FINAL – July 11, 2007

The Klamath County Community Wildfire Protection Plan, or KC CWPP, has been completed. The final copy will be officially signed by the Klamath County Commissioners at their July 24, 2007 meeting.

This section of text is to supplement the compact disc (cd) which contains the KC CWPP in a format called GEOBOOK. It is highly recommended that the reader use the enclosed cd to install the GEOBOOK version of the KC CWPP. One of the reasons to install the GEOBOOK software is to access all of the maps. In addition, over a thousand pages of reference text, documentation and dozens of websites are available in the GEOBBOK format. This supporting information would make a printed copy too cumbersome and expensive to be included. The cd can be used to install the GEOBOOK KC CWPP on numerous computers.

Starting with the Table of Contents page, this document is the printed text version of the KC CWPP. This version has been printed and made available for people that don't have access to a personal computer for installing or viewing the GEOBOOK format of the KC CWPP.

The next twelve pages include information about the GEOBOOK software, how to install it, how to utilize the software and some background information about CWPP documents and the legislation that is the basis for developing such plans.

CWPP GEOBOOK Introduction

Welcome to the Klamath County – Community Wildfire Protection Plan GEOBOOK! – An intuitive GIS (Geographic Information System) application for reviewing the findings and recommendations of the Klamath County communities' wildfire hazard and risk assessment in the form of a Community Wildfire Protection Plan (CWPP).

Hyperlinks are provided in all text pages of the book to support easy navigation to other pages. You can click on any blue link text to go to that specific page of the book, a supporting document, or to a website if your computer is connected to the internet.

What is the Community Wildfire Protection Plan GEOBOOK?

This GEOBOOK is a joint effort of a long list of collaborating agencies, departments and companies. A complete list of these entities is found in the Appendices. The experience of the individuals involved in this project is substantial, with many having over 30 years of professional wildland fire experience.

This GEOBOOK presents the results of the **Community Hazard and Risk Assessment** undertaken for Klamath County in Oregon. Overall guidance of the process was provided by the Klamath County CWPP core group. Many communities in Klamath County have completed their own community-specific CWPP's. By using a Geobook format, existing CWPP's and many related documents and information sources can be brought to the reader via this one document. All completed CWPP documents in Klamath County can be accessed from this Geobook.

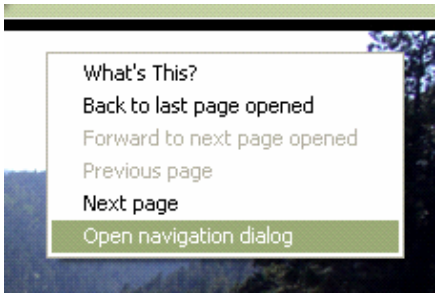
To support Klamath County emergency services, a wildland fire hazard survey was conducted in the summer of 2006. The Keno Rural Fire Protection District organized and completed this survey with the help of Klamath County Title III funds. Summer intern students were hired trained and completed the survey of residential structures throughout Klamath County. Over 10,000 properties were surveyed for a variety of fire hazard attributes including: roofing material, siding material, decking construction, adjacent wildland fuel types and more. The information gathered can be used to improve the capacity of the fire department/agencies in Klamath County by knowing where the properties exist and what values are at risk.

This CWPP GEOBOOK matches the organization of the hardcopy CWPP. Although a printed copy of the document can be acquired, the Geobook format allows the reader access to a substantial amount of background and supporting information through the internet and direct file links in the Geobook. A printed copy does not begin to expose the reader to the supporting information available from a computer with internet connectivity.

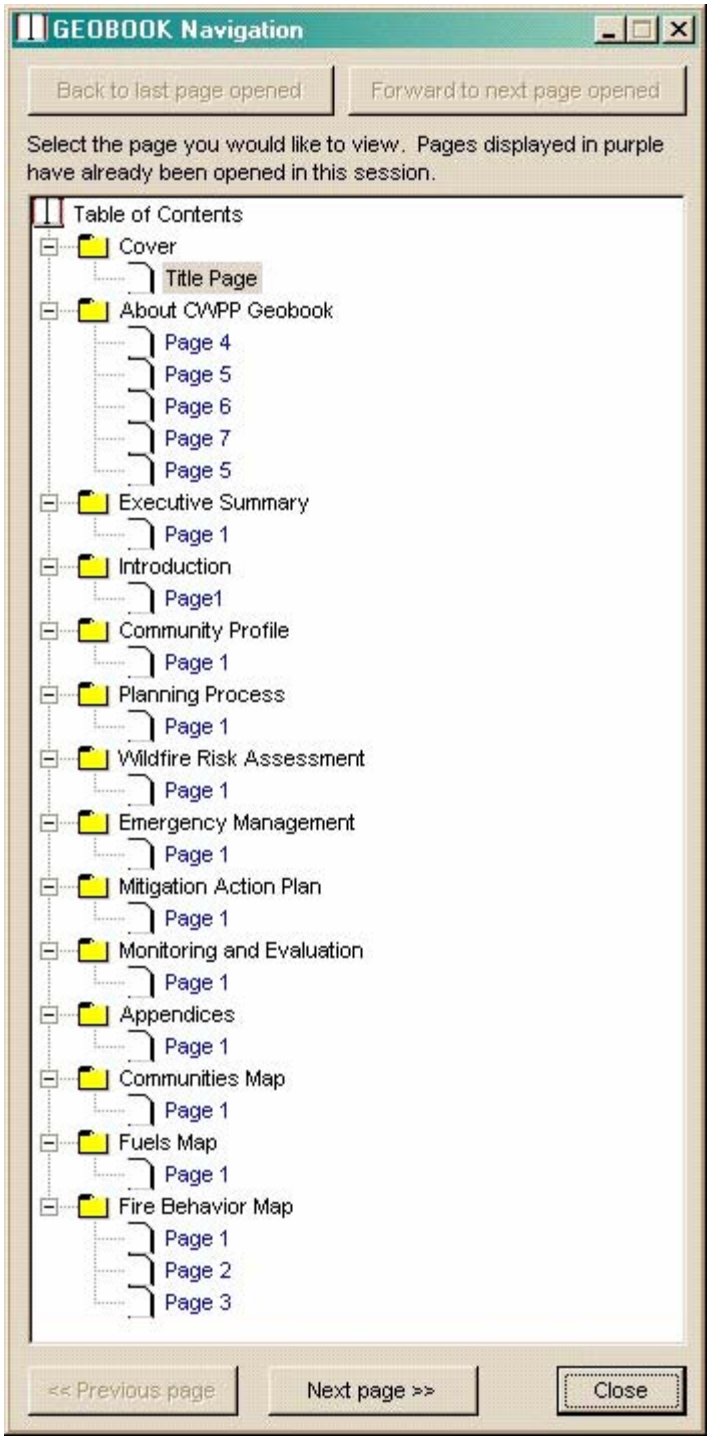
Using the Navigation Tool to Move Around the Book

You can easily navigate around the book by clicking on the tabs (think of these as chapters), and selecting pages to view. Some tabs have only a single page, while others may have several pages. Buttons will direct you to additional pages where appropriate.

The GEOBOOK also has a navigation tool that will aid you in moving from page to page in the book. The tool can be started by simply right clicking on any page. The following menu will appear:



Select the “Open Navigation dialog” option. You will be presented with an interactive Table of Contents for the book with tools that allow easy navigation to any page within the book.



Simply click on the page of interest to go to that page. Blue represents hyperlinks to new pages, and purple indicates pages that you have already been to. Buttons also allow you to go to previously opened pages, or previous pages.

Interactive GIS Mapping

Several static maps are provided in key sections of this plan, however **seventeen interactive maps** are available that allow the user to zoom and pan turning on the layers they desire to see. This provides a powerful interactive mapping capability embedded inside the pages of the plan. Tools are also available to query different layers for any point on the landscape. Click on the  icon on any map to get information on how to use the specific query and mapping capabilities of each map.

The seventeen interactive maps provided in the Klamath County CWPP are (click on the blue link to go to the maps):

1. WUI Boundaries Map

   This map shows the Klamath County WUI boundaries around defined WUI communities.

2. Critical Infrastructure Map

   This map shows the major utilities, constructed facilities, and transportation systems.

3. Protection Capabilities Map

   This map shows the fire district boundaries, fire station locations and equipment inventories of the station.

4. Ownership Map

   This map shows land ownerships, both private and public.

5. Structural Density Map

   This map shows the surveyed structures, areas with 4 or more structures per 40 acres, and significant fire perimeters.

6. Fire History

   This map shows the Klamath County WUI communities, significant fire perimeters, and fire occurrence location points.

7. Fire Behavior Maps

   This map button actually accesses eleven maps, one for each WUI

community. Each map shows the fire behavior inputs: elevation, slope, aspect, surface fuel model and canopy cover. Each map also shows the fire behavior outputs: rate of spread, flame length and crown fire potential.

You can switch between these maps at any time by simply clicking on the BACK Button for each map, then clicking on a new map from the main Maps Page.

What software do I need to run GEOBOOK?

GEOBOOK Reader

No specific GIS or mapping software (such as ArcView) is required to run GEOBOOK other than GEOBOOK Reader. GEOBOOK Reader is a self installing software program required to support the operation of GEOBOOKs on your computer. When you install your first GEOBOOK application you will be prompted to install the Reader. The Reader will take approximately 22 Mb of disk storage separately from the disk space required for the GEOBOOK(s) you are installing. GEOBOOK Reader software simply facilitates the use of GEOBOOKs on your computer and is provided at no cost licensing.

The power and utility of the GEOBOOK is that all mapping capabilities are embedded within pages of the book. Once you have a GEOBOOK you can distribute it to as many individuals as you wish with no licensing fee or cost. Therefore, GEOBOOK is ideal for distributing fire plans and associated documents to non-GIS audiences, such as operational staff and the public. The intuitive book look-and-feel makes GEOBOOK a very comfortable medium for non-technical people to operate.

Acrobat Reader

Adobe Acrobat Reader is required to view many of the reports available in GEOBOOK. A link is provided on this page to download the Adobe Acrobat Reader software from Adobe if you do not already have this software installed on your computer.

Internet Connection

An internet connection is also required on the local computer running GEOBOOK to utilize the web links available. If an Internet connection is not available it will not limit any of the mapping capabilities of the GEOBOOK. It will, however, limit your ability to retrieve additional information from linked websites.

Installing the Klamath County CWPP GEOBOOK

The KC CWPP GEOBOOK is available on cd or dvd disks. The disk will self-install on a pc from the cd/dvd drive. Just put the disk in the drive and you will be guided through the installation. We recommend you accept the default file locations.

Be aware that the installation of the KC CWPP GEOBOOK will take about 1.5 gigabytes of hard drive space. Make sure you have enough room for the installation by going to START> My Computer and verifying that your hard drive has the available space before letting the disk self-install.

About CWPP's

This information is an excerpt from the CWPP Handbook published in March 2004 in response to the Healthy Forests Restoration Act (HFRA). This publication is included in the GEOBOOK as reference in several locations, including the link above.

Background

The idea for community-based forest planning and prioritization is neither novel nor new. However, the incentive for communities to engage in comprehensive forest planning and prioritization was given new and unprecedented impetus with the enactment of the Healthy Forests Restoration Act (HFRA) in 2003.

This landmark legislation includes the first meaningful statutory incentives for the US Forest Service (USFS) and the Bureau of Land Management (BLM) to give consideration to the priorities of local communities as they develop and implement forest management and hazardous fuel reduction projects.

In order for a community to take full advantage of this new opportunity, it must first prepare a Community Wildfire Protection Plan (CWPP). Local wildfire protection plans can take a variety of forms, based on the needs of the people involved in their development. Community Wildfire Protection Plans may address issues such as wildfire response, hazard mitigation, community preparedness, structure protection—or all of the above.

The process of developing a CWPP helps a community clarify and refine its priorities for the protection of life, property, and critical infrastructure in the wildland–urban interface. It can also lead community members through valuable discussions regarding management options and implications for the surrounding watershed.

The language in the HFRA provides maximum flexibility for communities to determine the substance and detail of their plans and the procedures they use to develop them. Because the legislation is general in nature, some communities may benefit from assistance on how to prepare such a plan.

The CWPP Handbook is intended to provide communities with a concise, step-by-step guide to use in developing a CWPP. It addresses, in a straightforward manner, issues such as who to involve in developing a plan, how to convene other interested parties, what elements to consider in assessing community risks and priorities, and how to develop a mitigation or protection plan to address those risks.

The handbook is not a legal document, although the recommendations contained here carefully conform to both the spirit and the letter of the HFRA. The outline provided offers one of several possible approaches to planning. We hope it will prove useful in helping at-risk communities establish recommendations and priorities that protect their citizens, homes, and essential infrastructure and resources from the destruction of catastrophic wildfire.

Communities and the Wildland–Urban Interface

The wildland–urban interface (WUI) is commonly described as the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. This WUI zone poses tremendous risks to life, property,
and infrastructure in associated communities and is one of the most dangerous and
complicated situations firefighters face.

Both the National Fire Plan and the Ten-Year Comprehensive Strategy for Reducing Wildland Fire Risks to Communities and the Environment (10 Year Strategy) place a priority on working collaboratively within communities in the WUI to reduce their risk from large-scale wildfire.

The HFRA builds on existing efforts to restore healthy forest conditions near communities and essential community infrastructure by authorizing expedited
environmental assessment, administrative appeals, and legal review for hazardous
fuels projects on federal land.

The Act emphasizes the need for federal agencies to work collaboratively with communities in developing hazardous fuel reduction projects, and it places priority
on treatment areas identified by communities themselves in a CWPP.

Role of Community Wildfire Protection Plans

The HFRA provides communities with a tremendous opportunity to influence where
and how federal agencies implement fuel reduction projects on federal lands and how
additional federal funds may be distributed for projects on nonfederal lands. A CWPP is the most effective way to take advantage of this opportunity.
Local wildfire protection plans can take a variety of forms, based on the needs of those involved in their development. They can be as simple or complex as a community desires. The *minimum requirements* for a CWPP as described in the HFRA are:

(1) Collaboration:

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

(2) Prioritized Fuel Reduction:

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

(3) Treatment of Structural Ignitability:

A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan. The HFRA requires that three entities must mutually agree to the final contents of a CWPP:

- The applicable local government (i.e., counties or cities);
- The local fire department(s); and
- The state entity responsible for forest management.

In addition, these entities are directed to consult with and involve local representatives of the USFS and BLM and other interested parties or persons in the development of the plan. The process is intended to be open and collaborative, as described in the Ten-Year Strategy, involving local and state officials, federal land managers, and the broad range of interested stakeholders. If a community already has a plan that meets these requirements, the community need not develop an additional plan for the purposes of the HFRA.

Benefits to Communities

In the context of the HFRA, a CWPP offers a variety of benefits to communities at risk from wildland fire. Among those benefits is the opportunity to establish a localized definition and boundary for the wildland–urban interface. In the absence of a CWPP, the HFRA limits the WUI to within 1/2 mile of a community's boundary or within 11/2 miles when mitigating circumstances exist, such as sustained steep slopes or geographic features aiding in creating a fire break. Fuels treatments can occur along evacuation routes regardless of their distance from the community. At least 50 percent of all funds appropriated for projects under the HFRA must be used within the WUI as defined by either a CWPP or by the limited definition provided in the HFRA when no CWPP exists.

In addition to giving communities the flexibility to define their own WUI, the HFRA also gives priority to projects and treatment areas identified in a CWPP by directing federal agencies to give specific consideration to fuel reduction projects that implement those plans. If a federal agency proposes a fuel treatment project in an area addressed by a community plan but identifies a different treatment method, the agency must also evaluate the community's recommendation as part of the project's environmental assessment process.

Using the GEOBOOK Mapping Tools

Welcome to the GEOBOOK – an intuitive GIS application for reviewing your fire plan with the power of interactive mapping. You can click on any blue link text to go to that specific part of the book.

Using the Interactive Maps

The map page toolbars contains several tools to help you review and query the community assessment and fire behavior analysis information. Specific tools vary from map to map due to the content available on the maps.

More generic mapping tools are described below.

Zoom In/Out & Pan

These tools allow you to zoom in to see more detail, zoom out to see more area and less detail, and pan around to change the viewing area.

To zoom in, define a box on the map by clicking a top left corner and then a bottom right corner. The map will resize to the new area you have defined.

To zoom out, click anywhere on the map and the map will resize a constant amount using the point you clicked on as the new center of the map.

To pan around, click on any point on the map, hold the left mouse button down, and drag the map.

Fixed Zoom In-Out

These tools allow you to zoom in or out by a fixed scale from any point on the map.

Zoom to Entire Map

This tool will reset the map view to the entire map extent.

Enlarge Map

This tool allows you to enlarge the map page on your screen (like ArcView). This is particularly useful for viewing the map in more detail.

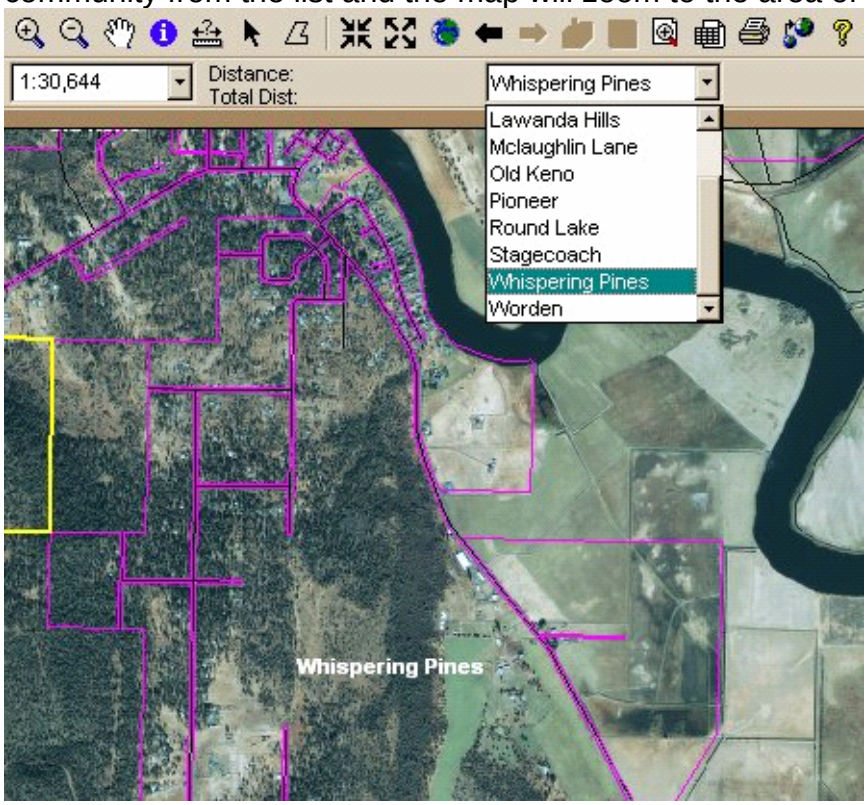
Last & Next Zoom

These tools allow you to return to a previous zoom view. This is useful for

walking through your map view extents.

Zoom to a Specific Community (all maps)

A tool is provided for all maps that allows the user to select one of the 11 communities from a scroll list and zoom directly to that community. Select a community from the list and the map will zoom to the area of interest.

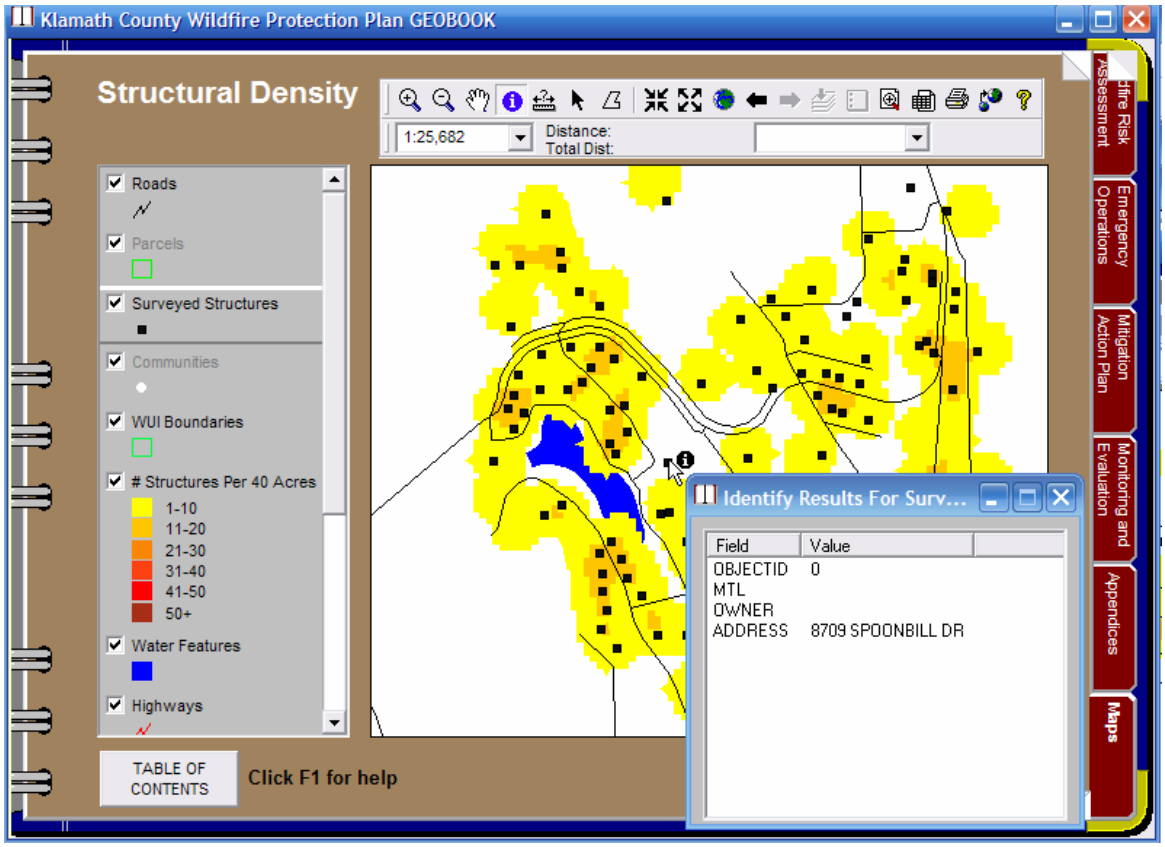


Turning On & Off Map Layers

Many of the map layers will automatically display at predefined scales. This is ideal for small features, such as water sources, helicopter landing zones, etc. Once the user zooms in far enough these features will appear. A layer that is checked, but grayed out, will turn on once the appropriate map scale is reached. In addition, the user can manually turn on or off any map layer by clicking the checkbox in the legend.

Querying Map Data with the Identify Tool

The primary method to query the community assessment information is to use the Identify tool available from the map toolbars. This tool will retrieve specific attributes for any theme you select. In this example, the theme "Surveyed Structures" was left-clicked by the user, causing the theme to be active (note the outline visible around the words Surveyed Structures).



Now press the Identify button and then click on a feature on the map. When the Identify button is clicked, an "i" in a black circle will attach itself to the cursor. In this example, the cursor with the Identify symbol is pointed at a structure point. Characteristics about the area, or point, selected will pop up in a dialog box. The Identify results may be different for each of the maps. For example, the Communities Map will retrieve information about the communities and infrastructure (i.e. water sources, fire stations, etc), while the Fire Behavior Map will retrieve information about the fire behavior analysis results (i.e. spread rate, flame length, crown fire potential). Not all themes have identified information attached.

Table of Contents

Executive Summary

This document is the Community Wildfire Protection Plan (CWPP) for Klamath County, Oregon. The content of this document has been developed to meet the intent of the National Fire Plan (NFP) and the Healthy Forest Restoration Act (HFRA). This document has been prepared to support the planning efforts of all agencies and departments that participate in wildland fire management throughout Klamath County. This document compiles analysis of wildland fire hazard for defined WUI (Wildland Urban Interface) communities in Klamath County.

Over that last five years, several CWPP products have been completed for the communities in Klamath County within fire protection districts. These local community efforts focused on assessment of the risk of wildland fire to those specific communities. In most cases, fuels treatments to lower the susceptibility of those communities to wildfire has been achieved.

Much of Klamath County is rural. Federal owned land in Klamath County accounts for 56% of the landmass. Numerous dispersed communities which have no formal structure fire protection exist in the county. A recent check of county records showed 7,580 residential parcels that are unprotected. These parcels are not within a structure fire protection district. Of these, 969 parcels have improvements with assessed values greater than $10,000. It should be noted that the total assessed value of these 969 unprotected parcels is $86,754,850. Many rural residents falsely assume state or federal structure fire protection is provided.

This plan was prepared to bring the existing CWPP products together, and to identify the communities in Klamath County that are at risk to wildfire. It is the intent of the Klamath County CWPP to better understand the wildland fire risk situation across the county. This understanding will focus on areas that are in need of fuel treatment to reduce the threat of wildland fire to residential communities.

Communities with existing or in-progress CWPP documents are: Bly, Chiloquin, Keno, Klamath Falls, Rocky Point and Walker Range. The communities addressed in these CWPP's have the larger concentrations of residential properties in Klamath County. Copies of the finished documents can be accessed from links in the appendices of this document.

Klamath County is experiencing an emerging economy for real estate. Klamath County offers investors and retirees an opportunity to own a property in a wildland urban interface setting. This opportunity has fueled an upsurge in people moving into the county. The market for raw land and homes has been robust. Individuals from more urbanized locales have found they can achieve a higher standard of housing in Klamath County. This plan hopes to shed light on the issues related to the future of the county in relationship to residents and wildland fire.

Much of Klamath County is a forested landscape, extending from the crest of the Cascades to the eastern desert lands. A significant portion of the county (56%) is public land administered by the U.S. Forest Service, Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and the Oregon Department of Forestry. Private timberland holdings represent a significant remainder of the county. One of the real estate draws to this county is the opportunity to acquire a property in or bordering timberlands. The influx of people to the county represents an increasing demand for fire protection services that may not be currently adequate or are non-existent.

Wildland fire is part of the ecosystem throughout most of Klamath County. Natural wildfire ignitions (lightning) and aboriginal fire sources (intentional or not) have played a major role in the forest ecosystems. Wildland fire shaped the vegetative landscape of Klamath County for centuries before settlement. Settlement brought a strong desire to eliminate or reduce the threat of wildfire. Wildland fire suppression has been an influence on the forests of Klamath County for decades. Wildland fire suppression (or management) is now a necessity as the values at risk increase throughout the Klamath County wildland urban interface.

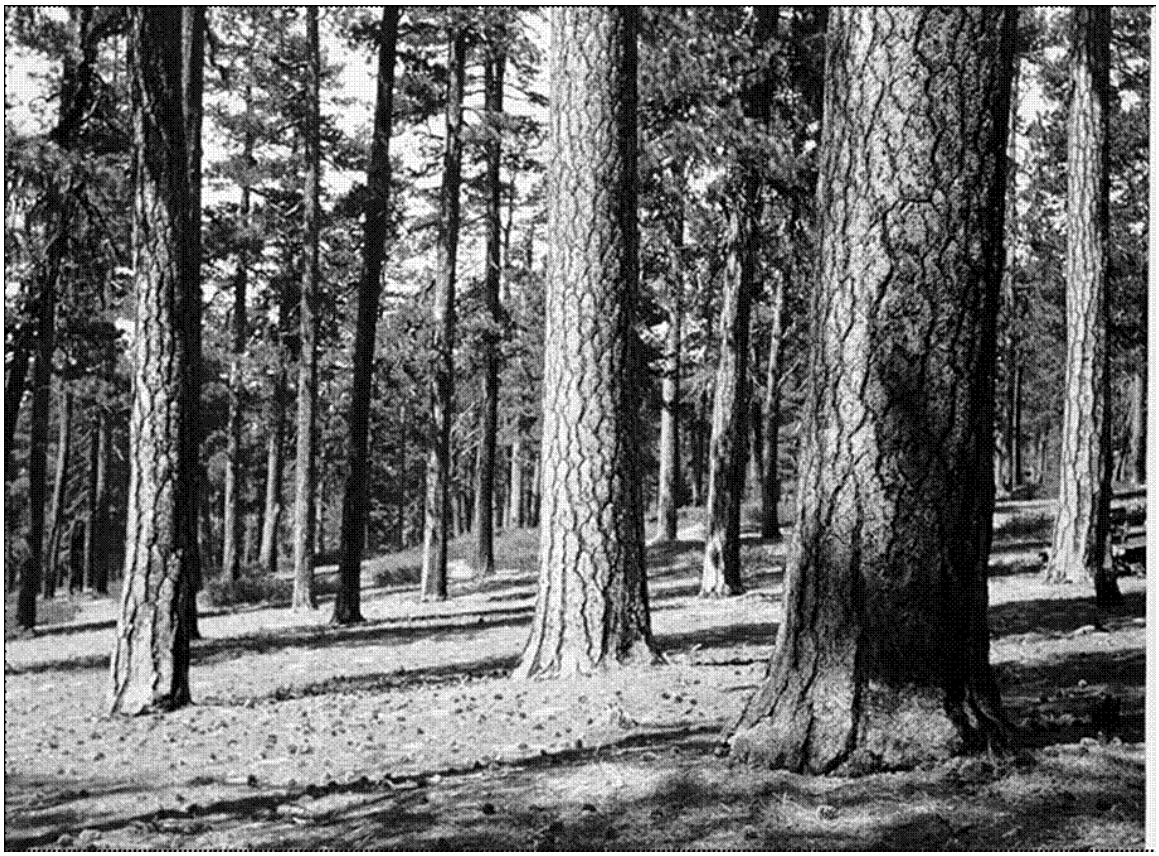


Photo taken 1930 near Calimus Butte, Klamath County (BIA)

Photo taken 2007 near Calimus Butte, Klamath County (iVision Consulting)

Fire suppression activity leads to increased vegetation and biomass, as evidenced by stocking density (stems per acre) and increased canopy density. Without fire as an agent of stocking control, or forest management activities (thinning), a stand of trees and/or shrubs will become dense and decadent. This condition represents a high fire hazard. Successful wildland fire suppression efforts over decades led to wildland fires too intense to suppress, as vegetation continues to develop un-checked.

Protection of properties, especially residential structures, in a wildland fire environment such as Klamath County requires understanding several points.

- Recognition that fire is part of the landscape.
- Wildland urban interface properties, especially those with structures, need to be managed to reduce the intensity of wildland fire when fire occurs.
- Fire protection agencies and departments in the county are equipped with the best information available in order to provide the best fire protection decisions.

Goals and Objectives

The Klamath County CWPP was developed to compile documentation that supports the following goals and objectives:

- Protect human life and property from wildfire.
- Increase the capacity for structure fire protection through pre-planning and fuels hazard treatment.
- Inform the public of realities of living in fire ecosystems.
- Develop a plan that can be updated for future needs of the Klamath County Fire Protection departments, agencies, and the public.
- Develop and update a GIS database that will enable rapid, accurate assessments for future emergency management decisions.
- Improve interagency cooperation through a combined effort on this CWPP.

Strategy

Klamath County has experienced large wildland fires and will continue to have large wildland fires that threaten or destroy residential property. The large portions of the county without formal fire protection are of concern to the Klamath County fire protection departments and agencies. It is well understood that reducing the fire behavior potential of wildland fires increases the protection capacity of firefighting resources. Actions taken by property owners can decrease the likelihood of sustaining damage when a wildland fire occurs. Information about roads, infrastructure, fuels, fire behavior potential and residential property locations is needed quickly during emerging incidents. The strategy of the Klamath County CWPP is as follows:

- Compile a mobile database of properties that have residential structures and/or constructed improvements.
- Assemble for future review the associated documents (agreements, etc.) that enable mutual aid authorities between existing Klamath County fire protection departments and agencies.
- Prepare for future wildland fire and all-risk incidents by use of live field scenarios to test the preparedness of the Klamath County fire protection departments and agencies.
- Continue to find funding sources for fuels reduction work in rural Klamath County communities.

Methodology

This CWPP involved an analysis of fire behavior potential and structure information for the defined WUI communities in Klamath County.

The wildland fire behavior potential was developed using fire weather parameters combined with surface and canopy fuels information. These weather and fuels inputs were used in a fire behavior model called FlamMap. FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, canopy fire potential, etc.) over an entire FARSITE landscape for constant weather and fuel moisture conditions. More detail is available in the Wildland Fire Risk chapter.

To support the information available to Klamath County fire protection departments and agencies, a county-wide property and structure survey was conducted during the Summer of 2006. The Keno Rural Fire Protection District utilized Title III funds allocated by the Klamath County Commissioners to hire, train and deploy a team to conduct surveys on Klamath County wildland urban interface properties. The survey teams completed over 10,000 residential surveys. These surveys were conducted using a standardized process including collection of property and structure information that addresses wildland fire susceptibility. Information gathered was moved to a database that will be available to fire protection personnel to make decisions during emerging incidents. This data will allow more rapid dissemination of information to incident personnel in order to provide more efficient protection capability to property owners.

Action Plan

The Klamath County CWPP is being developed under the following action plan:

- List and provide access to existing CWPP products for wildland urban interface (WUI) communities in Klamath County that have formal fire protection.
- Identify wildland urban interface (WUI) communities in Klamath County that do not have formal fire protection.
- Gather detailed information about Klamath County residential properties to address a variety of public safety issues related to wildland fire protection, structural fire protection and emergency medical services.
- Assess the relative fire risk and hazard of WUI communities in Klamath County.
- Develop a county-wide CWPP that will support tactical needs beyond a hazard assessment process and into the future.
- Provide the assembled data for future tactical application by the fire protection departments and agencies in Klamath County.

Protection recommendations

- Continue to seek opportunities to inform the public of the importance of hazard mitigation. Actively expose WUI home and property owners and/or residents to the value of completing fuels reduction as a way to increase fire protection capacity. Supply related information such as is found in Living With Fire to Klamath County WUI residents.

- As the Federal and State fire management agencies have gone to narrowband radio systems for dispatch center communications, the Klamath County fire departments will need to acquire narrowband capability. A grant proposal has been submitted for this need. For 2007 only tactical frequencies offer interoperability for all Klamath County fire resources.

- Fire Defense Board members should work with the Klamath County Community Development, Planning Division to update Article 69 of Chapter 60 and Article 70 of Chapter 70 of the Planning Department Development Standards.

- Encourage/Support protection capability organization and development in areas that have structures with no available structural protection.

- Continue to foster development of partnerships between local structure fire districts.

- Continue cross training of employees in wildland and structure firefighting.

- Continue to inventory and monitor water sources, and develop or improve sites as necessary.

- Annually update the Structure Vulnerability Surveys, ensuring that new homes and hazard reduction treatments are recorded.

- Acquire needed funding to complete the planning and construction of new fire stations as needed.

- Continue to recruit and train additional volunteer firefighters.

- Continue to invest in upgrading essential firefighting equipment such as turnouts, breathing apparatus, radios, and rescue equipment to ensure that the County firefighters have the supplies and personal protective equipment that is required for safe firefighting and rescue missions.

- Upgrade and replace the older firefighting and rescue vehicles as they become outdated or unusable.

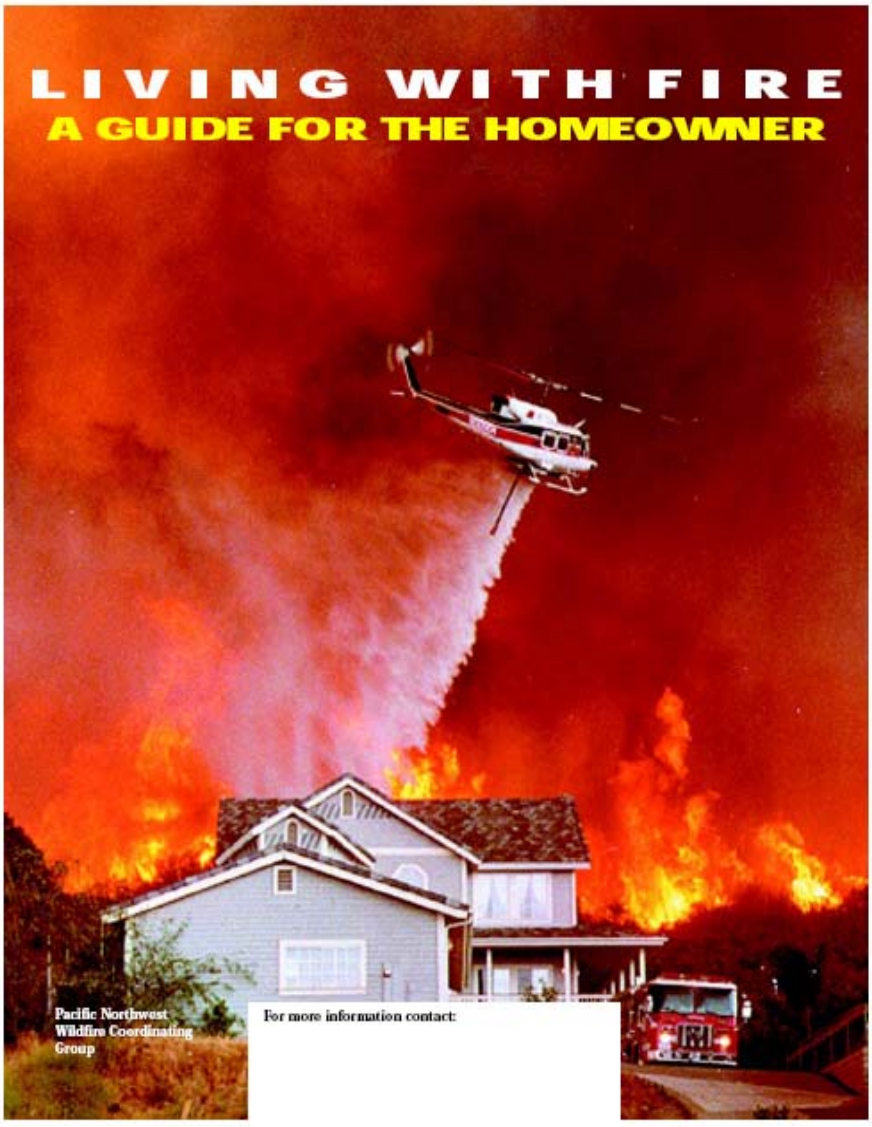
Hazard Reduction Recommendations

The fire service professionals participating in this planning process recognize the importance of fuel hazard reductions around structures. Increased protection capacity can be attained by fuels reduction work on adjacent properties. Chapters Six and Seven contain more information on this concept. The reader should click the link below entitled: "Message for the WUI Homeowner" to access detailed information about creating defensible space around homes. Information is available about home construction materials, vegetation types and techniques for reducing the flammability of vegetation or fuels adjacent to structures.

Wildfires can quickly overwhelm the available fire protection resources. Hazard reduction work is often the difference between a structure surviving a wildland fire or being burned.

Message to the WUI Homeowner and Occupant

If you own or occupy a home in the wildland urban interface (WUI), this section is added for you. Whether you are in a fire protection district or not, the survivability of your home in the event of a wildland fire is a function of the fuels around the home and the physical attributes of the home. If you live in an area without formal fire protection, this information is critical to your home's ability to survive a wildland fire.



Numerous publications are available that discuss how to make your home and property less vulnerable to wildland fire. One of the best available is Living With Fire. This document summarizes much of the information that can be found elsewhere in this CWPP and its linked references. Even if you only skim through this CWPP and GEOBOOK format, you should read the entire Living With Fire document. It is in Adobe acrobat (.pdf) format, so you can print a copy if you

desire. If you do not have Acrobat Reader software, you can get a free copy by clicking the link (if your computer is connected to the internet).

A wildfire will threaten your home by direct flame contact and/or by showering it with embers and sparks. Wildland fires are often driven by strong winds, which scatter embers over and around your home. Any surface that is combustible can trap these embers and start an ignition. Winds will swirl and roll around the corners of the home and the roof. Even homes with metal roofing can be ignited by the ember shower. It only takes one missed ignition to burn a house down. If your home has a wood shake roof, wood siding, wood decks, nearby firewood piles and other flammable items adjacent to it, the probability of it igniting go up dramatically.

The further from a fire station you live, the longer the wait will be for the arrival of a fire engine. If your home is among many that are simultaneously threatened by a large wildland fire there will not be enough engines to cover every home. Fire suppression personnel will prioritize homes by their inherent vulnerability. If flammable vegetation and accumulations of dead surface fuels are around your home, the firefighting personnel cannot safely defend your home.

If you mitigate the wildland fire hazards around your home, chances increase that it will survive a wildland fire. Review of the points made in Living With Fire can assist you in determining how much vegetation to clear around your home and property. If you still have questions consult with your fire department (contact information is in the Appendices) or a representative of the Oregon Department of Forestry.

The Oregon Forestland-Urban Interface Fire Protection Act (often referred to as Senate Bill 360) enlists the aid of property owners toward the goal of turning fire-vulnerable urban and suburban properties into less-volatile zones where firefighters may more safely and effectively defend homes from wildfires. Basically, the law requires property owners in identified forestland-urban interface areas to reduce excess vegetation, which may fuel a fire, around structures and along driveways. In some cases, it is also necessary to create fuel breaks along property lines and roadsides. This law will be implemented in Klamath County in the near future. For more information contact your local Oregon Department of Forestry Office.

Introduction

Background and History

Klamath County contains large expanses of forestland. Forests were responsible for much of the early economic development of the county. Old forest stands with large trees on relatively flat ground offered harvest using a variety of then current technologies. Many logging camps were set up throughout the county and supplied logs to mills in numerous communities. A significant portion of the county population made a living directly or indirectly from the timber industry into the 1980's.

In recent years, property values have increased dramatically, indicating that Klamath County has become a desired location for retirees and others. The increasing demand for residential parcels in a wildland setting brings an increasing burden to the fire protection agencies and departments of Klamath County.

Wildland fire is and has been a regular occurrence in the forests of Klamath County. The forests were shaped by natural and aboriginal fires prior to settlement. Post-settlement philosophy has emphasized fire suppression. As more is learned about fire-dependent ecosystems, such as Klamath County, the role of fire in the balance of flora and fauna is better understood. Wildland fire will always be present and must be managed.

However, human values are added to Klamath County every year in the form of homes and developed properties that present values at risk to a wildland fire. These values at risk drive this planning effort. The efforts completed to mitigate wildland fire hazard by individual property owners will strengthen the wildland fire protection capacities of the local, county, state and federal wildland fire resources.

It is the intent and desire of the core group that developed this CWPP that the reader become more aware of the implications of individual property hazard fuels abatement in the ultimate survivability of that parcel in a wildland fire event. Some communities in Klamath County have been practicing hazard fuel reduction activities, others have not. The importance of this hazard reduction work cannot be over emphasized. Every parcel that has created its own defensible space is one less parcel that requires the time and efforts of a fire protection system that is limited in capacity.

Klamath County is a wildland fire county. This plan is prepared to make that apparent and to identify communities at risk on a common scale.

Planning Area Boundaries

This CWPP will define communities throughout Klamath County. Some communities have organized and formal fire protection, many do not. Identified Wildland Urban Interface (WUI) communities can be individually viewed later in this Geobook. Map boundaries are readily shown on community specific pages.

Fire Policies and Programs

The Healthy Forest Restoration Act (HFRA)

President Bush signed the Healthy Forests Restoration Act of 2003 (P.L. 108-148) (HFRA) in December 2003. HFRA, as it is known, contains a variety of provisions to speed up hazardous-fuel reduction and forest-restoration projects on specific types of Federal land that are at risk of wildland fire and/or of insect and disease epidemics. The HFRA helps States, Tribes, rural communities and landowners restore healthy forest and rangeland conditions on State, Tribal, and private lands. (additional information on the HFRA is available at http://www.healthyforests.gov/initiative/introduction.html)

The following excerpts are from the handbook: Preparing a Community Wildfire Protection Plan, A Handbook for Wildland-Urban Interface Communities.

> Role of Community Wildfire Protection Plans
>
> The HFRA provides communities with a tremendous opportunity to influence where and how federal agencies implement fuel reduction projects on federal lands and how additional federal funds may be distributed for projects on nonfederal lands. A CWPP is the most effective way to take advantage of this opportunity.
>
> Local wildfire protection plans can take a variety of forms, based on the needs of those involved in their development. They can be as simple or complex as a community desires.

The Klamath County CWPP has been kept brief and presented in a format called Geobook. This format allows the reader access to a variety of background information electronically. When viewed on a computer with active internet access, the websites listed throughout the document will activate the linked website.

> The *minimum requirements* for a CWPP as described in the HFRA are:
>
> (1) Collaboration: A CWPP must be collaboratively developed by local and state government representatives, in consultation with federal agencies and other interested parties.
> (2) Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and

methods of treatment that will protect one or more at-risk communities and essential infrastructure.
(3) Treatment of Structural Ignitability: A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

The Klamath County CWPP has been developed during active collaboration with local, state and federal partners and interested local parties. The core team and list of stakeholders can be viewed by clicking the blue link. This CWPP document is prepared to support existing community CWPP's and to address the communities in the county that do not have a formal fire protection entity.

The HFRA requires that three entities must mutually agree to the final contents of a CWPP:

- The applicable local government (i.e., counties or cities);
- The local fire department(s); and
- The state entity responsible for forest management.

The Klamath County CWPP has been reviewed and achieved signatory agreement of the listed parties.

National Fire Plan (NFP)

The National Fire Plan was developed in August 2000 following a landmark wildland fire season. The intent was to actively respond to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. The NFP addresses five key points: Firefighting, Rehabilitation, Hazardous Fuels Reduction, Community Assistance, and Accountability.

The Healthy Forest Initiative (HFI)

The Healthy Forests Initiative (HFI) was launched in August, 2002 by President Bush with the intent to reduce the risks severe wildfires pose to people, communities, and the environment.

Definitions and Descriptions

Fire Behavior Basics

In order to better understand wildland fire behavior some known principles need to be introduced and considered.

All wildland fires are the product of three components: Fuels, Weather and Topography.

- Fuels must be in sufficient quantity, arrangement and of low enough moisture content to ignite.

- Weather must be warm and dry enough to support combustion. Wind will assist in moving the fire.

- Topography supplies a path or barrier to fire spread.

2003 KAGO Fire (Wildland Fire Technologies, Inc.)

Fuels

Fuels are described in four categories: grass, brush, timber litter or slash. The size of a fuel particle is important; fine fuels (< 1/4" diameter) are responsible for the rate-of-spread of a fire. Larger fuel particles are responsible for the intensity and duration of a fire (twigs, limbs, logs, etc.). As with a wood stove, fireplace or campfire, the proper mix of fine and large fuels is needed to start and maintain a fire. Fuel moisture changes daily, even hourly, but a fuel particle only contributes to the combustion process when it is sufficiently dry. Small fuels gain/lose moisture more quickly than large fuels, thus flammability can change throughout any given day.

Fuels may be live or dead. As such, they may be a heat sink or a heat source, depending on the moisture content. Live fuels are either annual or perennial grasses or woody shrubs and trees. A live shrub may contribute rapidly to the combustion process when it is decadent, e.g. old enough to have accumulated dead limbs and litter under the shrub. This condition is exacerbated when pine needles have draped into the shrub foliage.

Fuels are arranged on the landscape in both horizontal and vertical patterns. The more continuous the arrangement in either plane or both, the more intensely a fire can burn. Types of fuels are referred to as ground, surface or aerial. Ground fuels are flammable woody material in the ground: roots, duff and peat. Surface fuels include forest litter: leaves, needles, twigs, limbs, tree boles, and shrubs. Aerial fuels are those above the surface fuels: typically the limbs of trees and taller shrubs. A sufficient pathway from the surface fuels to the aerial fuels is referred to as ladder fuels.

Weather

Weather is a significant factor in fire behavior characteristics. Weather must be conducive for a wildland fire to spread across the landscape. Seasonal weather patterns are referred to as climatology. These patterns are often discussed as normal or deviations from normal. Climatology has great bearing on the vegetation patterns and plant associations of a landscape.

Seasonal patterns and intensity have a direct bearing on fuels. As weather warms and dries, fine fuels, especially the dead fuels, begin to dry sufficiently to carry fire. Curing of live fine fuels follows next as the summer season develops. Woody fuels of increasingly larger diameter lose moisture through the summer and subsequently achieve the lowest fuel moisture content in the fall.

Precipitation plays a major role in fire season severity. Duration of moisture input is far more critical than measured amount. For example: 24 hours of cool weather with drizzle measuring ½" of total rain has more effect on fire behavior potential than 1" of rainfall in a storm lasting an hour. Weather drives the rate of moisture gain or loss in forest fuels.

Winter weather also has a bearing on the intensity of fire season. *In general, fire seasons are more severe if a dry, cold snow falls and packs onto forest fuels without a preceding extended period of precipitation as drizzle or rain.* The rate of spring thaw can bring "early" fire season conditions to dead fuels. A lack of snow pack or limited snow pack obviously compounds this effect.

Wind is a critical weather element in fire behavior. It dictates the direction and speed of fire spread. Shifts in wind direction due to frontal patterns or daily effects (diurnal) will cause fires to move in different directions. Fortunately, these events are well forecasted.

A particularly critical weather factor is atmospheric stability. This is the atmosphere's ability to allow a parcel of air to rise or drop. When a fire is burning under conditions otherwise ideal for fire spread (dry live and dead fuel moisture content) and the atmosphere is or becomes quite unstable a fire behavior referred to as "plume-dominated" may occur. Such fire behavior is responsible for many of the larger, and often infamous, wildfires. Fires under this condition exhibit rapid spread and are characterized by a towering, billowing column. The effect is essentially the same as opening the door and damper of a wood stove and watching the fire become severe.

Such a fire is beyond fire suppression capability of personnel and equipment. Spotting fire behavior contributes largely to the final size development, with new ignitions a mile away from the fire front not uncommon. Fires influenced by atmospheric instability events have been known to grow thousands of acres in a few hours. The geographic scale of such an event makes efforts on the ground with dozers, engines and hand crews negligible. Understanding this level of fire behavior is a continuing science.

A measure of this potential is the Haines Index. This atmospheric stability index is regularly included in Fire Weather Forecasts from National Weather Service Offices that produce Fire Weather Forecasts. The Haines Index is rated with a number system ranging from 1 to 6. A score of 1-3 is assigned to stable atmospheric conditions. As the atmosphere becomes increasingly unstable the following scores apply: 4 - Low, 5 - Moderate and 6 - High. Extreme fire behavior can occur on days with a Haines Index of 1-3, but a strong wind is needed in addition to very dry fuel conditions.

2002 Skunk Fire on the Winema National Forest (USFS)

The photograph above illustrates the classic, billowing column and cloud formation associated with a wildfire under very unstable atmospheric conditions.

Topography

Topography is the overall shape of the landscape. Topography is typically referred to as slope, aspect and elevation. Although flat ground can produce impressive fire behavior given appropriate fuels and weather, the same fire might be even more dramatic given topographic influences.

Fire will be channeled by terrain features such as canyons. Fires run upslope faster than backing downslope. Fire may be slowed or literally stopped by topographic features.

A major topographic feature in Klamath County is the Cascade Mountain Range. Running north to south on the west side of the county, this mountain range influences day and night wind patterns. Another topographic feature that plays a role in Klamath County fire weather patterns is Klamath Lake. Heating and cooling at a different rate than the land around it, this large body of water has a pronounced effect on day and night winds.

Elevation is a topographic component that influences temperature and humidity trends. Their combined effect greatly influences vegetative patterns and thus the fuels on a site. Klamath County has a wide range of vegetative patterns adapted to elevations from less than 3,000 feet, to over 8,000 feet.

Fire Behavior Terminology

The following are terms that refer to types of fire behavior.

A smoldering fire is burning in ground and surface fuels, often with little or no visible flame. A creeping fire is slowly moving, often backing downslope or against a wind. A creeping fire has a relatively slow moving flaming front. The flaming front is the zone of active flame at the leading edge of a spreading fire.

smoldering fire

creeping fire

A running fire is moving relatively quickly. Often a running fire is driven by the wind, steep slope (upslope) or a combined influence of slope and wind.

Spotting is a series of new ignitions occurring as the result of fire brands landing in receptive fuels beyond the current flaming front.

running fire

spotting

Torching or passive crown fire is a term used when an individual or small cluster of trees exhibit ignition of the canopy foliage.

Crowning or active crown fire is when the canopy foliage of many acres or more ignite and the fire moves through the canopy.

torching or passive crown fire

crowning or active crown fire

It is important to understand that fire behavior is modified by topography and the weather. Of these two elements, weather is the most significant element of change in fire behavior. Fuel characteristics complete the equation for fire behavior potential.

Firefighting capability changes inversely as fire behavior characteristics change. A creeping or slow running fire may be easily suppressed by available firefighting resources. An increase of wind on the same fire may result in higher rates of spread and spotting which allow the fire to spread more rapidly than the available firefighting resources can suppress. A fire exhibiting torching or passive crown fire is on the edge of becoming an active crown fire. Sustained active crown fire is beyond the capability of firefighting resources.

The focus of hazard fuels mitigation is to identify locations where fuel conditions can be changed to prevent the transition from surface fire, to passive, or active crown fire behavior.

The term crown fire has been used for decades to describe a fire burning in the crown of trees. Crown fuels are the foliage, twigs and branches of an individual tree. Where crown fuels would refer to an individual tree, canopy fuels would refer to the total crown fuels in a stand of trees. A stand of trees can be a few dozen acres to thousands of acres.

Canopy base height is a term that refers to distance from the ground up to the canopy area of a tree that would support the vertical movement of fire. This value requires an estimate on the part of the observer. The higher the canopy base height is in a stand of trees, the less likely a fire is to move into passive fire behavior. Areas where canopy base height is conducive to passive or active

crown fire behavior are possible candidates for pruning of limbs, particularly where this condition exists around homes or clusters of homes. By raising the canopy base height by pruning the limbs, a higher intensity fire is required to allow a surface fire to enter the crown or canopy fuels.

Canopy bulk density is defined as the total canopy biomass divided by the area occupied by canopy biomass. The importance of this value is in determining stands with a likelihood of generating and sustaining active crown fire behavior. Wind is also a key element. Due to the scale of Klamath County, it was not possible to develop canopy bulk density data for this CWPP.

Stands with low canopy base heights and high canopy bulk density are the most likely to generate passive and active crown fire behavior, assuming a surface fuel model generating enough heat is present.

Reduction of surface fuel loadings will lower fire intensity and can be applied to any location, with or without a canopy. Such treatments include mastication, hand and machine piling, pile burning, underburning, broadcast burning and chipping. Reduction of canopy base height is accomplished by pruning. Reduction of canopy bulk density is done by thinning tree density.

Community areas not addressed in specific CWPP's were analyzed for fire behavior characteristics, including crown or canopy fire potential for the Klamath County CWPP. This process and results are discussed in the Wildfire Risk Assessment in Chapter 4.

Community Profile

Environment and Natural Resources

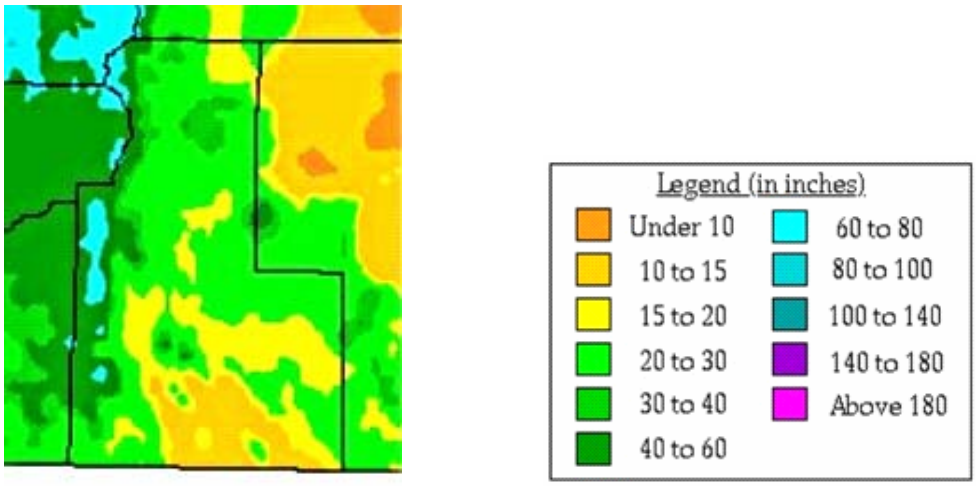
Klamath County is located in south-central Oregon. The county is bounded by the state of California to the south, Jackson County to the west, Deschutes County to the north and Lake County to the east. The largest city in the county is Klamath Falls, the county seat.

Klamath County ranges from the Cascade Mountains on the west, to the high desert to the east, from the California Border on the south, to Walker Rim, Crescent and Odell lakes on the north.

Cleetwood Cove Trail in Crater Lake National Park
Photograph by Gary Halvorson, Oregon State Archives

Klamath County Environmental Facts

- Oregon's 4th largest County covering 6,135 square miles.
- Elevation ranges from 4100 feet at Klamath Falls to points over 8,000 feet along the Cascade crest.
- Contains America's deepest lake, Crater Lake, at 1,932 feet deep, and Oregon's largest lake, Klamath Lake, covering 64 square miles.
- Home to the largest number of wintering bald eagles in the lower 48 states.
- Annual precipitation amounts range from approximately 13" in the Klamath Basin to over 60" along the Cascade crest.



Average Annual Precipitation amounts in Klamath County

Population, demographics, socio-economic data

The population of Klamath County is growing each year, with a relatively sharp increase over the last few years. Many of the new residents are moving into the wildland-urban interface areas of the County.

- **Current County Population** - **70,085** - 20,940 in City of Klamath Falls, 40,100 within the Urban Growth Boundary.
- 91.7% White persons, 0.8% Black persons, 4.0% Native American, 0.9% Asian, and 2.6% other as of 2004.
- 81.5% of residents are high school graduates, 15.9% are College graduates with a Bachelor's degree or higher.
- As of 2000, Klamath County has a 68.0% homeownership rate, with the median home value being $91,100 and 2.49 persons per household.
- Per capita income as of 1999 was $16,719.
- 15.3% of persons in the County are living below poverty as of 2003.

An old trading post near Bly
Photograph by Gary Halvorson, Oregon State Archives

Klamath County Communities

The following communities were identified within Klamath County during the development of this CWPP. Although smaller communities and other housing areas do exist within the county, these were felt to be the primary communities from a wildland-urban interface standpoint.

- **Beatty**
- **Beaver Marsh**
- **Bly**
- **Bonanza**
- **Chemult**
- **Chiloquin**
- **Crater Lake Headquarters**
- **Crescent**
- **Crescent Lake Jct.**
- **Dairy**
- **Diamond Lake Jct.**
- **Fort Klamath**
- **Gilchrist**
- **Keno**
- **Klamath Falls**
- **Lakewoods**
- **Lake of the Woods**
- **Malin**
- **Merrill**
- **Modoc Point**

- **Odessa**
- **Olene**
- **Rocky Point**
- **Sand Creek**
- **Sprague River**
- **Stewart Lennox**
- **Worden**

Wildland-Urban Interface (WUI) Areas

Ten different WUI areas were also analyzed during the development of this County CWPP. Several communities had previously completed their CWPP and had already identified their WUI boundaries, while several other communities did not have a current CWPP or established WUI boundary. For the purposes of this analysis, a general WUI boundary was created for these communities. The list below describes the communities included in each WUI area.

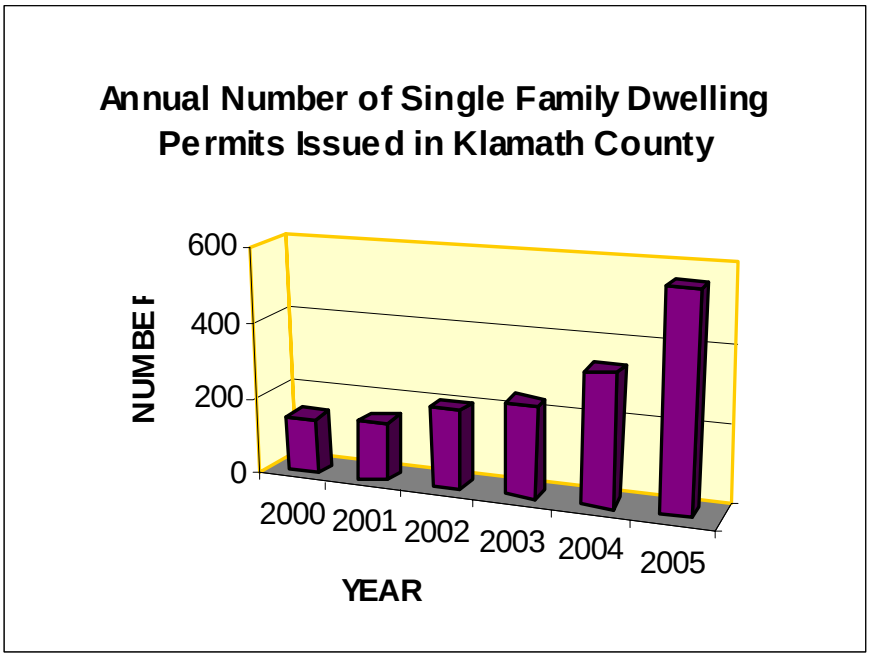
- **Bly** – WUI boundary established in completed CWPP includes homes along Highway 140.
- **Chemult** – Created WUI boundary which includes Chemult, Beaver Marsh and Diamond Lake Junction.
- **Chiloquin** – WUI boundary established in completed CWPP, includes Modoc Point, homes along Sprague River Road and the critical infrastructure around Applegate Butte.
- **Keno** – WUI boundary established in completed CWPP includes Worden, Lakewoods, and the critical infrastructure around Chase and Hamaker Mountains.
- **Klamath Falls** – WUI boundary established in CWPP which is nearing completion. Includes the communities of Klamath Falls, Stewart Lennox, Olene, Algoma, the homes along the slopes of Stukel Mountain and Klamath Hills, and those homes located in Poe Valley.
- **Lake of the Woods** – Created WUI boundary includes the summer recreation cabins and camps residing on the Forest Service lands around Lake of the Woods.
- **Mid County** – Created WUI boundary includes the communities of Sprague River, Moccasin Hills, Bly Mountain, and homes located along Highway 140.
- **Rocky Point** – WUI boundary established in completed CWPP includes the communities of Rocky Point, Odessa and the homes along the Westside Road.
- **Sand Creek** – Created WUI boundary includes the small community of Sand Creek, the homes along the actual creek itself, and homes located along Highway 97.
- **Walker Range** – WUI boundary established in completed CWPP includes the communities of Crescent, Gilchrist, Crescent Lake, and the homes along Highways 97 and 58.

- **Crater Lake National Park** - Crater Lake National Park is entirely federal land with 3 main communities, Park Headquarters, Rim Village, and Mazama Village. Crater Lake NP has created a structure protection plan for their communities which does not identify a specific WUI area, so the analysis for Crater Lake was based on the wildland areas around the 3 main communities.

Housing and Development Trends

As displayed by the chart below, Klamath County has experienced a significant increase in the number of houses being built over the last few years, with many of the housing developments being located in the WUI areas of the County. Several new subdivisions are being developed in areas that have experienced significant wildfires in the past, and must be constructed with fire safety in mind.

The number of new construction building permits has increased from 144 permits in 2000 to 562 permits in 2005, and the trend is expected to continue over the next few years.



Transportation, infrastructure and Land Use

Highways and Railroads

Several major transportation routes travel through Klamath County, with the Highway 97 corridor being the most significant transportation route in the County. Highway 140 is the major East-West transportation route through the County and provides access to Medford and Lakeview. Highway 97 and the Union Pacific railroad travel North-South through the center of the County and is the most

important North-South transportation route east of the Cascade Range. Highway 58 intersects Highway 97 north of Chemult, OR. This is a heavily used route to western Oregon and Interstate Highway 5. Almost 250,000 trucks travel along Highway 97 each year with about 10% of them carrying hazardous materials. An additional 17,000 rail cars also carry hazardous materials each year through Klamath County. Closures of the highways or railroad lines can cause significant impacts to the transportation systems of Northern California and Oregon.

Klamath Falls Airport

The Klamath Falls Airport (LMT) is the major airport for southeast Oregon and is home to the Oregon National Guard 173rd Fighter Wing. The 173rd Fighter Wing's mission statement is: To train the Best Air-to-Air Combat Pilots, Train Flight Doctors, and Serve Our State and Nation in Times of Peace and War.

Commercial air service and full general aviation services are available at the Klamath Falls airport, and the airport also serves as the home of the Klamath Falls Air Tanker Base. The airport has two major runways, a 5260' x 100' runway and a 10,301' x 150' runway.

Smoke from area wildfires can cause the local airport to close due to poor visibility, which could cause flight delays for commercial and military uses and possibly the ability to utilize aircraft for wildfire support.

Utilities

High voltage power lines, high pressure/high volume gas lines, and numerous communication sites are found in Klamath County. High voltage power lines traverse many parts of the county. Smoke from wildfires burning underneath power lines can cause electricity to arc down to the ground, putting firefighters and the public at risk. Shutting down a section of power lines can be a significant event, possibly shutting off power to numerous customers while causing financial hardship to the utility companies. Power lines can also cause fire starts when wires fall to the ground or become damaged from falling debris.

High-pressure, high volume gas lines operated by TransCanada cross the County. These high-pressure gas lines are buried underground and are monitored continually by the TransCanada Gas Company employees (Formerly Pacific Gas Transmission Co.) to quickly detect leaks or damage to the system. If a wildfire or other incident threatens the gas line, the personnel from TransCanada must be notified immediately as the consequences of a gas line explosion can be significant.

Numerous communication sites are located throughout the County. Most of the sites are located on local mountain tops such as Stukel, Applegate, Hogsback, and Swan Lake Pt. providing microwave, cellular and radio communication services to our area. A radar station located at the top of Hamaker Mt. is also a critical site from a national security standpoint. All of these sites, along with their

utilities and access, need to be protected if they can be damaged by wildfire.

Land Use

Land use planning in Klamath County (outside of the five incorporated cities of Bonanza, Chiloquin, Klamath Falls, Malin, and Merrill) is coordinated through the Klamath County Planning Department. Chapter 50 of the Klamath County Land Development Code describes the different Land Use Zones used to classify lands within Klamath County. Chapter 50 defines the purpose of each zone, and specifies the types of land uses appropriate for each. Additionally information such as minimum lot sizes, residential densities, building dimensions, access and landscaping requirements are identified.

The Oregon State Fire Marshal adopts the International Fire Code as the Oregon Fire Code every 3 years. The Oregon Fire Code regulates fire apparatus access and fire fighting water supplies. Where the County Land Use Code or County Public Works Ordinance specifies requirements that are different than the Oregon Fire Code; the County Ordinance supersedes the Oregon Fire Code.

Article 69 of the County Land Use Code includes regulations for the construction of County roads and water supplies that supersede the Oregon Fire Code. However, private roads and driveways must be constructed to meet the requirements of the Oregon Fire Code since the County Ordinances do not apply to them. Generally, the Oregon Fire Code requires private access roads to be a minimum of 20 feet wide, have a clear vertical height of 13 feet 6 inches above the driving surface, provide an all weather surface capable of supporting a 60,000 pound fire apparatus and have a maximum grade of 10%. By working together, the conflicts between Article 69 of the County Land Use Code and the Oregon Fire Code can be reduced or eliminated.

With the implementation of Measure 37, many Land Use Codes may not be applicable to parcels of land that were owned by residents prior to specific land use code implementation date(s) as provided for in State and Local regulatory waivers per the measure. However development regulations related to Health and Safety (such as fire and life safety), are exempt from Measure 37. Also, Measure 37 does not affect implementation of county building and health ordinances. These health and safety ordinances can be an effective way to ensure that homes and other developments are built with fire safety in mind.

Current and future collaboration between the Klamath County Community Development - Planning Division and the Fire Defense Board can help to ensure that future housing developments are created with fire safety in mind, including important items such as the availability of water, access for fire engines, and defensible space around homes.

Insurance Services Office - fire hazard rating and local insurance information

The Insurance Services Office (ISO) is one of several fire hazard rating companies that have systems to rate the fire hazard of a particular home or structure. Numerous factors are considered in the rating systems, including distance to fire hydrants and fire stations, type of firefighting equipment and personnel available, and fire department organization. The lower ISO hazard ratings yield lower fire insurance premiums.

Before a community can receive an ISO Public Protection Classification Rating (PPCTM), the community must have at least these minimum facilities and practices:

Organization
The community must have a fire department, organized permanently under applicable state or local laws. The organization must include one person responsible for the operation of the department, usually with the title of "chief."

The fire department must serve an area with definite boundaries. If a community does not have a fire department operated solely by or for the governing body of that community, the fire department providing such service must do so under legal contract or resolution. When a fire department's service area involves more than one community, each of the communities served should have a contract.

Membership
The department must have sufficient membership to assure the response of at least four members to fires in structures. The chief may be one of the responding members.

Training
The fire department must conduct training for active members, at least two hours every two months. Most of the Klamath County fire departments exceed this minimum requirement.

Alarm notification
Alarm facilities and arrangements must be such that there is no delay in the receipt of alarms and the dispatch of firefighters and apparatus.

Apparatus
The department must have at least one piece of apparatus meeting the general criteria of National Fire Protection Association (NFPA) Standard 1901, Automotive Fire Apparatus.

Housing
The department must house apparatus to provide protection from the weather.

If the community does not meet these minimum criteria, ISO will assign the community a Class 10, the highest rating in the ISO system.

Other criteria

ISO's Fire Suppression Rating Schedule (FSRS) — the manual ISO uses in reviewing the firefighting capabilities of individual communities — lists other minimum criteria for receiving particular PPC ratings:

- Minimum criteria for Class 9
- Minimum criteria for Class 8B
- Minimum criteria for Class 8 or better

Maintaining the local fire departments at a level that meets or exceeds the ISO personnel and equipment criteria for higher ratings is very important for both community fire protection as well as helping to control the insurance costs for the local homeowners.

Planning Process

The planning process as outlined in the document: A Framework for Community Fire Plans (Oct 2004), and Preparing a Community Wildfire Protection Plan (April 2005) and other CWPP documents and example plans guided the completion of the Klamath County CWPP. Additional sources of information, both documents and websites, can be accessed from the Appendices page.

The initial meeting to discuss the development of a Klamath County CWPP was held on August 4, 2005. This meeting was attended by a wide variety of people from local, county, state and federal agencies, departments and the private sector. link to agenda Many of the attendees were in the process of developing CWPP documents for individual communities. The concept of a county-wide CWPP was introduced and agreed to by those attending.

A schedule of meetings were held through the process of defining, developing and assembling the Klamath County CWPP. The notes from the meetings can be viewed by clicking: KC CWPP meeting notes.

Description of Partners and Committees

The Klamath County CWPP was a group effort. Participants agreed in an early meeting that the Klamath County Fire Defense Board would be a logical group to focus this effort. All of the county fire chiefs and many agency fire managers sit on this board.

As the CWPP effort became more organized individuals were selected by the group as members of the core team or stakeholders. A meeting facilitator was identified to keep the meetings on track with the agenda objectives. Facilitation of the meetings enabled documentation of topics, debate and conclusion.

Description of Community Fire Committee

The core members of the committee are either currently career fire professionals working for departments or agencies, or have completed a career in the occupation and are now active as consultants. Many interested private parties and agency personnel attended the initial meeting and are listed with the core team as stakeholders. This committee agreed early in the process that the Klamath County CWPP would ultimately be more than a document. The goal was to bring data and information into the process that would have tactical application after the plan was published.

A full list and contact information for all the active partners involved in the development of this Klamath County CWPP is in the Appendices chapter.

KC CWPP meeting, January 12, 2007 (WFT, Inc.)

Collaboration and Community Outreach

Collaboration was achieved from the beginning of this project. The participants in the meetings included fire specialists with local experience exceeding 25 years in many cases, to recently arriving employees of departments and agencies. A consensus process guided decisions.

The Klamath County Fire Defense Board was a pivotal group as a focal point for collaboration on this CWPP. As the CWPP neared final draft stages plans were made for public meetings and a presentation of the final copy and GEOBOOK to the Klamath County Commissioners.

Public distribution of the GEOBOOK and printed copies of the CWPP is planned. This release will be timely as the initial public meetings for Oregon Senate Bill 360 Implementation in Klamath County are scheduled in late May of 2007. Several of the people involved in preparation of the Klamath County CWPP also are involved with the Klamath County Forestland-Urban Interface Fuels Classification Committee. The Klamath County CWPP will supply supporting information for WUI property and homeowners.

Fire Hazard

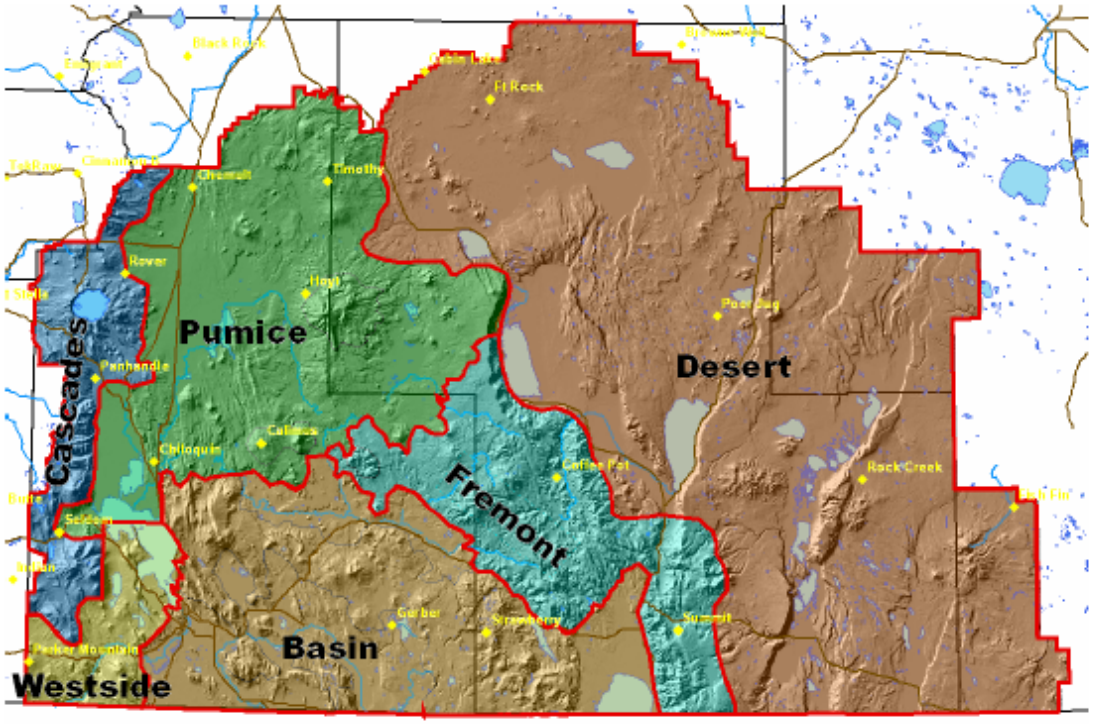
Fire hazard is defined by the National Wildfire Coordination Group (NWCG) as: *a fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control*. Thus, fire hazard is directly related to the physical properties of fuel. The presence of fuel does not define a degree of fire danger or fire behavior potential. Other factors, specifically, weather and topography must be factored into the equation. More definitions are available in the NWCG Glossary of Wildland Fire Terminology.

Fire behavior was discussed in the Introduction section of this document. Fire behavior is the combined result of current environmental factors. NWCG defines fire behavior as: *the manner in which a fire reacts to the influences of fuel, weather and topography*. Fire behavior prediction models calculate fire behavior characteristics under a set of environmental conditions (e.g. wind, temperature, etc.) for a relatively short period of time, typically a few hours.

In order to monitor changes in fire potential over months at a time and compare one season on a relative scale to another season, a National Fire Danger Rating System (NFDRS) was developed. NWCG defines fire danger as: the *sum of constant danger and variable danger factors affecting the inception, spread and resistance to control, and subsequent fire damage; often expressed as an index.*

Klamath County is a large land area with a wide range of topographic conditions resulting in a variety of vegetation patterns and micro-climatic weather conditions. To address these changing conditions in a county-wide plan requires some understanding of the differences in overall fire danger across in the county. Fortunately, a study and resulting document already exists. A joint effort of the U.S.F.S. Fremont-Winema National Forests, the Oregon Department of Forestry Klamath-Lake District, and other federal agencies in Klamath and Lake County, is the South Central Oregon Interagency Fire Danger Operating Plan (SCOFDOP). This document contains detail on the variations in weather, vegetation and fire danger across approximately 9.2 million acres. link

In this plan, fire danger rating areas were delineated across the defined landscape. Klamath County contains the Cascades, Westside, Basin, Pumice and a small portion of the Fremont fire danger rating areas. The highest elevation is located in the Cascades at 9,036', and the lowest elevation is in the Westside at 2,759', in the Klamath River canyon. Obviously, fire danger will vary on any given day between such elevations.



SCOFDOP Fire Danger Rating Areas map

In the above illustration, South Central Oregon is divided into Fire Danger Rating Areas. The following are condensed descriptions of the areas, the forest type within them and the fire behavior fuel models found in the respective areas.

Cascades – Mostly true Fir and Hemlock forests. In the south includes some Pine forest and regeneration. Fire Behavior Prediction System (FBPS) fuel model 8. More information about fuel models can be found by clicking the blue link.

Pumice – Mostly Ponderosa-Lodgepole Pine forests on pumice soils, quite a lot of pine forest regeneration on industrial timberland. Understory vegetation commonly consists of brush such as manzanita or bitterbrush, and/or grasses. Pumice soils are likely a key microclimatic factor for this area due to rapid gain and loss of temperature. FBPS fuel models 2, 6, 9.

Fremont – Mostly Ponderosa Pine forest and woodland with some mixed conifer forest. Understory vegetation commonly consists of brush such as manzanita or bitterbrush, and/or grasses. FBPS fuel models 2, 6, 9.

Westside - Mostly Ponderosa Pine forest and woodland. Much of the forest in regeneration or younger age class. Understory vegetation commonly consists of brush such as manzanita or bitterbrush, and/or grasses. Grasses common in Klamath River canyon. FBPS fuel models 2, 6, 9.

Basin – There is a wide variety of fuel types in this area. In the north, the Sprague River valley has a significant amount of sagebrush and Juniper woodland. To the south of the Sprague River is Ponderosa Pine woodland and mixed conifer woodland. Much of the Klamath and Goose basins are agriculture with sagebrush and juniper woodlands. FBPS fuel models 2, 6, 9.

The South Central Oregon Interagency Fire Danger Operating Plan (SCOFDOP) was used to determine weather zones and define the weather stations used for development of fuel moisture values and wind speeds for use in the fire behavior prediction model FlamMap. This software produces maps indicating fire behavior characteristics across a landscape based on GIS and environmental (weather) inputs. WUI communities were located within their respective Fire Danger Rating Areas (FDRA) in the SCOFDOP. The appropriate weather station data was used to determine percentile weather values.

This plan is prepared to assist the Klamath County fire protection departments and agencies make tactical decisions during extreme fire behavior episodes. To better illustrate these scenarios, the 97th percentile weather was used to make fire behavior predictive products in FlamMap. Daily weather observations from remote automated weather stations (RAWS) were queried in software called Fire Family Plus. 97th percentile weather would be the 3% worst-case values in the data set spanning 20 years.

It should be noted that wind speeds acquired from these weather stations are based on a 10 minute average. The reader should be aware that winds in the wildland environment can exceed the wind speeds used, even the 97th percentile values. The author researched wind gust data and found that average wind speeds of 10-15 mph are often associated with gusts of 2 to 3 times that speed. The gusts described are associated with the most extreme fire behavior episodes documented. Wind speeds shown are recorded at 20 feet above the vegetative layer. Eye level winds are significantly reduced by the friction associated with winds penetrating a forest canopy. Extreme fire behavior such as active crown fire is associated with higher wind speeds, provided all the other fire environment elements are present, such as low fuel moistures.

The following table shows the WUI communities, the SCOFDOP Fire Danger Rating Area and associated RAWS, or weather station used to generate weather data.

WUI Community	Fire Danger Rating Area	Weather Station (RAWS)
Bly	Basin	Gerber
Chemult	Pumice	Chiloquin
Chiloquin	Pumice	Chiloquin
Keno	Westside	Parker
Klamath Falls	Basin	Gerber
Lake of the Woods	Cascade	Seldom
Mid-County	Basin	Gerber
Rocky Point	Pumice (Cascade)	Chiloquin (Seldom)
Sand Creek	Pumice	Chiloquin
Walker Range	(Pumice)	Black Rock

After matching the WUI communities in this plan to a weather station the weather files for many years, 1986 through 2005 were queried in software called Fire Family Plus. The weather observation data was used to calculate the 97th percentile values needed to generate fire behavior output displays in other software called FlamMap. This software allows a display of a particular fire behavior characteristic, such as rate-of-spread, to be displayed across a large landscape simultaneously. The fire behavior calculations require dead fuel moisture and live fuel moisture values, plus windspeed to generate fire behavior outputs. The following table shows the 97th percentile values for the inputs to the fire behavior calculations by weather station. More information on fuels, weather and fire behavior software can be accessed by links in the Appendices.

Weather Station (RAWS)	1 hr dead fuel moisture	10 hr dead fuel moisture	100 hr dead fuel moisture	live herb-aceous fuel moisture	live woody fuel moisture	wind speed at 20 feet
Chiloquin	2%	3%	6%	28%	62%	16 mph
Gerber	2%	3%	6%	28%	60%	13 mph
Parker	3%	4%	5%	29%	60%	14 mph
Seldom	3%	4%	8%	37%	76%	8 mph
Black Rock	2%	3%	7%	41%	65%	16 mph

Using these inputs allows the weather associated with different parts of the county to be noted while using a common process to generate fire behavior outputs across the county. It should be noted that all of these fuel moisture values are quite low. Wind speeds are a ten minute average, thus gusts would be in excess of the value displayed here.

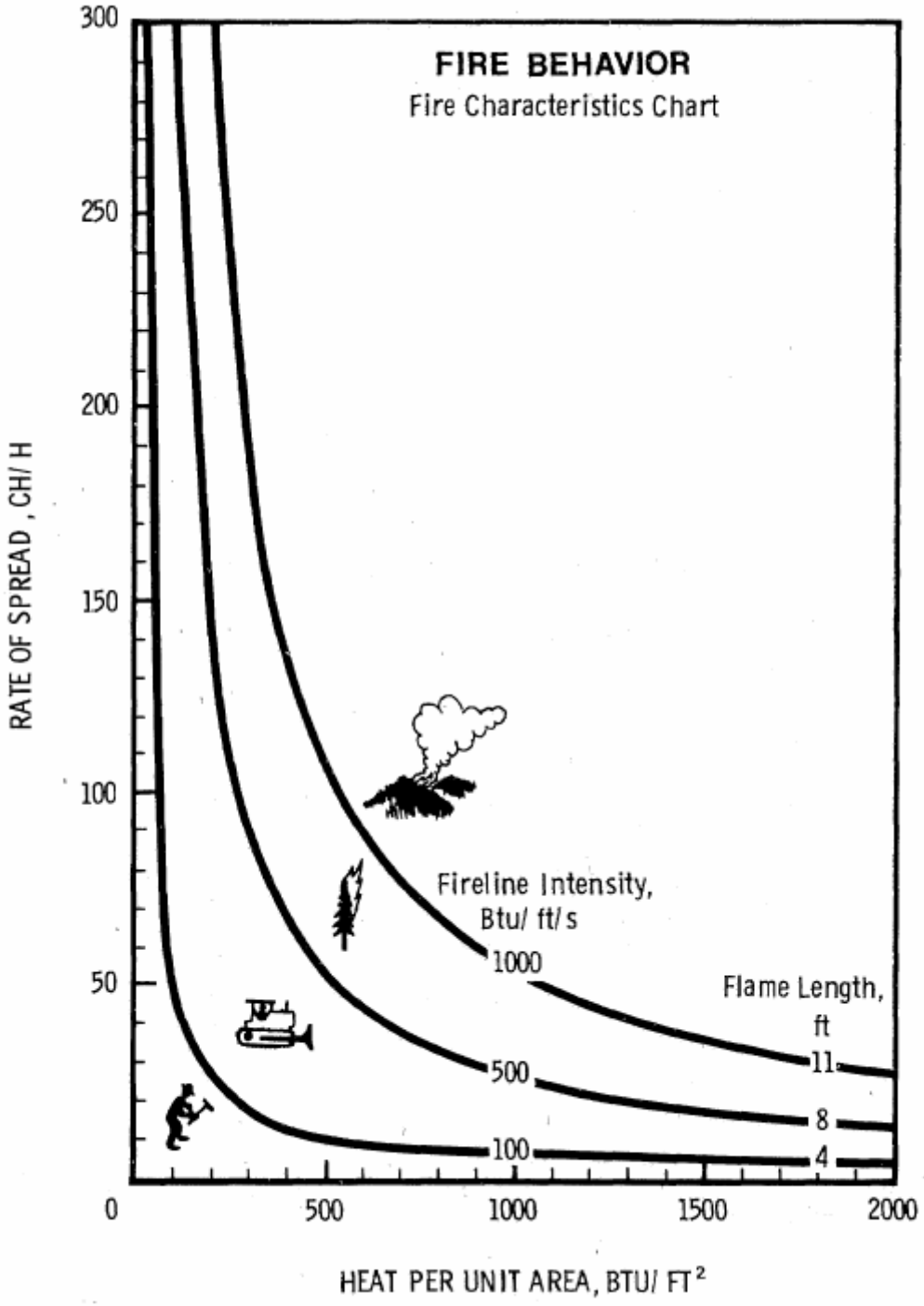
To help analyze fire behavior, researchers have classified dead fuels by sizes. The size refers to diameter of a fuel particle. Correlation of the rate of gain or loss of moisture by the size classes was completed. Studies show that a fuel particle would achieve approximately two-thirds of equilibrium with the atmospheric moisture around it within a defined time period relative to the size of the fuel. The following table displays this concept.

Fuel Size (diameter)	Timelag Category	Explanation
< ¼ inch	1 hour	A "1 hour" fuel that was bone dry would gain 2/3 of the moisture needed to reach equilibrium with the air around it in 1 hour.
¼ to < 1 inch	10 hour	
1 to < 3 inches	100 hour	
> 3 inches	1000 hour	

Using this table it would take a larger fuel particle much longer to respond to the air around it. Thus, larger fuels are slower to gain or lose moisture content over time. This concept is a key to understanding the increases and decreases in relative fire behavior potential through any given season. 1000 hr fuel values are not used in FlamMap calculations, but are displayed here for illustration of the concept.

Fire behavior outputs are displayed in the Fire Behavior Maps, in the Maps section of the Geobook. Fire behavior maps showing flame length, rate of spread and canopy fire potential are available for each WUI Community.

Flame length has been correlated to fire suppression capabilities. The chart below is taken from the document Charts for Interpreting Wildland Fire Behavior Characteristics. The chart compares Flame length and fire fighting resources. A fire exhibiting a flame length of 4 feet or less can be attacked by firefighters with hand tools. A fire exhibiting a flame length of up to 8 feet can be attacked by equipment: dozers, engines and aircraft. Fires that exhibit flame lengths over 8 feet are known to become difficult to suppress unless a change in fuel or weather occurs. Fires exhibiting flame lengths of 11 feet or more typically become very large and require significant effort and resources to suppress.

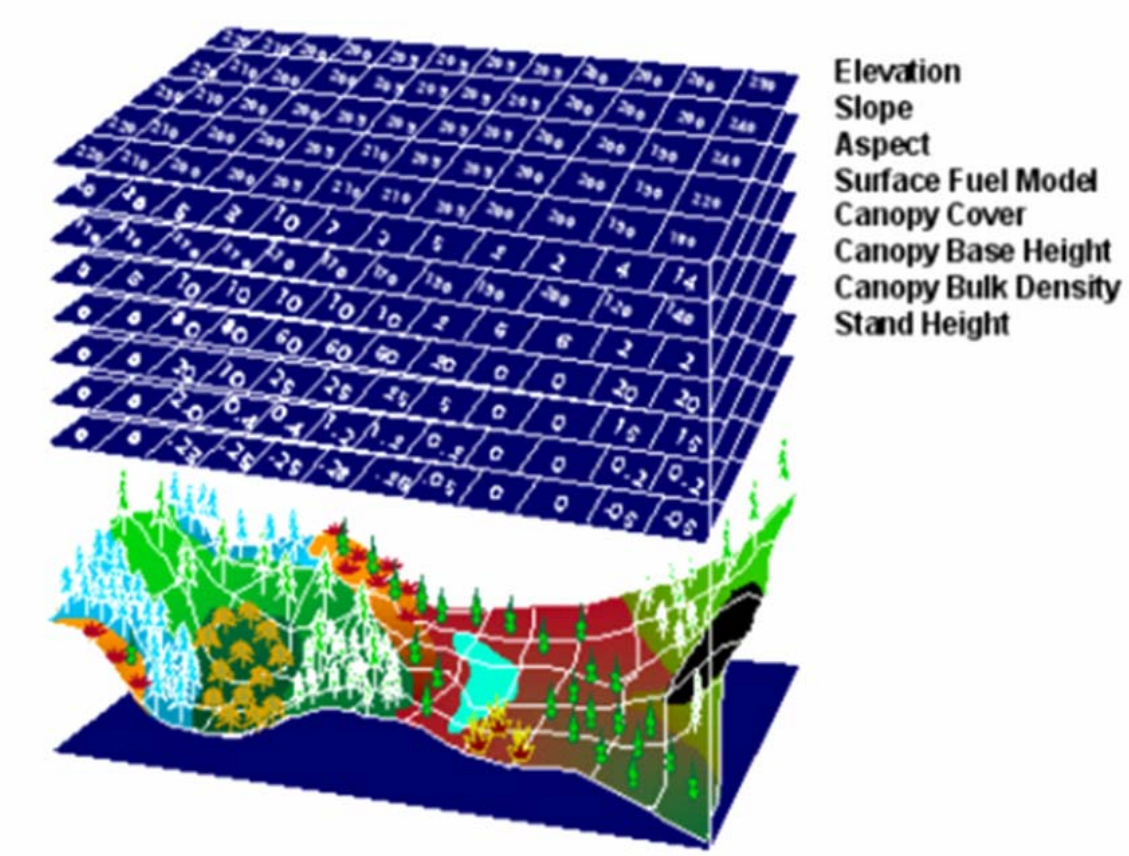

FIRE BEHAVIOR
Fire Characteristics Chart
RATE OF SPREAD, CH/H
HEAT PER UNIT AREA, BTU/FT²
Fireline Intensity, Btu/ft/s
1000
500
100
Flame Length, ft
11
8
4
0
50
100
150
200
250
300
500
1000
1500
2000

Rate of spread is the speed a fire is moving through surface fuels. Although the chart shows chains (66 ft.) per hour, this forest measurement can be roughly equated to feet per minute. Thus, a fire moving a chain an hour is moving about a foot per minute. Firefighting resources must be able to build fireline faster than a fire to contain it with a flanking attack.

Once a fire enters the canopy of a forest, fire behavior can take on another dimension. Rates of spread for canopy fires exceed the production rates of people and equipment. Crown or canopy fires exhibit extensive spotting as fire brands are lofted in the column and deposited ahead of the fire. This can occur miles in advance of the surface flaming front of the fire. Once a wildland fire has transitioned to canopy fire, a significant change in the fire environment is needed to stop it.

Canopy fire is displayed in FlamMap output maps in three levels: no spread or surface fire only (due to none or few trees), passive (where individual or clumps of trees are torching) or active (when an active canopy fire is spreading through the tree crowns unchecked). Passive canopy fire can transition quickly to active crown fire, particularly with increases in wind speed.

FlamMap will make predictions of canopy fire behavior by reading data supplied as inputs. The minimal input layers are: elevation, slope, aspect, surface fuel model and canopy cover. These layers were used in the KC CWPP. If available, FlamMap also reads input layers for canopy base height, canopy bulk density and stand height. These layers were not available for the KC CWPP. Inputs for these values were applied, results evaluated, and inputs adjusted by technical specialists to obtain more representative outputs.



The FlamMap output maps are in the Maps section of this Geobook. Separate displays of each WUI community and its associated flame length, rate of spread and crown fire type are available. The first two outputs, flame length and rate of spread, are most accurate in this analysis as the data layers to reasonably predict these outputs were available. Many of the WUI Communities have long flame length predictions, shown as dark read areas, that are associated with surface fuels of grass, some shrub and few or no trees. Wind will have a great influence in these open areas, as opposed to an area with thick trees that impede the wind.

Fire Occurrence

Throughout history, wildfires have played a key role in shaping the landscapes of Klamath County, from revitalizing forests and grasslands to clearing underbrush and weeding out weak trees. Over the last century, wildfires have been quickly suppressed and contained at the smallest possible size in order to protect forest and rangeland resources, as well as people and their homes. Today, wildfires that threaten property or other critical resources are suppressed as quickly as possible by the local firefighting forces.

Due to many years of fire suppression, logging, and other human activities, the forests and rangelands of Klamath County have changed significantly. Areas that historically experienced frequent, low-severity wildfires now burn with much greater intensity due to the build-up of understory brush and trees. As populations within Klamath County increase, so do the number of wildland fires, but the number of acres burned by wildfires each year is significantly less than what burned historically. When wildfires become large today, the landscape is often burned with very high severity; killing the trees and vegetation at all levels and causing severe resource damage.

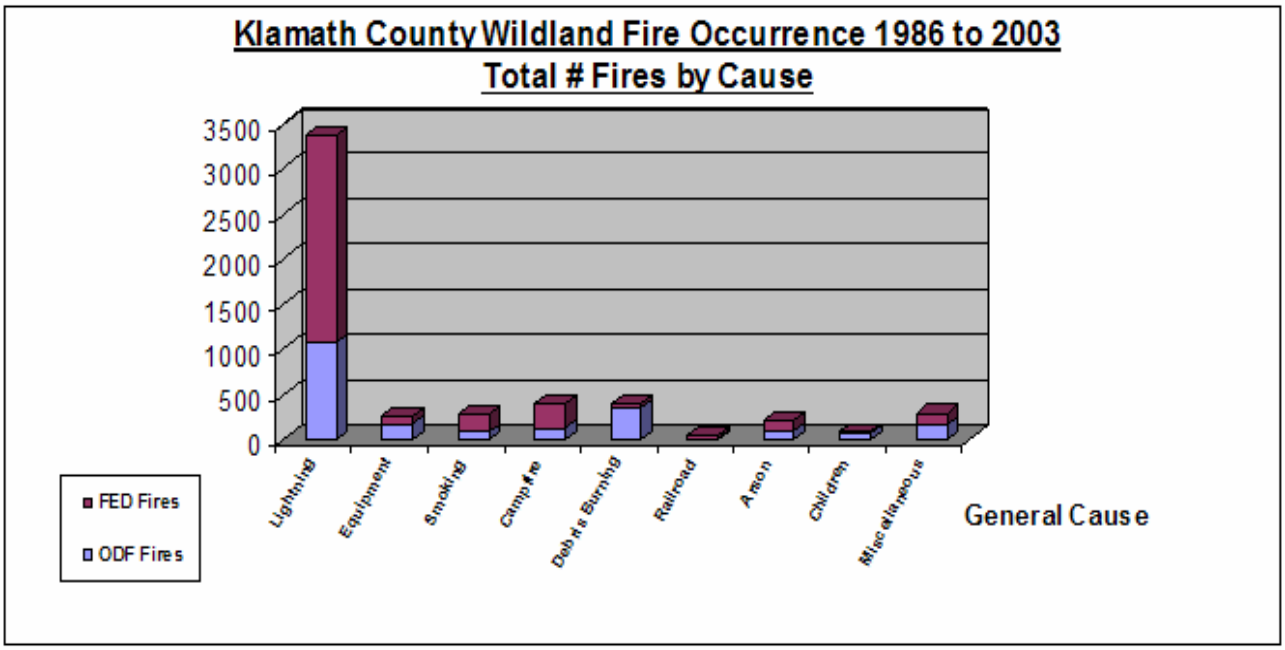
The analysis of fire occurrence data for lands within Klamath County includes the wildland fires that have occurred on Oregon Department of Forestry and Federally protected lands from 1986 to 2003. Local, state and federal firefighters suppress an average of 305 wildfires in the County each year, with 80% of them being contained at 1/4 of an acre or less, and over 97% being contained at 10 acres or less.

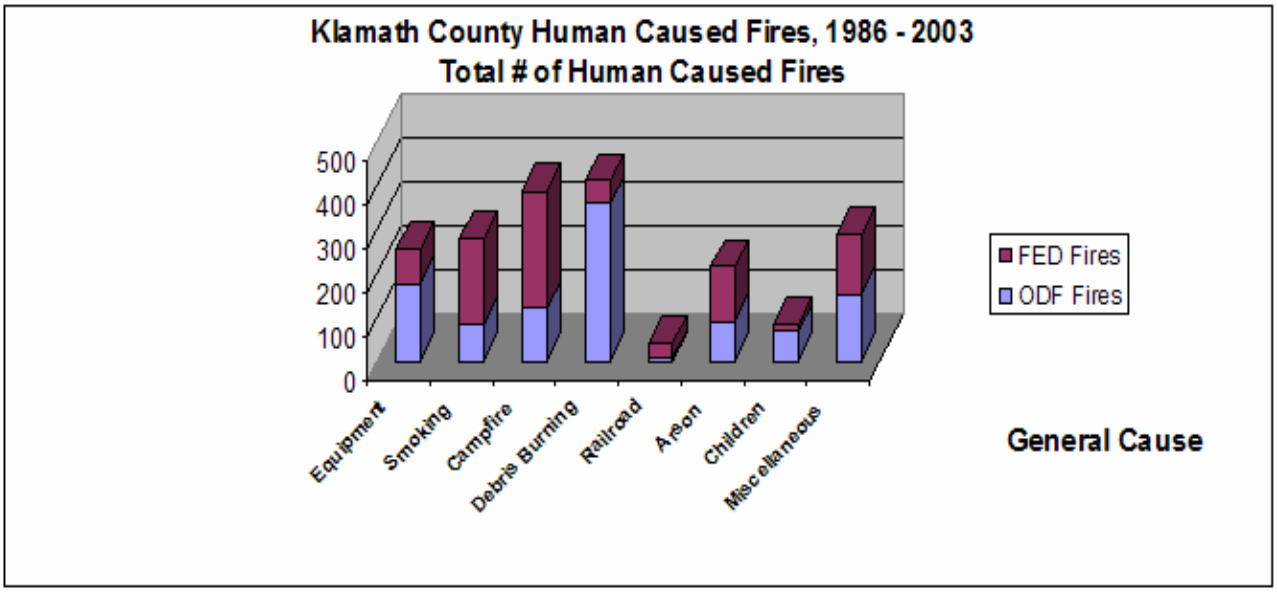
Klamath County Fire Occurrence 1986-2003		
Fire Size Class	**Description**	**% of fires**
A	0 to ¼ acres	80 %
B	¼ to 10 acres	17 %
C	10 to 100 acres	2 %
D	100 to 300 acres	< 1 %
E	300 to 1,000 acres	< 1 %
F	1,000 to 5,000	< 1 %
G	5,000+ acres	< 1 %

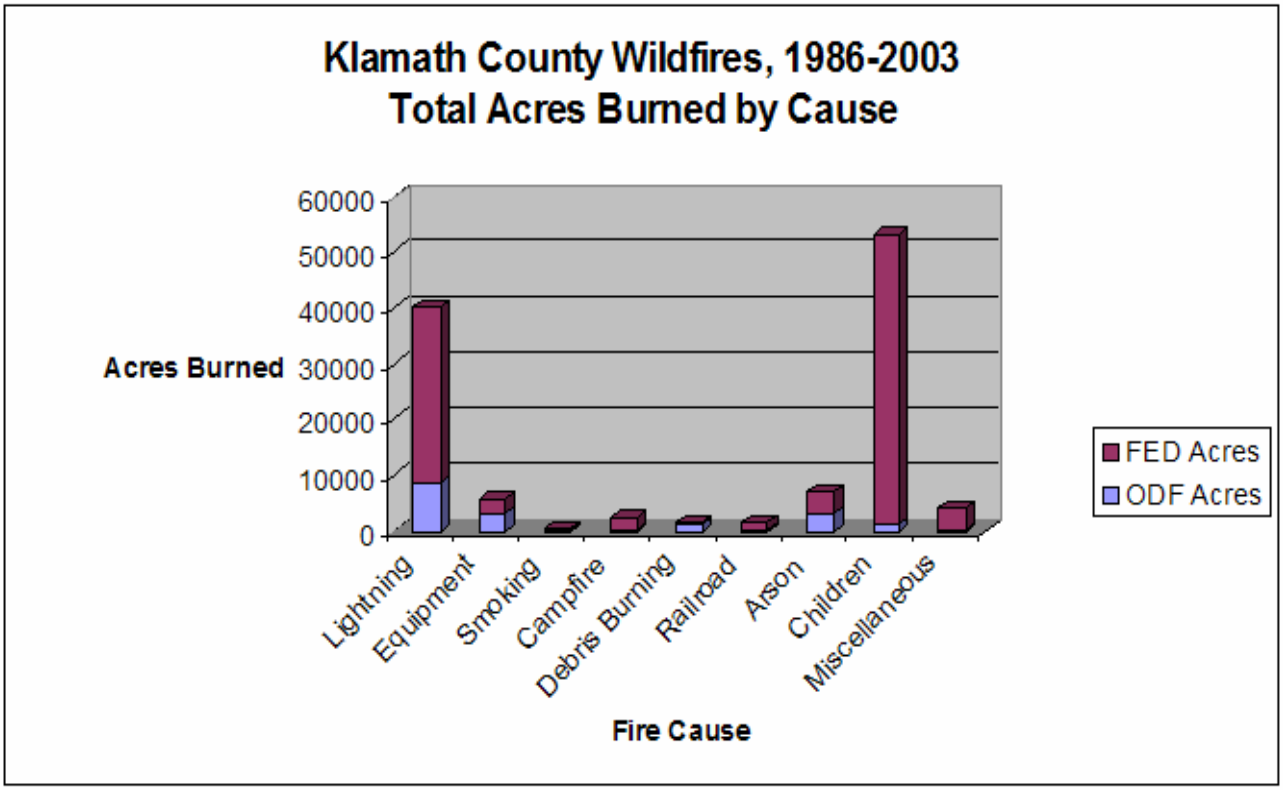
From the fire occurrence data displayed below, we can see that most wildfires in the County are caused by lightning (63%). The other 37% of wildfires are started from human activity, with smoking, campfires, and railroad being the most prevalent cause.

Klamath County Fire Occurrence 1986-2003		
Fire Cause Code	**Description**	**% of fires**
1	Lightning	63%
2	Equipment Use	5%
3	Smoking	5%
4	Campfire	7%
5	Debris Burning	8%
6	Railroad	1%
7	Arson	4%
8	Children	2%
9	Miscellaneous	5%

Human caused fires are normally of greater concern for fire managers, as they typically occur near homes or other improvements, and are not normally associated with thunderstorms like lightning caused fires. Lightning fires are often accompanied with rain or moist weather at the time of ignition, giving the wildland suppression resources a chance to suppress the fires before they become very active. A closer analysis of the historic wildfire occurrence in Klamath County shows that most of the large and damaging wildfires that threatened communities or other improvements were human caused, with children caused wildfires accounting for the most burned acres.







Railroad fires:

- Account for 2% of human caused wildfires in Klamath County, and 1% of the total acres burned within the County.
- Account for several small to medium sized wildfires each year with the point of origin typically being within the railroad right of way.
- Fire prevention efforts should focus on working with the local railroad operators to ensure that fire prevention measures are enforced, along with adequate right of way clearing to reduce the risk of railroad fires spreading into the wildland.

Campfires:

- Account for 19.7% of human caused wildfires in Klamath County, but only 2% of the total acres burned within the County.
- Most escaped campfires are suppressed at less than one acre, but a few have become large wildfires that threatened homes (Williamson Fire, 1988).
- Fire prevention efforts should focus on public education about putting campfires “dead out” and enforcement of campfire restrictions.

Smoking fires:

- Account for 14.3% of human caused wildfires in Klamath County, but only 1% of the total acres burned within the County.
- Account for several small to medium sized wildfires each year, with many of the fires being associated with mushroom picking activities in the

northern portion of the county.
- Fire prevention efforts should continue to include public education, especially with those people involved in mushroom picking activities, and enforcement of fire season restrictions.

Miscellaneous fires:
- Account for 14.7% of human caused wildfires in Klamath County, but only 3% of the total acres burned within the County.
- Typically involve power lines, welding or other causes that do not fit into the other categories.
- Fire prevention efforts should continue to focus on public education, power line right of way clearing, and enforcement of fire season restrictions.

Arson fires:
- Account for 10.9% of human caused wildfires in Klamath County, and 6% of the total acres burned within the County. The number of wildfire starts and acres burned by arson within Klamath County is significant and of major concern to local fire managers.
- Are of particular concern because the fires are typically started on high fire danger days, in areas where the arsonist feels the fire has a good chance of growing, becoming large, and causing significant damage.
- Fire prevention efforts should continue to focus on arson prevention, including the continued support of the local Arson Prevention Task Forces.

Debris burning fires:
- Account for 20.9% of human caused wildfires in Klamath County, but less than 1% of the total acres burned within the County.
- Debris burning fires typically occur at the beginning or end of fire seasons, often during times of the year when very few wildland firefighting resources are staffed. Local fire district resources often handle initial attack of debris burning fires, with a reduced or delayed response by the wildland firefighting agencies.
- Fire prevention efforts should continue to focus on public education and proper use of fire season restrictions that are based on actual observed fire season conditions.

Children fires:
- Account for only 4.3% of human caused wildfires in Klamath County, but account for 46% of the total acres burned by wildfire within the County. Children caused wildfires in Klamath County have burned more acres on average per year than any other wildfire cause. From 1986 to 2003, several large and devastating urban interface fires in the County have been caused by children, including the Lone Pine, Whopper, and Round Lake fires.
- Children caused wildfires are of particular concern due to the origins typically being near homes or other improvements, with the fires normally being started during the summer months and in the middle of the day.

- Fire prevention efforts must continue to focus on educating children and parents about wildfire prevention through school tours, Smokey Bear presentations, education booths and other ongoing public education efforts.

Equipment fires:

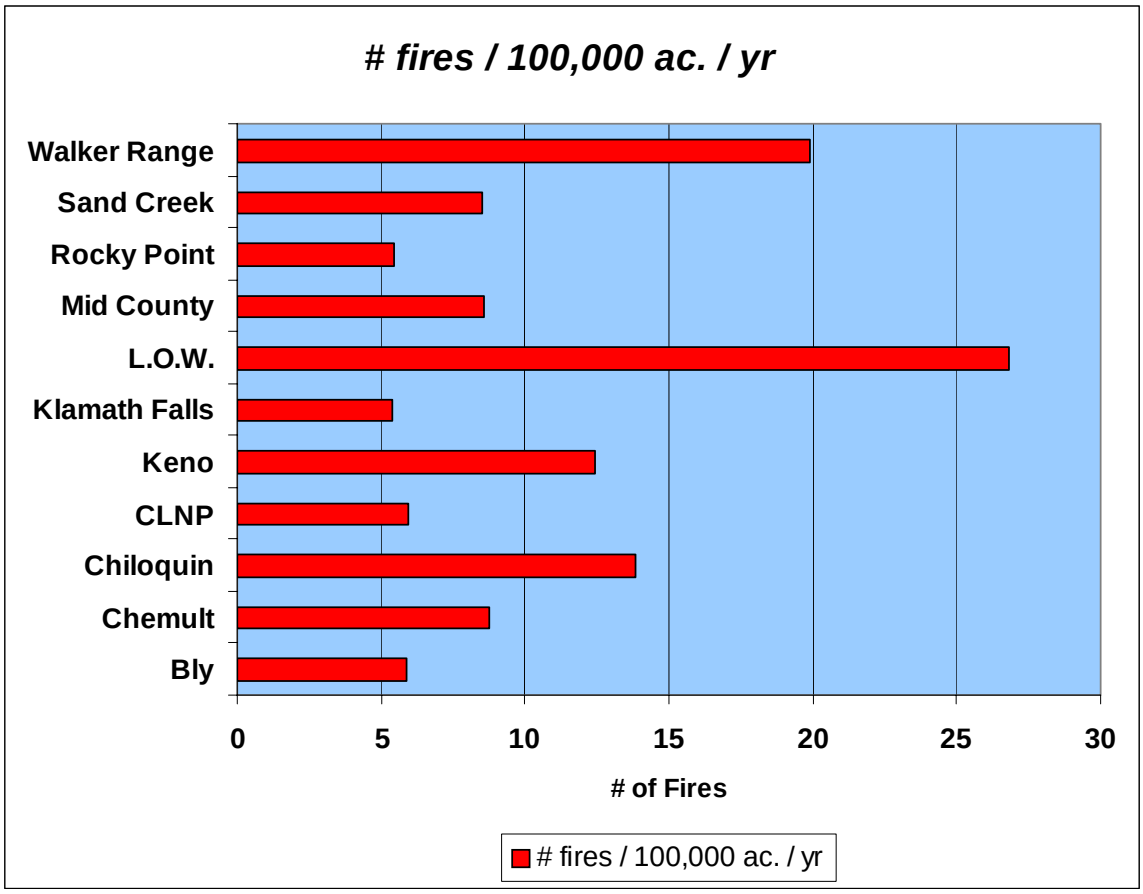
- Account for about 13% of human caused wildfires in Klamath County, and around 5% of the total acres burned by wildfire within the County.
- Equipment fires are often associated with logging or construction operations so they are normally discovered and reported in a timely matter.
- Fire prevention efforts should continue to focus on updating and enforcement of Industrial Fire Precaution requirements, timber sale contract requirements and continued inspections of forestry operations that may cause wildfire starts.

As displayed on the fire occurrence maps, numerous wildfires start within Klamath County each year with the origins concentrated around communities and the major transportation routes. While most wildfires within the County are controlled at less than an acre, a few do become very large and can threaten hundreds of homes in just a few hours. Even a small wildfire of 10 acres or less can be very devastating if the fire were to occur within, or adjacent to a community, especially in an area where homeowners have not created adequate "defensible space" around their homes.

A map of Klamath County with significant fires shown is available in the Maps section of this document, specifically in the Fire History map. It should be noted that the large fires shown are not a complete collection of the larger fires in Klamath County. There were many more large fires that digital files were not available for this project.

Fire Occurrence and Acres Burned by WUI Area

Historic Wildfires, 1986 to 2003



The chart above displays the number of wildfires per 100,000 acres per year, including all wildfires from 1986 to 2003, for each of the WUI areas of the County. Keno statistics include those fires occurring in Lakewoods. The CLNP data is for the entire park, where the small communities within the park are on federal land and at low risk to damage by wildfire. Walker Range statistics include Crescent Lake and Odell Lake areas.

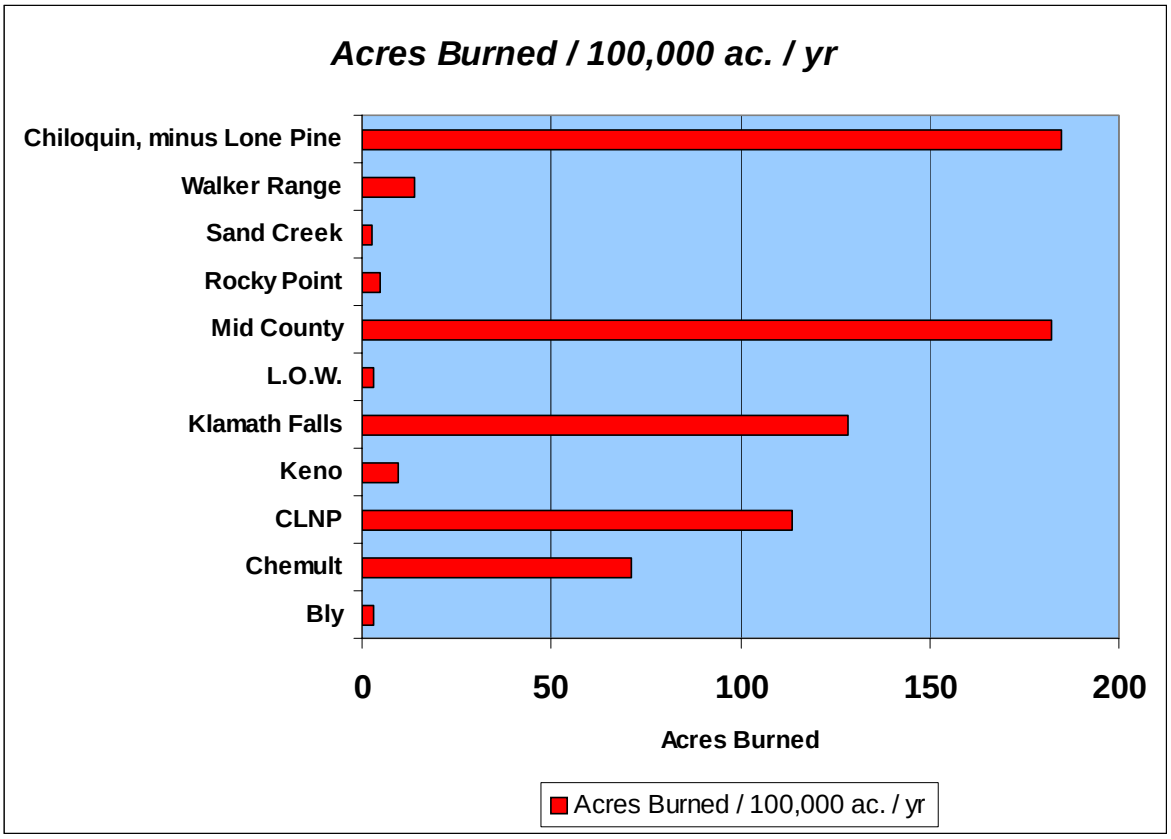
As displayed by the chart above, higher numbers of fires occur near recreation areas (L.O.W., Crescent, and Odell Lakes), but almost every part of the County has a significant number of wildfire starts each year. It was felt that no area of the County should rate as a "Low" fire occurrence area, so all areas with 10 or more wildfires per 100,000 acre per year would rate as "High" for fire occurrence, and those areas with less than 10 wildfires per year rating as "Moderate" for fire occurrence.

These statistics provide valuable information on the probability of a fire occurring, but do not provide a good indication of the severity of those wildfires. For example, numerous wildfires occur each year around Lake of the Woods (many

being escaped campfires), but very few ever become larger than 1/10th of an acre. This high frequency of reported fires is common in popular outdoor recreation sites.

Another way to look at historic wildfires is to display the numbers of acres burned per 100,000 acres per year. The chart below displays the equivalent acres burned between 1986 and 2003 on both federal and state protected lands. The selection of historic time periods to use and placement of WUI boundaries have an enormous effect on these statistics, so their usefulness in the overall ratings was in question. The Acres Burned statistics were not used in the final WUI area ratings.

Historic Wildfires, 1986 to 2003



Acres burned for Chiloquin and Mid County do not include the Lone Pine Fire of 2002. At over 30,000 acres, it was felt that this fire was an anomaly for our area, with too many outside factors influencing the final fire size. The acres burned for Crater Lake National Park (CLNP) includes wildfires that were allowed to burn with little or no suppression action taken due to a management plan that includes wildland fire use for resource benefits.

From this fire history analysis, the group has rated the different WUI communities into “moderate” or “high” categories as displayed below.

WUI community	Fire History Rating
Bly	Moderate
Chemult	Moderate
Chiloquin	High
CLNP	Moderate
Keno	High
Klamath Falls	Moderate
L.O.W.	High
Mid County	Moderate
Rocky Point	Moderate
Sand Creek	Moderate
Walker Range	High

Protection Capabilities

In the event of a wildland fire, calling 911 is critical and should be done quickly. However, homeowner fuels and hazard reduction work can save a structure before the resources arrive.

Fire protection districts are created and staffed to deal with the fire emergency needs of the property within the district. Wildland fires that threaten multiple homes simultaneously can quickly overwhelm the available fire resources.

Fuels reduction and hazard mitigation work completed by homeowners greatly increases the protection capabilities of initial response units. When a wildland fire is threatening structures, additional resources are ordered, but may be several hours away. A wildland fire can easily travel into and through a WUI community before additional responding resources can arrive. There simply won't be enough fire engines to protect all the threatened homes. Ultimately, the homes that are less vulnerable to ignition are most likely to survive. A home that is extremely vulnerable may not be able to be protected regardless of protection resources on scene.

Structural Vulnerability

Over 10,000 structures and WUI properties in Klamath County were surveyed in the Summer of 2006. The Keno Rural Fire Protection District coordinated the effort. Ten summer employees were hired from local high schools and trained to conduct the structure surveys. Two Keno RFPD fire interns supervised the data collection teams and assembled the data. Data was collected via handheld pda's (personal data assistant), each residential structure's location was logged with a GPS unit (Global Positioning System) and a digital picture of the structure was taken. All of this data is logged in a database designed by Redzone Software.

Information gathered included information about structures on each property, roof material, siding material, access, surface fuels, topographic information, utilities, etc. The complete list of information gathered can be seen in the Structure Survey document. In addition to the gathered survey information, structure location was recorded with a GPS unit and a digital photograph of the structure was taken. This information will be invaluable in the event of a future wildland fire in a Klamath County WUI community.

Individuals interested in personally assessing their property and structural vulnerability are welcome to contact their Fire Chief, or any of the contacts listed in the appendices. The document, Living With Fire is recommended reading. Those wanting a more detailed explanation of structural vulnerability to wildland fire should read "Wildland-Urban Fire - A different approach" by Jack Cohen, a recognized expert on wildland-urban structure vulnerability.

The comprehensive Hayman Fire Case Study offers further information on a major WUI fire in Colorado in 2002. This fire burned under extreme weather conditions.
The case study documents fire behavior, fuels treatments, structure ignition, economic impacts and more.

Values

People are drawn to the WUI communities in Klamath County because of the rural settings. Living in a forest without the traffic and noise associated with an urban setting is a definite draw. Many residents are seeking more privacy and space to pursue hobbies such as horses. This setting is also the source of the risk to the values represented by home, outbuildings and other, often expensive, improvements to properties.

Some small business/industry properties are scattered around the county. Most of these are related to the wood products industry. A few of these sites are co-located with residences and exist in identified WUI communities scattered across the county.

Many ecological values exist throughout the county. State and Federal agencies have compiled management plans addressing resource issues including habitat,

threatened and endangered species, soil and water quality. Environmental assessments and other documents can be accessed at the appropriate agency office. Such values at risk would be assessed during an emerging wildfire event by consultation with the jurisdictional agency representative.

WUI Hazard Rating

The process of assigning overall hazard ratings to Klamath County WUI Communities was based on several criteria. Each WUI Community was rated independently, although the rating elements were the same for all communities. Inputs to the final rating included: surface fire behavior (flame length and rate of spread), crown fire, structural vulnerability, wildland fire frequency and wildland fire intensity.

Arriving at a numerical score required several discussions and adjustments to the process as individual cases surfaced that didn't fit the logic of the process. A weighting process was applied at the end to gain separation of the ratings that was approved by the voting stakeholders. Professional opinion and expertise tempered the process.

Surface fire behavior

A rating was assigned based on composite surface fire flame lengths across the WUI. Less than 4 foot was rated Low, 4 to 8 foot was rated Moderate, and over 8 foot was rated High.

Crown Fire

Knowing that this is a highly variable element, the group arrived at consensus ratings of the potential for crown fire as displayed by FlamMap outputs. Local knowledge played as heavily in this decision, as the FlamMap input data was coarse-scale and lacked canopy fuels layers. Fire behavior experts reviewed the outputs. A rating of Low was given for a WUI with predominantly surface fire. A WUI with some passive crown fire rated Moderate, while a WUI with more passive and active crown fire behavior/potential was rated High.

Structural Vulnerability

This rating generated much discussion before consensus. The structural survey data generated a composite value for each property surveyed. A count of structures by score was compiled after establishing breakpoint scores for a rating of Low, Moderate or High.

Fire Frequency and Intensity

The shareholders reached consensus that only ratings of Moderate or High would be appropriate for Klamath County WUI communities. Variability of fire intensity due to elevation and terrain features complicates this rating. On any

given year, the higher elevation sites will tend to exhibit less intensity. WUI communities with 10 or less fires/100,000 acres/year were rated Moderate, those with over 10 fires/100,000 acres/year were rated High.

Weighting Decision

Individual element ratings scored as follows: Low = 1, Moderate = 2 and High = 3. The individual elements were weighted as follows: surface fire behavior = 4, structural vulnerability = 3, crown fire potential = 2 and fire frequency/intensity = 1. This weighting allowed separation while accounting for adequate rating of hazard. For example, much of some WUI communities have only scattered trees, yet are capable of long flame length, rapid spreading fires in grass and shrub fuels. A vulnerable structure in such a fuel condition would receive extra weighting. The same structure with canopy conditions conducive to crown fire would receive more points but on a diminishing relative value due to the weighting.

Several variations of composite scoring were evaluated until it was felt that the final rating was appropriate by consensus.

Final Weighted Rating

Review of the final weighted rating revealed some logical breakpoints in the community ratings. Consensus was achieved on the final rating on the first review of the rating table. Low: < 20, Moderate: 20-25, and High: >25.

WUI Community	Weighted Points	Weighted Rating
Crater Lake N.P.	11	Low
Lake of the Woods	12	Low
Rocky Point	20	Moderate
Lakewoods	21	Moderate
Crescent – Odell	21	Moderate
Sand Creek	26	High
Bly	26	High
Chemult	26	High
Klamath Falls	27	High
Mid County	29	High
Keno	30	High
Walker Range	30	High
Chiloquin (minus Lone Pine Fire)	30	High

Wildfire suppression capabilities

While it is important for wildland firefighting resources to arrive at fires in a timely manner, even resources that arrive an hour or two after the fire starts can be of significant value to the suppression efforts on wildland fires. Wildland firefighting resources may have long response times or limited availability during certain times of the year, especially pre and post-fire season. Many wildland firefighting resources may be unavailable or have significantly delayed response time before and after normal working hours. The local structural firefighting resources (fire protection districts) typically provide the initial response to wildland fires during these periods of limited availability.

Inventory of Wildland Fire Protection Resources

Wildland fire protection resources are categorized in the Incident Command System (ICS) by type. The tables below display the different minimum requirements for each type of resource, as outlined in the National Wildfire Coordinating Group Fireline Handbook, dated March 2004.

ICS Engines Types							
Components	***Type 1***	***Type 2***	***Type 3***	***Type 4***	***Type 5***	***Type 6***	***Type 7***
Pump min flow (GPM)	1000+	250+	150	50	50	30	10
Pump rated pressure (PSI)	150	150	250	100	100	100	100
Tank Capacity (gallons)	400+	400+	500+	750+	400-750	150-400	50-200
Hose, 2 ½" (feet)	1200	1000	-	-	-	-	-
Hose 1 ½" (feet	400	500	500	300	300	300	-
Hose 1" (feet)	-	-	500	300	300	300	200
Ladders (feet)	48	48	-	-	-	-	-
Master Stream (GPM)	500	-	-	-	-	-	-
Personnel (Min. #)	4	3	3	2	2	2	2

ICS Water Tender Types			
Components	**Type 1**	**Type 2**	**Type 3**
Tank Capacity (gallons)	5000+	2500+	1000+
Pump Capacity (GPM)	300+	200+	200+
Off Load Capacity (GPM)	300+	200+	200+
Max. Refill Time (Minutes)	30	20	15

ICS Dozer Types			
Components	**Type 1**	**Type 2**	**Type 3**
Minimum Horsepower	200 hp	100 hp	50 hp
Examples	D-7, D-8, JD-850	D-5, JD-650	D-4, D-3, JD-550

ICS Air Tanker Types				
Components	**Type 1**	**Type 2**	**Type 3**	**Type 4**
Minimum Capacity (Gallons)	3000	1800	800	100
Examples	DC-7, C130, P-3	DC-6, SP2H	S-2, CL215, CL415	Single Engine Air Tanker

ICS Helicopter Types			
Components	**Type 1**	**Type 2**	**Type 3**
Min. Payload @ sea level (lbs.)	5000	2500	1200
Min. Retardant or Water Carrying Capacity (Gallons)	700	300	100
Max. Gross Take-off/Landing Weight (lbs.)	12,501	6,000-12,500	Up to 6,000
Passenger Seats	15+	9-14	4-8
Examples	S-64, BV-107	Bell 212, 205	Bell 206

The list below displays the wildland firefighting resources that are available throughout Klamath County as of 2006. In addition to the resources listed below, numerous private contractor and cooperator fire engines, water tenders, and dozers are also available to respond to wildfires within Klamath County.

Klamath County Wildland Firefighting Resources
Federal and State Agencies

	Klamath County TOTALS*
Wildland Engines	35
Water Tenders	5
Dozers	4
20-Person Handcrews	2
10-Person Handcrews	2
5-Person Handcrews	2
Fire Detection Lookouts	8

- Totals are approximate due to periodic changes.

Aircraft and Aerial Delivered Fire Suppression Resources

It is widely accepted that Air Tankers are the single most effective initial attack firefighting resources available today. Air tankers and Type 1 helicopters can respond to distant locations in a very short time period. During extreme burning conditions, the availability of aircraft can mean the difference between a fire contained at a few acres and a fire that becomes hundreds or thousands of acres.

The availability of large air tankers and lead planes in the United States has become very limited over the last few years. Many air tankers that were available for decades are now grounded due to new requirements and regulations. This limited availability of firefighting aircraft can play a significant role in the success or failure of future wildfire suppression efforts within Klamath County.

Klamath Falls Air Tanker Base has historically been the home to two air tankers each fire season, one Type 1 and one Type 2, and one lead plane. From 2003 to present, the tanker base at Klamath Falls has been typically staffed with one Type 1 air tanker, one Type 1 Air Tactical Plane, and at times a Type 1 helicopter.

The resources listed below are either aircraft or aerial delivered firefighters such as smokejumpers or rappellers that are based in the Southern Oregon and Northern California area during each fire season. The actual number of resources may change from year to year, and personnel are sometimes moved to different locations during fire season.

Klamath Falls Interagency Fire Center, Klamath Falls
1 - Type 1 Air Tanker
1 – Type 1 Air Tactical Group Supervisor Aircraft

Oregon Department of Forestry, Klamath Falls
1 – Type 3 Helicopter

Redmond Air Tanker Base, Redmond
2 - Type 1 Air Tankers
1 - Lead Planes – Lead plane with Forest Service Pilot
1 - Type 1 Air Tactical Group Supervisor Aircraft
20+ Smokejumpers with smokejumper plane

Lakeview Interagency Fire Center, Lakeview
1 – Type 3 helicopter

Grants Pass Interagency Fire Center, Merlin
1 - Type 3 helicopter with 10+ rappellers

Medford Interagency Fire Center, Medford
1 - Type 1 Air Tanker

Redding Interagency Fire Center, Redding
1 - Type 1 Air tanker
1 - Type 3 Air Tanker
20+ Smokejumpers with smokejumper plane
1 – Lead plane with Forest Service Pilot
1 – Type 1 Air Tactical Group Supervisor Aircraft

Because of limited numbers and high demand at certain times of the fire season, aircraft are dispatched to incidents depending on the priorities established by the wildland firefighting agencies. Initial attack fires or fires that threaten life or property are always the number one priority for fire suppression aircraft use. Depending on the fire season activity and priorities for aircraft, firefighting aircraft may or may not be available for a particular incident. Aircraft can be staged at different locations throughout the western US, so the exact location of any particular aircraft is constantly subject to change.

Wildfire Detection Capabilities

Quick detection and reporting of wildfire ignitions is a key to a successful wildfire suppression program. Wildfires are often reported by private citizens to 911 or other emergency response agencies, but these individuals can not be depended on for continuous wildfire detection services. Wildfires in Klamath County are normally detected by the use of aerial patrol aircraft or lookout personnel stationed on local mountaintops. Aerial detection aircraft are often used after a lightning storm or during periods of extreme fire danger, but only on an as needed basis. The primary method of wildfire detection in Klamath County is by the use of lookouts, with most areas of the County being visible from one or more lookouts that are currently staffed each fire season.

Structural fire/rescue capabilities

Structure fires and rescue dispatches require rapid response by firefighting resources to save structures and preserve life. Local structural firefighting equipment and personnel from the nearest fire districts will be the primary fire resources responding to structure fires/rescue dispatches within the County.

Klamath County has seventeen organized fire districts and local fire departments. These fire departments have thirty fire stations located throughout the county protecting communities. These fire departments protect all of the population centers but not all structures in the county. Portions of Klamath County containing structures without organized fire protection (un-protected) are at greater risk because of limited or no response, delayed response, untrained personnel, and lack of proper equipment. Residents in un-protected areas should seek fire protection or at a minimum build defensible space around their homes and other structures.

The majority of Klamath County is protected by volunteer firefighters. The only areas protected by on-duty career firefighters are: Klamath Falls and surrounding suburbs (except Stewart-Lennox) and the Kingsley Air National Guard base.

Klamath County can assemble one structure protection task force, possibly two depending on day and time. Klamath County Fire District No. 1, Klamath County Fire District No. 4, Kingsley Field Fire Department, Keno Fire District, Chiloquin – Agency Lake Fire District, and Rocky Point Fire & EMS are the base responders

to the initial task force order. A structure task force consists of: four structural engines, one 2,000-4,000 gallon water tender, and a Task Force Leader with vehicle.

The other fire departments in Klamath County will assemble when available and also continue to protect the county. These fire departments are: Central Cascades Fire, Crescent Fire & Ambulance, Oregon Outback Fire District, Chemult Fire District, Klamath County Fire District No. 3, Klamath County Fire District No. 5, Bonanza Fire District, Bly Fire District, Malin Fire District, Merrill Fire District, and Sprague River Volunteer Fire Department. There are a total of approximately 300 structure fire personnel in Klamath County.

Water sources such as fire hydrants, lakes, rivers, canals, etc. are an important resource for fire fighting agencies. Fire hydrants and other water sources are surveyed for flow, vehicle or aircraft access, total gallons, and seasonal availability.

Inventory of Structural Fire Protection Resources

The table below is a summary of the Structural firefighting resources that were available in Klamath County as of 2005.

Klamath County Structural Fire/Rescue/Medical Resources

	Klamath County TOTALS*
Structure Engines	45
Rescue Vehicles	10
Medical Ambulance	19
Water Tender	24
Wildland Engine	26
Utility/Truck	6

- Totals are approximate due to periodic changes.

Mutual aid agreements

The Klamath County Fire Defense Board, Mutual Aid Agreement guides the sharing of fire resources between agencies and departments. The purpose of the mutual aid agreement as stated in document Introduction:

"This Agreement entered into the 24th day of April 2003, among and between the participating agencies for the purpose of securing to each periodic emergency assistance for the protection of life and property."

The mutual aid agreement outlines the types and kinds of mutual aid assistance, and operating terms and conditions for the participating agencies. Parties to the mutual aid agreement include the Oregon Department of Forestry, US Forest Service, and almost all county fire protection districts. The mutual aid agreement allows firefighting resources within the county to be utilized in a timely and expedient manner when incidents occur. The agreement outlines the resources available, payment procedures, and other agreements that allow different agencies in the county to work together regardless of the jurisdiction. Utilizing the closest and best emergency response resources for every incident is in the best interest of the public and agencies involved.

In the event that a large wildfire threatens homes, structure protection task forces may be mobilized from within Klamath County. If the fire exceeds the capabilities of the local resources, a request can be made to invoke the State Conflagration Act so resources can be mobilized from throughout the State. The Keno RFPD Fire Chief serves as the Klamath County Fire Chief under declaration of the Oregon Conflagration Act. According to the Oregon State Fire Marshals Office website:

*The Office of State Fire Marshal assists and supports the Oregon fire services during major emergency operations through the Conflagration Act (ORS 476.510). The Conflagration Act was developed in 1940 as a civil defense measure and can be invoked only by the Governor. The act allows the State Fire Marshal to mobilize firefighters and equipment from around the state and provides for the funding of resources through state funds. The Conflagration Act is **only** used for fires that involve or **threaten life and structures**.* OSFM Emergency Mobilization

Training resources and needs

Several local entities provide firefighter training, along with the training that each Fire District conducts every month. The entities listed below are the primary firefighter training curriculums that are available locally.

Klamath Community College
Oregon Institute of Technology
East Slope Training
Department of Public Safety Standards and Training (DPSST)
Oregon State Fire Marshals Office (OSFM)
Klamath-Lake Fire Training Association
Other neighboring training associations and community colleges

National fire training groups and associations sponsor and/or provide training materials and courses. A few of these are listed below.

National Fire Protection Association, NFPA

International Fire Safety and Training Association, IFSTA

National Wildfire Coordination Group, NWCG

U.S. Fire Administration, National Fire Academy

Protection recommendations

- Continue to seek opportunities to inform the public of the importance of hazard mitigation. Actively expose WUI home and property owners and/or residents to the value of completing fuels reduction as a way to increase fire protection capacity. Supply related information such as is found in Living With Fire to Klamath County WUI residents.

- As the Federal and State fire management agencies have gone to narrowband radio systems for dispatch center communications, the Klamath County fire departments will need to acquire narrowband capability. A grant proposal has been submitted for this need. For 2007 only tactical frequencies offer interoperability for all Klamath County fire resources.

- Fire Defense Board members should work with the Klamath County Community Development, Planning Division to update Article 69 of Chapter 60 and Article 70 of Chapter 70 of the Planning Department Development Standards.

- Encourage/Support protection capability organization and development in areas that have structures with no available structural protection.

- Continue to foster development of partnerships between local structure fire districts.

- Continue cross training of employees in wildland and structure firefighting.

- Continue to inventory and monitor water sources, and develop or improve sites as necessary.

- Annually update the Structure Vulnerability Surveys, ensuring that new homes and hazard reduction treatments are recorded.

- Acquire needed funding to complete the planning and construction of new fire stations as needed.

- Continue to recruit and train additional volunteer firefighters.

- Continue to invest in upgrading essential firefighting equipment such as

turnouts, breathing apparatus, radios, and rescue equipment to ensure that the County firefighters have the supplies and personal protective equipment that is required for safe firefighting and rescue missions.

- Upgrade and replace the older firefighting and rescue vehicles as they become outdated or unusable.

Current Projects and Policies

As previously mentioned, several of the communities in Klamath County have prepared individual CWPP documents. One of the goals for preparing this Klamath County CWPP was bringing together the cooperating departments and agencies and addressing the wildland fire risk to non-protected communities in the county.

Hazard fuel reduction projects have been, and are currently, being accomplished across Klamath County. Projects have included a variety of methods ranging from manual labor to specialized equipment. Prescribed fire is often used in conjunction with these other methods. This link will open a document describing a wildland fire that encountered effective WUI treatment.

By identifying the relative fuel hazard of the rural communities in Klamath County, future grant proposals could bring funding to accomplish fuels reduction in prioritized communities. The best protection for the communities without a formal fire protection district is to reduce the fuels hazard around structures.

Community strategy for risk reduction

Klamath County Fuels Strategy

Fuels reduction work in Klamath County should be guided by the following strategic priority.

1. Properties that have residential structures and/or constructed improvements.

2. Properties adjacent to parcels that have residential structures and/or constructed improvements.

3. Properties not adjacent to parcels that have residential structures and/or constructed improvements, but when treated are a segment of a larger treatment zone that offers tactical protection opportunities for the properties in priority 1.

Fuels Reduction

Excellent work has been done by individual agencies, departments and landowners. A desired outcome of this plan is to develop projects that would be a coordinated effort between all the stakeholders. By pooling expertise, personnel and equipment all of the entities would benefit from collaborative fuels reduction work. Click on the following link for more information and pictures: fuels reduction work.

Partnerships among neighboring departments, agencies and landowners have been developing in several Klamath County communities. The development of this CWPP has been an effort that has increased communication among the shareholders and other county departments.

Communities with CWPP's will continue to complete the work described in those plans as previously funded. NFP funds to communities have diminished over the last several years. Competition for these diminished funds is keen. Communities without a CWPP are not able to apply for grants. Individual property owners can pursue assistance opportunities by contacting their respective fire department or ODF office.

This CWPP, in GEOBOOK format, allows the reader to access a wide variety of information about hazard fuel reduction. Linked documents and websites offer direct access to information sources.

It is recommended that as treatments are completed that this information be entered in the structure survey database developed for Klamath County in 2006. Such information will support the efforts of ODF as Senate Bill 360 is implemented in Klamath County.

Residents of WUI communities in Klamath County that do not have formal fire protection should be aware by reading this plan of the importance of fuels reduction work. The survivability of their home when threatened by wildfire may totally depend upon the fuels reduction work done. Several sources of information about how to accomplish this work have been provided in this document.

Biomass Utilization

The US Department of Energy defines Biomass as: "*An energy resource derived from organic matter. These include wood, agricultural waste and other living-cell material that can be burned to produce heat energy. They also include algae, sewage and other organic substances that may be used to make energy through chemical processes.*"

http://www1.eere.energy.gov/biomass/student_glossary.html

From a wildland fire and fuels management perspective, the biomass material addressed is the material created from logging, thinning and other hazard reduction treatments. Often referred to as "slash", the utilization of this woody debris for energy or other products provides a double benefit to the County; utilization or marketing of the material can provide an economic benefit, and the amount of smoke emissions released into the Basin's air shed from slash burning is reduced.

The nearest biomass plant to Klamath County is Biomass One, a 25-megawatt, wood waste fired cogeneration plant, which annually recovers 355,000 tons of wood waste.

http://www.biomassone.com/

The Biomass One facility is located in White City, Oregon, approximately 70 miles to the West of Klamath Falls. Due to the plant's location, transportation costs, and other factors, utilization of this biomass facility by forest landowners in Klamath County has been limited. Trucking costs limit the distance that material can be transported, the processing site must be large enough to accommodate heavy equipment and there must be enough biomass material to outweigh the move-in and move-out costs for each site.

The Klamath County landfill site is a collection point for all waste material in the Klamath Falls area, and the County utilizes Biomass One to haul and process woody material accumulated there. Slash from logging operations within Klamath County is also utilized for biomass when it is cost effective, depending on travel distances and the quantity and quality of the biomass material that is available. From an economic viability standpoint, the primary considerations for biomass utilization within the County include; road types and travel distances to biomass facility, suitable loading and processing areas at the site, and adequate volume of material to ensure economic viability.

The planning of timber harvest or hazard reduction activities should always consider biomass utilization as a fuels disposal option. The general public can also contribute to biomass utilization by disposing of woody debris at the County landfill or other collection points.

A new biomass plant is being proposed in Lakeview, Oregon, approximately 100 miles to the East of Klamath Falls. The Lakeview Biomass Project is a *community-based, multi-stakeholder effort to develop an economically viable, ecologically sustainable biomass power facility*.

DG Energy Solutions LLC, plans to construct a 15-megawatt co-generation electrical facility that will be fueled by non-merchantable biomass from thinning operations in the nearby national forests, as well as sawmill wood by-products. The plant will feed electricity into the regional grid.

http://www.orsolutions.org/central/lakeviewbiomass.htm

Although Klamath County is currently limited in its options for creating energy from biomass, one of the most common uses of logging and thinning slash is firewood to heat homes during cold winter months. Smoke emissions are created by woodstoves, but the heat energy is also being utilized and not simply released into the atmosphere.

Logging and other hazard reduction activities produce many different types of forest products that have been effectively utilized in the past. In some locations, small trees, brush, and other slash is chipped or masticated on site and spread back out over the land to provide soil cover and nutrient cycling. Several local companies may also utilize the wood chips and mulch material for landscaping and gardens. Other small companies within the County have developed markets for forest products such as juniper and blue stained pine, creating jobs and utilizing material that previously would have been burned as slash. Posts and poles are also created from small diameter trees that are thinned or removed for fire hazard, again providing employment and a marketable product.

Industrial owners, as well as Federal agencies in the area currently are utilizing small diameter material for clean chips and hog fuel. Many efforts have been made for utilization of small diameter material historically. Such efforts will certainly continue into the future. Economic viability challenges will need to be overcome for such projects to be successful.

Education and Community Outreach

Materials and information will be distributed to the public by the business offices of the departments and agencies participating in the preparation of this CWPP. The Keno RFPD recently took delivery of a mobile command unit based on a recreational vehicle chassis. This unit will be outfitted with computers, communication capabilities, printing and copying equipment and television screens. By storing the data acquired during the 2006 structural survey of Klamath County, this vehicle can be used to support wildfire suppression efforts and other public safety emergencies. It is anticipated this unit will be used at fairs and other large public events to provide public education on the Wildland Urban Interface, hazard fuels and reduction recommendation, fire protection organizations and capabilities and more.

Monitoring and Evaluation

Prioritization Process / Coordination

During this analysis, numerous variables were considered including:

- Fuel types
- Historic Fire Occurrence
- Completed and Proposed Hazard Reduction Treatment Projects
- Vegetation and Stand Types
- Stand Conditions and Forest Health
- Values at Risk, and vulnerability of the values
- Risks to essential infrastructure
- Known areas of high fire hazard
- Access and travel routes
- Evacuation routes
- Limitations on detection capabilities
- Historic prevailing weather conditions
- Protection capabilities
- Structural vulnerability

Priority # 1

Where

The **defensible space** within 100 feet of structures or other improvements that need to be protected from wildfire. This includes lands within all communities of the County.

Why

As discussed numerous times in this plan, the number one priority for hazard reduction treatments is the defensible space within 100 feet of every home within the County. The area around the home must be the first line of defense against wildfire damage as this area provides the most benefit from the least amount of work and dollars spent, and provides the best protection for homes in the WUI.

What

Treatments in this area should focus on:

1) Defensible Space

Priority # 2

Where

High fire hazard private lands comprised mostly of vacant lots and small forested areas adjacent to homes and other improvements. This includes lands within all communities of the County.

Why

These properties are often vacant and owned by persons living outside of the fire district. An adjacent neighbor's vacant lot may be situated so that it comprises a large portion of your home's defensible space. The neighbor may not have a home on the lot, but the fire hazard must still be treated in order to fully protect your home and property. A wildfire starting in one of these high fire hazard areas can place several homes at risk almost immediately. These high fire hazard areas adjacent to homes are often a favorite place for children to play and are close to areas of high human activity; consequently these properties are constantly at risk to human caused fires.

What

Treatments in this area should focus on:

1) Defensible Space
2) 'High' fire hazard areas on vacant lots near homes
3) Complementing planned and completed projects on adjacent federal lands, where applicable.

Priority #3

Where

Wildland areas around communities with a final rating of "high" should receive first consideration. Communities that are rated moderate could still have individual parcels that require mitigation treatment.

Larger land ownerships with fuel loading that poses a threat to adjacent communities or homes.

Support and foster community involvement and desire to protect homes through landscape modifications and increasing local capacity, i.e. water source improvements, fuel breaks, extra outlets, phone trees, or other means as suggested by community members.

Implementation

Timeline for project implementation, monitoring and evaluation

Implementation of hazard reduction projects has been ongoing for many years, but has increased in 2001 after the National Fire Plan was adopted. Additional funding, such as grants and cost share programs discussed in the following section, should be aggressively pursued to help with the cost of necessary treatments.

The federal land management personnel, as required by their specific agency, will complete the monitoring and evaluation of treatments on the Federal lands.

The local Fire Chief, ODF representative or homeowners representative will be the primary entity to monitor and evaluate fire hazard reduction treatments completed on private lands. The entity responsible for fuels treatment will evaluate whether different treatments are effective, and monitor how long the treatments will be effective. Landowners are expected to maintain the hazard reduction treatments completed with cost share funds to ensure that they are kept effective as long as possible.

Inter-agency collaboration

The CWPP group encourages interagency partners to assist with continual monitoring and evaluation of current and planned projects within the County. Klamath County places high value on the input that is received from interagency partners because they each offer different expertise and perspectives unique to their discipline. Community members and personnel from local entities are invited to view different treatments that have been used within the County to learn about the treatment methods.

Identify funding for recommendations

Several different funding opportunities may become more accessible to the communities of Klamath County with the completion of this CWPP, in particular the areas not addressed in previous CWPP's. Future funding requests tied to implementation of this CWPP will help decision makers determine if the goals and objectives meet the overall County protection plan.

Numerous incentive programs are available to landowners, communities, and other entities to assist with funding for hazardous fuels reduction and community outreach and education projects. Listed below are some of the programs available in Oregon.

Major Incentive Programs available to Family Forestland Owners in Oregon:

Forest Stewardship Program (FSP) --- cost shares consultant written / ODF approved stewardship plans -- apply with your local ODF Stewardship Forester using FLEP application form.

Forest Resource Trust (FRT) --- loan / grant to cover costs (normally 100% of costs) to convert under producing forest land or marginal agricultural land into conifer forest. Applies only to DF "high" Site 4 or better sites. Apply by completing FRT application form at local ODF offices.

Forest Land Enhancement Program (FLEP) --- cost shares a variety of upland forestry practices (site prep, tree planting, non-commercial thinning, release, etc.) Apply with local ODF Stewardship Forester using FLEP application form.

Oregon 50% Under producing Forest Land Conversion Tax Credit -- state tax credit on cost of converting under producing forestland (brush land and low value / low volume forest) to well stocked forest. Apply by completing tax credit form and submitting it to the local ODF Stewardship Forester. (The form is available on the ODF/Private & Community Forests web site or at the local ODF office.) The state tax credit is available to qualified landowners and projects on a continuous basis. Proposed projects should be pre-qualified by the local ODF Stewardship Forester.

Afforestation Incentive (OAR 629-611 Forest Practices Rules) - Provides landowners an incentive to convert parcels of idle land or land in other uses to commercial forest use. Provides assurance that no state forest practices regulation will prohibit harvesting most of the planted timber established and grown as the first crop rotation. Contact the local ODF Stewardship Forester for more information.

Federal (10%) reforestation tax credit --- federal tax credit on cost of most afforestation or reforestation projects is available for project work completed before October 22, 2004. For reforestation / afforestation work done after October 21, 2004, landowners can "deduct" a certain amount of project expenses. (Note: The 10% federal tax credit has been repealed but landowners will be able to deduct some reforestation / afforestation expenses going forward from now.) Landowners need to contact the IRS or their tax professional to get the required forms and properly utilize this incentive. Additional Information can be found at: www.timbertax.org

Environmental Quality Incentives Program (EQIP) -- can cost share a wide variety of agricultural and forestry practices. However, availability of funding for upland forestry practices depends on a number of woodland owners applying for EQIP funding and actively participating in local EQIP working group. Apply for EQIP funds at local NRCS (Natural Resource Conservation Service) office.

Watershed Improvement Grants (OWEB) --- cost shares riparian (usually near stream or in-stream) work - check with local watershed counsel and / or SWCD (Soil & Water Conservation District). Grant applications are available on-line at OWEB or at the local SWCD office.

Wildlife Habitat Incentives Program (WHIP) -- cost shares a variety of wildlife enhancement practices, which can include forest establishment and thinning for wildlife purposes. Apply with local NRCS office.

Conservation Reserve Program (CRP) -- cost shares a variety of conservation practices on agricultural land including forest establishment and thinning. Pays rental on acres enrolled for ten to fifteen years. Apply at local FSA (Farm Services Agency) office.

Conservation Reserve Enhancement Program (CREP) -- cost shares primarily riparian and wetland improvement projects on agricultural land. Practices include riparian forest buffer establishment. Pays rental on acres enrolled for ten to fifteen years. Apply at local FSA office.

Community Fire Assistance:

Volunteer Fire Assistance (VFA): Assistance to Volunteer Fire Departments for equipment & supplies. Contact the local ODF office.

Rural Fire Assistance (RFA): Assistance to Rural Fire organizations for equipment and supplies. Contact the local ODF office.

Federal Excess Personal Property program (FEPP): Provides federal excess equipment and supplies to city & rural fire departments for firefighting purposes. Contact the local ODF office.

Other Programs:

Special funding for Insect & Disease control The cost share amounts vary depending on the acreage owned. It varies from 33% to 50%, with the larger landowners being eligible for only 33% of the costs. Contact the local ODF office.

Title II funding is available from the county for projects to enhance forest objectives. Contact the County Commissioners.

Monitoring

Annual updates of progress

The Klamath County CWC meetings will be held at a minimum of once each year. The purpose of meetings will be to update project progress, planning information, and to foster and continue public education and outreach. The original members of the CWC will be encouraged to participate in future meetings, and replacements will be made to the committee as necessary. The Communities will continue to collaborate with their interagency partners on hazard reduction treatments of federal lands within the County, and continue to collaborate with ODF personnel on hazard reduction projects being undertaken on private lands.

Description of monitoring and evaluation

Monitoring is a critical component of all natural resource management programs. Monitoring provides information on if a program is meeting its goals and objectives. The purpose of this monitoring strategy is to track implementation of planned activities and evaluate how the goals of the Klamath County CWPP are being met over time. The data gathered will help to determine if the objectives of the plan are being met, if updates need to me made, and if the plan is useful and being implemented as envisioned. This CWPP is a “living” document and must be continually monitored and updated as conditions and community values change.

Each functional element of the County CWPP (risk assessment, fuels reduction, emergency management, education and outreach) provides monitoring tasks for recommended action items. The table below provides a summary of monitoring task for each of these functional areas.

Summary of Monitoring Tasks

Objective	Monitoring Tasks	Who?	Timeline
Risk Assessment	Update fire occurrence and fire perimeter databases, including all state and federal fires that burn within the Fire District.	Local Fire Chief, ODF rep. or Homeowner rep.	Annually
	Update the risk assessment with new data as conditions change and new data becomes available.		Annually
	Continue to assess new values at risk and include them in the CWPP as appropriate.		Annually
Fuels Reduction	Identify and prioritize fuels treatment projects on an annual basis.	same	Annually
	Track the total acres treated through fuel reduction measures		Annually
	Track grants and utilize risk assessment data in new applications.		Annually
	Document number of residents that meet the requirements of Oregon Forestland-Urban Interface Fire Protection Act (Senate Bill 360)		Annually
	Track fuels reduction grants and defensible space projects occurring on homes of citizens with special needs.		Annually
	Track education programs and document how well they integrate fuels objectives.		Annually
	Evaluate opportunities for biomass marketing and utilization		Annually
Emergency Management	Track education efforts around emergency management	same	Annually
	Track progress on water source improvements		Annually
	Review emergency management policies and procedures, and Fire District training policies.		Annually
Education & Outreach	Evaluate techniques used to mobilize and educate citizens.	same	Annually
	Review public education and community outreach material and update as necessary.		Annually
	Random sample of "certified" homes to measure whether or not they continue to meet standards.		Annually
	Review progress of "Fire Wise" certification efforts and make adjustments as needed.		Annually

Appendices

Any comments, questions or corrections should be sent to Gene Rogers, Wildland Fire Technologies, Inc. His contact information is listed below.

Klamath County Information

Klamath County Government

Klamath County History

Klamath County Information

Klamath Falls Interagency Fire Center

The Klamath Tribes

Fire Departments and Agencies

Collaborating Departments, Agencies and Consultants Contact Information

Aspen GIS
5642 Knightwood Dr.
Klamath Falls, OR 97603
Phone: 541 850-4680
John Ritter/Sam Hamilton
email: aspengis@charter.net

Chiloquin-Agency Lake Rural Fire Protection District
P.O. Box 437
127 S. First Avenue
Chiloquin, Oregon 97624-0437
Phone: 541 783-3860
Dewaine Holster - Fire Chief
email: chilfire@centurytel.net
website: http://www.chiloquinfire.com/

i Vision Consulting
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Keno Rural Fire Protection District
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Phone: 541 883-3062
John Ketchum - Fire Chief
email: firechief@kenofire.com
website: http://www.kenofire.com

Klamath County Fire District No. 1
143 North Broad Street
Klamath Falls, OR 97601
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website: http://www.kcfd1.com

Klamath County Community Development - Planning Division
305 Main Street
Klamath Falls, OR 97601
Phone: 541 883-5121, option #4
website: http://co.klamath.or.us/ComDevelopment/Planning.htm

Klamath Fire, Inc.
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Rocky Point Fire and EMS
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U.S. Fish and Wildlife Service
Klamath Basin National Wildlife Refuge Complex
Division of Fire Management
4009 Hill Road
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U.S. Forest Service
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Ken Paul – Deputy Interagency FMO
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USDI - Bureau of Land Management
Klamath Falls Resource Area
2795 Anderson Ave. Bldg. #25
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USDI – National Park Service
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Crater Lake, OR 97604
Phone: 541 594-3000
Brad Reed – Fire Management Officer
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Wildland Fire Technologies, Inc.
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Klamath Falls, OR 97601
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Communities with completed Community Wildfire Protection Plans

- Bly CWPP
- Chiloquin CWPP
- Keno CWPP
- Rocky Point CWPP
- Walker Range CWPP
- Klamath Falls CWPP (in progress)

Existing Plans and Mutual Aid Agreements

- Klamath County Fire Defense Board Mutual Aid Agreement
- South Central Oregon Interagency Fire Danger Operating Plan
- ODF-Fremont/Winema NF Operating Plan
- ODF-BLM Cooperative Operation Agreement
- 2003-2008 BLM-ODF Contract
- Master Cooperative Fire Protection Agreement PNW Fed/State
- Northwest Operating Plan PNW Federal Agencies and ODF/WA DNR
- ODF-KCFD5 Mutual Assistance
- Oregon Conflagration Act

Referenced Documents and Materials

- NWCG Glossary of Wildland Fire Terminology
- CWPP Handbook
- 10 Year Strategy (Ten-Year Comprehensive Strategy for Reducing Wildland Fire Risks to Communities and the Environment
- Oregon Communities at Risk
- The Changing Role and Needs of Local, Rural, and Volunteer Fire Departments in the Wildland-Urban Interface, a report to the US Congress, 2003. link
- 2006 Fire Weather NW Area Operating Plan

Bibliography and Reference Materials

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Anderson, Hal E. 1982. Aids to determining fuel models for estimating fire behavior. USDA Forest Service General Technical Report INT-122, 20 p.

Andrews, Patricia L.; Rothermel, Richard C. 1982. Charts for Interpreting Wildland Fire Behavior Characteristics. Gen. Tech. Rep. INT-131. Ogden, UT: Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 1981. 21 p.

Andrews, Patricia L.; Bevins, Collin D.; Seli, Robert C. 2005. BehavePlus fire modeling system, version 3.0: User's Guide. Gen. Tech. Rep. RMRS-GTR-106WWW. Ogden, UT: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 142 p.

Cohen, Jack D. Wildland-Urban Fire - A different approach. USDA Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory, 5 p.

Fire Family Plus User's Guide, ver 3.0, 2002. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Lab, Systems for Environmental Management, 124 p.

Graham, Russell T., Technical Editor. 2003. Hayman Fire Case Study. Gen. Tech. Rep. FMRS-GTR-114. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 396 p.

Peterson, David L.; Evers, Louisa.; Gravenmier, Rebecca A.; Eberhardt, Ellen. 2007. A Consumer Guide - Tools to Manage Vegetation and Fuels. Gen. Tech. Rep. PNW-GTR-690. Portland, OR. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 151 p.

Scott, Joe H.: Reinhardt, Elizabeth D. 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. Res. Pap. RMRS-RP-29. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 59 p.

Websites pertinent to this CWPP

U.S. Forest Service - Missoula Fire Sciences Lab, http://www.firelab.org/

Redzone Software

Sanborn

Other Oregon CWPP's: http://oregon.gov/ODF/FIRE/FirePlans.shtml

Fire Management at the Klamath Basin National Wildlife Refuge Complex, http://www.fws.gov/klamathbasinrefuges/fire/index.html

Lakewoods Village, http://www.lakewoods-oregon.info/index.html

The Oregon History Project, by the Oregon Historical Society, http://www.ohs.org/education/oregonhistory/index.cfm

Preparing a Community Wildfire Protection Plan, A Handbook for Wildland-Urban Interface Communities. http://www.safnet.org/policyandpress/cwpp.cfm

Information about The Healthy Forest Initiative and The Healthy Forest Restoration Act http://www.healthyforests.gov/index.html

Federal Agency Implementation Guidance for the Healthy Forest Initiative and the Healthy Forest Restoration Act: http://www.fs.fed.us/projects/hfi/field-guide/

Field Guidance for Identifying and Prioritizing Communities at Risk: http://www.stateforesters.org/reports/COMMUNITIESATRISKFG.pdf

The National Fire Plan: www.fireplan.gov

Fire Safe Councils: www.firesafecouncil.org

Western Governors Association: http://www.westgov.org

http://bluebook.state.or.us/local/counties/counties18.htm

http://quickfacts.census.gov/qfd/states/41/41035.html

http://www.co.klamath.or.us/HumanResources/Community.htm

http://www.qualityinfo.org/pubs/lf/r11.pdf

http://www.el.com/to/klamathcounty/

http://www.isomitigation.com/

http://www.klamathfallsairport.com/

http://www.co.klamath.or.us/ComDevelopment/Planning/G.%20Chapter%205REV.pdf

Collaboration:

http://www.redlodgeclearinghouse.org

http://www.snre.umich.edu/ecomgt/collaboration.htm