COWYCHEE MOUNTAIN COMMUNITY WILDFIRE PROTECTION PLAN

YAKIMA COUNTY, WASHINGTON

2012

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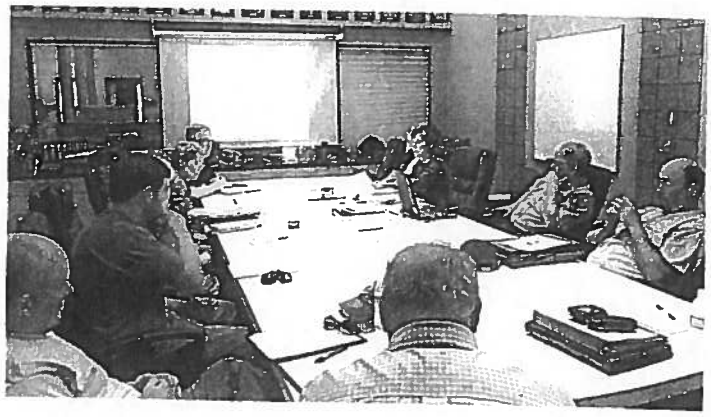

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Yakima County Geographic Information Services
Yakima County Emergency Services
Yakima County Fire Marshall's Office
Okanogan/Wenatchee National Forest, Naches Ranger District
U.S. Bureau of Land Management
U.S. Fish and Wildlife Service
Washington State Department of Natural Resources
Washington State Department of Fish and Wildlife

BOARD OF YAKIMA COUNTY COMMMISISONERS

IN THE MATTER OF ADOPTING THE COWYCHEE MOUNTAIN COMMUNITY WILDFIRE PROTECTION PLAN	)))	Resolution No. 163-2012

WHEREAS, the Healthy Forests Restoration Act promotes the idea of community-based forest planning and prioritization; and,

WHEREAS, the National Fire Plan places a priority on working collaboratively within communities in the wildland urban interface to reduce the risk from large-scale wildfire; and,

WHEREAS, the Federal Emergency Management Agency has directed state and local governments to adopt pre-disaster mitigation programs to reduce the losses resulting from natural disasters; and,

WHEREAS, the Yakima County Community Wildfire Protection Plan serves as a county-wide wildfire protection plan based on the needs of the people involved in the wildland urban interface area; and,

WHEREAS, the goals of the Yakima County Community Wildfire Protection Plan are to improve prevention and suppression, reduce hazardous fuels, restore fire adapted ecosystems, promote community assistance, comply with environmental laws and policies, and provide an overarching framework from which to tier more specific community plans; and,

WHEREAS, the Cowychee Mountain Community Wildfire Protection Plan tiers from the Yakima County Community Wildfire Protection Plan to address more focused issues of shrub-steppe wildfire response, hazard mitigation, community preparedness, and structure protection at the community level; and,

WHEREAS, it is the intent of Yakima County to partner with Federal, State, and private forest protection agencies, local fire protection districts, and wildland urban interface communities to preserve and enhance the safety, welfare and quality of life to our citizens; now, therefore,

BE IT HEREBY RESOLVED that the Board of County Commissioners hereby adopts and signs the attached Cowychee Mountain Community Wildfire Protection Plan.

Done this 1st day of May, 2012

SEAL OF THE BOARD OF YAKIMA COUNTY COMMISSIONERS STATE OF WASHINGTON

J. Rand Elliott, Chairman

Michael D. Leita, County Commissioner

Kevin J. Bouchey, County Commissioner
Constituting the Board of County Commissioners for Yakima County, Washington

ATTEST:

Tiera Girard, Clerk of the Board

Table of Contents

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List of Figures, Maps and Tables

Figures

Maps

Tables

1. Introduction

Residents in the west valley area of Yakima County who live near open shrub-steppe range areas have experienced repeated cycles of wildland fires. The Cowiche Mill fire of 2010 burned over 6,300 acres of shrub-steppe on Cowiche Mountain. This largely uninhabited zone is owned by public and private interests for use as grazing lands, recreation areas, habitat conservation, and wildlife/domestic animal migratory corridors. The 2010 fire in particular prompted local residents, government officials, a local recreation non-profit land owner, and local fire district leaders to come together and act to reduce the future risk of damaging wildfires.

This group of interested organizations and individuals opted to use the risk management framework made available through the Healthy Forests Restoration Act (HFRA) of 2003 (United States Congress, 2003). HFRA was enacted in response to the growing public recognition that forested and grassland habitats had, over the last 150 years, become increasingly susceptible to catastrophic wildfire. The rapid growth of human communities within these natural habitats put people and natural wildfire into direct contact at much greater frequency. HFRA legislation provided a way for communities to come together to assess their risk from wildland fire, and to implement risk reduction measures. The product developed by this risk reduction and project planning framework is the Community Wildfire Protection Plan (CWPP). With a completed plan, communities in the area served by the CWPP are eligible to seek community assistance grants to implement priority projects.

There are currently two Community Wildfire Protection Plans serving Yakima County. The State Highway 410 and U.S. Highway 12 CWPP (Highway 410/12) was completed in 2005 to address the small communities in the heavily forested upper Naches and Tieton basins. In early 2011, the Board of Yakima County Commissioners adopted the Yakima County Wildfire Protection Plan. This document serves as an overarching strategic plan highlighting the need for coordinated risk management.

These two plans were focused largely on the threat to communities associated with forested habitats.

The authors of this plan (the **Core Group**) chose to focus this CWPP on that area of Yakima County surrounding Cowiche Mountain. The area served lies in the shrub-steppe/rangeland zone, a habitat type not covered explicitly by the either of the two existing plans. Spurred by the Cowiche Mill fire of 2010 and based on the central location of Cowiche Mountain within the planning area, the Core Group has named this plan the **Cowychee Mountain Community Wildfire Protection Plan.** Sometimes spelled "Cowiche" the Core Group opted to use the less common spelling. The Core Group originally planned to include the forested area lying between the shrub-steppe zone and the eastern boundary of the Highway 410/12 CWPP as a whole chapter in this plan. As work progressed, it became increasingly apparent to the Core Group that the shrub-steppe zone required its own special focus. Working at this scale allowed the Core Group to analyze at a finer resolution and define projects that were pitched at the right scale for the affected communities in the shrub-steppe zone. As discussed in the section on Planning Area (page 4), the overall boundary for the planning area extends out to the Highway 410/12 CWPP boundary, but the scope of work envisioned for the Cowychee Mountain CWPP focuses on the shrub-steppe zone as shown in Figure 1.A.

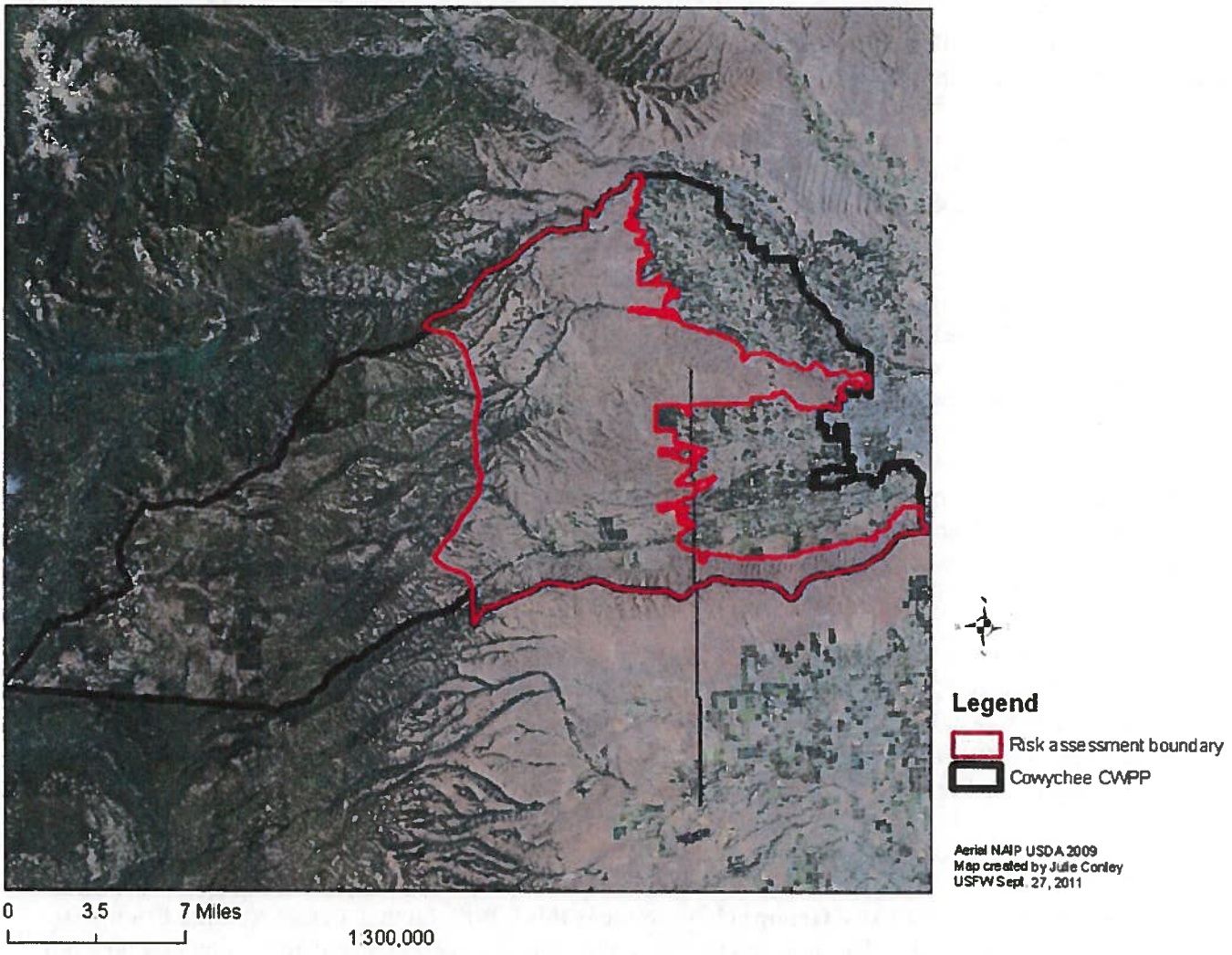


Figure 1.A. CWPP Overall Boundary and CWPP Assessment Area Boundary

The entire area affected by this plan is considered to be in the Wildland Urban Interface (WUI), defined as the "line area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels". WUIs are unique areas where there is a need both to ecologically manage the environment while prioritizing the safety of the individuals who reside there.

1.1 Vision and Goals

Through the development of a Community Wildfire Protection Plan, residents in the plan area aim to protect their community from the effects of wildfire by working in concert with the fire agencies to reduce risk of future fires and strive to be better informed and prepared in the face of fire events.

The goals of this CWPP are to:

- Create a safer environment for the public and fire fighting responders.
- Recognize that the focus of this CWPP is shrub-steppe vegetation, thus the CWPP will use shrub-steppe ecological principles, which vary from forest principles, to define fuel reduction priorities.
- Outreach across boundaries and jurisdiction by sharing land management principles that will include potential fuel reduction through restoration and best management practices.
- Create opportunities for training, education and available resources for fire agencies.

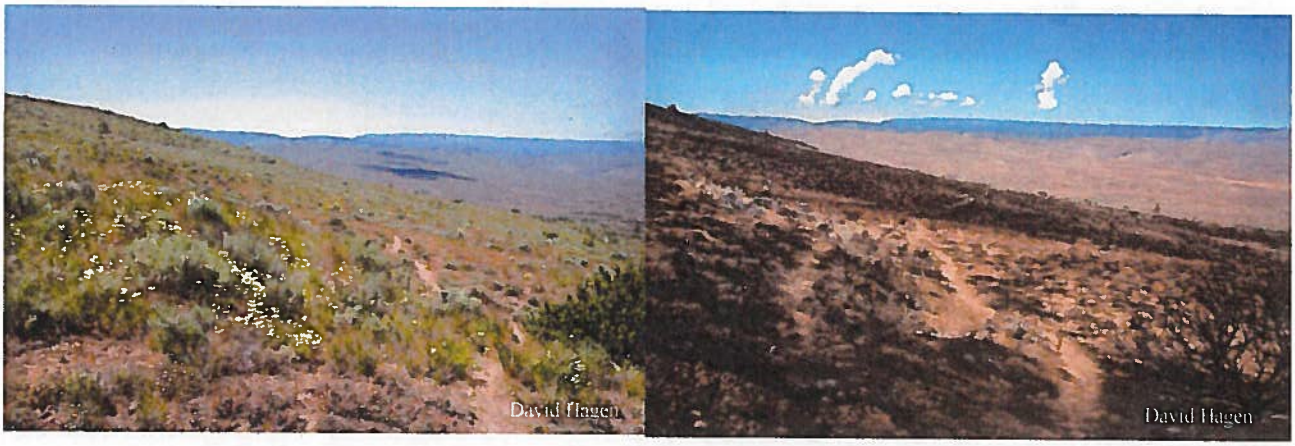


Figure 1.B: Snow Mt. Ranch, before and after 2010 Cowiche Mill fire

More specifically, the residents of the Cowychee communities wish to:

1. Provide for human health and safety.
2. Identify avenues for funding projects identified by this plan.
3. Provide input to the Washington State Department of Natural Resources (WDNR), Washington State Department of Fish and Wildlife (WDFW), United States Bureau of Land Management (BLM), and United States Forest Service (USFS) as to the management of public land adjacent to our communities.
4. Encourage community members to become involved in the NEPA/SEPA process by commenting during the scoping phase of proposed activities.
5. Restore fire adapted ecosystems as a means to reduce fire risk to communities.
6. Maintain the undeveloped character of the remaining relatively undisturbed shrub lands and grasslands.

[1] National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) are the national and state laws which require an environmental analysis for proposed projects and plans.

7. Promote and host fire prevention programs such as Firewise, FireFree, within the local community.
8. Support homeowner and landowner compliance with fire prevention program recommendations as a community objective.
9. Identify communication and suppression equipment needs for first responders.
10. Support and promote participation in our local volunteer fire departments and our elected fire district commissioners.
11. Be in compliance of all environmental laws, regulations, and policies as they apply to each landowner and agency.
12. Present this document to the Yakima County Commissioners so they are aware that we have recognized wildland fire as a threat to our community and are taking action to mitigate that threat. Commissioners also must sign the completed CWPP.
13. Request that this document be incorporated as an appendix to the Yakima County Multi-Jurisdictional Hazard Mitigation Plan.
14. Meet as a community frequently to review, validate, and/or update this plan, and to identify additional projects and opportunities.
15. Maintain communication and cooperation with our county, state, and federal government partner.

2. Planning Area

As stated in the introduction, the overall planning area encompasses the suburban fringe of Yakima out to the forest zone of the western county (See Figure 1.A). The project prioritization focuses within the shrub steppe and rangelands lying west of Yakima comprising approximately 89,000 acres of land. The character of residential development on private lands within the Cowychee corridors is rural in nature. The Urban Growth Boundary defined jointly by the City of Yakima and Yakima County is westerly from the current incorporated city limits, indicating the ongoing pressure to expand the WUI into the shrub-steppe zone. Besides the rural, unincorporated areas of Yakima County, the planning area includes the communities of Cowiche, Tieton, West Vallley, Tampico, Naches Heights and Ahtanum. In addition to year-around established residences and agricultural facilities, recreational residences are distributed throughout the planning area.

2.1 General Description of the Area

The Cowychee Mountain CWPP encompasses a wide variety of terrain, elevation, aspects, and the varying fuels associated with suburban/rural fringe (small orchards, pastures) shrub-steppe, rangelands, and low elevation forest fringe. The eastern boundary of the CWPP separates the relatively developed suburban "ranchette" style acreage and irrigated agriculture from the less developed and larger acreage rangelands. The higher elevations to the west transition from shrublands to dry deciduous forest types (Oregon white oak and cottonwood), through dry conifer forest types (ponderosa pine, Douglas-fir). There are stream corridors occupying the valley bottoms characterized by mixed riparian deciduous trees and shrubs. An important characteristic of the CWPP area is the prevailing wind direction. Coming largely as west-to-east winds, the shrub-steppe and forest fuels to the west, when ignited, are most likely to be fanned to the east, in the direction of the most concentrated residential zone.

2.2 At Risk Community/Wildland Urban Interface (WUI)

Figure 2.A: Plane dropping fire retardant near residences on Cowiche Mountain, 2010

As described in the Healthy Forest Restoration Act (United States Congress, 2003), the term Wildland Urban Interface means an area within or adjacent to an At Risk Community identified in a Community Wildfire Protection Plan. An At Risk Community means a group of homes and other structures with basic infrastructure and services (such as utilities and collectively maintained transportation routes) within or adjacent to Federal land. It is one in which conditions are conducive to a large-scale wildland fire disturbance event and significant threats to human life or property. The CWPP boundary was drawn with these parameters defining the planning area and the Wildland Urban Interface. Topographic and weather influences were a major factor in determining the CWPP boundary. Consultation with fire behavior experts identified the margin of potential threat.

[2]Fuels refer to the combustible matter which can maintain a fire, often dead or dry vegetation.

3. Planning Process

3.1 Process and Partners

Following the Cowiche Mill fire in July of 2010, the Cowiche Canyon Conservancy (CCC) met with the chief of the West Valley Fire District, one of the first responders, to seek ways to assist the fire district. It was determined that the best cooperative venture would be for CCC to use its non-profit status to help the district in obtaining grants to upgrade equipment and other capacity needs. CCC worked through the balance of the year to convene a core group of interests to respond to the need. In early 2011, CCC solicited sponsors to join in a proposal to secure a Fire Learning Network (FLN) award from The Nature Conservancy. The FLN award was designed to convene a core group of practitioners and interested community members to produce a CWPP in the shrub-steppe habitat in Yakima County. Composition of the group was driven by the requirements common to all CWPPs, which require federal and state agency participation. The staff director for CCC was tasked with facilitating the process. The facilitator recruited participants from the USFS, BLM, the Yakama Nation (YN), the WDNR, WDFW, The North Yakima Conservation District (NYCD), the Yakima Fire Marshall's office, the Chiefs of Fire Districts 1, 9 and 12 (represented by the Chief of Fire District 12), the South Central Washington Shrub-steppe Rangeland Partnership, and interested community members. The representatives from each of the organizations formed the Core Group, tasked with completing the CWPP.

Figure 3.A: Paul Jenkins *Members of Core Group during planning meeting*

The overall process for producing the CWPP was designed to occur in regularly convened workshops of the Core Group, with smaller subcommittees working on specific tasks between meetings. The facilitator worked with each subcommittee to frame tasks and bring results back for review by the full Core Group. Each of the workshops was based on the CWPP planning steps as prescribed in the CWPP handbook, "Preparing a Community Wildfire Protection Plan" (National Association of State Foresters, 2004).

3.2 Values at Risk

The Core Group identified the following values and property at risk to loss by catastrophic wildfire. These identified values and facilities are an integral part of the community. As such, fire protection and prevention, hazardous fuel reduction plans, and education-based projects proposed as risk mitigation considered all of these values.

Table 3.A: Values at Risk identified by Core Group.

Values at Risk	
Shrub-steppe	Cultural resources (traditional medicines, foods and archeological resources)
Riparian stream health	Agricultural lands
Clean drinking water	Commerce
Flood control	High quality native habitats
Grazing forage	Livestock
Air quality	Threatened and endangered plants and animals
Elk fence	Wildlife together with breeding, nesting and foraging areas

4. Assessment

The assessment phase of the CWPP assembles relevant information needed to assess risk to communities in the WUI from wildfire. This information includes the types of fuels that are present in the planning area, the behavior of those fuels under different conditions, the capability of fire suppression to protect communities at risk, and the role of the public and public policies in reducing risk exposure. The Core Group's overarching goal in developing the risk assessment was to use a method that was simple to describe, simple to use, and did a credible job in assessing risk. With a very small budget, the intent was to use existing data and the time and skills of the Core Group to communicate the assessment findings through a combination of maps and text.

The forested portion of the plan is an extension of the work that was done through the Highway 410 and 12 CWPP and was not considered in this CWPP.

4.1 Existing Information

A substantial amount of data is already available from several sources. Primary fire planning information/ Geographic Information System (GIS) data used in this plan came from Yakima County GIS, LANDFIRE collaborate geospatial layers, USFS Naches Ranger District, and WDNR.

4.2 Fire Ecology of the Shrub-Steppe

The first step toward understanding risk to communities in the WUI from wildfire is to recognize the role and behavior of fire in natural shrub-steppe ecosystem settings. Forest fire is generally better understood by the public and are more broadly covered by the media. Public policy has increasingly focused on the high costs of forest fires over the last couple decades. While large sagebrush fires have gained some attention in the Great Basin, shrub-steppe fire in the Columbia Basin and intermountain West is not as well understood, or as publicized, as forest fire.

The shrub-steppe habitat in the CWPP planning area can generally be described as continuous expanses of native grasslands made up of a variety of bunch-type grasses (as opposed to continuous turf or sod-type grass), with an intermingling of native shrubs and flowering plants (forbs). The shrub-steppe zone is found in an arid landscape with rainfall ranging from 3 inches at the lowest elevations, up to 18 inches in higher eleva-

Figure 4.A: Snow Mt. Ranch before and after 2010 Cowiche Mill Road fire

tions, generally at the gradient where annual moisture can start supporting woodlands .
Prior to the many changes in habitats brought about by intensive management over the last 150 years, the dryer woodlands at the upper edge of the shrub-steppe zone were maintained by frequent, low intensity fire (fires happening every 5-35 years). Although it seems logical that fires in the arid shrub-steppe would be even more frequent, ecologists have discovered that the natural interval for shrub-steppe fire were much less frequent—ranging anywhere from 50 to 240 years (Baker, 2006). Given this longer period expected between shrub-steppe fires, current conditions are far outside the expected range. Fires ranging from 34,000 to over 160,000 acres have occurred in the shrub-steppe zone of south central Washington every 2 to 4 of the last 15 years (Conley, 2010).

While no comprehensive fire history has been compiled for the shrub steppe, most land managers agree that the frequency of fires has accelerated, raising habitat concerns for those species that depend on sagebrush and other shrubs.

One of the most pervasive and far-reaching threats to the shrub-steppe habitat is the spread of invasive species, particularly the widespread establishment of exotic annual grasses (such as cheatgrass) as described in the following negative feedback loop:

> Invasion can set in motion a grass/fire cycle where an alien grass colonizes an area and provides the fine fuel necessary for the initiation and propagation of fire. Fire then increases in frequency, area, and perhaps intensity. Following these grass fueled fires, alien grasses recover more rapidly than native species, and cause a further increase in susceptibility to fire (D'Antonia & Vitousek, 1992)

Compared to native perennial bunchgrass, cheatgrass creates a continuous cover of fine, highly flammable fuels that dries out early in the summer and remains as a dry fuel source much longer in the fall. As a result, this invasive grass if prevalent greatly increases a site's fire risk. Rate of spread, size and frequency of fire all increase when it is present (Highway 410/12 CWPP pg 12).

Wildland fire is a natural process that has shaped the shrub-steppe vegetation communities for a millennia. After a naturally occurring fire event, grasslands soon dominate the landscape. Sagebrush is generally killed by fire, and takes many decades to recover, allowing grass species to generally have the upper hand over large areas and long time periods. If, however, bunchgrasses are replaced by cheatgrass and other invasive species, the fire cycle changes. Cheatgrass and other invasive species tend to emerge early in the spring, dry out earlier, thus resulting in a longer fire season. More fires, bigger fires and hotter fires mean that the slow growing shrubs, which many desert wildlife species depend on, begin burning away faster than they can regrow. The shrubs themselves are very flammable, so they become part of the negative fire feedback loop.

New research is demonstrating an emerging property of shrub-steppe plant behavior—native bunchgrasses are increasingly found growing in close proximity to sage plants, due to the relative protection the shrubs provide from grazing and heat stress. Biomass concentrates burn hotter and are more apt to result in plant mortality. Cheatgrass fills the space between these sage/native grass areas, so fires are increasingly killing sage and native grasses together, while allowing cheatgrass to colonize ever greater areas (Pyke, Reisner, & al., 2011). Restoration of shrub-steppe is a way to change the fire/invasive species cycle that creates risk to communities and cost to society. By restoring bunch grass systems, the fuels and negative feedback loops associated with invasive species in the shrub-steppe can be better managed (McArthury, Romney, Smith, & Tueller, 1989).

4.3 Risk Assessment Methodology

A key step that drives outcomes from the completed CWPP is the assessment of wildfire risk to the affected community. A technical subcommittee of the Core Group was convened to develop a protocol for assessing risk. The main goal for the committee was to come up with an assessment method that was easy to use, easy to explain to the public, and did a credible job assessing risk. The committee did not want to tie up time or resources on developing a new model or generating new data. The risk model developed for the county-wide CWPP was not considered useful for this project. Developed by a contractor from out of the area, the model was too complex, too forest-centric, and too generalized (low resolution) to meet the committee's criteria. The Core Group used their local knowledge and expertise in fuels behavior to target shrub-steppe fuel types.

4.4 Description of Analysis

The committee agreed that the national LANDFIRE products (www.landfire.gov) would serve as the ideal "off-the-shelf" data sets to serve as the starting point for the method. Using the vegetation fuel models clipped to the 88,789 acre assessment area, the committee designed a simple method to run each of the fuel types through a fire behavior model (BEHAVE). Parameters of interest for the fire behavior modeling step were selected by working with the fire district team members to learn what factors affected their suppression activities. Flame length was the key factor for firefighters in determining whether they would engage in suppression or not ("stand and fight or cut and run"). Rate of spread was the key factor for evaluating response and evacuation time. Taken together, these factors represented overall risk. By taking the area's LANDFIRE fuel types and running them through the BEHAVE program (assuming summertime temperatures and low fuel moisture), both flame length and rate of spread graphs were produced for each of the fuel types under different slopes and wind speeds. Fuel types in the shrub-steppe range from short, sparse grasses to large shrubs and tall grasses growing together. Amount of above-ground vegetation, length of growing season, ability of plants to stay greener longer into the growing season, are all factors that distinguish different plant communities as fuels that will behave differently in wildfire. With the graphs done for each fuel type, the next step was to turn graphs into a map. A simple "if-then" formula easily turned the graphs for each fuel type into a "low, medium and high" risk surface based on slope and the spatial distribution of the LANDFIRE fuel types. The map that resulted from the analysis met what the core team intuitively expected to see.

Figure 4.B: Core Group going over LANDFIRE and BEHAVE data

4.5 Risk Assessment Protocol

In order to establish a Risk Assessment for the Cowychee Mountain analysis area, the core group took the following steps (See Table 4.B).

Table 4.B: Process for Risk Assessment

Part 1: Fuels hazard assessment
Step 1: Add vegetation data layer (LANDFIRE data) to project area layer. **Step 2:** Conduct a desk-based ground-truthing exercise with the Core Group using paper maps. Identify known conversions in vegetation types. Query fire staff and core group to discuss fire behavior outputs of concern to use in BEHAVE model runs (Completed at Workshop 4). **Step 3:** Vegetation fuel models from LANDFIRE Refresh data are run through BEHAVE model using slope as x-axis variable. Use graph outputs as illustrations to accompany text-based assessment of fire risk. **Step 4:** Add a GIS layer depicting slope and aspect gradients. Use slope data to tie back to BEHAVE outputs, such that slopes are color coded for risk based on flame length produced per slope per vegetation type (Yakima County GIS) .
Part 2: Values at Risk (Yakima County GIS)
Step 1: Assemble map data on structure locations and add to vegetation/slope-aspect map to depict gradient of structural risk. **Step 2:** Identify other values at risk and add in tabular form. **Step 3:** Map areal extent of existing fire protection and response times.
Part 3: Public input
Step 1: Assemble maps and text and convene stakeholders workshop. **Step 2**: Incorporate stakeholders' input and draft final risk assessment

Table 4.C shows the results of the Risk Rating Model. The Risk Rating conveys flame length by slope under the assumed weather and fuel moisture conditions. For purposes of the Cowychee Mountain CWPP, it is interpreted as risk to human life, property, and/or infrastructure. It may also be applied as the regressing probability of suppression resources successfully protecting these values. No assumptions are made as to the application of pre-suppression measures such as implementation of defensible space treatments, WUI Fire Code compliance, defensible space construction, or availability or tactical deployment of firefighting resources. In vegetation types that have a very high proportion of small diameter fuels, such as grass, grass/shrub, and shrub types, subtle weather changes can greatly affect flame length. Implementation of pre-suppression measures such as those listed above, will not affect the risk posed by any given vegetation type/slope combination, but can greatly increase the defensibility of a physical value. The climate assumptions used in Table 4.C are typical mid-summer conditions of low fuel moisture, live fuels are cured, and 5 mph upslope wind.

Table 4.C: Risk Rating Model

If	Vegetation Type/ Fuel Model	And	Slope	=	Risk (display)	Risk (qualitative)
	GR1		Any		Green	Low
	GR2		<20		Yellow	Moderate
	GR2		>20		Red	High
	GR4		Any		Red	High
	GS2		Any		Red	High
	SH2		Any		Red	High

GR1: The primary carrier of fire in this fuel type is grass.
GR2: The primary carrier of fire is grass. Shrubs, if present, do not affect fire behavior.
GR4: The primary carrier of fire is continuous, dry climate grass, including past burned areas that are now dominated by cheatgrass.
GS2: The primary carrier of fire in this fuel type is grass and shrubs combined.
SH2: The primary carrier of fire in this fuel type is woody shrubs and shrub litter.

Risk Qualitative Outputs:

Green/Low	Flame Lengths less than 3½ feet
Yellow/Moderate	Flame Lengths 3½ to 7 feet
Red/High	Flame Lengths greater than 7 feet

4.6 Fire Behavior meets Human Behavior: Basis for Assessing Risk

Some individuals assume that if a wildfire approaches their property, a fire engine will be parked in their driveway and firefighters will be actively defending their home- they are incorrect. When a major wildfire is burning or when several smaller fires are occurring at the same time, it is unlikely there will be enough fire-fighting resources available to defend every home. In these instances, firefighters will likely select homes they believe they can safely and effectively protect.

Even with adequate resources, some fire conditions may be so intense that there is little firefighters can do to prevent a house from burning. House and property protection actually starts with addressing the areas around the home. Once an intense wildfire reaches a property, it may be too late to protect. Limiting fire intensity can be accomplished by reducing the amount of flammable vegetation surrounding a home and restoring degraded habitats in the WUI core areas. Consequently, the most important person in protecting a house from wildfire is not a firefighter, but the property owner. Furthermore, it's the action taken by the owner **before** the wildfire occurs (such as creating an effective *defensible space*) that is critical.

Flame length and rate of spread can, together or individually, be useful in forming simple risk assessments for firefighters, homeowners, and the general public. Risk will address a fire department's ability to: provide protection (stand and fight, or cut and run), compare fire department response time to fire size at first engagement, give general guidelines to escape (evacuation) time, and assist in guiding homeowners in determining an adequate defensible space. These fire behavior factors ***do not*** address any given structures ability to withstand a wildfire (flammability). Figure 4.C visually represents an active fire and how responders size it.

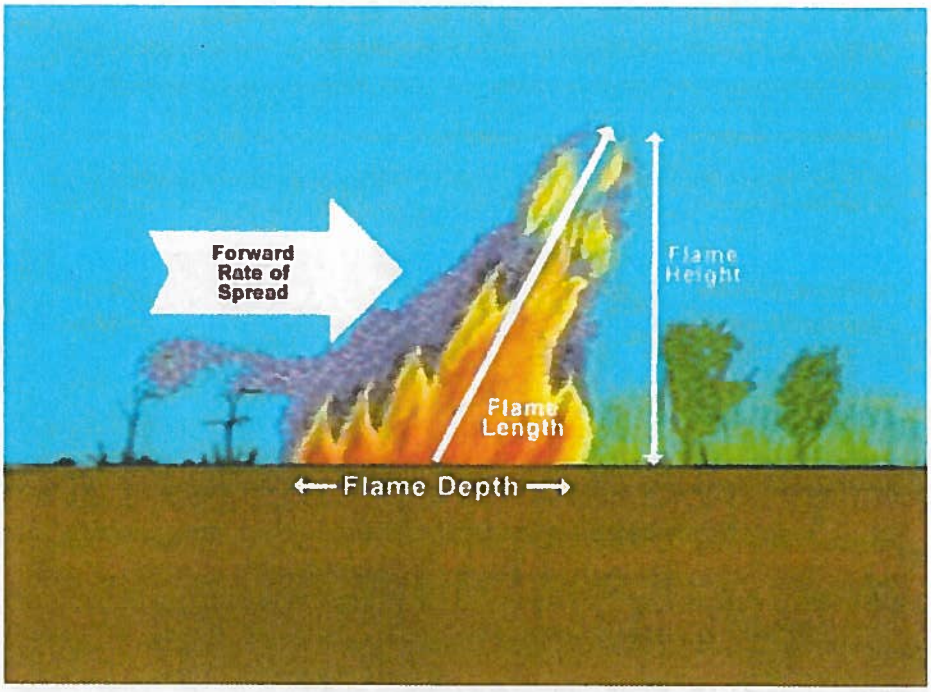


Figure 4.C: Dimension of an active fire

Flame length is the distance from the ground at the leading edge of the flame to tip of the flame. Flame length can be quite elongated due to wind and slope. Flame length is in comparison to flame height which is the average maximum vertical extension of flames at the leading edge of the fire front.

The following Fuel Model Graphs (Figures 4.D-4.H) display expected flame lengths by fuel type, as affected both by slope and wind speed. Percent slope is displayed at the bottom of the graph (x-axis), with wind speeds (in increments of 10 mph) represented as the lines inside the graph. **Activity:** to determine expected fire behavior in any given area, select the fuel model (choose a graph from Figures 4.D-4.H) select the estimated slope, and draw a vertical line until it intersects the current or expected wind speed. Draw a horizontal line to the left side of the graph (y-axis) and read the expected flame length. The Fuel Model Graphs are color coded to match Table 4.D, which organizes qualitative fire behavior and the associated fire suppression action. Fuel models are from Rocky Mountain Research Station (Scott & Burgan, 2005).

Table 4.D: Suppression Action under Varying Flame Lengths, NEDRS Adjective Ratings for Fire Behavior

Fire Behavior	Sustained Flame Length	Suppression Action
Low	0-1'	Direct[3] attack: handcrews and engines can work effectively at the fire's edge
Moderate	1-3'	Direct and/or parallel[4] attack: handcrews and engines can work effectively at or near the fire's edge
Active	3-7'	Parallel or indirect[5] attack; heavy equipment and aircraft can be effective in the support of handcrews and engines
Very Active	7-15'	Indirect attack with large burnout[6] and backfire[7] operations: heavy equipment and aircraft are marginally or no longer effective at the fire's edge. The fire is moving too quickly and/or is too intense for ground forces to keep pace. Control lines are typically established at least one ridgeline away from the fires edge.
Extreme	15'+	Indirect attack with large burnout and backfire operations: heavy equipment and aircraft are ineffective along the fire's edge. The fire is moving too quickly and/or is too intense for ground forces to keep pace. Control lines are typically established more than one ridgeline away. Burning out or backfiring of entire drainages (sub-watersheds) conducted.

[3]Any treatment applied directly to burning fuel such as wetting, smothering, or chemically quenching the fire or by physically separating the burning from unburned fuel. "One foot in the black" or "Putting the wet stuff on the red stuff".
[4]Fire containment method where crews construct fireline at some distance from the edge of the fire (e.g., 100 yards) and then burn out the fuel in the buffer as the fireline is completed.
[5]A method of suppression in which the control line is located some considerable distance away from the fire's active edge. Generally done in the case of a fast-spreading or high-intensity fire and to utilize natural or constructed firebreaks fuel breaks and favorable breaks in the topography. The intervening fuel is usually backfired; but occasionally the main fire is allowed to burn to the line, depending on conditions.
[6]Setting fire inside a control line to consume fuel between the edge of the fire and the control line.
[7]A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction or force of the fire's convection column.

The following graphs were prepared representing typical Yakima Valley mid-summer (very dry) conditions.

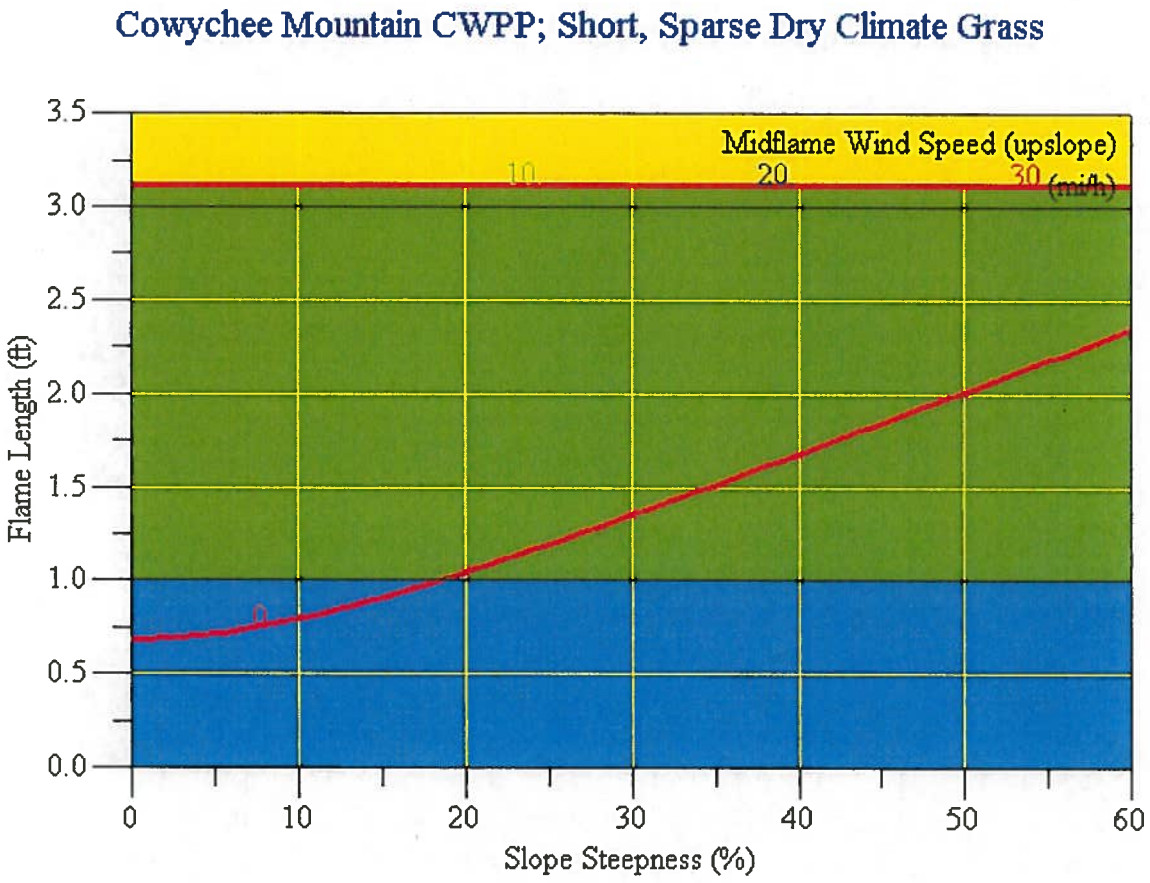


Figure 4.D: Fuel Model GR1 (primarily grass fuel type)

The primary carrier of fire in this fuel type is grass. Small amounts of fine dead fuel may be present. The grass is generally short, either naturally or by livestock grazing, and may be sparse or discontinuous (Scott & Burgan, 2005). This is the least volatile of the naturally occurring (flammable) fuel types within the Cowychee Mountain CWPP area. Even with a 30 mph wind and slope of 60%, firefighters would have little trouble containing a fire utilizing direct attack. Flame lengths are within capabilities of typical direct attack actions and fire spread tends to stay below 50 feet per minute (about ½ mile per hour), regardless of wind speed or slope. Fuel reduction/restoration treatments should focus on protecting and maintaining this ecotype as a naturally occurring fire break (Bailey, 2011).

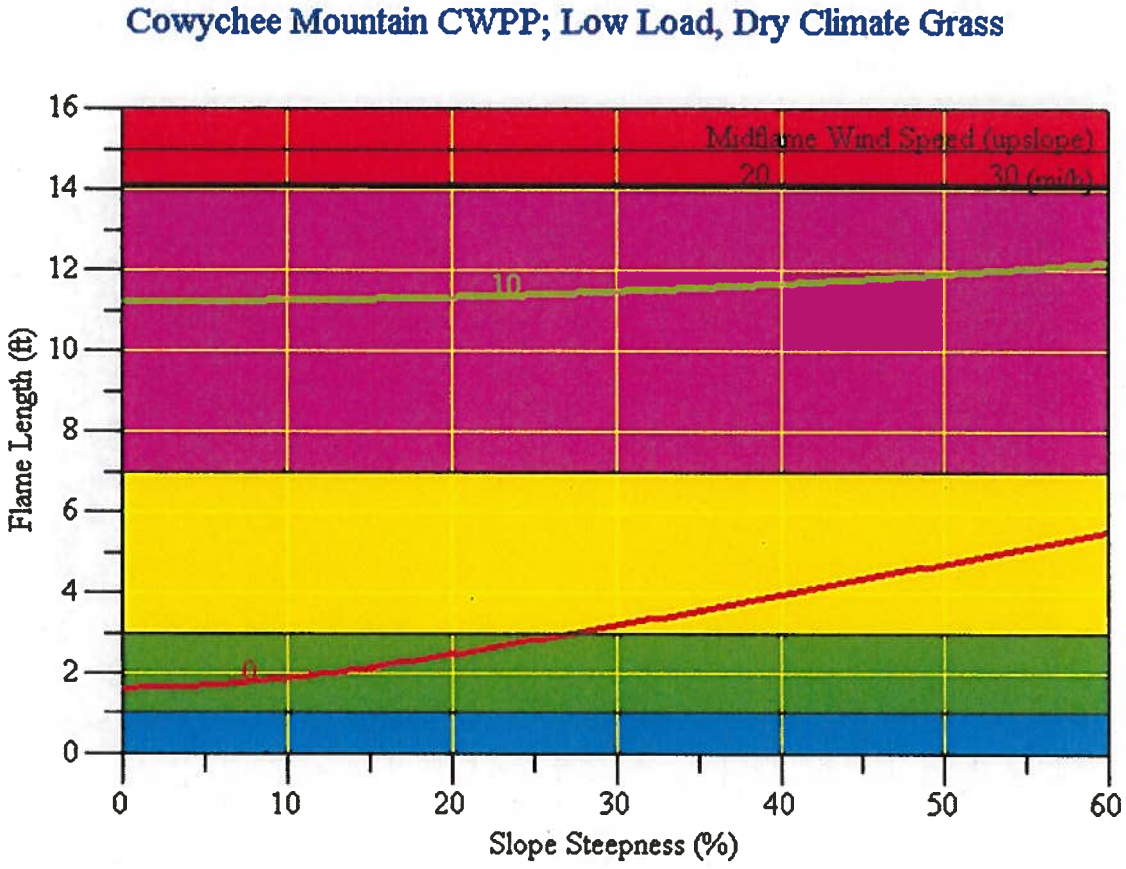


Figure 4.E: Fuel Model GR2 (primarily fuel type is grass. Shrubs, if present, do not affect fire behavior)

The primary carrier of fire in this fuel type is grass, though small amounts of fine dead fuel may be present (Scott & Burgan, 2005). Shrubs, if present, do not affect fire behavior. The patchy nature of this fuel type make it wind and/or slope dependant to achieve a larger size. In a zero-slope/zero-wind scenario a fire would have a forward rate of spread of only 3 feet per minute, growing to only 3 acres in an hour and making it well within the capabilities of local fire departments. However, this fuel type is very reactive to wind. With a 10 mph wind, fires can grow to nearly 1,000 acres in 1 hour with a forward rate of spread of 225 feet per minute (about 2½ mph). A defensible space of 50 feet or more around structures will greatly assist local fire departments in protection efforts. Fuel reduction/restoration treatments should focus on maintaining the fire behavior characteristics of this type in a current condition (Bailey, 2011).

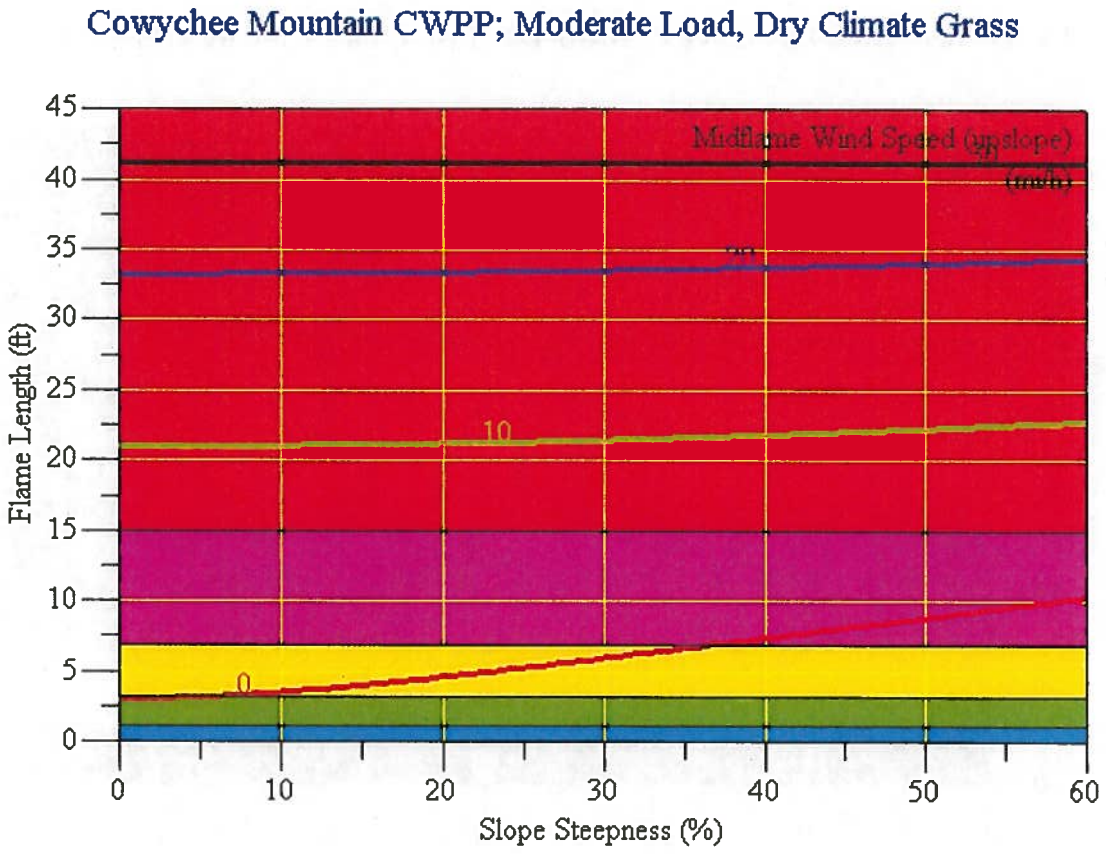


Figure 4.F: Fuel Model GR4 (primarily fuel type is continuous, dry climate grass)

The primary carrier of fire in this fuel type is continuous, dry climate grass (Scott & Burgan, 2005). This fuel type occurs naturally within the Cowychee Mountain CWPP area in small patches, but also represents past burned areas that are now dominated by cheatgrass. This fuel model may over-represent flame lengths for a nearly pure cheatgrass stand, but does a good job representing the rate of spread. Flame length and rate of spread are well represented by stands that are a mix of native bunch grasses and cheatgrass. Fires occurring in this fuel type can quickly exceed 10,000 acres with light to moderate wind or slope. In a more practical point of view, a mid-summer fire will probably exceed the size of the stand before local fire crews are able to respond. A defensible space of more than 120 feet may be desirable for structures bordering this fuel type. Fuel reduction treatments should focus on restoring stands by reducing or eliminating cheatgrass and promoting native bunch grasses and shrubs (Bailey, 2011).

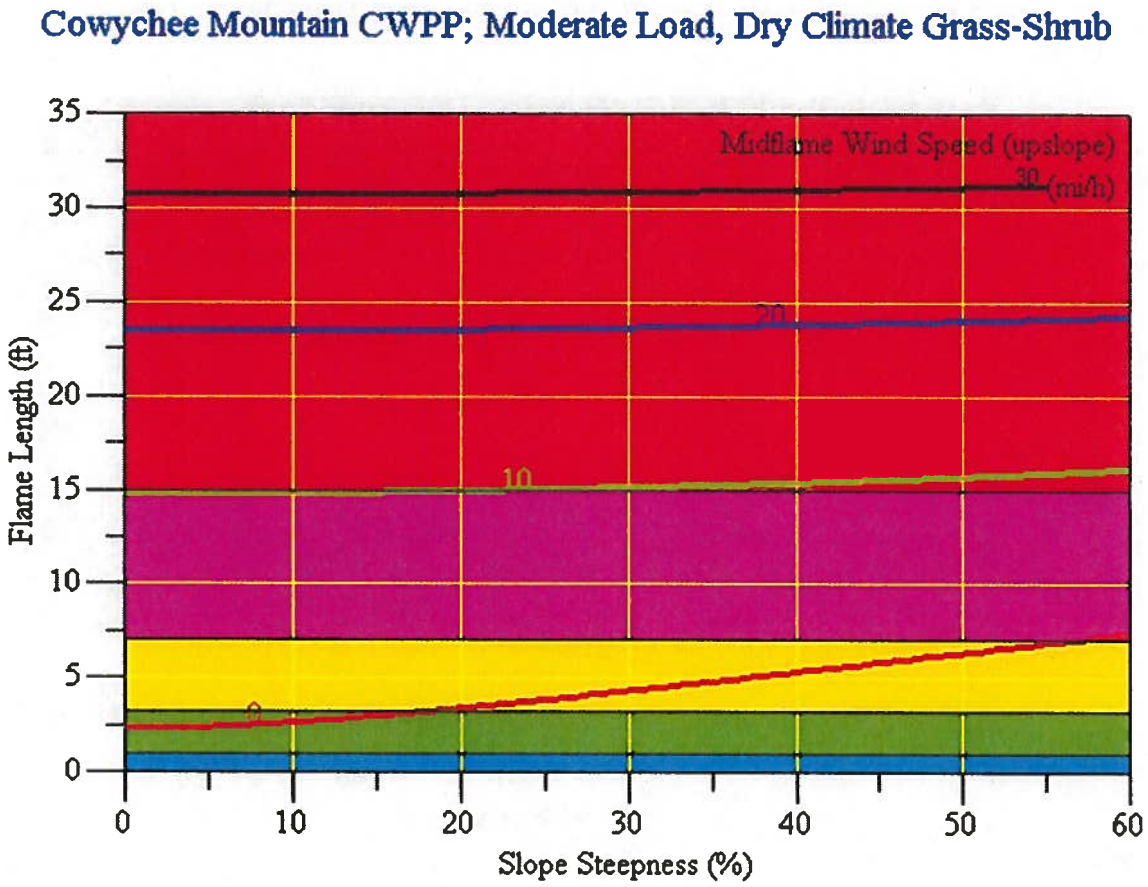


Figure 4.G: Fuel Model GS2 (primarily fuel type is grass and shrubs)

The primary carrier of fire in this fuel type is grass and shrubs combined. Shrubs are 1 to 3 feet high, grass load is moderate. Spread rate is high; flame length is moderate (Scott & Burgan, 2005). With a wind of 5 mph and/or moderately steep slopes, fires in this fuel type can quickly exceed the capabilities of handcrews and engines. Structure protection can be successful if home owners have established a defensible space of twenty feet or more. A wind of 10 mph or more, even on flat ground, can push a fire in this fuel type to exceed fire protection capabilities unless a defensible space of 100 feet or more has been established. Fires can spread rapidly and exceed 700 acres on a flat slope with a 10 mph wind. The fire front can be expected to move at approximately 180 feet per minute (about 2 mph). A 20 mph wind can push fires to exceed 2,500 acres in an hour at forward rate of spread of nearly 500 feet per minute (about 6 mph). Fires growing at this rate can quickly exceed the capabilities of local fire departments to protect all homes and structures being threatened.

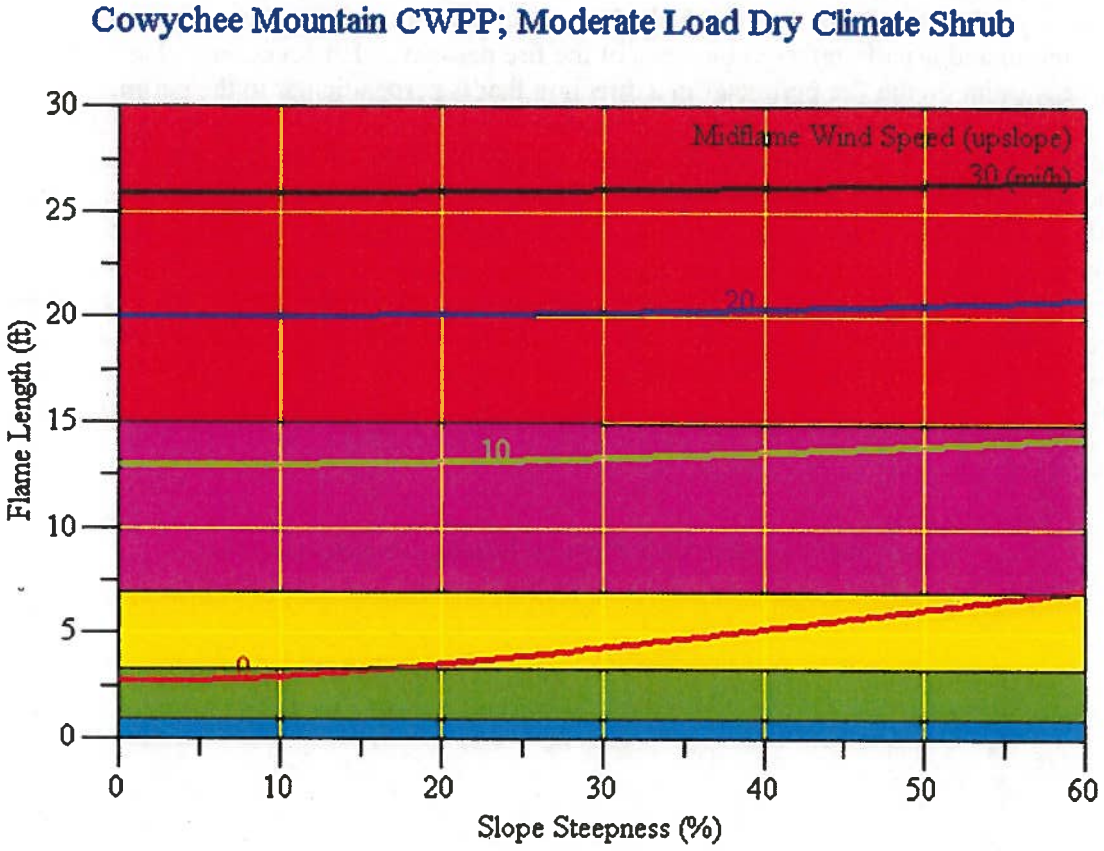


Figure 4.H: Fuel Model SH2 (primarily fuel type is woody shrubs and shrub litter)

The primary carrier of fire in this fuel type is woody shrubs and shrub litter. This fuel type has a moderate fuel load, with bunch grasses between shrubs (Scott & Burgan, 2005). This is the most volatile of the unaltered fuel types within the Cowychee Mountain CWPP area. It is both wind and slope reactive, and can move quickly into the Very Active and Extreme fire behavior categories. Fire can move moderately fast, with high flame lengths and intensity. With no wind or slope, fires can exceed 100 acres in an hour. A 10 mph wind can push a fire to exceed 3,000 acres in an hour. Flame lengths of 13 feet or more could be expected. These flame lengths will most often require an indirect attack, with holding (suppression) actions taking place from roads or ridgetops. A defensible space of 100 feet or more will assist local fire departments in structure protection. While a problematic fuel type as far as structure protection is concerned, it is also one of the most important and endangered ecosystems within the landscape. Fuel reduction/restoration treatments should focus on isolating this fuel type to provide protection to adjacent homeowners and also to protect the ecotype from wildfire (Bailey, 2011).

The following set of graphs (Figures 4.I-4.M) follow the flame length data graphs that display fire rate of spread for the same fuel types. Rate of spread is the horizontal distance that the flame zone moves per unit of time (feet per minute) and usually refers to the head of the fire perimeter. However, rate of spread can be measured from any point on the fire perimeter in a direction that is perpendicular to the perimeter. Because rate of spread can vary significantly over the area of the fire, it is generally taken to be an average value over some given period of time. The fastest rate of spread is along the forward moving perimeter located at the head of the fire. The slowest rate of spread will be found on the windward (back) side of the perimeter. The rate of spread along the flanks will be intermediate between the head and backing rates of spread. Rates of spread can easily be estimated by timing the passage of the flaming front between two landmarks of known distance apart. As with flame length, the modeling for rate of spread represents expected fire behavior over a constant fuel bed, slope, and weather conditions. In the wildlands, fire behavior can be dramatically affected by changes in the size of common vegetation patch, amount of fuel, presence of volatile products, moisture level (based on vegetation type), proportion of dead material, and distribution or continuity of fuel (Bailey, 2011).

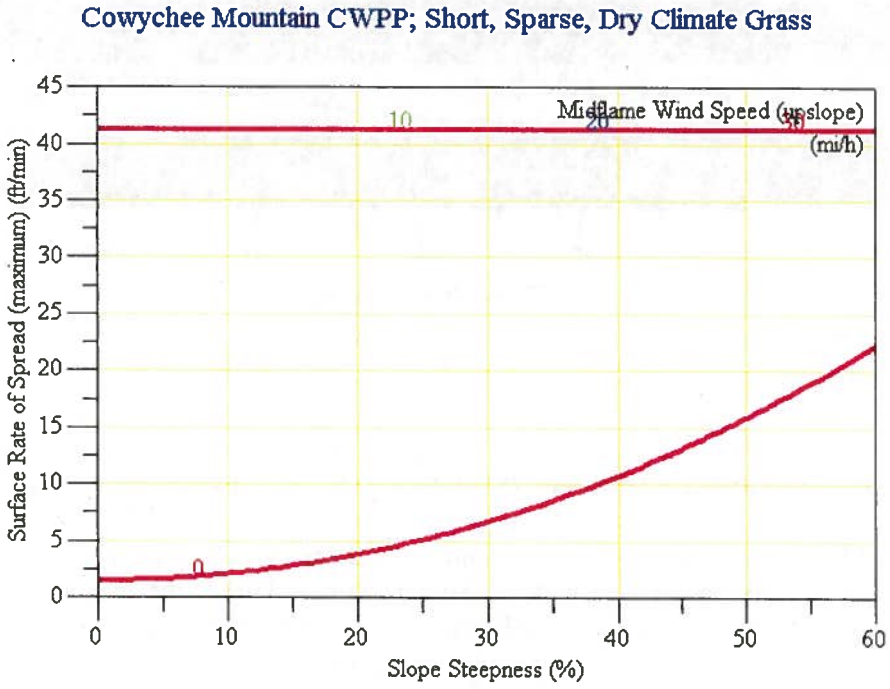


Figure 4.I: Fuel Model GR1, Fire Rate of Spread

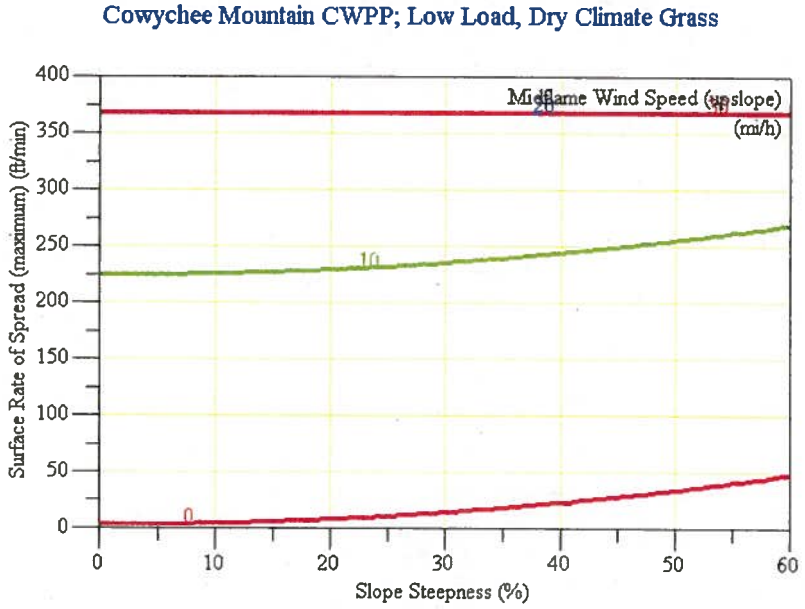


Figure 4.J: Fuel Model GR2, Fire Rate of Spread

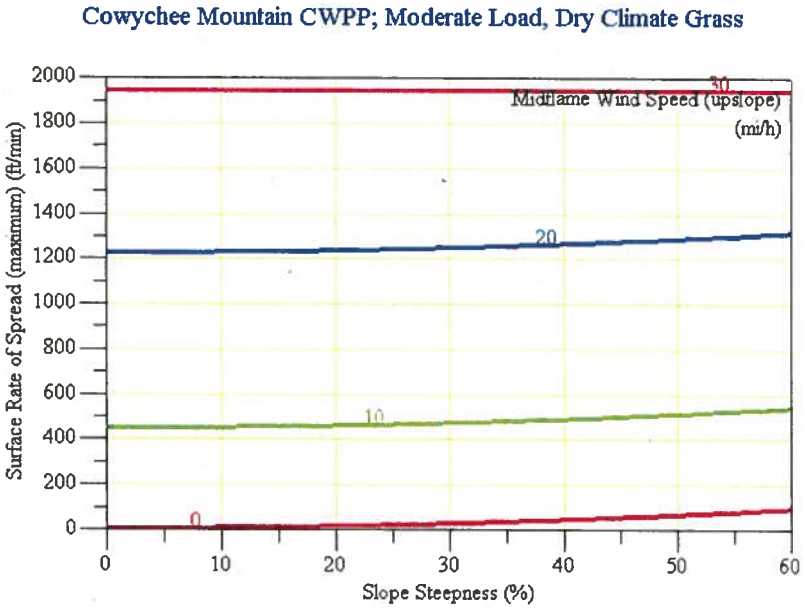


Figure 4.K: Fuel Model GR4, Fire Rate of Spread

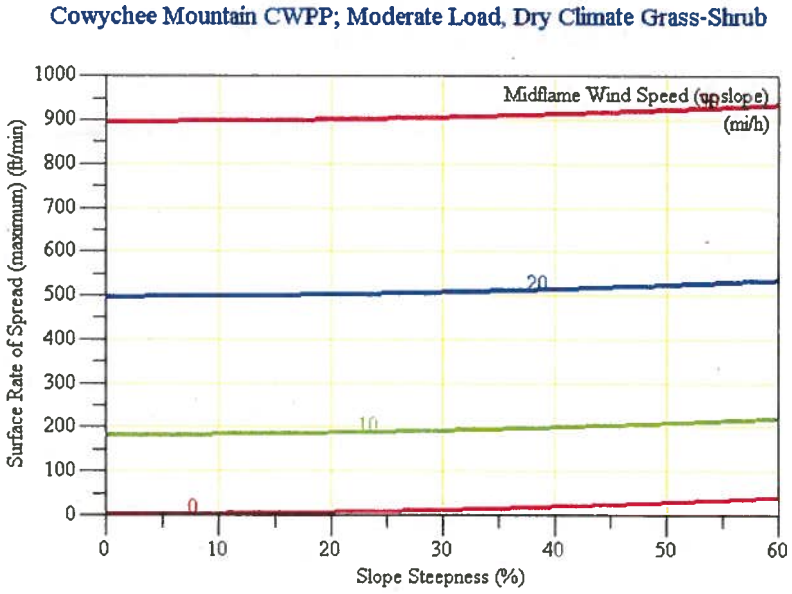


Figure 4.L: Fuel Model GS2, Fire Rate of Spread

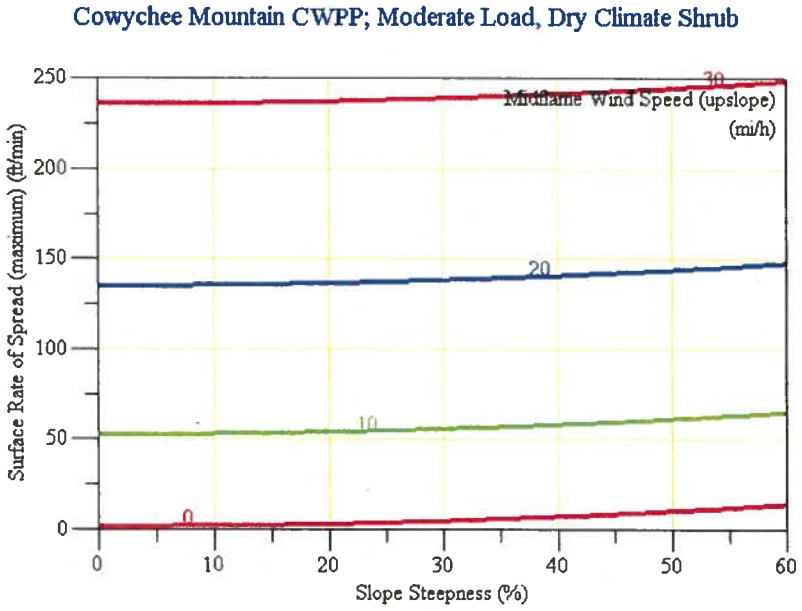


Figure 4.M: Fuel Model SH2, Fire Rate of Spread

Rate of spread can be applied to estimate escape times in the event of an emergency evacuation. The average walking pace for men on flat ground is about 3½ mph, and about 3 mph for women. Walking pace decreases rapidly as slope increases or as fitness levels decrease. For many, a pace of less than 1 mph may be a difficult or impossible to maintain on a slope. Rate of spread must also be considered in view of fire department response times. In the outlying areas of a fire district, even a relatively quick response time of approximately six minutes may allow a fire to gain a half mile or more of forward progress in certain fuel types.

Slope steepness affects fire behavior in a similar way as wind by affecting the flame angle. As slopes increase, flames are closer to fuels upslope from the flaming front. This preheats fuel, increases its combustibility and rate of spread. See Figure 4.N.

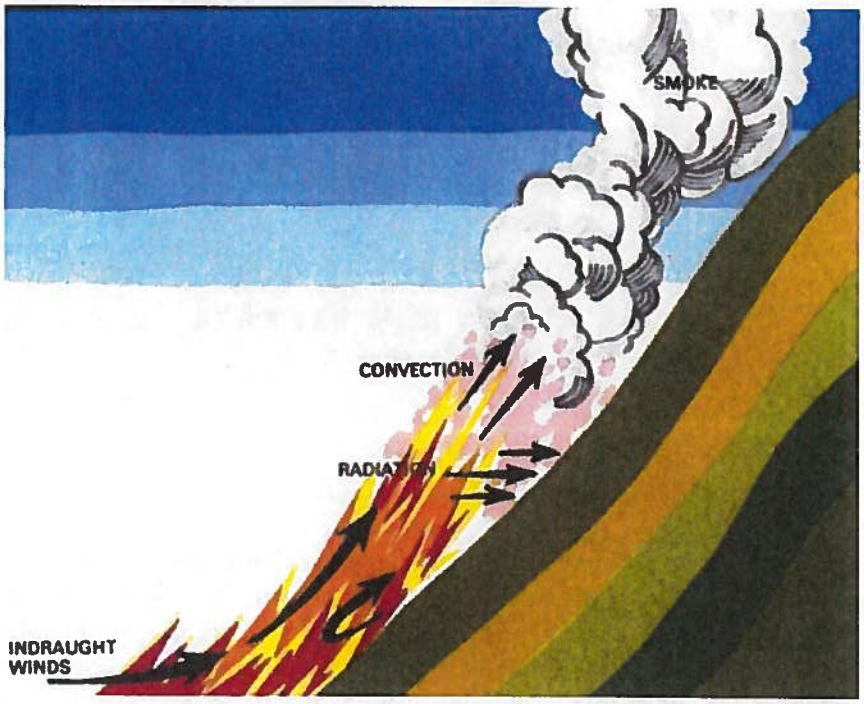


Figure 4.N: Fire movement with wind and slope factors

Aspect is the direction a slope is facing, which affects fire behavior due to differences in wind and solar radiation. Solar radiation, in turn, affects relative humidity and fuel types (see Figure 4.O on page 24). Ignition and spread are most favorable on south and southwest aspects because they receive more sunlight and have higher fuel temperatures and lower relative humidity than on north and east-facing slopes. Daytime upslope winds are also stronger on south and west facing slopes.

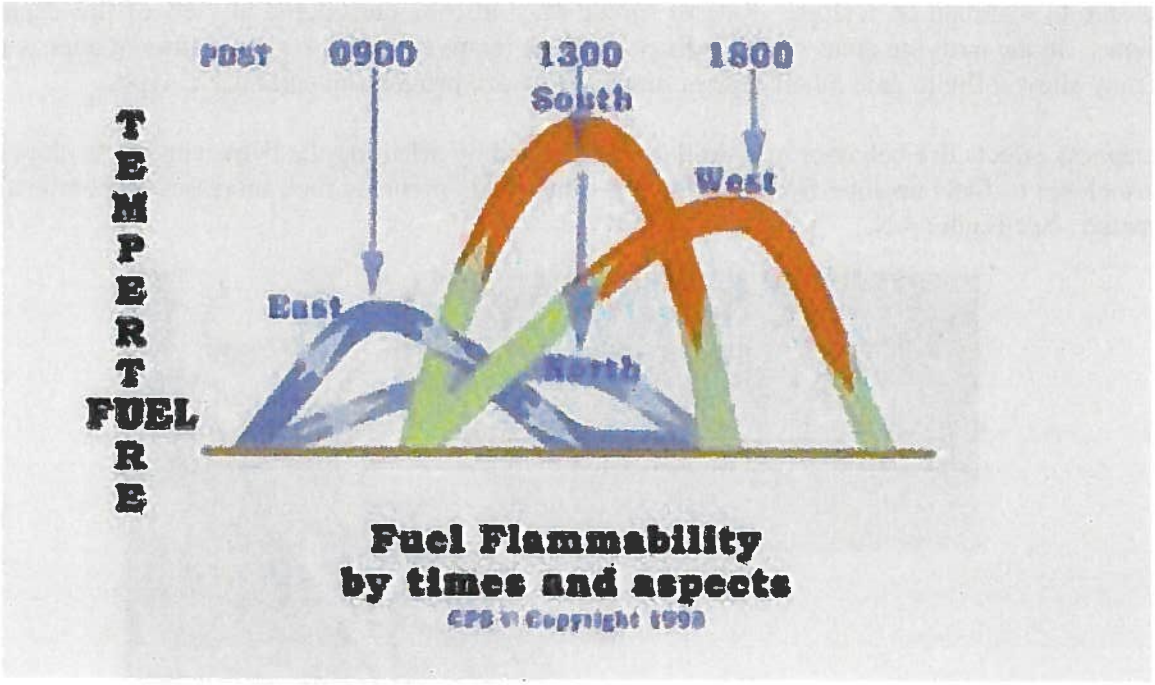
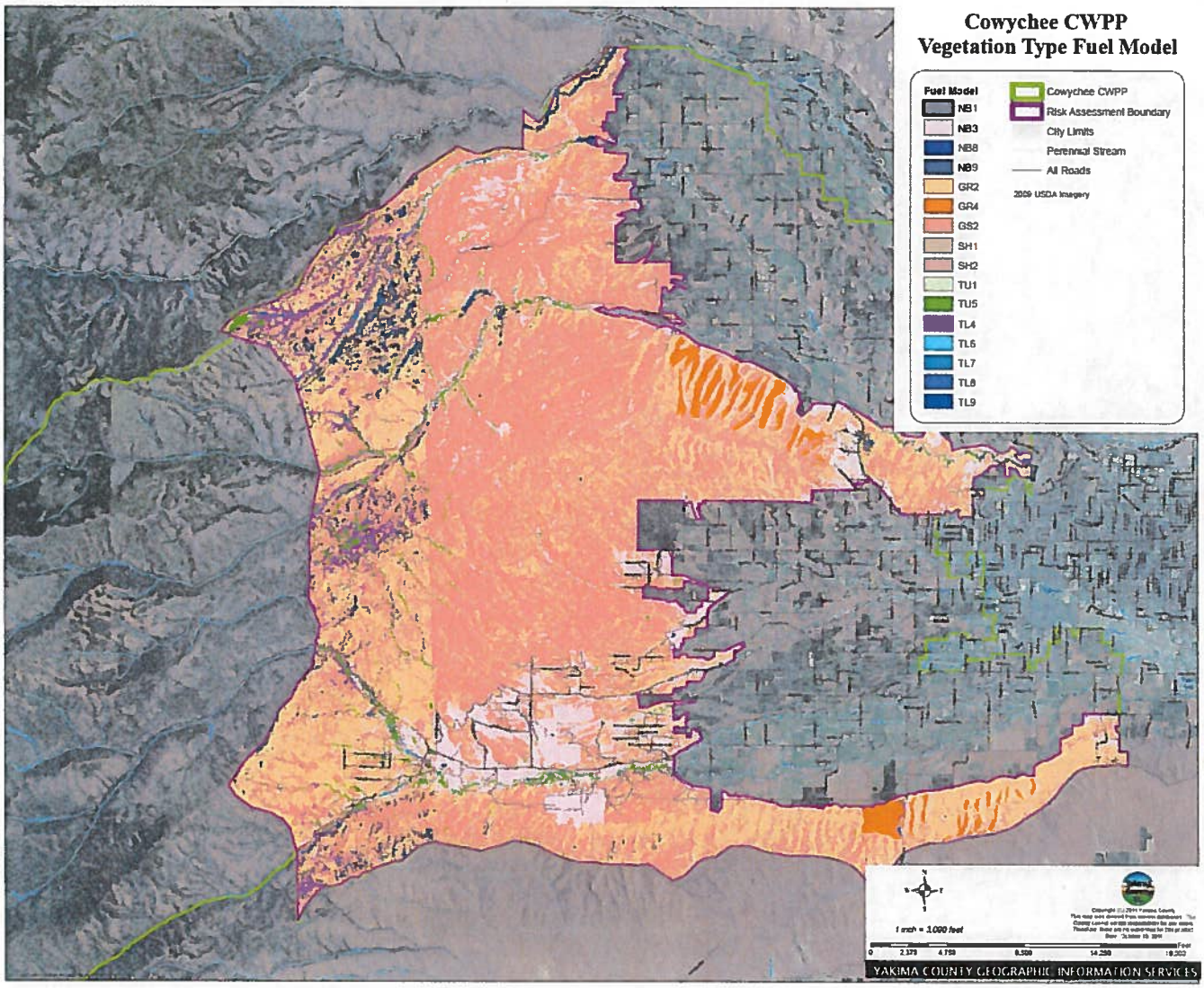


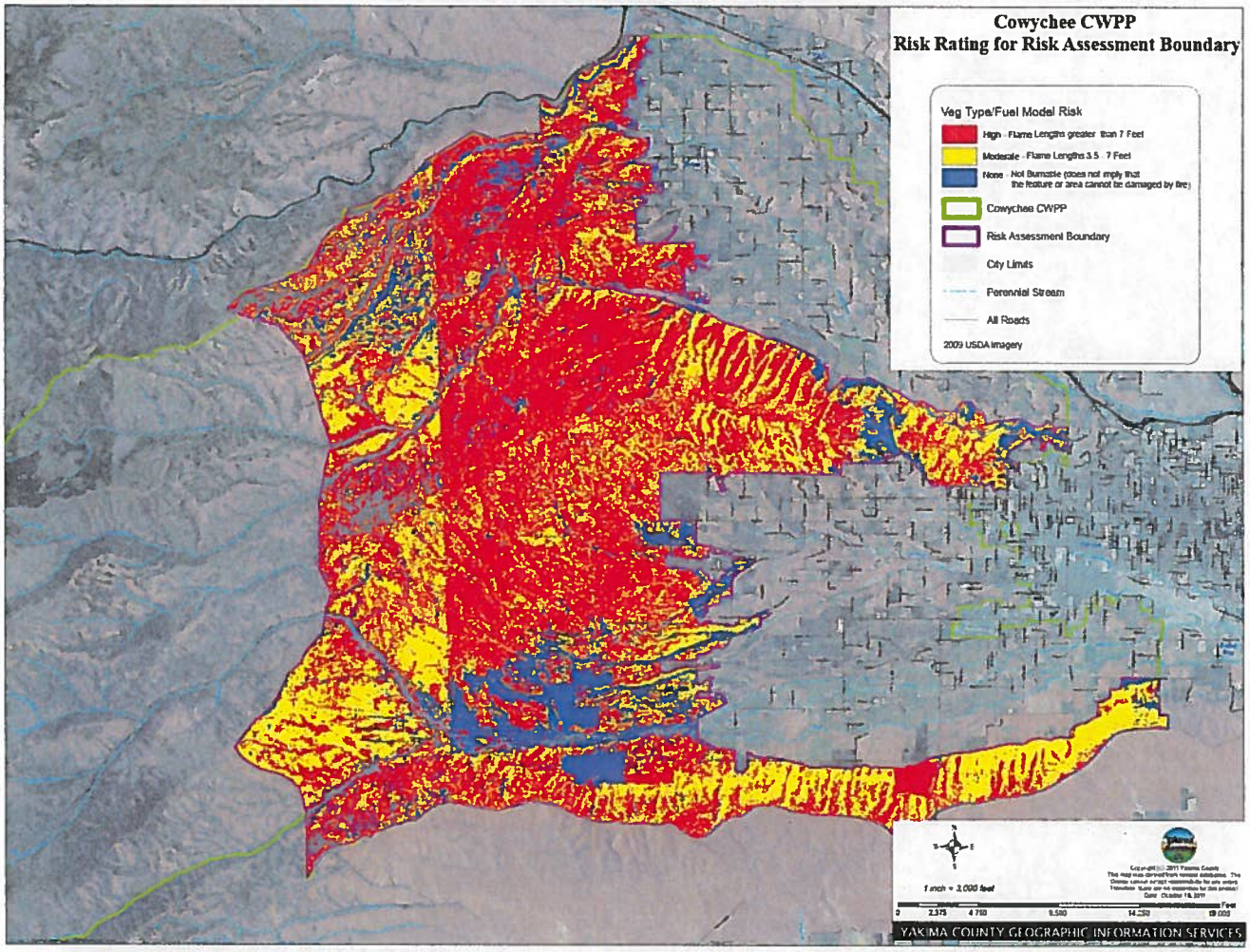
Figure 4.O: Fuel flammability in relation to time, temperature and aspect

With these few factors, an effective risk assessment can be made that applies both to firefighting and to individual home or community risk. For example, a point (be it a home or a landscape feature) would be at the highest risk if it were on a steep slope, south aspect, with a volatile fuel type (e.g., Fuel Model SH2) surrounding it. The mitigation to this risk could be to implement fuel reduction projects, create a wide buffer of defensible space and implement other defensible treatments around structures, and avoiding these areas when considering development. A tactical response to this situation would be dictated by safety and available personnel and equipment. Possible responses could include direct suppression actions, burning out or backfiring, or choosing not to take suppression actions at this location if it is determined to be not a defendable position.

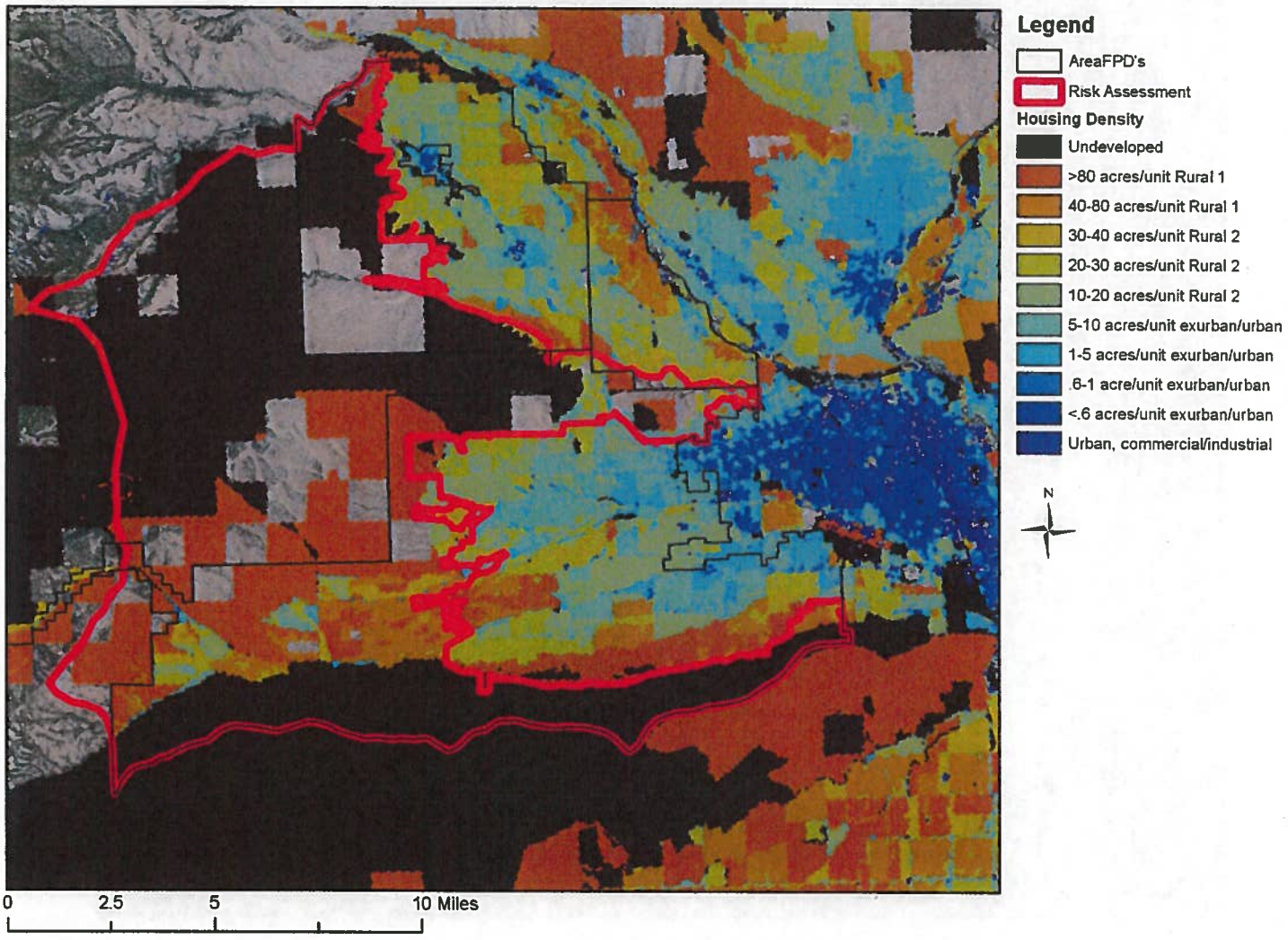
4.7 Risk Assessment Maps



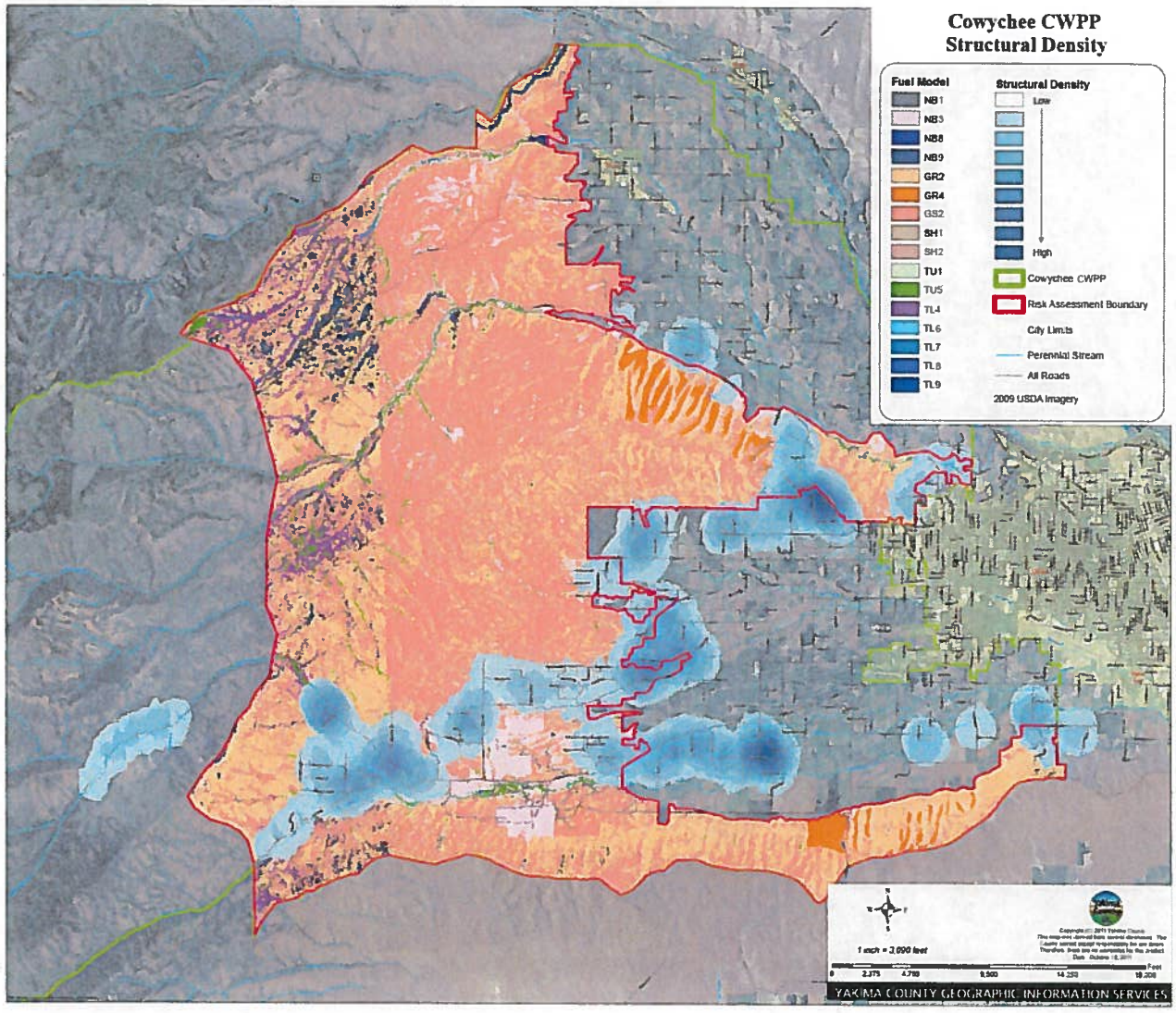
Map 4.A: Vegetation Type Fuel Models. These fuel models represent the first step in the risk assessment protocol-they represent where the different fuels are located.



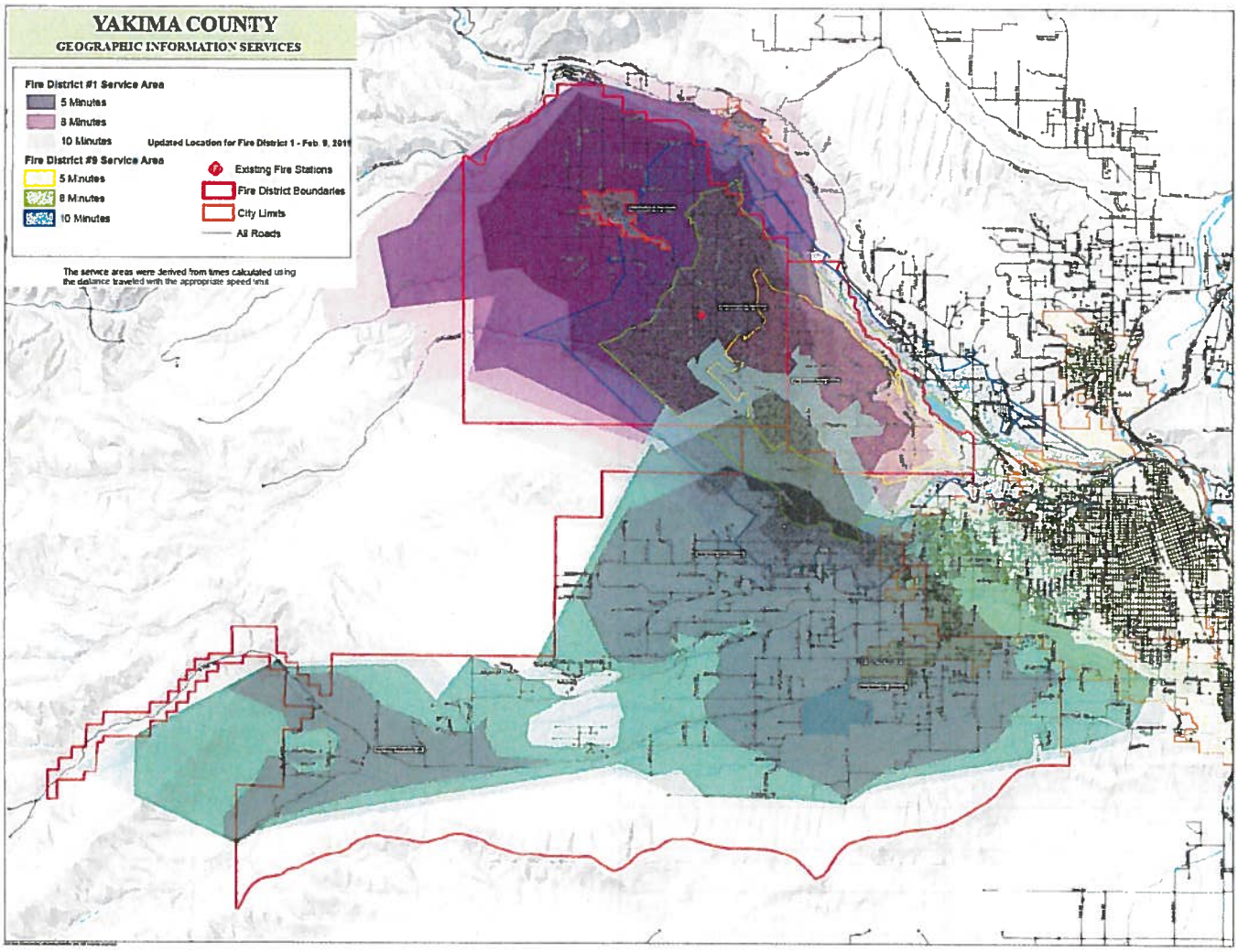
Map 4.B: Risk Rating. Using the Risk Rating Model shown in Table 4.C, and the fuels data shown in Map 4.A, combining slope and fuel type results in this map of low, medium and high risk.



Map 4.C: Structural Density distributed across the planning area. This map shows how structures throughout the planning area might be at risk for wildland fire. In areas of very low density, we have opportunities to abate fuel loads as a prevention to large fires occurring in the more populated areas. Map 4.D conversely shows the population concentration on the eastern and southern boundaries of the WUI that are at risk for fires.



Map 4.D-Structural Density near WUI. The structural density map conveys population concentrations at the wildland interface. The prevailing westerly winds for this region demonstrate the vulnerability of the population clusters from fires that are not prevented through restoration, or contained within the wildland core area.



Map 4.E: Response Times. Fire District service areas within the CWPP assessment area are shown with their predicted response times.

5. Risk Evaluation

5.1 Fire History

Data on fire occurrence and intensity on private, state and federal lands is documented by several agencies, and can be difficult to compile. It can be assumed that ignitions on other ownership on similar elevations, aspects, and vegetative types would continue to follow this pattern. Fire history in Yakima County is seen below in Table 5.A and Table 5.B.

Table 5.A: Five year Fire History in Overall Cowychee CWPP Boundary

Fire Cause Classification	# of Fires	% by cause
Lightning	4	19.9
Equipment	1	0.3
Smoking	0	0
Recreation-Campfire	12	39.7
Recreation- Hunter	4	12.9
Recreation- Misc.	3	9.7
Debris	2	0.6
Railroad	0	0
Human caused or Arson	1	0.3
Children	0	0
Miscellaneous	5	16.3
Fireworks	1	0.3
Total Fires	31	
False Alarms	9	
Total Responses	40	

*Fire History data is from DNR Fire Data– State and federal agencies may not have access to data from other responders.

Table 5.B: Five year History within focal area of the Cowychee CWPP boundary (with data from DNR and West Valley Fire District)

Fire Cause Classification	# of Fires	% by cause
Lightning	4	6.25
Equipment	4	6.25
Smoking	0	0
Recreation-Campfire	0	0
Recreation- Hunter	0	0
Recreation- Misc.	3	4.68
Debris	1	1.56
Railroad	0	0
Human caused or Arson	8	12.5
Children	0	0
Miscellaneous	30	46.80
Fireworks	14	21.18
Total Fires	64	
False Alarms	4	
Total DNR Responses	8	

*Fire History data is from DNR Fire Data– State and federal agencies may not have access to data from other responders.

5.2 Protection Capabilities

Fire protection within the CWPP boundary is supplied by numerous agencies, each with its own charge, capabilities, and limitations. Cooperative agreements exist that allow all agencies to work together to best protect lives, property, and natural resources. Local county, state, and federal agencies have forged positive working relations.

Yakima County Fire Protection District 12 (West Valley), District 1 (Highland) and District 9 (Naches Heights) are the primary first response within the CWPP boundary. The emphasis of these departments is to take action for fire suppression, rescue, and emergency medical and hazardous materials emergencies, and to provide fire prevention and education programs for the citizens in the response area. All three Fire Departments respond within their districts and outside of district by request. The ability to respond to large wildland fires is limited by equipment and personnel.

Figure 5.A: West Valley fire District Engine

The DNR and USFS are the primary wildland firefighting agencies west of the CWPP boundary. Through cooperative agreements, either agency is able to mobilize large amounts of personnel, equipment, aircraft, and logistical support. However, the actual number of firefighting resources stationed in the locale is small in relation to the area covered and the CWPP boundary constitutes only a small portion of the district they protect. Delays in the arrival of suppression forces of several hours to several days are likely, depending on the availability of these resources. These agencies are not equipped or trained to fight structure fires and do not provide protection of this nature.

5.3 Evacuation, Escape Routes, and Safety Zones

Evacuation is an organized, phased, and supervised withdrawal, dispersal, or removal of civilians from dangerous or potentially dangerous areas, and their reception and care in safe areas. An escape route is a preplanned and understood route to move to a safety zone or other low-risk area. A safety zone is an area cleared of flammable materials used for escape in the event the (fire) line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. Safety zones may also be constructed as integral parts of fuelbreaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity (National Wildfire Coordination Group).

Cowychee Mountain

It is recognized that even if fuels were to be treated around all communities and all residences conformed to defensible standards, evacuations may be necessary in the event of a nearby wildland fire. Safety zones large enough to accommodate an entire community are rare, and it is not desirable to evacuate citizens to a safety zone. However, desired fuel treatments are not completed and the possibility exists that local residents may need to utilize escape routes and safety zones if firefighting agencies have not had time to respond or react to a new fire start near a community. Safety zones can be uncomfortable, unhealthy (smoke), and frightening until a fire has passed by. Residents may find themselves in a safety zone for several hours. Whenever possible, citizens should take refuge in an evacuation center as directed by law enforcement or firefighting officials. Should the need arise; the community has identified the following sites for evacuation or safety zones.

Table 5.C: Evacuation Centers by Fire District

Evacuation Centers		
Fire District #12 West Valley	**Fire District #1 Highland**	**Fire Dist #9 Naches Heights**
West Valley High School	Highland High School	Naches Valley Elementary
West Valley Jr. High	Marcus Whitman Elementary	Naches Valley Elementary
West Valley Middle School	Tieton Middle School	Naches Valley Middle School
Summitview Elementary	St Peter Catholic Church	Naches Presbyterian Church
Wide Hollow Elementary	Highland United Methodist Church	
West Valley Missionary Church	Tieton Presbyterian Church	

Evacuation Routes

The Interstate and state routes should be considered first as evacuation routes in Yakima County; however, numerous county roads should also be considered based on the location of the incident.

Federal routes include:

I-82 going north and south in the north-central part of the county.

Hwy 97 going north and south in the north part of the county.

Hwy 12 going east and west in the north-west part of the county

State routes include:

SR 821 going north and south in the north part of the county.

SR 410 east and west in the northwest part of the county.

SR 24 going east and west in the north-central part of the county.

SR 241going north in the north-central part of the county.

SR 22 going east and west in the south-central part of the county.

Table 5.D: Primary Evacuation Routes by Fire District

Primary Evacuation Routes within the Fire Districts		
Fire District #12 West Valley	**Fire District #1 Highland**	**Fire Dist #9 Naches Heights**
Ahtanum Road	Cowiche Mill Road	Naches Heights Road
North Fork Ahtanum Road	Hatton Road	South Naches Road
South Fork Ahtanum Road	French Road	Naches Tieton Road
Tieton Drive	South Fork Cowiche Creek Road	Young Grade Road
Cottonwood Canyon Road	Summitview Road	
Summitview Road	Naches Tieton Road	

Table 5.E: Command Post and Staging Areas by Fire District

Command Post / Staging Areas		
Fire District #12 West Valley	**Fire District #1 Highland**	**Fire Dist #9 Naches Heights**
Station #1 100000 Zier Rd	Cowiche Fire Station	Naches Heights Fire Station
Station #2 9102 Ahtanum Rd	Tieton Fire Station	
Station #3 14901 Tieton Dr.		
Station #4 11 North Fork Dr		

5.4 Water Supplies

Water for firefighting is limited within the CWPP boundary in comparison to many areas throughout the western United States, or even in eastern Washington. The area lacks major rivers and lakes that are commonly used as water sources for drafting and for aircraft. The Fire Districts have inventoried and mapped water sources on lands under their jurisdiction. Fire Districts also benefit from the development of ponds and fire hydrant systems in and along the irrigated lands.

5.5 Structural Vulnerability

Washington Department of Natural Resources data suggests that homes within the CWPP boundary are at a Moderate to High risk of loss due to catastrophic wildfire, indicated by the orange (moderate) and red (high) coloring. See Risk rating Map 4.B.

Table 5.F: Key Contacts to Use in Emergency Situations

Organization	Contact	Phone Number
Yakima County Fire District #12	Chief Dave Leitch	911
Yakima County Fire District #1	Chief Sam Glanzer	911
Yakima County Fire District #9	Chief Chris O'Dell	911
Yakima County Fire Marshal	Jakki MacLean	(509) 574-2360
Yakima County Sheriff	Sheriff Ken Irwin	911 (509) 574-2500
Washington Department of Natural Resources	Rex Reed	(509) 925 - 8510
Naches Ranger District (USFS)	District Ranger - Irene Davidson FMO – Mike Starkovich AFMO – Julius Sims	(509) 653-1401
Central WA Interagency Comm. Center (CWICC)	Mark Hays	(509) 884-3473 1-800-826-3383

6. Current Actions

6.1 Existing Procedures

The Core Group members have already organized themselves for the purpose of producing this CWPP and have identified the need to continue the work by hosting defensible space and home protection workshops and by forming a Community Emergency Response Team. Many landowners have become more aware of the risk coming from wildland fires based on large fires within the CWPP planning area. The surrounding Cowiche Mountain landowners have worked with federal and state agencies serving on the Core Group for post-fire assistance grants, and the Cowiche Canyon Conservancy began working on its own lands and with adjacent landowners to initiate restoration activities. The Fire Marshall's office has committed to launching Firewise and other defensible space programs in the area, and the Core Group plans on seeking additional resources through National Fire Plan Grants and Western States Grants that can provide funding for fuels reduction, and prevention and education programs.

Figure 6.A: Core Group meeting

6.2 Project Development

Project proposals as shown in Part 7 were developed with input from specialists with the BLM, USFS, WDNR, WDFW, the Yakama Nation, and the West Valley Fire District. The Core Group developed the full project proposal list with input from the public at an Open House held at the West Valley Fire District in October 2011.

6.3 Coordination with Federal and State Agencies

The Naches Ranger District of the Okanogan and Wenatchee National Forest, the Wenatchee Field Office of the Bureau of Land Management and the Yakama Nation strive to keep close relations with all local fire departments, the Yakima County Fire Protection Bureau (Fire Marshal's Office), Yakima Sheriff's Office, WDNR, WDFW, and local citizens. Employees of the Naches Ranger District, The BLM and Yakama Nation fuels programs were involved in preparing this plan. Shrub-steppe ecology was used as the foundation for developing projects associated with fuels reduction.

7. Mitigation Action Plan

The projects developed by the Core Group were organized under four major themes that address the goals for this CWPP. Each theme has a select set of associated projects designed to mitigate risk. This complete suite of theme-based projects is designed to be implemented concurrently, thus a prioritization scheme was not deemed relevant to the Mitigation Action Plan.

Table 7.A: Theme 1– Fuels Reduction

Project Number	Name of Project	Status	Implementers	Funding Opportunities
FR1	Restore resilient shrub-steppe by reducing non-native fuels and re-establishing native plant succession (Move from FRCC III to I)	Intermittent	Public and private Homeowners	National Fire Plan (NFP) Grant, Western States Grant, Rocky Mountain Elk Foundation PAC grants , BIA adjacent owner assistance funds, NRCS programs: EQIP and WHIP
FR2	Initiate a "Fuels Breaks" project to evaluate best sites for controlling fire. Design planting mix for fire lines that are self maintaining and don't create a new fuel source.			NFP, Western States

Project Number	Name of Project	Status	Implementers	Funding Opportunities
FR3	Establish fire breaks around higher density WUI			DOT Mitigation funding?
FR4	Identify highest value shrub-steppe sites for active protection			NFP, Western States
FR5	Re-characterize abandoned orchards as Timber Understory (TU) or Timber/letter			

Figure 7.A: Snow Mt. Ranch ravine after 2010 Cowiche Mill Road fire

Table 7.B: Theme 2– Education

Project Number	Name of Project	Status	Implementers	Funding Opportunities
Ed1	Firewise: Provide three new workshops in higher density WUI in 2012-13	Intermittent		National Fire Plan (NFP) Grant, Western States Grant, Rocky Mountain Elk Foundation PAC grants
Ed 2	Other existing defensible space programs (identify—Jakki/ Paul?)			NFP, Western States
Ed3	Community signage plan—road signs and other emergency management efficiency measures			
Ed4	Coordination program for pre-and post fire response, perhaps led by a standing CWPP citizens steering committee			

Table 7.C: Theme 3– Firefighting Capacity

Project Number	Name of Project	Status	Implementers	Funding Opportunities
FC1	Establish a "community emergency response team (CERT)	Intermittent		National Fire Plan (NFP) Grant, Western States Grant, Rocky Mountain Elk Foundation PAC grants
FC 2	Work with Department of Emergency Management to coordinate information about evacuation centers and routes			NFP, Western States
FC3	Seek funding for training and equipment			FEMA, Assistance to Rural Communities
FC4	Integrate new shrub-steppe training modules for annual renewal courses			
FC5	Establish a new satellite station in high risk remote location			ARRA, Homeland Security

Table 7.D: Theme 4– Policy and Regulatory Framework

Project Number	Name of Project	Status	Implementers	Funding Opportunities
PR1	Coordinate a "no man's land" policy group	Intermittent		National Fire Plan (NFP) Grant, Western States Grant, Rocky Mountain Elk Foundation PAC grants
PR 2	Do a specific analysis of ingress/ egress issues in the CWPP planning area for connection to county zoning, planning and permitting.			NFP, Western States
PR3	Create a map of potential water sources in areas currently lacking that information			

Acronym Glossary

AFMO- Assistant Fire Management Officer
ARRA- American Recovery and Reinvestment Act of 2009
BIA- Bureau of Indian Affairs
BLM- United States Bureau of Land Management
CCC- Cowichee Canyon Conservancy
CERT- Community Emergency Response Team
CWPP- Community Wildfire Protection Plan
FEMA- Federal Emergency Management Agency
FLN- Fire Learning Network
FMO- Fire Management Officer
FRCC- Fire Regime Condition Class
GIS- Geographic Information Systems
GR1- The primary carrier of fire in this fuel type is grass
GR2- The primary carrier of fire is grass. Shrubs, if present, do not affect fire behavior
GR4- The primary carrier of fire is continuous, dry climate grass
GS2- The primary carrier of fire in this fuel type is grass and shrubs combined
HFRA- Health Forest Restoration Act of 2003
NEDRS- National Environmental Data Referral
NEPA- National Environmental Policy Act
NFP- National Fire Plan
NWCD- North Yakima Conservation District
PAC- Provincial Advisory Committee
SEPA- State Environmental Policy Act
SH2- The primary carrier of fire in this fuel type is woody shrubs and shrub litter
TU- Timber Understory
USDA- United States Department of Agriculture
USFS- United States Forest Service
USFWS– United States Department of Fish and Wildlife
WDFW- Washington State Department of Fish and Wildlife
WDNR- Washington State Department of Natural Resources
WUI- Wildland Urban Interface

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