Clallam County
Community Wildfire Protection Plan

Clallam County Community Wildfire Protection Plan

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I. Introduction

Overview

Wildfires are a growing hazard in most regions of the United States, posing a threat to life, property, and natural and cultural resources. This is especially true where development mixes with native ecosystems, the area that firefighters call the **Wildland-Urban Interface (WUI)**. In addition, the secondary effects of wildfires on lives, livelihoods, and infrastructure—including erosion, landslides, introduction of invasive species, and changes in water quality—can sometimes be more disastrous than the fire itself.

Wildfires are a natural and often beneficial ecological disturbance process, influencing species composition and vegetative structure across the landscape. Decades of timber harvest and fire suppression policies have altered this process in many areas, often creating a more dense forest environment that can burn more intensely than in the past. While the Olympic Peninsula may be known for its high levels of rainfall, fire is a common ecological influence in the area. Summer droughts occur here, which can elevate the risk of ignition in drier areas. Every summer, Clallam County experiences dozens of small wildfires, and every few decades we experience larger ones. The potential for a major wildfire disaster is extremely high due to the combination of having the driest climate in western Washington and some of the highest vegetative fuel loads on the planet—all it would take is an ignition under the right weather conditions.

The risk wildfire poses to human life is increased by the more than 13,000 homes located within the hundreds of square miles that comprise Clallam County's WUI. A recent study by Headwaters Economics found that Clallam County has the highest existing risk of catastrophic losses in the event of a major wildfire in all of Washington and is fifth highest among all 413 counties of the western United States. The same study ranks us second in Washington and twenty-fifth in the counties of the western states for potential future risk as the result of increasing human development in wildfire-prone areas.

Should we face a major wildfire it is more than likely we will become a major disaster zone, with heavy property losses and potential loss of human life.

Currently, many residents new to the region are developing homes in interface areas, particularly around the rainshadow of northeastern Clallam County. New residents often assume that wildfire isn't a problem on the western slopes of the Pacific Northwest, though research has determined that forests in our rainshadow area are more similar to those in central Oregon and northern California than those on the Pacific coast. Many new residents of Clallam County are also unaware of the concept of defensible space or are unaware that the concept is directly applicable to their lands, adding to the potential for severe WUI incidents in the near future.

Climate change research suggests that wildfire hazard could increase throughout the northwest, particularly in interface areas. Projections indicate that the Olympic Mountains may experience earlier spring snowmelt and runoff, likely causing longer summer drought periods. This suggests that eastern Clallam County could be affected more than most areas of Western Washington, due to its seasonal dry weather hazard and large WUI area.

With careful planning and collaboration among public agencies and communities, it is possible to minimize the losses that can result from wildfire.

The combination of high existing and future potential risk is a sobering set of statistics for those of us concerned with the lives and livelihoods of ourselves and our fellow residents. Should we face a major wildfire it is more than likely we will become a major disaster zone, with heavy property losses and potential loss of human life. With careful planning and collaboration among public agencies and communities, it is possible to minimize the losses that can result from wildfire.

In June of 2009, the Board of Clallam County Commissioners authorized funding for Peninsula College's Center of Excellence to research and develop a Community Wildfire Protection Plan (CWPP) in conjunction with state and federal agencies, fire protection districts, and community organizations throughout the County. A Community Wildfire Protection Plan identifies communities at risk, prioritizes hazardous fuel treatments, and recommends ways to reduce structural ignitability. The purpose of the Clallam County CWPP is to provide a consolidated reference document and framework that enables local, state, and federal agencies to identify hazard areas and establish effective mitigation strategies that will reduce wildfire risk to life, property, and resources.

This CWPP builds upon previous wildfire hazard assessments and can be used as a foundation for fire protection agencies in developing localized risk assessments and prioritized mitigation plans. This plan identifies and assesses wildfire hazards located within the county, identifies Wildland-Urban Interface areas, as well as presenting recommended mitigation measures to protect those areas from the effects of wildfire.

This CWPP will increase the County's competitiveness and eligibility for federal grant funding programs, such as those that come under the auspices of the Healthy Forests Restoration Act, the National Fire Plan, the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation Program, the Secure Rural Schools and Community Self Determination Act (Public Law 106-393), and others. As an incentive for communities to develop a CWPP, the Healthy Forests Restoration Act (HFRA) of 2003 requires that the United States Forest Service (USFS) and the Bureau of Land Management (BLM) give priority consideration to treatment areas and methods identified by communities in a CWPP when developing forest management and hazardous fuels reduction projects.

Policy Context

The following policy documents either legislatively mandate the completion of a CWPP, or have provided guidance and technical expertise that were used during this CWPP planning process:

Healthy Forests Restoration Act

On December 3rd, 2003, President George W. Bush signed into law the Healthy Forests Restoration Act (HFRA). The intent of this legislation is to prevent or reduce the threat of catastrophic wildfires, maintain or increase environmental standards, increase the commercial value of hazardous forest biomass, and to encourage public input during the planning process. The HFRA also specifies the three minimum requirements that must be included in a Community Wildfire Protection Plan.

The minimum requirements for a CWPP as described in the HFRA are:

- **Collaboration:** A CWPP must be collaboratively developed by local and state government representatives, in consultation with federal agencies and other interested parties.
- **Prioritized Fuel 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.
- **Treatment of Structural Ignitability:** A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

National Fire Plan

The National Fire Plan (NFP) was developed as the result of the extremely active wildfire season that occurred across the nation in 2000. The NFP provides technical, financial, and resource guidance support for wildfire management and mitigation activities occurring throughout the United States. The NFP addresses five key issues and identifies five main priorities with regard to wildfire events at the local, state, and national levels.

Key issues addressed in the NFP:

- Firefighting
- Rehabilitation
- Hazardous Fuels Reduction
- Community Assistance
- Accountability

The main priorities of the National Fire Plan are:

- Assuring that necessary firefighting resources and personnel are available to respond to wildfires that threaten lives and property.
- Conducting emergency stabilization and rehabilitation activities on landscapes and communities affected by wildfire.
- Reducing hazardous fuels (dry brush and trees that have accumulated and increase the likelihood of unusually large fires) in the county's forests and rangelands.
- Providing assistance to communities that have been or may be threatened by wildfire.
- Committing to the Wildfire Leadership Council, an interagency team created to set and maintain high standards for wildfire management on public lands.

All fuels management treatments must comply with NEPA. Hazardous-fuel reduction projects on USFS and BLM lands, such as mechanical thinning or prescribed fire, in one or more of the following areas qualify for expedited NEPA review under the HFRA:

- WUIs of at-risk communities;
- Municipal watersheds that are at risk from wildfire;
- Areas where wind throw, blowdown, ice storm damage, or the existence or imminent risk of an insect or disease epidemic significantly threatens ecosystem components or resource values; and

- Areas where wildfire poses a threat to, and where the natural fire regimes are important for, threatened and endangered species or their habitat.

Federal Emergency Management Agency Multi-Hazard Mitigation Plan

A Multi-Hazard Mitigation Plan (MHMP) is required by FEMA for state, local, and Indian tribal governments to meet the requirements of the Mitigation Planning regulations required under the Disaster Mitigation Act of 2000 (Public Law 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288). This policy provides the legal basis for state, local, and Indian tribal governments to undertake a risk-based approach to identify, assess and reduce the risks posed by natural hazards through mitigation planning. The legislation requires that local governments complete a MHMP in order to remain eligible for both hazard mitigation grant funding and disaster assistance funding.

On December, 2004, the Clallam County Hazard Mitigation Plan (CCHMP) was adopted by the county and approved by FEMA. The CCHMP provides a county-wide overview and assessment of existing or potential natural hazards that pose significant risk to human life and critical infrastructure within the County. The CCHMP rated the probability level of future occurrence of wildland fire hazard events as moderate. While this was a County scale assessment, hazards at the community level can rate from high to low. This CCWPP complements the CCHMP by identifying areas high wildfire hazard and providing methods for reducing the hazard level in those areas. At the time of this writing, an updated plan was in draft/public comment stage.

The Community Wildfire Protection Plan Handbook

The Community Wildfire Prevention Plan Handbook (CWPPH) is a guidance document that makes step–by-step recommendations for developing a community wildfire prevention plan. The document highlights overall wildfire prevention planning goals in the HFRA and other related policy documents and then suggests planning methods and public outreach activities that can be used to achieve them. Although following the steps recommended in CWPPH is not required, the handbook offers valuable insight and how-to information to local governments, individual community members, fire districts and other interested stakeholders in order to establish an effective, continuous and wide-ranging CWPP. This handbook was utilized in the development of this plan.

National Fire Protection Association and the International Code Council

The National Fire Protection Association (NFPA) was established in 1896 and is an internationally recognized organization devoted to improving fire safety, education, and fire prevention standards at the global scale. NFPA conducts research and develops technical standards and fire prevention methodologies that aid in protecting human life and community infrastructure from wildfire events. Two NFPA standards are applicable to CWPP planning efforts: *Standards for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas* (NFPA 1141, 2008 Edition), and *Standards for Reducing Structure Ignition Hazards from Wildfire* (NFPA 1144, 2002 and 2008 Editions). Similar to NFPA, the International Code Council has developed the *International Wildland-Urban Interface Code* (2006 and 2009 Editions), which has been used in the development of this CWPP.

II. Planning Process

Community Involvement

One of the major goals of any CWPP is to involve, to the greatest extent possible, any and all interested stakeholders prior to and during the CWPP planning process. As stated in the CWPPH, "A key element in community fire planning should be the meaningful discussion it promotes among community members regarding their priorities for local fire protection and forest management." Public meetings and education campaigns were conducted throughout Clallam County to provide fire prevention education materials and to obtain feedback from community members to determine community priorities for wildfire protection. All of the editorial comments received at these community meetings were regarding the WUI boundary and the suggested expansions have been integrated into this CWPP.

Public meetings were announced in the Sequim, Port Angeles, and Forks newspapers as well as posted on the Peninsula College Center of Excellence and fire district websites. Meetings were held on the dates listed below:

Tuesday, November 10th 2009, 3:30-5:00 (Fire District #3) at the Sequim Public Library.

Thursday, November 12th 2009, 6:00-7:30 (Fire Districts #1, #5, and #6) at the WA Department of Natural Resources, 411 Tillicum Lane, Forks.

Monday, November 23rd 2009, 6:00-7:30 (Fire Districts #2 and #4) at the Port Angeles Public Library.

Plan Adoption

In accordance with the Healthy Forest Restoration Act, a CWPP must be approved by the local fire agencies, governing body (the Board of County Commissioners), and agencies responsible for forest management. All of these entities provided comments, guidance, and feedback during the development of this plan.

Planning Area

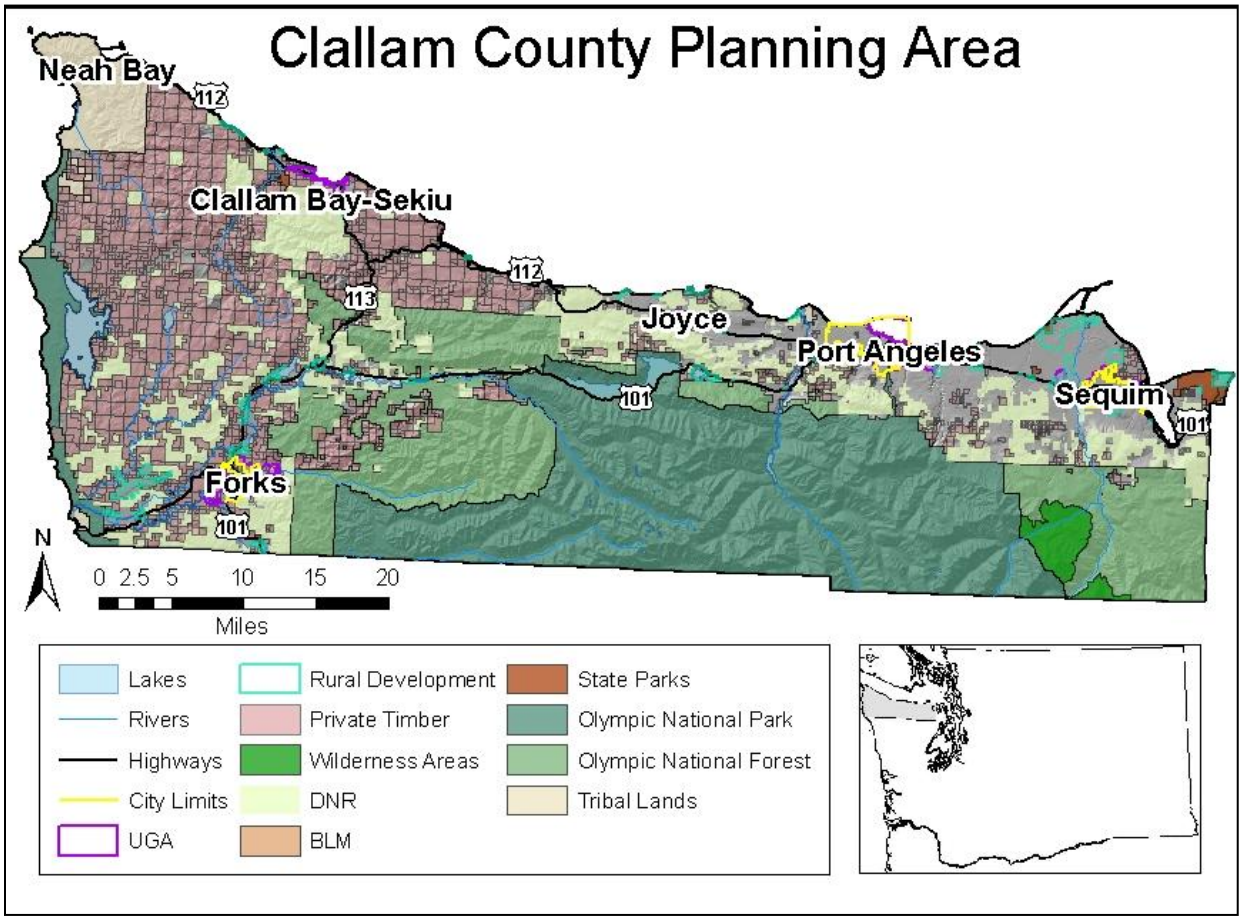
This document addresses all of Clallam County and serves as foundation and framework from which the Washington State Department of Natural Resources (DNR), the US Forest Service (USFS), the National Park Service (NPS), and county fire districts can develop assessment and treatment plans at the county, WUI "at-risk" area, and neighborhood scales.

III. Clallam County Description

Location and Background

Clallam County is located in the northwestern corner of Washington State (Figure 1). It borders the Pacific Ocean for more than 35 miles to the west, the Strait of Juan de Fuca for nearly 100 miles to the north, and Jefferson County to the east and south. Clallam County was created out of Jefferson County in 1854 and has a total area of 2,670 mi^2 (1,708,800 acres). Of that area, 65% (1,739 mi^2/1,112,960 acres) is land and 35% (931 mi^2/595,840 acres) is water, including nearshore areas. Elevations within the County range from sea level to nearly 8,000 ft.

Figure 1: Clallam County Location, Area, and Major Land Ownership.



Approximately 47% of County is federal land and approximately 14% is under state ownership (Table 1). There are six Urban Growth Areas (UGA) in the County listed that comprise 2% of County lands: Port Angeles (14.5 mi^2/9,307 acres); Sequim (8.1 mi^2/ 5,207 acres); Forks (7.7 mi^2/ 4,935 acres); Clallam Bay-Sekiu (2.2 mi^2/1,412 acres); Carlsborg (0.9 mi^2/557 acres); and Joyce (0.6 mi^2/354 acres). In addition to the intensively developed lands found in UGAs, the County also classifies developed rural areas as Land Areas of More Intensive Rural Development (LAMIRD), which comprise about 1% of the County lands.

The Quileute, Makah, Lower Elwha Klallam, and the Jamestown S'Klallam tribal lands comprise 3% of County lands. The county is named for the S'Klallam tribe, which translates as "the strong people."

Table 1: Land Area for Major Classes of Ownership within Clallam County, by Percent Class.

Land Owner	Acres	Percent of County Area
Federal Land	523,496	47%
Private Lands	434,054	39%
Olympic National Park	318,093	29%
Timber companies	278,240	25%
Olympic National Forest	199,209	18%
State Land	160,377	14%
State Forest Board and DNR Lands	154,530	14%
Rural Lands	89,037	8%
Other	66,778	3%
Other Federal Land	6,194	1%
State Parks	2,488	<1%
Other	3,359	<1%
County and Local Governments	7,350	<1%
Total County Land	3,817	<1%
County Parks	643	<1%
Port of Port Angeles	858	<1%
School Districts	344	<1%
Other (cities and special districts)	2,331	<1%

Communities

Port Angeles has been the county seat since it was incorporated in 1890. Sequim and Forks are the other two cities in the county to become incorporated, in 1913 and in 1945 respectively. Other Census-Designated Places (CDP) in Clallam County are: Bell Hill, Blyn, Carlsborg, Neah Bay, and River Road. Other non-CDP recognized communities are: Agate Beach, Agnew, Beaver, Bogachiel, Cape Flattery, Clallam Bay, Crane, Crescent, Diamond Point, Dungeness, Elwha, Fairholm, Gales Addition, Hoko, Joyce, Kalalock, La Push, Maple Grove, Mora, Mount Pleasant, Ozette, Pysht, Piedmont, Queets, Sappho, Schoolhouse Point, Sekiu, Sol Duc Hot Springs, and the Upper Hoh.

Demographics

The 2008 U.S. Census population estimate for Clallam County was 69,200. This represents a 7.2% growth rate from the 2000 estimate of 64,525 (Figure 2). The County had a 14% growth rate between 1990 (pop. 56,464) and 2000. 51% of the County population resides in the six UGAs while 9% is located in the LAMIRDs, and most of the remaining 40% of the population lives on rural or tribal lands. Nearly all of the County's population resides on only 14% of the county's land area.

In 2008, Clallam County had an estimated total of 33,861 housing units and a population density of 39.8 persons/mi^2 (Figure 3). Ethnicity in Clallam County is distributed as 90% white, 5.1% American Indian or Alaska Native, 4.8% Hispanic or Latino, 2.4% of two or more races, 1.5% Asian, 0.9% Black or African American, and 0.2% Native Hawaiian or Other Pacific Islander.

In 2008, Port Angeles had an estimated population of 19,170 with 9,120 housing units, and a land area of 10.1 mi^2. Sequim had an estimated population of 5,610 with 3,294 housing units, and a land area of 5.3 mi^2. Forks had a population of 3,205 with 1,447 housing units, and a land area of 3.1 mi^2. There are approximately 390 parcels of private property within the boundaries of Olympic National Park, and these properties total about 0.8 mi^2 (500 acres). Most of the private property within the park is located at Lake Crescent, Quinault, Ozette, and Oil City, with a few additional properties at Elwha, Heart of the Hills, and along the coastal strip.

Clallam County had a median household income of $42,395 in 2007, compared to $55,628 for Washington State (Figure 4). The 2008 unemployment rate in the County was 7.1% with a civilian labor force of 30,160. In 2007, approximately 11.9% of the population was below the poverty line in Clallam County.

Figure 2: Clallam County Population Growth 2000-2008 (data from US Census).

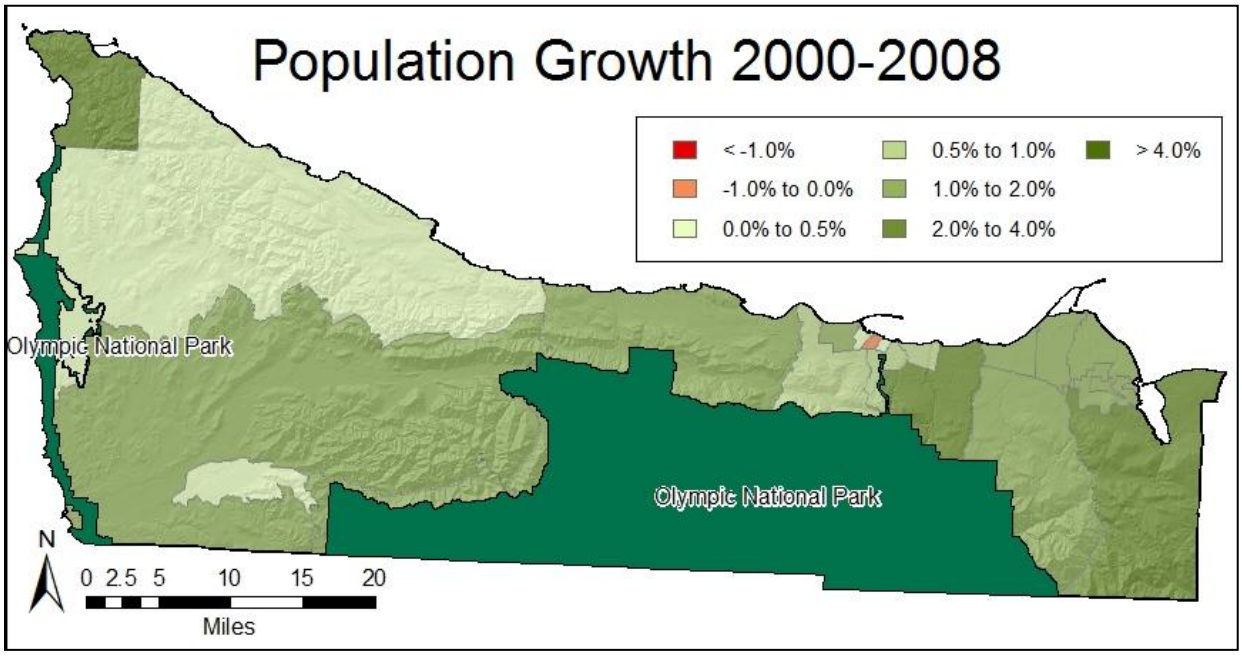


Figure 3: Clallam County Housing Density 2000 (data from US Census).

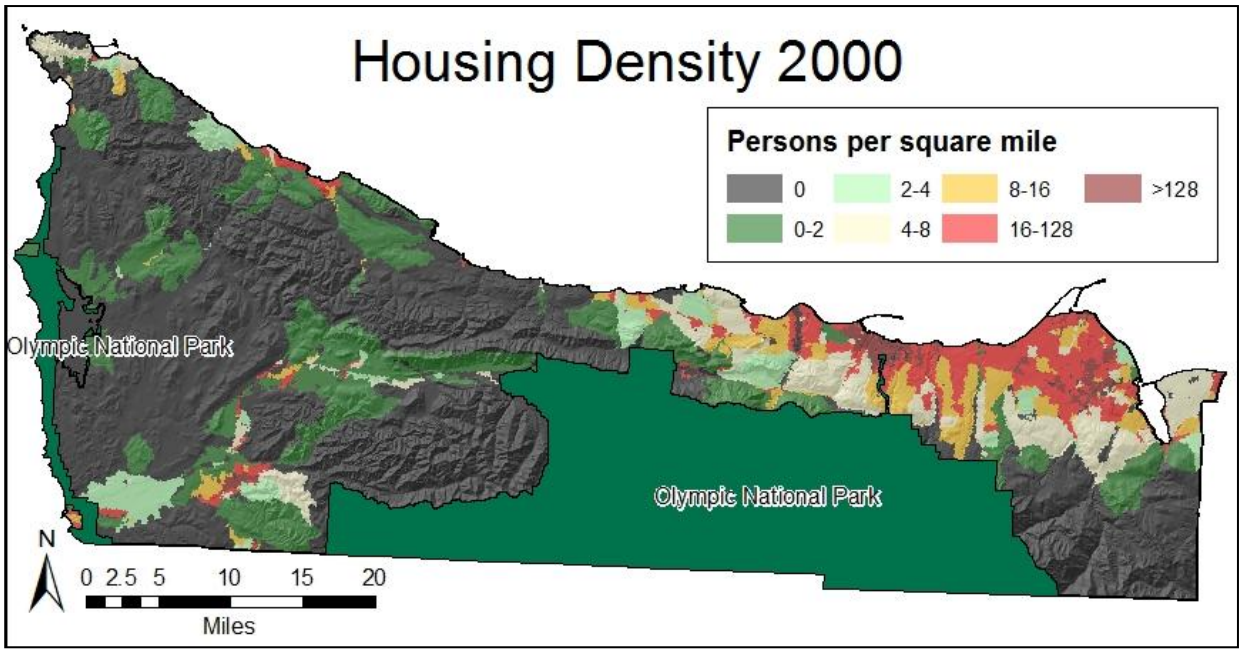
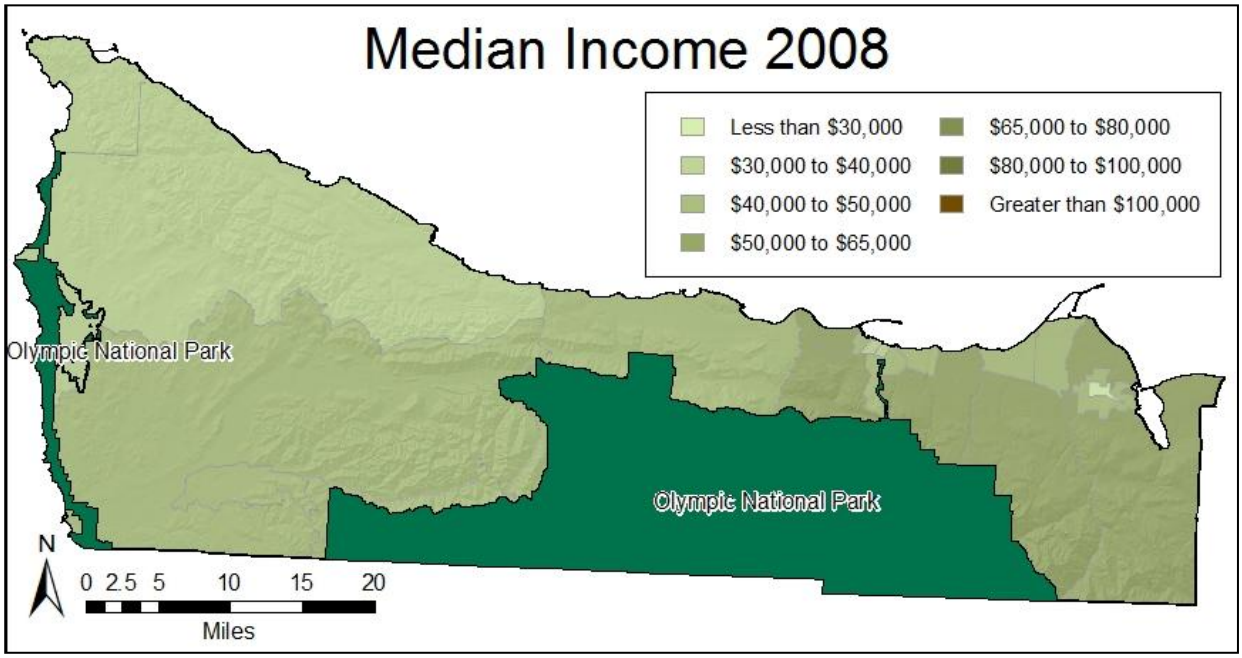


Figure 4: Clallam County Median Income 2008 (data from US Census).



Places of Value

Every community has sites of social, environmental, historic, or infrastructure value that need to be considered with a higher priority when assessing areas for wildfire hazard mitigation. These can include homes, protected areas, historic sites, schools, hospitals, utilities, and other sites. National protected areas in Clallam County include the Dungeness National Wildlife Refuge and Flattery Rocks National

Wildlife Refuge, which are managed by the U.S. Fish and Wildlife Service, as well as parts of Olympic National Forest and Olympic National Park. Historic sites are listed in Appendix I. Hospitals, Police and Fire Stations, and utilities are listed in Appendix J.

Environment

Weather

Clallam County's weather is affected by the location and intensity of the semi-permanent high and low-pressure areas over the North Pacific Ocean as well as a topography that ranges from coastal prairies to steep mountain ridges.

Air circulates in a clockwise direction around the semi-permanent high-pressure cell and in a counter-clockwise direction around the semi-permanent low-pressure cell. During the spring and summer, the low-pressure cell becomes weak and moves north of the Aleutian Islands. At the same time, the high-pressure area spreads over most of the North Pacific Ocean. A circulation of air around the high-pressure center brings a prevailing westerly and northwesterly flow of comparatively dry, cool and stable air onto the Peninsula. As the air moves inland, it becomes warmer and drier, which results in a dry season beginning in the late spring and reaching a peak in mid-summer. During the driest months of July and August it is not unusual for two to four weeks to pass with only a few scattered showers.

In the fall and winter, the Aleutian low-pressure center intensifies and moves southward, reaching a maximum intensity in midwinter. At the same time, the high-pressure area becomes weaker and moves southward. A circulation of air around these two pressure centers over the ocean brings a prevailing southwesterly and westerly flow of air into the Pacific Northwest (Figure 6). This air from over the ocean is moist and near the temperature of the water. Condensation occurs as the air moves inland over the cooler land, resulting in a wet season that begins in October, reaches a peak in winter, and then gradually decreases in the spring. During the wet season, rainfall is usually a light to moderate intensity and continuous over a period of time rather than heavy downpours for brief periods. The heavier intensities occur along the windward slopes of the mountains. In the wettest months of December and January precipitation is frequently recorded on 20 to 25 days or more each month.

Precipitation varies on the peninsula due in large part to orographic precipitation pattern that creates a rainshadow effect (Figures 5, 6, and 7). As air heavily laden with water vapor from the Pacific Ocean flows from west to east it faces its first terrestrial hurdle at the Olympic Range. The air mass is forced to rise up by the mountains and cools in the higher altitudes. This cooling condenses the water vapor, resulting in abundant precipitation on the west side. As the air mass flows east across the mountains, the water is gradually "squeezed out" of the clouds, and by the time that air mass reaches the other side of the range, there is very little water vapor left to fall out as rain. Because of this, annual precipitation in the County ranges from approximately 20 inches in the northeastern prairies to 150 inches along the southwestern coast (Figure 5). Snowfall is light in the lower elevations and heavy in the higher mountain elevations. Higher ridges are typically covered with snow from November until June. Winter season cumulative snowfall ranges from 10 to 30 inches in the lower elevations and between 250 to 500 inches in the higher mountains. In the lower elevations, snow melts rather quickly and depths seldom exceed

six to 15 inches. In midwinter, the snowline in the Olympic Mountains is between 1,500 and 3,000 feet above sea level. In January, maximum temperatures range from 43° to 48° F and minimum temperatures range from 32° to 38° F. In July, the average maximum temperature is near 70° F along the coast and 75° F in the foothills, with minimum temperatures near 50° F. Wind velocities in the lower elevations can be expected to reach 90 to 100 mph once in 100 years. Wind data from a well exposed site near the Pacific Ocean at 2,000 feet indicates that wind velocities in excess of 100 mph occur in the higher elevations almost every winter.

Figure 5: Mean Annual Precipitation Patterns for Clallam County (data from WRCC).

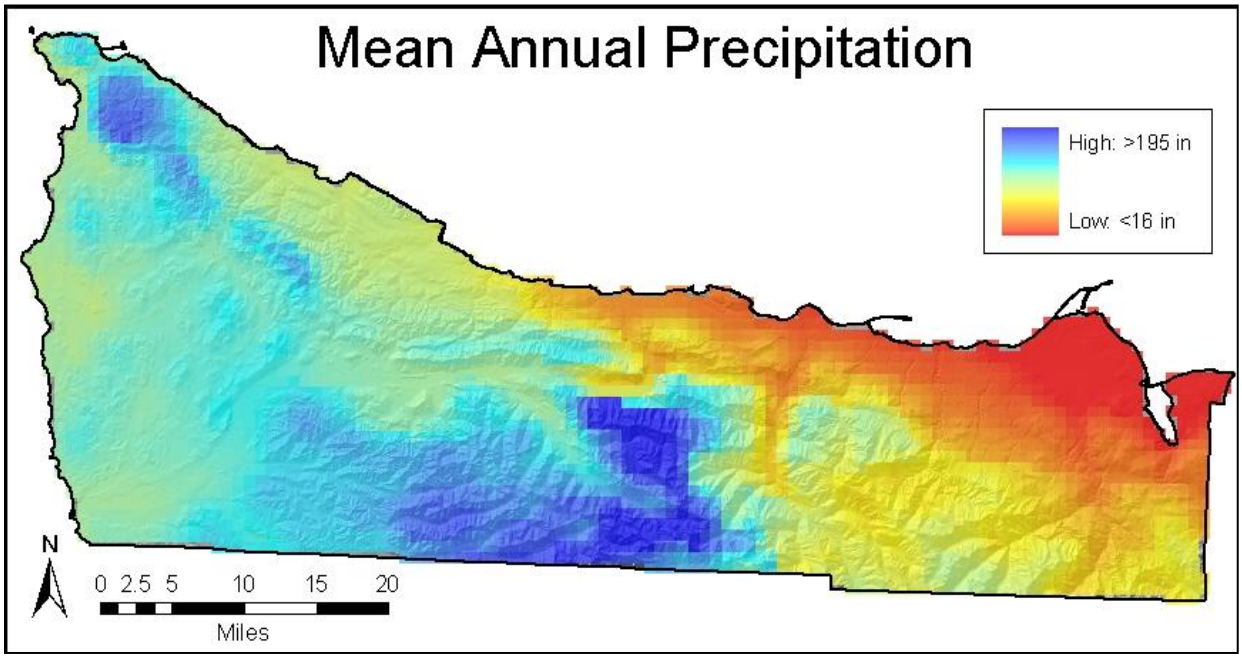


Figure 6: Prevailing winds for the Olympic Peninsula drive precipitation patterns (map from WRCC).

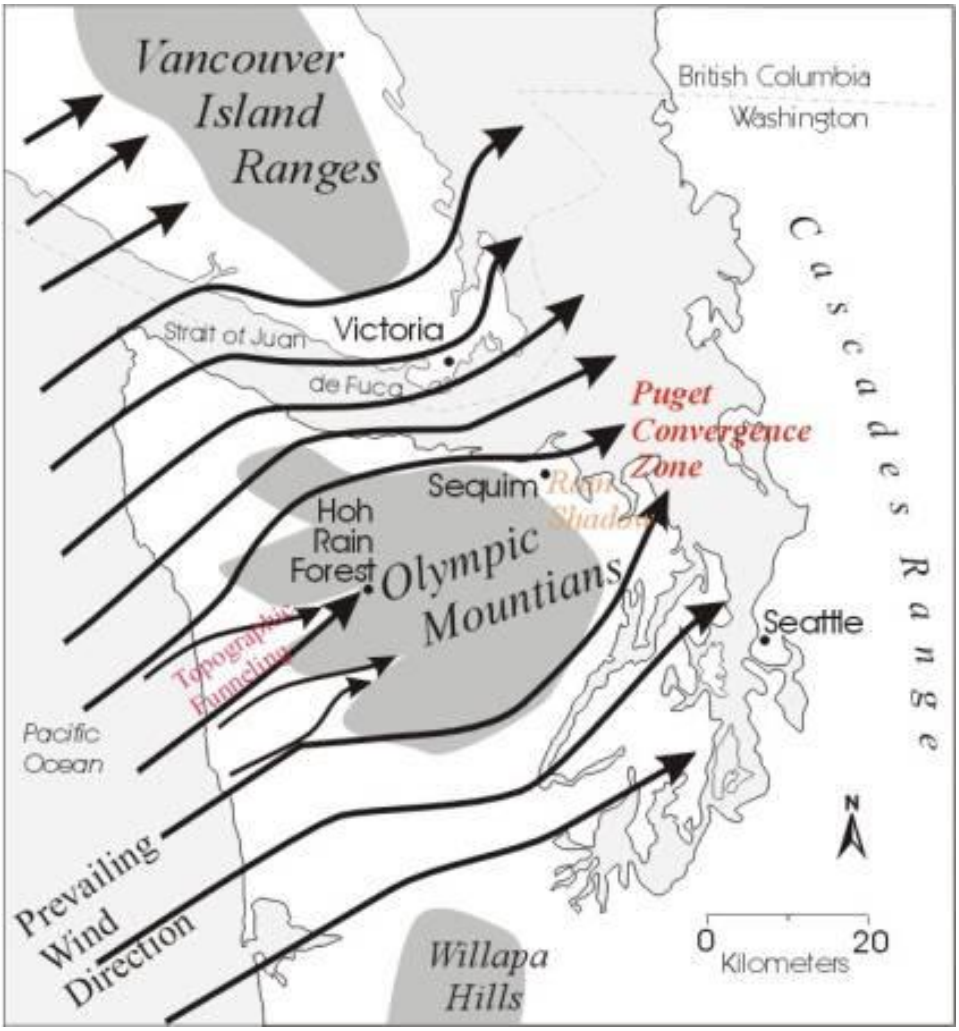
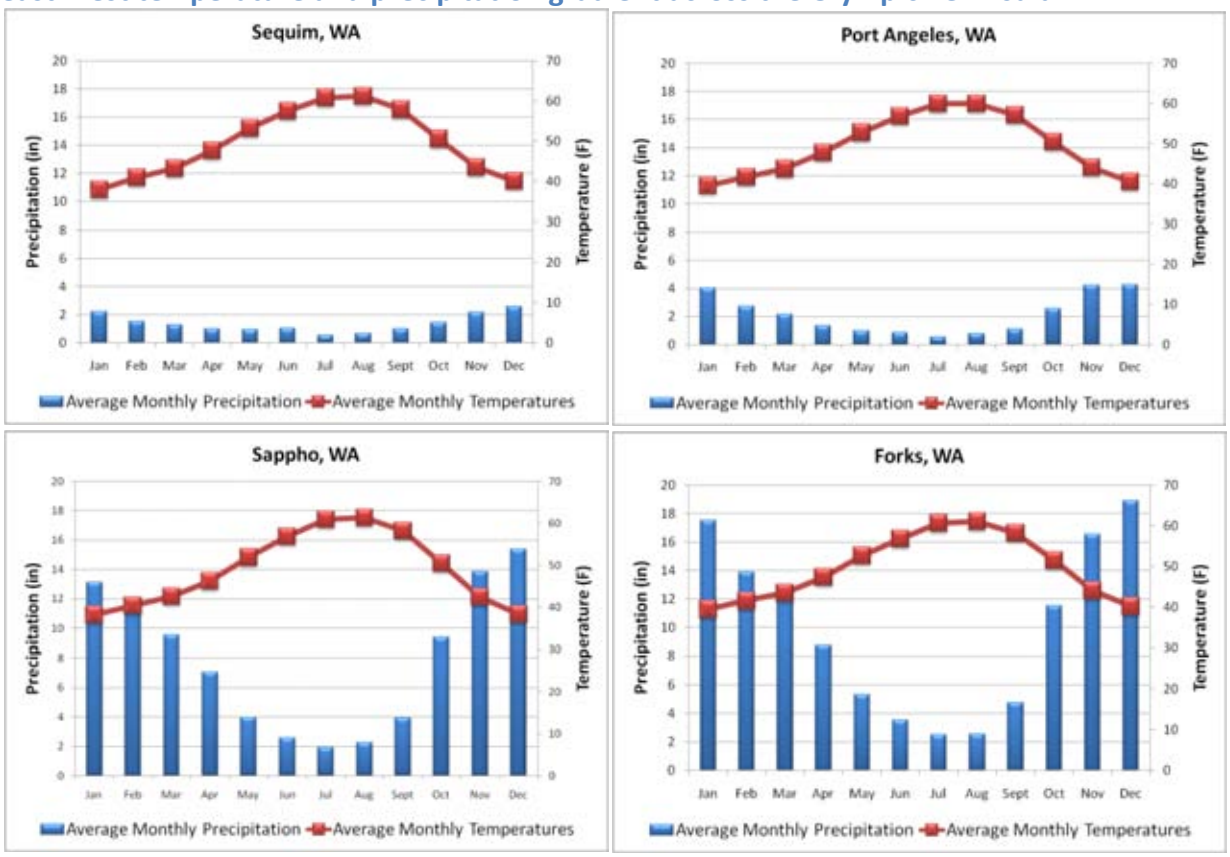


Figure 7: Climographs for Sequim, Port Angeles, Sappho, and Forks, WA representing the east-west temperature and precipitation gradient across the Olympic Peninsula.



Geology and Soils

Topography in Clallam County is marked by the rugged Olympic Mountains to the south surrounded by foothills and lowlands to the north and west. The mountains in the southern region extend to nearly 8,000ft, with deeply incised, fault-controlled drainages carved through episodes of glaciation. The Crescent Terrane geological unit surrounds the Olympic Mountain range and forms the foothills that trend to the northwest, parallel to the Strait of Juan De Fuca. The coastal lowlands to the north and west are the result of active mountain erosion forming marine and riverine terraces with slopes of less than 30 percent.

The general geology of the County is comprised of Eocene, Miocene, and late Oligocene marine sandstones, siltstones, and shales, interspersed with marine basalts. Types range from metamorphosed Eocene and Oligocene sandstones to the greenshists and graywackes that form the Olympic Mountains. Pre-Quaternary marine sedimentary, continental sedimentary, and basaltic rocks comprise the Crescent Terrane. Glacial deposits, till, outwash, and lacustrine sediments are typically found in the more gently sloping coastal terrain. Headlands are formed from mostly basalt, but occasionally from conglomerates and sandstones.

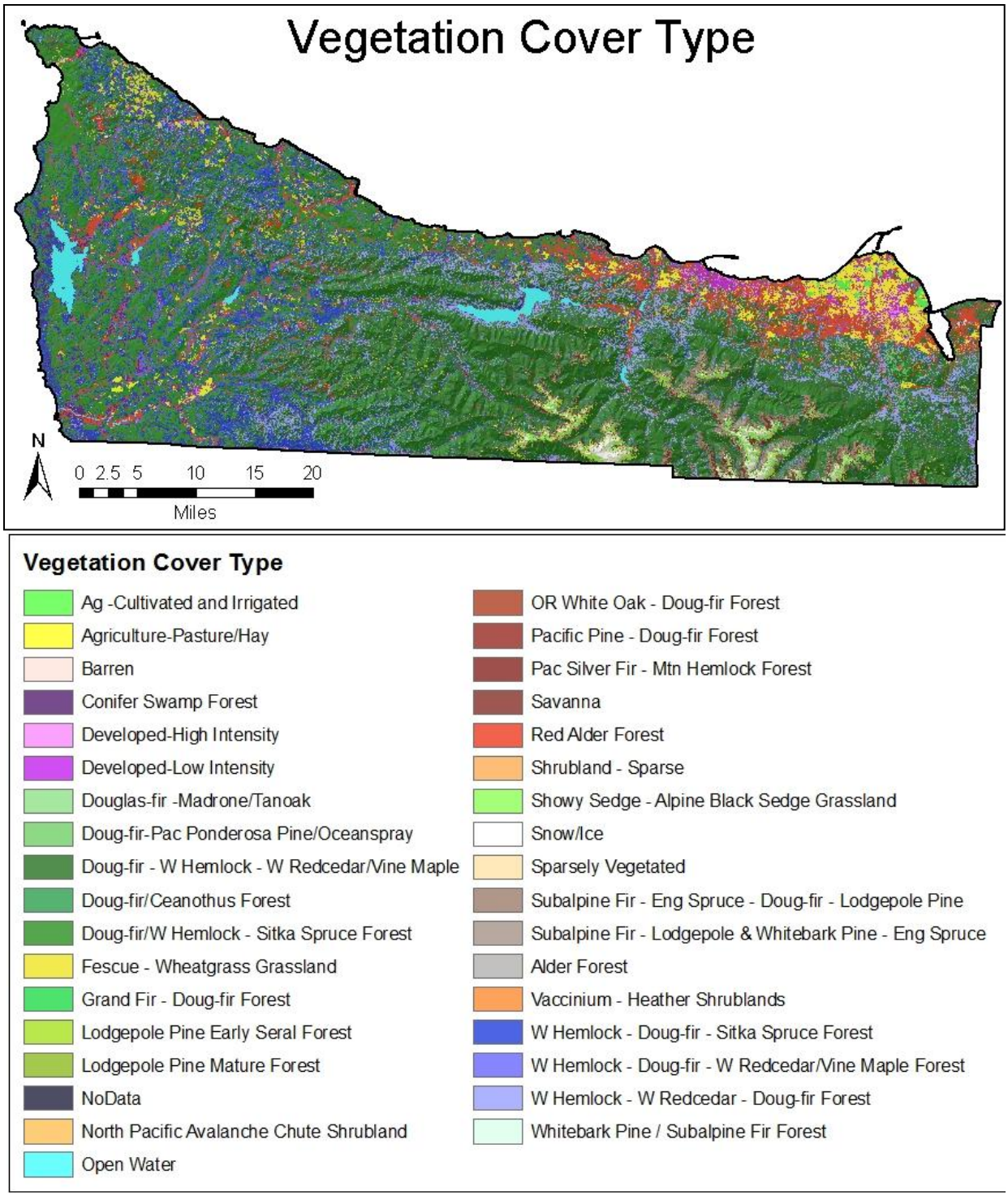
The moisture content of the upper soils, as well as that of the covering layer or duff, has an important effect on fire suppression efforts in forest and wildland areas. There are four soil moisture regimes present on the Peninsula: udic, xeric, perudic, and aquic. Udic is the most common soil moisture regime. It includes all moist soils but can be dry for up to 90 days during the year or 45 consecutive days in the summer (in 6 out of 10 years). Xeric soils are known to be dry for at least 45 consecutive days. Perudic soils are wet soils that are supplied with oxygen by moving ground water. Water moves through these soils in all but frozen months. Aquic conditions occur where water collects, causing wet anaerobic conditions. The soil is not always saturated, but must be both saturated and anaerobic at some time.

On the low mountains, typical soils are moderately deep or deeper, and have dark, humus-rich topsoil and low base saturation. The upper horizons of these soils have low bulk density, and amorphous material is dominant in the clay-size fraction. Soil moisture regime is udic and soil temperature regime is mesic or frigid. In the rainshadow, the soil moisture regime is xeric. Soils on the high mountains are similar but colder, having a cryic soil temperature regime. Some have a cemented layer that impedes water and roots. Soils that are continuously moist, a perudic moisture regime, occur in the high Olympic Mountains. In the coastal lowlands and hills, seasonal soil temperatures are moderated by fog and sea breezes, resulting in isomesic and isofrigid temperature regimes. Soils formed in sandy aeolian deposits have accumulations of iron, aluminum, and humus in subsoil horizons, and some have organic matter-rich surface horizons. Poorly drained soils with aquic moisture regime and an accumulation of organic matter near the surface occur on low marine terraces. On low hills in the fog belt are soils with humus-rich topsoil, low bulk density, and amorphous material in the clay-size fraction.

Vegetation

Clallam County consists of a variety of complex ecoregions and vegetation types. The western part of the County is dominated by the Sitka Spruce and Western Hemlock forest association that is common across the northern Pacific Northwest where precipitation is abundant. However, the northeastern portion of Clallam County is dominated by scattered remnant prairies and Douglas-fir forests, with forest understory vegetation comprised of salal and dwarf Oregon-grape. This forest association indicates that one or more fires have occurred within the past 500 years. The Western Red Cedar association is abundant in the drainages and lower elevations where soil moisture is abundant, while Pacific Silver Fir series is dominant on drier mountain soils. Vegetation cover type is shown in Figure 8.

Figure 8: Clallam County Vegetation Type (data from USGS).



Wildlife

The large herbivores, Roosevelt elk and blacktail deer, were not as common in coastal Douglas-fir forests prior to Anglo settlement and forest harvest. Both species are now common and widespread. Black bear, a common species, represents the large predator and coyotes represent the opportunistic small predator. Cougar and bobcat are now common predators, but, like the elk and deer, were not as common prior to forest harvest. Spotted owl and marbled murrelet were common species associated with late seral coastal forest plant associations but are now threatened due to limited habitat. Townsends mole is a widespread and abundant inhabitant of lowland flood plains and meadows. The saltwater-freshwater interface zone supports a variety of shore birds, waterfowl, mollusks, and anadromous fishes. Mountain beaver and the Olympic marmot occur in this area, and are both unique species endemic to the peninsula. Large mammals, including the whale, sea lion, and seal, are common components of adjoining marine waters. Other important inhabitants are more than 7,000 species of arthropods, a variety of amphibians and reptiles, and slugs. Resident species federally listed are marbled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*). Additional species federally listed as endangered or threatened that could potentially be found in the County are brown pelicans (*Pelecanus occidentalis*), and the short-tailed albatross (*Phoebastris albatrus*), and the western snowy plover (*Charadrius alexandrinus)*.

Land Use

Forestry is the dominant land use in Clallam County. The rapid growth in the eastern region is converting what was once open farmland into low-density residential development. Coastal areas are dominated by small communities that were historically supported by fishing but are now more dependent on tourism. Olympic National Park is a major presence, drawing over 3 million visitors annually. With more than 60% of the County available as public land, outdoor recreation is a popular land use and one that increases human exposure to wildfire hazard. Hiking, sport fishing, and hunting are common. Gathering of special forest products, such as mushrooms, ferns, shrubs, lichens, and mosses, is also common.

Transportation

Main transportation routes are restricted to the coastal shelf because of the Olympic Mountain range. U.S. Highway 101, a two-lane highway, is the main east-west transportation route across the County (Figure 1). State Routes 110, 110 Spur, 112, 113, and 117, as well as various county roads and city streets, also are important transportation routes that can be used in the event of a wildfire. U.S. Forest Service and National Park roads also may provide alternate access or evacuation routes during wildfire events.

Clallam County maintains 488 miles of roads and 34 bridges within the County. Roads not under the responsibility of the County Road Department include state highways, such as Highways 101 and 112; city streets in Sequim, Port Angeles, and Forks; Olympic National Park, Olympic National Forest, and Department of Natural Resources roads; and private roads. The County relies on Washington State Department of Transportation (WSDOT) for maintenance and repair of U.S. Highway 101 and the state routes that traverse the County. WSDOT funds for Clallam County roads historically have been relatively

low because of the low population density of the County. Since the 1990s, many forest service roads have been reclaimed or are out of use. As a result, the system of roads available from the 1950s to 1980s for fighting wildfires has diminished considerably.

The Clallam County Comprehensive Emergency Management Plan identifies the following roads, bridges, and transportation points as vital infrastructure that if damaged, could adversely affect transportation and evacuation efforts in the County.

- US 101, including bridges (US 101 connects Clallam County with the rest of the state).
- State Routes 112 & 113.
- Dungeness River bridges.
- Sol Duc River bridges.
- Elwha River bridges.
- Local airports including Fairchild International Airport, Sequim Valley Airport, Forks Airport, and Quillayute Airport.

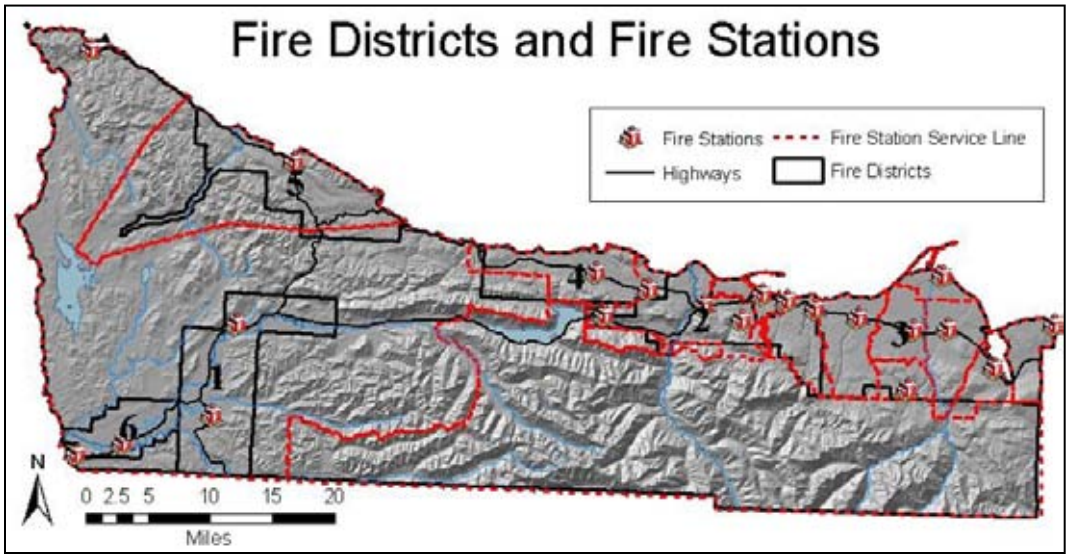
Fire Protection

Wildland fire fights are coordinated with the Washington State Department of Natural Resources (DNR), the US Forest Service (USFS), and the National Park Service (NPS). Clallam County has six fire districts, listed below, and twenty fire stations (Table 2 & Figure 9).

Table 2: General Information for the Fire Districts in Clallam County.

Clallam County Fire Protection District	Number of Fire Stations	Coverage Area (mi^2)
No. 1-including Forks	2	138
No. 2-including Port Angeles	6	101
No. 3-including Sequim	7	141
No. 4-Joyce	2	52
No. 5-Clallam Bay/Sekiu	1	75
No. 6-Quillayute Valley	1	30

Figure 9: Locations and Areas of the Fire Districts and Fire Stations in Clallam County.



IV. Wildfire Hazard and Risk Assessment

Wildfire risk is commonly defined as the likelihood of a wildfire to occur, and likelihood is usually based on past fire history. Fire expert Jim Agee has observed that the episodic nature of fire on the Olympic Peninsula "implies that prediction of future events based on past history is difficult." While it would be impossible to predict when and exactly where wildfires will occur in the future, homeowners and fire planners should be aware of fire prone areas when prioritizing areas for mitigation activities.

Homeowners and fire planners should be aware of fire prone areas when prioritizing locations for mitigation activities.

Fire History

Fire History of the Olympic Peninsula and Clallam County

Often overlooked on the rain-soaked Olympic Peninsula, wildfire is an age-old element of these ecosystems, and fires of varying severity have occurred both historically and in recent times. Wide-spread stands of Douglas-fir, tree-stand age classes, fire-scarred trees, and charcoal layers found in soil and bogs give evidence that major fires burned on the Olympic Peninsula every 200-300 years and the pattern of occurrence appears to be directly linked to long-term variations in climate. Medium-sized, less intense fires occur more frequently, as often as every 20 years for any given area, and small fires of a few acres or less occur every year in Clallam County.

There were three time periods during the Little Ice Age when major fires burned: around 1308, 1448 to 1538, and 1668 to 1701. The most recent of these fires burned more than a million acres on the north and east sides of the peninsula, resulting in extensive stands now dominated by Douglas-fir. Historical records list numerous large fires that occurred on the Olympic Peninsula between 1865 and 1942, many ignited by land clearing or logging activities as well as by lightning. More than forty-five of these fires were larger than 1,000 acres. Near the park, the Dungeness Fire of 1890/91 burned about 30,000 acres while the "Soleduck Burn" of 1907 covered approximately 12,800 acres. More than 700 lightning-caused fires have burned within the Park between 1913 and 1975, and 87% (650) of those fires occurred in the drier northeastern portion of the Park. A more recent study conducted in the Morse Creek watershed just east of Port Angeles determined that "…fires were much more common in the eastern Olympics than previously thought," further stating that the fire interval for any given ~500 acre area of the drainage was 21 years, with a 3 year return interval for the entire watershed.

In the summer of 1951, extremely dry weather set the stage for disaster in the Calawah River Valley and the town of Forks. Around 1,600 acres of forest burned after sparks from a logging train ignited a wildfire near Camp Creek on August 6th of that year. The fire was eventually controlled, but when a drop in humidity and a strong east wind occurred on September 20, a hot spot erupted into "The great Forks Fire of 1951." That fire progressed 18 miles in less than eight hours, burning a path three miles wide. Residents in Forks were evacuated, and many homes were lost. A total of 38,000 acres was burned in the fire. A mill, motel, and 28 homes were destroyed, but amazingly, there was no loss of life.

Wildfires occur frequently and can be a potential threat to homes and lives across the Peninsula.

In July 2004 a wildfire ignited near Joyce at Striped Peak, which burned between three and four acres of private hillside land. In May 2006, Joyce dealt with wildfire again when a controlled burn about one mile north of town turned into a five-acre wildfire. Although the fire was small and caused no structure damage, it did threaten a structure at one point, and authorities considered evacuating homes near the threat. A lucky change in wind helped the firefighters, who were hindered by a lack of roads. In July 2007, a wildfire burned eight acres west of Port Angeles' Fairchild Airport. The fire threatened several homes, but firefighters felt that the lack of wind was the only thing that prevented the need for evacuations. From January of 2008 to August of 2009, 38 different wildfire incidents have occurred within Clallam County, outside of Olympic National Park. Since 1970, more than 1,000 wildfires have occurred in Clallam and Jefferson Counties outside of Olympic National Park. The fire history of the past, as well as recent years, shows us that despite the region's reputation as "wet," wildfires occur frequently and can be a potential threat to homes and lives across the Peninsula.

Statewide Trends and Patterns

The National Interagency Fire Center (NIFC), the nation's support center for wildland firefighting, keeps records of wildfire occurrence across the nation. Wildfires and acres burned in Washington State from 2002 through December 13, 2009 are listed in Table 3. Wildfires from 1970 through 2009 are displayed in Figure 10.

Table 3: Recent Wildfire Occurrence Information for Washington State (data from NIFC).

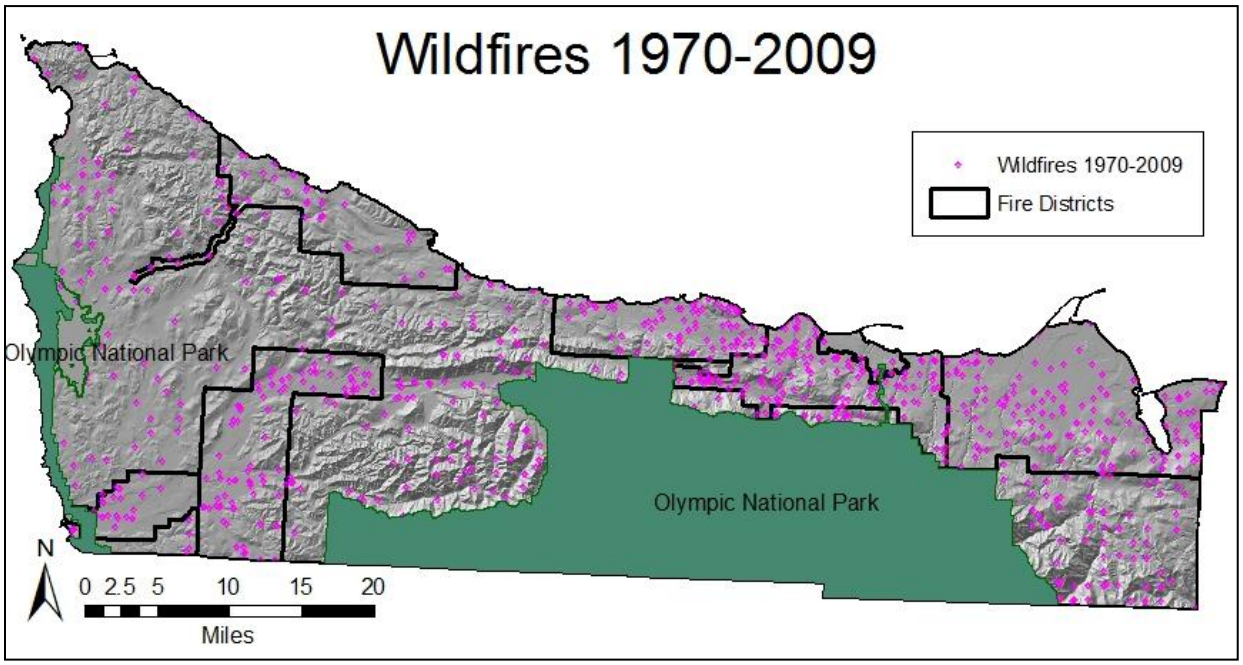
Year	Fires	Total Acres Burned
2009*	1,808	72,709
2008	1,303	147,264
2007	1,268	214,925
2006	1,579	410,060
2005	998	185,748
2004	1,674	92,617
2003	1,373	200,517
2002	1,285	92,742

* 2009 data was only available through mid December.

Wildfires are ignited both by natural causes, such as lightning, and by various human activities. Human-caused fires account for about 40% of all wildfires in the Northwest.
Common human causes are:

- Campfires
- Debris Burning and Uncontained Burn Barrels
- Fireworks
- Arson
- Children
- Smoking
- Off-Highway Vehicles
- Home Equipment

Figure 10: Wildfires reported in Washington State 1970-2009 (DNR & BLM).



NIFC records of human vs. lightning caused fires in the Northwest (OR and WA) from 2001 through 2008 are listed in Table 4.

Table 4: Lightning- and Human-Caused Wildfires in OR and WA (data from NIFC).

Year	Lightning Caused Fires	Lightning Caused Burn Acres	Human Caused fires	Human Caused Burn Acres	Total Fires	Total Acres
2008	1,624	183,253	1,365	99,706	2,989	282,959
2007	1,486	618,879	2,346	244,335	3,832	863,214
2006	2,170	843,984	2,666	112,098	4,836	956,082
2005	901	122,131	1,924	219,012	2,825	341,143
2004	2,042	64,460	1,901	58,178	3,943	122,638
2003	1,605	234,331	2,370	126,381	3,975	360,712
2002	1,797	988,527	2,148	105,544	3,945	1,104,071
2001	159	394	18,743	196,226	4,565	605,867

Historic Fire Regime

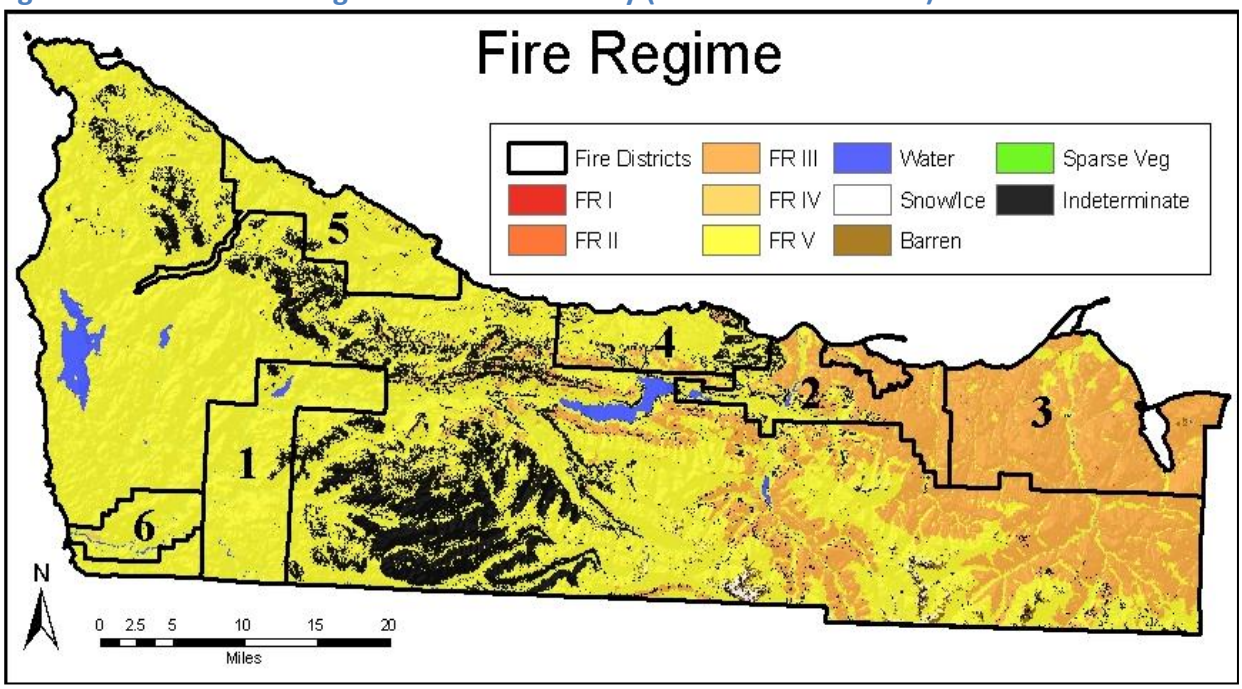
A natural fire regime is a general classification of the frequency and role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning. These groups are intended to characterize the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context. The five regimes are described as follows:

Fire Regime I: 0-35 year frequency with low to mixed severity (surface fires most common).
Fire Regime II: 0-35 year frequency with high severity (stand replacement fires).
Fire Regime III: 35-100+ year frequency with mixed severity.
Fire Regime IV: 35-100+ year frequency with high severity (stand replacement fires).
Fire Regime V: 200+ year frequency with high severity (stand replacement fires).

Historic fire regime data used in this document is a 30-meter grid spatial resolution raster data set developed by the LANDFIRE Project for regional representation. LANDFIRE is a federal program devoted to providing spatial data to wildland managers (www.landfire.gov). The data represents an integration of the spatial fire frequency and severity regime characteristics simulated using a vegetation and disturbance dynamics model. This information is an approximate representation of the general conditions present in an area and should be used for reference only.

The majority of forested land in Clallam County is classified as a moderate to high fire severity regime (Figure 12). "High" severity fire regimes are characterized by infrequent severe crown fires or surface fires that cause high tree mortality; or stand replacement fires that typically result in total stand mortality and moderate-to-high loss of the duff-litter layer. Unlike "moderate" fire severity regimes, the landscape following "high" severity fire regimes are usually dominated by a lack of remnant survivor trees. Stand structure is devoid of an overstory, which results in the eventual development of an even-aged forest stand. These fires are generally associated with drought years and east wind weather events (which lower humidity). Fires are often of short duration, but of high intensity and severity.

Figure 11: Historic Fire Regime in Clallam County (data from LANDFIRE).

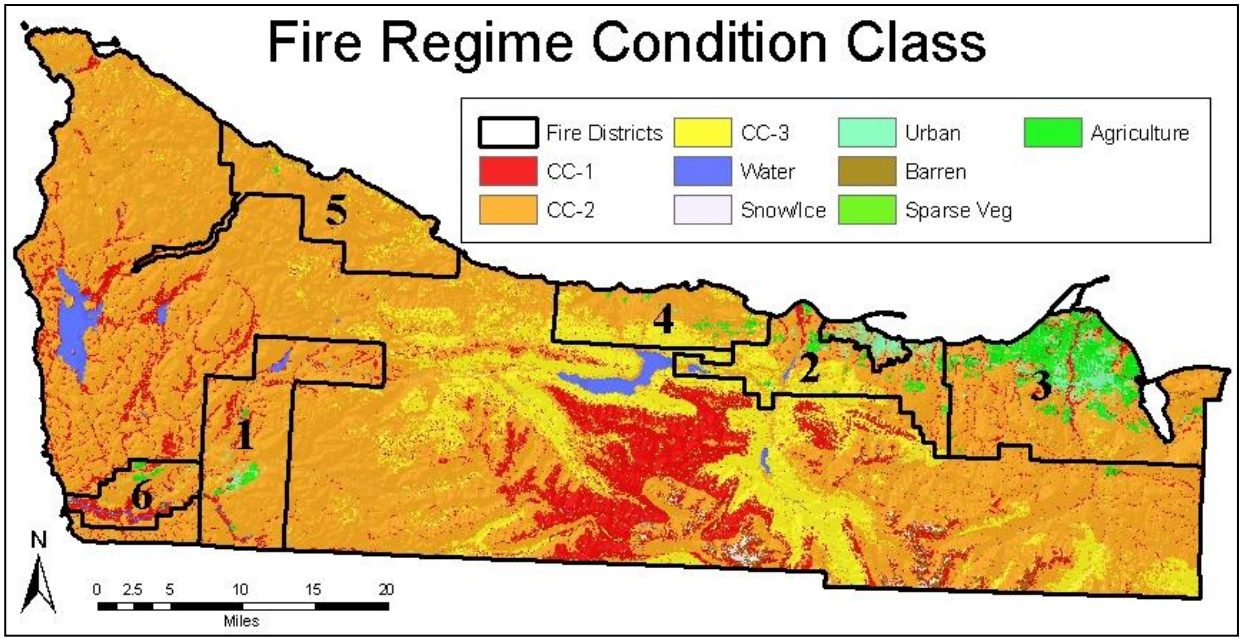


Fire Regime Condition Class

A fire regime condition class (FRCC) is a classification of the degree of departure from the natural regime. The condition class scale was developed to generally describe how the current severity, intensity, and frequency of fires have affected key vegetative components of the ecosystem, as compared to historic or reference conditions. The majority of Clallam County is within the Fire Regime Condition Class 2 (Figure 13). The three condition classes are described as follows:

Condition Class 1: Fire frequencies are within or near the historical range, and have departed from historical frequencies by no more than one return interval; vegetation attributes are intact and functioning within the historic range. The risk of losing key ecosystem components is low.
Condition Class 2: Fire frequencies and vegetation attributes have been moderately altered from the historical range and fire frequencies have departed from historical frequencies by more than one return interval. The risk of losing key ecosystem components is moderate.
Condition Class 3: Fire frequencies and vegetation attributes have been significantly altered from the historical range and fire frequencies have departed from historical frequencies by multiple return intervals. The risk of losing key ecosystem components is high.

Figure 12: Fire Regime Condition Class in Clallam County (data from LANDFIRE).



Wildland-Urban Interface

The term Wildland-Urban Interface (WUI) is defined simply as an area where humans and human development meet or intermix with Wildland fuels. In an effort to further refine this definition, HFRA has identified two levels of the WUI designation: Interface and Intermix communities. The federal definition of an **interface community** is an area where development densities are at least three residential, business, or public building structures per acre. For less developed areas, the **intermix community** has development densities of at least one residential structure per 40 acres. By definition,

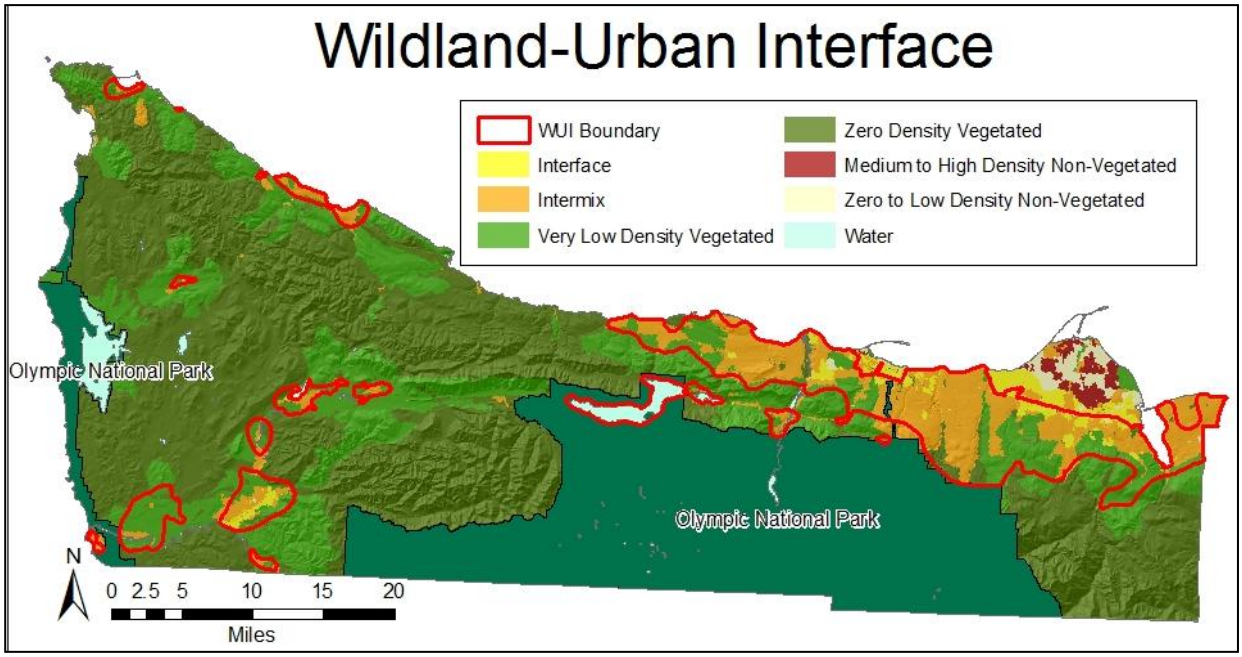
many of the communities in the study area do not meet the density requirement of an interface community, but rather of an intermix community. However, we refer to all "At-Risk" communities in this study as interface communities because fire managers already treat them as such.

This CWPP used Geographic Information System (GIS—a computer-based mapping and spatial analysis interface) analysis to determine the WUI in the County and to model and analyze the hazards and risks related to it as well. A GIS layer using the federal definition of interface and intermix densities, combined with 2000 Census and USGS Landcover datasets, was available from the University of Wisconsin (http://silvis.forest.wisc.edu/Library/WUIDefinitions2.asp). While this layer is useful for illustrating general interface and intermix densities, the Census data is not sufficiently current to determine a WUI boundary suitable for planning purposes. In order to get finer resolution of potential fire behavior, the Scott and Burgan 40 Fire Behavior Fuel Models dataset from the LANDFIRE Project were combined with recent parcel data available from Clallam County's Assessor's Office for structure density data. The fuel model dataset was reclassified to represent a consistent value for fuels, and non-burnable areas (ice, water, etc.) were eliminated from further classification. This map layer was further refined by removing fuel areas of less than five square kilometers in a subsequent step, which reduced the potential for urban parks and other green areas within developed areas to be classified as part of the WUI.

Structures of interest are confined to residential buildings (occupied or vacant), which helps fire managers focus their efforts on saving lives and property. To determine the residential structure density, parcel data was reduced from polygons to points, with each point's value being the number of residences or residential structures on its parcel. As previously stated, the WUI communities of the study area do not meet the general standards of an interface community due to the rural and largely near-coastal distribution of people throughout the Peninsula. Thus, density was determined for the whole study area and the map layer was reclassified to meet the regional WUI definition of ≥1 house/40 acres. This boundary was given a buffer of 1.5 miles, or the typical distance a firebrand can travel and potentially ignite a structure.

The mapped area representing residential density was intersected with the vegetative fuels map, which when combined provide an approximation of the wildland-urban interface for Clallam County. Due to the sporadic distribution pattern of fuels in developed areas, the initial boundary was very rough, and in some cases, there were areas within the WUI that did not meet the criteria. These areas included small- or medium-sized water bodies or bare dirt fields. To create more useful maps, these "islands" were removed and the boundaries smoothed. The WUI was further expanded to include additional areas recommended by DNR, fire agency personnel, and during the public comment period. The final WUI boundary is shown in Figure 14 (which also displays the interface and intermix community designations derived from the University of Wisconsin data set). The estimated area of the current WUI is approximately 148,000 acres.

Figure 13: The Wildland-Urban Interface for Clallam County, with Interface and Intermix areas derived from University of Wisconsin 2000 data providing a comparative background.

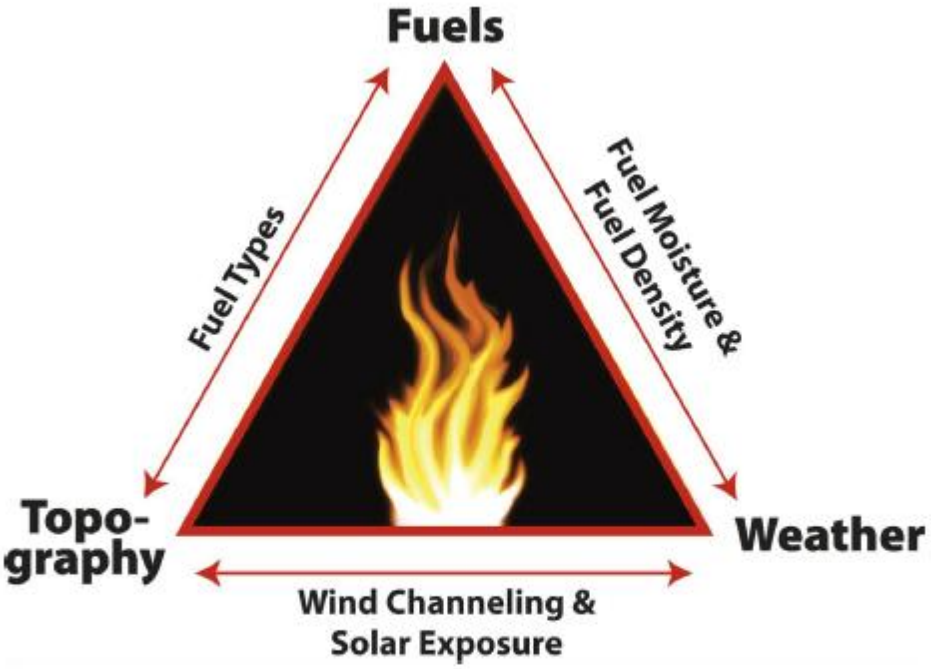


Wildfire Conditions

Wildfire behavior is driven by the interaction of a few factors: weather, vegetation type, or "fuels", and topography. The wildfire triangle (Figure 15) is a simple graphic used in wildland firefighter training courses to illustrate how the environment affects fire behavior. Each point of the triangle represents one of the three main factors that drive wildfire behavior. The sides represent the interplay between the factors that are seen on the ground as they affect wildfire behavior. The potential for these fires to become severe depends on these factors. For example, drier and warmer weather combined with dense fuel loads and steeper slopes will cause more hazardous fire behavior than light fuels on flat ground.

Large fires in western Washington typically occur on steep south-facing slopes, and often result from a combination of circumstances including a source of ignition in areas of dry, heavy fuels, an extended period of drought, and dry east winds. Forest fires here usually occur during the dry summer months of July, August, and early September, but they can occur anytime between April and October given the right conditions. Fire hazard increases in the late summer and early fall when hot, dry east winds (subsidence winds) occur more frequently and the area has experienced the low point of the annual precipitation cycle. While Clallam County rarely has low enough fuel moisture for major fires, small fires occur frequently. Fortunately, under average summer conditions, most fires go out on their own at less than one-quarter acre due to high fuel moisture and topographic barriers. The portion of the Peninsula with the highest potential for major fires is the area between Port Angeles and Hood Canal, though as residents of Forks can attest, large fires can occur anywhere on the Peninsula.

Figure 14: The Wildfire Behavior Triangle shows the relationships between the primary factors that affect fire behavior (image by Ron Kaufman).



Types of Wildfires

Ground fires burn in natural litter, duff, roots, and sometimes high organic soils. Once started, they are very difficult to detect and control. They also have a tendency to rekindle.

Surface fires burn in grasses and low shrubs (up to 4' tall) or in the lower branches of trees. They may move rapidly and ease of control depends upon the fuel involved.

Crown fires burn in the tops of trees. Once started, they are very difficult to control since wind plays an important role in crown fires.

Spotting fires can be produced by crown fires as well as wind and topography conditions. Large burning embers are thrown ahead of the main fire. Once spotting begins, the fire is very difficult to control.

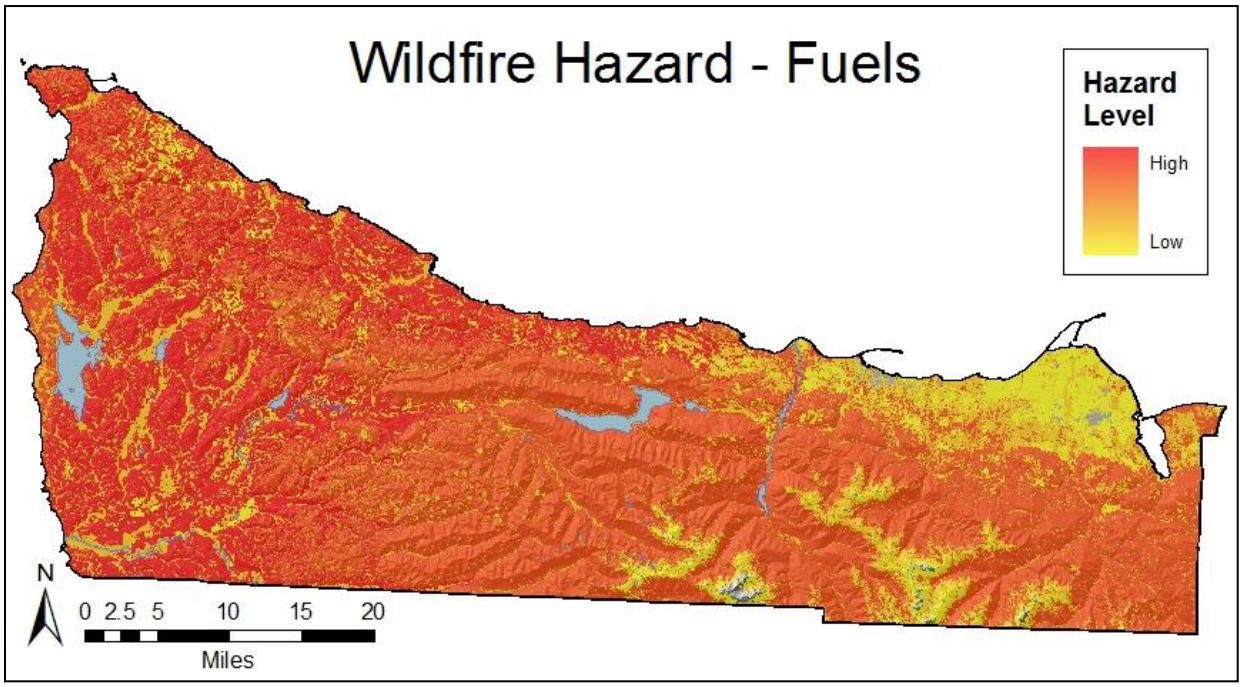
Hazard Assessment

Six individual factors—fuels, slope, aspect, climate, response time, and viewshed—were used to develop hazard maps for Clallam County. Each factor was scaled to provide a relative ranking of low to high hazard, and was also assigned a numeric weight based on its potential contribution to fire behavior. The spatial factors were then combined to create a spatial hazard rating map. This mapping layer was further combined with climate data to produce a single map of relative wildfire hazard analysis across the County for the month of August, at the height of the fire season (see Figure 22). An overview of the assessment factors and their relative ratings are listed in Table 5. Because of this analysis used relative weighting to define hazard, the ratings derived from this study cannot be compared with hazard levels in other geographic areas outside of the study area.

Table 5: Hazard Assessment Rating Table; the Points were used to help weight each map layer by potential contribution to wildfire behavior, which when summed determines the relative wildfire hazard levels for Clallam County.

Category	Item	Points	Point Category	Hazard Rating	Overall Rating Percent
Spatial	Fuels	5 10 20 25	Light/Agriculture Medium Heavy Slash/Heavy	Low Moderate High Extreme	30%
	Slope	1 4 7 8 10	<10% 10-20% 21-30% 31-40% >40%	Minimal Low Moderate High Extreme	12%
	Aspect	0 2 3 5	N E W S	Low Moderate High Extreme	6%
Human	Response Network	0 1 2 3 4	<6 minutes 6-10 minutes 11-15 minutes 15-60 minutes >60 minutes	Minimal Low Moderate High Extreme	6%
	Viewshed	0 4	Can be seen from major road Not in easy view	Visible Not Visible	4%
Climate	Weather	1 | 35	Average Monthly Precipitation (70%) Average Monthly Temperature (30%)	Low Extreme	42%
	Maximum Possible:	84			100%

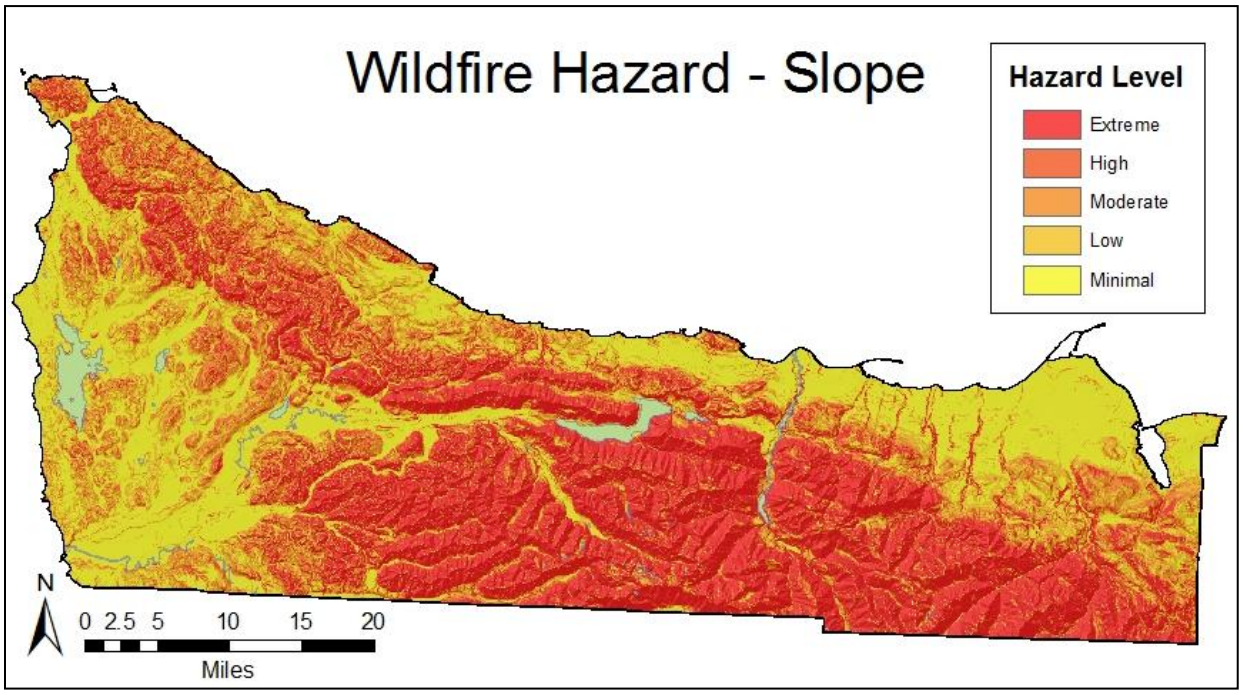
Figure 15: Relative Hazard Levels for the *Vegetative Fuels* Factor.



Fuels

Fuels for the study area are modeled using data available from LANDFIRE. The models are based on the 13 Anderson Fuel Models created by the US Forest Service, and link vegetative type (such as a woodlot) to a set of average fuel loadings (such as "Timber (litter and understory)") that can help predict wildfire behavior. LANDFIRE provides the raster data set on a 30 m grid with each pixel assigned a value corresponding to the Anderson Fuel Model code. The hazard levels for the fuels are based on the NFPA's 2002 *Standard for Protection of Life and Property from Wildfire* (NFPA 1144, 2002 edition). It accounts for 30% of the overall hazard rating (Figure 15).

Figure 16: Relative Hazard Levels for the *Slope* Factor.

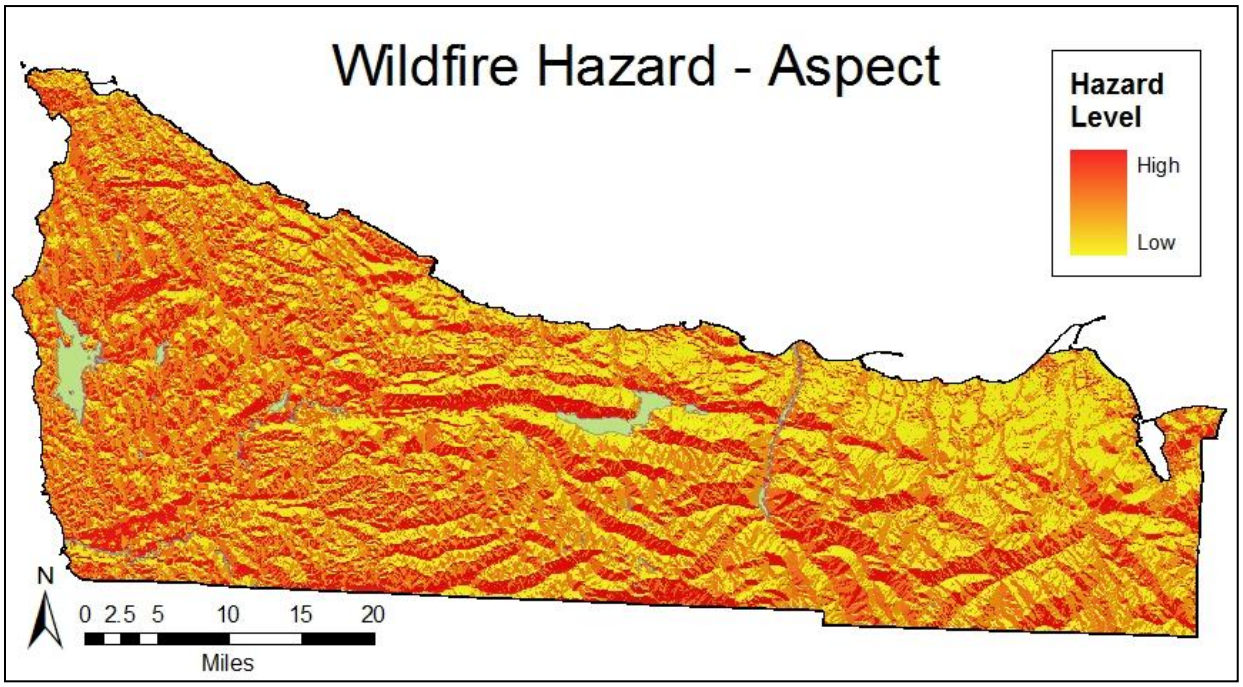


Slope

The geologic history of the Peninsula created a varied and elaborate set of valleys and drainages running from the Olympic Mountains to the surrounding ocean. Intense precipitation in the area cuts down through the predominantly sedimentary rocks, carving both steep canyons and wide drainages. Steep slopes increase a fire's rate of spread uphill and can create topographic influences on wind.

The percent slope is derived from a 30 m digital elevation model (DEM) supplied by the Washington Department of National Resources (DNR). The slope hazard rating is also based on NFPA 1144 (2002 edition) and is a large contributor (12%) to the hazard rating because of its influence on fire spread and the increased difficulty of fighting wildfire as slope steepens (Figure 16).

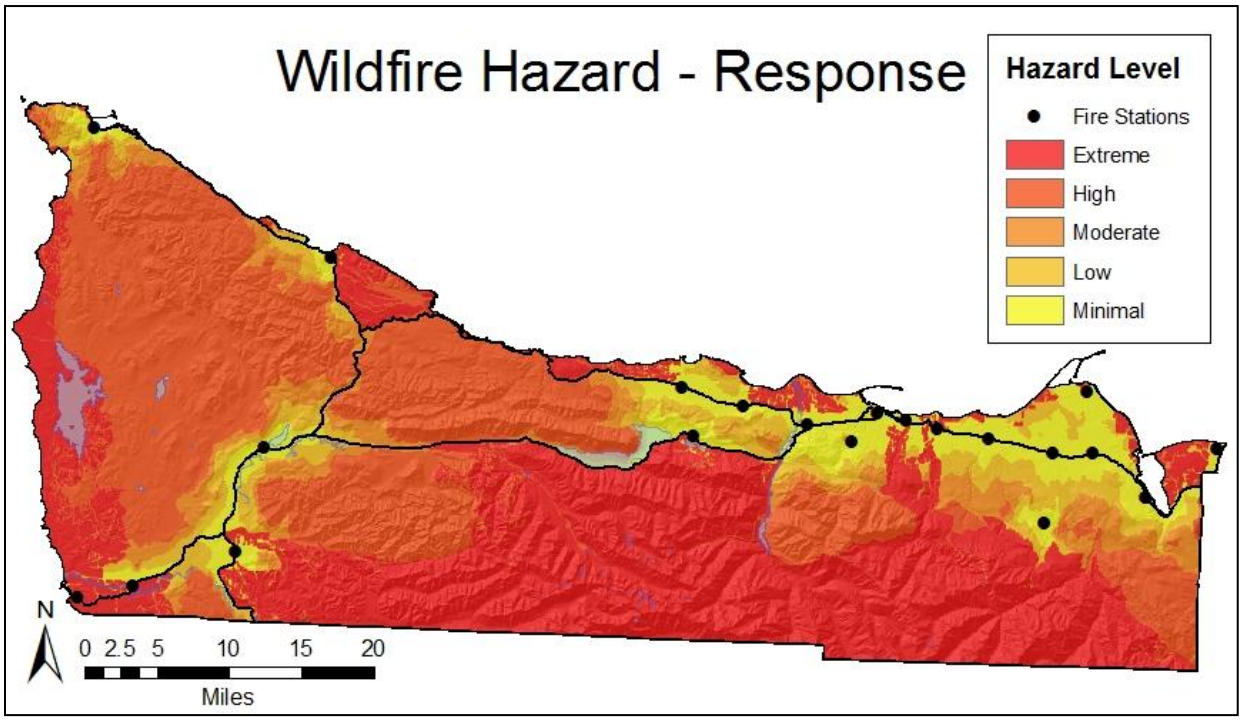
Figure 17: Relative Hazard Levels for the *Aspect* Factor.



Aspect

The north Olympic Peninsula has many cloudy days, but solar insolation still has a large effect on fuels, especially during fire season. South-facing slopes receive much more solar radiation than slopes with a north aspect, due to the Peninsula's mid latitude location near the 48th parallel. South slopes thus typically have drier fuels and soils, which affects fuel types and densities that can be grown on the slopes, as well as potential fuel moisture levels. While important, aspect is not a major driver of fire behavior and thus accounts for 6% of the hazard ratings (Figure 17).

Figure 18: Relative Hazard Levels for the *Response Time* Factor.

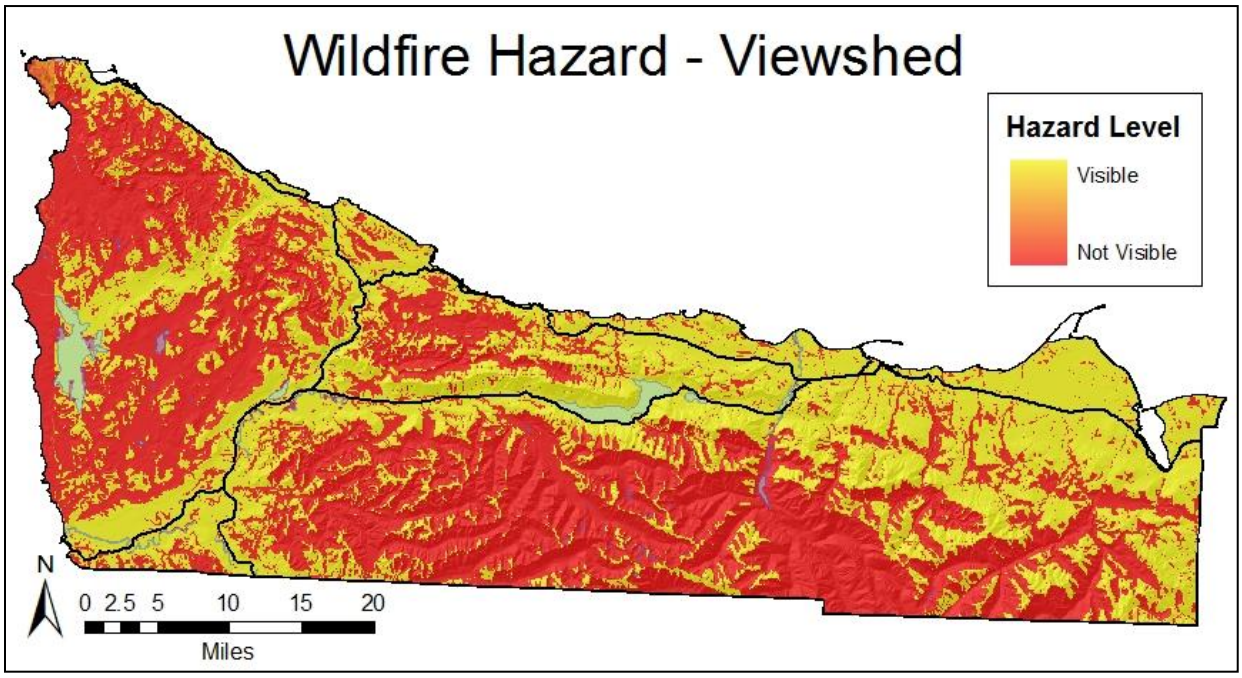


Fire Response Time Network

Due to the rural nature of the region, response times for wildfire crews can be a critical factor in early suppression of wildfires that threaten development. There are few fire stations, and even fewer of them are staffed with full-time fire crews. The roadless areas of the Peninsula (including Wilderness Areas managed by NPS and USFS) also pose a challenge for transportation of fire suppression resources. Fire stations considered within the assessment include stations operated by the cities of Forks and Port Angeles, Clallam County Fire Districts, the Makah Reservation, Olympic National Forest, Olympic National Park, and Washington DNR. The time of each response area was calculated using the speed limit on each road segment, starting from each station. Emergency vehicles can travel at five miles per hour over the speed limit, but will slow down for traffic, for navigating traffic controls, and at dangerous intersections. Thus, the speed limit was considered a reasonable basis for evaluating travel times.

Response times for each station were calculated using ESRI StreetMap data. A 500-foot buffer was included around all roads extending outside each time period's service area as well as interpolating between roads within the service area to give them the same response time. In addition to the response time, response area is also considered. This includes the average distance an engine can provide service from a location while parked on along a road (about 500 feet). The 500-foot buffer was used because a Mark III pump can pump water 500 feet on a 30% slope. Response network accounts for 6% of the hazard rating (Figure 18).

Figure 19: Relative Hazard Levels for the *Viewshed* Factor.

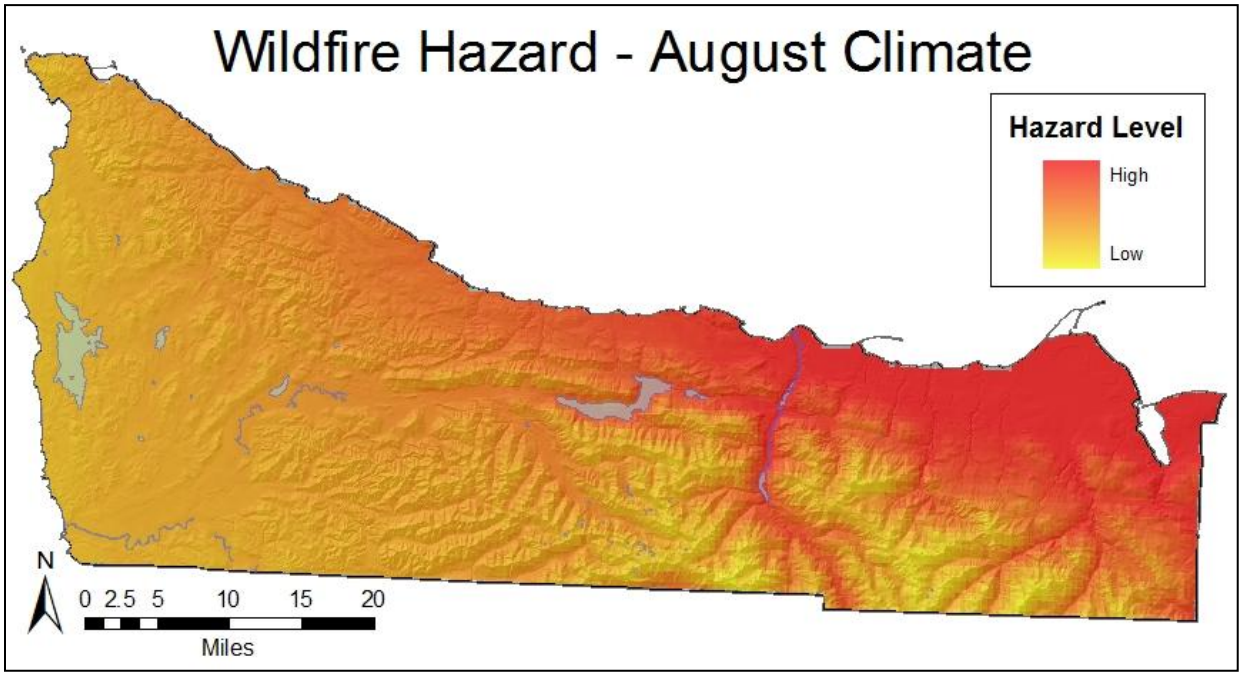


Viewshed

The transportation network across the Peninsula can be valuable for early fire detection. A viewshed of areas visible from major roads provides an assessment of areas of the Peninsula that—because fires or smoke plumes might be more quickly seen from areas more frequently traveled—could be detected more quickly after ignition. Faster detection can lead to better chances of earlier suppression by fire crews. This analysis was based on DNR's 90 m DEM (current computing capability is insufficient to run this analysis with the 30 m DEM). Because other factors are more important to overall hazard, this factor provides 4% of the overall hazard rating.

The two roads factors (Viewshed and Response Time) can have little to do with overall wildfire hazard when compared to the spatial and climatic variables, thus they are given low weight in the overall hazard analysis. However, quick detection and response can help avert a large disaster like the Great Forks Fire, or show fire managers where increased hazard mitigation may be necessary (Figure 19).

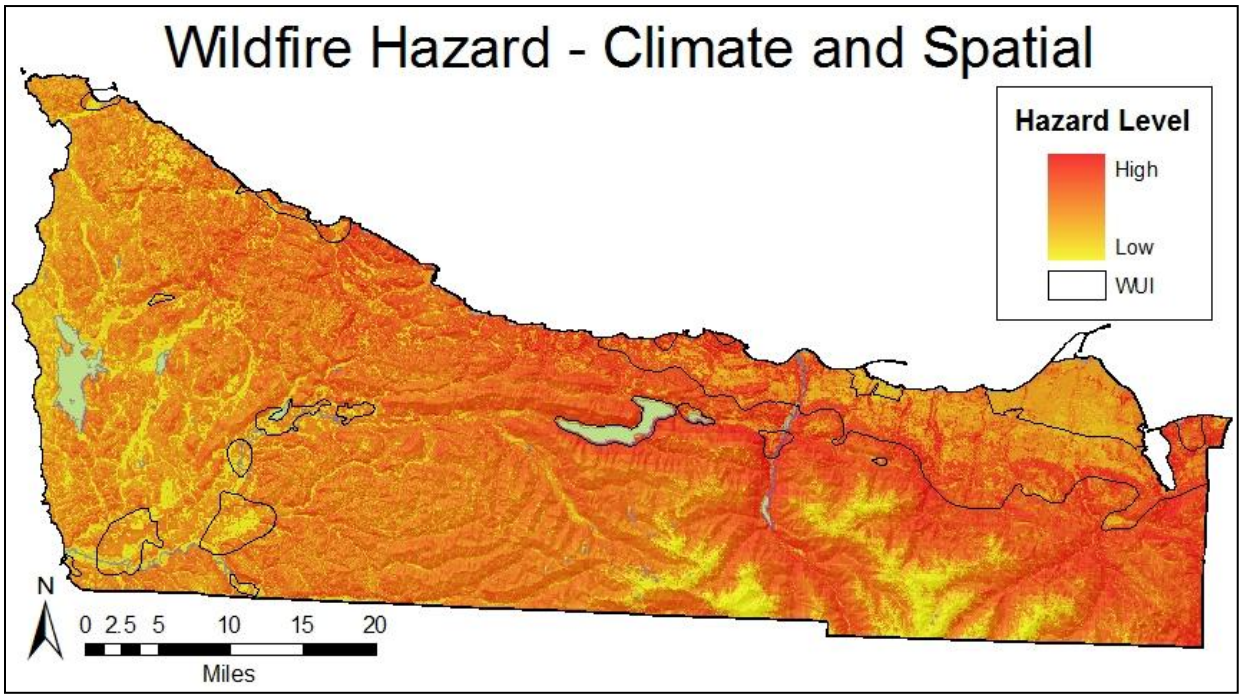
Figure 20: Relative Hazard Levels for the *Climate* Factor, based on August data as representative of the height of the fire season.



Climate

Vegetative fuel moisture/temperature, air temperature, and relative humidity are the most important drivers of wildfire behavior. Unfortunately, there are no existing geographic data sets for the Peninsula that provide an overall picture of these variables. To serve as a surrogate for these variables, a grid was produced from long-term climate data for the month of the August, at the height of fire season. Climate data was obtained from WORLDCLIM, a geographic climate dataset based on comparisons of regional weather stations and remotely sensed weather data. Average maximum temperature and average precipitation measurements are used to represent climate hazard. These are the two factors that heavily influence fuel moisture content, and increased hazards are associated with higher temperatures and lower levels of precipitation. To simplify analysis, the two datasets were combined into a single map, weighting precipitation at 70% and maximum temperature at 30%. The weighting is justified by 1) the very important influence of fuel moisture on fire behavior, and 2) the variable precipitation patterns during any given month. The data was ramped into 35 different classes to provide a relative hazard from location to location. The point categories for hazard are based on the judgment that precipitation will be more influential on fire behavior. Regionally, temperature is relatively constant during the dry season and is given less weight in each climate model. There are no WUI studies that use WORLDCLIM dataset, so the temperature/precipitation ratio was derived according to local conditions and data quality. The climate factor provides 42% of the weight toward the overall hazard rating (Figure 20).

Figure 21: Relative Overall Wildfire Hazard Levels for Clallam County during August.



Combined Climate and Spatial Hazard

To create the final hazard rating map, the spatial factor conditions map layers are added to the climate conditions map layer using the relative weights from Table 5 (Figure 21).

Modeling Fire Behavior

Modeling potential fire behavior can give fire managers an idea of what behavior might be expected by using specific weather inputs mapped across the spatial hazard map. Models are useful during wildfire suppression and can also be used for planning and mitigation activities so managers will know what areas can have increased danger should a wildfire occur. Another advantage of modeling is that managers can manipulate variable inputs—including fuel moisture and weather—to see how the static variables and varying conditions could affect fire behavior.

"Watch-Out" Weather Conditions

The climatic and fuel differences across the Peninsula vary greatly from place to place, which affects how fire would behave if a wildfire starts. For the Olympic Peninsula, any combination of two of the following "watch-out" weather parameters can create more intense and potentially destructive fire behavior, known as extreme fire behavior (Figure 22):

Figure 22: "Watch-out" Weather Parameters

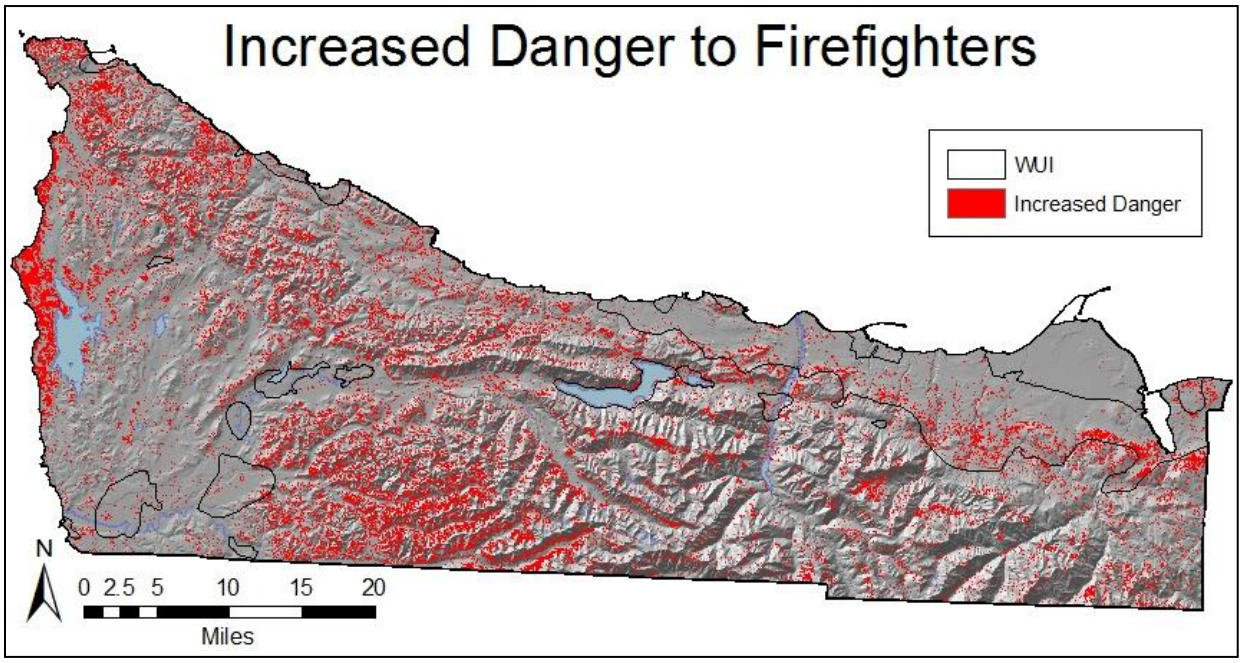
- **20-foot wind speeds >7 mph**
- **Sustained winds from the east** (more common in late August to early October)
- **Relative humidity < 40%**
- **Temperature > 72 °F**
- **1,000 hour fuel moisture < 17%**
- **14 days without rain**

Components of extreme fire behavior include more intense heat and preheating of surrounding fuels, stronger flame runs, potential tree crowning, increased likelihood of significant spot fires, and fire-induced weather (e.g., strong winds, lightning cells). Extreme fire behavior is significantly more difficult to combat and suppress, and would drastically increase the threat to the existence of homes and communities throughout the wildland-urban interface.

Areas of Increased Danger to Firefighters

BehavePlus (a wildfire modeling software program) can produce outputs showing expected fire behavior. Fire behavior that entails flame lengths greater than four feet or fireline intensities of greater than 100 BTUs/foot/second generally *cannot be attacked directly by wildland firefighters on the ground*. This significantly increases both the difficulty of suppression by firefighters as well as the potential for extreme fire behavior. For this example (Figure 23), the software was given inputs based on the "watch-out" weather conditions for weather and fuel moisture (which can occur anytime during fire season), the range of slope and aspect classes across the study area, and the Scott and Burgan 40 Fire Behavior Fuel Models that occur on the Peninsula. The output map shows the areas that are expected to have an increased danger to firefighters due to dangerous flame lengths or fireline intensities. Maps like this can be extremely helpful to fire departments and wildfire crews in planning for prevention as well as for suppression.

Figure 23: Areas in Clallam County where extreme fire conditions are most likely to occur.



V. WUI "At-Risk" Communities

Determining or Designating a Community as "At-Risk"

As outlined in Title 1 of the Healthy Forest Restoration Act, communities may identify themselves as being "at-risk" based on either an analysis following the *National Association of State Foresters Field Guidance on Identifying and Prioritizing Communities-at-Risk* (June 27, 2003), if it lies within the WUI as defined in the federal register (*FR Vol. 66, No. 3, Pages 751-754, January 4, 2001*), or **by stating this during development of their Community Wildfire Protection Plans**. It should not be assumed that a community will receive treatments just because it is identified as being in the WUI and "at-risk." Nor should it be assumed that wildfire hazard mitigation activities are unnecessary for areas outside of the WUI. Such designation identifies these areas as the **locations where wildfire hazard mitigation activities will have the greatest success at protecting the largest number of homes and private property**.

This plan endorses the Firewise Communities/USA recommendation of a planning scale of approximately that of a homeowners association. The size of a Firewise Communities/USA site is not governed by an arbitrary, fixed rule but rather by the limit of its effectiveness. Firewise has found that communities beyond the traditional neighborhood size generally have difficulty meeting the effectiveness and individual engagement criteria required for a long-term commitment to wildfire mitigation.

Criteria for Prioritizing Mitigation Activities

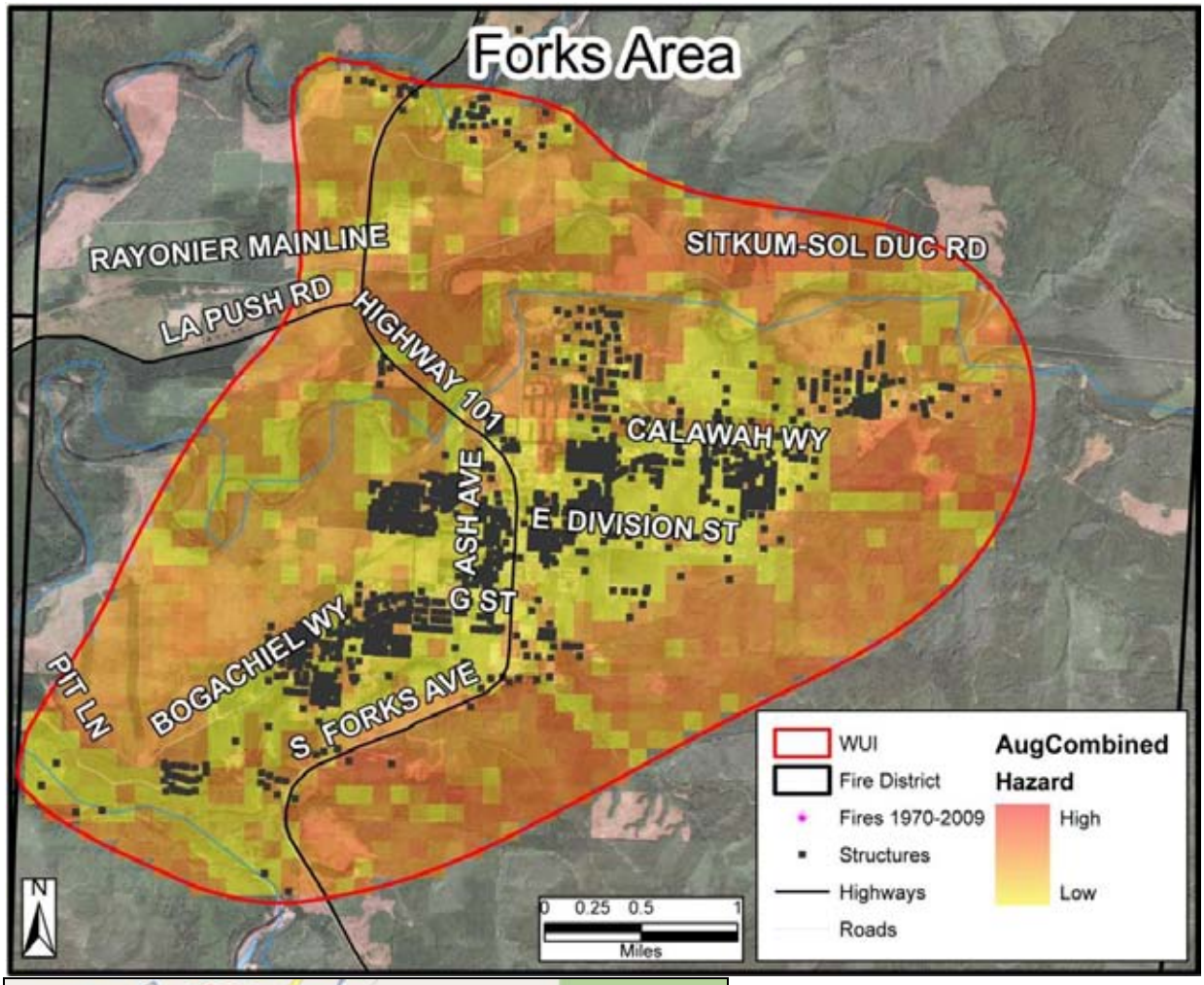
The wildfire hazard maps (Figures 15-21) can be used with the regionally adapted version of the National Fire Protection Association (NFPA) 1144 assessment forms to help determine the hazard severity level of each home or neighborhood (Appendix D-F). The Prioritization Forms (Appendix G) can be used with the mitigation strategies in Chapter VI to develop and prioritize mitigation plans.

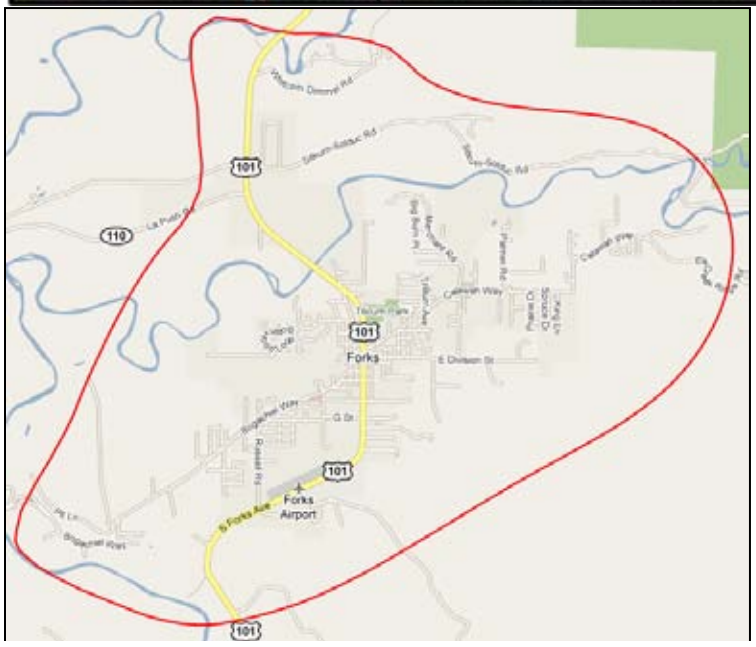
Identification of At-Risk Communities in Clallam County

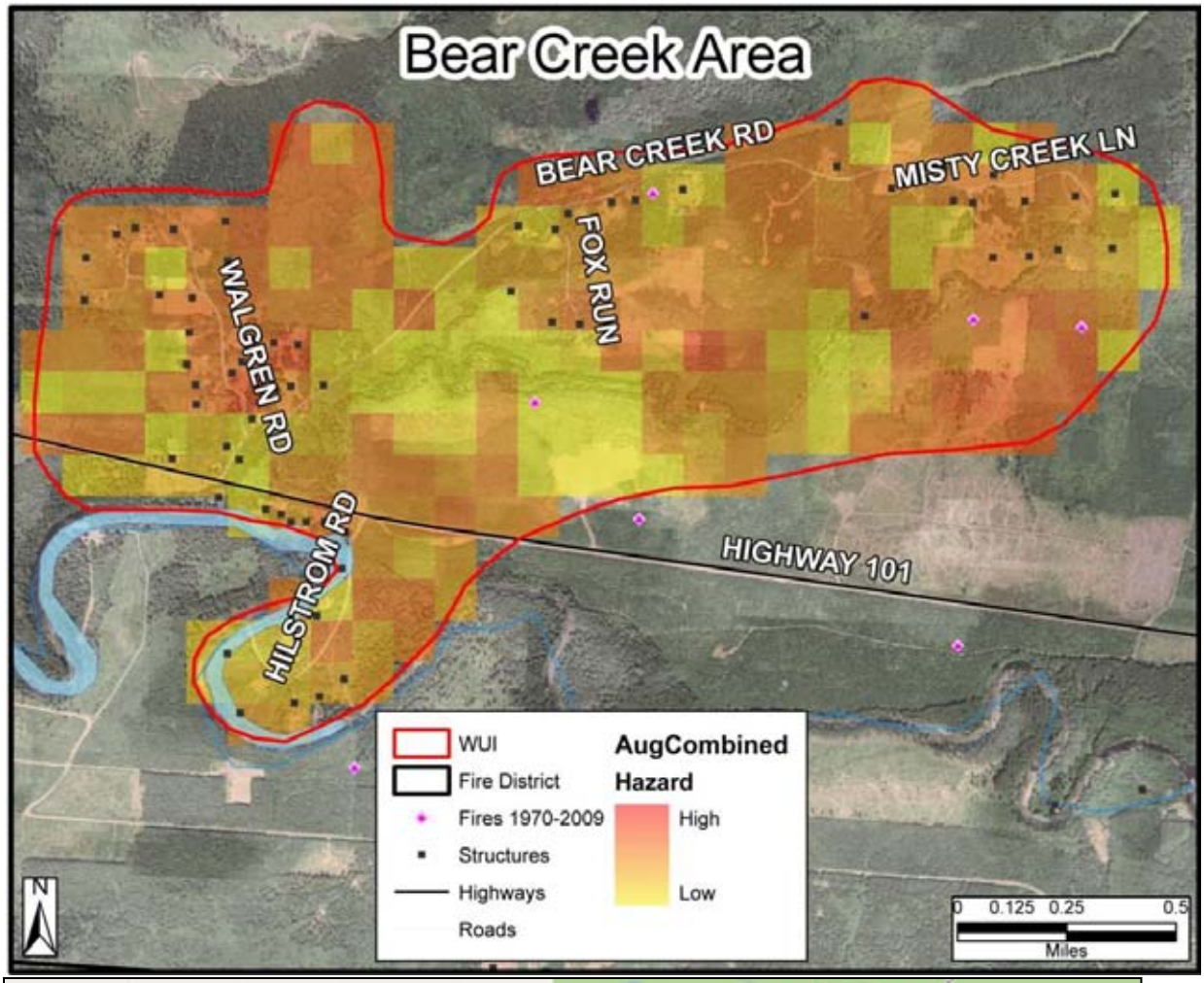
The following WUI areas, and the communities within them, have been identified as "at risk" priority areas for fuel reduction and hazard mitigation programs. They are organized by fire district for planning purposes. Port Angeles and Sequim were previously designated as Wildand-Urban Interface Communities in the Federal Register (*FR Vol. 66, No. 3, Pages 751-754, January 4, 2001*).

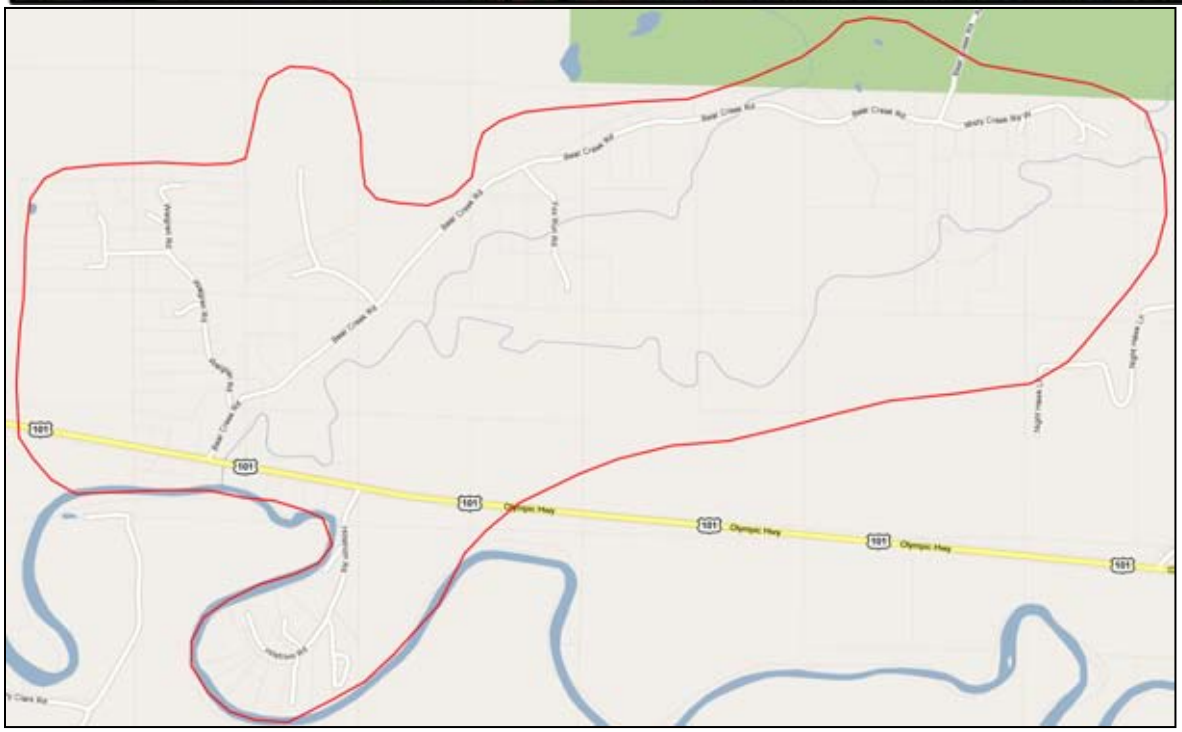
Fire District # 1 Forks Area Bear Creek Area Beaver Area Maxfield Rd. Area Bogachiel Area	**Fire District # 2** Port Angeles & Outlying Areas Indian Creek Area Lake Sutherland	**Fire District # 3** Sequim & Outlying Areas Miller Peninsula/Blyn/Diamond Point Area
Fire District # 4 Joyce Area	**Fire District # 5** Clallam Bay/Sekiu Area Hoko Rd.	**Fire District # 6** Quillayute Area
Unprotected Areas Lake Dawn Area Crescent Lake Area	**Tribal Areas** Neah Bay La Push	

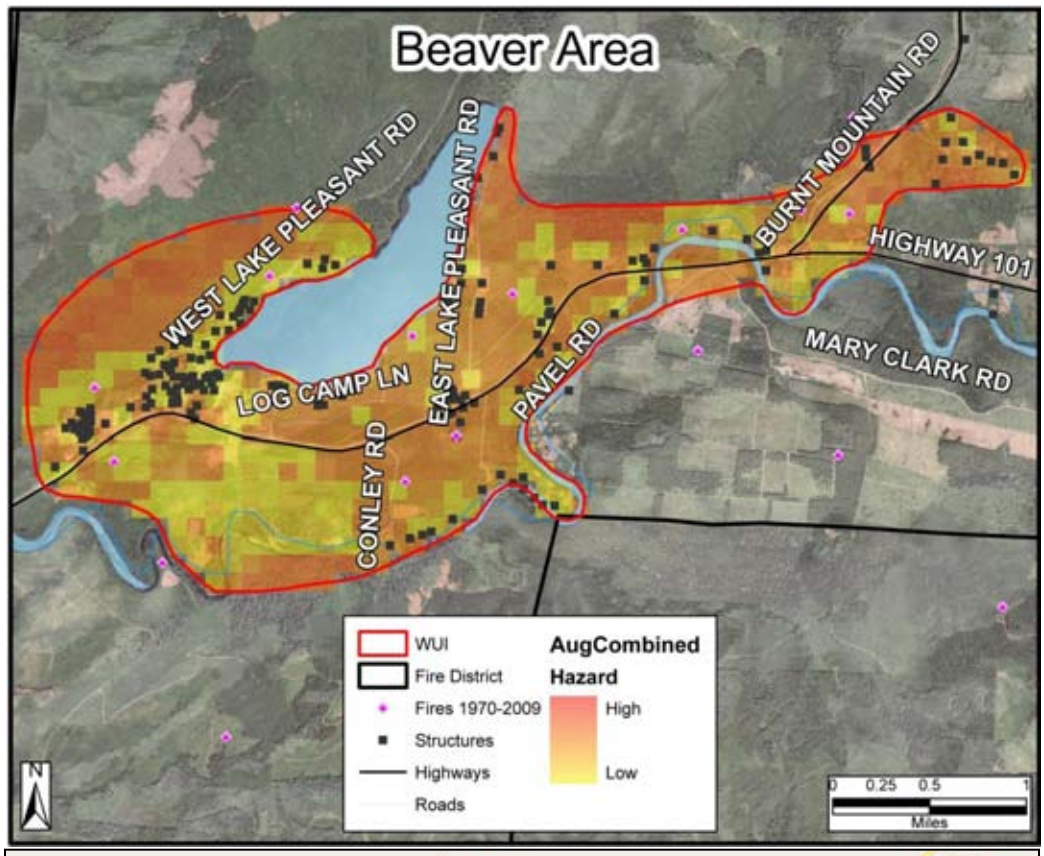
Fire District #1

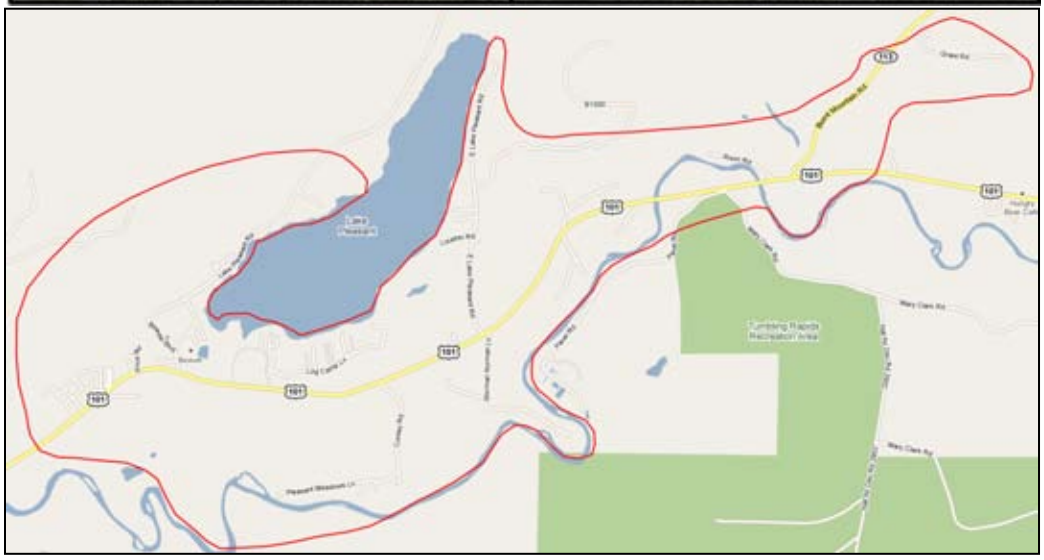


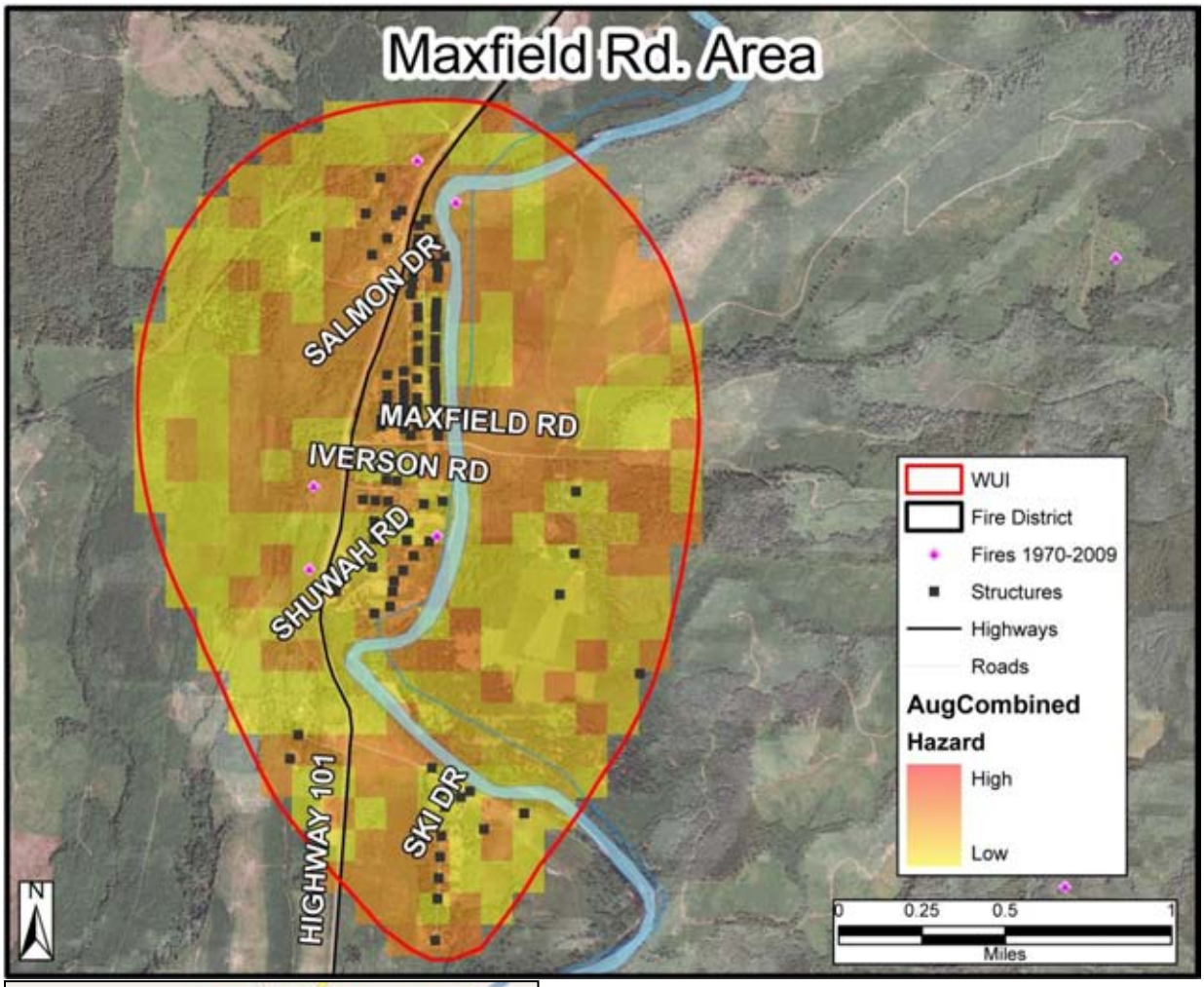


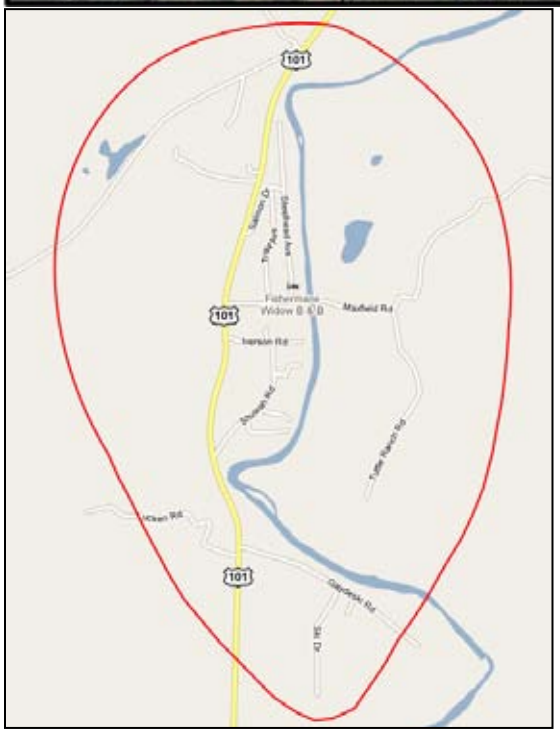

Bear Creek Area
BEAR CREEK RD
MISTY CREEK LN
FOX RUN
WALGREN RD
HILSTROM RD
HIGHWAY 101
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
N
0 0.125 0.25 0.5
Miles

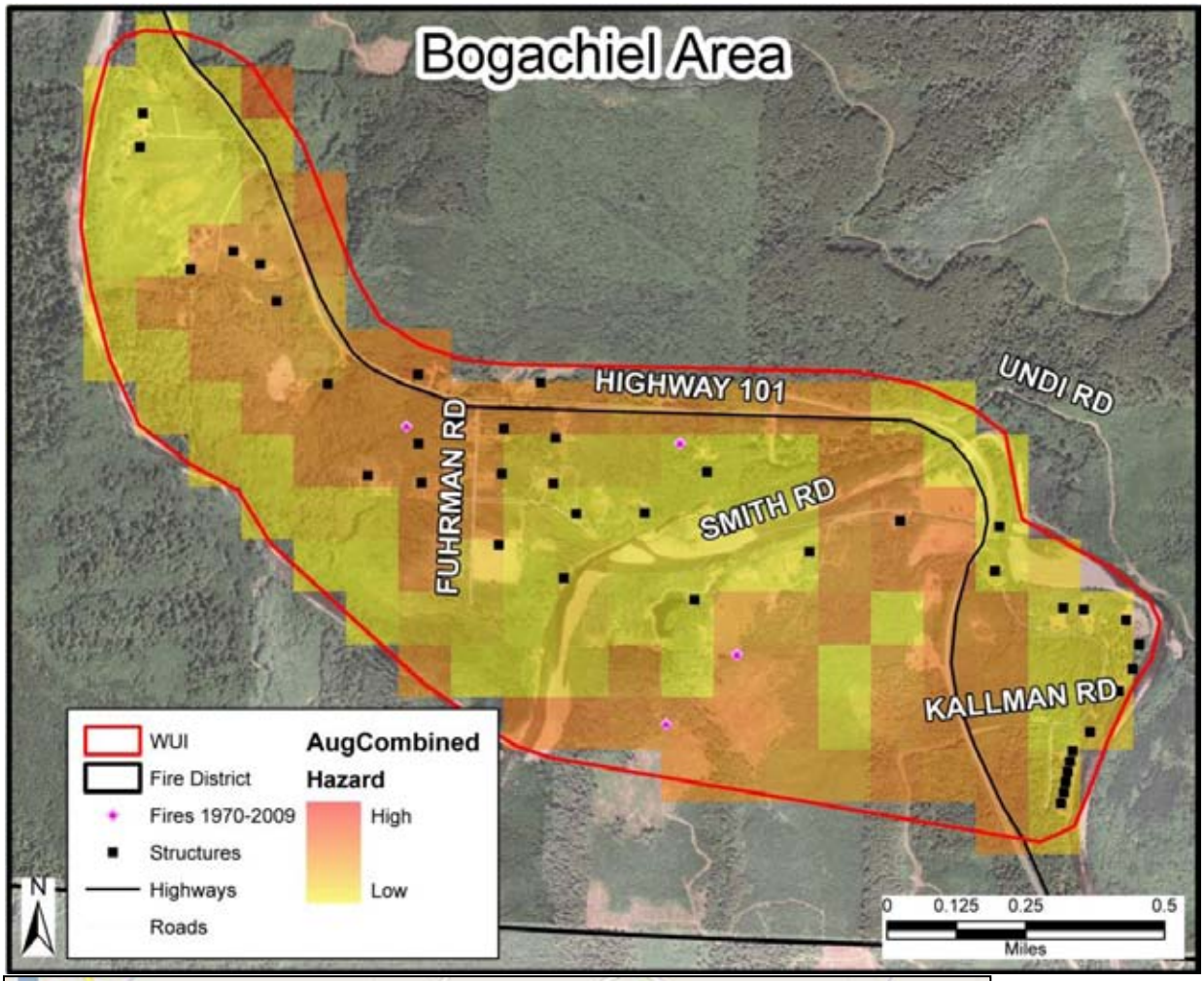


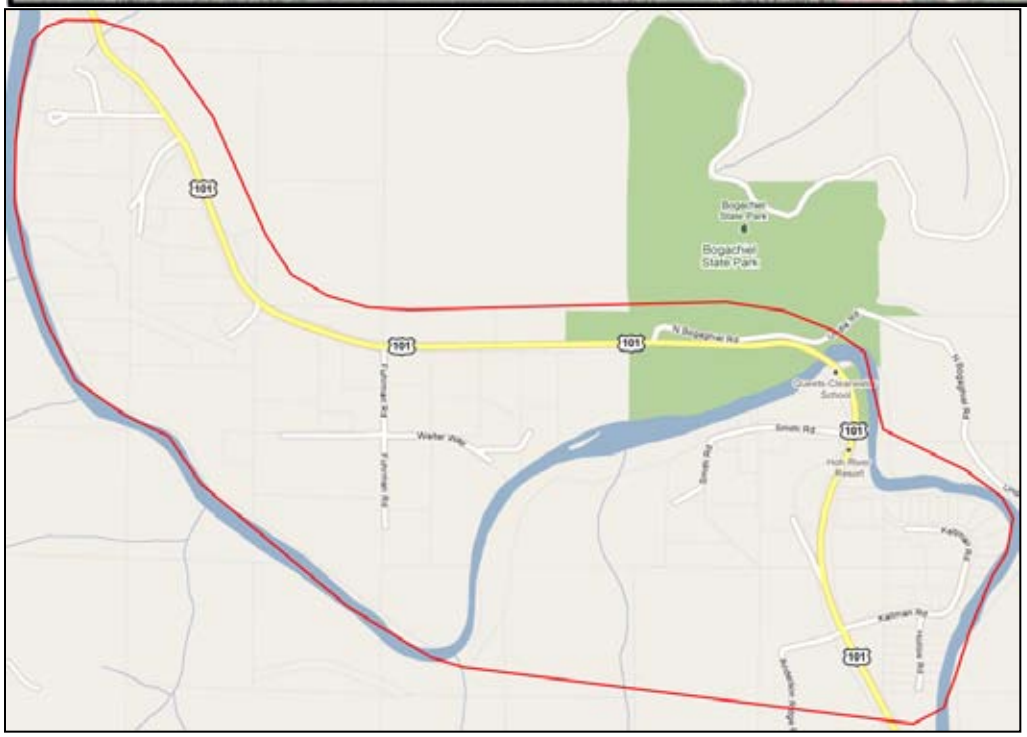

Beaver Area
WEST LAKE PLEASANT RD
EAST LAKE PLEASANT RD
BURNT MOUNTAIN RD
HIGHWAY 101
MARY CLARK RD
LOG CAMP LN
PAVEL RD
CONLEY RD
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
N
0 0.25 0.5 1
Miles



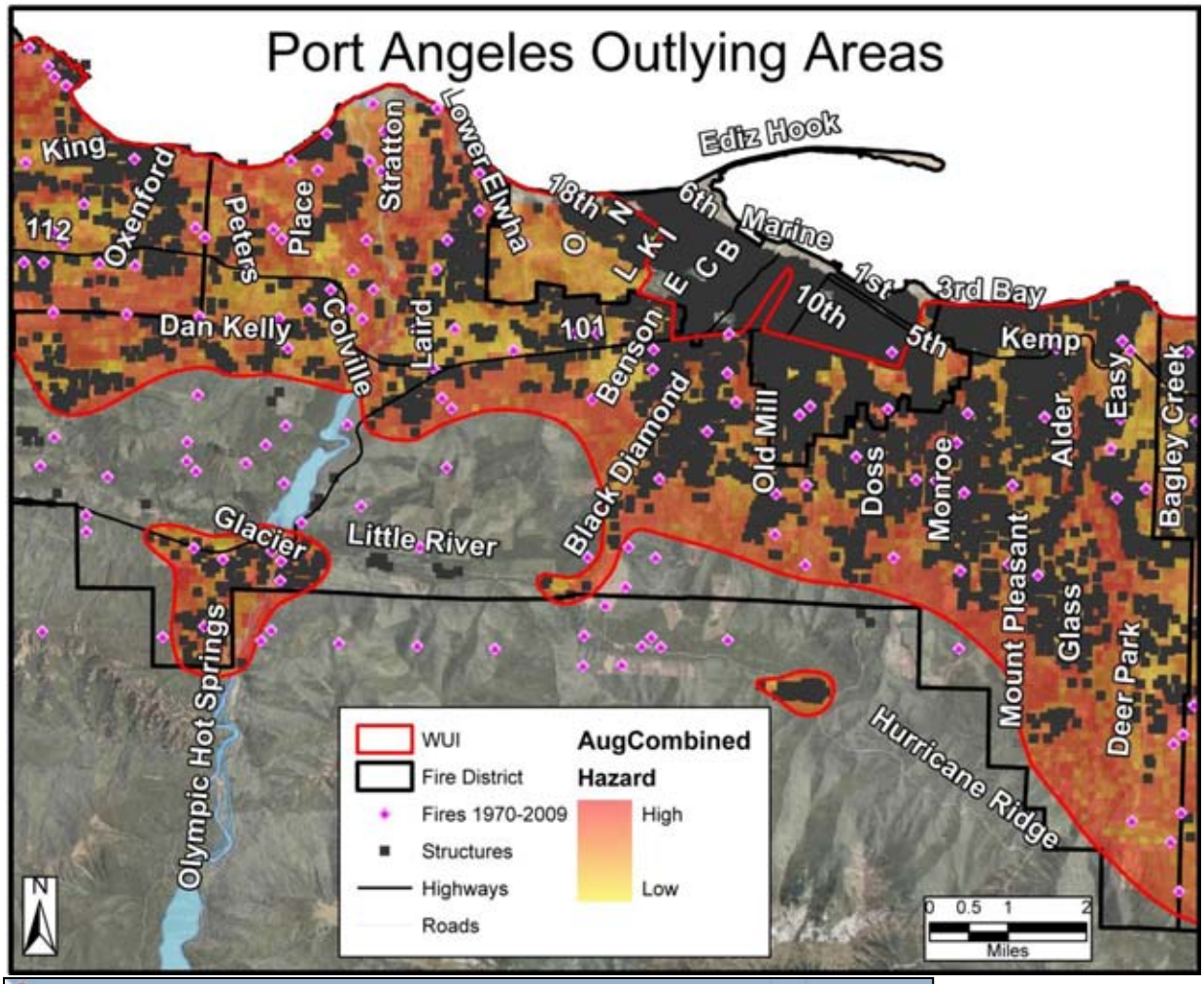

Maxfield Rd. Area
SALMON DR
MAXFIELD RD
IVERSON RD
SHUWAH RD
HIGHWAY 101
SKI DR
N
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
0
0.25
0.5
1
Miles

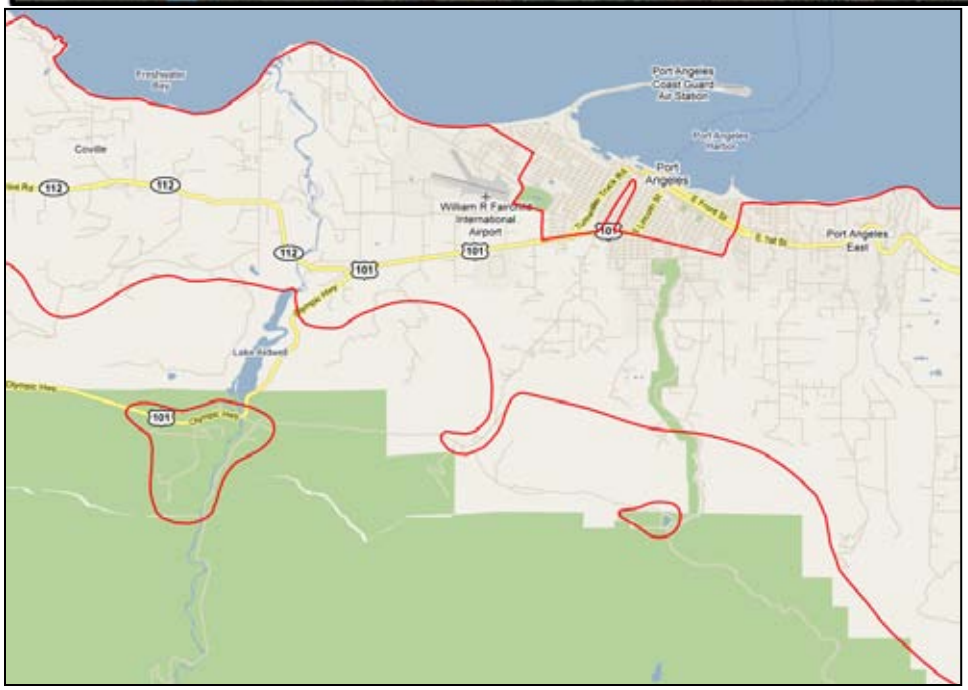

101
101
101

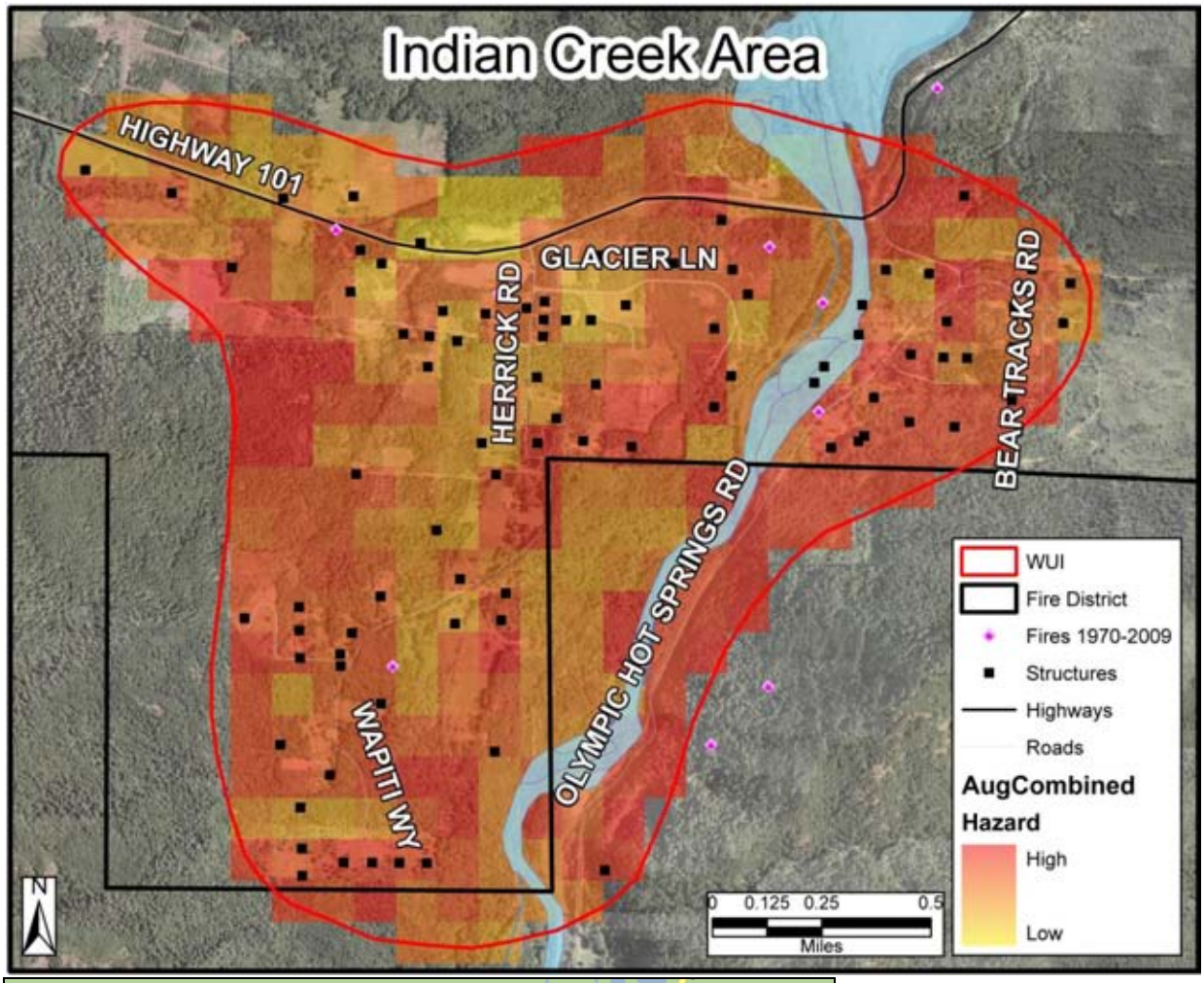

Bogachiel Area
HIGHWAY 101
UNDI RD
FUHRMAN RD
SMITH RD
KALLMAN RD
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
N
0 0.125 0.25 0.5
Miles

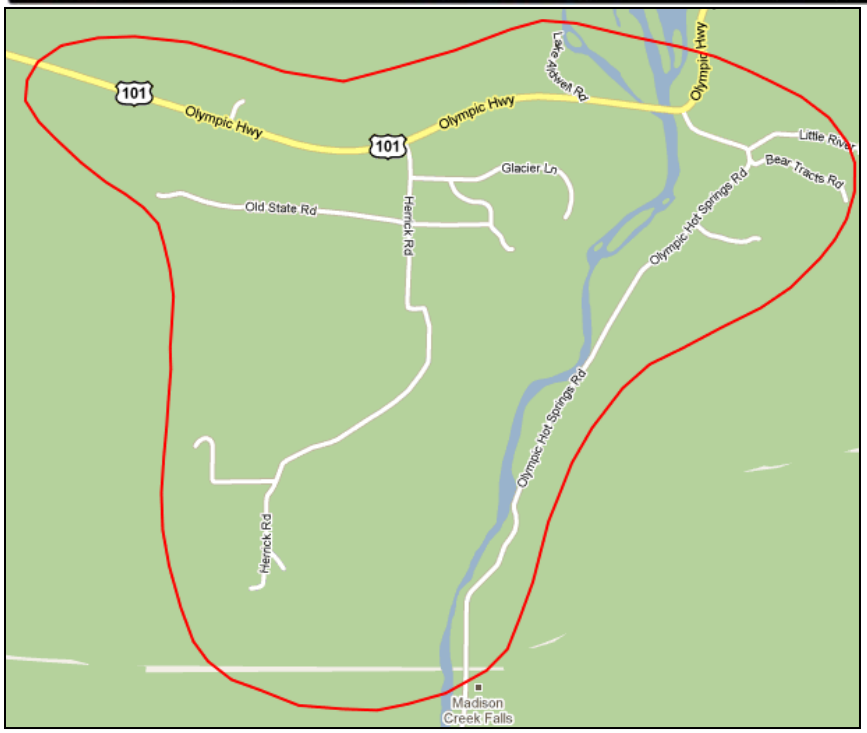

101
Bogachiel State Park
N Bogachiel Rd
Smith Rd
Kallman Rd

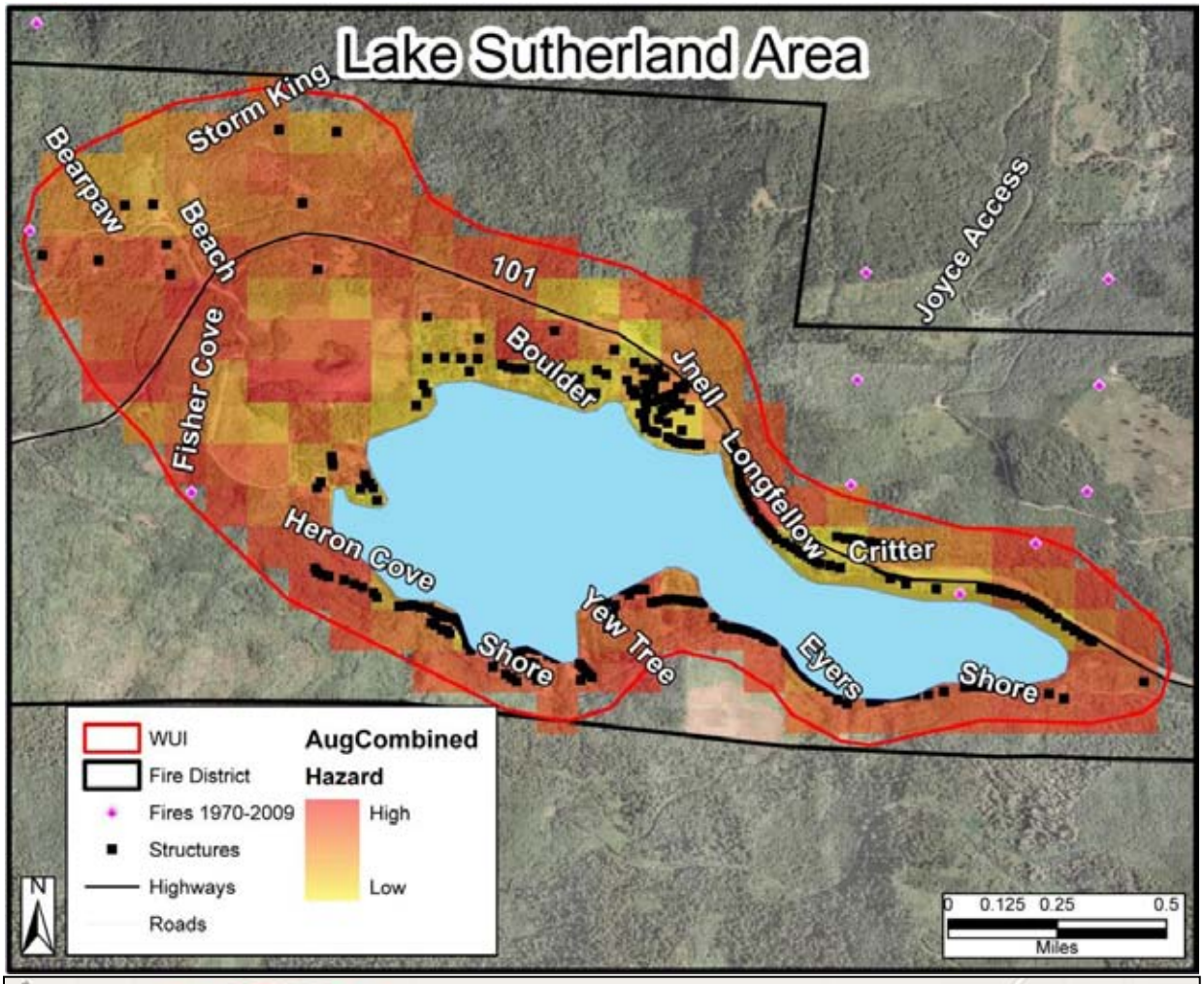
Fire District #2 and Port Angeles Fire Department

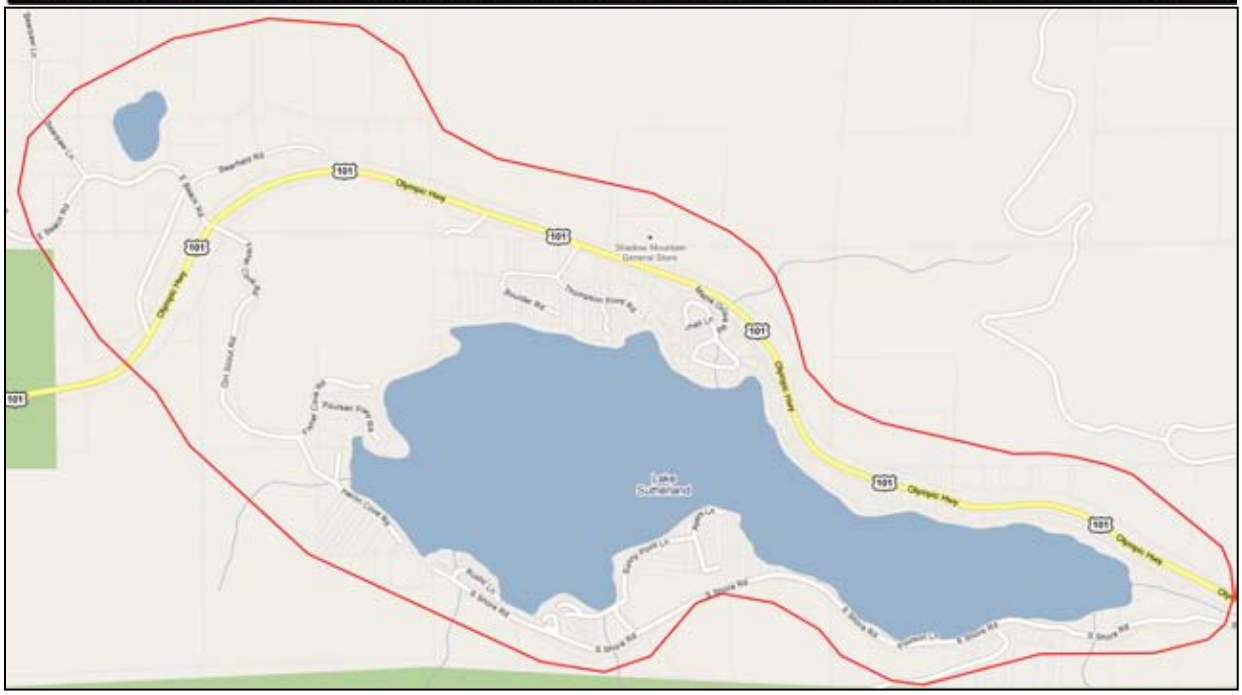




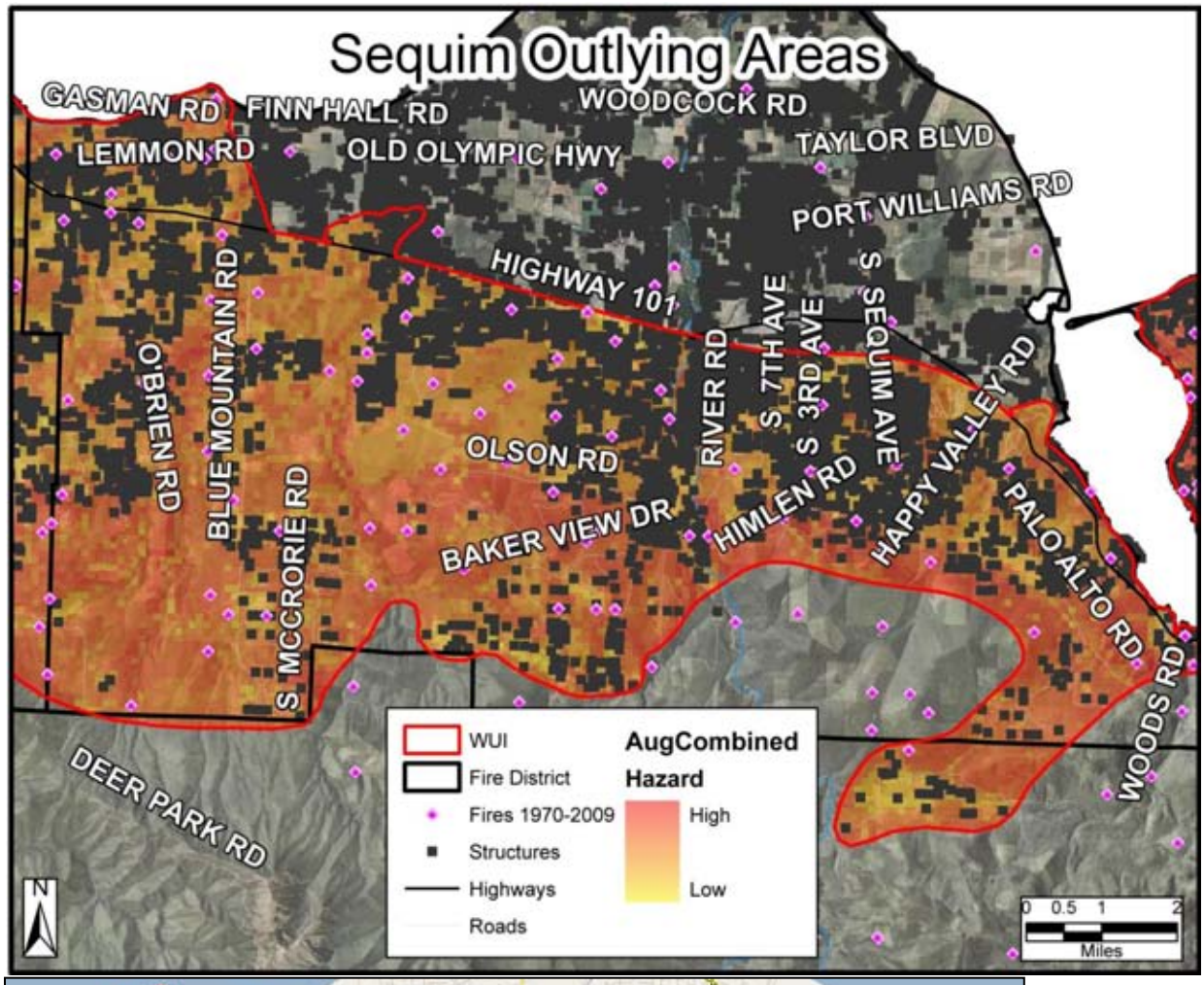

Indian Creek Area
HIGHWAY 101
GLACIER LN
HERRICK RD
BEAR TRACKS RD
OLYMPIC HOT SPRINGS RD
WAPITI WY
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
0 0.125 0.25 0.5
Miles
N

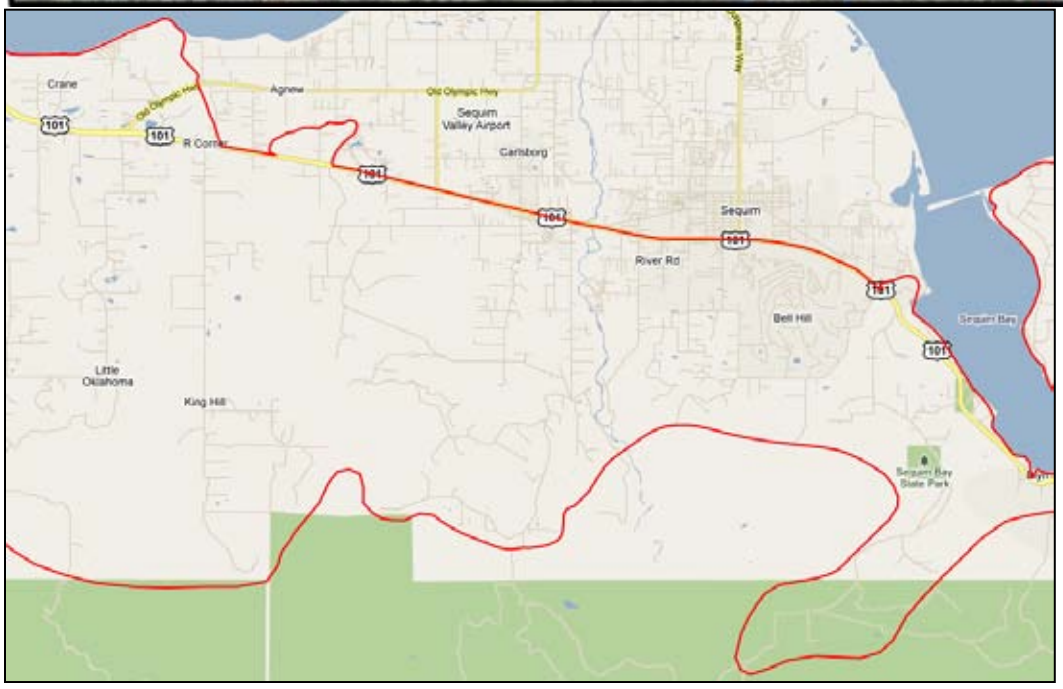

101
Olympic Hwy
101
Olympic Hwy
Lake Aldwell Rd
Olympic Hwy
Glacier Ln
Old State Rd
Herrick Rd
Bear Tracts Rd
Olympic Hot Springs Rd
Olympic Hot Springs Rd
Herrick Rd
Madison Creek Falls

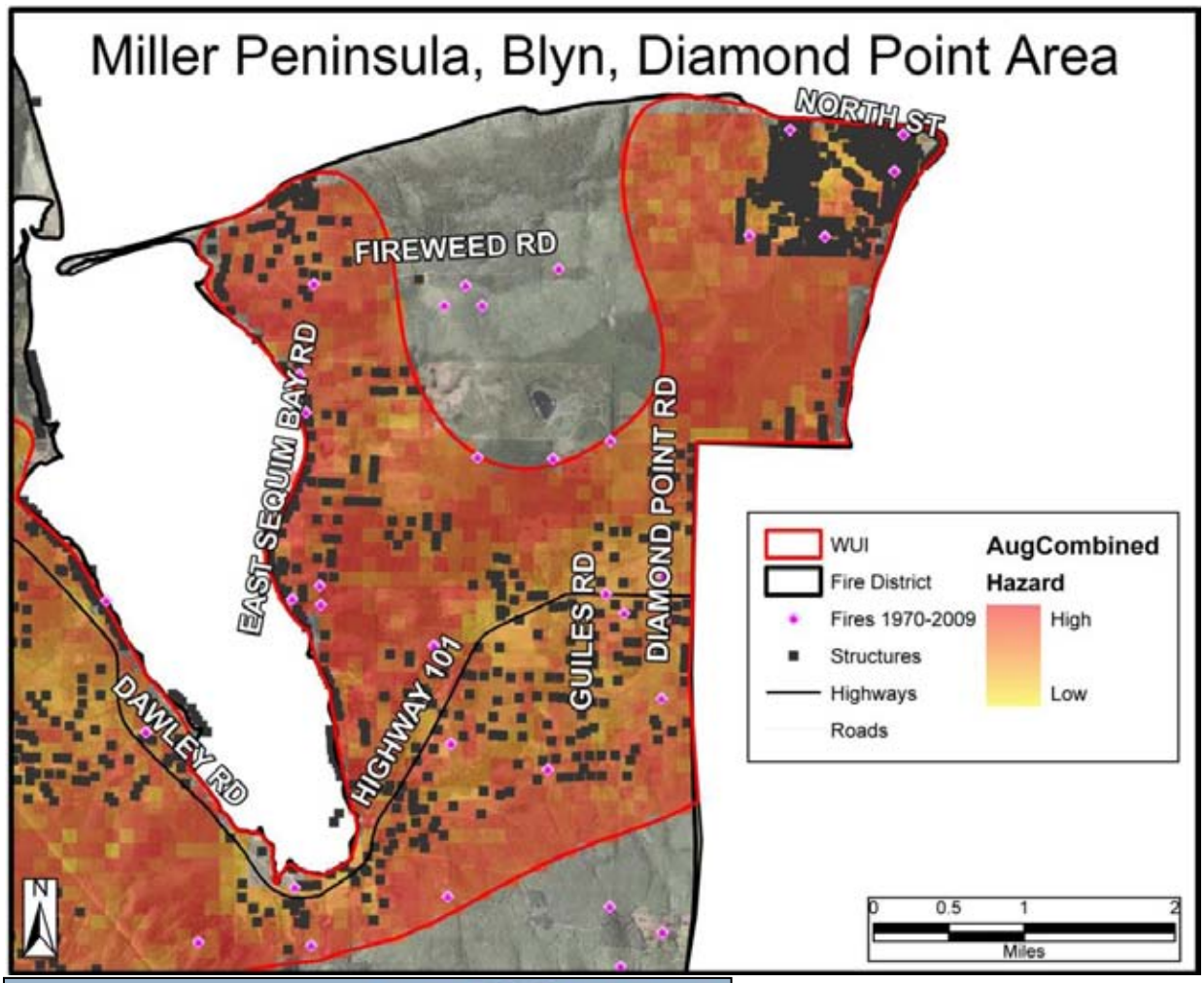

Lake Sutherland Area
Storm King
Bearpaw
Beach
101
Joyce Access
Fisher Cove
Boulder
Jnell
Longfellow
Critter
Heron Cove
Shore
Yew Tree
Eyers
Shore
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
N
0 0.125 0.25 0.5
Miles



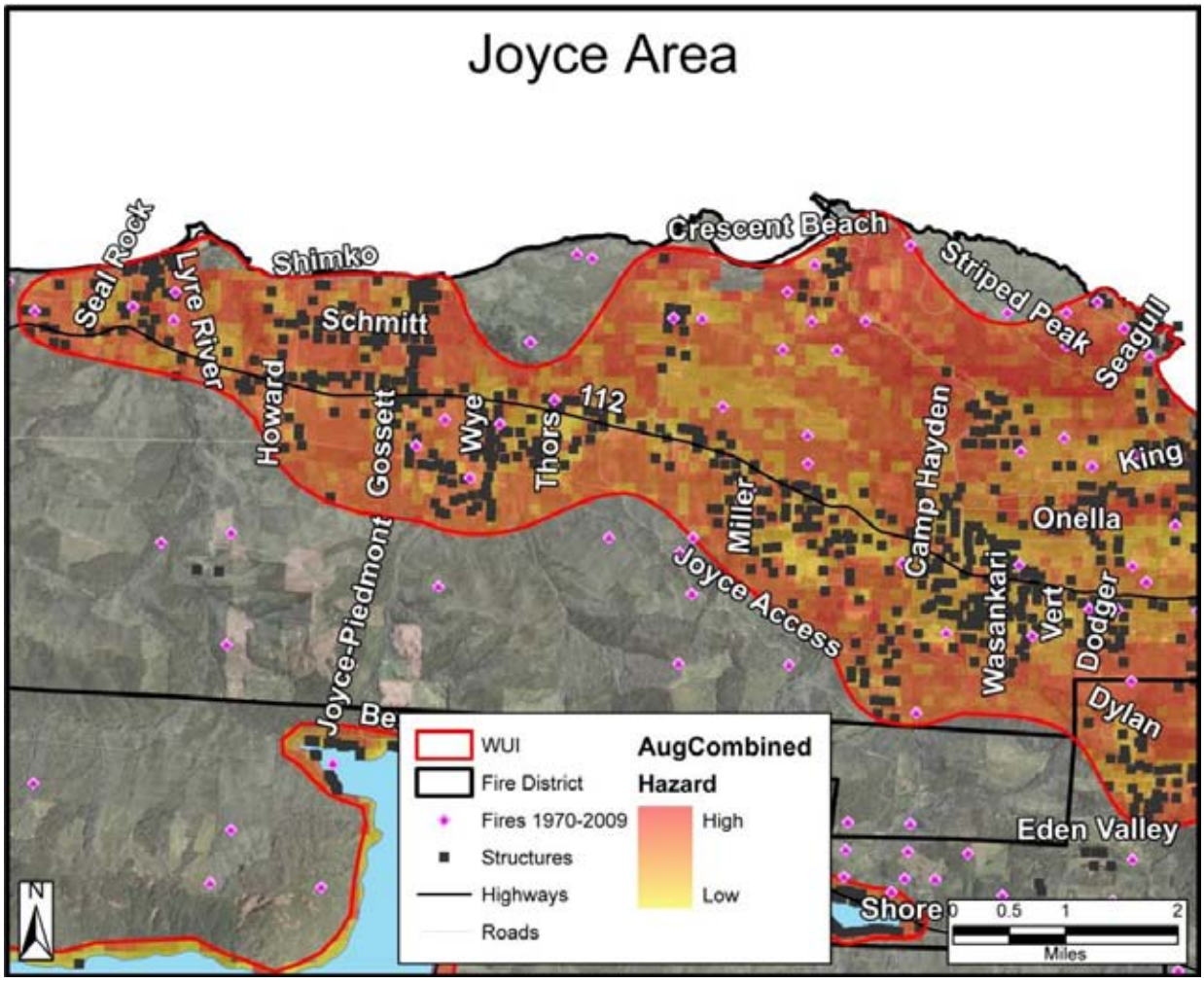
Fire District #3 (Including Sequim)



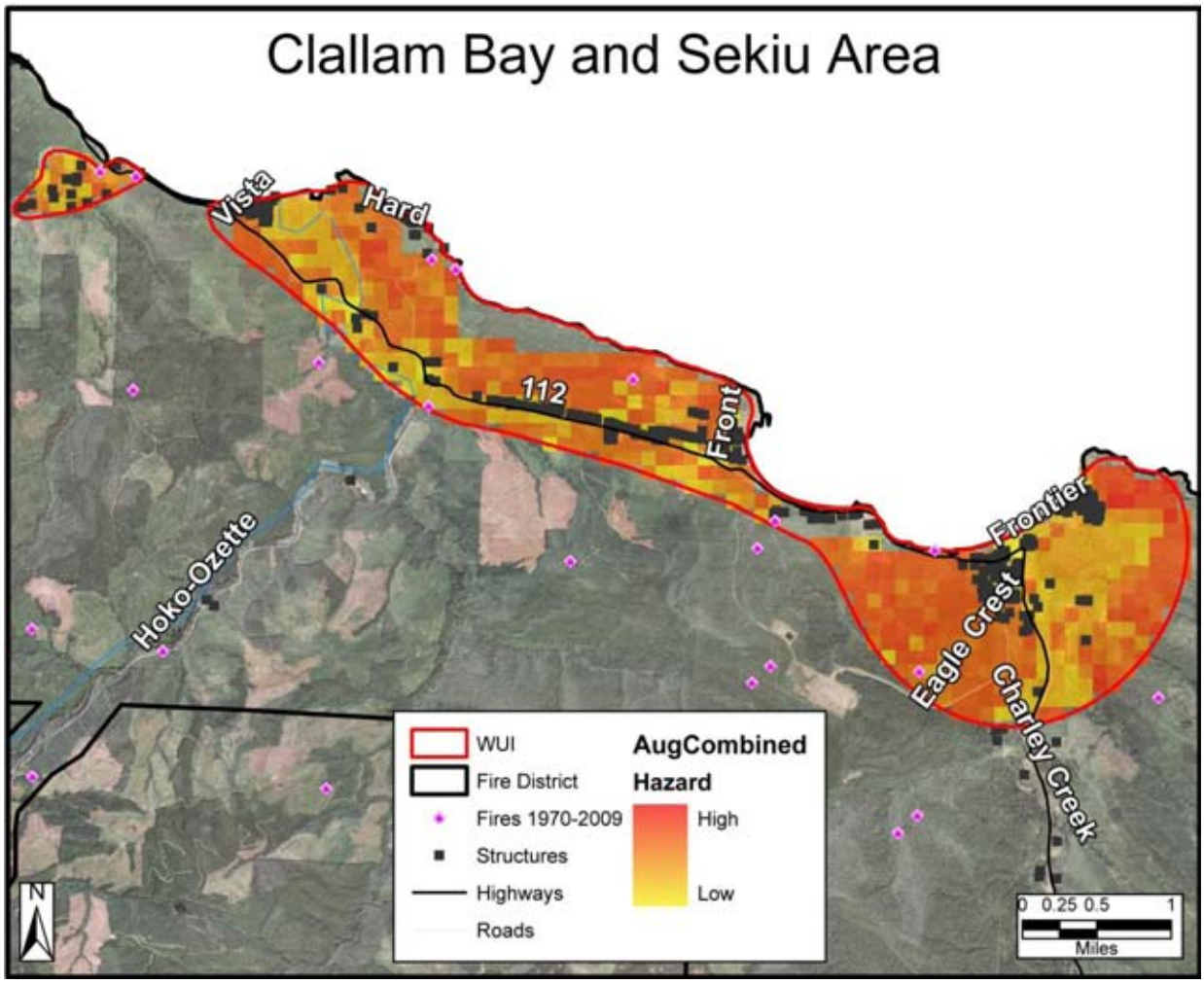


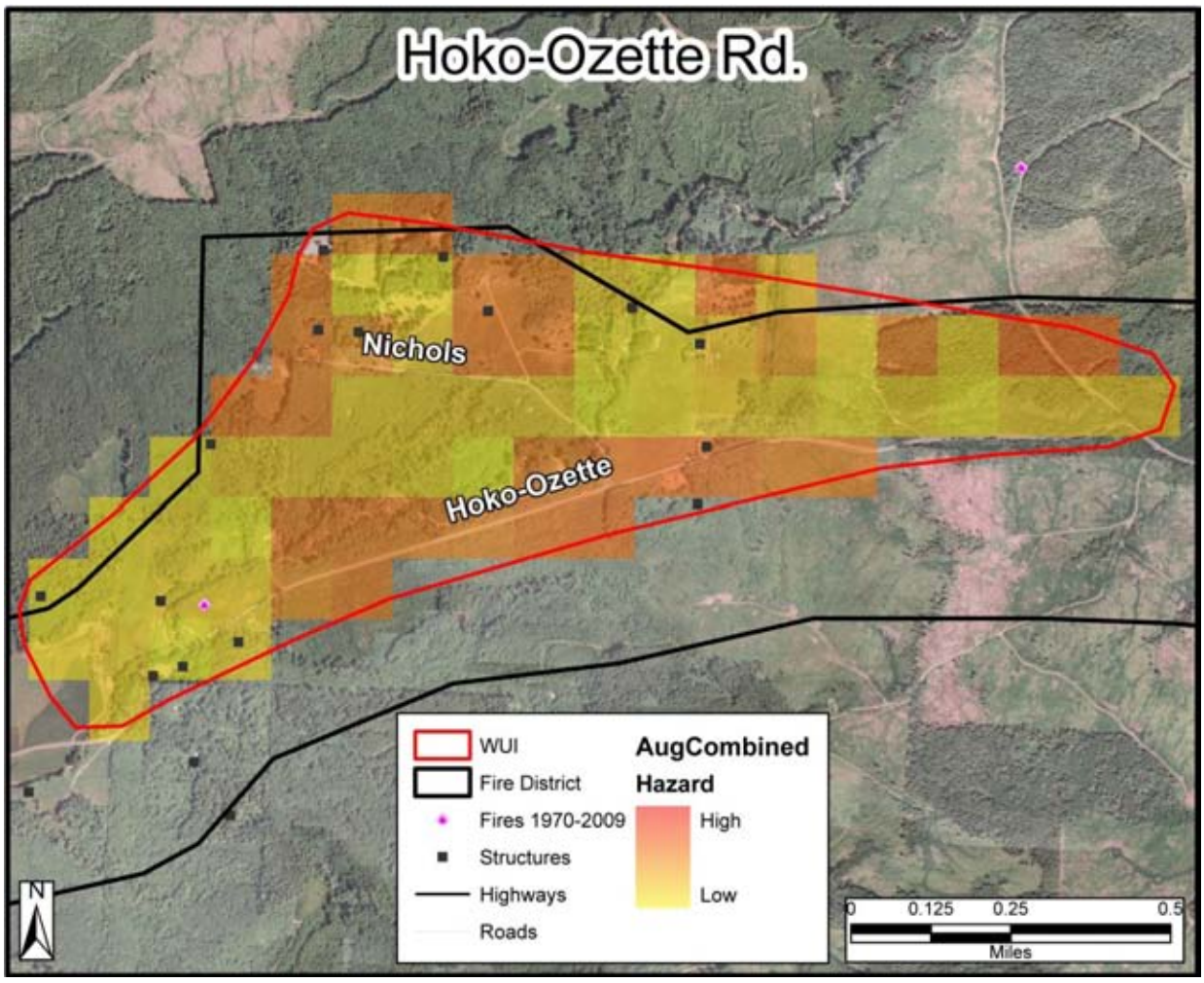

Miller Peninsula, Blyn, Diamond Point Area
NORTH ST
FIREWEED RD
EAST SEQUIM BAY RD
DIAMOND POINT RD
GUILES RD
HIGHWAY 101
DAWLEY RD
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
N
0 0.5 1 2
Miles

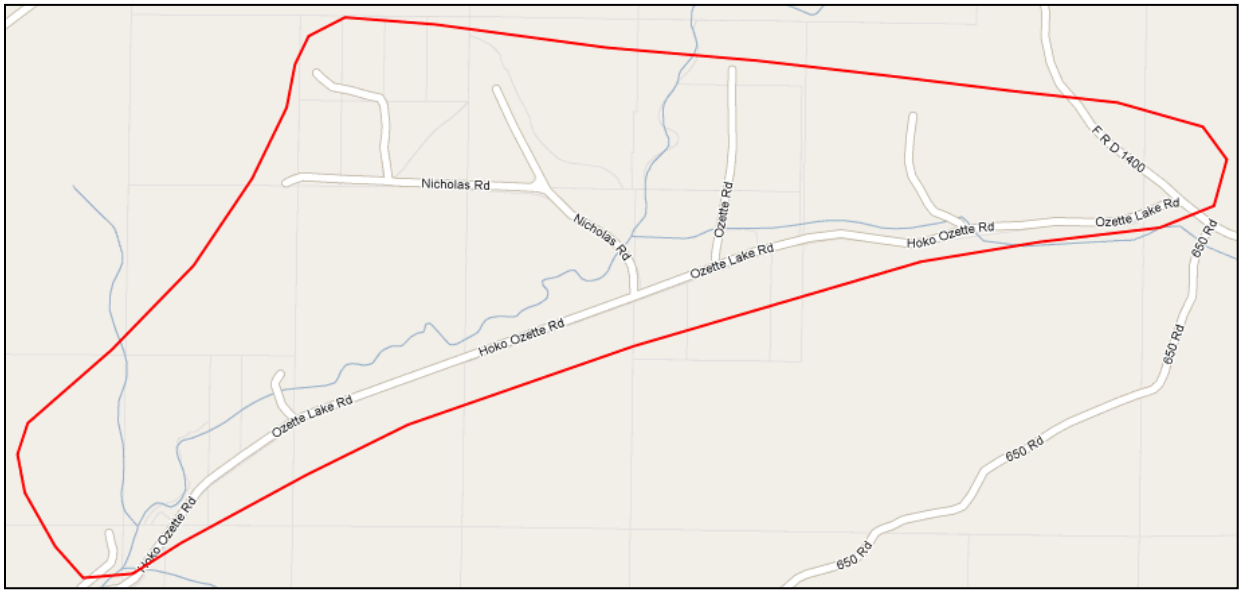
Fire District #4



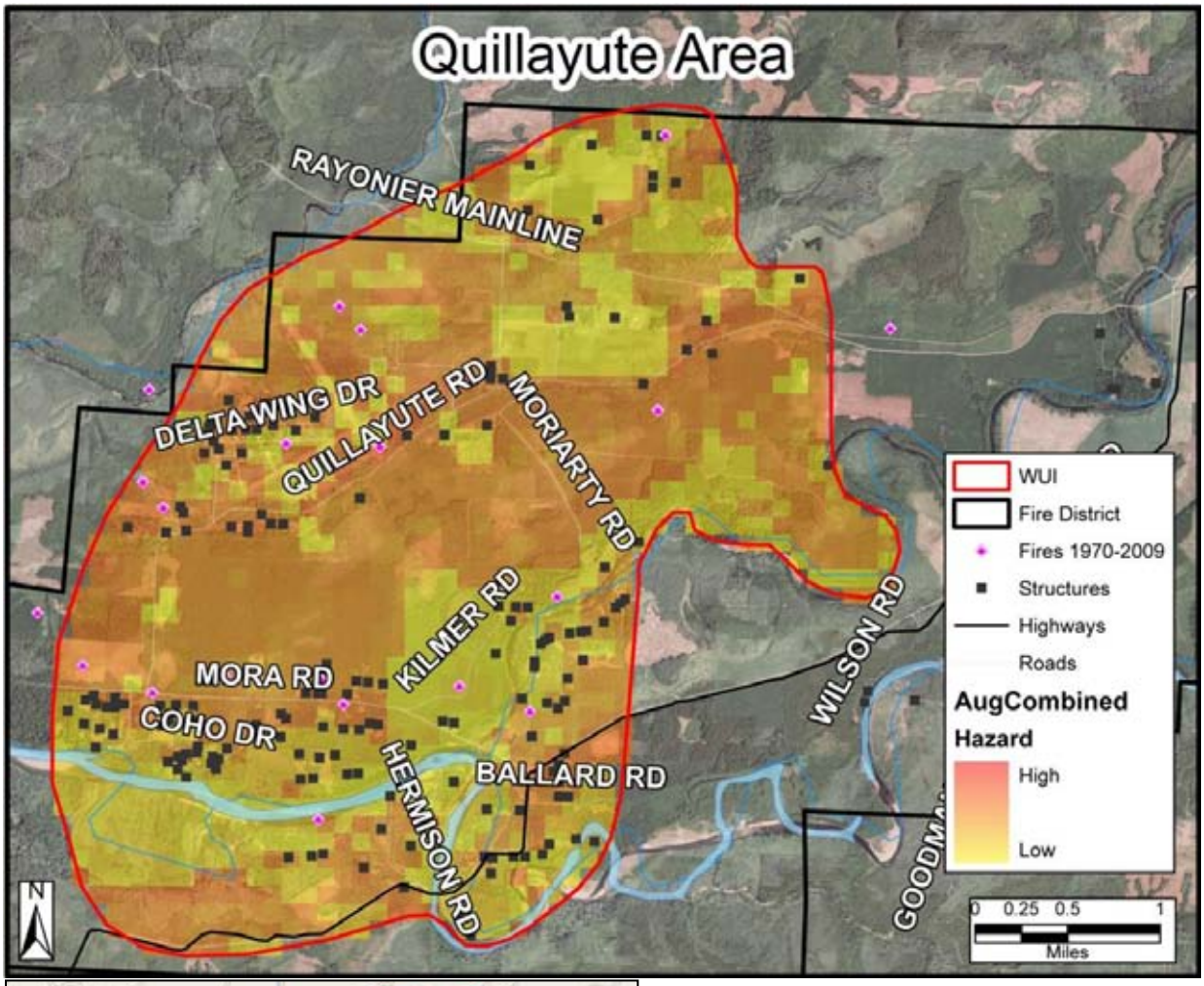
Fire District #5



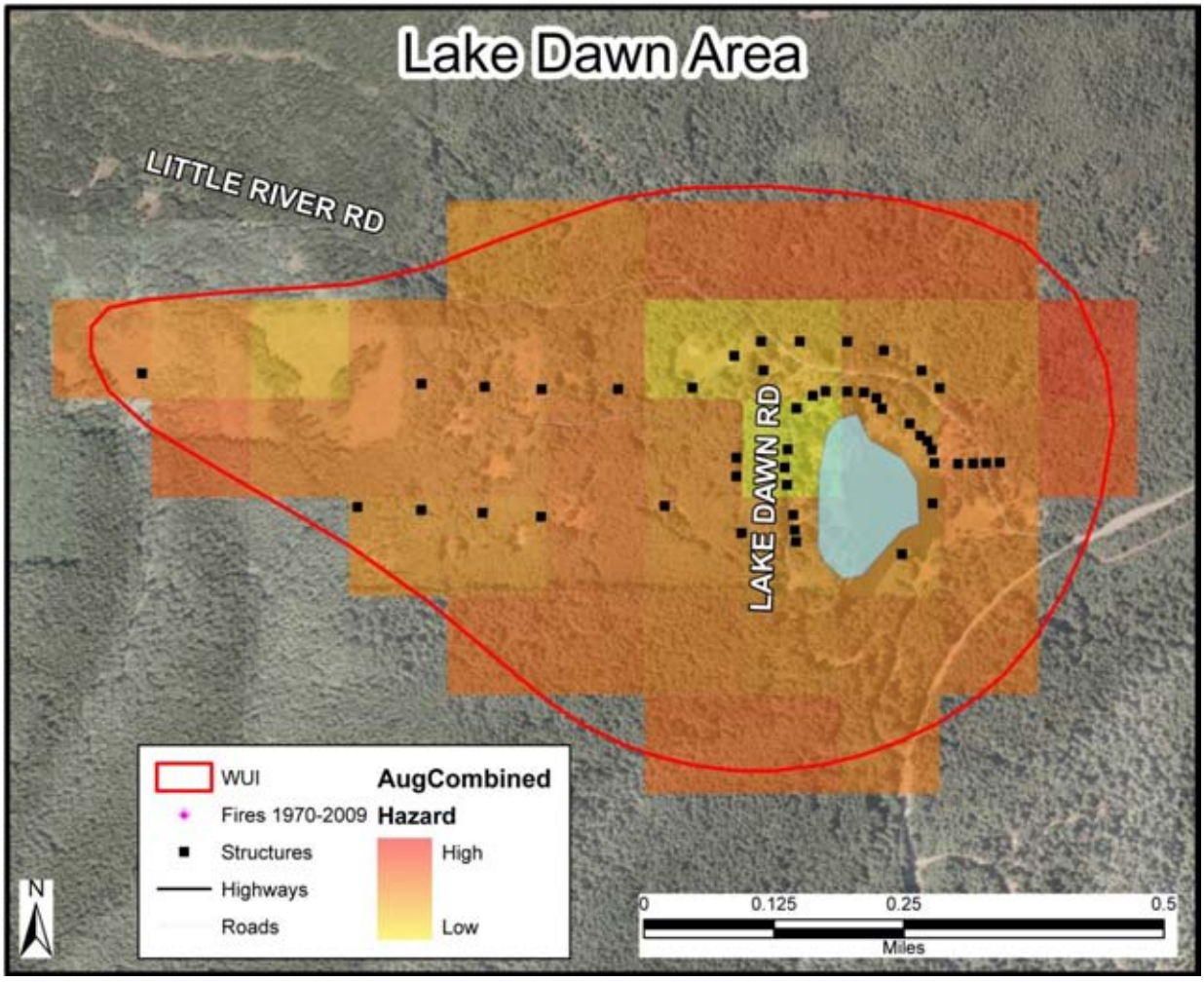

Hoko-Ozette Rd.
Nichols
Hoko-Ozette
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
N
0
0.125
0.25
0.5
Miles

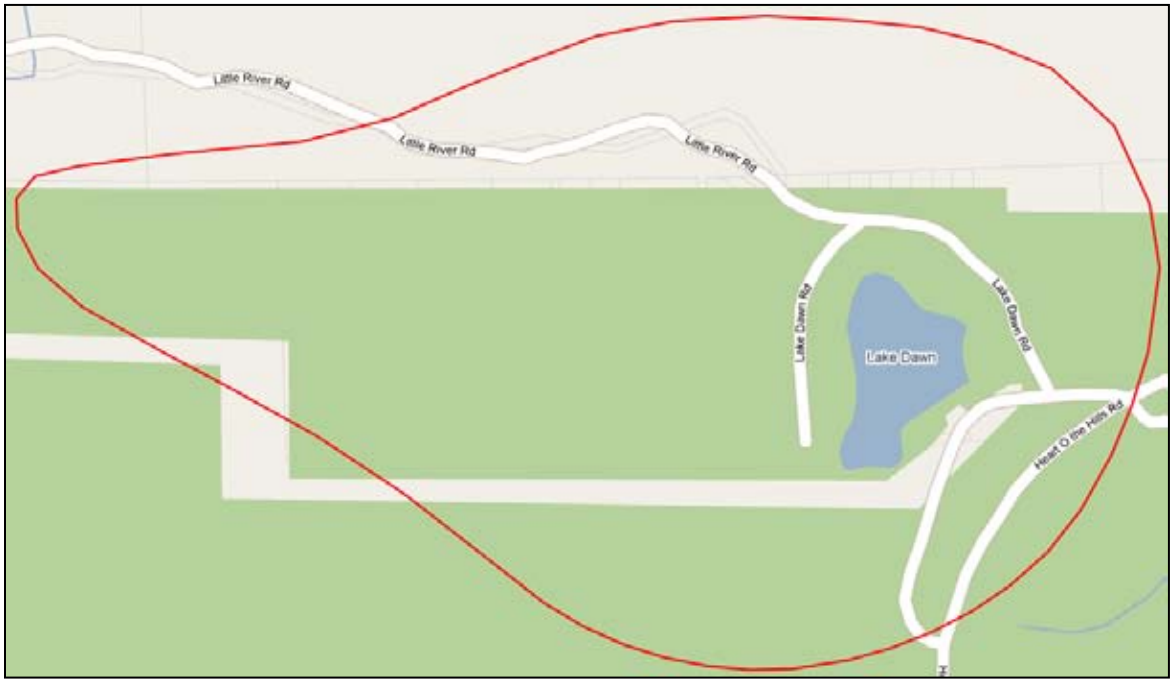

Nicholas Rd
Nicholas Rd
Ozette Rd
F R D 1400
Ozette Lake Rd
Hoko Ozette Rd
Ozette Lake Rd
650 Rd
Hoko Ozette Rd
Ozette Lake Rd
650 Rd
650 Rd
Hoko Ozette Rd
650 Rd

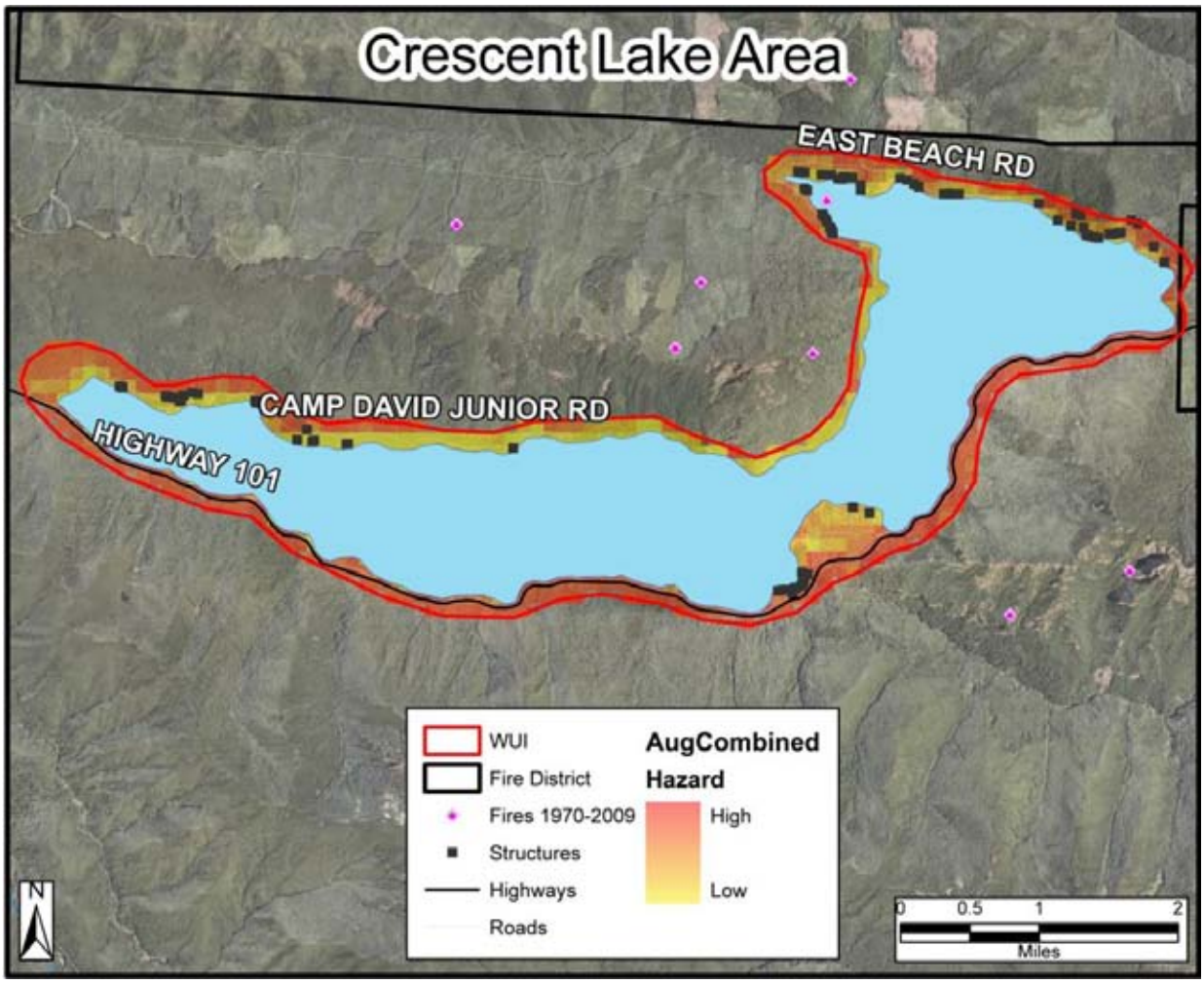
Fire District #6 – Quillayute Area

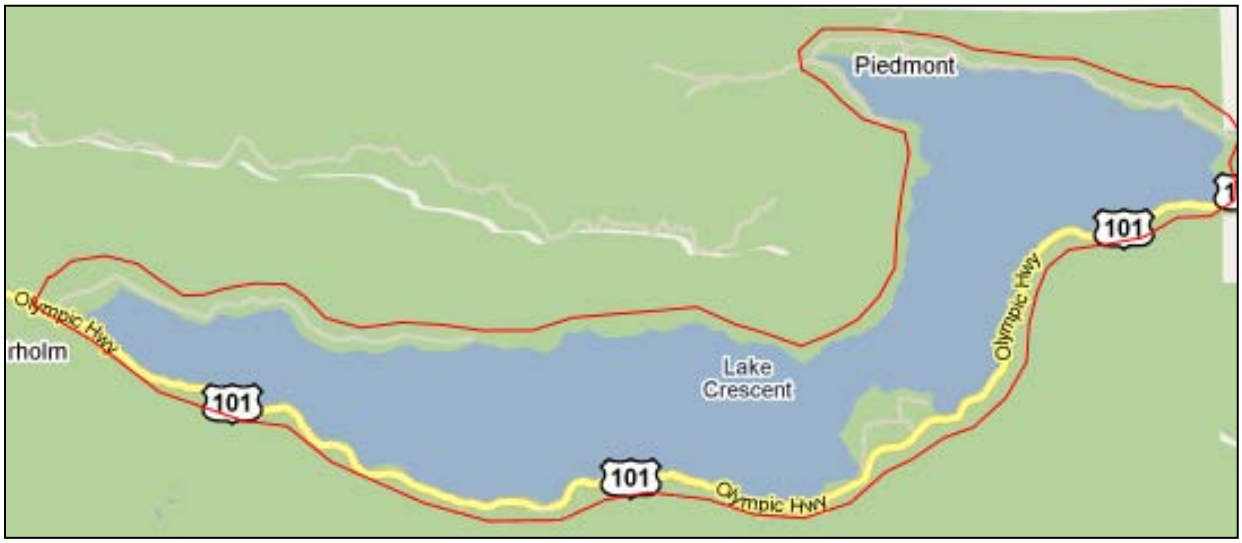


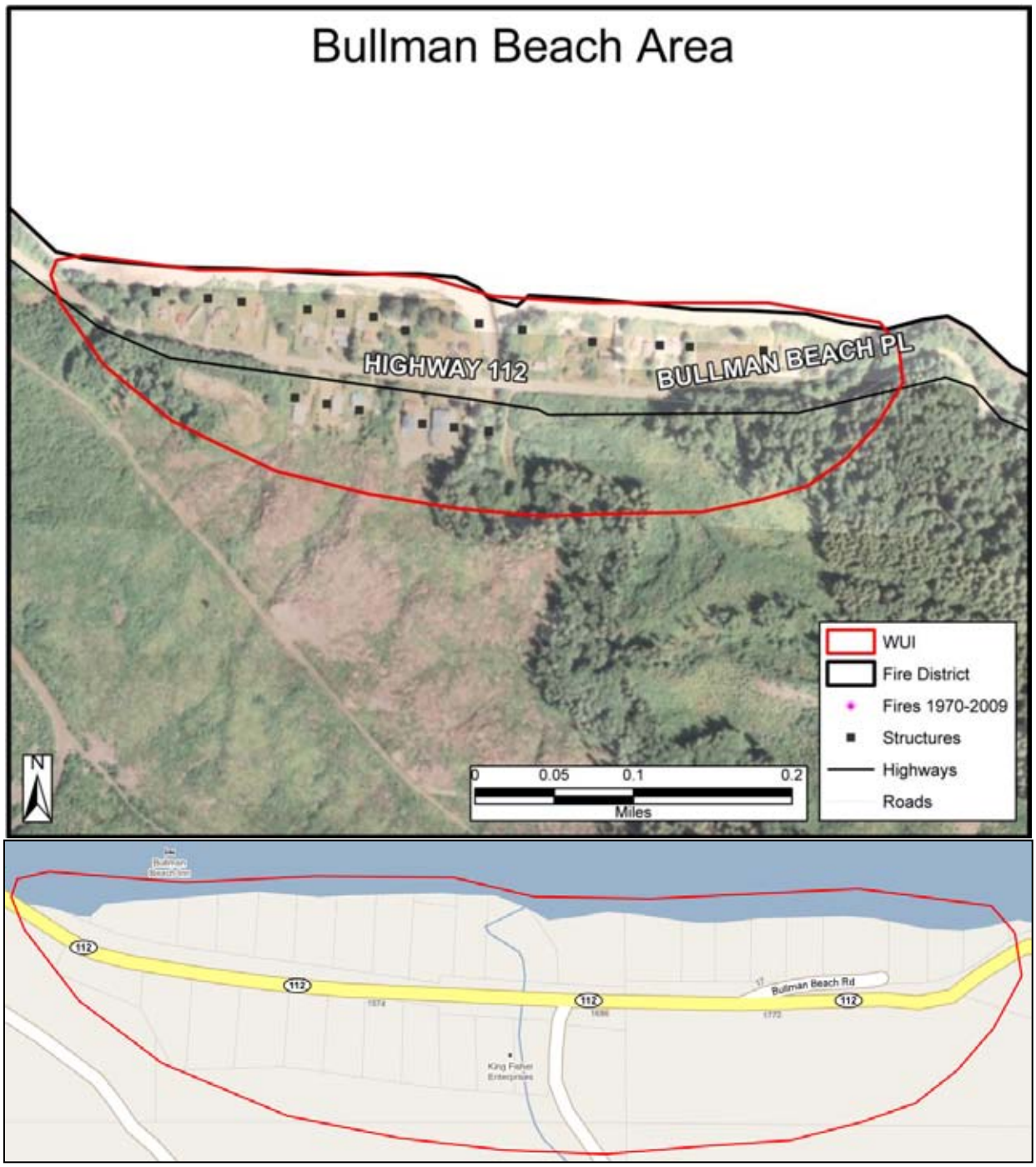
Unprotected Areas



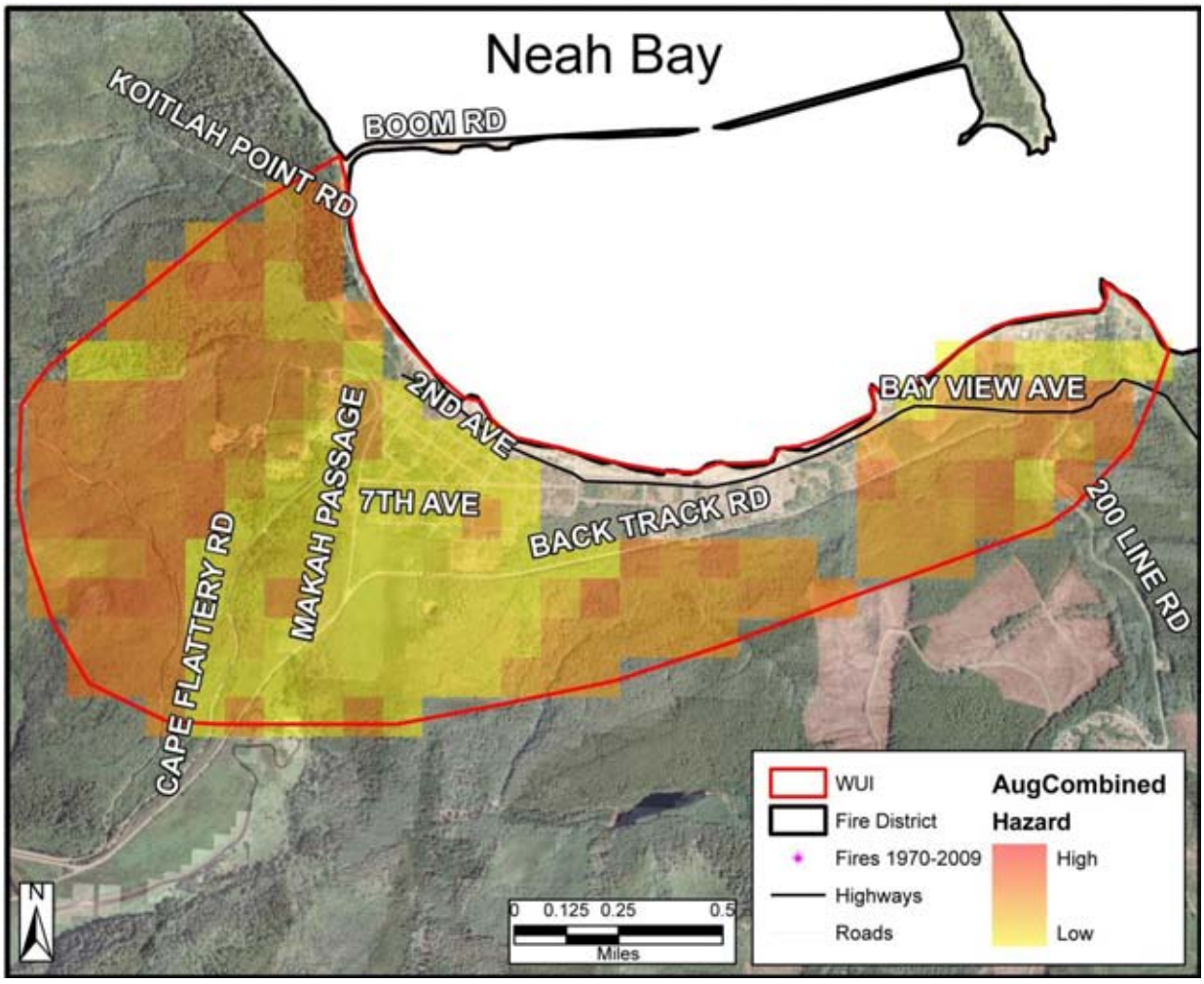


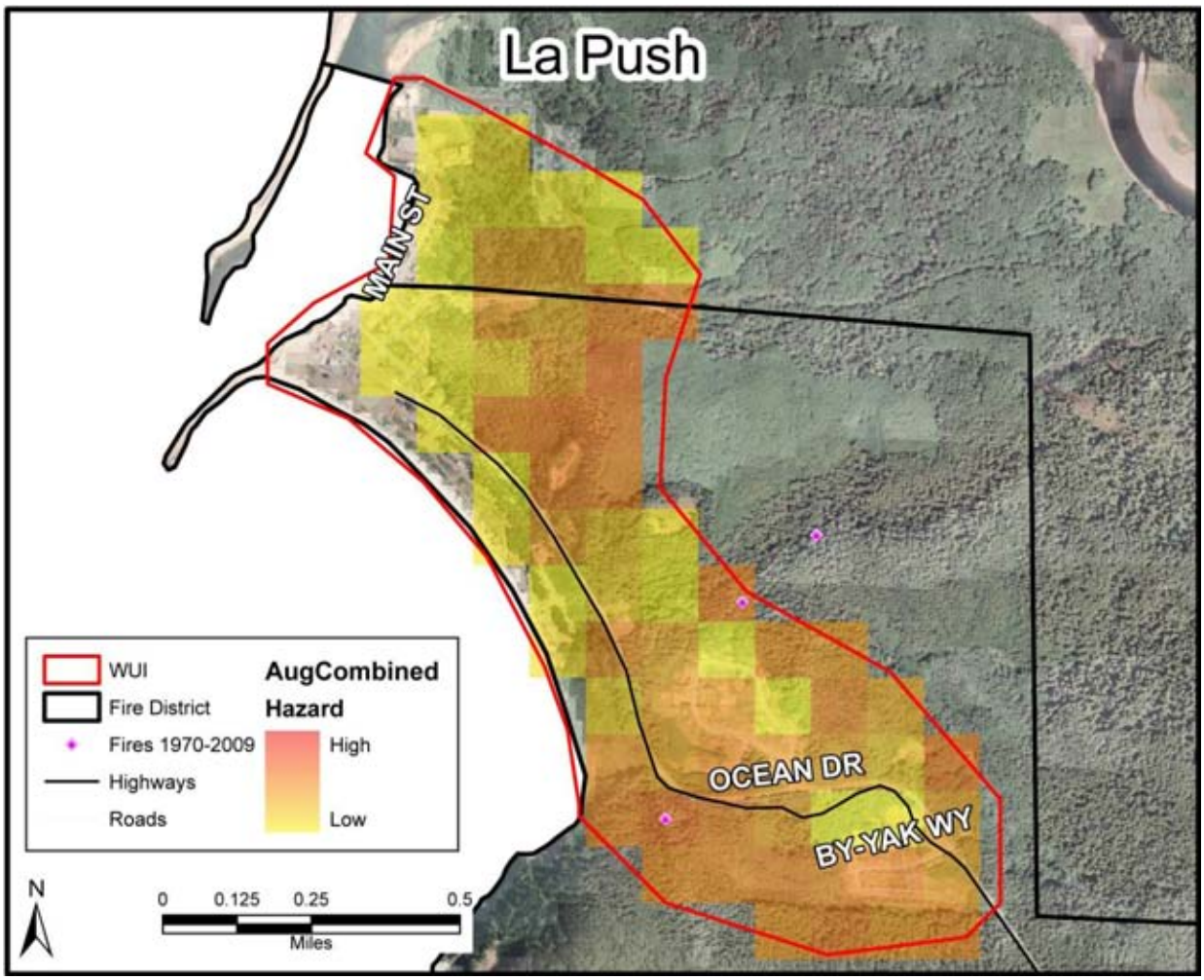

Crescent Lake Area
EAST BEACH RD
CAMP DAVID JUNIOR RD
HIGHWAY 101
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
AugCombined
Hazard
High
Low
N
0 0.5 1 2
Miles


Piedmont
Lake
Crescent
101
Olympic Hwy
rholm


Bullman Beach Area
HIGHWAY 112
BULLMAN BEACH PL
WUI
Fire District
Fires 1970-2009
Structures
Highways
Roads
N
0
0.05
0.1
0.2
Miles
112
112
112
112
Bullman Beach Rd
King Fisher Enterprises

Tribal Areas




La Push
MAIN ST
OCEAN DR
BY-YAK WY
WUI
Fire District
Fires 1970-2009
Highways
Roads
AugCombined
Hazard
High
Low
N
0
0.125
0.25
0.5
Miles


La Push Ocean
Park Resort
James Rd
Quileute St
La Push
Ocean Front Dr
Quileute Heights
La Push Rd
By-Yak-Way
Taxi Lits

VI. Mitigation Strategies

Because the Clallam County WUI is a large area that encompasses many different land/ownership types, the mitigation strategies in this CWPP have been written from a broad perspective. As homes and neighborhoods within the WUI at-risk areas are assessed, mitigation plans should be developed using the strategies deemed most effective for those sites. Primary mitigation strategies include: **Hazardous Fuel Reduction**, **Reduction of Structural Ignitability**, **Improvements in Emergency Response**, and **Education/Outreach**. Hazard mitigation activities and fuels reduction projects can entail considerable expense and therefore must be carefully weighed and chosen to ensure costs are commensurate with benefits to be derived. However, it is important to note that fire prevention efforts typically cost far less than fire suppression or fire damage.

Hazardous Fuel Reduction

While weather and topography are factors beyond human control, we are able to influence wildfire behavior by modifying fuel load and continuity across the landscape. Reducing hazardous fuels around homes, along transportation corridors, and at a landscape scale can significantly minimize losses to life, property, and natural and cultural resources from wildfire. Forests that are managed for resistance to fire damage will also be more resistant to damage by insects, disease organisms, and extreme weather conditions, further protecting fish, wildlife, watersheds, and other public resources. All treatments on federal land need to meet NEPA requirements and all treatments on state land need to meet SEPA requirements

The common methods for fuel reduction treatments include:

- Fire
- Mechanical
- Hand labor
- Chemical/Herbicide
- Grazing
- A combination of the above

Types of fuel reduction projects can include:

- Stand thinning
- Pruning/thinning from below
- Reduction of disease stands
- Prescribed fires
- Fuel breaks
- Firewise plantings

To aid in prioritizing areas to receive funding and attention for fuel reduction efforts, the projects should be ranked as high, med, or low based on the criteria listed below (Appendix G).

- Wildfire Hazard and Risk
- Number of acres treated

- Number of residences with improved protection
- Cost/Benefit analysis results
- Community/Environmental Assets protected
- Time needed to implement

Reduction of Structural Ignitability

The risk wildfire poses to forest lands and homes is inseparable; wildland fires can burn homes, and structural fires can spread to the forest. Because most developments in the WUI reside down-slope of state and federal wildlands, these developments can pose a significant threat to these resources. Therefore, any actions taken by WUI communities to reduce their ignitability will also be of benefit to forest resource managers.

As a basic measure, codes, covenants, conditions, and restrictions regarding construction and defensible space should be strictly enforced within WUI at-risk communities. It is further recommended that the County adopt the International Wildland-Urban Interface Code to ensure that new development is less vulnerable to wildfire. Some examples of how Clallam County Subdivision Code (Title 29) wildfire safety would be enhanced by this adoption are:

- County road access standard would require a vertical clearance of 13’6”.
- Landscape and structure areas less than 3,600 ft^2 would require a water supply of 1,000 gallons per minute.
- Landscape and structure areas exceeding 3,600 ft^2 would require a water supply of 1,500 gallons per minute.
- Address signs *and* supports would be required to be made of noncombustible materials.

Firewise Construction

As many as 2,000 homes are destroyed by wildfires each year. Because of the intensity of a wildfire situation, no fire department can ever guarantee the safety of a home or its residents in their event. While local agencies can provide information on how to reduce wildfire risk, individual property owners have a responsibility to take proactive steps to reduce their vulnerability to wildfire. Wildland-urban ignition research indicates that a home's characteristics and the area immediately surrounding a home within 100 to 200 feet principally determine a home's ignition potential during a severe wildfire. Creating a “defensible space” around the home, including reducing fuel loads such as dead tree limbs and other dead vegetation and using nonflammable building materials, are the two most important steps homeowners can take to protect their homes. The Firewise construction and landscaping methods provided below will help reduce the risk of a home igniting and increase the chances of it being protected by firefighters.

These are important steps to take in new construction, remodeling, and general home maintenance that will increase the chance of a home outlasting a wildfire (www.firewise.org).

Location – All structures should be set back 30 feet or more from downhill slopes and construction on steep slopes should be avoided.

Access – Driveways and private roads should be at least 12 feet wide with a vertical clearance of 15 feet and a slope of less than 5 percent to allow for emergency access. Any driveway or private road over 200 feet long should provide a 45-foot radius turnaround within 50 feet of the home. And bridges should be strong enough to support heavy emergency vehicles, including bulldozers hauled on trucks. Homes should have more than 30 feet of defensible space on all sides, clear of any major obstacles to emergency personnel and equipment.

Roof – As the most vulnerable part of the home to wildfire, roofs should be made of Class A materials, such as asphalt, tile, or metal roofing, which are most resistant to fire. In addition, a fire-resistant sub-roof can add extra protection.

Exterior walls – Fire resistant materials such as cement, plaster, stucco, or concrete masonry such as stone, brick, or block are best. Vinyl siding melts at fairly low temperatures and should be avoided. Fiber-cement siding is fire-resistant and can be used as long as there are no flammable materials (firewood, etc.) placed next to the walls.

Windows – All windows and glass doors should be double-paned or tempered glass to reduce their likelihood of breaking when heated. Plastic skylights should be avoided due to their potential to melt. Windows and skylights should be equipped with nonflammable screens or shutters.

Decks – After roofs, wooden decks are the most likely means by which a wildfire can destroy a home. Decks should be made from made from materials less flammable than wood, such as composites, or wood should be treated to resist sustaining flames. In addition, open areas under decks should be enclosed or screened with metal screens (less than ¼ inch gaps) to prevent firebrands from settling under the deck and igniting the structure from below.

Other openings – Vents in the attic, subfloor, or foundation should be screened with ¼ inch mesh or smaller metal mesh to prevent firebrands from entering. Chimneys should have spark arrestors installed to prevent fire from entering the home as well as to prevent sparks from the chimney from landing outside and starting a fire.

Firewise Landscaping

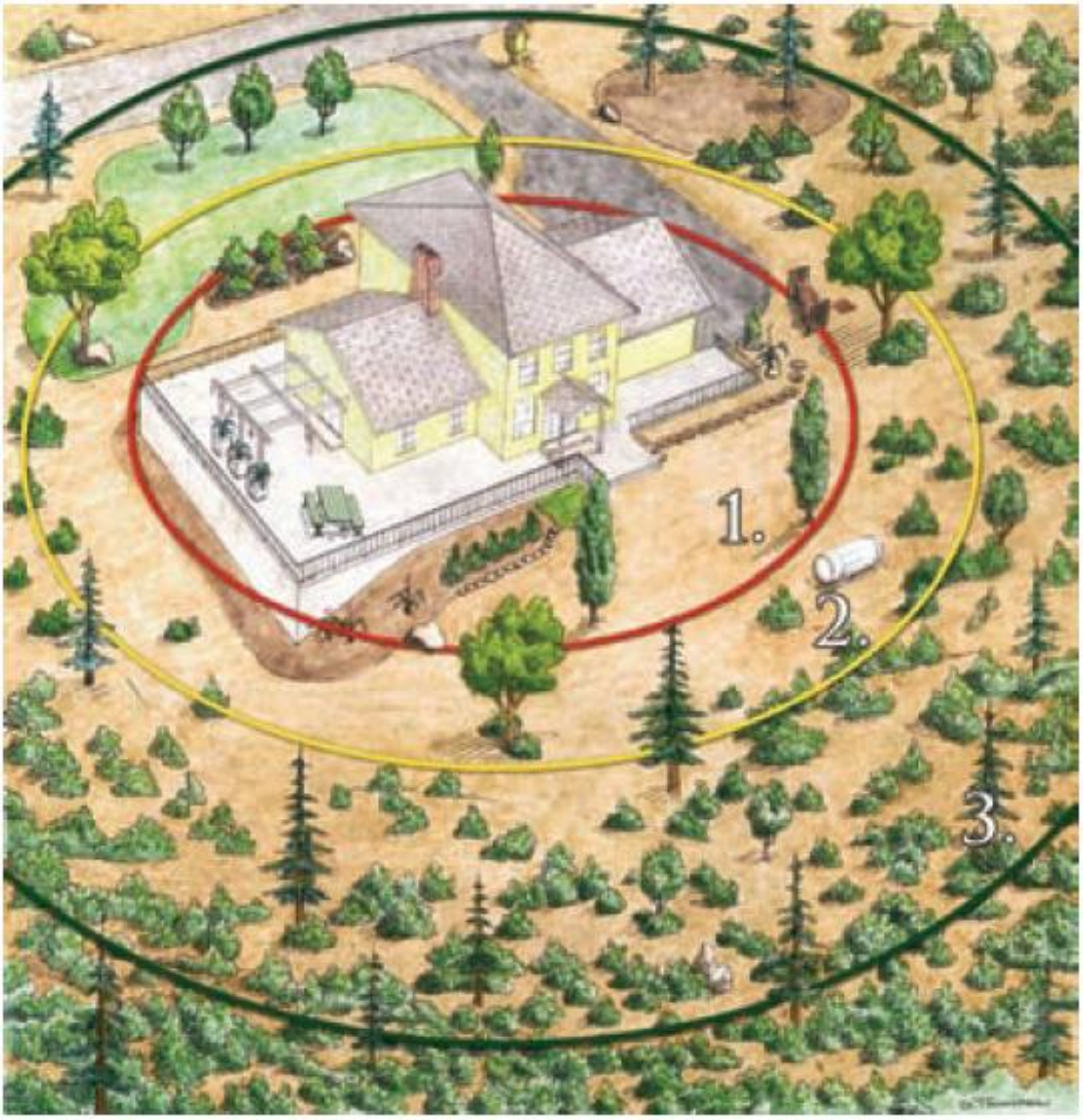
In designing a Firewise landscape, it's important to consider the following:

- Fire history for the local area.
- Site location and overall terrain.
- Prevailing winds and seasonal weather.
- Property contours and boundaries.
- Native vegetation type and fuel capacity.
- Irrigation capacity and needs.

The Firewise Zones Concept

In creating a Firewise landscape, the zone concept is used to achieve the primary goals of reducing fuels and structural ignitability (Figure 24).

Figure 24: Firewise landscaping zones; recommended mitigation measures for each zone are referenced below (image from Napa Firewise).



Zone 1: A minimum 30 foot perimeter of fuel free area.

- Area should be clear of obstacles to emergency equipment.
- All dead vegetative matter should be removed.
- The area should be well-irrigated with a minimum amount of vegetation, limited to thinly spaced, fire-resistant plant varieties.
- Any trees in this zone should be limbed up 6’ to 10’ above the ground and 10’ above the roof.
- Roof and rain gutters should be kept clear of leaves, needles, and debris.
- Fuels such as firewood, lumber scraps, or other combustibles (lawnmowers, gas cans, etc.) should not be stored in this zone.

Zone 2: 30 to 60 foot perimeter of minimum fuel.

- Use fire-resistant vegetation in this area.
- Be sure vegetation is low-growing or limbed up.
- Thin trees to a wider spacing.
- Use an irrigation system in this area.
- Remove dead vegetation monthly or seasonally, as conditions warrant.

Zone 3: 60 to 90 foot perimeter of reduced vegetation.

- Trees should be well spaced among low growing plants in this area.
- Avoid dense vegetation.
- Dead vegetation removed as necessary.

Zone 4: Beyond 90 foot from the structure.

- Natural area selectively pruned and thinned to remove highly flammable vegetation.

Maintenance is of utmost importance in *all* four zones.

- Remove or reduce ladder fuels, or vegetation that could provide a "ladder" that allows fire to move from the ground to tree canopies.
- Firebreaks should be established in all zones to reduce fuel continuity.
- All trees should be limbed to at least six feet and have crown spacing of at least 10 feet.

Fire-Resistant Plants

Making use of appropriately placed fire-resistant plants can add another aspect of protection against wildfire; these plants take longer to ignite, and when well spaced, may help stop a wildfire from ever reaching the home. Plants that are fire resistant have some common qualities. They have leaves that are pliable and moist, they do not accumulate dead or dry twigs or leaves, and they have watery and mild sap. Oregon State University's booklet "Fire-Resistant Plants for Home Landscapes" contains lists and photos of fire-resistant plants by type and provides enough information about each to allow for selection of the proper plants for any Pacific Northwest locale. Landscaping design should focus on developing islands of asymmetrical shapes that are spaced well enough to prevent fire from maintaining a consistent flame front.

Some common fire-resistant plants suitable for Pacific Northwest climates include Iceplant, Wild Strawberry, Columbine, Hostas, Salvia, Tall Oregon Grape, Mock Orange, Pacific Rhododendron, Vine and Big-Leaf Maples, and Flowering Dogwood.

Firewise Communities USA program

The fire season of 1985 motivated wildfire agencies and organizations to focus on local solutions to wildfire risks in WUI areas by forming what is now the Firewise Communities USA program (www.firewise.org). The program is a cooperative, non-regulatory program administered by the National

Fire Protection Association and sponsored by the US Forest Service, the US Department of the Interior, and state forestry organizations, including the Washington State DNR. The Firewise Communities approach emphasizes community responsibility for planning in the design of a safe community as well as effective emergency response and individual responsibility for safer home construction and design, landscaping, and maintenance. Working with local wildfire staff, communities can earn Firewise Communities/USA status by meeting the following criteria. Status is renewable annually.

- Enlist a wildland-urban interface specialist to complete a community assessment and create a plan that identifies agreed-upon achievable solutions to be implemented by the community. For Clallam County, this is currently Bryan Suslick of the WaDNR (BRYAN.SUSLICK@dnr.wa.gov).
- Sponsor a local board or committee that maintains the Firewise Community/USA program and tracks its progress or status.
- Observe a Firewise Communities/USA Day each year that is dedicated to a local Firewise project.
- Invest a minimum of $2.00 per capita annually in local Firewise projects. (Work by municipal employees or volunteers using municipal and other equipment can be included, as can state/federal grants dedicated to that purpose.)
- Submit an annual report to Firewise Communities/USA that documents continuing compliance with the program.

Education/Outreach

Educational projects can include efforts to inform the public of wildfire hazards and risks as well as promote Firewise methods of reducing fuel hazards and structural ignitability through public presentations, publications, PSAs, TV, and/or radio. WUI communities are encouraged to contribute to their wildfire safety by joining the Firewise Communities/USA program.

Possible Projects

- Publicized Firewise construction and landscaping projects.
- Provide Firewise training.
- Public presentations (e.g., County Fair, community service groups) on wildfire hazard.
- Defensible space and forest zone treatment workshops.
- Home wildfire risk assessment workshops.
- Forest health and stewardship education.
- Provide information packets on fire-safe construction materials, landscaping, access, water supply, and fuel breaks.

Emergency Response Improvements

Wildfire response agencies should evaluate their capacity to provide safe, cost-effective fire management with appropriate planning, staffing, training, equipment, and management oversight. Needed improvements to emergency response infrastructure identified in this planning document will gain increased eligibility for grant funding. The insurance industry uses the Public Protection

Classification (PPCT) program from ISO to evaluate a community's fire-protection services. PPC evaluation criteria are:

- **Fire alarm and communications systems**, including telephone systems, telephone lines, staffing, and dispatching systems.
- **The fire department**, including equipment, staffing, training, and geographic distribution of fire companies.
- **The water supply system**, including condition and maintenance of hydrants, and a careful evaluation of the amount of available water compared with the amount needed to suppress fires.

Access to property during a wildfire can be a significant factor limiting emergency response. Substitute Senate Bill 5315, which is intended to begin dealing with this issue, has recently (May 2007) been signed by the Governor of Washington. The Bill says that the Washington Association of Sheriffs and Police Chiefs will convene a work group to develop a model policy for sheriffs regarding residents, landowners, and others in lawful possession and control of land during a wildfire. The policy will include guidance on allowing access, when safe and appropriate, to residents, landowners, and others during a wildfire to conduct fire prevention or suppression activities and protect or retrieve any property located in their residences. Until the policy is formally completed, county sheriffs may establish and maintain a registry of persons authorized to access their land during a wildfire.

VII: Monitoring and Evaluation

Methods

This CWPP is intended to be a working document that can be used as a tool for approaching wildfire prevention and fuel-reduction efforts across Clallam County. This plan should be updated and expanded annually or as needed as more localized communities are assessed within the WUI at-risk areas and mitigation plans are developed and prioritized. Results from prevention activities may not be immediate, requiring documentation over time for thorough evaluation. Progress in partnerships, hazardous fuels reduction projects, and Firewise Communities/USA successes should be tracked in this document. Currently, the Washington DNR is coordinating the development of seven Firewise Communities in Clallam County. The assessments and mitigation strategies for these communities will be documented and prioritized within this CWPP. Bryan Suslick of the Washington State DNR - Olympic Region is the coordinator for updates to this CWPP.

Accomplishments should be documented both quantitatively and qualitatively. The *10-Year Comprehensive Strategy Implementation Plan* drafted by the Western Governors Association provides measures for quantitative documentation (Table 6); however, **the single most important quantitative reporting element is the number of implemented projects that result in a significant and measurable reduction of risk to the communities and landscapes within the project area**.

Table 6: Performance Measures Identified in the 10-Year Comprehensive Strategy Implementation Plan.

State Foresters or their equivalent will be responsible for tracking performance measures (**A**) and (**B**) for determining when communities have met the associated requirements. Federal agencies will be responsible for tracking performance measure (**C**).

A) Number and percent of communities-at-risk covered by a Community Wildfire Protection Plan (CWPP) that are reducing their risk from wildfire. A community is at reduced risk if it has satisfied at least one of the following requirements:

- Recognized as a FIREWISE community or equivalent, or
- Enacted a mitigation/fire prevention ordinance, or
- High priority hazardous fuels identified in a CWPP or equivalent are reduced or appropriate fuel levels on such lands are maintained in accordance with a plan.

B) Percentage of at risk communities who report increased local suppression capacity as evidenced by:

- The increasing number of trained and/or certified fire fighters and crews, or
- Upgraded or new fire suppression equipment obtained, or
- Formation of a new fire department or expansion of an existing department involved in wildfire fighting.

C) Number of green tons and/or volume of woody biomass from hazardous fuel reduction and restoration treatments on federal land that are made available for utilization through permits, contracts, grants, agreements, or equivalent.

In the long term, it is also important to document situations where a wildfire burned through an implemented project area, and determine how the treatment affected fire behavior. Successfully implemented projects can be documented qualitatively as "success stories." These success stories can then be placed on both the NASF and the National Fire Plan websites as examples of how we are reducing risks to communities, and can also demonstrate community success in future grant application efforts.

The HFRA contains provisions requiring that the USFS and the BLM monitor the results of a representative sample of authorized hazardous-fuel-reduction projects and submit a report every 5 years that includes an evaluation of the progress toward project goals and recommendations for project modifications.

Section 102(g)(5) of the HFRA instructs the US Forest Service and BLM to establish a collaborative multiparty monitoring, evaluation, and accountability process when significant interest is expressed in such an approach. The process can be used to assess the positive or negative ecological and social effects of authorized fuel-reduction projects, as well as those undertaken under Section 404 (applied silvicultural assessments) of the HFRA.

Diverse stakeholders, including interested citizens and Tribes, should be included in the monitoring and evaluation process. The HFRA requirement of USFS and BLM multiparty monitoring is not directly connected to the requirements for monitoring a representative sample of projects, but is to be used where "significant interest is expressed," in the judgment of the field unit involved. Through the HFRA, multiparty monitoring will be subject to available funding and the ability of stakeholders to contribute funds or in-kind services.

A publication on protocols and guidelines for multiparty monitoring of community-based forest restoration projects is available at the Collaborative Forest Restoration Program Web site: http://www.fs.fed.us/r3/spf/cfrp/monitoring.

Additional information on multiparty monitoring is available online at: http://www.fs.fed.us/forestmanagement/index.shtml (click on the Stewardship Contracting Success Stories link there) and http://www.pinchot.org/community.html.

Section 102(g)(8) of the HFRA requires the USFS and the BLM to develop a process for monitoring the need to maintain treated areas over time. For example, areas requiring treatment to move from Condition Classes 2 or 3 to Condition Class 1 also will require periodic treatments. Proposed actions and alternative descriptions should include an estimated maintenance treatment schedule and cost. As field units accomplish their projects, they should plan for future maintenance and monitor completed projects to ensure that the proposed maintenance treatment schedule is accurate. Field units should consider the maintenance workload when assessing their ability to implement fuel treatments.

Accomplishments for all projects using HFRA authority must be tracked and reported by fire regime and condition class. The National Fire Plan Operations and Reporting System (NFPORS) is the interdepartmental system for reporting National Fire Plan accomplishments, including those involving

hazardous-fuel reductions. The interdepartmental functionality of NFPORS is critical because the HFRA applies to both the BLM and the USFS.

The NFPORS database has been updated for reporting HFRA accomplishments. Field units will need to report fire regime and condition class determinations before and after treatments for all projects using the HFRA and HFI authorities, as well as for those funded by the National Fire Plan. Field units reporting accomplishments using the HFRA and HFI authorities will follow their agency's NFPORS reporting schedules and data quality standards.

Adaptive Management

Adaptive management is a process of learning from our management and mitigation actions. As applied to this CWPP, it involves implementing a transparent and replicable approach to current projects, monitoring and analyzing the effects of that approach, and then incorporating these findings into the next round of projects. At the end of each project or monitoring period, the following questions should be asked:

- Were the mitigation measures implemented as planned?
- What went right and what went wrong?
- Are there opportunities for improvement?
- Were objectives met?
- Were the mitigation measures effective at protecting the resources?
- If the mitigation measures successfully protected the resources, were they overprotective and did they place unnecessary constraints on the ability to accomplish project objectives?

VIII: Funding Sources

This CWPP can be utilized to apply for National Fire Plan, Pre Disaster Mitigation, and other State and federal grant programs. Funding under the National Fire Plan is available through the Interagency National Fire Plan Community Assistance, Volunteer Fire Department Assistance, and State Fire Assistance Wildland Urban Interface Hazard Mitigation Grants programs. There are two programs delivered through the US Forest Service to assist in meeting the needs of rural areas: the Rural Fire Prevention and Control (RFPC) and Rural Community Fire Protection (RCFP). These programs provide cost-share grants to rural fire districts.

It can be helpful to utilize partners such as the North Olympic Peninsula Resource Conservation & Development Council for accessing federal, state, or local funding not tied to NFP or HFRA. For example, through the NRCS's Environmental Quality Incentives Program (EQIP), farmers and forest landowners may receive financial and technical support with structural and management conservation practices on agricultural and forest land. Some of the practices EQIP can assist include thinning, slash treatment, and fuel break projects. The Firewise Communities/USA program can assists communities in finding grants from an assortment of funding sources.

FEMA offers grants to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. There are three types of grants available:

Assistance to Firefighters Grant (AFG)

The primary goal of the Assistance to Firefighters Grants (AFG) is to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical services organizations.

Staffing for Adequate Fire and Emergency Response (SAFER)

The SAFER Grant was created to provide funding directly to fire departments and volunteer firefighter interest organizations in order to help them increase the number of trained, "front-line" firefighters available in their communities.

Fire Prevention and Safety (FP&S)

The FP&S grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations, firefighter safety and mitigate high incidences of death and injury.

The WaDNR offers programs that can make several types of training, equipment, and other assistance more affordable to local fire districts.

Wildland Fire Training
Through this program, fire districts may be eligible for:

- Wildland firefighting courses taught in your community at no cost, after meeting requirements and with a minimum registration of 15 students.
- Instruction by qualified instructors.

Fire protection districts and departments that are not eligible may still register students but must pay a modest tuition.

Opportunities for this training may be available to fire protection districts and departments in Washington State that:

- Have volunteer members.
- Serve communities with a population of 10,000 or fewer residents.
- Border on or include a Department of Interior agency (Bureau of Land Management, National Park Service, Bureau of Indian Affairs, US Fish & Wildlife Service) within its protection area OR currently have a Wildland Fire Response Agreement with a Department of Interior agency.

Wildland Fire Assistance Grants

These grants are administered by DNR through funding from the U.S. Department of Agriculture, this grant program provides a 50 percent match for purchases of personal protective equipment and general equipment.

The Wildland Fire Assistance Grant Program is administered in two phases annually:

- Phase I – Personal protective equipment (PPE) can be acquired from the first Monday of March until the last Friday in April.
- Phase II – General Equipment Grant Program is open from the first Monday in September and to the last Friday in October.

Opportunities for these grants may be available to fire protection districts and departments in Washington State that:

- Respond to wildland fire on private, state, or federal lands.
- Serve communities with a population of 10,000 or fewer residents.
- Serve a community of more than 10,000 residents AND a service area that includes a rural community of fewer than 10,000 residents.

Rural Fire Assistance Grants

Administered by DNR with funding from the U.S. Department of Interior, this program helps rural fire districts and departments meet basic needs for equipment, training, and fire prevention through a 10 percent match.

Opportunities for this training may be available to fire protection districts and departments in Washington State that:

- Protect rural, wildland-urban interface communities (where homes are built in forested or sparsely populated areas).
- Play a substantial cooperative role in protecting federal lands.
- Have fire protection agreements with the Department of the Interior or the State of Washington.
- Serve communities with a population of 10,000 or fewer residents.

Firefighter Property Program

This program helps fire protection districts and fire departments get fire engines and fire tenders (vehicles that bring water, foam, or dry chemicals to fire trucks in the field) suitable for low-cost conversion to wildland use. Fire districts receive the title to the property. Districts may have to pay the

expense of transporting the vehicle from an out-of-state location (about two-thirds of the vehicles located through this program come from other states).

Opportunities to obtain equipment through this program may be available to fire protection districts and fire departments in Washington that:

- Agree put the vehicle in service within a year of taking possession.
- Are willing to assist DNR in protecting Washington wildlands from wildfire.

*This program replaces the Federal Excess Property Program (FEPP) in Washington State.

Appendix A: Acronyms

BLM Bureau of Land Management
CWPP Community Wildfire Protection Plan
DNR Department of Natural Resources
DOI Department of the Interior
FEMA Federal Emergency Management Agency
FSRS Fire Suppression Rating Schedule
USFWS United States Fish and Wildlife Service
HFI Healthy Forests Initiative
HFRA Healthy Forests Restoration Act
IAFC International Association of Fire Chiefs
ICC International Code Council
ISO Insurance Services Office
ITC Inter-Tribal Timber Council
JFSP Joint Fire Sciences Program
MOU Memorandum of Understanding
NACo National Association of Counties
NASF National Association of State Foresters
NBAER National Burned Area Emergency Response (Coordinators Group)
NEPA National Environmental Policy Act
NFPORS National Fire Plan Operations and Reporting System
NGOs Non-Governmental Organizations
NIFC National Interagency Fire Center
NLC National League of Cities
NMAC National Multi-Agency Coordinating Group
NRCS Natural Resources Conservation Service
NWCG National Wildfire Coordination Group
OFM Office of Financial Management
SAF Society of American Foresters
USDA United States Department of Agriculture
USFS United States Forest Service
WDFW Washington Department of Fish and Wildlife
WFLC Wildfire Leadership Council
WGA Western Governors' Association
WSDOT Washington State Department of Transportation
WUI Wildland-Urban Interface

Appendix B: Glossary

The hierarchy of terminology will be those defined in law, those defined in policy, those defined in this guidance and then all other agency and interagency documentation.

Aerial Fuels: All live and dead vegetation in the forest canopy or above the surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

Air Tanker: A fixed-wing aircraft equipped to drop fire retardants or suppressants.

Agency: Any federal, state, county or city organization participating with jurisdictional responsibilities.

Aspect: Direction toward which a slope faces.

Blow-up: A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or to upset control plans. Blow-ups are often accompanied by violent convection and may have other characteristics of a fire storm.

Brush: A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low growing trees, usually of a type undesirable for livestock or timber management.

Brush Fire: A fire burning in vegetation that is predominantly shrubs, brush and scrub growth.

Buffer Zones: An area of reduced vegetation that separates wildland fuels from vulnerable residential or business developments. This barrier is similar to a greenbelt in that it is usually used for another purpose such as agriculture, recreation areas, parks, or golf courses.

Burning Ban: A declared ban on open air burning within a specified area, usually due to sustained high fire danger.

Burning Conditions: The state of the combined factors of the environment that affect fire behavior in a specified fuel type.

Burning Index: An estimate of the potential difficulty of fire containment as it relates to the flame length at the most rapidly spreading portion of a fire's perimeter.

Burning Period: That part of each 24-hour period when fires spread most rapidly, typically from 10:00 a.m. to sundown.

Chipping: Reducing wood related material by mechanical means into small pieces to be used as mulch or fuel. Chipping and mulching are often used interchangeably.

Chain: A unit of linear measurement equal to 66 feet.

Closure: Legal restriction, but not necessarily elimination of specified activities such as smoking, camping or entry that might cause fires in a given area.

Command Staff: The command staff consists of the information officer, safety officer, and liaison officer. They report directly to the incident commander and may have assistants.

Complex: Two or more individual incidents located in the same general area which are assigned to a single incident commander or unified command.

Condition Class: The classification system used by the USFS to determine the extent of departure from the natural fire regime.

Condition Class I: A forest system within its natural fire range and at low risk for catastrophic fire.

Condition Class II: A forest that has moderately departed from its historic fire occurrence and is at moderate risk of experiencing losses to a wildfire.

Condition Class III: A forest that has departed from its historic fire regime and the risk of losing key habitat is high.

Controlled Burn: synonymous with Prescribed Fire.

Cooperating Agency: An agency supplying assistance other than direct suppression, rescue, support, or service functions to the incident control effort; e.g., Red Cross, law enforcement agency, Telephone Company, etc.

Creeping Fire: Fire burning with a low flame and spreading slowly.

Crown Fire (Crowning): The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

Curing: Drying and browning of herbaceous vegetation or logging slash.

Dead Fuels: Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.

Debris Burning: A fire spreading from any fire originally set for the purpose of clearing land or for rubbish, garbage, range, stubble, or meadow burning.

Defensible Space: An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildfire and the loss to life, property, or resources. In practice, “defensible space” is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation.

Detection: The act or system of discovering and locating fires.

Dozer: Any tracked vehicle with a front-mounted blade used for exposing mineral soil.

Dozer Line: Fire line constructed by the front blade of a dozer.

Drop Zone: Target area for air tankers, helitankers, and cargo dropping.

Drought Index: A number representing net effect of evaporation, transpiration, and precipitation in producing cumulative moisture depletion in deep duff or upper soil.

Dry Lightning Storm: Thunderstorm in which negligible precipitation reaches the ground. Also called a dry storm.

Duff: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves immediately above the mineral soil.

Energy Release Component (ERC): The computed total heat released per unit area (British Thermal Units per square foot) within the fire front at the head of a moving fire.

Engine: Any ground vehicle providing specified levels of pumping, water, and hose capacity.

Engine Crew: Firefighters assigned to an engine.

Entrapment: A situation where personnel are unexpectedly caught in a fire behavior-related, life threatening position where planned escape routes or safety zones are absent, inadequate, or compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose. These situations may or may not result in injury. They include "near misses."

Environmental Assessment (EA): EAs were authorized by the National Environmental Policy Act (NEPA). They are concise, analytical documents prepared with public participation that determine if an Environmental Impact Statement (EIS) is needed for a particular project or action. If an EA determines an EIS is not needed, the EA becomes the document allowing agency compliance with NEPA requirements.

Environmental Impact Statement (EIS): EISs were authorized by the National Environmental Policy Act (NEPA). Prepared with public participation, they assist decision makers by providing information, analysis, and an array of action alternatives, allowing managers to see the probable effects of decisions on the environment. Generally, EISs are written for large-scale actions or geographical areas.

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area, such as an already burned area, previously constructed safety area, a meadow that won't burn, natural rocky area that is large enough to take refuge without being burned, or other areas which allows access to safety zones. When escaped routes deviate from a defined physical path, they should be clearly marked (flagged).

Escaped Fire: A fire which has exceeded or is expected to exceed initial attack capabilities or prescription.

Extended Attack Incident: A wildfire that has not been contained or controlled by initial attack forces and for which more firefighting resources are arriving, en route, or being ordered by the initial attack incident commander.

Extreme Fire Behavior: "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, and/or a strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Fingers of a Fire: The long narrow extensions of a fire projecting from the main body.

Fire Behavior: The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Behavior Forecast: Prediction of probable fire behavior usually prepared by a Fire Behavior Officer, in support of fire suppression or prescribed burning operations.

Fire Break: A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

Fire Cache: A supply of fire tools and equipment assembled in planned quantities or standard units at a strategic point for exclusive use in fire suppression.

Fire Crew: An organized group of firefighters under the leadership of a crew leader or other designated official.

Fire Intensity: A general term relating to the heat energy released by a fire.

Fireline: A linear fire barrier that is scraped or dug to mineral soil.

Fire Load: The number and size of fires historically experienced on a specified unit over a specified period (usually one day) at a specified index of fire danger.

Fire Front: The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.

Fire Management Plan (**FMP**): a plan that identifies and integrates all wildfire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildfires (wildfire and prescribed fire). The plan is supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, prescribed fire burn plans, and prevention plans. Fire Management Plans assure that wildfire management goals and components are coordinated.

Fire Perimeter: The entire outer edge or boundary of a fire

Fire Regime: A natural fire regime is a classification of the role that fire would play across a landscape in the absence of human intervention.

Fire Season: 1) Period(s) of the year during which wildfires are likely to occur, spread, and affect resource values sufficiently to warrant organized fire management activities. 2) A legally enacted time during which burning activities are regulated by state or local authority.

Fire Storm: Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface in drafts, near and beyond the perimeter, and sometimes by tornado-like fire whirls.

Fire Triangle: Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; removal of any of the three factors causes flame production to cease.

Fire Weather: Weather conditions that influence fire ignition, behavior, and suppression.

Fire Weather Watch: A term used by fire weather forecasters to notify using agencies, usually 24 to 72 hours ahead of the event, that current and developing meteorological conditions may evolve into dangerous fire weather.

Fire Whirl: Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to more than 500 feet in diameter. Large fire whirls have the intensity of a small tornado.

Firefighting Resources: All people and major items of equipment that can or potentially could be assigned to fires.

Flame Height: The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind of slope.

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Flaming Front: The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. Also called the fire front.

Flanks of a Fire: The parts of a fire's perimeter that are roughly parallel to the main direction of spread.

Flare-up: Any sudden acceleration of fire spread or intensification of a fire. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

Future Desired Conditions: The future desired conditions on federal land is a return to Condition Class 1. (see Condition Class 1)

Flashy Fuels: Fuels such as grass, leaves, draped pine needles, fern, tree moss, and some kinds of slash, that ignite readily and are consumed rapidly when dry. Also called fine fuels.

Forbs: Plants with a soft, rather than permanent woody stem, that is not a grass or grass-like plant.

Fuel: Any combustible material. This includes vegetation, such as grass, leaves, ground litter, shrubs, and trees, which feed a fire.

Fuel Bed: An array of fuels usually constructed with specific loading, depth, and particle size to meet experimental requirements; also, commonly used to describe the fuel composition in natural settings.

Fuel Loading: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Fuel Model: Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model has been specified

Fuel Moisture (Fuel Moisture Content): The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried.

Fuel Reduction (Fuel Treatment): Manipulation, including combustion or removal of fuels, to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

Fuel Type: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Geographic Area: A political boundary designated by the wildfire protection agencies where these agencies work together in the coordination and effective utilization.

Ground Fuel: All combustible materials below the surface litter, including duff, tree or shrub roots, punch wood, peat, and sawdust that normally support a glowing combustion without flame.

Haines Index: An atmospheric index used to indicate the potential for wildfire growth by measuring the stability and dryness of the air over a fire.

Hand Line: A fireline built with hand tools.

Hazard Reduction: Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Head of a Fire: The side of the fire having the fastest rate of spread.

Heavy Fuels: Fuels of large diameter, such as snags, logs, and large limb wood, that ignite and are consumed more slowly than flash fuels.

Helibase: The main location within the general incident area for parking, fueling, maintaining, and loading helicopters. The helibase is usually located at or near the incident base.

Helispot: A temporary landing spot for helicopters.

Hotspot: A particularly active part of a fire.

Hot spotting: Reducing or stopping the spread of fire at points of particularly rapid rate of spread or special threat, generally the first step in prompt control, with emphasis on first priorities.

Incident: A human-caused or natural occurrence, such as wildfire, that requires emergency service action to prevent or reduce the loss of life or damage to property or natural or cultural resources.

Incident Action Plan (IAP): A plan that contains objectives reflecting the overall incident strategy and specific tactical actions and supporting information for the next operational period. The plan may be oral or written. When written, the plan may have a number of attachments, including but not limited to: incident objectives, organization assignment list, division assignment, incident radio communication plan, medical plan, traffic plan, safety plan, and incident map.

Incident Command Post (ICP): Location at which primary command functions are executed. The ICP may be co-located with the incident base or other incident facilities.

Incident Command System (ICS): The combination of facilities, equipment, personnel, procedure and communications operating within a common organizational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Incident Commander: Individual responsible for the management of all incident operations at the incident site.

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire.

Job Hazard Analysis: This analysis of a project is completed by staff to identify hazards to employees and the public. It identifies hazards, corrective actions, and the required safety equipment to ensure public and employee safety.

Keech Byram Drought Index (KBDI): Commonly-used drought index adapted for fire management applications, with a numerical range from 0 (no moisture deficiency) to 800 (maximum drought).

Ladder Fuels: Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

LANDFIRE: a federal interagency group devoted to providing spatial data to wildland managers (www.landfire.gov).

Land/Resource Management Plan (L/RMP): a document prepared with public participation and approved by an agency administrator that provides general guidance and direction for land and resource management activities for an administrative area. The L/RMP identifies the need for fire's role in a particular area and for a specific benefit. The objectives in the L/RMP provide the basis for the development of fire management objectives and the fire management program in the designated area.

Light (Fine) Fuels: Fast-drying fuels, such as grasses and conifer needles, generally with comparatively high surface area-to-volume ratios, which are less than ¼-inch in diameter and have a moisture time lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Litter: Top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer, composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Live Fuels: Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms rather than by external weather influences.

Mineral Soil: Soil layers below the predominantly organic horizons; soil with little combustible material.

Mobilization: The process and procedures used by all organizations, federal, state and local for activating, assembling, and transporting all resources that have been requested to respond to or support an incident.

Mop-up: To make a fire safe or reduce residual smoke after the fire has been controlled by extinguishing or removing burning material along or near the control line, felling snags, or moving logs so they won't roll downhill.

Multi-Agency Coordination (MAC): A generalized term which describes the functions and activities of representatives of involved agencies and/or jurisdictions who come together to make decisions regarding the prioritizing of incidents, and the sharing and use of critical resources. The MAC organization is not a part of the on-scene ICS and is not involved in developing incident strategy or tactics.

Mutual Aid Agreement: Written agreement between agencies and/or jurisdictions in which they agree to assist one another upon request, by furnishing personnel and equipment.

National Environmental Policy Act (NEPA): NEPA is the basic national law for protection of the environment, passed by Congress in 1969. It sets policy and procedures for environmental protection, and authorizes Environmental Impact Statements and Environmental Assessments to be used as analytical tools to help federal managers make decisions.

National Fire Danger Rating System (NFDRS): A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

National Wildfire Coordinating Group (NWCG): A group formed under the direction of the Secretaries of Agriculture and the Interior and comprised of representatives of the U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service and Association of State Foresters. The group's purpose is to facilitate coordination and effectiveness of wildfire activities and provide a forum to discuss, recommend action, or resolve issues and problems of substantive nature. NWCG is the certifying body for all courses in the National Fire Curriculum.

Normal Fire Season: 1) A season when weather, fire danger, and number and distribution of fires are about average. 2) Period of the year that normally comprises the fire season.

Operational Period: The period of time scheduled for execution of a given set of tactical actions as specified in the Incident Action Plan. Operational periods can be of various lengths, although usually not more than 24 hours.

Overhead: People assigned to supervisory positions, including incident commanders, command staff, general staff, directors, supervisors, and unit leaders.

Peak Fire Season: That period of the fire season during which fires are expected to ignite most readily, to burn with greater than average intensity, and to create damages at an unacceptable level.

Planned Ignition: The intentional initiation of a wildfire by hand-held, mechanical, or aerial device where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (weather, fuel, topography), firing technique, and other factors which influence fire behavior and fire effects (see prescribed fire).

Preparedness: Condition or degree of being ready to cope with a potential fire situation.

Prescribed Fire: A wildfire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition (see planned ignition).

Prescribed Fire Plan (Burn Plan): This document provides the prescribed fire burn boss information needed to implement an individual prescribed fire project.

Prescription: Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Prevention: Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards.

Protection: The actions taken to limit the adverse environmental, social, political, and economical effects of fire.

Radiant Burn: A burn received from a radiant heat source.

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Reburn: The burning of an area that has been previously burned but that contains flammable fuel that ignites when burning conditions are more favorable; an area that has reburned.

Red Flag Warning: Term used by fire weather forecasters to alert forecast users to an ongoing or imminent critical fire weather pattern.

Rehabilitation: The activities necessary to repair damage or disturbance caused by wildfires or the fire suppression activity.

Relative Humidity (RH): The ratio of the amount of moisture in the air, to the maximum amount of moisture that air would contain if it were saturated. The ratio of the actual vapor pressure to the saturated vapor pressure. RH is a strong driver of moisture content in fine fuels.

Remote Automatic Weather Station (RAWS): An apparatus that automatically acquires, processes, and stores local weather data for later transmission to the GOES Satellite, from which the data is re-transmitted to an earth-receiving station for use in the National Fire Danger Rating System.

Resources: 1) Personnel, equipment, services, and supplies available, or potentially available, for assignment to incidents. 2) The natural resources of an area, such as timber, forage, watershed values, recreation values, and wildlife habitat.

Resource Management Plan (RMP): A document prepared by field office staff with public participation and approved by field office managers that provides general guidance and direction for land management activities at a field office. The RMP identifies the need for fire in a particular area and for a specific benefit.

Response to Wildfire: The mobilization of the necessary services and responders to a fire based on ecological, social, and legal consequences, the circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected.

Retardant: A substance or chemical agent which reduces the flammability of combustibles.

Run (of a fire): The rapid advance of the head of a fire with a marked change in fire line intensity and rate of spread from that noted before and after the advance.

Safety Zone: An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of a blowup in the vicinity.

Severity Funding: Funds provided to increase wildfire suppression response capability necessitated by abnormal weather patterns, extended drought, or other events causing abnormal increase in the fire potential and/or danger.

Single Resource: An individual, a piece of equipment and its personnel complement, or a crew or team of individuals with an identified work supervisor that can be used on an incident.

Size-up: To evaluate a fire to determine a course of action for fire suppression.

Slash: Debris left after logging, pruning, thinning or brush cutting; includes logs, chips, bark, branches, stumps, and broken understory trees or brush.

Slop-over: A fire edge that crosses a control line or natural barrier intended to contain the fire.

Smoke Management: Application of fire intensities and meteorological processes to minimize degradation of air quality during prescribed fires.

Snag: A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

Spark Arrester: A device installed in a chimney, flue, or exhaust pipe to stop the emission of sparks and burning fragments.

Spot Fire: A fire ignited outside the perimeter of the main fire by flying sparks or embers.

Spot Weather Forecast: A special forecast issued to fit the time, topography, and weather of each specific fire. These forecasts are issued upon request of the user agency and are more detailed, timely, and specific than zone forecasts.

Spotting: Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

Staging Area: Locations set up at an incident where resources can be placed while awaiting a tactical assignment on a three-minute available basis. Staging areas are managed by the operations section.

Strategy: The science and art of command as applied to the overall planning and conduct of an incident.

Structure Fire: Fire originating in and burning any part or all of any building, shelter, or other structure.

Suppressant: An agent, such as water or foam, used to extinguish the flaming and glowing phases of combustion when directly applied to burning fuels.

Suppression: All the work of extinguishing or containing a fire, beginning with its discovery.

Surface Fuels: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also

grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.

Tactics: Deploying and directing resources on an incident to accomplish the objectives designated by strategy.

Torching: The ignition and flare-up of a tree or small group of trees, usually from bottom to top.

Uncontrolled Fire: Any fire which threatens to destroy life, property, or natural resources.

Unplanned Ignition: The initiation of a wildfire by lightning, volcanoes, or unauthorized and accidental human-caused fires.

Under burn: A fire that consumes surface fuels but not trees or shrubs.

Volunteer Fire Department (VFD): A fire department of which some or all members are unpaid.

Wildfire: Unplanned ignition of a fire in a wildland setting (such as a fire caused by lightning, volcanoes, unauthorized and accidental human-caused fires, and escaped prescribed fires).

Water Tender: A ground vehicle capable of transporting specified quantities of water.

Wildland fire: Any nonstructural fire, other than prescribed fire, that occurs in wildland setting.

Wildfire Implementation Plan (WFIP): A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildfire being managed for resource benefits.

Wildfire Use: The management of naturally ignited wildfires to accomplish specific pre-stated resource management objectives in predefined geographic areas outlined in Fire Management Plans.

Wildland-Urban Interface: The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

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Appendix D: Neighborhood Wildfire Hazard Assessment Form

Neighborhood Wildfire Hazard Assessment Form

This assessment form is based on 2006 International Wildland-Urban Interface Code Appendix C and 2002 NFPA 1144 Annex A

Community Name	**Community Location**
Primary Access Road Name	**Evaluator(s)**
Evaluation Date	

A: Neighborhood Design	**Score**	**Rating**	**Notes**
Access			
Two or more primary roads	0		
One road through	3		
One road in and out (entrance & exit are the same)	5		
Gate			
Not gated	0		
Locked gate	5		
Bridges			
No bridges or bridges with no weight and width restrictions	0		
Low weight or narrow bridge restricting emergency vehicle access	5		
Road Width			
20' or more	1		
Less than 20'	3		
Road Grade			
5% or less	1		
Greater than 5%	3		
Road Type			
All weather, paved	0		
All weather, gravel	3		
Limited access or unmaintained	5		
Secondary Road Terminus			
Loop roads or cul-de-sacs, outside turning radius of 45' or more	1		
Cul-de-sac, outside turning radius of less than 45'	2		
Dead-end road, less than 200' long	3		
Dead-end road, more than 200' long	5		
Street Signs			
Present, with ≥4" reflective letters	1		
Missing, or present with <4" letters or non-reflective letters	3		
	Sum:		

B: Vegetation / Fuels	Score	Rating	Notes
Fuel Type			
Light (e.g., grasses <6", decidous leaf litter)	1		
Medium (e.g., grasses >6", conifer litter, light brush, small trees)	5		
Heavy (e.g., dense brush, timber)	10		
Very heavy (e.g., logging slash, high volume of dead and down)	15		
Ladder Fuels			
Most tree branches pruned up >6' above ground or understory fuels	0		
Most tree branches close to ground or understory fuels	5		
Defensible Space			
70% or more of neighborhood	1		
30 - 70% of neighborhood	10		
Less than 30% of neighborhood	20		
	Sum:		

C: Topography and Weather	Score	Rating	Notes
Weather			
History of high fire occurrence	0 - 5		
Exposed to unusually severe fire weather and strong, dry winds	0 - 5		
Local weather conditions and prevailing winds	0 - 5		
Slope			
8% or less	1		
8 - 19%	4		
20 - 29%	7		
More than 30%	10		
Topographic features*			
Topography that adversely affects fire behavior	0 - 5		
** Consider attributes like ridges, saddles, steep slopes, steep narrow draws, small canyons, etc.*	**Sum:**		

D: Building and Property Construction	Score	Rating	Notes
Roofing			
More than 75% of homes have metal, tile, class A asphalt or fiberglass shingles	0		
50 - 70% of homes have metal, tile, class A asphalt or fiberglass shingles	10		
Less than 50% of homes have metal, tile, class A asphalt or fiberglass shingles	15		
More than 50% of homes have wood roofs	20		

D: Building/Property Construction (con't)	Score	Rating	Notes
Siding and Decks			
More than 75% of homes have noncombustible siding/deck	0		
50 - 70% of homes have noncombustible siding/deck	5		
50 - 70% of homes have noncombustible siding and combustible deck	10		
Less than 50% of homes have noncombustible siding and combustible deck	15		
More than 50% of homes have combustible siding/deck	20		
Foundations / Crawlspace			
More than 75% of homes have enclosed foundations with vents covered by ≤1/4" metal mesh	0		
50 - 70% of homes have enclosed foundations with with vents covered by ≤1/4" metal mesh	5		
Less than 50% of homes have enclosed foundations with vents covered by ≤1/4" metal mesh	15		
More than 50% of homes have open foundations	20		
	Sum:		

E: Fire Protection - Water Source	Score	Rating	Notes
500 GPM hydrants spaced within 1,000'	0		
Hydrants spaced >1,000' apart or < 500 GPM hydrants	2		
Other water source available within community (tanks, pools, lakes, etc.)	5		
Water source located within 20 minute or less round trip	7		
Water source located farther than 20 minute but less than 45 minute round trip	10		
Water source farther than 45 minute round trip	15		
	Sum:		

F: Utilities	Score	Rating	Notes
Electric			
Underground, clearly marked	0		
Underground, not clearly marked	1		
Overhead, with adequate right of way (>20')	2		
Overhead, with right of way not maintained	5		

F: Utilities (con't)	Score	Rating	Notes
Gas			
Underground, clearly marked	0		
Underground, not clearly marked	1		
Aboveground, with 15' of brush clearance and >30' from structures	2		
Aboveground, with no brush clearance or <30' from structures	5		
	Sum:		

G: Surrounding Landscape	Score	Rating	Notes
Neighborhood is predominately within low fire hazard mapping area	0		
Neighborhood is predominately within moderate fire hazard mapping area	10		
Neighborhood is predominately within high fire hazard mapping area	15		
Neighborhood is predominately within extreme fire hazard mapping area	20		
	Sum:		

Neighborhood Hazard Ratings	**Sum**
A: Neighborhood Design	
B: Vegetation / Fuels	
C: Topography and Weather	
D: Building and Property Construction	
E: Fire Protection - Water Source	
F: Utilities	
G: Surrounding Landscape	
Total:	

Neighborhood Hazard from Wildfire Rating Scale	
Low	**< 70**
Moderate	**71 - 110**
High	**111 - 135**
Extreme	**> 135**

Additional notes:

Appendix E: Qualitative Property Wildfire Hazard Assessment Form

Qualitative Property Wildfire Hazard Assessment Form

This assessment form is based on NFPA 1144, Standard for Reducing Structure Ignition Hazards from Wildfire, 2008

Homeowner Name	**Home Address**
Evaluator(s) / Evaluation Date:	
Assessment Item	**Mitigation Recommendations**
1. Overview of Surroundings	
How is the structure positioned in relationship to severe fire behavior? **Type of Construction**	
2. Chimney to Eaves	
Inspect the roof - noncombustible? Shingles missing? Shingles flat with no gaps? **Gutters - present? Noncombustible?** **Litter on roof, in gutters, or crevices?**	
3. Top of Exterior Wall to Foundation	
Attic, eaves, soffit vents, and crawl space: **Inspect windows & screens - metal screens? Mulit-paned or tempered windows? Picture windows facing vegetation?** **Wall and attachments - noncombustible? Will they collect litter?** **Decks - combustible material?** **Fences:** **Flammable material next to or under structure?** **Combustible materials near or on surface where walls meet roof or deck?** **Nooks, crannies, or other spaces where firebrands could enter?**	
4. Foundation to 30' from Structure	
Landscaped (managed) vegetation - separation distances, maintenance, plant selection? **Propane tanks?** **Vehicle and RV use and parking, including lawn mowers, etc.** **Outbuildings / structures:**	
5. Between 30 - 120'	
Inspect vegetation clearance and crown separation, setbacks, etc.	

Appendix F: Quantitative Property Wildfire Hazard Assessment Checklist

Quantitative Property Wildfire Hazard Assessment Checklist

This assessment form is based on NFPA 1144, Standard for Reducing Structure Ignition Hazards from Wildfire, 2008

Homeowner Name	**Neighborhood Name & Location**
Address / Coordinates	**Evaluator(s) / Evaluation Date**

A: Chimney to Eaves	**Score**	**Rating**	**Notes**
Is there a chimney?			
None	0		
Present, with spark arrester	5		
Present, without spark arrester	20		
What is the primary roofing material?			
Metal/Asphalt/Tile	0		
Wood, Treated	30		
Wood, Untreated	50		
What is the primary gutter material?			
None or Metal	0		
Vinyl or Wood	5		
None, exposed wood fascia	5		
What is the primary soffit material?			
Metal, with metal mesh/screens	0		
Vinyl, with metal mesh/screens	10		
Wood or no vent screens	15		
Open eaves	20		
	Sum:		

B: Top of Walls to Foundation	**Score**	**Rating**	**Notes**
Is the foundation/crawlspace enclosed?			
Enclosed with vents covered by ≤1/4" metal mesh	0		
Enclosed with open vents or combustible mesh	5		
Open	15		
Is there a fixed fire protection system?			
NFPA 13, 13R, 13D sprinkler system	0		
None	5		
What is the primary construction material? (Consider amount and type of windows, deck size and exposure(s), proximity to fuels that promote firebrands, etc.)			
Noncombustible / fire-resistive / ignition-resistive siding and deck	0-14		
Noncombustible / fire-resistive / ignition-resistive siding and combustible deck (score depends on qualities above)	15-49		
Combustible siding and deck	50		
	Sum:		

C: Foundation to 30' from Structure	Score	Rating	Notes
Are there fences or other attachments to the structure?			
None or non-combustible	0		
Combustible	15		
What is the average slope within 30' of the structure?			
Little to no slope	0		
Slope 5 - 9%	1		
Slope 10 - 20%	4		
Slope 21 - 30%	7		
Slope 31 - 40%	10		
Slope >40%	15		
What is the predominant fuel type within 30' of the structure?			
Sand, gravel, etc. (non combustible)	0		
Light fuels, maintained, e.g., established lawn, up to 6" tall	5		
Light fuels, not maintained, e.g., wild grasses and forbs, up to 6" tall	10		
Light fuels, non-fire-prone shrubs w/leaves (include creeping or spreading, e.g., ground ivy)	12		
Medium fuels, grasses and forbs over 6" tall (pasture, heavy weeds, etc.)	15		
Medium fuels, herbaceous understory or forest needle/leaf litter	15		
Medium fuels, light brush or small trees	20		
Medium fuels, shrubs w/needles (creeping/spreading, e.g., spreading juniper)	20		
Heavy fuels, fire-prone shrubs (manzanita, etc.)	25		
Heavy fuels, dense brush or timber	25		
Heavy fuels, logging slash	30		
Is there fuel modification treatment within 100' of the structure? (e.g., removal of ladder fuels, dead branches removed, limbed up trees, tree crown separation, tree canopies >10' from structure(s), etc.)			
71 - 100' of vegetation treatment from the structure	0		
30 - 70' of vegetation treatment from the structure	7		
<30' of vegetation treatment from the structure	15		
What is the separation from structure(s) on adjacent property(ies) that can contribute to fire spread or behavior? (Consider ignition risk of adjacent properties' structures, including garages, gazebos, sheds, and other outbuildings.)			
More than 200'	0		
120-200'	1		
30-100'	3		
<30'	5		
	Sum:		

What is the predominant fuel model within 30' of the structure?
NFFL Fuel Model:

D: 30' to 100+' from Structure	Score	Rating	Notes
What is the average slope between 30-120' of the structure?			
Little to no slope	0		
Slope 5 - 9%	1		
Slope 10 - 20%	2		
Slope 21 - 30%	3		
Slope 31 - 40%	6		
Slope >40%	10		
What is the predominant fuel type between 30-120' of the structure?			
Sand, gravel, etc. (non combustible)	0		
Light fuels, maintained, e.g., established lawn, up to 6" tall	1		
Light fuels, not maintained, e.g., wild grasses and forbs, up to 6" tall	1		
Light fuels, non-fire-prone shrubs w/leaves (include creeping or spreading, e.g., ground ivy)	5		
Medium fuels, grasses and forbs over 6" tall (pasture, heavy weeds, etc.)	5		
Medium fuels, herbaceous understory or forest needle/leaf litter	5		
Medium fuels, light brush or small trees	5		
Medium fuels, shrubs w/needles (creeping/spreading, e.g., spreading juniper)	10		
Heavy fuels, fire-prone shrubs (manzanita, etc.)	15		
Heavy fuels, dense brush or timber	15		
Heavy fuels, logging slash	20		
Is there fuel modification treatment between 100-200' of structure?*			
101 - 200' of vegetation treatment from the structure	0		
71 - 100' of vegetation treatment from the structure	5		
* *E.g., removal of ladder fuels, dead branches removed, limbed up trees,* tree crown separation, tree canopies >10' from structure(s), etc.			
What is the separation from structure(s) on adjacent property(ies) that can contribute to fire spread or behavior? *(Consider ignition risk from burning adjacent properties' structures (including garages, gazebos, sheds, and other outbuildings).*			
More than 200'	0		
101-200'	1		
30-100'	3		
<30'	5		
	Sum:		

What is the predominant fuel model between 30-120' of the structure?
NFFL Fuel Model:

E: Overview of Surrounding Environment	Score	Rating	Notes
Topography and weather considerations			
Topography that adversely affects fire behavior	0 - 5		
Areas with history of high fire occurrence	0 - 5		
Areas exposed to unusually severe fire weather and strong, dry winds	0 - 5		
Local weather conditions and prevailing winds	0 - 5		
What is the predominant fuel type of the surrounding environment?			
Sand, gravel, etc. (non combustible)	0		
Light fuels, maintained, e.g., established lawn, up to 6" tall	2		
Light fuels, not maintained, e.g., wild grasses and forbs, up to 6" tall	5		
Light fuels, non-fire-prone shrubs w/leaves (include creeping or spreading, e.g., ground ivy)	5		
Medium fuels, grasses and forbs over 6" tall (pasture, heavy weeds, etc.)	10		
Medium fuels, herbaceous understory or forest needle/leaf litter	10		
Medium fuels, light brush or small trees	10		
Medium fuels, shrubs w/needles (creeping/spreading, e.g., spreading juniper)	12		
Heavy fuels, fire-prone shrubs (manzanita, etc.)	15		
Heavy fuels, dense brush or timber	15		
Heavy fuels, logging slash	15		
What is the building setback relative to slopes of ≥30%?			
Equal to or greater than 30' to slope ≥30%	1		
Less than 30' to slope ≥30%	5		
Where are gas and electricity utilities placed?			
Both belowground	0		
One aboveground, one belowground	3		
Both aboveground	5		
What is the separation from structure(s) on adjacent property(ies) that can contribute to fire spread or behavior? (Consider ignition risk from burning adjacent properties' structures, including garages, gazebos, sheds, and other outbuildings.)			
More than 200'	0		
101-200'	1		
30-100'	3		
<30'	5		
	Sum:		

What is the predominant fuel Hazard in the surrounding environment?
NFFL Fuel Model:

Property Hazard Ratings	Sum
A: Chimney to Eaves	
B: Top of Walls to Foundation	
C: Foundation to 30' from Structure	
D: 30' to 100+' from Structure	
E: Overview of Surrounding Environment	

Structure Ignition Hazard from Wildfire Rating Scale*		
Slight structure ignition hazard		**0 - 14**
Moderate structure ignition hazard		**15 - 29**
Significant structure ignition hazard		**30 - 49**
Severe structure ignition hazard		**50+**

** Compare with **each** of the five hazard assessment areas*

Appendix G: Prioritized Wildfire Hazard Mitigation Form

Neighborhood/Structure	
Location and Fire District	
Lead Agency/Individual	
Ignition Risk and Hazard Rating (Appendix D,E, F)	
Values Protected (# of homes, schools, hospitals, utilities, etc.)	
Steps taken to reduce Structural Ignitability (Appendix E)	
Hazardous fuels Reduction Projects (Type, Method, # of Acres)	
Education/Outreach Activities	
Emergency Response Capabilities and Needs	
Access/ Evacuation Plan	
Funding Source (cost/benefit)	
Timeline	
Overall Priority Rating (High, Med, Low)	

Appendix H: National Register of Historic Places

Resource Name	Address	City	Listed	Area of Significance
Aircraft Warning Service Observation Tower	216 Spring Rd.	Agnew	1993	Military
Altair Campground Community Kitchen	Olympic Hot Springs Rd.	ONP	2007	Architecture
Beaver School	US 101 N, W side	Beaver	1992	Education
Blue Mountain School	Blue Mountain Rd.	Port Angeles	1987	Education, Social History
Canyon Creek Shelter	.9 mi. N of the Upper Sol Duc River Trailhead	ONP	2007	Architecture
Clallam County Courthouse	319 Lincoln St.	Port Angeles	1987	Architecture, Politics/Gov.
Dodger Point Fire Lookout	13 mi. along Dodger Point Trail	ONP	2007	Architecture
Dungeness River Bridge	Spans Dungeness River	Sequim	1982	Engineering, Transportation
Dungeness School	657 Towne Rd.	Dungeness	1988	Education, Architecture
Eagle Ranger Station	Upper Sol Duc Rd.	ONP	2007	Architecture
Elkhorn Guard Station	11.5 mi. along Elwha River Trail	ONP	2007	Architecture
Elwha Campground Community Kitchen	Olympic Hot Springs Rd.	ONP	2007	Architecture
Elwha Ranger Station	Olympic Hot Springs Rd.	ONP	2007	Architecture
Elwha River Bridge	Old Hwy. 112	Elwha	1982	Engineering, Transportation
Elwha River Hydroelectric Power Plant	N end of Lake Aldwell	Port Angeles	1988	Engineering, Industry
Emery Farmstead	Emery Rd	Port Angeles	1988	Architecture
Fifteen Mile Shelter	12.4 mi. from park boundary on N Fork Bogachiel River Trail	ONP	2007	Architecture
Glines Canyon Hydroelectric Power Plant	N end of Lake Mills at Elwha River	Port Angeles	1988	Engineering, Industry
Hoko River Archeology Site	Address Restricted	Pysht	1978	Prehistoric
Hoko River Rockshelter Archeological Site	Address Restricted	Sekiu	1980	Prehistoric
Humes Ranch Cabin	S of Port Angeles on Elwha River	ONP	1977	Architecture, Historic - Aboriginal
Hyak Shelter	15.4 mi. from park boundary on N Fork Bogachiel River Trail	Forks	2007	Architecture
Hyer, John A., Farm	Address Restricted	Sequim	1994	Architecture
Manis Mastodon Site	Address Restricted	Sequim	1978	Prehistoric

Masonic Temple	622 S. Lincoln St.	Port Angeles	1989	Architecture, Social History
McAlmond House	N of Sequim on Dungeness Bay	Sequim	1976	Architecture, Politics/ Government, Commerce
Michael's Cabin	2 mi. from Whiskey Bend Trailhead	ONP	2007	Architecture, Social History
Naval Lodge Elks Building	131 E. First St.	Port Angeles	1986	Architecture, Social History
New Dungeness Light Station	Dungeness Spit	Sequim	1993	Maritime History
North Fork Sol Duc Shelter	9.5 mi from North Fork Sol Duc Trailhead	ONP	2007	Architecture
Olympic National Park Headquarters Historic District	600 E. Park Ave.	Port Angeles	2007	Architecture, Social History
Ozette Indian Village Archeological Site	Address Restricted	La Push	1974	Prehistoric, Historic - Aboriginal
Paris, Joseph, House	101 E. Fifth St.	Port Angeles	1987	Architecture
Peter Roose Homestead	Lake Ozette Prairie	ONP	2007	Architecture, Social History
Pyramid Peak Aircraft Warning Service Lookout	Up Pyramid pk. Trail at the end of Camp David Jr.Rd.	Port Angeles	2007	Architecture, Social History
Rosemary Inn	SW of Port Angeles on Barnes Point	Port Angeles	1979	Architecture, Conservation, Entertainment/Recreation
Sekiu School	Rice St.	Sekiu	1991	Education, Architecture
Sequim Opera House	119 N. Sequim Ave.	Sequim	1991	Entertainment/Recreation
Singer’s Lake Crescent Tavern	Barnes Point	ONP	2007	Architecture, Social History
St. Andrew's Episcopal Church	206 S. Peabody St.	Port Angeles	1987	Architecture, Social History
Storm King Ranger Station	Barnes Point	ONP	2007	Architecture, Social History
Tatoosh Island	NW of Cape Flattery	Olympic Peninsula	1972	Transportation
Three Forks Shelter	4.5 mi N of Deer Park Campground	ONP	2007	Architecture, Social History
U.S. Post Office	W. 1st and Oak Sts.	Port Angeles	1983	Architecture
US Quarantine Station Surgeon's Residence	101 Discovery Way	Diamond Point	1989	Health/Medicine
Wedding Rock Petroglyphs	Address Restricted	Forks	1976	Religion, Art, Prehistoric
Wendel Property	E. Shore Rd.	Port Angeles	2007	Architecture, Social History

Appendix I: Emergency Contacts

Contact	Phone #
WA DNR - Report a Forest Fire	1-800-562-6010
Washington Department of Natural Resources 411 Tillicum Lane, Forks, WA 98331	(360) 374-2800
Olympic National Forest 437 Tillicum Lane, Forks, WA 98331	(360) 374-6522
Olympic National Park 600 East Park Avenue, Port Angeles, WA 98362	(360) 565-3130
Fire District No. 1-Forks area	(360) 374-5561
Fire District No. 2-Port Angeles Area	(360) 452-7725
Port Angeles Fire Department	(360) 417-4655
Fire District No. 3-Sequim Area	(360) 683-4242
Fire District No. 4-Joyce Area	(360) 928-3132
Fire District No. 5-Clallam Bay/Sekiu Area	(360) 963-2371
Fire District No. 6-Quillayute Area	(360) 374-2266
Law Enforcement	911
Sheriff's Office 223 E. 4th Street, Suite 12, Port Angeles, WA 98362	(360) 374-5324
State Patrol 62 Old Olympic Highway, Port Angeles, WA 98362	(360) 417-1738 or 800-283-7808
Ambulance	911
Olympic Medical Center 939 Caroline Street, Port Angeles, WA 98362	(360) 417-7000
Forks Community Hospital 530 Bogachiel Way, Forks, WA 98331	(360) 374-6271
Clallam Bay Medical Clinic 74 Bogachiel Street, Clallam Bay, WA 98326	(360)-963-2202
Utilities	
Port Angeles City Light	(360) 417-4731
Clallam County PUD –Customer Service Representatives may be reached by calling 800-542-7859 or at any of the Clallam County PUD offices listed below.	
Port Angeles PUD office 2431 E. Highway 101, Port Angeles, WA 98362	(360) 452-9771
Sequim PUD office 502 S Still Road, Sequim, WA 98382	(360) 452-9771
Clallam Bay/Sekiu PUD office 15 Sekiu Airport Rd., Sekiu, WA 98381	(360) 963-2223
Forks PUD office 31 Spartan Ave., Forks, WA 98331	(360) 374-6201
Telecommunications providers	
Century Tel	800-201-4102
Olypen	(360) 683-1456
Qwest	800-244-1111
Verizon	(253) 483-5000