Mason County
Community Wildfire
Protection Plan

Prepared by Western Washington University, Huxley College – Peninsula

Ecosystem Management Class, Winter 2012

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Mason County Community Wildfire Protection Plan

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I. Introduction

Overview

Wildfires are a growing hazard in many regions of the United States, posing a threat to life, property, and natural and cultural resources. This is especially true where development mixes with wildland vegetative fuels, 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 these processes, often creating a more dense forest environment that can burn more intensely than historic wildfires. While the Puget Sound Region is known for its high levels of rainfall, it is less common knowledge that fire is a strong ecological influence in the area. Summer droughts occur here, which can elevate the risk of ignition in drier areas. Every summer, Mason County experiences several small wildfires and experts anticipate a serious wildfire event once every ten years. The potential for a major wildfire is extremely high due to the combination of having a seasonally dry climate and high vegetative fuel loads.

The risk wildfire poses to human life has increased in Mason County over the past few decades because of the increase in homes built within the WUI. A recent study by Headwaters Economics found that out of all the counties in Washington, Mason County has the twelfth highest risk of catastrophic losses in the event of a major wildfire. The same study ranks Washington third in the western states for potential future risk as the result of increasing human development in wildfire-prone areas.

Currently, many residents are developing homes in interface areas near the dense, fuel loaded forest. New residents often assume that wildfire is not a problem in the Pacific Northwest, though research has determined that forests in the rain shadow areas are more similar to those in central Oregon and northern California than those on the pacific coast. One area of concern is near the recreational areas of Mason County, where many of the structures are secondary vacation homes. Development is expanding further and further into forested land in these areas, creating a significant hazard for interface fires. Many of the property owners in Mason County may be unaware of the concept of defensible space, and how it is directly relevant to their lands, adding to the potential for severe WUI fires in the near future.

Development is expanding further and further into forested land in these areas, creating a significant hazard for interface fires.

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 parts of Mason County could be more severely affected than other areas in Western Washington due to its seasonal dry weather hazard and large WUI area.

Those who are concerned for their community as well as their own lives and livelihoods should be aware of the high risk of a future wildfire. A serious wildfire in Mason County could cause many communities to become disaster zones with heavy property losses and a potential loss of lives. With careful planning and collaboration among public agencies and communities, it is possible to minimize the losses that can result from wildfire.

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

In February of 2012, Western Washington University students began research and development of a Community Wildfire Protection Plan (CWPP) in conjunction with state and federal agencies, fire protection districts, and community organizations throughout the county. A CWPP identifies communities-at-risk, prioritizes hazardous fuel treatments, and recommends ways to reduce structural ignitability. The purpose of the Mason County CWPP is to provide a consolidated reference document and framework that enable 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, delineates Wildland-Urban Interface areas, and presents recommended mitigation measures to protect these 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 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 within their 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 the planning process for this CWPP:

Healthy Forests Restoration Act

On December 3rd, 2003, former 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 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.

All fuels management treatments must comply with the National Environmental Policy Act (NEPA). Hazardous-fuel reduction projects on USFS and BLM lands, such as mechanical thinning or prescribed fire, qualify for expedited NEPA review under the HFRA if they occur within one or more of the following areas:

- 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.

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 include:

- Firefighting
- Rehabilitation
- Hazardous Fuels Reduction
- Community Assistance

- Accountability

The main priorities of the NFP 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 such as dry brush and trees that have accumulated) in the county's forests and rangelands thus reducing the likelihood of intense fires.
- 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.

Federal Emergency Management Agency (FEMA) 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)). 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.

In August, 2010, the Mason County Hazard Mitigation Plan (MCHMP) was adopted by the county and approved by FEMA. The MCHMP provides a county-wide overview and assessment of existing or potential natural hazards that pose a significant risk to human life and critical infrastructure within the County. The MCHMP rated the probability level of future occurrence of wildland fire hazard events as high. The Mason County CWPP complements the MCHMP by identifying areas of high wildfire hazard and providing methods for reducing the hazard level in those areas.

The Community Wildfire Protection Plan Handbook

The Community Wildfire Protection Plan Handbook (CWPPH) is a guidance document that makes step-by-step recommendations for developing a community wildfire protection 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." On Mar. 3, 2012, the contents of this CWPP were presented to the public, along with state and county officials at the Public Works facility in Mason County. It is recommended that this material be presented at future public meetings where associated education campaigns should be conducted to provide fire prevention education materials and to obtain feedback from community members in order to further determine community priorities for wildfire protection.

Plan Adoption

In accordance with the HFRA, 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 takes into account all of Mason County and serves as a 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. Mason County Description

Location and Background

Mason County is located in the southeastern portion of the Olympic Peninsula in western Washington State (Figure 1) and encompasses parts of Olympic National Park, Hood Canal, and the Kitsap Peninsula. It borders on Jefferson County to the north, Grays Harbor County to the west and southwest, Thurston County to the southeast, Pierce County to the east, and Kitsap County to the northeast. Mason County has over 90 miles of marine shoreline to the east. The county was created out of Thurston County in 1854 and was named Sawamish County in honor of the first residents of the area. In 1864, it was renamed Mason County after Charles Mason, the secretary of Washington Territory during the Indian wars during 1855-56. The earliest known inhabitants of the county were coastal Salish members of the Skokomish-Twana and Sawamish tribes. European exploration of the area began in the late eighteenth century and introduced diseases to the tribes that decimated their populations. In 1792, George Vancouver mapped the Hood Canal and many other parts of the south Puget Sound and in the 1830s fur traders began to settle in the area followed by American settlers in the 1840s.

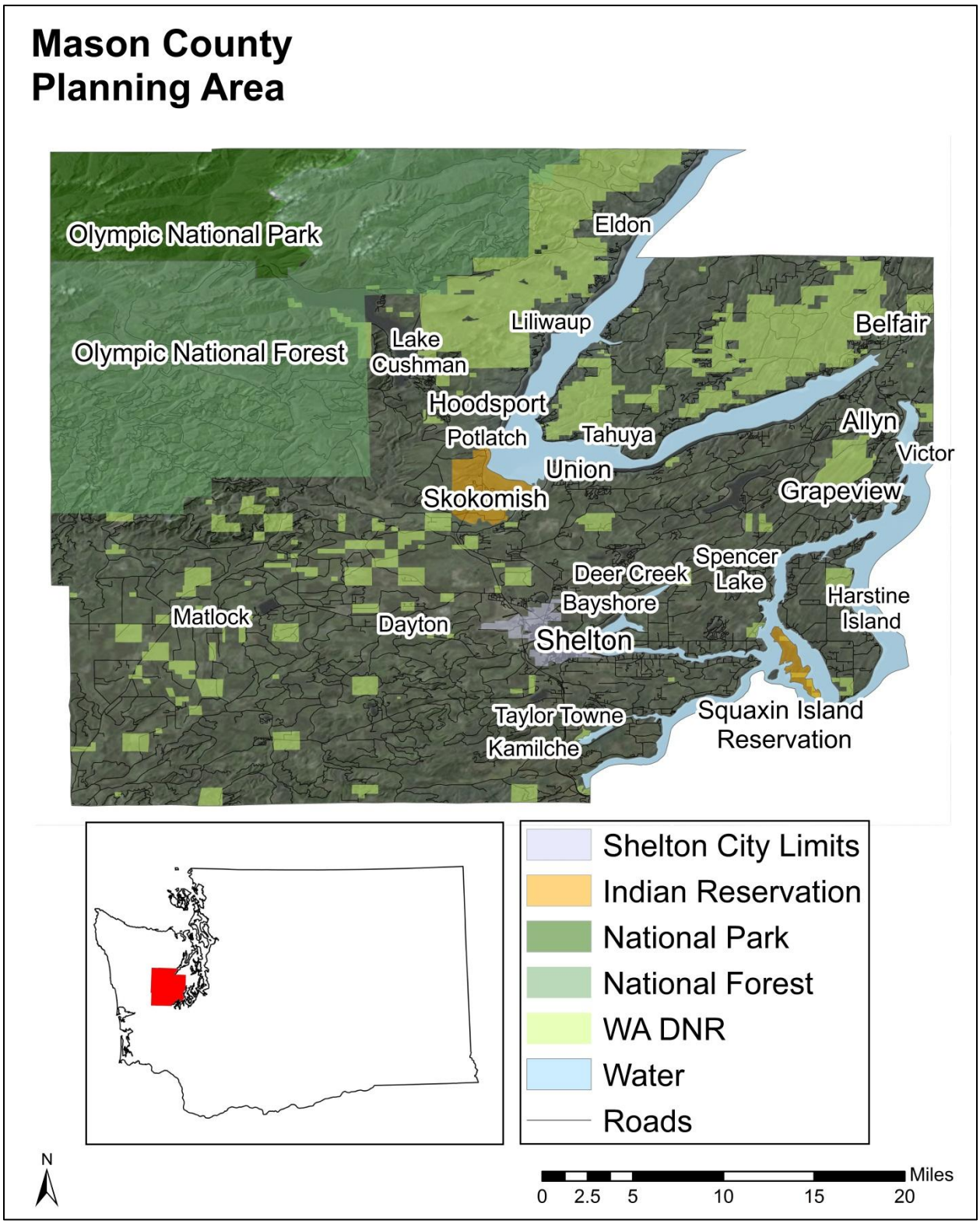
Mason County has a total area of 1,049 mi^2 (671,360 acres). Of that area, 91.4% (959 mi^2) is land and 8.6% (90 mi^2) is water. Elevations within the county range from sea level to 6,476 feet. Approximately 57.3 mi^2 of county land falls within the Olympic National Park, and 211.1 mi^2 are within Olympic National Forest. Three Urban Growth Areas (UGA) have been designated, comprising 1.4% of county lands: Shelton (7.9 mi^2/5,056 acres), Belfair (3.75 mi^2/ 2,400 acres), and Allyn (1.94 mi^2/1,244 acres). The Skokomish and Squaxin Island tribes also have reservations comprising approximately 1% of county lands.

Today, Mason County is predominantly rural but is experiencing rapid population growth. In April of 1996 (revised 2005) Mason County presented a comprehensive plan to guide growth and development in a way that would preserve rural lands and protect the environment, while providing jobs and resources for the expanding population.

Communities

Shelton has been the county seat since 1888 and was incorporated in 1890. It is the only incorporated city in Mason County as well as the largest community with a population of 9,834 (2010 Census). Other Census-Designated Places (CDP) in the county include: Allyn, Belfair, Grapeview, Hoodsport, Skokomish, and Union. Non-CDP recognized communities include: Bayshore, Dayton, Deer Creek, Eldon, Kamilche, Lake Cushman, Lilliwaup, Matlock, Potlatch, Taylor Towne, Tahuya, Spencer Lake, and Victor.

Figure 1: Mason County Wildfire Hazard Assessment Area



Demographics

The 2010 U.S. Census population estimate for Mason County was 60,699. This represents an average annual growth rate of 2.3% from the 2000 estimate of 49,405 (Figure 2). The county had an average annual growth rate of 2.9% between 1990 (pop. 38,341) and 2000. The bulk of population growth has occurred in unincorporated lands, but the cities of Shelton and Belfair have also started to show substantial growth. The county seat of Shelton had a 2010 estimated population of 9,834 with 3,388 housing units and a land area of 5.76 mi^2.

Also in the 2010 census, the county had an estimated total of 32,518 housing units and a population density of 63.3 persons per mi^2 (Figure 3). Ethnicity in Mason County is distributed as 86.1% white, 8.0% Hispanic or Latino, 3.7% American Indian or Alaska Native, 1.1% Asian, 1.1% Black or African American, and 0.4% Native Hawaiian or Other Pacific Islander. The 2010 unemployment rate was 11.1% with a civilian labor force of 25,649. The median annual household income was $48,104, compared to $57,244 for Washington State, and approximately 15.6% of the county population was below poverty level.

Figure 2: Mason County Population change 2000-2010 (US CENSUS Data)

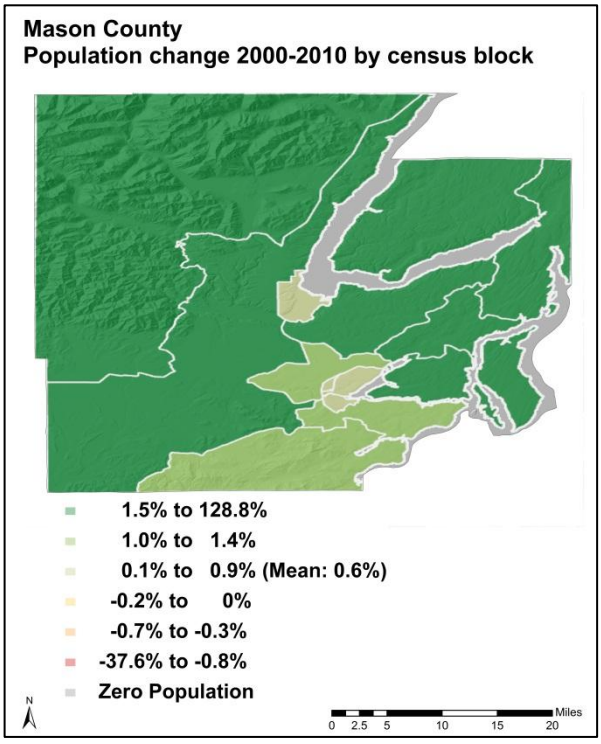
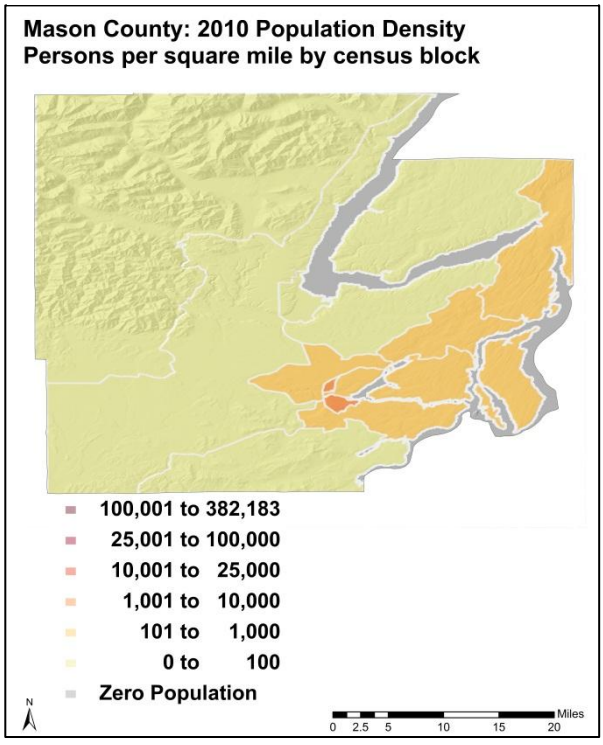


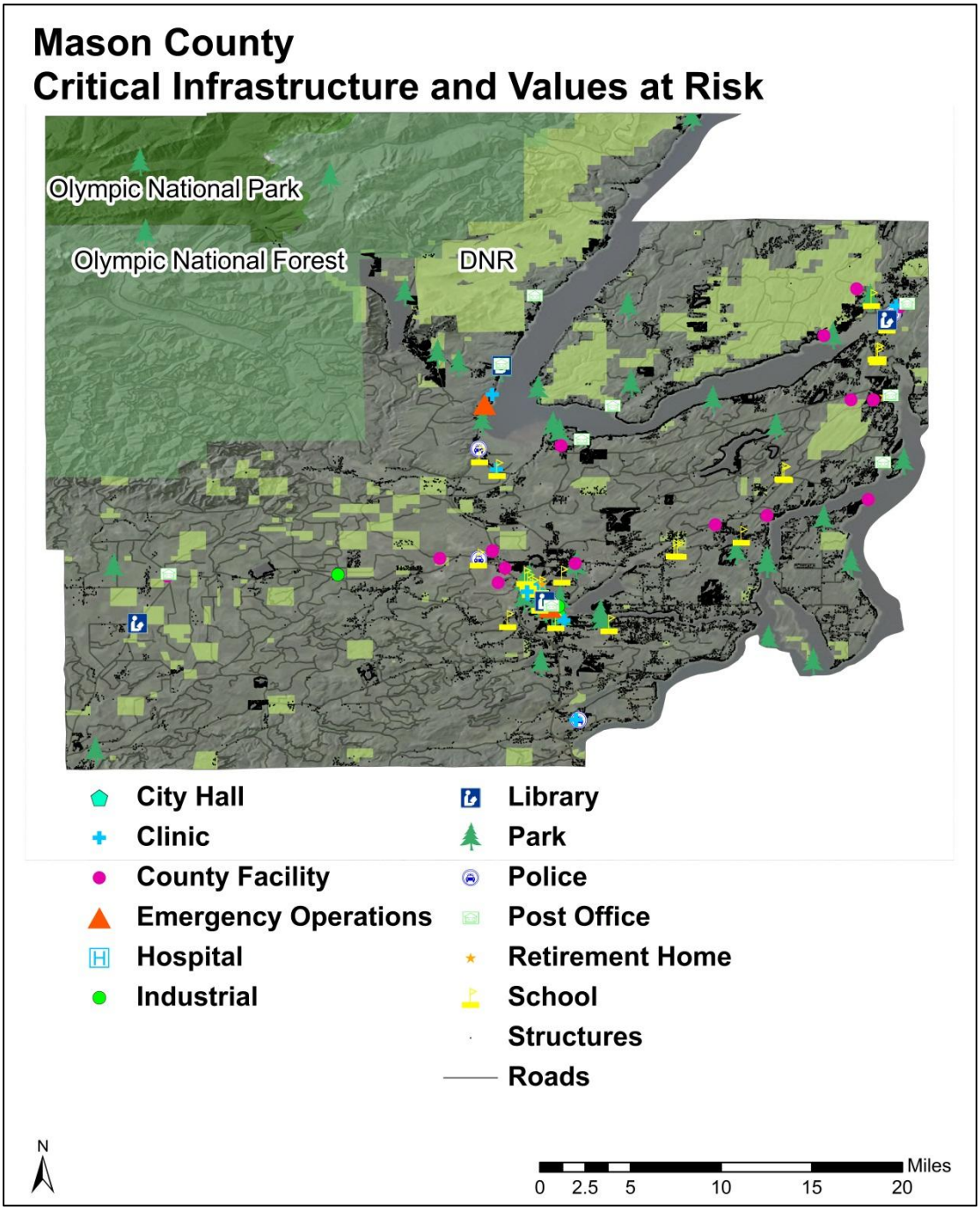
Figure 3: Mason County Population density 2010 (US CENSUS Data)



Places of Value

While fire planning typically focuses on protecting homes, every community also has sites of social, environmental, historic, or infrastructural value that need to be considered with a higher priority when assessing areas for wildfire hazard mitigation (Figure 4). These can include protected areas, historic sites, schools, hospitals, utilities, and other sites. National protected areas in Mason County include parts of Olympic National Forest and Olympic National Park. Historic sites are listed in Appendix H. Hospitals, Police and Fire Stations, and utilities are listed in Appendix I.

Figure 4: Mason County Critical Infrastructure and Values at Risk



Environment

Weather

The climate in Mason County is generally characterized by mild, wet winters and warm, dry summers, typical of a West Coast marine climate. Due to Mason County's proximity to the Pacific Ocean and the Puget Sound, average temperatures remain moderate relative to the season. Mason County lies on the south-east side of the Olympic Coastal Range, which influences prevailing wind and precipitation patterns (Figures 5 & 6). Average temperatures range from 32° F in the winter to 78°F in the summer. Mason County's average annual rainfall is 64 inches, and it experiences a daily average temperature of 51° F. The average monthly precipitation ranges from 10.4 inches in January to 0.8 inches in July. Like much of western Washington, most of the rain falls from October to May; the summer months experience an average of less than 2 inches of rain per month.

Figure 5: Prevailing winds for the Olympic Mountains drive precipitation patterns in Puget Sound (WRCC map).

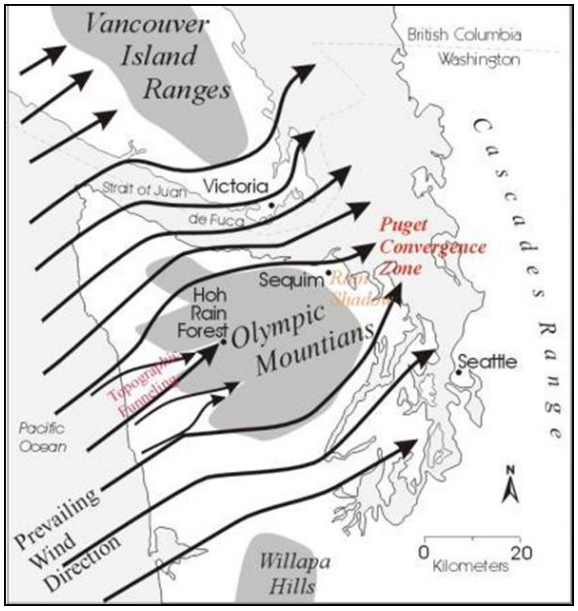
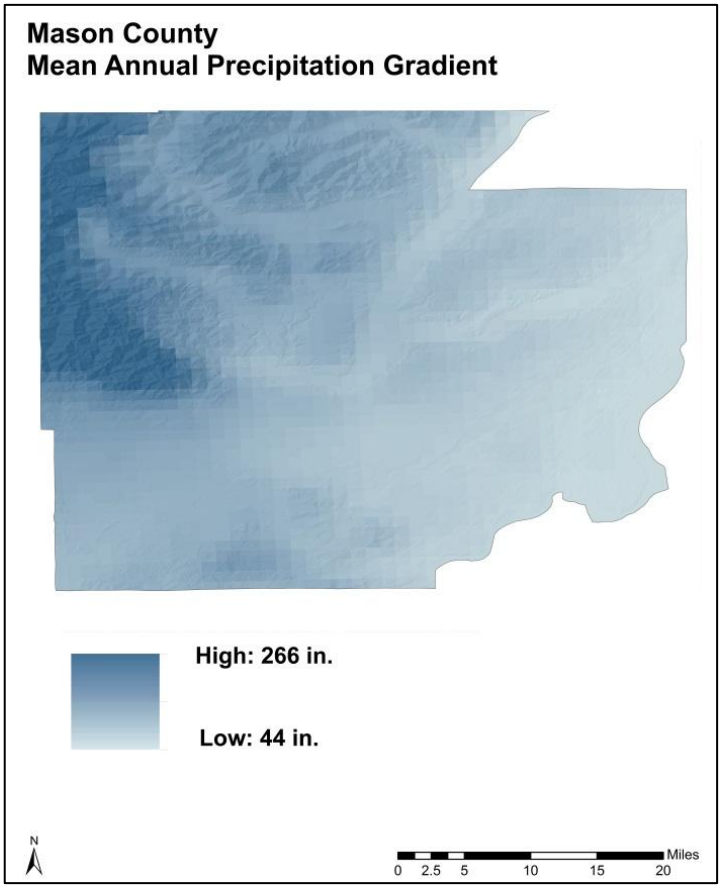


Figure 6: Mason County average annual precipitation and distribution gradient (OSU-PRISM data).



Geology and Soils

The Puget Sound Lowlands, the Olympic Mountains, and the Black Hills are three geological provinces that combine to form Mason County. In addition to these land forms, seven watersheds are present within Mason County. These watersheds are Case Inlet, Chehalis River, Lower Hood Canal, Oakland Bay, Skokomish River, Totten-Little Skookum River, and West Hood Canal. There are over 90 miles of marine shoreline, 100 freshwater lakes, two major rivers, and a number of smaller tributaries and creeks are contained in Mason County.

Mason county bedrock is composed of basaltic and andesitic lava formed from volcanic activity during the Eocene Epoch of the Tertiary Period. Late in the Eocene, volcanic activity decreased and sea level fluctuations began eroding volcanic rocks, this sediment was then deposited to form thousands of feet of sedimentary rock on top of volcanic rocks. The Olympic Mountains and Black Hills were formed from north-south uplift due to tectonic plate activity during the late Pliocene Epoch. The Puget Sound Lowlands formed because of down warping, resulting from the building of the mountains.

The majority of the soil and geology of Mason County (Figures 7 & 8) can be attributed to glacial advance and retreat during the Pleistocene Ice Age. During this time, glaciers traveled south from Canada and covered the Puget Sound Lowland area. Glacial movement picks up large amounts of soil and in the process grinds the soil down to till. Till is composed of cables mixed with silt and clay; when glaciers retreat they deposit this till. During periods of retreat, vegetation and forests recover; when glaciers advance again the vegetation is buried and forms peat beds. The last glacier left Puget Sound around 14,000 years ago. Glacial runoff carved channels and deposited sediments creating the present marine environment of the Puget Sound, including the fresh and marine waters in Mason County.

Figure 7: Mason County surface geology (DNR data).

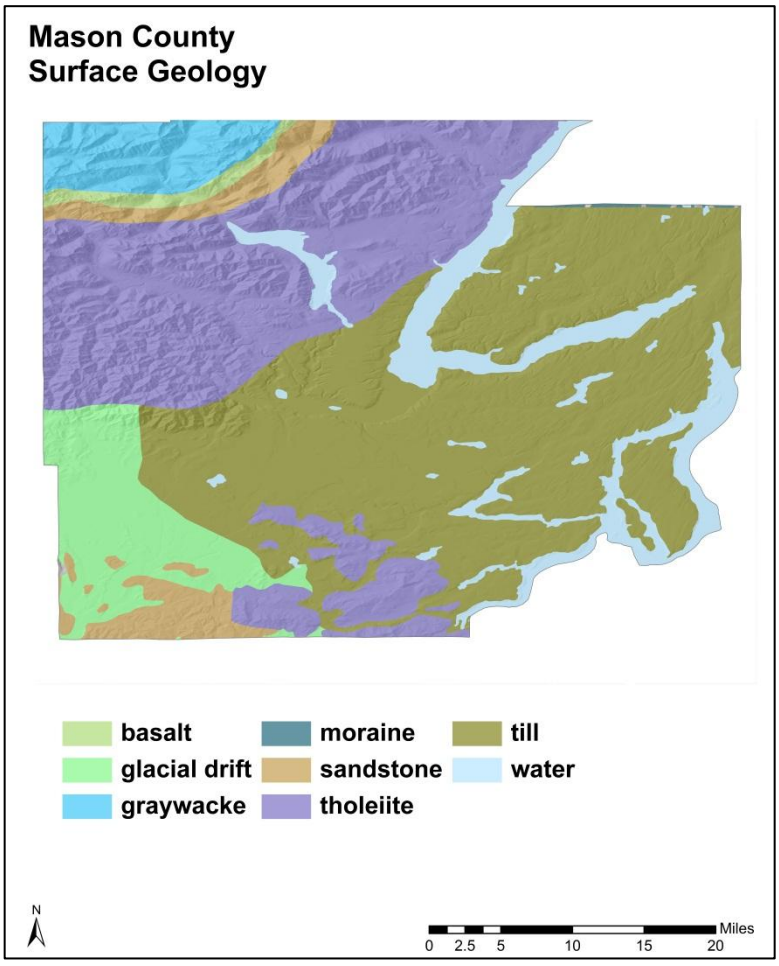
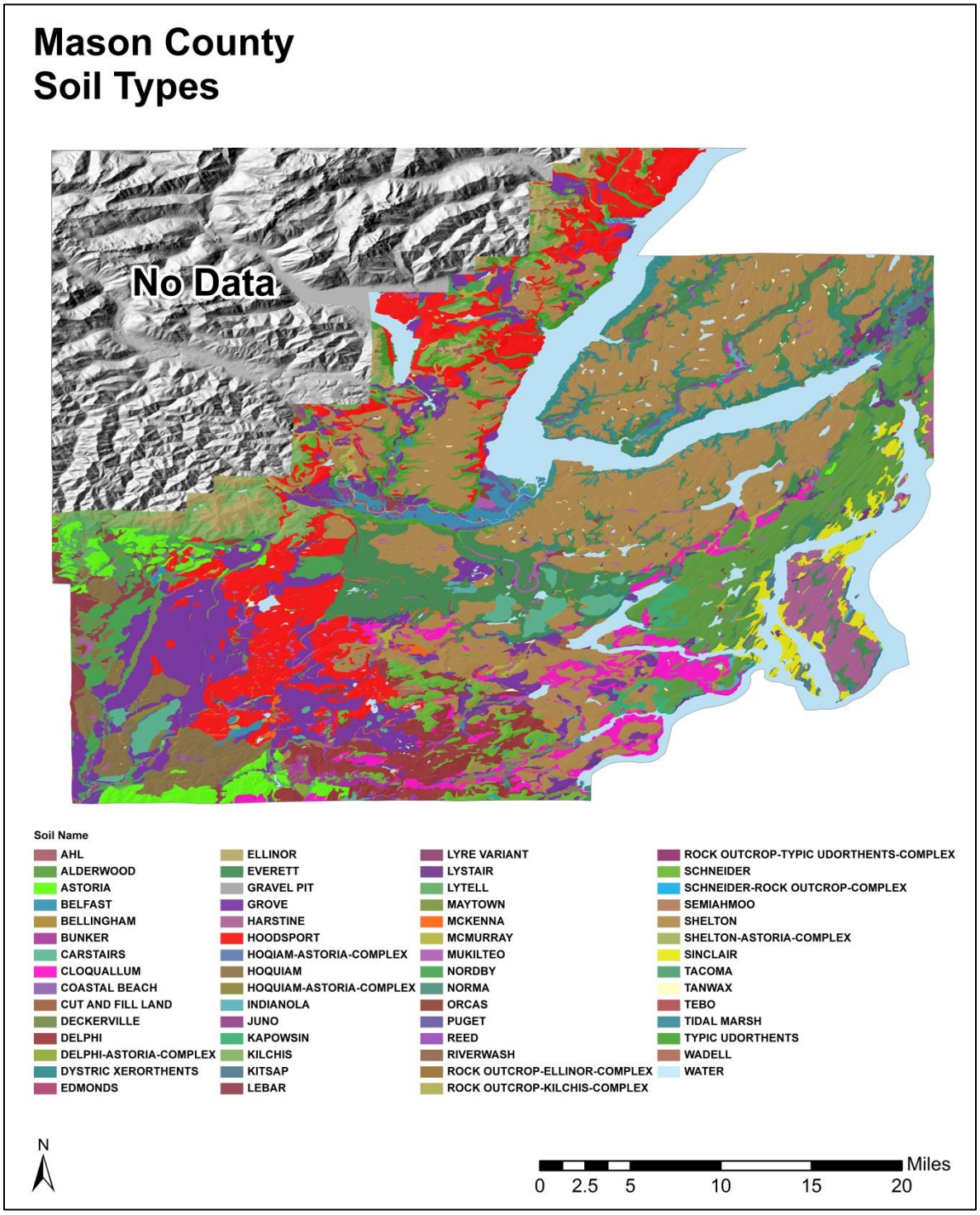


Figure 8: Mason County soil types (DNR data).



Vegetation

The native vegetation of Mason County includes thick stands of coniferous trees with smaller trees, shrubs, and mosses composing the understory (Figure 9). Historically, conifers covered all of Mason County; however, three quarters of the available land have been cleared since settlement of the area in the 1800s. In most areas, these forests have regrown densely and are comprised of many of the same species that previously inhabited the area. While not numerous, there are some small bogs and prairies in Mason County.

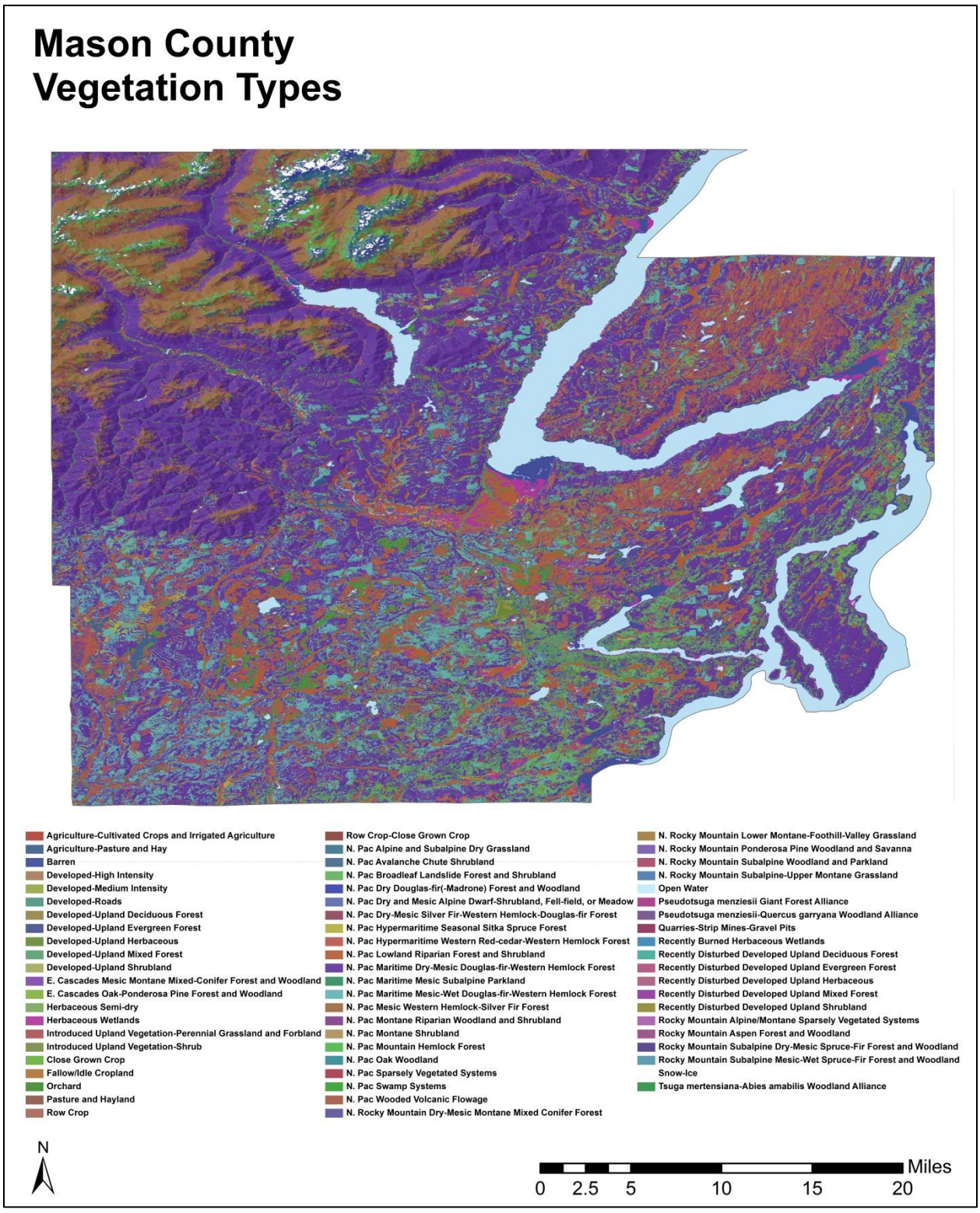
Douglas-fir is the predominant forest species and grows extensively throughout Mason County. Western hemlock is less prolific but hemlock does grow in areas associated with Douglas-fir. Western red cedar can also be found in areas of high soil moisture. Another coniferous tree, which can be found in drier clear cut sites, is lodgepole pine. Although not as economically important as Douglas-fir, lodgepole pine stands are significant because they hinder the recruitment of Douglas-fir. Lodgepole pine is most likely to grow in areas affected by a severe burn that have killed the Douglas-fir seeds.

Found within the county are intermittent stands of grand fir, Sitka spruce, western white pine, and western yew. Two non-native species have been planted in drier areas, yellow pine and California redwood; however, neither species has grown much due to the cooler climate of Mason County.

The saltwater-freshwater interface zones, or estuaries, support a variety of shore birds and waterfowl, including many species of loons, cormorants, mergansers, gulls, geese, and ducks. A number of bird species have been identified as state priority wildlife species along the shorelines of Mason County, including the bald eagle, osprey, and great blue heron. In addition, the marbled murrelet has been federally listed as endangered. Freshwater wetlands and riparian areas offer ample habitat for salmon and trout. Some fish species of importance, within Mason County, have been federally listed as endangered, including Chinook salmon, Chum Salmon, Dolly Varden trout, and Steelhead trout.

The terrestrial forests and under story within Mason County provide habitat for Roosevelt Elk, black tail deer, coyotes, small mammals, and a variety of birds. Mountain beaver and Olympic marmot, both species unique to the Olympic Peninsula, can also be found within Mason County. The large predators in the terrestrial habitats are black bear, cougar, and bobcat.

Figure 9: Mason County vegetation types (USGS data).

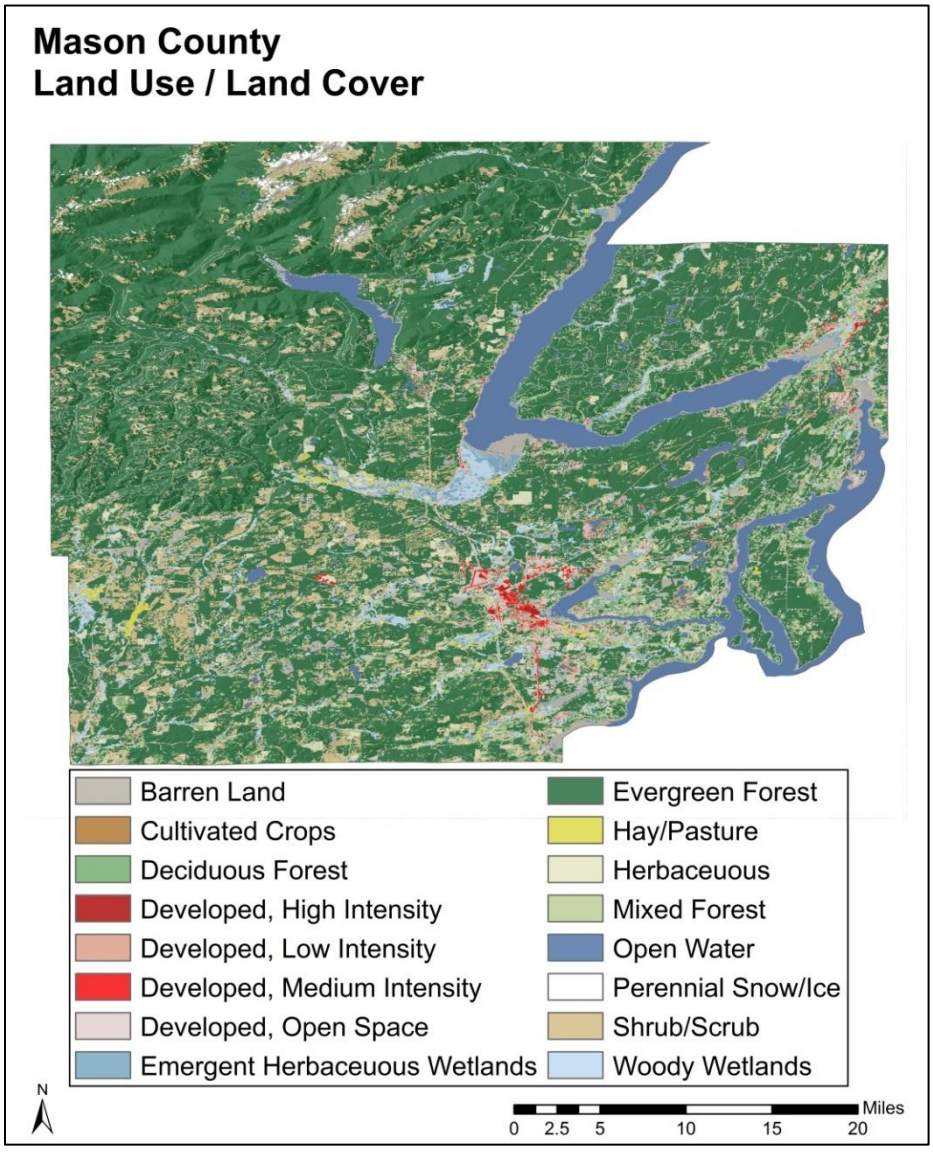


Land Use

Within Mason County, human land uses can be categorized as managed forest lands, agriculture, residential land uses, and industrial uses (Figure 10). Managed forest lands are prevalent in the southern part of the county, while the rest of Mason County consists of a mixture of un-harvested and managed forests. Agricultural areas are not widespread and are primarily concentrated in the floodplains of major rivers, such as the Skokomish River. Residential land uses are focused mainly along freshwater and marine shorelines and condensed in the towns of Shelton and Belfair. Oakland Bay in Shelton is the only major industrial area in Mason County.

Mason County is rich with natural resources, and the landscape is composed of substantial open spaces. Nearly 82% of the County's land is made up of national, state, and private forests. Mineral deposits lie under Mason County's top soils, and the county presently maintains 21 surface mining operations. Open space within the county provides substantial wildlife habitat and undeveloped natural areas. This supports 101 park and recreation sites managed by federal, state, county, municipal, and private parties.

Figure 10: Mason County Land Use/Land Cover (USGS data).



Transportation

The Mason County roads fall under Washington State Department of Transportation's Olympic Region. Main transportation routes in the north western area of Mason County are restricted to the coastal shelf because of the Olympic Mountain range (Figure 11). The northwest corner of Mason County covers a portion of the Olympic National Forest and contains few local roads. State Highway 101, a two-lane highway, is the main north-south transportation route across Mason County, connecting to Thurston Country, in the South, and Jefferson County, in the North. State Highway 101 runs along the western side of the Hood Canal and follows it up the coast. State Route 3 connects Mason County to the Kitsap Peninsula. Highway 101 is critical to the infrastructure and should receive a high priority in wildfire hazard mitigation planning.

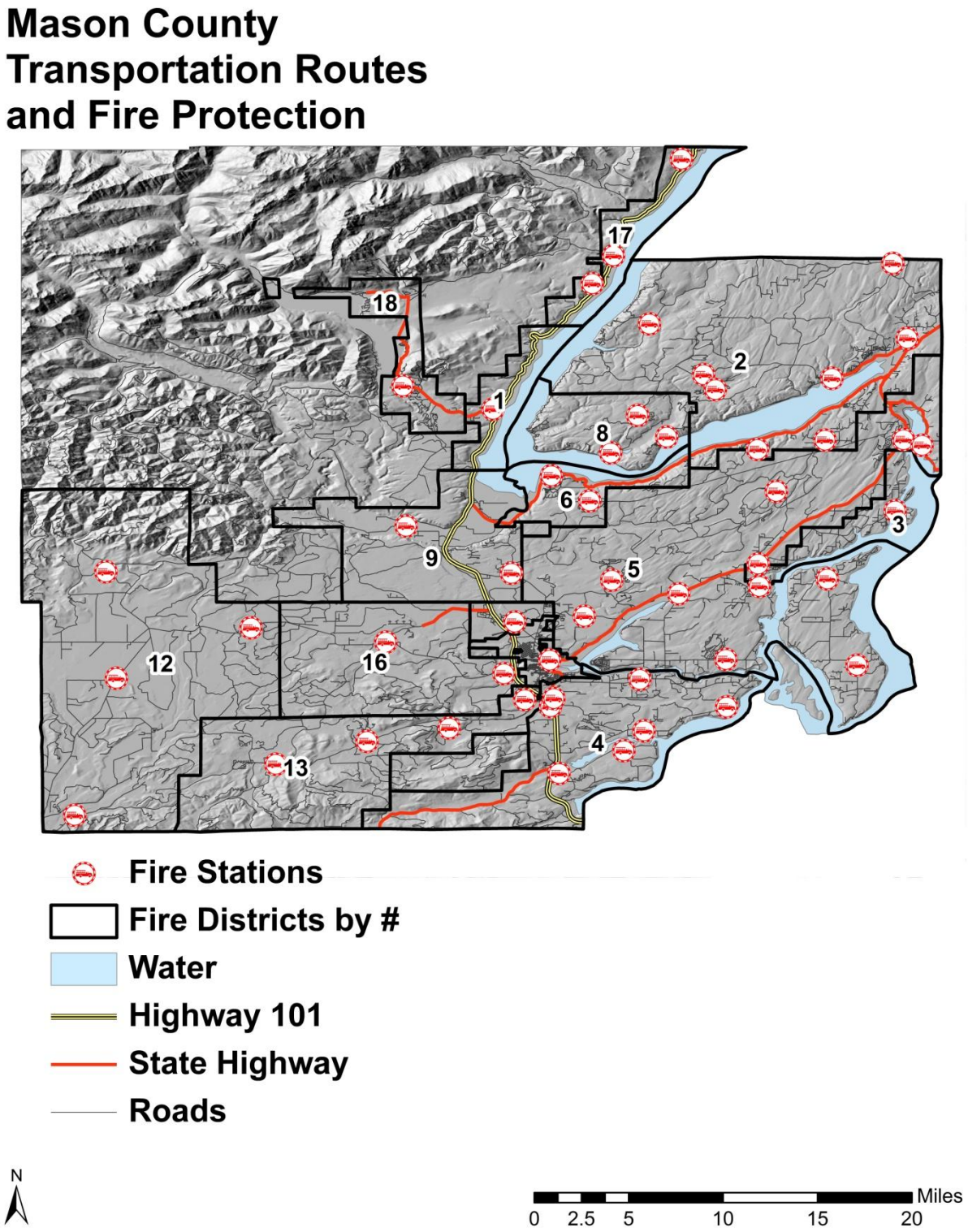
Fire Protection

Mason County has a total of 14 fire districts serving its citizens (Figure 11). Within these fire districts, there are a total of 51 fire stations which protect the county during emergency situations. Fire prevention in Mason County is mainly focused on rural and wildland areas and is done through a Firewise community program in coordination with the WA DNR and the USFS.

Mason County has a division on staff specifically for emergency management. This division is responsible for the preparation for, mitigation of, response to, and recovery from all hazards which impact Mason County, including fires. This division of Mason County has implemented several regulations regarding building permits, and fire safety and fire/prevention.

The purpose of Mason County Fire Districts is the provision of fire prevention services, fire suppression services, emergency medical services, and for the protection of life and property. Mason County Fire Districts enjoy a working relationship with Mason County Government through an Interlocal Agreement addressing fire investigations. The Mason County Fire Chiefs Association, (in partnership with local law enforcement agencies) provides fire investigation services on behalf of the Mason County Fire Marshal's Office. Mason County Department of Community Development is authority for inspections of all building sites prior to permit issuance, to include burn permits. Where there is limited or improper access to building(s), the Mason County fire protection plan calls for mandatory residential sprinkler system

Figure 11: Mason County transportation routes, fire stations, and fire protection districts.



IV: Wildfire Risk and Hazard Assessment

Risk

Wildfire **"risk"** is commonly defined as the likelihood of a wildfire to occur, and this likelihood is usually based on fire history, although 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 is 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 is an integral function of the majority of ecosystems in Washington. 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 Mason 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.

Depending on the plant community composition, structural configuration, and buildup of plant biomass, fires resulted from ignitions with varying intensities and extent across the landscape. Shorter return intervals between fire events often resulted in less dramatic changes in plant composition. The fires burned from 1 to 47 years apart, with most at 5- to 20-year intervals. With infrequent return intervals, plant communities tended to burn more severely and be replaced by vegetation different in composition, structure, and age (Johnson et al. 1994). Native plant communities in this region developed under the influence of fire, and adaptations to fire are evident at the species, community, and ecosystem levels. Near Olympic National 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.

Detailed records of fire ignition and extent have been compiled by the Washington Department of Natural Resources of fire ignitions dating from 1972 to 2007. Using these data on past fire extents and fire ignition data, the occurrence of wildland fires in the region of Mason County have been evaluated (Table 1). The Washington Department of Natural Resources database of wildfire ignitions for those areas where the Washington Department of Natural Resources provides primary wildfire suppression services includes data from 1970 through 2011 (Figure 12). An analysis of the wildfire ignitions in Mason

County reveals that during this period approximately 9,006 acres have burned as a result of 1,810 wildfire ignitions in Mason County on DNR protected lands (Table 2).

Table 1: Mason County annual vegetation fire count and total acres burned 1997-2007 (DNR data).

Year	Number of Fires	Total Acres Burned
2007	19	241.7
2006	35	188.2
2005	20	257.1
2004	27	28.9
2003	25	19.1
2002	26	21.0
2001	15	9.3
2000	26	30.7
1999	25	41.5
1998	33	25.2
1997	27	21.9

Table 2: Mason County vegetation fire count and acres burned by cause 1970-2007 (DNR data).

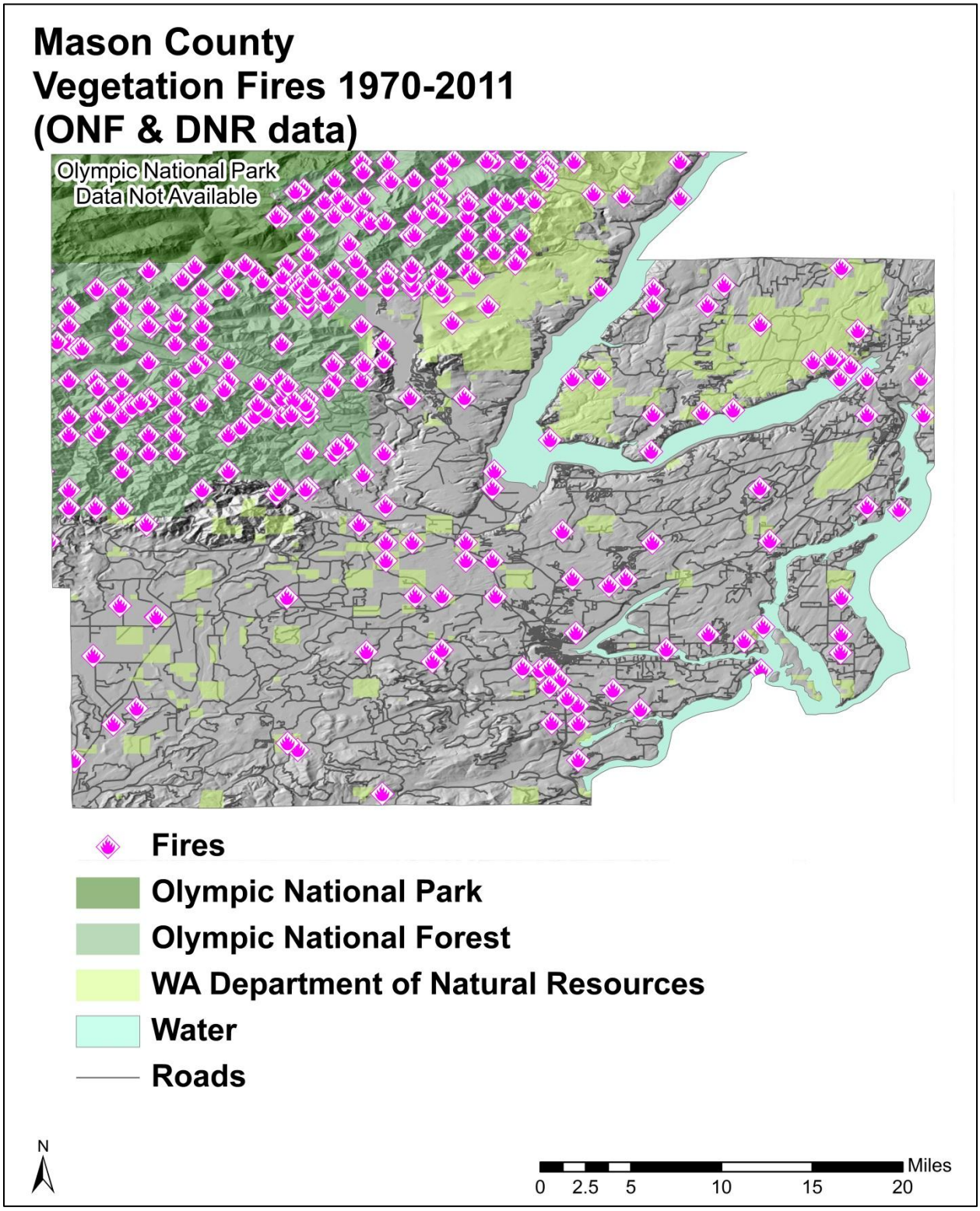
Cause	Acres Burned	Percent	Number of Fires	Percent
Children	777.0	8.6	143	7.9
Debris Burning	591.7	6.6	442	24.5
Arson	1557.0	17.3	120	6.6
Lightning	1112.7	12.4	254	14
Logging	28.4	0.4	32	1.8
Miscellaneous	2275.0	25.2	399	22
Recreation	2478.9	27.5	338	18.7
Smoker	185.6	2.0	82	4.5
Total	**9006.3**		**1810**	

The “Miscellaneous” category includes ignitions originating from structure fires, burning material from aircraft, burning material from auto (other than smoking), burning vehicle, electric fence, equipment crash, fireworks (other than children), hot ashes, power lines, sparks from auto exhaust, sparks from cutting torch or welder, sparks from farm tractors, spontaneous combustion (other than sawdust piles), use of fire (other than logging), woodcutting, railroad, and an “other” category

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 include:

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

Figure 12: Mason County vegetation fires 1970-2011 (ONF and DNR data).



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.

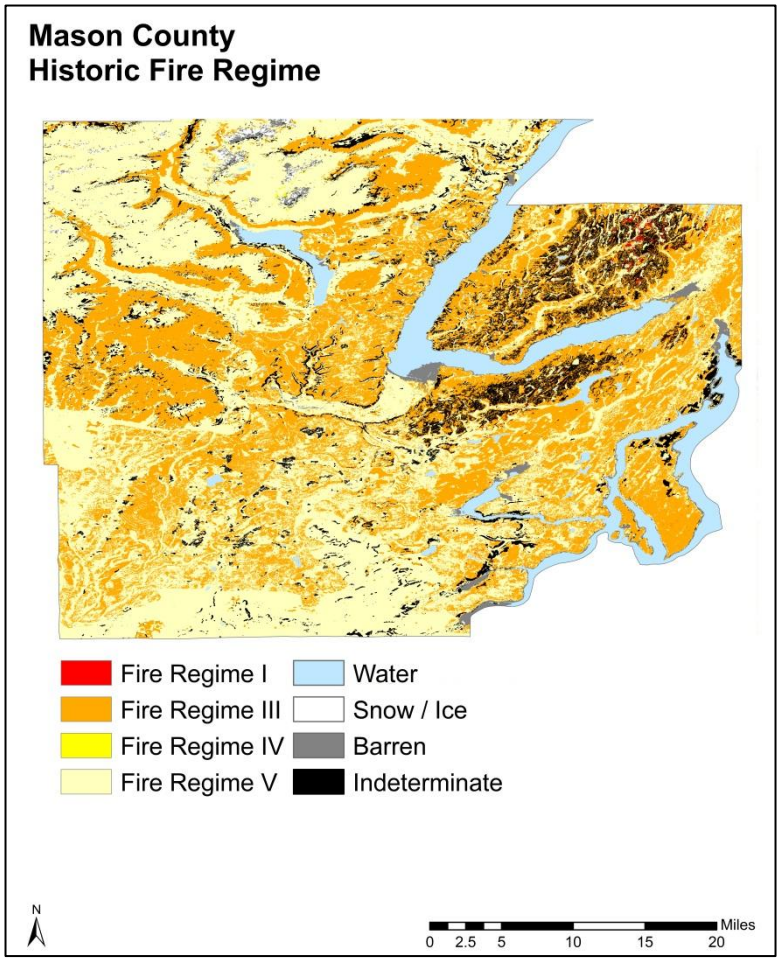
Fire Regime IV: 35-100+ year frequency with high severity (stand replacement fires).

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, 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.

The majority of forested land in Mason Country has a historic fire regime of three and five, characterized by a fire frequency greater than 35 years with a mixed to high fire severity (Figure 13). “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 because these lower the humidity). Fires are often of short duration, but of high intensity and severity.

Figure 13: Mason County historic fire regime (LANDFIRE data).



Vegetation Condition Class

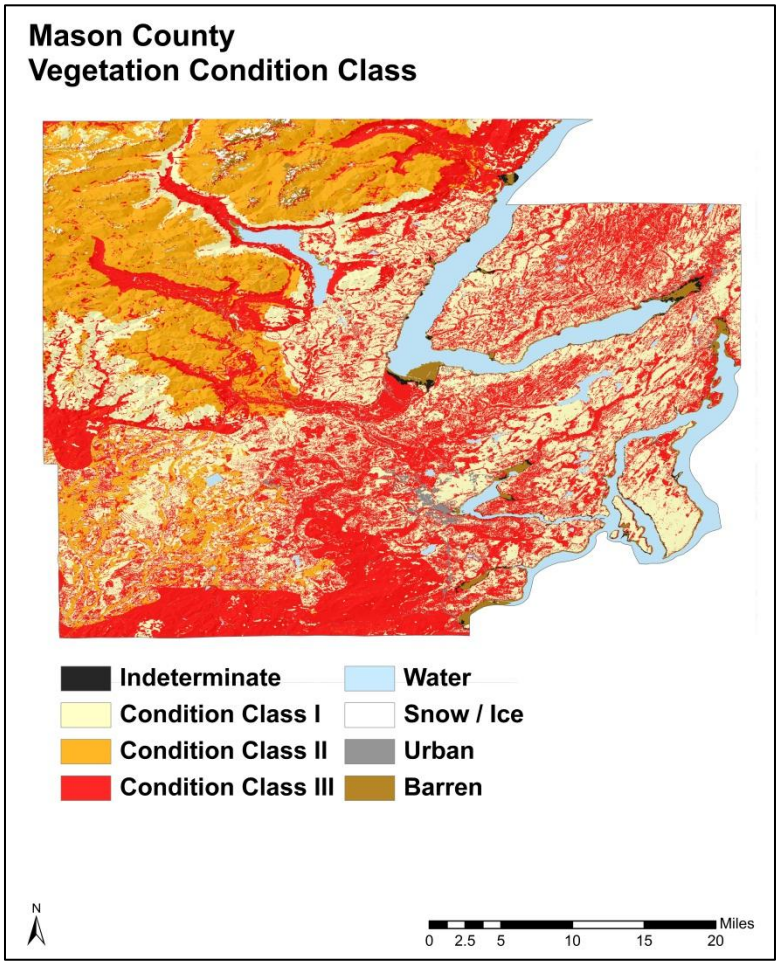
A vegetation condition class (VCC) is a classification of the degree of departure from the historic fire regime. The condition class scale was developed to generally describe how the current severity, intensity, and frequency of fires have affected key vegetative components of the ecosystem, as compared to historic or reference conditions. The majority of Mason County has a vegetation condition class of 2 or 3, indicating moderate to significant departure from historic conditions (Figure 14).

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 14: Mason County vegetation condition class (LANDFIRE data).



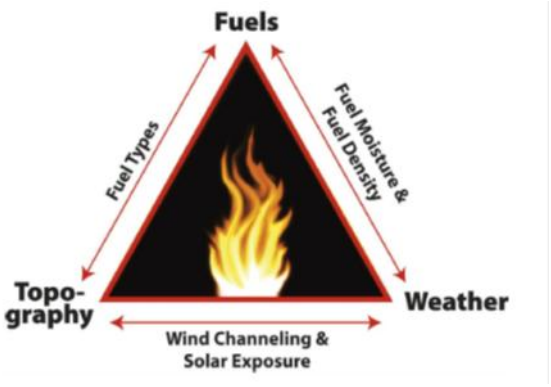
Hazard

Wildfire **hazard** is commonly defined as those factors (fuels, topography, weather, fire protection limitations, etc.) which can affect the destruction caused by a wildfire once it has ignited.

Wildland Fire Characteristics

Wildfire behavior is driven by the interaction of a few factors: weather, vegetation type (commonly called "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 wildfires 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.

Figure 15: The wildfire behavior triangle (graphic by Ron Kaufman, WWU).



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. Wildfires 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 occur more frequently and the area has experienced the low point of the annual precipitation cycle.

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, and can travel as much as 1.5 miles ahead of the flame front. Once spotting begins, the fire is extremely difficult to control.

Hazard Assessment

For this CWPP, a Geographic Information System (GIS) analysis was used to model and analyze wildfire hazards. Three spatially-explicit data sets of factors critical to wildfire behavior (fuels, slope, and aspect) were combined with a climate layer comprised of a weighted grid of precipitation and temperature (Figures 16-19). Each factor was assigned a numeric weight based on its potential contribution to fire behavior (Table 3), following point-rating conventions based on NFPA 1144 (2008, Annex A). The points for each of the factors were then added together to create a combined hazard rating map. The final map was then scaled into quartiles to provide a relative ranking of low to high hazard (Figure 20). An overview of the assessment factors and their relative ratings are listed in Table; more details are found in the following pages. A technical overview of the GIS analysis process is covered in Appendix.

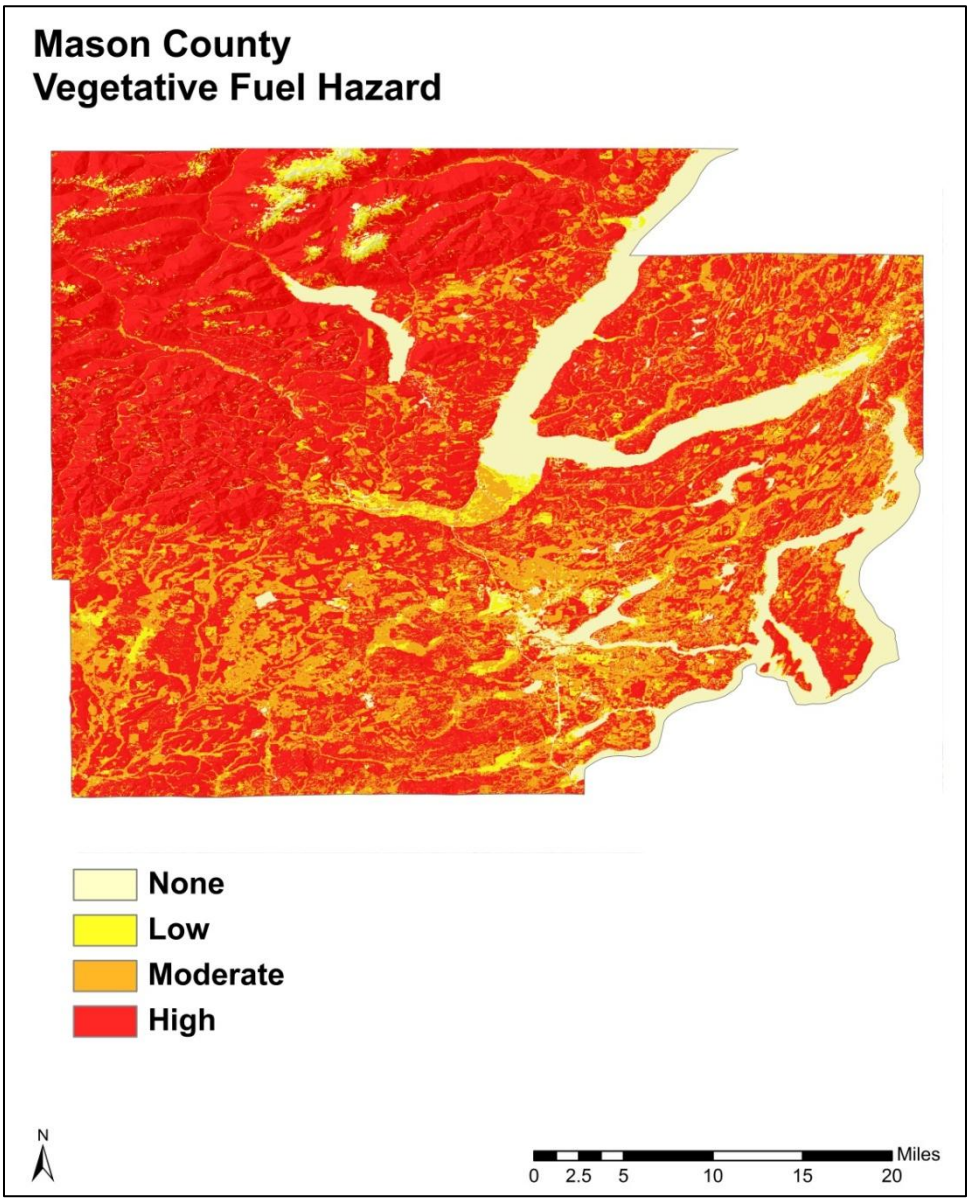
Table 3: Hazard assessment criteria and ratings

Category	Item	Points	Point Category	Hazard Rating	Percent of Overall Rating
Spatial Hazard	Fuels	0 15 20 25 30*	Non-Burnable Light Medium Heavy Slash	None Low Moderate High Very High (*not represented in analysis)	36%
	Slope	1 4 7 10 15	<10% 10-20% 21-30% 31-40% >40%	Minimal Low Moderate High Very High	21%
	Aspect	0 2 3 5	N E W S	Low Moderate High Very High	7%
Climate	Weather	1-25	Average Monthly Precip (70%) Average Monthly Max Temp (30%)	Point category based on judgment that precip/moisture will be more influential to fire behavior in region than temp.	36%
	Maximum Possible:	70			100%

Vegetative Fuels

The presence of living or dead vegetative fuels can be the greatest contributor to wildfire hazard. Combustion of vegetation can create flame lengths exceeding 100', radiate heat capable of igniting structures 100' away, and cast off firebrands that can travel well over a mile. Vegetation cover for Mason County was displayed in Figure 9 (page 20); this fuel hazard assessment (Figure 16) uses the 40 Scott & Burgan fire behavior fuel model (FBFM) descriptions to classify vegetation hazards into categories of non-burnable (e.g., roads, extensive areas of concrete, etc.), light (grasses, forests with light litter; fuel loading <1.10 tons/acre), medium (most forests; fuel loads ~1.1 to 2.5 tons/acre), heavy (dense forests; fuel loads >5 tons/acre), and slash (none present in this database). The fuels are ranked according to NFPA 1144 criteria. A technical description of the fuels hazard development method is located in Appendix.

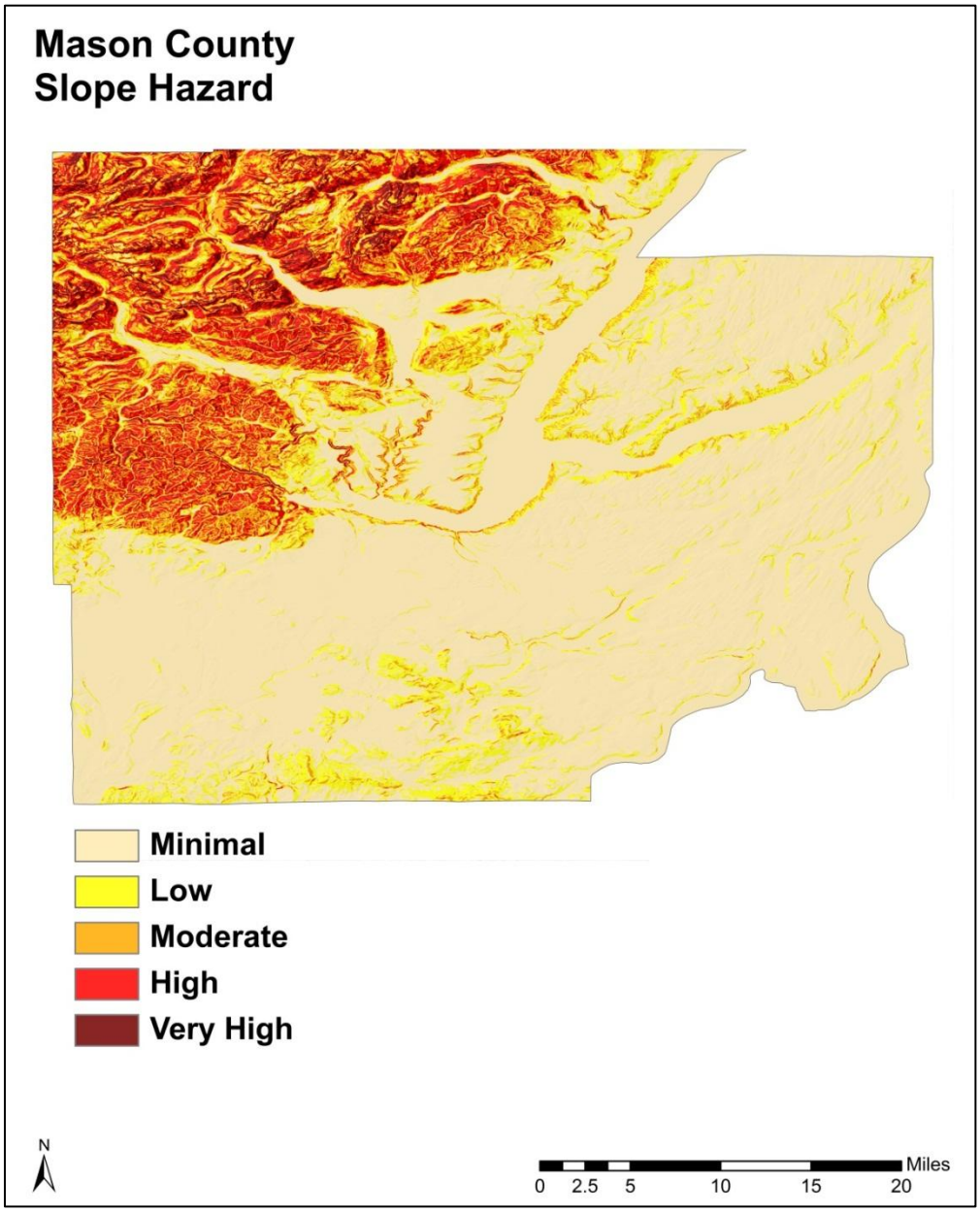
Figure 16: Hazard levels for the *Vegetative Fuels* factor.



Slope

Steep slopes increase a fire's rate of spread uphill and can create topographic influences on wind. Topography is mostly low, rolling hills with several ridges oriented north to south. The percent slope is derived from 30 m digital elevation model (DEM) supplied by the USGS. The slope hazard rating is a large contributor to the overall hazard rating because of its influence on fire spread and the increased difficulty of fighting wildfire as slope steepens (Figure 17).

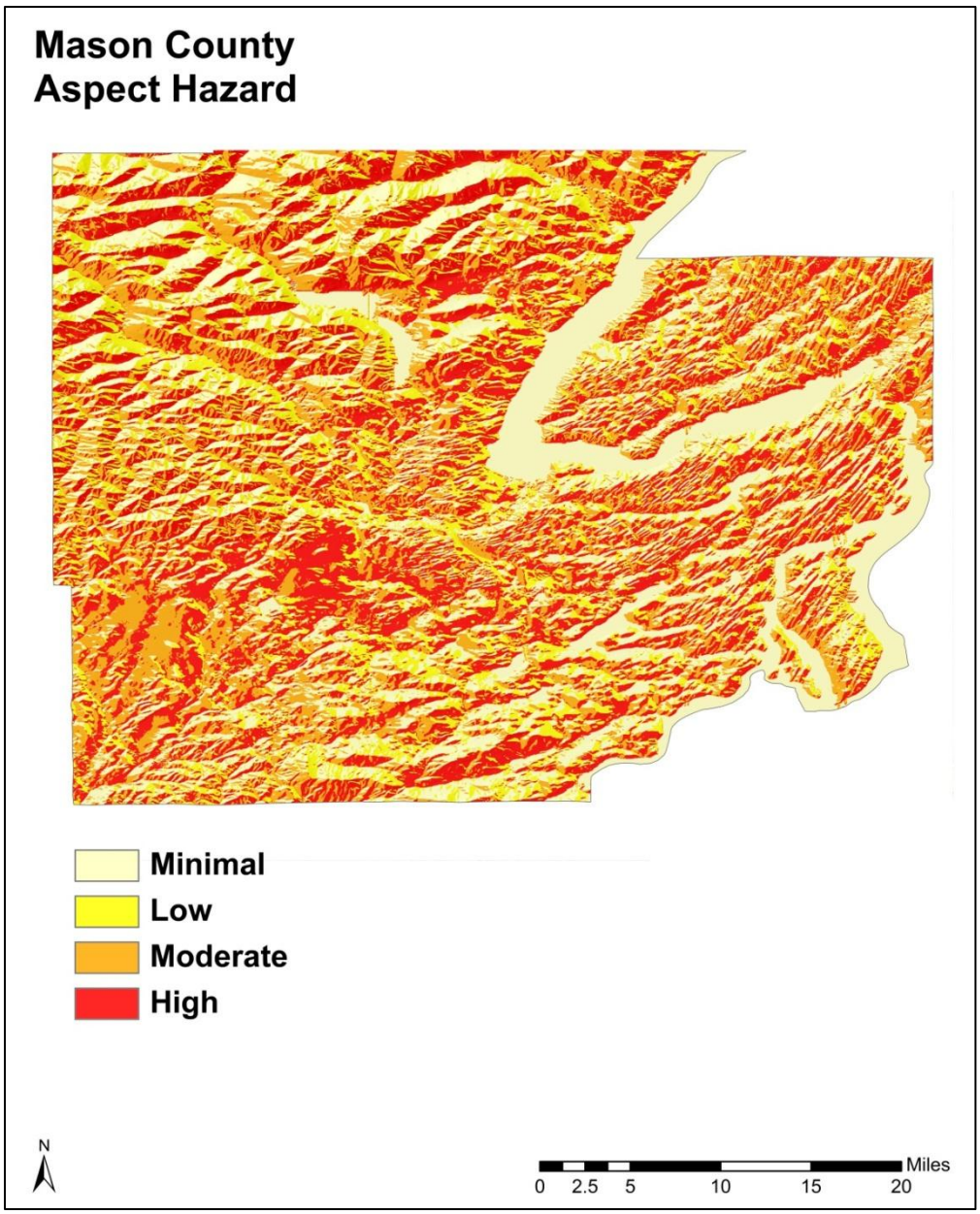
Figure 17: Hazard levels for the *Slope* factor



Aspect

The mid 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 7% of the hazard ratings (Figure 18).

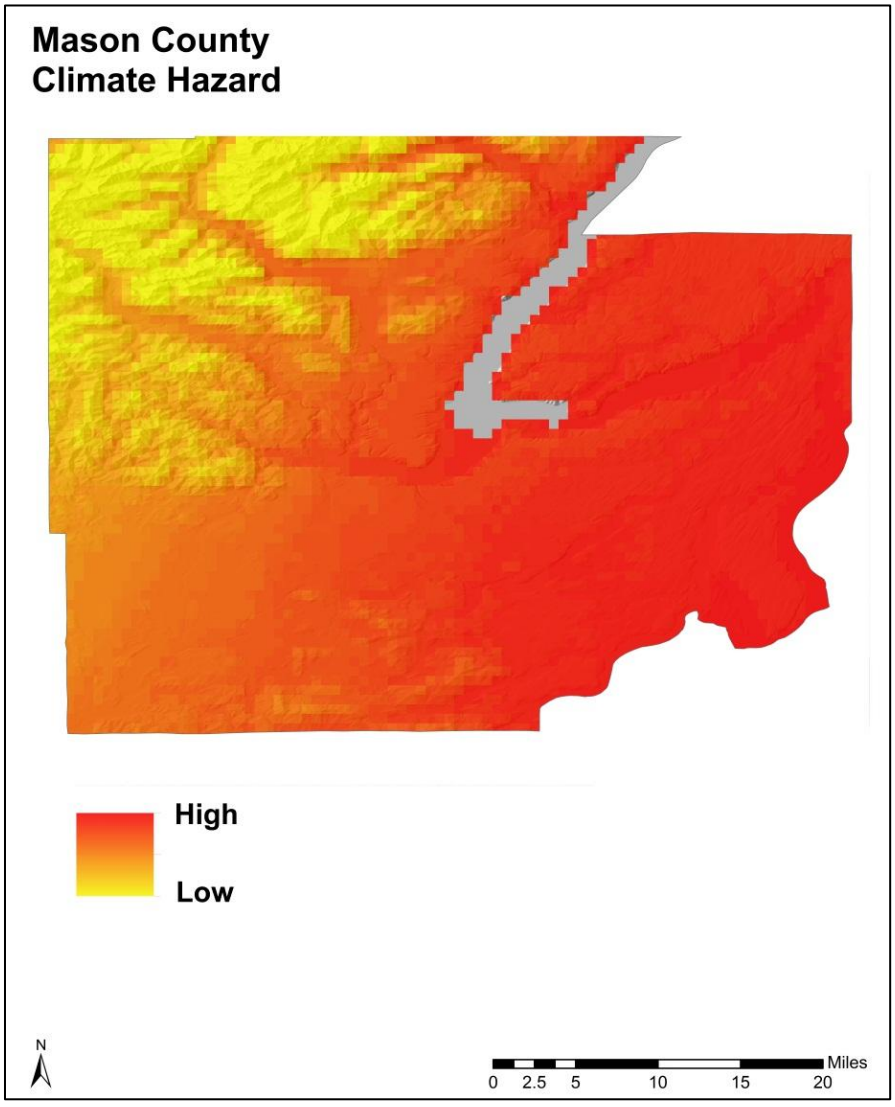
Figure 18: Hazard levels for the *Aspect* factor.



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 August, at the height of the fire season. Climate data was obtained from WORLDCLIM, a geographic 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 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 data sets were combined into a single grid, 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. Regionally, temperature is relatively constant during the dry season and is given less weight in each climate model. The data was ramped into 25 different classes to provide relative hazard from location to location and provides 36% of the weight toward the overall hazard rating (Figure 19).

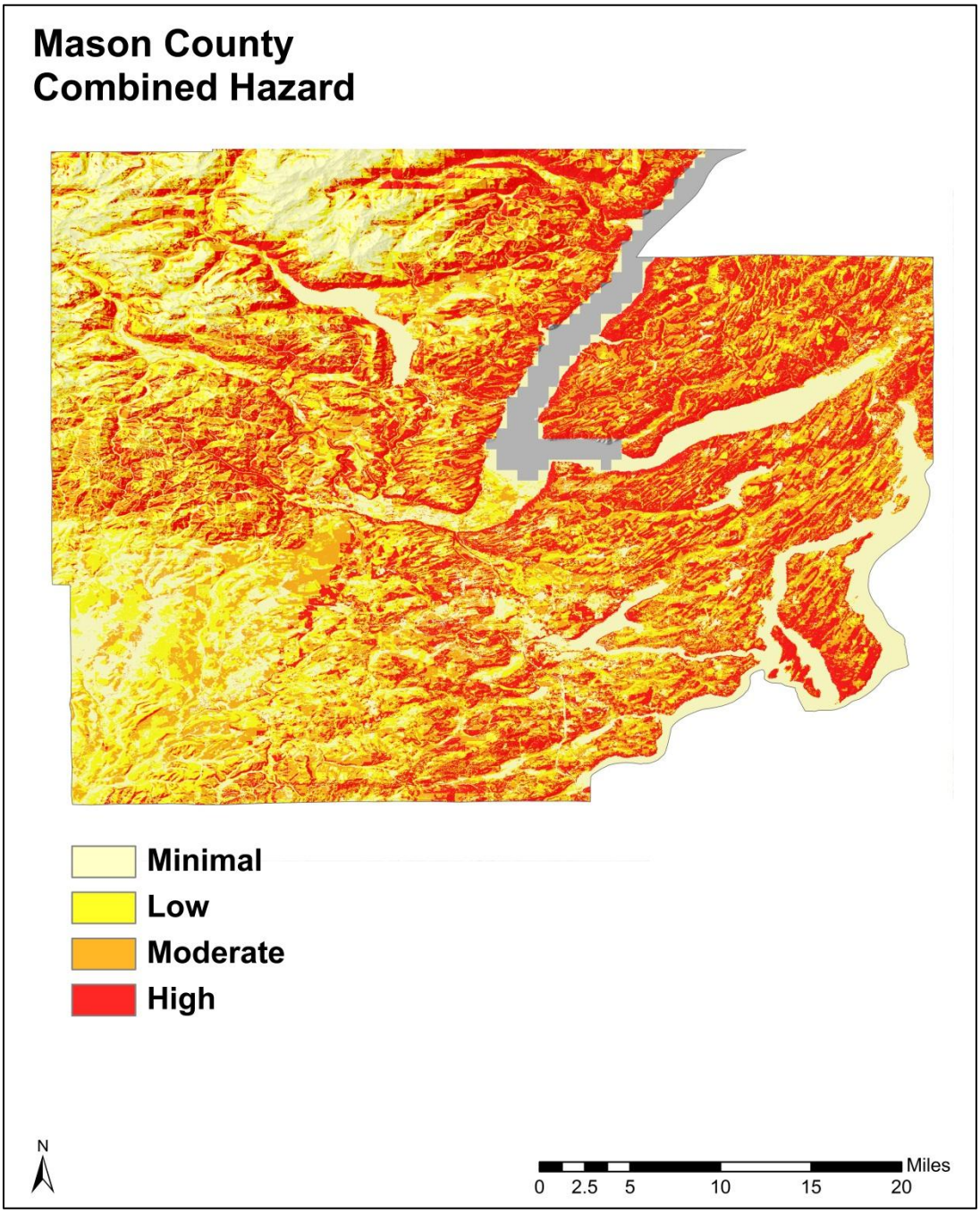
Figure 19: Hazard levels for the *Climate* factor.



Overall Wildfire Hazard

To create the final hazard rating map, all of the assessment maps were summed using the point scale in Table 3 and classified from low to very high by quartile (Figure 20).

Figure 20: Hazard levels for the *Combined* factors.



V. Wildfire Modeling

"Watch-Out" Weather Conditions

Weather strongly affects wildfire behavior. Any combination of two of the following "watch-out" weather parameters can create more intense and potentially destructive fire behavior:

- 20' 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 <20% (1,000 hour fuels are dead branches, etc., between 3 and 8 inches in diameter)
- 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.

Modeling Fire Behavior in Mason County

Modeling 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 (i.e., Figure 20, page 35, for Bainbridge Island). Another advantage of modeling is that managers can manipulate variable inputs—including changes in fuel load, fuel moisture, and weather—to see how the static variables and varying conditions could affect fire behavior. Models like this 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. A number of modeling programs have been developed by the U.S. Forest Service for planning purposes, including *BehavePlus*, *Farsite*, and *Flammap*.[1]

BehavePlus can produce outputs showing expected fire behavior (Figure 21; Table 4). Fire behavior that entails flame lengths greater than four feet *cannot be attacked directly by wildland firefighters with hand tools on the ground*. This significantly increases both the difficulty of suppression by engine crews as well as the potential for extreme fire behavior. *Flammap* and *Farsite* can produce a variety of landscape-level fire behavior GIS layers, including flame length and rate of spread. While *Farsite* calculates the same outputs based on a simulated point of fire origin, *Flammap* calculates outputs independently for each cell. Because of this, *Flammap* outputs were used to create hazard maps for Bainbridge Island showing the areas that are expected to have an increased danger to wildland firefighters due to dangerous flame lengths (see Table 4) and rate of spread given "watch-out" or worse weather conditions. For the examples in Figures 22-24, *Flammap* was given input variables using the default fuel moisture levels (representing very dry fine dead fuels, as might occur in the region after a

[1] www.fire.org

few weeks in August without rain), 100% foliar moisture (representing mature vegetation where new growth has essentially stopped, e.g., as in a period of drought), and wind speed inputs of 8, 15, and 20 mph (for flame lengths).

Figure 21: Example BehavePlus run showing potential fire behavior in low density grass with scattered trees after a couple weeks of no rain, with wind speeds of 8 mph. The blue 1 in the center of the graph (circled in red) indicates fire characteristics associated with the described conditions. In this run, flame lengths are greater than 8 feet, making such a wildfire impossible to attack directly and increasing the likelihood of extreme fire behavior.

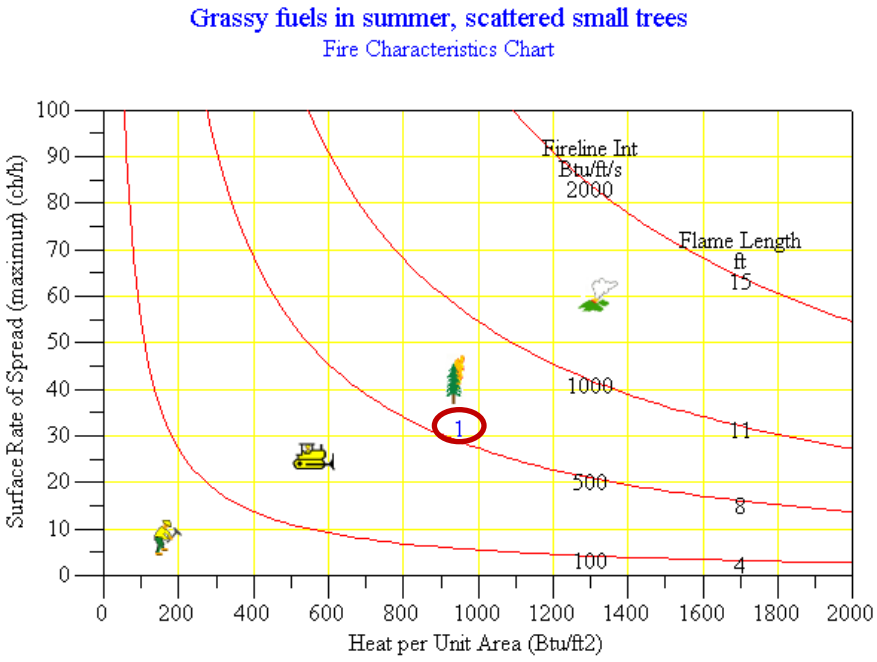


Table 4: Fire Suppression Interpretations (NWCG Fireline Handbook Appendix B, Table 14).

Flame Length (ft.)	Fireline Intensity (Btu/ft/sec)	Interpretations
< 4	< 100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 – 8	100 – 500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 – 11	500 – 1,000	Fires may present serious control problems such as: torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
> 11	> 1,000	Crowning, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective.

Figure 22: Predicted wildfire flame lengths in Mason County when wind speeds are 8 mph.

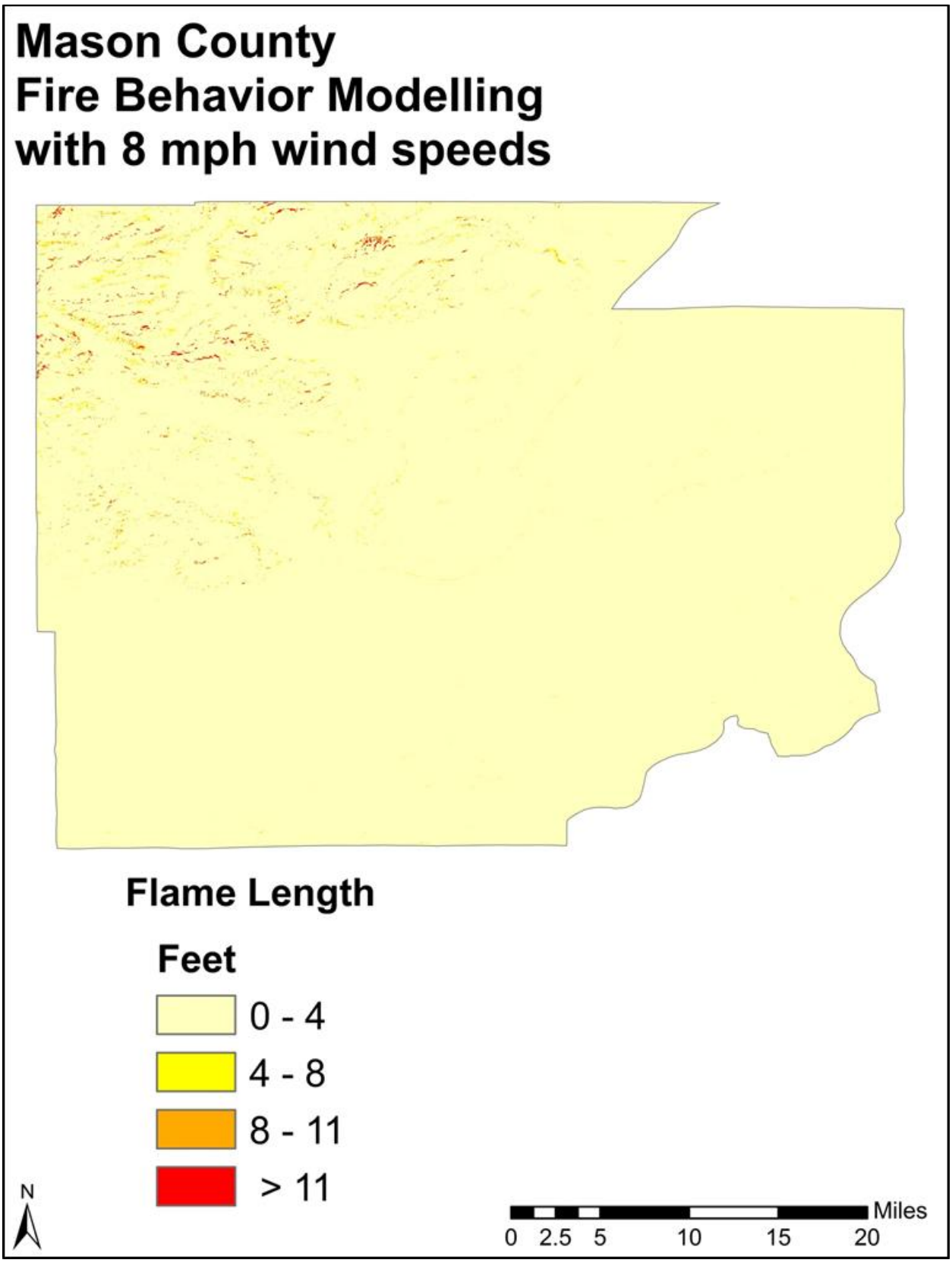


Figure 23: Predicted wildfire flame lengths in Mason County when wind speeds are 15 mph.

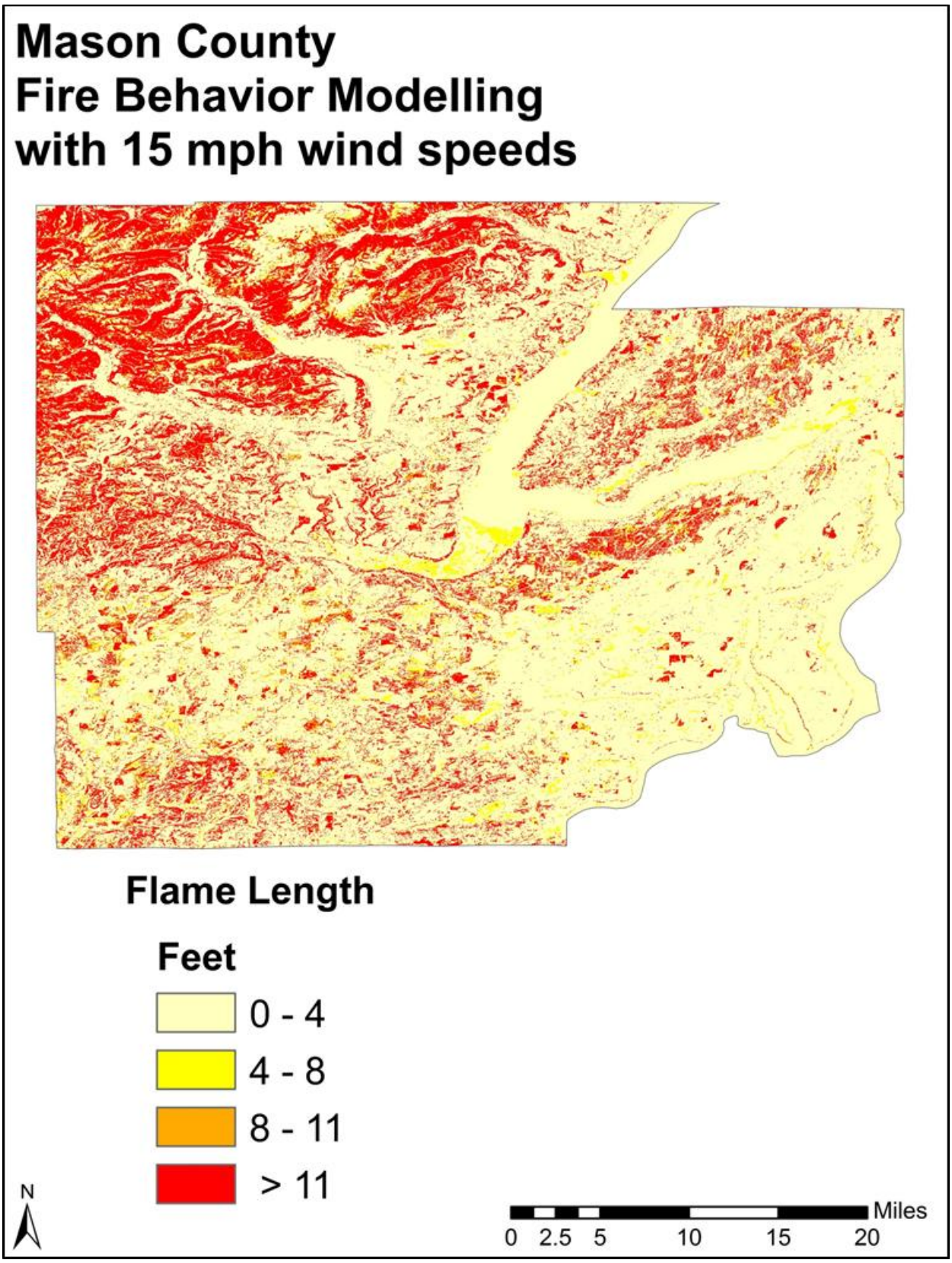
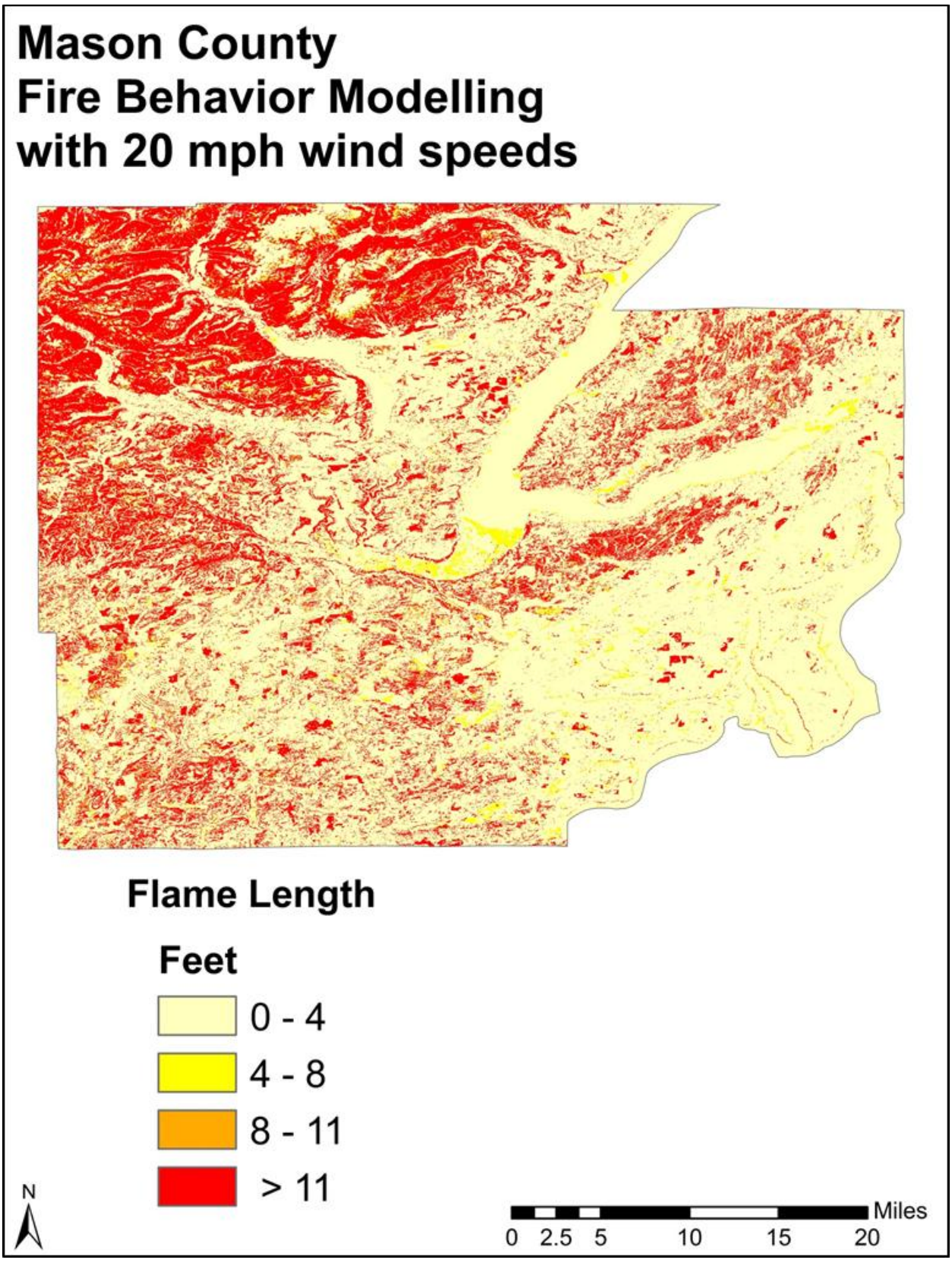


Figure 24: Predicted wildfire flame lengths in Mason County when wind speeds are 20 mph.



VI. WUI and "Communities-at-Risk"

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 (vegetative) 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 in or adjacent to (within 1.5 miles) wildland vegetation 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 density. However, in practice fire managers across the western U.S. use the 1 structure/40 acres definition to delineate WUI areas.

In order to get a refined representation of the intermix definition; we calculated the density of structures in Mason county and then divided the output by greater than or less than one structure per 40 acres. We started with the "site address" layer provided by the Mason County GIS department and removed those structures in areas without any vegetative fuels. The next step was to run a Kernal density analysis of the structure layer using ArcGIS software with a 1.5 miles calculation radius, or the distance a firebrand can travel, and an output in acres (Figure25). This density was reclassified as less than or greater than .025 structures per acre (the mathematical equivalent of 1/40) and the resultant boundary between these densities is the Federal defined WUI (Figure 26). While this WUI boundary represents the Federal definition, it should be used as a foundation that can be edited or expanded as the community sees fit.

Figure 25: Kernal Density of Mason County structures using ArcGIS software.

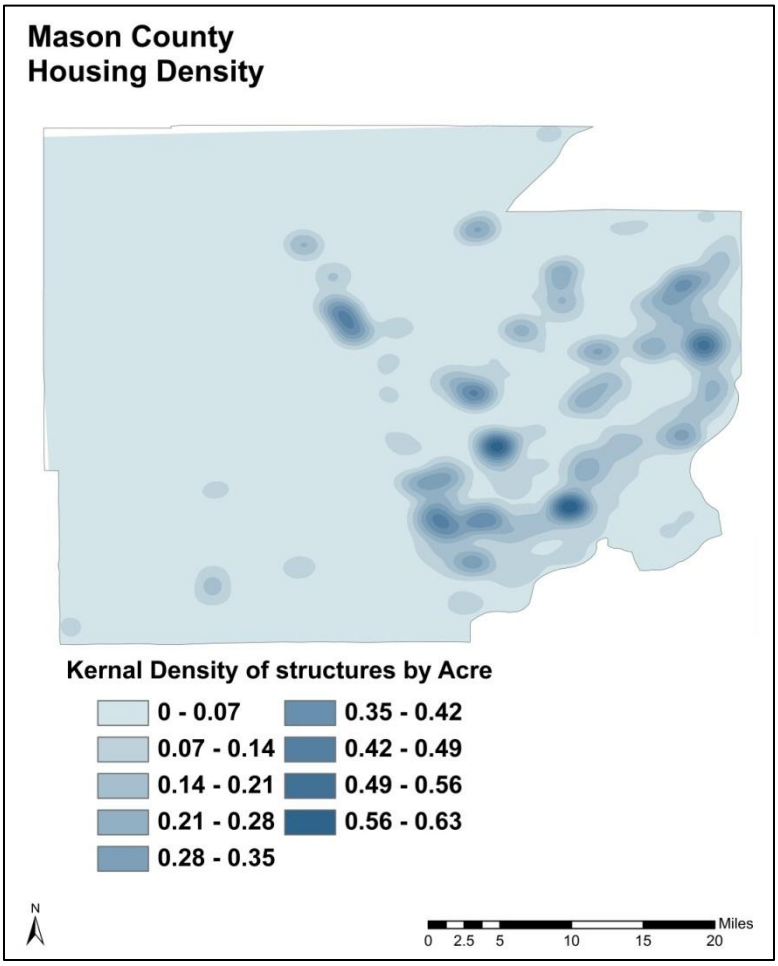
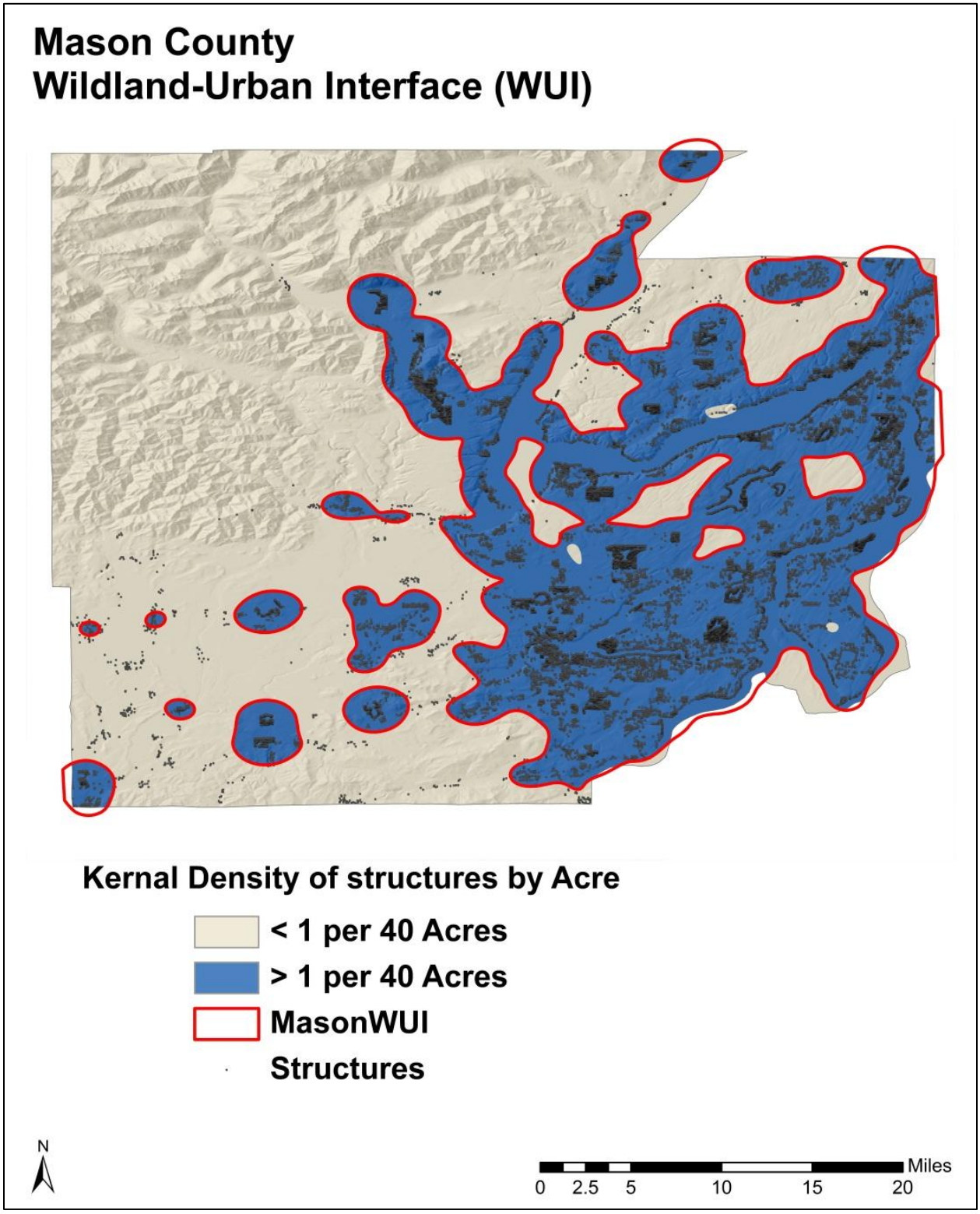


Figure 26: Mason County representation of the federal definition of the Wildland-Urban Interface.



Determining or Designating a Community or Area 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.** This CWPP defines any communities lying within the WUI as "at-risk." 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 an "at-risk" 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 property.**

This plan endorses the Firewise Communities/USA[2] recommendation of a planning scale of approximately that of a neighborhood or 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.

The following maps with structures contrasted against the combined hazard layer by fire district (Figures 27-40) can be used as a foundation for identifying areas for finer-scale hazard assessments. These assessments can be done utilizing the hazard assessment forms in Appendix D-G.

[2] www.firewise.org

Figure 27: Fire District 1 WUI boundary and combined wildfire hazard.

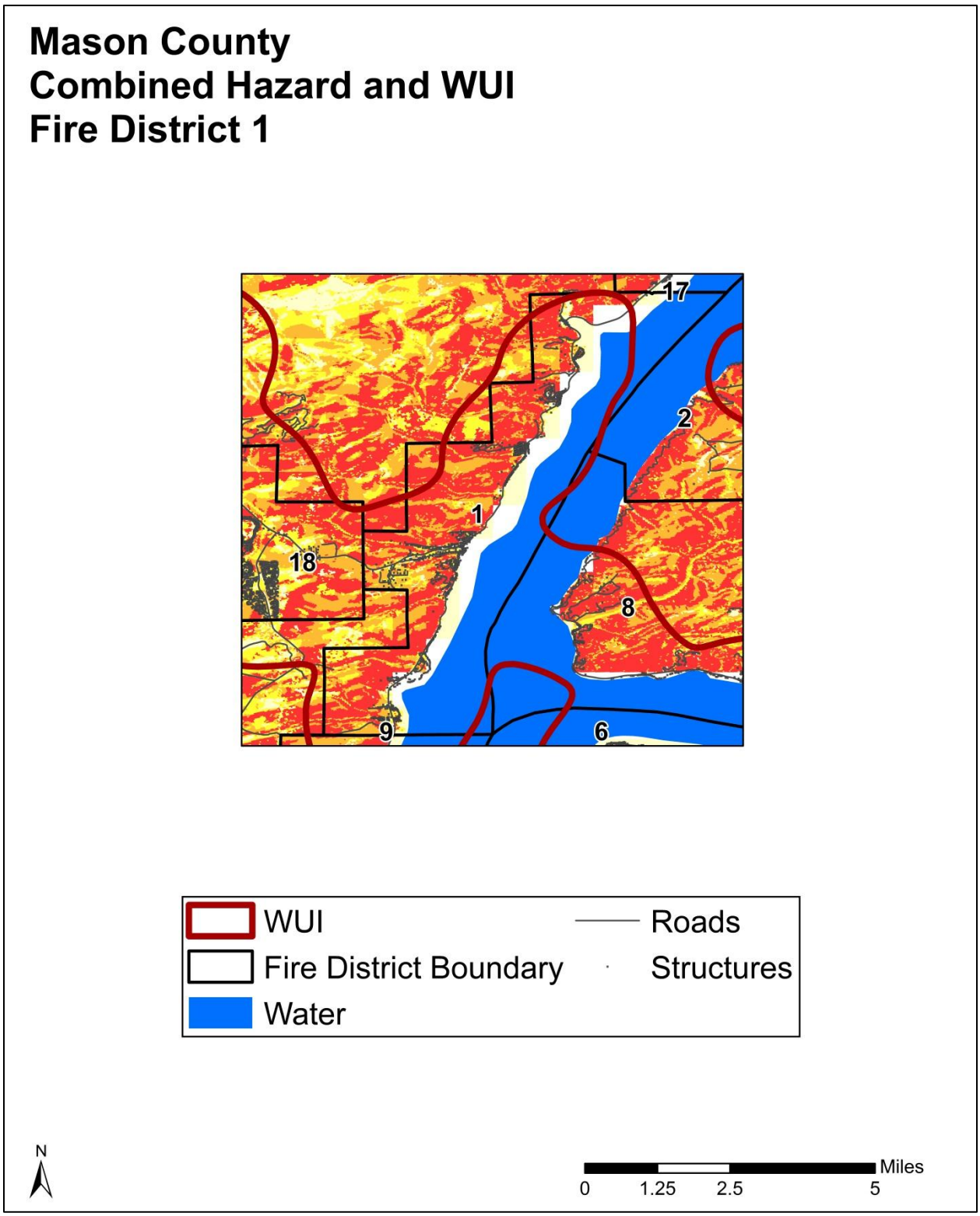


Figure 28: Fire District 2 WUI boundary and combined wildfire hazard.

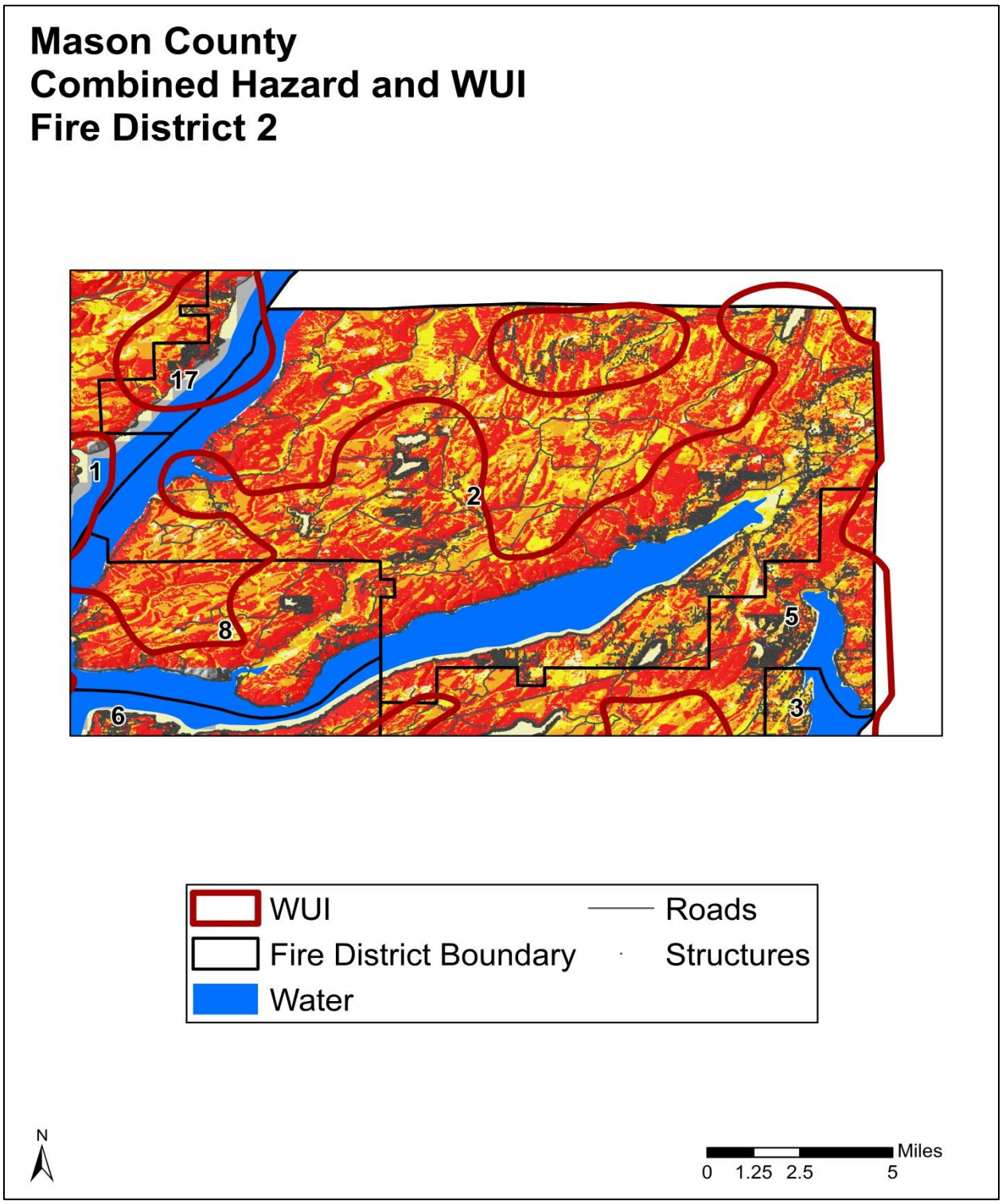


Figure 29: Fire District 3 WUI boundary and combined wildfire hazard.

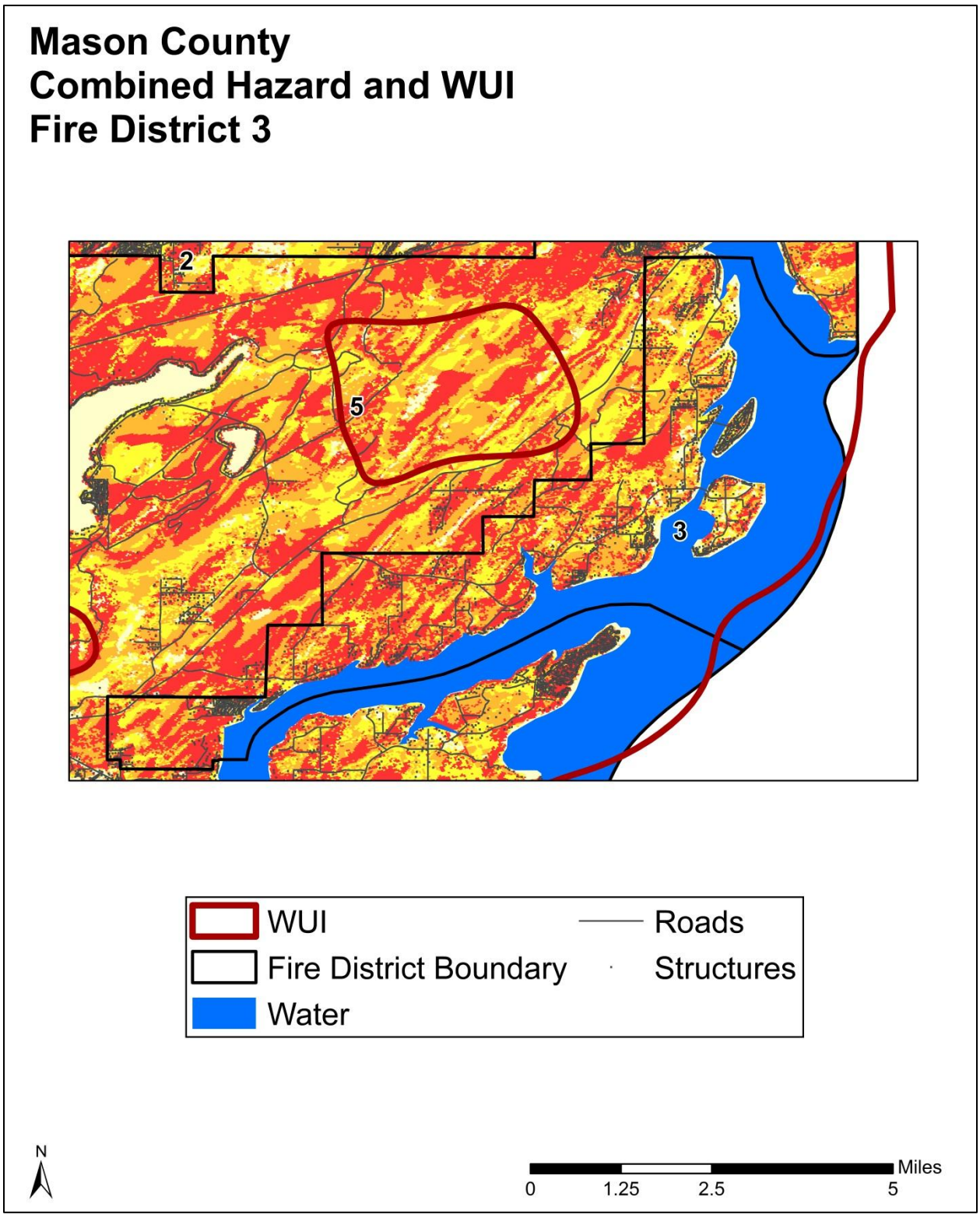


Figure 30: Fire District 4 WUI boundary and combined wildfire hazard.

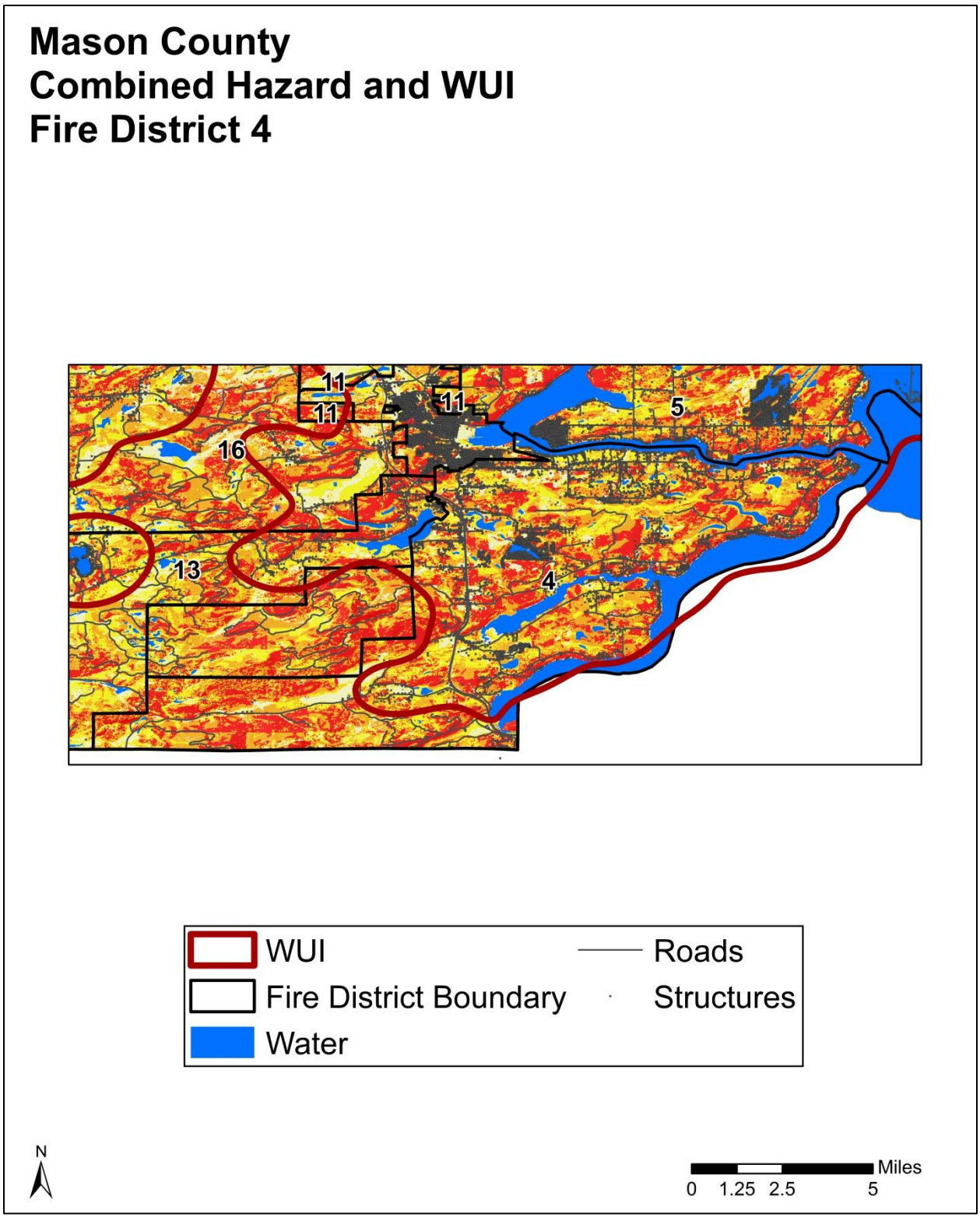


Figure 31: Fire District 5 WUI boundary and combined wildfire hazard.

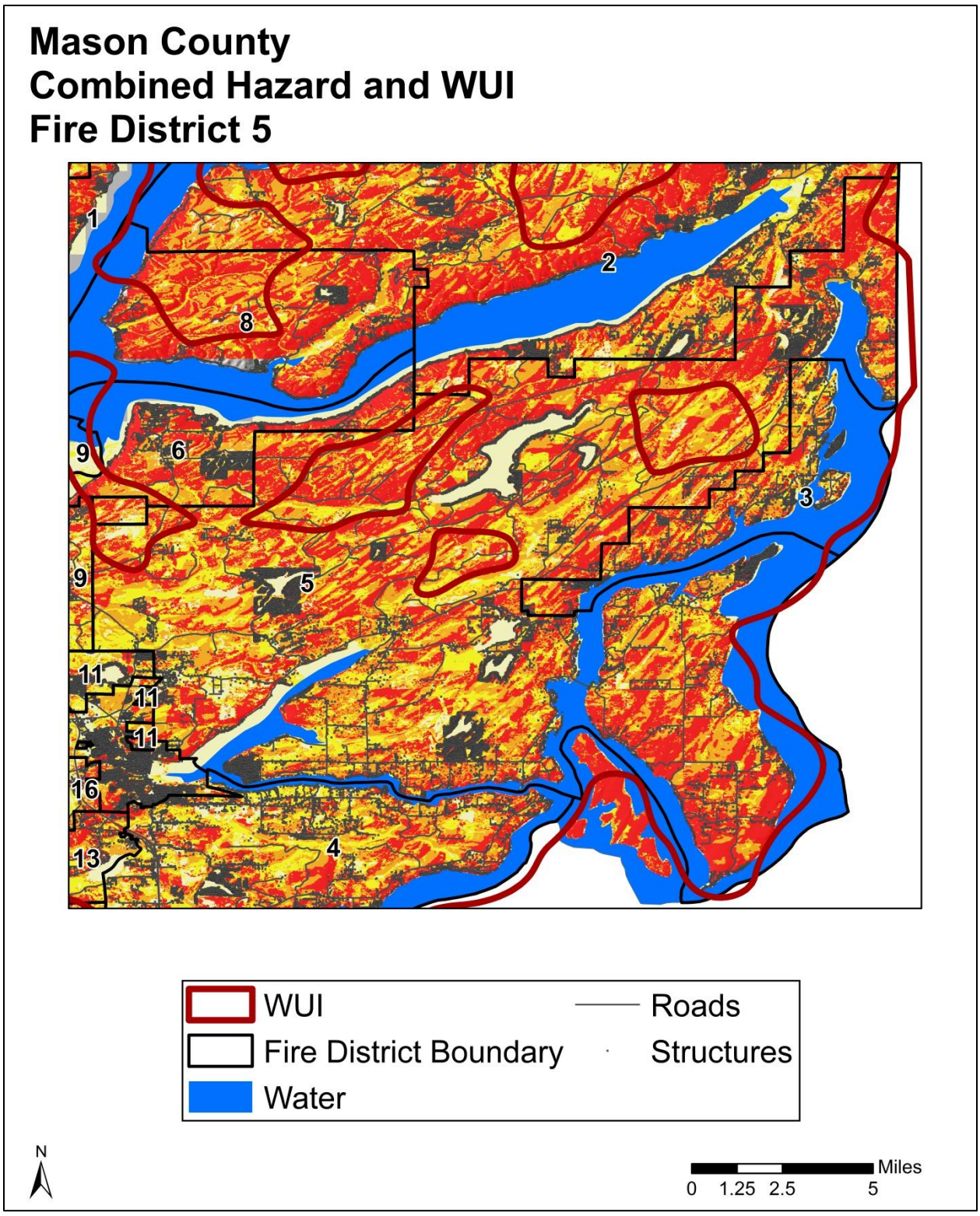


Figure 32: Fire District 6 WUI boundary and combined wildfire hazard.

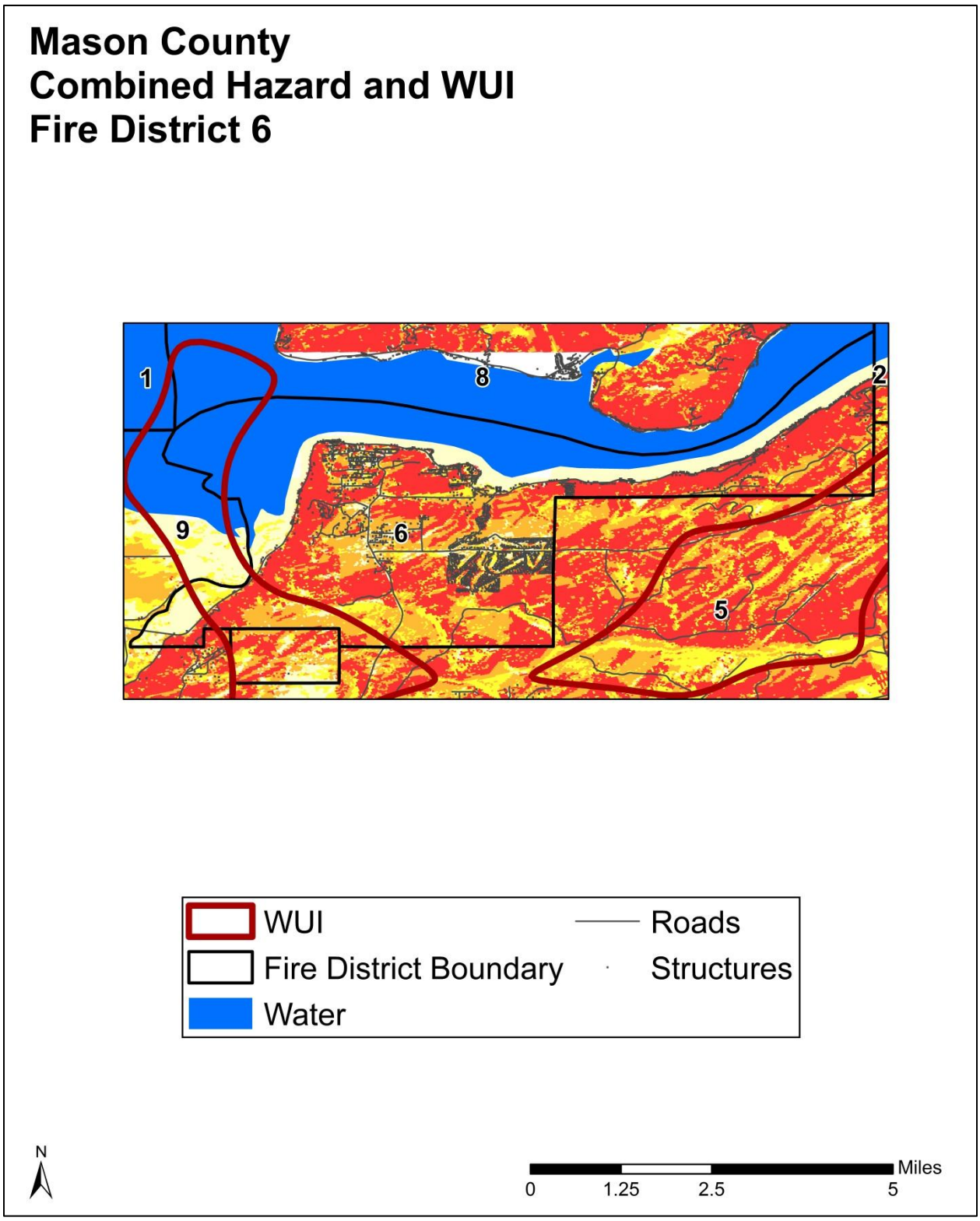


Figure 33: Fire District 8 WUI boundary and combined wildfire hazard.

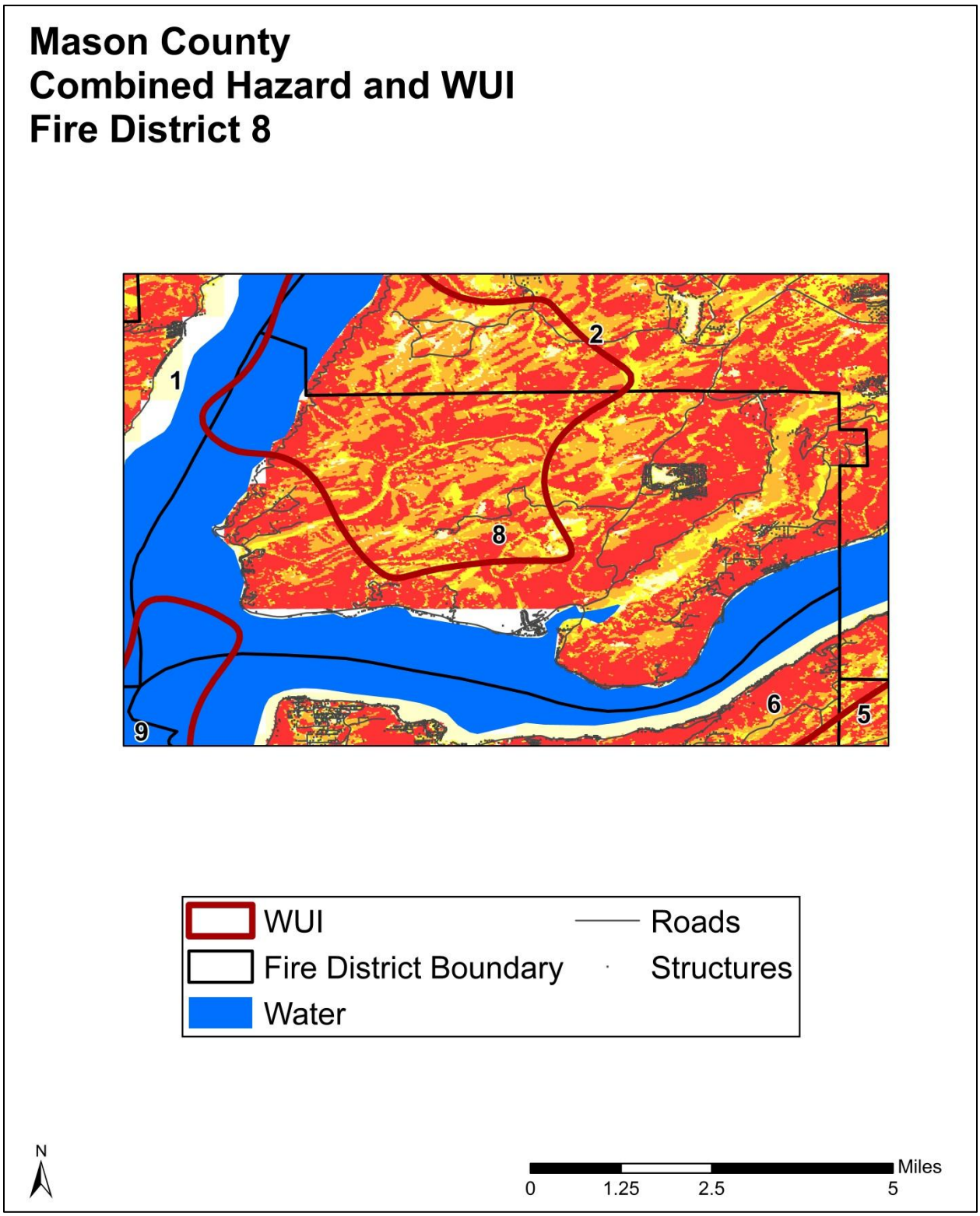


Figure 34: Fire District 9 WUI boundary and combined wildfire hazard.

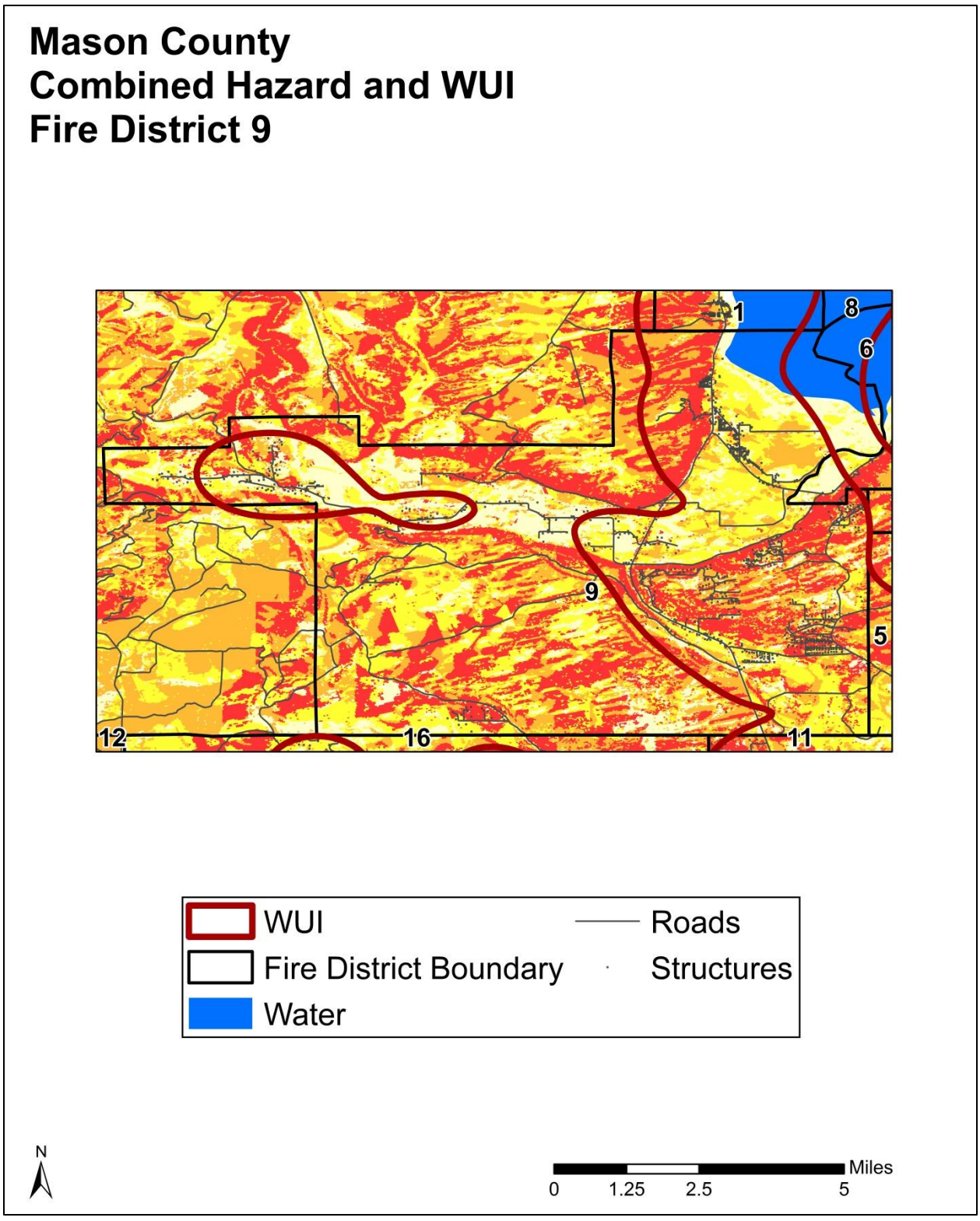


Figure 35: Fire District 11 WUI boundary and combined wildfire hazard.

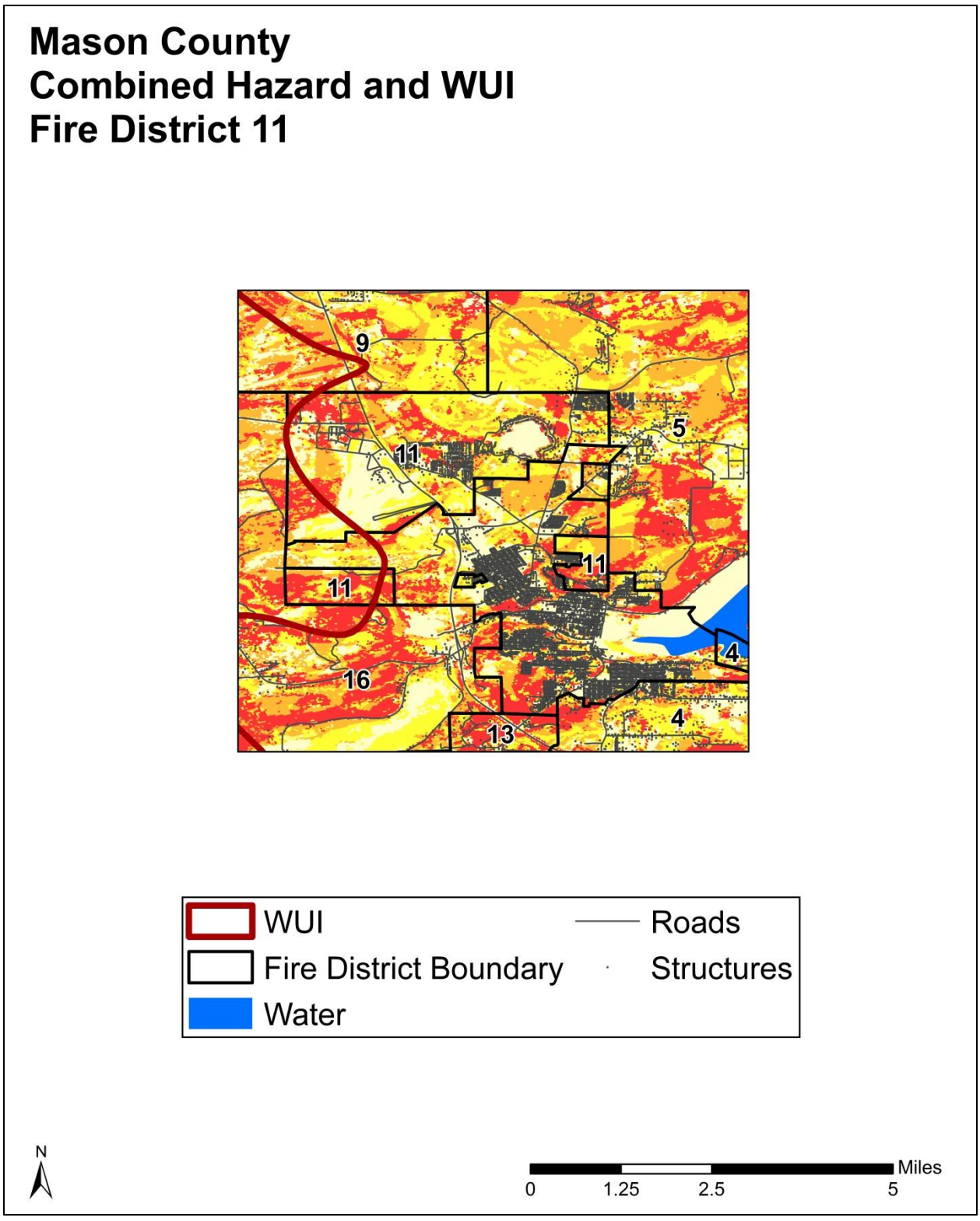


Figure 36: Fire District 12 WUI boundary and combined wildfire hazard.

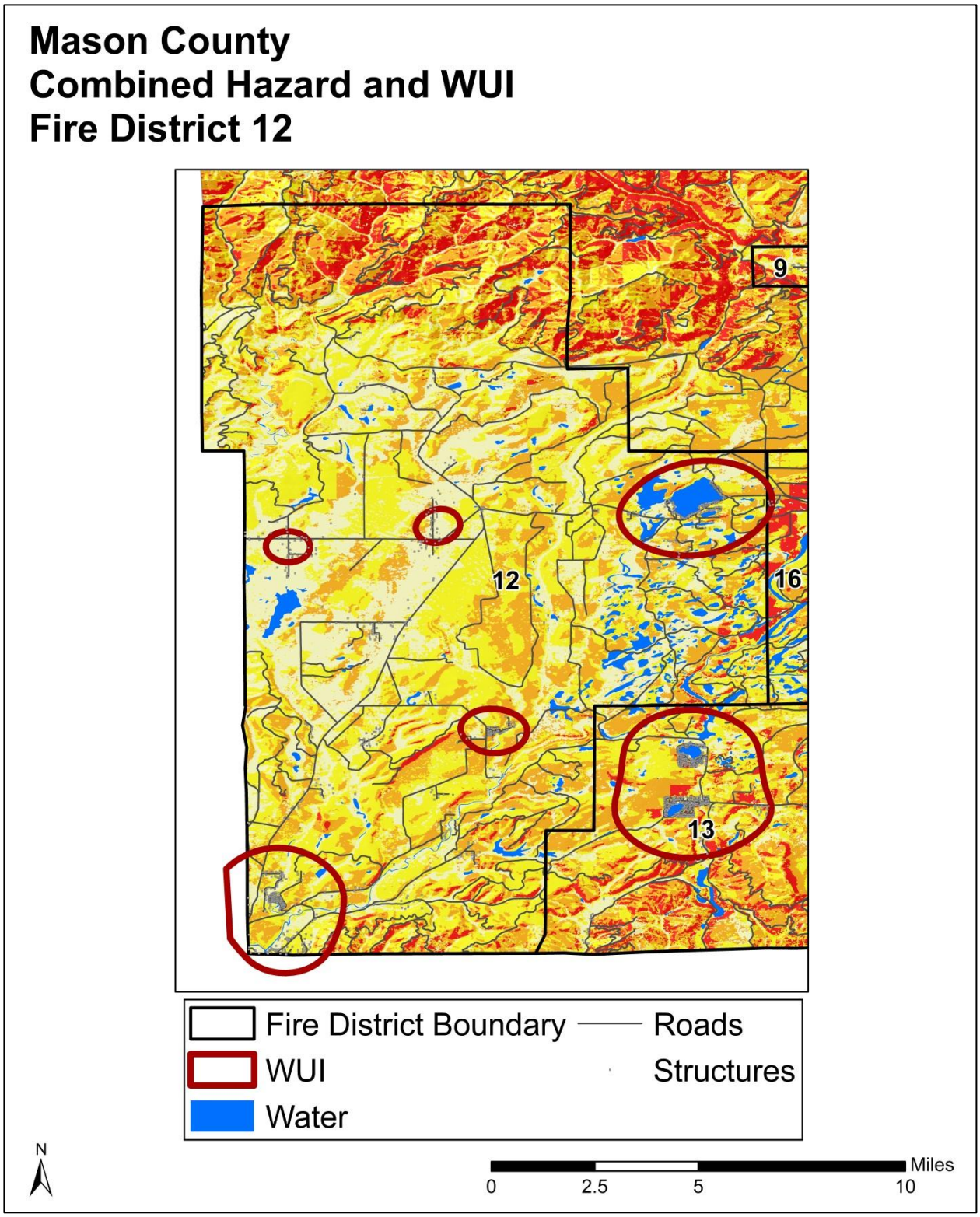


Figure 37: Fire District 13 WUI boundary and combined wildfire hazard.

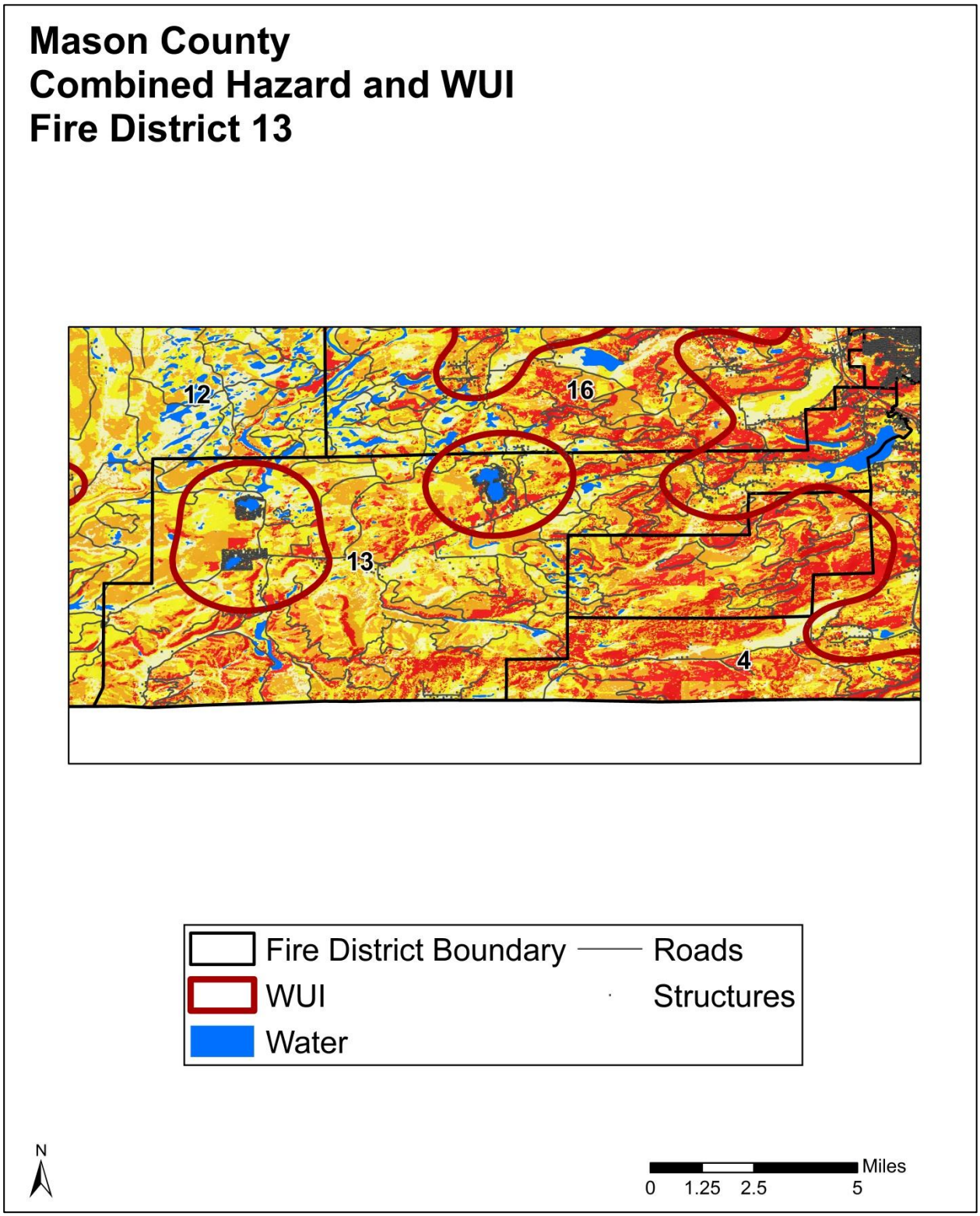


Figure 38: Fire District 16 WUI boundary and combined wildfire hazard.

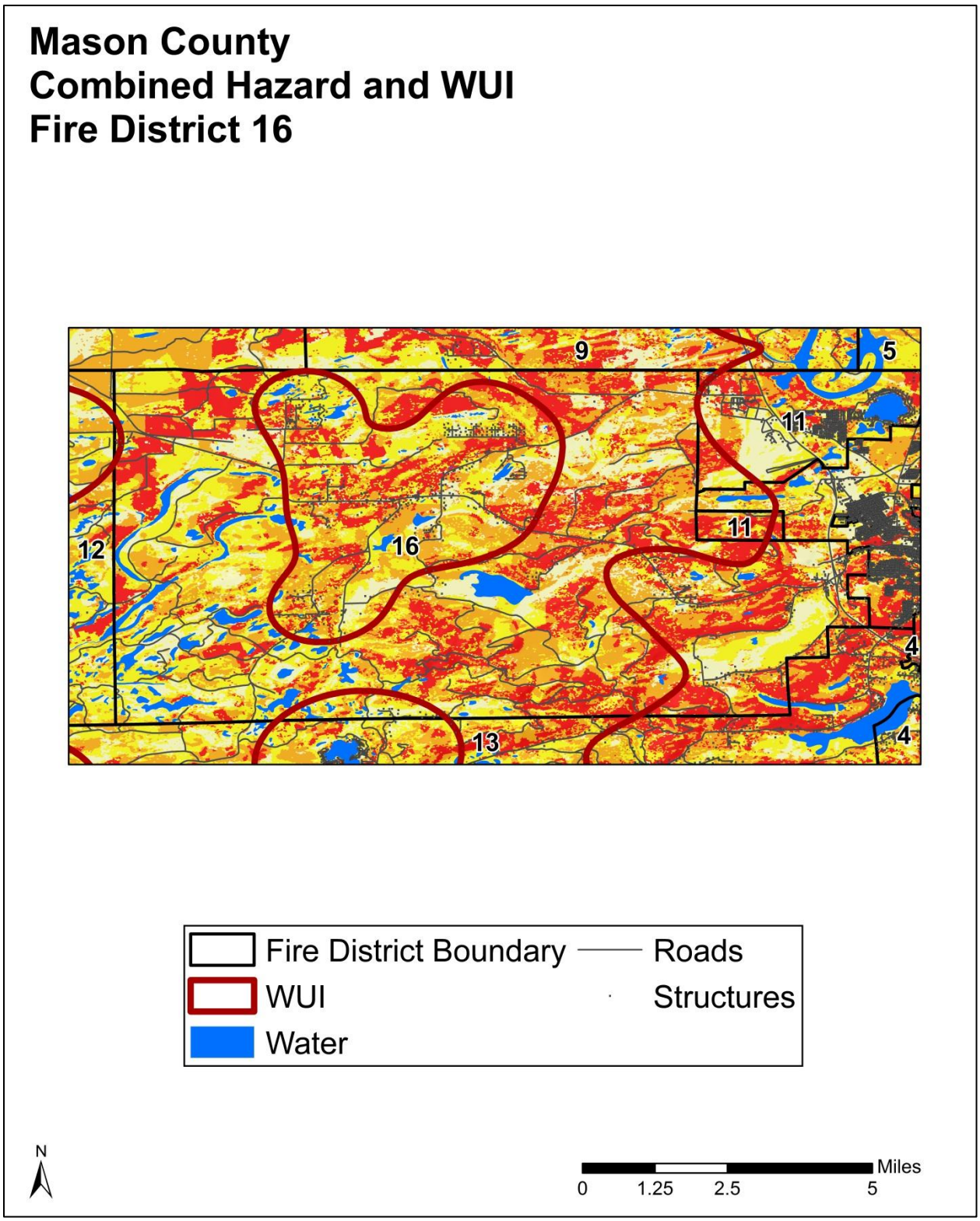


Figure 39: Fire District 17 WUI boundary and combined wildfire hazard.

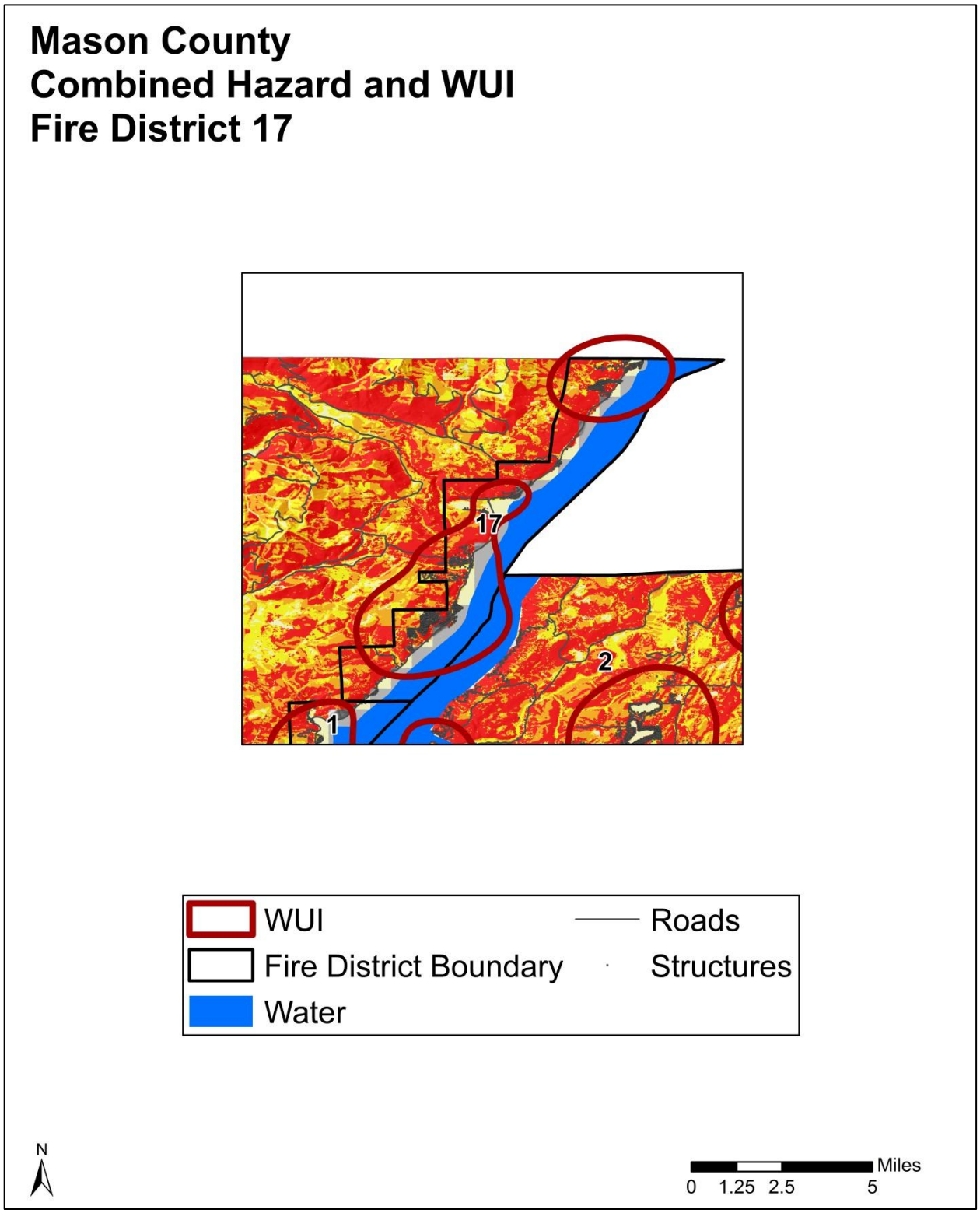
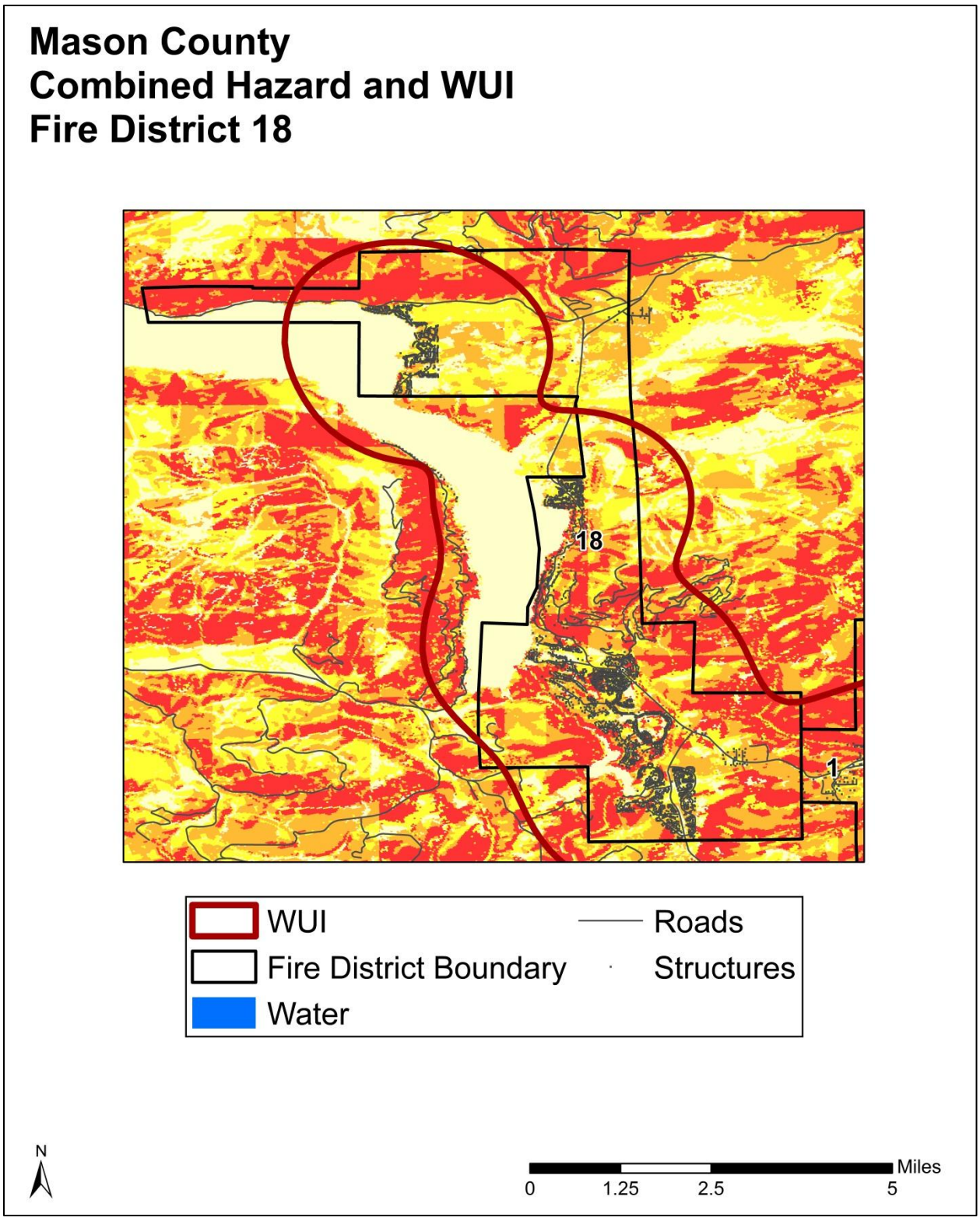


Figure 40: Fire District 18 WUI boundary and combined wildfire hazard.



VII. Mitigation Strategies

Due to the Mason County WUI consisting of a large area that encompasses many different land and 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 determined the most effective for those sites. The County has recognized this need by preparing the 2010 Mason County Natural Hazard Mitigation Plan; wildfire is addressed in section 4. 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 loss 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. This will also safeguard the forests by 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.Fire Districts #5 and #18 have recognized the need for fuels reduction in their communities and have recently prepared Wildfire Structure Protection and Evacuation Plans that provide a framework for future fuels reduction efforts.

The common methods for fuel reduction treatments include:

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

Types of fuel reduction projects can include:

- Stand thinning
- Reduction of disease stands
- Fuel breaks
- Pruning/thinning from below
- Prescribed fires
- 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 residences with improved protection
- Community/Environmental Assets protected
- Number of acres treated
- Cost/Benefit analysis results
- 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 **(Appendix K)** to ensure that new development is less vulnerable to wildfire. Some examples of how **Mason County Buildings and Construction Code (Title 14)** wildfire safety would be enhanced by this adoption are:

- 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"

Firewise Construction

As many as 2,000 homes are destroyed by wildfires each year. Because of the imminence of a wildfire situation, no fire department can ever guarantee the safety of a home or its residents in a fire 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

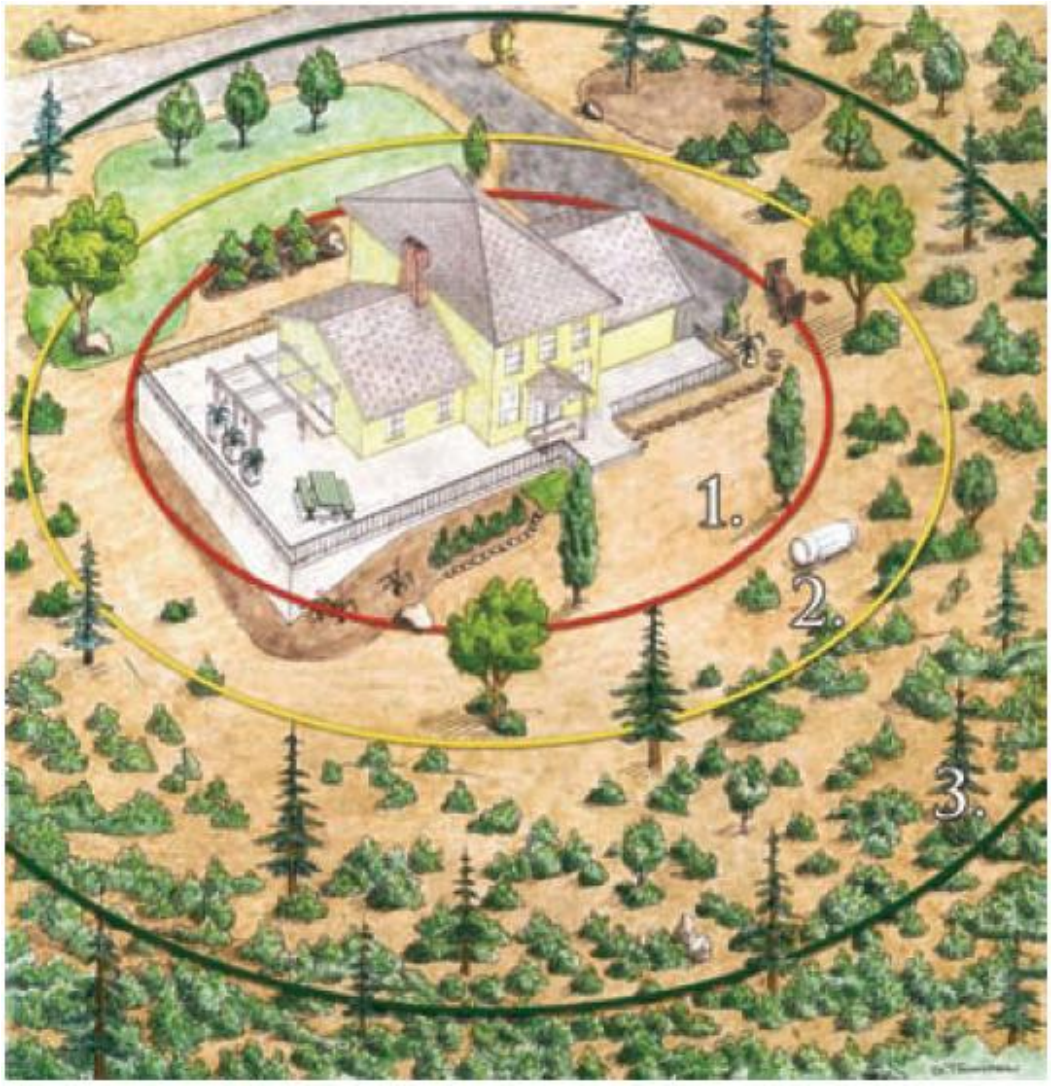
In designing a Firewise landscape, it's important to consider the following:

- 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 41).

Figure 41: Firewise landscaping zones; recommended mitigation measures for each zone are referenced below (image from Napa, CA 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. Within Mason County, Lake Cushman is a Firewise Community; in 2006, the Lake Cushman Firewise Council drafted a CWPP for the community, in which the community's emergency response/evacuation, wildfire education, and fuel reduction potential was assessed.

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 Mason County, this is currently **Jane Potter** of the Washington DNR jane.potter@dnr.wa.gov or (**360-802-7030**).
- 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 and 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. **Social networking sites, mobile applications, and Quick Response (QR) Codes may also be useful mediums for educating and informing the public.** 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 states 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.

VIII. 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 Mason County. This plan should be updated and expanded annually or as needed as more localized communities are assessed within the at-risk areas and mitigation projects 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.

Accomplishments should be documented both quantitatively and qualitatively. The *10-Year Comprehensive Strategy Implementation Plan* drafted by the Western Governors Association provides possible measures for quantitative documentation (Table 5); 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 5: Performance measures identified in the Western Governors Association 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 firefighters 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 National Association of State Foresters (NASF), Firewise, and the National Fire Plan websites as examples of how CWPPs and related efforts are reducing risks to communities, and can also demonstrate community success in future Mason County grant application efforts.

Several publications on protocols and guidelines for multiparty monitoring of community-based forest restoration projects are available online from the U.S. Forest Service.[3]

Adaptive Management

Adaptive management is a process of learning from 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?

[3] http://www.fs.fed.U.S./r3/spf/cfrp/monitoring and http://www.fs.fed.U.S./forestmanagement/index.shtml

IX. Potential Funding Sources

This CWPP can be utilized to apply for National Fire Plan, Pre Disaster Mitigation, and other State and federal grant programs as relevant. 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.

U.S. Forest Service

There are two programs delivered through the U.S. 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.

NRCS

The NRCS's Environmental Quality Incentives Program (EQIP) allows farmers and forest landowners to 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.

Firewise

The Firewise Communities/USA program can also assist communities in finding grants from an assortment of funding sources.

FEMA

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.

WA DNR

The Washington DNR 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 trainees.
- 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, U.S. 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% 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% 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 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). This program replaces the Federal Excess Property Program (FEPP) in Washington State.

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.

Appendix A: Acronyms

BLM Bureau of Land Management
CWPP Community Wildfire Protection Plan
DNR Department of Natural Resources
DOI Department of the Interior
FBFM Fire Behavior Fuel Model
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
NASF National Association of State Foresters
NEPA National Environmental Policy Act
NFPA National Fire Protection Association
NGOs Non-Governmental Organizations
NIFC National Interagency Fire Center
NLC National League of Cities
NRCS Natural Resources Conservation Service
NWCG National Wildfire Coordinating Group
OFM Office of Financial Management
PCC Public Protection Classification
PMA Primary Mitigation Area
USDA United States Department of Agriculture
USFS United States Forest Service
WDFW Washington Department of Fish and Wildlife
WGA Western Governors Association
WSRB Washington Surveying and Rating Bureau
WUI Wildland-Urban Interface

Appendix B: Glossary and Wildland Fire Terms

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.

Appendix C: References

Binion, A. 2006. Houses encroaching on woods complicate firefighting. September 13, 2006. *Peninsula Daily News*. Retrieved October 9, 2007. http://www.peninsuladailynews.com/article/20060914/NEWS/609140305

BLM. 2009. Risk Assessment and Mitigation Strategies Overview and other Guidance. Available at http://www.nifc.blm.gov/nsdu/fire_planning/rams/

Cascade Land Conservancy. 2011. Olympic Agenda: Mason County Dialogues, Summary of Findings. Available at http://www.cascadeland.org/the-olympic-agenda/mason-county/Mason%20County%20report%20FINAL.pdf

City of Shelton. 2006. The Community. Available at http://www.ci.shelton.wa.us/community.php

Clallam County Community Wildfire Protection Plan. (n.d.). Retrieved from http://clallamfire2.org/pdfs/misc/rp_burn_cwpp_clallamco.pdf

EPA. 2012. Surf Your Watershed: Mason County. Available at http://cfpub.epa.gov/surf/county.cfm?fips_code=53045

Firewise Communities. 2007. Be Firewise around your home. Firewise Brochure FWC-100-06.

Gedalof, Z., et al. 2005. Atmospheric, climatic and ecological controls on extreme wildfire years in the northwestern United States. *Ecological Applications* 15(1):154-174.

Gude, P., Rasker, R., van den Noort, J. 2007. Potential for future development on fire-prone lands. *Journal of Forestry* June 2007: 201-207.

Henderson, J., et al. 1989. Forested Plant Associations of the Olympic National Forest. Technical Paper 001-88. Portland, OR: Pacific Northwest Region.

Lake Cushman Firewise Council. 2006. Lake Cushman Firewise Council Community Fire Protection Plan. Pp . 11. Lake Cushman, WA: Lake Cushman Firewise Council.

Lake Cushman Firewise Council. (2010). Lake Cushman Wildfire Structure Protection and Evacuation 2010-2011. Lake Cushman, WA: Lake Cushman Firewise Council.

Mason County Division of Emergency Management. 2010. Mason County Natural Hazard Mitigation Plan. Retrieved from Mason County: http://www.co.mason.wa.us/forms/dem/natural_hazard_mitigation.pdf

Mason County Fire District 5. (2008). Mason County Fire District 5 Wildfire Structure Protection and Evacuation Plan. Allyn, WA: Mason County Fire District #5 Fire Prevention Office.

Mason County Washington . (2007). Chapter 14.18 - Interim fire flow standards for group a water systems. Retrieved from Mason County Washington Code of Ordinances: http://www.co.mason.wa.us/code/commissioners/level2/TIT14BUCO_CH14.18INFIFLSTGRWASY.html

Mason County Washington. (2010, May 25). Chapter 14.17 - Standards for fire apparatus access roads. Retrieved from Mason County Washington Code of Ordinances: http://www.co.mason.wa.us/code/commissioners/level2/TIT14BUCO_CH14.17STFIAPACRO.htm

Mason County. No Date. Fire Apparatus Access Standards. Available at http://www.co.mason.wa.us/community_dev/fire_marshal/access_standards.php

Mason County. 2005. Mason County Comprehensive Plan. Available at http://www.co.mason.wa.us/code/comp_plan/CH1.pdf

Mason County. 2011. Mason County Draft Shoreline Inventory and Characterization Report and Map Folio. Available online: http://www.co.mason.wa.us/community_dev/shoreline_master_program/smp_documents.php

Mason County. No Date. Welcome to the Office of the Fire Marshal. Available at http://www.co.mason.wa.us/community_dev/fire_marshal/index.php

Mason County Commissioners. 2010. Proceedings: August 24, 2010 Available from: http://www.co.mason.wa.us/commissioners/Minutes_2010/2010-08-24.REG.pdf

Mason County Division of Emergency Management. 2009. Hazard identification and vulnerability analysis. Available from: http://www.co.mason.wa.us/forms/dem/2009_HIVA.pdf

Ness, A., and R. Fowler. 1960. Soil Survey of Mason County, Washington. Available at http://soildatamart.nrcs.usda.gov/Manuscripts/WA645/0/wa645_text.pdf

NFPA. 2008. Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas. NFPA 1141. Quincy Park, MA: National Fire Protection Association.

NFPA. 2008. Standard for Protection of Life and Property from Wildfire. NFPA 1144. Quincy Park, MA: National Fire Protection Association.

OFM. Demographic data retrieved from the Office of Financial Management website www.ofm.wa.gov, accessed 2/22/2012.

OFM. 2010. Census 2010, Summary File 1: Mason County. Available at http://www.ofm.wa.gov/pop/census2010/sf1/data/county/wa_2010_sf1_county_05000US53045.pdf

OFM. 2011. Local Government and Special Districts 2011 Data Book. Available at http://www.ofm.wa.gov/databook/pdf/local.pdf

Pacific Northwest Properties. 2009. Directory of Lakes in Mason County. Available at http://www.free2b.com/Area%20Information/directory_of_lakes_in_mason_coun.htm

U.S. Census Bureau. 2012. 2010 Place Lookup. Available at http://www.census.gov/geo/www/codes/place/data/5300000.html

U.S. Census Bureau. 2012. State & County QuickFacts: Mason County, Washington. Available at http://quickfacts.census.gov/qfd/states/53/53045.html

USDA. 1960. Soil Survey of Mason County, Washington. Available online: http://soildatamart.nrcs.usda.gov/Manuscripts/WA645/0/wa645_text.pdf

Vleming, J. 2011. Mason County Profile. Available at https://fortress.wa.gov/esd/employmentdata/reports-publications/regional-reports/county-profiles/mason-county-profile#laborforce

Washington State DOC. 2010. Mason County.
http://www.choosewashington.com/locate/counties/Pages/Mason.aspx

Washington State Legislature. (2009). Chapter 51-54 WAC State building code adoption and amendment of the 2009 edition of the international fire code. Retrieved from Washington State Legislature: http://apps.leg.wa.gov/wac/default.aspx?cite=51-54

Wilma, D. 2006. Mason County -- Thumbnail History.
http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=7730

Agee, J.K. 1993. Fire ecology of the Pacific Northwest forests. Washington: Island Press.

Brown, J.K. 1995. Fire regimes and their relevance to ecosystem management. Pages 171- 178 *In* Proceedings of Society of American Foresters National Convention, Sept. 18-22, 1994, Anchorage, AK. Society of American Foresters, Wash. DC.

Barrett, J.W. 1979. Silviculture of ponderosa pine in the Pacific Northwest: the state of our knowledge. USDA Forest Service, General Technical Report PNW-97. Pacific Northwest Forest and Range Experiment Station, Portland, OR. 106 p.

Hann, W.J., Bunnell, D.L. 2001. Fire and land management planning and implementation across multiple scales. Int. J. Wildland Fire. 10:389-403.

Hardy, C.C., Schmidt, K.M., Menakis, J.M., Samson, N.R. 2001. Spatial data for national fire planning and fuel management. International Journal of Wildland Fire 10:353-372.

Johnson, C.G.; Clausnitzer, R.R.; Mehringer, P.J.; Oliver, C.D. 1994. Biotic and Abiotic Processes of Eastside Ecosytems: the Effects of Management on Plant and Community Ecology, and on Stand and Landscape Vegetation Dynamics. Gen. Tech. Report PNWGTR-322. USDA-Forest Service. PNW Research Station. Portland, Oregon. 722pp.

Johnson, C.G. 1998. Vegetation Response after Wildfires in National Forests of Northeastern Oregon. 128 pp.

National Interagency Fire Center. 2003. Information posted on the Agency's Internet web site at http://www.nifc.gov/

Schmidt, K.M., Menakis, J.P. Hardy, C.C., Hann, W.J., Bunnell, D.L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. General Technical Report, MRS-GTR-87, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

USFS. 2001. United States Department of Agriculture, Forest Service. Wildland Urban Interface. Web page. Date accessed: 25 September 2001. Accessed at: http://www.fs.fed.us/r3/sfe/fire/urbanint.html

Washington State Department of Natural Resources. Washington Forest Health Issues in 2005. Web page. Date accessed July 13, 2006. Available at:
http://www.dnr.wa.gov/htdocs/rp/forhealth/2005highlights/index.html .

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' – 100+'	
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		
100-200'	1		
30-100'	3		
<30'	5		
	Sum:		

What is the predominant fuel model within 30' of the structure?

Fuel Model:

D: 30' to 100+' from Structure	**Score**	**Rating**	**Notes**
What is the average slope between 30-100' 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 30-100' 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?*			
100 - 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		
100-200'	1		
30-100'	3		
<30'	5		
	Sum:		

What is the predominant fuel model between 30-120' of the structure?

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		
100-200'	1		
30-100'	3		
<30'	5		
	Sum:		

What is the predominant fuel Hazard in the surrounding environment?
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	
Project Lead	
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, Medium, Low)	

Appendix H: National Register of Historic Places

Resource Name	Address	City	Listed	Area of Significance
Big Creek Archeological Site	Address restricted	Hoodsport	1999	Prehistoric
Cushman No. 1 Hydroelectric Power Plant	S end of Lake Cushman	Hoodsport	1988	Engineering, Industry
Cushman No. 2 Hydroelectric Power Plant	Skokomish River	Hoodsport	1988	Engineering, Industry, Architecture
Goldsborough Creek Bridge	WA 3	Shelton	1982	Engineering, Transportation
Harstine Island Community Hall	North Island Dr. and Harstine Island Drive	Harstine Island	1989	Social History
High Steel Bridge	Spans Skokomish South Fork	Shelton	1982	Transportation, Engineering
North Hamma Hamma River Bridge	Spans North Hamma Hamma River	Eldon	1982	Engineering, Transportation
Schafer State Park	1365 W Schafer Park Rd.	Elma	2010	Entertainment/Recreation, Politics/Government, Architecture
Shelton Public Library and Town Hall	5th St. and Railroad Ave.	Shelton	1983	Education, Politics/Government, Architecture
Simpson Logging Company Locomotive No. 7 and Peninsular Railway Caboose No. 700	3rd and Railroad Aves.	Shelton	1984	Transportation, Industry
South Hamma Hamma River Bridge	Spans South Hamma Hamma River	Eldon	1982	Engineering, Transportation
Vance Creek Bridge	NW of Shelton	Shelton	1982	Engineering, Transportation
taba das Also known as 45MS50	Address restricted	Potlatch	2005	Historic – Aboriginal, Prehistoric, Native American

Appendix I: Geoprocessing Steps

Spatial Data is accessible in county extents from LANDFIRE:
1. Use the ArcGIS *Reclassify* tool to reclass Slope according Table 3.
2. Use the ArcGIS Reclassify tool to reclass Aspect according to Table 3.
3 Use the ArcGIS Reclassify tool to reclass the FBFM 40 layer according to Table below.

40 Scott & Burgan Fire Behavior Fuel Models	Hazard Points
NB1, NB8, NB9	0
GR1, GR2, TL4, TL7	15
GS2, TL5, TL6, TU1, TU2, SB1	20
Tl8, TU5	25

Climate data:
1. Add precipitation and max temperature datasets for August to the .mxd.
Using *Extract by Mask*, extract the data within the MasonCo.shp for all datasets. Note:
This is done to isolate the study area to determine relative differences, not absolute differences.
2. For the average precipitation dataset, *Reclassify* the values using equal intervals, breaking it into 25 classes. Each class will have a value of 1-25 with the lower values reclassified with the higher values. To do this, click the "Reverse New Values" check box. This associates lower precipitation with a higher hazard level.
3. For the average maximum temperature dataset, *Reclassify* the values using equal intervals, breaking it into 25 classes. For temperature, accept the auto populated new values so warmer temperatures have higher hazard.
4. With the *Raster Calculator* use the following equation to aggregate the reclassified precipitation and temperature data for each month into a single layer: ([MonthPrecip] * 0.7)+([MonthTemp] * 0.3). Export as a GRID and add it to the .mxd.

All Hazard Mash-up: use the *Raster Calculator* to add the layers together, then *Reclassify* by quartile.

The WUI layer is developed using the site address shapefile.

1. Use the *Kernel Density* tool with a search radius of 7920 feet (for the maximum distance a firebrand can travel), cell size 1, and units in Acres.

2. Reclassify by less than or greater than .025 per acre.

Appendix J: 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 950 Farman Avenue N, Enumclaw, WA 98022	 (360) 374-2800 (360) 825-1631
Olympic National Forest 295142 Highway 101 S, Quilcene, WA 98376	(360) 765-2200 TDD (360) 765-2200
Olympic National Park 600 East Park Avenue, Port Angeles, WA 98362	(360) 374-5450 (360) 565-3130
Fire District No. 1-Hoodsport Area	(360) 877-5186
Fire District No. 2-Belfair Area	(360) 275-6711
Fire District No. 3-Grapeview Area	(360) 275-4483
Fire District No. 4-Arcaia/Kamilche Area	(360) 426-7222
Shelton Fire Department	(360) 426-3348
Fire District No. 5-Allyn/Agate/Shelton Area	(360) 426-5533
Fire District No. 6-Union Area	(360) 898-4871
Fire District No. 8-Tahuya Area	(360) 275-6478
Fire District No. 9-Skokomish Area	(360) 427-7426
Fire District No. 11-Shelton Area	(360) 426-1822
Fire District No. 12-Matlock Area	(360) 426-4976
Fire District No. 13-Cloquallum Area	(360) 482-4610
Fire District No. 16-Dayton Area	(360) 426-7343
Fire District No. 17-Lilliwaup/Eldon Area	
Fire District No. 18-Lake Cushman Area	(360) 877-9882
Law Enforcement	911
Sheriff's Office	South County (360) 427-9670 X313

322 N 3rd Street, Shelton, WA 98584	North County (360) 275-4467 X313 West County (360) 482-5269 X313
State Patrol 629 West Dayton Airport Road, Shelton, WA 98584	(360) 427-2180
Ambulance	911
Mason General Hospital 901 Mountain View DR, Shelton WA 98584	(360) 426-1611
Utilities	
Mason County PUD District 1 office 21971 U.S. 101, Shelton (Potlatch), WA 98584	(360) 877-5249
Mason County PUD District 3 main office 307 W Cota ST, Shelton, WA 98584	(360) 426-8255
Mason County PUD District 3 Belfair office 21341 E State Route 3, Belfair, WA 98528	(360) 275-2833
Telecommunications providers	
CenturyLink	866-642-0444
Comcast	866-922-0069
Verizon	(360) 427-0430