cohesive Wildland Fire Management Strategy (dubbed the Cohesive Strategy) encourages communities to develop a dynamic approach to planning for, responding to, and recovering from wildland fires. It provides a framework for wildfire-related discussion, efforts, and goals across the United States. The overarching national strategy is further divided into three regions for tighter collaboration and coordination in each area. Hawai'i falls into the Western Region, which delineates its goals into the following categories:

- Restore and Maintain Landscapes
- Fire-Adapted Communities
- Improve Wildfire Response

The Western Maui CWPP public input is well aligned with these Cohesive Strategy categories. The results of the public input meetings have been organized according to this framework to mesh with this national planning strategy. In addition to this, all line item details of community input are also included in Appendix D and organized by Fire Protection Category. The community priorities are identical in each, but presented separately to aid compatibility with various national and local efforts with goals organized by one or the other. The following figures and tables depict the results relative to the Cohesive Strategy.



**Figure 30.** Community Concerns Organized by Cohesive Strategy Categories

The following tables summarize Western Maui public participants' priorities per Western Region Cohesive Strategy Category/Goal.

<b>Public Input— Prioritized Concerns and Recommended Actions</b>	
<b>Category: Fire Adapted Communities</b>	
<b>Wildfire Concern (In priority order)</b>	<b>Recommended Actions</b>
1. Fuels Management & Reduction Around & Within Communities	<ul style="list-style-type: none"> <li>• Utility companies must manage vegetation and powerline-caused ignitions</li> <li>• Make developers responsible for defensible space around structures &amp; communities</li> <li>• Improve public education &amp; advocacy</li> <li>• Create fuel abatement laws</li> <li>• Lobby for tax breaks for maintaining defensible space, fuel breaks, and agriculture (living fuel breaks)</li> <li>• Create large landowner requirements</li> <li>• Increase funding for subdivision brush abatement and management</li> <li>• Improve homeowner capacity for brush management &amp; other preventative actions</li> <li>• Protect communities with more buffers (agriculture zones &amp; range buffers)</li> <li>• Give overtime to Fire Department for community education</li> <li>• Get property managers to keep access roads clear</li> <li>• Organize community volunteer days to clean up roadside combustible trash, vegetation management, etc.</li> </ul>
2. Education & Outreach	<ul style="list-style-type: none"> <li>• Improve public education &amp; advocacy about fire prevention, defensible space, etc.</li> <li>• Outreach &amp; Education to landowners about fuel abatement/enforcement</li> <li>• Fund education, fire plans &amp; community/tourist outreach (severity of fire threat)</li> <li>• Prepare workshops for community associations after fire</li> <li>• Develop and offer classes/training/information for community associations (Firewise presentations, etc.). Include: <ul style="list-style-type: none"> <li>○ Fire history &amp; impacts</li> <li>○ Fire threat signs</li> <li>○ Non-combustible building materials</li> <li>○ Firewise landscaping</li> <li>○ Defensible space</li> <li>○ Proper storage of ignitable materials</li> <li>○ Fire suppression details (evacuation, Emergency Response team, everyone's roles)</li> </ul> </li> <li>• PSAs to remind people to be prepared (before/during fire season)</li> <li>• Offer forum/symposium/meeting to engage landowners with community associations and lessees (clear up who is responsible for mitigation)</li> <li>• Seek funds &amp; start community outreach program for DHHH Properties (prevention, evacuation &amp; safety information)</li> <li>• Provide cultural education on safe ahi (fire) practices associated with imu</li> <li>• State should provide funding &amp; increase/contribute to outreach &amp; education</li> <li>• Install big signs near communities (fire prevention reminders)</li> <li>• Create a place for proper disposal of combustible materials</li> <li>• Talk to politicians about fire issues (i.e. fire fuel reduction)</li> </ul>



Public Input— Prioritized Concerns and Recommended Actions	
Category: Fire Adapted Communities	
Wildfire Concern (In priority order)	Recommended Actions
3. Land Use – Improve landscapes to be “Firewise”	<ul style="list-style-type: none"> <li>• Designate dirt bike areas &amp; required maintenance – include signs, fines and enforcement if rules broken</li> <li>• Develop dirt bike education program (host a Saturday BBQ at racetrack). Engage them in something else like search and rescue</li> <li>• Make landowners responsible for enforcing “No Trespassing” (dirt bikers)</li> <li>• Erosion prevention projects in dirt bike areas</li> <li>• Hand out or require spark arresters</li> <li>• Require Firewise plants on fallow lands</li> <li>• Land manager/fallow land owner education/outreach</li> <li>• Legislation &amp; Enforcement of unmanaged vegetation on fallow lands</li> <li>• Promote controlled burns</li> </ul>
4. Large Landowner Responsibility	<ul style="list-style-type: none"> <li>• Make landowners responsible for enforcing “No Trespassing” (dirt bikers)</li> <li>• Land manager/fallow land owner education/outreach</li> <li>• Legislation &amp; Enforcement of unmanaged vegetation on fallow lands</li> <li>• Promote controlled burns</li> <li>• Large landowners in some cases need assistance to transition to sustainable fuels management, such as grazing</li> <li>• Contact landowners and give a timeline to clean up their property</li> <li>• Increase personnel &amp; equipment to keep fuels and fires under control</li> <li>• Create field and wildland buffers</li> <li>• Work with private landowners to create fuelbreaks/fire roads on fallow agricultural lands</li> <li>• Civil defense training on agricultural roads “combat roads”</li> <li>• Involve students in projects to work with resistant landowners</li> </ul>
5. Community Planning for Wildfire Preparedness	<ul style="list-style-type: none"> <li>• Encourage fire prevention plans for individual homes and communities</li> <li>• Incorporate fire into community leadership trainings (DHHL, HOA Boards)</li> <li>• Address fire preparedness in every community</li> <li>• Incorporate fire into county, community planning processes</li> <li>• Offer community association focused workshops &amp; trainings, regular meetings with HWMO present</li> <li>• Add newsletter &amp; website content on wildfire</li> </ul>
6. Change Human Behaviors	<ul style="list-style-type: none"> <li>• Need motorbike park/designated area</li> <li>• Make firebreaks into mountain bike trails</li> <li>• Outdoor fires education (campfires, outdoor cooking, arson prevention)</li> <li>• Stop green harvest to prevent arson in wildland &amp; cane fields</li> </ul>

Public Input— Prioritized Concerns and Recommended Actions	
Category: Fire Adapted Communities	
Wildfire Concern (In priority order)	Recommended Actions
7. Homeowners/Small Landowners	<ul style="list-style-type: none"> <li>• Tax incentives for private property fire prevention/protection actions</li> <li>• Explore insurance discounts for fire preparedness and incentive programs (Firewise communities, homeowners)</li> <li>• Offer forum/symposium/meeting to engage landowners with community associations and lessees (clear up who is responsible for mitigation)</li> <li>• More funding for Fire Dept. for inspections on Wildland Urban Interface (WUI)</li> <li>• Funding for brush abatement inspections (proactive)</li> <li>• Tax incentives for private property fire protection actions</li> </ul>
8. Business Responsibility	<ul style="list-style-type: none"> <li>• Improve MECO transmission system</li> <li>• Improve MECO power line fuel reduction</li> <li>• MECO could put % to fund fuel reduction &amp; restoration</li> <li>• Create fuel buffers by MECO power lines</li> <li>• Mover power lines away from road</li> <li>• Bury power lines underground</li> <li>• Targeted outreach/information to mountain ecotourism companies (Brochure about fire hazards in their areas (horseback riding, vehicle use, zip line companies). Should be required to participate</li> </ul>
9. Volunteering (Opportunities & Participation)	<ul style="list-style-type: none"> <li>• Organize community volunteer days</li> <li>• Opportunities for community groups to earn money through a fundraiser (roadside/vegetation clean ups)</li> <li>• Involve school classes</li> <li>• Need volunteer project leaders (paid or compensated)</li> <li>• Involve volunteers in project planning</li> <li>• Volunteers needed to help maintain vegetation (incentive – fishing/hunting access – Kahikinui)</li> </ul>
10. Tourism	<ul style="list-style-type: none"> <li>• Fund education fire plans &amp; community/tourist outreach programs (severity of fire threat)</li> </ul>
11. Incentives to Take Action	<ul style="list-style-type: none"> <li>• Tax incentives for private property fire prevention/protection actions</li> <li>• Lobby for tax breaks for maintaining defensible space, fuel breaks, and agriculture (living fuel breaks)</li> <li>• Explore insurance discounts for fire preparedness and incentive programs (Firewise communities, homeowners)</li> </ul>
12. Legislation	<ul style="list-style-type: none"> <li>• Defensible space laws (county, state legislation)</li> <li>• Fuel abatement laws</li> <li>• Legislation about fallow lands vegetation management requirements (unmanaged fire fuels)</li> </ul>
13. Wildland Fire Training	<ul style="list-style-type: none"> <li>• Incorporate fire into leadership training for community protection and fire planning</li> </ul>
14. Enforcement	<ul style="list-style-type: none"> <li>• Increase enforcement of unmanaged fire fuels on fallow lands</li> </ul>

**Table 13.** Public Input— Fire Adapted Communities

Public Input- Prioritized Concerns and Recommended Actions	
Category: Restore and Maintain Landscapes	
Wildfire Concern (In priority order)	Recommended Actions
1. Fuels Management & Reduction	<ul style="list-style-type: none"> <li>Require and increase landowner, land manager, and municipal bodies to properly maintain fuels (outreach, requirements, deadlines)</li> <li>Increase agriculture zones and buffers</li> <li>Organize community volunteer days (adopt a highway for vegetation management)</li> <li>Increase controlled burns</li> <li>Get chipper/mulcher to communities and offer to do one area as an incentive</li> <li>Plant indigenous fire retardant plants</li> <li>Create manual of vegetation management lease requirements</li> <li>Seek funding for proactive fuel reduction</li> </ul>
2. Keep Up As Land Use Changes	<ul style="list-style-type: none"> <li>Manage fuels in areas that experienced land use changes.</li> <li>Designate dirt bike areas and required maintenance</li> <li>Erosion prevention</li> </ul>
3. Natural Resources Protection	<ul style="list-style-type: none"> <li>Ask Wailuku Water Company to provide dip tanks as act of goodwill</li> <li>Increase conservation &amp; restoration efforts of land and water resources (native forests, Forest Reserves and Natural Area Reserves (NARs)</li> <li>Increase firebreaks (e.g. coffee plantations)</li> <li>Re seeding to prevent erosion, sedimentation and silt</li> <li>Power line fuel reduction</li> <li>Seek funds for proactive conservations efforts &amp; water resources for reforestation</li> <li>Reestablish traditional agriculture &amp; water systems; loʻi (from mac nuts)</li> <li>Power line fuel reduction</li> <li>Seek landowner assistance</li> </ul>
4. Restoration (General & Post-fire)	<ul style="list-style-type: none"> <li>More restoration efforts in native forests and natural area preserves</li> <li>Seek funding for water resources for restoration efforts</li> <li>Develop nurseries</li> <li>Loʻi restoration (water access)</li> <li>Restore Wahikuli Reservoir (water access)</li> <li>Identify where plantation ditches are and open them up for use</li> <li>Plan for post-fire restoration needs &amp; impacts</li> </ul>
5. Watershed Protection	<ul style="list-style-type: none"> <li>Need constant monitoring of invasive species</li> <li>Alien species education &amp; mitigation</li> <li>Involve/educate youth (promote careers in natural resources, sustainable forestry, etc.)</li> <li>Help fund current Maui watershed conservation entities &amp; efforts (i.e. WMMWP, Puʻu Kukui Watershed Preserve)</li> <li>Include fire &amp; watershed protection in water planning</li> <li>Improve riparian buffers</li> <li>Create buffers between watersheds &amp; communities</li> </ul>
6. Marine Impacts (erosion, sedimentation, silt)	<ul style="list-style-type: none"> <li>Re seeding</li> <li>Encourage &amp; plant rain gardens/vegetation to hold sediment</li> <li>Develop burned area recovery plan</li> </ul>

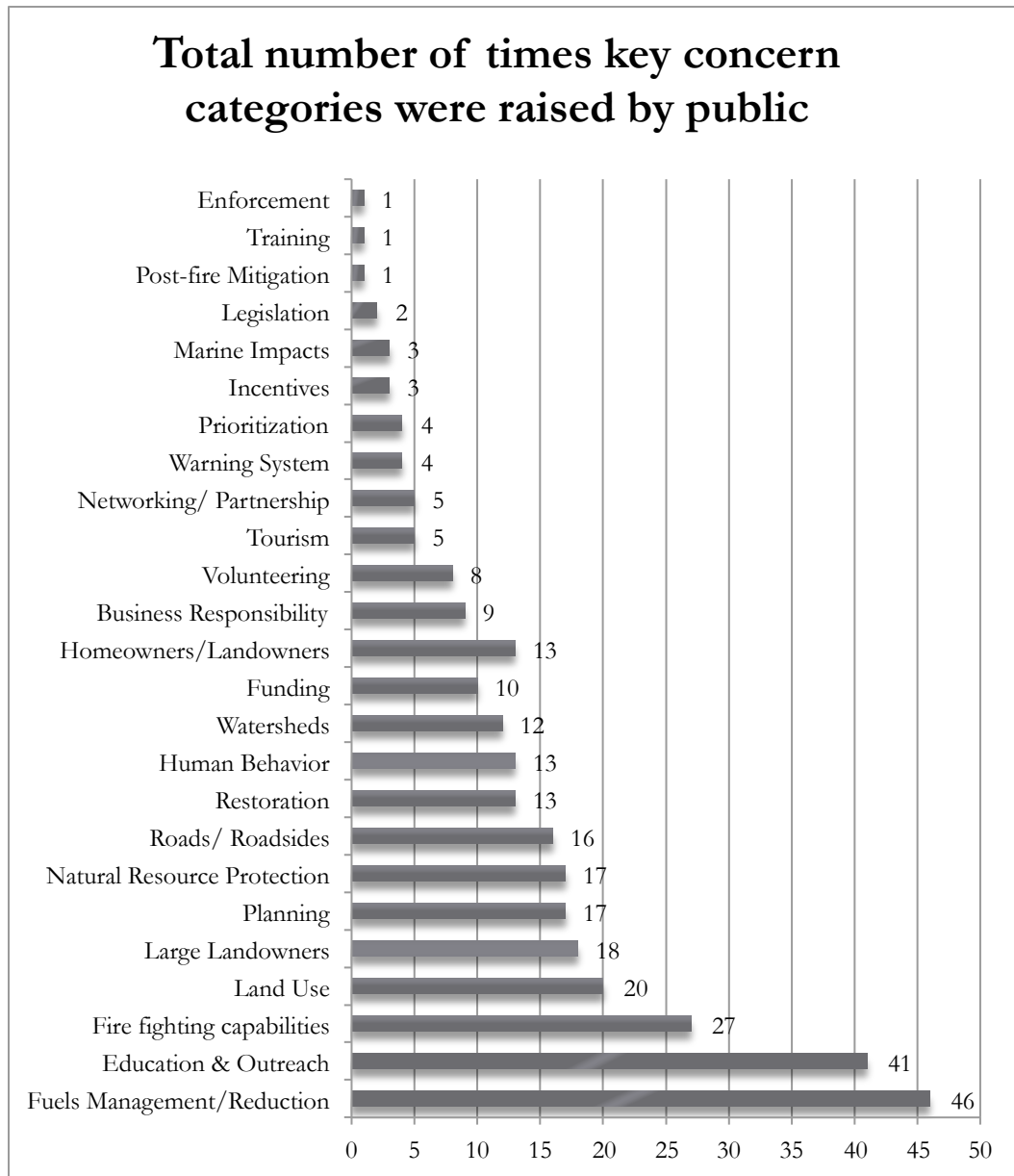
**Table 14.** Public Input— Restore and Maintain Landscapes

Public Input- Prioritized Concerns and Recommended Actions	
Category: Improve Wildfire Response	
Wildfire Concern	Recommended Actions
1. Fire Fighting Capacity & Resources	<ul style="list-style-type: none"> <li>Couple dip tanks with fuel management cattle (provides drinking water for cattle e.g. state lands could be grazed with cattle leases but need water (Lāhaināluna, Olowalu, Ukumehame, Wahikuli)</li> <li>Wailuku Water Company could assist and provide dip tanks</li> <li>More restoration efforts in native forests, Forest Reserves &amp; Natural Area Reserves (NARs)</li> <li>2nd egress road in case of road closures (fire prep.)</li> <li>Outreach &amp; Education includes: <ul style="list-style-type: none"> <li>Fire Department priority mandates</li> <li>Limited resources during multiple emergency events</li> </ul> </li> <li>Install diptanks and put them high for ease of helicopter access (should be required for fire prone areas &amp; new development)</li> <li>Funding &amp; liability insurance for bulldozer fire break preventative work</li> <li>Political support for volunteer Fire Department</li> </ul>
2. Planning	<ul style="list-style-type: none"> <li>Incorporate fire into county, community planning processes</li> <li>Encourage fire prevention plans &amp; buffers for individual homes and communities county-wide</li> <li>Set up fire escape easements (Launiupoko, Waichu/Waihe'e)</li> </ul>
3. Roads, Roadsides & Fuels Management	<ul style="list-style-type: none"> <li>Create fuel breaks and defensible space (for access to fire and fuel reduction)</li> </ul>
4. Funding	<ul style="list-style-type: none"> <li>Funding &amp; liability insurance for bulldozer fire break preventative work</li> <li>Funding &amp; planning for new highways that include fuel breaks &amp; fire hydrants</li> </ul>
5. Networking & Partnerships	<ul style="list-style-type: none"> <li>Create committee to network between communities</li> <li>Share information, resources, and knowledge</li> <li>Link efforts between communities (create partnerships)</li> <li>Reach out to large landowners i.e. West Maui Land and Pineapple Company, Kamehameha Schools, Wailuku Water Company) and open up communications with them.</li> <li>Conduct private meetings and planning conferences with residents, communities, agencies (County, State, Federal, Fire Department), and non-profit organizations.</li> </ul>
6. Warning System	<ul style="list-style-type: none"> <li>Warning system needed to alert tourists &amp; hotels</li> <li>Check with Civil Defense about a master list for emergency communications</li> </ul>

**Table 15.** Public Input— Improve Wildfire Response



Public input was also organized into key categories of concern based on a tally of the number of times those key categories of concern were raised during public meetings. Figure 31 below shows the results of that tally for each category.



**Figure 31.** Community Recommendations Organized by Concern Category

## 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 16 below.

Community Resource, Structure, or Value at Risk	Fuel Hazard Rating	Type of Treatment	Treatment Method Options
Fallow agricultural lands	HIGH OR EXTREME IF UNMANAGED	Mechanical, Grazing	Utilize well-managed grazing, weed whip, mow, hand-pull, herbicide where appropriate with follow-up vegetation removal. Reforestation and restoration.
Mauka forested lands, parks, and reserves	HIGH OR EXTREME IF UNMANAGED	Mechanical, hand labor, chemical	Utilize well-managed grazing, weed whip, mow, hand-pull, herbicide where appropriate with follow-up vegetation removal. Reforestation and restoration.
Homes and structures with large lots	MOD-EXTREME	Mechanical, hand labor, chemical, fuels conversion	Utilize properly managed grazing, weed whip, mow, and hand-pull boundaries and roadsides. Convert fuels to landscaping with drought-tolerant, fire-resistant plants. Reduce ladder fuels.
Densely arranged homes and structures	MOD-EXTREME	Mechanical, hand labor, chemical, fuels conversion	Weed whip, mow, hand-pull, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant plants.
Historical sites throughout Western Maui	MOD-EXTREME	Mechanical, hand labor, chemical, 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, hand labor, chemical	Continue roadside treatment: mowing, herbicide spray, and weed whip. Where appropriate convert fuels to fire-resistant plants that require little or no maintenance.
Resorts	MOD-EXTREME	Mechanical, hand labor, chemical, fuels conversion	Weed whip, mow, hand-pull, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant plants.

**Table 16.** Hazardous Fuels Treatments



**Photo 18.** (far left)  
Vegetation management is needed both around homes and in fallow areas, to include active and fallow agricultural fields, see **Photo 19** (near left).

## REDUCING STRUCTURAL IGNITABILITY<sup>38, 39, 40</sup>

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.

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 (see Background Chapter-Threatened and Endangered Species section above).

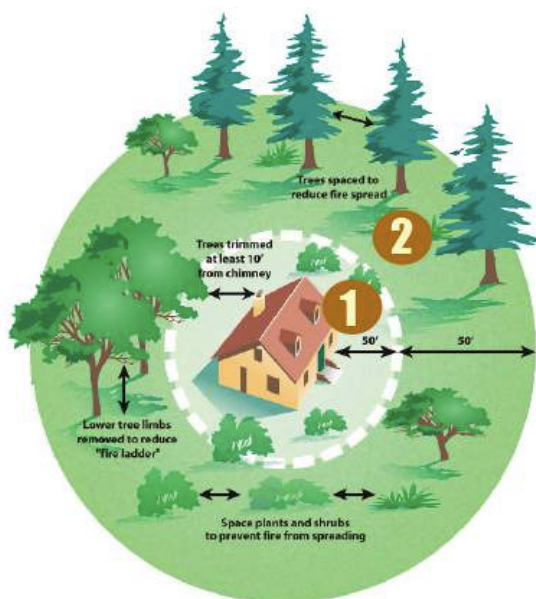
Creating defensible space does not necessarily mean eliminating the presence of greenery on your property. You can still landscape around your home to make it fire-safe without compromising beauty and aesthetics. By planting native, drought-tolerant plants (xeriscaping) around your home, you can:

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

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

### Defensible Space Zones Around Structures

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



**Figure 32.** Defensible space zones around structures.



**Figure 33.** Ladder Fuels Diagram. 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 fire cannot climb.

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 33). 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.

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 33 above).
- 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 (seen above), 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 (seen below) 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 evacuees. Preparation and early evacuation are key actions recommended by the national Ready, Set, Go! Program. Prepare your home as follows:

**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 composition, 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 ten 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).

**Deck/Patio Cover:** Use heavy timber or non-flammable construction material for decks. Enclose the



**Figure 34.** Covering vents with 1/8-inch or smaller metal mesh blocks embers from entering a home or structure.

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.

**Raingutters:** 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 likelihood of the home igniting.

**Driveways and Access Roads:** Driveways should be designed to allow fire and emergency vehicles



**Figure 35.** Keep windows free of vegetation to reduce likelihood of heat-caused breakage that lets embers into your home.



**Figure 36.** Make sure your eaves are enclosed with non-combustible materials to prevent ember entry.



**Figure 37.** Rain gutters should have screens to keep leaf debris from accumulating. Maintain gutters to keep them clear and clean.



**Figure 38.** Wood fencing can act like a fire wick straight to a home. Use non-combustible materials for all fencing and yard structures.

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.

# CWPP ACTION PLAN

The Western Maui CWPP Action Plan follows the guidelines for HFRA:

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

## WESTERN MAUI CWPP ACTION PLAN

The Western 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, and County agencies, private entities and landowners, and area residents and homeowners were invited to submit projects that provide protection and reduce risk. The public concerns and action items listed above served as the basis for the projects listed below that will guide hazard reduction efforts in the future.

Landowners and agencies are invited to continue to submit projects that provide community protection and mitigate wildfire risk. The West Maui Fire Task Force, along with HWMO whenever possible, intend to meet annually to evaluate progress on projects and mutually agree on treatment priorities. Additional projects will be attached as appendices in updated versions of this plan. The following table lists initial projects suggested by the West Maui Fire Task Force and West Maui Mountains Watershed Partnership. The general public input is not included in this table.

## RECOMMENDED NEXT STEPS

The Fire Response and Natural Resources Managers provided a list of action item projects for the next 1-5 years, not in priority order. Community meeting participants did not contribute to this list.

### Immediate Projects (1-3 Years)

Proposed Project	Anticipated Cost	When	Lead
Restoration Project – Pu'u Kukui Watershed Preserve - 75 acres burned in Oct 2011 fire. Site needs to be planted – shovel ready	\$60,000	ASAP when funded	Pu'u Kukui Preserve
Maintain 9 miles of fire breaks	\$15,000	Ready – ASAP. Requires 1 week. Repeat annually.	DLNR-DOFAW
Conduct a firebreak assessment. Make roads into firebreaks. 100 plus miles. WUI agricultural roads.	\$25,000	ASAP	West Maui Mountains Watershed Partnership
Post Fire Rehab and Restoration Methods & Case Studies	\$10-15,000	ASAP	HWMO and/or land managers



Procure 4x4 vehicle and ATV mounted herbicide spray rigs to treat fuel breaks and maintain fire breaks.	\$20,000	ASAP	West Maui Mountains Watershed Partnership
Purchase common use chipper & masticater/mulcher	\$20,000	ASAP	West Maui Mountains Watershed Partnership
Support volunteer restoration of watersheds in previously burned areas.	\$100,000/yr. for P/T Volunteer Coordinator	ASAP	West Maui Mountains Watershed Partnership
Pre- and Post-Fire Plans for all forested areas	\$10,000	3 years	West Maui Mountains Watershed Partnership
Work with local weather stations to help with firefighting predictions		2 years	DOFAW

**Table 17.** *Next Steps: Immediate Projects*

## Future Projects

Proposed Project	Anticipated Cost	When	Lead
Annual funding to maintain GIS databases on fire infrastructure	\$10,000	3 yrs.	Maui County GIS Division
Maintain post-fire restoration monitoring data sufficient to measure success, inform adaptive management, funders, and policy makers	Project dependent	3 yrs.	Maui County GIS Division
Work with State Land Division and ranches 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	3 yrs.	DLNR
Install water tanks around margin of communities to serve as dip tanks for helicopter fire suppression. Have tanks double as water troughs for ranching (southern end state lands)	\$18-30,000 per diptank	3 yrs.	HWMO, DOFAW
Outreach to existing community associations	Variable	2014	HWMO

Green waste disposal - Waiehu, Hawaiian homes	TBD--
Community equipment sharing program for fuel breaks (hay baler, masticater, chippers)	TBD--
Wildfire Education for Decision Makers Subdivision pre-planning County Council & Planning Dept.	TBD--
Seed Storage for Post Fire Replanting Across Western Maui	TBD--
Cost benefit analysis for utility companies comparing maintenance cost vs. fire fighting and impacts costs. (Cost analysis between fire prevention and suppressions costs)	TBD--
Engage Cattlemen's Association, Fuel Mitigation Group, and Commission on Water Resources	TBD--

**Table 18.** *Next Steps: Future Projects*

## **PLAN IMPLEMENTATION AND MAINTENANCE**

The Healthy Forest Restoration Act (HFRA) requires that the Maui County Fire Department, the Maui County Civil Defense Department, and the State of Hawaii Department of Land and Natural Resources all agree on the final contents of the Western 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 Western 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 Western Maui Area, and area residents are urged to contribute their time and effort to implement the actions they self-identified in the Western Maui CWPP planning process.

Hawaii Wildfire Management Organization, in cooperation with the West Maui Fire Task Force, will provide technical support, identify and coordinate funding when possible, and serve as a centralized resource for wildfire risk reduction efforts in Western Maui. Together, representatives will prioritize and recommend funding for projects, document the successes and lessons learned from those projects, and evaluate and update the CWPP as needed.

Hawaii Wildfire Management Organization 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 additional community involvement in implementing the actions identified in this plan.

Many Western 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.

## **FINALIZE PLAN**

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

### **County:**

#### **Maui Fire Department**

Jeffrey Murray, Maui County Fire Chief  
200 Dairy Rd.  
Wailuku, HI 96793  
(808) 270-7561  
Jeffrey.Murray@mauicounty.gov



#### **Maui County Civil Defense Agency**

Anna Foust, Emergency Management Officer  
200 S. High St.  
Kalana O Maui Bldg, 1<sup>st</sup> fl.  
Wailuku, HI 96793  
(808) 270-7285  
Civil.Defense@mauicounty.gov



### **State:**

#### **Department of Land and Natural Resources:**

##### **Division of Forestry and Wildlife**

Lisa Hadway, Administrator  
1151 Punchbowl St., Rm. 325  
Honolulu, HI 96813  
(808) 587-0166  
Lisa.J.Hadway@hawaii.gov



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

---

---

## REFERENCES

- <sup>1</sup> **Photo Credit:** Chris Brosius, West Maui Mountains Watershed Partnership
- <sup>2</sup> **Photo Credit:** <http://www.city-data.com/forum/hawaii/86709-hawaii-picture-thread-pictures-only-40.html>Photo
- <sup>3</sup> **Healthy Forests Restoration Act of 2003– HR 1904. US Federal Register.**  
[http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108\\_cong\\_bills&docid=f:h1904enr.txt.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_bills&docid=f:h1904enr.txt.pdf)
- <sup>4</sup> **Hawaii Wildfire Management Organization.** Hawaii Wildfire History Database and Map.  
<http://www.hawaiiwildfire.org/hwmo-products.html>
- <sup>5</sup> **West Maui Community Plan.** 1996. Maui County Council.
- <sup>6</sup> **West Maui Mountains Watershed Partnership.** <http://www.westmauiwatershed.org>
- <sup>7</sup> **College of Tropical Agriculture and Human Resources.** Soil Nutrient Management for Maui County. [www.ctahr.hawaii.edu/mauisoil/](http://www.ctahr.hawaii.edu/mauisoil/)
- <sup>8</sup> **USDA Soil Conservation Service.** Soil Survey of Islands of Kauai, Oahu, Maui, Moloka ʻi, and Lānaʻi, State of Hawaii, 1972.
- <sup>9</sup> **State of Hawaii. DLNR-DOFAW. Forestry Programs. Forest Reserves System**  
<http://dlnr.hawaii.gov/forestry/frs/>
- <sup>10</sup> **State of Hawaii. Native Ecosystems Protection & Management.**  
<http://dlnr.hawaii.gov/ecosystems/nars/reserves/maui/west-maui/>
- <sup>11</sup> **Puʻu Kukui Watershed Preserve.** <http://mauland.com/puukukui.shtml>
- <sup>12</sup> **Pomaikaʻi Kaniaupio-Crozier.** Puʻu Kukui Preserve Manager, email description
- <sup>13</sup> **The Nature Conservancy, Kapunakea Preserve.**  
<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/hawaii/placesweprotect/kapunakea.xml>
- <sup>14</sup> **West Maui Ridge to Reef Initiative.** <http://www.westmauir2r.com/>
- <sup>15</sup> **Hawaiian Islands Land Trust.** <http://www.hilt.org/>
- <sup>16</sup> **Project Malama Honokōwai, Maui Cultural Lands**  
[http://www.mauiculturallands.org/news\\_mauiweekly-080522.html](http://www.mauiculturallands.org/news_mauiweekly-080522.html)



- 
- <sup>17</sup> **Makai Watch.** <http://www.westhawaiicoralreefstrategy.com/index.php/local-action-strategies/makai-watch>
- <sup>18</sup> **Save Honolua Coalition.** <http://www.savehonolua.org/>
- <sup>19</sup> **Surfrider Foundation, Maui Chapter.** <http://maui.surfrider.org/>
- <sup>20</sup> **U.S. Fish and Wildlife Service.** <http://www.fws.gov/pacificislands/teslist.html>
- <sup>21</sup> **U.S. Fish and Wildlife Service.** Letter to Department of Energy regarding Project Impacts on T & E species. 2012. Written for Hawaii Clean Energy Programmatic Environmental Impact Statement (PEIS), as published in the Federal Register (FR Vol. 77, No. 155, Pages 47828-47831) on August 10, 2012. Provided by USFWS for use in West Maui CWPP via email correspondence.
- <sup>22</sup> **USFWS Environmental Conservation Online System.**  
[http://ecos.fws.gov/tess\\_public/pub/stateListingAndOccurrenceIndividual.jsp?state=HI&s8fid=112761032792&s8fid=112762573902](http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=HI&s8fid=112761032792&s8fid=112762573902)
- <sup>23</sup> **Lucienne de Naie and Marty McMahon, M.A.** Maui's Water Resources: A General Overview. Summary of Research conducted by Maui Tomorrow's Ka Waiola Project 2002-2004.  
<http://maui-tomorrow.org/mauis-water-resources-a-general-overview/>
- <sup>24</sup> **West Maui Community Plan.** 1996. Maui County Council
- <sup>25</sup> **Wailuku Museum.** <http://www.Wailukumaui.org>
- <sup>26</sup> **Maui Museum** <http://www.Mauiuseum.org>
- <sup>27</sup> **Hawaii State Department of Education.** Maui Schools webpage.  
<http://www.hawaiipublicschools.org/ParentsAndStudents/EnrollingInSchool/SchoolFinder/Pages/Maui-County-Map.aspx>
- <sup>28</sup> **County of Maui Parks and Recreation.** <http://www.co.maui.hi.us/index.aspx?NID=119>
- <sup>29</sup> **Hawaii State Parks:** Maui State Parks page <http://www.hawaiistateparks.org/parks/maui/>  
<http://www.hawaiistateparks.org/parks/maui/>
- <sup>30</sup> **Adapted from Linn County Community Wildfire Protection Plan.** ECONorWest 2007  
[https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/5795/Linn\\_County\\_Wildfire\\_Plan.pdf?sequence=1](https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/5795/Linn_County_Wildfire_Plan.pdf?sequence=1)
- <sup>31</sup> **County of Maui Drought Mitigation Strategies**  
<http://state.hi.us/dlnr/drought/preparedness/MauiDroughtMitigationStrategies.pdf>
- <sup>32</sup> **County of Maui Multi-Hazard Mitigation Plan.**  
<http://www.co.maui.hi.us/documents/10/Maui%20MultiHazard%20Mitigation%20Plan%20Vol.I%20-%20May%202020.PDF>
- <sup>33</sup> **County of Maui Water Use and Development Plan Draft**  
<http://www.co.maui.hi.us/index.aspx?NID=767>
- <sup>34</sup> **Maui Island Plan** <http://www.co.maui.hi.us/index.aspx?nid=1503>
- <sup>35</sup> **State Drought Plan and the County Drought Mitigation Strategies**

---

<http://hawaii.gov/dlnr/drought/preparedness.htm>

<sup>36</sup> **State of Hawaii Multi-Hazard Mitigation Plan.** 2007.  
[http://scd.state.hi.us/HazMitPlan/executive\\_summary.pdf](http://scd.state.hi.us/HazMitPlan/executive_summary.pdf)

<sup>37</sup> **National Cohesive Wildland Fire Management Strategy**  
<http://www.forestsandrangelands.gov/strategy/>

<sup>38</sup> **Ready, Set, Go!** <http://www.wildlandfirersg.org>

<sup>39</sup> **Hawaii Wildfire Management Organization.** Ready, Set, Go! Personal Wildland Fire Action Guide- Hawaii Edition. <http://www.hawaiiwildfire.org>

<sup>40</sup> **Firewise** <http://www.Firewise.org>

Hawaii Wildfire Management Organization took all photos not specifically credited above.

Hawaiian language diacriticals were based on Hawaiian place name lexicology as listed on Ulukau: The Hawaiian Electronic Library. Hyphens were removed to utilize more common spellings.  
<http://www.ulukau.org/cgi-bin/hpn?l=haw>

# APPENDIX A

## Soils Map Key for Figure 7

AaC	Ainakea silty clay loam, 3 to 12 percent slopes
AaD	Ainakea silty clay loam, 12 to 20 percent slopes
AaE	Ainakea silty clay loam, 20 to 35 slopes
AFD	Apakuie very fine sandy loam, 12 to 20 percent slopes
AkC	Akaka silty clay loam, 0 to 10 percent slopes
AkD	Akaka silty clay loam, 10 to 20 percent slopes
AlC	Alapai silty clay loam, 0 to 10 percent slopes
AlD	Alapai silty clay loam, 10 to 20 percent slopes
AlE	Alapai silty clay loam, 20 to 35 percent slopes
ApD	Alapai extremely stony silty clay loam, 10 to 20 percent slopes
ASD	Apakuie very stony very fine sandy loam, 12 to 20 percent slopes
BH	Beaches
FL	Fill land
HaA	Hawi silty clay, 0 to 3 percent slopes
HaC	Hawi silty clay, 3 to 12 percent slopes
HCD	Hanipoe very stony loam, 12 to 20 percent slopes
HDD	Hanipoe silt loam, 12 to 20 percent slopes
HeC	Hawi extremely stony silty clay, 6 to 12 percent slopes
HFD	Hanipoe very rocky silt loam, 6 to 20 percent slopes
HHC	Heake very rocky sandy loam, 6 to 12 percent slopes
HKC	Heake extremely rocky sandy loam, 0 to 10 percent slopes
HlC	Hilea silty clay loam, 6 to 12 percent slopes
HND	Honaunau silt loam, 6 to 20 percent slopes
HoC	Hilo silty clay loam, 0 to 10 percent slopes
HoD	Hilo silty clay loam, 10 to 20 percent slopes
HoE	Hilo silty clay loam, 20 to 35 percent slopes
HRD	Honaunau extremely rocky silty clay loam, 6 to 20 percent slopes
HsC	Honokaa silty clay loam, low elevation, 0 to 10 percent slopes
HsD	Honokaa silty clay loam, low elevation, 10 to 20 percent slopes
HsE	Honokaa silty clay loam, low elevation, 20 to 35 percent slopes
HTD	Honokaa silty clay loam, 10 to 20 percent slopes
HTE	Honokaa silty clay loam, 20 to 35 percent slopes
HUD	Honuaulu very stony silty clay loam, 6 to 20 percent slopes
HVD	Honuaulu extremely stony silty clay loam, 12 to 20 percent slope
KaC	Kaiwiki silty clay loam, 0 to 10 percent slopes
KaD	Kaiwiki silty clay loam, 10 to 20 percent slopes
KaE	Kaiwiki silty clay loam, 20 to 35 percent slopes
KBC	Kaalualu extremely stony loamy sand, 2 to 12 percent slopes
KCD	Kahua silty clay loam, 6 to 20 percent slopes
KDD	Kainaliu very stony silty clay loam, 12 to 20 percent slopes
KEC	Kainaliu extremely stony silty clay loam, 12 to 20 percent slopes
KfA	Kikoni very fine sandy loam, 0 to 3 percent slopes
KGC	Kamakoa very fine sandy loam, 0 to 10 percent slopes
KhA	Kohala silty clay, 0 to 3 percent slopes
KhC	Kohala silty clay, 3 to 12 percent slopes
KhD	Kohala silty clay, 12 to 20 percent slopes
KhE	Kohala silty clay, 20 to 35 percent slopes

## APPENDIX A

### Soils Map Key for Figure 7

KIC	Kamaoa loam, 6 to 12 percent slopes
KJC	Kamaoa loam, moderately shallow, 6 to 12 percent slopes
KKC	Kamaoa extremely stony loam, 6 to 12 percent slopes
KLC	Kapapala loam, 0 to 10 percent slopes
KLD	Kapapala loam, 10 to 20 percent slopes
KMD	Kapapala very rocky loam, 6 to 20 percent slopes
KNC	Kawaihae extremely stony very fine sandy loam, 6 to 12 percent slopes
KOC	Kawaihae very rocky very fine sandy loam, 6 to 12 percent slopes
KPD	Kealakekua silty clay loam, 12 to 20 percent slopes
KRD	Kealakekua very stony silty clay loam, 6 to 20 percent slopes
KSD	Kealakekua extremely stony silty clay loam, 12 to 20 percent slopes
KTB	Keekee loamy sand, 0 to 6 percent slopes
KuC	Kukaiau silty clay loam, 6 to 12 percent slopes
KuD	Kukaiau silty clay loam, 12 to 20 percent slopes
KuE	Kukaiau silty clay loam, 20 to 35 percent slopes
KVC	Kehena silty clay loam, 6 to 12 percent slopes
KwD	Kukaiau silty clay loam, moderately shallow, 12 to 20 percent slopes
KXC	Kikoni very fine sandy loam, 3 to 12 percent slopes
KYC	Kikoni extremely stony very fine sandy loam, 6 to 12% slopes
KZD	Kilohana loamy fine sand, 12 to 20 percent slopes
LAD	Laumaia silt loam, 6 to 20 percent slopes
LUC	Laumaia extremely stony silt loam, 6 to 12 percent slopes
MaA	Maile silt loam, 0 to 3 percent slopes
MHC	Mahukona silty clay loam, 3 to 12 percent slopes
MKC	Mahukona very stony silty clay loam, 6 to 12 percent slopes
MLD	Maile silt loam, 6 to 20 percent slopes
MMD	Manahaa silt loam, 6 to 20 percent slopes
MND	Manahaa extremely stony silt loam, 6 to 20 percent slopes
MoC	Moaula silty clay loam, 0 to 10 percent slopes
MoD	Moaula silty clay loam, 10 to 20 percent slopes
MoE	Moaula silty clay loam, 20 to 35 percent slopes
MT	Mixed alluvial land
NaC	Naalehu silty clay loam, 0 to 10 percent slopes
NaD	Naalehu silty clay loam, 10 to 20 percent slopes
NaE	Naalehu silty clay loam, 20 to 35 percent slopes
NhD	Naalehu very rocky silty clay loam, 6 to 20 percent slopes
NIC	Niulii silty clay loam, 6 to 12 percent slopes
NID	Niulii silty clay loam, 12 to 20 percent slopes
NIE	Niulii silty clay loam, 20 to 35 percent slopes
OaC	Olaa silty clay loam, 0 to 10 percent slopes
OHC	Ohia silty clay loam, 0 to 10 percent slopes
OID	Olaa extremely stony silty clay loam, 0 to 20 percent slopes
OoC	Ookala silty clay loam, 6 to 12 percent slopes
OoD	Ookala silty clay loam, 12 to 20 percent slopes
OoE	Ookala silty clay loam, 20 to 35 percent slopes
OSD	Ohia extremely stony silty clay loam, 0 to 20 percent slopes
PaC	Paauhau silty clay loam, 6 to 12 percent slopes



## APPENDIX A

### Soils Map Key for Figure 7

PaD	Paauhau silty clay loam, 12 to 20 percent slopes
PaE	Paauhau silty clay loam, 20 to 35 percent slopes
PeC	Panaewa very rocky silty clay loam, 0 to 10 percent slopes
PKB	Pakini very fine sandy loam, 2 to 6 percent slopes
PLC	Palapalai silt loam, 6 to 12 percent slopes
PMC	Palapalai silty clay loam, 6 to 12 percent slopes
PND	Piihonua silty clay loam, 6 to 20 percent slopes
POD	Piihonua extremely stony silty clay loam, 6 to 20 percent slopes
PPC	Puauulu silt loam, 0 to 10 percent slopes
PRD	Punohu silt loam, 12 to 20 percent slopes
PSC	Puukala extremely stony silt loam, 6 to 12 percent slopes
PTC	Puukala very rocky silt loam, 6 to 12 percent slopes
PUC	Puu oo silt loam, 6 to 12 percent slopes
PVD	Puu pa extremely stony very fine sandy loam, 6 to 20 percent slopes
PVF3	Puu pa extremely stony very fine sandy loam, 70 to 100 percent slopes, severely eroded
PWD	Puu pa silt loam, 12 to 20 percent slopes
rAK	Akaka soils
rAM	Amalu soils
rAR	Amalu-rough broken land association
RB	Rough broken land
rCL	Cinder land
rHID	Huikau loamy sand, 12 to 20 percent slopes
rHID2	Huikau loamy sand, 12 to 20 percent slopes, eroded
rHLD	Huikau extremely stony loamy sand, 12 to 20 percent slopes
rHP	Hydrandep-tropofolist association
rKAD	Kahaluu extremely rocky muck, 6 to 20 percent slopes
rKED	Kaimu extremely stony peat, 7 to 25 percent slopes
rKFD	Keaukaha extremely rocky muck, 6 to 20 percent slopes
rKGD	Keei extremely rocky muck, 6 to 20 percent slopes
rKHD	Kekake extremely rocky muck, 6 to 20 percent slopes
rKUC	Kilauea extremely gravelly sand, 6 to 12 percent slopes
rKXD	Kiloa extremely stony muck, 6 to 20 percent slopes
rKYD	Kona extremely rocky muck, 6 to 20 percent slopes
rLLD	Lalaaau extremely stony muck, 6 to 20 percent slopes
rLV	Lava flows, aa
rLW	Lava flows, pahoe
rMAD	Malama extremely stony muck, 3 to 15 percent slopes
rMUB	Manu silt loam, 2 to 6 percent slopes
rMWD	Mawae extremely stony muck, 6 to 20 percent slopes
rOPE	Opihikao extremely rocky muck, 3 to 25 percent slopes
rPAE	Papai extremely stony muck, 3 to 25 percent slopes
rPHB	Puhimau silt loam, 2 to 6 percent slopes
rPXE	Puna extremely stony muck, 3 to 25 percent slopes
rPYD	Punaluu extremely rocky peat, 6 to 20 percent slopes
rRO	Rock land
rVS	Very stony land

## APPENDIX A

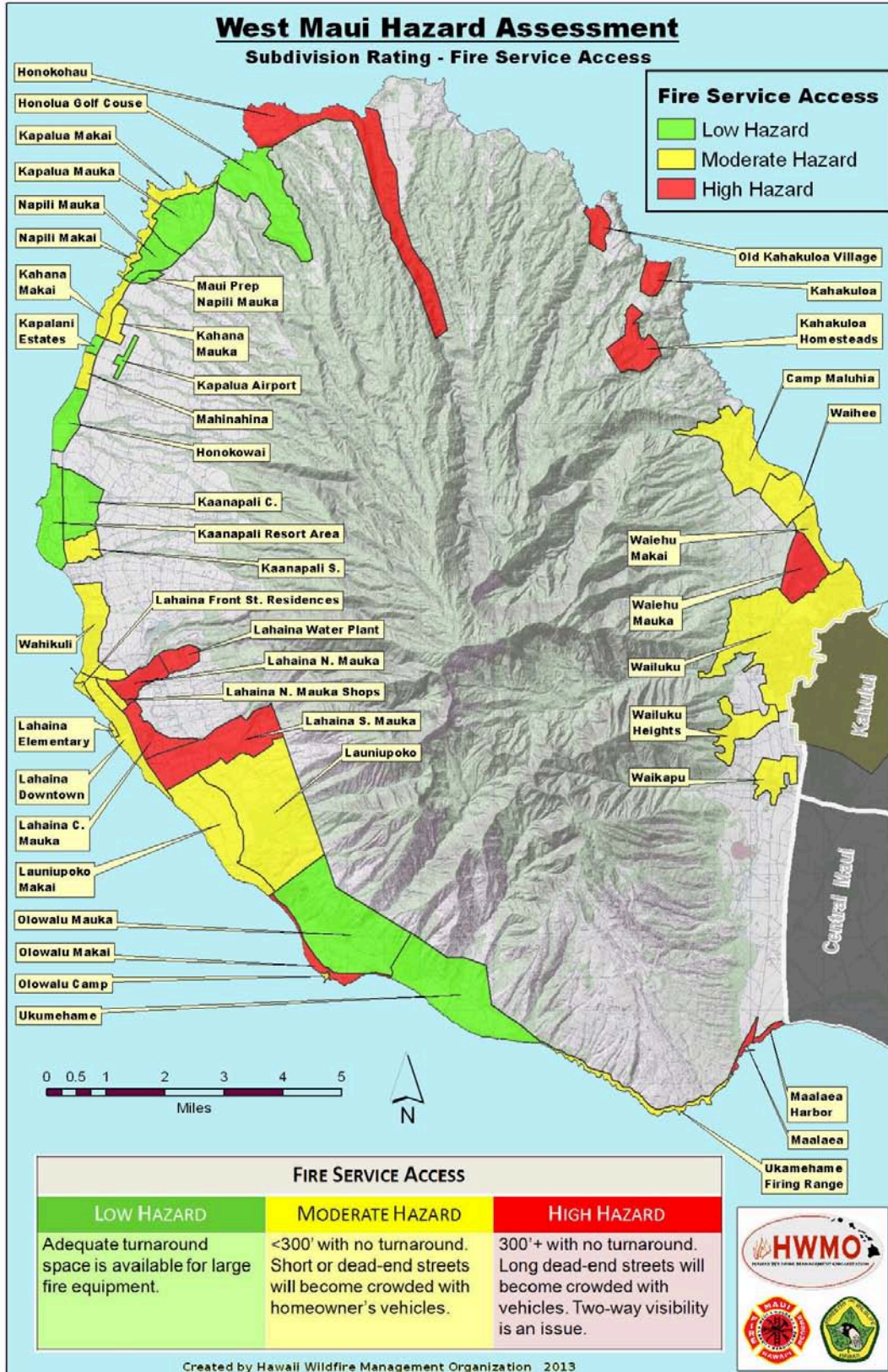
### Soils Map Key for Figure 7

Tr	Tropaquepts
UMD	Umikoa silt loam, 12 to 20 percent slopes
USD	Umikoa extremely stony silt loam, 12 to 20 percent slopes
W	Water > 40 acres
WAC	Waiaha silt loam, 0 to 10 percent slopes
WAD	Waiaha silt loam, 10 to 20 percent slopes
WHC	Waiaha extremely stony silt loam, 6 to 12 percent slopes
WKD	Waiaha very rocky silt loam, 10 to 20 percent slopes
WLC	Waikaloa very fine sandy loam, 6 to 12 percent slopes
WMC	Waimea very fine sandy loam, 6 to 12 percent slopes
WSD	Waimea extremely stony very fine sandy loam, 12 to 20 percent slopes

# APPENDIX B

## Western Maui Hazard Assessment Maps

### 1. Subdivision Hazard Rating – Fire Service Access Map

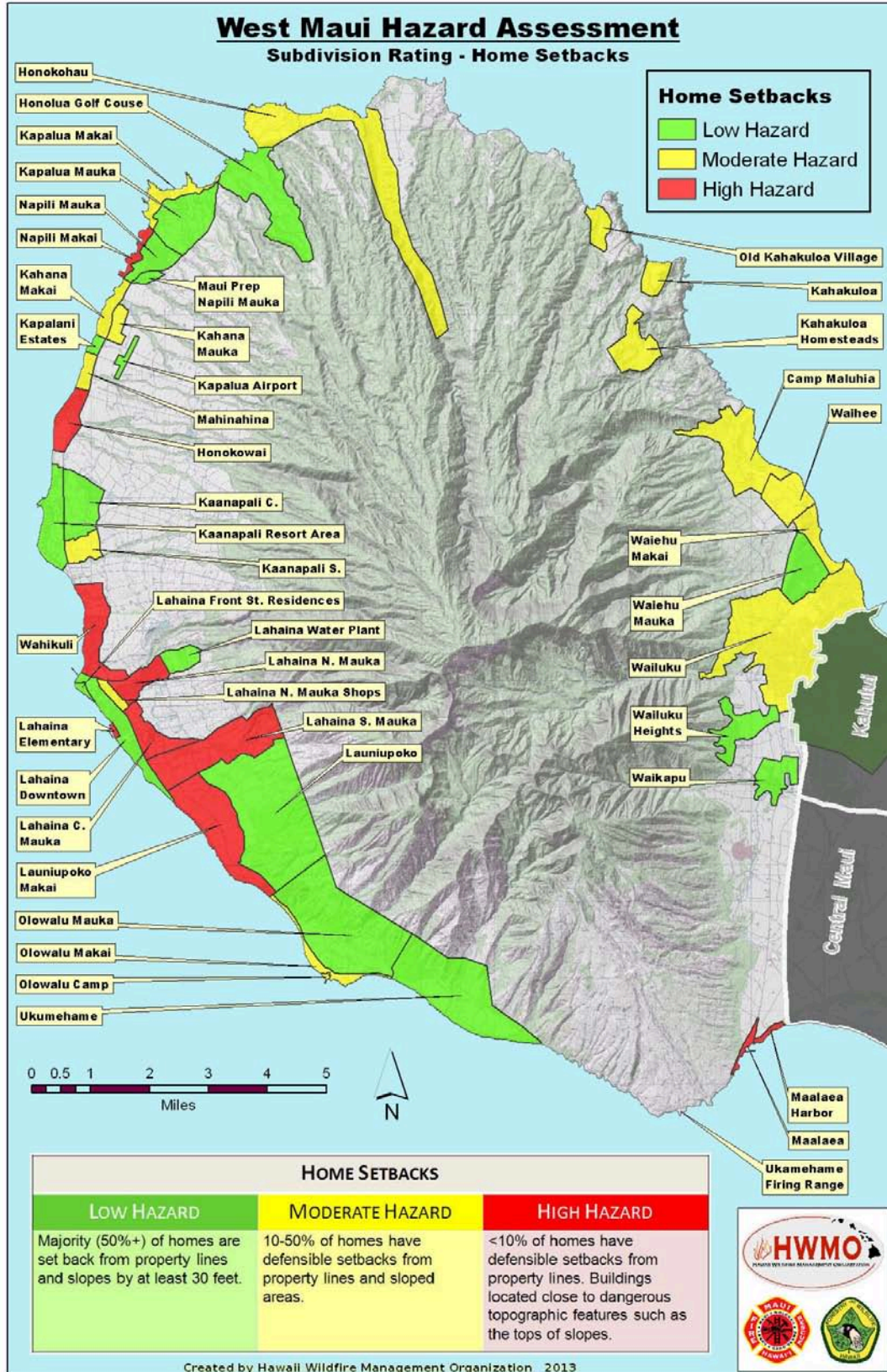




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 2. Subdivision Hazard Rating – Home Setbacks Map

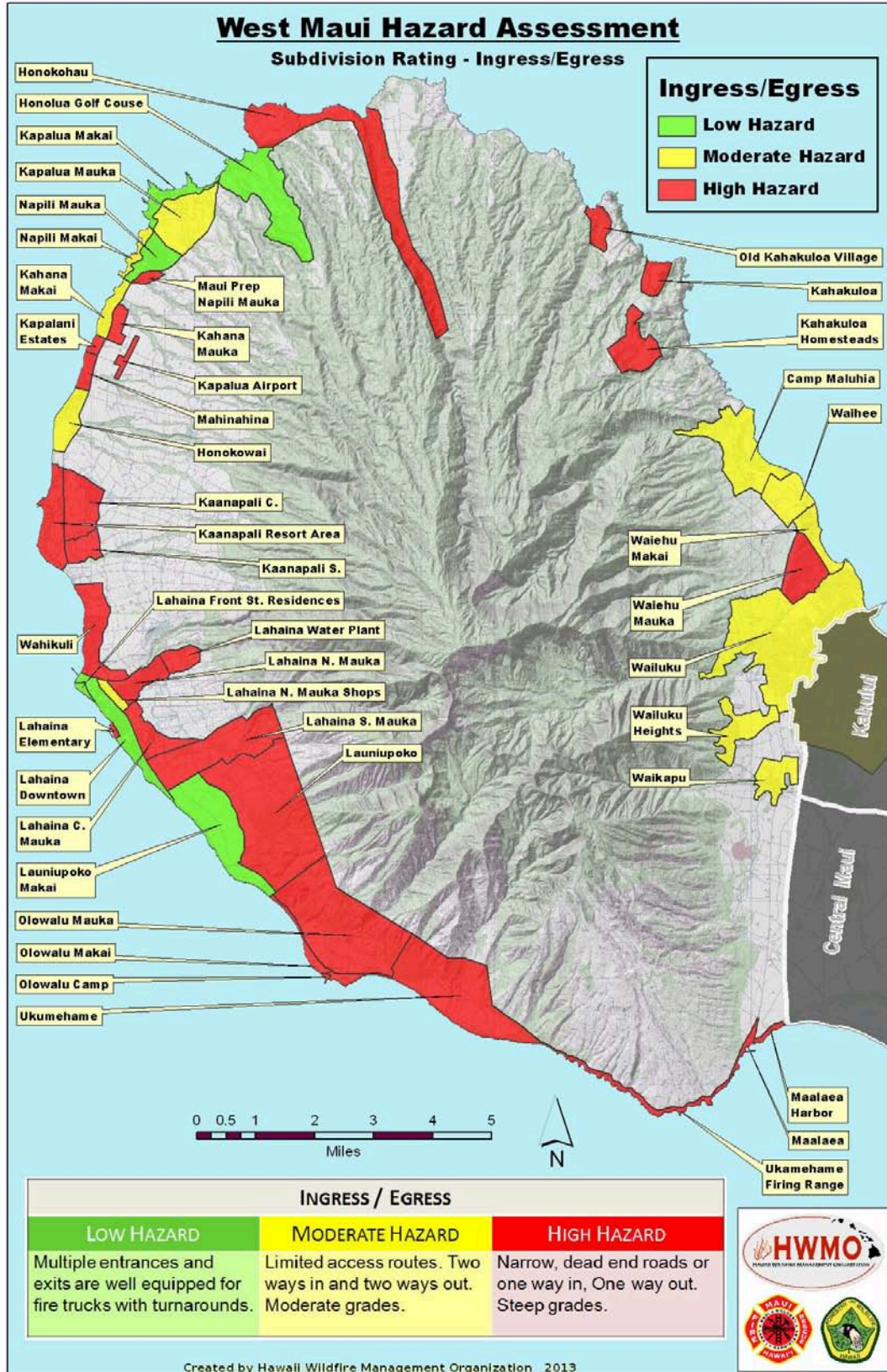




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 3. Subdivision Hazard Rating – Ingress/Egress Map

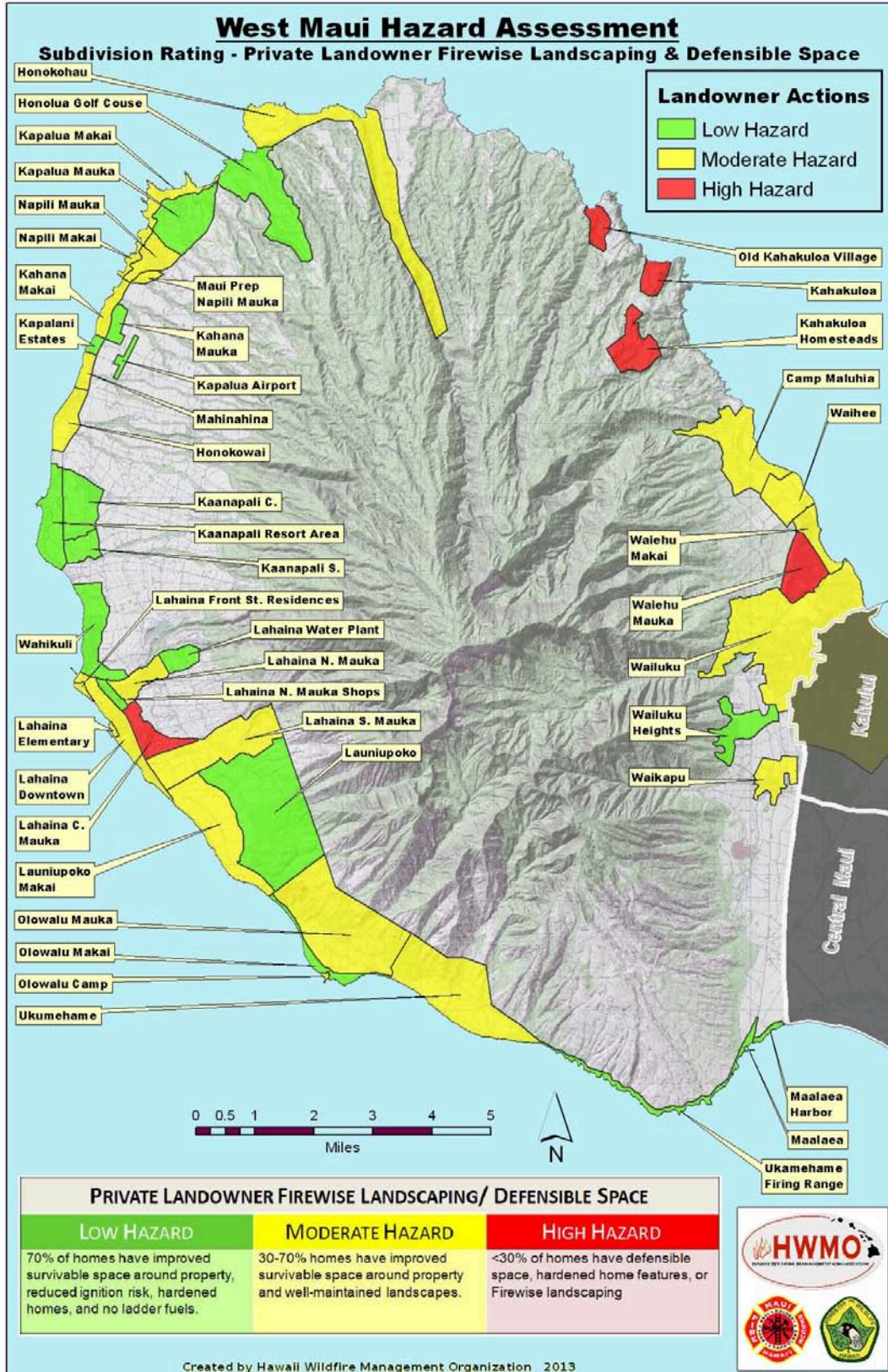




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 4. Subdivision Hazard Rating – Private Landowner Map

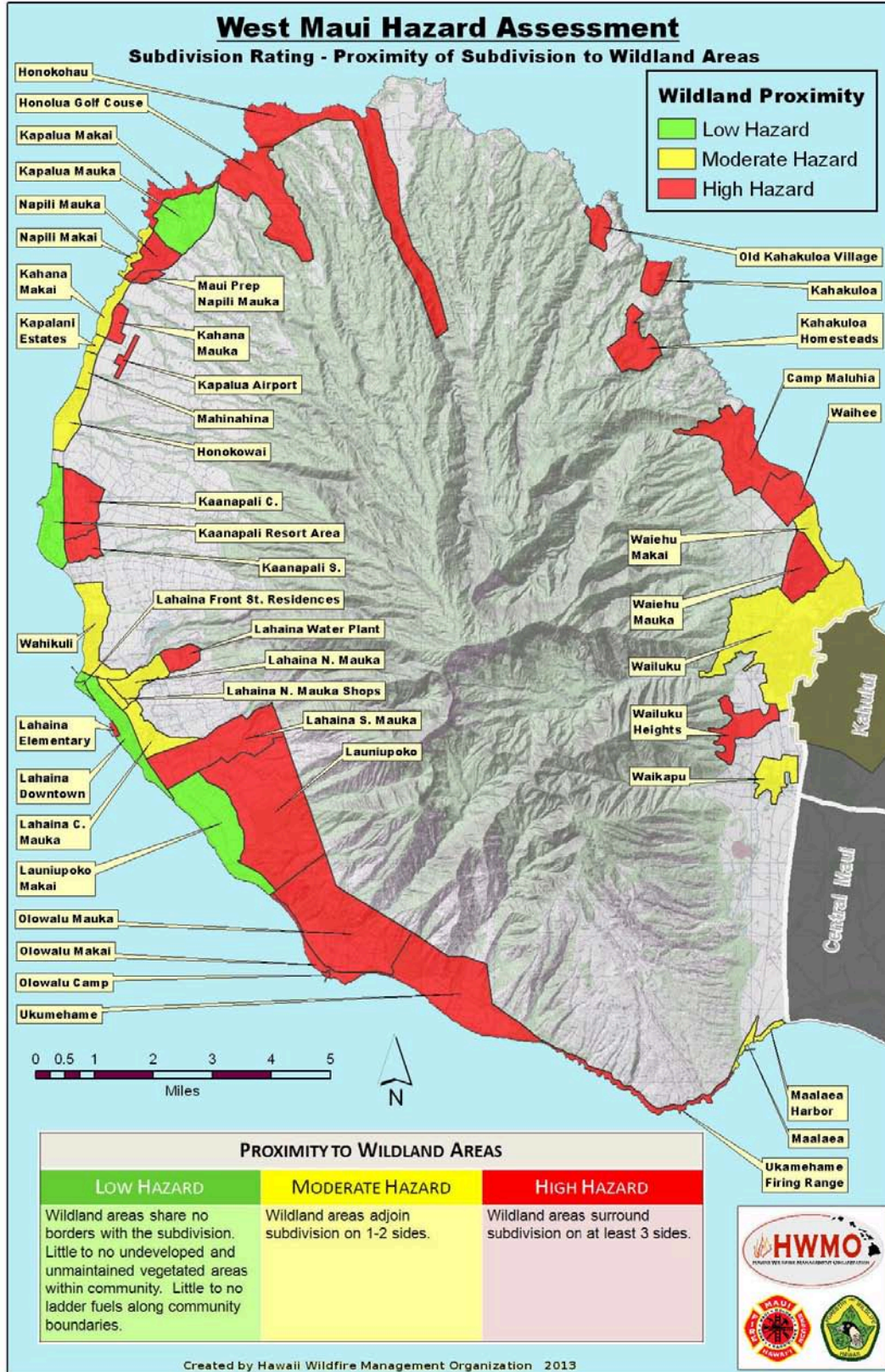




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 5. Subdivision Hazard Rating – Proximity to Wildland Areas Map

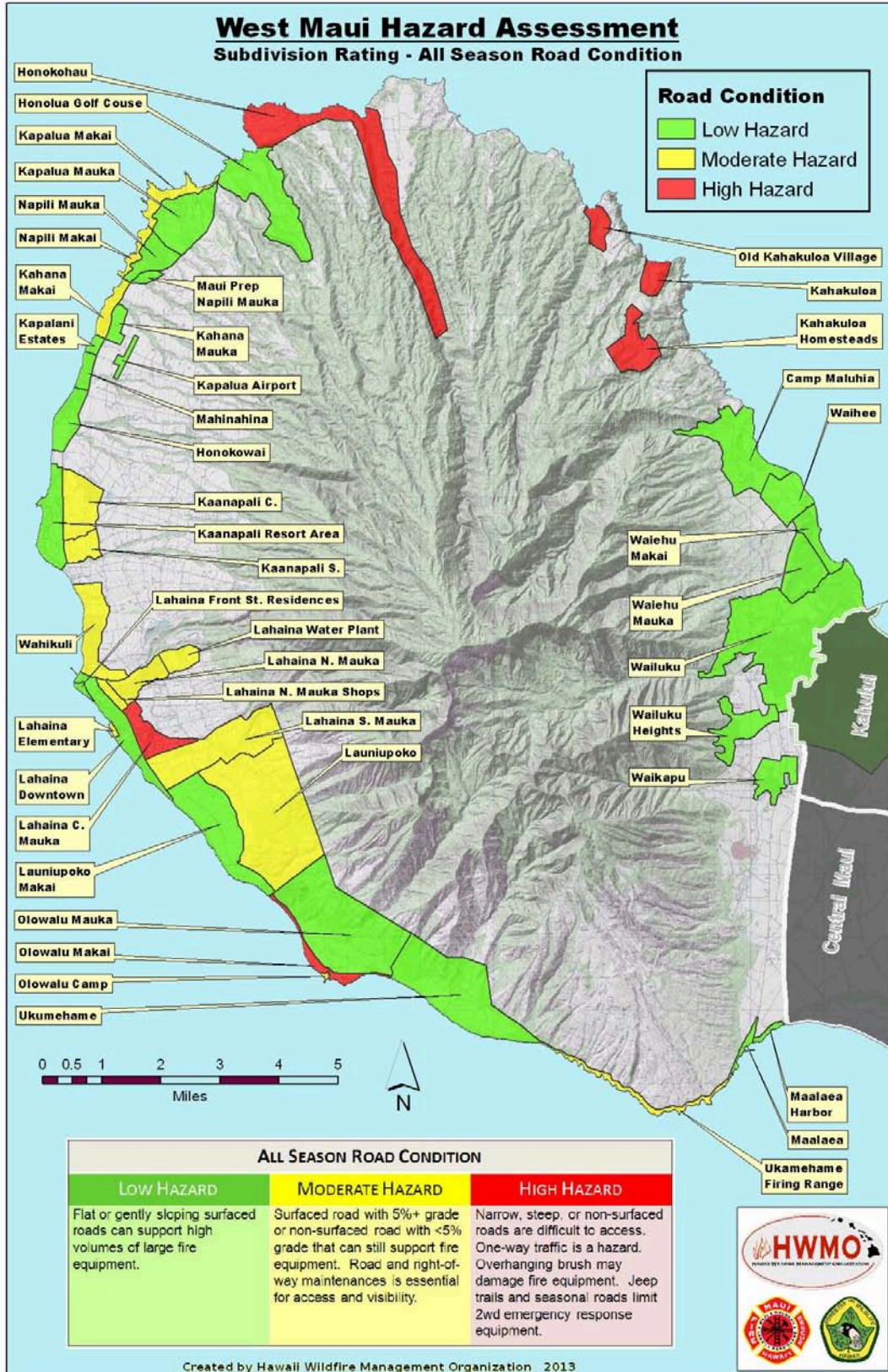




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 6. Subdivision Hazard Rating – All Season Road Condition Map

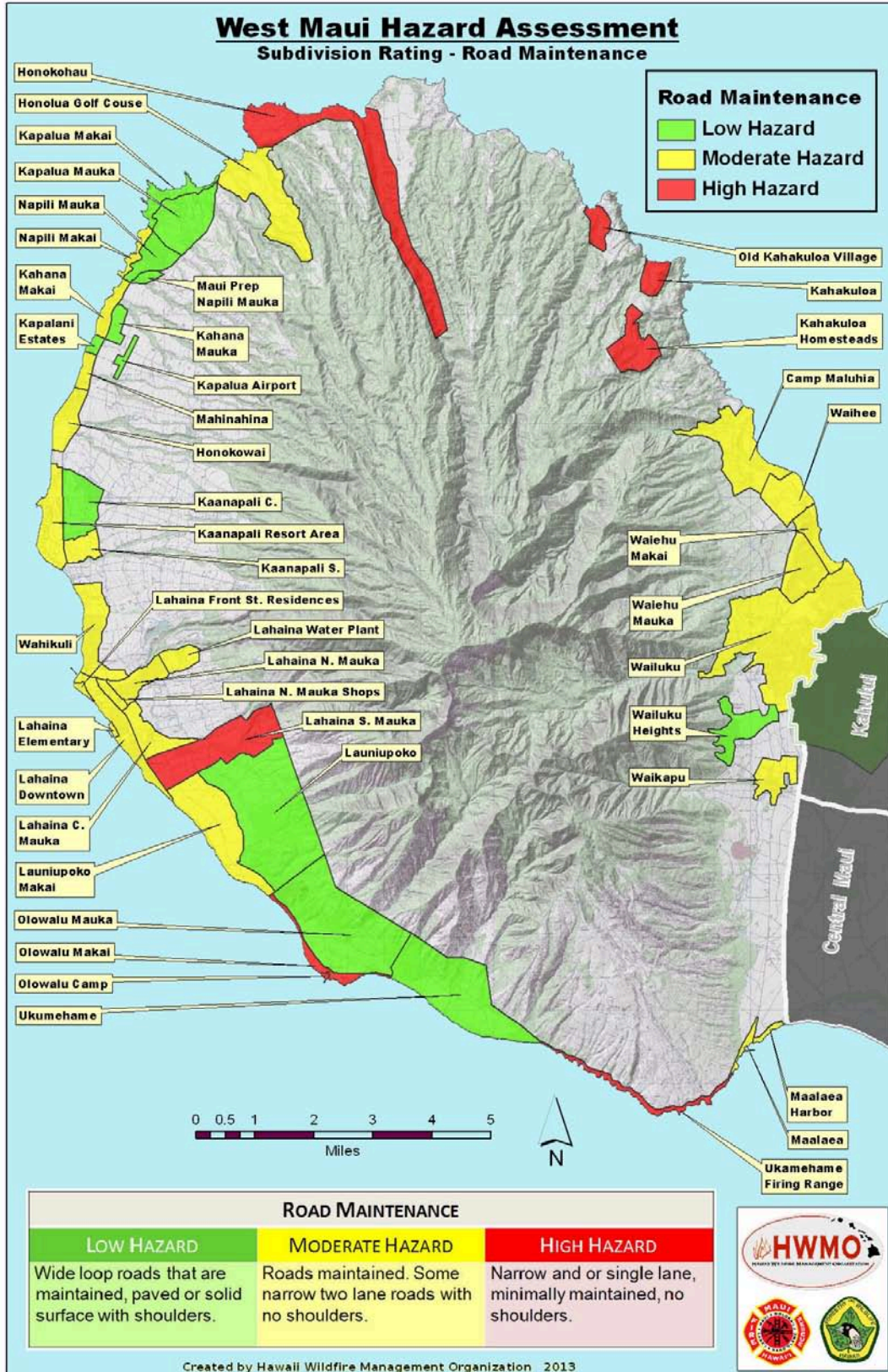




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 7. Subdivision Hazard Rating – Road Maintenance Map

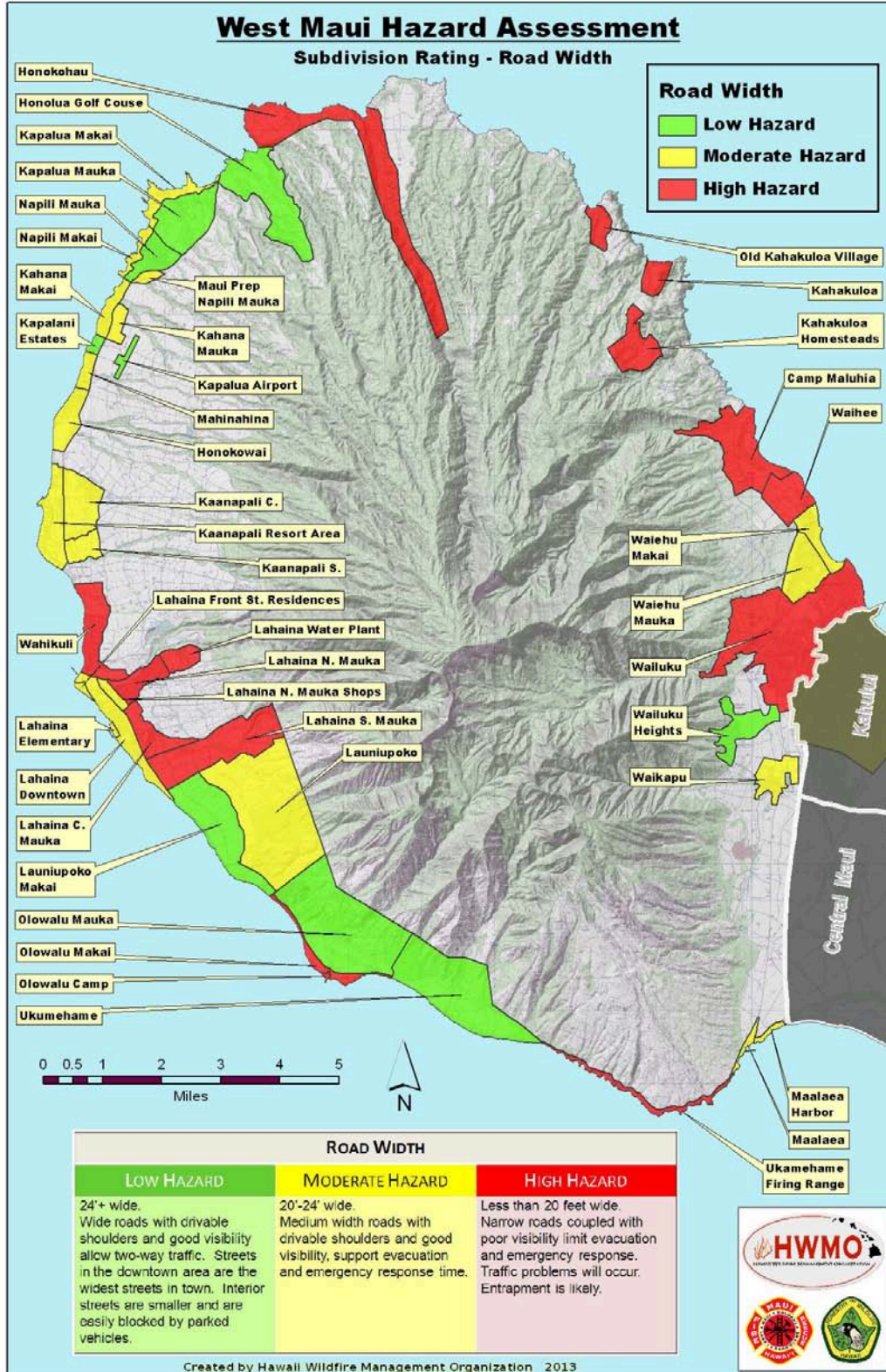




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 8. Subdivision Hazard Rating – Road Width Map

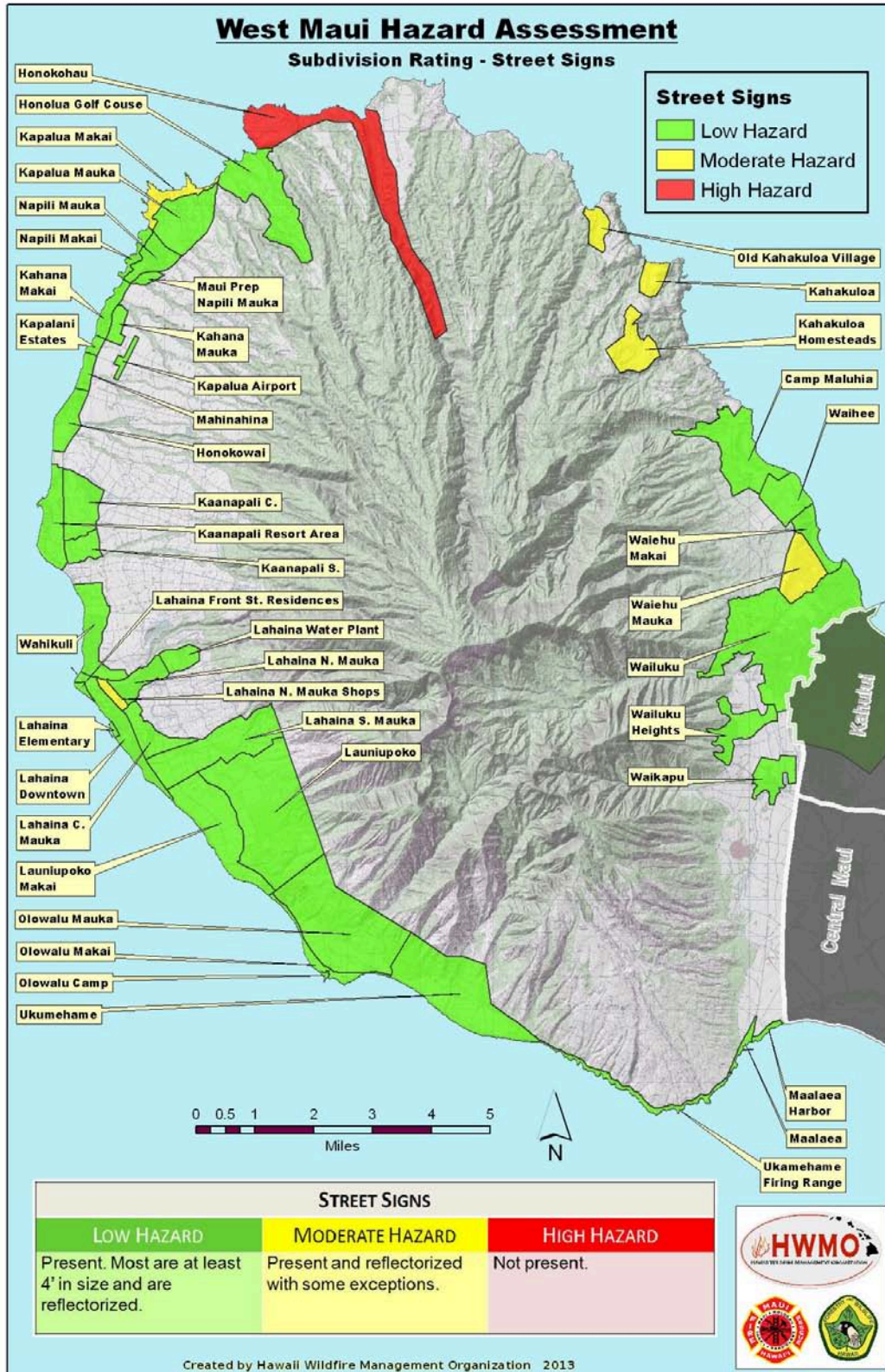




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 9. Subdivision Hazard Rating – Street Signs Map

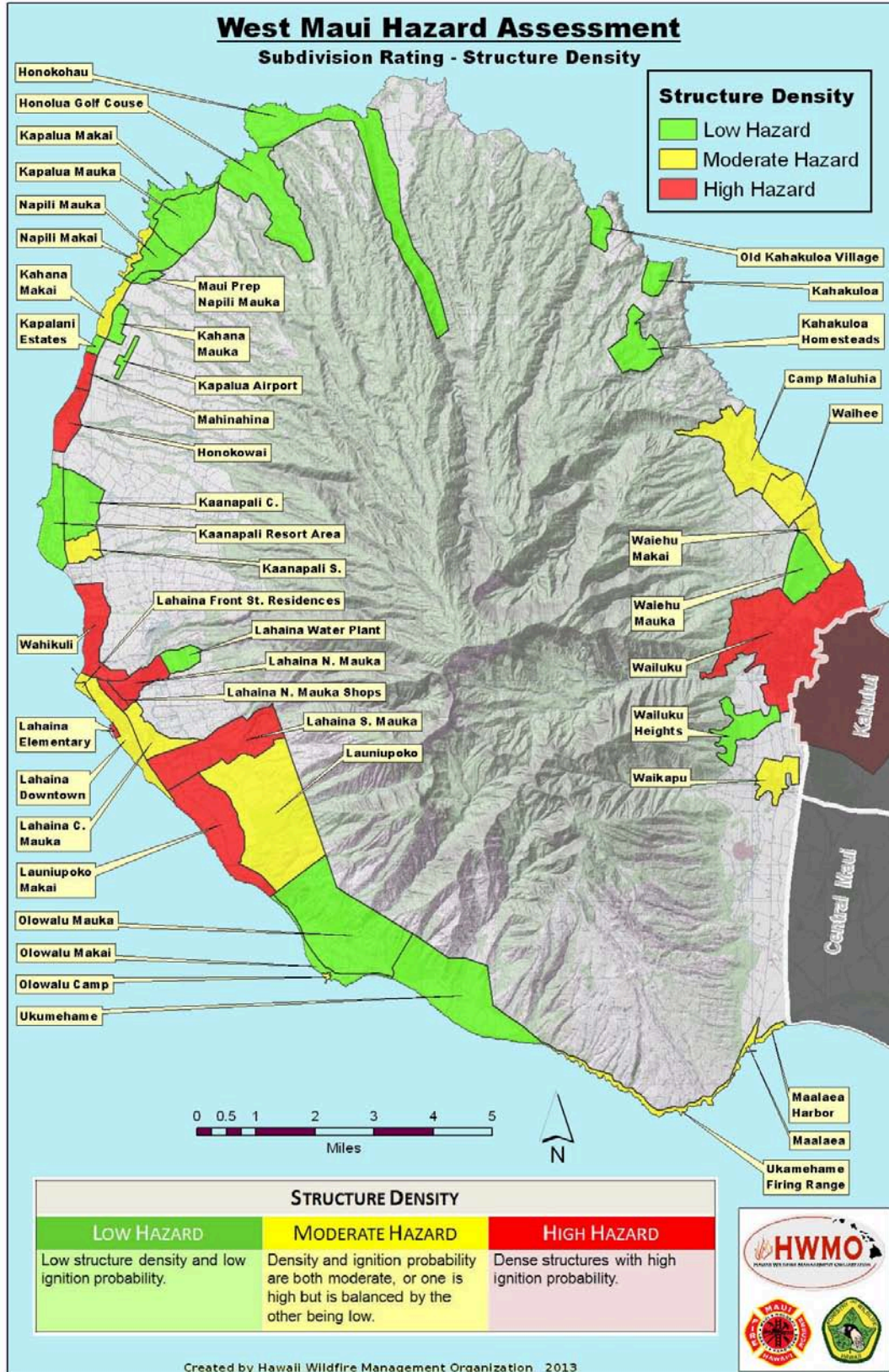




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 10. Subdivision Hazard Rating – Structure Density Map

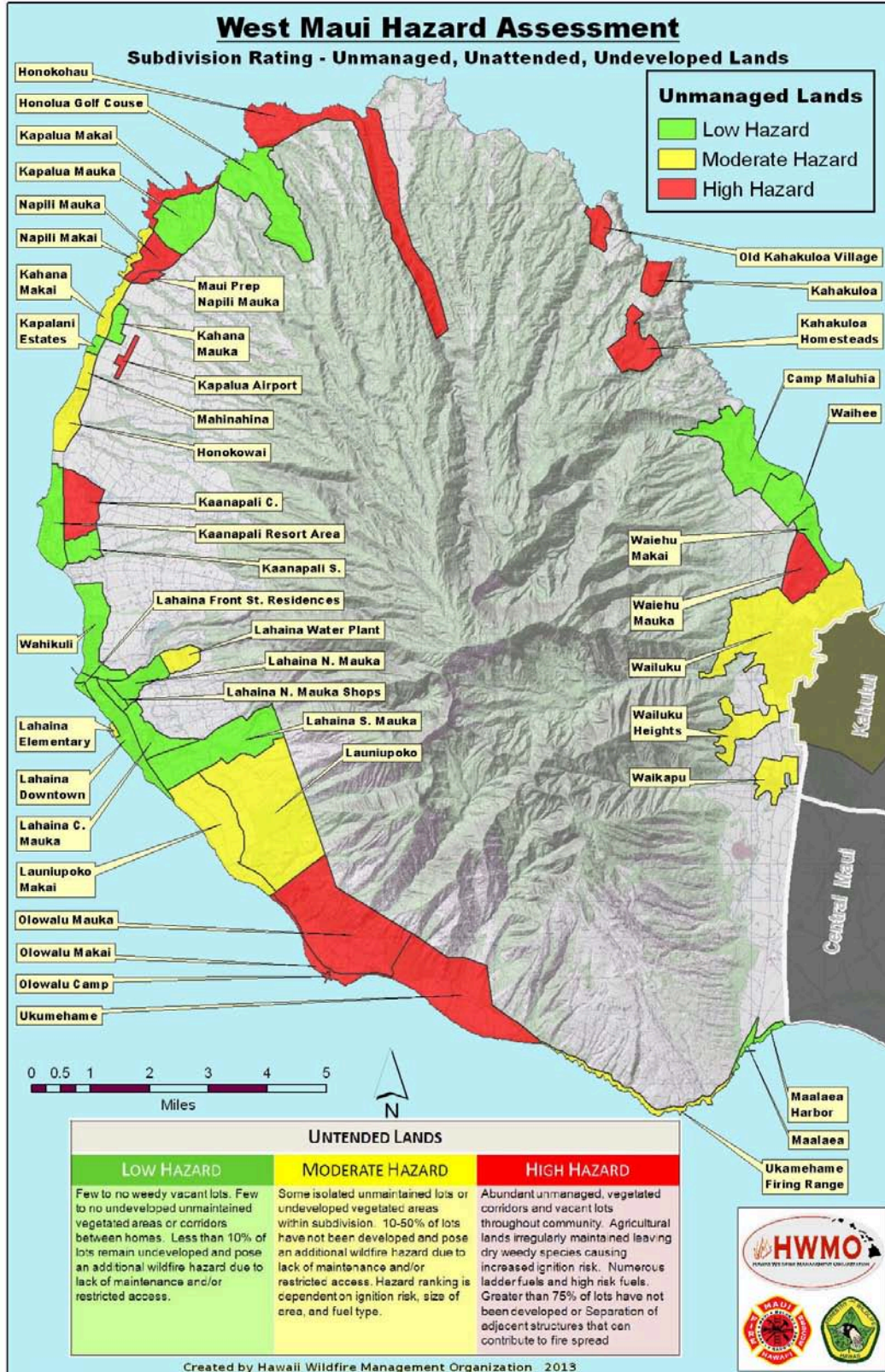




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 11. Subdivision Hazard Rating – Unmanaged Lands Map

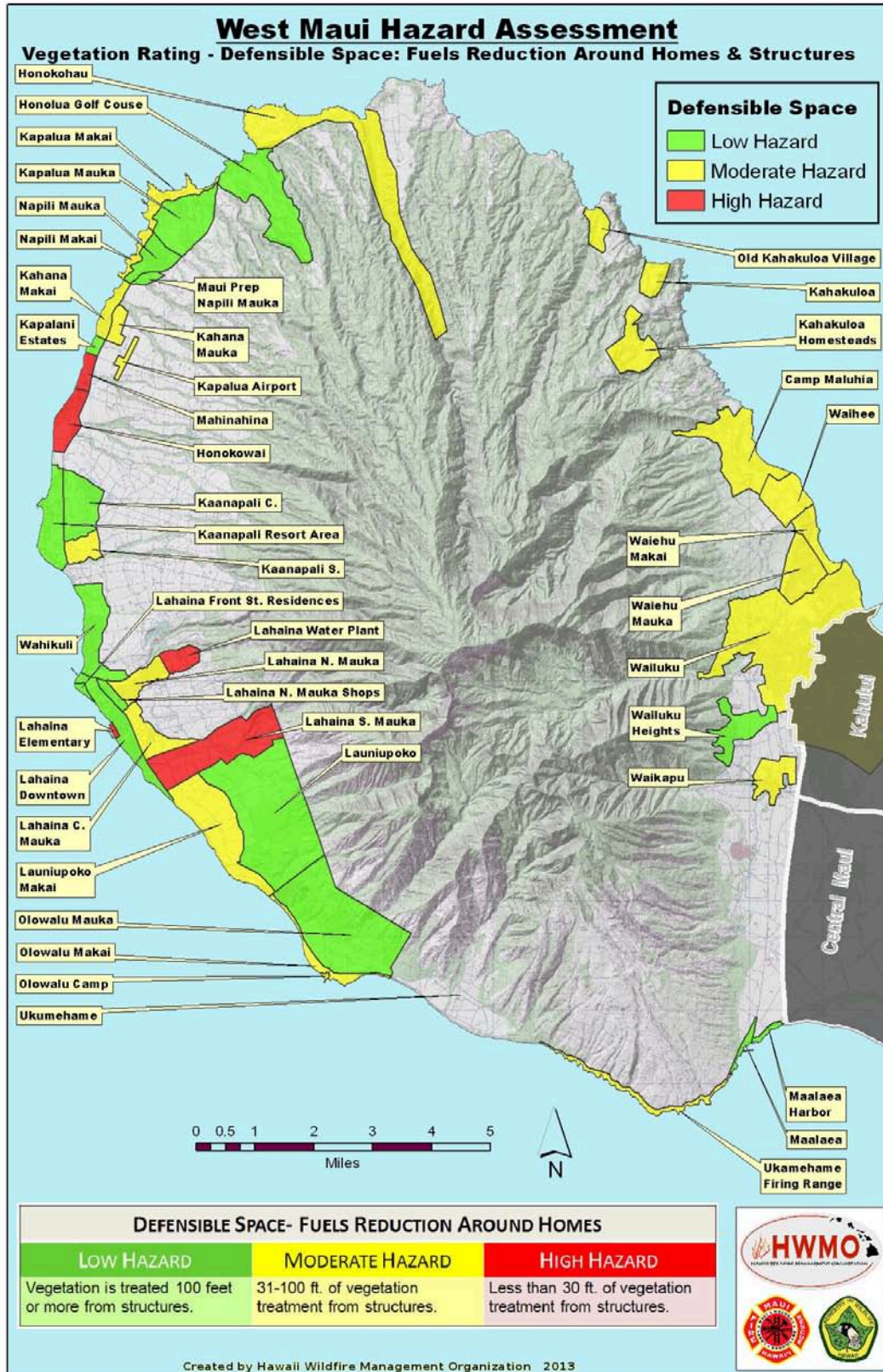




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 12. Vegetation Hazard Rating – Defensible Space Map

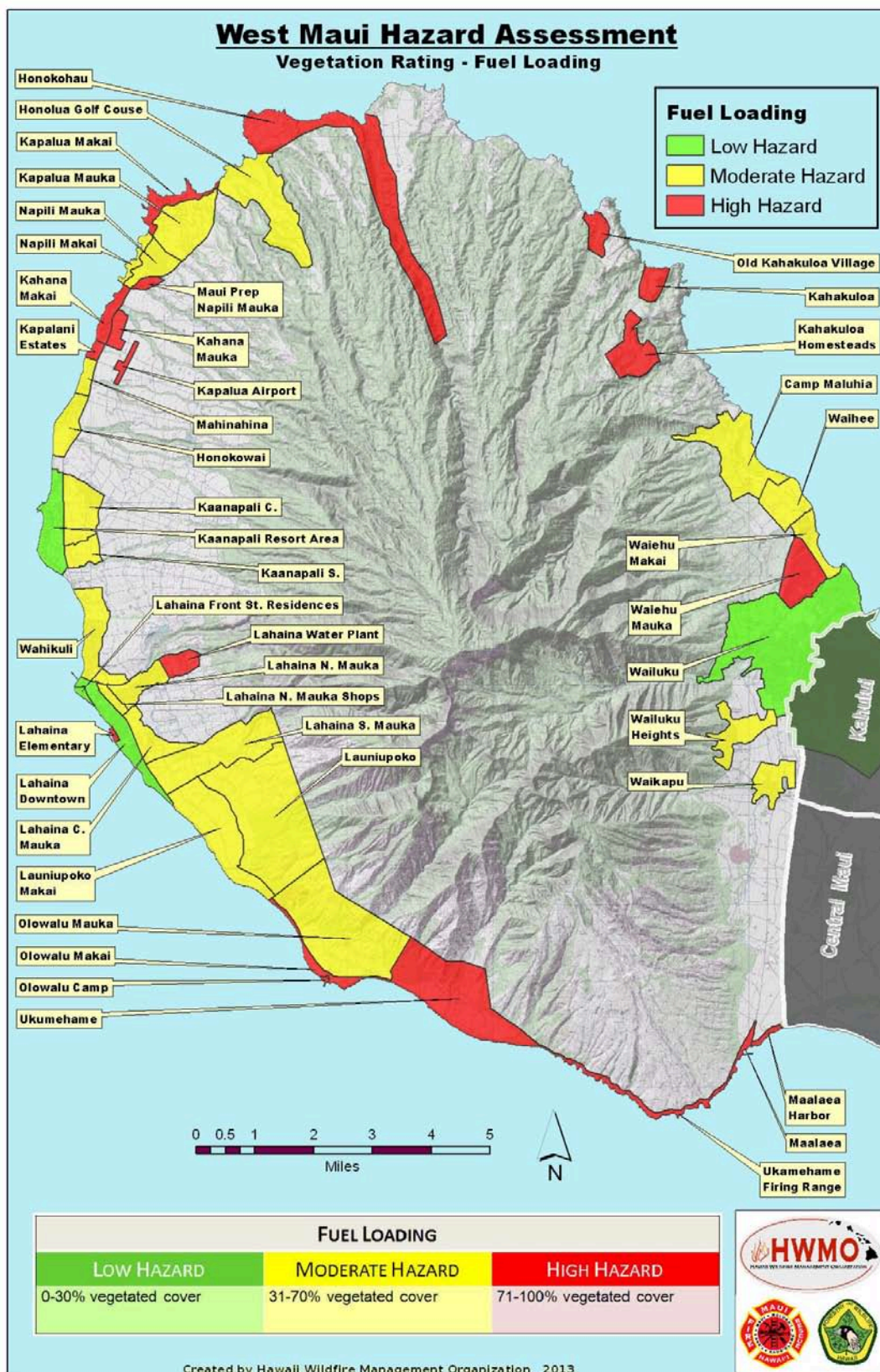




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 13. Vegetation Hazard Rating – Fuel Loading Map

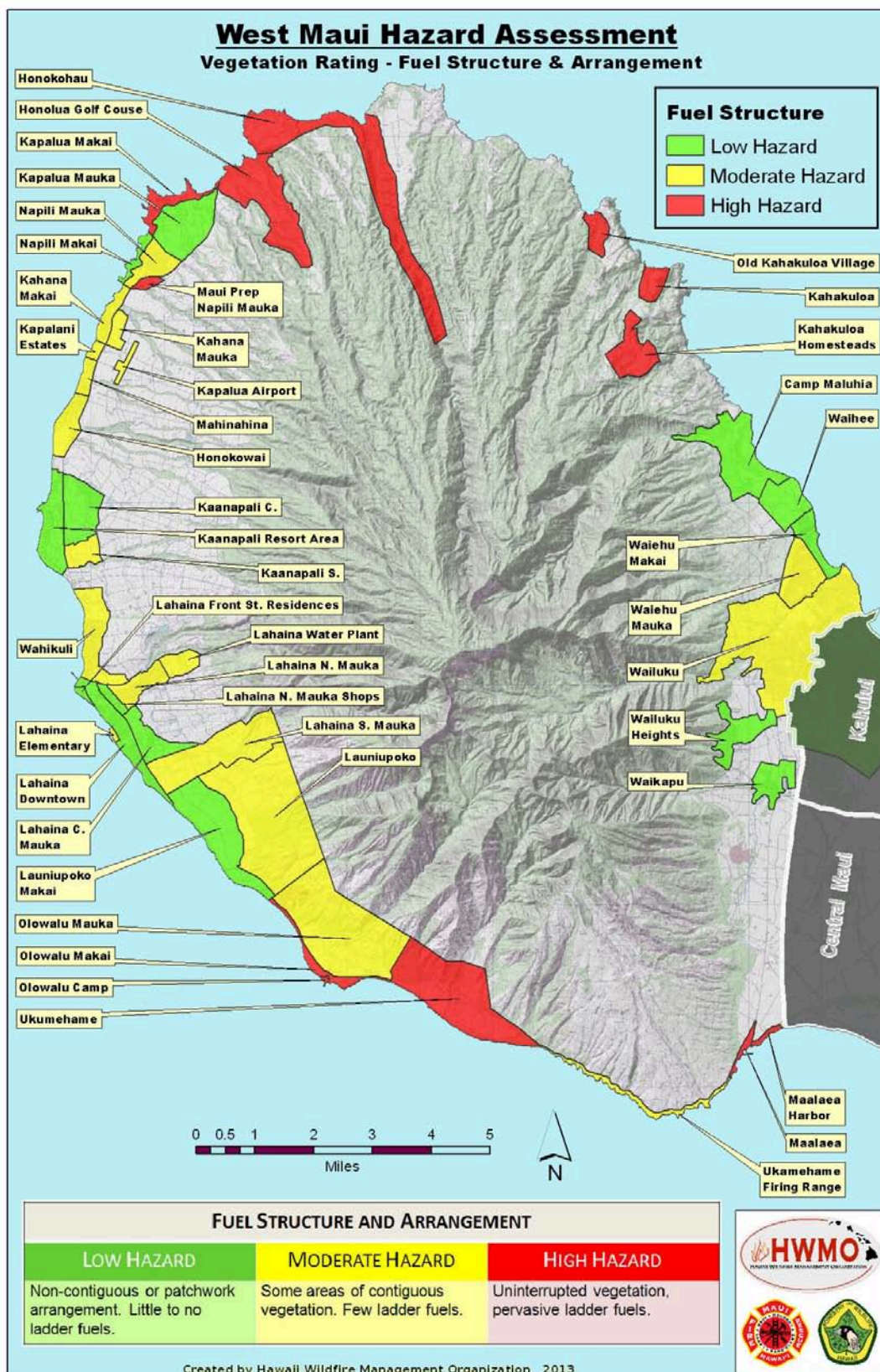




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 14. Vegetation Hazard Rating – Fuel Structure & Arrangement Map

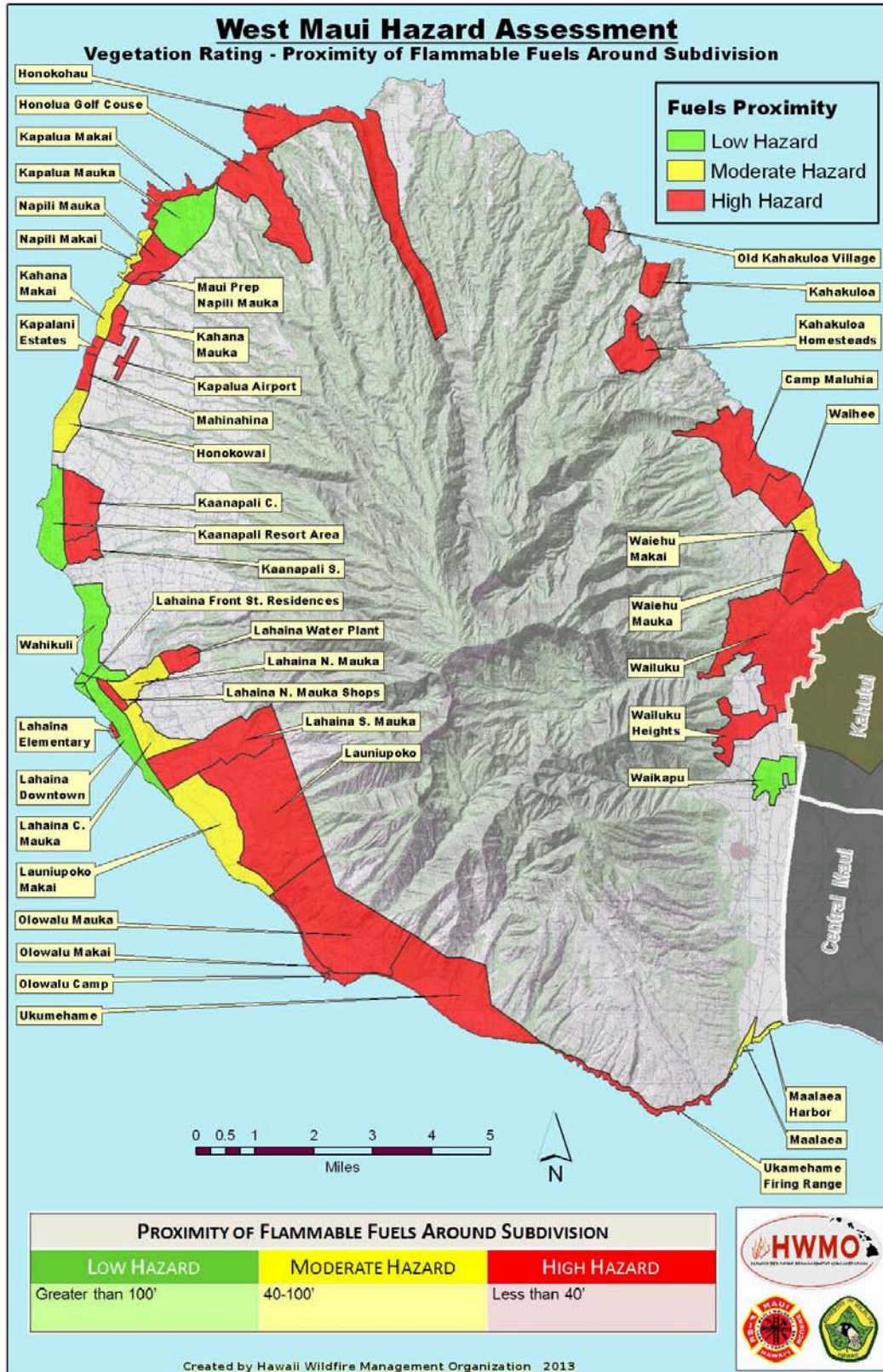




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 15. Vegetation Hazard Rating – Proximity of Flammable Fuels Map

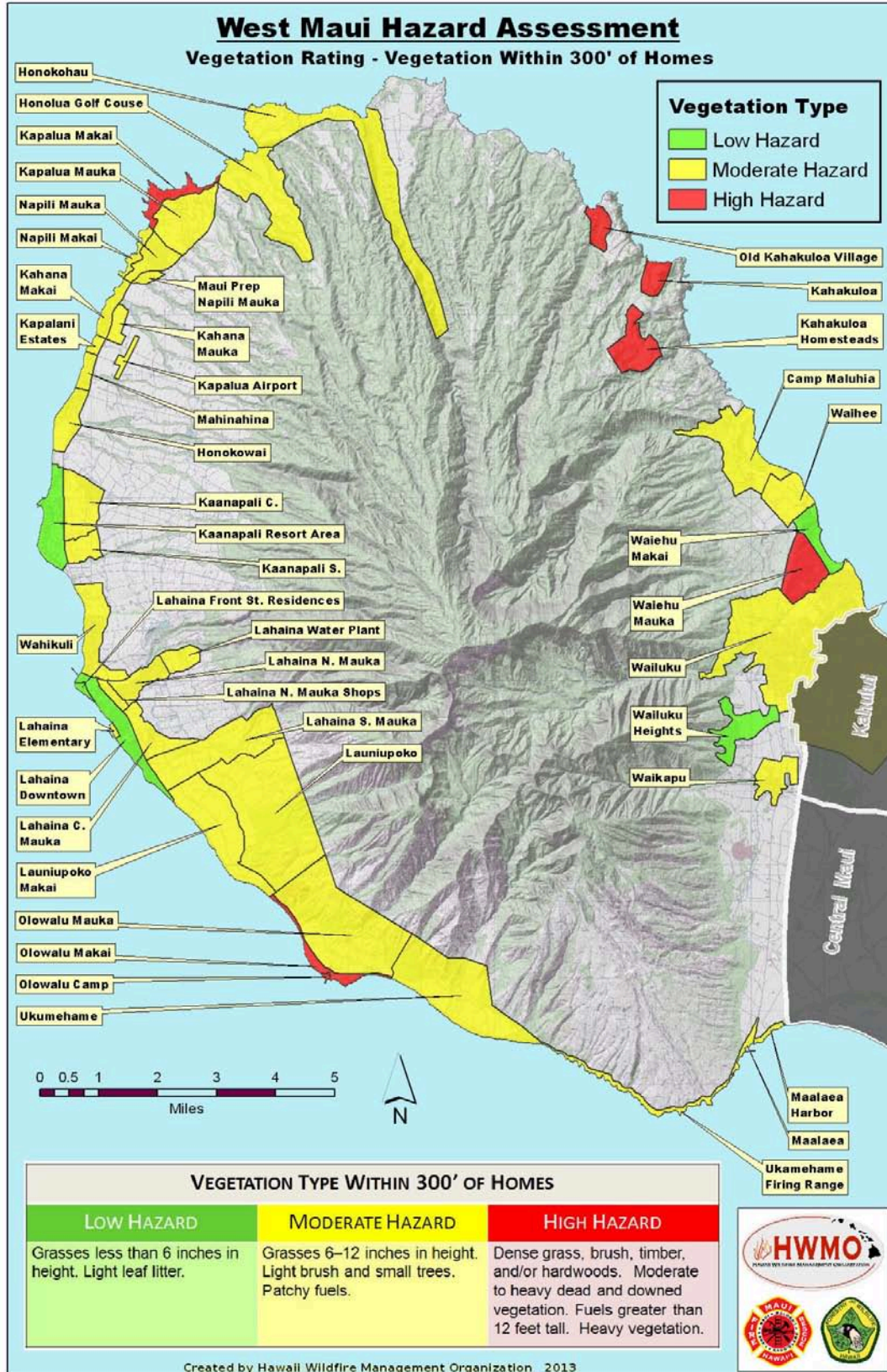




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 16. Vegetation Hazard Rating – Vegetation within 300' of Homes Map

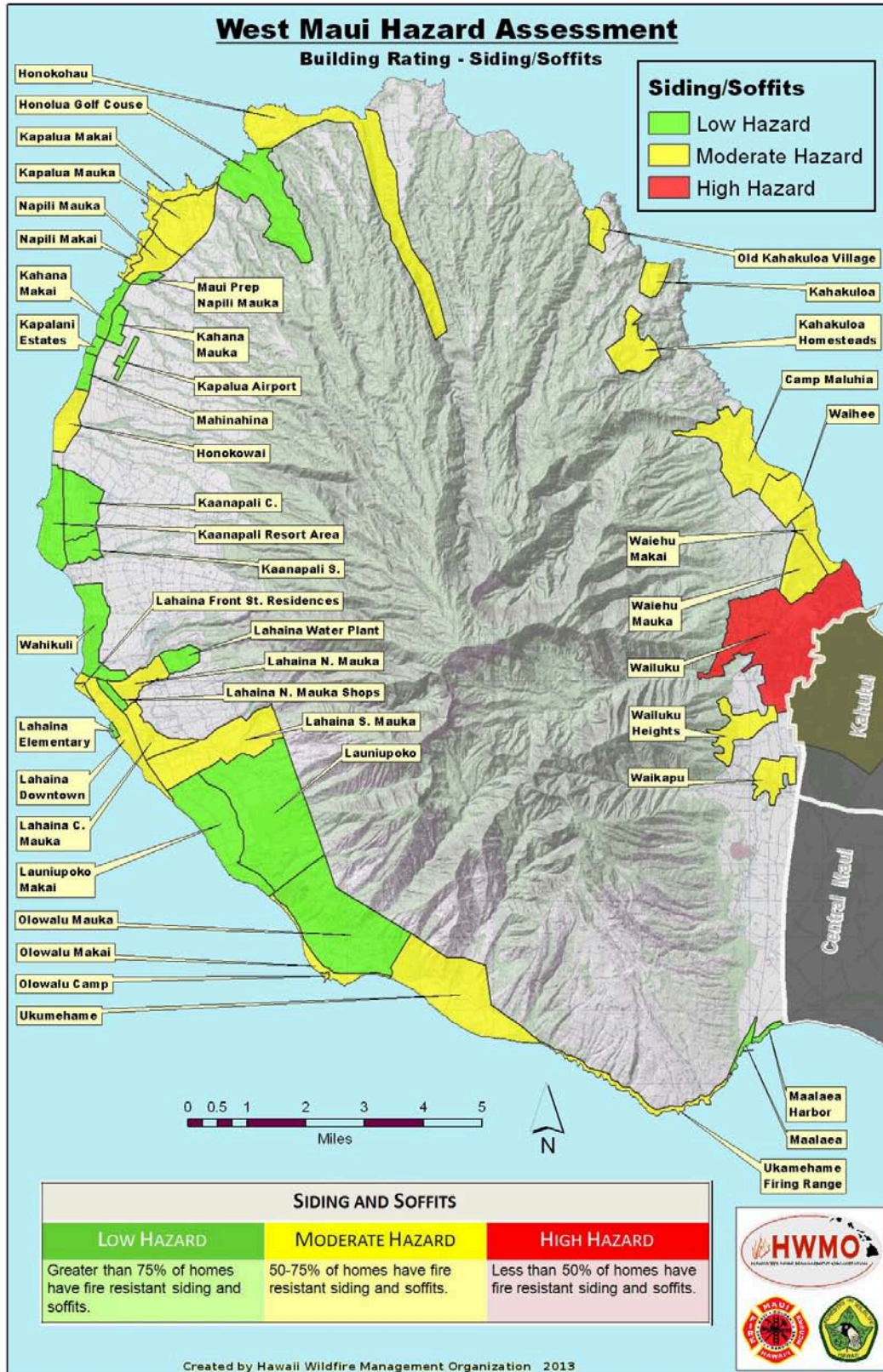




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 17. Building Hazard Rating – Siding/Soffits Map

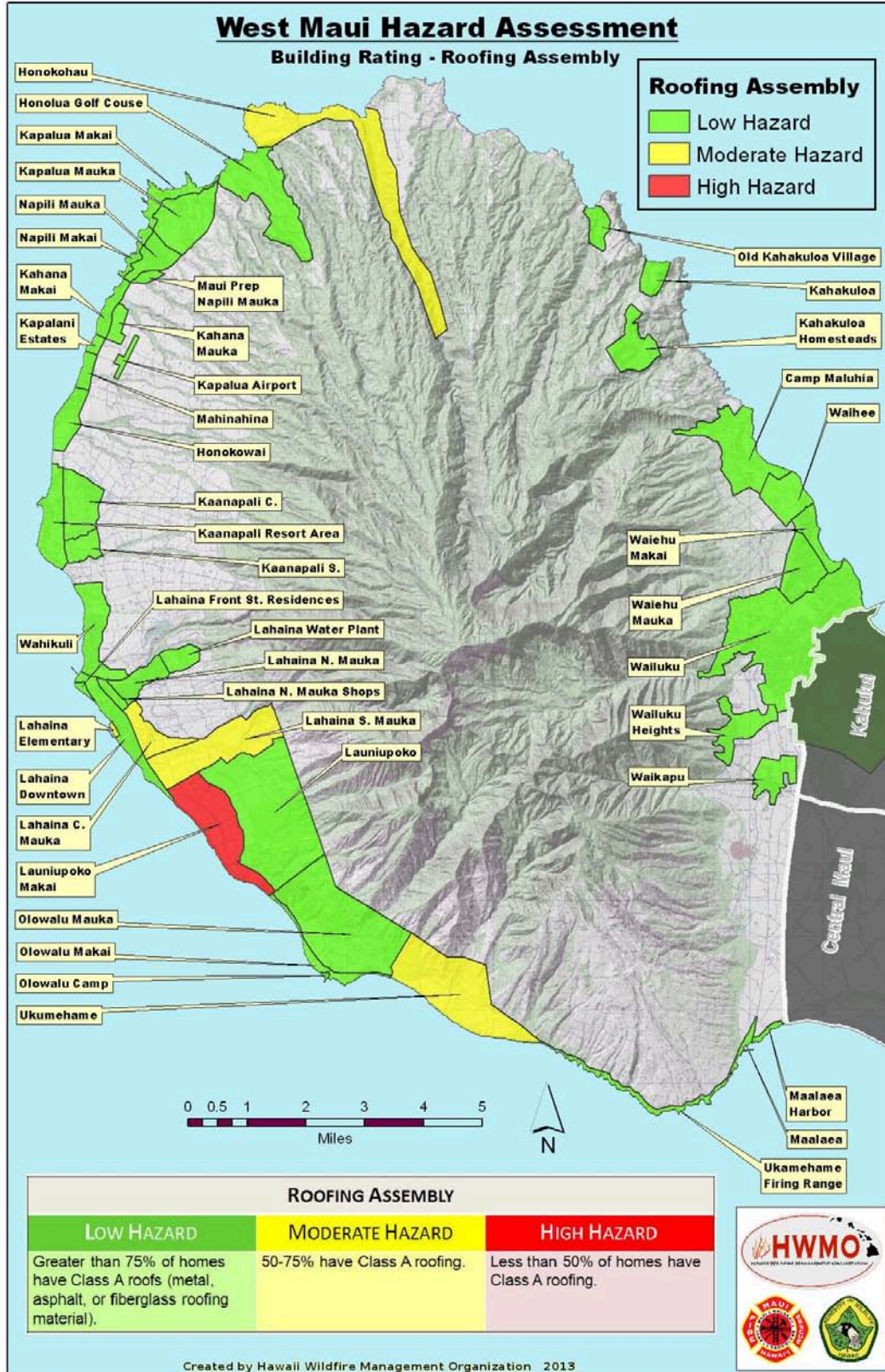




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 18. Building Hazard Rating – Roofing Assembly Map

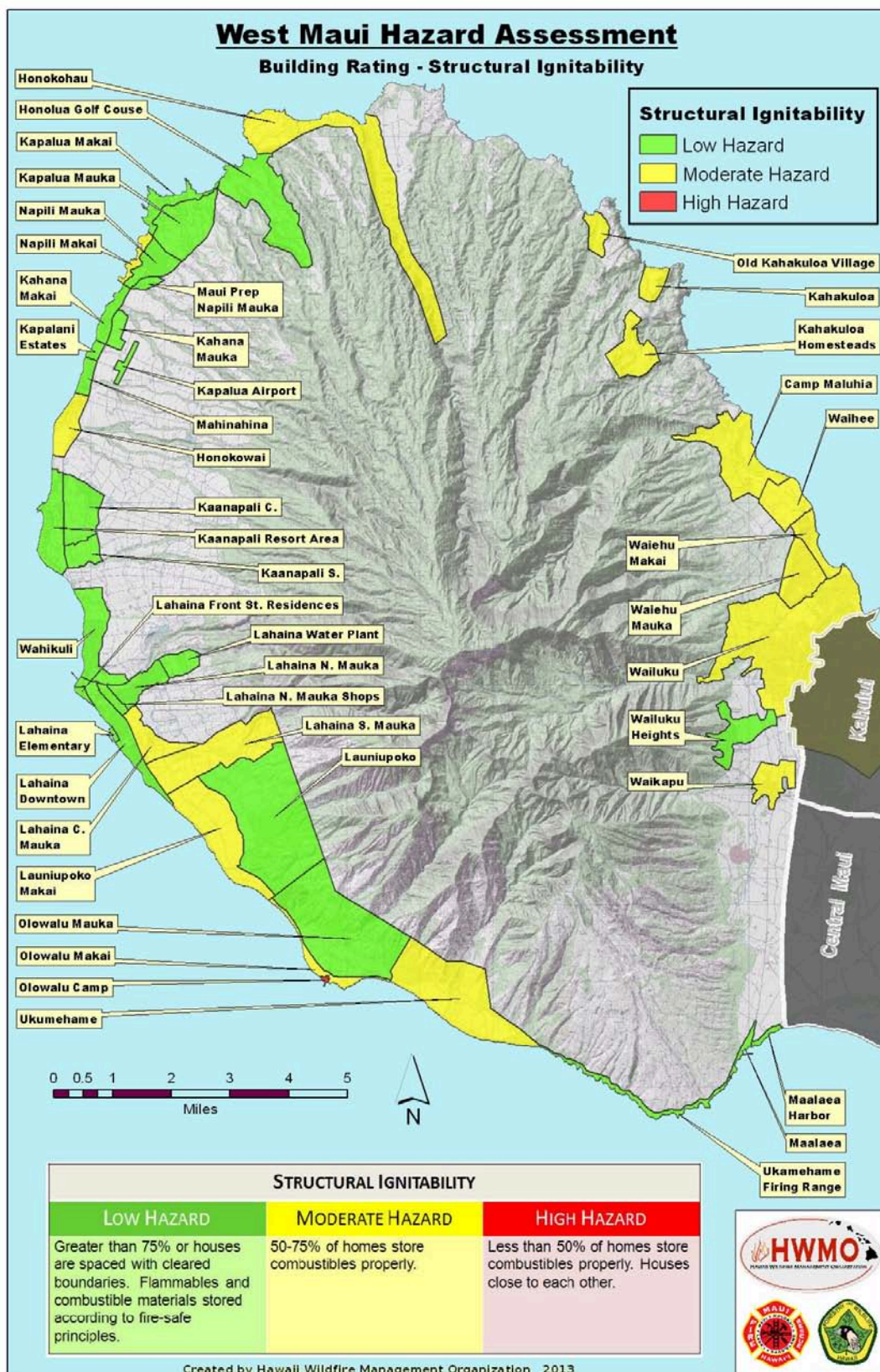




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 19. Building Hazard Rating – Structural Ignitability Map

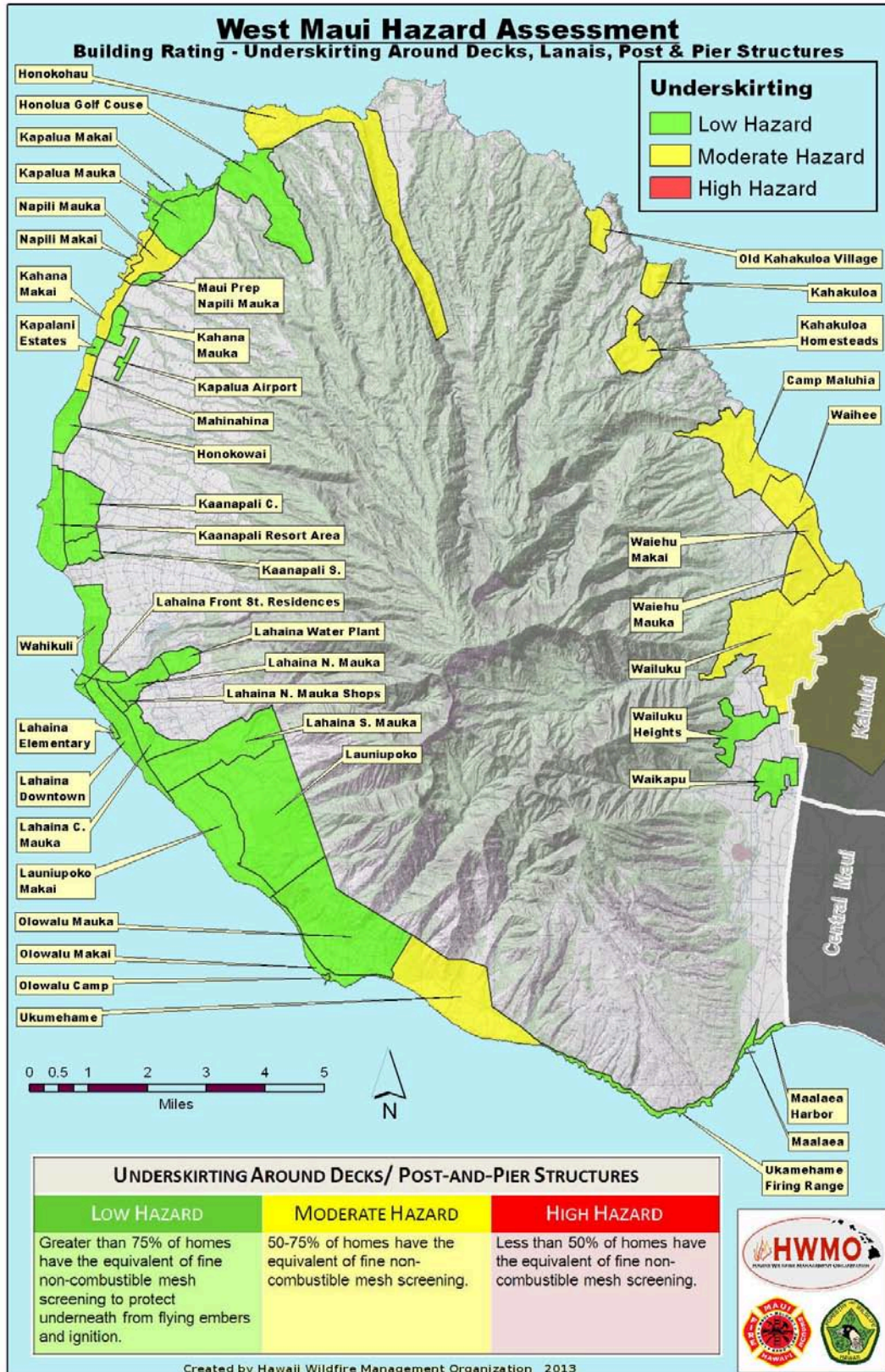




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 20. Building Hazard Rating – Underskirting Around Decks Map

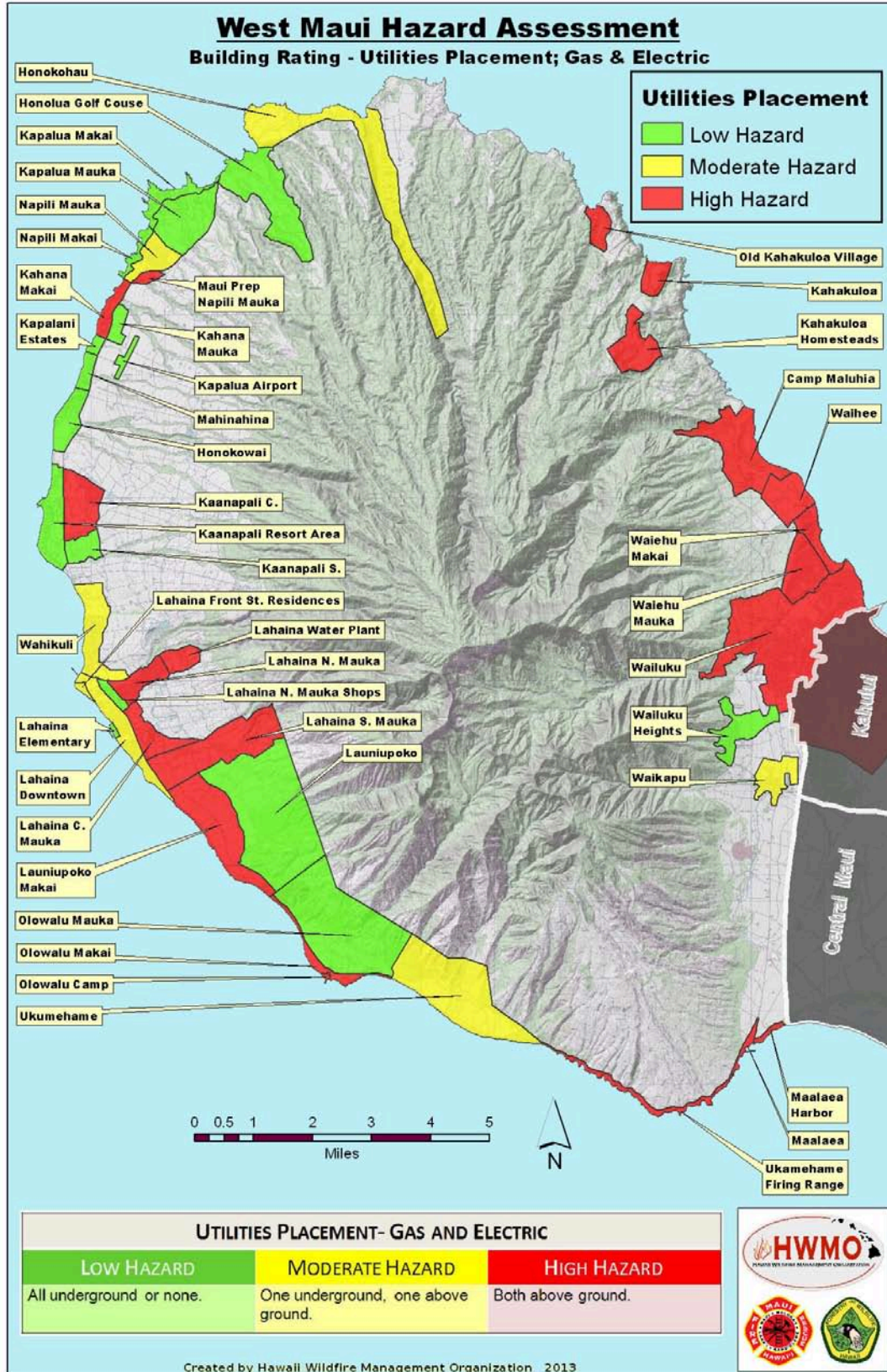




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 21. Building Hazard Rating – Utilities Placement Map

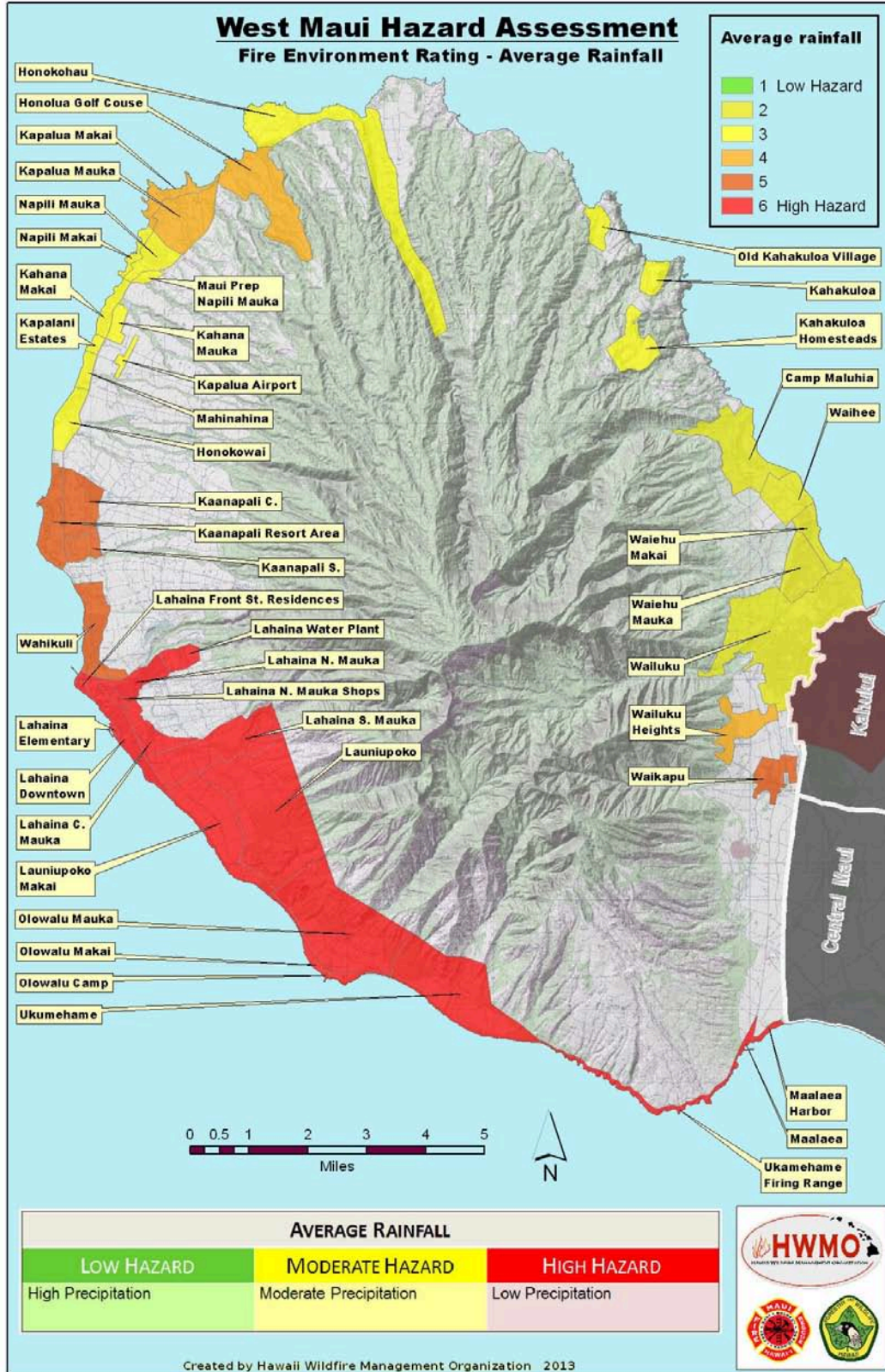




## APPENDIX B

### Western Maui Hazard Assessment Maps

#### 22. Fire Environment Hazard Rating – Average Rainfall Map

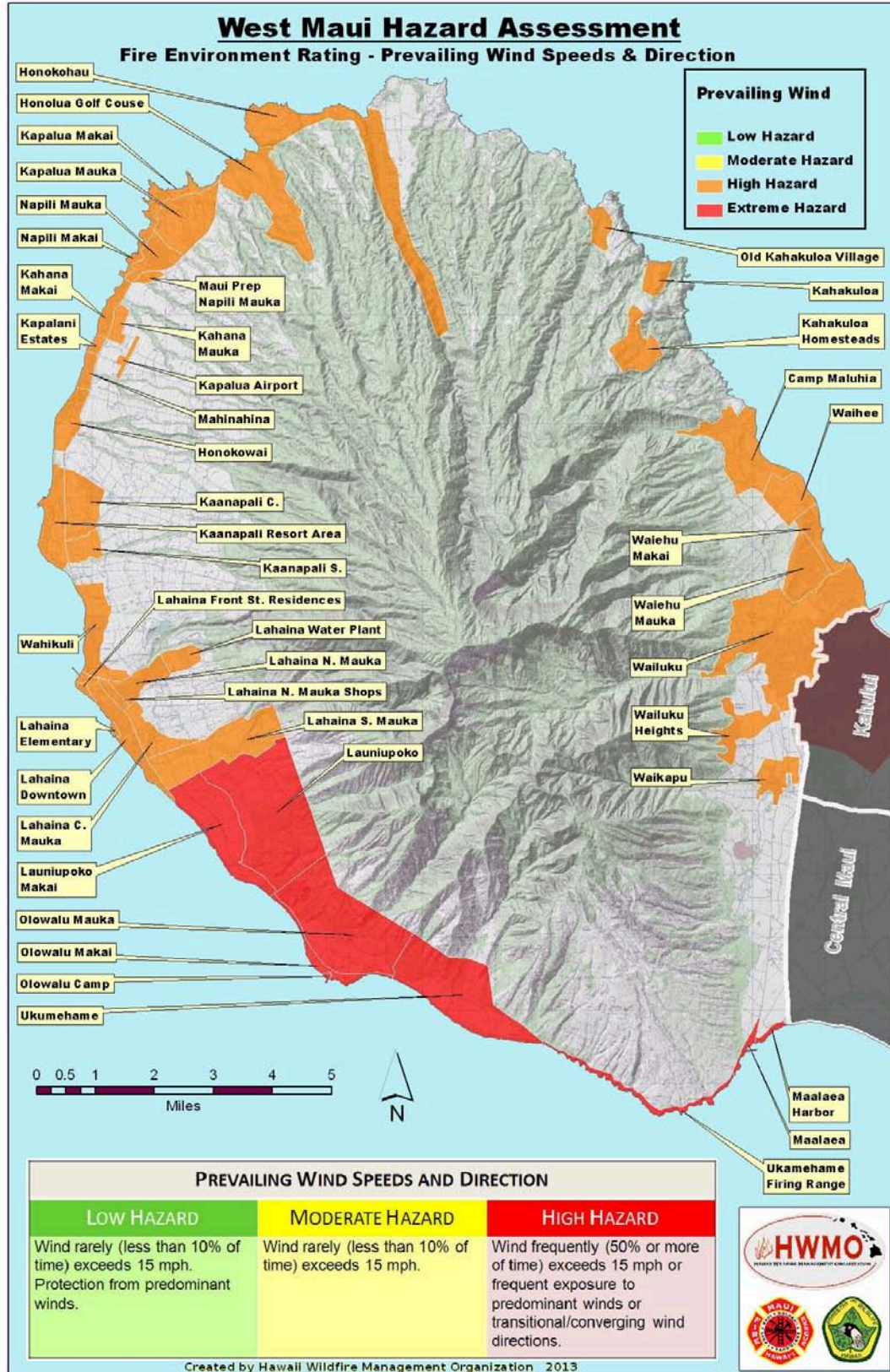




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 23. Fire Environment Hazard Rating – Prevailing Wind Speeds & Direction Map

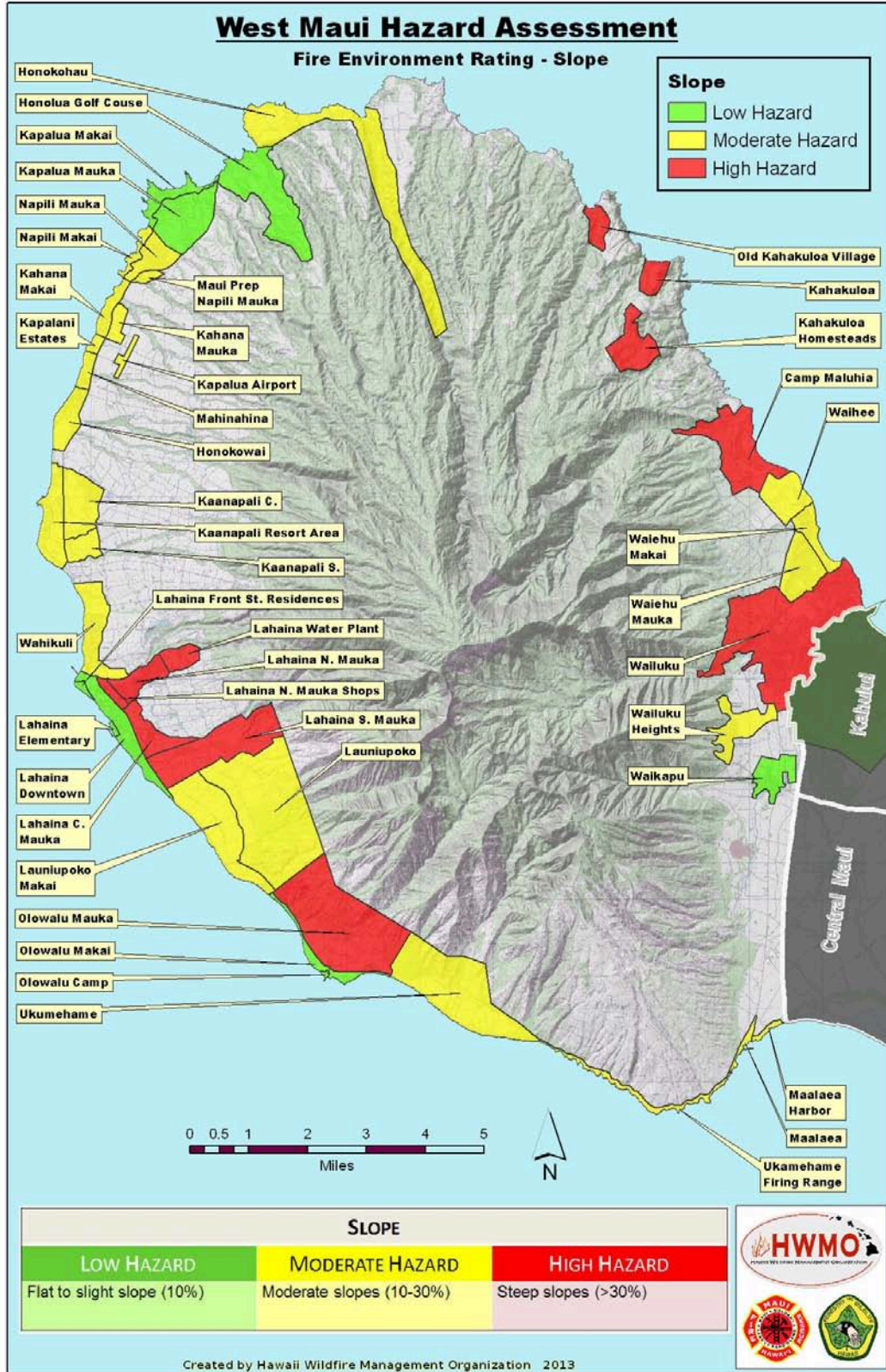




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 24. Fire Environment Hazard Rating – Slope Map

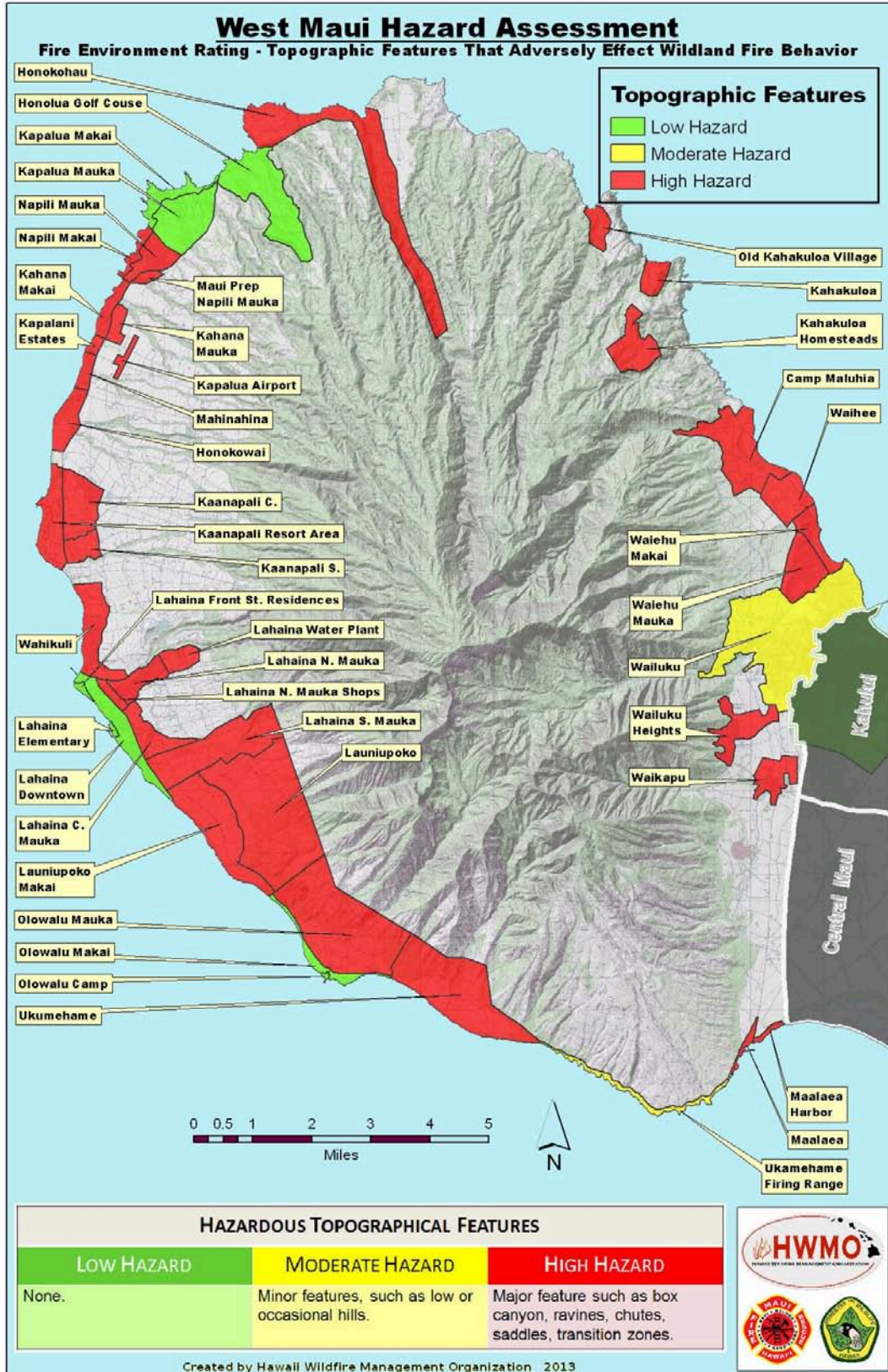




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 25. Fire Environment Hazard Rating – Topographic Features Map

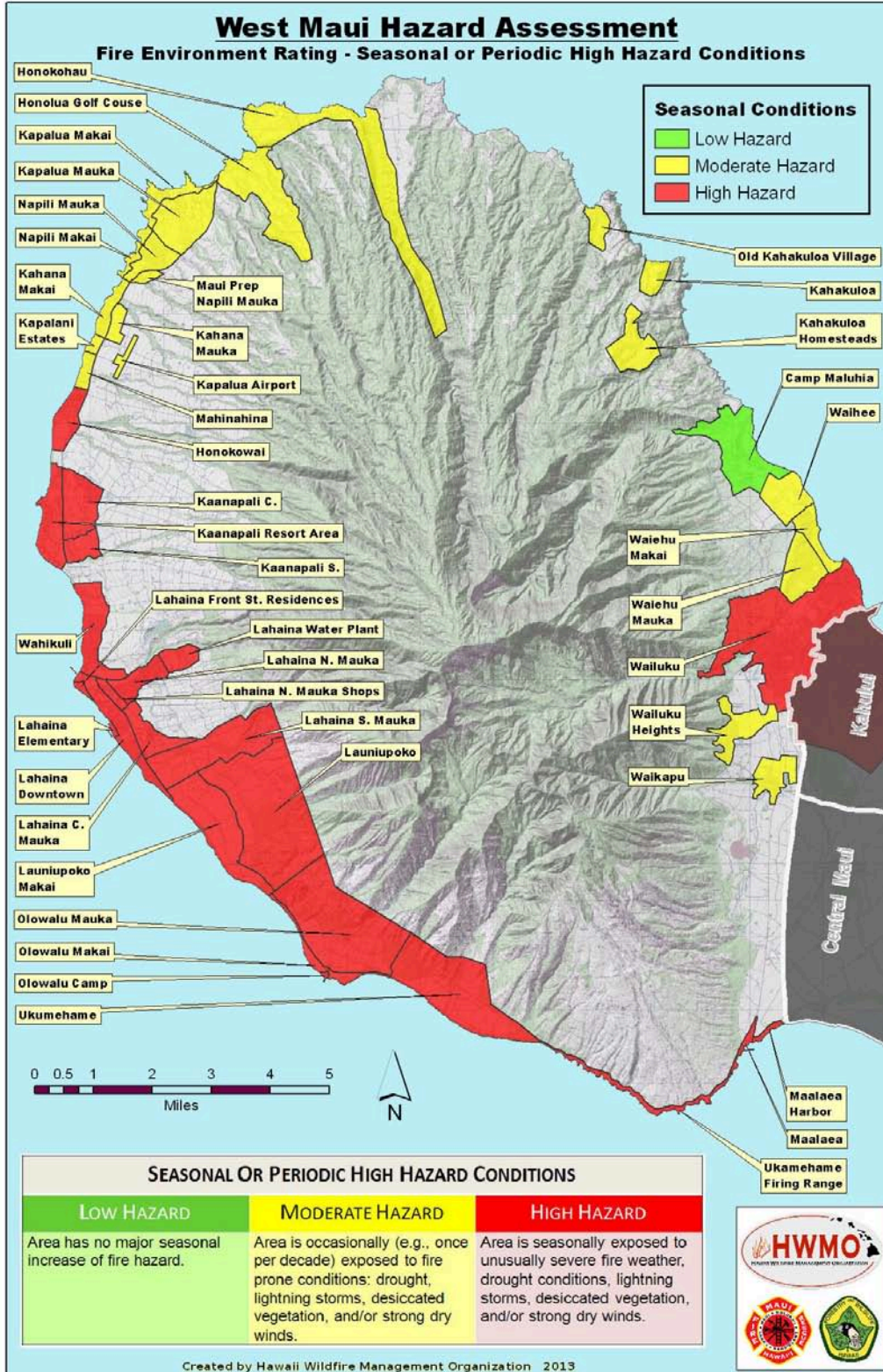




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 26. Fire Environment Hazard Rating – Seasonal Conditions Map

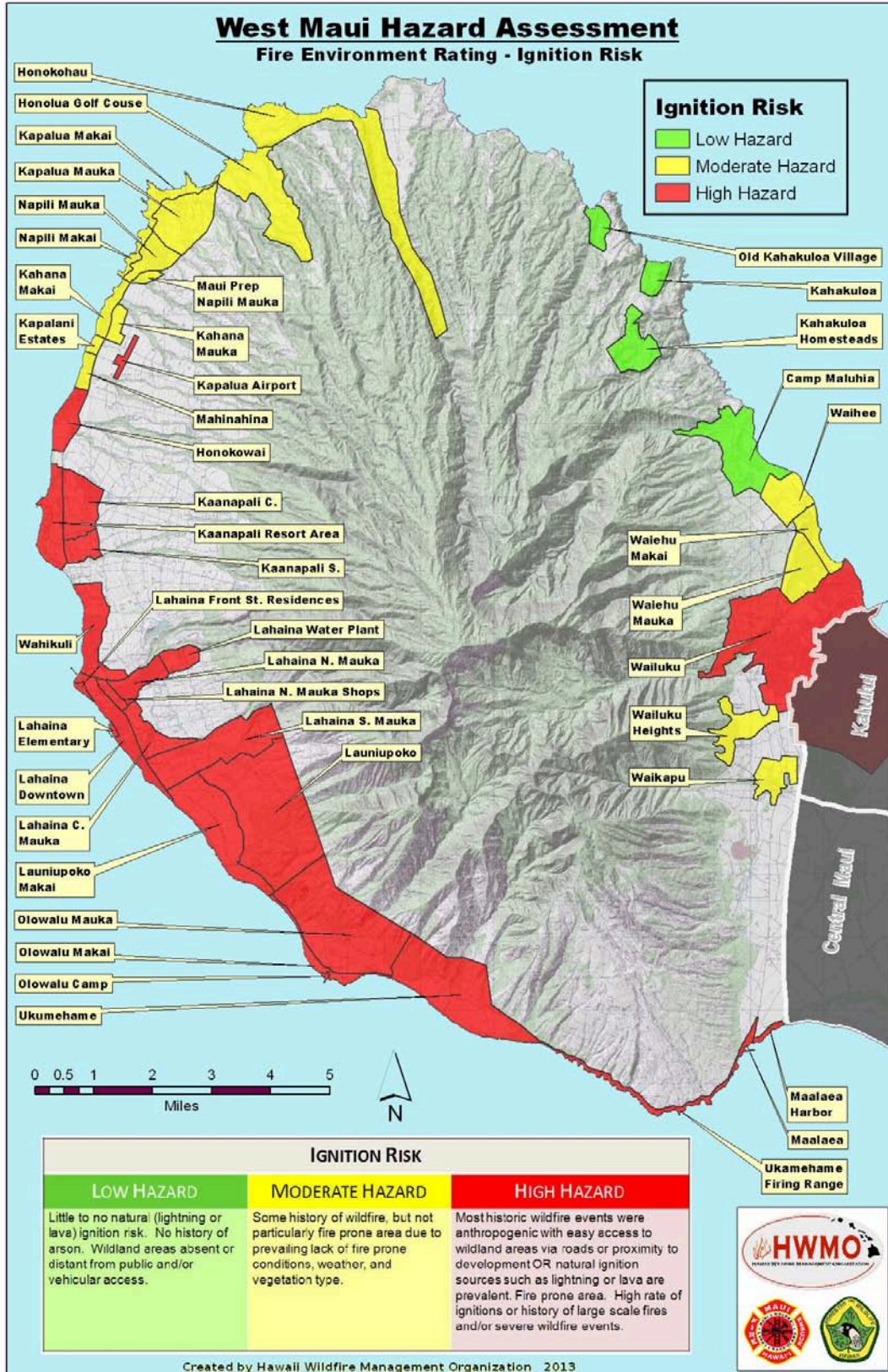




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 27. Fire Environment Hazard Rating – Ignition Risk Map

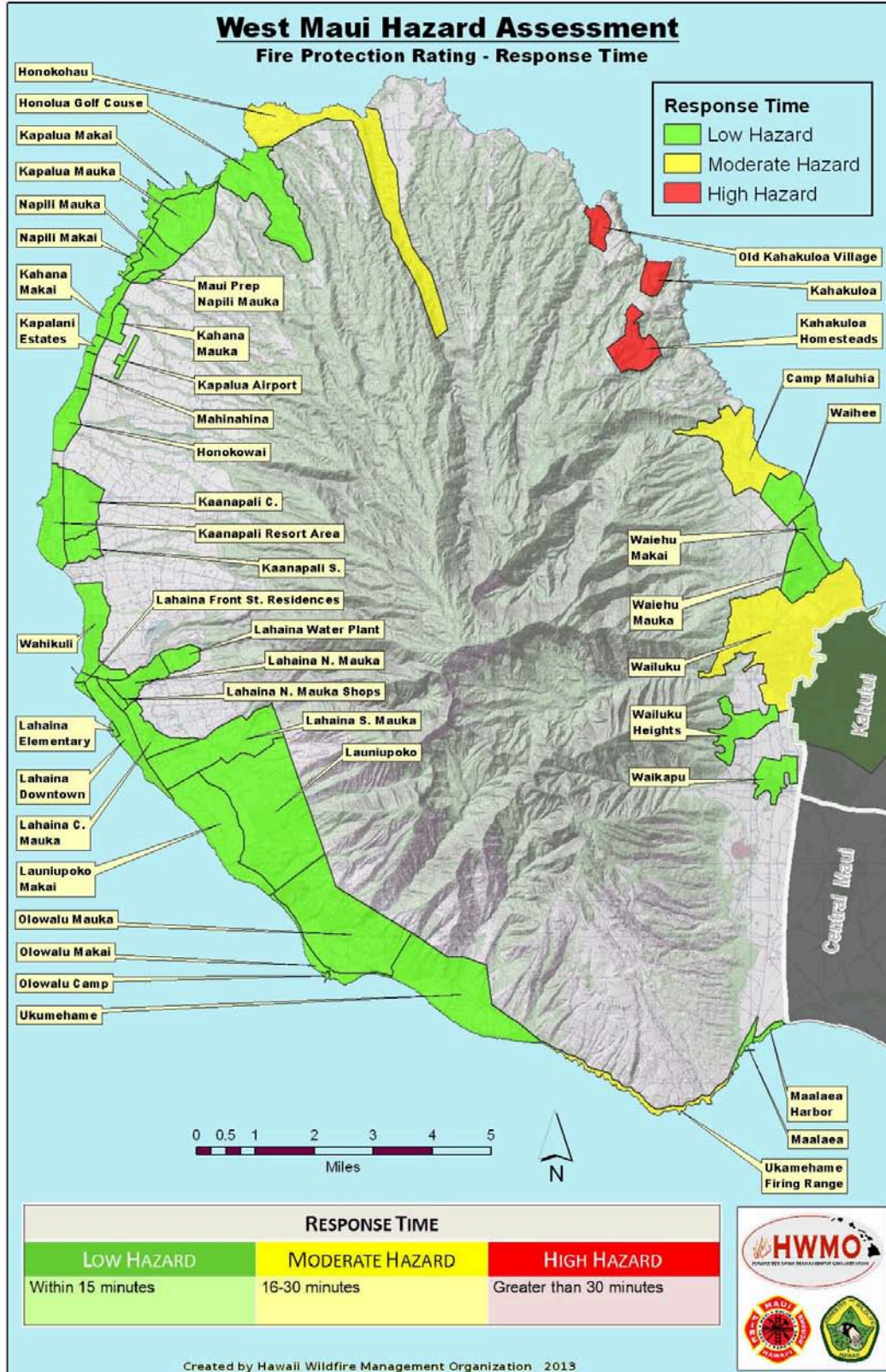




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 28. Fire Protection Hazard Rating – Response Time Map

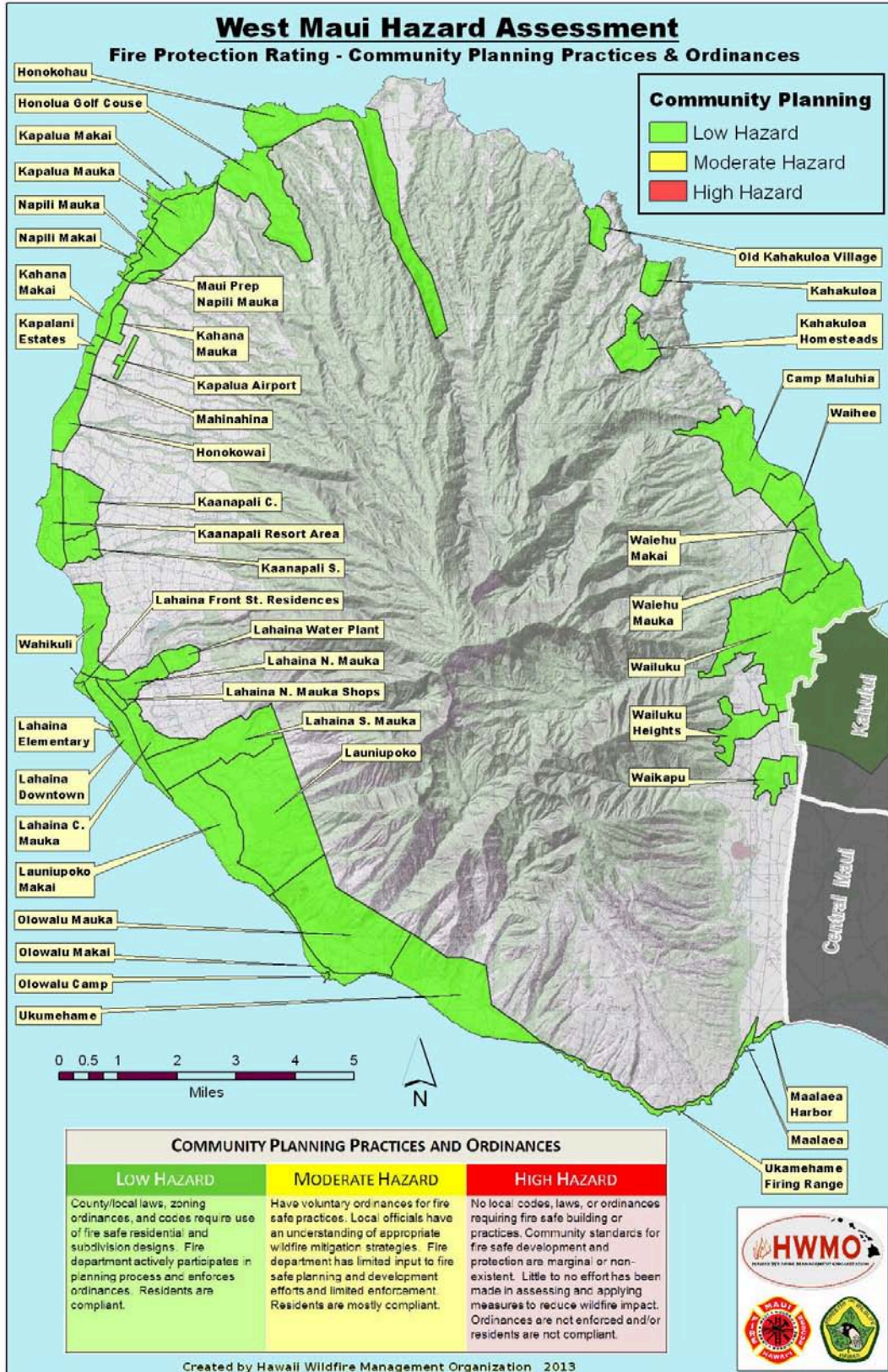




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 29. Fire Protection Hazard Rating – Community Planning Map

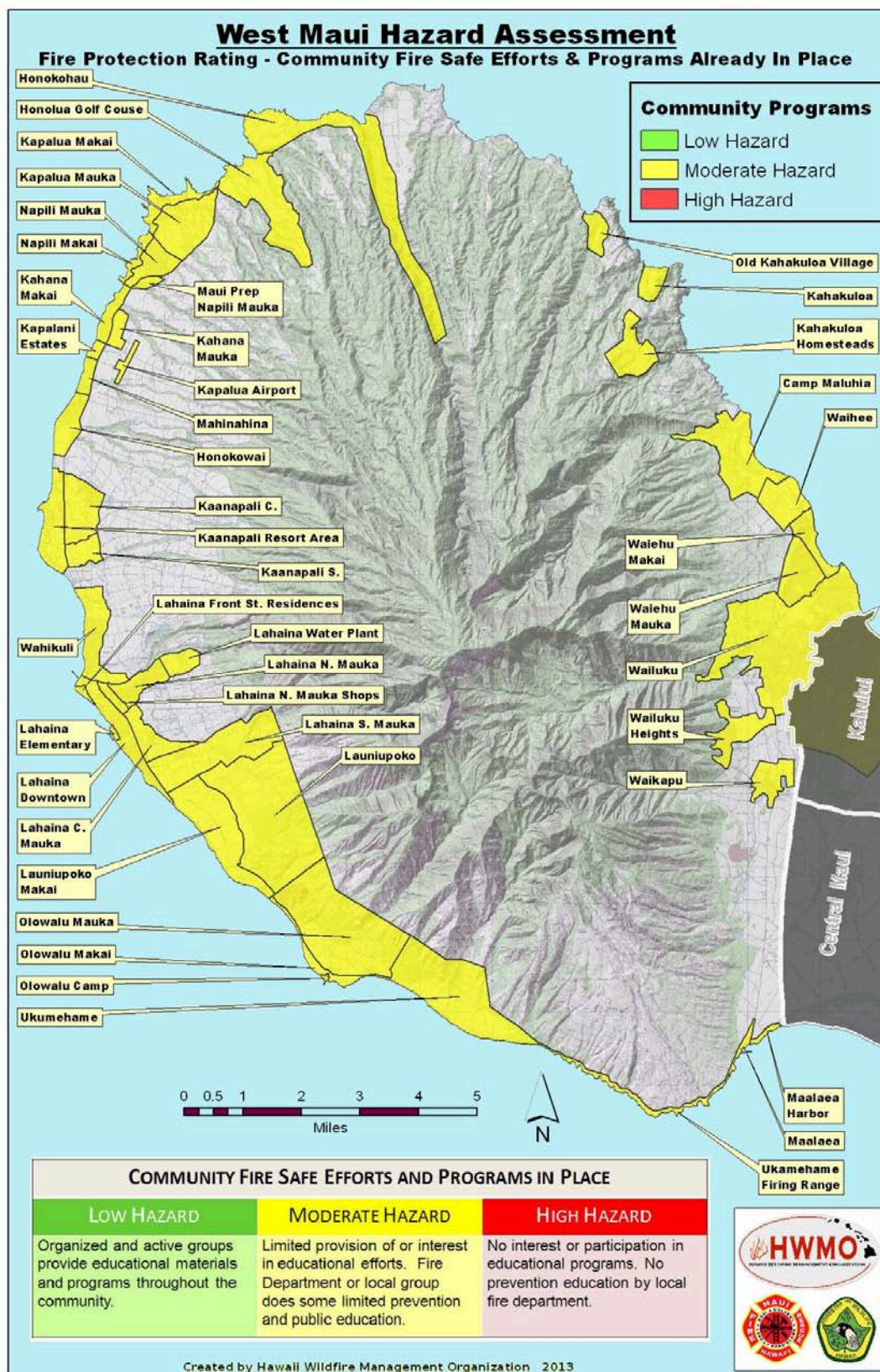




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 30. Fire Protection Hazard Rating – Community Fire Safe Programs Map

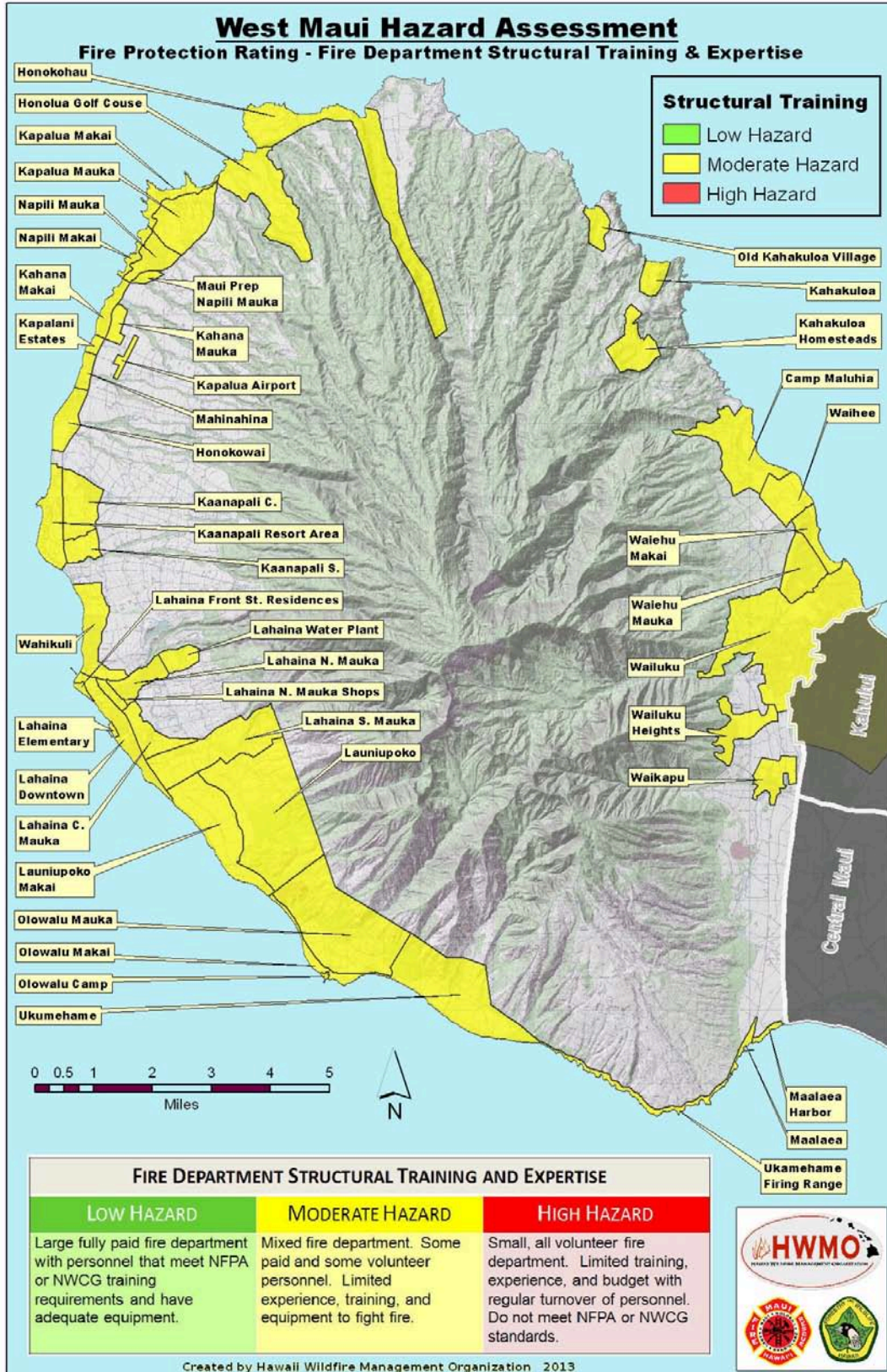




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 31. Fire Protection Hazard Rating – Fire Department Training & Expertise Map

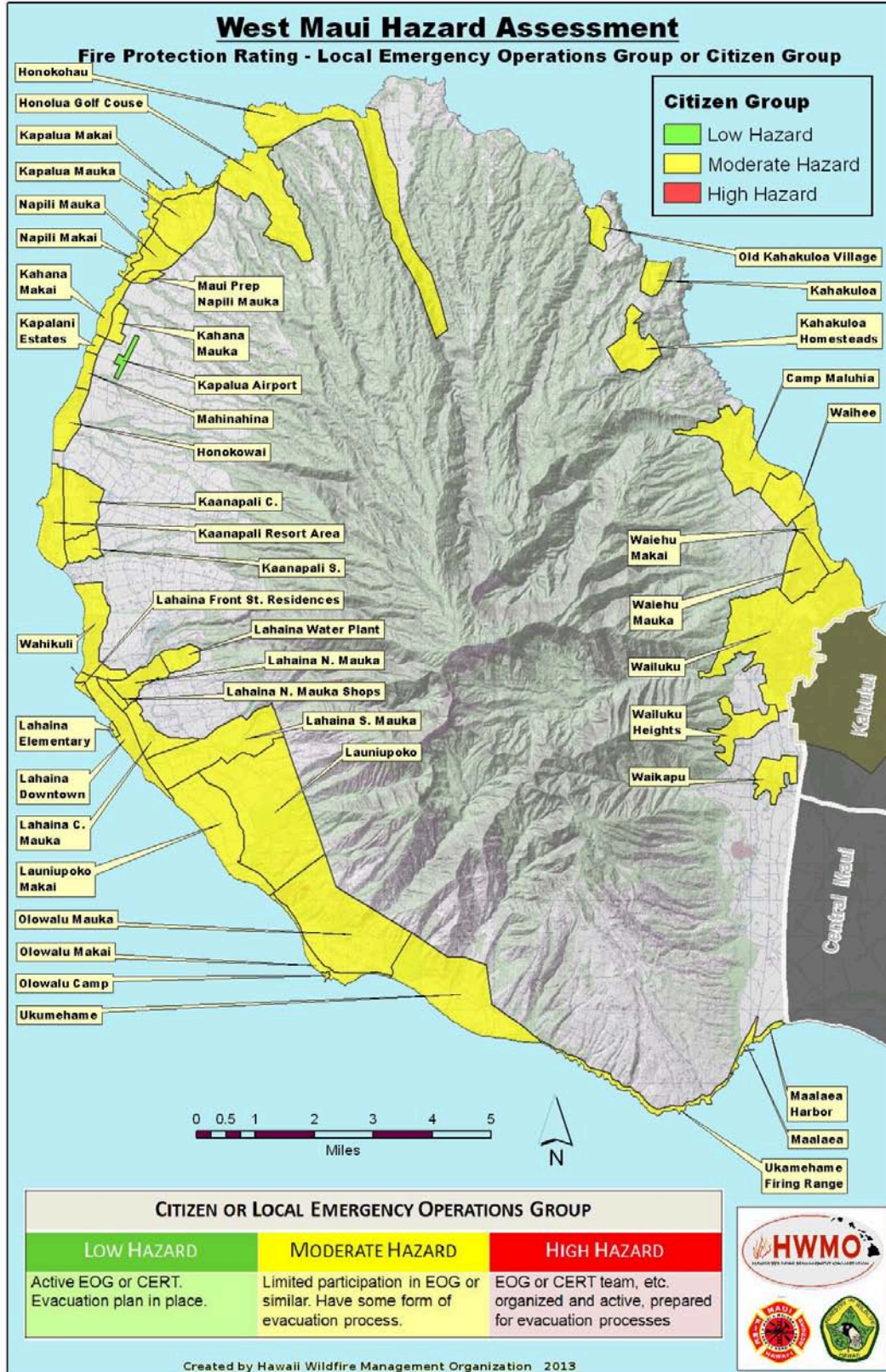




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 32. Fire Protection Hazard Rating – Local Emergency Operations Group Map

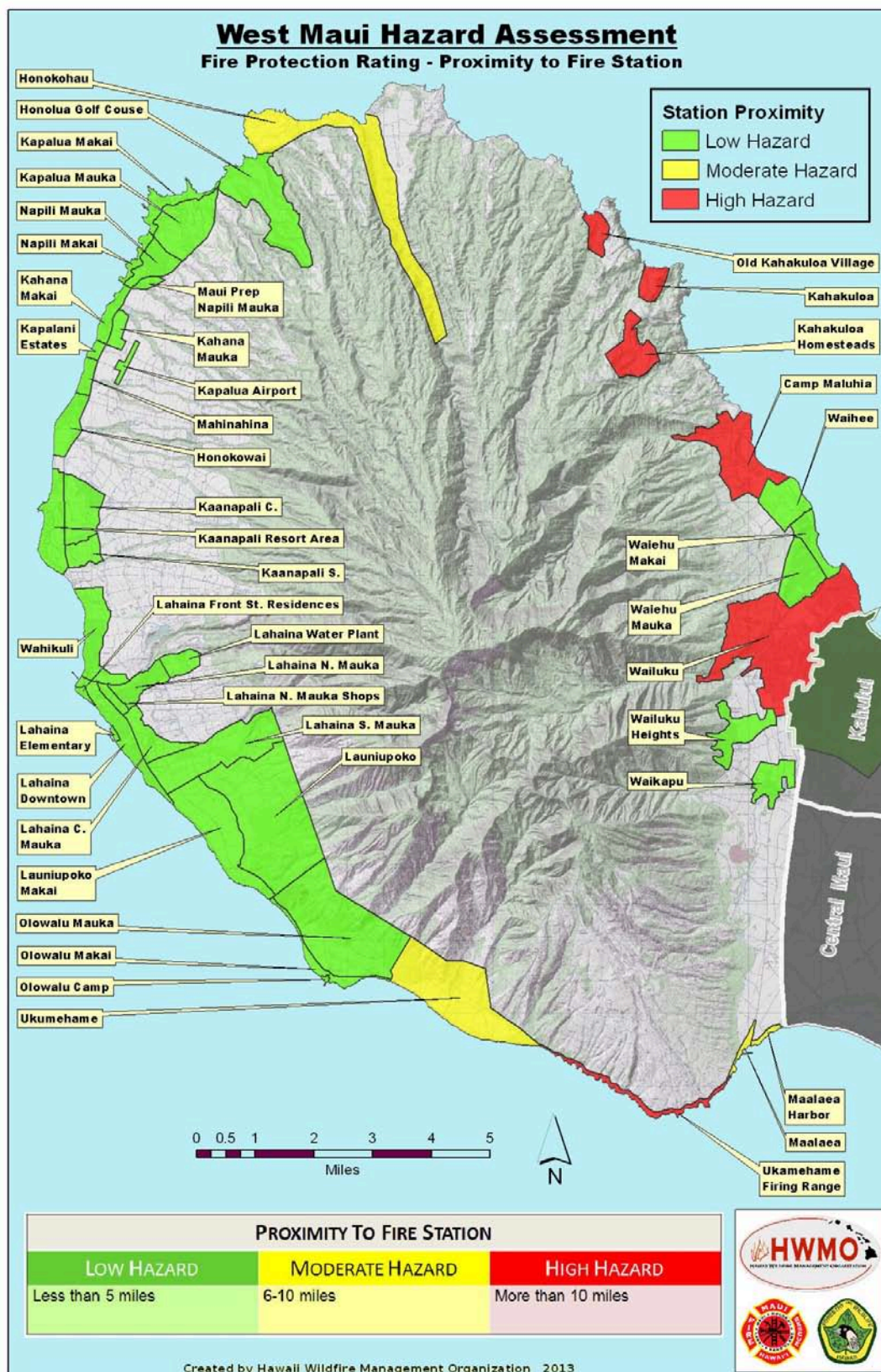




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 33. Fire Protection Hazard Rating – Proximity to Fire Stations Map

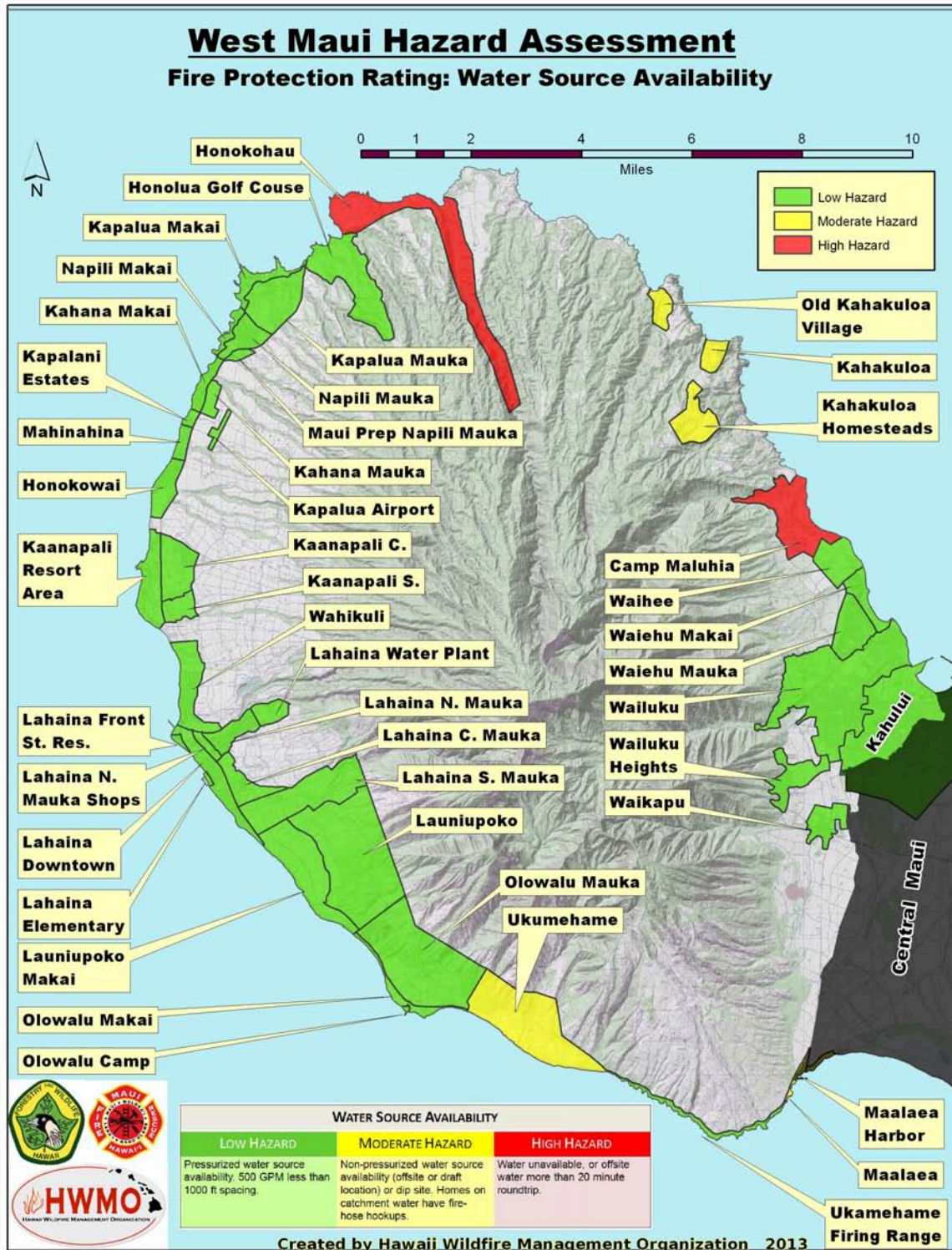




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 34. Fire Protection Hazard Rating – Water Source Availability Map

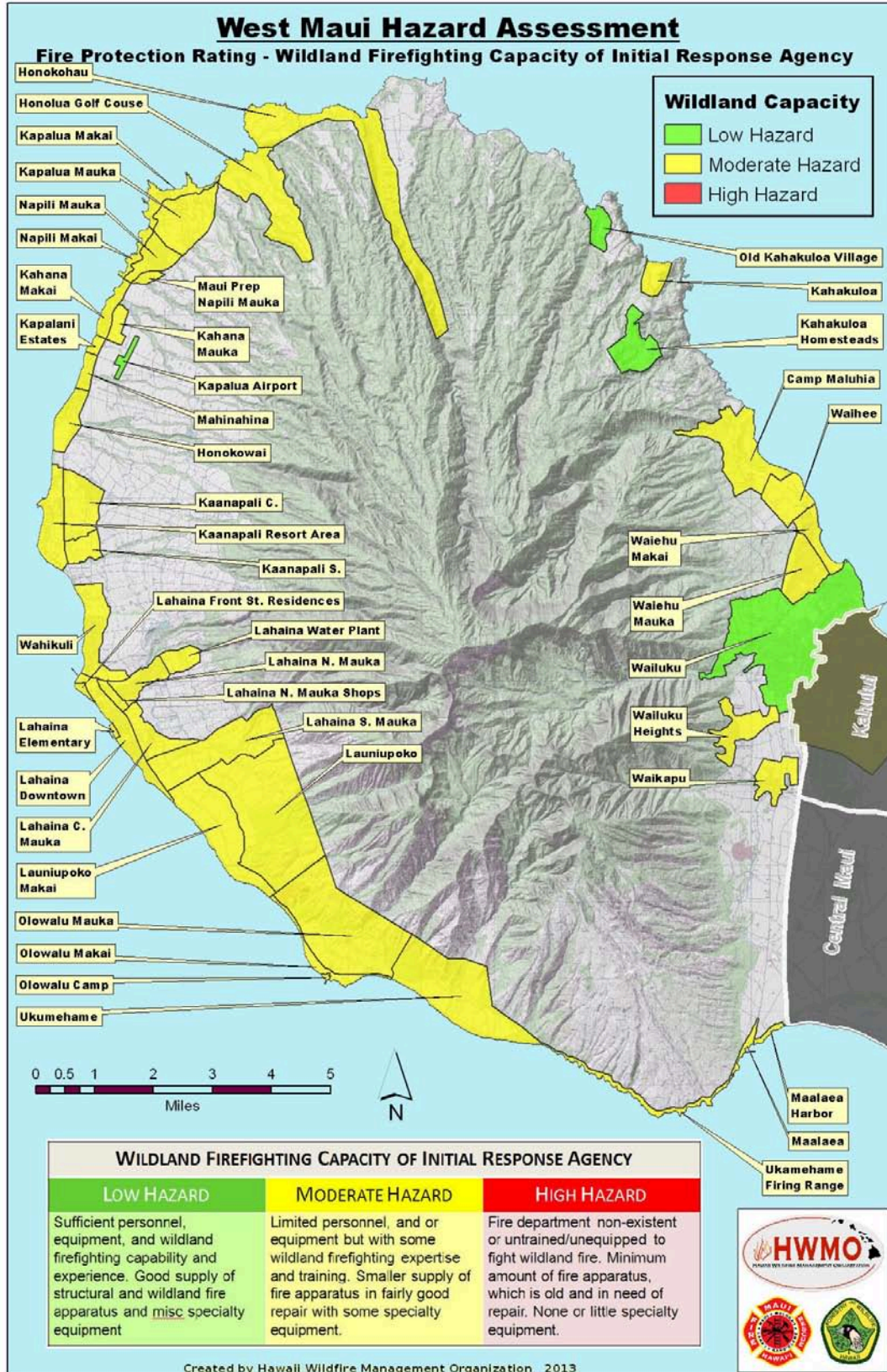




# APPENDIX B

## Western Maui Hazard Assessment Maps

### 35. Fire Protection Hazard Rating – Wildland Firefighting Capacity Map



# APPENDIX C

## Hazard Assessment Rating Keys

1. Subdivision Hazard Rating Key			
Rating Element	Low (Score =1)	Moderate (Score=2)	High (Score=3)
<b>Ingress/ Egress</b>	Multiple entrances and exits are well equipped for fire trucks with turnarounds.	Limited access routes. 2 ways in and 2 ways out. Moderate grades.	Narrow, dead end roads or 1 way in, 1 way out. Steep grades
<b>Road Maintenance</b>	Wide loop roads that are maintained, paved or solid surface with shoulders.	Roads maintained. Some narrow two lane roads with no shoulders.	Narrow and or single lane, minimally maintained, no shoulders.
<b>Road Width</b>	24'+ wide. Wide roads with drivable shoulders and good visibility allow two-way traffic. Streets in the downtown area are the widest streets in town. Interior streets are smaller and are easily blocked by parked vehicles.	20'-24' wide. Medium width roads with drivable shoulders and good visibility, support evacuation and emergency response time.	Less than 20 feet wide. Narrow roads coupled with poor visibility limit evacuation and emergency response. Traffic problems will occur. Entrapment is likely.
<b>All-season Road Condition</b>	Flat or gently sloping surfaced roads can support high volumes of large fire equipment.	Surfaced road with 5%+ grade or non-surfaced road with <5% grade that can still support fire equipment. Road and right-of-way maintenances is essential for access and visibility.	Narrow, steep, or non-surfaced roads are difficult to access. One-way traffic is a hazard. Overhanging brush may damage fire equipment. Jeep trails and seasonal roads limit 2wd emergency response equipment.
<b>Fire Service Access</b>	Adequate turnaround space is available for large fire equipment.	<300' with no turnaround. Short or dead-end streets will become crowded with homeowner's vehicles.	300'+ with no turnaround. Long dead-end streets will become crowded with vehicles. Two-way visibility is an issue.
<b>Street signs</b>	Present. Most are at least 4' in size and are reflectorized.	Present and reflectorized with some exceptions.	Not present.
<b>Structure Density</b>	Low structure density and low ignition probability.	Density and ignition probability are both moderate, or one is high but is balanced by the other being low.	Dense structures with high ignition probability.
<b>Home Setbacks</b>	Majority (50%+) of homes are set back from property lines and slopes by at least 30 feet.	10-50% of homes have defensible setbacks from property lines and sloped areas.	<10% of homes have defensible setbacks from property lines. Buildings located close to dangerous topographic features such as the tops of slopes.



## APPENDIX C

### Hazard Assessment Rating Keys

<b>Unmanaged, untended, undeveloped lands</b>	Few to no weedy vacant lots. Few to no undeveloped unmaintained vegetated areas or corridors between homes. Less than 10% of lots remain undeveloped and pose an additional wildfire hazard due to lack of maintenance and/or restricted access.	Some isolated unmaintained lots or undeveloped vegetated areas within subdivision. 10-50% of lots have not been developed and pose an additional wildfire hazard due to lack of maintenance and/or restricted access. Hazard ranking is dependent on ignition risk, size of area, and fuel type.	Abundant unmanaged, vegetated corridors and vacant lots throughout community. Agricultural lands irregularly maintained leaving dry weedy species causing increased ignition risk. Numerous ladder fuels and high risk fuels. Greater than 75% of lots have not been developed or Separation of adjacent structures that can contribute to fire spread
<b>Private landowner actions / Firewise landscaping and defensible space</b>	70% of homes have improved survivable space around property, reduced ignition risk, hardened homes, and no ladder fuels.	30-70% homes have improved survivable space around property and well-maintained landscapes.	<30% of homes have defensible space, hardened home features, or Firewise landscaping
<b>Proximity of subdivision to wildland areas</b>	Wildland areas share no borders with the subdivision. Little to no undeveloped and unmaintained vegetated areas within community. Little to no ladder fuels along community boundaries.	Wildland areas adjoin subdivision on 1-2 sides.	Wildland areas surround subdivision on at least 3 sides.

# APPENDIX C

## Hazard Assessment Rating Keys

2. Vegetation Hazard Rating Key			
Rating Element	Low (1)	Moderate (2)	High (3)
<b>Proximity of flammable fuels around subdivision</b>	Greater than 100'	40-100'	Less than 40'
<b>Type of predominant vegetation within 300' of homes</b>	Grasses less than 6 inches in height. Light leaf litter.	Grasses 6–12 inches in height. Grasses 6-12" tall. Light brush and small trees. Patchy fuels.	Dense grass, brush, timber, and/or hardwoods. Moderate to heavy dead and downed vegetation. Fuels greater than 12 feet tall. Heavy vegetation.
<b>Fuel loading</b>	0-30% cover	31-70% cover	71-100% cover
<b>Fuel structure and arrangement</b>	Non-contiguous or patchwork arrangement. Little to no ladder fuels.		Uninterrupted vegetation, pervasive ladder fuels.
<b>Defensible Space/ Fuels reduction around homes &amp; structures</b>	Vegetation is treated 100 feet or more from structures.	31-100 ft of vegetation treatment from structures.	Less than 30 ft of vegetation treatment from structures.

## APPENDIX C

### Hazard Assessment Rating Keys

<b>3. Building Hazard Rating Key</b>			
<b>Rating Element</b>	<b>Low (1)</b>	<b>Moderate (2)</b>	<b>High (3)</b>
<b>Roofing Assembly</b>	Greater than 75% of homes have Class A roofs (metal, asphalt, or fiberglass roofing material).	50-75% have Class A roofing.	Less than 50% of homes have Class A roofing.
<b>Siding/ Soffits</b>	Greater than 75% of homes have fire resistant siding and soffits.	50-75% of homes have fire resistant siding and soffits.	Less than 50% of homes have fire resistant siding and soffits.
<b>Under-skirting around decks, lanais, post-and-pier structures.</b>	Greater than 75% of homes have the equivalent of fine non-combustible mesh screening to protect underneath from flying embers and ignition	50-75% of homes have the equivalent of fine non-combustible mesh screening	Less than 50% of homes have the equivalent of fine non-combustible mesh screening
<b>Utilities Placement- Gas and Electric</b>	All underground or none.	One underground, one above ground.	Both above ground.
<b>Structural Ignitability</b>	Greater than 75% of houses are spaced with cleared boundaries. Flammables and combustible materials stored according to fire-safe principles.	50-75% of homes store combustibles properly.	Less than 50% of homes store combustibles properly. Houses close to each other.



# APPENDIX C

## Hazard Assessment Rating Keys

### 4. Fire Environment Hazard Rating Key

\* Note: two elements have unique scoring for better assessment accuracy

Rating Element	Low (1)		Moderate (2)		High (3)	
<b>Slope</b>	Flat to slight slope (10%)		Moderate slopes (10-30%)		Steep slopes (>30%)	
<b>Average rainfall</b> <b>*Score 1-6 instead</b>	High precipitation (Score=1)	(Score=2)	(Score=3)	(Score=4)	(Score=5)	Low precipitation (Score=6)
<b>Prevailing wind speeds and direction</b> <b>*Score 1-4 instead</b>	Wind rarely (less than 10% of time) exceeds 15 mph. Protection from predominant winds.		Wind rarely (less than 10% of time) exceeds 15 mph.		Wind frequently (50% or more of time) exceeds 15 mph or frequent exposure to predominant winds or transitional/converging wind directions.	
<b>Seasonal or periodic high hazard conditions</b>	Area has no major seasonal increase of fire hazard.		Area is occasionally (e.g., once per decade) exposed to fire prone conditions: drought, lightning storms, desiccated vegetation, and/or strong dry winds		Area is seasonally exposed to unusually severe fire weather, drought conditions, lightning storms, desiccated vegetation, and/or strong dry winds	
<b>Ignition risk</b>	Little to no natural (lightning or lava) ignition risk. No history of arson. Wildland areas absent or distant from public and/or vehicular access.		Some history of wildfire, but not particularly fire prone area due to prevailing lack of fire prone conditions, weather, and vegetation type.		Most historic wildfire events were anthropogenic with easy access to wildland areas via roads or proximity to development OR natural ignition sources such as lightning or lava are prevalent. Fire prone area. High rate of ignitions or history of large scale fires and/or severe wildfire events.	
<b>Topographical features that adversely wildland fire behavior</b>	None.				Major feature such as box canyon, ravines, chutes, saddles, transition zones.	

--

## APPENDIX C

### Hazard Assessment Rating Keys

<b>5. Fire Protection Hazard Rating Key</b>			
<b>Rating Element</b>	<b>Low (1)</b>	<b>Moderate (2)</b>	<b>High (3)</b>
<b>Water source availability</b>	Pressurized water source availability. 500 GPM less than 1000 ft spacing.	Non-pressurized water source availability (offsite or draft location) or dipsite. Homes on catchment water have fire-hose hookups.	Water unavailable, or offsite water more than 20 minute roundtrip
<b>Response time</b>	Within 15 minutes	16-30 minutes	Greater than 30 minutes
<b>Fire Station Proximity</b>	Less than 5 miles	6-10 miles	More than 10 miles
<b>Fire department structural training and expertise</b>	Large fully paid fire department with personnel that meet NFPA or NWCG training requirements and have adequate equipment.	Mixed fire department. Some paid and some volunteer personnel. Limited experience, training, and equipment to fight fire.	Small, all volunteer fire department. Limited training, experience, and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards.
<b>Wildland firefighting capability of initial response agency</b>	Sufficient personnel, equipment, and wildland firefighting capability and experience. Good supply of structural and wildland fire apparatus and misc specialty equipment	Limited personnel, and or equipment but with some wildland firefighting expertise and training. Smaller supply of fire apparatus in fairly good repair with some specialty equipment.	Fire department non-existent or untrained/unequipped to fight wildland fire. Minimum amount of fire apparatus, which is old and in need of repair. None or little specialty equipment.
<b>Interagency Cooperation</b>	Mutual aid agreements and resources available to deploy.	Mutual aid agreements but limited resource availability.	No mutual aid agreements.
<b>Local emergency operations group or other similar</b>	Active EOG or CERT. Evacuation plan in place.	Limited participation in EOG or similar. Have some form of evacuation process.	EOG or CERT team, etc. organized and active, prepared for evacuation processes
<b>Community planning practices and ordinances</b>	County/local laws, zoning ordinances, and codes require use of fire safe residential and subdivision designs. Fire department actively participates in planning process and enforces ordinances. Residents are compliant.	Have voluntary ordinances for fire safe practices. Local officials have an understanding of appropriate wildfire mitigation strategies. Fire department has limited input to fire safe planning and development efforts and limited enforcement. Residents are mostly compliant.	No local codes, laws, or ordinances requiring fire safe building or practices. Community standards for fire safe development and protection are marginal or non-existent. Little to no effort has been made in assessing and applying measures to reduce wildfire impact. Ordinances are not enforced and/or residents are not compliant.
<b>Community fire-safe efforts and programs already in place</b>	Organized and active groups provide educational materials and programs throughout the community.	Limited provision of or interest in educational efforts. Fire Department or local group does some limited prevention and public education.	No interest or participation in educational programs. No prevention education by local fire department.

# APPENDIX D

## Public Input Organized by Fire Protection Category

West Maui Public Meeting Input Results, January 2014 (6 Meetings)  
All Public Wildfire Concerns and Recommended Action Line Items Contributed to Meetings by Public  
Organized by Fire Protection Category in Ranked (Prioritized) Order

### 1. Prevention

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Prevention</u>	
Wildfire Concern (in priority order)	Recommended Actions
MECO maintenance of transmission lines	<ul style="list-style-type: none"> <li>Require MECO to maintain fuels reduction near lines</li> </ul>
Dirt bikers attracted to firebreaks	<ul style="list-style-type: none"> <li>Need motorbike park or designated area</li> <li>Make firebreaks into mountain bike trails</li> </ul>
Native forests & natural area preserves	<ul style="list-style-type: none"> <li>Develop a motocross area so bikers don't use forest reserves</li> </ul>
Fallow lands, unmanaged fire fuels (post-agriculture); All of Maui at mercy of fallow fields	<ul style="list-style-type: none"> <li>Education</li> </ul>
Fire prone areas are private properties	<ul style="list-style-type: none"> <li>Outreach &amp; education to landowners</li> <li>Tax incentives</li> </ul>
Fire prone areas are private properties	<ul style="list-style-type: none"> <li>Education about fuel abatement/enforcement</li> </ul>
Lack of education and community outreach	<ul style="list-style-type: none"> <li>Fund education, fire plans &amp; community/tourist outreach (about how big of a threat fire is)</li> </ul>
Lack of communication b/w large landowners & residents/communities & appropriate agencies (county, state, fed. fire)	<ul style="list-style-type: none"> <li>Reach out to landowners (e.g. West Maui land, Kamehameha School, Wailuku Water Co.)</li> </ul>
Need to connect fire issues and homeowners to insurance incentives	<ul style="list-style-type: none"> <li>Explore insurance options and incentive programs (Firewise communities)</li> </ul>
No defensible space around homes; Nobody offering classes/info. (not part of Hawaiian Homes consciousness); General fire safety	<ul style="list-style-type: none"> <li>Provide classes/training/info. for defensible space &amp; keeping high risk combustibles away from structures</li> </ul>
Firewise landscaping & non-combustible materials on housing	<ul style="list-style-type: none"> <li>Community training</li> <li>Fire prevention plans</li> <li>Insurance incentives/fines</li> <li>More funding to Fire Department for inspections on WUI</li> </ul>
Protecting property	<ul style="list-style-type: none"> <li>Give overtime to FD for community education</li> </ul>
Lack of community awareness or interest/apathetic residents	<ul style="list-style-type: none"> <li>Firewise presentations; community assn. meetings</li> </ul>
Lack of recent fires leads to false security	<ul style="list-style-type: none"> <li>Remind people of fire history and impacts</li> <li>Fire threat signs</li> <li>PSAs to remind people to be prepared and that there is a threat (MFD has responded to x # of fires or 3 homes lost in past fires, etc.)</li> </ul>
Lack of funding for community outreach	<ul style="list-style-type: none"> <li>Fund community outreach for DHHL</li> </ul>
People making too large imu fires - Lack of cultural programs on cultural fire practices	<ul style="list-style-type: none"> <li>Cultural education on 'ahi (fire)</li> </ul>
Arson, campfires, outside cooking	<ul style="list-style-type: none"> <li>Problem needs more attention (potentially from Fire Prevention Bureau)</li> </ul>
Christmas trees being imported to HI	<ul style="list-style-type: none"> <li>Regulate/complete ban</li> </ul>



## APPENDIX D

### Public Input Organized by Fire Protection Category

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Prevention</u>	
Wildfire Concern (in priority order)	Recommended Actions
Landowners & community assns. not taking responsibility for fire protection	<ul style="list-style-type: none"> <li>• More PSAs &amp; wildfire hazard reminders</li> </ul>
Need more awareness/reminders	<ul style="list-style-type: none"> <li>• Big signs near communities (billboard-style)</li> </ul>
Combustible materials under homes & in garages	<ul style="list-style-type: none"> <li>• Educate on proper storage &amp; common materials that could ignite</li> <li>• Make a place for community to dispose materials properly</li> </ul>
Arson in wildland and cane fields	<ul style="list-style-type: none"> <li>• Stop green harvest</li> </ul>
Lack of fire escape routes and help for elderly neighbors	<ul style="list-style-type: none"> <li>• Need to start program to provide evacuation &amp; safety information (through DHHL community outreach)</li> </ul>
Power line knock downs --> electrical ignitions; Salt degradation of lines	<ul style="list-style-type: none"> <li>• Move power lines away from road</li> <li>• Bury power lines underground</li> </ul>
Not enough brush abatement inspectors & not proactive (respond only to complaints)	<ul style="list-style-type: none"> <li>• Funding</li> </ul>
Lack of proactive effort to reduce fire fuels	<ul style="list-style-type: none"> <li>• Talk to politicians about issues</li> </ul>
Anyone working on mountain ecotourism, horseback riding, zipline companies should be required to participate; Not watched closely enough	<ul style="list-style-type: none"> <li>• Targeted outreach, info. brochure about fire hazards in their area's vehicle use</li> </ul>
Need to increase outreach and ed. for wildfire	<ul style="list-style-type: none"> <li>• State should increase/contribute to outreach and ed.</li> </ul>

## 2. Prevention & Pre-Suppression

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Prevention &amp; Pre-Suppression</u>	
Wildfire Concern	Recommended Actions
Defensible space around individual structures	<ul style="list-style-type: none"> <li>• Public education &amp; advocacy</li> </ul>
Protecting communities with buffers	<ul style="list-style-type: none"> <li>• Education</li> </ul>
Landowners & lessees unclear of who is responsible for mitigation (disconnect between landowners & lessees)	<ul style="list-style-type: none"> <li>• Have forum/symposium/meeting to engage landowners w/ community assns. &amp; lessees</li> </ul>
Need links/communication/network between communities	<ul style="list-style-type: none"> <li>• Posters on bulletin boards &amp; info. on websites</li> </ul>
DHHL needs to be actively dealing with & preparing for wildfire in all DHHL communities	<ul style="list-style-type: none"> <li>• Community assn. focused workshops &amp; trainings, regular meetings w/ HWMO present</li> <li>• Add fire to leadership trainings for DHHL Board Reps.</li> <li>• Newsletter and website content (DHHL); Develop 1 pg. summary for website/newsletters</li> </ul>

## APPENDIX D

### Public Input Organized by Fire Protection Category

#### 3. Prevention & Suppression

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Prevention &amp; Suppression</u>	
Wildfire Concern	Recommended Actions
Lack of awareness of priority mandate of Fire Dept. (1: Life, 2: Environment, 3: Property) Mission has been revised but not fully adopted or implemented, or known by community --> leads to lack of understanding of prioritization; People don't understand secondary impacts.	<ul style="list-style-type: none"> <li>• Outreach &amp; education</li> </ul>
Resources spread thin during multiple events --> ends up being triage-type prioritization (sometimes is political)	<ul style="list-style-type: none"> <li>• Alleviate pressure through awareness of limited resources; community should reduce risks</li> </ul>

#### 4. Prevention & Post-Fire

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Prevention &amp; Post-Fire</u>	
Wildfire Concern	Recommended Actions
Dirt bikers as source of erosion and soil loss (generations of same usage areas)	<ul style="list-style-type: none"> <li>• BBQ picnic on a Saturday (racetrack &amp; snacks)</li> <li>• Keep them busy w/ something else (e.g. search &amp; rescue)</li> <li>• Designated dirt bike areas w/ required maintenance</li> <li>• Prohibition/fines/signs/find kids' mothers (not as effective)</li> <li>• Education</li> <li>• Spark arresters</li> <li>• Erosion prevention</li> <li>• Landowner's responsibility (stop trespassing)</li> </ul>
People only come to community meetings after fire	<ul style="list-style-type: none"> <li>• Be ready to provide workshops to community associations after fire (use as opportunities!)</li> </ul>

#### 5. Pre-Suppression

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Pre-Suppression</u>	
Wildfire Concern	Recommended Actions
Water not flowing in streams	<ul style="list-style-type: none"> <li>• Wailuku Water Co. could assist &amp; provide dip tanks as act of goodwill</li> <li>• Plantation ditches --&gt; ID where they are --&gt; open up</li> </ul>
Lack of cattle troughs & dip tanks	<ul style="list-style-type: none"> <li>• Couple dip tanks w/ fuel management cattle (provides drinking water for cattle); E.g. state lands could be grazed w/ cattle leases but need water; E.g. areas: Lahainaluna, Olowalu, Ukumehame, Wahikuli</li> </ul>
Native forests & natural area preserves	<ul style="list-style-type: none"> <li>• More restoration efforts</li> <li>• Firebreaks (e.g. coffee plantations)</li> <li>• Adequate access for suppression</li> </ul>

# APPENDIX D

## Public Input Organized by Fire Protection Category

Public Prioritized Concerns and Recommended Actions	
Fire Protection Category: Pre-Suppression	
Wildfire Concern	Recommended Actions
Fallow lands, unmanaged fire fuels (post-agriculture); All of Maui at mercy of fallow fields	<ul style="list-style-type: none"> <li>• Legislation</li> <li>• Enforcement</li> <li>• Controlled burns</li> <li>• Firewise plants required</li> </ul>
Defensible space around individual structures	<ul style="list-style-type: none"> <li>• Laws (county, state legislation)</li> <li>• Developers are responsible</li> <li>• Large landowner requirements</li> <li>• Fuel abatement laws</li> <li>• Tax breaks for defensible space, fuelbreaks, and ag.</li> </ul>
MECO ignitions	<ul style="list-style-type: none"> <li>• Powerline fuel reduction</li> <li>• Improved transmission system</li> <li>• MECO could put % of funds from area to fund fuel reduction &amp; restoration</li> </ul>
Protect watershed from alien species and forest structure changes	<ul style="list-style-type: none"> <li>• Alien species education &amp; mitigation (what's being shipped in?)</li> <li>• Constant monitoring</li> <li>• Involve/educate youth (careers in natural resources, sustainable forestry, etc.)</li> </ul>
Road closures/access issues (ingress/egress)	<ul style="list-style-type: none"> <li>• 2nd egress road</li> </ul>
Road closures/access issues (egress)	<ul style="list-style-type: none"> <li>• Larger egress road</li> </ul>
Water infrastructure may not be maintained because of agricultural & land use changes	<ul style="list-style-type: none"> <li>• Reestablish traditional agriculture &amp; water systems and lo'i (from macnuts)</li> </ul>
Water plans and watershed affected by fire	<ul style="list-style-type: none"> <li>• Include fire and watershed protection ("No water, No life")</li> </ul>
Need to identify how to protect communities (vegetation, buffers, etc.) - Fire not in plan, not prioritized	<ul style="list-style-type: none"> <li>• Incorporate fire into planning (island → community)</li> <li>• Incorporate fire into leadership training</li> <li>• Address fire preparedness beyond Kahikinui → statewide</li> </ul>
Diptanks should be in every community	<ul style="list-style-type: none"> <li>• Install diptanks (put them high for ease of helicopter)</li> </ul>
Amount of brush surrounding subdivision - Need brush abatement & management (especially between subdivisions & new developments)	<ul style="list-style-type: none"> <li>• Funding</li> <li>• Homeowner actions</li> <li>• Education</li> </ul>
Too much unattended land - lots of dead brush	<ul style="list-style-type: none"> <li>• Clear-off land</li> </ul>
Reforestation & natural resource protection	<ul style="list-style-type: none"> <li>• Need funding for water resources</li> <li>• Nurseries</li> </ul>
Protect native habitat	<ul style="list-style-type: none"> <li>• Appropriate funds for proactive conservation efforts</li> </ul>
Protect watershed	<ul style="list-style-type: none"> <li>• Fund current Maui conservation entities &amp; efforts such as Pu'u Kukui Watershed, WMMWP</li> </ul>
Protecting communities with buffers	<ul style="list-style-type: none"> <li>• More ag. zones and range buffers</li> <li>• Fire protection and planning</li> <li>• Greenbelt</li> <li>• Golf course on outside plan (with state or county funding)</li> </ul>
Fallow mac nuts = fuels (limbs + grass); Attracts dirt bikers (ignition source)	<ul style="list-style-type: none"> <li>• Contact landowners (timeline to clean it up)</li> <li>• Get chipper-mulch to community; offer to do one area for them as incentive</li> </ul>
Protecting property	<ul style="list-style-type: none"> <li>• Homeowners protecting own property with preventative actions</li> </ul>
Access roads should be clear	<ul style="list-style-type: none"> <li>• Get property manager to keep road clear</li> </ul>



## APPENDIX D

### Public Input Organized by Fire Protection Category

Public Prioritized Concerns and Recommended Actions	
Fire Protection Category: Pre-Suppression	
Wildfire Concern	Recommended Actions
Financial issues limit preventative dozer firebreaks	<ul style="list-style-type: none"> <li>Funding &amp; liability insurance</li> </ul>
Kahana - Kaopala Bay	<ul style="list-style-type: none"> <li>Prioritize mauka area (haole koa)</li> </ul>
Roadside combustibile trash	<ul style="list-style-type: none"> <li>Community volunteer days</li> </ul>
Lack of diptanks	<ul style="list-style-type: none"> <li>Diptanks &amp; water should be required for fire prone areas &amp; new developments</li> </ul>
Power transmission line	<ul style="list-style-type: none"> <li>Fuel buffer</li> </ul>
Water access/availability	<ul style="list-style-type: none"> <li>Dip tanks</li> </ul>
Vulnerability of streams	<ul style="list-style-type: none"> <li>Riparian buffers</li> </ul>
Lessees not being enforced to maintain their properties/buffers	<ul style="list-style-type: none"> <li>Wildfire Education attendance</li> <li>Manual of requirements of lease - include fire management requirements</li> </ul>
Landowners & community assns. not taking responsibility for fire protection	<ul style="list-style-type: none"> <li>ID water reservoirs &amp; water accessibility in their community (for all communities in W. Maui)</li> </ul>
DHHL needs to be actively dealing with & preparing for wildfire in all DHHL communities	<ul style="list-style-type: none"> <li>Include fire in community plans</li> <li>Provide support to community assns. to apply for WUI funding (HWMO &amp; DHHL)</li> </ul>
Maintenance in Kahiki Nui (roads, catchment)	<ul style="list-style-type: none"> <li>Volunteers (lessees are not there but should be required to) - Incentive: fishing/hunting</li> </ul>
Need links/communication/network between communities	<ul style="list-style-type: none"> <li>Create committee (meet at park)</li> <li>Share info., resources, knowledge</li> <li>Link efforts (partnership)</li> </ul>
Lack of Hawaiian Homes on priority list	<ul style="list-style-type: none"> <li>Make it all equal priority/equal rights</li> </ul>
Access to fire & fuels reduction	<ul style="list-style-type: none"> <li>Fuel breaks</li> <li>Improved road access</li> </ul>
HC&S agricultural fields - fires sometimes out of control	<ul style="list-style-type: none"> <li>Field &amp; wildland buffers</li> </ul>
Lack of clear permission for using reservoirs & water resources from landowners	<ul style="list-style-type: none"> <li>Document/agreement to support MFD</li> </ul>
Ingress/egress issues (Launiupoko, Waichu/Waihee)	<ul style="list-style-type: none"> <li>Fire escape easements</li> </ul>
Dry grass along roadsides	<ul style="list-style-type: none"> <li>Planting of indigenous fire-retardant plants</li> </ul>
New highways - include fire hydrants, fuel breaks	<ul style="list-style-type: none"> <li>Funding &amp; planning</li> </ul>
Roadside/abandoned vehicles	<ul style="list-style-type: none"> <li>Tow truck program - possibly grant funded? community?</li> </ul>
Lack of proactive effort to reduce fire fuels	<ul style="list-style-type: none"> <li>Fund proactive fuel reduction</li> </ul>
Lack of control burns	<ul style="list-style-type: none"> <li>More control burns (reduce fuels training opp.)</li> </ul>
Need fuel breaks/fire roads in fallow agricultural lands	<ul style="list-style-type: none"> <li>Work with private large landowners</li> <li>Civil Defense training - "combat roads"</li> </ul>
Volunteer-oriented projects fizzle → need to be involved in planning and need leadership to keep it going; Leaders should be compensated for their time	<ul style="list-style-type: none"> <li>Join with other volunteer orgs. (e.g. Red Cross)</li> <li>Involve school classes</li> </ul>
Landowner resistance	<ul style="list-style-type: none"> <li>Student-driven project</li> </ul>
Watershed needs to be priority	<ul style="list-style-type: none"> <li>Buffer between watershed &amp; communities</li> <li>Need to look into new equipment to clear/chip better</li> </ul>

## APPENDIX D

### Public Input Organized by Fire Protection Category

#### 6. Pre-suppression & Post-fire

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Pre-Suppression &amp; Post-Fire</u>	
Wildfire Concern	Recommended Action
Water not flowing in streams	<ul style="list-style-type: none"> <li>• Loi restoration</li> <li>• Restore Wahikuli Reservoir</li> </ul>

#### 7. Suppression

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Suppression</u>	
Wildfire Concern	Recommended Action
Resources spread thin during multiple events --> ends up being triage-type prioritizations (sometimes is political)	<ul style="list-style-type: none"> <li>• Public education &amp; prevention of limited resource allocation</li> </ul>
No volunteer Fire Department	<ul style="list-style-type: none"> <li>• Political support for volunteer Fire Department</li> <li>• Establish ways community can support firefighting efforts during fire events</li> </ul>
Not enough helicopters	<ul style="list-style-type: none"> <li>• Funds to support helicopter suppression</li> </ul>
HC&S agriculture fields - fires sometimes out of control	<ul style="list-style-type: none"> <li>• More personnel &amp; equipment to keep under control</li> </ul>
FD could benefit from wildland equipment & vehicles	<ul style="list-style-type: none"> <li>• More equipment &amp; vehicles</li> </ul>
Road closures affect visitors & visitor industry	<ul style="list-style-type: none"> <li>• Visitor Bureau, airlines, and hotel visitors should be notified ahead of time</li> </ul>
No formal system in place to alert hotels other than Civil Defense	<ul style="list-style-type: none"> <li>• Check with Civil Defense about master list</li> <li>• Warning system</li> <li>• Roadside signage (permanent)</li> </ul>
Community may not realize that equipment availability has changed (decreased); Only have MFD + DOFAW (not as much private agriculture equipment available)	<ul style="list-style-type: none"> <li>• Inventory and stage equipment (dozers, water truck)</li> <li>• Memorandums of Understanding to agree on equipment use</li> <li>• Have lined up to assist MFD &amp; DOFAW to suppress fire</li> </ul>
Enough fuel to run equipment?	<ul style="list-style-type: none"> <li>• Stage fuel w/ equipment</li> <li>• Have lined up to assist MFD &amp; DOFAW to suppress fire</li> </ul>

#### 8. Post-Fire Response

Public Prioritized Concerns and Recommended Actions Fire Protection Category: <u>Post-Fire Response</u>	
Wildfire Concern	Recommended Action
Marine impacts (erosion, sedimentation, silt)	<ul style="list-style-type: none"> <li>• Reseeding</li> </ul>
Need to address post-fire issues	<ul style="list-style-type: none"> <li>• Reforestation</li> <li>• Burned area recovery plan</li> <li>• Rain gardens/vegetation to hold sediment</li> </ul>