TROUT LAKE COMMUNITY WILDFIRE PROTECTION PLAN

Final Draft - November 2005

Trout Lake

CWPP

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Trout Lake Community Council
Northwest Service Academy, AmeriCorps

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Skamania County
Trout Lake Community Council
Trout Lake Country Inn
Trout Lake General Store
Trout Lake Post Office
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Trout Lake School
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Trout Lake
Community Wildfire Protection Plan
Signatures of Support

November, 2005

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With assistance from:
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USFS, Klickitat County, and the Trout Lake Community.

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TABLE OF CONTENTS

LIST OF MAPS

CHAPTER 1: INTRODUCTION

Wildfire is a fact of life for Washington's wildland urban interface (WUI) communities. It is a key part of the life cycle of the twenty-two million acres of private, state, and federal forests that cover nearly fifty percent of the state. Because it also threatens human life and property, wildfire has long been suppressed. But in a fire-adapted ecosystem, suppressing fire does not make the threat go away. To the contrary, decades of successfully suppressing fire has led to a widespread decline in forest health. Many forests are out of balance (overcrowded, weakened by disease, dominated by the wrong species) and heavily loaded with woody fuel. Add population growth to these factors and you have a recipe for catastrophic wildfires. Fortunately, throughout the West, state and federal agencies, local communities, private contractors, non-profit groups, and individual citizens are now teaming up to reduce that risk.[1]

In August of 2000 the National Fire Plan (NFP), or 10 Year Comprehensive Strategy, was developed to actively respond to severe wildland fires and their impacts on communities while ensuring sufficient firefighting capacity for the future. In August of 2002 and in the midst of one of the worst fire seasons in recent history, the President launched the Healthy Forests Initiative (HFI). The HFI focuses on reducing the risk of catastrophic fire by thinning dense undergrowth and brush in priority locations that are on a collaborative basis with selected federal, state, tribal, and local officials and communities. A major result of the HFI was the Healthy Forest Restoration Act of 2003 (HFRA). The HFRA provides improved statutory processes for hazardous fuel reduction projects through Community Wildfire Protection Plans (CWPP).

A CWPP represents the best opportunity communities have to address the challenges of the WUI in a manner that brings about comprehensive and locally supported solutions. CWPPs emphasize the need for federal agencies to work collaboratively with communities in developing hazardous fuels reduction projects, and they place priority on treatment areas identified through a plan. This ultimately allows communities to influence where and how federal agencies implement fuel reduction projects on federal land, as well as how additional federal funds may be distributed for projects on non-federal lands.[2]

[1] http://www.dnr.wa.gov/htdocs/rp/01wildlandfiresum/nfplan02.pdf
[2] http://www.stateforesters.org/pubs/CWPPBriefingPaper.pdf

The HFRA requires three elements of a CWPP:

1. It must be collaboratively developed by local and state government representatives, in consultation with federal agencies and other interested parties.

2. It must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure.

3. It must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

Why develop a Trout Lake CWPP?

The community of Trout Lake and its adjacent areas has experienced many wildfires and represents a classic example of a WUI community with strong potential for a catastrophic wildfire event. Fortunately, suppression efforts by our local and assisting firefighters have been successful in preventing a fire of this nature from taking place. However, conditions exist for a large wind-driven wildfire to overrun the community and for a large wildfire to occur within the community. Each year this situation worsens as additional people move into the area and the surrounding vegetation becomes denser.

The following are found within and adjacent to the Trout Lake planning area:

- High value of life, homes, property, and the landscape
- Steep slopes
- Prevailing wind directions that would strongly influence a large wildfire
- A fuel load that would support a large wildfire event
- Emergency access issues including one means of ingress/egress, narrow roads, turning radius limitations, and identification of addresses and roads
- Many structures with no, or very limited, defensible space
- Numerous homes with combustible construction materials, and/or high factors of structural ignitability
- Growing population and increased development that could lead to increase fire frequency

Although Trout Lake has not recently experienced a catastrophic wildfire, community residents realized the current level of wildfire danger and decided to develop a CWPP to counter these conditions and protect lives, homes, and the valued landscape. After two years of formulating ideas and receiving positive feedback from the community, Trout Lake received adequate funding to develop a CWPP.

Five Objectives of the Trout Lake CWPP

1. Develop a fluid Community Wildfire Protection Plan

- Show regional fire history with influencing weather and topographical features
- Define planning area and entities involved
- Summarize current prevention and fuel management strategies, educational outreach efforts, and develop a mitigation plan
- Convey this information to community and agencies

2. Map locations of local infrastructure

- Conduct surveys utilizing GPS/GIS technology
- Identify on maps things such as homes, evacuation routes, safety zones, locations of livestock, access roads, water sources, and major power and communication systems
- Identify areas of community importance and value
- Provide maps to firefighters and emergency response agencies

3. Develop a coordinated system for emergency communications

- Research, define, and convey a coordinated system of emergency communications for valley residents, Trout Lake Volunteer Fire Department, neighboring fire departments, and cooperating fire departments
- Develop and annually update a database that lists by organization and location: firefighting equipment and contact information of fire managers
- Develop a community evacuation strategy

4. Educate residents on how to protect their homes and property from wildfire

- Provide information for community residents to make structures and property safer from wildfire
- Teach "firewise" concepts to community and school
- Educate community residents on ways to reduce structural ignitability
- Conduct community outreach activities

5. Develop and implement strategies for fuel reduction and fire suppression

- Identify critical access roads that can't handle fire department equipment
- Develop a fuel reduction plan
- Recruit groups to remove hazardous fuels
- Assist seniors and disabled individuals to create defensible space around homes
- Encourage local landowners to remove hazardous fuels on their property
- Research incentive programs for landowners to control hazardous fuels on their property

The Trout Lake CWPP is an evolving plan and may change as new information is collected. This first version is based upon the best information available, so exactness may vary. It is intended to be used by all Trout Lake residents and property owners within and adjacent to the community, and to serve as a chapter in the Skamania and Klickitat Counties Wildfire Protection Plan. This plan provides information on wildfire, defensible space, and methods to reduce structural ignitability. In addition, it supplies a prioritized list of hazardous fuels reduction projects and other recommendations that will protect the community from wildfire if and when one was to occur.

CHAPTER 2: PLANNING PROCESS

The planning process for the Trout Lake CWPP follows recommendations from, *"Preparing a Community Wildfire Protection Plan: a Handbook for Wildland-Urban Interface Communities," "A Framework for Community Fire Plans: a Collaborative Approach to Developing Community Fire Plans,"* and information gathered from other CWPPs.

Step one – Convene Decision Makers and Establish CWPP Team

After two years of formulating ideas and receiving positive feedback from the community, Trout Lake received a Secure Rural Schools and Community Self-Determination Act of 2000 Title III Grant, Klickitat County Economic Development Assistance Grant, and matching hours and assistance from Northwest Service Academy, AmeriCorps, USFS, and WADNR in 2004. These resources helped form both the steering committee and the CWPP Team:

Steering Committee

- Steve Koenig - Klickitat County Fire District 1 Trout Lake Volunteer Fire Department Fire Chief
- Greg Page - USFS Lead Fire Prevention Technician - Mt. Adams Ranger District, Fire Management
- Jim Wells - Director of Northwest Service Academy, AmeriCorps - Mt. Adams Center

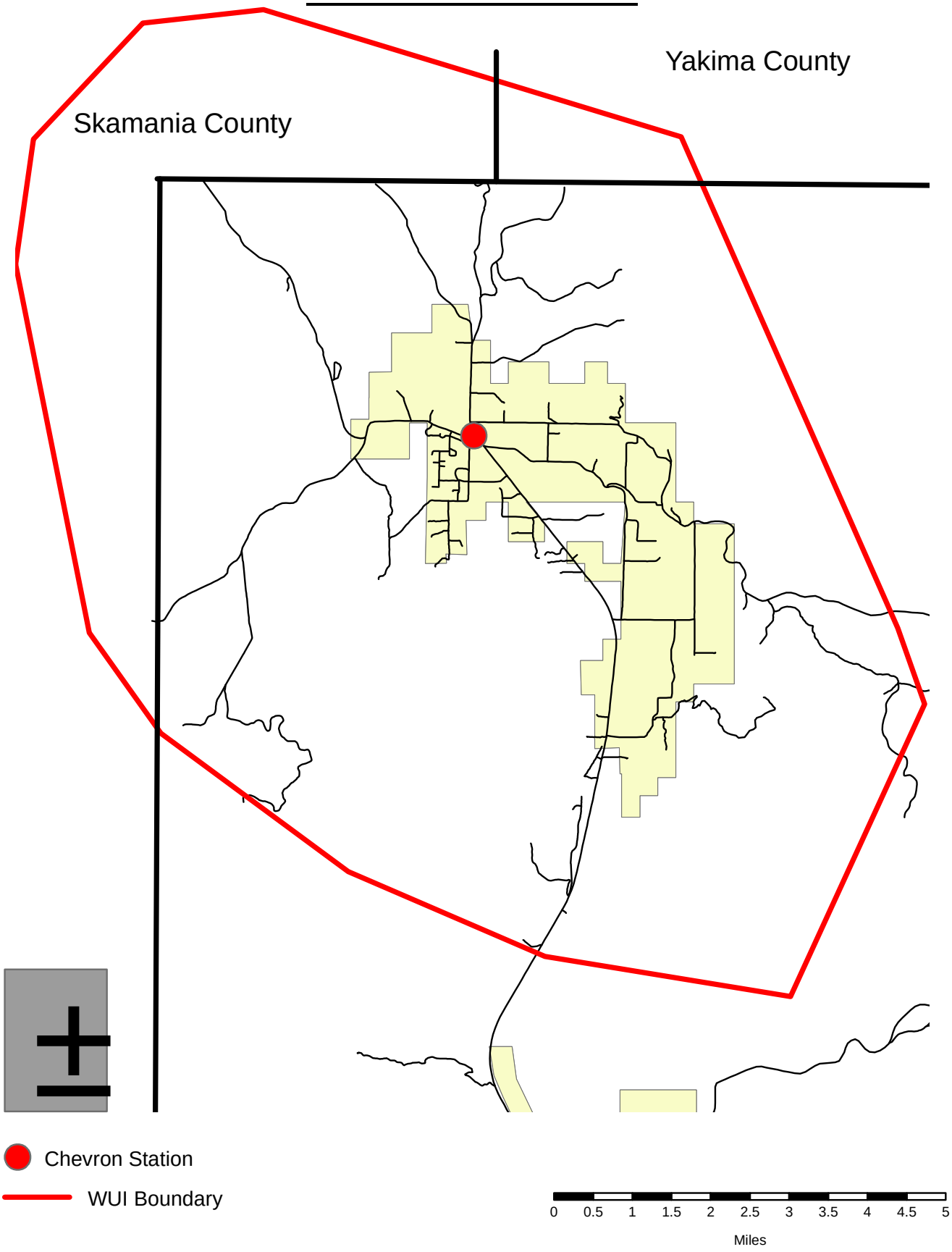
CWPP Team (Northwest Service Academy, AmeriCorps)

- Carter Davis - Project Coordinator
- Joseph Esteves - Project Technical Advisor
- Matt Dearden - Project Assistant Technician

Step two – Establish Planning Area

The planning area for Trout Lake's WUI was derived from where large wind-driven wildfires had potential to overrun the community. Wildfire hazards, wind direction, population density, risks of ignition, watersheds, values, and logical placement of hazardous fuels reduction projects are elements that shaped the planning area. The WUI planning area boundary is subject to change with time as the landscape changes.

Trout Lake WUI



Step three – Education and Community Outreach

For years the community of Trout Lake has had numerous learning opportunities for wildfire protection from the TLVFD, WADNR, and USFS. The fourth objective of this plan is to educate community residents on how to protect homes and property from wildfire. This was accomplished through mailings, bulletins, signup sheets, and individual assessments. The following is a list of educational materials and outreach efforts the CWPP Team and community residents provided:

DATE	ACTIVITY
1-04	Ole Helgerson & WSU Extension Wildfire Preparedness Class.
5-04	Community meeting introducing Wildfire Protection Plans.
3-05	Position announcement for Project Coordinators and CWPP Team.
6-05	Community Council Meeting introducing the CWPP Team.
6-05	Trout Lake's CWPP flyer posted at local businesses.
6-05	First CWPP publication and survey for community and landowners in and around Trout Lake.
7-05	Community Council Meeting updating CWPP progress.
5	Mailing offering individual assessments and educational materials.
8-05	Sign up sheets for individual assessments posted at local businesses.
8-05	Radio PSAs announcing CWPP booth at Trout Lake Fair.
8-05	CWPP booth at Trout Lake Fair and collaborative float with USFS, WADNR, TLVFD, CWPP and Smokey Bear in Trout Lake parade.
8-05	Volunteer calling session to engage community, provide educational materials, and perform NFPA-299 home assessments.
8-05	Editorial by Stan Rapp in the *Enterprise*.
9-05	Community Council Meeting updating CWPP progress.
9-05	Article in *Enterprise* by Pat Arnold about CWPP and invitation to discuss it in the community council.
10-05	Community Council Meeting updating CWPP progress and introducing plan for final draft review.
11-05	Community Council Meeting discussing final draft for submission.

Step four - Community Assessment

In July 2005, the CWPP Team performed a community assessment by driving throughout Trout Lake and surrounding areas while observing the levels of wildfire hazard, risks of ignition, values identified by the community, and elements of structural ignitability on an area-by-area basis. Definitions of these elements are as follows:

- **Risk of Ignition** - the potential for wildfire to occur (lightning, discarded cigarettes, and debris burning)
- **Hazard** - the conditions that may contribute to wildfire (weather, available fuel, slope, aspect, exposure, and increasing population)
- **Values** - the people, property, natural resources, and other resources that would suffer losses in the event of a wildfire
- **Structural Ignitability** - elements that affect a structure's likelihood for ignition during a wildfire (building materials, access, and defensible space)

The CWPP Team's empirical observations were given ratings based upon the NFPA-299 (National Fire Plan Assessment form 299)[3]. What was observed is in concurrence with WADNR findings. Trout Lake is a high-risk WUI community, and without extensive modification it is extremely vulnerable from a large wind-driven wildfire. Results of the community assessment are discussed in Chapter 5.

Supplemental to the community assessment are individual home and property assessments currently being performed using both the NFPA-299 form and a modified version of the NFPA-299 for TLVFD purposes. Currently, most properties and structures are in the Moderate range with a growing number scoring in the High to High+ range. These are also discussed in Chapter 5.

Step five - Incorporate Community Feedback

In June of 2005, surveys were mailed to all of Trout Lake's known fulltime and partial-year residents. For those surveys returned, a number of residents touched on the need to protect certain community values and structures.

Word of mouth was the predominant factor in obtaining community feedback, as fewer than expected surveys were returned. Topics included respecting privacy, the need for hazardous fuels reduction on individual properties, and financial assistance opportunities to carry out fuels reduction projects. Upon the approval of this plan, further community outreach and information gathering will continue to be offered. More feedback and involvement is also expected.

[3] To see the NFPA-299 form, see appendix D

Step six - Review Emergency Preparedness

The third objective of this plan is to develop a coordinated system for emergency communications. Upon the completion of this version of the Trout Lake CWPP, it has become evident that more research is needed to determine the best method of developing this. Recommendations for developing a coordinated system of emergency communications are discussed in Chapter 10**,** and will most likely be fleshed out in future developments of this plan.

Chapter 6 provides information on how the community can better prepare itself for the event of a wildfire, identifies evacuation routes, discusses potential safety zones, and lists the response resources of our local firefighting agencies and how they relate to one-another.

Step seven - Develop Mitigation Strategy & Recommendations

As of November 2005, the Trout Lake CWPP has prioritized fuel reduction projects in a manner that would protect the community from the most likely directions of a large advancing wind-driven wildfire, and to slow the spread of wildfire within the community. However**,** these opportunities may not be viable based upon landowners' objectives these are discussed in Chapter 7. A list of other recommendations and future developments of this CWPP has also been created to enhance emergency response, safety, and meet original goals that were unable to become developed. These are discussed in Chapter 10.

Step eight - Finalize CWPP

Although this edition of the Trout Lake CWPP touches on many aspects of wildfire in the planning area, more data, energy, and funding is necessary to fulfill the five original goals. Many aspects of this plan will require follow-through and future development, and are discussed in Chapter 8.

CHAPTER 3: COMMUNITY OVERVIEW

Trout Lake is a WUI community-at-risk (CAR) located in the northwest corner of Klickitat County, Washington. Roughly 25 miles north of Hood River, Oregon and the Columbia River Gorge, we sit toward the eastern side of the Cascade Mountain Range at around 2000 feet in elevation. The surrounding landscape is densely forested with Ponderosa pine and Douglas-fir dominated stands. The Gifford Pinchot National Forest (GPNF) lies to the north and west. Ten miles to the north, 12,276-foot Mt. Adams dominates the skyline. These surroundings provide fresh water supplies, abundant wildlife habitat, scenic beauty, and ample recreation opportunities. As part of the White Salmon watershed, the main bodies of water include Trout Lake Creek and the White Salmon River, which feed from the many creeks and springs from Mt. Adams and surrounding terrain.

CLIMATE

Trout Lake is located in an interesting transition zone both in elevation and within the Cascade Mountain Range. The winters are often wet and cold. According to data taken from the Mt. Adams Ranger Station, Trout Lake receives an average annual precipitation of 42.77 inches. 92% of Trout Lake's total precipitation falls between the months of October and May. The average snowfall in Trout Lake is around 84 inches a year.

Fire season presents itself from May-October, with July and August being the driest and hottest months. June, July, August, and September only bring about 8% of the annual precipitation.

POPULATION

Trout Lake is a growing WUI community. The 2000 U.S. Census states that Trout Lake had 210 households with a population of 494. In contrast, a buildable lands inventory by Tenneson Engineering Corporation in 2005 estimates the current population at 1,190. These estimates include partial-year residents and a number of small cabins that dot the peripheral areas of the valley. At present, there are an estimated 506 individual dwelling units of single and multiple families. According to this same company, population growth could reach 1,368 - 3,157 by the year 2025.[4]

Tourism has been a growing element for Trout Lake and the surrounding landscape. Recreational opportunities draw thousands to the area annually for all types of outdoor activities. An estimated 22,543 people visited the Mt. Adams Ranger Station in 2003, and an estimated 6000 people climb Mt. Adams annually.

[4] Trout Lake Master Plan: "Buildable Lands Inventory" by Tenneson Engineering Corporation, 2005.

TRANSPORTATION

"Transportation systems are of critical importance in wildfire planning. Road systems provide access for fire suppression and a means for residents and visitors to escape from a wildfire. Unfortunately, they also increase potential for wildfire starts because of increased access to vegetative fuels."[5]

Roads in the Trout Lake planning area are private, or under the jurisdiction of the county, state, and federal governmental agencies that cooperate to monitor and maintain vegetation and road conditions. There is no railway service to the valley. There is a small airport that serves primarily private, single engine aircraft. The USFS has previously utilized the airstrip as a helipad during wildfire events.

State Highway 141 is the primary arterial providing access through the White Salmon River watershed. Other main roads that also serve as primary escape routes include: 88 Rd., 23 Rd., 24 Rd., and the Trout Lake-Glenwood Highway. Small, loosely grouped homes exist off Highway 141 and the peripheral areas of the community. Many are served by a single access route that provide only one means of ingress and egress. There are numerous dirt track or gravel roads on both public and private land that mostly stem from previous timber harvesting.

INFRASTRUCTURE

"Facilities critical to emergency response and recovery activities include 911 centers, emergency operations centers (EOCs), police and fire stations, public works facilities, sewer and water facilities, hospitals, bridges, roads, and shelters."[6] A majority of returned Trout Lake CWPP surveys portrayed values and infrastructure seen to be at risk from wildfire. These include but are not limited to:

- Trout Lake K-12 School
- Mt. Adams Ranger Station
- Hollenbeck Landing Strip
- Sprint Switch Station
- Flattop Mountain Communications Towers
- Guler Mt. Adams County Park
- Trout Lake Airport
- Trout Lake Post Office
- Glacier Springs Water Association
- Northwest Service Academy, AmeriCorps

Power service to Trout Lake is mostly distributed via Klickitat County PUD with a mix of overhead and underground utilities. A power line parallels Hwy. 141 until reaching the network of roads in the valley. Power lines also support communications towers on Flattop Mountain.

[1] Josephine County Integrated Fire Plan
[2] Josephine County Integrated Fire Plan

The bulk of the community utilizes water and fire protection hydrants or standpipes from Glacier Springs Water Association. Residents outside this area use wells and/or springs.

FIRE IN AND AROUND TROUT LAKE[7]

Fire has a steady history in the Trout Lake valley. This area was a summer home for Native Americans for thousands of years. Traveling to and from the plentiful resources in the area, they camped here to fish for trout and gather tule reeds that grew in the lake.[8] "While use of fire varied greatly, its believed that tribes used wildfire as a tool for hunting, crop management, improving growth and yields, insect collection, pest management, warfare, signaling, clearing areas for travel, felling trees, clearing riparian areas, and for fireproofing."[9] Also, Native Americans would often burn sections of the forest to manage huckleberry growth and to burn out undergrowth in the forests.

Fire history both in and adjacent to the planning area suggests that a wildfire is two to three times more likely to advance from the southwest and south when compared to other directions. There have been around 65 wildfires in an eight-mile radius throughout the past ten years. This radius extends eight miles in all directions except the east, where it extends about 6 miles. An estimated 30.1 acres burned from wildfire, according to USFS and DNR records. At least 44 of these fires, or 68%, were human caused, while 16 fires, or 25% were lightning caused. Eighty percent of the fires were one-tenth of an acre or smaller due to the quick response time of the USFS, WADNR, and the TLVFD. The low acreage burned shouldn't be discounted as low wildfire activity, but rather serve as an indicator that a catastrophic wildfire has not yet occurred. If the fire history radius were extended another four miles to the north, west, and south, about 67 more fires would be included, increasing the number of wildfires by 103%.

FIRE ECOLOGY OF THE MID-COLUMBIA REGION[10]

In the western United States, wildfire, climate, and topography have been the primary shapers of forest ecosystems in the landscape that we know today. Although the current landscape includes many plant and animal species not present before 1850, prior to white settlement, this region consisted of a mosaic of forests, woodlands, and grasslands. All of these burned at different times of the year and at different intensities for several thousand years.

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[7] This data is missing recent information and is therefore incomplete.
[8] Trout Lake Valley Cookbook - facts compiled from Esther Schmid and Cheryl Mack
[9] Josephine County Integrated Fire Plan, pg. 23
[10] Information was taken from, *Fire Ecology of the Mid-Columbia Region,* Louisa Evers, Heidi Hubbs, Rob Crump, John Colby, and Robin Dobson

Recent fire exclusion has had the most impact on fuel loading and stand composition in areas where human development and land management practices, like fire suppression, occur. Climax species, like Douglas-fir and Grand fir, are replacing seral communities.

Generally, wildfire affects wildlife primarily by changing the habitat. It creates, destroys, enhances, or degrades food supply, cover, shelter, or the physical environment. Wildlife responses are more directly related to plant community responses, so fire rarely affects wildlife. Direct mortality of large animals rarely occurs, while smaller animals usually die from suffocation in their burrows.

Understory shrubs and herbs recover from fire via surviving parts. Fire completely removes other plants or creates a post-fire environment in which some species cannot survive. While some understory vegetation may stay from onsite seeds in the soil, others colonize a burned area from off-site seed sources.

Fire can cause direct and indirect mortality to trees. Heat damage to trees, crown scorch, and cambium damage can immediately kill a tree, or lead to mortality from insect and disease attack. In comparison, lack of fire frequency also attracts infestations of insect and disease.

Many tree species are adapted to wildfire in and around the Trout Lake area. The following table contains the most common timber found in the planning area and portrays their stand habitat and degree of fire resistance:

Species	**Stand Habitat**	**Degree of fire resistance**
Oregon white oak	open	medium
Ponderosa pine	open	very resistant
Douglas-fir	moderate to dense	very resistant
Western larch	open	most resistant
Grand fir	dense	medium
Lodgepole pine	open	medium
Western white pine	dense	medium
Engelmann spruce	dense	low
Noble fir	dense	low
Pacific silver fir	dense	low
Subalpine fir	moderate to dense	very low
Western hemlock	dense	low
Mountain hemlock	dense	low
Western redcedar	dense	medium
Incense-cedar	moderate to dense	low
Western juniper	open	medium

Ponderosa pine is one of the most fire-resistant species of trees. Seedlings and saplings can survive low-intensity wildfires. Mature trees can often survive when 90% of its crown has been scorched. Fires remove litter and surface fuels which favor Ponderosa pine seedling establishment. Because of its fire resistant nature, it is has a competitive advantage when mixed stands of conifers burn.

Mature **Douglas-firs** resist fire damage well, while younger trees do not. Fire resistant bark takes over 40 years to develop. This tree rarely grows in open stands, but does form dense stands under old-growth Ponderosa pine and Oregon white oak. These types of stands are vulnerable to crown fires.

Western larch is the most fire resistant conifer in the western United States. Rapid early growth combined with self-pruning characteristics makes it difficult for a surface fire to spread into the canopy. Because it is deciduous, this tree can tolerate defoliation.

Grand fir is more susceptible to fire damage than other conifers. Mature stands can withstand light to moderate intensity fires. They have rather slow reproductive success, but germinate best on ash, and grow best with partial shade.

Individual **Lodgepole pines** can resist low intensity fires. Thin bark makes this species very susceptible to fire. Its cones, however, require fire to open, and are very successful following a fire.

Western white pine resists fire moderately well. Medium thick bark, moderately flammable foliage, self-pruning characteristics, and tall stature help this species survive low intensity fires. A purely seral species, it depends on stand-replacing fire and areas of blow-down to maintain its presence in the forest in the absence of management activities.

Western redcedar exhibits moderate fire resistance. Mature trees often survive due to its large size, but thin bark, shallow roots, and dense branching often make them vulnerable to even low intensity wildfires.

Incense-cedar is fairly tolerable from fire due to its thick bark and high, open crown. Although younger trees are drought tolerant, they are susceptible to fire.

Engelmann spruce is easily killed by fire. Thin bark, low canopy, dense stand habitat, and moderately flammable foliage contribute to its vulnerability to all but the lowest intensity fires. Because it usually grows in cool, moist conditions, it is rarely subjected to fire.

Mountain hemlock & Western hemlock exhibit a low resistance to fire. Although they usually survive low intensity wildfires, they do well pioneering meadows and burned sites at higher elevations.

Noble fir has a low tolerance to fire because of its thin bark, low branches, and high foliage flammability. Stands in which this tree grows often supports wind-driven crown fires.

Pacific silver fir has very low fire resistance because of its thin bark, dense lower branches, and high foliage flammability.

Subalpine fir is one of the least fire resistant conifers in the western United States. Thin bark, highly flammable foliage, and moderate to high stand density in mature forests promote high intensity, stand-replacing fires. Mature Subalpine fir stands indicate long fire-free intervals.

CHAPTER 4: WILDFIRE BASICS

The intention of this chapter is to provide the reader with an understanding of wildfire and therefore recognize ways to reduce structural ignitability.[11]

The Fire Triangle

Fuel is the only arm of the triangle that we have control over:

Control the fuel = Control the fire

Fire may seem like a deadly, unstoppable force that goes wherever it pleases. However, it needs three things to survive: fuel, oxygen, and heat. Without any one of these three things a fire cannot start and/or keep going.

1. **Fuel** is anything, live or dead, that is available to burn and includes materials such as pine needles, trees, and roofing on a house.
2. **Oxygen** is found in the air all around us, and therefore difficult to control. In order for the combustion process to start and/or keep going, there must be oxygen.
3. A fire cannot start or continue the combustion process without **heat**. Flame alone is not a requirement to start a wildfire - all you need is a quick burst of lightning, or a hot muffler igniting dry grass and the combustion process will begin.

[11] Contents of this chapter are based upon the S-190, Introduction to wildland fire behavior course by the National Wildfire Coordinating Group.

Fuel Types

There are four basic types of fuel:

1. **Grass** - these are found intermixed with other types of fuel, but are more dominant in desert and range areas. Before, during, and after fire season, grass is quick to ignite and its fires spread very rapidly.

2. **Shrubs** - these are also found with other types of fuel. Although shrubs usually have higher fuel moisture content, when ignited they act as ladder fuels and ignite surrounding trees and grass.

3. **Timber** - this is very dominant in mountainous topography, especially in the Northwest. While walking through the woods, it doesn't take much to observe the types of timber fuel that could feed a wildfire. Healthy trees, snags, dead down, limbs, branches, and disease-infested trees are only a few examples.

4. **Debris Piles** - these include: logs, rounds, bark, branches, stumps, stacked building materials, straw, and broken understory trees or shrubs after an area is logged, pruned, or thinned. Slash piles are a common result in areas that have been logged or thinned and strongly influence wildfires.

Fuel Characteristics

There are four basic characteristics that any fuel type can have:

1. **Fuel Moisture** – this is the amount of moisture in a fuel. Dry fuels will burn and ignite easier than wet fuels. In order for wet fuel to burn, the moisture must vaporize, which takes a lot of heat. This can occur with any of the three types of heat transfer. Light fuels like grass will gain and lose moisture more quickly than heavier fuels like mature trees.

2. **Size and Shape** – there are basically two size and shape categories:
    a. First, light fuels include shrubs, grass, leaves, and pine needles. They ignite and burn quickly due to the available source of oxygen. Fire in light fuels burn quick and fast.

b. Second, heavy fuels include trees, limbs, and logs. They get warm slowly when compared to light fuels, but will burn for a longer period of time given the right conditions.

3. **Fuel Loading** – this is the amount of fuel in an area. Although the amount of fuel sometimes doesn't matter during a wildfire, what does matter is the amount of fuel available for combustion. Size and shape, arrangement, and fuel moisture are all factors that affect the characteristics of fuel.

4. **Horizontal Continuity and Vertical Arrangement** - this is how fuels are spread over an area.

    a. Horizontal continuity is unbroken fuels that provide a continuous path for the spread of fire. For example, a dense forest with consistent ground fuels, ladder fuels, and aerial fuels. Patchy fuels however, are spread unevenly over an area. These include areas that have natural breaks or barriers like rocks, bare ground, or a tight network of roads.

    b. Vertical arrangement is the way the fuels are organized from the ground to the treetops.

        - Ground fuels are under the surface and include: deep duff, tree roots, rotten buried logs, and other organic material.
        - Surface fuels are either directly on the ground or right above it. These include needles, leaves, duff, grass, small dead wood, downed logs, stumps, large limbs, and low shrubs.
        - Aerial fuels are above the ground and can be live or dead. These are usually located in the upper canopy and can include tree branches, crowns, snags, hanging moss, and tall shrubs.

Heat Transfer

As mentioned earlier, heat is a necessary component of the combustion process. Heat can be supplied from matches, cigarettes, lightning, or another fire. In order for a fire to spread, heat must be transferred from one burning fuel source to another fuel source so more combustion can take place. This is known as heat transfer and it occurs in three basic ways:

1. **Radiation** - Radiant heat is like a ray or a wave. This type of heat transfer is what keeps you warm when you are standing by a campfire. For example, during a fire, radiation heats surrounding fuels, lowers fuel moisture, and makes available fuels more apt to ignite.

2. **Convection** - Convection can be understood like a smoke column rising out of a chimney. Convection transfers heat through an air current and carries hot gases and embers. For example, if a fire starts at the bottom of a slope it rapidly moves uphill. The hot air from the fire is forced to rise, and heat is rapidly transferred to available up-slope fuels.

3. **Conduction** - Conduction takes place when you place a metal spoon in a hot drink. Heat is transferred from the drink, through the spoon, and to your hand. During a fire, conduction can occur through smoldering duff. The fire travels underground and can eventually ignite a dry tree stump 20 feet away from the fire's original location.

Influence of Weather

Wildfire is strongly influenced through weather conditions. Temperature, wind, relative humidity, and precipitation are key elements to wildfire.

Temperature

The main source of heat for the air around us is the sun. The temperature of the earth and fuels are due to the sun's radiation. Usually, air temperature increases or decreases because of its contact with the ground. If the temperature is high, it becomes easier for fuel to ignite and burn.

Wind

Wind does several things to contribute to the combustion and spread of fire:

- Increases the supply of oxygen for the fire
- Influences the speed and direction that the fire spreads
- Dries out available fuels
- Carries burning embers ahead of the main fire to cause spot fires
- Causes convection to heat and dry downwind fuels

Relative Humidity

This is the ratio of the amount of moisture in the air compared to how much moisture the air can hold. Both fuels and air are constantly exchanging moisture. If the humidity in the air is low, the air will take moisture from the fuel. When the humidity of the air is high, fuels will take moisture from the air. Low humidity, in both fuel and air, provide excellent ignition conditions during fire season.

Precipitation

The more rain and snow there is, the more moisture fuels will take in and the harder it will be for them to burn. Light fuels gain and lose moisture more quickly in comparison to heavy fuels. Therefore, a large amount of precipitation over a short amount of time won't affect an area as much as a smaller amount of precipitation over a long period of time. This is because fuels have the opportunity to absorb the moisture rather than having a large amount as runoff.

Factors of Topography

Topography is the lay of the land and is extremely influential in wildfire situations. There are five basic elements:

1. **Aspect** – this is the direction that a slope faces. This is especially important in steep mountainous regions. The aspect of a slope will determine how much heat it gets from the sun and the amount, condition, and types of fuels that are present. South and southwest slopes tend to get more sun than north-facing slopes, and can therefore have sparser-lighter fuels, higher temperatures, lower humidity, lower fuel moisture, and will influence the spread a wildfire quickly. North-facing slopes often have heavier fuels and more moisture.

2. **Slope** – this is the degree of incline of a hillside. Fires will burn fastest going uphill rather than downhill. The steeper the slope is, the faster the fire will burn. This is because the fuels above the fire on a slope experience rapid heat transfer. An additional concern about steep slopes is that burning material can roll down the hill and ignite fuel below the main fire.

3. **Shape of the Country** – there are certain topographic features that can influence the wind's speed and direction during a fire, and therefore have an affect on the rate, spread and intensity that a fire spreads. There are five basic features:

    - **Box Canyons** – if a fire starts near the base of a box canyon, it acts just like a fire in a wood burning stove or fireplace. Air is drawn up the canyon in strong upslope drafts. These drafts spread fire very quickly and cause extreme fire behavior that is very dangerous for firefighters.
    - **Narrow canyons** – if there is a fire on one side of a narrow canyon, it can easily spread to fuels on the opposite side through radiation and spotting, and can therefore start a fire without any flame contact.
    - **Wide Canyons** – prevailing wind direction can be altered by the direction of a canyon, thus causing additional elements to a fire's spread.
    - **Ridges** – if a fire is burning on a lateral ridge, it can abruptly change direction and rate of spread if the ridge turns into a canyon.

- **Saddles** – wind is often channeled through saddles, or passes, in mountain ranges. When looking at a topographic map of Trout Lake, it becomes apparent that wind has three primary routes into the valley floor. Wind speed will often increase as it goes through these areas, meaning fire could spread more rapidly.

4. **Elevation** – this is the height of the land above sea level. Elevation is important because it often determines fuel conditions, fuel load, and fuel types. Fuels at lower elevations will dry out earlier in the year when compared to fuels at higher elevations.

5. **Barriers** – these are things that obstruct a wildfire. They can be natural (rivers, lakes, rockslides, and some fire resistant fuels), or human-made (roads, highways, reservoirs, and fuel breaks.)

CHAPTER 5: COMMUNITY ASSESSMENT

In July 2005, the CWPP Team performed a community assessment by driving throughout the planning area and observing risks of ignition and wildfire hazards. Subsequently, this chapter discusses risks and hazards found both in and around the community. Empirical observations of the community assessment were given ratings based upon the NFPA-299 (see appendix D), which rates low, moderate, high, and extreme levels of hazard. Observations were in concurrence with WADNR findings, meaning Trout Lake is a high-risk WUI community. Without extensive modification to structures and properties, it is extremely vulnerable to wildfire.

Community Assessment Findings

The CWPP Team found that the preponderance of the community's structures and sub-areas do not have adequate defensible space, and therefore have minimal defensibility. Fuels in and adjacent to observed areas are abundant and highly fire prone. While the CWPP Team found no areas of low hazard, they did find that all of Trout Lake scored in the moderate to high+ range. The following chart identifies areas by road name with their current level of wildfire hazard:

Moderate	Moderate +	High	High +
Hwy 141 from Mt. Adams Hwy split to Lake Rd.	Hwy 141 from Fire District 1 boundary to Mt. Adams Hwy split	Hwy 141 from Lake Rd. through 24 Rd. in GPNF	Yellowbrick Rd
Bryans Rd.	Carr Rd.	Chaparral Rd.	Coyote Rd.
Lydia Ln.	Ward Rd.	Wapiti Way	Lois Lane.
Dean Rd.	Wood Rd.	Lonesome Pines Drive.	Abbey Rd.
Pokaroba Rd.	Greenwood Rd. & Greenwood Ct.	Valley Rd.	Baker Road
Murdock Way	Guler Rd.	Lava Rd.	Airport Rd.
Jennings Rd. from 141 to Bryans Rd.	Sunnyside Rd. from Schmid Rd. to Trout Lake-Glenwood Hwy.	Jennings Rd. from Bryans Rd to end	Mt. Adams Hwy.
Little Mountain Rd.		Lake Rd	Martin Rd.
Old Creamery Rd.		Stadleman	Plenty Pines Drive
Sunnyside Rd. from Mt. Adams Hwy to Schmid Rd.		Trout Lake-Glenwood Hwy	Morrison Rd.
River Rd.		Westside Rd.	86 Rd. at Gable house area
Warner Rd.		Park Rd.	82 Rd.
S. Sunnyside from TL Glenwood Hwy to end			88 Rd.
Stoller			23 or Randle Rd.
Deanna Dr.			80 Rd.

Road categories were rated in averages. For example, the Mt. Adams Highway does not entirely fall into the High + category, as different parts of this road share different characteristics than others. Elements of existing fuel, structures, and defensibility essentially were summarized and averaged over this stretch of road. Therefore, some sections of the identified roads might contain a slightly lower or higher hazard rating.

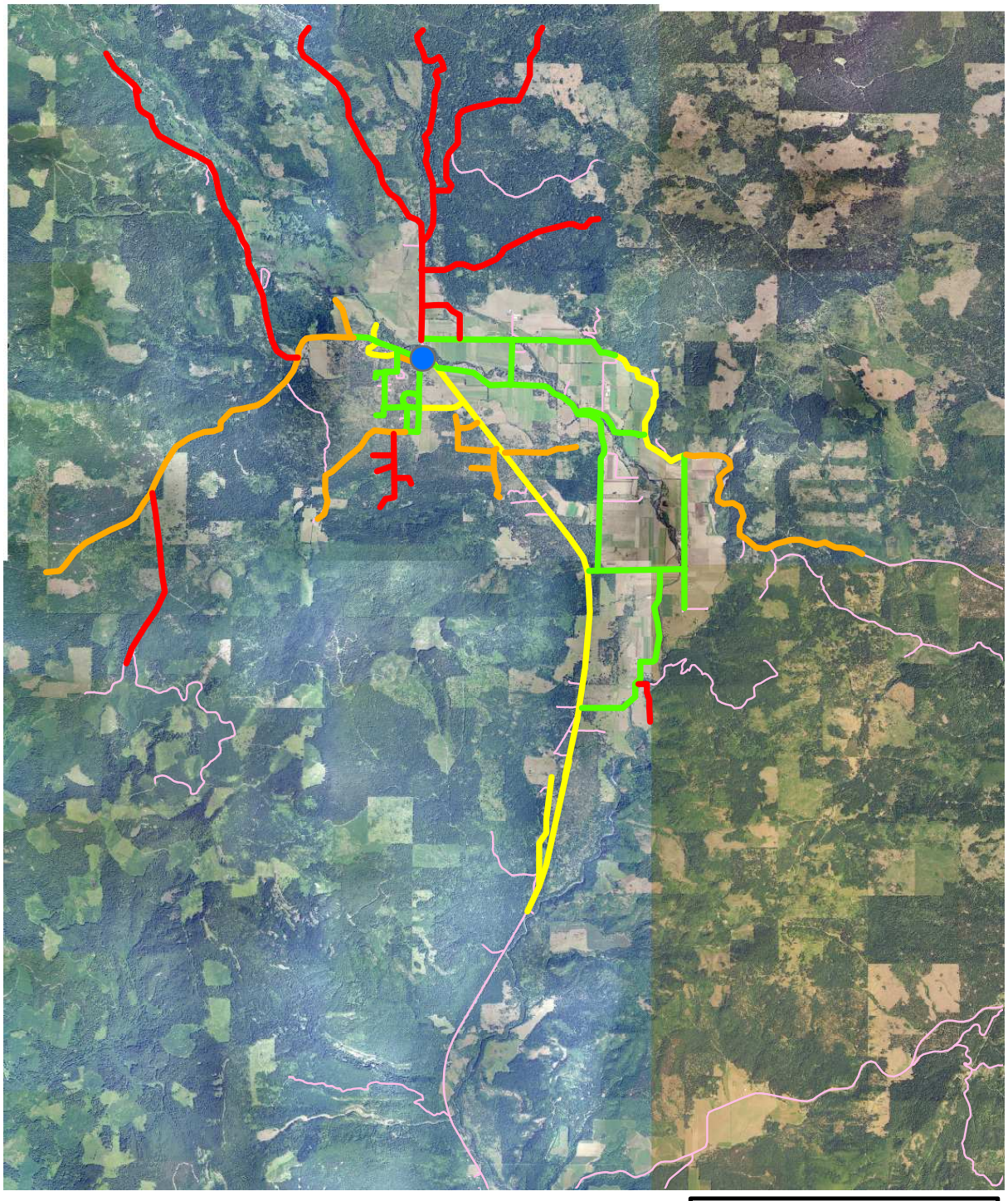
Individual Assessment Findings

For interested community members, individual structure and property assessments were accomplished using both the original NFPA-299 and a modified version for the TLVFD. As of November 2005, 25 individual assessments have been completed, with a growing number scoring in the moderate + to high + range:

Low	Moderate	Moderate +	High	High +
3	11	6	3	2

Individual assessments will continue to be offered by the CWPP Team into the future. Assessments are encouraged because they increase wildfire awareness and so the TLVFD and/or assisting firefighters may better respond to a large-scale wildfire should one ever occur.

Trout Lake CWPP:
Community Assessment



RISKS OF IGNITION

Risk of ignition is defined as the potential for wildfire to occur. Although interrelated to hazard, they are separated due to their association with wildfire. Trout Lake's risks include but are not limited to: travel corridors, fireworks, power lines, lightning, debris burning, discarded cigarettes, structural fires, awareness, and other probable sources.[12]

Travel Corridors

Travel corridors are areas where many wildfires start. They are usually lined with light-flashy fuels that can act like a fuse leading to surrounding fuel sources. Roadside camping, car accidents, hot mufflers, or discarded cigarettes are a few examples of previous wildfire starts along travel corridors around the community. Many areas along Trout Lake's valley floor are lined with tall dry grass and are highly trafficked. Outside the valley floor, many travel corridors are lined with light to medium fuels that lead to surrounding, heavier fuel sources.

This image portrays how easy it would be for the dry grass to ignite on the 88 Road and spread fire to the adjacent heavier fuel.

[12] Some text in this chapter was taken from various CWPPs, most notably Bingen and White Salmon.

Fireworks

The use of fireworks can and has previously led to the ignition of wildfires. Klickitat County bans them with the exception of July 4th events. Over the July 4th weekend in 2005, there were numerous firework-ignited wildfires that burned hundreds of acres in the Columbia River Gorge. Although they are illegal for most of the year, use of fireworks still occurs and a person choosing to use them may select a more remote location that may have a high number of hazards.

Power lines

Power lines also pose a risk of ignition. Falling trees or car accidents could cause a power line to break, allowing a live current of electricity to provide heat for the ignition of fuel. Power companies such as Klickitat County PUD are responsible for maintaining power lines, and they do monitor fire frequencies. If they hear of a fire in a location where they have distribution or transmission lines, their operations section will dispatch a crew.

This power line is a risk because it intertwines with surrounding trees

Lightning

Although we have no control over the risk of lightning, we do have the ability to reduce the hazardous fuels around our structures and properties that lightning strikes ignite. When viewing the fire history in and around Trout Lake, lightning accounted for around 25 % of wildfires within an eight-mile radius during the past ten years. With the right weather conditions and fuel characteristics, just one lightning storm could spawn many wildfires from multiple lightning strikes.

Lightning caused the Salt Creek wildfire on Mt. Adams in 2001. Photo by Murray Brown

Debris Burning

Although Trout Lake has a fire season burn ban, debris burning is a huge risk factor. During the past 10 years, debris burning accounted for around 11% of recorded wildfires. TLVFD Fire Chief Steve Koenig reports that many of Trout Lake's fire department calls were for people burning ditches that got out of control. Many areas in Trout Lake are undergoing development resulting in debris piles. These could be removed to reduce the fuel load and risks of ignition.

Debris piles such as the one in this image can easily get out of control.

Discarded Cigarettes

When viewing the fire history in and adjacent to Trout Lake, cigarettes accounted for around 8% of wildfires within the past 10 years. A lit cigarette carelessly thrown into available fuel sources has been and continues to be a risk of ignition. The surrounding landscape hosts many types of recreation and forest use activities, where many of these fires originated.

Structural Fires

Combined with the proximity of surrounding structures, a structural fire could ignite existing sources of fuel to burn entire neighborhoods. The CWPP Team observed many areas in Trout Lake's WUI where this risk of ignition is high. Defensible space not only increases a structure and property's chance of surviving a wildfire, but also decreases the chance of a burning structure igniting an entire neighborhood.

Other

Other potential risk of ignition factors for Trout Lake and the surrounding area could include flying embers from Mt. St. Helens, arson, and spontaneous combustion.

WILDFIRE HAZARDS

Fire season in Trout Lake is normally from mid May - October, but changes annually with the amount of precipitation and other climatic factors. Trout Lake's greatest hazards, or conditions that contribute to wildfire, are weather, topography, and fuel.

Weather

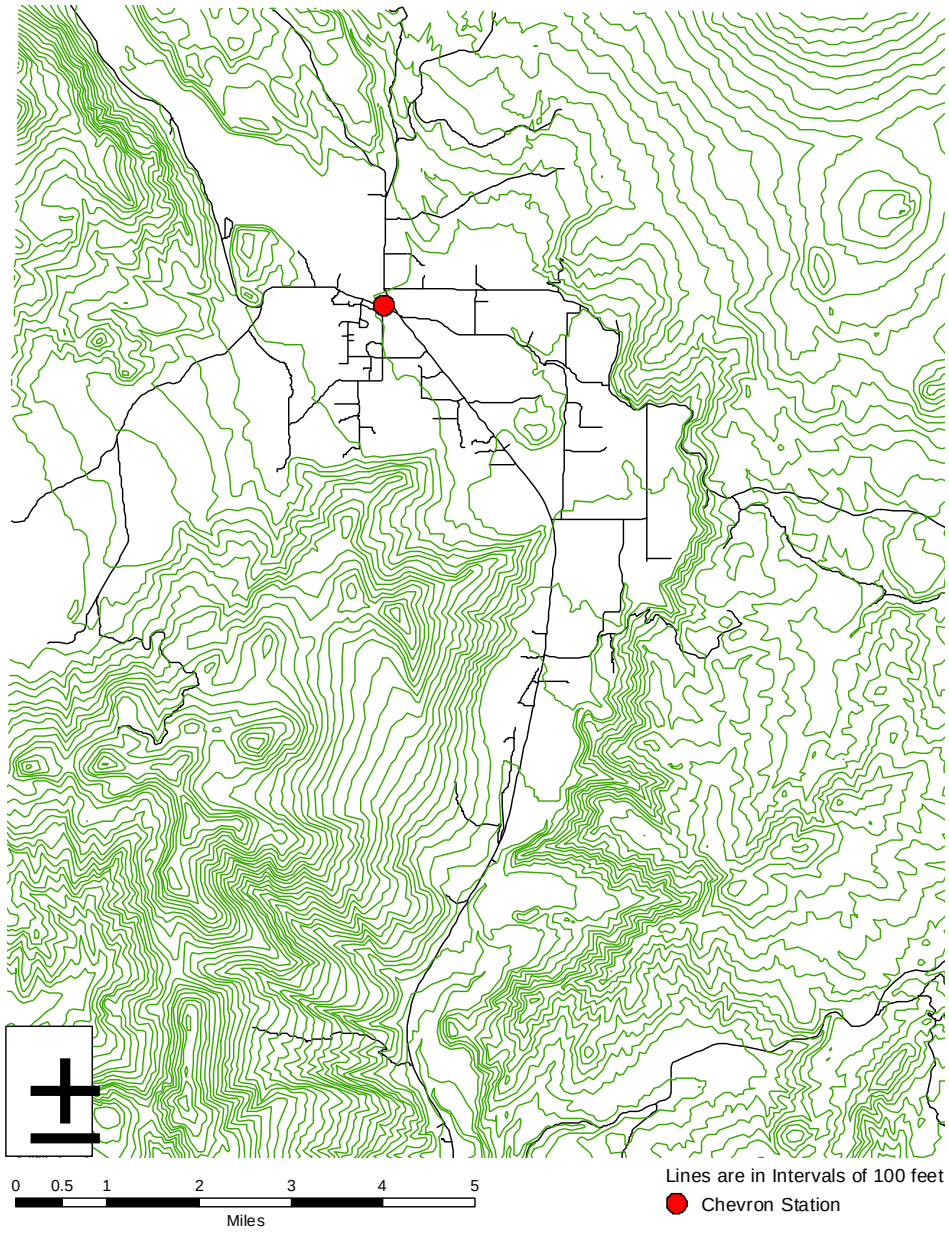
Wind is an element of wildfire hazard because it pushes the flame front, increases the rate of fire spread, and decreases moisture in both the air and fuel. When viewing a topographic map of Trout Lake, it is easy to see that wind is funneled toward the community from three main directions, the southwest, northwest, and south. Although higher elevations experience east winds, they are primarily funneled up the valley from the south. Therefore, there are three main directions that wind can influence a large wildfire in the community.

All wildfires have the potential to throw burning embers downwind to cause numerous spot fires, and this is a major hazard for many of Trout Lake's structures and properties. It has been researched that flying embers are a primary reason why homes ignite during wildfire events. Embers have been known to travel for up to a mile before igniting available fuel. Creating defensible space, thinning dense vegetation, providing access, and having an established escape route from a home and/or neighborhood to an adequate safety zone prove themselves during these types of situations.

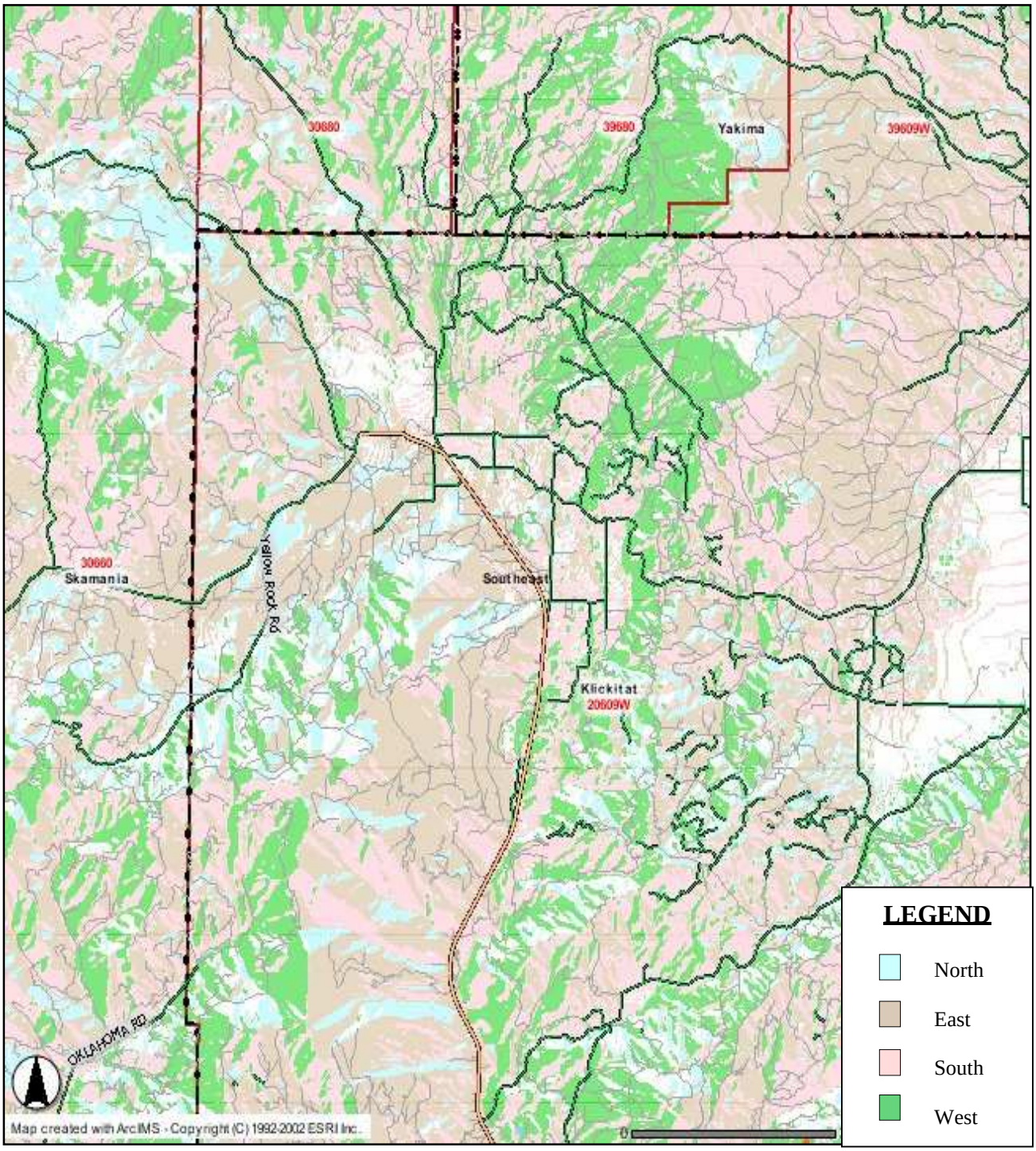
Another factor of weather (or more properly climate) influencing hazard is precipitation. As discussed in Chapter 4, precipitation, along with relative humidity, determines the amount of moisture fuel has. Currently, the geographic area of Trout Lake is experiencing a drought. Extended periods of drought generally lead to increased wildfire activity, as lack of precipitation and snowmelt in and around the community has led to drier fuels and increased risk of ignition.

Topography

Slope accelerates heat transfer. It is estimated that the rate of fire spread is twice as fast on a 30 percent or more slope when compared to a level surface. Outside the valley floor, densely vegetated slopes can be found in all directions. Although fire primarily burns uphill, structures at the base of slopes are in hazardous situations because burning fuels always have the potential to roll downhill and ignite available fuel. Structures built on slopes have this hazard from both directions. For residents living in these conditions, consulting with the CWPP Team or local firefighter is recommended. The following map shows Trout Lake's topography and exemplifies how wind is funneled into the community.



Aspect is the direction a slope faces. Because southwest facing slopes generally receive more direct sunlight than north facing slopes, they generally have lower fuel moisture making them more fire prone. The following map illustrates that southwest slopes are abundant throughout Trout Lake and surrounding area.



Source: http://fortress.wa.gov/dnr/app1/fmanfire

Fuel

The preponderance of structures and properties both in and adjacent to Trout Lake have high fuel components. The following fuel models were taken from the NFPA-299 form and used in assessing Trout Lake's wildfire hazard. Fuel models don't necessarily mean lower or higher levels of hazard, they are just different.

Light -Flashy Fuel (grass, forbs, and shrubs)

This fuel type can be found throughout the planning area in many forms. A large portion of the valley floor and its travel corridors fall into this fuel category.

This image portrays mostly light fuels. A fire in this area would rapidly spread to the other fuel sources, and potentially up the surrounding slopes.

Also observed throughout Trout Lake were shrub fields with different canopy types. These light fuels can spread fire fast.

Moderate Fuel (light brush and small trees)

A significant portion of the community consists of moderate fuel intermixed with other fuel types. Moderate fuels also act as ladder fuels, where a ground fire can spread vertically into the tree canopy.

This photo illustrates the abundant supply of Ceonothis in many areas outside the agricultural portion of the valley. Ceonothis has a high oil content making it influential to a wildfire.

This photo illustrates a moderate fuel model with sparse trees (12-16" diameter at breast height (DBH) and second growth), brush, and light-flashy fuels. Much of this fuel type is interspersed between private developments.

Heavy Fuel (dense brush, timber, and hardwoods)

The majority of areas outside the valley floor fall into this category. Flying embers landing in trees and/or a ground fire burning up ladder fuels can easily ignite heavy fuels.

Heavy fuels with an closed canopy have a high crown fire component with low understory fire.

Heavy fuels with an open canopy allow lighter to medium fuels below the canopy as well as timber residue. These areas usually have large amounts of ladder fuel.

Other Combustibles (harvest or thinning residue, stacked building materials, and fuel storage)

Flying embers have the potential to land on available fuels and ignite them. The community assessment exemplified the number of other combustibles that make Trout Lake a high-risk WUI community, as there were random but significant numbers of debris piles both in and around the community from present and past activities. Debris piles provide excellent sources of ignition, and when ignited they are extremely difficult to put out.

The CWPP Team also observed many areas in and adjacent to the community where stacked building materials are within a hazardous proximity to structures. By spacing these piles away from structures and other combustible fuels, this hazard can be reduced.

Although a must for many community residents, fuel storage (propane, oil, and firewood) can quickly turn into an enemy when ignited. If applicable, creating defensible space and/or concealing these will significantly decrease the hazard of their ignition during a wildfire situation.

OTHER FINDINGS

Awareness

A key component to both risk of ignition and wildfire hazard is awareness. Information on wildfire and defensible space can be obtained from many sources (Smokey Bear programs in schools, wildfire workshops offered by fire departments, literature obtained from this CWPP, *Firewise* workshops, and the internet.) If one has awareness, then the risk of ignition and hazard is reduced. Resources to learn more about wildfire are listed in appendix B.

Water Availability

Sources of water include miscellaneous springs, Trout Lake Creek, White Salmon River, and many seasonal creeks in the planning area. Water available for fire suppression is mostly centered on and around the valley floor. While Glacier Springs Water Association supplies standpipes and fire hydrants to Trout Lake's growing population, they do not have the capacity to allow many of these sources to function simultaneously. Although many exist throughout Trout Lake, the risk of contaminating the water supply is too high for firefighters to draw from certain standpipes and hydrants. Thus, during a large wind-driven wildfire, water availability would be limited to a few places.

The Trout Lake valley floor also has a network of nine independently owned irrigation ditches. Most (if not all) have a good supply of water running through them during fire season. These would serve as an excellent source of water for draft pools to refill tenders and possibly as a direct source of water.

Outside the valley floor, there are no standpipes or fire hydrants. Most people in these areas obtain water from wells or springs. Lack of water availability combined with the surrounding fuel conditions ultimately lead to increased hazard. Developing alternative water sources such as pools, tanks, and/or ponds could significantly increase the success of fire suppression.

Trout Lake's Growing WUI Population

Trout Lake's population is growing. Increased development is resulting in a growing number of debris piles, available sources of fuel, and sources of ignition. For the number of people who are unfamiliar with wildfire in the Northwest, certain types of personal land management practices increases wildfire hazard. Increasing education and outreach will decrease this hazard.

Adjacent to the community are the Gotchen and the Little White Salmon drainage areas. While these areas have high fuel components and would support a large wildfire, they are not seen as a direct threat to the community of Trout Lake. While any wildfire has potential to get out of control, these areas are more of a hazard to neighboring resources and properties.

The community assessment shows that the Trout Lake WUI and adjacent area contains high risks of ignition and high hazard conditions. Prevailing south, southwest, and northwest winds, existing fuel conditions, topographical features, and locations of past wildfires have the potential to funnel a large wind-driven wildfire toward the community. Fire history both in and adjacent to the planning area suggests that a wildfire is two to three times more likely to advance from the southwest and south when compared to other directions. For community residents that have only one means of ingress and egress, the ability of firefighters to protect homes and structures is unfortunately low. Many things can be done, however, to mitigate current hazards and risks of ignition. These are discussed in Chapters 6 and 7.

CHAPTER 6: EMERGENCY PREPAREDNESS

This chapter provides an overview of Trout Lake's current firefighting organization, emergency response resources, and provides recommendations to better prepare residents during wildfire emergency situations. Our hope is that at the end of reading this chapter, community residents will have an increased knowledge base resulting in a decrease of structural ignitability.

Klickitat County Emergency Management Plan[13]

Although the Klickitat County Emergency Management Plan will potentially transition into an emergency action plan in Incident Command System (ICS) format, it currently gives guidance for the coordination of local fire department operations during local incidents. The plan provides an organizational framework to effectively use available firefighting resources and operations during local incidents. Important elements of the Emergency Management Plan related to wildfire situations include:

- The Incident Command System (ICS) will be utilized by all response organizations under the direction of the Chief Fire Official or designee.
- The Klickitat County Department of Emergency Management (DEM) will provide for the alert and warning of persons located within the fire area.
- For fires, which threaten, or have the potential to overwhelm the TLVFD, "assistance shall be requested through the local County (DEM)."
- The DEM will assist the TLVFD as needed with equipment, staffing, communications, logistical support, food, and shelter.
- The local fire departments "will utilize all reasonable mutual aid only within Klickitat County, or Washington State counties."
- The TLVFD will coordinate the release of public information through the DEM Public Information Officer.
- The DEM will coordinate the procurement of resources as requested by the Incident Commander or as requested by the local emergency management agency or other designated response agency).
- The Plan (Annex Q, Attachment one) provides a dispatch protocol and states that the Klickitat County DEM will be notified when: a fire is out of control, hazardous material or explosives are involved, mutual aid is requested, non-member volunteers are used, and evacuation of people is needed.
- The plan (Annex G) addresses the evacuation of people during an emergency.

[13] Community Wildfire Protection Plan for the Cities of White Salmon and Bingen, and the Klickitat County Comprehensive Emergency Management Plan, 1996.

Local Resources

All agencies respond to wildfires, but only the TLVFD responds to structural fires. Although priorities are different, they have cooperative assistance agreements that state how they will and can share resources with each other during fire emergencies.

Department	Priority 1	Priority 2	Priority 3
TLVFD	Life	Structures	Property
WADNR	Life	Resources	Property
USFS	Life	Property	Resources

As of November 2005, Trout Lake possesses the following forms of local and assisting firefighting resources:

USFS Mt. Adams Fire	
E-301 Type 6X 300 Gallon with foam	Staff
E-302 Type 6X 300 Gallon with foam (DNR co-op)	11 + crew
P-303 Type 6X 320 Gallon with foam	
P-304 Type 6X 200 Gallon with foam	
Klickitat County Fire District #1 - Trout Lake Volunteer Fire Department	
2.5 Ton 6x6 off road 1942 Wittenberg 1500 Gallon	23 Volunteer Fire Fighters
2 Ton 1978 GMC Tender 1000 Gallon	5 EMTs
1979 White Truck Tender 3500 Gallon	2 Paramedics
F750 Ford Fire truck 1250 Gallon	
Ford Rescue Vehicle 250 Gallon	
Ford Emergency Aid	
Washington State Department of Natural Resources - Husum	
H5S Type 5 600 Gallon with foam	12 Crew
H5S Type 5 600 Gallon with foam	
A1S Type 6 240 Gallon with foam	
A1S Type 6 240 Gallon with foam	
Washington State Department of Natural Resources - Goldendale	
H5S Type 5 600 Gallon with foam	9 crew
H5S Type 5 600 Gallon with foam	
A1S Type 6 240 Gallon with foam	

Klickitat County Fire District #3	
Husum Station	**STAFF**
Ford Aid Vehicle	11 Firefighters
American LeFrance Pumper - 1000 Gallon	5 EMT's
Western States Pumper - 1000 Gallon	1 First Responder
Kenworth Tender - 2400 Gallon	
International Tender - 4000 Gallon	
Command Jeep	
Cherry Lane Station	**Cherry Lane & Mt. Brook STAFF**
FMC Pumper - 1000 Gallon	7 Firefighters
Mack Tender - 3000 Gallon	1 EMT
GMC aid vehicle	
Chevy Rescue	
Mountain Brook Station	
FMC Brush Truck - 750 Gallon	
Ford Tender - 1000 Gallon	
Klickitat County Fire District #8 - Glenwood Volunteer Fire Department	
1 Structure Engine - 600 Gallon	18 Firefighters
2 Tenders - various Gallons	5 EMTs
1 Wildland Fire Engine - 200 Gallon slip in	1 Paramedic
1 Aid Vehicle	

It should be noted that while many of the structures in the Trout Lake Valley are under the protection of Klickitat County Fire District #1, some are not. Homeowners outside the district are encouraged to join, as they legally have no one to fight structural fires except themselves and their neighbors unless the structure is threatened by a wildfire. Joining the fire district is also good because it decreases home insurance rates, it supports the community fire district, and the TLVFD can have a documented home assessment so they may better defend your home and property.

Evacuation Routes

During the event of a wildfire emergency, an Incident Command System (ICS) would be assembled to manage the fire. If the emergency required evacuation, these routes and safety zones would be conditional on the location of the wildfire, wind direction, fire advancement, time of day, and the size of the fire. The Incident Management Team (IMT) would determine the evacuation time, route, and best safety zone. Although safety zones are currently being researched and additional resources may be necessary (sanitation, medical supplies, shelter, and more), the five escape routes are:

1. **The 88 Road to the north** - until reaching Flattop Snow Park. Depending on the size of the fire, a further safety zone may have to be determined by the IC.

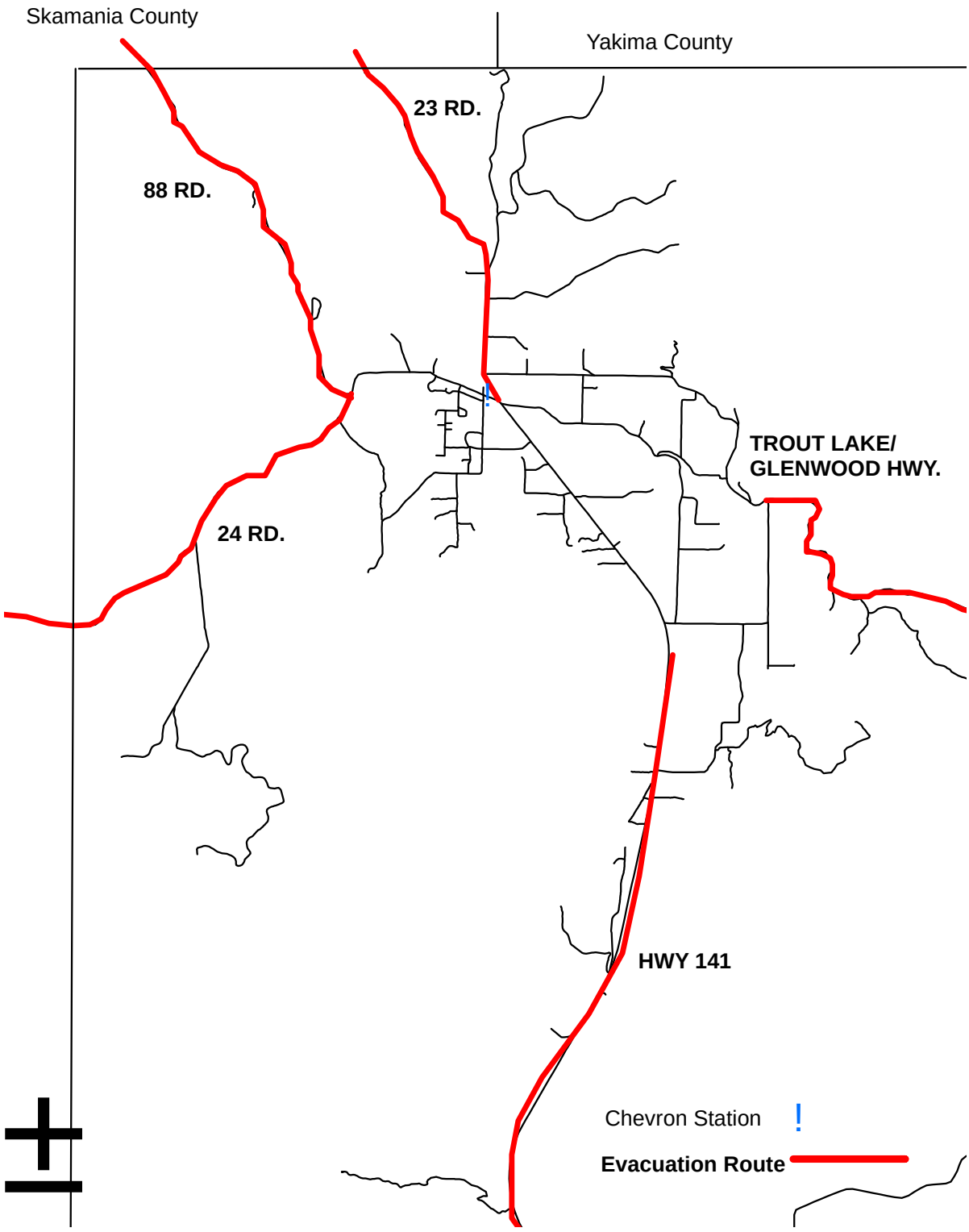
2. **Trout Lake-Glenwood Highway to the east** - until reaching Glenwood. Depending on the emergency, it is possible that valley residents could be evacuated to Goldendale, or south from Glenwood to the Columbia River.

3. **Highway 141 to the south** - until reaching the Columbia River.

4. **Highway 141 to Forest Service Road 24 to the west** - until reaching Peterson Prairie or Atkisson Snow Park. These areas would be adequate for a temporary safety zone

5. **The 23/Randle Road to the north** - towards Randle or Mt. St. Helens. The IC would more than likely find a better route for a closer safety zone.

Trout Lake's Primary Escape Routes



Creating Defensible Space[14]

In the event of a major wildfire, there may not be enough local firefighting resources available to defend every threatened structure. In this case, firefighters would be forced to make decisions about which structures they can safely and effectively protect. Structures with effective defensible space and non-combustible roofs are more likely to survive a wildfire. Structures with dense vegetation, highly combustible building materials, and/or limited access would be lower priority for protection. Under extreme conditions, any structure can burn. Creating defensible space will significantly improve the odds of a structure surviving a wildfire. The most important person in protecting a structure from wildfire is the owner.

Defensible space is the area between a structure and an oncoming wildfire where vegetation has been modified to reduce wildfire threat and an opportunity for firefighters to effectively defend a structure has been created.[15] Although all vegetation is potential fuel for a wildfire, properly modified and maintained vegetation can slow the spread of a wildfire, keep flame lengths low, and reduce the level of heat. All of these elements allow firefighters a better opportunity to protect a structure.

The optimum size of each homeowner's defensible space depends on the type of vegetation growing near the structure and the steepness of the terrain. On flat to gently sloping ground surrounded by mainly grass vegetation, the recommended defensible space is 30 feet. In situations with steep slopes and heavy vegetation, a defensible space of 200 feet may be needed.

Homeowners should seek assistance from their local firefighting agencies and CWPP Team to help determine a proper defensible space for their particular situation. The *Oregon Forestland-Urban Interface Fire Protection Act: Property Evaluation and Self-Certification Guide* is an excellent handbook available from the Oregon Department of Forestry (ODF). The *Living with Fire* from the WADNR is another available publication that describes how landowners can create defensible space on their property.

[14] Community Wildfire Protection Plan for the Cities of White Salmon and Bingen
[15] Living With Fire, A Guide for Homeowners. Pacific Northwest Wildfire Coordinating Group

The following list recommends ways to create an effective wildfire barrier within a homeowner's defensible space:

- Remove all dead vegetative material including: standing and down trees, shrubs, grasses, wildflowers, weeds, needles, leaves, branches, cones, stacked building materials, and firewood.

- Remove or modify live trees and shrubs a minimum of 30 feet from the home.

- Wildfire threat is directly related to the density and continuity of vegetation. Homeowners can decrease their wildfire risk by providing cleared space between plants.

- If possible, use fire-resistant, high-moisture content varieties of vegetation for landscaping. Although all plants will burn under extreme fire weather conditions, such as drought, they burn at different intensities and rates of consumption. When compared to fire-prone plants like conifers and tall exotic grasses, fire-resistant plants burn at a relatively low intensity with slow rates of spread and short flame lengths. See Appendix A for a list of fire-resistant native plants.

- Remove or thin overcrowded or weakened trees beyond the 30-foot distance from the home, and up to 200 feet away depending on slope and vegetative conditions. If necessary, work with adjacent neighbors to get proper spacing from affected homes.

- Reduce ladder fuels by pruning low-hanging branches up to 15 feet above ground. This keeps a ground fire from climbing into upper branches.

- If possible, stack limbs, construction debris, and other flammable materials at least 30 feet away from your home. Keep flammable vegetation 10 feet away from these piles.

- Maintain your structure and yard by cleaning pine needles, leaves, and other debris from your roof, gutters, decks, and yard. Clean up after storms, especially during the dry summer months when a single spark can ignite a fire.

- Dispose of cuttings and debris material promptly. Aside from burn piles, composting, chipping, and/or recycling debris are possibilities.

- If possible, do not keep combustible material under decks or elevated porches. If this is a must, make trellises of non-combustible material and cover with 1/8th inch metal mesh to

prevent contact with fire or flying embers.

- Keep lawn area mowed, watered, and green. Maintain irrigation system in good working order. Consider establishing an alternative water pump and power source for fire suppression purposes.

- Remove tree branches within 15 feet of a chimney.

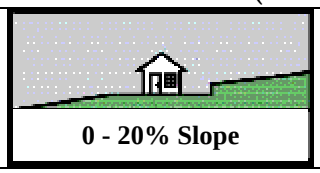
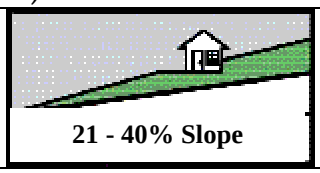
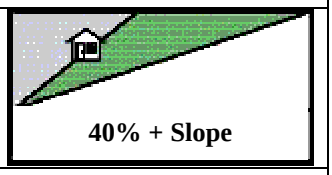
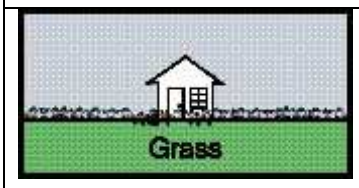
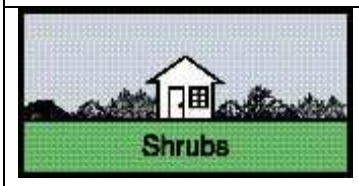
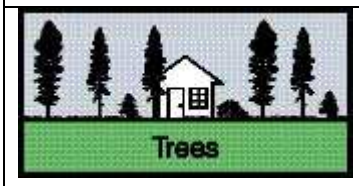
- Design driveways and walkways to serve as fuel breaks.

- When conducting open burning with barrels, when allowed and with proper burning permits, clear flammable material at least 10 feet around the barrel and cover the top with a metal screen of 1/8 inch or smaller mesh.

- Cover any areas where burning embers could accumulate with 1/8th metal mesh (minimum).

- Annually maintain vegetative modifications to keep an effective defensible space

RECOMMENDED DISTANCE FOR DEFENSIBLE SPACE
(in feet)

	 0 - 20% Slope	 21 - 40% Slope	 40% + Slope
 Grass	**30**	**100**	**100**
 Shrubs	**100**	**200**	**200**
 Trees	**30**	**100**	**200**

Evaluate Your Structure(s).[16]

While no human-made structure should be considered fireproof, fire resistant home construction materials can greatly decrease the chance of a wildfire ignition. The following should be considered during new home construction, and/or during remodeling or maintaining structures:

- The roof is the most vulnerable part of a house in a wildfire situation. Flying embers or nearby sources of heat can easily ignite wooden shake roofs. These can be replaced with fire resistant roofing such as composite, concrete, or metal. Treating wooden shake roofs offers some level of protection, but the benefit is typically short-lived. Attaching sprinklers to the roof will also help in making the home fire resistant.

- With new home construction, use fire resistive or non-combustible material for sidings, roofs, and decks. Siding materials that resist heat and flames include cement, plaster, stucco, and concrete masonry such as stone, brick, or block.

- Exposure to heat can cause windows to fracture and collapse, providing an opportunity for flames or firebrands to enter and ignite the interior of a structure. Glass products that can withstand convective and radiant heat will reduce this risk. Tempered glass can withstand much higher temperatures than plate glass and is recommended for large windows, especially if they overlook steep or heavy vegetation. Double pane glass is slightly more resistant to heat than single pane glass. Shutters of fire resistant materials will also aid in protecting the structure.

- Homes should have well placed smoke detectors and possess type ABC fire extinguishers. Sprinkler systems in the home provide an extra level of protection.

- Maintain at least two ground-level doors as safety exits. Each room should have two means of escape via a door or window combination. Ladders can assist with second story escape routes.

- Prevent sparks from entering the house by covering open areas like vents and underneath porches and steps with wire mesh with maximum of 1/8" openings.

- Enclose overhanging eaves and decks.

- Maintain spark arresters on chimneys.

[16] Community Wildfire Protection Plan for the Cities of White Salmon and Bingen

- If possible locate butane, oil, and propane tanks at least 30 feet from any structure and provide 10 feet of defensible space around them.

- If possible, locate new homes at least 30 feet from all property lines to assure the opportunity in developing and maintaining effective defensible space. Build away from ridge tops, canyons, and areas between high points on a ridge.

- For homes with their own wells, maintain an emergency generator to operate the pump during a power failure. Run this system before and during fire season to ensure that it is working properly.

- Make sure electric service lines, fuse boxes, and circuit breakers are installed and maintained according to code. Have qualified service people perform electrical maintenance and repairs.

- Bridges should be constructed to support the weight of emergency vehicles (minimum of 30 ton weight limit for tenders filled with water).

- Keep garden tools like rakes, hoses and shovels easily accessible. Make sure everyone in your home knows where this equipment is, and how to call for help in the event of an emergency.

Provide Access

Good access is important for several reasons. First, it allows firefighters to get to a house and defend it in case there is a wildfire emergency. Second, it helps in escaping in the event of an emergency. Finally, if there is more than one escape route, both a homeowner and emergency personnel have a much better chance of not getting trapped by a fire. It is extremely important to have at least two ways of leaving a house or area. These routes should be able to accommodate two cars passing each other, allow enough room for emergency vehicles to clear surrounding vegetation, and contain adequate turnaround spots.

During a wildfire emergency, local firefighters may be occupied in different areas, and assisting firefighters would half to be utilized. It is highly possible that the assisting personnel would be unfamiliar with Trout Lake, so it is a good idea to make sure clear signs are posted around homes and neighborhoods identifying such things as dead end roads, weight and height restrictions, house addresses, and road names. Each house should be clearly marked with address signs, both on the end of the driveway and on the house itself.

If a driveway is longer than 150 feet, a fuel break should be established around it. The fuel break should be able to accommodate emergency vehicles, and it can slow the rate, spread, and intensity of a wildfire.[17]

Make sure there is enough space for a fire engine to turn around at the house. Providing access for emergency personnel to enter the property and work efficiently could significantly increase a structure's chances for surviving a wildfire. The following recommendations are key points of good access[18]:

- Maintain at least two means of ingress and egress, or in and out, (each with two-way traffic) for emergency purposes.

- Identify at least two emergency exit routes from the neighborhood.

- Identify dead-end roads and weight and height restrictions with clear signs. Provide wide areas at the end of dead-end roads to allow emergency vehicles to turn around. Construct turnouts along one-way roads.

- Assure driveway access is wide enough for emergency vehicles to enter and turnaround.

- Clear flammable material at least 10 feet from roads edges and five feet from driveway edges. Remove overhanging branches above roads. Horizontal clearance should be 12 feet, and vertical clearance should be at least 14 feet.

- Mark houses and driveways with house numbers clearly visible from the road. Assure streets are named and marked with clear signs at each intersection.

[17] Self Certification Guide for Jackson County
[18] Community Wildfire Protection Plan for the Cities of White Salmon and Bingen

There are many people in the valley that have only one means of ingress/egress. For example, the Yellowbrick Road residents would have a difficult time escaping an oncoming wildfire from the north because there is only one means of ingress/egress.

Residents in the Jennings Rd. area would benefit by improving the Telephone Pole Rd. By creating or modifying existing wheel track roads such as this one, community residents would enhance both access and escape routes.

Safety Zones

Safety zones are pre-arranged areas where people who are threatened by wildfire or other emergencies can meet and safely wait until the fire emergency passes. Such areas must have more than one high standard access road and ideally have adequate parking for vehicles, an indoor meeting place, bathrooms, and access to communication systems.[19]

Trout Lake has several options depending on the scale of emergency. Locally, Jonah Ministries and the Trout Lake School are ideal places for safety zones. If a safety zone had to be outside Trout Lake, Peterson Prairie, Atkisson Snow Park, and Flattop Mountain Snow Park are potential candidates depending on the time of year. To the east, Glenwood would serve as an excellent meeting place, and to the south, BZ Corner. Some of these locations would need to be supplied and supported, so other resources would have to be obtained. Some of the necessary resources and items would include: (portable toilets, first aid packages, food vendors, and areas for pets and other animals).

Safety zones for livestock are a potential issue. However, the reality of the situation at hand might require people who possess livestock to mix their heads in one area that has an excellent supply of water and defensible space until the wildfire passes.

When the Big One Comes[20]

If you see a wildfire, call 9-1-1. Don't assume that someone else has already called. Describe the location of the fire, speak slowly and clearly, and answer any questions asked by the dispatcher. Stay on the line until dispatch releases you.

In the event of a wildfire, evacuation may become necessary. Homeowners have the right to remain on their property, provided that individuals do not hinder firefighting efforts. If residents are unable to evacuate or elect not to evacuate, the following checklist will assist in protecting property and maintaining the safety of all family members:

- Evacuate, if possible, all family members not essential to protecting the house, as well as pets.
- Contact a friend or relative and relay your plans.
- Make sure family members are aware of a pre-arranged meeting place.
- Tune to a local radio station and/or a Portland TV station listen for instructions.

[19] Community Wildfire Protection Plan for the Cities of White Salmon and Bingen
[20] This list is copied from: http://www.sccfiresafe.org/LWF/LWFSCC_19.pdf

- Place vehicles in the garage, have them pointing out and roll up windows.
- Place valuables and mementos in the car.
- Close the garage door, but leave it unlocked. If electric, release the garage door from the center track so the door can be opened manually.
- Place combustible patio furniture in the house or garage.
- Shut off propane or oil supply at the tank.
- Wear only cotton or wool clothes. Proper attire should include long pants, long sleeved shirt or jacket, and boots. Carry gloves, water to drink, goggles, and 2 bandanas. One should cover the face, and the other should be wet and worn around the neck. Do not wet the bandana around your face - it will steam and transfer heat into your lungs.
- Close and/or cover all exterior vents.
- Prop a non-wooden ladder against the house so firefighters have easy access to the roof.
- Make sure that all garden hoses are connected to faucets and attach the nozzle set to "spray".
- Soak rags, towels, or small rugs with water to use in beating out embers or small fires.
- Inside, fill bathtubs, sinks and other containers with water. Outside, do the same with garbage cans and buckets. The water heater and toilet tank are also available sources of water.
- Close all exterior doors and windows.
- Close all interior doors.
- Open the fireplace damper, but place the screen over the hearth to prevent sparks and embers from entering the house.
- Leave a light on in each room.
- Remove curtains and other combustible materials from around windows.
- If installed, close fire resistant drapes, shutters, or venetian blinds. Attach pre-cut fire-resistant painted plywood panels to the exterior side of windows and glass doors.
- Turn off all pilot lights.
- Move furniture away from windows to the center of the room.
- Keep wood shake or shingle roofs moist by spraying water. Consider placing a lawn sprinkler on your roof if water pressure is available.
- Do not waste water. Water pressure can drop leaving firefighters with problems in defending structures. Before a fire approaches, saturate the roof and then turn off the water. When burning embers begin to fall on the roof, turn on the water.

- Continually check the roof and attic for embers, smoke, or fire. Continue to do so for several hours after the fire passes.
- Follow recommendations from "Develop a Family Emergency Plan."

Develop a Family Emergency Plan[21]

Talk with your neighbors about tools, equipment and other resources you could share in an emergency. The following list can be potential elements of your family plan:

- Evacuation Plan - early evacuation is the safest way to avoid injury or death. Timing and other factors can vary so widely that each household needs its own specific plan, including options to cover anything that might happen.
- Escape Routes - know your primary and alternate escape routes.
- Safety Zones - know the locations and routes to large areas with little to no vegetation or other fuels where family members can ride out the fire if it's too late to evacuate.
- Communication - prearrange primary and alternate ways to stay in touch with family members, even if phones are out. A good process would be for family members to "check in" with a friend or relative in another area as soon as they're able.
- Assign a role - who is to do what when in an emergency.
- Keep an adequate supply of type ABC fire extinguishers nearby and check on them annually.
- After developing your plan, do a couple trial runs and practice a few times per year.
- Follow recommendations from "When the Big one Comes".

[21] Community Wildfire Protection Plan for the Cities of White Salmon and Bingen

If Caught in the Open

The best temporary safety zone when caught in the open is in an area with sparse fuels. On a steep slope, the backside is safer. Avoid canyons, natural chimneys, and saddles. If a road is nearby, lie face down along the road cut or in the ditch on the uphill side. Cover yourself with anything that will shield you from the fire's heat. If hiking in the backcountry, seek a depression with sparse fuel. Clear fuel away from the area with a small hole or depression to lay your face over while the fire is approaching. Lie face down in the depression and cover yourself staying down until after the fire passes.

Survival in a Vehicle

This is dangerous and should only be done in an emergency, but you can survive a wildfire if you stay in your car. It is much less dangerous than trying to run from a fire on foot.

- Roll up windows and close air vents. Drive slowly with headlights on. Watch for other vehicles and pedestrians. Do not drive through heavy smoke.

- If you have to stop, park away from the heaviest trees and brush. Turn headlights on and ignition off. Roll up windows and close air vents.

- Get on the floor and cover up with a blanket or coat.

- Stay in the vehicle until the main fire passes.

- Stay in the car and do not run! Engine may stall and not restart. Air currents may rock the car. Some smoke and sparks may enter the vehicle. Temperature inside will increase. Metal gas tanks and containers rarely explode.

CHAPTER 7: MITIGATION STRATEGY

The community assessment shows that Trout Lake contains many wildfire hazards and risks. When deciphering the best approach to mitigate these, it became apparent that there were two levels of defense. To truly protect from an advancing wildfire, there would have to be exterior fuel breaks surrounding the community. Likewise, to protect from a wildfire within the community, there would have to be defensible space, fuel breaks, and low ignitability components on all properties and structures.

With unlimited funding, it could take $1.5 million to protect the entire community (this includes hazardous fuels reduction both exterior to and within the community, contingency lines, and creating defensible space for all homes and properties.) Although obtaining this funding is a highly unrealistic scenario, it is an indicator of what the community can do with the funding that will become available from this CWPP. For example, if Trout Lake received $100,000, what would be the best way to use it? One approach could fund the creation of defensible space for roughly 100 out of the 500 or more properties in the community. Another approach could create shaded fuel breaks that are 100 feet wide to protect the entire community from a large southwestern wind-driven wildfire.

Therefore, with limited available funding, protecting the bulk of the community from wildfire takes priority when compared to only assisting a fraction of community residents to create defensible space. Accordingly, this chapter contains a mitigation strategy in the form of hazardous fuels reduction, and has been organized in two categories:

A. Fuels Reduction Exterior to the Community

B. Fuels Reduction Within the Community

A. Fuels Reduction Exterior to the Community

Hazardous fuels reduction projects were identified as having the highest level of protection for the bulk of Trout Lake's community from a large advancing wildfire. Factors influencing the location of these projects include: prevailing wind directions, fire hazard, population density, community values, and utilizing existing roads for fuel breaks.

Fire history both in and adjacent to the planning area suggests that a wildfire is two to three times more likely to advance from the southwest and south when compared to other directions. Similar to a Wildland Fire Situation Analysis (WFSA), there are different levels of defense for communities like Trout Lake (an inner, middle, and outer layer of protection). The CWPP Team took this philosophy to identify levels of defense, and started within the community and worked outward. This process ultimately led us to identifying projects that would protect the bulk of the community.

After the incorporation of this plan, it will become evident how much funding is available for both exterior and interior hazardous fuels reduction projects. Depending on available funding opportunities project implementation will be decided on where we can get the biggest bang for the buck. Therefore, projects can be done individually or in combination depending on available resources and participation from landowners. Other projects may arise out of potential sources of funding, but will more than likely become developed in future versions of this plan.

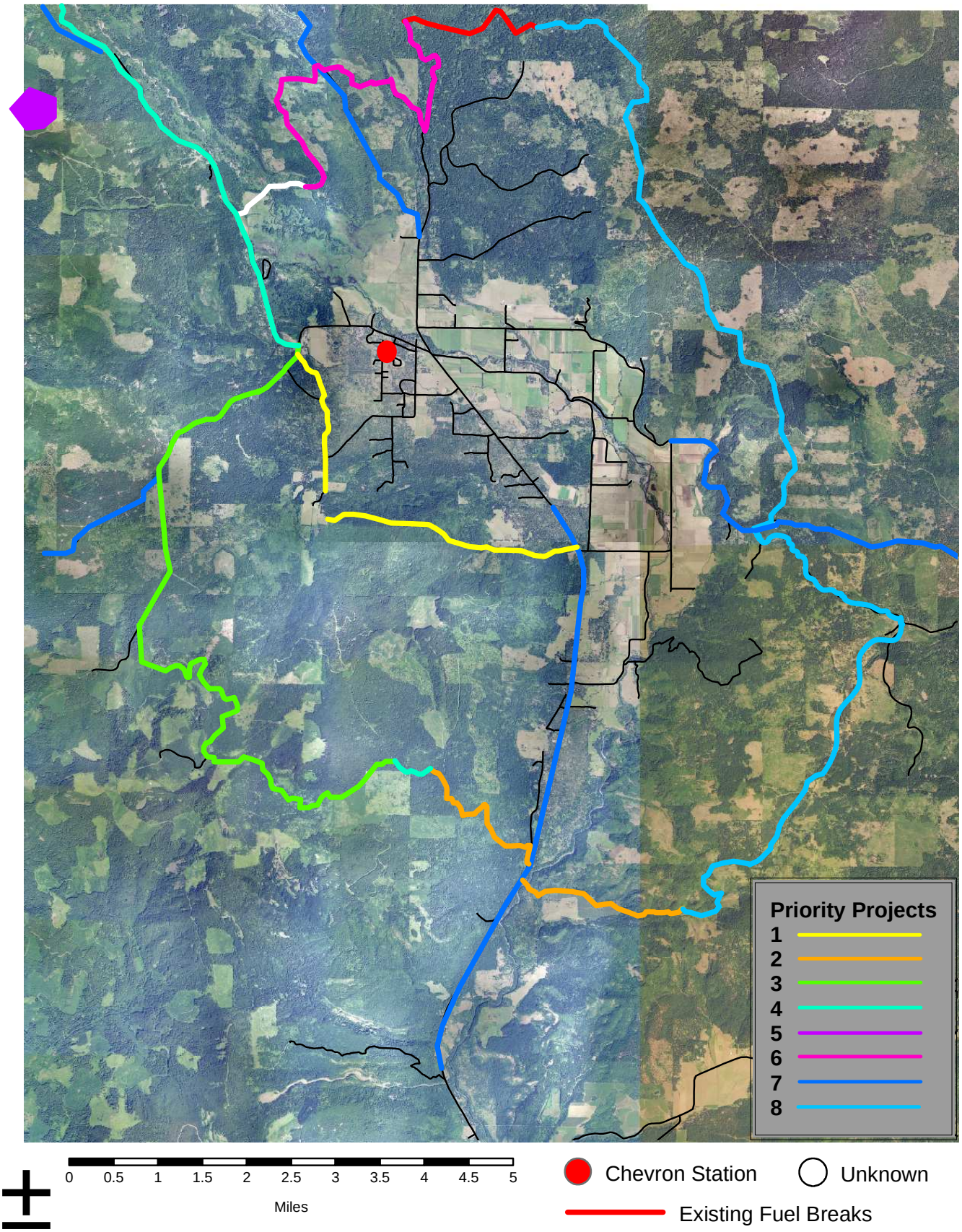
Treatment methods for all recommended projects could include: chemical treatment, dozer work on existing or decommissioned roads, chainsaw work, chipping, pruning, grazing, prescribed burning, and planting native vegetation to reduce the potential for noxious weeds to establish themselves. Project managers, landowners, and cost-benefit analysis will ultimately define the best method of treatment.

Project Costs

According to WADNR and USFS information, hazardous fuels reduction projects cost between $600 and $1300 per acre depending on the amount of vegetation removed. Estimates include: tree removal, chipping, thinning, pruning, and removing dead – down fuel.

Cost estimates for hazardous fuel reduction projects are based on $7,272 to $15,757 for 100 ft. by 1 mile of treatment, depending on amount of vegetation to be removed and the type of work to be done. It is very possible that the identified projects could cost much more or less, and that fuels reduction projects could not be implemented for a while depending on available funding cycles. All projects have the potential to be divided into segments and/or slightly change, but general location of priority remains.

Community & Adjacent Lands
Hazardous Fuels Reduction Projects



Project 1: Fuel break for southwestern wildfire

Location: 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.

Hazard: Wildfire has the highest probability of advancing from the southwest and south. Vegetation on existing roads is overgrown reducing the effectiveness of a fuel break, and poses a hazard to electrical and communication lines.

Strategy: Consult with landholders and perform site visit. Determine logical treatment method for creating a fuel break (shaded or other) 50 feet each side of centerline. Remove understory, ladder fuels, and space out canopy. Possibly recondition dirt-track road to create a second means of ingress/egress for residents and emergency personnel.

Benefit: Trout Lake residents as a whole, especially those that live in that area. This would serve as a secondary fuel break, a second means of ingress/egress, and protection of PUD power and communication lines in that area.

Landholders: WADNR, SDS Company LLC., Six S Company, Dean Enterprises, INC., USFS, Alfred Thomas, Thomas Thompson, Klickitat County PUD, William Lauterbach, and Bruce Steinbach.

Cost: Dependent upon Klickitat County PUD as they have an estimated 30 foot per side right of way with these type of power lines, so cost will vary. Some of this area has previously been harvested, so cost will vary.
$600- $1300 per acre treated, up to $78,000 for the project.

Project 2: Fuel break for southern wildfire

Location: Existing roads from WADNR B7000 Rd. toward the west for two miles, and from Winegartner Bridge toward the east for two miles.

Hazard: Wildfire has the highest probability of advancing from the southwest and south. Vegetation on existing roads is overgrown reducing the effectiveness of a fuel break.

Strategy: Consult with landholders and perform site visit. Determine logical treatment method for creating a fuel break (shaded or other) 50 feet each side of centerline. Remove understory, ladder fuels, and space out canopy. A portion of this project will extend into Priority Project 3.

Benefit: Trout Lake residents and project 3 as this will serve as an excellent fuel break from a southern wildfire.

Landholders: WADNR, SDS Company LLC., USFS, and Six S Company.

Cost: Some of this area has previously been harvested, so cost will vary.
$600- $1300 per acre treated, up to $63,000 for the project.

Project 3: Fuel break for southwestern wildfire

Location: From where Priority Project 2 stopped on the B7000 Rd., eventually connecting to the 86 Rd., and onto Hwy. 141 until reaching the 88 Rd for approximately ten miles.

Hazard: Wildfire has the highest potential of advancing from the southwest. Vegetation on existing roads is overgrown reducing the effectiveness of a fuel break.

Strategy: Consult with landholders and perform site visit. Determine logical treatment method for creating a fuel break (shaded or other) 50 feet each side of centerline. Remove understory, ladder fuels, and space out canopy. Possibly condition existing road to provide access for emergency personnel.

Benefit: The bulk of Trout Lake residents.

Landholders: WADNR, SDS Company LLC., West Wind Properties, West Wind Timber, Inc., Six S Company, Woodruff Tree Farm, Dean Enterprises, USFS, WDOT, and the Gablehouse area landholders.

Cost: Some of this area is private and has previously been harvested, so cost will vary. $600-$1300 per acre, up to $157,000 for the project.

Project 4: Fuel break for northwestern wildfire

Location: On 88 Rd. from Highway 141 onto 8810 Rd. for approximately six miles.

Hazard: Wildfire has potential of advancing from the northwest. Vegetation on portions of existing roads is overgrown reducing the effectiveness of a fuel break and escape route.

Strategy: Consult with landholders and perform site visit. Determine logical treatment method for creating a fuel break (shaded or other) 50 feet each side of centerline. Remove understory, ladder fuels, and space out canopy. This would have to be done in a manner that protects the Trout Lake Creek watershed, as it would be necessary not to disturb soil that may cause increased sedimentation.

Benefit: The community of Trout Lake, especially the residents of Clarksville, and potentially the Natural Area Preserve and Flattop communication tower.

Landholders: Landowners along the 88 Rd., WADNR, Klickitat County Road Dept., Hollenbeck Properties LLC, Flattop Properties LLC, SDS Company LLC, Elk Meadows RV Park, and the USFS.

Cost: Dependent upon vegetation cover, a segment of this project is residential so cost will vary. $600- $1300 per acre treated, up to $94,500 for the project.

Project 5: Fuel break for Flattop Communication Tower

Location: Flattop Communication Tower on eastern boundary of GPNF and Klickitat County.

Hazard: Dense vegetation surrounds this critical communication tower for the Trout Lake community and emergency response agencies. The risk of ignition is high and the fuel load should be reduced.

Strategy: Create fuel break (shaded or other) on existing roads surrounding Flattop Communication Tower (091 and 081 Rds.) This would include intensive thinning, shaded fuel break, and understory removal.

Benefit: Cell phone communication capabilities of Trout Lake residents and radio capabilities of the USFS.

Landholders: USFS and WADNR.

Cost: $600- $1300 per acre treated.

Project 6: Fuel break for northern wildfire

Location: 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.

Hazard: Vegetation on existing roads is overgrown reducing the effectiveness of a fuel break.

Strategy: Consult with USFS and perform site visit. Determine logical treatment method for creating a fuel break (shaded or other) 50 feet each side of centerline. Remove understory, ladder fuels, and space out canopy. This project connects to an established fuel break created by the USFS.

Benefit: The community of Trout Lake and wildland firefighters. From a wildfire either advancing from the north or spreading into the GPNF from the south.

Landholder: USFS, Campbell Group (Handcock), and SDS Company LLC.
Cost: $600- $1300 per acre treated, up to $78,000 for the project.

Project 7: Maintain Trout Lake's five escape routes

Location: Portions of Highway 141, 23 Rd., 88 Rd., 24 Rd., and Trout Lake-Glenwood Highway until reaching an adequate safety zone.

Hazard: Vegetation on some portions of the five escape routes is overgrown reducing the effectiveness of the fuel break and escape route.

Strategy: Consult with landholders and perform site visits. Determine logical treatment method for creating a fuel break (shaded or other) 50 feet each side of centerline. Remove understory, ladder fuels, and space out canopy.

Benefit: The community of Trout Lake, firefighting agencies, and power companies. This would increase the efficiency of the fuel break and safety of the escape route.

Landholders: Klickitat County, USFS, WADNR, private residents, timber companies.

Cost: $600 - $1300 per acre treated.

Project 8: Create fuel break on eastern boundary of planning area

Location: Eastern side of Trout Lake Valley on existing roads for approximately 14 miles.

Hazard: There are pockets of harvested timber along the eastern side of the valley. Although east winds primarily come from the south, the potential for wildfire to spread from the south and east still exist. The pockets of vegetation between harvested areas are overgrown with lots of fuel.

Strategy: Connect the pockets of harvested timber with a fuel break (shaded or other) to decrease the potential of wildfire spread. Harvested areas might have to be cleaned of debris and slash piles. This project will most likely be completed in stages.

Benefit: Residents along the valley floor and north, and timber companies.

Landholders: PK Kreps Family LLC, SDS Company LLC, Longview Fiber Company, Campbell Group (Handcock), WADNR, and USFS.

Cost: Many areas have previously been harvested, so cost will vary.
$600- $1300 per acre treated, up to $220,000 for the project.

B. Fuels Reduction Within the Community

Interrelated with the defensibility of the community from an oncoming wildfire is the defensibility of individual properties and structures. Therefore, the number one priority for all Trout Lake residents is to create defensible space around their structures and properties. This will decrease the spread and intensity of a wildfire within the community, while increasing the chances of structures and properties to survive a wildfire should one ever occur.

A person's structures and property are ultimately their responsibility. It is assumed that during and upon the incorporation of this plan, community residents will have an increased knowledge base and begin to incorporate defensible space practices. To learn more about defensible space see Chapter 6, browse available resources in appendix B, or consult with the CWPP Team, TLVFD, WADNR, and/or USFS.

A concern among the CWPP Team and some community residents is that this plan will become shelf art. To counter this, as of November 2005, the CWPP Team is pursuing funding that would supply workers and equipment for hazardous fuels reduction projects along travel corridors and twenty feet into driveways. If funding is received, and depending on participation from landowners, projects will take place in highest risk areas identified by this plan. Priority of treatment was determined by level of wildfire risk, population density within high-risk areas, and issues associated with emergency access.

Depending on property owners' wishes, removed fuels would be chipped on site, brought to a location and chipped for transport, sold to interested companies or agencies, or possibly made into firewood. These projects will ultimately create or enhance emergency access, enhance priority projects from the previous section, and hopefully engage community residents to incorporate defensible space practices around their properties and structures.

Although not finalized, the following is a list of areas to treat in their suggested priority order:

1. Yellow Brick Road System
2. Valley and Lava Road Systems
3. Jennings Road from Bryans Rd. until the end
4. Airport Rd. System + Morrison
5. Stadleman
6. Westside Rd.
7. Mt. Adams Highway
8. Plenty Pines Drive
9. Chaparral Road System
10. Trout Lake Glenwood Hwy
11. Park Rd.
12. 86 Rd. by Gablehouse residents
13. Lake Road

The CWPP Team is also researching available opportunities to assist community residents with creating defensible space around their home and property. If such funding were received, and depending on the amount received, availability of funding might be prioritized on the following:

- Documented and surveyed homes (those assessed with the NFPA-299)
- Structures and properties that rated in the moderate + to high + categories
- Handicapped residents
- Senior citizens
- Residents who receive minimal income

CHAPTER 8: FOLLOW THROUGH

Hazardous fuel reduction projects are not instantaneous activities. Specifics of projects ultimately depend on available sources of funding and will need to be fleshed out by project implementers. For example, two years ago Trout Lake developed the idea of a CWPP. In 2004, available sources of funding supported the development and implementation of a CWPP by the end of 2005. It could take 1.5 or more years to receive available funding to implement prioritized projects. Thus, project implementation may not occur until 2007. After the approval of this plan, many items will require follow-through:

- Identifying sources of funding to implement the mitigation projects and recommendations.
- The community assessment map illustrates the current levels of wildfire hazard on a scale from moderate to high+. Over time, as projects are identified and implemented, as community residents create defensible space, and as vegetation cover changes, hazard ratings will change. Eventually, a new community assessment will need to be performed.
- Annual updates on progress of project work, home assessments, new community residents, and documented fires will need to be incorporated into the CWPP.
- As of November 2005, the Trout Lake CWPP prioritized fuel reduction projects exterior to the community and within the community. These projects will need to be fleshed out for funding where it will then be necessary to identify goals and objectives, methods for achieving these goals, a time line, and a budget. During this time, the CWPP Team will continue to search for potential sources of funding.
- Depending upon project implementation, these areas will require maintenance and therefore future funding.
- Collaboration and incorporation of the Trout Lake CWPP with the Klickitat & Skamania County Wildfire Protection Plan.
- During project planning, the following items will be evaluated:
    - Respecting the values of neighboring landholders
    - Current laws and regulations of wildlife habitat and watersheds will be followed
    - Mitigating the establishment and spread of invasive species in project areas

It would be beneficial to learn how this plan influenced the community's view on wildfire, defensible space, and to determine how many residents have been interested and/or are ready for the next stage of implementation. Therefore, a survey will be developed to assess these viewpoints.

CHAPTER 9: SUMMARY

The Trout Lake CWPP is the result of a community desire to decrease the threat of wildfire. The Trout Lake CWPP serves as part of the foundation of the Skamania and Klickitat County Wildfire Protection Plan, which is being developed. By basing the dual county plan on individual CWPPs like Trout Lake, the goals, objectives, and recommendations contained within will be developed by and remain specific to each community.

Trout Lake is identified as a high-risk WUI community. This plan provides an excellent stepping-stone for understanding the components of wildfire and how it relates to the community and adjacent areas. It discusses measures residents can take to reduce structural ignitability and recommends projects that will make the community more defensible from wildfire.

A wildland firefighter's job is to fight wildfires "out there." The reality is that these fires can quickly get out of hand, and there won't be enough firefighting personnel to help defend everyone's home or property. That is why it is up to each of us to defend our own structures and properties and claim responsibility for how susceptible they are to wildfire. By following some of the recommendations within this CWPP, everyone has taken the first step to reducing the threat of wildfire.

CHAPTER 10: RECOMMENDATIONS FOR THE FUTURE

Because the Trout Lake CWPP is a living-breathing document, many other things can be done in the future to enhance defensibility from wildfire. Supplemental to the mitigation strategy discussed in chapter 7, the following ideas have the potential to manifest dependent upon community involvement and available resources.

1. Education & Outreach

One of the best methods to reduce wildfire hazard and risk of ignition is to provide wildfire education and outreach materials to community residents. This version of the Trout Lake CWPP serves as an excellent stepping-stone for understanding the basics of wildfire, how to prepare in wildfire emergencies, and measures a homeowner can take to reduce structural ignitability. The following list will further develop education and outreach efforts.

- Continue and stress the importance of individual, and/or area assessments with the modified NFPA-299 TLVFD form.
- Continue to gather wildfire educational resources and make them available to community residents by developing a wildfire library at TLVFD, USFS, Trout Lake School, or General Store.
- Develop an annual fire extinguisher day at the TLVFD (before fire season) where community residents can check, exchange, and/or purchase adequate fire extinguishers.
- Encourage new development to incorporate firewise concepts into their practices.
- Implement a Junior Firewise Program as part of the curriculum at the Trout Lake School. It could be a TLVFD, USFS, WADNR, and community-driven approach to enhance firewise concepts to the community's youth.
- Hold an annual spring Firewise Workshop. It could be a collaborative effort of the TLVFD, WADNR, USFS, and the Trout Lake CWPP.
- Hold annual hazardous fuels clean-up week. This could include a place to bring removed vegetation for chipping, and possibly supply firewood for Trout Lake's residents in need.
- Have volunteers from neighborhood areas locate vacant, unmanaged lots and partial year residents. Contact owners with wildfire and CWPP information.

2. Improving Emergency Response Capabilities

While developing this CWPP and performing the community assessment, it became apparent that many things could be done to improve emergency response capabilities. The following list touches on individual, community, county, state, and federal levels of emergency response capabilities.

- Develop a TLVFD Emergency Response Booklet.
    - This could provide local and assisting firefighters with up-to-date maps on the location of important resources, evacuation routes, viable roads, irrigation ditches, ponds, rivers, water pumping stations, standpipes, hydrants, and homes that have been assessed.
- Identify adequate safety zones and research their emergency potential.
    - Develop resource list for safety zones and make sure we have access to the materials necessary for a community-wide evacuation.
- Identify areas that have poor access for emergency response personnel
    - Encourage the construction of turnouts along roads that are the only means of ingress/egress.
    - Encourage the identification of road names, addresses, dead ends, weight restrictions, and house addresses
    - Identify critical access roads and bridges that cannot handle fire department equipment.
- Increase water availability
    - Areas that do not possess standpipes or fire hydrants would have increased emergency capabilities if more water sources were available. Research and possibly develop ponds or other water sources in strategic locations.
- Establish consistency of road names
    - While viewing maps and performing the community assessment, it became apparent that many roads have multiple or different names according to different sources. During emergency situations, accuracy and consistency of road names is important for 9-1-1 calls and/or assisting firefighters who are unfamiliar with Trout Lake's road system.
- Have Glacier Springs Water Association and the TLVFD work together and identify fire hydrants and/or standpipes that do not have adequate fire flow, and plan strategic locations of future hydrants in areas that are being developed.

- Improve emergency communication systems
    - Locate community residents who own HAM radio systems and develop a system to be used as backup in case of emergencies.
- Perform a community-wide wildfire emergency scenario
    - Although an exercise of this nature would require a lot of cooperation and development, the potential for it to uncover unforeseen elements during emergency situations would undoubtedly benefit the community and firefighting agencies.

3. Other Recommendations

The following list of recommendations would enhance Trout Lake's WUI on both the individual and community levels.

- Further research biomass utilization
    - Depending on the scale of community and individual hazardous fuel reduction projects, there could be several alternatives for residents to explore instead of debris burning, chipping, or disposing of removed fuel. For example, selling to companies and/or agencies, or use as a source for energy creation (green fuel generators).
- Evacuation and safety of livestock
    - People who own livestock and/or other animals could get together and formulate an evacuation strategy and/or safety zone for their heads. Plans could include transportation logistics such as not having the cattle block the road while residents are in the process of evacuation.
- Further research and convey financial assistance opportunities
    - Many community residents touched on the need for financial assistance programs to undergo hazardous fuels reduction projects. Depending on available resources, the CWPP Team has the objective of further researching existing programs.

4. Create Sub-Area Plan

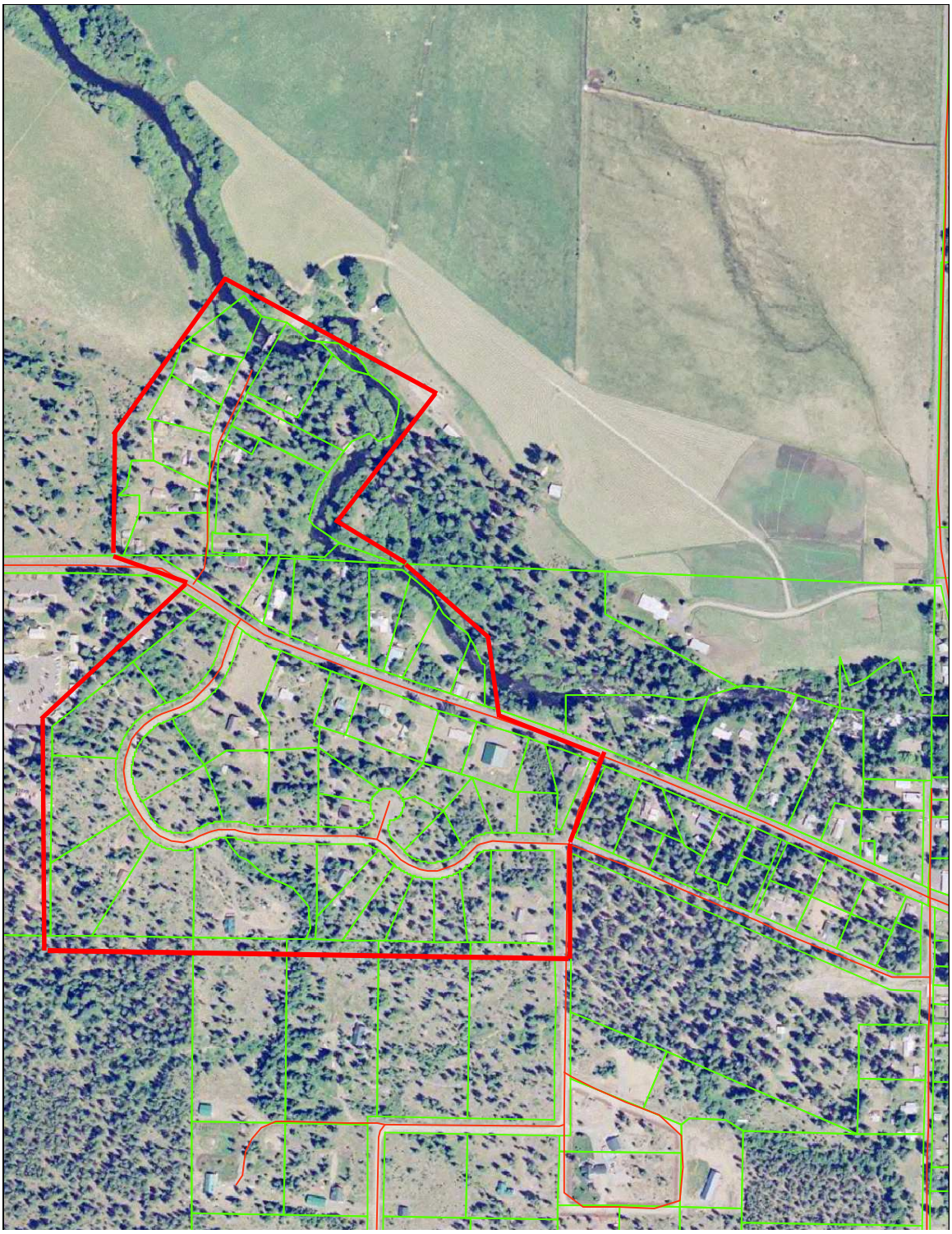
An ideal future supplement to this plan would be to divide Trout Lake into sub-areas (or areas that share similar vegetation cover, proximity, transportation networks, hazards, and risks) and develop plans to decrease wildfire hazard, increase defensibility, increase emergency preparedness, and help reduce the spread of wildfire within the area.

Depending on available resources, the CWPP Team would assist these sub-areas with coordination, communication, project organization, and data gathering. Sub-areas could be generated by the CWPP Team, but would ultimately be fleshed out by community residents. The following is an example of what a sub-area plan could include for the Greenwood Road area:

EXAMPLE OF A GREENWOOD ROAD SUB-AREA PLAN

The Greenwood Road sub-area contains similar vegetation cover, housing proximity, and characteristics of wildfire influence. It includes all residents who have primary access on Greenwood Rd., Greenwood Ct., Guler Rd., and Highway 141 between Guler Rd. and Dean Rd. This sub-area was not included with neighboring Dean Rd., USFS property, and other adjacent sub-areas for the following reasons:

- Fewer numbers of people and structures are easier to work with than larger groups
- Adjacent sub-areas share slightly different characteristics
- Greenwood Rd. sub-area residents share same transportation networks.
- Residents interested in developing this idea would self-organize and describe their own sub-area.



EXAMPLE OF GREENWOOD ROAD SUB-AREA

EXAMPLE OF SUB-AREA PLAN OUTLINE

- Hold initial introductory meeting with Greenwood Rd. sub-area residents to discuss their neighborhood and current wildfire situation.

- Undergo broad approach to protect sub-area from wildfire by performing a sub-area assessment with the modified NFPA-299 TLVFD form. Convey this information to all sub-area residents.
    - Brief overview of firewise concepts (residents coming to the meeting should possess general firewise knowledge already).
    - Discuss risks of ignition, hazards, and sub-area conditions that would influence the spread of wildfire and decrease emergency response capabilities.
    - Set up mitigation plan with input and consultation from TLVFD and/or CWPP Team.
        - Identify and/or formulate an escape plan.
        - Identify safety zones.
        - Develop sub-area telephone tree.
        - Increase access, turnaround space, road signs, and visible addresses.
        - Possibly develop other projects like retaining ponds and/or other water sources in key areas that could be used in emergency situations.
        - Discuss neighborhood issues, concerns, and opportunities.
        - Properties and structures in the periphery of these sub-areas have the potential to be included in other sub-areas. Encourage courtesy communication with neighboring sub-areas and possibly mesh together as they may share similar characteristics.
    - Assign responsible person(s) for specific component(s).
    - Research available financial assistance opportunities.

- Undergo specific approach for individuals.
    - Individual home assessments with modified NFPA-299 TLVFD form.
    - Recommend measures to defend property and structures.
    - If necessary, research financial assistance opportunities to assist in implementing identified projects.

APPENDICES

Appendix A: FIRE RESISTANT NATIVE TREES AND SHRUBS

This list of fire resistant native trees and shrubs will provide an excellent stepping-stone for community residents who wish to incorporate *Firewise* practices in their landscaping or property management.

Common Names

Evergreen Trees	Height	Spread	Exposure	Native Distribution
Ponderosa Pine	90'	20'	Sun	Eastern WA
Shore Pine	60'	20'	Sun	Western WA
Western Larch	120'	20'	Sun	Eastern WA
Deciduous Trees	**Height**	**Spread**	**Exposure**	**Native Distribution**
Big Leaf Maple	80'	30'	Sun/Shade	Western WA
Red Alder	80'	20'	Sun/Part Shade	Western WA
Paper Birch	100'	20'	Sun/Part Shade	All of Washington
Water Birch	20'	10'	Sun/Part Shade	Eastern WA
Oregon Ash	60'	20'	Sun/Part Shade	Western WA
Pacific Crabapple	30'	15'	Sun/Part Shade	Western WA
Black Cottonwood	50'	20'	Sun/Part Shade	All of Washington
Quaking Aspen	80'	15'	Sun/Part Shade	All of Washington
Chokecherry	20'	10'	Sun	Eastern WA
Oregon White Oak	40'	20'	Sun	Western WA
Willow Species	10-40'	10-20'	Sun/Part Shade	All of Washington
Shrubs	**Height**	**Spread**	**Exposure**	**Native Distribution**
Vine Maple	20'	10'	Sun/Shade	All of Washington
Rocky Mountain Maple	25'	15'	Sun/Part Shade	All of Washington
Serviceberry	15'	12'	Sun/Part Shade	All of Washington
Red Osier Dogwood	20'	10'	Sun/Part Shade	All of Washington
Oceanspray	10'	10'	Sun/Part Shade	All of Washington
Mock Orange	10'	8'	Sun	All of Washington
Oregon Grape	8'	6'	Sun/Shade	All of Washington
Red Flowering Currants	10'	6'	Sun/Part Shade	All of Washington
Woods Rose	8'	6'	Sun	Eastern WA
Western Spirea	6'	4'	Sun/Part Shade	Western WA
Snowberry	8'	6'	Sun/Part Shade	All of Washington

Appendix B: RESOURCES:

Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities

http://www.safnet.org/policyandpress/cwpphandbook.pdf

A Framework for Community Fire Plans: A Collaborative Approach to Developing Community Fire Plans

http://ewp.uoregon.edu/pdfs/resources/CFP_framework_1-29-04.pdf

United States Forest Service

http://www.fs.fed.us/

Healthy Forest Restoration Act

http://www.fs.fed.us/r6/frewin/projects/hfra/hr1904.pdf

National Fire Plan

http://www.fireplan.gov/

Firewise

www.firewise.org

Firefree

http://www.firefree.org/

Washington Department of Natural Resources

www.wadnr.gov

Trout Lake

www.troutlake.org

Creating Defensible Space

http://www.springsgov.com/units/fire/wildfire/DefensibleSpace.pdf

Local Resources:

Trout Lake Volunteer Fire Department

(509) 395-2454

USFS - Mt. Adams Ranger District

(509) 395-3400

Washington Department of Natural Resources

(509) 493-3218 - Husum

(509) 925-8510 - SW Region Headquarters, Ellensburg

(360) 902-1000 - State Headquarters, Olympia

Appendix C: CWPP BUDGET

The Trout Lake CWPP budget is based upon a Secure Rural Schools and Community Self-Determination Act of 2000 Title III Grant - $8000, Economic Development Assistance Grant - $8000, and matching hours and assistance from Northwest Service Academy, AmeriCorps, USFS - Mt. Adams Ranger District, and Klickitat County Fire District #1 Trout Lake Volunteer Fire Department.

CWPP Budget Breakdown

Item	Expense	Budget		Balance
				$16,000
Full Time position	$7000		$7000	$9000
2 Part Time Slots @ $1500	$3000		$3000	$6000
Mileage		$1000 (2500 miles @ $0.41 each)		$5000
Supplies		$200 (ink, office supplies)		$4800
Equipment	$1100	$1300 (computer, table, printer, chair, phone)		$3500
Printing		$2260 (1 full color@ 800, 3 printings @ 365)		$1240
Postage		$200 (4 mailings @ 50/month)		$1040
Internet	$540	$540 (45 month x12 months)		$500
Miscellaneous		$500 (final prints, maps, conferences, etc…)		$0

Appendix D: NFPA-299 FORM

Wildfire Hazard Severity Form Checklist NFPA 299

This form may be used for individual houses or larger areas like developments or other types of applications.

Name of area or address receiving assessment

A. Subdivision Design	Points	House or area	Notes
1. Ingress and egress			
Two or more roads in/out	0		
One road in/out	7		
2. Road width			
Greater than 24 feet	0		
Between 20 and 24 feet	2		
Less than 20 feet wide	4		
3. All-season road condition			
Surfaced, grade < 5%	0		
Surfaced, grade > 5%	2		
Non-surfaced, grade < 5%	2		
Non-surfaced, grade > 5%	5		
Other than all-season	7		
4. Fire service access			
< = 300ft, with turnaround	0		
> = 300ft, with turnaround	2		
< = 300ft, no turnaround	4		
> = 300ft, no turnaround	5		
5. Street signs			
Present (4 in. in size and reflective)	0		
Not present	5		
B. Vegetation (Fuel Models)			
1. Predominant vegetation			
Light (grasses, forbs)	5		
Medium (light brush and small trees)	10		
Heavy (dense brush, timber, and hardwoods)	20		
Slash (timber harvest residue)	25		
2. Defensible space			
More than 100 ft of treatment from buildings	1		
More than 71 -100 ft of treatment from buildings	3		
30-70 ft of treatment from buildings	10		
Less than 30 feet	25		
C. Topography			
1. Slope			
Less than 9%	1		
Between 10-20%	4		
Between 21-30%	7		
Between 31-40%	8		
Greater than 41%	10		
Totals for this page			

D. Additional Rating Factors	Points	House or area	Notes
1. Topography that adversely affects wildland fire behavior	0 - 5		
2. Area with history of higher fire occurrence	0 - 5		
3. Areas of unusually severe fire weather and winds	0 - 5		
4. Separation of adjacent structures	0 - 5		
E. Roofing Materials			
1. Construction material			
Class A roof (metal, tile)	0		
Class B roof (composite)	3		
Class C roof (wood shingle)	15		
Non-rated	25		
F. Existing Building Construction			
1. Materials (predominant)			
Noncombustible siding/ deck	0		
Noncombustible siding/ wood deck	5		
Combustible siding and deck	10		
2. Setback from slopes > 30%			
More than 30 feet to slope	1		
Less than 30 feet to slope	5		
Not applicable	0		
G. Available Fire Protection			
1. Water source availability (on site)			
500 gpm pressurized hydrants < 1000ft apart	0		
250 gpm pressurized hydrants < 1000ft apart	1		
More than 250 gpm non-pressurized, 2 hours	3		
Less than 250 gpm non-pressurized, 2 hours	5		
No hydrants available	10		
2. Organized response resources			
Station within 5 miles of structure	1		
Station greater than 5 miles	3		
3. Fixed fire protection			
Sprinkler system (NFPA 13, 13R, 13D)	0		
None	5		
H. Utilities (Gas and Electric			
1. Placement			
All underground utilities	0		
One underground, one aboveground	3		
All aboveground	5		
Totals for this page			
I. Totals for Risk Assessments			
Totals for page 1 and 2			
1. Low Hazard: < 39 points			
2. Moderate Hazard: 40-69 points			
3. High Hazard: 70-112 points			
4. Extreme Hazard: 113 > points			
Census Data			
Track number			
Block group number			
Block number (s)			

GLOSSARY

For a full list of terms visit: http://www.fireplan.gov/

Aerial Fuels:

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

Brush:

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

Buffer Zones:

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

Burning Conditions:

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

Burning Period:

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

Cambium:

The layer of cells lying between the wood and bark of a stem from which new bark and wood cells originate.

Closure:

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

Contingency Line:

A primary or alternative fire break (fuel break) of some fashion.

Creeping Fire:

Fire burning with a low flame and spreading slowly.

Crown Fire:

The movement of fire through the crowns or tops of trees or shrubs more or less independently of the surface fire. A fire is said to be crowning when the flames get up into the tops of trees and spread.

Curing:

Drying and browning of herbaceous vegetation or slash.

Dead Fuels:

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

Debris Burning:

A fire originally set for the purpose of clearing land or for rubbish, garbage, range, stubble, or meadow burning.

Defensible Space:

An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and resources or lives at risk. In practice, defensible space is generally defined as an area of 30 feet or more around a structure that is cleared of flammable brush or vegetation or other fuels.

Duff:

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

Escape Route:

A pre-planned and understood route firefighters can take to move to a safety zone or other low-risk area, such as an already burned area (commonly called "the black"), a previously constructed safety area, a meadow that won't burn, or a natural rocky area that is large enough to provide refuge without being burned.

Extreme Fire Behavior:

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

Fine Fuels:

Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a time lag of one hour or less. These fuels ignite readily and are rapidly consumed by fire when dry.

Fire Break (Fuel Break):

A natural or constructed barrier used to stop or check fires, or to provide a control line from which to work.

Fire line:

A linear fire barrier that is scraped or dug to mineral soil after being cleared of all vegetation.

Fire Season:

1) Periods of the year during which wildland fires are likely to occur, spread, and affect resource values sufficient to warrant organized fire management activities.

2) A legally enacted time during which burning activities are regulated by state or local authorities.

Fire Triangle:

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

Flash Fuels:

Fuels such as grass, leaves, pine needles, ferns, tree moss, and some types of slash, flash fuels or flashy fuels ignite readily and are consumed rapidly when dry. Also called fine fuels.

Fuel:

Combustible material. Includes vegetation such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire. (Also see Surface Fuels.)

Fuel Bed:

In a research setting, an array of fuels usually constructed with specific loading, depth, and particle size to meet experimental requirements; also commonly used to describe the fuels composition in natural settings.

Fuels Reduction:

Manipulation, including combustion or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control. Often includes thinning and/or prescribed burning.

Fuel Type:

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

Geographic Area:

A political boundary designated by the wildland fire protection agencies, where these agencies work together in the coordination and effective utilization of fire management resources. Each geographic area includes a Geographic Area Coordination Center (GACC) that handles fire intelligence, information, ordering, and dispatch.

Ground Fuels:

All combustible materials below the surface litter, including duff, tree or shrub roots, punky wood, peat, sawdust, and other materials that can support a glowing combustion without flame.

Hazard Reduction:

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

Heavy Fuels:

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

Home Unit:

Where firefighting resources are coming from.

Host Unit:

Who has responsibility for where the fire initiated.

Incident:

A human-caused or natural occurrence, such as a wildland fire or tornado or hurricane or major flood, that requires emergency service action to prevent or reduce the loss of life or damage to property or natural resources.

Ladder Fuels:

Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help start and continue crowning on a fire.

Light Fuels:

Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a time lag of one hour or less. These fuels ignite readily and are rapidly consumed by fire when dry.

Litter:

Top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer. It's comprised of loose debris including sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Live Fuels:

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

Mineral Soil:

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

Mutual Aid Agreement:

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

Normal Fire Season:

1) A season during which the weather, fire danger, and number and distribution of fires are about average.

2) Period of the year that normally comprises the fire season.

Peak Fire Season:

That period of the fire season during which fires are expected to ignite most readily, to burn with greater than average intensity, and to cause damage at an unacceptable level.

Prevention:

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

Running:

A fire event including rapidly spreading surface fire with a well-defined head.

Safety Zone:

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

Slash:

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

Snag:

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

Spark Arrester:

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

Spot Fire:

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

Surface Fuels:

Loose litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branch wood, downed logs, and stumps interspersed with or partially replacing the litter.

Sub-area:

Geographic polygon that tie community residents together based upon similar characteristics (i.e. vegetation cover, proximity, fuel load, and transportation network).

Uncontrolled Fire:

Any fire which threatens life, property, or natural resources.

Under burn:

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

Vectors:

Directions of fire spread as related to rate of spread calculations (in degrees from upslope).

Wildland Fire:

Any non-structure fire, other than prescribed fire, that occurs in a wildland area.

Wildland Fire Situation Analysis (WFSA):

A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economical, political, and resource management objectives as selection criteria.

Wildland Urban Interface (WUI):

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