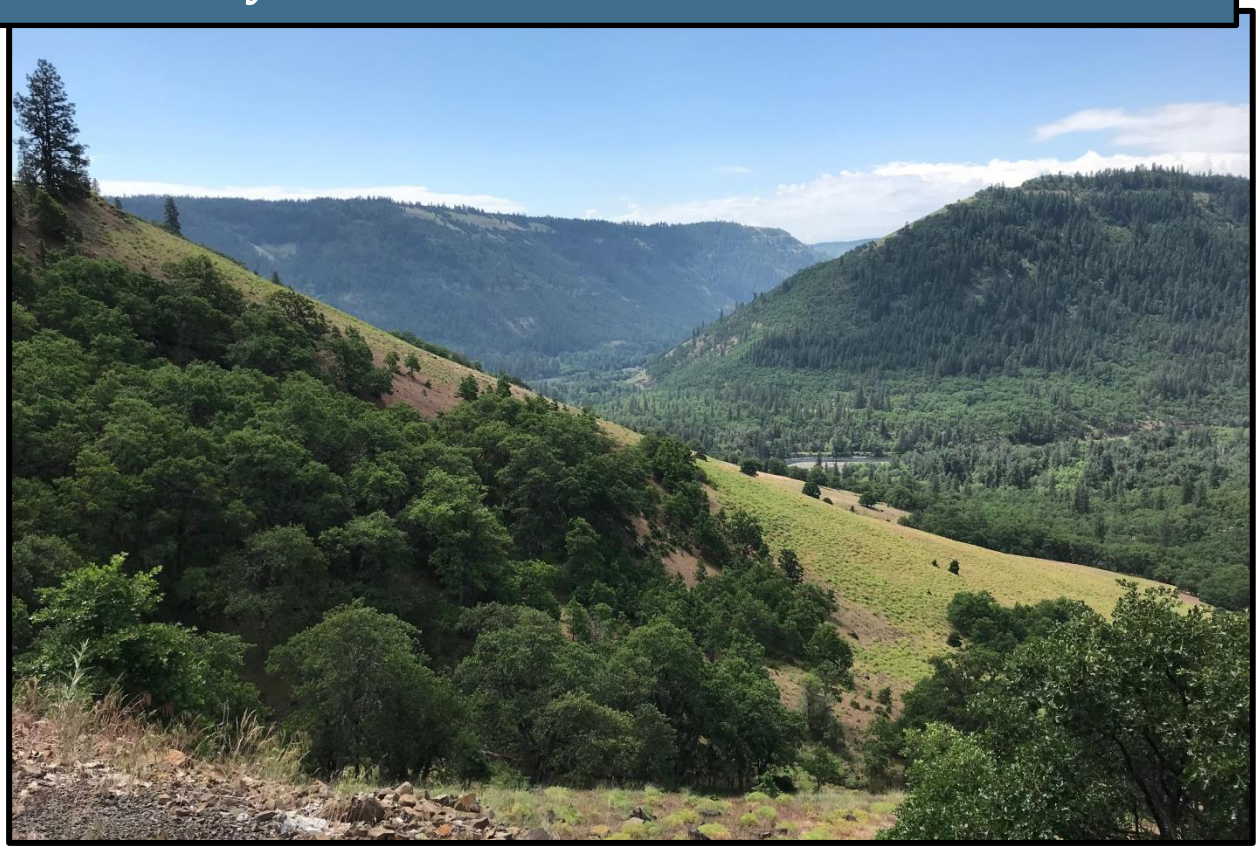
Klickitat County, Washington

Community Wildfire Protection Plan 2018



Klickitat County Emergency Management
199 Industrial Way
Goldendale, WA 98620
(509) 773-0582

Prepared By
Northwest Management, Inc.

-This page intentionally left blank-

Acknowledgements

This Community Wildfire Protection Plan represents the efforts and cooperation of a number of organizations and agencies working together to improve preparedness for wildfire events while reducing factors of risk.

Underwood Conservation District

CONSERVATION DISTRICTS OF WASHINGTON STATE

your window to healthy lands

Eastern Klickitat Conservation District

Central Klickitat Conservation District

Cities and Communities of Klickitat County:

City of Goldendale
City of Bingen
City of White Salmon
Town of Bickleton
Town of Centerville
Town of Dallesport
Town of Glenwood
Town of Klickitat

Klickitat County Fire Districts #1-15

Unincorporated Communities & Local Businesses and Citizens of Klickitat County

To obtain copies of this plan contact:

Klickitat County Department of Emergency Management
199 Industrial Way
Goldendale, Washington 98620
509-773-0582

Table of Contents

Foreword

The process of developing a Community Wildfire Protection Plan (CWPP) can help a community clarify and refine its priorities for the protection of life, property, and critical infrastructure in the wildland–urban interface on both public and private land. It also can lead community members through valuable discussions regarding management options and implications for the surrounding land base. Natural Resource conservation districts and fire service organizations help define issues that may place the county, communities, and/or individual homes at risk. Through the collaboration process, the CWPP advisory group discusses potential solutions, funding opportunities, and regulatory concerns and documents their resulting recommendations in the CWPP. The CWPP planning process also incorporates an element of public outreach. Public involvement in the development of the document not only facilitates public input and recommendations, but also provides an educational opportunity through interaction of local wildfire and natural resource conservation specialists and an interested public.

The idea for community-based wildland fire planning and prioritization is neither novel nor new. However, the incentive for communities to engage in comprehensive forest and range planning and prioritization was given new and unprecedented impetus with the enactment of the Healthy Forests Restoration Act (HFRA) in 2003. This landmark legislation includes the first meaningful statutory incentives for the US Forest Service (USFS) and the Bureau of Land Management (BLM) to give consideration to the priorities of local communities as they develop and implement forest management and hazardous fuel reduction projects. In order for a community to take full advantage of this new opportunity, it must first prepare a Community Wildfire Protection Plan (CWPP). A countywide CWPP advisory group generally makes project recommendations based on the issue causing the wildfire risk, rather than focusing on individual landowners or organizations. Thus, projects are mapped and evaluated without regard for property boundaries, ownership, or current management. Once the CWPP is approved by the County Commissioners and the State Forester, the advisory group will begin further refining proposed project boundaries, feasibility, and public outreach as well as seek funding opportunities.

The Klickitat County Community Wildfire Protection Plan was developed in 2017-18 by the Klickitat County CWPP advisory group with leadership from the Washington Department of Natural Resources and Klickitat County Department of Emergency Management and project facilitation and support provided by Northwest Management, Inc. of Moscow, Idaho. Funding for the project was provided by the Bureau of Land Management in cooperation with the

Washington Department of Natural Resources. This Community Wildfire Protection Plan will be reviewed annually and updated at least every five years starting from the year of adoption.

The Community Wildfire Protection Plan was developed in compliance with the Federal Emergency Management Agency requirements for a wildfire mitigation plan, a chapter of a countywide Multi-Hazard Mitigation Plan.

Signature Pages

This Klickitat County Community Wildfire Protection Plan Update has been developed in cooperation and collaboration with representatives of the following organizations and agencies.

Klickitat County Commissioners

This Klickitat County Community Wildfire Protection Plan has been developed in cooperation and collaboration with representatives of the following organizations and agencies.

Rex F. Johnston, Commissioner/Chairman Klickitat County Commissioner	Date
David Sauter, Commissioner Klickitat County Commissioner	Date
Jim Sizemore, Commissioner Klickitat County Commissioner	Date

Klickitat County Fire Protection Districts and Departments

This Community Wildfire Protection Plan and all of its components identified herein were developed in close cooperation with the participating entities listed. These members of the CWPP advisory group formally recommended that this document be adopted by the Klickitat County Commissioners.

Carl Spratt, Chief Bingen Fire Department	Date
Noah Halm, Chief Goldendale Fire Department	Date
Bill Hunsaker, Chief White Salmon Fire Department	Date
Lanny Smith, Chief Klickitat County F. P. D. #1 (Trout Lake)	Date
John Jensen, Chief Klickitat County F.P.D. #2 (Bickleton)	Date
Wesley Long, Chief Klickitat County F.P.D. #3 (Husum)	Date
David McCune, Chief Klickitat County F.P.D. #4 (Lyle)	Date

Lawrence Browning, Chief Klickitat County F. P. D. #5 (Centerville)	Date
Rhet Howard, Chief Klickitat County F. P. D. #6 (Dallesport)	Date
Tony Browning, Chief Klickitat County F.P.D #7 (Goldendale)	Date
Brent Gimlin, Chief Klickitat County F. P. D. #8 (Glenwood)	Date
Earl Snyder, Chief Klickitat County F. P. D. #9 (Roosevelt)	Date
Calvin Mercer, Chief Klickitat County F. P. D. #10 (Alderdale)	Date
Clyde Rosa, Chief Klickitat County F. P. D. #11 (Wishram)	Date
Curtis Melvin, Chief Klickitat County F. P. D. #12 (Klickitat)	Date
Gene Pyke, Chief Klickitat County F. P. D. #13 (Appleton)	Date

Tim Darland, Chief Klickitat County F. P. D. #14 (High Prairie)	Date
Brad Knowland, Chief Klickitat County F. P. D. #15 (Wahkiacus)	Date

Other Advisory Group Representatives

This Community Wildfire Protection Plan and all of its components identified herein were developed in close cooperation with the participating entities listed. These members of the CWPP advisory group formally recommended that this document be approved by the Klickitat County Commissioners.

Alan Lawson, Washington Department of Natural Resources	Date
Jeff King, Director Klickitat County Department of Emergency Management	Date
George Geissler, State Forester; Deputy Supervisor for Wildfire Washington Department of Natural Resources	Date
Aaron King, Wenatchee Field Manager Bureau of Land Management	Date
Lindsey Babcock, Border Resource Manager Spokane District Bureau of Land Management	Date

Chapter 1: Plan Overview and Development

In 2016, the Washington Department of Natural Resources (DNR) contracted with Northwest Management Inc. to conduct an in-depth risk assessment for the hazard of wildland fire in Klickitat County, Washington. Wildfire events occur annually in Klickitat County; thus, programs and projects that mitigate the impacts of this hazard benefit to the local residents, property, infrastructure, and the economy.

This Community Wildfire Protection Plan (CWPP) for Klickitat County, Washington, is the result of analysis, professional collaboration, and assessments of wildfire risks and other factors focused on reducing wildfire threats to people, structures, infrastructure, and unique ecosystems in Klickitat County.

Northwest Management, Inc. of Moscow, Idaho was selected to assist the advisory group by facilitating meetings, leading the assessments, and authoring the document. The project manager from Northwest Management, Inc. was Tera King.

Goals and Guiding Principles

The goals of the planning process include integration with the National Fire Plan, the Healthy Forests Restoration Act, FLAME Act, Cohesive Wildfire Strategy, and the Disaster Mitigation Act. The plan utilizes the best and most appropriate science from all partners as well as local and regional knowledge about wildfire risks and fire behavior while meeting the needs of local citizens and recognizing the significance wildfire can have to the regional economy.

Vision Statement

Promote awareness of the County-wide wildland fire hazard and propose workable solutions to reduce the wildfire potential. The CWPP is an action plan and depends upon people and partnerships to carry it forward.

Mission Statement

To make Klickitat County residents, businesses, and resources less vulnerable to the negative effects of wildland fires.

Washington DNR Mission Statement

The Department of Natural Resources endeavors to educate and inform the public to increase wildfire awareness. Cooperatively and in coordination with other agencies, and through public outreach and educational events, the DNR disseminates information to the public regarding wildfire safety and preparedness.

Goals

1. Identify and map Wildland Urban Interface (WUI) boundaries.
2. Identify and evaluate hazardous fuel conditions, prioritize areas for hazardous fuel reduction treatments, and recommend the types and methods of treatment necessary to protect communities.
3. Prioritize the protection of people, structures, infrastructure, natural resources, and unique ecosystems that contribute to our way of life and the sustainability of the local and regional economy.
4. Develop regulatory measures such as building codes and road standards specifically targeted to reduce the wildland fire potential and reduce the potential for loss of life and property.
5. Educate communities about the unique challenges of wildfire in the wildland-urban interface.
6. Provide a plan that balances private property rights of landowners in Klickitat County with personal safety and responsibility.
7. Improve fire service organizations' awareness of wildland fire threats, vulnerabilities, and mitigation opportunities or options.
8. Address structural ignitability and recommend measures that homeowners and communities can take to reduce the ignitability of structures.
9. Recommend additional strategies for private, state, and federal lands to reduce hazardous fuel conditions and lessen the life safety and property damage risks from wildfires.
10. Improve public entity eligibility for funding assistance (National Fire Plan, Healthy Forest Restoration Act, FEMA, and other sources) to reduce wildfire hazards, prepare residents for wildfire situations, and enhance fire agency response capabilities.
11. Provide opportunities for meaningful discussions among community members and local, state, and federal government representatives regarding their priorities for local fire protection and forest management.
12. Emphasize local cooperation and community ties with conservation districts and the landowner educational resources and services that they provide.
13. Meet or exceed the requirements of the National Fire Plan and FEMA for a county level Community Wildfire Protection Plan.

14. Identify areas of inadequate fire protection, such as gaps in district coverage, and develop solutions.

United States Government Accountability Office (GAO)

Since 1984, wildland fires have burned an average of more than 850 homes each year in the United States and, because more people are moving into fire-prone areas bordering wildlands, the number of homes at risk is likely to grow. The primary responsibility to ensure that preventative steps are taken to protect homes fall on the homeowners. Between 2003 and 2013, seven of the ten years have produced the largest direct property loss wildland fires in the United States, with five of the fires costing more than $400 million in damage.[1]

GAO was asked to assess, among other issues, (1) measures that can help protect structures from wildland fires, (2) factors affecting use of protective measures, and (3) the role technology plays in improving firefighting agencies' ability to communicate during wildland fires.

The two most effective measures for protecting structures from wildland fires are: (1) creating and maintaining a buffer, called defensible space, from 30 to 100 feet wide around a structure, where flammable vegetation and other objects are reduced; and (2) using fire-resistant roofs and vents. In addition to roofs and vents, other technologies – such as fire-resistant windows and building materials, surface treatments, sprinklers, and geographic information systems mapping can help in protecting structures and communities, but they play a secondary role.

Although protective measures are available, many property owners have not adopted them because of the time or expense involved, competing concerns such as aesthetics or privacy, misperceptions about wildland fire risks, and lack of awareness of their shared responsibility for fire protection. Federal, state, and local governments, as well as other organizations, are attempting to increase property owners' use of protective measures through education, direct monetary assistance, and laws requiring such measures. In addition, some insurance companies have begun to direct property owners in high risk areas to take protective steps[2].

[1]National Fire Protection Association Fire Analysis and Research Division. Large-Loss Fires in the United States 2013. NFPA No. LLS10. November 2014.
[2] United States Government Accountability Office. Technology Assessment – Protecting Structures and Improving Communications during Wildland Fires. Report to Congressional Requesters. GAO-05-380. April 2005.

State and Federal CWPP Guidelines

This Community Wildfire Protection Plan includes compatibility with FEMA requirements for a Hazard Mitigation Plan, while also adhering to the guidelines proposed in the National Fire Plan, and the Healthy Forests Restoration Act (2003). This Community Wildfire Protection Plan has been prepared in compliance with:

- The National Fire Plan: A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan (December 2006).
- The Integrated Rangeland Fire Management Strategy (2015).
- Healthy Forests Restoration Act (2003).
- National Cohesive Wildland Fire Management Strategy (March 2011).
- The Federal Emergency Management Agency's Region 10 guidelines for a Local Hazard Mitigation Plan as defined in 44 CFR parts 201 and 206, and as related to a fire mitigation plan chapter of a Multi-Hazard Mitigation Plan.
- National Association of State Foresters – guidance on identification and prioritizing of treatments between communities (2003).

The objective of combining these complementary guidelines is to facilitate an integrated wildland fire risk assessment, identify pre-hazard mitigation activities, and prioritize activities and efforts to achieve the protection of people, structures, the environment, and significant infrastructure in Klickitat County while facilitating new opportunities for pre-disaster mitigation funding and cooperation.

Integration with other Local Planning Documents

During development of this Community Wildfire Protection Plan, several planning and management documents were reviewed in order to avoid conflicting goals and objectives. Existing programs and policies were reviewed in order to identify those that may weaken or enhance the mitigation objectives outlined in this document. The following sections identify and briefly describe some of the existing Klickitat County planning documents and ordinances considered during development of this plan.

Klickitat County Comprehensive Emergency Management Plan (2017)

The purpose of the Comprehensive Emergency Management Plan (CEMP) is to coordinate and facilitate resources to minimize the impacts of disasters and emergencies on people, property, the environment and the economy of Klickitat County. The CEMP establishes responsibilities for agencies within Klickitat County and the coordination with organizations inside and outside of the County for preparation for, response to, recovery from, and mitigation of the potential effects of emergencies and disasters.

The CEMP is an all hazard plan that is promulgated by Klickitat County Board of Commissioners and Mayors of the participating cities within the County and applies to all local public and private entities and organizations participating and included in the plan.

Klickitat County 10 Year Economic Development Strategic Plan

The strategic plan serves as a blueprint for attracting new industry, retaining existing business, developing the workforce, and enhancing the county's quality of place. Ultimately, the plan will help position Klickitat County as an ideal location to operate a successful business, make capital investment, find a job, raise a family, and enjoy all that life has to offer. The strategies were developed with the goal of creating new jobs in the county and significantly increasing the region's tax base.

Klickitat County Multi-Hazard Mitigation Plan (to be completed 2018-2019)

The purpose of the Klickitat County Multi-Hazard Mitigation Plan is to reduce potential for natural hazards to threaten people, businesses, structures, infrastructure, and unique ecosystems within Klickitat County. This plan will satisfy the requirements for a local natural hazard mitigation plan under 44 CFR Part 201.6, in addition this plan will integrate FEMA's Natural Hazard Mitigation Plan (NHMP) with the Community Wildfire Protection Plan as outlined in the Healthy Forest Restoration Act. Integration will be accomplished through incorporating necessary information from the existing CWPP (2018) into the NHMP document. The anticipated completion date for the Klickitat County Multi-Hazard Mitigation Plan is November 2019.

Chapter 2: Documenting the Planning Process

To provide seamless integration between CWPP and FEMA mitigation plans, documentation of the planning process, including public involvement, has been included to meet FEMA's DMA 2000 requirements (44CFR§201.4(c)(1) and §201.6(c)(1)). This section includes a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how all of the involved agencies participated.

Description of the Planning Process

The Klickitat County Community Wildfire Protection Plan was developed through a collaborative process involving all of the organizations and agencies detailed in this chapter. The planning process included five distinct phases which were in some cases sequential (step 1 then step 2) and in some cases intermixed (step 4 completed throughout the process):

1. **Collection of Data** about the extent and periodicity of the wildfire hazard in and around Klickitat County.
2. **Field Observations and Estimations** about risks, location of structures and infrastructure relative to risk areas, access, and potential treatments.
3. **Mapping** of data relevant to pre-wildfire mitigation and treatments, structures, resource values, infrastructure, risk assessments, and related data.
4. **Facilitation of Public Involvement** from the formation of the advisory group to news releases, public meetings, public review of draft documents, and acknowledgement of the final plan by the signatory representatives.
5. **Analysis and Drafting of the Report** to integrate the results of the planning process, provide ample review and integration of advisory group and public input.

The Planning Team

Northwest Management, Inc. facilitated the CWPP planning meetings, which were held in coordination with the Klickitat county Interagency Fire Association in order to encourage the representation from all of the participating fire districts. Stakeholders involved in the meetings included representatives from local communities, fire protection districts and departments, county representatives, federal and state agencies, and local organizations with an interest in the County's fire safety.

The planning philosophy employed in this project included the open and free sharing of information with interested parties. Information from federal, state, and local agencies was integrated into the database of knowledge used in this project. Meetings with the advisory

group were held throughout the planning process to facilitate a sharing of information between participants. When the public meetings were held, many of the advisory group members were in attendance and shared their support and experiences and their interpretations of the results.

Collaboration is a key component and requirement of CWPPs. By working together efforts are unified and a diverse set of skills, knowledge, and resources are shared to further the ability to protect and mitigate against wildfires. Collaboration connects local and state governments with federal agencies and other interested parties. Throughout this planning process participation from local, state, federal agencies, other organizations, and local citizens were actively involved in the development of this Community Wildfire Protection Plan.

NAME **ORGANIZATION**

- Al Lawson .....Washington Department of Natural Resources
- Dan Lennon .....Washington Department of Natural Resources
- Jordan Tsubota.....Washington Department of Natural Resources
- Shane Bare .....Washington Department of Natural Resources
- Nathan Bell.....Klickitat County Resident
- Tom Montag.....Klickitat County Fire District #3
- David McCune .....Klickitat County Fire District #4
- Gracy McCune.....Klickitat County Fire District #4
- Justin Ramsay.....Klickitat County Fire District #4
- Chris Anderson.....Klickitat County Fire District #4, 13
- Butch Hallenbelk .....Klickitat County Fire District #8
- Earl Snyder .....Klickitat County Fire District #9
- Jason Blain.....Klickitat County Fire District #9
- Calvin Mercer .....Klickitat County Fire District #10
- Eric Hess .....Klickitat County Fire District #10
- Gene Pyke .....Klickitat County Fire District #13
- Chuck Walker .....Klickitat County Fire District #13
- Tom McMackin .....Klickitat County Fire District #14
- Brad Knowland.....Klickitat County Fire District #15
- Noah Halm .....Goldendale Fire Department
- Mike Delangis.....Goldendale Fire Department
- Bill Hunsaker .....White Salmon Fire Department
- David Lapop.....Klickitat EMS #1
- Roland Rose .....United States Forest Service CRGNSA
- Loretta Duke .....United States Forest Service CRGNSA
- Scott Brewer .....United States Forest Service CRGNSA

- Scott Koehler.....KCDEM
- Jeff King.....KCDEM
- Kaci Bartkowski .....CKCD/EKCD
- Loren Meagher.....CKCD/EKCD
- Gary R. Peters.....BIA Yakama Agency
- Monika Nicholson .....Spokane District BLM
- Jay McLaughlin.....MARS
- Lindsey Cornelius .....Columbia Land Trust
- Nathan Putnam.....SDS Lumber Company
- Jeremy Grose .....SDS Lumber Company
- Diane Bambee.....Trout Lake Community Council
- James Day .....High Prairie
- Mary-Lane Baker.....Firewise Ponderosa Park
- Carol A. Martin.....Firewise Ponderosa Park
- Ken Schleif.....Firewise Ponderosa Park
- Eric Bieler .....Western Pacific Timber
- Tera King .....Northwest Management, Inc.
- Eric Nelson .....Northwest Management, Inc.
- Vaiden Bloch .....Northwest Management, Inc.

These jurisdictions were represented on the advisory group and in public meetings either directly or through their servicing fire department or district. They participated in the development of hazard profiles, risk assessments, and mitigation measures. The advisory group meetings were the primary venue for authenticating the planning record. However, additional input was gathered from each jurisdiction in the following ways:

- Advisory group members attended local group meetings where updates were provided and information was exchanged.
- One-on-one visits between the advisory group leadership and representatives of the participating jurisdictions (e.g. meetings with Klickitat County Board of County Commissioners, city councilors and mayor, fire district commissioners, and community leaders).
- Written correspondence between the advisory group leadership and each jurisdiction to update the participating representatives on the planning process, make requests for information, and/or facilitate feedback.

Like other areas of Washington and the United States, Klickitat County's human resources have many demands placed on them in terms of time and availability. In Klickitat County, elected officials do not serve in a full-time capacity; some of them have other employment and serve the community through a convention of public service. Recognizing this and other time constraints, many of the jurisdictions decided to identify a representative to cooperate on the advisory group and then report back to the remainder of their organization on the process and serve as a conduit between the CWPP advisory group and the jurisdiction.

Advisory Group Meeting Minutes

Advisory group meetings were scheduled and held from June 2017 through June 2018. These meetings served to facilitate the sharing of information and to lay the groundwork for the Klickitat County CWPP. Northwest Management, Inc. as well as other advisory group leadership attended the meetings to provide the group with regular updates on the progress of the document and gather any additional information needed to complete the Plan. Meeting notes and sign-in sheets are recorded in the project file.

Public Involvement

Public involvement was made a priority from the inception of the project. There were a number of ways that public involvement was sought and facilitated. The idea is to allow members of the public to provide information and seek an active role in protecting their own homes and businesses, and in some cases it may lead to the public becoming more aware of the process without becoming directly involved in the planning.

Public meetings were scheduled in strategic locations during the wildfire risk assessment phase of the planning process to share information on the Plan, obtain input on the details of the wildfire risk assessments, and discuss potential mitigation treatments. Attendees at the public meetings were asked to give their impressions of the accuracy of the information generated and provide their opinions of potential treatments.

The schedule of public presentation meetings in Klickitat County included two locations: Goldendale and White Salmon, Washington. The public meetings were attended by several individuals on the advisory group and 17 individual representing the general public. The public meeting announcement was sent to the local newspapers, the Goldendale Sentinel and White Salmon Enterprise, and advisory group members were asked to post the flyer shown in Appendix 2 around their communities.

A public comment period was conducted from November 7 to November 23 to allow members of the general public an opportunity to view the full draft plan and submit comments and any

other input to the advisory group for consideration. A press release was submitted to the local newspapers on November 7 announcing the comment period, the locations of the plan for review, and instructions on how to submit comments. Hardcopy drafts were printed and made available at Klickitat County Public Libraries in Goldendale and White Salmon. An electronic version of the plan was made available online at **www.klickitatcounty.org/249/Emergency-Management**. Copies of the public meeting announcements and press releases can be found in Appendix 2 of this document.

Documented Review Process

The opportunity to review and comment on this plan has been provided through a number of avenues for the advisory group members as well as the members of the general public.

During regularly scheduled advisory group meetings in the fall of 2017 and spring of 2018, the advisory group met to discuss findings, review mapping and analysis, and provide written comments on draft sections of the document. During the public meetings, attendees observed map analyses and photographic collections, discussed general findings from the community assessments, and made recommendations on potential project areas.

Continued Public Involvement

Klickitat County is dedicated to involving the public directly in review and updates of the Community Wildfire Protection Plan and Wildfire Risk Assessment. The Klickitat County Department of Emergency Management is responsible for facilitating the annual and 5 year reviews and updates of the plan.

The public will have the opportunity to provide feedback annually on the anniversary of the adoption of this plan, at an open meeting of the advisory group. Copies of the Klickitat County Wildfire Protection Plan will be catalogued and kept at all of the appropriate agencies in the County. The Plan also includes the address and phone number of Klickitat County Department of Emergency Management, who is responsible for keeping track of public comments on the Plan.

A public meeting will also be held as part of each annual evaluation or when deemed necessary by the advisory group. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The Klickitat County Department of Emergency Management will be responsible for using county resources to publicize the annual public meetings and maintain public involvement through the webpage and various print and online media outlets.

Chapter 3: Klickitat County Characteristics

Located in south central Washington, Klickitat County is located within the Columbia Plateau. Acting as its southern border the Columbia River cuts through the basalt flows that dominate the Plateau. Prior to 1855, Klickitat County was inhabited by the Klickitat Tribe which is the namesake for the county. Klickitat County was officially established in 1859 and is 84 miles long and, on average, 23 miles wide. It covers 1,908 square miles and has approximately 11 persons per square mile. To the south, the average daily temperature in Dallesport varies from a low of 28˚F to over 65˚F, averaging 46˚ and to the north in Glenwood temperatures range from a low of 31˚F to a high of 60˚F for an average of 46˚F. Annually, Dallesport and Glenwood receive 14 and 31 inches of precipitation on average, respectively.

Population and Demographics

According to the 2010 Census the population of Klickitat County was 20,318 which was an increase from a population of 19,161 in 2000. Since 1940, the population of Klickitat County has been steadily increasing. Table 1 shows historical changes in population size for Klickitat County. The U.S. Census Bureau estimates that Klickitat County has experienced a 7.4% increase in population from 2010 to 2017. As of 2016, the median income for a household in Klickitat County was $49,633, which was less than the statewide median of $62,848.

Table 1) Census data for Klickitat County, WA.

Census Year	Population
1900	6,407
1910	10,180
1920	9,268
1930	9,825
1940	11,357
1950	12,049
1960	13,455
1970	12,138
1980	15,822
1990	16,616
2000	19,161
2010	20,318
2017*	21,811
***Population is an estimate based off of 2010 census year**	

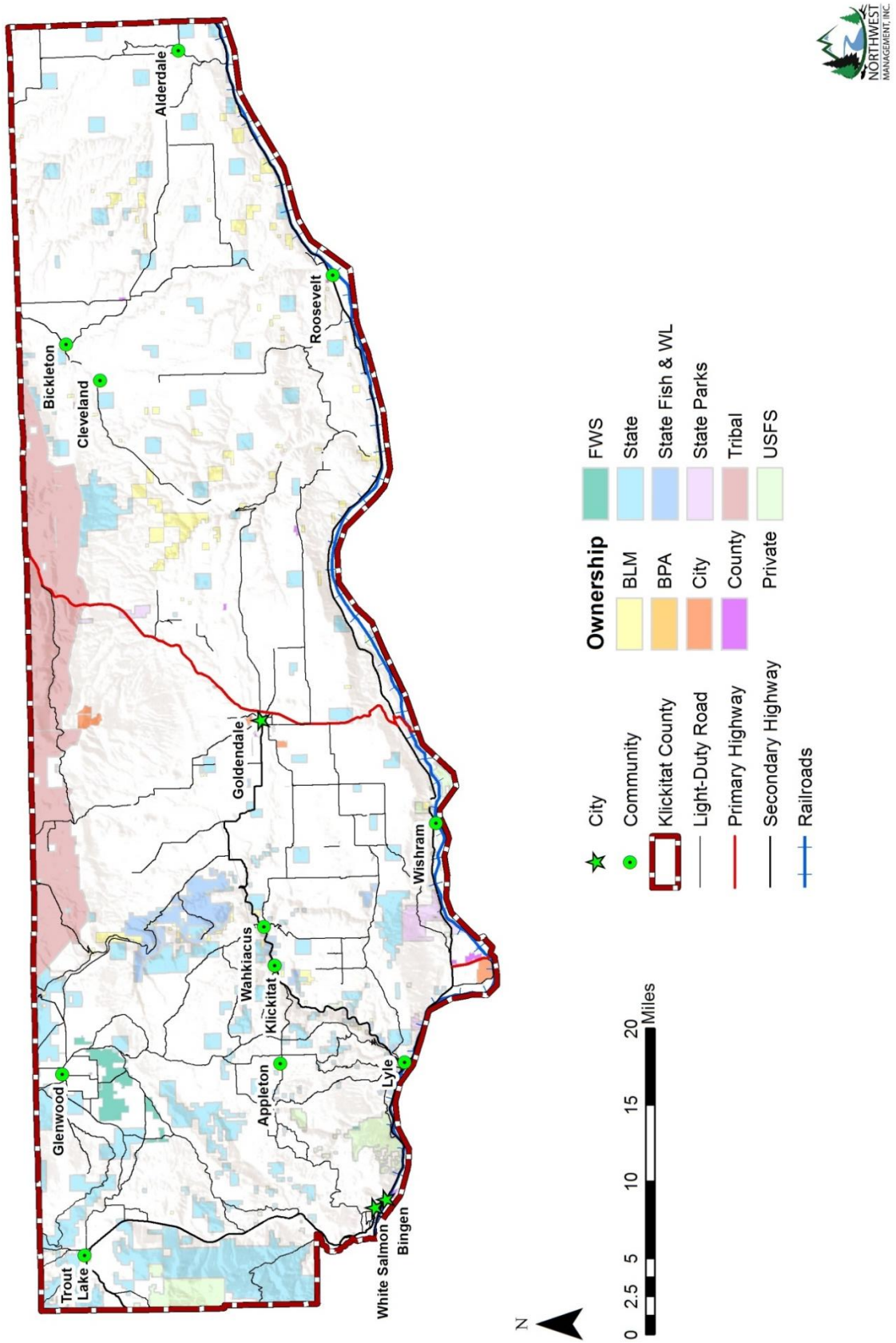


Figure 1) Land ownership in Klickitat County, WA.

Land Ownership

Most of the land in Klickitat County, approximately 76%, is privately owned and is classified as agricultural or rangeland. Just over 10% of the total area of Klickitat County is tribal land owned by the Yakama Nation. The State of Washington owns almost 8% of the land in Klickitat County while less than 5% is owned by the Federal Government (Table 2). Tribal land is located along the northern boundary of the county, Federal land is concentrated along the western edge of the county, and state land is scattered throughout the county (Figure 1).

Table 2) Land ownership in Klickitat County, WA.

Land Owner	Percent
Private	76.70%
Bureau of Land Management	1.50%
FWS	<1%
Tribal	10.30%
US Forest Service	1.30%
Washington State	7.80%
Water	<1%
Washington Department of Fish and Wildlife	1.10%
Washington State Parks	<1%
Total	100%

Development Trends

Being one of its most notable features, Klickitat County is largely characterized by rural, undeveloped land. The three incorporated cities and ten census-designated locations make up the urban growth areas that account for the majority of Klickitat County's population. The remaining population is located outside of urban areas across a rural landscape that serves as the natural resource base of the county's economy. The rural landscape features flat plains and irregular plains that are the base for the agricultural industry and foothills and low mountain terrain that supports the forest industry. Carved throughout the county are deep rugged canyons that serve as highway corridors that connect communities and support tourism.

Considering the wildfire risks in Klickitat County, additional development will increase wildfire exposure across the county. In 2018, Pyrologix published a report called *Exposure of human communities to wildfire in the Pacific Northwest* (Appendix 9). The report lists the top 50 communities in both Oregon and Washington with the greatest cumulative housing-unit exposure to wildfire. The communities were ranked based on a calculated mean annual burn

probability and the total number of housing units exposed to wildfire. Several communities in Klickitat County were included in the list and were ranked as follows: Goldendale, 7th; Klickitat, 36th; White Salmon, 40th; Trout Lake, 47th. See Table 3 for more information.

Table 3) Communities in Klickitat County, WA included in the list of the 50 Washington communities with the greatest cumulative housing-unit exposure to wildfire per the Exposure of human communities to wildfire in the Pacific Northwest report published by Scott et al. in 2018. As defined in Table 1 of the original report, the "mean of exposed housing units" rank indicates the mean (typical) burn probability of housing units within each community.

Community Exposure Ranking	Community Name	Total number of housing units exposed to wildfire	Estimated mean annual number of housing units visited by wildfire	Mean annual burn probability	Burn probability rank
7	Goldendale	3,341	17.9	0.0053	55
36	Klickitat	734	7.2	0.0099	13
40	White Salmon	2,487	6.7	0.0027	91
47	Trout Lake	814	5.9	0.0072	30

Agriculture

Approximately 45% of land use in Klickitat County is in some form of agriculture; dryland and irrigated grain crops (including CRP) and rangeland livestock grazing. The 2012 Agriculture Census ranked Klickitat County as being twentieth of the counties in Washington in terms of volume of agriculture sales at $72 million. Klickitat County has 760 farms covering 551,097 acres which is an average of 725 acres per farm. This is an 8% decrease from the total number of acres farmed as reported by the 2007 census of agriculture.[3]

Natural Resources

Klickitat County is a diverse ecosystem with a complex array of vegetation, wildlife, and fisheries that have developed with and adapted to fire as a natural disturbance process. Nearly a century of wildland fire suppression coupled with past land-use practices (primarily timber harvesting and agriculture) has altered plant community succession and has resulted in dramatic shifts in the fire regimes and species composition. As a result, some forests and rangelands in Klickitat County have become more susceptible to large-scale, higher-intensity fires posing a threat to life, property, and natural resources that are important to the economy and culture of Klickitat County. High-intensity, stand-replacing fires have the potential to seriously damage soils and native vegetation. In addition, an increase in the number of large,

[3] U.S. Department of Agriculture's National Statistics Service 2012 Census of Agriculture: Washington State and County Data. Available online at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/wav1.pdf. Accessed December 2016.

high-intensity fires throughout the nation's forest and rangelands has resulted in significant safety risks to firefighters and higher costs for fire suppression (House of Representatives, Committee on Agriculture, Washington, DC, 1997).

Vegetation

Much of the terrain along the Columbia Gorge and eastern portion of the county is dominated by shrub-steppe communities. Oak-prairie is found across the irregular plains and in deep rugged canyons. Conifer forests that primarily consist of ponderosa pine, Douglas-fir, and grand fir dominate the western and north central sections of the County. Riparian corridors are located intermittently across the landscape and are often characterized by hardwood species. For wildlife, these cover-types provide cover from predators, thermal cover from extreme temperatures, forage and nesting sites, and sources of water.

An existing vegetation type analysis reveals that coniferous cover types are the most dominant in the county and cover almost 34% of the total acreage. Shrubland covers approximately 22% of the county and agriculture covers just over 14%. Grasslands and exotic herbaceous (non-native/invasive), collectively, cover almost 20% of Klickitat County. The rest of the county is classified as barren or sparse, developed, open water, or some variation of the aforementioned cover types. Table 4 shows the percent coverage of each vegetation cover type. The orographic effect caused by the Cascades creates a moisture gradient across Klickitat County that results in wetter conditions in the west and drier conditions in the east and influences species composition, vegetative growth, and vegetative distribution. Conifer dominated forests represent the greatest coverage in the west part of the county where conditions are wetter and grasslands and shrublands dominate the east part of the county where conditions are drier. Figure 2 shows the distribution of existing vegetation types in Klickitat County and Figure 3 shows average annual precipitation.

Table 4. Existing Vegetation Types in Klickitat County, WA.

Existing Vegetation Type	Acres	% of Total
Agricultural	172,488	14.2%
Barren	93	<1.0%
Conifer	411,418	33.8%
Conifer-Hardwood	1,684	<1.0%
Developed	41,562	3.4%
Developed-High Intensity	276	<1.0%
Developed-Low Intensity	10,941	1.0%
Developed-Medium Intensity	1,787	<1%
Developed-Roads	22,865	1.9%
Exotic Herbaceous	94,922	7.8%
Grassland	114,368	9.4%
Hardwood	15,440	1.3%
Open Water	22,365	1.8%
Quarries-Strip Mines-Gravel Pits	16.	<1%
Riparian	21,778	1.8%
Shrubland	268,316	22%
Sparsely Vegetated	18,323	1.5%
Total	**1,218,640**	**100.0%**

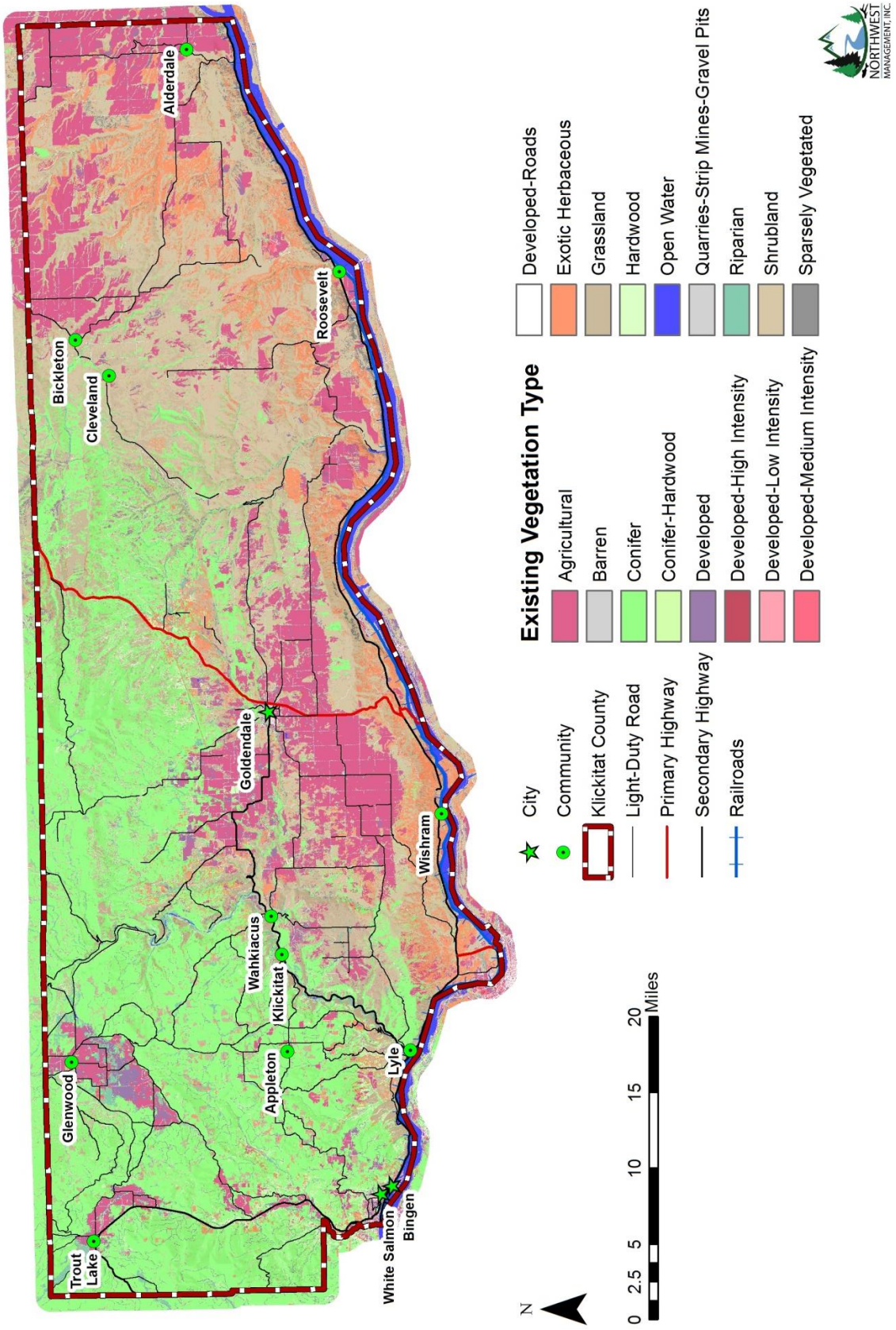


Figure 2) Existing Vegetation Types for Klickitat County, WA.

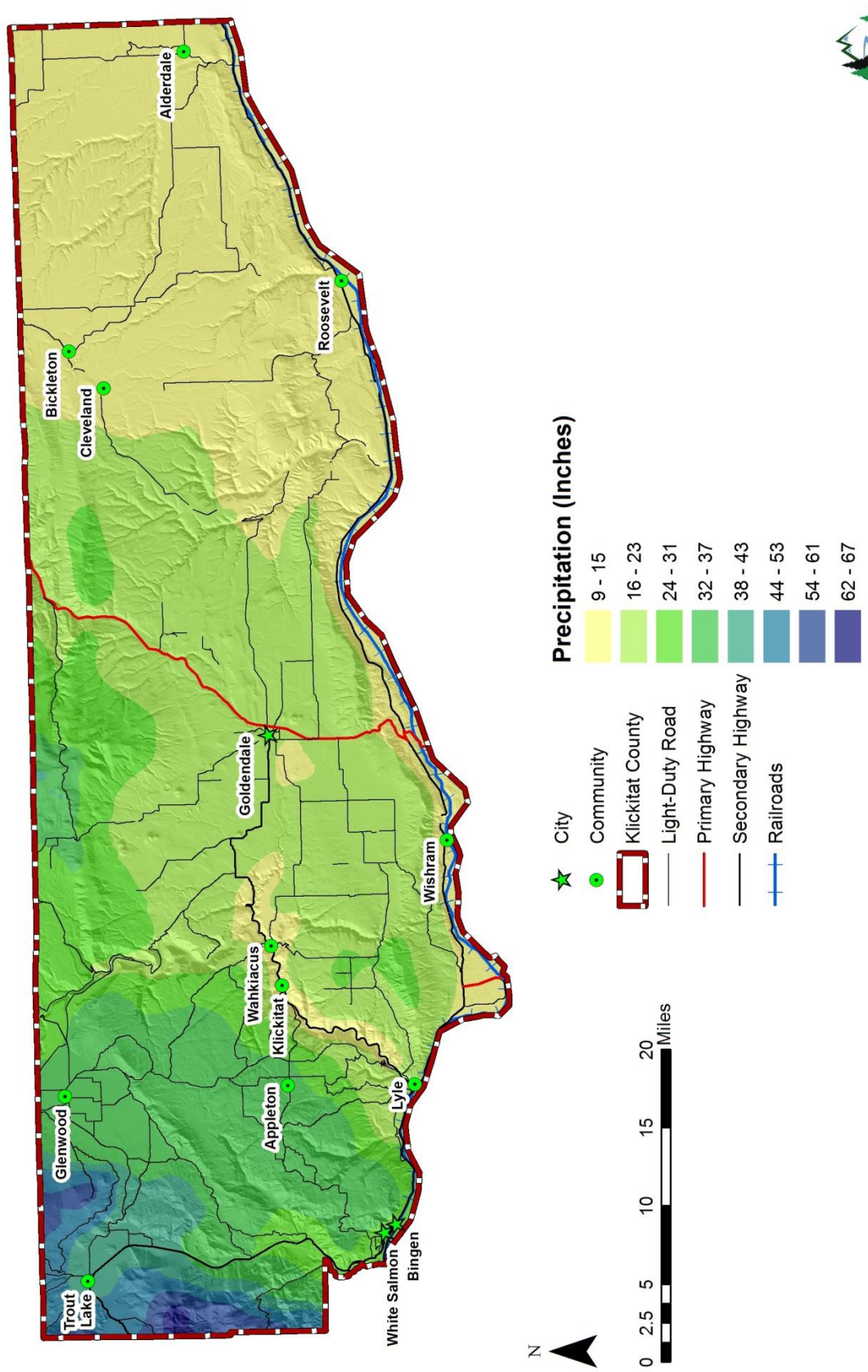


Figure 3) Average annual precipitation in Klickitat County, WA.

Air Quality

The primary means by which the protection and enhancement of air quality is accomplished is through implementation of National Ambient Air Quality Standards (NAAQS). These standards address six pollutants known to harm human health including ozone, carbon monoxide, particulate matter, sulfur dioxide, lead, and nitrogen oxides.[4]

The Clean Air Act, passed in 1963 and amended in 1977, is the primary legal authority governing air resource management. The Clean Air Act provides the principal framework for national, state, and local efforts to protect air quality. Under the Clean Air Act, OAQPS (Office for Air Quality Planning and Standards) is responsible for setting standards, also known as national ambient air quality standards (NAAQS), for pollutants which are considered harmful to people and the environment. OAQPS is also responsible for ensuring these air quality standards are met, or attained (in cooperation with state, Tribal, and local governments) through national standards and strategies to control pollutant emissions from automobiles, factories, and other sources.[5]

Smoke emissions from fires potentially affect an area and the airsheds that surround it. Climatic conditions affecting air quality in Washington are governed by a combination of factors. Large-scale influences include latitude, altitude, prevailing hemispheric wind patterns, and mountain barriers. At a smaller scale, topography and vegetation cover also affect air movement patterns. Air quality in the area is generally moderate to good. However, locally adverse conditions can result from occasional wildland fires in the summer and fall, and prescribed fire and agricultural burning in the spring and fall. All major river drainages are subject to temperature inversions which trap smoke and affect dispersion, causing local air quality problems. This occurs most often during the summer and fall months and could potentially affect all communities in Klickitat County. Winter time inversions are less frequent, but are more apt to trap smoke from heating, winter silvicultural burning, and pollution from other sources.

Air quality standards and regulations for Klickitat County are governed by the Washington Department of Ecology in Yakima, WA. The State of Washington Department of Ecology website provides information on burn bans, local air quality, burning permits, data and research, and state and federal regulations. **Visit: https://ecology.wa.gov/Air-Climate/Air-quality.**

[4] USDA-Forest Service (United States Department of Agriculture, Forest Service). 2000. Incorporating Air Quality Effects of Wildland Fire Management into Forest Plan Revisions – A Desk Guide. April 2000. – Draft.
[5] Louks, B. 2001. Air Quality PM 10 Air Quality Monitoring Point Source Emissions; Point site locations of DEQ/EPA Air monitoring locations with Monitoring type and Pollutant. Idaho Department of Environmental Quality. Feb. 2001. As GIS Data set. Boise, Idaho.

Chapter 4: Risk and Preparedness Assessments

Wildland Fire Characteristics

In general, wildland fire behavior describes how fire reacts to available fuels, local topography, and current weather conditions. The relationships between these three components are dynamic; changing one condition can often exacerbate the affects that the other conditions have on fire behavior. As such, fire behavior is often modeled as a triangle with fuels, topography, and weather serving as the three sides (Figure 4). Understanding the relationships between the fire behavior components has important implications for not only managing an active wildfire but also mitigating wildfire risk. Since fuel is the only component that can be managed directly, management decisions regarding fuel types and fuel loading across the landscape need to be made based on characteristics that are inherent of the region; climate and topography. Strategic fuel breaks, conservation and restoration of native species, and prescribed burns are examples of management activities that can reduce wildfire risk and simplify the process of assessing potential wildfire behavior. A brief description of each of the fire behavior elements follows in order to illustrate their effect on fire behavior.

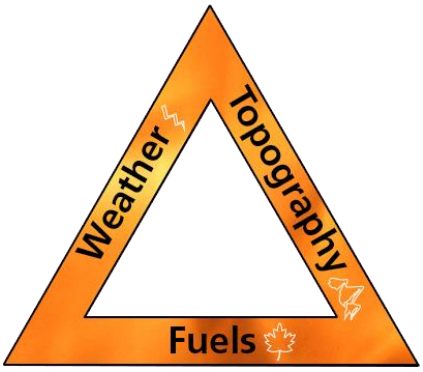


Figure 4) Fire Triangle

Weather

Fire behavior is largely influenced by weather conditions. Wind, moisture levels, temperature, and relative humidity are all factors that determine the rates at which fuels dry and vegetation cures. The ignition potential of fuels is also determined by these factors; weather patterns and trends can be analyzed to determine how likely or easily a certain fuel type will ignite and if a fire will be sustained. Once started, the behavior of a wildfire is further determined by atmospheric stability and local and regional weather. As temperature, wind speed, wind direction, precipitation, storm systems, and prevailing winds all influence fire behavior, weather is the most difficult component of the fire triangle to predict and interpret. As observed in the Yarnell Hill fire in Arizona that killed 19 firefighters, a storm cell can cause a flaming front to change direction abruptly, 90 degrees in the case of the Yarnell Hill fire, and rapidly accelerate up to speeds of 10 to 15 mph.

Topography

Fires burning in similar fuel types will burn differently under varying topographic conditions. Topography alters heat transfer and localized weather conditions, which in turn influences vegetative growth and resulting fuels. Changes in slope and aspect can have significant influences on how fires burn. In General, north slopes tend to be cooler, wetter, more productive sites. This typically results in heavy fuel accumulations, high fuel moistures, lower rates of curing for fuels, and lower rates of spread. In contrast, south and west slopes tend to receive more direct sun and therefore have the highest temperatures, lowest soil and fuel moistures, and lightest fuels. The combination of light fuels and dry sites leads to fires that typically display the highest rates of spread. These slopes also tend to be on the windward side of mountains which means they tend to be "available to burn" for a greater portion of the year. Slope also plays a significant role in the rate of spread of a fire as fuels upslope from the flaming front are subjected to preheating which means that they readily combust as the fire draws closer. The preheating process is exacerbated as slope increases which results in greater rates of spread and increased flame lengths. Therefore, steep slopes with a south –southwest aspect generally promote intense fire behavior due to dry fuels and the likelihood of predominant, westerly winds.[6]

Fuels

In the context of wildfire, fuels describe any organic material, dead or alive, found in the fire environment. Grasses, brush, branches, logs, logging slash, forest-floor litter, conifer needles, and buildings are all examples of fuel types. The physical properties and characteristics of fuels govern how fires burn. Fuel loading, size and shape, moisture content, and continuity and arrangement all have an effect on fire behavior. In general, the smaller and finer the fuels, the faster the potential rate of fire spread. Small fuels such as grass, needle litter and other fuels less than a quarter inch in diameter are most responsible for fire spread. Fine fuels, those with high surface to volume ratios, are considered the primary carriers of surface fire. As fuel size increases, the rate of spread tends to decrease due to a decrease in the surface to volume ratio. Fires in large fuels generally burn at a slower rate but release much more energy and burn with much greater intensity. This increased energy release, or intensity, makes these fires more difficult to control.[7]

Fuels are classified by diameter as that has important implications for fuel moisture retention. The smaller the diameter, the more quickly the moisture content of a given fuel type changes

[6] Auburn University website https://fp.auburn.edu/fire/topos_effect.htm. Accessed December 2016
[7] Gorte, R. 2009. Congressional Research Service, Wildfire Fuels and Fuel Reduction.

while larger diameter fuels take longer to change. In terms of fire potential on the landscape and fire suppression, the amount of time that is required for a fuel type to become volatile is critical which is why instead of referring to fuels by size, they are referred to as either one hour, ten hour, 100 hour, or 1000 hour fuels. This method of classifying fuels describes the amount of time required for a particular fuel's status to change from non-combustible to combustible as a result of altered moisture levels in the surrounding environment.

Wildfire Hazards

In the 1930s, wildfires consumed an average of 40 to 50 million acres per year in the contiguous United States, according to US Forest Service estimates. By the 1970s, the average acreage burned had been reduced to about 5 million acres per year. Accounting for the substantial reduction in burned acreage was an increase in fire suppression efforts and development of firefighting equipment and strategy. Since 1970, about 3.5 million acres burn annually in the western U.S. The 2014 wildfire season set a new record for 31 days at Preparedness Level (PL) 5 and had one of the largest wildfires in Washington History, the Carlton Complex at 256,108 acres. There were a total of 425,136 acres consumed in the state of Washington.[8]

The potential volatility of a fire season can be predicted from winter snowfall, snowpack longevity, spring temperatures, and total precipitation. When winter snowfall is limited and snowpack melts early due to warm spring temperatures, conditions begin to favor fire activity as fine fuels dry out and spring storms generate lighting and high winds. Additionally, human activity increases in natural areas and recreation areas in warm weather months; typically April through October in the Columbia River Basin. This increases the likelihood of a human-caused ignition, particularly in natural areas where fuels are abundant, that could result in a wildfire, threatening both populated areas and natural resources.

Fire History

Historically, most plant communities in the state of Washington were fire-adapted and burned at fairly regular intervals. Frequent, low intensity fires limited fuel accumulation across the landscape and contributed to the distribution of native, fire-adapted plant communities. In contrast to modern day conditions, fire return intervals (the amount of time between fires in a defined area) were shorter but fires burned with less intensity. Shorter return intervals between fire events often resulted in less dramatic changes in plant species composition.[9] Across the landscape, fires typically burned 1 to 50 years apart in a given areas with most fire

[8] http://www.nwccinfo.blogspot.com. Accessed July 2017.
[9] Johnson, C.G. 1998. Vegetation Response after Wildfires in National Forests of Northeastern Oregon. 128 pp.

returning between 5 and 20 years.[10] With infrequent return intervals, plant communities tended to burn more severely and be replaced by vegetation communities different in composition, structure, and age.[11] Native plant communities in this region developed under the influence of fire. These adaptations to fire are evident at the species, community, and ecosystem levels.

Table 5) Fires 1,000 acres in size or larger that affected Klickitat County, WA between 1972 and 2016 (Fire History Points dataset). Fire information taken from the 2013 Washington State Enhanced Hazard Mitigation Plan list of major wildland fires are denoted with an asterisk (*).

Year	Name of Fire	Size (acres)	Notes
1992*	Skookum	51,000	Threatened the Town of Goldendale
1998	Cleveland	18,500	
2000*	Mule Dry	76,800	Affected multiple counties
2001	Goodnoe	4,455	
2005	Wood Gulch	5,751	
2007	WoodGulch	7,666	Part of the Horse Heaven Complex
2007	Sixprong	20,395	Part of the Horse Heaven Complex
2010	Dallesport	1179	
2010	Highway 8	2,018	
2011	Monastery	3,621	Destroyed numerous structures
2011	Wishram II	8,990	
2012	Highway 141	1,636	
2012	Roosevelt	2,827	
2013	Dead Canyon	3,708	
2013	Mile Marker 28	26,092	
2014	Sand Ridge	2,277	
2015	Davies Pass	1,300	
2015	Horsethief Butte	6,383	
2015	Old Highway 8	33,105	Threatened the town of Roosevelt. See below for more information.
2016	Old Lady Canyon	2,800	Destroyed multiple structures. See below for more information.
2018	Mile Post 90	14,200	Threatened multiple communities and forced evacuations. See below for more information.

[10] 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.
[11] Johnson, C.G.; Clausnitzer, R.R.; Mehringer, P.J.; Oliver, C.D. 1994. Biotic and Abiotic Processes of Eastside Ecosystems: The Effects of Management on Plant and Community Ecology, and on Stand and Landscape Vegetation Dynamics. Gen. Tech. Report PNW-GTR-322. USDA-Forest Service. PNW Research Station. Portland, Oregon. 722pp.

Since 1990, Klickitat County has had 21 significant wildfires ranging in size from approximately 1,200 to 51,000 acres (Table 5). Several fires directly threatened cities and communities in Klickitat County:

- **Skookum Fire (1992):** Burned 51,000 acres and threatened the town of Goldendale.
- **Monastery Fire (2011):** Burned 3,626 acres and destroyed numerous structures.
- **Old Highway 8 fire (2015):** Burned 33,105 acres and was notable for the following points:
    - It threatened the town of Roosevelt burning right to the edges of town.
    - Structures lost include 2 camper trailers, a homestead over 100 years old (unoccupied), and miscellaneous outbuildings. No homes were lost.
    - PUD evaporation pit liner damage. Replacement cost could potentially reach $500,000 to $750,000 (this is only an estimate and needs to be verified).
    - It was a wind driven event from the beginning. The fire nearly doubled in size after a wind shift on the third day.
- **Old Lady Canyon Fire (2016):** Burned approximately 2,800 acres but was a significant fire in Klickitat County:
    - One occupied home was lost and one ranch ceased operation due to fire related losses (fencing, corrals, feed, & range land).
    - Wind driven event from the beginning. The structures were lost on the second day when the wind direction changed and the fire size nearly doubled in size.
- **Mile Post 90 Fire (2018):** Threatened the communities of Wishram and Mayhill and forced level 2 and level 3 evacuations.

Historically, major wildfires have occurred throughout Klickitat County and are expected to continue to happen into the future. Since 1990, most major fires occurred in the eastern half of the county (Figure 5) while significant fires that burned in the western half of the county were generally located along the Columbia River. The Washington DNR created fire history maps of western and eastern Klickitat County that show historical wildfires in a greater level of detail. Figure 6 shows wildfire history for the western half of the Klickitat County and Figure 7 shows wildfire history for the eastern half of Klickitat County.

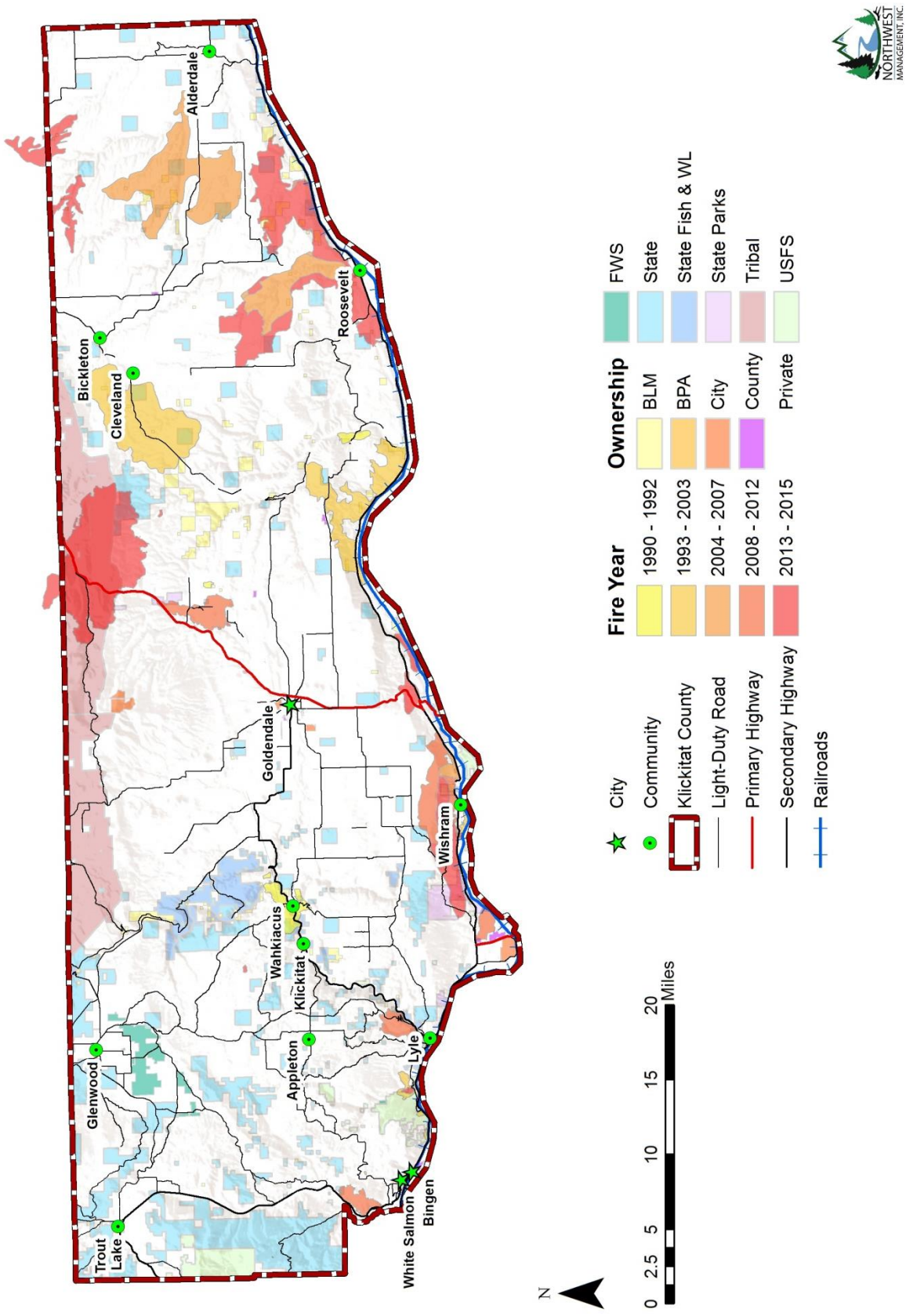


Figure 5) Fire history map of Klickitat County, WA for 1990 – 2015.

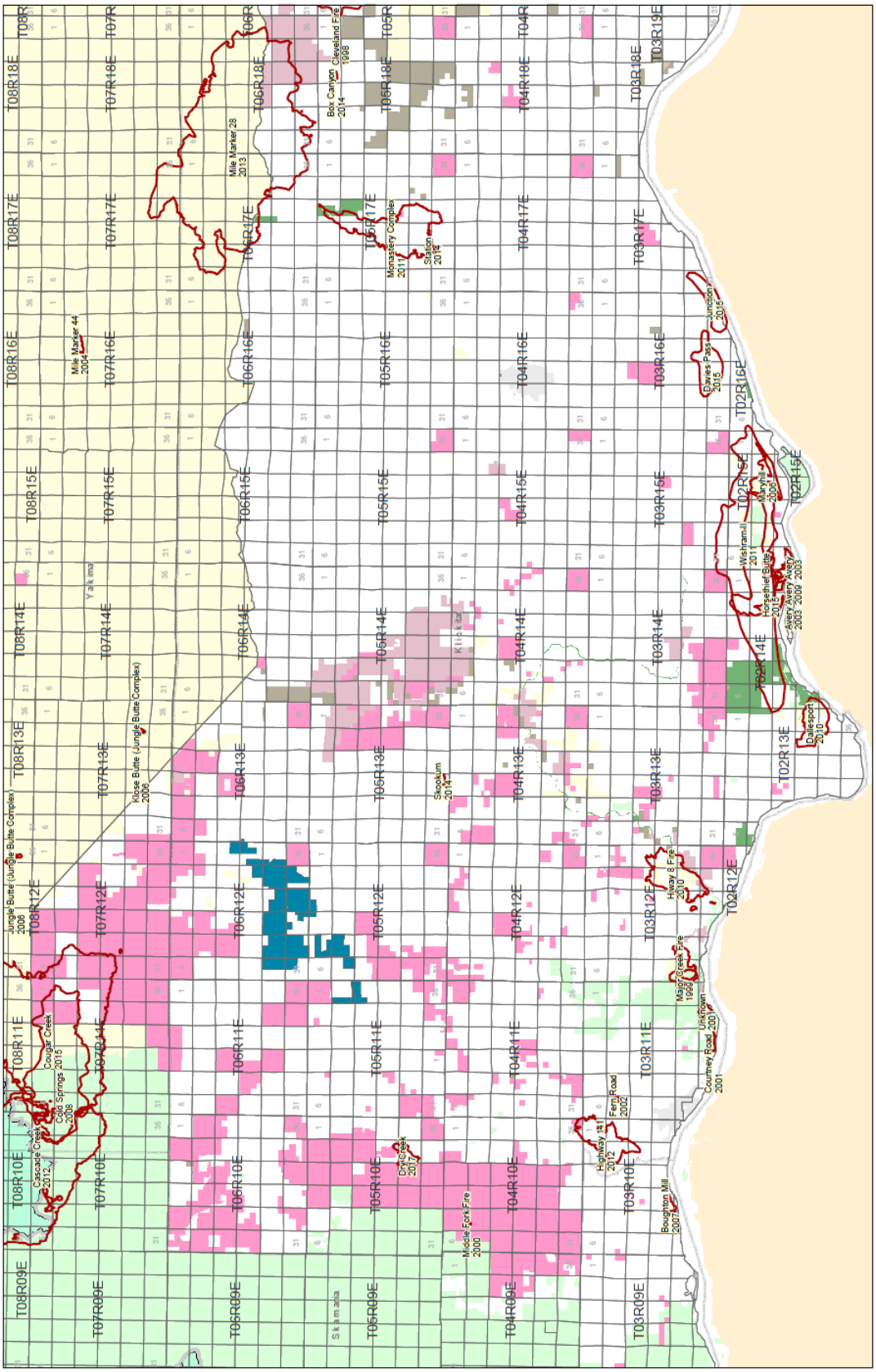


Figure 6) Detailed fire history map of Western Klickitat County, WA (Map created by WADNR).

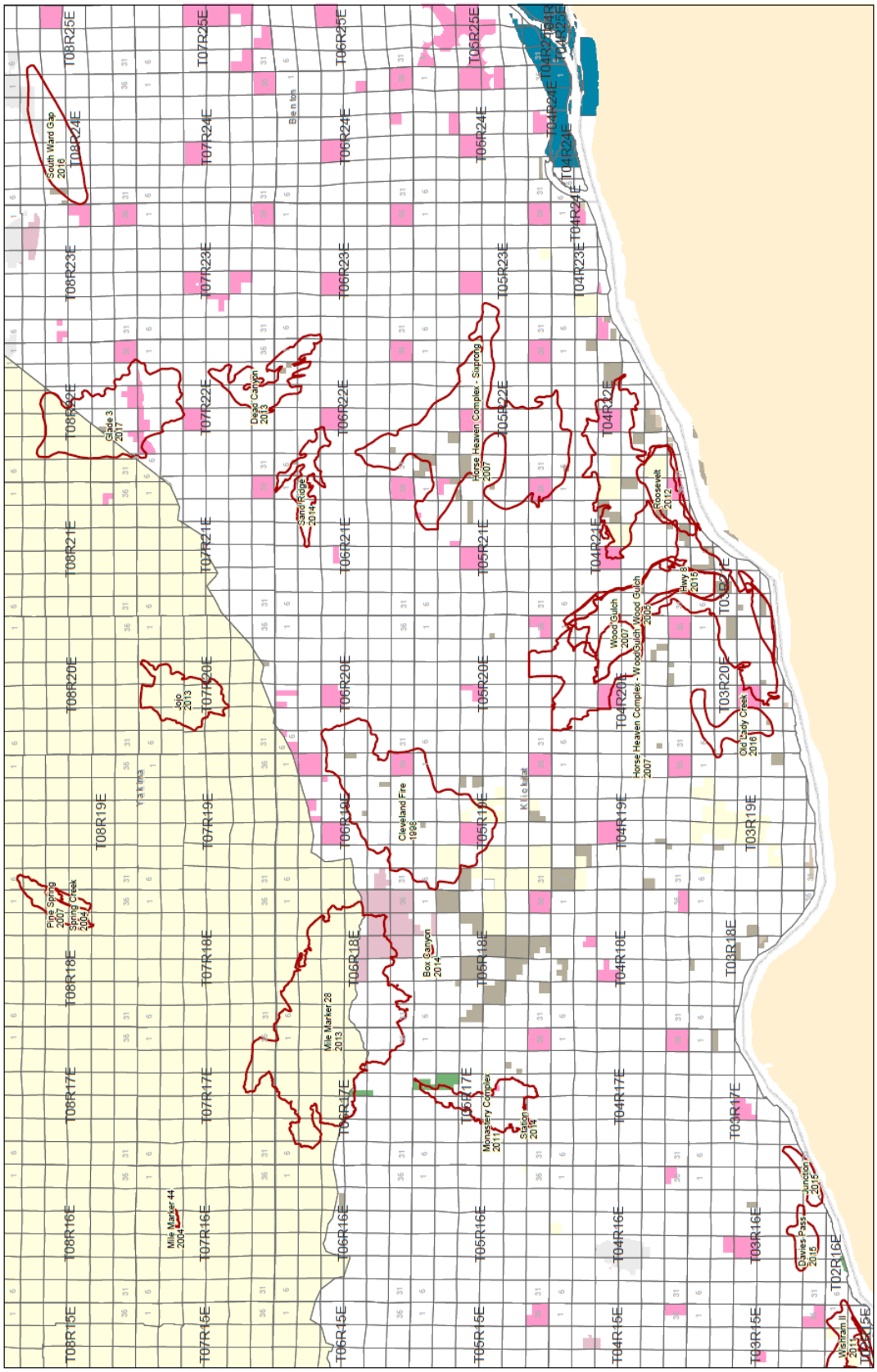


Figure 7) Detailed fire history map of Eastern Klickitat County, WA (Map created by WADNR).

Wildfire Ignition Profile

Detailed records of wildfire ignitions and extents from the Washington Department of Natural Resources (DNR) and Bureau of Land Management (BLM) have been analyzed. In interpreting these data, it is important to keep in mind that the information represents only the lands protected by the agency specified and may not include all fires in areas covered only by local fire departments or other agencies.

The Federal and State agencies database of wildfire ignitions (1972-2016) used in this analysis includes ignition and extent data within their jurisdictions. During this period, the agencies recorded an average of 53 wildfire ignition per year resulting in an average total burn area of 1,732 acres per year. The highest number of ignitions (85) occurred 1999. According to this dataset, the majority of fires, approximately 80%, that occurred in Klickitat County were human caused; however, naturally ignited/unknown caused fires equal about 20%. Of the known-cause categories, the two human-causes responsible for the most fire starts were debris burning (428 starts) and recreation (405 starts) (Figure 8). These values were comparable to the number of lighting caused fires which totaled 413 starts.

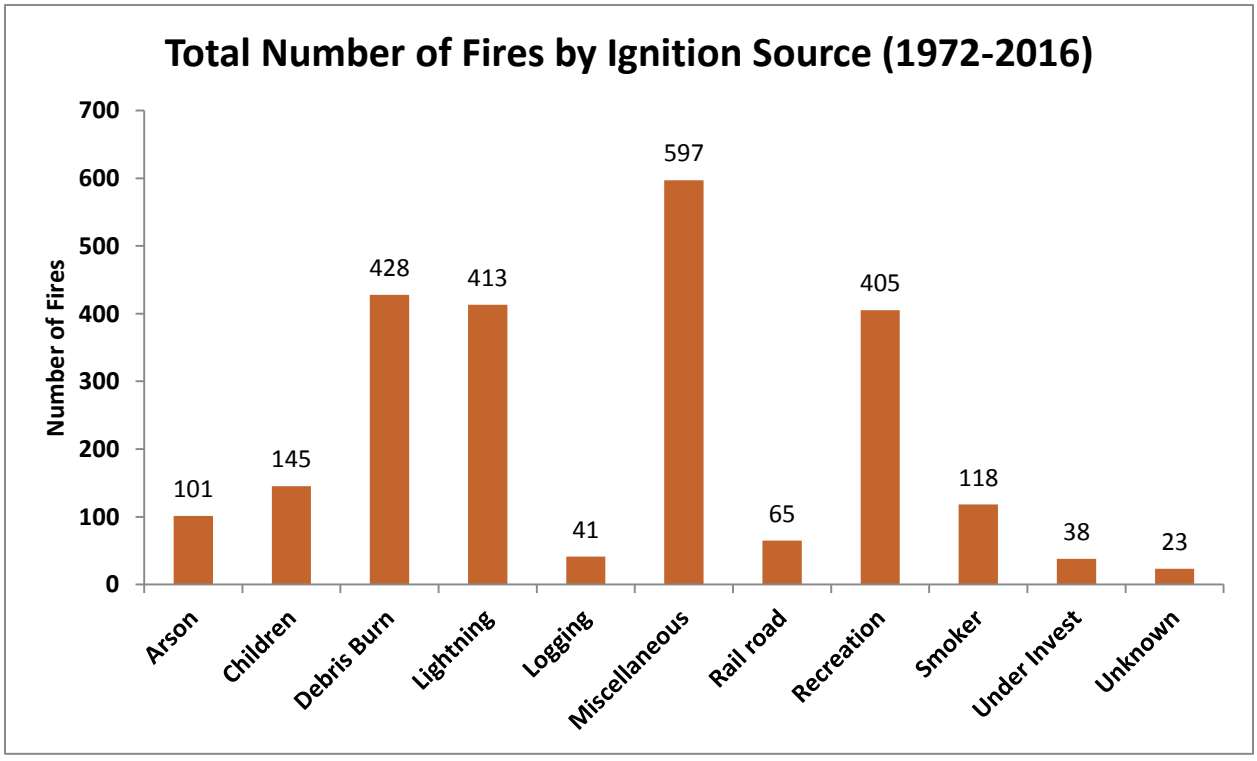


Figure 8) Total number of wildfires by ignition source for Klickitat County, WA from 1972-2016.

Based on the wildfire ignition data specific to Klickitat County, the trends in both acreage burned (Figure 9) and number of fire starts (Figure 10) since 1972 match the national trends;

acreage burned has increased while the number of fire starts has decreased. However, it is important to note that acreage burned is skewed by several "above average" fire seasons in the early and mid-1990's and even more so by the Mule Dry fire in 1998 and the Mile Marker 28 fire in 2013. The reasoning behind the decreasing-trend in fire starts at the national level, which is discussed in the next section, can likely be applied to Klickitat County.

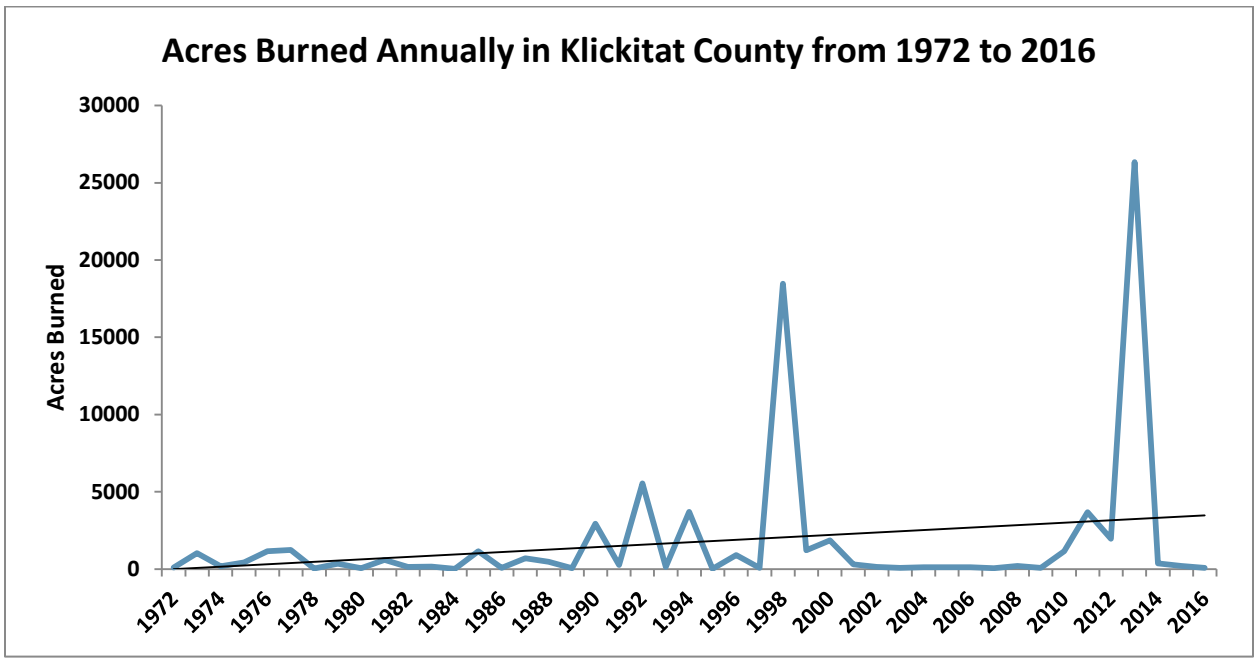


Figure 9) Annual acreage burned as a result of wildfire in Klickitat County from 1972 to 2016.

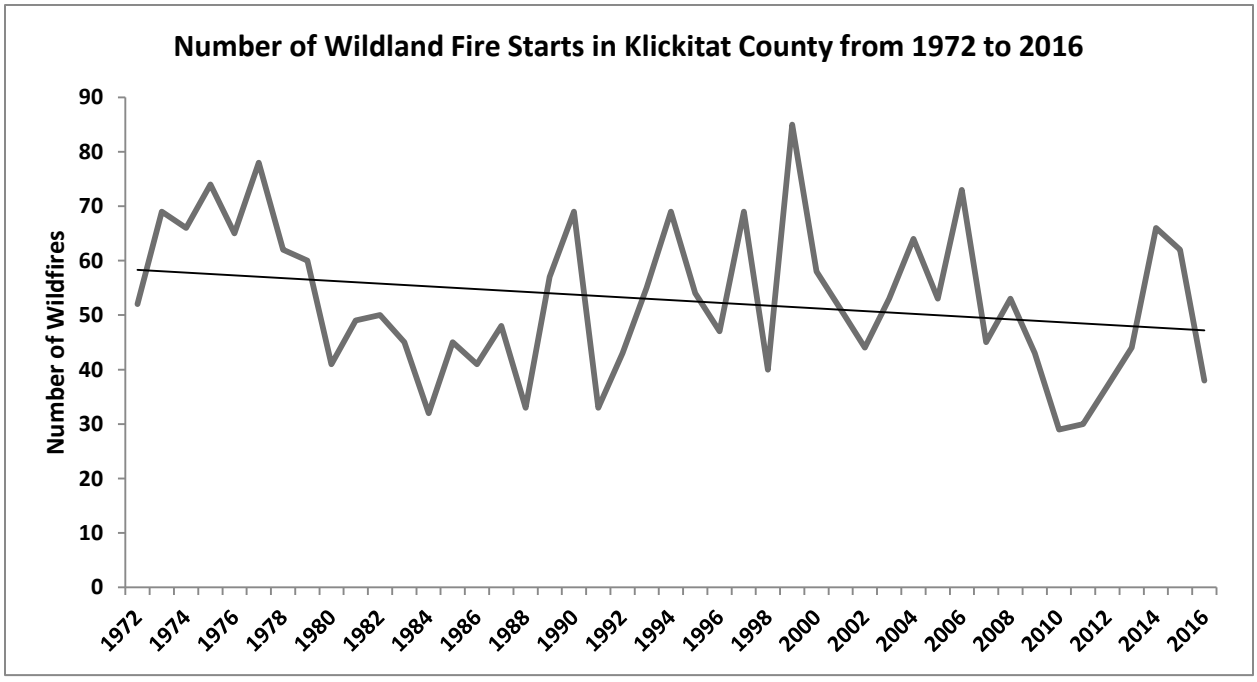


Figure 10) Annual number of wildland fire starts in Klickitat County from 1972 to 2016.

The data reviewed above provides a general picture regarding the level of wildland-urban interface fire risk within Klickitat County. There are several reasons why the fire risk may be even higher than suggested above, especially in developing wildland-urban interface areas.

1) Large fires may occur infrequently, but statistically they will occur. One large fire could significantly change the statistics. In other words, 40 years of historical data may be too short to capture large, infrequent wildland fire events.

2) The level of fire hazard depends profoundly on weather patterns. A several year drought period would substantially increase the probability of large wildland fires in Klickitat County. For smaller vegetation areas, with grass, brush and small trees, a much shorter drought period of a few months or less would substantially increase the fire hazard.

3) The level of fire hazard in wildland-urban interface areas is likely significantly higher than for wildland areas as a whole due to the greater risk to life and property. The probability of fires starting in interface areas is much higher than in wildland areas because of the higher population density and increased activities. Many fires in the wildland urban interface are not recorded in agency datasets because the local fire department responded and successfully suppressed the ignition without mutual aid assistance from the state or federal agencies.

Wildfire Extent Profile

The National Interagency Fire Center and the National Incident Coordination Center maintains records of fire costs, extent, and related data for the entire nation. The number of wildland fire starts, total acreage burned, and annual cost to control figures were created using data from end-of-year reports compiled by all wildland fire agencies after each fire season. The agencies include the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, US Fish and Wildlife Service, Forest Service, and all state agencies.

Across the west, wildfires have been increasing in extent and cost of control (Figure 11). Even though the number of fires that occur annually has decreased since 1990 (Figure 12), the total number of acres burned has increased (Figure 13). Over the last few decades summers have become warmer and drier; this trend has had significant implications for the severity of recent fire seasons, particularly in areas where decades of fire suppression have resulted in overstocked stands and heavy fuel loading. However, the inverse relationship between total number of fires and total acres burned can likely be attributed to a few other factors as well. Fire awareness programs have likely reduced the number of fire starts per season by making the public more cognizant of the impacts of wildfire and therefore more diligent when recreating or working in high risk areas. While in addition to recent climate trends, the increase

in acreage burned each year can partially be attributed to changes in wildland firefighting tactics and emphasis on safety. In some situations, fire management teams are electing to intentionally burn additional acreage with a back burn operation or let the fire burn itself out or burn to a point where it can be contained with a greater level of assurance and under safer conditions.

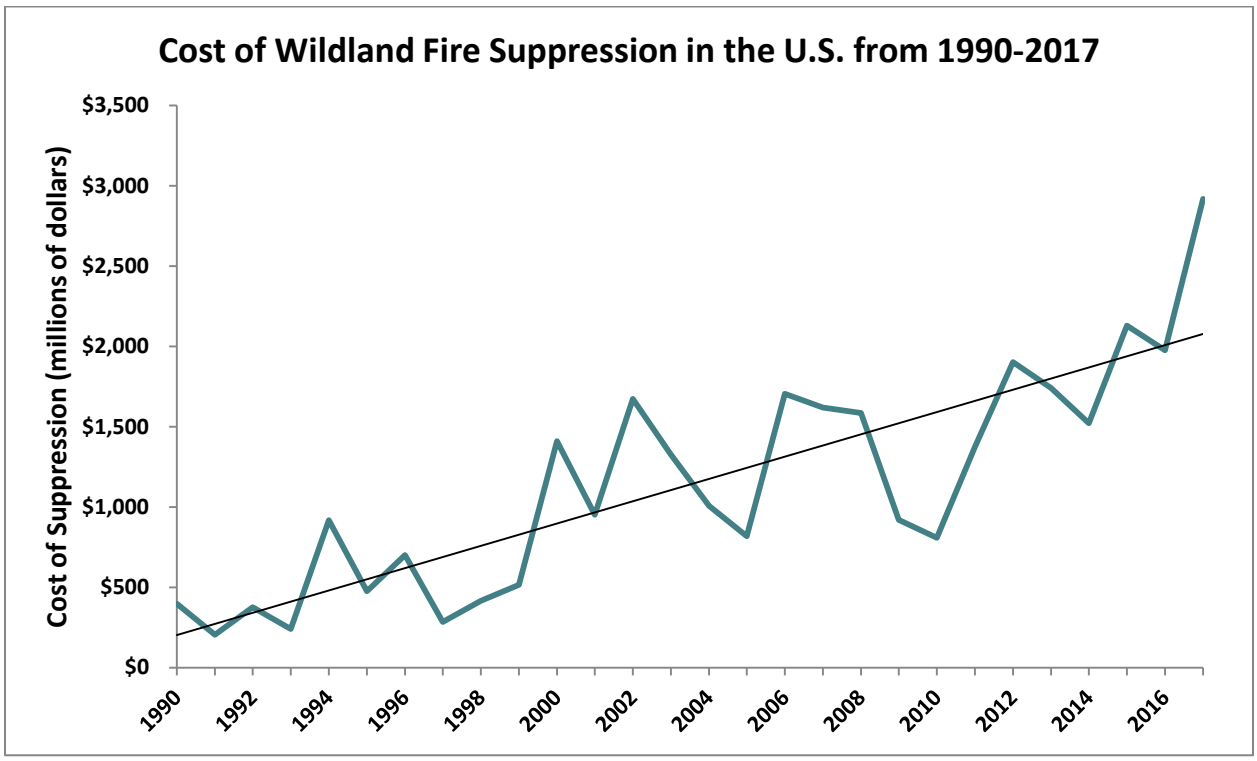


Figure 11) Annual cost of wildland fire suppression in the United States from 1990 to 2017. Values were not adjusted for inflation.

The trends displayed in these figures are likely to continue into future fire seasons. Particularly as fire seasons extend earlier and later into the year and conditions become more volatile at the hottest and driest times of the year. As populations continue to increase and the WUI expands, more people, structures, and infrastructure will be exposed to wildfire risks which continue to increase the value of fire planning and fire mitigation work.

The fire suppression agencies in Klickitat County respond to numerous wildland fires each year, but few of those fires grow to a significant size. According to national statistics, only 2% of all wildland fires escape initial attack. However, that 2% accounts for the majority of fire suppression expenditures and threatens lives, properties, and natural resources. These large fires are characterized by a size and complexity that require special management organizations drawing suppression resources from across the nation. These fires create unique challenges to local communities by their quick development and the scale of their footprint.

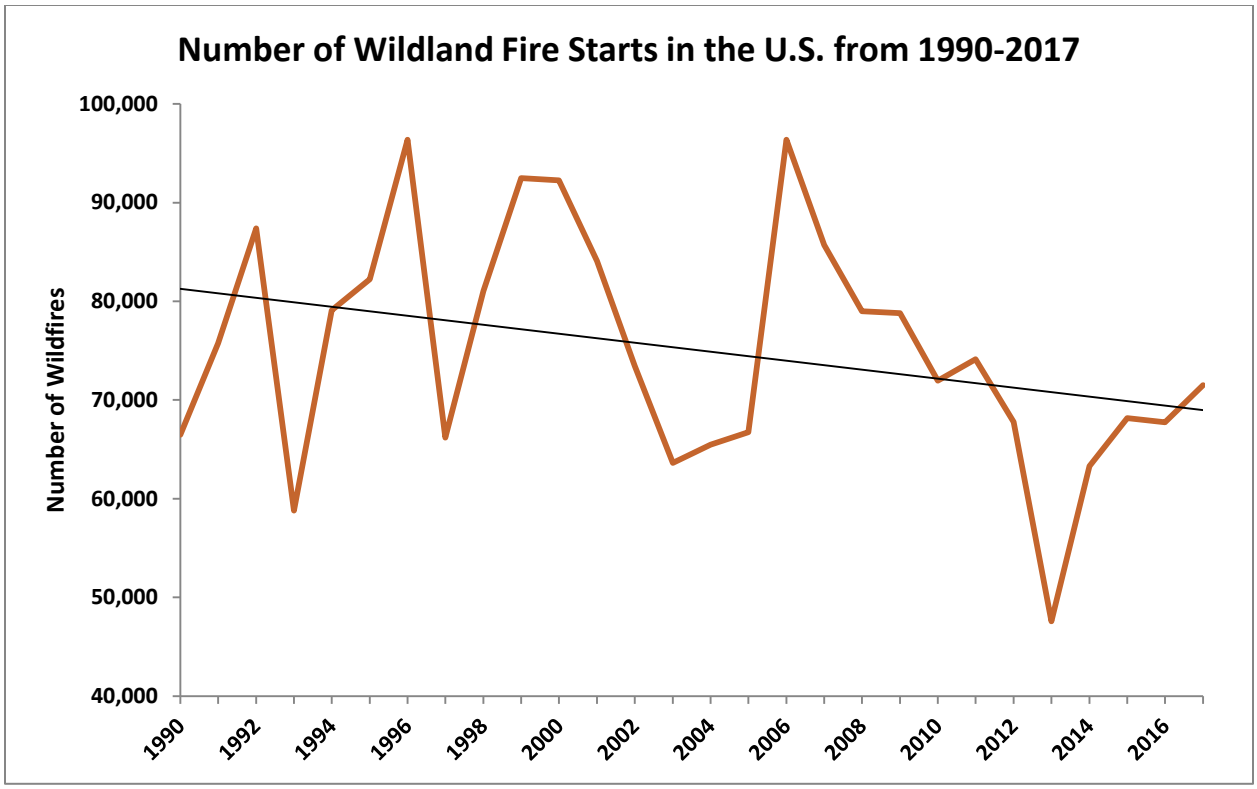


Figure 12) Annual number of wildland fire starts in the United States from 1990 to 2017.

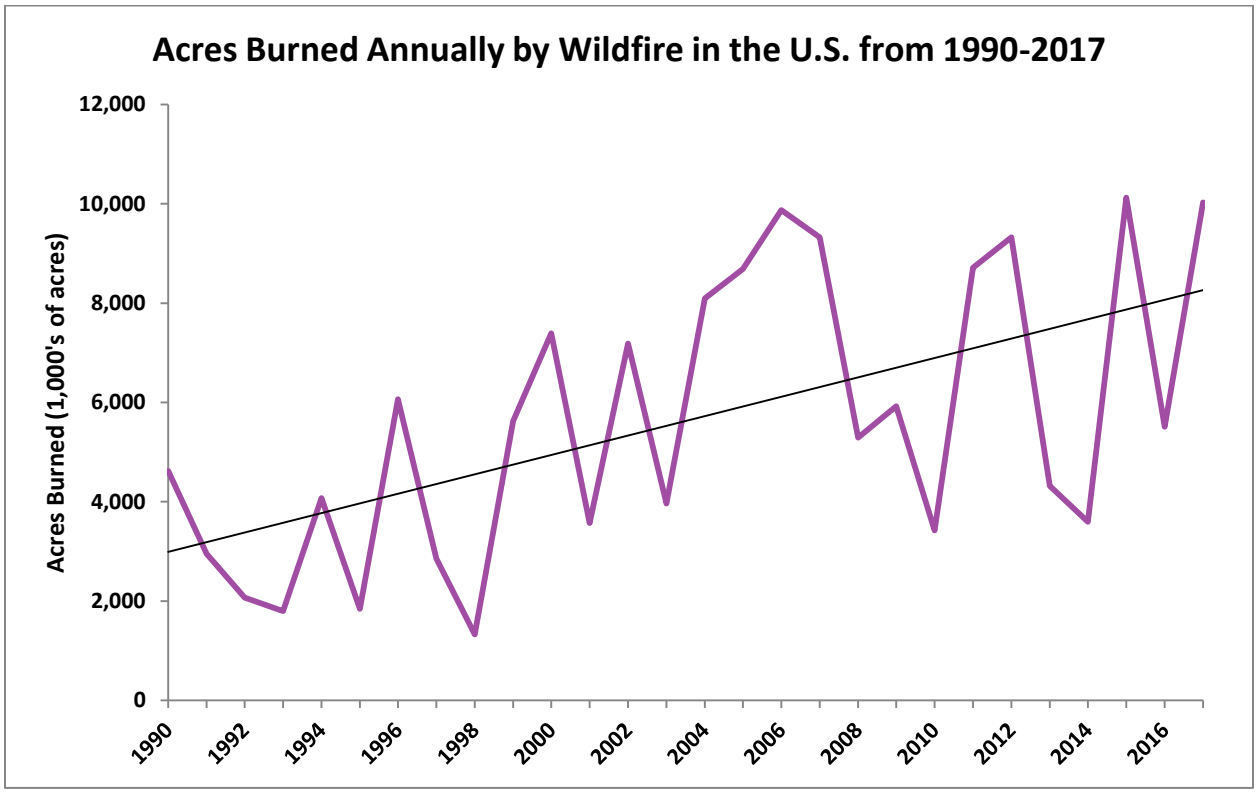


Figure 13) Annual acreage burned as a result of wildfire in the United States from 1990 to 2017.

Wildfire Hazard Assessment

Klickitat County was analyzed using a variety of models, managed on a Geographic Information System (GIS) system. Physical features of the region including roads, streams, soils, elevation, and remotely sensed images were represented by data layers. Field visits were conducted by specialists from Northwest Management, Inc. and others. Discussions with area residents and local fire suppression professionals augmented field visits and provided insights into forest health issues and treatment options. This information was analyzed and combined to develop an objective assessment of wildland fire risk in the region.

Historic Fire Regime

Historical variability in fire regime is a conservative indicator of ecosystem sustainability, and thus, understanding the natural role of fire in ecosystems is necessary for proper fire management. Fire is one of the dominant processes in terrestrial systems that constrain vegetation patterns, habitats, and ultimately, species composition. Land managers need to understand historical fire regimes, the fire return interval (frequency) and fire severity prior to settlement by Euro-Americans, to be able to define ecologically appropriate goals and objectives for an area. Moreover, managers need spatially explicit knowledge of how historical fire regimes vary across the landscape.

"Natural" fires in Klickitat County would have been disproportionately caused by Native Americans. Aboriginal peoples intentionally set fires throughout the region for the purposes of controlling tree and shrub expansion and for the cultivation of select plants. When we describe "natural" in the Range of Natural Variability we are including indigenous peoples as natural disturbance agents and contributors to perceptions of what is "natural".

A primary goal in ecological restoration is often to return an ecosystem to a previously existing condition that no longer is present at the site, under the assumption that the site's current condition is somehow degraded or less desirable than the previous condition and needs improvement.

Land managers in Klickitat County must determine if the past, Native American influenced condition of the County was necessarily healthier, had a higher level of integrity, and was more sustainable than the current condition. In other words, is "restoration" an appropriate course of action? After a prolonged absence, if fire is reintroduced to these ecosystems the result could be damaging. Fuel loads throughout most of the County today are quite high and most of the County is inhabited by people, homes, and infrastructure. The ecosystem was adapted to fire in the past, but is no longer adapted today, especially in light of the human component.

In the absence of intensive Native American burning, a condition has developed where fire could/should not be reintroduced without some significant alteration of the current ecosystem structure. This would also require a significant assessment of social acceptance and financial contribution.

Many ecological assessments are enhanced by the characterization of the historical range of variability which helps managers understand: (1) how the driving ecosystem processes vary from site to site; (2) how these processes affected ecosystems in the past; and (3) how these processes might affect the ecosystems of today and the future. Historical fire regimes are a critical component for characterizing the historical range of variability in fire-adapted ecosystems. Furthermore, understanding ecosystem departures provides the necessary context for managing sustainable ecosystems. Land managers need to understand how ecosystem processes and functions have changed prior to developing strategies to maintain or restore sustainable systems. In addition, the concept of departure is a key factor for assessing risks to ecosystem components. For example, the departure from historical fire regimes may serve as a useful proxy for the potential of severe fire effects from an ecological perspective.

This model uses only the current vegetation types to determine the historic fire regime. Native Americans reportedly burned throughout the County on a regular basis. The vegetation types were much different pre-Euro-American settlement than they are today and believed to be a landscape dominated by bunch grasses and other native grass species and fire adapted forests that featured grassy understorys and burned more frequently.

The Historic Fire Regime Group (FRG) model suggests that fires in Klickitat County historically burned with mixed severity and on both short and long return intervals. The orographic effect caused by the Cascades creates a moisture gradient across Klickitat County that results in wetter conditions in the west and drier conditions in the east and influences both species composition and vegetative growth. According to the analysis, approximately 60% of the county, primarily the eastern portion, are categorized as FRG III and IV. For these areas, a 35 to 200 year historical return interval and mixed severity fires capable of consuming 100% of existing vegetation should be expected. Approximately 54% of the county, mostly the western portion, is categorized as FRG I and III. Historical fire return intervals of less than 35 years to more than 200 years and low to mixed severity fires should be expected. Fire will likely consume grassy understory fuel types while overstory trees survive. Currently, forested areas in the western half of the county are overstocked and in poor health which will likely increase the severity of fires to the level of stand replacing. Table 6 shows total acreage and percent of total acreage by FRG for Klickitat County and Figure 14 shows the distribution of FRGs.

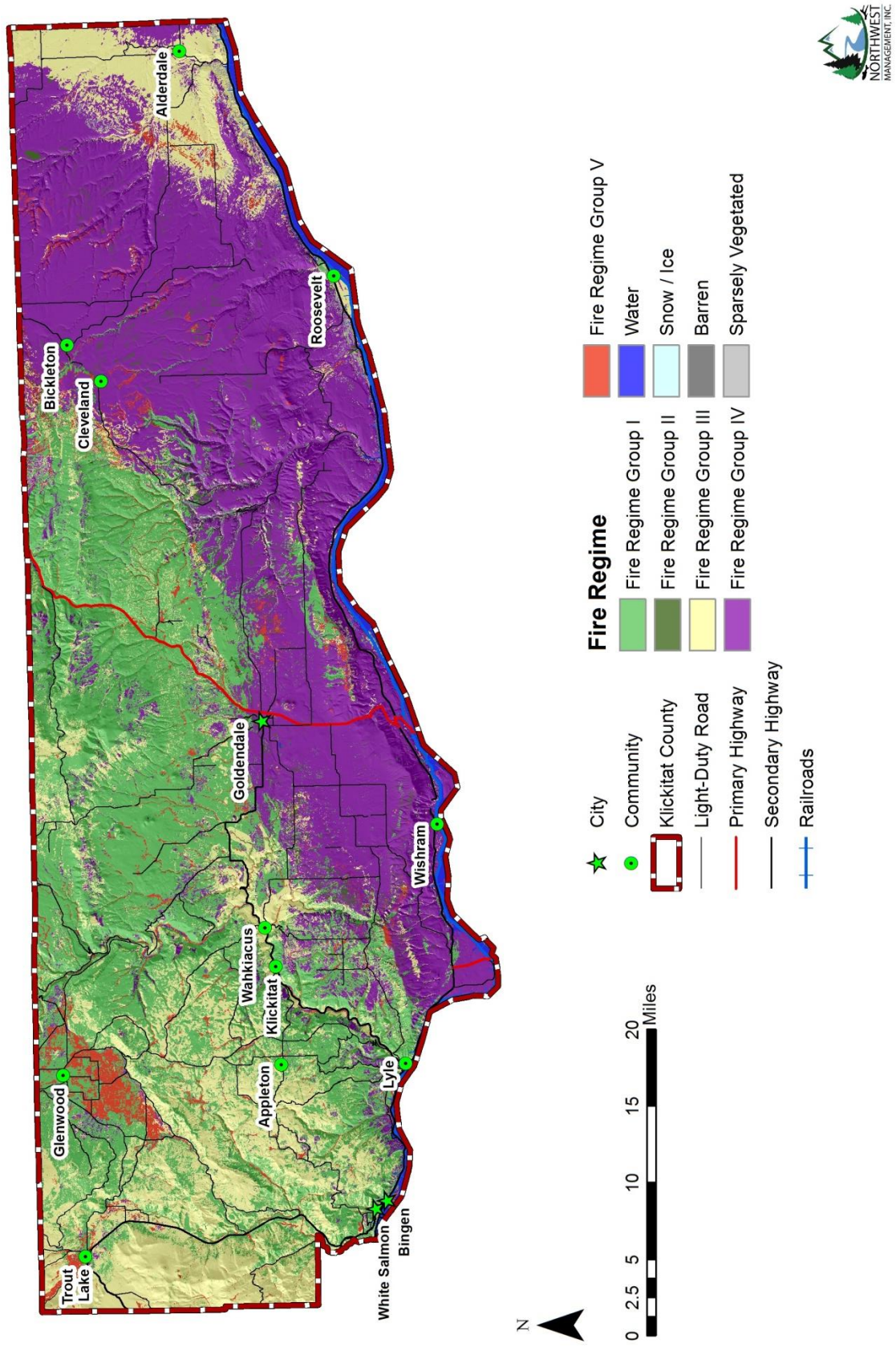


Figure 14) Fire Regime Group map for Klickitat County, WA. Map created using the Fire Regime Group dataset.

Table 6) Total acreage and percent of total acreage by Fire Regime Group for Klickitat County, WA.

Classification	Description	Acres	% Total
Fire Regime Group I	<= 35 Year Fire Return Interval, Low and Mixed Severity	393,342	32.3%
Fire Regime Group II	<= 35 Year Fire Return Interval, Replacement Severity	17,778	1.5%
Fire Regime Group III	35 - 200 Year Fire Return Interval, Low and Mixed Severity	267,719	22.0%
Fire Regime Group IV	35 - 200 Year Fire Return Interval, Replacement Severity	466,723	38.3%
Fire Regime Group V	> 200 Year Fire Return Interval, Any Severity	41,394	3.4%
Water	Water	22,364	1.8%
Barren	Barren	93	<1%
Sparsely Vegetated	Sparsely Vegetated	9,147	<1%
Total		**1,218,560**	**100%**

Fire Regime Condition Class

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning.[12, 13] Coarse scale definitions for historic fire regimes have been developed by Hardy et al[14] and Schmidt et al[15] and interpreted for fire and fuels management by Hann and Bunnell.

A vegetation condition class (VCC) is a classification of the amount of departure from the historic regime. [16] The three classes are based on low (VCC 1), moderate (VCC 2), and high (VCC 3) departure from the central tendency of the natural (historical) regime.[17, 18] The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered

[12] Agee, J. K. Fire Ecology of the Pacific Northwest forests. Oregon: Island Press. 1993.
[13] Brown. J. K. "Fire regimes and their relevance to ecosystem management." *Proceedings of Society of American Foresters National Convention*. Society of American Foresters. Washington, D.C. 1995. Pp 171-178.
[14] Hardy, C. C., et al. *"Spatial data for national fire planning and fuel management."* International Journal of Wildland Fire. 2001. Pp 353-372.
[15] Schmidt, K. M., et al. *"Development of coarse scale spatial data for wildland fire and fuel management."* General Technical Report, RMRS-GTR-87. U.S. Department of Agriculture, Forest Service. Rocky Mountain Research Station. Fort Collins, Colorado. 2002.
[16] Hann, W. J. and D. L. Bunnell. "Fire and land management planning and implementation across multiple scales." International Journal of Wildland Fire. 2001. Pp 389-403.
[17] Hardy, C. C., et al. *"Spatial data for national fire planning and fuel management."* International Journal of Wildland Fire. 2001. Pp 353-372.
[18] Schmidt, K. M., et al. *"Development of coarse scale spatial data for wildland fire and fuel management."* General Technical Report, RMRS-GTR-87. U.S. Department of Agriculture, Forest Service. Rocky Mountain Research Station. Fort Collins, Colorado. 2002.

to be within the natural (historical) range of variability, while moderate and high departures are outside.

An analysis of Vegetation Condition Classes in Klickitat County shows that, of all land that has not been converted to agriculture, approximately 28% of the land in the County is considered highly departed from its historic fire regime and associated vegetation and fuel characteristics (Table 7). Just over 15% has a low departure and just over 35% is considered moderately departed.

The current Vegetation Condition Class model shows that most of the land that is classified as High Departure is found in the eastern half of the county which is predominately grassland (Figure 15). The slopes along the Columbia River are also considered to be High Departure. The current fire severity model suggests that fires with increased severity, relative to historical fires, should be expected in these areas (Figure 14).

Table 7) Fire Regime Condition Class and other land classifications by acreage and percent acreage for Klickitat County, WA.

Fire Regime Condition Class	Description	Acres	Percent of Total
Fire Regime Condition Class I	Low Vegetation Departure	185,043	15.2%
Fire Regime Condition Class II	Moderate Vegetation Departure	429,890	35.3%
Fire Regime Condition Class III	High Vegetation Departure	339,464	27.9%
Water	Water	20,988	1.7%
Urban	Urban	33,674	2.8%
Burnable Urban	Burnable Urban	39,002	3.2%
Barren	Barren	87	<1%
Sparsely Vegetated	Sparsely Vegetated	8,550	<1%
Agriculture	Agriculture	94,356	7.7%
Burnable Agriculture	Burnable Agriculture	67,508	5.5%
Total		**1,218,560**	**100%**

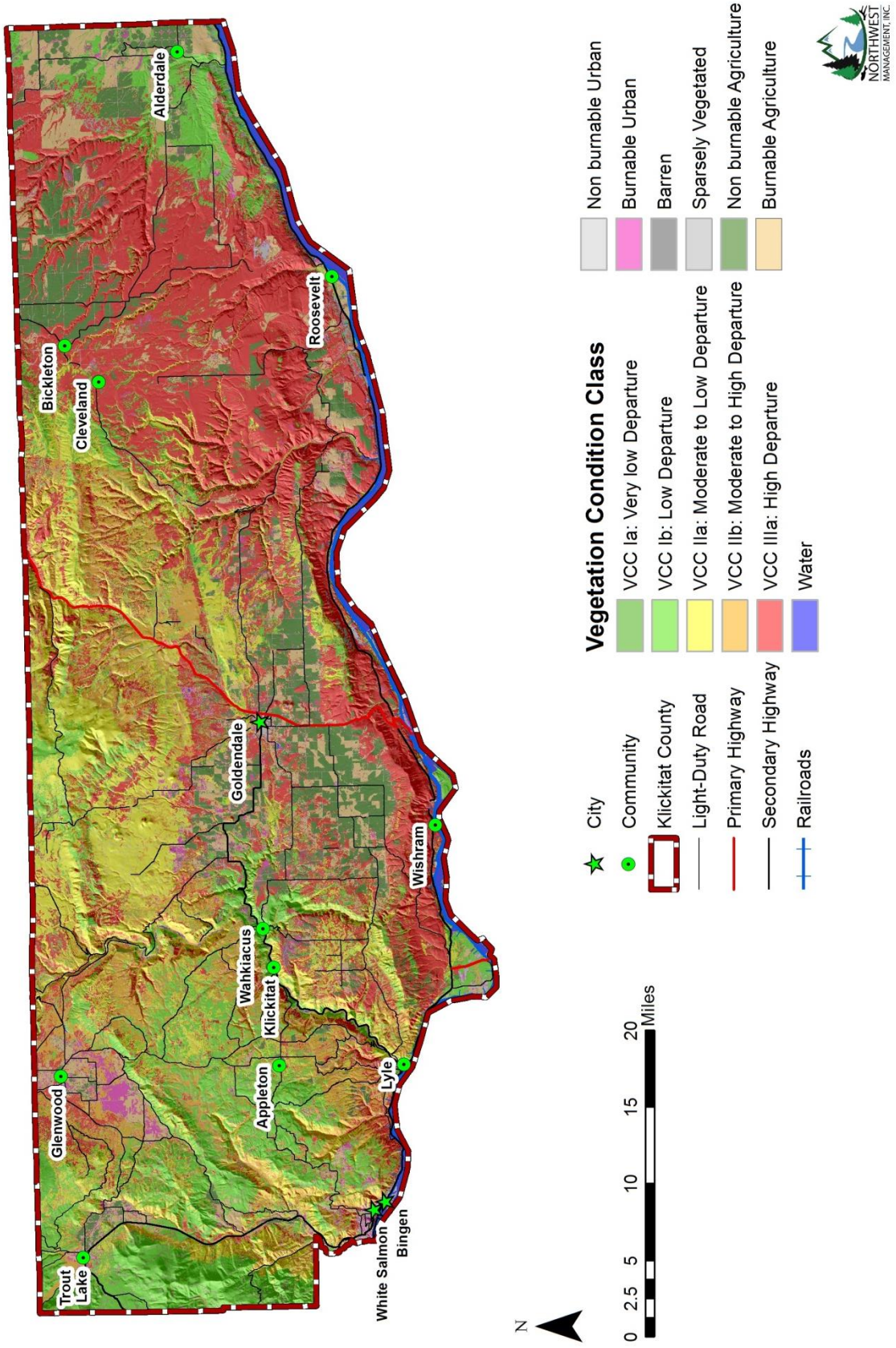


Figure 15) Vegetation Condition Classes and other land classifications for Klickitat County, WA.

Wildland-Urban Interface

A key component in meeting the underlying need for protection of people and structures is the protection and treatment of hazards in the wildland-urban interface (WUI). The WUI refers to areas where wildland vegetation meets urban developments or where forest fuels meet urban fuel-types such as man-made structures. The WUI encompasses not only the interface (areas immediately adjacent to urban development), but also the surrounding vegetation and topography. Reducing the hazard in the WUI requires the efforts of federal, state, and local agencies and private individuals.[19]

By reducing hazardous fuel loads and creating new and reinforcing existing defensible space, landowners can protect the WUI, the biological resources of the management area, and adjacent property owners by:

- Minimizing the potential of high-severity fires entering or leaving the area;
- Reducing the potential for firebrands (embers carried by the wind in front of the wildfire) impacting the WUI. Research indicates that flying sparks and embers (firebrands) from a crown fire can ignite additional wildfires as far as 1¼ miles away during periods of extreme fire weather and fire behavior;[20]
- Improving defensible space in the immediate areas for suppression efforts in the event of wildland fire.

Three wildland-urban interface conditions have been identified (Federal Register 66(3), January 4, 2001) for use in wildfire control efforts. These include the Interface Condition, Intermix Condition, and Occluded Condition. Descriptions of each are as follows:

- **Interface Condition** – a situation where structures abut wildland fuels. There is a clear line of demarcation between the structures and the wildland fuels along roads or back fences. The development density for an interface condition is usually 3+ structures per acre;
- **Intermix Condition** – a situation where structures are scattered throughout a wildland area. There is no clear line of demarcation; the wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres; and

[19] Norton, P. Bear Valley National Wildlife Refuge Fire Hazard Reduction Project: Final Environmental Assessment. Fish and Wildlife Services, Bear Valley Wildlife Refuge. June 20, 2002.
[20] McCoy, L. K., et all. Cerro Grand Fire Behavior Narrative. 2001.

- **Occluded Condition** – a situation, normally within a city, where structures abut an island of wildland fuels (park or open space). There is a clear line of demarcation between the structures and the wildland fuels along roads and fences. The development density for an occluded condition is usually similar to that found in the interface condition and the occluded area is usually less than 1,000 acres in size.

In addition to these classifications detailed in the Federal Register, Klickitat County has included three additional classifications to augment these categories:

- **Rural Condition** – a situation where the scattered small clusters of structures (ranches, farms, resorts, or summer cabins) are exposed to wildland fuels. There may be miles between these clusters.
- **High Density Urban Areas** – those areas generally identified by the population density consistent with the location of incorporated cities, however, the boundary is not necessarily set by the location of city boundaries or urban growth boundaries; it is set by very high population densities (more than 7-10 structures per acre).
- **Non-WUI Condition** – a situation where the above definitions do not apply because of a lack of structures in an area or the absence of critical infrastructure. This classification is not considered part of the WUI and does not occur in Klickitat County.

In summary, the designation of areas by the Klickitat County advisory group includes:

- Interface Condition: WUI
- Intermix Condition: WUI
- Occluded Condition: WUI
- Rural Condition: WUI
- High Density Urban Areas: WUI
- Non-WUI Condition: Not WUI, not present in Klickitat County

Klickitat County's WUI is primarily based on population density. Relative population density across the County was estimated using a GIS based kernel density population model that uses object locations to produce, through statistical analysis, concentric rings or areas of consistent density. To graphically identify relative population density across the county, structure locations are typically used as an estimate of population density. However, Klickitat County does not have an address or structure GIS layer so population densities are based on parcel count for this analysis. Assigning a value of one to each parcel, the resulting output displays the concentration of parcels throughout the county (Figure 16).

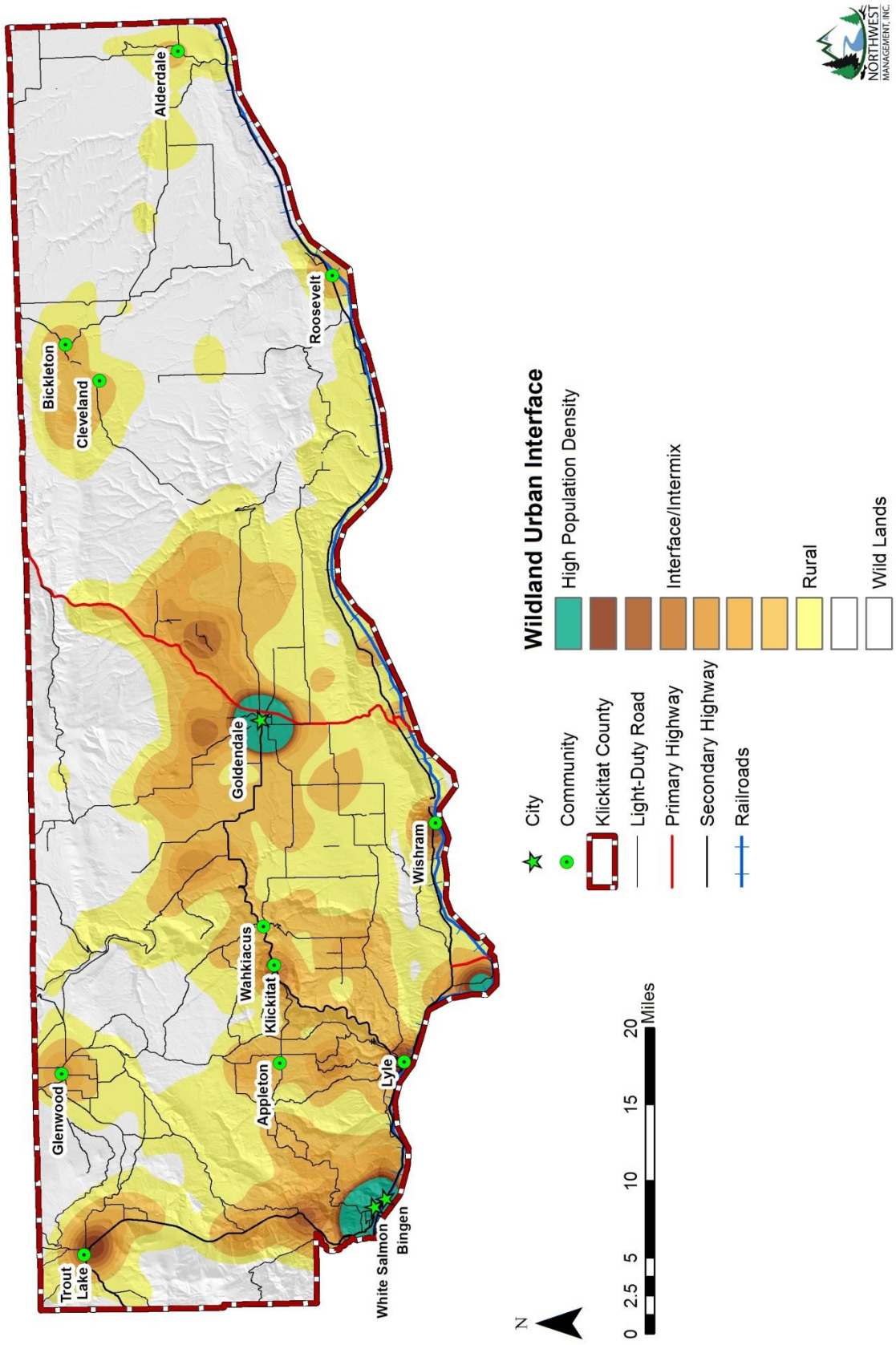


Figure 16) Wildland-Urban Interface analysis for Klickitat County, WA.

By evaluating structure density in this way, WUI areas can be identified on maps by using mathematical formulae and population density indexes. The resulting population density indexes create concentric circles showing high density areas, interface, and intermix condition WUI, as well as rural condition WUI (as defined above). This portion of the analysis allows us to "see" where the highest concentrations of structures are located in reference to relatively high risk landscapes, limiting infrastructure, and other points of concern.

The WUI, as defined here, is unbiased and consistent and most importantly – it addresses all of the county, not just federally identified communities at risk. It is a planning tool showing where homes and businesses are located and the density of those structures leading to identified WUI categories. It can be determined again in the future, using the same criteria, to show how the WUI has changed in response to increasing population densities. It uses a repeatable and reliable analysis process that is unbiased.

The Healthy Forests Restoration Act makes a clear designation that the location of the WUI is at the determination of the county or reservation when a formal and adopted Community Wildfire Protection Plan is in place. It further states that the federal agencies are obligated to use this WUI designation for all Healthy Forests Restoration Act purposes. The Klickitat County Community Wildfire Protection Plan advisory group evaluated a variety of different approaches to determining the WUI for the County and selected this approach and has adopted it for these purposes. In addition to a formal WUI map for use with the federal agencies, it is hoped that it will serve as a planning tool for the County, state and federal agencies, and local Fire Protection Districts.

Potential WUI Treatments

The definition and mapping of the WUI is the creation of a planning tool to identify where structures, people, and infrastructure are located in reference to each other. This analysis tool does not include a component of fuels risk. There are a number of reasons to map and analyze these two components separately (population density vs. fire risk analysis). Primary among these reasons is the fact that population growth often occurs independent from changes in fire risk, fuel loading, and infrastructure development. Thus, making the definition of the WUI dependent on all of them would eliminate populated places with a perceived low level of fire risk today, which may in a year become an area at high risk due to forest health issues or other concerns.

By examining these two tools separately, the planner is able to evaluate these layers of information to see where the combination of population density overlays areas of high current relative fire risk and then take mitigation actions to reduce the fuels, improve readiness,

directly address factors of structural ignitability, improve initial attack success, mitigate resistance to control factors, or (more often) a combination of many approaches.

It should not be assumed that because an area is identified as being within the WUI, that it will therefore receive treatments because of this identification alone. Nor should it be implicit that all WUI treatments will be the application of the same prescription. Instead, each location targeted for treatments must be evaluated on its own merits: factors of structural ignitability, access, resistance to control, population density, resources and capabilities of firefighting personnel, and other site specific factors.

It should also not be assumed that WUI designation on national or state forest lands automatically equates to a treatment area. The Forest Service, Bureau of Land Management, and Washington Department of Natural Resources are still obligated to manage lands under their control according to the standards and guides listed in their respective forest or resource management plans (or other management plans). The adopted forest plan has legal precedence over the WUI designation until such a time as the forest plan is revised to reflect updated priorities.

Most treatments may begin with a home risk evaluation, and the implicit factors of structural ignitability (roofing, siding, deck materials) and vegetation within the treatment area of the structure. However, treatments in the low population areas of rural lands (mapped as yellow) may look closely at access (two ways in and out) and communications through means other than land-based telephones. On the other hand, a subdivision with densely packed homes (mapped as brown – interface areas) surrounded by forests and dense underbrush, may receive more time and effort implementing fuels treatments beyond the immediate home site to reduce the probability of a crown fire entering the subdivision.

Relative Threat Level Mapping

Klickitat County recognizes that certain regions of the county have unique risk factors that increase their vulnerability to wildland fire. In an effort to demonstrate these risk factors, the advisory group developed a threat level model analyzing various risk factors on a scale relative to Klickitat County specifically.

Risk Categories

- **High Risk Vegetation** –The eastern half and portions of central Klickitat County are characterized by light, flashy fuel types that are continuous in coverage and pose a high risk for ignition. Areas featuring light fuel types and higher population centers and / or

greater volumes of vehicle traffic were assigned higher risk values on the threat level map.

- **Issues with Accessibility**–Areas with either limited or no access points were assigned higher risk values on the threat level map. Wildfires burning in remote areas or areas with limited road systems either require more time for response from ground suppression resources or they require air support.
- **High Value-Resources at Risk –**In addition to residential and municipal infrastructure, recreational resources and infrastructure are also of high value and generate revenue in the county. These areas were also assigned a higher risk level because of the potential financial impacts that a wildfire could have on recreational infrastructure and the recreation-industry.
- **Population Centers and Human Activity** –Areas with larger populations and higher levels of human activity were assigned a higher threat level because of the increased potential for ignition, particularly in areas that feature light, flashy fuels like grasses and shrubs.

Determination of Relative Threat Level

Risk categories included in the final Relative Threat Level analysis were slope, aspect, precipitation, fuel models, fire intensity, and population density. The various categories, or layers, were ranked by the advisory group based on their significance pertaining to causal factors of high wildland fire risk conditions or protection significance. The ranked layers were then analyzed in a geographical information system to produce a cumulative effects map based on the ranking. Following is a brief explanation of the various categories used in the analysis and the general ranking scheme used for each.

- **Environmental Factors** – slope, aspect and precipitation all can have an enormous impact on the intensity of a wildfire. Therefore, areas with steep slopes, dry aspects, or lesser amounts of precipitation, relative to Klickitat County, were given higher threat rankings.
- **Vegetation Cover Types** – certain vegetation types are known to carry and produce more intense fires than other fuel types. For Klickitat County, shrub and grass fuel models were given the higher rankings followed by short grass / agriculture, and forest types (shrub understory) fuel models.

- **Fire Behavior** – areas identified by fire behavior modeling as having high rate of spread potential or extreme fire behavior (crowning potential) were given a higher threat level ranking.
- **Populated Areas** – these areas were ranked higher due to the presence of human populations, structures, and infrastructure requiring protection from fire.
- **Critical Infrastructure** – areas or assets that cannot be replaced or afford special wildfire protection such as critical infrastructure, cultural or historic sites, and recreational areas were overlaid onto the Relative Threat Level Map to show those areas where critical infrastructure is most at risk. This allows land managers to focus mitigation efforts in those identified areas.

Each data layer was developed, ranked, and converted to a raster format using ArcGIS 10.1. The data layers were then analyzed in ArcGIS using the Spatial Analyst extension to calculate the cumulative effects of the various threats. This process sums the ranked overlaid values geographically to produce the final map layer. The ranked values were then color coded to show areas of highest threat (red) to lowest threat (blue) relative to Klickitat County (Figure 17).

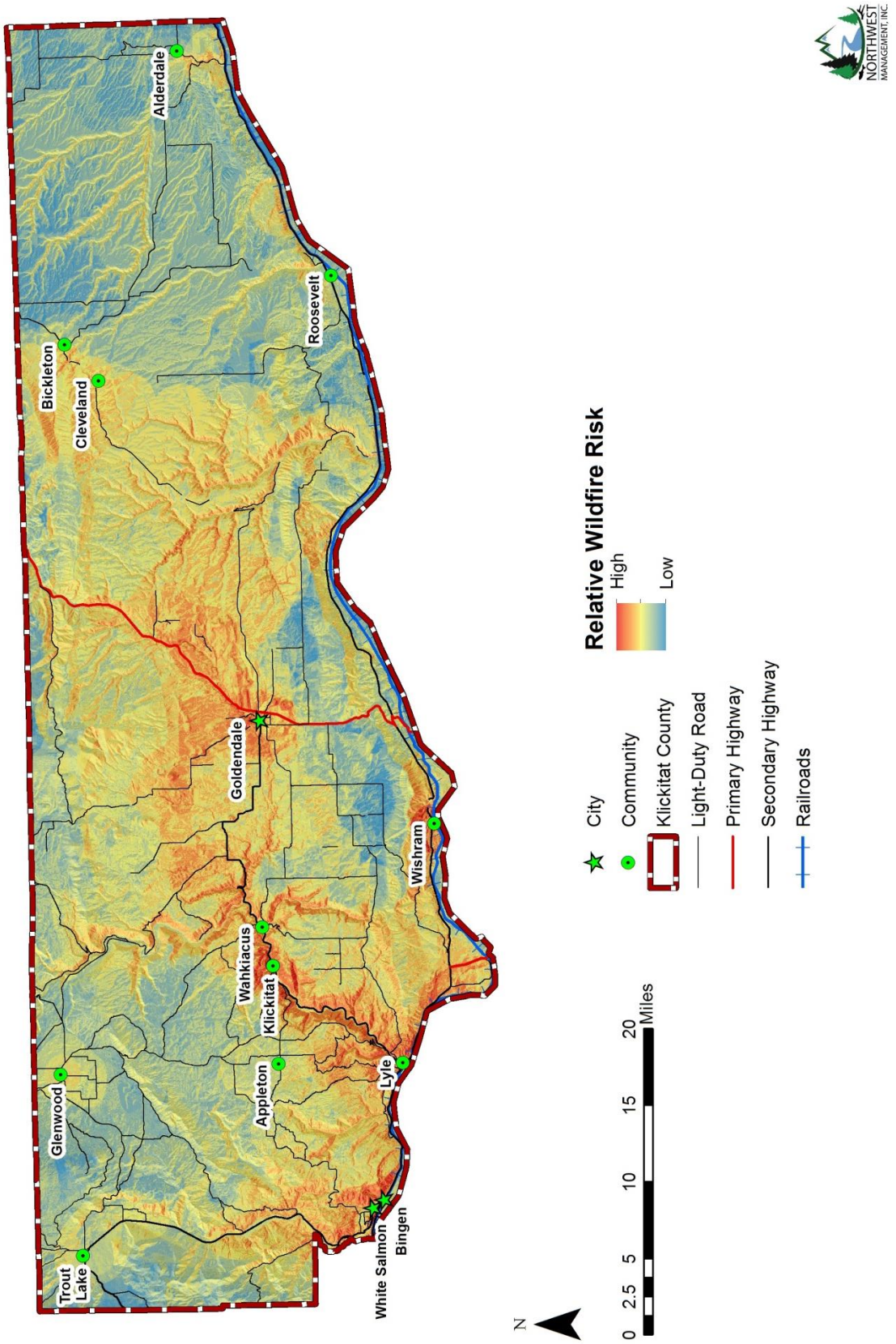


Figure 17) Relative Threat Level Map for Klickitat County, WA.

Overview of Fire Protection System

The Department of Interior (DOI), United States Forest Service, State, Tribes, Counties, and local governments maintain operational wildland fire organizations. These are supplemented by volunteer organizations such as volunteer fire departments and rangeland protection associations. In DOI, the operational fire organizations reside in Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and Bureau of Indian Affairs. Other organizations such as US Fire Administration and U.S. Geological Survey have fire expertise that supports and partners with the operational fire organizations. The Office of Wildland Fire at DOI provides budget and policy coordination, leadership, and oversight for the operational programs within DOI. A number of chartered interagency groups exist to provide coordination and consistency among wildland fire organizations to ensure policy and operational consistency and interoperability.

Local Fire Department and District Summaries

The firefighting resources and capabilities information provided in this section is a summary of information provided by the fire chiefs or representatives of the wildland firefighting agencies listed. Each organization completed a survey with written responses. Their answers to a variety of questions are summarized here. These synopses indicate their perceptions and information summaries. Also included in this section is a map of Klickitat County fire districts and their boundaries (Figure 18).

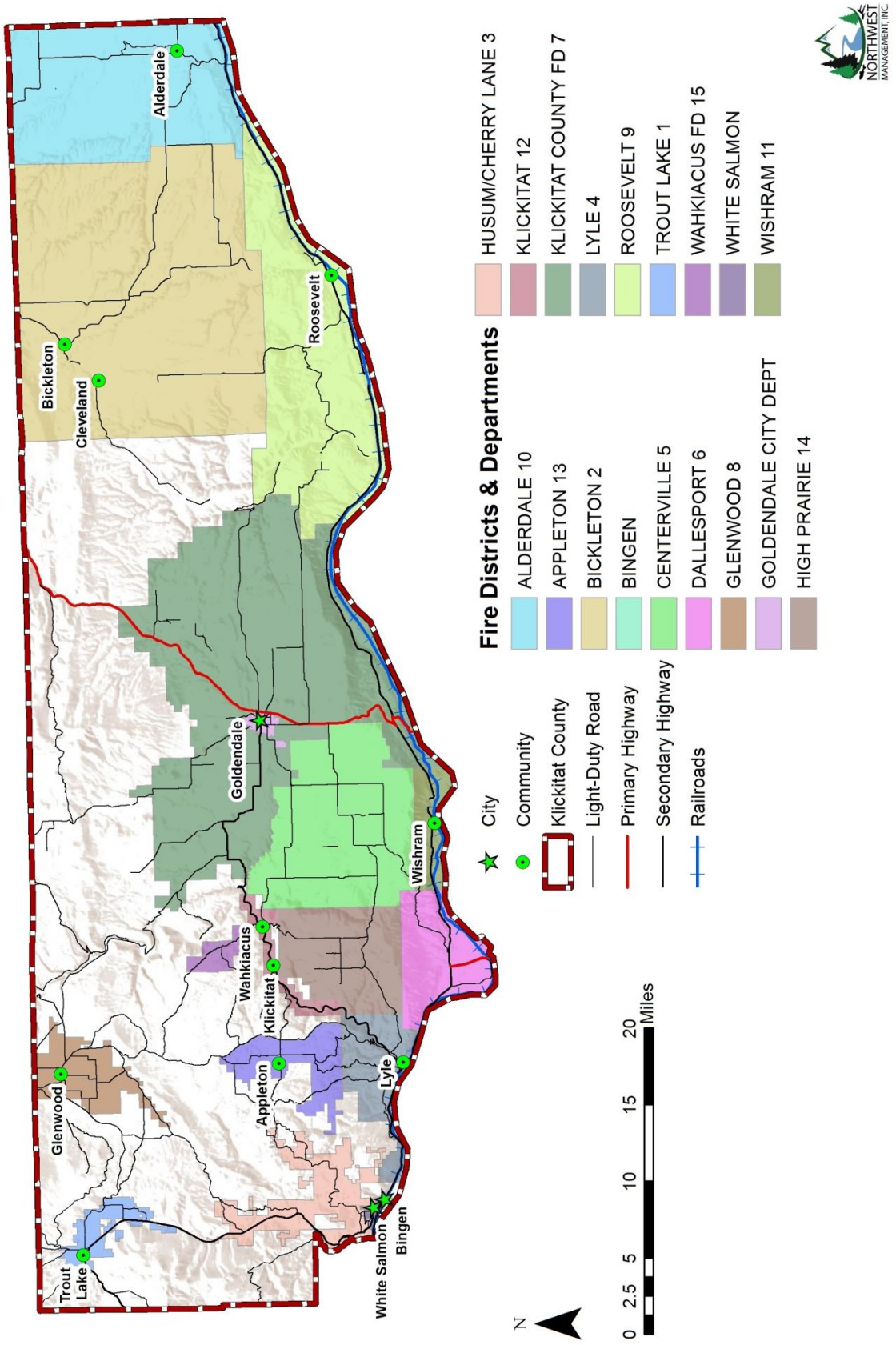


Figure 18) Fire district map for Klickitat County, WA

Bingen Fire Department

District Summary: The Bingen Fire Department covers 0.8 square miles within the city of Bingen. This district is staffed by 14 volunteer firefighters and has access to the vehicles listed in Table 8.

Table 8) Available firefighting resources for Bingen Fire Department.

Equipment	Year	Make	Tank Size (Gallons)	Type	Pump GPM	License #	VIN #	Other Info
Engine 33	2004	E-One Typhoon	1000	S1	1500	19139D	4EN6AAA8441009091	Class A Foam
Engine 34	1976	American R200HD	1000	S1	1250	09753D	3574121875	Class B Foam
Engine 35	1969	Ford F-600 Western States	750	S2	700	D8534	F80FUE16072	Class A, B Foam
Tender 36	1977	Ford Cabover	3000	T2	300	19100D	X90JVL72543	
Brush 37	1979	Chev K2500 4x4	200	B6	250	13802D	CKL249J154964	

Goldendale Fire Department

District Summary: The City of Goldendale Volunteer Fire Department is a volunteer organization; it is not staffed with any full time fire fighters. The department typically maintains between 20 and 30 members but can have as many as 36 members. The Goldendale Volunteer Fire Department covers approximately 2.9 square miles.

Table 9) Available firefighting resources for Goldendale Fire Department.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
E 61-11	2004	HME	780	S1	1500	32118D	44KFT42845 WZ20627	Class A Foam	Yes
E 61-12	1998	Pierce	500	S1	1250	19114D	P1CT0202W A000795		Yes
61-15		FIRE STATION	N/A	N/A	N/A	N/A	N/A		N/A
B 61-21	1994	GMC 3/4 Ton 4x4	275	B6	50			Class A Foam	Yes
S 61-23	1999	Ford F350	TRAUMA VERIFIED BLS AID UNIT			19190D	1FDWE30FO X4A87536		No
S 61-24	1986	Chevrolet G-30 1 Ton	BREATHING AIR SUPPORT			32157D	2GDHG3E1M 3E4530230	Set up for Rehab Cascade air supply	Yes
T 61-31	2002	TENDER	3000	T3	60				Yes
B 61-51	1969	Jeep M3521, 1 1/4 Ton 4x4	200	B6	60	1282D	35966	Class A Foam	Yes
B 61-52	2014	Ford F-450 Ext. Cab 4x4	500	B3	150	32155D	2FTJW36G3J CA09472	Class A Foam	Yes
B 61-53	1994	Chevrolet G-20 3/4 Ton 4x4	200	B6	60	19107D	1GGK263294	Class A Foam	Yes
E 61-64	1972	Seagrave	500	S1	1500	01281D	PB25068	UL Rated	No

White Salmon Fire Department

District Summary: The White Salmon Fire Department covers 1.25 square miles. The department encompasses the city of White Salmon, which lies along the Columbia River in the western portion of Klickitat County.

#1) Klickitat County Fire District 1 (Trout Lake)

District Summary: KCFD #1 covers slightly more than 13 square miles. The land consists mostly of hay and pasture ground, with some agriculture and timber interspersed.

#2) Klickitat County Fire District 2 (Bickleton)

District Summary: KCFD #2 protects 290 square miles consisting of farm ground, shrublands and minor amounts of timber. Paging is handled by the Klickitat Department of Emergency Management.

#3) Klickitat County Fire District 3 (Husum)

District Summary: KCFD #3 consists of a mix of timber and agriculture. It covers 38 square miles. The department consists of 30 volunteer firefighters and one paid fire chief. This district covers almost 40 square miles and is located in the southwestern portion of Klickitat County, with its majority to the north of the city of White Salmon. Table 10 lists available resources for KCFD #3.

Table 10) Available firefighting resources for Klickitat County Fire District #3.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
				Type-1 Engine					
				Type-1 Engine					
				Type-1 Tender					
				Type-1 Tender					
				Type-3 Brush/Engine					
				Type 6 Brush					
				Reserve Engine					
				Utility Vehicle					
				Utility Vehicle					
				Passenger School Bus					

#4) Klickitat County Fire District 4 (Lyle)

District Summary: KCFD #4 consists of 30 volunteer firefighters and covers 32 square miles along the Columbia River and the encompasses the hills north and west of the city of Lyle. The land consists mostly of shrubland, with some timber. As with any volunteer-based department, the largest need in the District is more volunteers, while there are plenty of volunteers that are trained and willing to respond many have jobs that require travel outside of the District making them unavailable for response. Table 11 lists available resources for KCFPD #4.

Table 11) Available firefighting resources for Klickitat County Fire District #4.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
C400	2000	Ford 4x4	N/A					Command	
E401	2003	Freightliner	1000	S1	1250			Structure w/ foam	
E404	1991	International	500	S3	1000			Structure w/ foam	
T405	1984	Kenworth	3000	T2	300			Tender w/ pump	
A406	1996	Ford 4x4	N/A		N/A			Aid/Rescue truck	
B408	1993	International	750	B3	200			Brush w/foam	
B409	1991	International	750	B3	200			Brush w/foam	
B411	1996	GMC 4x4	450	B4	200			Brush w/foam	
B411	1991	Ford F-450	200	B6	100			Brush w/foam	

#5) Klickitat County Fire District 5 (Centerville)

District Summary: KCFD #5 currently has 25 volunteers serving a population of approximately 700 residents spread over 102 square miles. The fire station is located in the town of Centerville with 3 trucks stationed remotely during fire season. The primary land use in this area is dryland agriculture, and much of the district is shrubland. The south, east, and western regions of the district have channeled scablands. The district also protects 24 sections of state and federal land.

#6) Klickitat County Fire District 6 (Dallesport)

District Summary: KCFD #6 encompasses 38 square miles and serves a population of approximately 2,000. There are 18 volunteer firefighters serving Dallesport District. Presently, all of the district's communication equipment is capable of narrow banding.

#7) Klickitat County Rural 7 Fire and Rescue (Goldendale)

District Summary: KCFD #7 is staffed by 24 part-time firefighters. It is 272 square miles and surrounds the city of Goldendale. The primary land cover in the district is agriculture, with scrubland interspersed, as well as timber. The city of Goldendale has its own fire department.

#8) Klickitat County Fire District 8 (Glenwood)

District Summary: KCFD #8 is located in the northwestern portion of Klickitat County, Washington. It consists of 26 square miles and is staffed by 13 volunteer firefighters. The primary land use is hay and pasture.

#9) Klickitat County Fire District 9 (Roosevelt)

District Summary: KCFD #9 covers 145 square miles. It is located in the eastern portion of the County and the Columbia River borders it on the south. The land consists mostly of shrubland with some agriculture. Table 12 lists available resources for KCFD #9.

Table 12) Available firefighting resources for Klickitat County Fire District #9.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
902	2003	Ford F250	30	Type-7 Command	CAFS				
903	1970	American	1000	Type-4	61				
904	1985	Am Gen	1000	Type-4	140				
906	1982	Am Gen	1000	Type-5	140				
907	1998	Ford F350	N/A	Aid Car-BLS	N/A				
909	2001	Ford F350	300	Type-6	100				
910	1963	Peterbilt	4500	Tender-1	850				
911	1999	E One Pumper	750	Type-1	1000				
912	2002	Ford F350	300	Type-6	140				
914	2008	LMTV	750	Type-4	250				
915	1977	GMC	1500	Tac Tender-1	140				
916	1977	GMC	1500	Tac Tender-1	140				
918	2004	Freightliner F70	625	Type-4	850				
920	2010	Freightliner M916A1	3100	Tac Tender-1	850				
926	2008	Ford F550	300	Type-6	140				

#10) Klickitat County Fire District 10 (Alderdale)

District Summary: Covering roughly 128 square miles KCFD #10 services the eastern portion of the County, where the fuels consist of agriculture and sagebrush/grass understory. KCFD #10 typically response to 10-20 fires per season, with half of responses as aid to neighboring districts. The District relies on volunteers, and is currently staffed by 25 volunteers. Table 13 lists available resources for KCFD #10.

Table 13) Available firefighting resources for Klickitat County Fire District #10.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
1051		Chevrolet	N/A	N/A	N/A				
1004	1992	Ford	N/A	N/A	N/A				
Fire Buggy		Polaris	100	Type 7	50				
1011	1984	GMC	300	Type 6	150				
1012	1987	Chevrolet	300	Type 6	150				
1013	1992	Ford	300	Type 6	150/Foam				
1014	1984	Chevrolet	500	Type 6	150/Foam				
1015	1983	Jeep/Kaiser	1000	Type 4	150				
1016	1977	Jeep/Kaiser	1000	Type 4	150				
1017	1984	Jeep/Kaiser	1000	Type 4	150				
1018		Jeep/Kaiser	1000	Type 4	150				
1019	2004	Stewart and Stevenson	500	Type 6	150				
1020		Freightliner	5000	Type 2	300				
1021			1500	Type 3	150/300				
1031	1964	Ford	1000		1000				
1051	1979	Ford	750		1000				

#11) Klickitat County Fire District 11 (Wishram)

District Summary: KCFD #11 covers almost 17 square miles. The district encompasses the town of Wishram, and the land cover is primarily shrubland and herbaceous cover. Table 14 lists available resources for KCFD #11.

Table 14) Available firefighting resources for Klickitat County Fire District #11.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
C1100	1997	Ford Exp		Command		902088	1FMFU18L4 VLB14832	Command	Yes
A1101	1989	Ford Econoline		Aid		65123C	1FDHS34M1 KHC39147	Aid Vehicle	
T1102	1966	White Diesel	4000	T2	500	33725C	671337	2.5" Monitor	County
B1103	1966	Jeep 1 1/4 Ton 4x4	250	B6	150	C41980	11630		County
B1104	1994	Ford F350 4x4	250	B6	150	31920C	2FTHF36RCA 500088	Medical Supplies	Yes
E1105	1996	Hend	750	S1	1500	B2792C	44KFT4284T WZ18180	Structure	County
T1106	2005	International	3000	T2	1000	65162C	1HTWYAHT2 5J036820	2.5" Monitor, Foam	Yes
B1107	1973	Ford F250 4x4	250	B6	150	74581C	F28YRR8364 3		Yes

R11	1985	International 1800 4x4	125	Rescue	35	33743C	1HTLFHXN5F HA40005	Rescue Truck	County
B1108	1999	Ford F450 4x4	300	B6	150	96767C	1FDXF47FXX EB00615		County

#12) Klickitat County Fire District 12 (Klickitat)

District Summary: KCFD #12 consists of 15 volunteer firefighters and covers 11 square miles along the Klickitat River. The land consists mostly of shrubland, with some timber. The district encompasses the town of Klickitat. Table 15 lists available resources for KCFD #12.

Table 15) Available firefighting resources for Klickitat County Fire District #12.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
	1993	Ford		Brush Truck					
	1990	Chevy		Command					
	1995	Ford		Ambulance					
	1990	FMC Ford		Tender					
	1985	GMC		Pumper tanker					

#13) Klickitat County Fire District 13 (Appleton)

District Summary: KCFD #13 is a small district with 25 square miles and only 598 residents. It contains large areas of evergreen forest as well as herbaceous land cover. This district borders the shrublands of the east and the Cascades to the west. Table 16 lists available resources for KCFD #13.

Table 16) Available firefighting resources for Klickitat County Fire District #13.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other (Crew)	Available for Mobilization
1302	200?	Freightliner	3000		450				
1303	1984	Hurricane	500		1500				
1304	1996	Ford							
1305	1992	Freightliner	3200		450				
1306	2000	Ford	300		250				
1307	2000	Ford	500		250				
1308	1990	Ford	1200		450				
1309	1989	Ford	1000		1250				
1310	1997	Ford	300		250				
1311	1994				450				
	2001	Ford							

#14) Klickitat County Fire District 14 (High Prairie)

District Summary: KCFD #14 covers approximately 49 square miles and consists primarily of shrubland with nearly equal parts of agriculture and timber cover. The department consists of 10 volunteer firefighters. Table 17 lists available resources for KCFD #14.

Table 17) Available firefighting resources for Klickitat County Fire District #14.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other (Crew)	Available for Mobilization
C1400	2003	Ford	N/A	Command	N/A			2	
T1415	1977	Oshkosh M911	4000	Type-2 Tender	400			2	
E1411	2002	International	750	Type-2 Pumper	750			5	
B1412	2007	Ford F550	300	Type-6 Brush	120			5	
E1421	N/A	N/A	750	Type-1 Pumper	1250			3 (+2)	
B1422	1983	GMC	500	Type-3 Brush	350			3 (+2)	
1424	1967	Ford FW004	1000	Type-5 Tender	120			2	
1425	1988	international	2000	Type-2 Tender	500			2	
Aid 14	1989	Ford		Aid Unit	N/A			2 (+1)	

#15) Klickitat County Fire District 15 (Wahkiacus)

District Summary: KCFD #15 consists of 16 volunteer firefighters and covers 7 square miles. The land consists of nearly equal parts of timber and shrubland and lies west of the Klickitat River. Table 18 lists available resources for KCFD #15.

Table 18) Available firefighting resources for Klickitat County Fire District #15.

Equipment Number	Year	Make	Tank Size (Gallons)	Type	Pump (GPM)	License Number	Vin Number	Other	Available for Mobilization
			300	Type-6 Brush	150				
				Type-6 Brush	150				
			1000	Type-6 Brush	150				
			1000	Type-6 Brush	150				
			3000	Type-1 Tactical Tender	750				
			3000	Type-1 Tactical Tender	750				
			10000	Storage Tank					

Additional Entities with Wildland Firefighting Resources

USFS Columbia River Gorge National Scenic Area

- **Available Personnel:**
  - 1 Permanent Full Time Fire Management Officer (ICT3, DIVS, TFLD, AOBD, RXB2)
  - 1 Permanent Full Time Assistant FMO – suppression (ICT3, DIVS, TFLD, RXB2)
  - 1 Permanent Full Time Assistant FMO – Fuels/Planner (ICT3, OPS2, DIVS, TFLD, RXB2)
  - 1 Permanent Seasonal Prevention Tech. (ENGB, FFT1)
  - 1 Permanent Full Time Engine Captain (ICT3, DIVS, ENGB, RXB2)
  - 1 Permanent Full Time Engine Captain (ICT4, ENGB, TFLD)
  - 1 Permanent Full Time Crew Captain (ICT4, DIVS, TFLD, CRWB, ENGB, RXB2)
- **Seasonal Resources:**
  - During Fire season (May through October) 2 type 6 Engines and a 10 person Handcrew are fully staffed. The Engines are 7-day effective and the Handcrew works 5 days per week.
- **Additional Vehicle Resources:**
  - 2 Type 6 Engines (Captains are full time but the crew are seasonal and temp employees) – Available with full staff between May and mid-October.
  - 1 additional Type 6 Engine (used as back up engine if mechanical issues arise with primary engines; but can also staff up for a third staffed Engine).
  - 1 Type 7 patrol truck (Prevention tech has water with pump in bed of pick-up truck).
- **Additional Personnel Resources:**
  - In addition to our regular fire personnel we roster other resource area employees with red cards for extra help. These employees are typically just FFT2 qualified and can assist on the engines or handcrew. We also keep a list of AD employees for various needs. We have many EMTF, EMPF, ENGB, FFT1, HECM, and a few finance section ADs that help us.

USFS Mt. Adams Ranger District / Gifford Pinchot National Forest

USFS Mt. Adams Ranger District / Gifford Pinchot National Forest Washington State Parks currently have the following vehicles and staff for wildfire suppression:

- 2 type 6 engines, both are fully staffed with 5 personnel
- Both engines are capable of 7 day coverage

Bureau of Land Management

District Summary: The BLM owns and manages over 18,000 acres in Klickitat County; all of which could potentially receive hazardous fuels reduction treatments in the future. However, in addition to being identified by the community as a priority, those projects will be planned, implemented, and prioritized in accordance with Agency directives and goals.

Washington DNR Resources

District Summary: The Washington Department of Natural Resources (DNR) is the largest on-call fire department in the State with 1,200 permanent and temporary employees that fight fire on more than 12 million acres of private and state-owned forest lands. The DNR's fire protection and safety equipment requirements help local Fire Protection Districts respond to wildfires. The DNR also works with the National Weather Service to provide the fire weather forecasts and fire precaution levels that firefighters, landowners, forest industry rely on.

The Washington DNR maintains a statewide fire support system of which the Southeast Region of the DNR supports Klickitat County with resources to educate the public on fire risks and resources to suppress fires on private and state lands that are under various "patrol assessment" structures.

Cooperative Agreements in Klickitat County: There are formal agreements between all rural fire districts and city fire departments in Klickitat County and the Washington DNR and the US Forest Service.

****NOTE: Washington DNR does not respond to structure fires****

Firefighting Resources: The Washington State Department of Natural Resources has multiple workcenters within Klickitat County with a variety of firefighting resources and personnel. The following is the list of resources available within Klickitat County as of 2018 as well as a summary of the fires that DNR resources were dispatched to in Klickitat County in 2018.

- **Goldendale Workcenter:**
  - 4 Type 5 Engines (Ford F-550, 420 gal, crew cabs, staffed w/4)
  - 1 Type 6 Engine (Ford F-450, 240 gal, single cab, staffed w/3)
  - 1 UTV (utility terrain vehicle, side by side)
  - 1 Type 3 Cache Truck (Support local type 3 incidents)

  - 4 OH (Fire Unit Manager, Assistant Fire Unit Manager, Fire Technician, and Land owner assistant Forester)
- **Husum Workcenter:**
  - 3 Type 5 Engines (Ford F-550, 420 gal, crew cab, staffed w/4)
  - 1 Cooperator Firefighter position from CRGNSA (FFT2)
  - IA Dozer (D5 Cat, w/operator, transport w/operator)
  - 3 OH (Assistant Fire Unit Manager, LOA Coordinator, RMAPs Forester)
  - 2 Support functions (Type 3 Logistics, Type 3 Plans, Type 2/3 Finance)
- **Glenwood Workcenter:**
  - 1 Type 6 Engine (Not Staffed/Spare Engine)
- **Seasonal Staffing:**
  - 8 ENGL (5 of 8 ENGB qualified) April 1st– October 31st
  - 21 Firefighters (May 1st– October 31st)
  - End of Season (5 Type 5 Engines w/ 14 seasonal employees)
- **Aviation Assets – Dallesport SEAT Base (Staffed June through September):**
  - 1 Air Attack platform (Contracted)
  - 2 C508 w/pontoon (Contracted Fire Bosses); Added a third early August
  - 0-2 Bell 205++ Type 2 Helicopter; staffed with Helitack Crew (Hit and miss with seeing a ship in Dallesport this season)
  - Still discussion about having a CWN Type 1 Helicopter in Dallesport in the future?
- **Preparedness Resources (Hosted in Klickitat Unit 2018); There has been an increase over the last few seasons in Severity staffing:**
  - 3 STEN (OR, NW, SPS)
  - 5 ENGB (OR, MN, FL)
  - 3 ENGB (t) (MN, FL)
  - 1 TFLD (Spokane FD)
  - 2 DIVS (NC, North Bend FD)
  - 3 Dozers (Viper Contracts Local: Krepps, Holtmann, Estey) 6+ weeks hired
  - 3 HEQB (MS, PC, Mt Vernon FD)
  - 3 INVF (AK, PC)
  - 8 Boost Engines (PC and OLY)
- ***Washington DNR Fire Stats for 2018:***
  - 48 classified fires (>400 acres); 1 Type 3 Fire for 230 acres
  - 16 other agency assist (>14, 807 acres)
  - 64 Total Fire responses in the Klickitat Unit
  - 94% Human Caused/Unknown
  - 6% Lightning
  - 90% of fires <10 Acres

Washington State Parks

The Goldendale Area Parks Management includes:

Brooks Memorial	Maryhill
Goldendale Observatory	Doug's Beach
Ft. Simcoe	Columbia Hills
Spring Creek	

Washington State Parks currently they have four Red Carded Employees that take the fire refresher and pack test annually:

- 2 Type-1 firefighters
- 2 Type-2 firefighters

The following vehicles and equipment are available to assist with fire suppression:

- 1 Type 4 Engine
- 1 one-ton truck with a slip-on tank
- 2 smaller pickups with 50 gallon slip-on takes

Mt. Adams Resource Stewards (MARS)

Mt. Adams Resource Stewards (MARS) formed in 2004 to address issues surrounding forest health and the well-being of Mt. Adams communities. Programs include the Mt. Adams Community Forest Project – 400 acres of working forestlands managed for sustainable forestry, public access and fire protection; participation in the Washington Fire Adapted Communities Learning Network; management agreements with Conboy Lake National Wildlife Refuge to provide support services in implementation of forest restoration, wildlife habitat and prescribed burning projects that have led to approximately 500 acres of successfully completed burns over the past three years; stewardship agreements with the Gifford Pinchot National Forest and work with the S. Gifford Pinchot Collaborative to secure $375K in state funding to prepare prescribed burned units on the south slopes of Mt. Adams; development of a local stewardship crew with wildland and prescribed fire training/capacity; and efforts to incubate businesses that will expand local markets for small diameter logs and byproducts of fuels management work in the region. MARS also authored the Glenwood Community Wildfire Protection Plan.

Roosevelt Landfill

Republic Services at Roosevelt is able to assist with wildfire that is within proximity to the landfill (within 10 to 15 miles of the landfill). Personnel availability for fire is dependent on the day and the number of people working at the landfill at that time; several employees are district firefighters and EMTs. The following is a list of all available resources:

Resource	Quantity	Description
D10 Dozers	4	Would not be able to transport off site
D6 Dozers	3	Available to move with lowboy
Graders	2	
Hydro-seeder	1	4,000 gallon capacity, equipped with monitor and 200 feet of hose
Tender	1	9,000 gallon capacity off-road Caterpillar truck with monitor
Type 6 Engine	1	200 gallon brush truck with 200 feet of hose on reel
Dump Trucks	3	ADT's off-road trucks
Loaders	2	
Excavators	2	
Backhoes	2	
AEDs	4	Located on-site at Landfill

SDS Lumber Company

SDS will respond within our capability to all fires occurring on lands managed by SDS and any uncontrolled fires, which may threaten our ownership. Our response should be immediate, within reason, and with utmost concern for the safety of everyone involved. SDS employees will take the immediate action necessary to contact appropriate fire control agencies once a fire is identified. SDS employees will not place themselves or contractors at unreasonable risk during any response to a fire or during the course of fighting a fire. Safety is our first priority. SDS employees and contractors should work to contain and extinguish fires until fire is taken over by state or federal fire protection agency or some other responsible party. SDS will cooperate with, and follow the direction of the state fire protection agencies or local fire protection associations responsible for fire protection on SDS lands. SDS will obey Industrial Fire Precaution Levels (IFPL's). Additionally, SDS Managers can consider the use of other factors that may influence shutdown on lands managed by SDS. These factors could include: relative humidity, temperature, wind direction and speed, overall fire season trends, and availability of resources. See the *SDS Lumber Company: 2018 Fire Plan* for more information including contact information, fire policy, prevention procedures, etc.

The following is a list of equipment required to be carried with or readily available during day to day operations on SDS grounds. Minimum Equipment Requirements that satisfy WA and OR rules:

- **Pickups and trucks:**
  - Fire extinguisher, 5 pounds 2A:10BC, inspect monthly/maintain annually
  - Round pointed shovel
  - Ax or pulaski
- **Power saws:**
  - Fire extinguisher, 8 oz., immediately available
  - Round pointed shovel
  - Firewatch (in Washington)
- **Equipment Operations**
  - *Each mobile machine:*
    - Fire extinguisher, 5 pounds 2A:10BC, inspect monthly/maintain annually
    - Round pointed shovel appropriately mounted
  - *Operation requirements:*
    - 2, 5-gallon pump cans
    - Hand tools: 1 per person: even mix of Pulaskis, axes, shovels, Hazel hoes • Portable water supply, 300 gallon minimum; at least 250 feet of hose and nozzle connected and ready to go, and enough hose to reach all parts of operation where equipment working that day (OR). Additional water capacity may be required. **Check and run pump daily**
    - Communications to outside within 15 minutes
  - *Additional requirements for cable logging:*
    - 5-gallon pump can and round-pointed shovel at each block
    - Hand tool cache and portable water supply on the rigging (for WA, >1,200 feet span): 3 axes/Pulaskis, 6 shovels, 6 Hazel hoes, 300 gallons water

Other Wildland Firefighting Cooperators

- **Yakama Nation Fire Management / Bureau of Indian Affairs (BIA):**
  - *Our Mission is to protect lives, property, and resources while restoring and maintaining healthy ecosystems through cost-effective fire management* –YNFM
- **Bureau of Land Management (BLM):**
  - *The BLM has holdings in Klickitat County and firefighting resources in the Spokane area.*
- **United States Fish and Wildlife Service (USFWS):**
  - *The USFWS has holdings in Klickitat County and firefighting resources outside of the county.*

Fire Protection Issues

The following sections provide a brief overview of the many difficult issues currently challenging Klickitat County in providing wildland fire safety to citizens. These issues were discussed at length both during the advisory group process and at several of the public meetings. In most cases, the advisory group has developed action items that are intended to begin the process of effectively mitigating these issues.

Wildland Urban Interface Expansion

One challenge Klickitat County faces is an increase in the number of houses in the rural fringe. Since the 1970s, a segment of Washington's growing population has expanded further into traditional forest or resource lands. The “interface” between urban and suburban areas and the resource lands created by this expansion has produced a significant increase in threats to life and property from fires and has pushed existing fire protection systems beyond original or current design or capability. Currently, High Prairie and Ponderosa Park are Firewise communities and Goldendale has received the Keystone Acres HOA grant but many property owners throughout the County are still not aware of the threats they face or of the resources that are available to them.

Most fire districts have similar concerns in regard to the WUI: adequate landowner education about fire protection programs, landowner initiative to create defensible space around homes and clear driveways, and that the response potential of fire resources adequately covers the number of residents and structures within a given jurisdiction. In addition to issues with defensible space in residential areas, most of the fire districts within Klickitat County are concerned about human activity, such as recreation, campfires, and brush burning, in proximity to fire-sensitive areas. This includes activity in community green spaces, such as Lyle Point where light, flashy fuels are abundant, and recreation in proximity to heavily wooded areas; for example, Washington Department of Fish and Wildlife land near Highway 97 and the ground owned and managed by industrial timber companies as many logging units in the county feature dense conifer regeneration and stands of sub merchantable trees that are yet to be pre-commercially thinned. Other districts have also identified the need to address fuel concerns around city structures and municipal property.

Rural Fire Protection

People moving from mainland urban areas to the more rural parts of Klickitat County, frequently have high expectations for structural fire protection services. Often, new residents do not realize that the services provided are not the same as in an urban area. The diversity and

amount of equipment and the number of personnel can be substantially limited in rural areas. Fire protection may rely more on the landowner's personal initiative to take measures to protect his or her property. Furthermore, subdivisions on steep slopes and the greater number of homes exceeding 3,000 square feet are also factors challenging fire service organizations. In the future, public education and awareness may play a greater role in rural or interface areas. Great improvements in fire protection techniques are being made to adapt to large, rapidly spreading fires that threaten large numbers of homes in interface areas.

In most western states, state and federal agencies that have wildland fire protection responsibilities have launched a campaign to reiterate to the public that they do not provide structural fire protection. Much of the increasing costs of wildland fires can be directly related to the increasing number of structures in the wildland urban interface. State and federal agencies are trying to make it clear to the public that land and homeowners are responsible for reducing the fire risk on their property and that the agencies are not responsible for or required to provide structural protection.

Fire districts within Klickitat County have reported various concerns and needs in regards to staffing and equipment. Few districts feel as though they are both sufficiently staffed and have all equipment necessary to service their respective jurisdictions, particularly in scenarios where prolonged action is required. Most districts are challenged by either personnel recruitment or retention or by outdated equipment and/or equipment limitations.

Fireworks

Fireworks are becoming increasingly available to the public in Klickitat County. Even with the existing fireworks ban during periods of high wildland fire risk, the use of fireworks, particularly in recreational areas is high. Both the CWPP advisory group and local residents have noted fireworks as a high-risk factor for wildfire ignitions. In June of 2018, the Klickitat County Sherriff Office issued a cease and desists to fireworks retailers within Klickitat County.

Pre-planning in High Risk Areas

Although conducting home, community, and road defensible space projects is a very effective way to reduce the fire risk to communities in Klickitat County, recommended projects cannot all occur immediately and many will take several years to complete. Thus, developing pre-planning guidelines specifying which and how local fire agencies and departments will respond to specific areas is very beneficial. These response plans should include assessments of the structures, topography, fuels, available evacuation routes, available resources, response times, communications, water resource availability, and any other factors specific to an area.

Community-based CWPPs often contain pre-planning information useful to fire managers. All of these plans should be available to the local fire departments as well as dispatch personnel.

All fire districts identified the need for fuel treatments in high risk areas on their respective districts. A few districts have developed plans for or intend to address fuels in high risk areas, but most districts reported that they either need to perform mitigation work or do not currently have plans in place for any mitigation projects.

Accessibility

Fire chiefs throughout the County have identified home accessibility issues as a primary concern in some parts of Klickitat County. Many existing housing developments and private driveways have been constructed without regard to access requirements of large emergency vehicles. Additionally, many of these roads are several miles long and dead end with no warning or plans for future connections to other access roads. The lack of road connectivity and general accessibility in some areas restricts engagement by fire suppression resources. Continued enforcement of Klickitat County's current standards regarding road and driveway construction regulations for fire apparatus would prevent accessibility issues in new developments. Wildfire risk can be lessened and firefighter safety can be improved by keeping vegetation including tall grass, brush, and trees a safe distance from the road right-of-way. This will not only improve accessibility, but will also allow the road to serve as a control point for suppression activities.

A few districts reported that road width/clearance is adequate for emergency vehicles and that fuel breaks have been created and maintained, but most districts recognize the need to widen roads in order to accommodate two-way traffic during emergency situations and that more fuel breaks need to be created. These fuel treatment projects are especially important in areas where access is limited to only one road, a concern expressed by some districts.

Additionally, the fire districts have identified several unimproved and unmaintained county roads that could serve as strategic access points for fire suppression activities if they were maintained periodically for this purpose. In some cases, these roads are partially maintained, but are limited by inadequate or nonexistent bridge crossings.

Protection of Natural Resources

Protection of native plant communities, especially those containing perennial native grasses and forbs essential to ecosystem integrity and diversity, is important to provide ecosystem services that sustain wildlife, such as the greater sage-grouse and native pollinators. One of the primary challenges to restoring the health of rangeland ecosystems is achieving effective long-term restoration and post-fire recovery. Arid rangelands face many environmental and site

conditions stresses exacerbated by drought, climate change, and spread of invasive species, leading to more frequent and catastrophic fires. While restoration can be successful at the small scale, achieving a landscape approach to effective and sustainable restoration of the sagebrush-steppe can be difficult. There is a need for natural resource advisors and fire managers, at all levels, to improve communication and continue to coordinate and work collaboratively to identify priority habitats before and throughout the wildfire season to improve fire response and protection of priority habitats. Where priority habitat exists, pre-position of firefighting assets to improve preparedness and suppression capability in the initial stages of a wildfire increases the chances of keeping fires small and limits loss of habitat.

Fire-Resistant Construction Materials

Due to the multitude of highly publicized wildland-urban interface fires occurring in the western states, there has been an increased level of research, development, and marketing of more fire-resistant construction materials. Information on high risk materials as well as fire-resistant alternatives can be readily found online or through local fire departments.

Conservation Reserve Program

Since the introduction of the CRP by the federal government, many formerly crop producing fields have been allowed to return to native grasses or, as in many cases in Klickitat County, non-native annual grasses. CRP fields are creating a new fire concern all over the west. As thick grasses are allowed to grow naturally year after year, dense mats of dead plant material begin to buildup. Due to the availability of a continuous fuel bed, fires in CRP fields tend to burn very intensely with large flame lengths that often times jump roads or other barriers, particularly under the influence of wind. Many landowners and fire personnel are researching allowable management techniques to deal with this increasing problem.

Volunteer Firefighter Recruitment

The rural fire departments in Klickitat County are predominantly dependent on volunteer firefighters. The trend for several years, in many volunteer fire departments, is that membership has continued to decrease. This can be attributed to several reasons including the need for two wage earners in a house hold to support their family, lack of desire from today's generation, and the tremendous amount of time spent in training to satisfy the ever-increasing regulations from state and federal agencies. Whether it be job and family commitments combined with hobbies or competition with other volunteer organizations, it comes down to the fact there is very little time left for being a volunteer firefighter. This is exacerbated by the

added stress of emergencies and inherent dangers of the job, not to mention that our society is generally less appreciative of the commitment and sacrifices made by volunteer firefighters.

Today's fire departments, career and volunteer, find themselves in a position where there is an increased demand for their services, but are confronted with increasing operational costs and overall less revenue. In the rural setting where revenue is limited and volunteers are limited, this can add up to a fire service that is stretched very thin. In particular, many departments have difficulty maintaining volunteers available during regular work day hours (8am to 5pm).

Each district spends a considerable amount of time and resources training and equipping each volunteer, with the hope that they will continue to volunteer their services to the department for at least several years. One problem that all volunteer-based departments encounter is the diminishing number of new recruits. As populations continue to rise and more and more people build homes in high fire risk areas, the number of capable volunteers has gone down.

Several fire districts stated that recruiting volunteer fire fighters is a challenge and that they are currently in need of more volunteers. As time has passed, unsuccessful recruitment and low rates of retention have caused the average age of fire personnel to increase on some districts. As a result, pressure to recruit younger firefighters has increased and the impacts of a limited volunteer-pool have been exacerbated as current members of volunteer fire departments retire or become unavailable due to lifestyle changes.

Communication

The public safety radio system in Klickitat County was upgraded with two new towers in 2014, improving communications between first responders and central dispatch. There are still areas throughout the county that have poor cellphone reception, specifically the remote and isolated areas around Glenwood and Bickleton. Communication in the county will be further improved with the purchase of new radios for White Salmon and the construction of a cell tower in the Appleton area.

Water Resources

Developing water supply resources such as cisterns, dry hydrants, drafting sites, and/or dipping locations ahead of an incident is considered a force multiplier and can be critical for successful suppression of fires. Pre-developed water resources can be strategically located to cut refilling turnaround times in half or more, which saves valuable time for both structural and wildland fire suppression efforts.

Several districts reported concerns regarding water availability, FD2, FD3, and FD13 specifically, in the event of a wildfire while others felt that they would be better prepared if their current resources were supplemented with additional hydrants, etc. Several of the districts that reported having adequate water supplies stated that some of the tanks that they can fill from are also open to public use which may be an issue during a wildfire.

Invasive Species

Cheatgrass (*Bromus tectorum*) contributes to the size and frequency of fires and directly threatens the habitat of the greater sage-grouse and other sagebrush-steppe dependent wildlife. Fire behavior and fire regimes have been altered due to the proliferation of cheatgrass and other invasive species. Cheatgrass invades disturbed open sites and can dominate an area. Cheatgrass ripens and cures much earlier in the season when compared with native species, thus extending the fire season.[21] According to some statistical analysis, cheatgrass dominated ranges are about 500 times more likely to burn than a native species dominated range.[22] Fire return intervals in steppe and shrub-steppe fuel types, pre-European settlement was typically between 32 and 70 years.[23] In certain Great Basin rangelands, the fire return interval is now less than 5 years on rangelands dominated by cheatgrass.[24]

Vegetation management at this scale is complex and requires aggressive and targeted application of both proven techniques and implementation of new practices to control cheatgrass and mitigate habitat impacts from unwanted rangeland fire. Land managers need tools to reduce cheatgrass while simultaneously restoring resilient sagebrush-steppe ecosystems that can withstand fire and resist re-invasion of cheatgrass or other invasive species. Effective strategies developed for early detection and rapid response and implemented in collaboration with a wide range of stakeholders, can help check the rapid expansion of invasive non-native species.

Hazardous Materials

Hazardous materials that are stored throughout the county are a concern for fire fighters. Pesticides and fertilizers used in the agriculture industry can present significant hazards should a location storing such materials burn. Any facility in Washington that stores over a certain

[21] Pellant, Mike. 1996. Cheatgrass: The Invader That Won the West. Idaho State Office: Bureau of Land Management. 23p.
[22] Platt, K.; Jackman, E.R. 1946. The cheatgrass problem in Oregon. Extension Bull. 668. Corvallis, OR: Oregon State College. 48 p.
[23] Wright, H.A.; Neuenschwander, L.F.; Britton, C.M. 1979. The role and use of fire in sagebrush and pinyon juniper plant communities: a state-of-the-art review. Gen. Tech. Rep. INT-58. Ogden UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 48 p.
[24] Pellant, Mike. 1990. Unpublished data on file at: U.S. Department of Interior, Bureau of Land Management, Idaho State Office, Boise, ID.

amount (reporting threshold) of a hazardous material must submit a Tier Two report by March 1st each year. These reports are sent to the Washington State Emergency Response Commission, local emergency planning committees, and local fire departments. Tier Two reports will be on file for larger facilities, such as those in the Dallesport area. Many private residences and farms will have smaller quantities of hazardous materials that may be unreported. The distribution of unreported hazardous materials across the county poses a threat to unsuspecting first responders.

Public Wildfire Awareness

As the potential fire risk in the wildland-urban interface continues to increase, it is clear that fire service organizations cannot be solely responsible for protection of lives, structures, infrastructure, ecosystems, and all of the intrinsic values that go along with living in rural areas. Public awareness of the wildland fire risks as well as homeowner accountability for the risk on their own property is paramount to protection of all the resources in the wildland-urban interface.

Firewise Communities Program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire

Fire Adapted Communities incorporates people, buildings, business, infrastructure, cultural resources and natural areas into the effort to prepare for the effects of wildland fire.

Wildfire Community Preparedness Day is an excellent opportunity for neighborhoods and fire agencies to work together to make communities a safer place to live. Efforts raise wildfire awareness and help protect homes, neighborhoods, and entire communities, while increasing safety of wildland firefighter or could lessen current post-fire impacts.

The national **Ready Set Go! Program**, managed by the International Association of Fire Chiefs (IAFC), works to develop and improve dialogue about wildland fire awareness and action between local fire departments and the residents they serve. It is designed to be complimentary and collaborative with Firewise and other wildland fire public education efforts.

NFPA Fire Prevention Week offers information and tools to help public educators teach all audiences about important fire and life safety issues.

FEMA's America's PrepareAthon! Is an opportunity for individuals, organizations, and communities to prepare for specific hazards, including wildfire, through drills, group discussions, and exercises.

Protection of Watersheds

Catastrophic wildfires often burn all surface vegetation and soil organic material which can result in flooding, mudslides, and debris flows. Additionally, catastrophic wildfires also affect surface water quality due to increased sediment loading. Large quantities of post-fire sediment can harm wildlife by inundating sensitive aquatic habitats as well as impact drinking water systems by filling or damaging a water source, such as a reservoir, or by overwhelming and clogging water treatment systems that remove suspended particulate. Residents in Klickitat County that get their drinking water from reservoirs or water treatment facilities could face water shortages if a catastrophic wildfire burned within one of the local watersheds.

Protection of watersheds is a concern of the different agencies and governing bodies in Klickitat County. There are several watershed projects for 2019 and 2020 that are in the development stages that aim to reduce the risk of catastrophic wildfire and protect surface water quality. Descriptions of these projects can be found in Chapter 6 – Community Fuels Reduction Projects.

Post Fire Recovery

Both local government officials and citizens of Klickitat County should be aware of post fire recovery resources that are available through federal and state agencies. Post fire recovery resources offer some guidance to government officials but focus on private landowners who may not be aware of the hazards present on the portions of their property that burned or who to contact if they are in need of assistance. The NRCS, for example, provides information on personal and public safety, managing risk and protecting property, protection of soils and erosion mitigation practices, insect infestation protection, reseeding, site rehabilitation and restoration, and financial and technical assistance. More information and specific resources can be found in Appendix 7.

Response Drills/Planning

Currently, there are a limited number of designated locations where ICP can be set up in the event of a fire. Identifying additional locations where ICP can be set up may decrease response times and allow ICP to become operational sooner and be in a more strategic location.

Most fire districts do not conduct response drills. Response drills can increase emergency preparedness and decrease response times in the event of a wildfire.

Special Areas of Concern

The following pieces of critical infrastructure have been identified as special areas of concern:

- Utility lines, including power transmission, water, phone, internet, and natural gas lines
- Goldendale Generating Station. Puget Sound Energy natural gas-fired power plant in Goldendale
- Wind power turbines and facilities
- Municipal watershed infrastructure and facilities
- Natural gas service lines and pumping stations
- Cell and 911 communication towers.
- Millions of dollars in recreational infrastructure and spending are at risk during a wildfire.
- Ranching and farming equipment, protection of fence posts and other infrastructure during a wildfire.

Current Wildfire Mitigation Activities

Public Education Programs

Many of the county's fire departments and agencies are actively working on public education and homeowner responsibility by visiting neighborhoods and schools to explain fire hazards to citizens. Often, they hand deliver informative brochures and encourage homeowners to have their driveways clearly marked with their addresses to ensure more rapid and accurate response to calls and better access.

Mutual Aid Agreements

Currently the cities, towns, fire protection districts, and wildland fire agencies within Klickitat County have extensive mutual aid agreements that serve to increase the protection and effectiveness of all Klickitat County fire response jurisdictions. Municipal and county fire departments provide mutual aid for each other to the fullest extent possible. These agreements significantly improve the capabilities and effectiveness of any and all individual fire departments as well as provide assistance to the state and federal wildland fire teams. Not only does this improve the safety of Klickitat County residents, structures, infrastructure, and lands, but it also facilitates good interdepartmental working relationships.

Washington DNR Wildland Fire Protection Strategic Planning

Washington's record fire seasons in 2014 and 2015 were devastating: the loss of life, homes, and structures; damage to fish and wildlife habitat and other natural and cultural resources; local communities suffering from a loss of visitors and revenue, and poor air quality. The state spent millions of dollars in direct suppression costs, and millions more were spent mitigating the social, cultural, and economic impacts from these fires. These seasons—and this year's fire season across the west—represent a trend of large, uncharacteristic wildfires that is expected to continue with no end in sight.

The state's future Wildland Fire Protection Strategic Plan will provide a blueprint for effective wildland fire protection in Washington and inform associated policy and resource decisions. The plan is the next phase in an overall strategy to fundamentally change the future trajectory of wildland fire in Washington. It follows the recent roll-out of the state's 20-Year Forest Health Strategic Plan, which establishes a framework to systematically treat broad forest landscapes to improve forest health and reduce the risk of uncharacteristic wildfires. The plan is also anchored in the National Cohesive Wildland Fire Management Strategy and shares its focus on resilient landscapes, fire-adapted communities, and safe, effective wildfire response. Additionally, the plan will focus on wildfire prevention and reducing human-caused ignitions.

Washington DNR Landowner Assistance Program

The Following information was taken from the Washington DNR Forest Highlights Brief 2018 and was written for private landowners.

If you own forest land in eastern Washington, the odds are that your property is in a less-than-healthy condition and at increased risk of damage from threats like wildfire and bark beetles.

The Eastern Washington Forest Landowner Cost-Share Program can provide you with professional forestry advice and financial assistance to help you significantly improve the health of your forest and substantially reduce the threat of future damage and loss.

- ***How does the program work?***
    - The program can reimburse approved applicants for up to 50% of their cost
    - Eligible practices include:
        - Thinning
        - Pruning
        - Slash (forest debris) Disposal
        - Preparation of a Forest Stewardship Plan by a private consulting forester.

- ***Contact your landowner assistance forester, or apply online to get the process started.***
    - In Klickitat County DNR offices are located in Goldendale and Husum.
        - Husum: 509-493-3218
        - Goldendale: 509-773-5588

Washington Department of Ecology

The Washington Department of Ecology Air Quality Program protects public health and the environment from pollutants caused by vehicles, outdoor and indoor burning, and industry. The DOE oversees permitting for non-forested (i.e. agriculture and rangeland) burning. Klickitat County falls under the jurisdiction of the Central Regional Office (ERO).

The ERO can be reached at: 509-575-2490.

Washington State Smoke Management Plan

The Department of Natural Resources (DNR), Department of Ecology (DOE), U.S. Forest Service (USDA), National Park Service (NPS), Bureau of Land Management (BLM), U.S Fish and Wildlife Service (USFWS), participating Indian nations, military installations (DOD), and small and large forest landowners have worked together to deal with the effect of outdoor burning on air.

Protection of public health and preservation of the natural attractions of the state are high priorities and can be accomplished along with a limited, but necessary, outdoor burning program. Public health, public safety, and forest health can all be served through the application of the provisions of Washington State law and this plan, and with the willingness of those who do outdoor burning on forest lands to further reduce the negative effects of their burning.

The Washington State Smoke Management Plan pertains to DNR-regulated silvicultural outdoor burning only and does not include agricultural outdoor burning or outdoor burning that occurs on improved property. Although the portion of total outdoor burning covered by this plan is less than 10 percent of the total air pollution in Washington, it remains a significant and visible source.

The purpose of the Washington State Smoke Management Plan is to coordinate and facilitate the statewide regulation of prescribed outdoor burning on lands protected by the DNR and on unimproved, federally-managed forest lands and participating tribal lands. The plan is designed to meet the requirements of the Washington Clean Air Act.

The plan provides regulatory direction, operating procedures, and advisory information regarding the management of smoke and fuels on the forest lands of Washington State. It

applies to all persons, landowners, companies, state and federal land management agencies, and others who do outdoor burning in Washington State on lands where the DNR provides fire protection, or where such burning occurs on federally-managed, unimproved forest lands and tribal lands of participating Indian nations in the state.

The plan does not apply to agricultural outdoor burning and open burning as defined by Washington Administrative Code (WAC) 173-425-030 (1) and (2), nor to burning done "by rule" under WAC 332-24 or on non-forested wildlands (e.g., range lands). All future reference to burning in this plan will refer only to silvicultural burning unless otherwise indicated.

Chapter 5: Landscape Risk Assessments

Larger than the State of Rhode Island, Klickitat County covers 1,904 square miles and is bordered on the north by Yakima County, on the south by the Columbia River, on the east by Benton County, and on the west by Skamania County and the North Cascade Mountains. A portion of the Yakama Nation Reservation overlaps the northern boundary of Klickitat County, amounting to over 125,000 acres and is an integral part of the heritage of the county. Klickitat County is the 16th largest county in Washington and of the 1,218,560 acres that it includes almost 935,000 acres are privately owned and approximately 40,000 acres are federally owned. Of the total area that makes up Klickitat County, 14% of the land is designated as agriculture and 23% is designated as conifer forest with a portion of that actively managed for timber production. The small percentage of federally owned land is in either the Conboy Lake National Wildlife Refuge (UFWS) or the Gifford Pinchot National Forest (USFS) and state owned land is in the Columbia Hills Historical State Park.

Forested highlands, extensive agriculture and rangeland, and an oak prairie "transition zone" between the forest and grass/agricultural cover-types largely comprise Klickitat County. Hardwood-dominated riparian areas and conifer-lined ephemeral creek beds/shallow canyons represent a small area of Klickitat County. In general, the eastern half of the county is characterized by agriculture and rangeland that is dissected by shallow conifer-lined canyons. The south-central portion features deep rugged canyons with hardwood dominated creek beds with white oak scattered across canyon faces and oak prairie mixed with ponderosa pine scattered across the rolling prairie on top. The north central part of the county is highland conifer; species composition in this area is dictated by elevation with homogenous stands of ponderosa pine found at lower elevations and mixed conifer at higher elevations. The western half of the county is mostly highland conifer with oak prairie lined canyons closer to the central part of the county.

Due to the distribution of vegetation across the landscape in Klickitat County, the county will be split and assessed as two different regions: the Eastern and South Central Region and Western and North Central Region (Figure 19). The distribution of current existing vegetation types is displayed in Figure 19.

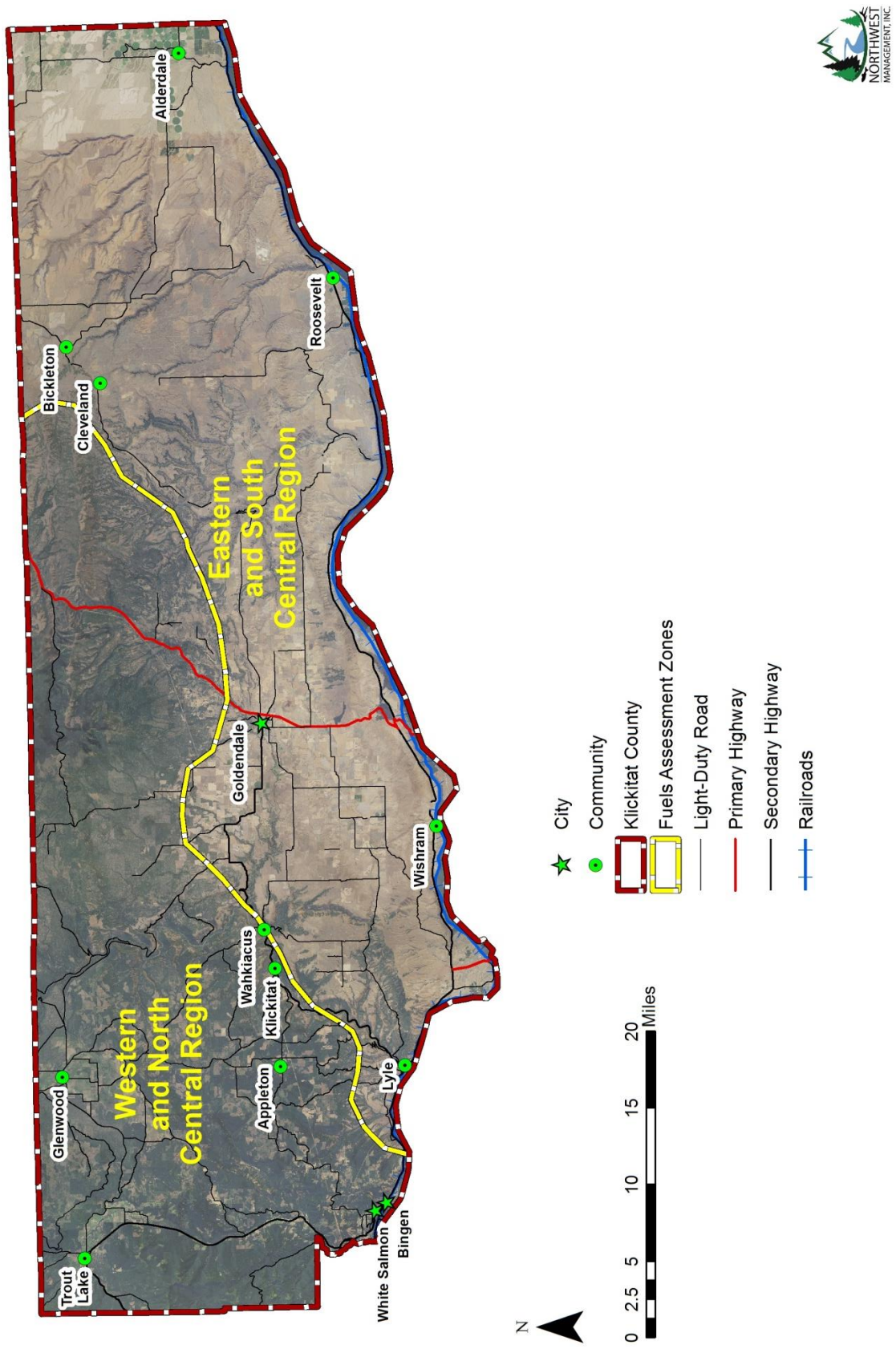


Figure 19 Regions that were delineated in Klickitat County, WA for the landscape risk assessment.

The landscape and vegetation are important to the local economy and industry in Klickitat County. Approximately 76% of the land in the county is privately owned with a large portion in either agriculture or timber production. More than half of the county's job base (55.7 percent) is comprised of three industries: agriculture and forestry, local government, and manufacturing. Education and healthcare account for an additional 18%. Agriculture and forestry are the largest industries in Klickitat County (23.6%) with the forest industry experiencing a 15% increase in employment from 2005 to 2015. As such, the destruction of natural resources by wildfire could potentially have an adverse impact on the local economy by affecting employment in both the forest and agricultural industries.

In order to facilitate a mutual understanding of wildfire risks specific to commonly known areas in the county, the landscape-level wildfire risk assessments in the following sections are based on four predominant landscapes types that exhibit distinct terrain and wildland fuels. The four landscapes identified for the assessments are: flat plains, irregular plains, breaks/foothills, and low mountain. These landscapes, although intermixed in some areas, exhibit specific fire behavior, fuel types, suppression challenges, and mitigation recommendations that make them unique from a planning perspective[25].

Overall Fuels Assessment

The flat and irregular plains of the eastern half of Klickitat County are largely characterized by gently-sloped terrain dissected by finger-like canyons. The terrain caters to large scale farming and ranching operations which are the main types of land use in the eastern half of the county. Agricultural fields occasionally serve to fuel a fire after curing; burning in much the same manner as low grassy fuels. Fires in grassland and rangeland fuel types tend to burn at relatively low intensities with moderate flame lengths and tend to exhibit short-range spotting. However, wildfire burning in grasslands can exhibit extreme fire behavior, moving at speeds up to 15 mph and producing flame lengths that can exceed 15 ft. Common suppression techniques and resources are generally quite effective in this fuel type, especially as fuel break construction is faster and easier than in standing timber and short spotting distances can make roads effective fuel breaks with the exception of extreme fire conditions. Homes and other improvements can be easily protected from direct flame contact and radiant heat by following guidelines set by community fire protection programs. Shrub steppe cover type will have much higher fuel loads with greater spotting potential than grass and agricultural fuels.

[25] Sayre, Roger, Comer, Patrick, Warner, Harumi, and Cress, Jill, 2009, A new map of standardized terrestrial ecosystems of the conterminous United States: U.S. Geological Survey Professional Paper 1768, 17 p. (Also available online: https://pubs.usgs.gov/pp/1768/pp1768.pdf)

Although fires in agricultural and rangeland fuels may not present the same control problems as those associated with large, high intensity fires in timber, they can cause significant damage if precautionary measures have not been taken prior to a fire event. Wind driven fires in these fuel types spread rapidly and can be difficult to control. During extreme drought and when pushed by high winds, fires in agricultural and rangeland fuels can exhibit extreme rates of spread, which complicates or negates suppression efforts.

The foothills and low mountain areas in the western and north central part of the county are a patch-work of dry Douglas-fir and ponderosa pine forests that, in many unmanaged areas, have become overstocked, resulting in multistoried conditions with abundant ladder fuels and, in some places, a decline in forest health. During pre-settlement times, much of this area was characterized by low intensity fires due to the relatively light fuel loading, which mostly consisted of small diameter fuels. Frequent, low intensity fires generally kept stands open; free of fire intolerant species and maintained seral species such as ponderosa pine as well as larger diameter fire resistant Douglas-fir. In some areas, low intensity fires stimulated shrubs and grasses, maintaining vigorous browse and forage. The shrub layer could either inhibit or contribute to potential fire behavior, depending on weather and live fuel moisture conditions at the time of the burn.

In general, large fires that start in the Klickitat Highlands start high in elevation and move downhill. As fires move down in elevation, they encounter drier and flashier fuels in the lower elevations. Rolling embers and spot fires are a common method of downhill fire spread. Spot fires ignited on slopes trigger uphill runs that throw more spot fires, expanding the downward fire progression. Modifying fuels to reduce the likelihood of torching and crowning trees will in turn reduce the likelihood of spot fires.

Increased activities by pathogens will continue to increase levels of dead and down fuel, as host trees succumb to insect attack and stand level mortality increases. Overstocked, multi-layered stands and the abundance of ladder fuels lead to horizontal and vertical fuel continuity. These conditions, combined with an arid and often windy environment, can facilitate the development of a stand replacing fire. These fires can burn with very high intensities and generate large flame lengths and fire brands that can be lofted long distances. Such fires present significant control problems for suppression resources, often developing into large, destructive wildland fires.

Spot fires create additional challenges for firefighters. Large fires may easily produce spot fires from ½ to 2 miles away from the main fire. How fire suppression forces respond to spot fires is largely dependent upon the fuels in which they ignite. Stands of timber that are managed for

fire resilience are much less likely to sustain torching and crowning behavior that produces more spot fires. The objective of fuel reduction thinning is to change the fuels in a way that will moderate potential fire behavior. If fire intensity can be moderated by vegetation treatments, then ground and air firefighting resources can be much more effective.

Areas that have recently burned, such as the Highway 8 Fire, will be at low risk for wildfire starts and fire growth until fuel loading and fuel distribution is sufficient on site. However, the overall reduction in hazardous fuels in these areas is minimal, particularly in dry Douglas-fir and ponderosa pine forests which were dense, multi-storied stands prior to wildfire. Dense stands of snags will become heavy dead and down branches and logs within 10-20 years. Sites will become re-loaded with fine fuels as pioneer species become established around large down, dead wood will create conditions for severe fire 20-30 years after the initial wildfire.

Fire Behavior Fuel Models

For the purpose of simplification, only fuel types that represent more than 1% of the area in Klickitat County will be discussed in the fuels assessment (Table 19). Of the 15 fuel types that meet this criteria, GR2 (grass fuel type) and GS2 (shrub fuel type) represent just over 50% of the total area in Klickitat County. Both fuel types are associated with high rates of spread and moderate flame lengths. NB fuel types are non-burnable and represent about 18% of the area in Klickitat County and TL and TU are timber fuel types that cover more than 25% of Klickitat County.

The grass and shrub fuel types are dominant in the eastern and south central region of the county while the timber fuel types dominate the western and north central region of the county. Figure 17 shows the distribution of fuel model classifications in Klickitat County and it includes descriptions of the different fuel models. The fuel types highlighted in Table 19 will be discussed in greater detail in the regional sections that follow.

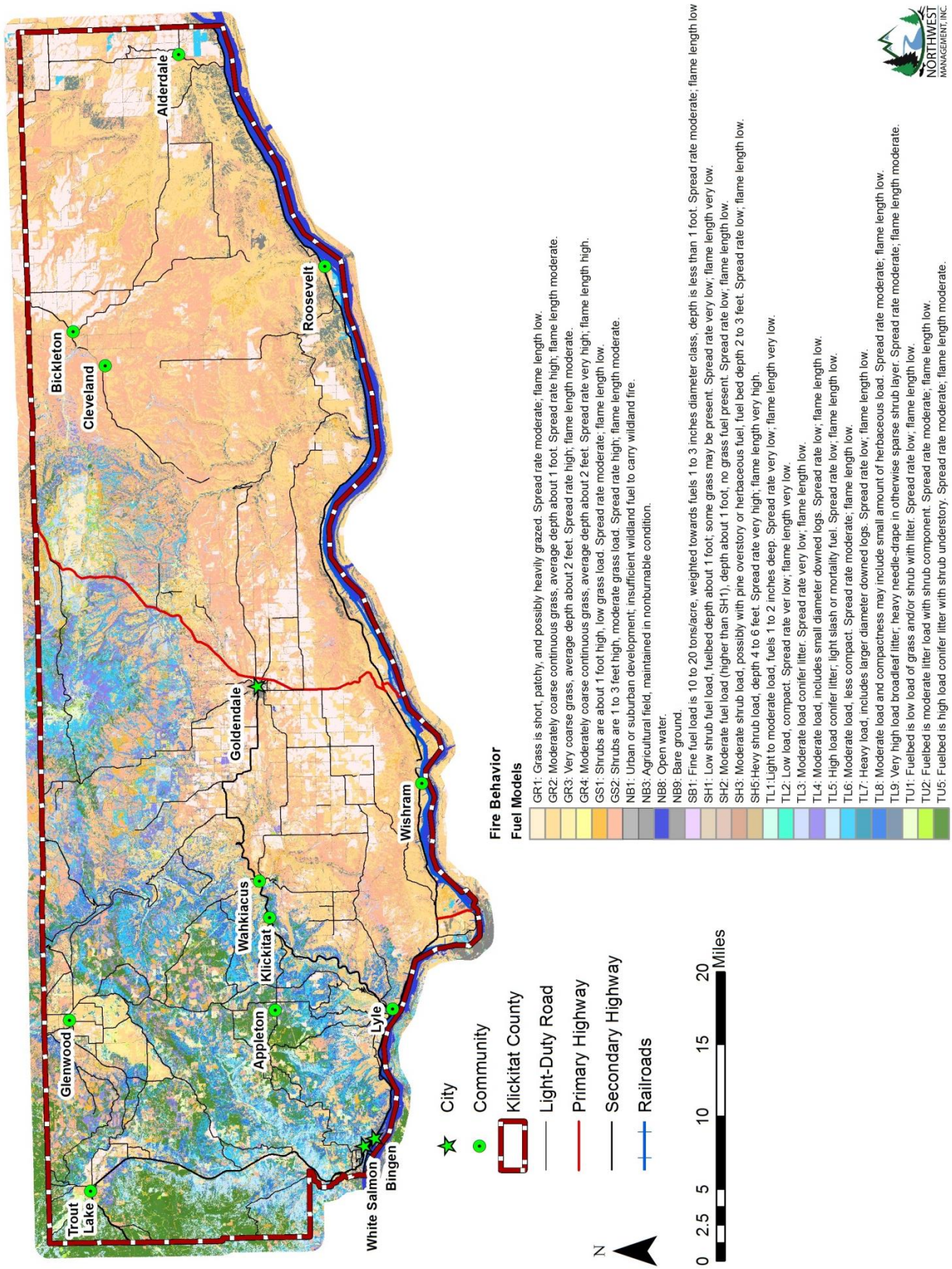


Figure 20) Fire Behavior Fuel Model 40 for Klickitat County, WA.

Table 19) Fire Behavior Fuel Model 40 classifications and coverage for Klickitat County, WA. Fuel types highlighted in blue represent more than 1% of the acreage in Klickitat County and are discussed in the fuels assessment.

FBFM40	Acres	% Total	FBFM40	Acres	% Total
GR1	**28,431**	**2.3%**	SH4	8	<1%
GR2	**321,140**	**26.4%**	SH5	106	<1%
GR3	1,985	<1%	TL1	1,157	<1%
GR4	2	<1%	TL2	480	<1%
GS1	**33,956**	**2.8%**	**TL3**	**17,589**	**1.4%**
GS2	**288,660**	**23.7%**	**TL4**	**42,821**	**3.5%**
NB1	**40,178**	**3.3%**	**TL5**	**32,220**	**2.6%**
NB3	**106,843**	**8.8%**	**TL6**	**76,837**	**6.3%**
NB8	**42,377**	**3.5%**	TL7	1,166	<1%
NB9	**27,434**	**2.3%**	**TL8**	**34,547**	**2.8%**
SB1	21	<1%	TL9	2,154	<1%
SH1	214	<1%	**TU1**	**23,892**	**2.0%**
SH2	2,127	<1%	TU2	4,908	<1%
SH3	29	<1%	**TU5**	**87,357**	**7.2%**
Total Acreage: 1,218,640.0					

Overall Mitigation Activities

There are many specific actions that will help improve safety in a particular area; however, there are also many potential mitigation activities that apply to all residents and all fuel types. General mitigation activities that apply to all of Klickitat County are discussed below while area-specific mitigation activities are discussed within the individual landscape assessments.

The safest, easiest, and most economical way to mitigate unwanted fires is to stop them before they start. Generally, prevention actions attempt to prevent human-caused fires. Campaigns designed to reduce the number and sources of ignitions can take many forms. Traditional "Smokey Bear" type campaigns that spread the message passively through signage can be quite effective. Signs that remind people of the dangers of careless use of fireworks, burning when windy and leaving unattended campfires have been effective. Fire danger warning signs posted along access routes remind residents and visitors of the current conditions. It's impossible to say just how effective such efforts actually are; however, the low costs associated with posting of a few signs is inconsequential compared to the potential cost of fighting a fire.

Burn Permits: Washington State Department of Natural Resources is the primary agency issuing burn permits in forested areas of Klickitat County. The Washington DNR burn permits regulate silvicultural burning. Washington Department of Ecology (DOE) is the primary agency issuing burn permits for improved property and agricultural lands. All DOE burn permits are subject to fire restrictions in place with WA DNR & local Fire Protection Districts. Washington DNR has a general burning period referred to as "Rule Burn" wherein a written burn permit is not required in low to some moderate fire dangers. See "Rules for Burning Without a Permit" in Appendix 8 for more information. Rural Fire District #7 and the City of White Salmon issue burn permits as well.

Defensible Space: Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Klickitat County must be made aware that home defensibility starts with the homeowner. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. "Living with Fire, A Guide for the Homeowner" is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Klickitat County should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations. Beyond the homes, forest management efforts must be considered to slow the approach of a fire that threatens a community.

Evacuation Plans: Community evacuations will be handled on a case-by-case basis. Officials will assist with an evacuation but residents living in high risk areas should familiarize themselves with the layout of the roads around their homes and know where to go given the location of an advancing wildfire.

Accessibility: Also of vital importance is the accessibility of the homes to emergency apparatus. If a home cannot be protected safely, firefighting resources will not jeopardize lives to protect a structure. Thus, the fate of the home will largely be determined by homeowner actions prior to the event. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or pruning driveways and creating a turnaround area for large vehicles.

Fuels Reduction & Restoration: Reducing fuels, particularity the rapid spread of invasive species such as cheatgrass, is a critical part of the strategy for reducing future rangeland fires and protecting important habitat, it is important that vegetation management and habitat

restoration (not simply building firebreaks or applying prescribed fire) be in an integral part of the solution. Recreational facilities such as campgrounds and boat launches should be kept clean and maintained. In order to mitigate the risk of an escaped campfire, escape proof fire rings and barbeque pits should be installed and maintained. Implementation of restoration projects concerning rangeland vegetation and reversing the spread of invasive, non-native grasses, such as cheatgrass, is critical to breaking the invasive species-fire cycle that has contributed to the increased frequency and intensity of rangeland fires. By planning projects at the landscape scale to reduce and control invasive species and rapidly restore lands impacted by fire to native vegetation, progress in protecting and restoring Klickitat County's unique ecosystems for the benefit of all. Vegetation inventories, treatments, and preventative measures can be used to reduce the risk of rangeland fire such as the appropriate use of herbicides, biological controls, biocides; prescribed fire, greenstripping, and fuel breaks; and the prioritization of efforts to restore fire-impacted landscapes.

Emergency Response: Once a fire has started, how much and how large it burns is often dependent on the availability of initial attack resources. In most cases, rural fire departments are the first to respond and have the best opportunity to halt the spread of a wildland fire. For many districts, the ability to reach these suppression objectives is largely dependent on the availability of functional resources and trained individuals. Increasing the capacity of departments through funding and equipment acquisition can improve response times and subsequently reduce the potential for resource loss.

Other Activities: Other specific mitigation activities are likely to include improvement of emergency water supplies, access routes, and management of vegetation along roads and power line right-of-ways. Furthermore, building codes should be revised to provide for more fire-conscious construction techniques such as using fire resistant siding, roofing, and decking in high risk areas.

Eastern and South Central Landscape Risk Assessment

The communities of Alderdale, Bickleton, Cleveland, Lyle, Roosevelt, and Wishram and the City of Goldendale all lay within the eastern and south central region of Klickitat County. For the most part, all of these jurisdictions have been developed around residential and agricultural purposes with small populations concentrated in outlying unincorporated communities and a larger population in the incorporated community of Goldendale. This region also has several communities with high and increasing levels of wildland urban interface conditions including Box Canyon, Cedar Valley, Ponderosa Park, and Wahkiacus. Located just to the east of the Cascade Mountains, adequate precipitation allows for dry agriculture and grazing which surround the populated areas of eastern and south central Klickitat County.

Wildfire Potential

Flat Plains and Irregular Prairie

Supported by the history of large wildfires that have occurred in the eastern half of the county, the eastern and south central region of Klickitat County have a high risk of experiencing a large wildfire. Large expanses of open rangeland or pasture provide a continuous fuel bed that could, if ignited, threaten structures and infrastructure under extreme weather conditions. Cattle grazing will often reduce fine, flashy fuels reducing a fire's rate of spread; however, high winds increase the rate of fire spread and intensity of rangeland fires. A wind-driven fire in dry, native fuel complexes on variable terrain produces a rapidly advancing, very intense fire with large flame lengths, which enables spotting ahead of the fire front.

Wildfire risk in the flat plains and irregular prairie is at its highest during summer and fall when daily temperatures are high and relative humidity is low. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Fields enrolled in conservation programs or managed for wildlife habitat, can burn very intensely due to an increased amount of fuel build-up from previous years' growth. Fires in this fuel type are harder to extinguish completely due to the dense duff layer, which often leads to hold-over fires that may reemerge at a later date causing additional fire starts.

Breaks and Foothills

Breaking up the prairie and agricultural fields are shallow conifer-lined canyons and several deep rugged canyons that feature various fuel types and levels of fuel loading. The shallow canyons and adjacent prairie primarily feature ponderosa pine which is a fire adapted species that is capable of surviving low intensity fires. Overstory fuels are discontinuous so it is unlikely

that a fire would be carried any significant distance before a natural break slows the spread. However, torching trees and high winds can cause fire to spot over longer distances in these conditions versus a fire burning in a mix of grasses and low shrubs. There are two deep rugged canyons in the eastern and south central region of the county. Klickitat River Canyon and Rock Creek are characterized by steep canyon walls that feature prairie grasses and rock outcrops with patches of oak and conifers growing mostly in draws or other higher-moisture sites. These deep rugged canyons pose a more serious fire threat due to the steep, complex terrain and variable fuel types and fuel loading. Even though the oak and conifer species are more fire adapted, a wildfire could still make a significant run in the deep canyons if conditions are hot and dry enough. Klickitat Canyon likely has a higher risk of ignition due to the presence of Highway 142 which runs along the bottom of the canyon for almost 20 miles. Heavy vehicle traffic during the summer season and several small communities located along the bottom of the canyon could be potential sources of ignition. The Rock Creek drainage is at a lower risk for human-caused wildfires as there is very little public access to the canyon. However, fighting wildfire in Rock Creek could be challenging for firefighters due to limited access to the canyon.

Fire Behavior Fuel Model

The following table describes the dominant fuel types in the eastern and south central region of Klickitat County and the fire behavior that is typically associated with those fuel types (Table 20). Although more extreme fire behavior is possible, moderate to high rates of spread and low to moderate flame lengths can be expected in the grass and shrub fuel types that dominate the eastern and south central region of Klickitat County. Refer back to Figure 20 and Table 19 for more information.

Table 20) Fire behavior fuel models (FBFM40) that describe the dominant cover/fuel types in the eastern and south central region of Klickitat County, WA.

Cover Type	Fuel Model	Coverage in Klickitat County		Description	Spread Rate	Flame Length
		Acreage	% Total Acreage			
Grassland	GR1	28,431	2.30%	Grass is short, patchy, and possibly heavily grazed.	M	L
	GR2	321,140	26.40%	Moderately coarse continuous grass, average depth about 1 foot.	H	M
Shrubland	GS1	33,956	2.80%	Shrubs are about 1 foot high, low grass load.	M	L
	GS2	288,660	23.70%	Shrubs are 1 to 3 feet high, moderate grass load.	H	M

L = Low, M = Moderate, H = High

Ingress-Egress

Almost bisecting the county, US Highway 97 serves as the main corridor for traffic in Klickitat County as it continues south into Oregon and north all the way to the Canadian border. However, communities that are located closer to the eastern boarder of Klickitat County are situated relatively far from Highway 97 and only have the Bickleton Highway and smaller county roads as options for traveling west to reach Highway 97. Some sections of the Bickelton Highway have tight corners, particularly the section that passes through the gulch at Rock Creek. The other two main county roads in the eastern half of Klickitat County include Dot Road, Alderdale Road, and E Road which are oriented north/south and connect the Bickleton Highway with State Highway 14 along the Columbia River. There is an extensive network of paved and unpaved roads in the eastern half of the county; these roads tend to follow sections lines.

Infrastructure

- **Water Infrastructure and Resources:**
  - Domestic water is primarily supplied by private wells with the exception of homes in Goldendale which are on a municipal water supply.
  - Municipal water sources and sewer plants and sewer systems.
  - Water resources for wildfire suppression include water tanks, hydrants, drafting ponds, and irrigation sources.
- **Power/Electricity:**
  - Major power infrastructure includes transmission lines that run through the east half of the county, windmills, and sub stations and residential areas feature above-ground powerlines.
  - In the event of a wildfire, utility poles along Hwy 14 could be threatened and residents who are on wells will not be able to get water in their homes if they were to lose power.
- **Timber Industry Resources and Infrastructure:**
  - Equipment and infrastructure
  - Roads and improvements including culverts, gates, signs, fencing, etc.
- **Recreational Infrastructure and Resources:**
  - Recreational activities including hiking, biking, wind surfing, rafting, etc., generate millions of dollars in spending.
  - Millions of dollars in recreational assets, including fences, restrooms, parking areas, signage, trail heads, launch sites, etc., at risk in the event of a wildfire.
  - Impacts from wildfire result in millions of dollars lost in recreational spending:

        - The Dry Creek fire forced the closure of river access points which had major financial impacts on local rafting outfitters.
        - The Monastery and Mile Marker 28 fires forced the closure of Brooks Memorial State Park. Major damage was cause to the park and recovery efforts required extensive financial resources.
- **Ranching and Farming**
    - Wildfire can cause significant losses to ranching and farming operations. Fences, water tanks, buildings, vehicles, livestock, irrigation equipment, tools, etc. are all at risk during a wildfire.
- **Other Infrastructure:**
    - Critical repeater and cell sites.
    - Cell coverage is limited to nonexistent in the community of Bickleton and outside of the Highway 97 and Highway 14 corridors.
    - Large commercial buildings in and around the City of Goldendale.
    - Major highways and other roadways and roadway infrastructure.
    - The BNSF rail line.
    - A natural gas pipeline runs the entire length of Klickitat County with pumping stations east of Goldendale off Hoctor Road and north of Roosevelt off of Six Prong Road.
    - Dallesport Industrial site and Dallesport Airport.
    - The Roosevelt Landfill is located just northeast of Roosevelt just off of E Road / the Roosevelt Grad Road.

Fire Protection

The following fire protection districts fall in the eastern and south central region of Klickitat County: KCFD #2, KCFD #4, KCFD #5, KCFD #6, KCFD #7, KCFD #9, KCFD #10, KCFD #14 and the Goldendale Volunteer Fire Department.

Potential Mitigation Activities

Mitigation efforts in the breaks/foothills landscapes include understory and overstory thinning, fuel breaks, and emphasis on native, fire-adapted species. As vehicle traffic during the tourist season could be a potential source of ignition, fire-awareness programs and public education can also help limit the potential for a large wildfire to occur in the breaks/foothills in Klickitat County. Adherence to community fire guidelines can help protect structure in the event of a fire.

North Central and Western Landscape Risk Assessment

The communities of Appleton, Glenwood, Klickitat, and Trout Lake and the Cities of Bingen and White Salmon all lay within the western and north central region of Klickitat County. For the most part, all of these jurisdictions have been developed around residential and natural resource purposes with small populations concentrated in outlying unincorporated communities and larger populations in the incorporated communities of Bingen and White Salmon. This region also has several communities with high and increasing levels of wildland urban interface conditions including Appleton/Timber Valley, B.Z. Corners, Courtney Rd., and Snowden. Located just to the east of the Cascade Mountains, adequate precipitation allows for agriculture, grazing, and timber production which surround the populated areas of western and north central Klickitat County.

Wildfire Potential

Foothills and Low Mountain

Although not historically as active as the eastern half of the county, the western and north central region of Klickitat County also has a moderate to high risk of experiencing a large wildfire. At lower elevations, stands of white oak are both homogenous and mixed with conifers (primarily ponderosa pine) and are extensive across irregular prairie and line canyons and draws. These stands can be classified as oak-prairie cover type due to a heavy grass/grass-shrub understory component that is frequently associated with the oak in Klickitat County. Stands of ponderosa pine and mixed-conifer stands are found at higher elevations. In areas where prairie and forest converge, the understory consists of regen and grasses while areas of continuous forest coverage feature brush and regeneration in the understory. At higher elevations, mixed conifer forests are primarily composed of Douglas-fir and grand fir with other species present at lower frequencies. All of these cover types have the ability to carry large fires under high risk conditions.

Fuel distribution at the landscape level is often disrupted by logging or agriculture, specifically to the east of highway 141 where logging units are numerous and variation in stocking density and horizontal and vertical structure is high. Most logging units are clear cut with wildlife trees and stream buffers left intact. The variability in fuel loading in this part of the county can potentially be an advantage in the event of a wildfire given the circumstances and site-specific terrain. In general, conditions to the west of highway 141 are similar to those to the east but forested tracts of land seem to be more continuous as logging does not appear to be as heavy. The valley bottoms, particularly around Trout Lake and Glenwood, are mostly used for

agriculture. Considering the amount of precipitation that the western half of the county receives and the use of some irrigation, the potential for a large wildfire in these areas is low. In the north central part of the county, the bottom of Satus Pass is an interface of ponderosa pine and prairie. Stands of ponderosa pine often have understories that contain grasses, shrubs and regeneration. At higher elevations, forests are mixed conifer and are mostly composed of ponderosa pine and Douglas-fir at mid-elevations and grand fir becomes a larger component at higher elevations. As Satus pass doesn't receive as much precipitation as the eastern flanks of the Cascades, stocking densities appear to be lower in the north central part of the county. This is also attributed to logging operations that occur on Satus Pass. The potential for the north central part of Klickitat County to experience a large wildfire is also high.

Breaks and Foothills

The western and north central region of the county does feature one deep rugged canyon. The White Salmon drainage runs from the Cascade Range down through Trout Lake and down to the City of White Salmon. Differing from the other two deep rugged canyons in the eastern half of the county, the White Salmon drainage is in the low mountain portion of the county and features large hardwood trees and shrubs in the riparian corridor and mostly conifers on the canyon walls. Highway 141 runs along the bottom of the canyon and passes through multiple small towns/communities. Logging activity takes place on either side of the canyon as industrial timber ground is extensive in the low mountain areas of the county. In hot dry conditions or periods of drought, the level of human activity taking place in the canyon poses a fire risk in the canyon. Summer tourism and higher volumes of traffic along Highway 141 introduce new sources of ignition. The amount of mechanized logging happening in the area could also be a source of ignition but closure systems, such as the Industrial Fire Precaution Level system, help to reduce risk associated with fires. The flanks of the Cascade Mountains are also subject to summer storms that could produce lightning. Lightning is one of the leading sources for wildfire in Klickitat County often starting fires in areas that can be difficult to access.

Fire Behavior Fuel Model

The following table describes the predominant fuel types in the western and north central region of Klickitat County and the fire behavior that is typically associated with those fuel types (Table 21). Of the cover types and fuel models that are listed, the TL and TU fuel types represent the greatest coverage in the western and north central region while the GR and GS fuel types represent a much smaller area. Although more extreme fire behavior is possible, very low to moderate rates of spread and low flame lengths can be expected in the timber litter and timber understory fuel types and moderate to high rates of spread and low to moderate flame

lengths can be expected in the grass and shrub fuel types that dominate the western and north central region of Klickitat County. Refer back to Figure 20 and Table 19 for more information.

Table 21) Fire behavior fuel models (FBFM40) that describe the dominant cover/fuel types in the western and north central region of Klickitat County, WA.

Cover Type	Fuel Model	Coverage in Klickitat County		Description	Spread Rate	Flame Length
		Acreage	% Total Acreage			
Grassland	GR1	28,431	2.3%	Grass is short, patchy, and possibly heavily grazed.	M	L
	GR2	321,140	26.4%	Moderately coarse continuous grass, average depth about 1 foot.	H	M
Shrubland	GS1	33,956	2.8%	Shrubs are about 1 foot high, low grass load.	M	L
	GS2	288,660	23.7%	Shrubs are 1 to 3 feet high, moderate grass load.	H	M
Timber Litter	TL3	17,589	1.4%	Moderate load conifer litter.	VL	L
	TL4	42,821	3.5%	Moderate load, includes small diameter downed logs.	L	L
	TL5	32,220	2.6%	High load conifer litter; light slash or mortality fuel.	L	L
	TL6	76,837	6.3%	Moderate load, less compact.	M	L
	TL8	34547	2.8%	Moderate load and compactness may include small amount of herbaceous load.	M	L
Timber Understory	TU1	23892	2.0%	Fuelbed is low load of grass and/or shrub with litter.	L	L
	TU5	87357	7.2%	Fuelbed is high load conifer litter with shrub understory.	M	M

VL = Very Low, L = Low, M = Moderate, H = High

Ingress-Egress

Almost bisecting the county, US Highway 97 serves as the main corridor for traffic in Klickitat County as it continues south into Oregon and north all the way to the Canadian border. Communities that are located closer to the western boarder of Klickitat County are situated relatively far from Highway 97 but state highway 141, which is oriented north-south, and the BZ-Glenwood highway and Trout Lake highway, which are oriented east-west, service the communities on the west side of Klickitat County. There are also numerous smaller county roads that connect to main highways but these often have tight corners and are either paved, gravel, or dirt. However, some communities have limited ingress and egress options should residents need to evacuate. Some roads may need to be widened and fuels reduced on either

side to ensure safe evacuation during a wildfire, particularly in the communities of Glenwood, Lyle, Snowden, and Trout Lake.

Infrastructure

- **Water Infrastructure and Resources:**
  - Domestic water is primarily supplied by private wells with the exception of homes in Bingen, White Salmon, Glenwood, and Klickitat which are on municipal water supplies.
  - Municipal water sources and sewer plants and sewer systems.
  - Water resources for wildfire suppression include water tanks, hydrants, drafting ponds, and irrigation sources.
- **Power/Electricity:**
  - Major power infrastructure includes sub stations and transmission lines that run through the west half of the county and residential areas feature above-ground powerlines.
  - In the event of a wildfire, residents who are on wells will not be able to get water in their homes if they were to lose power.
- **Timber Industry Resources and Infrastructure:**
  - Equipment and infrastructure
  - Roads and improvements including culverts, gates, signs, fencing, etc.
- **Recreational Infrastructure and Resources:**
  - Recreational activities including hiking, biking, wind surfing, rafting, etc., generate millions of dollars in spending.
  - Millions of dollars in recreational assets, including fences, restrooms, parking areas, signage, trail heads, launch sites, etc., at risk in the event of a wildfire.
  - Impacts from wildfire result in millions of dollars lost in recreational spending:
    - The Dry Creek fire forced the closure of river access points which had major financial impacts on local rafting outfitters.
    - The Monastery and Mile Marker 28 fires forced the closure of Brooks Memorial State Park. Major damage was cause to the park and recovery efforts required extensive financial resources.
- **Ranching and Farming**
  - Wildfire can cause significant losses to ranching and farming operations. Fences, water tanks, buildings, vehicles, livestock, irrigation equipment, tools, etc. are all at risk during a wildfire.

- **Other Infrastructure:**
  - Critical repeater and cell sites.
  - Major highways and other roadways and roadway infrastructure.
  - The BNSF rail line.
  - Large commercial buildings in and around the City of White Salmon.

Fire Protection

The following fire protection districts fall in the western and north central region of Klickitat County: KCFD #1, a small part of KCFD #2, KCFD #3, KCFD#7, KCFD #8, KCFD #12 KCFD #13, KCFD #15 Bingen Volunteer Fire Department, and the White Salmon Volunteer Fire Department.

Potential Mitigation Activities

Mitigation strategies that would be most effective in the western and north central regions of Klickitat County include understory and overstory thinning, the creation of fuel breaks, attention to and implementation of forest management practices that promote forest health, expansion and maintenance of right-of-ways, and adherence to community fire guidelines in the WUI.

Chapter 6: Mitigation Recommendations

Critical to the process of developing a Community Wildfire Protection Plan and reducing wildfire risk in Klickitat County is the identification of wildfire mitigation action items and development of a schedule for implementation. The purpose of this section is to identify and prioritize mitigation action items based on input from fire, natural resource, and emergency service personnel. As there are multiple public land management agencies, industrial land owners, and thousands of private landowners in Klickitat County, it is reasonable to expect that differing schedules of adoption will be made and varying degrees of compliance will be observed across ownerships.

The land management agencies in Klickitat County, including the Washington Department of Natural Resources, private industry, and USDA Forest Service, are participants in the planning process and have contributed to the development of this plan. When possible, land management/treatment schedules were considered in the planning process in an effort to align and/or coordinate management goals with Klickitat County.

Through the CWPP, land owners and land managers in Klickitat County will be able to better incorporate fire-mitigation strategies into the scope of work already being performed. Implementation of action items through existing programs should minimize the costs associated with mitigation projects.

All risk assessments were made based on 2018 conditions. Over time it will be necessary to review and make adjustments to the recommendations made in this plan in order to account for changes in risk and risk factors, total population and population distribution, infrastructure additions and modifications, and any other factors that alter Klickitat County's susceptibility to wildfire.

The Klickitat County Wildfire Protection Plan will be reviewed at least annually at meetings convened by the CWPP advisory group, open to the public and involving all municipalities/jurisdictions, where action items, priorities, budgets, and modifications can be made or confirmed. Amendments to the plan should be documented and attached to the formal plan as an amendment. Re-evaluation of this plan should be made on the fifth anniversary of its acceptance, and every five years following.

Maintenance and Monitoring

A commitment to monitoring changes in resource conditions to evaluate the effectiveness of different management strategies will improve learning and, through adaptive management, increase the success of wildfire mitigation activities. Monitoring to evaluate the effectiveness of management actions must occur to determine the success of fire prevention, suppression, and restoration actions. Lessons learned from self-evaluation can be shared and inform changes to correct for ineffective management prescriptions, respond to changes in resource conditions, guide new science and research needs and address changes in management policy and direction. Monitoring and evaluation is an essential part of adaptive management and depends upon timely information, analysis and learning. Strategic application of new management techniques, improved use of risk analysis to set management priorities, and the translation of science and research findings into tools for easy use on the ground to prioritize prevention, suppression, and restoration efforts can help improve the efficacy and efficiency of fire management.

Prioritization of Mitigation Activities

The action items recommended in this chapter were prioritized through a group discussion and voting process. The action items are ranked 1, 2 or 3 to indicate urgency for that particular item; with 1 being the most urgent for Klickitat County as a whole. The CWPP advisory group does not want to restrict funding to only those projects that are high priority because priorities vary by community. The flexibility to fund a variety of diverse projects based on varying criteria is a necessity for a functional mitigation program at the county and community level.

Policy and Planning Efforts

Wildfire mitigation efforts must be supported by a set of policies and regulations at the county level that maintain a solid foundation for safety and consistency. The recommendations enumerated here serve that purpose (Table 22). These items are regulatory in nature, and thus will not necessarily be accompanied by cost estimates. These recommendations are policy related and therefore are recommendations to the appropriate elected officials; debate and formulation of alternatives will serve to make these recommendations suitable and appropriate.

Table 22) Action Items in Safety and Policy. Items receiving a ranking of 1 are more urgent.

Action Item	Priority Level	Responsible Organization	Timeline	2018 Status
6.1.A: Develop additional water resource sites to supplement fire suppression efforts throughout Klickitat County.	**1**	**Lead:** Klickitat County Board of Commissioners **Support:** Klickitat County Planning Department, Underwood Conservation District, Central Klickitat Conservation District		
6.1.B: Consider adopting countywide regulations or codes that will improve rural subdivisions' fire resistance as well as ensure new developments are constructed using fire safe standards.	**3**	**Lead:** Klickitat County Board of Commissioners **Support:** Klickitat County Fire Districts		
6.1.C: Distribute Firewise-type educational brochures with building permit applications.	**2**	**Lead:** Klickitat County Building Department **Support:** Washington DNR Northeast Region		
6.1.D: Support prescribed burning by agency land managers as an effective tool to reduce hazardous fuels in the WUI within applicable regulations as is appropriate.	**1**	**Lead:** Klickitat County Fire Districts **Support:** Washington DNR, NRCS, NPS		
6.1.E: Establish a committee to work with the Farm Service Agency on feasible solutions for reducing the wildland fire risk associated with land enrolled in the Conservation Reserve Program, specifically around population centers.	**3**	**Lead:** CWPP Sub-advisory group **Support:** Klickitat County Board of Commissioners		
6.1.F: Continue to work with developers and private landowners to enhance road layout and adherence to accepted road standards that will improve emergency services' accessibility as well as provide for better road connectivity.	**1**	**Lead:** Klickitat County Board of Commissioners **Support:** Klickitat County Planning Department		
6.1.G: Continue to regulate and actively enforce all fireworks-related restrictions in Klickitat County.	**2**	**Lead:** Klickitat County Sheriff's Office and Washington DNR **Support:** Klickitat County Fire Districts, NPS		
6.1.H: Develop a local contact list of individuals that. could be used in an advisory capacity to fire suppression teams.	**3**	**Lead:** Klickitat County Sheriff's Office **Support:** Klickitat County Fire Districts		
6.1.I: Continue to encourage local residents to develop pre-emergency communication plans including phone trees and contact lists.	**1**	**Lead:** Klickitat County Sheriff's Office **Support:** Klickitat County Fire Districts		

6.1.J: Consider adopting a countywide firework ban that is in effect prior to the 4th of July.	**3**	**Lead:** Klickitat County Board of Commissioners **Support:** Klickitat County Fire Districts and Washington DNR		
6.1.K: Develop a campaign to encourage County residents to sign their cell phone numbers up with the Countywide emergency notification service.	**1**	Lead: **Klickitat County Sheriff's Office** Support: **Klickitat County Fire Districts, Conservation District, DNR**		

Fire Prevention and Education Projects

Even though communities and neighborhoods can be evacuated before the arrival of a flaming front, preparation and protection of structures has implications for protecting people who may have trouble with mobility, live alone, live in rural areas where services and communication are limited, or for those who refuse to leave their homes during such an event. In 2017, wildfire in southern California killed more than 40 people. Most of the victims were senior citizens and others included a 28 year old woman who used a wheelchair for mobility and a 14 year old boy who was unable to outrun the fire in a rural neighborhood. Although not a guarantee, structure preparation and protection can potentially save lives in such circumstances. Many of the recommendations in this section involve education and increasing wildfire awareness among Klickitat County residents (Table 23).

Residents and policy makers of Klickitat County should recognize that wildfire is a natural and, to some degree, inevitable aspect of living in wooded or rural areas and that human decisions about home-siting, construction methods and defensible space (landscaping, forest thinning, road condition, etc.) can reduce or exacerbate the effects of wildfire on private property. The items listed below should be considered for their contributions to the reduction of wildland fire risks:

Shrub/Steppe Management has a significant impact on the fuel composition and structure in Klickitat County. The shrub/steppe management programs of the BLM, FWS, BOR, WADNR and numerous private landowners in the region have led to a reduction of wildland fuels. Furthermore, shrub/steppe systems are dynamic and will never be completely free from risk. Treated areas will need repeated treatments to reduce the risk to acceptable levels in the long term.

Table 23) Action Items for Fire Prevention, Education, and Mitigation. Items receiving a ranking of 1 are more urgent.

Action Item	Priority Level	Responsible Organization	Timeline	2018 Status
6.2.a: Implementation of youth and adult wildfire educational programs.	**2**	**Lead:** Washington DNR, BLM, and Klickitat County Conservation District **Support:** Klickitat County Fire Districts and local schools		
6.2.b: Prepare for wildfire events in high risk areas by working with HOA and individual property owners to conduct home site risk assessments and develop Firewise communities	**1**	**Lead:** Klickitat County Conservation Districts **Support:** Other Conservation Districts??		

6.2.c: Work with WSU Extension, Master Gardeners, and other existing programs to offer Firewise landscaping clinics to assist property owners in maintaining fire-resistant defensible space around structures.	**3**	**Lead:** Underwood CD and Central Klickitat CD **Support:** WSU Extension		
6.2.d: Develop educational handbook regarding construction in high risk wildfire areas to be handed out with building permits.	**2**	**Lead:** Klickitat County Building Department **Support:** Washington DNR, Conservation District		
6.2.g: Identify and treat high wildfire risk areas within the county, particularly in areas experiencing intense public use.	**1**	**Lead:** Klickitat County CWPP Advisory group and NPS **Support:** Klickitat County Fire Districts		
6.2.h: Develop a Klickitat County fire prevention coop to provide a continuing public wildfire education program and better capture defensible space and prevention teachable moments.	**2**	**Lead:** Washington DNR, Klickitat County Conservation Districts. **Support:** Klickitat County Fire Districts and WSU Extension		
6.2.i: Develop a forest and range public education program to encourage healthy management of natural resources on private property.	**3**	**Lead:** Conservation District **Support:** County Conservation District, WSU Extension and Washington DNR		
6.2.j: Explore creating a grant funded fire prevention position for Klickitat County.	**3**	**Lead:** Conservation District **Support:** WSU Extension and Washington DNR		
6.2.k: Provide funding to WSU Extension to be active in Klickitat County	**3**	**Lead:** Washington DNR **Support:** CWPP advisory group and Conservation District		

Infrastructure Enhancements

Critical infrastructure refers to the communications, transportation, power lines, and water supply that service a region or a surrounding area. These networks are, by definition, a part of the wildland urban interface in the protection of people, structures, infrastructure, and unique ecosystems. Without supporting infrastructure, a community's structures may be protected, but the economy and way of life lost. As such, a variety of components will be considered here in terms of management philosophy, potential policy recommendations, and mitigation recommendations (Table 24).

Table 24) Action Items for Infrastructure Enhancement. Items receiving a ranking of 1 are more urgent.

Action Item	Priority Level	Responsible Organization	Timeline	2018 Status
6.3.a: Inventory, map and provide signage for onsite water sources such as hydrants, underground storage tanks, and drafting or dipping sites on all ownerships across the county.	**2**	**Lead:** Klickitat County Fire Districts **Support:** Klickitat County GIS Department		
6.3.b: Support efforts to provide funding for upgrading the emergency service communication infrastructure to provide for better emergency response and notification countywide.	**3**	**Lead:** **Support:**		
6.3.c: Improve ingress/egress and create fuel breaks by conducting roadside fuels treatments.	**1**	**Lead:** Conservation District **Support:** Klickitat County Road Department, BLM & WDFW		
6.3.d: Re-establish water crossing at Sinking Creek on Smith Prather Road North to provide access to this area for fire suppression apparatus.	**1**	**Lead:** Klickitat County Road Department **Support:** Klickitat County Board of Commissioners		
6.3.e: Replace bridge and maintain road surface between Walter Road East and Smith Road East to provide access for fire suppression apparatus.	**-**	**Lead:** Klickitat County Fire District #6 **Support:** Area landowners		
6.3.f: Develop additional high-volume wells on private land.	**-**	**Lead:** National Park Services **Support:** Washington DNR and Klickitat County Fire District #7		

Resource and Capability Enhancements

There are a number of resource and capability enhancements identified by the rural and wildland firefighting districts in Klickitat County. All of the needs identified by the districts are in line with increasing the ability to respond to emergencies and are fully supported by the CWPP advisory group (Table 25).

The implementation of each action item will rely on either the isolated efforts of the rural Fire Protection Districts or a concerted effort by the county to achieve equitable enhancements across all of the districts. Given historic trends, individual departments competing against neighboring departments for grant monies and equipment will not necessarily achieve countywide equity.

Table 25) Action Items for Resource and Capability Enhancements. Items receiving a ranking of 1 are more urgent.

Action Item	Priority Level	Responsible Organization	Timeline	2018 Status
6.4.a: Develop additional water resource sites to supplement fire suppression efforts throughout Klickitat County. FD#2, FD#7, Pipeline Road, Hwy 97, Hwy 141, Bickelton Hwy.	**1**	**Lead:** Klickitat County Fire Districts **Support:** County Conservation District(s)		
6.4.b: Improve departmental capability by establishing a program to increase the retention and recruitment of volunteer firefighters.	**1**	**Lead:** Klickitat County Fire Districts		
6.4.c: Update personal protective equipment for all fire districts in Klickitat County.	**2**	**Lead:** Klickitat County Fire Districts **Support:** Washington DNR		
6.4.e: Obtain funding for three additional apparatus and portable generators for multiple fire district.	**1**	**Lead:** Klickitat County Fire District # **Support:** Washington DNR		
6.4.f: Obtain funding for building additions at Fire District #'s ## and ## stations.	**1**	**Lead:** Klickitat County Fire District #		
6.4.h: Obtain support and funding for a water storage tank and upgraded water tender for the Washington Department of Fish and Wildlife.	**3**	**Lead:** Washington Department of Fish and Wildlife **Support:** Washington DNR and BLM		
6.4.i: Obtain funding for a new fire station and updated rolling stock for Fire District #3, others.	**1**	**Lead:** Klickitat County Fire District # **Support:** Washington DNR		
6.4.j: Obtain funding for a water tender, two large drop tanks, and a new station for Fire District #14.	**-**	**Lead:** Klickitat County Fire District # **Support:** Washington DNR		
6.4.k: Obtain funding for an urban interface truck for Fire District #1, 2, 3, 5, 12, 13, 15.	**-**	**Lead:** Klickitat County Fire District # **Support:** Washington DNR		
6.4.l: Obtain funding for upgraded rolling stock and equipment storage for Fire District #1.	**-**	**Lead:** Klickitat County Fire District # **Support:** Washington DNR		

6.4.m: Obtain support and funding for the construction of a fire station and the necessary equipment and training in Fire District #1 and/or 5.	-	**Lead:** Klickitat County Fire District # **Support:** Washington DNR		
6.4.n: Obtain funding for the construction of a multi-agency Fire/EMS station with bays for both fire apparatus and EMS equipment with OSHA-approved exhaust removal systems, meeting rooms, offices, and residency quarters for Fire District #.	**3**	**Lead:** Klickitat County Fire District # **Support:**		
6.4.o: Obtain funding for the installation of additional fire hydrants around the perimeter of SOME TOWN to help protect the community from approaching wildland fires. Goldendale and White Salmon.	**1**	**Lead:** Town of		
6.4.p: Continue to work with local landowners to provide access to irrigation systems for fire suppression purposes and obtain funding for the necessary adapters.	**1**	**Lead:** Klickitat County Fire Districts		
6.4.r: Obtain funding for the purchase and operation of a fire and rescue boat, specifically for the patrol of the Columbia River near John Day and The Dalles Dams.	-	Lead: **Klickitat County Sheriff's Office** Support: **Klickitat County Board of Commissioners and Klickitat County Fire Districts**		

Proposed Project Areas

The following project areas were identified by the CWPP advisory group and from citizen recommendations during the public meetings. Most of the sites were visited during the field assessment phase. The areas where these projects are located were noted as having multiple factors contributing to the potential wildfire risk to residents, homes, infrastructure, and the ecosystem. Treatments within the project areas will be site specific, but will likely include homeowner education, creation of a wildfire defensible space around structures, fuels reduction, and access corridor improvements. This work would build on and expand efforts carried out in various areas of central and western Klickitat County by Underwood Conservation District, Central Klickitat Conservation District, and the Washington DNR. All work on private property will be performed with consent of, and in cooperation with the property owners. Defensible space projects may include, but are not limited to commercial or pre-commercial thinning, pruning, brush removal, chipping, prescribed burning, installation of greenbelts or shaded fuel breaks, and general forest and range health improvements.

The Washington Department of Natural Resources, U.S. Forest Service, and/or individual Fire Protection Agencies may take the lead on implementation of many of these projects; however, project boundaries were purposely drawn without regard to land ownership in order to capture the full breadth of the potential wildland fire risk. Coordination and participation by numerous landowners will be required for the successful implementation of the identified projects:

Proposed 2018 and 2019 Planning Areas for the 20-Year Forest Health Strategic Plan

Highway 97 Overview

Two large wildfires have jumped Hwy 97 near Satus Pass in the past decade, destroying dozens of structures, threatening hundreds of residents and thousands of acres of industrial timberland. Development of a shaded fuel-break along both sides of Hwy 97 in this heavily populated area of forested land stressed by drought and insect infestation can potentially play a critical role in containment of the next wildfire to hit this area. The potential treatment area consists of a mix of state, private residential and private industrial timberland along with the Yakama Nation. Distance is approximately 10 miles with a minimum treatment of 100' on each side of the highway. Project prescription would generally include non-commercial thinning, with crown spacing of 5-10 feet, pruning to 10 feet, brush control and disposal of slash through piling and burning, chipping, mastication or hauling off site.

Goldendale City Watershed Overview

In 2017 the watershed was threatened by a wildfire that was burning on private industrial timberland. Access to this watershed is challenging as it is several miles behind locked gates on a narrow gravel road system. Project prescription recommendations would include improvements to two separate road systems to improve access to this watershed; one is along the pipeline that transports water to the city reservoirs to the SW of the watershed and the other is along the existing road system from the SE. A shaded fuel break around much of the watershed perimeter to the W/NW and NE would help reduce the threat of catastrophic fire in the area. The following are important notes about the watershed:

1) The watershed is included in portions of sections 15, 21, 22, 27 and 28 of T. 6N R. 16E totaling 1114 acres, it provides to 1500 water connections serving 3500 residents.
2) Only project for 2018 is a 200 acre timber harvest which has been permitted.
3) The SW portion is in the worst condition.

Project Area	Proposed Year	Planning Efforts	Project Description	Planning Stage	Total Acres	Forested Acres
Trout Lake	2018	Conduct landscape evaluation and landscape Rx for private and state land	Treatments on private, State, and USFS.	Complete - Implementation in progress	117,163	106,978
Klickitat	2018	Conduct landscape evaluation and landscape Rx for private and state land	Treatments on private and State	None completed	120,531	111,558
Little White Salmon	2020	Conduct landscape evaluation and landscape Rx	Treatments on private, State, and USFS.	Very Early - begin in 2020	83,864	69,424
Hwy 97	2020	Conduct landscape evaluation and landscape Rx for private and state land	Treatments on private	None	60,399	45,420
Glenwood	2020	Conduct landscape evaluation and landscape Rx for private and state land	Treatments on private and state	None	116,782	101,321

Community CWPP Fuels Reduction Projects

The following projects were found in the most recent version of the Glenwood, High Prairie, Trout Lake, Bingen/White Salmon, and Ponderosa Park community CWPP's:

- Glenwood CWPP
  - Adams View Shaded Fuel Break
  - Bird Shaded Fuel Break
  - Glenwood Highway Project
  - Glenwood Shaded Fuel Break
  - Island Camp Shaded Fuel Break
  - West Glenwood Shaded Fuel Break
- High Prairie Community Wildfire Risk Assessment (2016):
  - Create or maintain 7 acre fuel break at Hartland Road and Centerville highway Intersection.
  - Create or maintain 8.5 acre fuel break at Struck Road and Centerville Highway (west) intersection.
- Trout Lake CWPP (2005):
  - **Fuel break for southwestern wildfire** –included a two mile stretch of Telephone Pole Tree Rd., Cheese Cave Rd., and Jennings Rd., and a three-mile stretch from Kilowatt Canyon Rd. to Jennings Rd.
  - **Fuel break for south wildfire** – included roads from WADNR B7000 Rd. toward the west for two miles, and from Winegartner Bridge toward the east for two miles.
  - **Fuel break for southwestern wildfire** – included the remaining portion of the B7000 Rd. and connected to the 86 Rd and continued onto Highway. 141 before terminating at the 88 Rd.
  - **Fuel break for northwestern wildfire** – located on the 88 Rd. from Highway 141 until reaching the 88 Rd. for approximately ten miles.
  - **Fuel break for northwestern wildfire** - On 88 Rd. from Highway 141 onto 8810 Rd. for approximately six miles.
  - **Fuel break for Flattop Communication Tower** – Flattop Public Safety Radio and Cellular Phone Communication Tower on eastern boundary of GPNF and Klickitat County.
  - **Fuel break for northern wildfire** – located on the 80 Rd. and 011 Rd. for approximately 2 miles, and existing roads off the 23 Rd. for approximately 3 miles towards the Trout Lake Natural Area Preserve.

  - **Maintain Trout Lake's five escape routes** – includes portions of Highway 141, 23 Rd. , 88 Rd., 24 Rd., and Trout Lake-Glenwood Highway until an adequate safety zone is reached.
  - **Fuel break on eastern boundary of planning area** – includes Eastern side of Trout Lake Valley on existing roads for approximately 14 miles.
- Bingen and White Salmon CWPP (2004):
  - Maintain fuel breaks along main streets which include Dock Grade, Lincoln Street, NW Lincoln Street, SW Waubish, and State Highway 141.
  - Create or maintain fuel breaks around and within the Spring Street and Washington Street Trailer Courts.
  - Maintenance of fuel reduction project on the bluff above Highway 14 which includes the thinned right-of-way along Highway 14, continued reduction of fuels across the entire bluff via grazing, maintaining area of reduced fuels between the railroad and Highway 14, maintaining defensible space around homes on the bluff, and increasing or maintaining the fuel break along Dock Grade.
  - Create or improve ingress and egress in areas that are at high risk for wildfire including SW Waubish, Eyrie, NW County Place Road, Dogwood, Strawberry Mountain and numerous private drives, etc.
  - Reduce fuels or maintain fuels reduction work performed in the Jewett Creek area.
  - Reduce or maintain current fuel levels in the drainage west of Puckerhuddle.
- Ponderosa Park CWPP (2014):
  - Residents have been proactive with elimination of fuels and maintenance of defensible space around home in the park but awareness programs would be beneficial.
  - Shaded fuel breaks need to be created around the perimeter of the park and right-of-ways along main roads need to be widened and maintained.
  - Safety zones need to be created that are capable of accommodating both residents and fire fighters in the event that they are unable to leave or need to remain in the park during a wildfire.

Completed and Planned Fuels Reduction Projects

The following table (Table 26) and map (Figure 21) summarize and display both completed and planned fuels treatment and reduction projects in and around different cities, communities, on public lands, and along roadway corridors in Klickitat County, WA.

Table 26) Fuel treatment and reduction projects performed and planned in different communities, public areas, and roadway corridors in Klickitat County, WA.

Id	Name	Project	Acres
1	Ponderosa Park	Fuel Breaks, Safety Zones, Road Side Fuels	3,230
2	Hartland Rd and Centerville Hwy	Fuel Breaks	15
3	Struck Rd and Centerville Hwy	Fuel Breaks	9
4	Dock Grade White Salmon	Fuel Breaks	14
5	NW Lincoln St White Salmon	Fuel Breaks	14
6	Waubish St White Salmon	Fuel Breaks	6
7	State Hwy 141 White Salmon	Fuel Breaks	20
8	Spring Street Trailer Court	Defensible Space	11
9	Washington Street Trailer Court	Defensible Space	9
10	Bluffs Above Hwy 14	Haz fuel Reduction/Fuel Breaks	110
11	Strawberry Mountain White Salmon	Haz fuel Reduction/Fuel Breaks	44
12	Jewett Creek	Haz fuel Reduction	42
13	Puckerhuddle Drainage White Salmon	Haz fuel Reduction	20
14	Flattop Mountain Comm. Tower	Haz fuel Reduction/Fuel Breaks	17
15	23 Rd	Fuel Break	94
16	Glenwood Shaded Fuel Break	Fuel Break	51
17	W. Glenwood Shaded Fuel Break	Fuel Break	16
18	Shaded Fuel Break Potential	Fuel Break	476
19	Appleton Area of Concern	Road Side Fuels	621
20	Appleton Area of Concern	Haz fuel Reduction/Fuel Breaks	5,291
21	Appleton Area of Concern	Haz fuel Reduction/Fuel Breaks	4,471
22	Tracy Fuel Reduction	Haz fuel Reduction	536
23	BLM Thinnings	Haz fuel Reduction	123
24	Diamond Gap Comm Tower	Haz fuel Reduction	5
25	Bickleton Comm Tower	Haz fuel Reduction	6
xx	DNR LOA Fuels Treatments	Various Haz fuel Reduction Projects	2,477
xxx	USFS Fuels Treatments	Various Haz fuel Reduction Projects	2,236
YY	USFWS Prescribed Burn Units	Various Haz fuel Reduction Projects	411
YYY	Columbia Land Trust	Fuels Treatment Projects	2,824

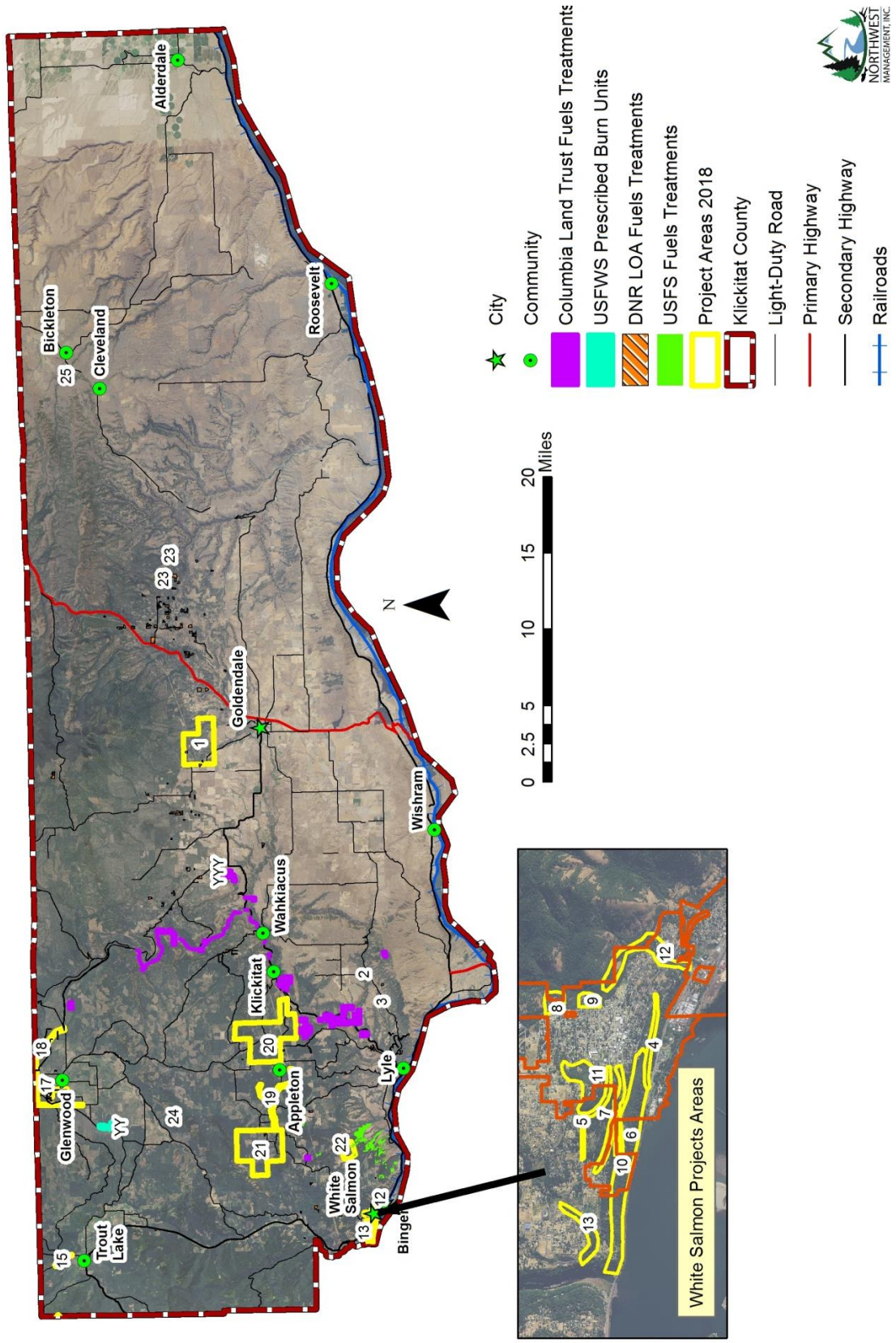


Figure 21) Map of completed and planned fuel reduction and treatment projects in Klickitat County, WA.

Regional Land Management Recommendations

Active land management that modifies fuels, promotes healthy ecosystem conditions, and promotes the use of natural resources (consumptive and non-consumptive) will ensure that these lands have value to society and the local region. The Washington DNR, Washington Department of Fish and Wildlife Service, BLM, USFS, private forest landowners, and all other landowners in the region should be encouraged to actively manage their wildland-urban interface lands in a manner consistent with reducing fuels and wildfire risks.

Active land management that modifies fuels, promotes vegetative health, and effectively utilizes natural resources, in both a consumptive and non-consumptive manner, will ensure that the land in Klickitat County will continue to have value to communities despite the forecast of more severe fire seasons with increased fire behavior. The Washington DNR, Washington Department of Fish and Wildlife Service, BLM, USFS, private forest landowners, and all other landowners in the region should be encouraged to actively manage wildland-urban interface areas with the intent of adapting structures and communities to the wildfire hazard that is inherent of the region.

Control Invasive Weeds

Non-native or invasive plants have been spreading across the western United States since Euro-Americans began settling the region. With the aid of grazing livestock and human disturbance, some non-native species, such as cheat grass and various thistles, have spread over vast areas and can out-compete many native species. This change in species composition often comes with secondary impacts such as a shorter fire return interval and changes in fire behavior and/or fire intensity.

There are many methods that can be utilized to control non-native species from spreading. The size of the outbreak and the species involved will determine the most effective method to control the outbreak. Small outbreaks of non-native plants can often be pulled by hand and disposed of before the plant goes to seed. Mowing, spraying, and even biological (insect) methods can be employed to control larger outbreaks. Regardless of the method, timing is often very important and a quality plan will ensure the treatment is successful. *Contact Marty Hudson, Coordinator of the Klickitat County Weed Control Board Office for more information at (509) 773-5810.*

Control Insects and Disease

Insects and diseases are a natural part of the environment and perform a multitude of ecosystem functions when they spread at rates or exist in numbers that are consistent with that

of their respective life histories. However, there are times when environmental conditions facilitate the spread of insects and disease resulting in widespread forest mortality. With the potential to leave thousands of acres of standing dead trees, these epidemics can create forest conditions that are highly susceptible to intense, stand replacing fires. Wildfire hazards associated with the impacts of insects and disease can be mitigated through management practices that aim to improve forest health and reduce susceptibility to outbreaks.

Thin Shrublands

Many of the shrublands throughout the western U.S. have become overstocked and stagnant and will require an appropriate level of management in order to maintain vegetative health across the landscape. Just like a forest, overstocking in shrublands can increase susceptibility to insects, disease, and drought.

Appropriate spacing between shrubs will make shurblands less susceptible to wildfire. The shrubs are cut by hand or with a machine and mulched or piled for burning. The result is a stand of shrubs that is less dense which allows the remaining shrubs to have access to more resources (water, sunlight, and nutrients) than there was pre-thinning, creating a healthier ecosystem that is more resistant to insect and disease outbreaks.

Reintroduce Fire to the Ecosystem

In response to several catastrophic wildfires in the 20th century, U.S. Government policy on wildland fire was created to mandate the suppression of any and all active wildfires. The new policies were effective and resulted in a significant reduction in the number of acres burned annually by wildfire.[26] However, years of suppression resulted in heavy fuel loading across the landscape which primed some of the deadliest and most destructive fire seasons in U.S. history, including the 1910 fire in Idaho[27] The absence of wildfire has also altered species composition across the landscape. As they become more abundant, species that are not fire adapted are capable of altering ecosystem fire regimes which can result in hotter, more intense wildfires that pose a greater threat to people and structures.

Restoration of natural fire regimes and reintroducing fire to the landscape can protect lives and structures by potentially reducing the intensity of a wildfire. One approach to this process is through the use of prescribed burns which can be conducted under desirable conditions and at specified intervals. While effective in most cases, there are many areas, such as the WUI, where

[26] Pyne SJ (1982) Fire in America: A cultural History of Wildland and Rural Fire (Cycle of Fire). Seattle: University of Washington Press.
[27] Dennis C. Odion, Et. Al. 2014. Examining Historical and Current Mixed-Severity Fire Regimes in Ponderosa Pine and Mixed-Conifer Forests of Western North America. DOI: 10.1371/journal.pone.0087852.

a prescribed burn could put lives and property at risk. As an alternative, land managers and property owners can attempt to create post-fire conditions or "mimic" the effects of wildfire with mechanical fuel treatments. The removal of ladder fuels and overstory thinning are examples of mechanical fuel treatments that can reduce wildfire risk.

Livestock Grazing

Livestock grazing, particularly cattle, has been a long standing tradition in the rangelands of central Washington. Historically, ranchers were able to make agreements with state and federal land managers to expand their grazing operations on public ground for mutual benefit. In the last 30 years, this practice has been limited due to liability issues, environmental concerns, and litigation. Additionally, where federal grazing allotments are still available, the restrictions on timing are often inappropriate and/or too inflexible for the objectives of reducing fuel loads (i.e. wildfire risk), eradicating noxious and invasive species, and restoring native grass and sagebrush communities.

Most rangeland ecologists agree that in ***site-specific*** situations, livestock can be used as a tool to lower fire risk by reducing the amount, height, and distribution of fuel. Livestock can also be used to manage invasive weeds in some cases and even to improve wildlife habitat.

Targeted grazing can indeed reduce the amount, height, and distribution of fuel on a specific rangeland area, potentially decreasing the spread and size of wildfires under normal burning conditions. By definition, "Targeted grazing is the application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals."[28]

There are many factors to consider regarding the use of livestock for reducing the amount, height, and continuity of herbaceous cover (especially cheatgrass) in site-specific situations:

- During the spring, cheatgrass is palatable and high in nutritional value before the seed hardens. Repeated intensive grazing (two or three times) at select locations during early growth can reduce the seed crop that year, as well as the standing biomass. In areas where desirable perennial species are also present, the intensive grazing of cheatgrass must be balanced with the growth needs of desired plants that managers and producers want to increase.

- Late fall or winter grazing of cheatgrass-dominated areas, complemented with protein supplement for livestock, should also be considered. After the unpalatable seeds have all

[28] Karen Launchbaugh, Walker, J. Targeted Grazing – A New Paradigm for Livestock Management. University of Idaho. Accessed December 2016. at: http://www.webpages.uidaho.edu/rx-grazing/handbook/Chapter_1_Targeted_Grazing.pdf.

dropped, cheatgrass is a suitable source of energy, but low in protein. Strategic intensive grazing of key areas can reduce carry-over biomass that would provide fuel during the next fire season. Late fall grazing can also target any fall-germinating cheatgrass before winter dormancy, thus reducing the vigor of these plants the following spring. Fall/winter grazing when desirable perennial grasses are dormant and their seeds have already dropped, results in minimal impact to these species and therefore can be conducted with minimal adverse impact to rangeland health in many areas.

- The concept of "brown-strips" refers to areas where one or more treatments (prescribed fire, mechanical thinning, herbicide, and/or grazing) are used to reduce shrub cover, releasing the native perennial grasses. These grassy areas are preferred by cattle, which can then be grazed to reduce herbaceous fuels. This method leaves "brown-strips" when the stubble dries out in mid-summer, serving as fuel breaks to control the spread of wildfire. Where appropriate, protein-supplemented cows or sheep could be used to intensively graze and create brown-strips (e.g. along fences) to reduce the spread of fires during or after years of excess fuel build-up.

- Targeted grazing for the management of herbaceous fuels often requires a high level of livestock management, especially appropriate timing, as well as grazing intensity and frequency. In order to meet prescription specifications, operators often use herders, portable fencing, and/or dogs to ensure pastures are grazed to specification before the livestock are moved. Other expenses may include feed supplements, guardian dogs and/or night enclosures for protection from predators, water supply portability, mobile living quarters, and grazing animal transport. Targeted grazing is a business whose providers must earn a profit. Therefore, land management agencies need the option of contracting such jobs to willing producers and paying them for the ecosystem service rendered. This payment approach is already being implemented in some private and agency-managed areas to a limited extent, primarily for control of invasive perennial weeds. The use of and payment for prescription livestock grazing as a tool has substantial potential in the immediate and foreseeable future for managing vegetation in site-specific situations.

- In general, and less intensively, livestock can be used strategically by controlling the timing and duration of grazing in prioritized pastures where reduction of desirable perennial grass cover is needed for fire reduction purposes. Strategic locations could be grazed annually to reduce fuel loads and continuity at specific locations. Rotation of locations across years prevents overgrazing of any one area but confers the benefits of

fuel load reductions to much larger landscapes. Even moderate grazing and trampling can reduce fuels and slow fire spread.[29]

Dormant season grazing of perennial grasses has also been reported to aid in seedling recruitment. Some seeds require scarification before they will germinate. That can be accomplished by passage through the digestive tract or by hoof action on the seed. Hoof action can also press the seed into the ground and compress the soil around it, i.e. preparing a beneficial seed bed. These processes can also reasonably be expected to provide some benefit to the exotic annual grasses. These grasses; however, appear to succeed very well without that assistance. One can speculate that the perennial grasses would demonstrate a greater response to these effects and thus would gain some edge in the struggle for dominance with the exotic annuals. If those annuals were also grazed in the early spring before the perennials started or during fall germination events, or both, it is likely the annuals would have less vigor and produce less seed which would detract from their ability to out compete the perennials.[30] While the exact details of how the perennials benefit from dormant season grazing are not fully understood, Agricultural Research Service research in Nevada has reported success in decreasing annual grass dominance.

"The role of grazing as a tool for fuel management is generally supported, but it should be cautiously evaluated on a case-by-case basis because fire potential is influenced by interactions among several ecosystem variables."[31] Targeted grazing can reduce wildfire risk in specific areas. The targeted grazing strategies discussed above all require a very flexible adaptive management approach by both land management agencies and targeted grazing providers. Managers must determine objectives, then select and implement the appropriate livestock grazing prescription, monitor accomplishments, and make adjustments as needed.[32]

Livestock grazing is a more desirable tool for managing wildland fire risk on both private and public lands because it poses less risk than prescribed burning, is less expensive than chemical applications, can be managed effectively for the long-term, and it benefits a large sector of the local economy.

---

[29] McAdoo, Kent, et al. "Northeastern Nevada Wildfires 2006: Part 2 – Can Livestock Grazing be Used to Reduce Wildfires?" University of Nevada Cooperative Extension. Fact Sheet-07-21. Available online at http://www.unce.unr.edu/publications/files/nr/2007/fs0721.pdf. Accessed December 2016.

[30] Schmelzer, L., Perryman, B. L., Conley, K., Wuliji, T., Bruce, L. B., Piper, K. 2008. *"Fall grazing to reduce cheatgrass fuel loads"*. Society for Range Management 2008.

[31] Fuhlendorf, S. D., D. D. Briske, and F. E. Smeins. 2001. Herbaceaous vegetation change in variable rangeland environments: the relative contribution of grazing and climatic variability. Applied Vegetation Science 4: 177-188.

[32] McAdoo, Kent, et al. "Northeastern Nevada Wildfires 2006: Part 2 – Can Livestock Grazing be Used to Reduce Wildfires?" University of Nevada Cooperative Extension. Fact Sheet-07-21. Available online at http://www.unce.unr.edu/publications/files/nr/2007/fs0721.pdf. Accessed December 2016.

Appendix 1 - Mapping Products

Northwest Management, Inc.

233 East Palouse River Dr.
P.O. Box 9748
Moscow, ID 83843
208-883-4488
www.Consulting-Foresters.com

The information on the following maps was derived from digital databases held by Northwest Management, Inc. Care was taken in the creation of these maps, but all maps are provided "as is" with no warranty or guarantees. Northwest Management, Inc. cannot accept any responsibility for errors, omissions, or positional accuracy, and therefore, there are no warranties accompanying this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.

Appendix 2 - Documenting the Planning Process

Documentation of the planning process, including public involvement, is necessary to meet FEMA's DMA 2000 requirements (44CFR§201.4(c)(1) and §201.6(c)(1)). This appendix includes the agendas, a record of published articles regarding the CWPP, and the presentation given at local public meetings.

Advisory Group Involvement Documentation

Meeting Sign-In Sheets

The following are advisory group meeting sign-in sheets from February 28 to June 27, 2018.

Sign-In Sheet from February 28, 2018

Natural Resources

Page: 1 of

CLASS SIGN-IN SHEET

LEARNER: Print Name & Personnel ID #, below (Other state/private/etc. employee: indicate agency/org. and/or Pers. ID). If Name is listed, initial for attendance confirmation

*Course Title: CWPP ADVISORY COMMITTEE

*Class Date(s): 2/28/18

*Class Location (E.g. Region/City): LYLE FIRE STATION – KLICKITAT

*Classroom (Ex. NHB 175 A/B...):

*Instructor(s) Name(s) & *Organization: KACIFA

	ORGANIZATION	*Last Name, First Name (Print clearly)	PHONE	EMAIL
1	WADNR	LAWSON ALAN	509 889 2641	alan.lawson@dnr.wa.gov
2	KCFD 13	Walker Chuck	541-806-0731	charleswalker215@Gmail.com
3	KCFD 13	Pyke Gene	509-281-0901	apdalaska@Hotmail.com
4	KCFD 4	McCune David	509 637 4687	chief@Lylefire.com
5	NMI	Mathews Bill	208-941-6469	Mathews@nmi2.com
6	citizen	Bell, Nathan	503 752 1918	paddlernate@gmail.com
7	Fire Wise PPOA	Carol Martin	509.773-5946	cistecian@gorge.net
8	KCFD 10	Mercer, Calvin	509-391-4256	calvinwmercer@gmail.com
9	FireWise/Reducers	SCHNEIT, KEN	509 773 4074	[illegible]
10	KCFD 10	Hess, Eric	509 830 3888	erichess08@hotmail.com
11	CKCD/EKCD	Bartkowski, Kaci	(509) 773-5823 x5	Kaci@ckcd.org
12	W.S. Fire	Bill Hunsaker	509-493-1135	billh@ci.white-salmon.wa.us
13	KCFD 9	EARL SNYDER	509 261 1178	roosevelt9chief@gmail.com
14	KCFD 15	Brad Knowland	509-261-0634	hidenseek@gorge.net
15	WADNR	Dan Lennon	509-250-0491	daniel.lennon@dnr.wa.gov
16	MARS	Jay McLaughlin	509-364-4110	jay-mars@gorge.net
17	TL Com. Council	Bambe, Daina	541-490-9033	dainabambe89@gmail.com
18	Lyle #4	Ramsay, Justin	541-993-4928	foxjdr22@hotmail.com
19	High Prairie	DAY, JAMES	206-375-9694	samesday99@yahoo.com
20	WA DNR	TSUBOTA, JORDAN	541-980-1110	jordan.tsubota@dnr.wa.gov

INSTRUCTOR: Clearly indicate "No Shows" (E.g. "NS", or cross name out) and send completed roster to HR Div. Training Program, MS 47033, for completion credit and retention

Natural Resources

Page: 2 of

CLASS SIGN-IN SHEET

LEARNER: Print Name & Personnel ID #, below (Other state/private/etc. employee: indicate agency/org. and/or Pers. ID.). If Name is listed, initial for attendance confirmation

*Course Title: CWPP ADVISORY COMMITTEE

*Class Date(s): 2/28/18

*Class Location (E.g. Region/City...): LYLE FIRE STATION – KLICKITAT

*Classroom (Ex. NRB 175 A/B...):

*Instructor(s) Name(s) & *Organization: KACIFA

	ORGANIZATION	*Last Name, First Name (Print clearly)	PHONE	EMAIL
1	WA DNR	BARE, SHANE	509.607.6395	shane.bare@dnr.wa.gov
2	KCFD 14	MCMACKEN, TOM	509-3652786	mcmackint@gmail.com
3	SDS Lumber Co	GROSE, JEREMY	509 4932153	jeremy.g@sdslumber.com
4	USFS	Brewer, Scott	5094324808	sjbrewer@fs.fed.us
5				

Sign-In Sheet from March 28, 2018

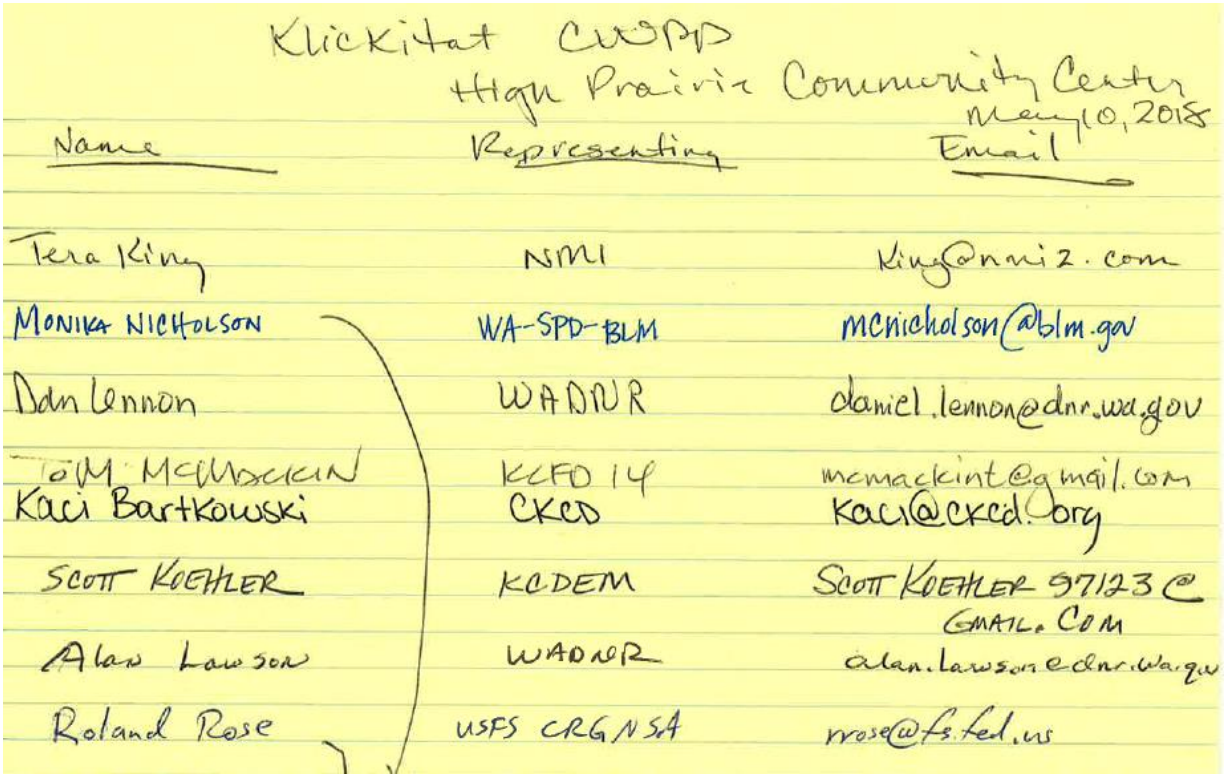
KLICKITAT COUNTY DEPARTMENT OF EMERGENCY MANAGMENT
SIGN-IN ROSTER

Goldendale Fire Station

Event Title:	Date:	Time:	Instructor/Presenter/Facilitator:
Klickitat CWPP	3-28-2018	6pm	

	NAME (Please print clearly)	REPRESENTING	TITLE	EMAIL	PHONE
1	MARY-LANE BAKER	FIREWISE PONDEROSA		mlaneandbob.z@gmail.com	509-773-4961
2	Carol A. Martin	Firewise Ponderosa Park		cistercian@gorge.net	773-5946
3	Eric Bieker	Western Pacific Timber		[illegible]	
4	EARL SNYDER	KCFD 9	FIRE CHIEF	roosevelt9chief@gmail.com	5092611178
5	Jason Blain	KCFD 7		bbkinranch@aol.com	509-250-0068
6	Kaci Bartkowski	CKCD/EKCD	Programs mng	kaci@ckcd.org	(509) 773-5823 x5
7	Loren Meagher	CKCD/EKCD	Manager	lm@ckcd.org	(509) 773-5823 x5
8	NOAH HALM	GFD	Fire chief	[illegible]@gorge.net	509-250-1678
9	Mike Delangis	GFD	CPT.	MRD_357@msn.com	" 250 1402
10	Loretta Duke	USFS CRGNSA	AFMO Ops	lorettaduke@fs.fed.us	509 885-3300
11	Scott Brewer	USFS CRGNSA Lyle	Engine Squad Leader	sjbrewer@fs.fed.us	(509) 432-4808
12	Gary R. Peters	Yakama Agency BIA	Prevention officer	gary_peters@yakama.com	509-865-6653
13	Dan Lennon	DNR	Landowner Assistance	daniel.lennon@dnr.wa.gov	509-773-5588
14	KEN SCHALEIP	FIREWISE PONDEROSA	LANDOWNER	[illegible]	509 2502408
15	Tom McMackin	KCFD 14/FIREWISE	LT. HIGH PRAIRIE	mcmackint@gmail.com	509 365-2786
16	Brad Knowland	KCFD 15	Fire chief	hidenseek@gorge.net	509-261-0834
17					

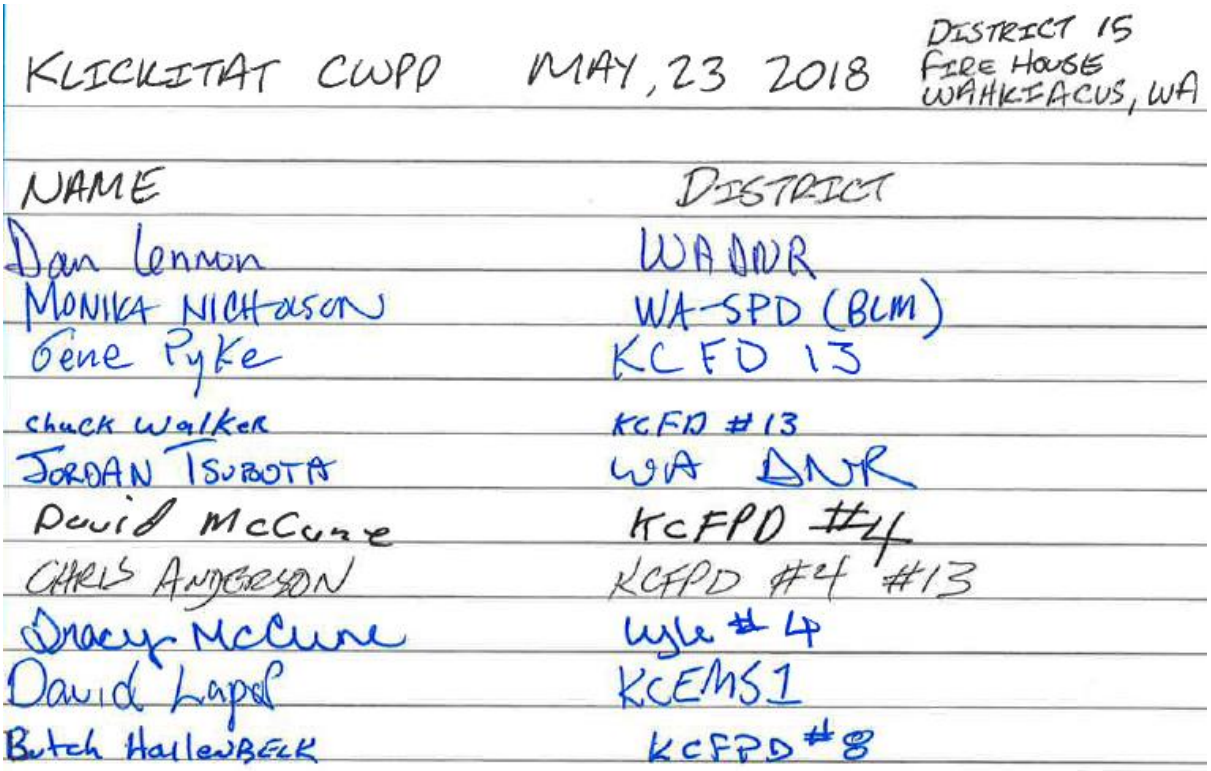
Sign-In Sheet from May 10, 2018



Klickitat CWPP
High Prairie Community Center
May 10, 2018

Name	Representing	Email
Tera King	NMI	King@nmi2.com
Monika Nicholson	WA-SPD-BLM	mcnicholson@blm.gov
Dan Lennon	WADNR	daniel.lennon@dnr.wa.gov
Tom McMackin	KCFD 14	mcmackint@gmail.com
Kaci Bartkowski	CKCD	kaci@ckcd.org
Scott Koehler	KCDEM	Scott Koehler 97123@gmail.com
Alan Lawson	WADNR	alan.lawson@dnr.wa.gov
Roland Rose	USFS CRGNSA	rrose@fs.fed.us

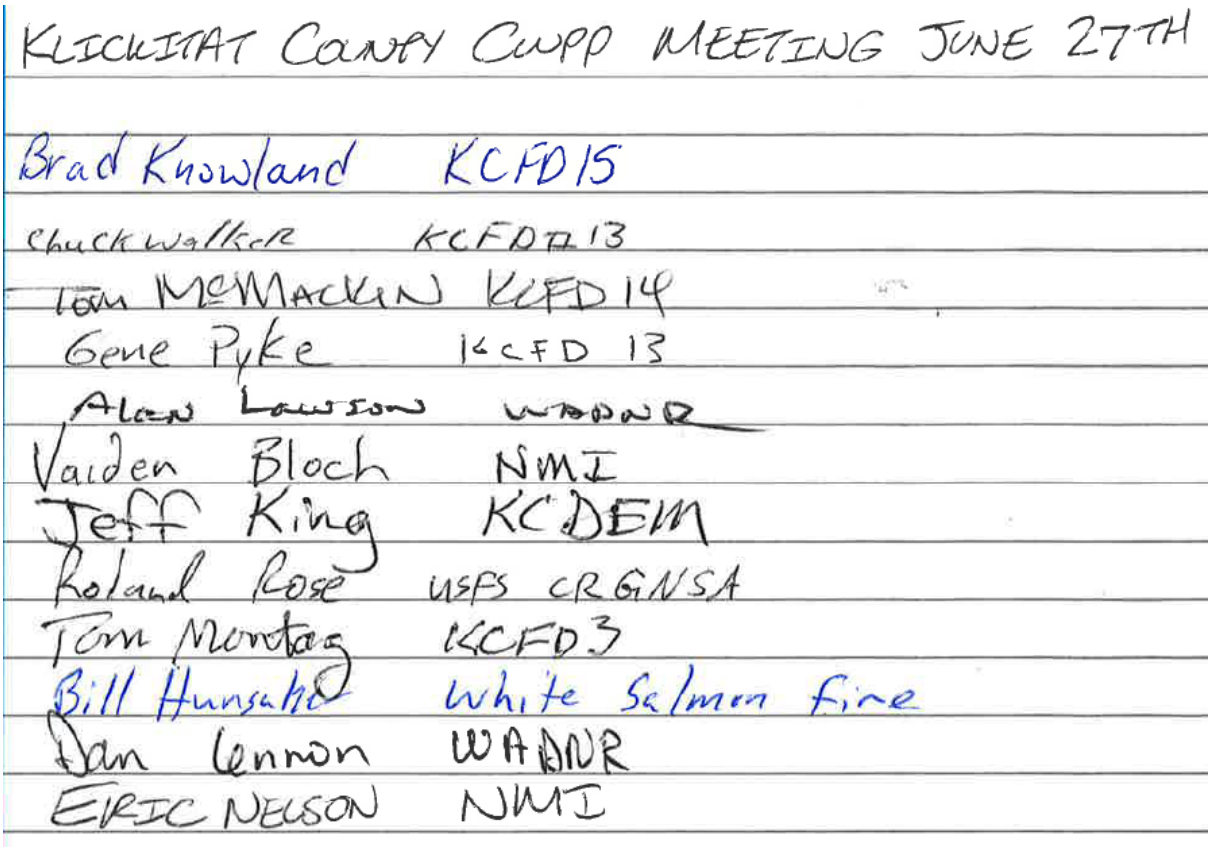
Sign-In Sheet from May 23, 2018



KLICKITAT CWPP MAY, 23 2018 DISTRICT 15 FIRE HOUSE WAHKIACUS, WA

NAME	DISTRICT
Dan Lennon	WADNR
Monika Nicholson	WA-SPD (BLM)
Gene Pyke	KCFD 13
Chuck Walker	KCFD #13
Jordan Tsubota	WA DNR
David McCune	KCFPD #4
Chris Anderson	KCFPD #4 #13
Stacy McCune	Lyle #4
David Lapof	KCEMS1
Butch Harlewbeck	KCFPD #8

Sign-In Sheet from June 27, 2018



KLICKITAT County CWPP MEETING JUNE 27TH

Brad Knowland	KCFD 15
Chuck Walker	KCFD #13
Tom McMACKIN	KCFD 14
Gene Pyke	KCFD 13
Alan Lawson	WADNR
Vaiden Bloch	NMI
Jeff King	KC DEM
Roland Rose	USFS CRGNSA
Tom Montag	KCFD 3
Bill Hunsaker	White Salmon Fire
Dan Lennon	WADNR
ERIC NELSON	NMI

Meeting Agendas

A G E N D A	**Klickitat County** **Community Wildfire Protection Plan** **Wednesday, February 28, 2018** **6pm – 7:30pm** **Location: Lyle Fire Station** **514 Washington Street, Lyle, WA**	
6:00pm	**OPEN – Introductions**	Al Lawson WADNR
6:15 am	**GROUP MEETING** I. Overview ✔ Review Purpose and End Goal of Countywide CWPP ✔ How is this different from the HMP and EOP ✔ Q&A II. Risk Assessments ✔ Grassland versus timberland – how do we capture differences? ✔ CWPP Questionnaire – discuss and collect ✔ Discuss plan components that need local review & insight III. Existing Community CWPPs ✔ Status Report from Representatives in Attendance ✔ How do they tie in? ✔ Review specific content and discuss past and planned projects IV. Public Outreach ✔ Any local CWPP groups currently hosting meetings? ✔ Other events that might work? ✔ Is there a way to tie in an education component? V. Looking Ahead ✔ Timelines for Deliverables ✔ Next Meeting	Northwest Management, Inc.
7:00 pm	**OPEN DISCUSSION**	Group

A G E N D A	**Klickitat County** **Community Wildfire Protection Plan** **Wednesday, March 28, 2018** **6pm – 7pm** **Location: Goldendale Fire Station**	
6:00pm	**OPEN – Introductions**	Al Lawson WADNR
6:05 am	**GROUP MEETING** I. Old Business ✓ Comments on CWPP goals statement ✓ Collect any remaining questionnaires II. Priority Project Areas ✓ On – the – ground - High impact areas? - Chronic loss areas? - High conservation values at risk? - Vulnerable populations? ✓ Updated Action Items from Community-level Plans ✓ Big Picture Solutions - Policies? - Education? - Coverage? III. Public Outreach Planning ✓ Any local CWPP groups currently hosting meetings? ✓ Other events that might work? ✓ Is there a way to tie in an education component? IV. Looking Ahead ✓ Timelines for Deliverables ✓ Next Meeting – structure, date, location?	Northwest Management, Inc.
6:50 pm	**OPEN DISCUSSION**	Group

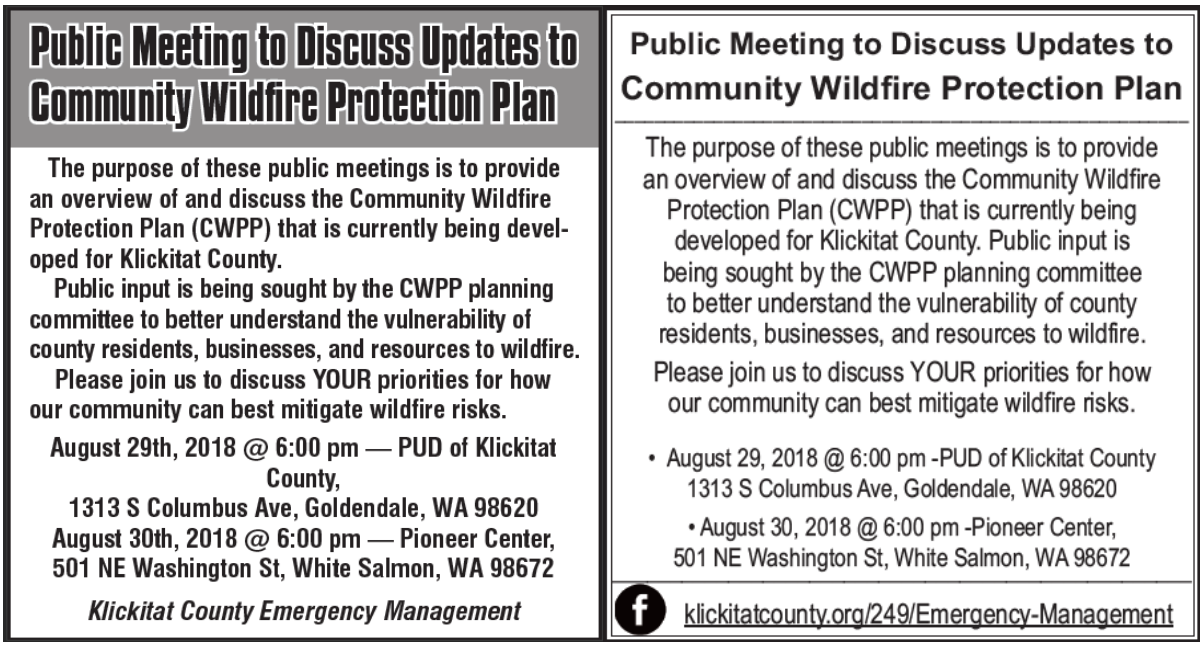
A G E N D A	**Klickitat County** **Community Wildfire Protection Plan** **Thursday, May 10, 2018** **6pm – 8:00pm** **Location: High Prairie Community Center** **701 Struck Road, Lyle, WA**	
6:00pm	**OPEN – Introductions**	Al Lawson WADNR
6:15 am	**GROUP MEETING** I. Old Business ✓ Purpose of Dedicated Meeting II. Risk Assessments ✓ WUI ✓ Fire Risk Models ✓ Field Assessments III. Priority Issues and Project Areas - *continued* ✓ On – the – ground 1. High impact areas? 2. Chronic loss areas? 3. High conservation values at risk? 4. Vulnerable populations? ✓ Questionnaire Summary Issues ✓ Big Picture Solutions 1. Policies? 2. Education? 3. Coverage? IV. Public Outreach ✓ Dates? Venues? V. Looking Ahead ✓ Upcoming Schedule ✓ Timelines and Dates for Deliverables	Northwest Management, Inc. and Meeting Participants
7:45 pm	**OPEN DISCUSSION**	

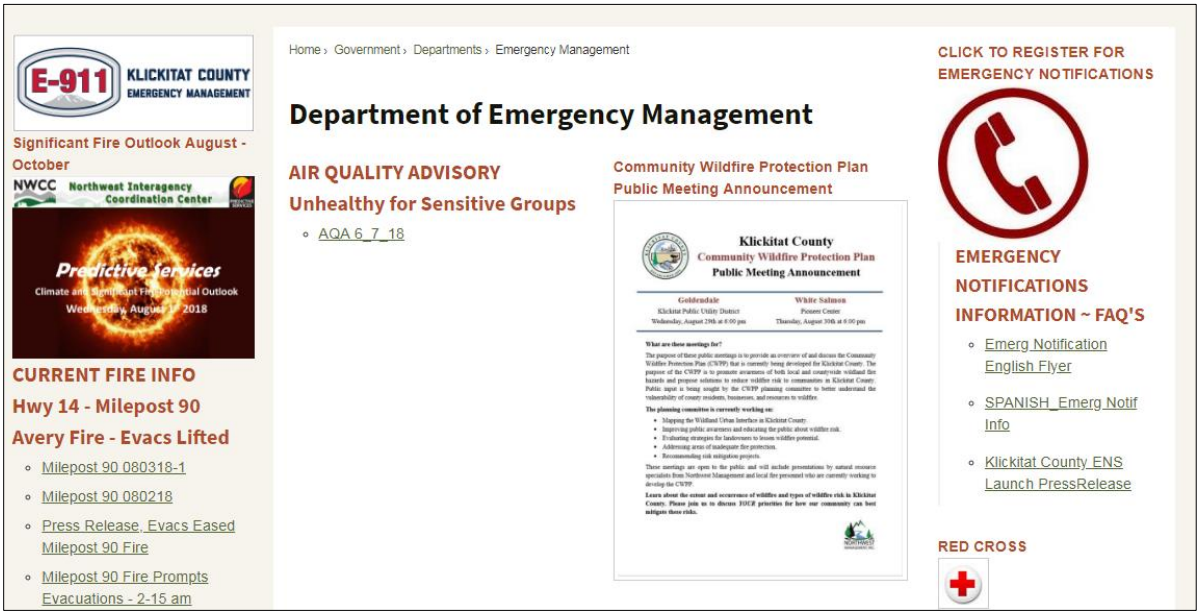
A G E N D A	**Klickitat County** **Community Wildfire Protection Plan** **Wednesday, May 23, 2018** **6pm – 7pm** **Location: District #15 - Wahkiacus Fire Station**	
6:00pm	**OPEN – Introductions**	Al Lawson WADNR
6:05 am	**GROUP MEETING** I. Old Business ✓ Review Mitigation Action Items Handout ✓ Review Project Map II. Public Outreach ✓ June Dates and Locations III. Looking Ahead ✓ Upcoming Schedule ✓ Timelines and Dates for Deliverables	Northwest Management, Inc. and Meeting Participants
6:50 pm	**OPEN DISCUSSION**	

A G E N D A	**Klickitat County** **Community Wildfire Protection Plan** **Wednesday, June 27, 2018** **6pm – 7pm** **Location: District #13 – Appleton Fire Station**	
6:00pm	**OPEN – Introductions**	Al Lawson WADNR
6:05 am	**GROUP MEETING** I. Old Business ✓ Briefly review comments received II. Review Committee Draft of CWPP ✓ Review contents and layout ✓ Review missing information III. Public Outreach ✓ Set dates and locations IV. Looking Ahead ✓ Upcoming Schedule ✓ Timelines and Dates for Deliverables	Northwest Management, Inc. and Meeting Participants
6:50 pm	**OPEN DISCUSSION**	

Public Involvement Documentation

Public Meeting Advertisements





Klickitat County
Community Wildfire Protection Plan
Public Meeting Announcement

Goldendale	White Salmon
Klickitat Public Utility District	Pioneer Center
Wednesday, August 29th at 6:00 pm	Thursday, August 30th at 6:00 pm

What are these meetings for?

The purpose of these public meetings is to provide an overview of and discuss the Community Wildfire Protection Plan (CWPP) that is currently being developed for Klickitat County. The purpose of the CWPP is to promote awareness of both local and countywide wildland fire hazards and propose solutions to reduce wildfire risk to communities in Klickitat County. Public input is being sought by the CWPP planning committee to better understand the vulnerability of county residents, businesses, and resources to wildfire.

The planning committee is currently working on:

- Mapping the Wildland Urban Interface in Klickitat County.
- Improving public awareness and educating the public about wildfire risk.
- Evaluating strategies for landowners to lessen wildfire potential.
- Addressing areas of inadequate fire protection.
- Recommending risk mitigation projects.

These meetings are open to the public and will include presentations by natural resource specialists from Northwest Management and local fire personnel who are currently working to develop the CWPP.

Learn about the extent and occurrence of wildfire and types of wildfire risk in Klickitat County. Please join us to discuss *YOUR* priorities for how our community can best mitigate these risks. Visit www.klickitatcounty.org/249/Emergency-Management or find Klickitat County Emergency Management on Facebook for more information.

NORTHWEST MANAGEMENT, INC.

Public Meeting Presentation

The following slides are excerpts from the PowerPoint that was presented by Eric Nelson and Brad Tucker of Northwest Management, Inc. at the public meetings. Local emergency and natural resource personnel were also present when available.

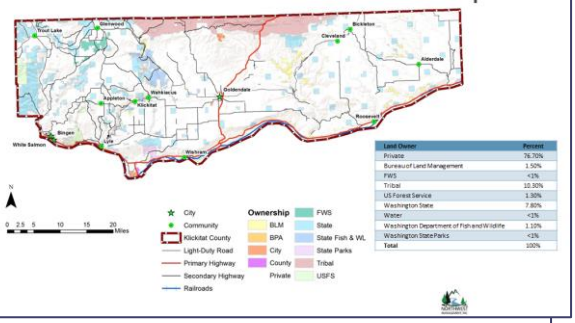
Community Wildfire Protection Plan
Klickitat County, WA

Northwest Management, Inc.
Eric Nelson, Brad Tucker
August, 2018

Purpose of the CWPP

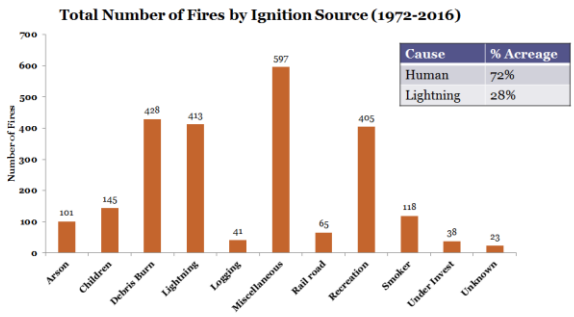
- The Healthy Forests Restoration Act of 2003 (HFRA):
  - Enables the USFS and BLM to perform hazardous fuels reduction projects.
  - Fuels-reduction projects are aimed at protecting communities, watersheds, and other at-risk lands from catastrophic wildfire.
  - Projects are developed around priorities of local communities.
- The Community Wildfire Protection Plan (CWPP):
  - Development and adoption of a CWPP allows local communities to take full advantage of the HFRA.
  - Community officials and the public can identify areas of concern and participate in planning fuels reduction projects.
  - Local wildfire protection plans can take a variety of forms, based on the needs of the people involved in their development.

Characteristics: Land Ownership



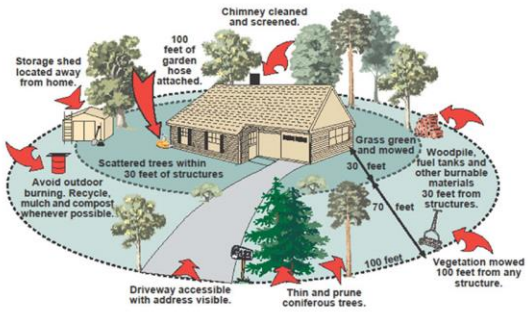
Land Owner	Percent
Private	76.70%
Bureau of Land Management	1.50%
FWS	<1%
Tribal	10.30%
US Forest Service	1.30%
Washington State	7.80%
Water	<1%
Washington Department of Fish and Wildlife	1.10%
Washington State Parks	<1%
Total	100%

Risk Assessment: Fire History

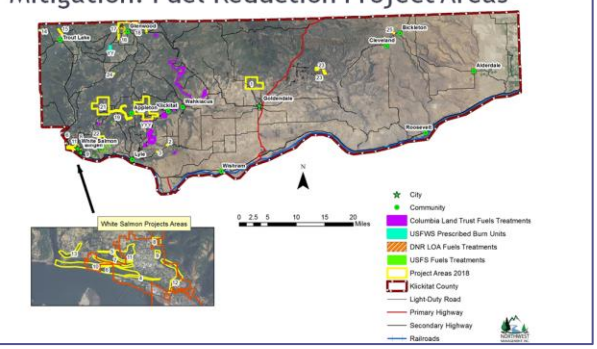


Cause	% Acreage
Human	72%
Lightning	28%

Mitigation: Firewise



Mitigation: Fuel Reduction Project Areas



Public Comment Period Press Release

Klickitat County
Emergency Management
911/Dispatch

199 Industrial Way, Goldendale, WA 98620
(509) 773-0582
Fax (509) 773-0362
emergencymanagement@klickitatcounty.org

Immediate Press Release

Klickitat County Community Wildfire Protection Plan Available for Public Review

The Klickitat County Community Wildfire Protection Plan has been completed in draft form and is available to the public for review at the locations listed below. Electronic copies may be viewed in pdf format at (https://www.klickitatcounty.org/249/Emergency-Management). The public review phase of the planning process will be open through November 23, 2018.

Klickitat County Board of County Commissioners
205 S. Columbus Rm 103
Goldendale, WA 98620

Goldendale Community Library
131 West Burgen St.
Goldendale, WA 98620

The purpose of the Klickitat County Community Wildfire Protection Plan (CWPP) is to reduce the impact of wildfire on Klickitat County residents, landowners, businesses, communities, local governments, and state and federal agencies while maintaining appropriate emergency response capabilities and sustainable natural resource management policies. The CWPP identifies high-risk areas as well as recommend specific projects that may help prevent wildland fires from occurring altogether or, at the least, lessen their impact on residents and property. The CWPP is being developed by a committee of city and county elected officials and departments, local and state emergency response representatives, land managers, conservation district representatives, and others.

The Klickitat County CWPP includes a risk analysis at the community level with predictive models for where wildfires are likely to occur. This Plan will enable Klickitat County and its communities to be eligible for grant dollars to implement the projects and mitigation actions identified by the committee. Although not regulatory, the CWPP will provide valuable information as we plan for the future.

Please submit comments on the CWPP to Eric Nelson, Northwest Management, Inc. @ nelson@nmi2.com or by mail Attention: Eric Nelson, Northwest Management, Inc. PO Box 9748, Moscow, Idaho 83843 by close of business on November 23, 2018. For more information on the Klickitat County CWPP update process, contact Eric Nelson at 208-883-4488 Ext 127.

Appendix 3 - Risk Analysis Models

Historic Fire Regime

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse-scale definitions for natural (historical) fire regimes have been developed by Hardy et al. (2001) and Schmidt et al. (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. These five regimes include: I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced); II – 0-35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced); III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced); IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced); V – 200+ year frequency and high (stand replacement) severity.

A database of fire history studies in Washington was used to develop modeling rules for predicting historical fire regimes (HFRs). Tabular fire-history data and spatial data was stratified into ecoregions, potential natural vegetation types (PNVs), slope classes, and aspect classes to derive rule sets which were then modeled spatially. Expert opinion was substituted for a stratum when empirical data was not available.

Fire is one of the dominant disturbance processes that manipulate vegetation patterns in Washington. The HFR data were prepared to supplement other data necessary to assess integrated risks and opportunities at regional and sub-regional scales. The HFR theme was derived specifically to estimate an index of the relative change of a disturbance process, and the subsequent patterns of vegetation composition and structure.

These data were derived using fire history data from a variety of different sources. These data were designed to characterize broad scale patterns of historical fire regimes for use in regional and sub-regional assessments. Any decisions based on these data should be supported with field verification, especially at scales finer than 1:100,000. Because the resolution of the HFR theme is 30 meter cell size, the expected accuracy does not warrant their use for analyses of areas smaller than about 10,000 acres (for example, assessments that typically require 1:24,000 data).

Vegetation Condition Class

Vegetation Condition Class (VCC) is an interagency, standardized tool for determining the degree of departure from reference condition vegetation, fuels, and disturbance regimes. Assessing VCC can help guide management objectives and set priorities for treatments.

As scale of application becomes finer the five historic fire regimes may be defined with more detail, or any one class may be split into finer classes, but the hierarchy to the coarse scale definitions should be retained. Coarse-scale VCC classes have been defined and mapped by Hardy et al. (2001) and Schmidt et al. (2001). They include three condition classes for each historic fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing, and drought). There are no wildland vegetation and fuel conditions or wildland fire situations that do not fit within one of the three classes.

The three classes are based on low (VCC 1), moderate (VCC 2), and high (VCC 3) departure from the central tendency of the natural (historical) regime (Hann and Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2002). The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), “high graded” forest composition and structure (e.g. large trees removed in a frequent surface fire regime), or repeated annual grazing that maintains grassy fuels across relatively large areas at levels that will not carry a surface fire.

Determination of amount of departure is based on comparison of a composite measure of fire regime attributes (vegetation characteristics; fuel composition; fire frequency, severity and pattern) to the central tendency of the natural (historical) fire regime. The amount of departure is then classified to determine the vegetation condition class. A simplified description of the vegetation condition classes and associated potential risks follow.

Relative Threat Level

Development of a Threat Level map for the Klickitat County CWPP involved geographically developing and ranking the various threat categories identified by the CWPP Advisory group. Threat categories identified for the analysis include Slope, Aspect, Fire Behavior Fuel Model, Predicted Flame Length Class, Precipitation Levels, Predicted Rate of Fire Spread, Predicted Wild Fire Intensity and Population Density. The various data sets for each threat or condition were developed and ranked based on their significance pertaining to wildfire. The various ranked layers were then analyzed in a geographical information system to produce a cumulative effects map based on the ranking. Following is a brief explanation of the various threats identified for the analysis, and the general value ranking scheme used for each. The Relative Threat Level Map is found on page 9 of the appendices of the CWPP document.

Appendix 4 –Contact Information

Klickitat County Fire Departments and Fire Districts

District Information	Chief Contact Information	
District 1 - Trout Lake	**Chief:**	**Lanny Smith**
2483 Hwy 141	Telephone:	541-490-5825
PO Box 328	e-mail:	lannysmithjdc@gorge.net
Trout Lake, WA 98650		
District 2 – Bickleton	**Chief:**	**John Jensen**
135 Creston Ave	Telephone:	509-896-5445
PO Box 405	e-mail:	chief@bickleton.org
Creston, WA 99117		
District 3 – Husum	**Chief:**	**Wesley Long**
200 Husum St.	Telephone:	509-493-2996
PO Box 151	e-mail:	Cheif@kcfd3.com
Husum, WA 98623		
District 4 – Lyle	**Chief:**	**David McCune**
514 Washington St.	Telephone:	509-365-2500
PO Box 63	e-mail:	Chief@lylefire.com
Lyle, WA 98635		
District 5 – Centerville	**Chief:**	**Lawrence Browning**
2297 Centerville Hwy	Telephone:	509-773-1919
Centerville, WA 98613	e-mail:	kcfd5@gorge.net
District 6 – Dallesport	**Chief:**	**Rhet Howard**
PO Box 215	Telephone:	509-767-1252
Dallesport, WA 98617	e-mail:	rhet.dallesportfire@gmail.com
District 7 – Goldendale	**Chief:**	**Tony Browning**
327 W Brooks	Telephone:	509-980-7415
Goldendale, WA 98620	e-mail:	rural7@gorge.net
District 8 – Glenwood	**Chief:**	**Brent Gimlin**
215 Ash St	Telephone:	509-364-4158
PO Box 22	e-mail:	N/A
Glenwood, WA 98619		
District 9 – Roosevelt	**Chief:**	**Earl Snyder**
211 Columbia	Telephone:	509-384-5192
PO Box 147	e-mail:	rural9office@gmail.com
Roosevelt, WA 99356		
District 10 – Alderdale	**Chief:**	**Calvin Mercer**
1318 Hale Rd	Telephone:	509-364-3709

Mabton, WA 98935	e-mail:	calvinmercer@gmail.com
District 11 – Wishram	**Chief:**	**Jennifer Rosa**
PO Box 134	Telephone:	509-748-2255
Wishram, WA 98673	e-mail:	rosacjl@centurylink.net
District 12 - Klickitat	**Chief:**	**Curtis Melvin**
PO Box 77	Telephone:	541-490-5226
Klickitat, WA 98628	e-mail:	bgfink@gorge.net
District 13 - Appleton	**Chief:**	**Gene Pyke**
839 Appleton Rd.	Telephone:	509-365-3185 (Home)
PO Box 44		509-365-5091 (Fax)
Appleton, WA 98602		
District 14 – High Prairie	**Chief:**	**Tim Darland**
704 Centerville Hwy	Telephone:	509-365-3085
PO Box 853	e-mail:	darland007@gmail.com
Lyle, WA 98635		
District 15 – Wahkiacus	**Chief:**	**Brad Knowland**
12 Mill Rd.	Telephone:	509-261-0834
PO Box 123	e-mail:	hidenseek@gorge.net
Klickitat, WA 98628		

Other Natural Resources Entities and Agencies

Entity/Agency	Contact Information
Klickitat County Emergency Management	**Phone:** (509) 773-4545 **Website:** www.klickitatcounty.org/249/Emergency-Management
Washington DNR: Southeast Region	**Phone:** (509) 925-8510 **E-mail:** southeast.region@dnr.wa.gov
BLM: Spokane District Office	**Phone:** (509) 536-1200 **E-mail:** BLM_OR_SP_Mail@blm.gov
Yakama Nation Fire Management	**Phone:** (509) 865-6653 **Website:** www.yakamanationfire.com
USFS: Columbia River Gorge National Scenic Area	**Phone:** (541) 308-1700 **Website:** www.fs.usda.gov/crgnsa
USFS: Gifford Pinchot National Forest: Mt Adams Ranger District	**Phone:** (509) 395-3402 **Website:** www.fs.usda.gov/giffordpinchot
Eastern & Central Klickitat Conservation Districts	**Phone:** (509) 773-5823 EXT 5 **E-mail:** cdoffice@ckcd.org
Underwood Conservation District	**Phone:** (509) 493-1936 **E-mail:** info@ucdwa.org

Appendix 5 - State and Federal CWPP Guidance

National Cohesive Strategy

In response to requirements of the Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009, the Wildland Fire Leadership Council (WFLC) directed the development of the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy).

The Cohesive Strategy is a collaborative process with active involvement of all levels of government and non-governmental organizations, as well as the public, to seek national, all-lands solutions to wildland fire management issues.

The Cohesive Strategy is being implemented in three phases, allowing stakeholders to systematically develop a dynamic approach to planning for, responding to, and recovering from wildland fire incidents. This phased approach is designed to promote dialogue between national, regional and local leadership.

Phase I involved the development of two documents: *A National Cohesive Wildland Fire Management Strategy* and *The Federal Land Assistance, Management And Enhancement Act Of 2009 - Report to Congress*. These documents provide the foundation of the Cohesive Strategy.

In Phase II, regional assessments were completed to address the national goals to the needs and challenges found at regional and local levels. Regional Strategy Committees representing three regions of the country—the Northeast, Southeast, and West—examined the processes by which wildland fire, or the absence thereof, threatens areas and issues that American value, including wildlife habitats, watershed quality, and local economies, among others.

Phase III involves taking the qualitative information gathered in Phase II and translating it into quantitative models that can help inform management actions on the ground. Once the strategy is finalized, it will be implemented across the country and overseen by the Wildland Fire Executive Council (WFEC), which will establish a five-year review cycle to provide updates to Congress.

The Wildland Fire Executive Council (WFEC) accepted the final Regional Action Plans for each of the Cohesive Strategy Regions: Northeast, Southeast, and West in April 2013. The WFEC tasked the Cohesive Strategy Sub-Committee (CSSC) to use the regional action plans to inform the development of the national action plan. The National Risk Analysis Report and National Action Plan will become WFEC recommendations to the Wildland Fire Leadership Council (WFLC) and ultimately to the Secretaries of the Interior and Agriculture. The regional action plans reflect the regional perspective that is important in the development of that national-level recommendation. Implementation of actions identified in Regional Action Plans is the responsibility of the sponsoring organizations at the discretion of those organizations.

National Fire Plan

The National Fire Plan (NFP) was developed by the U.S. Departments of Interior and Agriculture and their land management agencies in August 2000, following a landmark wildland fire season, with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. The NFP addresses five key points: Firefighting, Rehabilitation, Hazardous Fuels Reduction, Community Assistance, and Accountability. The National Fire Plan continues to provide invaluable technical, financial, and resource guidance and support for wildland fire management across the United States. Together, the USDA Forest Service and the Department of the Interior are working to successfully implement the key points outlined in the National Fire Plan.

This Community Wildfire Protection Plan fulfills the National Fire Plan's 10-Year Comprehensive Strategy Implementation Plan (WFLC 2006). The projects and activities recommended under this plan are in addition to other federal, state, and private / corporate forest and rangeland management activities. The implementation plan does not alter, diminish, or expand the existing jurisdiction, statutory and regulatory responsibilities and authorities or budget processes of participating federal and state agencies.

The NFP goals of this Community Wildfire Protection Plan include:

1. Improve Fire Prevention and Suppression
2. Reduce Hazardous Fuels
3. Restoration and Post-Fire Recovery of Fire-Adapted Ecosystems
4. Promote Community Assistance

By endorsing this implementation plan, all signed parties agree that reducing the threat of wildland fire to people, communities, and ecosystems will require:

- Maintaining firefighter and public safety continuing as the highest priority.
- Communities and individuals in the wildland-urban interface to initiate personal stewardship and volunteer actions that will reduce wildland fire risks.
- A sustained, long-term and cost-effective investment of resources by all public and private parties, recognizing overall budget parameters affecting federal, state, county, and local governments.
- A unified effort to implement the collaborative framework called for in the strategy in a manner that ensures timely decisions at each level.
- Accountability for measuring and monitoring performance and outcomes, and a commitment to factoring findings into future decision making activities.

- The achievement of national goals through action at the local level with particular attention to the unique needs of cross-boundary efforts and the importance of funding on-the-ground activities.
- Management activities, both in the wildland-urban interface and in at-risk areas across the broader landscape.
- Active forestland management, including thinning that produces commercial or pre-commercial products, biomass removal and utilization, prescribed fire and other fuels reduction activities to simultaneously meet long-term ecological, economic, and community objectives.

The National Fire Plan identifies a three-tiered organizational structure including 1) the local level, 2) state/regional and tribal level, and 3) the national level. This plan adheres to the collaboration and outcomes consistent with a local level plan. Local level collaboration involves participants with direct responsibility for management decisions affecting public and/or private land and resources, fire protection responsibilities, or good working knowledge and interest in local resources. Participants in this planning process include local representatives from federal and state agencies, local governments, landowners and other stakeholders, and community-based groups with a demonstrated commitment to achieving the strategy's four goals. Existing resource advisory committees, watershed councils, or other collaborative entities may serve to achieve coordination at this level. Local involvement, expected to be broadly represented, is a primary source of planning, project prioritization, and resource allocation and coordination. The role of the private citizen should not be underestimated as all phases of risk assessment, mitigation, and project implementation are greatly facilitated by their involvement.

National Association of State Foresters

This plan is written with the intent to provide decision makers (elected and appointed officials) the information they need to prioritize projects across the entire county. These decisions may be made by the Board of Commissioners or other elected body or through the recommendations of ad hoc groups tasked with making prioritized lists of communities at risk as well as project areas. It is not necessary to rank communities or projects numerically, although that is one approach. Rather, it may be possible to rank them categorically (high priority set, medium priority set, and so forth) and still accomplish the goals and objectives set forth in this planning document.

The following was prepared by the National Association of State Foresters (NASF), June 27, 2003, and is included here as a reference for the identification and prioritizing of treatments between communities.

Purpose: To provide national, uniform guidance for implementing the provisions of the "Collaborative Fuels Treatment" Memorandum of Understanding (MOU), and to satisfy the

requirements of Task e, Goal 4 of the Implementation Plan for the 10-Year Comprehensive Strategy.

Intent: The intent is to establish broad, nationally compatible standards for identifying and prioritizing communities at risk, while allowing for maximum flexibility at the state and regional level. Three basic premises are:

- Include all lands and all ownerships.
- Use a collaborative process that is consistent with the complexity of land ownership patterns, resource management issues, and the number of interested stakeholders.
- Set priorities by evaluating projects, not by ranking communities.

The National Association of State Foresters (NASF) set forth the following guidelines in the Final Draft Concept Paper; Communities at Risk, December 2, 2002.

Task: Develop a definition for "communities at risk" and a process for prioritizing them, per the Implementation Plan for the 10-Year Comprehensive Strategy (Goal 4.e.). In addition, this definition will form the foundation for the NASF commitment to annually identify priority fuels reduction and ecosystem restoration projects in the proposed MOU with the federal agencies (section C.2 (b)).

Conceptual Approach

1. NASF fully supports the definition of the Wildland Urban Interface (WUI) previously published in the Federal Register. Further, proximity to federal lands should not be a consideration. The WUI is a set of conditions that exists on, or near, areas of wildland fuels nationwide, regardless of land ownership.
2. Communities at risk (or, alternately, landscapes of similar risk) should be identified on a state-by-state basis with the involvement of all agencies with wildland fire protection responsibilities: state, local, tribal, and federal.
3. It is neither reasonable nor feasible to attempt to prioritize communities on a rank order basis. Rather, communities (or landscapes) should be sorted into three, broad categories or zones of risk: high, medium, and low. Each state, in collaboration with its local partners, will develop the specific criteria it will use to sort communities or landscapes into the three categories. NASF recommends using the publication "Wildland/Urban Interface Fire Hazard Assessment Methodology" developed by the National Wildland/Urban Interface Fire Protection Program (circa 1998) as a reference guide. (This program, which has since evolved into the Firewise Program, is under the oversight of the National Wildfire Coordinating Group (NWCG)). At a minimum, states should consider the following factors when assessing the relative degree of exposure each community (landscape) faces.

- **Risk:** Using historic fire occurrence records and other factors, assess the anticipated probability of a wildfire ignition.
- **Hazard:** Assess the fuel conditions surrounding the community using a methodology such as fire condition class, or [other] process.
- **Values Protected:** Evaluate the human values associated with the community or landscape, such as homes, businesses, and community infrastructure (e.g. water systems, utilities, transportation systems, critical care facilities, schools, manufacturing and industrial sites, and high value commercial timber lands).
- **Protection Capabilities:** Assess the wildland fire protection capabilities of the agencies and local fire departments with jurisdiction.

4. Prioritize by project not by community. Annually prioritize projects within each state using the collaborative process defined in the national, interagency MOUs, "For the Development of a Collaborative Fuels Treatment Program." Assign the highest priorities to projects that will provide the greatest benefits either on the landscape or to communities. Attempt to properly sequence treatments on the landscape by working first around and within communities, and then moving further out into the surrounding landscape. This will require:
    - First, focusing on the zone of highest overall risk but considering projects in all zones. Identify a set of projects that will effectively reduce the level of risk to communities within the zone.
    - Second, determining the community's willingness and readiness to actively participate in an identified project.
    - Third, determining the willingness and ability of the owner of the surrounding land to undertake, and maintain, a complementary project.
    - Last, setting priorities by looking for projects that best meet the three criteria above. It is important to note that projects with the greatest potential to reduce risk to communities and the landscape may not be those in the highest risk zone, particularly if either the community or the surrounding landowner is not willing or able to actively participate.
5. It is important, and necessary, that we be able to demonstrate a local level of accomplishment that justifies to Congress the value of continuing the current level of appropriations for the National Fire Plan. Although appealing to appropriators and others, it is not likely that many communities (if any) will ever be removed from the list of communities at risk. Even after treatment, all communities will remain at some, albeit reduced, level of risk. However, by using a science-based system for measuring relative risk, we can likely show that, after treatment (or a series of treatments); communities are at "*reduced risk."*

Using the concept described above, the NASF believes it is possible to accurately assess the relative risk that communities face from wildland fire. Recognizing that the condition of the vegetation (fuel) on the landscape is dynamic, assessments and re-assessments must be done on a state-by-state basis, using a process that allows for the integration of local knowledge, conditions, and circumstances, with science-based national guidelines. We must remember that it is not only important to lower the risk to communities, but once the risk has been reduced, to maintain those communities at a reduced risk.

Further, it is essential that both the assessment process and the prioritization of projects be done collaboratively, with all local agencies with fire protection jurisdiction taking an active role.

Healthy Forests Restoration Act

On December 3, 2003, President Bush signed into law the Healthy Forests Restoration Act of 2003 to reduce the threat of destructive wildfires while upholding environmental standards and encouraging early public input during review and planning processes. The legislation is based on sound science and helps further the President's Healthy Forests Initiative pledge to care for America's forests and rangelands, reduce the risk of catastrophic fire to communities, help save the lives of firefighters and citizens, and protect threatened and endangered species.

The Healthy Forests Restoration Act (HFRA) seeks to:

- Strengthens public participation in developing high priority projects;
- Reduces the complexity of environmental analysis allowing federal land agencies to use the best science available to actively manage land under their protection;
- Creates a pre-decisional objections process encouraging early public participation in project planning; and
- Issues clear guidance for court action challenging HFRA projects.

The Klickitat County Community Wildfire Protection Plan was developed to adhere to the principles of the HFRA while providing recommendations consistent with the policy document. This should assist the federal land management agencies with implementing wildfire mitigation projects in Klickitat County that incorporate public involvement and the input from a wide spectrum of fire and emergency services providers in the region.

Federal Emergency Management Agency Philosophy

Effective November 1, 2004, a hazard mitigation plan approved by the Federal Emergency Management Agency (FEMA) is required for Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Program (PDM) eligibility. The HMGP and PDM programs provide funding,

through state emergency management agencies, to support local mitigation planning and projects to reduce potential disaster damages.

The local hazard mitigation plan requirements for HMGP and PDM eligibility are based on the Disaster Mitigation Act (DMA) of 2000, which amended the Stafford Disaster Relief Act to promote an integrated, cost effective approach to mitigation. Local hazard mitigation plans must meet the minimum requirements of the Stafford Act-Section 322, as outlined in the criteria contained in 44 CFR Part 201. The plan criteria cover the planning process, risk assessment, mitigation strategy, plan maintenance, and adoption requirements.

FEMA only reviews a local hazard mitigation plan submitted through the appropriate State Hazard Mitigation Officer (SHMO). FEMA reviews the final version of a plan prior to local adoption to determine if the plan meets the criteria, but FEMA will not approve it prior to adoption.

A FEMA designed plan is evaluated on its adherence to a variety of criteria.

- Adoption by the Local Governing Body
- Multi-jurisdictional Plan Adoption
- Multi-jurisdictional Planning Participation
- Documentation of Planning Process
- Identifying Hazards
- Profiling Hazard Events
- Assessing Vulnerability: Identifying Assets
- Assessing Vulnerability: Estimating Potential Losses
- Assessing Vulnerability: Analyzing Development Trends
- Multi-jurisdictional Risk Assessment
- Local Hazard Mitigation Goals
- Identification and Analysis of Mitigation Measures
- Implementation of Mitigation Measures
- Multi-jurisdictional Mitigation Strategy
- Monitoring, Evaluating, and Updating the Plan
- Implementation through Existing Programs
- Continued Public Involvement

Appendix 6 - Potential CWPP Project Funding Sources

Assistance to Firefighters Grant (AFG)

http://www.fema.gov/assistance-firefighters-grant

The primary goal of the Assistance to Firefighters Grant (AFG) is to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical service organizations. Since 2001, AFG has helped firefighters and other first responders to obtain critically needed equipment, protective gear, emergency vehicles, training and other resources needed to protect the public and emergency personnel from fire and related hazards.

Fire Service Grants and Funding (AFGP)

http://www.usfa.fema.gov/grants/

Under the Federal Emergency Management Agency's Assistance to Firefighters Grant Program (AFGP), career and volunteer fire departments and other eligible organizations can receive funding through three different grants to:

- Enhance a fire department's/safety organization's ability to protect the health and safety of the public.
- Protect the health of first responders.
- Increase or maintain the number of trained, "front-line" firefighters available in communities.

Staffing for Adequate Fire & Emergency Response Grant (SAFER)

http://www.fema.gov/staffing-adequate-fire-emergency-response-grants

The Staffing for Adequate Fire and Emergency Response Grants (SAFER) was created to provide funding directly to fire departments and volunteer firefighter interest organizations to help them increase or maintain the number of trained, "front line" firefighters available in their communities. The goal of SAFER is to enhance the local fire departments' abilities to comply with staffing, response and operational standards established by the NFPA (NFPA 1710 and/or NFPA 1720).

Fire Prevention & Safety Grants (FP & S)

http://www.fema.gov/fire-prevention-safety-grants

The Fire Prevention and Safety (FP&S) Grants are part of the Assistance to Firefighters Grants (AFG) and support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to reduce injury and prevent death among high-risk populations. In 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include Firefighter Safety Research and Development.

Buffer Zone Protection Program (BZPP)

http://www.fema.gov/pdf/government/grant/bzpp/fy06_bzpp_guidance.pdf

The FY 2006 BZPP provides funds to build capabilities at the state and local levels to prevent and protect against terrorist incidents primarily done through planning and equipment acquisition.

Emergency Management Performance Grant Program

https://www.fema.gov/fiscal-year-2015-emergency-management-performance-grant-program

The purpose of the EMPG Program is to provide Federal grants to states to assist state, local, territorial, and tribal governments in preparing for all hazards, as authorized by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act), as amended (42 U.S.C. §§ 5121 et seq.) and Section 662 of the Post Katrina Emergency Management Reform Act of 2006, as amended (6 U.S.C. § 762). Title VI of the Stafford Act authorizes FEMA to make grants for the purpose of providing a system of emergency preparedness for the protection of life and property in the United States from hazards and to vest responsibility for emergency preparedness jointly in the Federal government and the states and their political subdivisions. The Federal government, through the EMPG Program, provides necessary direction, coordination, and guidance, and provides necessary assistance, as authorized in this title, to support a comprehensive all hazards emergency preparedness system.

State Homeland Security Program

https://www.fema.gov/fiscal-year-2015-homeland-security-grant-program

The SHSP assists state, tribal and local preparedness activities that address high-priority preparedness gaps across all core capabilities and mission areas where a nexus to terrorism exists. SHSP supports the implementation of risk driven, capabilities-based approaches to address capability targets set in urban area, state, and regional Threat and Hazard Identification and Risk Assessments (THIRAs). The capability targets are established during the THIRA process, and assessed in the State Preparedness Report (SPR) and inform planning, organization, equipment, training, and exercise needs to prevent, protect against, mitigate, respond to, and recover from acts of terrorism and other catastrophic events.

Pre-Disaster Mitigation Grant Program

https://www.fema.gov/pre-disaster-mitigation-grant-program

The PDM Program, authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, is designed to assist States, territories, Federally-recognized tribes, and local communities in implementing a sustained pre-disaster natural hazard mitigation program. The goal is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis.

Community Assistance Grants

http://www.fs.fed.us/r6/fire/fireplan/apply/

The 2016 National Fire Plan grant process has been scaled down to accommodate a limited source of funding that is directly tied to state planning efforts. At a minimum, project proposals must reside within high priority areas identified in the statewide assessments and resource strategies (refer to links below) to be considered.

In order to focus limited resources and funding (potentially $875,000 within each state), the interagency Pacific Northwest Wildfire Coordinating Group, FMWT Fuels Management Working Team (PNWCG-FMWT) has asked the Washington Department of Natural Resources (DNR) and the Oregon Department of Forestry (ODF) to collaborate with communities that are within high priority areas.

Projects should address and reduce the threat of wildfire within Eligible Project Areas and be identified as high priority in a completed Community Wildfire Protection Plan (CWPP). DNR will work with local CWPP groups to identify and prioritize projects.

Western States Fire Managers Wildland Urban Interface Grant Program

http://wflccenter.org/state-private-forestry/wui-grants/

The focus of much of this funding is mitigating risk in Wildland Urban Interface (WUI) areas. In the West, the State Fire Assistance (SFA) funding is available and awarded through a competitive process with emphasis on hazard fuel reduction, information and education, and community and homeowner action. This portion of the National Fire Plan was developed to assist interface communities manage the unique hazards they find around them. Long-term solutions to interface challenges require informing and educating people who live in these areas about what they and their local organizations can do to mitigate these hazards.

Appendix 7 – Post Fire Recovery Information

The following information has been excerpted from a document titled *Appendix E: Post Fire Recovery* that can be found in the upload section on Project Wildfire. Some of the information has been changed to reflect resources available in Klickitat County, WA. The full URL is as follows:

http://www.projectwildfire.org/wp-content/uploads/2016/02/Appendix-E-Post-Fire-Recovery.pdf

During the Fire Resources

Klickitat County Non-Emergency Dispatch Number: (509) 773-4545

American Red Cross Northwest Region: (206) 323-2345

Washington Department of Natural Resources:

- ***REPORT A FOREST FIRE: 911 and 800-562-6010***
- WADNR Wildfire Division: (360) 902-1300; wd@dnr.wa.gov
- The best way to get up-to-date information on wildfires is to follow the **#WaWILDFIRE** hashtag on Twitter.
- DNR provides information about wildfires that are notable, due to location or size, on Twitter at **@waDNR_fire**. Those who don't use Twitter can **text 40404** to get DNR tweets delivered to your phone as text messages.
- DNR and other wildfire response agencies work collaboratively to provide information about large fires on **Inciweb** (the Incident Information System) and through the **Northwest Interagency Coordination Center** (follow the NICC on Twitter **@nwccinfo**).

After the Fire Resources

Fire Management Assistance Grant Program (FMAGP)

Fire Management Assistance is available to States, local and tribal governments, for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. The Fire Management Assistance declaration process is initiated when a State submits a request for assistance to the Federal Emergency Management Agency (FEMA) Regional Director at the time a "threat of major disaster" exists. The entire process is accomplished on an expedited basis and a FEMA decision is rendered in a matter of hours.

The Fire Management Assistance Grant Program (FMAGP) provides a 75 percent Federal cost share and the State pays the remaining 25 percent for actual costs. Before a grant can be awarded, a State must demonstrate that total eligible costs for the declared fire meet or exceed either the individual fire cost threshold - which is applies to single fires, or the cumulative fire cost threshold, which recognizes numerous smaller fires burning throughout a State.

https://www.fema.gov/fire-management-assistance-grant-program

FEMA Individual Assistance (FEMA IA)

FEMA IA has created a set of tools to help those facilitating their community's recovery. Community Services Programs deliver a variety of services to assist in disaster recovery. Disaster Housing Resources provides links to access information on multiple disaster housing programs and strategies. FEMA Voluntary Agency and Donations Coordination delivers information, support and guidance during disaster recovery. The National Emergency Child Locator Center and National Mass Evacuation Tracking System are both tracking databases that can be activated during disasters and assist in reunifying family members. The National Shelter System is a database that supports the agencies responsible for Mass Care and Emergency Assistance.

https://www.fema.gov/individual-assistance-program-tools

FEMA Public Assistance (FEMA PA)

FEMA's Public Assistance (PA) grant program provides federal assistance to government organizations and certain private nonprofit (PNP) organizations following a Presidential disaster declaration. PA provides grants to state, tribal, territorial, and local governments, and certain types of PNP organizations so that communities can quickly respond to and recover from major disasters or emergencies.

Through the program, FEMA provides supplemental federal disaster grant assistance for debris removal, life-saving emergency protective measures, and the repair, replacement, or restoration of disaster-damaged publicly-owned facilities, and the facilities of certain PNP organizations. The PA program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.

The federal share of assistance is not less than 75 percent of the eligible cost. The Recipient (usually the state) determines how the non-federal share (up to 25 percent) is split with the subrecipients (eligible applicants).

https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit

Small Business Disaster Loans

The Small Business Administration (SBA) provides low-interest disaster loans to businesses of all sizes, private non-profit organizations, homeowners, and renters. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.

https://disasterloan.sba.gov/ela/Information/Index

Washington VOAD

Washington VOAD (Voluntary Organizations Active in Disaster) is a group of voluntary organizations and faith-based, community service groups with disaster relief roles related to short and long-term recovery from disasters. WAVOAD coordinates disaster planning with member agencies to ensure reduction of duplication and an increase in effective delivery of services.

http://www.wavoad.org/cms/home

Local Agencies and Other Resources

Conservation Districts

Established in 1946, CKCD has a full and varied history of conservation in Klickitat County. Our ultimate goal has always been and continues to be cooperation with landowners to provide the most on-the-ground conservation for the dollars spent. As conservation practices progress, we have adopted the new technologies to provide the best in conservation to our constituents.

Central Klickitat Conservation District: http://www.ckcd.org

Eastern Klickitat Conservation District: http://www.ekcd.org

Central and Eastern C.D. Phone: (509) 773-5823 EXT 5

Farm Service Agency

USDA offers a variety of programs and services to help communities, farmers, ranchers, and businesses that have been hard hit by Hurricanes Irma, Harvey, Maria and other natural disaster events. To find out how USDA can further assist you, visit USDA's Storm Disaster Page.

https://www.usda.gov/topics/disaster/storms

Klickitat County USDA FSA Phone: (509) 773-5822 EXT2

Natural Resource Conservation Services (NRCS)

The NRCS may be able to provide funding for wildfire recovery efforts on agricultural and non-industrial private forestlands. Program and application announcements will be made as funding

becomes available. Please check the NRCS website for updates. The following are tips provided by the NRCS for post-fire recovery and safety. More information can be found on the NRCS website.

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/wa/home/?cid=STELPRDB1259629

Fire Recovery Safety Tips

REMEMBER – use caution and good judgment. Hazards may still exist, even though the fire is controlled.

Electrical Hazards

Residents of Klickitat County should report power outages, downed power lines, and other electrical hazards to the Klickitat Public Utility District (KPUD). For additional information about KPUD call the following number or visit the website:

Website: www.klickitatpud.com

Goldendale Office
Phone: (509) 773-5891
Toll Free: (800) 548-8357

White Salmon Office
Phone: (509) 493-2255
Toll Free: (800) 548-8358

Safety Facts

An important part of the disaster recovery is hazard recognition. Should you come across damaged or fallen power poles or lines, contact your local electrical power authorities. DO NOT TOUCH THE DOWNED WIRES. In the cleanup area, be especially careful when cutting trees and operating heavy equipment around power lines. Vegetation and power poles may have lost stability due to fire damage.

If a power line or pole should fall next to you while working in the area, do not walk – hop out of the area. (Using this technique, you will be less likely to be a conductor of electricity).

Electricity is always trying to go somewhere. It goes easily through conductors; it does not go easily through non-conductors.

Conductors	Non-conductors
Metal	Rubber
Water	Glass
Wet things	Plastic
Things in water (including animals/pets)	

One of the most important fixtures in the conduction of electrical current are utility poles. The fire or fire suppression actions may have dislodged or broken some of these poles, causing the wires to sag or break, resulting in extremely hazardous conditions. Do not touch anything at the scene.

Trees can also be dangerous conductors of electricity. When a tree falls or grows into contact with power wires, the electric power diverts and finds a path to the ground through the branches and the trunk. Anyone who comes into contact with these trees is subject to tragic consequences, since electric power can easily jump from the tree to the person.

Safety Tips

- Do not overload circuits; don't operate several large appliances at the same time on the same circuit.
- Do not use extension cords to plug in many items on one outlet.
- Turn off appliances when you finish using them. Provide adequate air circulation around all appliances to prevent over-heating. Keep appliances clean, repaired and serviced.
- Check wires and plugs regularly. Replace worn or frayed wires. Do not run cords under carpets or across doorways.
- Be careful when replacing fuses or breakers. Keep the area near the circuit box dry and turn the main switch off before changing the fuse/breaker.
- Temporary lines should be removed from service.

Locations to Avoid

- Electrical meters and service lines coming into the home or other outbuildings.
- Any power supply line which appears to sag, show bare wire, or have insulation missing.
- Secured power sub-stations or any area identified as high voltage.
- Downed power lines.

Emergency Procedures for an Electrical Fire

- Call the fire department.
- Shut off power supply at the breaker if possible.

Restoring Electric Power

If, upon returning to your residence, there is no electrical power, please check to make sure the main breaker is on. If the breakers are on and power is still not present, please call to report the power outage to your local electrical power authorities.

Reporting problems like a down or broken wire will speed up the process of power restoration:

- Stand off to one side of the breaker box when turning on the main breaker. Do not stand directly in front of the box.
- If any smells of hot electrical insulation or sparking occurs, turn of the breaker immediately and call an electrician.
- If electrical lights or appliances appear brighter than normal, turn off main breaker. The service entrance needs to be checked.

To Change a Fuse

Try to find the cause of the blown fuse, and correct it by disconnecting the defective appliance or appliances causing the overload or short circuit. Shut off the main power switch when you change the fuse.

- Do not replace fuses with a higher amp rating fuse than you removed.
- Turn on the main switch to restore the power.
- If the fuse blows again, leave it alone and contact a certified electrician. Other problems may exist and should be investigated to remove the possibility of an electrical fire

To Reset a Circuit Breaker

Try to find the cause of the overload or short circuit and correct it by disconnecting the defective appliance or appliances. Turn the switch to “on” to reset and restore power. If breaker trips again leave it alone, and contact a certified electrician. Other problems may exist and should be found to remove the possibility of an electrical fire.

Special Information of Fuses & Circuit Breakers

Fuses and circuit breakers shut off the current whenever too much current tries to flow through a wire because of:

- A short circuit, possibly caused by a bare wire touching the ground;
- Overloading, possibly caused by too many lights or appliances on one circuit;
- By defective parts in an appliance.

Know where the main circuit or fuse box is located in your house. Be sure you can locate the main switch; it controls all of the power coming into the house and is usually inside the circuit box. In some cases, however, it may be located outside of the house. Fuse or circuit boxes generally are labeled to designate which area of the house the circuits or fuses serve.

Drinking Water

Restoring Water Systems

Unless impacted by a fuel spill, the fire should not have affected wells at undamaged homes. If your house was damaged, your water system may potentially have become contaminated with bacteria due to loss of water pressure. In this case it is recommended that the well be disinfected and the water be tested before consumption. To disinfect your water system, pour ½ - 1 cup of chlorine bleach inside the well casing and turn on all faucets until a chlorine scent in noticed. Allow the chlorine solution to remain in the system overnight. The following morning, open all faucets and flush the system until free of chlorine smell.

If you have a public use well or water system, contact the County Health Department for specifics on testing prior to consumption of any water.

Solid Waste

Removing Debris

Cleanup of your property can expose you to potential health problems from hazardous materials. Wet-down any debris to minimize health impacts from breathing dust particles. The use of a two-strap dust particulate mask with nose clip and coveralls will provide the best minimal protection. Leather gloves should be worn to protect your hands from sharp objects while removing debris.

Hazardous materials such as kitchen and bathroom cleaning products, paint, batteries, contaminated fuel and damaged fuel containers must be handled properly. Contact your local County Officials for specific handling restrictions and disposal options.

All hazardous materials should be labeled as to their contents if known!

Heating Fuels

Checking Propane Tanks

Propane suppliers recommend homeowners contact them for an inspection prior to reusing their system. If the fire burned the tank, pressure relief valve probably opened and released the contents of the tank. Tanks, brass and copper fittings, and lines may be heat-damaged and unsafe. Valves should be turned off and remain closed until the propane suppliers inspect the system.

Checking Home Heating Oil Tanks

Heating oil suppliers recommend homeowners contact them for an inspection prior to reusing their system. The tank may have shifted or fallen from the stand and fuel lines may have kinked

or weakened. Heat from the fire may have caused the tank to warp or bulge. Non-vented tanks are more likely to bulge or show signs of stress. The fire may have loosened or damaged fittings and filters. If the tank is in-tact and heating oil remains in the tank, the heating oil should still be good. If you have questions on the integrity of the tank, fuel lines, tank stand, or the fuel, or need assistance in moving the tank or returning it to service, contact your fuel supplier.

Miscellaneous Safety Awareness

Ash Pits

Holes created by burned trees and stumps create ash pits, which are full of hot ashes. Mark them for your safety, as they can stay hot for many days following the fire, causing serious burns. Warn your family and neighbors, especially children. Tell them to watch for ash pits and to not put hands or feet in these holes—they are hot!

Evaluation of Trees Damaged by Fire

The following information will assist you in evaluating any trees that have been scorched or burnt by the fire. Identification of the type of tree affected is important and can easily be done. Two basic types of trees exist in this area: deciduous and evergreen. Deciduous trees are broad leaf trees that lose their leaves in the fall.

In this area we have a variety of deciduous tree species. Evergreen trees have needles and in this area we mainly have Ponderosa Pine, Lodgepole Pine and Western Juniper.

First: visually check the tree stability. Any tree weakened by fire may be a hazard. Winds are normally responsible for toppling weakened trees. The wind patterns in your area may have changed as a result of the loss of adjacent tree cover. Seek professional assistance before felling trees near power lines, houses or other improvements.

If the tree looks stable:

- Visually check for burnt, partially burnt or broken branches and tree tops that may fall.
- Check for burns on the tree trunk. If the bark on the trunk of the tree has been burned off or scorched by very high temperatures completely surround the tree's circumference, the tree will not survive. This is because the living portion of the tree (cambium) was destroyed. The bark of the tree provides protection to the tree during fire. Bark thickness varies based upon tree species: check carefully to see if the fire or heat penetrated the bark. Where fire has burnt deep into the tree trunk, the tree should be considered unstable until checked.
- Check for burnt roots by probing the ground with a rod around the base of the tree and out away from the base several feet. The roots are generally six to eight inches below

the surface. If you find that the roots have been burned you should consider this tree very unstable; it could easily be toppled by wind.

If the tree is scorched:

- A scorched tree is one that has lost part or all of its needles. Leaves will be dry and curled. Needles will be a light red or straw colored. Healthy deciduous trees are resilient and may possibly produce new branches and leaves, as well as sprouts at the base of the tree. Evergreen trees, particularly long-needled trees, may survive when partially scorched. An evergreen tree that has been damaged by fire is subject to bark beetle attack. Please seek professional assistance concerning measures for protecting evergreen trees from bark beetle attack.

Residual Smoke in Fire Interior

Smoke may be present on the interior of the fire for several days following containment. This occurs as a result of stumps, roots, and other surface materials being exposed to changing temperatures and wind conditions. Smoke volume from these materials may fluctuate depending on weather conditions. This activity should not pose a risk and smoke will continue to dissipate until materials are fully consumed or extinguished by fire crews or weather.

Flooding Risk

Preparing for Flooding

In the event of moderate to heavy rainfall, do not wait for a flash flood warning in order to take steps to protect life and property. Thunderstorms that develop over the burned area may begin to produce flash flooding and debris flows before a warning can be issued. If you are in an area vulnerable to flooding and debris flows, plan in advance and move away from the area. There may be very little time to react once the storms and rain start.

- Have an evacuation/escape route planned that is least likely to be impacted by flash flooding or debris flows.
- Have an emergency supply kit available.
- Stay informed before and during any potential event; knowing where to obtain National Weather Service (NWS) outlooks, Watches and Warnings via the NWS Pendleton Website, Facebook, Twitter, or All Hazards NOAA Weather Radio.
- Be alert if any rain develops. Do not wait for a warning to evacuate should heavy rain develop.
- Call 911 if you are caught in a flash flood or debris flow.
- Contact local officials for additional risk information and potential mitigation efforts.
- Contact The US Army Corps of Engineers regarding their Silver Jackets Program.

Other Post-Fire Considerations

Personal and Public Safety

It is important after a wildfire to ensure your own personal safety and that of the public. Walk your property and look for safety issues along property boundaries, roads and buildings. Check for the following:

1. Are there fire damaged trees within one tree height of your home, other structures or access roads? If so, refer to the Washington DNR publication "**Assessing Tree Injury**" for steps to evaluate and remove trees.
2. After a fire the risk of flash floods, debris and mud flows are much greater. Consider the following to evaluate your flooding risks:
    - How close is your house and outbuilding to the closest streams, seasonal draws or valley bottoms (floodplains?)
    - Could your home become inaccessible? Do you have a bridge or culvert, stream or drainage crossing that could be destroyed by a flash flood?

Manage your risk and protect your property

If your home survived the wildfire, it may still be at risk of post-fire flooding or debris flows. Consider the following questions and steps to take to manage your risk and protect your property:

1. Are there National Weather Service rain gauges in your watershed? If so, is there an emergency alert system associated with them?
2. Contact your insurance agent or FEMA about The National Flood Insurance Program even if you are out of the 100 year flood plain. The following websites provide additional information:
    - https://www.fema.gov/national-flood-insurance-program
    - https://www.floodsmart.gov/
3. Remove debris in and near culverts and cross drains. This includes rocks, grass clippings, decking, structures, vegetation, fences across draws, etc.
    - When walking your property, look for items that may potentially plug stream channels and/or culverts, particularly at road crossings.
    - Additional runoff may cause channels to shift, creating additional streambank erosion.
4. Secure/anchor outdoor items. Move lawn furniture, barbecues, propane tanks, pool covers, etc. inside.
5. Identify sources of surface runoff onto property and around your house. (See Hillside Home Drainage Fact Sheet.)

Soil Erosion Protection

Fires can cause the soil in your area to become very unstable and prone to erosion. Soil erosion can cause a significant increase in sediment and debris delivery to streams. The high rate of erosion can cause streams to fill in, reducing their ability to pass flood water. NRCS has several practices and treatments that can help to keep soil in place and not in your streams. The following treatments can help to protect your erodible soil.

- Diversions
- Dikes
- Straw Waddles
- Log Erosion Barriers
- Sandbags Barriers
- Straw Bale Sediment and Dikes
- Rock Check Structures
- Natural duff, litter and debris
- Mulch

Insect Infestation Protection

Insect infestations in the fire-killed and fire-stressed trees are a hazard.

- Remove or make sure woody slash is dried out.
- If clumps of live trees are overstocked thin them.
- Removed the most damaged trees and leave the best.

Reseeding

Loss of vegetation and forest cover reduces grazing for livestock and wildlife, degrades habitat, and increases the risk of weed infestations. If possible, these areas should be reseeded or mulched. Seeding should occur late fall after October 15th, preferably in November.

Rehabilitation and Restoration

It may be difficult to visualize the rebirth of a forest or rangeland following a wildfire. However, nature is well equipped for regenerating some fire resistant species such as ponderosa pine trees and shrub-steppe species. You may already notice some grasses and plants recovering on the landscape. Revegetation of burned areas is also imperative for restoring the health of the ecosystem. Some possible treatments include:

- Grass seeding a pasture mix for livestock forage or native for wildlife or livestock forage (May need to defer grazing for up to 2 years).
- Forest tree planting (primarily ponderosa pine) May potentially need hand scalping for site preparation to get through the ash down to mineral soil.
- Riparian plantings along stream corridors.

Post Fire Recovery: Ways to Move Forward

The following is a 2006 publication by the Oregon State University Extension Service. The original document can be found at **https://ucanr.edu/sites/postfire/files/247833.pdf**

Oregon State University Extension Service

WILDFIRE RECOVERY

Summer 2006

INSIDE THIS ISSUE:

WAYS TO MOVE FORWARD

Wildfires make a profound impact in Oregon—on people, land, animals, environment and the economy. As the population continues to increase, homes and communities expand to new rural boundaries, and fires become more a part of the changing landscape, Oregonians are faced with the challenges of preventing, preparing and recovering from wildfires.

The following information will help guide Oregonians in recovering from recent large, intense and uncontrollable wildfires. This publication is intended to help individuals, families, and business as they begin making decisions about their personal well-being , home, and property.

Beginning recovery from wildfires calls forth human emotions that intertwine with what has to be done today, tomorrow, and next month. Trying to grasp all of these decisions at once is a part of human nature and often overwhelming.

This guide will focus on how to support children through these tough times, ways to address household damage, and methods to protect property, forage, and landscape from further damage.

DISASTERS AREN'T NECESSARILY DISASTROUS TO THE WELL-BEING OF YOUTH

Wildfires scare adults and children. They often hit without warning. This type of disaster scares children more because they lack the life skills and experience of adults. They don't know what is happening, what to do, or how to calm themselves.

Children often think things are worse than they really are. Ask them what would make them feel better. Children feel powerful when they can solve their own problems.

Learning how to handle their fears now will help them all their lives. Here are some other ideas:

Treasure Bags—Have children fill a cloth grocery bag with "treasures" that remind them they are safe and loved. Visit with them about the treasures.

Stories—Retell stories that you know comfort . Check out books that tell how other children faced solving problems.

Connect—Call and/or visit loved ones. Friends and relatives can help children feel better.

Exercise— Let children work off worries physically.

In addition... connect with the 4-H program. 4-H is able to mobilize its volunteers to assist in evacuation and care of large and small animals. 4-H can also help youth through FEMA's Disaster Connection: Kids to Kids. Stories, poems, artwork, and essays about wildfires can be submitted to the 4-H program for submission to FEMA.

Good Connections:

- http://extension.oregonstate.edu/deschutes
- http://www.fema.gov/kids/
- http://www.redcross.org
- http://www.mountainriver.redcross.org/

What About Food That Has Been In A Fire?

Three factors can affect food that has been exposed to fire—the heat, smoke and chemicals used to put out the fire.

The heat of the fire can activate high-temperature food spoilage bacteria in commercial or home canned food.

These bacteria do not affect canned food under normal circumstances, but after a fire they can make the food inedible. High temperatures from fire may cause jar lids of home-canned food to come unsealed allowing bacteria to get into the food. The jar lids may "seal" again when the air temperature drops.

Toxic fumes released from burning materials can contaminate food, tableware, and cookware, as can toxic components from the chemical (retardant) used to fight fire. Use the following guidelines to insure the safety of food after a fire:

- Throw away food stored in permeable packaging such as cardboard, plastic wrap, home-canned food, and screw top jars.
- Discard raw foods that were stored outside the refrigerator.
- Discard food if power failure has occurred causing refrigerator temperature to rise above 40'F. If freezer temperature to rises above 0'F check for ice crystals in the food. If crystals are present refreeze immediately. If food is thawed discard.
- Discard commercially-canned goods which smell or look spoiled.

ABOUT FIRE RETARDANT

One of the most effective tools firefighters have to work with to suppress wildfires are the fire retardant chemicals. These retardant chemicals have gone through extensive testing for fire control ability and animal and environmental impacts.

Fire retardants are comprised of ammonia phosphate blend with a surfactant and a color dye included. Ammonia phosphate is basically a concentrated agricultural fertilizer. It binds oxygen, which retards the fire and it aids in vegetation regrowth; the dye allows pilots and ground crews to see where they have already treated.

Where Do We Begin When Replacing Food?

Planning can help relieve stress, save time and money, and contribute to serving healthy meals.

- Decide how much money you have to spend on food.
- Plan a menu one day at a time, then move to planning for one week. Use the Food Guide Pyramid (contact Extension Service) to create balanced meals.
- Make a grocery list by organizing in the following categories—fresh fruits and vegetables, breads and cereals, meats, beverages, canned goods, refrigerator items, frozen foods, staples, and non-food items.
- Plan to eat together. Emergencies and crisis can provide opportunities for coming together. Mealtimes can be a time to re-establish routine and stability. Eating together can provide more nutritious and healthy meals and save money. Communication in families can improve and traditions can be created around food and meals.

What Can I Do To Address Damage to our Home, Buildings, and Contents?

Damage to structures and contents can vary from smoke, fire, water, and/or chemicals. The first step is to assess what kind of damage has occurred and to what extent. Work closely with your insurance company making sure to document the damage.

Use water and detergent to wash the structure exteriors as soon as possible if fire retardant has been used.

Smoke damage can infiltrate textiles and other surfaces. Follow cleaning instructions recommended by manufacture. Washable textiles will benefit with use of 1-2 cups of white vinegar with each load of wash realizing clothes may need to be washed 3 to 5 times.

Commercial cleaning of carpets, drapes, upholstery and other furnishings is common. Keep a record of all cleaning contracts, expenses incurred in cleaning, and other damage (for insurance purposes).

Water damage can produce mildew and off odors sometime following the fire. Commercial enzyme cleaners are available at janitorial supply companies that reduce bacteria and odors.

Computers can be impacted by heat, smoke, water, and fumes. Check with the manufacture before operating.

Livestock and Pasture Management Recovery

When the fire is over, is it safe to take livestock and other animals back? What are the short and long term impacts of fire on livestock and pastures?

Impacts of Retardant on Livestock and Water Quality

Studies indicate little if any negative impacts to livestock or wildlife due to the use of retardants. However, it is not recommended for fire crews to place retardant in areas where it could enter waterways. The surfactant in the retardant has negative impacts on the gills of fish and limits their abilities to absorb oxygen from the water, causing suffocation. Also depending on surface area and flow of the waterway, nitrogen in the surfactant has the potential to negatively impact water quality.

Upon returning home, livestock owners should examine pastures, fences, and water sources. If property was not damaged and fences are intact, returning livestock should not be a problem. However, significant fire damage to pastures call for revegetation, such as replanting and deferment of grazing. A cool grass fire will not kill grass, however, typically it will not regrow until next spring when sufficient moisture and temperatures are present.

Livestock should not be returned to a burned pasture. Further vegetation damage can occur due to hoof action and trampling. Consult the Extension Service or Natural Resources Conservation Service (NRCS) for further recommendations. If retardant was used in a pasture, it is recommended to rinse the product off as soon as possible. On irrigated pastures, it may be as simple as irrigating a day or two to dilute and disperse the product. On non-irrigated land, any biological absorbent material may be used (soil, sand, sawdust etc. .

If less than 25% of pasture land is covered with retardant and sufficient vegetation remains, it is safe to return livestock. If greater than 25% of pasture was covered with retardant, steps must be taken to reduce the amount of retardant on the ground.

Also check for obstacles that may be harmful to animals. Returning livestock to a pasture that has been sprayed with retardant poses a risk of these animals having a toxic reaction to nitrate. This occurs when excess nitrogen is absorbed into the blood system of animals, binding to hemoglobin and reducing the amount of oxygen that is circulated throughout the body. Animals that die from nitrate toxicity often suffocate due to lack of oxygen being delivered from the circulatory system. Nitrate toxicity does occur and often causes abortion of fetuses of cattle and horses.

Pond or stock water holding areas contaminated by retardant should be flushed if possible. However, caution should be taken not to contaminate water down stream with contaminated pond water. Water samples can be taken to Coffee Laboratories in Redmond for nitrate analysis.

Animal Management After Fire

Evacuated animals require alternative pasture or boarding facilities. Horses do very well on pasture but if necessary they can be boarded in corrals or stalls until others options become available. Cattle only require pasture but can also be held in corrals until other options are made available. When dry-lotting animals, always ensure sufficient quantity and quality of fresh water, and ensure there are no obstacles present they can harm themselves on.

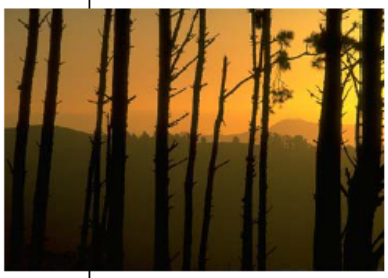
Horses and cows at maintenance require approximately 15 to 20 percent of their body weight in dry matter consumption. A 1,000 lb horse at maintenance requires 15 to 20 lbs of good quality hay. A 1,000 lb cow requires the same. For more detailed nutrient requirements contact a Veterinarian or the Extension Service.

Final thoughts

One thing to be aware of is the potential for the encroachment of noxious weeds onto these disturbed sites. Keep an eye out for noxious weeds and consult the Extension Service for management practices.

Livestock owners need to realize that short term renting of alternative pasture for their livestock can have a long-term positive impact on their disturbed pastures. Investigate all alternatives before immediately returning livestock to burnt and damaged pastures.

How Do I Minimize Soil Erosion?



Good Resources:

Farm Services Agency
Deschutes County Farm Service Agency
625 SE Salmon Ave. Bldg A
Redmond, OR 97756-8695
Phone: (541) 923-4358
Fax: (541) 923-4713
http://www.fsa.usda.gov/pas/default.asp
For information on:
financial assistance with soil stabilization and range improvement

Natural Resource Conservation District
Redmond Service Center
Jefferson Soil and Water Conservation District
Deschutes Soil and Water Conservation District
625 SE Salmon Avenue,
Redmond, Oregon 97756-9580
Phone: (541) 923-4358
Fax: (541) 923-4713
http://www.nrcs.usda.gov/
For information on:
financial assistance with reforestation, soil stabilization, range improvement

Oregon Department of Fish and Wildlife
Deschutes Watershed District Office (Regional Office)
61374 Parrell Road
Bend, OR 97702
Phone: (541) 388-6363
Fax: (541) 388-6281
http://www.dfw.state.or.us/
For information on:
soil stabilization – grass seeding; wildlife habitat – forage, snags, down logs, financial assistance

Soil erosion following wildfire is a concern for many forest owners. In many instances the site will recover on its own with minimal erosion. In other places, where the fire burned more severely, some erosion-control treatments may be needed.

The potential for significant erosion is related to the severity of the burn, slope steepness, soil type, and the amount and duration of rainfall following the fire.

Wildfires burn at different intensity and can have varying effects on trees, plants, and soil. Three fire-severity classes include:

Low Severity Most trees survive with scorch evidence. Most organic matter on soil top is intact and little consumption or charring of twigs and down logs is evident.

Moderate Severity Most trees have been killed or are severely scorched and retain most of their needles. Some organic matter on soil top is consumed. Twigs may be consumed and downed logs are deeply charred.

High Severity Nearly all trees are killed and have no needles. Nearly all organic matter, twigs, and logs have been consumed and soil may be damaged or altered.

Forest soils are prone to erosion following severe wildfires. The tree canopy and protective organic layer covering the soil have been consumed, which help dampen and adsorb intense rainfall events. Severe heating can make the upper few inches of the soil "hydrophobic" reducing infiltration and ability to adsorb rainfall. Instead of infiltrating, water moves across the soil surface displacing and transporting soil. The steeper the slope and the more intense the rainfall event, the greater the potential for significant soil movement and debris flows.

Survey your property and determine the amount of light, moderate, or high severity areas. Some areas may need some type of erosion-control treatment, particularly if streams, roads, or buildings are directly down slope from the burned area. Potential erosion controls:

Seeding Grasses Seeding of exotic annual and perennial grasses has been used in the past, however seeding provides little erosion control the first year. Effectiveness generally increases as the plants become established. Seeding for erosion control is a marginal erosion-control practice, and is generally not recommended on forest sites. Seeding of exotic grasses suppresses establishment of native plants, competes with planted tree seedlings, and can increase fire hazard as grasses cure and dry out.

When seeding, be aware seed may often wash down slope after heavy rains before it has had a chance to germinate and establish. Protective cover, such as mulch or some type of biodegradable fabric, may be needed to hold seed in place. High damage areas where there is little regrowth of native plants, seeding of native grasses and plants may be desirable. Finding sufficient amounts of native grass seed from suppliers is difficult and the seed is expensive.

Mulching Straw mulch applied at 1 to 2 tons per acre across the soil surface can protect soil from raindrop impact and may significantly reduce erosion. Straw mulch may contain weed seeds, however, that can germinate and may require future control. Rice straw, free of weed seed, is preferred.

Silt Fences They are constructed of landscape fabric held in place with wire and stakes. They need to be anchored and sealed to the ground to be effective. Placed in small swales, ephemeral drainages, or along hill slopes they provide temporary sediment storage. They work best on gentle slopes and where runoff and sediment is less concentrated.

Straw Bale Check Dams These are placed in small swales and drainages to reduce sediment in streams during the first winter or rainy season. Bales need to be in full contact with soil, curved up and keyed into the banks, and adequately staked. Their effectiveness decreases as they fill in after the first few storm events and usefulness is short lived. They can blow out in large storms. Bales can contain noxious weed seeds, so monitoring and weed control may be necessary.

Contour Log Placement This involves cutting burned trees and placing them along the contour of the slope to create an area behind the log for soil to settle. Logs 6 to 10 inches in diameter and 10 to 30 feet in length are typically used. Logs need to be in full contact with the slope so that water and sediment do not run out beneath the log. This treatment is expensive, so target areas most prone to erosion.

Straw Wattles - Straw wattles are long flexible tubes of straw, excelsior or other material held together with plastic netting. Apply in same manner as contour log placement.

For advice and assistance, refer to agencies listed in the left hand margin.

Recovering the Landscape

How does fire retardant affect my landscape?
A major component in retardants is fertilizer. This fertilizer is higher in ammonia than what is sold at garden centers, and may cause leaf burn or phytotoxicity to the plant. In most cases, the retardant only affects the above ground foliage of a plant and not its branches, trunk, or roots. Occasionally, more sensitive plants may die.

- Rinse all plant materials with water to avoid fertilizer burn.
- Check to see if the plant is still alive by looking for viable buds or scratching the cambium on a stem to see if it is still alive (green). Plant foliages affected by the retardant showing a "burned" appearance can be removed and discarded. New foliage will grow back later in the season or the following spring depending upon the time of year when the wildfire occurs. Be sure and wear gloves when removing any retardant covered plant material to avoid skin irritation.
- Rinse all turf grass areas.
- Rinse all fruits and vegetables thoroughly before eating.

Controlling Noxious Weeds

After a fire, weeds are among the first plants to recolonize. It is important to monitor and manage these weeds, especially those that are considered "noxious" for the area.

Noxious weeds are a group of plants that are aggressive and abundant, often choking out more desirable vegetation. Following a wildfire, their abundance threatens to exclude native and desirable plants from reestablishing. These weeds are more difficult and expensive to control once established. Examples of noxious weeds include cheat grass and spotted knapweed.

- Monitor soils for noxious weeds, particularly areas disturbed by fire suppression efforts or salvage removal.
- Control weeds using an integrated plant management approach including cultural, biological, mechanical, and chemical control. The key to effective weed control is a sustained, continuous effort over time. Cultural control includes planting or seeding desirable grasses and forbs in a burned area, if necessary. Mechanical control includes cutting off flower heads and disposing of them, before they go to seed. Be cautious of using broad spectrum herbicides (e.g. Roundup) in burn areas to avoid spraying desirable plant species.

How Does Wildfire Affect the Soil?

High intensity fires can create soil conditions that are water-repellant (hydrophobic), making it difficult for seeds to receive moisture necessary for germination.

- To test and see if water repellant soil exist, scrape away any remaining surface organic matter and place a drop of water on top of the soil and wait a few minutes to see if the water is absorbed. If the water remains in a droplet, gently break up the soil with a seed rake or harrow in larger areas.
- For more information on wildfire affects on soil see the section "Minimizing Erosion of Your Property Following Wildfire"

Oregon Department of Forestry
3501 E. Third Street, Prineville, OR 97754
Phone:
P 541/447-5658 F 541/447-1469
http://www.odf.state.or.us/
For information on:
reforestation - salvage logging, tree planting , financial assistance; soil stabilization – mechanical barriers

Oregon State University Extension Service See page 6
For information on:
educational materials on reforestation, fire-resistant plants, forestry land management, food safety, home care.

Oregon Watershed Enhancement Board
6574 NW Larch Drive
Redmond, OR 97756
Phone: (541) 923-7353
Fax: 541-923-7353
For information on:
financial assistance – soil stabilization

Soil and Water Conservation District
Deschutes Soil and Water Conservation District
625 SE Salmon Avenue, Suite 4
Redmond, Oregon 97756-9580
Phone: (541) 923-4358
Fax: (541) 923-4713
For information on:
financial assistance:
reforestation, soil stabilization – grass seeding

Watershed Councils
700 NW Hill Street
Bend, OR 97701
Phone: 541-382-6102
Fax: 541-382-4078
http://www.deschuteswatersheds.org/links.html
For information on:

Oregon State University Extension Service

Crook County
498 SE Lynn Blvd
Prineville, Oregon 97754
Phone 541-447-6228

Deschutes County
3893 SW Airport Way
Redmond, Oregon 97756
Phone 541-548-6088

Jefferson County
34 SE D Street
Madras, Oregon 97741
Phone 541-475-3808

We are on the Web!
http://extension.oregonstate.edu/deschutes

Faculty and Staff contributing to this information:

Teresa Hogue, Chair OSU Extension Service, Deschutes County and Family Community Development Agent for Central Oregon

Cory Parsons, Livestock Agent, Baker County

Amy Jo Waldo, Horticulture Agent for Central Oregon

Stephen Fitzgerald, Eastern Oregon Silviculture and Wildland Fire Specialist

Lynette Patterson, Oregon Family Nutrition Program Coordinator for Central Oregon

David J. White, 4-H Youth Development Agent for Deschutes County

Will Fire Damaged Trees Survive?

It depends on the tree species and size, bark thickness, degree of crown and bole scorch, wildfire severity, health of the tree prior to the fire, presence of bark beetles, and other factors.

Trees with the thickest bark and most resistant to fire include ponderosa pine, western larch, and mature Douglas-fir. Species least resistant (thin bark) include grand fir, lodgepole pine, western juniper and other cedars, and Engelmann spruce.

Crown scorch is one of the most important factors determining survival of fire-damaged trees. For ponderosa pine, if trees have less than 10-20 percent of their crown remaining (green), they have a 65-80 percent chance of dying over the next year or two. Ponderosa pine trees with about 30 percent of their crown remaining have a 50 percent chance of surviving. The crown is measured from the very top of the tree to the bottom branch of the tree. The percentage of tree's crown still green is used to estimate the percent survival.

In addition, if tree trunks are deeply charred killing 50 percent or more of cambium (living tissue underneath the bark), the trees will most likely die. If there are bark beetles pitch tubes, trees will likely die within a year. Removal of beetle-infested trees can prevent the spread of beetles to other surviving trees.

Should I Salvage-Log Fire Damaged Trees?

The answer depends on the species, tree size and how severely the trees are damaged. In addition, consideration must be given to logging and trucking costs, and whether local mills are buying fire-killed timber. Shop around and ask timber buyers from at least 3 area mills whether they are interested in buying your fire-damaged timber and what they are paying for logs delivered to the mill.

If the value of the burned timber does not pay for the logging and trucking costs to the mill, re-evaluate whether to conduct a salvage harvest. For any logging operation, filing a "notification of operation" with the Oregon Department of Forestry is needed.

If conducting a salvage logging operation, there is a requirement to reforest the land. This is a requirement of Oregon's Forest Practices Act.

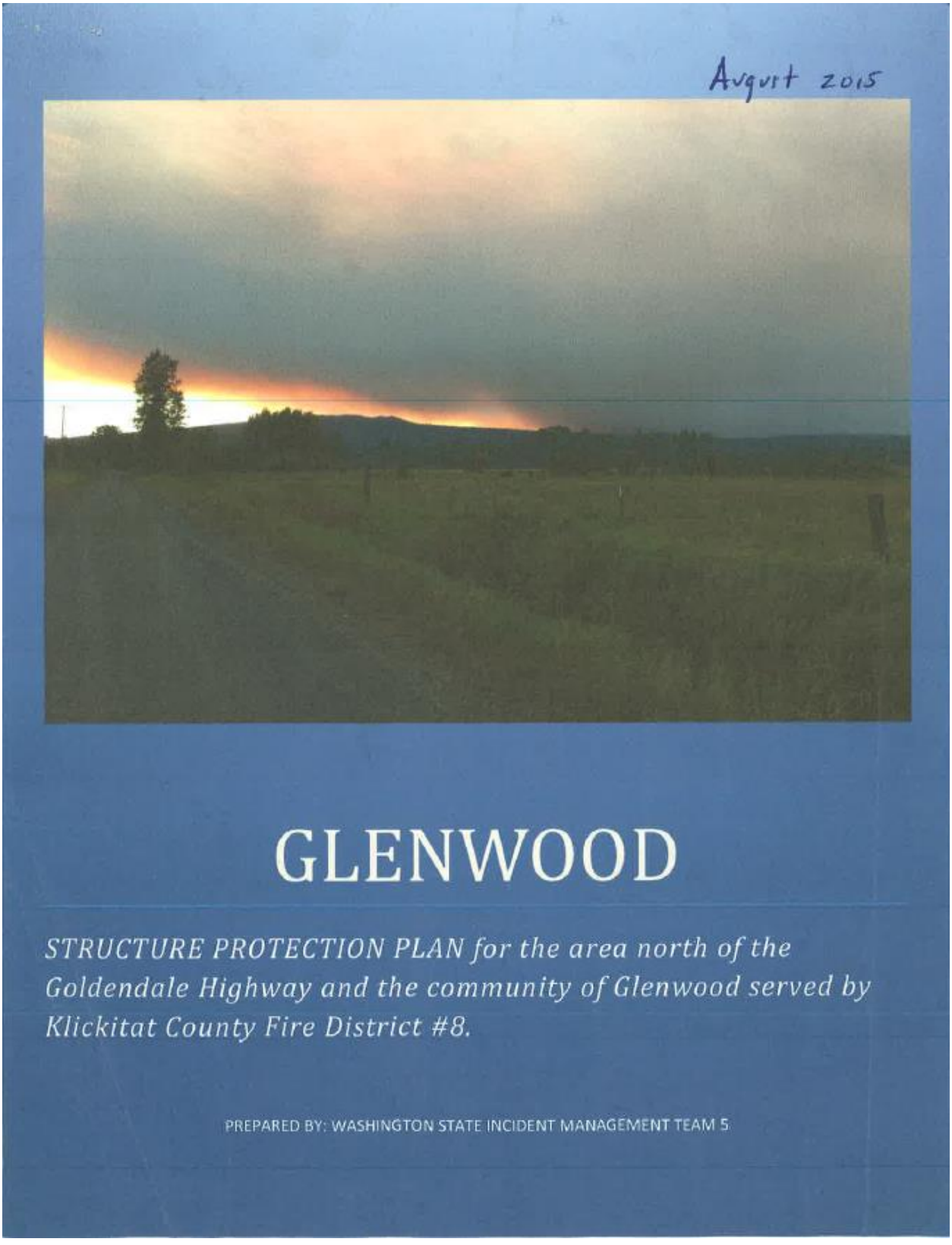
Reforesting may cost anywhere from $200 to $400 dollars per acre. The Oregon reforestation tax credit program allows a ten percent credit (up to a maximum of $10,000 per year) for planting and reforestation expenses. This program is administered by the Oregon Department of Forestry.

What About Removing and Replacing Trees and Shrubs?

The ability of ornamental trees and shrubs to withstand fire damage is based on the thickness of bark, rooting depth, needle length, bud size, and degree of scorch. (see above). The severity of a fire and how deeply it burned directly impacts which species regenerate or survive. For example, if the main trunk of an aspen is killed the roots will send up suckers.

- Be sure and take photographs of your landscape trees and shrubs prior to any removal. These photographs may be useful in helping to document losses covered by insurance policies or as a casualty loss on income taxes.
- Contact a consulting arborist who specializes in plant appraisal work in the area. These appraisers use a guide published by the International Society of Arboriculture (ISA) entitled a *Guide for Plant Appraisals.* This guide covers how to assess monetary value of landscape trees and shrubs based on size, location, and species. To find a list of consulting arborists that specialize in plant appraisal in your area check the website (www.asca-consultants.org/why_how.html)
- Hire a certified arborist to safely remove larger trees.
- Create a defensible space around your home using fire-resistant plant materials (see our publication at http://www.firefree.org/downloads/FireResPlants.pdf)
- Use adaptable, fire-resistant plant material for your area
- For planting tips on trees, shrubs, and turf grass, contact the OSU Extension Service.

Appendix 8 – Glenwood Structure Protection Plan



Glenwood
Structure Protection Plan

Table of Contents

PART I
INTRODUCTION

Experience has proven that many homeowners will be reluctant to leave their home and belongings when an evacuation is ordered. Fire officials lack the authority to force anyone to leave, nor do they have the time to educate evacuees after an order is issued. Preplanning, including structure protection plans and education of the community prior to an incident is imperative for a successful operation.

Early evacuation will reduce traffic congestion and facilitate ingress by fire suppression forces so structural triage can be started. Early evacuation will also allow suppression crews to leave the area as a fire front passes and return rapidly to resume protection of the values at risk.

PROTECTION AREA DEFINED

This structure protection plan is for area north of the Goldendale Hiway including the community of Glenwood served by Klickitat County Fire District 8.

FIRE POTENTIAL

The area that this plan covers is described as a mixture of open range land, timber, grass lands and large amounts of Wildland-Urban Interface land were structure and its citizens are intermixed within the areas previously mentioned.

It is noted that there appears that there were some fuel reductions in past in the area of Pine Vista Road. More fuels reduction programs in the future would benefit the area.

FUELS

The predominate fuel models in the Glenwood area is:
Model 1 Short grass
Model 2 Timber (grass and understory)
Model 10 Timber (litter and understory)
Model 12 Slash

TOPOGRAPHY

The topography of this structure plan in the area of Pine Vista Road, Bird Creek Road and Surface Road is primarily flat with a mixture of open land and timbered land. The topography of the area of Ladiges Road is also primarily flat. The area east of Glenwood around the K1000 road has some gentle hills.

STRUCTURAL PROTECTION CONCEPTS

As is typical, in evacuation and structural protection plans we assume three levels of risk to exposed structures. Further, consideration may be given to the relative importance of individual structures. The most significant difference in this plan is that the emphasis is on the safety of the firefighter involved in the operation and not the survivability of any given structure or group of structures. The three basic levels of risk to structures from wildfire are closely aligned with the alerting levels for evacuation:

1. SAFETY FACTOR CATEGORY 1 - Those structures or groups of structures that are not directly threatened by a fire and can be defended with minimum risk to firefighters. Because of any number of circumstances which may include; level of protection, location away from the main fire, fire resistive construction and/or preparation of the area prior to the advance of the fire, these structures are considered defendable. Frequently, one engine can protect several structures.

2. SAFETY FACTOR CATEGORY 2 - Those structures or groups of structures that are directly threatened by a fire but have not become involved. These structures may be protected without unduly jeopardizing the safety of fire suppression crews working at the scene provided safety zones and escape routes are in close proximity to the structures. Time is a key element in this category of structure protection. There must be sufficient time prior to the advance of the fire front for fire crews to set-up an appropriate level of

protection. This level of protection is usually characterized by the assignment of one engine per structure.

3. SAFETY FACTOR CATAGORY 3 - Those structures or groups of structures that are involved in fire or there is no time available for the safe deployment of a fire crew. These structures are considered outside the acceptable risk parameters.

Attached to this plan is Appendix A which is a Structure Protection Check Sheet that is used to determine the safety factor on structures.

Pine Vista Road

Pine Vista Road Overhead

5

STRUCTURE PROTECTION

Pine Vista Road
T6N R12E

GENERAL – Pine Vista Road is an established neighborhood located at the West end of Glenwood.

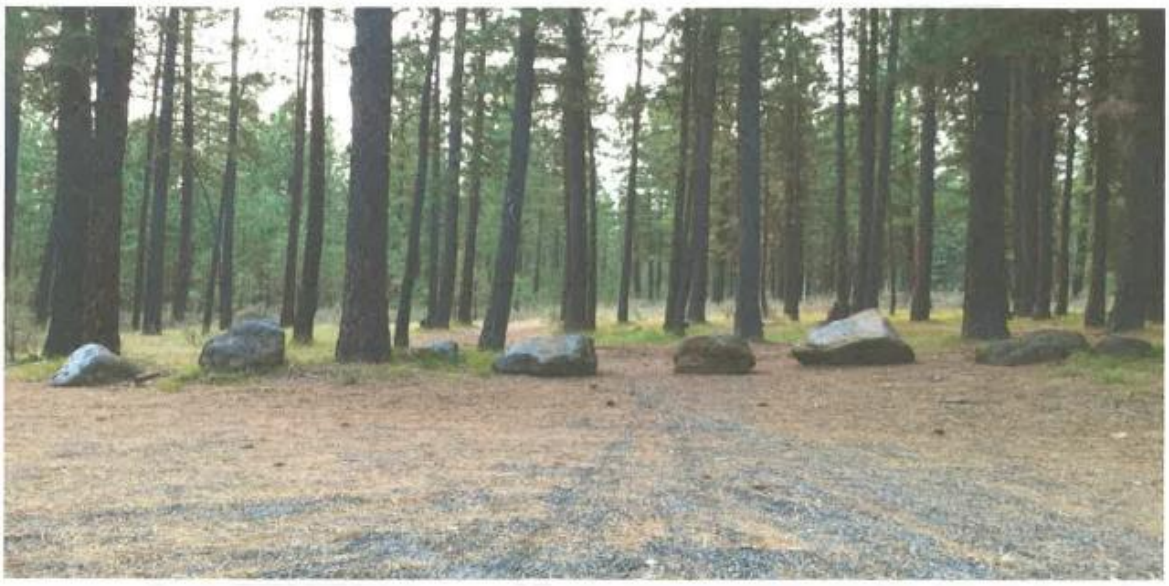
HAZARDS – Above ground diesel tanks, septic tanks, dogs, numerous pieces of heavy equipment and numerous large slash piles.

WATER SUPPLY – The area is served by fire hydrants located at 8 Pine Vista Road, 18 Pine Vista Road & 31 Pine Vista Road.

TACTICAL CONSIDERATIONS – Most residences in the Pine Vista Road area will need some fuel reduction around them. In addition there are a large number of outbuildings in the area.

RESOURCE NEEDS – 1 STEN, 1 strike team of type 1 engines. 1 type 1 or type 2 water tender. Local law enforcement personnel for traffic control.

PROBIBILITY OF SUCCESS – Moderate



Bird Creek and Surface Roads

Bird Creek and Surface Road Overhead

7

STRUCTURE PROTECTION
Birdcreek and Surface Roads
T6N R12E

GENERAL – Birdcreek Road is located west of Glenwood at the intersection with the Trout Lake Hiway. Birdcreek Road is a flat two lane paved road that turns into Surface Lane as it proceeds north.

HAZARDS – Propane tanks, Septic tanks, outbuildings with hazardous materials, overhead power lines.

WATER SUPPLY – There is one fire hydrant located in the Bureau of Indian Affairs, Glenwood Ranger Station, hydrants located in the Pine Vista Area along with irrigation ditches and creeks. Tender operations will need to be used for water movement in most of the area.

TACTICAL CONSIDERATIONS – Fuel reduction on the west side of Bird Creek Road will be needed around some residents. The Bureau of Indian Affairs, Glenwood Ranger Station is located on the east side of Bird Creek Road as is a Klickitat County road shop. Both the road shop and the ranger station are free from most fuels and should be self-protecting.

RESOURCE NEEDS – 1 Task Force Leader, 1 structure strike Team, 2 Water Tenders.

PROBIBILITY OF SUCCESS – High

8

Ladiges Road

Ladiges Road Overhead

9

STRUCTURE PROTECTION
Ladiges Road
T6N R12E

GENERAL – Ladiges Road is transportation route running west to east between Bird Creek Road and the Mount Adams Hiway just north of the community of Glenwood. The fuels consist of open areas of grass.

HAZARDS – Dusty road, power lines.

WATER SUPPLY – There is a fire hydrant at the intersection of Ladiges Road and Mt. Adams Highway. There are also numerous ditches and creeks in the area to draft from.

TACTICAL CONSIDERATIONS – Most structures located on Ladiges Road have adequate open spaces with green fields or light brush.

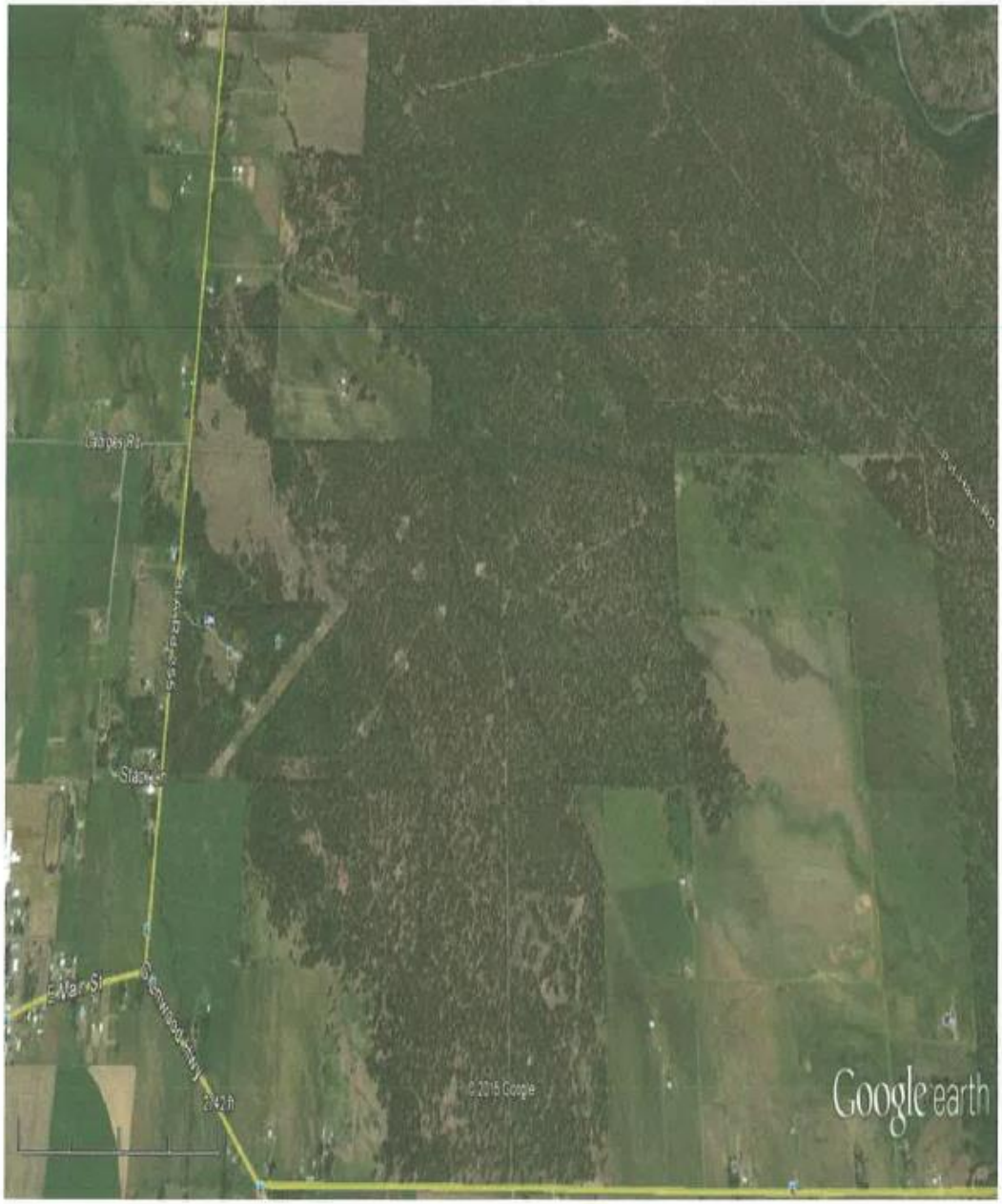
RESOURCE NEEDS – 1 structure or wildland engine for patrol purposes.

PROBIBILITY OF SUCCESS – High

10

K1000 Road

K1000 Road South & Mt. Adams Highway East Overhead



11

STRUCTURE PROTECTION
Area South of the K 100 Road
T6N R12E

GENERAL – This area is South of the K1000 Road and East of the Mount Adams Highway.

HAZARDS – Power lines, dusty roads, Klickitat PUD electrical substation located east of Glenwood & Highway speed traffic, heavy timber in places.

WATER SUPPLY – There is a fire hydrant located at the intersection of Ladiges, Mt. Adams Hiway and Inclusivity Road. A pond located at the Mount Adams Lodge and numerous ponds and in the area.

TACTICAL CONSIDERATIONS – Most structures in this area are self – protecting having adequate open spaces. Some structures have long driveways leading to heavy timbered areas around the houses. There are many opportunities to use long existing driveways and open fields to limit fire spread. This area is large in size and will need additional resources due to travel distance.

RESOURCE NEEDS 2 Task Force Leaders, 1 structure strike team and 1 wildland Strike Team. 2 tenders.

PROBIBILITY OF SUCCESS – High

12

Glenwood

Community of Glenwood Overhead

STRUCTURE PROTECTION
Glenwood
T6N R12E, S10

GENERAL – Community of Glenwood.

HAZARDS – Power lines, propane and petroleum tanks, hazardous materials and abundant fuels around some of the structures.

WATER SUPPLY – There is a fire hydrants located at the intersection of Main Street and North Ash Street along with the elementary school.

TACTICAL CONSIDERATIONS – This area is like most communities with adequate street access. Resources should be aware of hazardous material located throughout the structures. The potential for fire spread during a wind event is moderate due to the amount of potential fuels available.

RESOURCE NEEDS – Task Force Leader, structure strike team and 1 Type 1 or 2 tender.

PROBIBILITY OF SUCCESS – moderate

Structure Protection Checksheet - Single Property

Tactical Area	Protection #	SF
Address	Owner	
Legal Sec	Twnsp Range	
LAT. N	LONG W	
Structure Type 1 Story ☐	2 story ☐ Other	
Wood Frame ☐ A-Frame ☐	Log Home ☐ Outbuilding ☐	Safety Factor

RAPID ASSESSMENT ☐ Driveway - Unsafe to use for ingress - egress during fire passage ☐ Roof - Involved in fire upon arrival ☐ Powerlines Blocking

If yes to either question above, skip next section and check "non-defendable" below

	Check YES or NO for all areas [yes means it is a factor]	
DRIVEWAY -	Dead End or Longer than 200 Ft.	☐ YES ☐ NO
ROOF -	Flammable Debris on roof/gutters	☐ YES ☐ NO
ROOF -	Combustible [Asphalt Shingle or Wood Shake/Shingle]	☐ YES ☐ NO
TREES -	Overhanging Roof	☐ YES ☐ NO
TREES/BRUSH	Flammable Vegetation within 30 Ft. of Structure	☐ YES ☐ NO
VEHICLES	Parked outside within 30 Ft. of Structure	☐ YES ☐ NO
SLOPE	More than 20% anywhere within 30 Ft. of Structure	☐ YES ☐ NO
SLOPE	More than 40% anywhere within 30 Ft. of Structure	☐ YES ☐ NO
DECK / STILTS	Not enclosed / Open underneath / Intermediate Fuels	☐ YES ☐ NO
POWERLINE	Overhead within 30 Ft. of Structure	☐ YES ☐ NO

Defensible Evaluation Tally — Place tally # in upper right box

0-2 YES above	☐ DEFENDABLE=SF 1 (Green)
3-5 YES above	☐ NEEDS PREPARATION/Defend AGGRESSIVELY=SF 2(Yellow)
6-7 YES above	☐ NEEDS PREPARATION/Defend CAUTIOUSLY = SF 2 or 3
8-10 YES above	☐ NON-DEFENSIBLE=SF 3 (Red)

map / photo

Priorities

Hazards:

Water Supply?

Tactics

PREPARED BY [print] : DATE:

Glenwood Structure Protection Contingency Line Plan

This fall back plan identifies possible areas were line construction can be completed around the community of Glenwood. The identified line starts the intersection of Scott's Road (AKA as road S2161A) and the Trout Lake Hiway (T6N – R12E, S9, southeast corner) located just west of the Glenwood Rodeo grounds. The line then proceeds north on Scotts Road to the intersection of the S2100 road and follows the S2100 road to the intersection of the S4000 Road. The line continues on the S4000 Road into T6N-R12E, S4 until it reaches the NE corner of Section 4 where is can be tied into grass field above the last structure.

The next piece of line starts in T7N – R12E, S34 SW corner. The line continues on a unnamed unapproved dirt road east were it intersects with the Mount Adams Highway in Section 34 of the same range and township. The line continues north on the Mount Adams Highway until it intersects with the K1000 road in section 35. The line follows the K1000 road east until it intersects with the Glenwood Hiway in T6N – R13E, S7.

There is also an unimproved dirt road that can be used if necessary that is immediately west of Pine Vista Road. This road starts on the east side of the Glenwood Rodeo grounds and proceeds north until it intersects with Ladiges Road in T6N - -R12E, S4. This road is in need of brushing and a firing operation would be possible.

Additional unapproved roads could also be used to off of the K1000 Road to tie into the grass fields in that area.

In the event that there is fire threatening the community of Glenwood, Klickitat County Fire Districts can provide a strike team of structure engines, a strike team of wildland engines and 4 tenders within an hour. Additionally county fire resources can be ordered but availably and travel time is unknown.

Washington State Mobilization can be requested by the fire district chief but mobilization resources usually are 12 hours plus before arrival. With the current amount of mobilization fires occurring in Washington resources may be limited.

Appendix 9 – Exposure of human communities to wildfire in the Pacific Northwest

Joe H. Scott, Pyrologix
Julie Gilbertson-Day, Pyrologix
Richard D. Stratton, USDA Forest Service

Purpose and background

At the request of the United States Forest Service Pacific Northwest Regional Office, Pyrologix[1] assessed the exposure to wildfire of housing units within named human communities across the Pacific Northwest Region (Oregon and Washington). The purpose of the assessment was to identify the communities most threatened by wildfire. The fifty most-threatened communities in each state were identified.

These results have several applications. A home buyer can use these results for comparing the relative wildfire exposure of homes in different communities; homeowners can gauge their wildfire exposure compared to their peers in neighboring communities. Governments and other organizations can potentially use the results to prioritize communities for home-loss mitigation efforts, allocate mitigation funding, inform building codes, and guide residential development. Finally, land owners and land management agencies can use the exposure-source results to identify locations within their ownerships that produce damaging wildfires.

What is exposure to wildfire?

In the broadest sense, wildfire exposure encompasses the likelihood of wildfire burning a given location on the landscape, and the potential intensity of a wildfire if one were to occur. For this assessment we focus only on wildfire likelihood because the effect of fire intensity on home loss rate is not well studied, and because the inclusion of intensity for this and similar assessments did not influence the conclusions. Wildfire likelihood is measured by annual burn probability, a measure generated by comprehensive simulation of wildfire occurrence and spread (see section below on Wildfire hazard simulations).

What is a human community?

We defined a human community as the population (housing units) within a community core as defined by the Populated Place Areas dataset produced by the United States Census Bureau plus the population within a 45-minute drive of the boundary of the community core[2].

Housing unit data

The West Wide Wildfire Risk Assessment (Sanborn Map Company 2013) produced a spatial dataset called Where People Live (WPL). The WPL layer, which was generated by processing LANDSCAN and U.S. Census data, represents the estimated density of housing units across the 17 western states. We converted those housing-unit density values to housing-unit counts. Summing the housing-unit count

[1] Pyrologix is a Montana-based wildfire threat assessment research firm (www.pyrologix.com).
[2] The drive-time analysis was conceived and conducted by Dr. Alan Ager and his staff at the Rocky Mountain Research Station, USDA Forest Service.

values for all locations in a named community provides an estimate of the total number of housing units in the community.

For this assessment, housing units were considered *directly* exposed to wildfire if they were located on burnable land cover[3]. Housing units were considered *indirectly* exposed to wildfire if they were located on nonburnable land cover (other than open water) but within 150 m of burnable land cover. Only directly or indirectly exposed housing units are summarized in this report. Nonexposed housing units (those within an urban core, for example) are not included.

Wildfire hazard simulations

This assessment relies on wildfire behavior simulations produced using a comprehensive wildfire occurrence, growth and behavior simulation system called FSim (Finney and others 2011). The FSim modeling for Oregon was conducted for the Pacific Northwest Region Quantitative Wildfire Risk Assessment (QWRA), which was completed in 2018 (Gilbertson-Day and others 2018). The FSim model works by simulating 10,000 or more "iterations" to produce spatial data representing annual burn probability—the annual likelihood that a wildfire will reach a given point on the landscape. Each iteration is a possible realization of a complete calendar year. The FSim burn probability results show considerable variation in wildfire likelihood across the states (Figure 1).

In addition, FSim records the start location and final perimeter for each of its simulated wildfires, enabling us to attribute housing-unit exposure to the origin location, which we use in an assessment of the source of exposure of housing units to wildfire.

Housing-unit exposure to wildfire

Mean burn probability

We calculated the mean burn probability where the housing units are located within each community. This measure represents the mean likelihood that a housing unit in a community will experience a wildfire in one year. The higher this value, the more likely it is that an individual housing unit will experience a wildfire. Mean burn probability is not a cumulative measure for a community, so it does not necessarily increase as the number of housing units increases. Instead, this measure is sensitive to the general location of a community within the burn probability map (Figure 1) and the specific locations of housing units with each community.

Community-wide housing-unit exposure

We first generated raster data representing the expected annual number of housing units exposed to wildfire (the product of housing-unit count and burn probability). We then summed those results within each community; a community with more housing units can therefore have a greater community-wide exposure. The resulting sum represents the estimated mean annual number of housing units expected to experience a wildfire. The top 50 Washington communities by this measure are listed in Table 1; the top 50 Oregon communities are listed in Table 2.

[3]Burnable and nonburnable land cover is characterized by the LANDFIRE 2014 FBFM40 data layer (www.landfire.org), with minor calibration edits informed by local expert knowledge. Burnable land cover includes land covered by grasses, forbs, shrubs, tree litter, understory trees, or logging slash. Nonburnable land cover includes urban areas, irrigated agricultural land, permanent snow or ice, bare ground, and open water.

to start near housing units, and the land surrounding housing units is generally not in USFS ownership. Exceptions exist, however. Fires originating on some portions of USFS land ownership, especially east of the Cascade Mountains in Washington, can indeed reach significant numbers of housing units.

More information

The full list of communities in Washington and Oregon and their exposure to wildfire in is available here as a Microsoft Excel workbook.

Additional detailed spatial information about wildfire hazard and risk to homes in Oregon can be found at the Oregon Wildfire Risk Explorer.

References

Gilbertson-Day, Julie; Scott, Joe; Vogler, Kevin; Brough, April. 2018. Pacific Northwest Quantitative Wildfire Risk Assessment: Methods and Results. Final report. Available: http://pyrologix.com/ftp/Public/Reports/PNRA_QuantitativeWildfireRiskReport_08_27_18.pdf

Sanborn Map Company. 2013. West wide wildfire risk assessment: FINAL REPORT. Available: http://www.odf.state.or.us/gis/data/Fire/West_Wide_Assessment/WWA_FinalReport.pdf

Strauss, David; Bednar, Larry; Mees, Romain. 1989. Do one percent of forest fires cause ninety-nine percent of the damage? Forest Science 35(2): 319–328.

Suggested citation

Scott, Joe H.; Gilbertson-Day, Julie; Stratton, Richard D. 2018. Exposure of human communities to wildfire in the Pacific Northwest. Briefing paper. 10 p. Available at: http://pyrologix.com/ftp/Public/Reports/RiskToCommunities_OR-WA_BriefingPaper.pdf

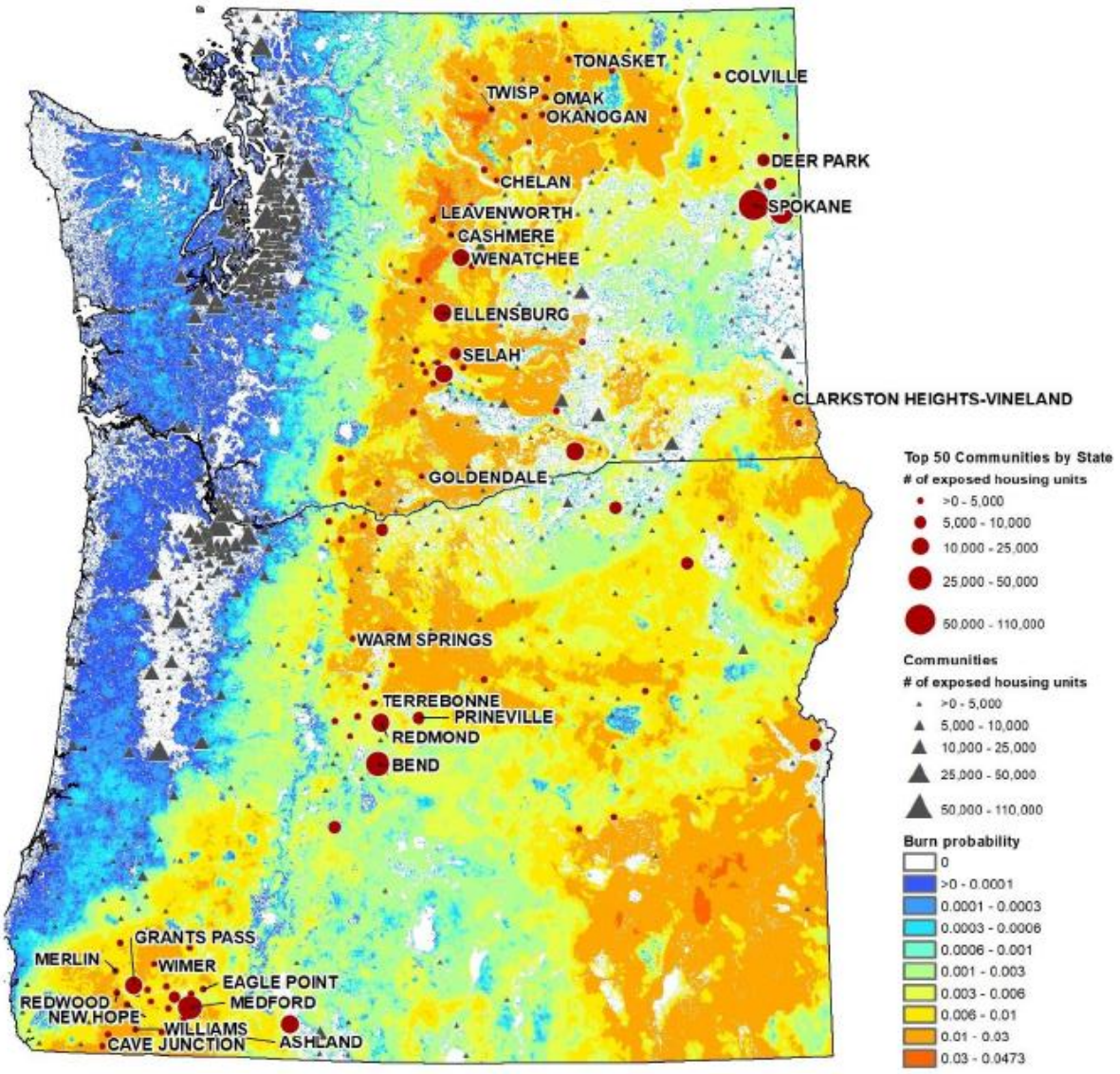


Figure 1. Annual burn probability across the states of Washington and Oregon and exposed human communities in each state. The 50 most-exposed communities in each state are mapped in dark red. The most-exposed communities tend to be in areas with the highest annual burn probabilities based on the FSim modeling results.

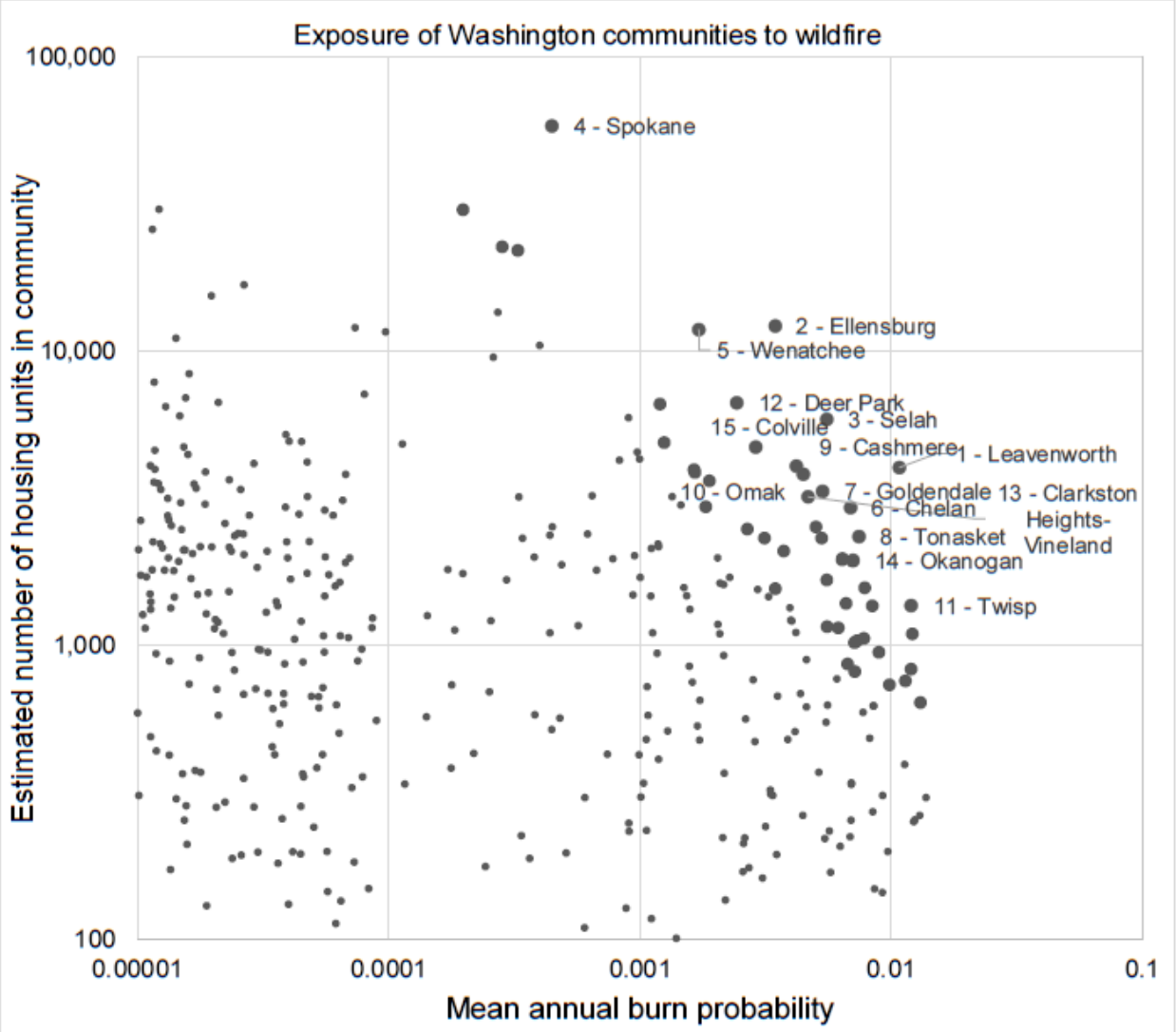


Figure 2. Exposure of Washington communities to wildfire. The 50 most-exposed communities (by cumulative annual housing-unit exposure) are shown as larger gray dots. The top 15 are labeled with the rank and community name. See Table 1 for the names of the remaining top-50 communities. Smaller gray dots represent communities not among the 50 most exposed. Only the 382 communities with a mean burn probability greater than 0.0001 (1 in 10,000) are shown; 245 communities with a lower mean burn probability are not shown. Axes are shown on a common-log scale (base 10).

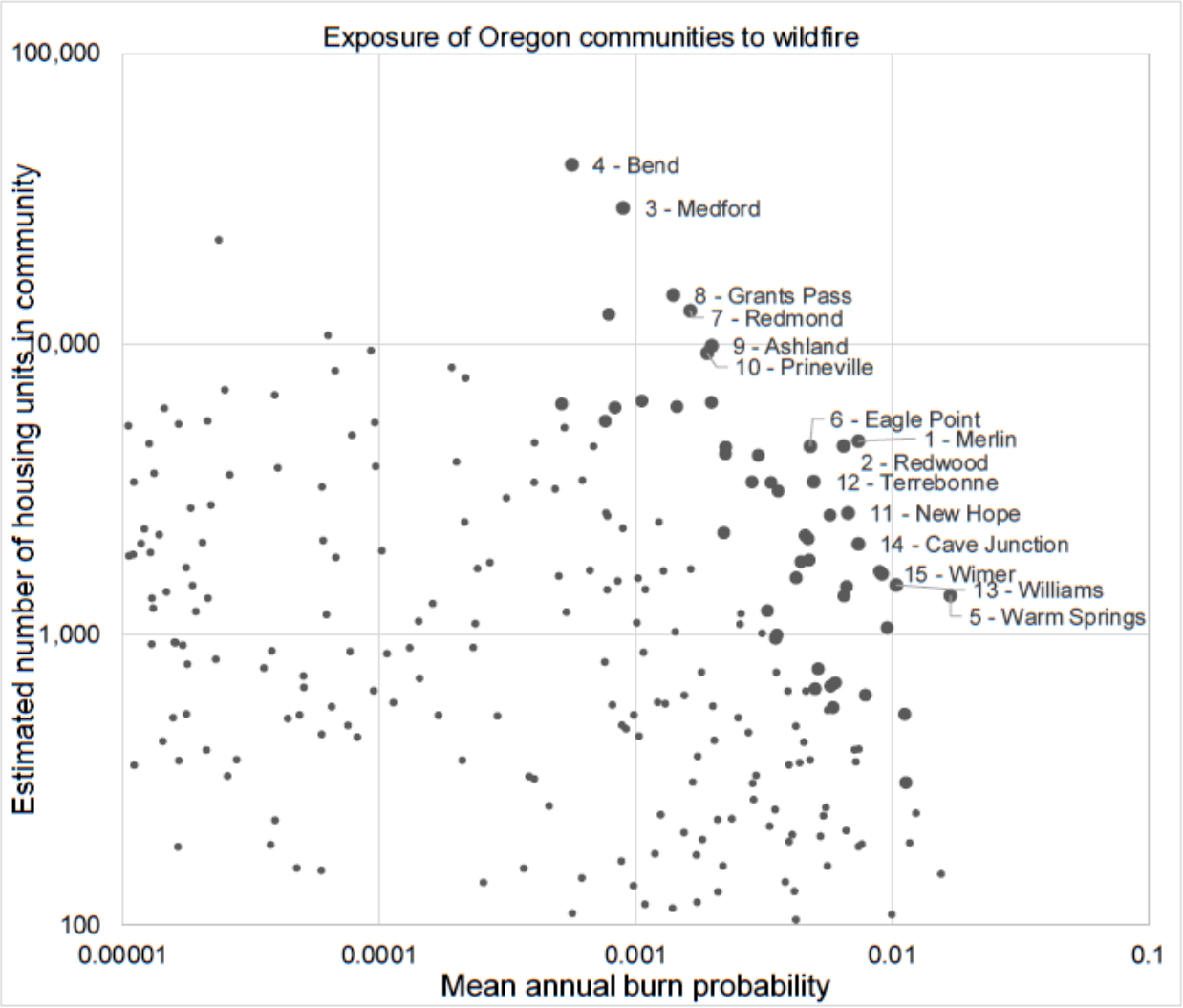


Figure 3. Exposure of Oregon communities to wildfire. The 50 most-exposed communities (by cumulative annual housing-unit exposure) are shown as larger gray dots. The top 15 are labeled with the rank and community name. See Table 2 for the names of the remaining top-50 communities. Smaller gray dots represent communities not among the 50 most exposed. Only the 244 communities with a mean burn probability greater than 0.0001 (1 in 10,000) are shown; 133 communities with a lower mean burn probability are not shown. Axes are shown on a common-log scale (base 10).

Table 1. The 50 communities in Washington with greatest cumulative housing-unit exposure to wildfire. The "mean of exposed housing units" rank indicates the mean (typical) burn probability of housing units within each community.

Community Exposure Ranking	Community Name	Total number of housing units exposed to wildfire	Estimated mean annual number of housing units visited by wildfire	Mean annual burn probability	Burn probability rank
1	Leavenworth	4,025	43.5	0.0108	11
2	Ellensburg	12,204	42.3	0.0035	76
3	Selah	5,873	32.6	0.0056	52
4	Spokane	58,409	26.2	0.0004	165
5	Wenatchee	11,864	20.4	0.0017	112
6	Chelan	2,938	20.3	0.0069	37
7	Goldendale	3,341	17.9	0.0053	55
8	Tonasket	2,343	17.5	0.0075	28
9	Cashmere	3,822	17.1	0.0045	62
10	Omak	4,065	17.1	0.0042	65
11	Twisp	1,364	16.4	0.0121	7
12	Deer Park	6,684	16.3	0.0024	96
13	Clarkston Heights-Vineland	3,198	15.0	0.0047	59
14	Okanogan	1,947	13.8	0.0071	32
15	Colville	4,720	13.7	0.0029	87
16	Cle Elum	1,936	13.7	0.0071	33
17	Winthrop	1,095	13.3	0.0122	6
18	Sunnyslope	2,528	12.7	0.0050	58
19	Brewster	1,973	12.6	0.0064	41
20	Kittitas	1,952	12.5	0.0064	42
21	Entiat	1,570	12.3	0.0079	25
22	Ahtanum	2,318	12.3	0.0053	56
23	Summitview	1,361	11.5	0.0084	23
24	Malott	830	10.0	0.0120	8
25	Manson	1,670	9.3	0.0056	51
26	Springdale	1,388	9.2	0.0066	40
27	Thorp	757	8.6	0.0114	9
28	Asotin	947	8.5	0.0089	18
29	Riverside	638	8.4	0.0131	2
30	Republic	1,057	8.3	0.0078	26
31	Mead	6,614	8.0	0.0012	126
32	South Wenatchee	2,090	7.8	0.0037	73
33	White Swan	1,035	7.6	0.0073	29
34	Inchelium	1,022	7.3	0.0072	31
35	Oroville	2,317	7.3	0.0031	84
36	Klickitat	734	7.2	0.0099	13
37	Yakima	22,047	7.2	0.0003	176
38	Naches	1,147	7.1	0.0062	44
39	Ephrata	3,623	6.9	0.0019	108
40	White Salmon	2,487	6.7	0.0027	91
41	Othello	3,961	6.5	0.0016	115
42	Addy	1,157	6.5	0.0056	50
43	Kennewick	22,660	6.4	0.0003	178
44	Newport	3,871	6.4	0.0017	114
45	West Richland	4,889	6.1	0.0013	125
46	Spokane Valley	30,340	6.0	0.0002	186
47	Trout Lake	814	5.9	0.0072	30
48	Cowiche	864	5.8	0.0067	39
49	Terrace Heights	2,960	5.4	0.0018	109
50	Gleed	1,557	5.4	0.0035	77

Table 2. The 50 communities in Oregon with greatest cumulative housing-unit exposure to wildfire. The "mean of exposed housing units" rank indicates the mean (typical) burn probability of housing units within each community.

Community Exposure Ranking	Community Name	Total number of housing units exposed to wildfire	Estimated mean annual number of housing units visited by wildfire	Mean annual burn probability	Burn probability rank
1	Merlin	4,628	34.2	0.0074	21
2	Redwood	4,451	28.9	0.0065	29
3	Medford	29,340	26.3	0.0009	128
4	Bend	41,321	23.4	0.0006	145
5	Warm Springs	1,362	23.0	0.0169	1
6	Eagle Point	4,443	21.3	0.0048	45
7	Redmond	13,005	21.3	0.0016	103
8	Grants Pass	14,718	20.6	0.0014	108
9	Ashland	9,853	19.5	0.0020	90
10	Prineville	9,285	17.7	0.0019	92
11	New Hope	2,616	17.7	0.0067	25
12	Terrebonne	3,353	16.6	0.0050	43
13	Williams	1,481	15.4	0.0104	9
14	Cave Junction	2,049	15.2	0.0074	20
15	Wimer	1,617	14.8	0.0091	13
16	Gold Hill	2,576	14.8	0.0057	35
17	Chenoweth	1,650	14.8	0.0090	15
18	Talent	4,138	12.5	0.0030	71
19	Central Point	6,282	12.4	0.0020	91
20	Sisters	3,336	11.3	0.0034	67
21	Tumalo	3,119	11.2	0.0036	62
22	Selma	1,055	10.1	0.0096	12
23	Jacksonville	2,132	10.1	0.0047	47
24	Rogue River	2,189	10.1	0.0046	49
25	Klamath Falls	12,620	9.9	0.0008	134
26	Madras	4,408	9.9	0.0022	82
27	Ruch	1,463	9.7	0.0067	26
28	Phoenix	3,346	9.5	0.0028	75
29	White City	4,186	9.4	0.0022	83
30	Ontario	6,086	8.8	0.0015	106
31	Glendale	1,356	8.8	0.0065	28
32	Shady Cove	1,804	8.6	0.0048	46
33	Burns	1,778	7.9	0.0044	51
34	La Pine	6,357	6.7	0.0011	120
35	Eagle Crest	1,565	6.6	0.0042	53
36	Takilma	532	6.0	0.0112	8
37	The Dalles	6,032	5.0	0.0008	132
38	Odell	2,239	5.0	0.0022	84
39	Halfway	619	4.9	0.0079	16
40	La Grande	5,426	4.1	0.0008	138
41	Foots Creek	683	4.1	0.0060	31
42	Culver	1,207	3.9	0.0033	69
43	Trail	763	3.9	0.0052	41
44	Mount Hood	664	3.8	0.0058	34
45	Elgin	997	3.5	0.0036	63
46	Mitchell	310	3.5	0.0114	7
47	Hines	970	3.4	0.0035	65
48	Butte Falls	560	3.3	0.0059	33
49	Prairie City	650	3.3	0.0050	21
50	Pendleton	6,215	3.2	0.0005	29

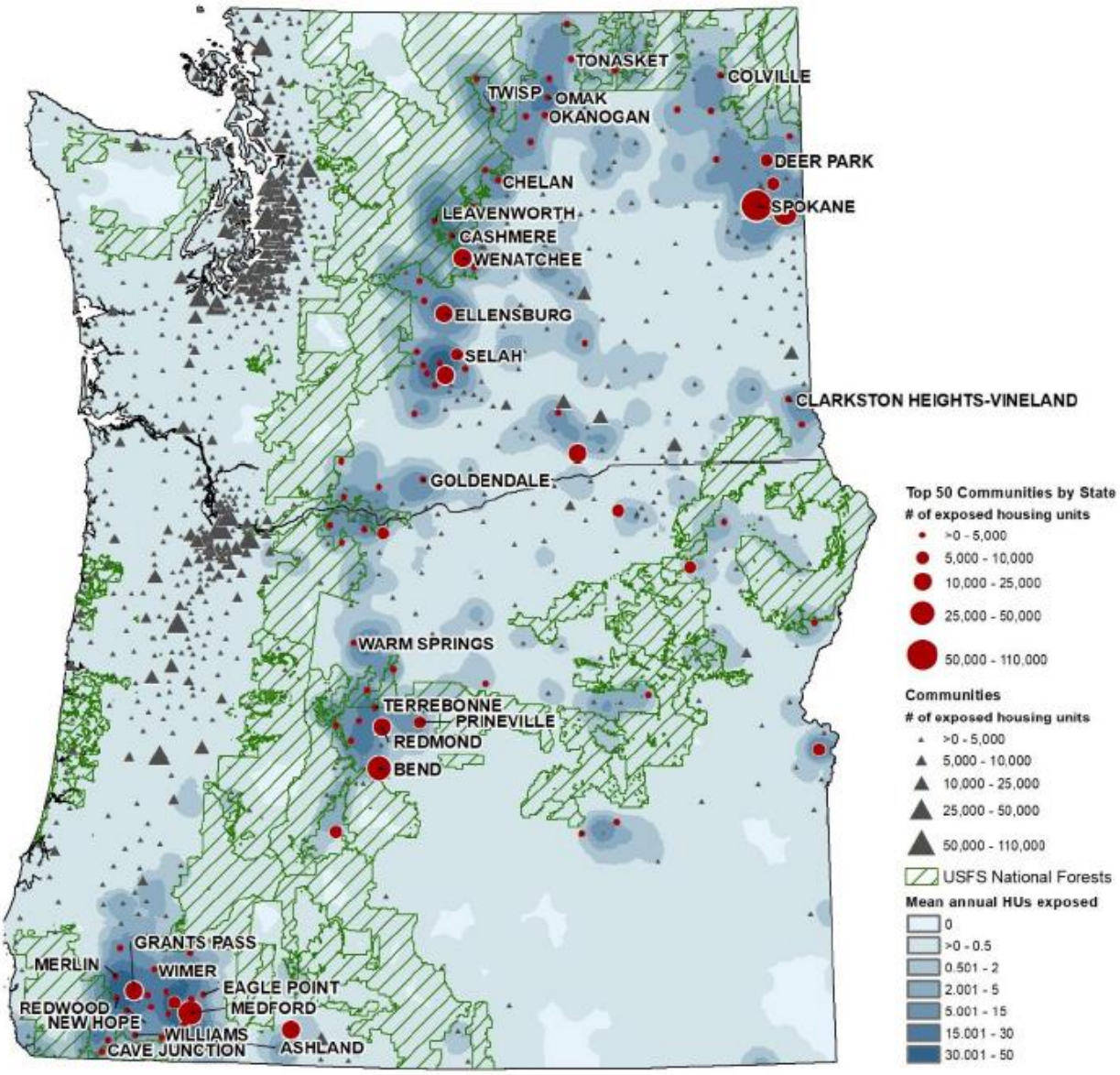


Figure 4. Sources of housing-unit exposure to wildfire across Washington and Oregon and exposed communities across the two states. The fifty most exposed communities in each state are shown in dark red, the remaining communities in gray. Dark blue areas of the map tend to produce greater annual housing-unit exposure.

Appendix 10 - Additional Information

Glossary of Terms

Defensible Space - The area within the perimeter of a parcel, development, neighborhood or community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structures fires. The perimeter as used in this definition is the area encompassing the parcel or parcels proposed for construction and or development, excluding the physical structure itself. The establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures characterize the area.

Disturbance - An event which affects the successional development of a plant community (examples: fire, insects, windthrow, and timber harvest).

Diversity - The relative distribution and abundance of different plant and animal communities as well as species within an area.

Exotic/Invasive Plant Species - Plant species that are introduced and not native to the area.

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

Fire Behavior Prediction Model - A set of mathematical equations that can be used to predict certain aspects of fire behavior when provided with an assessment of fuel and environmental conditions.

Fire Danger - A general term used to express an assessment of fixed and variable factors such as fire risk, fuels, weather, and topography which influence whether fires will start, spread, and do damage; also the degree of control difficulty to be expected.

Fire Exclusion - The disruption of a characteristic pattern of fire intensity and occurrence (primarily through fire suppression).

Fire Intensity Level - The rate of heat release (BTU/second) per unit of fire front. Four foot flame lengths or less are generally associated with low intensity burns and four to six foot flame lengths generally correspond to “moderate” intensity fire behavior. High intensity flame lengths are usually greater than eight feet and pose multiple control problems.

Fire Prone Landscapes – The expression of an area’s propensity to burn in a wildfire based on common denominators such as plant cover type, canopy closure, aspect, slope, road density, stream density, wind patterns, position on the hillside, and other factors.

Fireline - A loose term for any cleared strip used in control of a fire. That portion of a control line from which flammable materials have been removed by scraping or digging down to the mineral soil.

Fire Management - The integration of fire protection, prescribed fire and fire ecology into land use planning, administration, decision making, and other land management activities.

Fire Prevention - An active program in conjunction with other agencies to protect human life, prevent modification of the ecosystem by human-caused wildfires, and prevent damage to cultural resources or physical facilities. Activities directed at reducing fire occurrence, including public education, law enforcement, personal contact, and reduction of fire risks and hazards.

Fire Regime - The fire pattern across the landscape, characterized by occurrence interval and relative intensity. Fire regimes result from a unique combination of climate and vegetation. Fire regimes exist on a continuum from short-interval, low-intensity (stand maintenance) fires to long-interval, high-intensity (stand replacement) fires.

Fire Return Interval - The number of years between two successive fires documented in a designated area.

Fire Risk - The potential that a wildfire will start and spread as determined by the presence and activities of causative agents.

Fire Severity - The effects of fire on resources displayed in terms of benefit or loss.

Fire Use – The management of naturally ignited fires to accomplish specific pre-stated resource management objectives in predefined geographic areas.

Flashy Fuel - Quick drying twigs, needles, and grasses that are easily ignited and burn rapidly.

Fuel - The materials which are burned in a fire: duff, litter, grass, dead branch wood, snags, logs, etc.

Fuel Break - A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Fuel Loading - Amount of dead and live fuel present on a particular site at a given time; the percentage of it available for combustion changes with the season.

Fuel Model - Characterization of the different types of wildland fuels (trees, brush, grass, etc.) and their arrangement, used to predict fire behavior.

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

Fuels Management - Manipulation or reduction of fuels to meet protection and management objectives, while preserving and enhancing environmental quality.

Habitat - A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Habitat Type - A group of habitats that have strongly marked and readily defined similarities that when defined by its predominant or indicator species incites a general description of the area; *e.g. a ponderosa pine habitat type*.

Heavy Fuels - Fuels of a large diameter, such as snags, logs, and large limb wood, which ignite and are consumed more slowly than flashy fuels.

Human-Caused Fires - Refers to fires ignited accidentally (from campfires, equipment, debris burning, or smoking) and by arsonists; does not include fires ignited intentionally by fire management personnel to fulfill approved, documented management objectives (prescribed fires).

Intensity - The rate of heat energy released during combustion per unit length of fire edge.

Inversion - Atmospheric condition in which temperature increases with altitude.

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

Landsat Imagery - Land remote sensing, the collection of data which can be processed into imagery of surface features of the Earth from an unclassified satellite or satellites.

Landscape - All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

Lethal - Relating to or causing death.

Lethal Fires - A descriptor of fire response and effect in forested ecosystems of high-severity or severe fire that burnt through the overstory and understory. These fires typically consume large woody surface fuels and may consume the entire duff layer, essentially destroying the stand.

Litter - The top layer of the forest floor composed of loose debris, including dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Mitigation - Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

Monitoring Team - Two or more individuals sent to a fire to observe, measure, and report its behavior, its effect on resources, and its adherence to or deviation from its prescription.

Native - Indigenous; living naturally within a given area.

Natural Ignition - A wildland fire ignited by a natural event such as lightning or volcanoes.

Noxious Weeds - Rapidly spreading plants that have been designated "noxious" by law which can cause a variety of major ecological impacts to both agricultural and wildlands.

Planned Ignition - A wildland fire ignited by management actions to meet specific objectives.

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescription - A set of measurable criteria that guides the selection of appropriate management strategies and actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Seral - Refers to the stages that plant communities go through during succession. Developmental stages have characteristic structure and plant species composition.

Stand Replacing Fire - A fire that kills most or all of a stand.

Surface Fire - Fire which moves through duff, litter, woody dead and down and standing shrubs, as opposed to a crown fire.

Watershed - The region draining into a river, river system, or body of water.

Wet line - Denotes a condition where the fireline has been established by wetting down the vegetation.

Wildland Fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Use - The management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in predefined geographic areas outlined in FMP's. Operational management is described in the WFIP. Wildland fire use is not to be confused with "fire use," which is a broader term encompassing more than just wildland fires.

Wildland Fire Use for Resource Benefit (WFURB) - A wildland fire ignited by a natural process (lightning), under specific conditions, relating to an acceptable range of fire behavior and managed to achieve specific resource objectives.

Wildland-Urban Interface (WUI) - For purposes of this plan, the wildland-urban interface is located defined in Section 4.5. In general, it is the area where structures and other human development meet or intermingle with undeveloped wildland.

General Mitigation Strategies

There are many actions that will help improve safety in a particular area; there are also many mitigation activities that can apply to all residents and all fuel types. General mitigation activities that apply to all of Klickitat County are discussed below while area-specific mitigation activities are discussed within the strategic planning area assessments.

Prevention. The safest, easiest, and most economical way to mitigate unwanted fires is to stop them before they start. Generally, prevention actions attempt to prevent human-caused fires. Campaigns designed to reduce the number and sources of ignitions can be quite effective and can take many forms.

Limiting Use. The issues associated with debris burning during certain times of the year are difficult to negotiate and enforce. However, there are significant risks associated with the use of fire adjacent to expanses of flammable vegetation under certain scenarios. Fire departments typically observe the State of Washington closed fire season between July 1st to September 30th. During this time, an individual seeking to conduct an open burn of any type shall obtain a permit to prescribe the conditions under which the burn can be conducted and the resources that need to be on hand to suppress the fire. Although this is a statewide regulation, compliance and enforcement has been variable between fire districts.

Defensible Space. Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Franklin County must be made aware that home defensibility starts with the homeowner. Once a fire has started and is moving toward a structure, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the building. The Firewise Communities USA program is an excellent tool for educating homeowners on the steps to take in order to create an effective defensible space. Residents of Klickitat County should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations. Beyond the homes, forest management efforts must be considered to slow the approach of a fire that threatens a community.

Evacuation. Community evacuations will be handled on a case-by-case basis. Officials will assist with an evacuation but residents living in high risk areas should familiarize themselves with the layout of the roads around their homes and know where to go given the location of an advancing wildfire.

Access. Also of vital importance is the accessibility of homes to emergency apparatus. The fate of a home will often be determined by homeowner actions prior to the event. A few simple

guidelines such as widening or pruning along driveways and creating a turnaround area for large vehicles, can greatly enhance home survivability.

Facility Maintenance. Recreational facilities near communities or in the surrounding forests such as parks or natural areas should be kept clean and maintained. In order to mitigate the risk of an escaped campfire, escape-resistant fire rings and barbeque pits should be installed and maintained. In some cases, restricting campfires during dry periods may be necessary. Surface fuel accumulations in nearby forests can also be kept to a minimum by periodically conducting pre-commercial thinning, pruning and limbing, and possibly controlled burns.

Fire District Response. Once a fire has started, how much and how large it burns is often dependent on the availability of suppression resources. In most cases, rural fire departments are the first to respond and have the best opportunity to halt the spread of a wildland fire. For many districts, the ability to reach these suppression objectives is largely dependent on the availability of functional resources and trained individuals. Increasing the capacity of departments through funding and equipment acquisition can improve response times and subsequently reduce the potential for resource loss.

Development Standards. County, city, and even fire district policies can be updated or revised to provide for more fire conscious techniques such as using fire resistant construction materials; improving roads, and establishing permanent water resources.

Other Mitigation. Other actions to reduce fire hazards are thinning and pruning timbered areas, creating a fire resistant buffer along roads and power line corridors, and strictly enforcing fire-use regulations. Ensuring that areas beneath power lines have been cleared of potential high risk fuels and making sure that the buffer between the surrounding lands is wide enough to adequately protect the poles as well as the lines is imperative

Rules for Burning Without a Permit

When there is no burn ban, you may burn following these conditions.

On forest lands regulated by DNR, recreational and debris burning is permitted without a written permit if the following conditions are met:

- Recreational fires are:
    - Contained within a campfire pit located in a state, county, municipal, or other campground approved by the department; OR
    - Contained within a camp stove or barbecue; OR
    - A pile no larger than four feet in diameter that is being used exclusively for recreational purposes that is situated on bare soil, gravel bars, beaches, green field, or other similar areas free of flammable material for a sufficient distance adequate to prevent the escape of fires
- Debris burns:
    - Only one pile may be burned at any one time and each pile must be extinguished before lighting another.
    - From July 1 to October 15 individual pile size in all counties shall be limited to no larger than 4 feet, except pile size in Clallam and Jefferson counties is limited to ten feet.
    - From October 16 through June 30 individual pile size in all counties is limited to ten feet; except pile size is limited to four feet in Island, King, Kitsap, Mason, Pierce, San Juan and Spokane counties.
- Burn only natural vegetation. Material growing in and/or gathered from improved property, such as yard and garden debris, cannot be burned under DNR regulations.
- Burn piles are at least 50 feet from structures and 500 feet from any forest slash.
- The area around the burn pile is clear of any flammable debris.
- The winds are calm or light. It is too windy to burn if trees are swaying, flags are extended, or waves appear on open water.
- Maintain a connected water hose or at least five gallons of water and a shovel nearby.
- Attend the fire until it is completely extinguished.
- Be prepared to extinguish the fire if it becomes a nuisance.
- Call the DNR burn line (800-323-BURN) or visit https://fortress.wa.gov/dnr/protection/firedanger/ each day of ignition prior to lighting any fire. The instructions provided for the county you are burning in, including fire danger and air quality burn bans, become a condition of burning. Failure to comply with these instructions is a violation subject to citation.

If any of these conditions cannot be met, a written burning permit is required. These conditions apply only to burning in areas regulated by DNR.

List of Figures

List of Tables

This plan was updated by Northwest Management, Inc. under contract with the Washington Department of Natural Resources.

Citation of this work:

King, Tera and Nelson, Eric. *Lead Authors.* 2018 Klickitat County, Washington Community Wildfire Protection Plan Update. Northwest Management, Inc., Moscow, Idaho.

Northwest Management, Inc.
233 East Palouse River Drive
PO Box 9748
Moscow ID 83843

208-883-4488 Telephone
208-883-1098 Fax
NWManage@northwestmanagement.com
www.northwestmanagement.com