



Evergreen Fire Protection District Community Wildfire Protection Plan



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Environmental Scientists and Engineers, LLC

EVERGREEN FIRE PROTECTION DISTRICT COMMUNITY WILDFIRE PROTECTION PLAN

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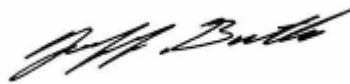
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Environmental Scientists and Engineers, LLC

Community Wildfire Protection Plan

Evergreen Fire Protection District
Jefferson County, Clear Creek County, Colorado

October, 2007

Introduction

This Community Wildfire Protection Plan (CWPP) was developed for the Evergreen Fire Protection District with guidance and support from the Jefferson County Division of Emergency Management, Colorado State Forest Service, and U.S. Forest Service. The CWPP was developed according to the guidelines set forth by the Healthy Forests Restoration Act (2003) and the Colorado State Forest Service's Minimum Standards for Community Wildfire Protection Plans (2004). This CWPP supplements the Jefferson County and Clear Creek County Annual Operating Plans and the Jefferson County Fire Plan.

Wildfire Prevention and Fire Loss Mitigation

The Jefferson County Division of Emergency Management, the Jefferson County Fire Council, and the Evergreen Fire Protection District support and promote Firewise activities as outlined in the Jefferson County Fire Plan.

Protection Capability

Initial response to all fire, medical, and associated emergencies within the Evergreen Fire Protection District is the responsibility of Evergreen Fire Rescue. Wildland fire responsibilities of local fire departments, Jefferson and Clear Creek Counties, the Colorado State Forest Service, U.S. Forest Service, Bureau of Land Management, and the U.S. Fish and Wildlife Service are described in the current Jefferson and Clear Creek Counties Annual Operating Plans. All mutual aid agreements, training, equipment, and response are the responsibility of the local fire department and the agencies listed above.

The following agencies have reviewed and agree to this Community Wildfire Protection Plan.

USDA Forest Service, Arapaho/Roosevelt National Forest

Golden District, Colorado State Forest Service

Jefferson County Division of Emergency Management

Evergreen Fire Protection District

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List of Acronyms and Abbreviations

AOP	Annual Operating Plan
BTU	British thermal unit
CAPCD	Colorado Air Pollution Control Division
CDPHE	Colorado Department of Public Health and Environment
CRWB	Crew Bosses
CSFS	Colorado State Forest Service
CWPP	Community Wildfire Protection Plan
EFPD	Evergreen Fire Protection District
EFR	Evergreen Fire/Rescue
ENGB	Engine Bosses
ERC	Energy Release Component
F	Fahrenheit
FBFM	Fire Behavior Fuel Model
FEMA	Federal Emergency Management Agency
FPD	Fire Protection District
GIS	Geographic Information System
HFRA	Healthy Forests Restoration Act
HOA	Homeowners Association
ICT	Incident Command Team
ICT3	Incident Commander Type 3
IMT	Incident Management Team
JFDRS	Jefferson County Fire Danger Rating System
mph	miles per hour
NEPA	National Environmental Policy Act
NFDRS	National Fire Danger Rating System
NFPA	National Fire Protection Association
NWCG	National Wildfire Coordinating Group
PPE	Personal Protective Equipment
PTB	Position Task Books
RAWS	Remote Automated Weather Stations
TFLD	Taskforce Leaders
USFS	U.S. Forest Service
WALSH	Walsh Environmental Scientists and Engineers, LLC
WFU	Wildland Fire Use
WUI	Wildland-Urban Interface

List of Fire Behavior Terms

Aerial Fuels	All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.
Aspect	Direction a slope faces.
Chain	A unit of linear measurement equal to 66 feet.
Chimney	A steep gully or canyon conducive to channeling strong convective currents, potentially resulting in dangerous increases in rates of fire spread and fireline intensity.
Crown Fire	The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.
Dead Fuels	Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.
Defensible Space	An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, “defensible space” is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation.
Direct Attack	A method of fire suppression where actions are taken directly along the fire’s edge. In a direct attack, burning fuel is treated directly, by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.
Fire Behavior	The manner in which a fire reacts to the influences of fuel, weather, and topography.
Fire Danger	The broad-scale condition of fuels as influenced by environmental factors.
Fire Front	The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.
Fire Hazard	The presence of ignitable fuel coupled with the influences of terrain and weather.

Fire Intensity	A general term relating to the heat energy released by a fire.
Fire Regime	The characterization of fire's role in a particular ecosystem, usually characteristic of particular vegetation and climatic regime, and typically a combination of fire return interval and fire intensity (i.e., high frequency low intensity/low frequency high intensity).
Fire Weather	Weather conditions that influence fire ignition, behavior, and suppression.
Flame Length	The distance from the base to the tip of the flaming front. Flame length is directly correlated with fire intensity.
Flaming Front	The zone of a moving fire where combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front.
Forest Improvement District	A special district created pursuant to Article 18 of the Colorado State Revised Statutes that protects communities from wildfires and improves the condition of forests in the District.
Fuel Loading	The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.
Fuel Model	Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.
Fuel Type	An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.
Fuel	Combustible material that includes vegetation such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire. Not all vegetation is necessarily considered fuel. Deciduous vegetation such as aspen actually serve more as a barrier to fire spread and many shrubs are only available as fuels when they are drought-stressed.
Ground Fire	Fire that consumes the organic material beneath the surface litter ground, such as a peat fire.
Ground Fuel	All combustible materials below the surface litter, including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame.

Indirect Attack	A method of fire suppression where actions are taken some distance from the active edge of the fire due to intensity, terrain, or other factors that make direct attack difficult or undesirable.
Intensity	The level of heat radiated from the active flaming front of a fire, measured in British thermal units (BTUs) per foot.
Ladder Fuels	Fuels that provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. Ladder fuels help initiate and ensure the continuation of crowning.
Live Fuels	Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.
National Fire Danger Rating System (NFDRS)	A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.
One-Hour Timelag Fuels	(a.k.a. one-hour fuels) Fuels consisting of dead herbaceous plants and roundwood less than about ¼ inch (6.4 mm) in diameter. Also included is the uppermost layer of needles or leaves on the forest floor.
One-Hundred-Hour Timelag Fuels	(a.k.a. hundred-hour fuels) Dead fuels consisting of roundwood in the size range of 1 to 3 inches (2.5 to 7.6 cm) in diameter and very roughly the layer of litter extending from approximately ¾ of an inch (1.9 cm) to 4 inches (10 cm) below the surface.
One-Thousand-Hour Timelag Fuels	(a.k.a. thousand-hour fuels) Dead fuels consisting of roundwood 3 to 8 inches in diameter and the layer of the forest floor more than about 4 inches below the surface.
Prescribed Fire	Any fire ignited by management actions under certain predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and National Environmental Policy Act (NEPA) requirements must be met prior to ignition.
Rate of Spread	The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, rate of forward spread of the fire front, or rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Sometimes it is expressed as feet per minute; one chain per hour is equal to 1.1 feet per minute.

Risk The probability that a fire will start from natural- or human-caused ignition.

Surface Fire Fire that burns loose debris on the surface, which includes dead branches, leaves, and low vegetation.

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

**Ten-Hour
Timelag Fuels** (a.k.a. ten-hour fuels) Dead fuels consisting of roundwood $\frac{1}{4}$ to 1 inch (0.6 to 2.5 cm) in diameter and, very roughly, the layer of litter extending from immediately below the surface to $\frac{3}{4}$ inch (1.9 cm) below the surface.

Topography Referred to as “terrain.” The term also refers to parameters of the “lay of the land” that influence fire behavior and spread. Key elements are slope (in percent), aspect (the direction a slope faces), elevation, and specific terrain features such as canyons, saddles, “chimneys,” and chutes.

Torching (a.k.a. passive crown fire) The burning of the foliage of a single tree or a small group of trees, from the bottom up.

Wildfire An unplanned and unwanted wildland fire that is not meeting management objectives and thus requires a suppression response.

Wildland Fire Any fire burning in wildland fuels, including prescribed fire, fire use, and wildfire.

Wildland Fire Use The management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in pre-defined geographic areas outlined in fire management plans.

Source: NWCG 1996

EXECUTIVE SUMMARY

The Community Wildfire Protection Plan (CWPP) is a strategic plan that identifies specific wildland fire hazard and risks facing communities and neighborhoods, and provides prioritized mitigation recommendations that are designed to reduce those hazards and risks. Once the CWPP is finalized and adopted, it is the responsibility of the community or neighborhood to move forward and implement the action items. This may require further planning at the project level, acquisition of funds, or simply motivating individual homeowners. It should be emphasized that the CWPP is a living document to be revisited on a regular basis and revised as needed.

This CWPP is not a legal document. There is no legal requirement to implement the recommendations herein. However, treatments on private land may require compliance with county land use codes, building codes, local covenants, and treatments on public lands will be carried out by appropriate agencies and may be subject to federal, state, and county policies and procedures such as adherence to the Healthy Forests Restoration Act (HFRA) and National Environmental Policy Act (NEPA).

The HFRA of 2003 provides the impetus for local communities to engage in comprehensive forest and wildfire management planning as well as incentive for public land management agencies to consider these recommendations as they develop their own strategic management plans. The HFRA provides communities with a flexible set of assessment procedures and guidelines that facilitate a collaborative standardized approach to identify wildfire risks and prioritize mitigation actions. The CWPP addresses such factors as:

- Stakeholder collaboration;
- Public agency and local interested party engagement;
- Mapping;
- Risk assessment – fuels, historical ignitions, infrastructure, structural ignitability, local resources, and firefighting capability;
- Hazard reduction recommendations; and
- Strategic action plans.

This CWPP provides wildfire hazard and risk assessments and mitigation recommendations for select neighborhoods and subdivisions within the Evergreen Fire Protection District (EFPD), situated approximately 30 miles west of Denver on the eastern slopes of Mount Evans. The elevation of Evergreen is approximately 7,500 feet and the elevation within the fire district ranges from 6,720 to 10,500 feet. As its name implies, Evergreen is a heavily forested region that is dissected by streams and expansive grassy meadows. Evergreen Fire/Rescue (EFR) serves nearly 40,000 residents across EFPD's more than 120 square miles. Subdivision characteristics range from rugged ridge top developments to luxury fairway homes. Commercial development is primarily service oriented and concentrated along primary roadways.

A wildland-urban interface (WUI) is defined as the area where development encroaches on undeveloped natural areas and represents the zone of greatest potential for loss resulting from wildfire. WUI delineations within the EFPD focus on development margins that are adjacent to open space or subdivisions that represent a common emergency response area with similar resources, risks, and hazards. Thirty such areas were identified within the District.

Natural resource management policies and changing ecological conditions have converged to create hazardous fuel situations throughout the assessment area. Decades of aggressive fire suppression practices have resulted in very dense and weakened timber stands. Years of drought have further stressed the forests, setting the stage for the devastating insect and disease infestations the area is experiencing today. Shrubs have expanded into traditional grasslands, resulting in accumulating hazardous amounts of woody ground fuel. The diversity of native grasses has succumbed to aggressive non-native species and noxious weeds. In many areas these fire-dependent ecosystems have grown unchecked by fire for more than a century. When combined with continued human development in the area, the net result is any wildfire has the capacity to become catastrophic.

Field surveys, interviews with public lands managers, and close collaboration with the EFPD and other stakeholders were utilized for data collection, hazard assessments, and treatment recommendations. All information was gathered, analyzed, and prepared in the CWPP format by Walsh Environmental Scientists and Engineers, LLC (WALSH). A project website (http://jeffco.us/sheriff/sheriff_T62_R191.htm) is maintained by Jefferson County Division of Emergency Management and provides access to the CWPP report for public review, project updates, meeting notices, and related project information. Wildland fire information and a downloadable version of the CWPP is also available from EFR at <http://www.evergreenfirerescue.com>.

The success of any CWPP hinges on community involvement, and input from local stakeholders is a required component of a certified CWPP. Although important during the writing of the plan, this type of involvement is critical when it comes to implementing recommended actions. The EFPD CWPP process included community meetings with objectives including sharing information about the CWPP process, project goals and objectives, assessment methodology, as well as facilitating communication between the Core Team, stakeholders, and District residents. Input from these meetings has been incorporated into the final CWPP plan.

Questionnaires were distributed to District residents in order to ascertain public opinion concerning the level of wildfire risk in the EFPD, evaluate values at risk, and assess mitigation practices needed to reduce risk. Safety pamphlets and brochures explaining proper home construction and landscaping practices designed to reduce the risk of wildfire were also made available. CWPP documentation is posted on Jefferson County's Emergency Management website to encourage public review and comment.

The National Fire Protection Association (NFPA) Form 1144, Standards for Protection of Life and Property from Wildfire, 2002 Edition, was utilized to assess the level of risk and hazard to individual neighborhoods. Form 1144 provides a means to assess predominant

characteristics within individual neighborhood communities as they relate to structural ignitability, fuels, topography, expected fire behavior, emergency response, and ultimately human safety and welfare. Scores are assigned to each element and totaled to determine the overall level of risk. Low, moderate, high, and extreme hazard categories are determined based on the total score. This methodology provides a standardized basis for wildfire hazard assessment and a baseline for future comparative surveys. Thirty subdivisions and neighborhoods were identified by the EFPD as areas of concern and were surveyed according to NFPA Form 1144 protocols during February and March 2007. A summary of the community hazard ratings is provided in Table ES-1.

Table ES-1. Community Hazard Rating Summary

Wildland Urban Interface ID	Subdivision(s)	Hazard Rating
5	Echo Hills	EXTREME
20	Brook Forest Estates, Upper Cub Creek	EXTREME
12	Rosedale Acres, Segar Acres	EXTREME
1	Beaver Brook Canyon, Highland Hills, Chase Subdivision, Elmgreen Acres, Pleasant Lane, Homestead Hideaway	EXTREME
21	Buffalo Park Estates, Evergreen Hills	EXTREME
7	Evergreen West	HIGH
30	Greystone Estates	HIGH
13	Independent Heights, Forest Hill, Mountain Park Homes	HIGH
18	Bear Mountain Vista, Stanley Park	HIGH
29	French Springs	HIGH
23	Cub Creek Ranch, Evergreen Highlands, North Marshner, South Marshner	HIGH
2	Soda Creek, Fox Ridge	HIGH
11	Circle K, Bendemeer Valley, Golden Willow, Greystone Lazy Acres, Bear Creek Estates, Diamond Park, Wilderness Point	HIGH
3	Beaver Brook, Beaver Brook Lodge Estates Hoffer Heights, Pine Valley Estates	HIGH
25	Evergreen Meadows East	HIGH
22	Estates of Blue Creek, Blue Creek Road	HIGH
9	Hiwan Hills, Hidden Village at Hiwan, Douglas Park, Hiwan Homestead Museum	HIGH
19	Pine Valley Estates, Hillcrest Village, Peaceful Hills	HIGH
17	Herzman Mesa, Wonderview, Pine Crest Park, Sunset Heights, High Prairie, Far View Acres, Craigmont Estates, Marshdale Park, Marshdale	HIGH
8	Tanoa, Overlook, Palo Verde, Troutdale Estates, Glen Eyrie, Bear Creek	HIGH
26	The Ridge at Hiwan	HIGH
16	Evergreen Park Estates, Evergreen Heights, Evergreen Golf Course, Evergreen Valley Estates, Columbine Road	HIGH

Wildland Urban Interface ID	Subdivision(s)	Hazard Rating
27	El Pinal, El Pinal Acres	HIGH
10	Kittredge, Quartz Mountain, Pine Valley Acres, Mountain Meadow Heights	HIGH
24	Evergreen Meadows West, Timbers Estates	HIGH
4	Hidden Valley, Ruby Ranch, Nob Hill, Avery Acres, El Rancho	HIGH
28	Wah Keeney Park	MODERATE
14	Hagan Ranch, Elk Ridge, Elephant Park, Our-Lady-of-the-Rockies, Westhaven Heights	MODERATE
15	Greenwood, Wilmot Woods, Evergreen Hill	MODERATE
6	Hiwan Country Club	MODERATE

There are many rural areas within the District that are not identified as a designated WUI. The CWPP recognizes that there are individual residences and commercial occupancies within those areas that would benefit from individualized hazard and risk assessment and targeted mitigation. While it is beyond the scope of a CWPP to develop mitigation recommendations for outlying residents, the planning process should facilitate interaction between all concerned residents with available resources that can aid with individual home and property assessments.

In addition to the larger-scale treatments recommended in this plan, the most effective wildfire hazard reduction depends largely on the efforts of individual landowners making common sense modifications to their own homes and property. In to assessment services provided by the CSFS, EFR provides hazard mitigation assessments through the Fire Prevention Division. The creation of effective defensible space and the utilization of fire-resistant construction materials will significantly reduce the risk of life and property loss in the event of a wildfire. When these common sense practices become the predominant model in a neighborhood the entire community benefits.

Familiarization and coordination with the Jefferson County and Clear Creek County Annual Operating Plans (AOPs) are also recommended. This provides important information concerning county and regional fire operations, policies, and procedure definitions. Information is available through the Clear Creek County and Jefferson County Division of Emergency Management websites.

The EFPD CWPP is a strategic planning document that is developed and approved by the Core Team. An important component of the development process includes building a stakeholder group that will move the plan forward, implement prioritized recommendations, and maintain the CWPP as the characteristics of the WUI change over time. Organizing and maintaining this team is often the most challenging component of the CWPP process. It is, however, essential in the process of converting the CWPP from a strategic plan into action. This team will oversee the implementation and maintenance of the CWPP by working with fire authorities, community organizations, private landowners, and public agencies to coordinate and implement hazardous fuels treatment

projects management and other mitigation projects. Building partnerships among neighborhood-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners is necessary in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation is a long-term effort that requires the commitment of all partners involved. The CWPP encourages citizens to take an active role in identifying needs, developing strategies, and implementing solutions to address wildfire risk by assisting with the development of local community wildfire plans and participating in countywide fire prevention activities.



Environmental Scientists and Engineers, LLC

EVERGREEN FIRE PROTECTION DISTRICT COMMUNITY WILDFIRE PROTECTION PLAN

1 INTRODUCTION

1.1 Community Wildfire Protection Plan Purpose

The Community Wildfire Protection Plan (CWPP) is a strategic plan that identifies specific wildland fire risks facing communities and neighborhoods and provides prioritized mitigation recommendations that are designed to reduce those risks. Once the CWPP is adopted, it is the community's responsibility to move forward and implement the action items. This may require further planning at the project level, acquisition of funds, or simply motivating individual homeowners.

Decades of aggressive fire suppression practices in fire-adapted ecosystems have removed a critical natural cleansing mechanism from the vegetation regeneration cycle. Fire exclusion has altered historic forest and scrubland conditions and contributed to an unprecedented buildup of naturally occurring flammable fuels. Such management tactics have also led to an alteration of prairie habitats, supporting the invasion of aggressive and highly flammable noxious weeds and grasses that, in many areas, have entirely replaced naturally occurring species. In addition, years of persistent drought have resulted in a weakened forest infrastructure and regional epidemics of disease and insect infestation. At the same time, demographic trends have shifted the nation's population growth centers to western and southwestern states where these ecosystems are predominant. The region where human development is pushing into these stressed ecosystems is known as the wildland-urban interface (WUI). This is the area where risk of loss resulting from wildfire is the greatest. The potential consequences are devastating and costly, and in recent years have drawn the attention of the U.S. Congress in the pursuit of an effective solution.

Precipitated by over a decade of increasing wildfire activity, related losses, and spiraling suppression costs, the National Fire Plan was developed by the federal government in 2000. The Healthy Forests Restoration Act (HFRA) of 2003 helps implement the core components of the plan and provides the impetus for wildfire risk assessment and planning at the county and community level. The HFRA refers to this level of planning as the CWPP process. This empowers the participating community to take advantage of wildland fire and hazardous fuel management opportunities offered under HFRA legislation. This includes a framework for hazard evaluation and strategic planning, prioritized access to federal grants supporting hazard reduction projects, and a basis for collaboration with local, state, and federal land management agencies.

1.2 Need for a Community Wildfire Protection Plan

The Evergreen Fire Protection District (EFPD) lies between 6,720 and 10,500 feet elevation in the foothills to the west of the greater Denver, Colorado, metropolitan area, straddling the Clear Creek County/Jefferson County boundary (Map 1, Appendix A). A population of approximately 40,000 resides in the numerous subdivisions and several named communities within the fire District's 120 square miles. The District is characterized by a lattice work of roads and neighborhoods in this mountainous and forested terrain. The eastern half of the District is more heavily populated, while the western portion of the District has a higher percentage of public lands. Commercial areas are concentrated along the main travel routes of I-70, CH 73, SH 74 also known as the Evergreen Parkway.

The forest, shrublands, and grasslands in EFPD have adapted to a mixture of low- and high-severity fires along a broad range of historic frequencies. It is generally acknowledged that a policy of fire suppression along the Front Range has exacerbated the potential for high-intensity wildfire.

Weather plays a critical role in determining fire frequency and behavior. A dry climate and available fuels in an area prone to strong gusty winds can turn an ignition from a discarded cigarette, vehicle parked over dry grass, or lightning into a major wildfire event in a matter of several minutes.

The EFPD is characterized by a combination of a relatively dense population, heavily utilized recreational lands and travel routes, fire adapted vegetation, and the potential for natural and human ignitions. These factors combine a degree of hazard, ignition risk, and values at risk that require serious evaluation.

The EFPD is a desirable place to live because of diverse forests, recreation, and aesthetics. However, the District is characterized by several factors that typify a hazardous WUI: aggressive development into fire-adapted ecosystems, steep topography, frequency of natural and human-caused ignitions, hazardous fuels, prolonged drought, and dry, windy weather conditions. Each identified WUI neighborhood or subdivision represents a distinct area with a unique combination of wildfire fuels, building construction, topography, access, available resources, and opportunities for fuels mitigation (Map 2, Appendix A).

The CWPP provides a coordinated assessment of neighborhood wildfire risks and hazards and outlines specific mitigation treatment recommendations designed to make the EFPD a safer place to live, work, and play. The CWPP development process can be a significant educational tool for people who are interested in improving the environment in and around their homes. It provides ideas, recommendations, and guidelines for creating a defensible space around the house and ways to reduce structural ignitability through home improvement and maintenance.

1.3 Community Wildfire Protection Plan Process

The HFRA designed the CWPP to incorporate a flexible process that can accommodate a wide variety of community needs. This CWPP is tailored to meet specific goals as identified by the Core Team, following the standardized steps for developing a CWPP as outlined in “Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities” (Society of American Foresters 2004) and the Colorado State Forest Service Minimum Standards for Community Wildfire Protection Plans (CSFS 2004). Table 1 presents the CWPP development process.

Table 1. CWPP Development Process

Step	Task	Explanation
One	Convene Decision Makers	Form a Core Team made up of representatives from local governments, fire authorities, and the Colorado State Forest Service (CSFS).
Two	Involve Federal Agencies	Engage local representatives of the U.S. Forest Service (USFS) and other land management agencies as appropriate.
Three	Engage Interested Parties	Contact and encourage participation from a broad range of interested organizations and stakeholders.
Four	Establish a Community Base Map	Develop a base map of the District that provides a better understanding of communities, critical infrastructure, and forest/open space at risk.
Five	Develop a Community Risk Assessment	Develop a risk assessment that considers fuel hazards, community and commercial infrastructure, resources, and preparedness capability. Rate the level of risk and incorporate into the base map as appropriate.
Six	Establish Community Priorities and Recommendations	Use the risk assessment and base map to facilitate a collaborative public discussion that prioritizes fuel treatments and non-fuel mitigation practices to reduce fire risk and structural ignitability.
Seven	Develop an Action Plan and Assessment Strategy	Develop a detailed implementation strategy and a monitoring plan that will ensure long-term success.
Eight	Finalize the CWPP	Finalize the District CWPP and communicate the results to interested parties and stakeholders.

The initial step in developing the EFPD CWPP is to organize an operating group that serves as the core decision-making team (Table 2). At a minimum, the Core Team consists of representatives from local government, local fire authorities, and the CSFS. In addition, the Core Team should include relevant affected land management agencies (Map 3, Appendix A) and active community and homeowners association (HOA) stakeholders. Collaboration between agencies and with communities is an important CWPP component because it promotes sharing of perspectives, plans, priorities, and

other information that are useful to the planning process. Together these entities guide the development of the CWPP as described in the HFRA and must mutually agree on the plan's final contents.

Table 2. EFPD CWPP Core Team Members

Team Member	Organization	Phone Number
Rocco Snart	Jefferson County Division of Emergency Management	303-271-4900
Allen Gallamore	CSFS	303-279-9757 x 302
Randy Frank	Jefferson County Open Space	303-271-5925
Kathleen Gaubatz	Director, Clear Creek County Office of Emergency Management	303-679-2320
Frank Dearborn	EFR	303-674-3145
Einar Jensen	EFR	303-674-3145
Peter Anderson	EFR	303-674-3145

As a strategic plan, the real success of any CWPP hinges on effective and long-term implementation of the identified objectives. The CWPP planning and development process must include efforts to build a stakeholder group that serves as an implementation team and will oversee the execution of prioritized recommendations and maintain the plan as the characteristics of the WUI change over time. Specific projects may be undertaken by individual HOAs, while larger-scale treatments may require collaboration between multiple HOAs, local government, and public land management agencies. Original CWPP Core Team representatives may, but are not required to, assist in the implementation of the CWPP action plan. Continued public meetings are recommended as a means to generate additional support and maintain momentum.

A successful CWPP utilizes relevant geographic information (e.g., Geographic Information System [GIS] data) to develop a community base map. Comprehensive risk assessment is conducted at the neighborhood or community level to determine relative levels of wildfire risk to better address hazard treatment prioritization. A standardized survey methodology is utilized to create an address-based rating benchmark for comparative future assessments and project evaluations.

CWPP fuel treatment recommendations derived from this analysis are prioritized through an open and collaborative effort with the Core Team and stakeholders. Prioritized treatments target wildfire hazard reduction in the WUI communities and neighborhoods, including structural ignitability and critical supporting infrastructure. An action plan guides treatment implementation for high-priority projects over the span of several years.

The finalized CWPP represents a strategic plan with Core Team consensus that provides prioritized wildfire hazard reduction treatment projects, preferred treatment methods, a base map of the WUI, defensible space recommendations, and other information relevant to the scope of the project.

1.4 Policy Framework

This CWPP is not a legal document. There is no legal requirement to implement the recommendations herein. Actions on public lands will be subject to federal, state, and county policies and procedures such as adherence to the HFRA and National Environmental Policy Act (NEPA). Action on private land may require compliance with county land use codes, building codes, and local covenants.

There are several federal legislative acts that set policy and provide guidance to the development of the CWPP for the EFPD:

- HFRA (2003) – Federal legislation that promotes healthy forest and open space management, hazardous fuels reduction on federal land, community wildfire protection planning, and biomass energy production;
- National Fire Plan and 10-Year Comprehensive Strategy (2001) – Interagency plan that focuses on firefighting coordination, firefighter safety, post-fire rehabilitation, hazardous fuels reduction, community assistance, and accountability; and
- Federal Emergency Management Agency (FEMA) Disaster Mitigation Act (2000) – Provides criteria for state and local multiple-hazard and mitigation planning.

The CSFS is a valuable resource that provides education and guidance to communities and individual landowners concerned with the threat of wildfire, as well as forest resource management in the WUI. EFR is another excellent resource for wildfire mitigation guidance within EFPD.

The Jefferson County and Clear Creek County Annual Operating Plans (AOPs) provide intergovernmental mutual aid agreements between local fire districts within each county and include the CSFS and USFS. These plans provide emergency response infrastructure for any large incident support.

1.5 Evergreen Fire Protection District, Community Wildfire Protection Plan Goals and Objectives

Table 3 provides a brief summary of the primary goals and objectives for the EFPD CWPP process.

Table 3. EFPD CWPP Goals and Objectives

Goal	Objective
Facilitate and develop a CWPP for the EFPD	<ul style="list-style-type: none">▪ Provide oversight for all activities related to the CWPP.▪ Ensure representation and coordination among agencies and interest groups.▪ Develop a long-term framework for sustaining CWPP efforts.
Conduct a wildfire risk assessment	<ul style="list-style-type: none">▪ Conduct a district-wide wildfire risk assessment.▪ Identify areas at risk and contributing factors.▪ Determine the level of risk to structures that wildfires and contributing factors pose.
Develop a mitigation plan	<ul style="list-style-type: none">▪ Identify and prioritize hazardous fuel treatment projects.▪ Identify and prioritize non-fuel mitigation needs.▪ Identify communities at highest risk and prioritize hazard reduction treatments.▪ Recommend sustainable initiatives at the HOA level.

Goal	Objective
Facilitate emergency planning	<ul style="list-style-type: none">▪ Develop strategies to strengthen emergency management, response, and evacuation capabilities for wildfire.▪ Build relationships among county government, fire authorities, and communities.
Facilitate public outreach	<ul style="list-style-type: none">▪ Develop strategies to increase citizen awareness and action for firewise practices.▪ Promote public outreach and cooperation for all fuel reduction projects to solicit community involvement and private landowner cooperation.

1.6 Forest Improvement District

The Colorado State legislated the Forest Improvement District (House Bill 07-11680) during the 2007 legislative session that allows for a special overlay district to be created for wildland fire mitigation. The counties of Jefferson, Clear Creek, Gilpin, and northeast Park should develop a special district to assist the counties and fire districts to meet the goals outlined within these and other CWPPs. The District's objectives will be to provide a funding base for managing mitigation projects, developing grant applications for the individual communities, developing specific mitigation plans not outlined within this document, providing a contracting process for mitigation work and providing staffing/equipment for mitigation projects.

2 WILDLAND FIRE MANAGEMENT PRIMER

Wildland fire is defined as any fire burning in wildland fuels and includes prescribed fire, wildland fire use (WFU), and wildfire. Prescribed fires are planned fires ignited by land managers to accomplish specific natural resource improvement objectives. Fires that occur from natural causes, such as lightning, that are then used to achieve management purposes under carefully controlled conditions with minimal suppression costs are known as WFU. Wildfires are unwanted and unplanned fires that result from natural ignition, unauthorized human-caused fire, escaped WFU, or escaped prescribed fire. EFR actively suppresses all wildfires, and WFU is not authorized in the District.

Wildland fires may be further classified as ground, surface, or crown fires. Ground fire refers to burning/smoldering materials beneath the surface including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame. Surface fire refers to loose fuels burning on the surface of the ground such as leaves, needles, and small branches, as well as grasses, forbs, low and medium shrubs, tree seedlings, fallen branches, downed timber, and slash. Crown fire is a wildland fire that moves rapidly through the crowns of trees or shrubs.

2.1 Wildland Fire Behavior

Fire behavior is the manner in which a fire reacts to the influences of fuel, weather, and topography. Fire behavior is typically modeled at the flaming front of the fire and described most simply in terms of fireline intensity (flame length) and in rate of forward spread. The implications of observed or expected fire behavior are important components of suppression strategies and tactics, particularly in terms of the difficulty of control and effectiveness of various suppression resources. The Hauling Chart (Table 4) is an excellent tool for measuring the safety and potential effectiveness of various fireline resources given a visual assessment of active flame length. . It was so named because it infers the relative intensity of the fire behavior to trigger points where hauling various resources to or away from an incident should be considered.

Table 4. Hauling Chart Interpretations

Flame Length (Feet)	Fireline Intensity (BTU/Ft/Sec)	Interpretation
0-4	0-100	Persons using handtools can generally attack fires at the head or flanks. Handline should hold the fire.
4-8	100-500	Fires are too intense for direct attack on the head by persons using handtools. Handline can not be relied on to hold fire. Equipment such as dozers, engines, and retardant aircraft can be effective.
8-11	500-1,000	Fires may present serious control problems such as torching, crowning, and spotting. Control efforts at the head of the fire will probably be ineffective.
11+	1,000+	Crowning, spotting, and major runs are common, control efforts at the head of the fire are ineffective.

Source: Fireline Handbook Appendix B

Fire risk is the probability that wildfire will start from natural or human-caused ignitions. Fire hazard is the presence of ignitable fuel coupled with the influences of topography and weather, and is directly related to fire behavior. Fire severity, on the other hand, refers to the immediate effect a fire has on vegetation and soils.

The characteristics of fuels, topography, and weather conditions combine to dictate fire behavior, rate of spread, and intensity. Wildland fuel attributes refer to both dead and live vegetation and include such factors as density, bed depth, continuity, density, vertical arrangement, and moisture content. Structures with flammable materials are also considered a fuel source.

Fuels are often characterized in terms of fire behavior fuel models, which are discussed in sections 3.4 and 3.5. Fuels may also be described in terms of size. The terms one-hour, ten-hour, one-hundred-hour, and one-thousand-hour timelag fuels refer to the amount of time required for the water content of the fuel particle to reach equilibrium with the ambient environment. This timelag corresponds to the diameter of the fuel particle. Each size class is individually described in the List of Fire Behavior Terms at the beginning of this document.

When fire burns in the forest understory or through grass, it is generally a surface fire. When fire burns through the canopy of vegetation, or overstory, it is considered a crown fire. The vegetation that spans the gap between the forest floor and tree crowns can allow a surface fire to become a crown fire and is referred to as ladder fuel.

For fire to spread, materials such as trees, shrubs, or structures in the flame front must meet the conditions of ignitability. The conditions needed are the presence of oxygen, flammable fuel, and heat. Oxygen and heat are implicitly available in a wildland fire. However, if the potential fuel does not meet the conditions of combustion, it will not ignite. This explains why some trees, vegetation patches, or structures may survive a wildland fire and others in the near vicinity are completely burned.

Potential surface fire behavior may be estimated by classifying vegetation in terms of fire behavior fuel models (FBFMs) and using established mathematical models to predict potential fire behavior under specific climatic conditions. In this analysis, FBFMs were determined through a combination of field evaluations and interpret satellite image. Climatic conditions were derived from local weather station records.

Weather conditions such as high ambient temperatures, low relative humidity, and windy conditions favor fire ignition and high-intensity fire behavior. Under no-wind conditions fire burns more rapidly and intensely upslope than on level terrain. The affects of terrain can be particularly pronounced in steep narrow canyons often referred to as “chimneys” due to their convective characteristics. Wind tends to be the driving force in fire behavior in the most destructive WUI fires. The “chinook” winds common along the Front Range can rapidly drive wildfire downslope.

2.2 History of Wildfire

Lightning-induced fire is a historic component of Jefferson County ecosystems, and its occurrence is important to maintaining the health of forest and open space ecosystems. Native Americans used fire as a tool for hunting, improving wildlife habitat, and land clearing. As such, many of the plant species and communities have adapted to recurring fire through phenological, physiological, or anatomical attributes. Some plants, such as Lodgepole pine and western wheatgrass, require reoccurring fire to exist.

European settlers, land use policy, and changing ecosystems have altered fire behavior and fuels accumulation from their historic setting. Euro-American settlers in Jefferson County changed the historic fire regime in several interrelated ways. The nature of vegetation (fuel) changed because of land use practices such as homesteading, livestock grazing, agriculture, water development, and road construction. Livestock grazing reduced the amount of fine fuels such as grasses and forbs, which carried low-intensity fire across the landscape. Continuous stretches of forest and open space fuels were broken up by land-clearing activities. The removal of the natural vegetation facilitated the invasion of nonindigenous grasses and forbs, some of which create more flammable fuel beds than their native predecessors.

In addition, more than a century of fire-suppression policy has resulted in large accumulations of surface and canopy fuels in western forests and brushlands. Fuel loads also increased as forests and brushlands encroached into grasslands as a result of fire exclusion. This increase in fuel loading and continuity has created hazardous situations for public safety and fire management, especially when found in proximity to communities. These hazardous conditions will require an array of mitigative tools, including prescribed fire and thinning treatments.

2.3 Prescribed Fire

Prescribed fire may be used as a resource management tool under carefully controlled conditions. This includes pre-treatment of the fuel load and close monitoring of weather and other factors. Prescribed fire ultimately improves wildlife habitat, helps abate invasive vegetation, reduces excess fuel loads, and lowers the risk of future wildfires in the treatment area. These and other fuel management techniques are employed to protect human life, economic values, and ecological values. The use of prescribed fire in the WUI is carefully planned and enacted only under favorable weather conditions, and must meet air quality requirements of the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (CAPCD). Open burning permits are obtained from Jefferson County Environmental Health Services (www.co.jefferson.co.us/health/health_T111_R38.htm).

Prescribed fire may be conducted either in a defined area, as a broadcast burn, or in localized burn piles. Broadcast burns are used to mimic naturally occurring wildfire but only under specific weather conditions, fuel loads, and expert supervision. Burn piles are utilized to dispose of excess woody material after thinning if other means of disposal are not available or cost-prohibitive.

2.4 Hazardous Fuels Mitigation

Wildfire behavior and severity are dictated by fuel type, weather conditions, and topography. Because fuel is the only variable of these three that can be practically managed, it is the focus of many mitigation efforts. The objectives of fuels management may include reducing surface fire intensity, reducing the likelihood of crown fire initiation, reducing the likelihood of crown fire propagation, and improving forest health. These objectives may be accomplished by reducing surface fuels, limbing branches to raise canopy base height, thinning trees to decrease crown density, and/or retaining larger fire-resistant trees.

By breaking up vertical and horizontal fuel continuity in a strategic manner, fire suppression resources are afforded better opportunities to control fire rate of spread and contain wildfires before they become catastrophic. In addition to the creation of defensible space, fuelbreaks may be utilized to this end. These are strategically located areas where fuels have been reduced in a prescribed manner, often along roads. Fuelbreaks may be strategically placed with other fuelbreaks or with larger-area treatments. When defensible space, fuelbreaks, and area treatments are coordinated, a community and the adjacent natural resources are afforded an enhanced level of protection from wildfire.

Improperly implemented fuel treatments can have negative impacts in terms of forest health and fire behavior. Aggressively thinning forest stands in wind-prone areas may result in subsequent wind damage to the remaining trees. Thinning can also increase the amount of surface fuels and sun and wind exposure on the forest floor. This may increase surface fire intensity if post-treatment debris disposal and monitoring are not properly conducted. The overall benefits of properly constructed fuelbreaks are, however, well documented.

The WUI is the zone where communities and wildland fuel interface and is the central focus of this CWPP. Every fire season catastrophic losses from wildfire plague the WUI. Homes are lost, businesses are destroyed, community infrastructure is damaged, and, most tragically, lives are lost. Precautionary action taken before a wildfire strikes often makes the difference between saving and losing a home. Creating a defensible space around a home is an important component in wildfire hazard reduction. Providing an effective defensible space can be as basic as pruning trees, applying low-flammability landscaping, and cleaning up surface fuels and other fire hazards near a home. These efforts are typically concentrated within 75 feet of a home but may significantly vary based on percent of slope adjacent to the structure. Recommended guidelines for creating effective defensible space are outlined in CSFS bulletin 6.302 and included as Appendix G. Defensible space is defined as an area around a structure where fuels have been treated, thinned, or removed in order to reduce wildfire intensity as it moves towards a structure, reduce the chances of a structure fire moving to the surrounding wildlands, and to provide room for firefighters to do their jobs (see Section 5.2).

While reducing hazardous fuels around a structure is very important to prevent fire loss, recent studies indicate that, to a great extent, the attributes of the structure itself determine ignitability. Experiments suggest that even the intense radiant heat of a crown

fire is unlikely to ignite a structure that is more than 30 feet away as long as there is no direct flame impingement (Cohen and Saveland 1997). Studies of home survivability indicate that homes with noncombustible roofs and a minimum of 30 feet of defensible space had an 85-percent survival rate. Conversely, homes with wood shake roofs and less than 30 feet of defensible space had a 15-percent survival rate (Foote 1996).

3 EVERGREEN FIRE PROTECTION DISTRICT PROFILE

3.1 County and District Setting

Jefferson County was established in 1861 as one of the original 17 counties created by the Colorado Territorial Legislature with a land base of 774 square miles. The county population is currently estimated at 529,401 people with approximately 184,640 people living in the incorporated areas.

Evergreen is an unincorporated community of approximately 40,000 people, and is located in the Front Range of west-central Jefferson County, west of Denver, Colorado. The EFPD is mountainous and heavily forested with a mix of conifer and deciduous trees. The elevation is approximately 6,720 to 10,500 feet. The three major highways in and around Evergreen are I-70, CH 73, and CH 74 (Evergreen Parkway). Evergreen attractions include Evergreen Lake, downtown Evergreen with its historic buildings, miles of hiking trails, the Evergreen and Hiwan Golf courses, and the close proximity to summer and winter playgrounds including Mount Evans. Winter sport activities can also be found at nearby Echo Mountain Park.

Evergreen is surrounded by thousands of acres of forested land in the Denver Mountain Parks and Jefferson County Open Space park systems. The Denver Mountain Parks located within the EFPD are Bergen Park, Corwina Park, Dedisse Park, Dillon Park, Fillius Park, O'Fallon Park, and multiple holdings scattered throughout the District. The Jefferson County Open Space parks include Alderfer/Three Sisters and Elk Meadow.

The EFPD serves 126 square miles of suburban and rural WUI. The majority of the WUI is within the Jefferson County portion of EFPD. Fifty-two square miles of the EFPD lie within east Clear Creek County.

WUI delineations focus on neighborhoods and neighborhood margins adjacent to open space or rural developments that represent a common emergency response zone with similar assets, risks, and hazards. Of the 30 identified WUI response areas within the District, many are situated in close proximity to hazardous fuels, with the primary access limited to single ingress/egress roads with steep mountainous grades.

3.2 Climate

The EFPD climate is relatively dry with the majority of precipitation occurring with spring rains and summer monsoons (Table 5). The area receives more than 220 days of sunshine per year and an average of 18.75 inches of annual precipitation. Winter high temperatures are typically in the mid 40s (degree Fahrenheit [F]) and summer highs are in the 70s and low 80s. The low precipitation months are typically December, January, and February. Fire weather conditions are discussed in Section 4.2.

**Table 5. Average Monthly Climate Summary for the EFPD
(1961-2005, Evergreen, Colorado)**

Climate Attribute	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average maximum temperature (° F)	45	46	50	57	65	75	82	80	72	63	51	45	61
Average total precipitation (inches)	0.54	0.68	1.66	2.2	2.56	2.19	2.24	2.35	1.49	1.22	0.97	0.66	18.75
Average snowfall (inches)	8.3	9.6	18.5	14.1	3.5	0.1	0.0	0.0	1.6	6.7	12.6	8.5	83.6

Source: High Plains Regional Climate Center (<http://hprcc.unl.edu>)

3.3 Topography

Topography and elevation play an important role in dictating existing vegetation, fuels, and wildland fire behavior. Topography also dictates community infrastructure design, further influencing overall hazard and risk factors. The terrain of the EFPD is mountainous with steep slopes and open valleys. The elevation of the EFPD ranges from 6,720 to 10,500 feet. The majority of communities within the EFPD are situated on steep mountainous terrain and ridge tops, though most of the commercial development is located along valley floors and is less susceptible to problematic fire behavior. Mountainous topography limits the availability of alternative evacuation routes, significantly increasing the risk of entrapment. Although ideal slopes for home sites are generally less than 10 percent, many homes in the District are perched on steeper slopes, restricting access and exposing the structures to higher intensities of fire behavior. Defensible space zones need to be expanded to accommodate steep slopes.

3.4 Wildland Vegetation and Fuels

The vegetation found in the District is typical of the Rocky Mountain montane ecosystem. Vegetation type and distribution is controlled primarily by available soil moisture, which is closely related to slope aspect. Drier south-facing slopes support open stands of ponderosa pine, shrub, and grass. The spacing of individual ponderosa trees is related to available soil moisture and may become dense in protected drainages or more shaded slope aspects.

North aspects of the montane ecosystem retain more soil moisture and support denser stands of conifer that are less drought resistant. These species include Douglas-fir, Englemann spruce, and, at higher elevations, Lodgepole pine. Depending on the elevation and localized aspect, these stands may be mixed with ponderosa pine. Montane zones with high soil moisture content may support deciduous groves of quaking aspen. Willows, blue spruce, Engleman spruce, mountain alder, water birch, and other water-loving trees may be found in riparian zones along creeks and streams. The District is also characterized by valley meadows that support a variety of high altitude grasses.

Existing vegetation is the fuel source for wildland fire and has a direct effect on fire behavior. Accurately mapping vegetative ground cover is a critical component of fuel modeling and fire behavior modeling. Understanding the fire behavior characteristics of particular fuel types facilitates effective fuels treatment strategies on a local, as well as landscape, level. Maps 4a and 4b (Appendix A) illustrate FBFMs that are derived from spectral analysis of vegetation from satellite imagery and ground truthed through field surveys. Map 4b is derived from the assessment of SPOT multispectral satellite imagery (19-meter resolution) and classified using remote sensing techniques that recognize specific reflected spectral signatures of vegetation and other ground cover types. FBFM data from the LandFire project is included as Map 4a due to cloud and cloud shadow cover in the available SPOT image. LandFire is a shared project between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior. LANDFIRE data products are designed to facilitate national- and regional-level strategic planning and reporting of wildland fire management activities. LandFire FBFMs are classified utilizing Landsat multispectral satellite imagery (30-meter resolution).

FBFMs are utilized in predictive fire modeling which is an important component in a variety of strategic and tactical applications including risk and hazard assessments, pre-attack planning, initial attack, extended suppression, prescribed fire planning, and predictive modeling of active wildfires.

BehavePlus fire behavior modeling software was utilized for this assessment. By inputting several user-defined parameters including FBFM, fuel moisture, weather, and slope, expected rates of spread, associated flame lengths, and fire intensity can be determined. These are important factors in any tactical or strategic fire management decision. Fire behavior analysis is detailed in Section 4.2.

There are several systems for classifying fuel models. This CWPP utilizes the most commonly used fuel modeling methodology as developed by Hal E. Anderson (1982). Thirteen FBFMs are presented in four fuel groups: grasslands, shrublands, timber litter and understory, and logging slash. Each group comprises three or more fuel models. Of these 13 fuel models, FBFMs 1, 2, 4, 5, 6, 8, 9, and 10 are the most prevalent in the EFPD assessment area (Table 6).

Table 6. Fuel Models Common to the EFPD
(Fuel models most prevalent in EFPD are shaded)

Group	FBFM Number	Description
Grasslands	1	Short grass (1 foot)
	2	Grass with timber/brush overstory
	3	Tall grass (2.5 feet)
Shrublands	4	Mature brush 6 feet)
	5	Young brush
	6	Intermediate or dormant brush

Group	FBFM Number	Description
	7	Southern rough
Timber Litter and Understory	8	Closed or short-needle timber litter – light fuel load
	9	Hardwood or long-needle or timber litter
	10	Mature/overstory timber and understory
Logging Slash	11	Light slash; closed timber with down woody fuel
	12	Medium slash (35 tons/acre)
	13	Heavy slash (200 tons/acre)

Source: Anderson 1982

Grasslands, FBFMs 1 and 2

Grass fuels are most common on south-facing slopes and valley meadows. On many forested slopes with a south-facing aspect, grasses may mix with open ponderosa pine and shrub to form a vegetative understory. The short- and mid-grass species common to this area include blue grama, western wheatgrass, needle-and-thread, and prairie Junegrass. These western annual grasses are adapted to the relatively frequent disturbance of fire and benefit from fast moving, “cool” fire because it removes excess dried biomass and adds nutrients to the soil. In the absence of these periodic fires, the accumulation of thatch and woody material and the encroachment of brush increases surface fuel loads, increasing the probability of high-intensity surface fires.

Historic fire return intervals for these grasslands range from approximately 10 to 35 years, allowing for a rapid departure from the historic fire regime conditions when fire is excluded. Fire exclusion also encourages shrub and noxious grass and weed encroachment. Cheatgrass, also known as downy brome, is an aggressive invasive grass species that is now common throughout the state and region. It exhibits higher fire intensity than other native grasses. Despite its early growth and rich color, cheatgrass provides poor nutrition for livestock, deer, and elk.

Although brush and timber fires are known for intense fire behavior, the potential impact of grass fires should not be underestimated. These light, flashy fuels can be resistant to suppression, producing incredibly rapid rates of spread, and flame lengths in excess of 10 feet. They can pose a very real risk to firefighter safety and a serious threat to untreated homes.

Open prairie, grassy slopes, and irrigated meadow and lawns are characterized as FBFM 1. Grassy understory of ponderosa pine mixed with other herbaceous fuels that would carry a surface fire is defined as FBFM 2.

Shrublands, FBFMs 4, 5, and 6

Shrub stands are most common on south slope aspects and meadow margins throughout the District. Mountain mahogany is the dominant shrub species in the northern two-thirds and oakbrush is dominant in the southern one-third of the District. Areas where conifer is aggressively regenerating are also classified as shrublands based primarily on density and height of the growth. Deciduous riparian zones along creek beds and slope

drainages are common throughout the area and also support shrub growth. Cottonwood, scrub willow, chokecherry, and alder are common in these zones.

Shrub stands in the EFPD are classified as FBFM 4 (mature brush, greater than 6 feet tall, dense woody surface fuel), FBFM 5 (young brush, less than 6 feet tall, clean litter), and FBFM 6 (intermediate brush, older than FBFM 5, less dense than FBFM 4).

It should be noted that shrub vegetation typically constitutes higher-moisture woody plants associated with low to moderate fire behavior. However, prolonged drought, experienced in recent years, lowers the live fuel moisture content in plant stems, producing extreme fire behavior under favorable weather conditions.

Timber Litter and Understory, FBFMs 8, 9, and 10

Forest composition in the District is strongly influenced by elevation and slope aspect, which are directly related to the available soil moisture. Ponderosa pine favor drier south-facing aspects while Douglas-fir, lodgepole pine, and spruce favor moister and cooler north-facing aspects. Lodgepole pine is more common in higher elevations above 8,000 feet but species will commonly mix on transitional slope aspects. In some areas, fire exclusion has allowed Douglas fir to become disproportionately dominant. Continuous forest canopy, most common at higher elevations and north-facing aspects, often prohibits live surface fuels from taking hold. In some mature and over mature closed canopy conifer stands, the understory is devoid of live surface fuel but thick with woody timber litter from downed trees and ladder fuels.

FBFMs in timber are classified according to the surface fuels that accumulate in the absence of a dominant live understory. FBFM 8 is associated with all short-needle conifer species including Douglas fir, lodgepole pine, and a variety of spruce; FBFM 9 is characterized by the long needles of ponderosa pine; and FBFM 10 is associated with forest floors that are thick with naturally occurring downed timber in a mature or overmature stand.

3.5 Fire Behavior Fuel Model Classifications of the Evergreen Fire Protection District

This section details the predominant FBFMs observed in the EFPD, including their unique characteristics and expected fire behavior. Local photos of fuels are displayed with a narrative for each fuel model as described by Anderson (1982). This section can be used independently as a field reference.

FBFM 1 – Short Grass

Figure 1. FBFM 1

Characteristics: Grassland and savanna vegetation are dominant (Figure 1). Very little shrub or timber overstory is present, generally less than 30 percent of the area. Western perennial and annual grasses such as western wheatgrass, buffalograss, blue grama, and little bluestem that characterize short- to mid-grass prairie are common. Cheatgrass, medusahead, ryegrasses, and fescues occur at slightly higher elevations. Grass shrub combinations that meet the above criteria are also represented.

Fire Behavior: Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires burn as surface fires that move rapidly through the cured grass and associated material.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	0.74 ton/acre
Dead Fuel Load, 0 to ¼ inch	0.74 ton/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	1.0 foot

Source: Anderson 1982

FBFM 2 – Grass with Timber/Shrub Overstory

Figure 2. FBFM 2

Characteristics: FBFM 2 defines surface fuels found in open conifer, shrub, or riparian stands (Figure 2). Ground cover generally consists of grasses, needles, and small woody litter. Conifers are typically mature and widely spaced. Limited shrub or regeneration may be present. This model favors mature conifer in the foothill to montane zones. Open shrubland, pine stands, or Rocky Mountain juniper that cover one-third to two-thirds of the area may generally fit this model. Such stands may include clumps of fuels that generate higher fire intensities that may produce firebrands (embers that stay ignited and aloft for great distances).

Fire Behavior: Fire is spread primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stem wood from the open shrub or timber overstory, contribute to the fire intensity.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	4.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	2.0 tons/acre
Live Fuel Load, foliage	0.5 ton/acre
Fuel Bed Depth	1.0 foot

Source: Anderson 1982

FBFM 4 – Mature Brush

Figure 3. FBFM 4

Characteristics: Stands of mature shrubs 6 or more feet in height, local oakbrush, and tall western sage with flammable foliage and a significant dead component fit this model (Figure 3). A deep litter layer may also be present. Actual brush height qualifying for this model varies and depends on local conditions.

Fire Behavior: High fire intensity and fast-spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	13.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	5.0 tons/acre
Live Fuel Load, foliage	5.0 tons/acre
Fuel Bed Depth	6.0+ feet

Source: Anderson 1982

FBFM 5 – Young Brush



Figure 4. FBFM 5

Characteristics: Shrubs in FBFM 5 are younger than in FBFM 6, not as tall as in FBFM 4, and do not contain as much fuel as in FBFMs 4 and 6. Shrub height is less than 6 feet tall and shrub cover most of area. Young green stands with no dead wood qualify for this FBFM. Fuel situations would include young stands of oak and mountain mahogany (Figure 4).

Fire Behavior: Fire is generally carried on the surface fuels that are made up of litter cast by the shrubs and the grasses and forbs in the understory. The live vegetation produces poor burning qualities.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	3.5 tons/acre
Dead Fuel Load, 0 to ¼ inch	1.0 tons/acre
Live Fuel Load, foliage	2.0 tons/acre
Fuel Bed Depth	2.0 feet

Source: Anderson 1982

FBFM 6 – Intermediate or Dormant Brush

Figure 5. FBFM 6

Characteristics: Shrubs in FBFM 6 are older than in FBFM 5, not as tall as in FBFM 4, and do not contain as much fuel as in FBFM 4. Fuel situations to be considered include intermediate stands of chamise, chaparral, oakbrush, mountain mahogany, and juniper shrublands (Figure 5).

Fire Behavior: Fires carry through the shrub layer where the foliage is more flammable than in FBFM 5; however, this requires moderate winds (greater than 8 miles per hour [mph] at midflame height). Fire will drop to the ground at low wind speeds or break in continuous stands.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	6.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	1.5 tons/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	2.5 feet

Source: Anderson 1982

FBFM 8 – Closed or Short-Needle Timber Litter – Light Fuel Load



Figure 6. FBFM 8

Characteristics: Closed canopy stands of short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer (Figure 6). This layer is mainly needles, leaves, and twigs because little undergrowth is present in the stand. Representative conifer types are white pine, lodgepole pine, spruce, and fir. Ponderosa pine can also be included if the understory reflects these characteristics.

Fire Behavior: Fires associated with this model are generally slow-burning, low-intensity ground fires, although a fire may encounter an occasional area of heavy fuels concentration that can flare up (jackpot). Only under severe fire weather conditions does this fuel model pose a significant fire hazard, and this is typically due to fire becoming active in the crowns of trees.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	5.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	1.5 tons/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	0.2 foot

Source: Anderson 1982

FBFM 9 – Hardwood or Long-Needle or Timber Litter – Moderate Ground Fuel Load



Figure 7. FBFM 9

Characteristics: Both long-needle conifer and hardwood stands, especially the oak-hickory types, are characterized by FBFM 9 (Figure 7). Closed stands of long-needle pine such as ponderosa pine are grouped in this model.

Fire Behavior: Fires run through the surface litter faster than in FBFM 8 and have longer flame lengths. Fall fires in hardwoods are predictable; however, high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling or blowing embers and fire brands. Concentrations of dead-down woody material will contribute to possible torching, crowning, and spotting.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	3.5 tons/acre
Dead Fuel Load, 0 to ¼ inch	2.9 tons/acre
Live Fuel Load, foliage	0.0 ton/acre
Fuel Bed Depth	0.2 foot

Source: Anderson 1982

FBFM 10 – Mature/Over Mature Timber and Understory



Figure 8. FBFM 10

Characteristics: Any forest type may be considered FBFM 10 if heavy downed woody material is present. Locally this model is represented by dense stands of over mature ponderosa pine, lodgepole pine, mixed conifer, and continuous stands of Douglas fir (Figure 8). Examples include insect or disease-ridden stands, wind-thrown stands, over mature situations with deadfall, and aged light thinning or partial-cut slash. Dead-down fuels include large quantities of 3-inch or larger limbwood resulting from over maturity or natural events that create a large load of dead material on the forest floor.

Fire Behavior: Fire will burn in the surface and ground fuels with greater intensity than the other timber litter models. Crowning out, spotting, and torching of individual trees is more frequent in this fuel situation, leading to potential fire control difficulties.

Fuel Model Values for Estimating Fire Behavior

Total Fuel Load, less than 3-inch dead and live	12.0 tons/acre
Dead Fuel Load, 0 to ¼ inch	3.0 tons/acre
Live Fuel Load, foliage	2.0 tons/acre
Fuel Bed Depth	1.0 foot

FBFMs present in the District are summarized in Table 7.

Source: Anderson 1982

Table 7. Fire Behavior Fuel Models of EFPD

FBFM	Description
1 Short Grass	Grass Group – Fire spread is determined by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. These are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third cover of the area. Annual and perennial grasses occur in this model. Fire rate of spread can exceed 300 chains per hour with flame lengths over 8 feet.
2 Grass with Timber/Shrub Overstory	Grass Group – Fire spread occurs through curing of dead herbaceous fuels. These are surface fires where downed woody debris from the shrub and tree component adds to fire intensity. Open shrublands, pine stands, or oakbrush stands that cover from one- to two-thirds of the area generally fit this model.
4 Mature Brush	Shrub Group – High intensity and fast spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory.
5 Young Brush	Shrub Group – Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and grasses or forbs in the understory. The live vegetation produces poor burning qualities.
6 Intermediate or Dormant Brush	Shrub Group – Fire spreads though the shrub layer with flammable foliage but requires moderate winds to maintain the foliage fire. Fire will drop to the ground in low wind situations. Shrubs are mature with heights less than 6 feet. These stands include oakbrush and mountain mahogany less than 6 feet tall. Fire rate of spread can be rapid with flame lengths of 6 to 10 feet.
8 Closed or Short- Needle Timber Litter–Light Fuel Load	Timber Group – These fuels produce slow-burning ground fires with low flame lengths. Occasional “jackpots” in heavy fuel concentrations may occur. These fuels pose a fire hazard only under severe weather conditions with high temperatures, low humidity, and high winds. These are mixed conifer stands with little undergrowth. Fire rate of spread is up to 106 feet per hour with flame lengths of 1 foot.
9 Hardwood or Long- Needle or Timber Litter–Moderate Ground Fuel	Timber Group – Fires run through the surface litter faster than in FBFM 8 and have longer flame lengths. These are semiclosed to closed canopy stands of long-needle conifers, such as ponderosa pine. The compact litter layer is mainly needles and occasional twigs. Concentrations of dead-down woody material contribute to tree torching, spotting, and crowning. Fire rate of spread is up to 27 chains per hour with flame lengths of 5 feet.
10 Mature/Overmature Timber and Understory	Timber Group – Surface fires burn with greater intensity than the other timber litter models. Dead and down are heavier than other timber models and the stands are more prone to hard-to-control fire behavior such as torching, spotting, and crown runs.

Source: Anderson (1982)

3.6 Water Resources

Nine assessed WUI areas and a portion of a tenth are serviced with pressurized hydrant grids. This emergency water infrastructure serves most of the newer, higher-density subdivisions along the Evergreen Parkway, totaling more than 3,500 homes and the adjacent commercial areas. Grid spacing is based on local building codes and generally requires a 1,000-foot minimum spacing for residential areas and a 300-foot minimum spacing for commercial areas.

Cisterns and a few single gravity-fed hydrants are distributed throughout most of the other interface regions. Many cisterns are privately owned and serve a specific residence. Several EFPD-maintained cistern installations were observed as part of the community surveys. These installations are accessible with standard-diameter fire apparatus fittings and most appear to be gravity feeds.

Reservoirs are located on Beaver Brook Creek and Bear Creek, where the Evergreen Lake Dam creates the historic Evergreen Lake. Numerous stock ponds are identified as potential helicopter dip sits pending field survey and acquisition of emergency access agreements. Stream drainages include Cub, North Turkey, Witter Gulch, Yankee, Corral, and Soda Creeks. Most observed streams had adjacent roads providing many access points for drafting.

Coordinates and descriptions of hydrants and cisterns within the EFPD are available from EFPD and have been utilized in this plan. Some discrepancies were noted during field surveys and associated attributes of plotted cistern resources were sometimes insufficient for assessment purposes. A water resource records update through field survey and attribute enhancements is recommended.

3.7 Fire Protection District

Emergency fire, medical, and rescue services for the District are provided by EFR, which is comprised of 85 volunteer firefighters, 33 full-time paid staff, and 12 part-time paid staff. There are currently eight lieutenants, six captains, two assistant chiefs, and one operations chief under the command of the Chief of EFR. EFR maintains eight fully equipped stations and 29 pieces of apparatus.

- Station 1
 - 1 Type 6 Engine
 - 1 Type 1 Engine
 - 1 Water Tender
 - 1 Command Vehicle
 - 1 Rescue
 - 1 Mobile Pumping Platform

- Station 2
 - 1 Type 6 Engine (SCAT)
 - 1 Type 1 Engine
 - 2 Water Tenders
 - 1 Rescue
 - 1 Ladder Tower
 - 2 ALS Ambulances

- Station 3
 - 1 Type 6 Engine
 - 1 Type 1 Engine

- 1 Water Tender
- Station 4
 - 1 Investigation Truck
 - 2 ALS Ambulances
- Station 5
 - 1 Type 6 Engine
 - 1 Type 7 Engine
 - 1 Water Tender
- Station 6
 - 1 Type 1 Engine
 - 1 Type 1 Reserve Engine
- Station 7
 - 1 Type 1 Engine
 - 1 Type 6 Engine
 - 1 Mass Casualty Incident Trailer
- Station 8
 - 1 Type 1 Engine
 - 1 Water Tender

Mutual aid agreements for the EFPD are governed by the Denver-wide mutual aid agreement as well as the Jefferson County AOP, which provides an intergovernmental mutual aid agreement between all fire districts in the county, and include the CSFS and USFS. Jefferson County maintains a certified Type 3 Incident Management Team (IMT) for additional overhead support in the event of a large-scale incident. EFR also has specific mutual aid agreements with the Clear Creek Fire Authority and the Clear Creek Sheriff's Office.

EFR has developed a draft Wildland Fire Plan (Appendix M) that addresses operational goals and objectives, including training and response targets. The plan's goals are reflected in this CWPP:

- Facilitate a CWPP;
- Conduct a wildfire risk assessment;
- Develop a mitigation plan;
- Manage hazardous fuels;
- Facilitate emergency planning and operations; and
- Facilitate public outreach.

3.8 Values at Risk

In any hazard and risk assessment, human life and welfare are the most important resources to protect. Homes, businesses, aesthetics, and cultural and ecological resources are all important factors and certainly influence any recommendation; however, the safety and welfare of residents and emergency responders remains the top priority. The WUI has inherent risks including residential and commercial development in areas historically prone to fire, hazardous fuels, and limited access. The EFPD is characterized by dense suburban development within a forested setting.

Resources at risk include the following:

- | | |
|--------------------------------|----------------------------------|
| ▪ Homes | ▪ Watersheds |
| ▪ Businesses | ▪ Water quality |
| ▪ Local economy | ▪ Air quality |
| ▪ Municipal water supply | ▪ Natural vegetation communities |
| ▪ Community infrastructure | ▪ Viewshed |
| ▪ Wildlife and aquatic habitat | ▪ Historic structures |

Catastrophic wildfire can have a severe and long-term impact on all natural resource and ecological values that people take for granted. The actions recommended in this CWPP are geared toward lowering the wildfire risk to neighborhoods, as well as economic and ecological resources.

4 WILDFIRE RISK ASSESSMENT

4.1 Approach to the Wildfire Risk Assessment

A comprehensive wildfire risk assessment takes into account a variety of factors that ultimately result in an accurate hazard ranking of the neighborhoods and subdivisions that have been collaboratively identified and determined to be the primary areas of concern within the assessment area. Hazard rankings provide quantifiable guidance in the determination of mitigation treatment project prioritization.

To better understand the nature and scope of the wildfire threat that faces the EFPD, a full spectrum of factors that influence fire behavior are evaluated including vegetation and fuels, topography, weather, potential fire behavior, and historical fire frequency. Community infrastructure is evaluated in terms of emergency response, defensibility, and structural flammability. Analyzing the relationship between expected fire behavior in the wildlands and the placement and design of neighborhoods and subdivisions proximate to those areas is at the core of an effective community wildfire risk assessment. From this process targeted mitigation recommendations are developed that directly address the identified hazards and, if implemented, will greatly reduce the risk of loss from a wildfire for each homeowner as well as the community as a whole.

The primary assessment area for this CWPP is defined by the boundaries of the EFPD. Thirty neighborhoods within the District were identified as areas of critical concern and surveyed in detail using a standardized methodology. Vegetation was mapped 1 mile into surrounding regions utilizing overhead imagery which was ground verified (photo survey points) and converted to FBFMs (Map 4a, Map 4b, Appendix A).

In the wildland fire vernacular, fire hazard refers to vegetation or wildland fuel in terms of its contribution to problem fire behavior and its resistance to control. Risk is the probability of ignition of wildland fuels. Values-at-risk include infrastructure, structures, improvements, and natural resources that are likely to suffer long-term damage from the direct impacts of a wildfire.

As part of the assessment, a concerted effort was made to solicit and include input from the public and local experts in fire and natural resource issues. This was achieved through direct outreach, meetings, and the distribution of questionnaires (Appendices D and E). A draft report of the CWPP was posted on the Jefferson County Emergency Services and EFR websites to encourage public participation and input.

4.2 Fire Behavior Analysis

Fire behavior is defined as the manner in which a fire reacts to the influences of fuel, weather, and topography. Two key measures of this behavior are the rate of spread and the intensity. Rate of spread is often expressed in chains per hour. A chain is 66 feet, and one chain per hour closely approximates a spread rate of 1.1 feet per minute. Fire line intensity is reflected by flame length at the flaming front; it does not account for continued burning of fuels once the main fire front has passed.

BehavePlus version 3.0.1 is software that was used to assess potential fire behavior given the identified FBFMs, local topography, and local weather conditions. The predicted fire behavior represents surface fire behavior only. Fire moving through the forest canopy (crowning) and other types of extreme fire behavior are not represented in this analysis.

Topography

Topography plays an import role in wildland fire behavior and may also dictate infrastructure design, influencing overall hazard and risk factors. Elevation in the EFPD ranges from 6,720 to 10,500 feet. Slope steepness of developed areas generally ranges from 10 to 20 percent but may exceed 30 percent in some cases. In the less populated western portion of the District slopes up to 70 percent are present. Many homes and roads within the District are exposed to hazardous terrain features such as steep slopes, narrow gullies, and saddles along ridges.

Fire Weather

Average and severe case weather and fuel moisture conditions were determined using records from local remote access weather stations (RAWS) during the summer wildfire season of June through August. Data sets from four RAWS stations within 30 miles of Evergreen (Table 8) were processed using FireFamily Plus. Average and severe fire climate conditions were identified for each station using 50th and 90th percentile conditions. There are other weather stations in close proximity to Evergreen that were not used because of their lack of appropriate data including Bailey 7,982 ft. 15 miles wnw, South Platte 7,550 ft. 21 miles sse, and Polhemus 8,683 ft. 27 miles sse.

Table 8. Remote Access Weather Stations near Evergreen, Colorado

Station	Elevation (feet)	Location Relative to Evergreen	Years of Data
Corral Creek	7,844	7 miles west	2001-2006
Pickle Gulch	9,380	18 miles northwest	1995-2006
Sugarloaf	6,758	26 miles north-northwest	1977-2006
Cheesman	7,546	30 miles south	1987-2006

Percentile refers to historic occurrences of specified conditions. For example, 90th percentile conditions means that within the weather data examined from the RAWS stations, only 10 percent of the days had more extreme conditions. Fiftieth percentile is approximately average with half the records exceeding recorded conditions and half the records below recorded conditions. Fire climate and fuel moisture conditions were defined for the typical summer fire season of June through August for each of the RAWS stations (Table 9). Mid-flame wind speeds of 8 and 4 mph were used for the modeling of 90th and 50th percentile conditions respectively.

Table 9. Average and Severe Case Fire Weather and Fuel Moisture Conditions for June - August near Evergreen, Colorado

Raws Station	Percentile	Max Temp	Relative Humidity	1-Hour Fuel Moisture	10-Hour Fuel Moisture	100-Hour Fuel Moisture	Herbaceous Fuel Moisture	Woody Fuel Moisture
Corral Creek 2001-2006	50th	77°F	34%	5%	6%	10%	55%	105%
	90th	85°F	15%	3%	3%	6%	30%	75%
Pickle Gulch 1995-2006	50th	80°F	33%	6%	7%	11%	51%	98%
	90th	73°F	15%	3%	4%	7%	30%	72%
Sugarloaf 1977-2006	50th	84°F	35%	6%	8%	10%	64%	110%
	90th	91°F	16%	3%	4%	6%	29%	71%
Cheesman 1987-2006	50th	81°F	25%	5%	7%	10%	52%	100%
	90th	89°F	11%	2%	3%	6%	29%	67%

Additional important fire- and weather-related resources include:

- Fort Collins Interagency Wildfire Dispatch Center Web index for Fire Intelligence, Fire Weather, Fire Danger/Severity, RAWS – <http://www.fs.fed.us/r2/arnf/fire/fire.html>
- RAWS index for the Rocky Mountain Geographic Coordinating Area – http://raws.wrh.noaa.gov/cgi-bin/roman/raws_ca_monitor.cgi?state=RMCC&rawsflag=2
- National Fire Weather Page – <http://fire.boi.noaa.gov/>

Potential Fire Behavior

Fire behavior is defined as the manner in which a fire reacts to the influences of fuel, weather, and topography. Two key measures of this behavior are the rate of spread and the intensity. Rate of spread is expressed here in feet per minute, rather than chains per hour as commonly used in the wildland fire profession. Fireline intensity is reflected by flame length at the flaming front.

Fire behavior simulations were conducted for average (50th percentile) and severe (90th percentile) conditions for the critical months of the fire season, June through August (Table 10). The high and low fuel moistures from the four RAWS stations were used as inputs to the BehavePlus model to represent a range of potential conditions. Slope steepness was set to 20 percent.

BehavePlus software was used to generally illustrate the potential surface fire behavior given the prevailing fuel types, local topography, and local weather conditions. While any number of variables and assumptions will affect the modeled outputs, there are several significant general principles to focus on:

- The differences in surface fire behavior under 50th and 90th percentile conditions (drier fuels, windier conditions) are most pronounced in brush and grass fuels.

- This increase in fire activity is approximately two times for flame length and three to four times for rate of spread.
- Fire behavior for most fuel types under 90th percentile conditions exceeds the 4-foot flame lengths generally considered appropriate for direct line construction with handcrews.
- If FBFM 9 converts into the denser FBFM 10, the increases in fireline intensity and flame length are pronounced and conducive to the initiation of crown fire.

Table 10. BehavePlus Predictions of Fire Behavior on 20 Percent Slope for Average and Severe Climatic Conditions

FBFM	Flame Length (feet) Average Conditions ^a	Rate of Spread (chains/hr) ^b Average Conditions	Flame Length, (feet) Severe Conditions ^c	Rate of Spread (chains/hr) ^b Severe Conditions
1 Short Grass	4	68-72	9-10	316-370
2 Grass with Timber/Shrub Overstory	6	33	13-14	133-150
4 Mature Brush	17-18	61	34-38	213-247
5 Young Brush	4-6	14-20	11-12	67-78
6 Intermediate or Dormant Brush	6	27-30	10-11	86-98
8 Closed or Short-needle Timber Litter – Light Fuel Load	1	2	2	5-6
9 Hardwood or Long-Needle or Timber Litter – Moderate Ground Fuel	3	7	5-6	26-30
10 Mature/Overstory Timber and Understory	5	7	9-10	23-27

a. Average conditions based on 50th percentile weather and 4 mph midflame windspeed

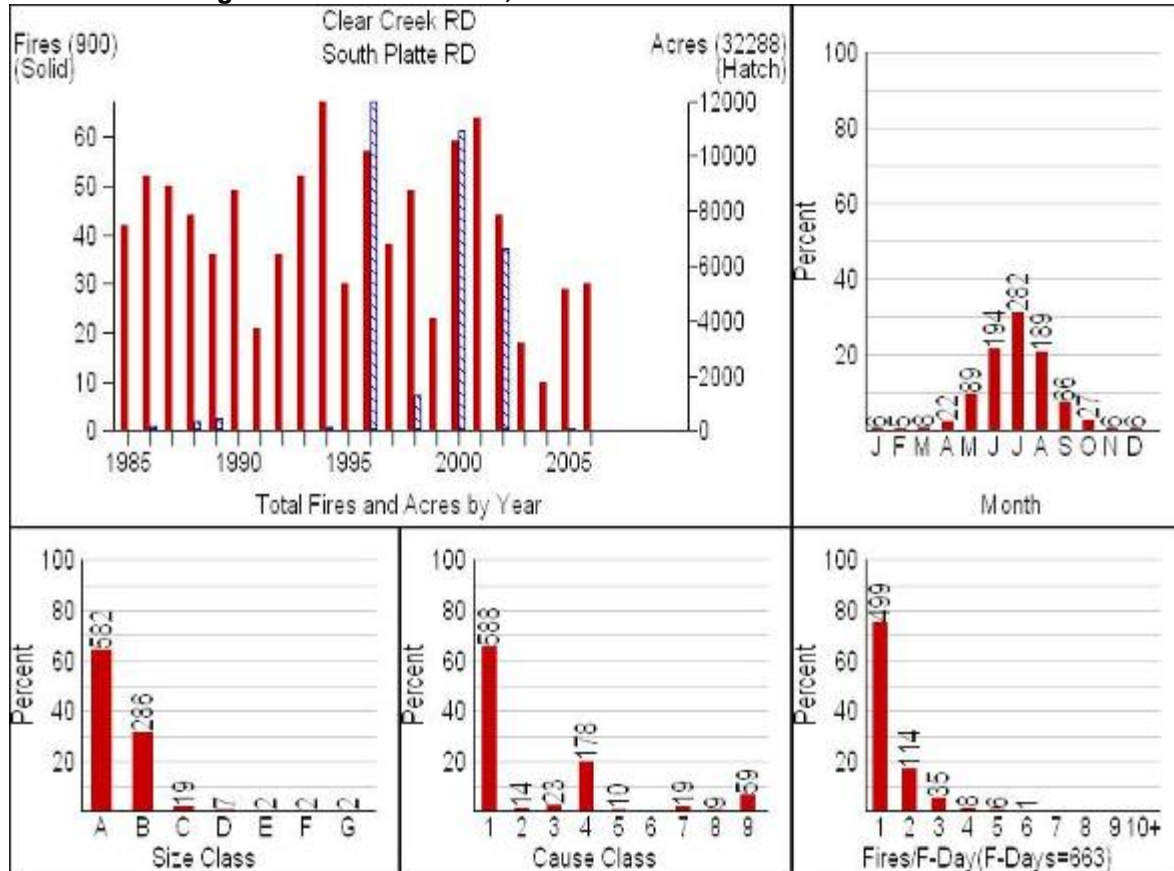
b. Severe conditions based on 90th percentile weather and 8 mph midflame windspeed

4.3 Wildfire Occurrence

The vegetation in the assessment area is diverse and typical for the Colorado Front Range. A mix of grass, brush, and a variety of forest types are found throughout the EFPD. All of these vegetation types represent ecosystems that are fire-adapted to some degree. Fire regimes in the area include low, mixed, and high severity with fire return intervals ranging from less than 30 years to over 200 years.

While the majority of fires on the surrounding USFS districts are caused by lightning, humans have started the majority of community-threatening fires in the EFPD, and it is widely acknowledged that fire suppression policies have exacerbated fire intensity along the Colorado Front Range (Figure 9).

Figure 9. USFS Fire Data, South Platte and Clear Creek Districts



Fire size class: A<1/4 acre, B= 1/4 to 9 acre, C= 10 to 99 acre, D= 100 to 299 acre, E= 300 to 999 acre, F= 1,000 to 4,999 acre, G> 5,000 acre

Fire cause class: 1=lightning, 2= equipment, 3= smoking, 4= campfire, 5= debris burning, 6= railroad, 7= arson, 8= juveniles, 9= misc

Source: US Forest Service: <http://famweb.nwcg.gov/kcfast>.

EFPD call records show that approximately 70 percent of incidents responded to are medical. Approximately 15 percent of responses are fire incidents. The average of five wildfires per year constitutes approximately 17 percent of fire calls and less than 1 percent of total incidents. Most wildfires in the District are contained and suppressed during the initial attack phase. Though these statistics may seem to portray wildfires as a limited hazard within the District, a study of past wildfires in the area illustrates the potential for large fires and the threat to communities (Table 11). See Appendix L for a comprehensive wildfire history of the CSFS, Golden District, which includes the EFPD.

Table 11. Significant Wildfires in the Local WUI

Fire	Month/Year	Acres Burned	Fire Protection District
Murphy Gulch	Sep 1978	3,300	Inter-Canyon/Bancroft
Mount Falcon	Apr 1989	125	Indian Hills
O'Fallon	Mar 1991	52	Evergreen
Elk Creek	May 1991	102	Golden Gate
Buffalo Creek	May 1996	10,400	USFS/North Fork
Bear Tracks	Jun 1998	500	USFS/Evergreen
Liningier Mountain	Feb 1999	35	Genesee/Foothills
Hi Meadow	Jun 2000	10,800	Platte Cyn/Elk Cr/North Fork
Black Mountain	May 2002	300	USFS/Elk Cr/Evergreen
Fountain Gulch	Jun 2002	200	Clear Creek
Centennial Cone	Jul 2006	22	Jefferson County Open Space
Upper Bear Creek	Jan 2006	35	Evergreen

Source: Gallamore 2007 (See Appendix L for a comprehensive wildfire history of the CSFS, Golden District)

4.4 Jefferson County Fire Danger Rating System and Local Weather Information

The Jefferson County Fire Danger Rating System (JFDRS) is based on the National Fire Danger Rating System (NFDRS) implemented in 1978. The JFDRS uses both RAWS and independent weather stations that are monitored with the data available from the Internet. Jefferson County limits the fire danger rating to NFDRS fuel models C (Pine-Grass Savanna) and G (Short-Needle [Heavy Dead]). The RAWS supply all necessary data used for fire danger rating; however, the independent stations require manual inputs to calculate fire danger such as state of the weather and calculation of 1-hour fuel moisture. After the weather data are collected the fire danger is calculated with an NFDRS calculator provided in the Fire Family Plus software. The energy release component (ERC) is then compared to the rating chart developed for Jefferson County, and an adjective fire danger value (extreme, very high, high, moderate, or low) is assigned. The Evergreen Communications Center emails completed forms for the RAWS and independent weather stations to the Jefferson County Sheriff, CSFS, and local fire agencies for distribution. The completed form with various components of the NFDRS is used for responders and an adjective fire danger for the public.

4.5 Wildfire Risk to Communities

EFPD assessment and neighborhood hazard and risk surveys were conducted during May, June, and July 2007. Detailed analysis of the assessment area, conducted with the EFPD, resulted in the identification of thirty individual WUI zones. Each identified WUI represents a unique response area with specific characteristics, resources, and identifiable hazards and risks. A single WUI may span multiple subdivisions or HOAs, or a single subdivision or HOA may be subdivided in multiple WUIs. The remainder of the District

may be characterized as either urban/commercial with no direct wildland interface, or rural, that is best served through individual home and property hazard and risk assessments

A standardized survey process defined by the NFPA was utilized to assess the relative level of wildfire risk and hazard for each neighborhood. Appendix B contains an example of the NFPA Form 1144, *Standard for Protection of Life and Property from Wildfire*. Surveys assess predominant characteristics within individual communities and subdivisions as they relate to structural ignitability, fuels, topography, expected fire behavior, emergency response, and ultimately human safety and welfare. Scores are assigned to each element and then totaled to determine the community's relative level of risk. Low, moderate, high, and extreme hazard ratings may be assigned based on the total community score (Table 12). Detailed observations and survey results are provided in Appendix C.

Table 12. Community Hazard Rating and Contributing Factors

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
EXTREME	5 - Echo Hills	123	<ul style="list-style-type: none"> Single ingress/egress. Topographic locale on ridgeline with long chimneys. Predominant north aspect and dense over-mature lodgepole pine and Douglas-fir stands. Limited emergency water access. Majority of homes lack adequate defensible space, are constructed with combustible building material, and are in close proximity to steep heavily forested slopes.
	20 - Brook Forest Estates, Upper Cub Creek	118	<ul style="list-style-type: none"> Single access with poor secondary access through a forest service access road. Dense forest encroachment on main access routes. Defensible space efforts complicated by dense continuous lodgepole pine > 50% < 30'. Dead ends on most secondary roads. Topography, steep slopes, chimney access. Grade and condition of secondary roads.
	12 - Rosedale Acres, Segar Acres	115	<ul style="list-style-type: none"> Single ingress/egress. Steep valley slopes. Heavy forest fuels on both north and south aspects. Limited emergency access/no turnarounds. Combustible building materials and restricted defensible space.
	1 - Beaver Brook Canyon, Highland Hills, Chase Subdivision, Elmgreen Acres, Pleasant Lane, Homestead Hideaway	115	<ul style="list-style-type: none"> Single ingress/egress. Dead ends. Majority of homes lack adequate defensible space, are constructed with combustible building material, and are in close proximity to steep heavily forested slopes. Steep topography with chimney. Limited emergency water access.
	21 - Buffalo Park Estates, Evergreen Hills	112	<ul style="list-style-type: none"> Areas of high timber density. Topography; significant relief, steep chimneys. Upper half of subdivision single ingress/egress. Structural ignitability. Structure proximity to steep slopes. Defensible space > 40% < 30'; efforts complicated by lodgepole stands. Forest encroachment on main access routes. Dead ends on many secondary roads. Steep grade and washed out condition of some secondary roads. Absence of emergency water supply.

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
HIGH	7 - Evergreen West	105	<ul style="list-style-type: none"> Topography, box canyon, chimney. Forest composition, high density. Dense forest along primary access road margins. Wood shingle roofing. Structure proximity to steep slopes. Hazardous dead ends and restricted turnarounds.
	30 - Greystone Estates	105	<ul style="list-style-type: none"> Topography, steep south aspect. Restricted ingress/egress to homes. Predominance of flashy fuels. Structural ignitability. Wood shingle roofing. Structure proximity to steep slopes. Absence of emergency water supply or drafting source.
	13 - Independent Heights, Forest Hill, Mountain Park Homes	101	<ul style="list-style-type: none"> Housing density. Timber composition and density. Topography; steep slopes cut by chimneys. Structural ignitability. Structure proximity to steep slopes. Defensible space > 70% < 30'. Secondary roads dead end and steep switchbacks.
	18 - Bear Mountain Vista, Stanley Park	98	<ul style="list-style-type: none"> Upper half of subdivision single ingress/egress. Density and composition of timber stands. Topography; areas of significant relief, steep slopes, chimneys. Proximity of homes to slopes <10%. Limited emergency water supply. Forest encroachment on some secondary roads. Structural ignitability.
	29 - French Springs	96	<ul style="list-style-type: none"> Single ingress/egress. Dead-ends with no turnarounds. Defensible space > 50% < 30'. Structural flammability. Absence of established emergency water source.
	23 - Cub Creek Ranch, Evergreen Highlands, Timbers Estates, North Marshner, South Marshner	96	<ul style="list-style-type: none"> Limited dual access. Density and composition of timber stands. Limited emergency water supply. Structural flammability. Roofing flammability. Above-ground utilities. Topography; steep slopes, chimneys, and saddles.
	2 - Soda Creek, Fox Ridge	94	<ul style="list-style-type: none"> Topography, significant relief, steep slopes. Limited emergency water supply. Secondary road accessibility and restricted turnarounds. Timber stand density and composition. Forest encroachment along primary access routes. Roofing flammability ~ 25% wood shake shingle.
	11 - Circle K, Bendemeer Valley, Golden Willow, Greystone Lazy Acres, Bear Creek Estates, Diamond Park, Wilderness Point	92	<ul style="list-style-type: none"> Lower tier secondary roads not maintained and dead end with no turnarounds. Topography; significant relief, chimney access, steep slopes in some areas. Limited emergency water supply. Structural flammability. Above-ground utilities.
	3 - Beaver Brook, Hoffer Heights, Pine Valley Estates	91	<ul style="list-style-type: none"> Limited emergency water supply. Street signage. Structural flammability. Above-ground utilities. Heavy timber at east access. Restricted access and dead ends in north end of area, Bluebell, Beaver Roads. Defensible space ~ 35% <30'.

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
	25 - Evergreen Meadows East	89	<ul style="list-style-type: none"> Timber density and composition. Limited emergency water availability. Topography; significant west aspect slope. Proximity of homes to steep slope. Structural flammability. Above-ground utilities.
	22 - Estates of Blue Creek, Blue Creek Rd	82	<ul style="list-style-type: none"> Timber density and composition. Limited emergency water availability. Topography; significant west aspect slope. Proximity of homes to steep slope. Structural flammability. Secondary roads steep switchbacks and dead ends. Above-ground utilities.
	9 - Hiwan Hills, Hidden Village at Hiwan, Douglas Park, Hiwan Homestead Museum	81	<ul style="list-style-type: none"> Defensible space ~ 45% <30'. Structural flammability. Structural density. Topography; steep slope in central area. Medium timber predominant.
	19 - Pine Valley Estates, Hillcrest Village, Peaceful Hills	81	<ul style="list-style-type: none"> Structural flammability. Limited emergency water availability. Topography; significant relief central. Defensible space ~ 30% <30'. Timber stands dense in some areas.
	17 - Herzman Mesa, Wonderview, Pine Crest Park, Sunset Heights, High Prairie, Far View Acres, Craigmont Estates, Marshdale Park, Marshdale	80	<ul style="list-style-type: none"> Structural flammability. Limited emergency water availability. Topography; significant relief central. Defensible space ~ 30% <30'. Timber stands dense in some areas.
	8 - Tanoa, Overlook, Palo Verde, Troutdale Estates, Glen Erie, Bear Creek	77	<ul style="list-style-type: none"> Timber density along some primary and secondary roads. Structural flammability. Topography; significant relief central. Proximity of structures to steep slopes. Access to some areas is limited to single ingress/egress. Some secondary roads dead ends with no turnarounds. Signage; some intersections missing.
	26 - The Ridge at Hiwan	76	<ul style="list-style-type: none"> Wood shingle roofing. Secondary road dead ends. Conifer regeneration. Restricted dual access south Keystone. Housing density. Defensible space maintenance.
	16 - Evergreen Park Estates, Evergreen Heights, Evergreen Golf Course, Evergreen Valley Estates, Columbine Road	76	<ul style="list-style-type: none"> Defensible space ~ 46% <30'. Topography; significant relief, Evergreen Mountain central to the area; chimneys on lower slopes bisect housing. Restricted turnarounds on the majority of dead ends. Structural flammability. Proximity of structures to steep slope. Timber density and forest composition high on north aspects. Absence of emergency water supply. Above-ground utilities.
	27- EL Pinal, El Pinal Acres	75	<ul style="list-style-type: none"> Housing density. Topography; steep slope. Narrow and steep roads, intersections. Restricted ingress/egress east end. Dead-ends with no turnarounds. Proximity of structures to steep slope. Structural flammability. Wood shingle roofing ~ 12%.
	10 - Kittredge, Quartz Mountain, Pine Valley Acres, Meadow Mountain Heights	75	<ul style="list-style-type: none"> Structural flammability. Topography; steep valley slopes. Single ingress/egress along Kittredge Park. Predominant road grade.

HAZARD RATING	WUI ID - SUBDIVISIONS	1144 SURVEY SCORE	CONTRIBUTING FACTORS
			<ul style="list-style-type: none"> Housing density. Proximity of structures to steep slopes. Secondary roads with restricted turnarounds or dead ends. Timber encroachment on secondary roads. Signage missing at some intersection.
	24 - Evergreen Meadows West	74	<ul style="list-style-type: none"> Timber density and forest composition throughout area. Housing density. Structural flammability. Limited emergency water availability. Above-ground utilities. Topography; significant relief to ridge on west side. Proximity of homes to slope.
	4 - Hidden Valley, Ruby Ranch, Nob Hill, Avery Acres, El Rancho	73	<ul style="list-style-type: none"> Topography; prominent ridge/valley. Structures in proximity to slope. Timber encroachment on primary and secondary access routes. Timber density in proximity to subdivision. Defensible space ~ 31% <30'. Major secondary road with single ingress/egress. Above-ground utilities.
MODERATE	14 - Hagan Ranch, Elk Ridge, Elephant Park, Westhaven Heights, Our-Lady-of-the-Rockies	67	<ul style="list-style-type: none"> Structural flammability. Defensible space ~ 31% <30'. Above-ground utilities. Limited emergency water supply.
	28 - Wah Keeney Park	59	<ul style="list-style-type: none"> Structural flammability. Restricted access at east end. Predominance of flashy fuels. Topography; steep slope.
	15 - Greenwood, Wilmont Woods, Evergreen Hill	58	<ul style="list-style-type: none"> Structural flammability. Some dead-end secondary roads. One zone without hydrants.
	6 - Hiwan Country Club	57	<ul style="list-style-type: none"> Roofing flammability. Structural flammability. Restricted access south end.

Note: In addition to the listed factors, rating scores are also influenced by the region's high fire occurrence and potential for severe fire weather.

These comprehensive community assessments provide the basis for effective identification, prioritization, and implementation of specific mitigation and hazard reduction recommendations.

5 WILDFIRE MITIGATION PLAN

5.1 Approach to Mitigation Planning

Wildfire mitigation can be defined as those actions taken to reduce the likelihood of loss due to wildfire. Effective wildfire mitigation can be accomplished through a variety of methods including reducing hazardous fuels, managing vegetation, creating defensible space around individual homes and subdivisions, utilizing fire-resistant building materials, enhancing emergency preparedness and response capabilities, upgrading current infrastructure, and developing programs that foster community awareness and neighborhood activism. Once implemented, these actions will significantly reduce the risk of loss due to wildfire to an individual home, and on a larger implementation scale, to an entire community.

Specific mitigation treatment recommendations for the EFPD were identified through detailed community wildfire hazard assessment surveys that evaluated parameters such as vegetation and hazardous fuels, predicted fire behavior, physical infrastructure, emergency response resources, home construction flammability, and defensible space characteristics around structures. All recommendations were reviewed by and collaboratively developed with the fire district, stakeholders, and relevant public agencies with detailed assessment of individual community surveys, stakeholder recommendations, public feedback, and the integration of existing fuels and forest management plans for affected public lands (Map 5). During the assessment process individual WUIs receive a hazard ranking that is relative to other WUIs within the assessment area as well as adjacent districts. Recommended project prioritization is based on individual WUIs, regardless of hazard and risk score.

5.2 Recommended Actions

Recommended action item categories are summarized in Table 13 and detailed in Table 15. Recommendation priorities are based on effective impact to overall community wildfire hazard and risk reduction. The most effective action begins with the individual homeowner taking responsibility to create defensible space and reduce structural ignitability. Community outreach and individual home owner mitigation actions are prioritized. Other recommendations such as strategic shaded fuel breaks, thinning in identified treatment zones, emergency access improvements, and water resource improvements follow.

Table 13. Recommended Actions by Category

Project	Actions
Outreach/Public Education	<ul style="list-style-type: none"> Encourage stakeholder participation in community meetings. Distribute Firewise materials. Assess individual homes.
Defensible Space	<ul style="list-style-type: none"> Establish a fuel-free zone around homes. Establish a treated second zone that is thinned, pruned, and cleared of excess surface fuels. Extend treatment to property boundary to improve natural forest conditions and reduce excess hazardous

Project	Actions
	<ul style="list-style-type: none"> vegetation. Employ defensible space practices around identified resources such as cisterns, dip and draft sites, potential safety zones, or observation areas.
Firewise Building Improvements	<ul style="list-style-type: none"> Replace shake roofs with fire-resistive roofing. Implement Firewise construction principals for all remodels. Enclose exposed decks and gables. Screen vents and chimneys.
Shaded Fuelbreaks	<ul style="list-style-type: none"> Treat along primary and secondary evacuation routes. Improve/expand utility right-of-ways.
Access/Egress Improvements	<ul style="list-style-type: none"> Improve hazardous primary access routes. Create/improve dead end turnarounds. Create/improve secondary evacuation routes where needed. Improve restricted switchbacks.
Strategic Fuelbreaks	<ul style="list-style-type: none"> Provide for fuelbreaks in identified treatment zones. Conduct removal where possible. Burn piles where needed. Coordinate with adjacent public land management agencies. Expand to address infestation where needed.
Supporting Actions	<ul style="list-style-type: none"> Support grant funding acquisition actions. Involve Jefferson County in evacuation improvements. Revise county statutes addressing defensible space requirements for home sales. Coordinate with agency forest management plans.
Fire Department Preparedness	<ul style="list-style-type: none"> Integrate project GIS Update and distribute run books. GIS and update all water resources. Survey potential dip sites and safety zones Develop community pre-plans based on surveys On-going community education Conduct ongoing recruitment, training, and certification Coordinate mutual aid strategic planning. Upgrade apparatus, facility, and personal protective equipment (PPE).

Outreach and Public Education: The most effective means to initiate local action is through community education and public outreach. The purpose of a district-wide education program is as follows:

- Identify wildfire hazards and risks;
- Introduce the benefits of defensible space and Firewise construction principals;
- Urge homeowners to take action on their own property and influence neighbors, friends, and HOAs;
- Initiate creation of an oversight group to drive CWPP implementation and grant application;
- Increase awareness of current forest conditions and how hands-on management practices can help restore forest health and reduce wildfire risk; and

- Create awareness of the historical role fire has played in the regional ecosystem and forest and rangeland health.

Some parcels within subdivisions may be undeveloped and/or owned by absentee owners. A lack of fuels management on these lots can impact the entire community. An effort should be made to contact these landowners and determine how to address their concerns and overcome potential obstacles to conducting hazard fuel mitigation on their land.

Action Item: An annual community meeting in the spring can spur action on the part of neighborhoods and individuals. This can be a forum for presentations by experts in the field and allow for coordination of “cleanup” efforts within the community. Firewise materials and postings should be made available to the public at each fire station, post office, HOA, and elementary school on a regular basis. A disposal method for yard waste should be coordinated every spring. This may be coordinated with HOA spring cleanup activities and may include the coordination of a central disposal site, mobile chipping services, or a hauling service. See Section 5.4 for potential funding opportunities.

An example would be the continuance of the annual “Slash Day,” which took place this year on June 23 and 24 at the Evergreen High School. Perhaps slash collection days could occur in the fall or at other locations to make it easy for all residents to participate. A community, HOA, or neighborhood would hire a contractor by the hour to chip the slash stacked along the main road by homeowners in front of each residence. Each landowner would pay for the time it took to chip his/her slash, but the equipment and scheduling costs would be carried/distributed among all participating landowners.

Defensible Space: An action that can be taken immediately to improve community hazard ratings is the implementation of defensible space around individual homes. It is recommended that defensible space be created following the CSFS guidelines as set forth in *Creating Wildfire Defensible Zones*, Bulletin No. 6.302 (Dennis 2003) (Appendix G), which is consistent with Jefferson County regulations. A majority of the public questionnaires, that were filled out and returned, stated that defensible space was key to wildfire risk reduction (Appendix E).

Action Item: This is the primary recommendation for hazard fuels mitigation within the EFPD. It is suggested that the above outreach efforts be used to coordinate and spur implementation and slash disposal at the individual homeowner level. Active participation ultimately leads to effective hazard reduction at the community level. Many homeowners with the highest need for defensible space are directly adjacent to public lands. Coordinating fuel reduction activities between public and private lands creates a mutually beneficial environment. Establishing a procedure whereby homeowners who have established defensible space on their property may petition for fuels management on adjacent public lands would facilitate communication and coordination.

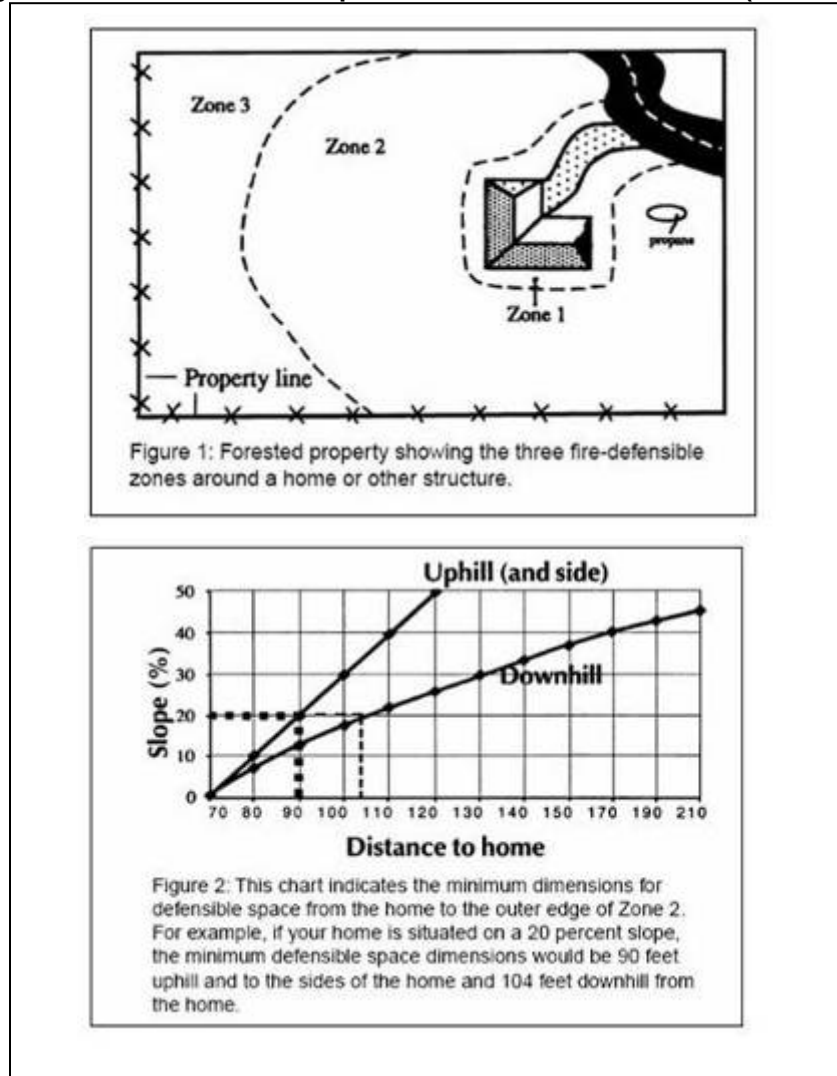
When this principle of defensible space is combined with fire-resistant construction and some common sense, the risk of structure loss is greatly reduced. When these principles are consistently applied across a neighborhood, everybody benefits. Additionally, in the event of a wildfire, homes and neighborhoods with defensible space are much more likely to be assigned structure defense crews than those without (Figure 10).

Zone 1 (0 to 15 feet from structure): Within 3 to 5 feet of the structure, decorative rock or mowed, irrigated grass is recommended (Figure 11). Well-spaced and pruned, low-flammability plants are acceptable if the structure has noncombustible siding. In the remainder of Zone 1, trees' lower branches should be pruned 5 to 10 feet above the ground (not to exceed one-third of the tree height). Dead wood, tall grass, and ladder fuels (low limbs, small trees, and shrubs that may carry fire into tree crowns) should be removed from this area. Leaves and overhanging branches should be removed from the roof and gutters. The 15-foot area should be irrigated as appropriate. Woodpiles should be removed and stored in Zone 2.

[illegible]

**Figure 10. Jefferson County
Structure Triage Tag
(for prioritizing structure defense
in the event of an advancing
wildfire)**

Figure 11. CSFS Defensible Space Guidelines and Standards (Dennis 2006)



Zone 2 (typically from 15 feet out to 60-210 feet from Zone 1): The size of this zone is dependent upon slope. Treatment of ground fuels and ladder fuels is generally the same as for Zone 1. Trees (or small groups of trees) and shrubs should be thinned to provide 10 feet of clearance among crowns. Grasses should be mowed because they dry in late summer.

Zone 3 (beyond Zone 2 to property line): This area outside of Zone 2 should be managed for the appropriate land use objectives, such as forest health, aesthetics, recreation, and wildlife habitat (Figure 12).

See Appendix K, or visit www.csfs.colostate.edu/library.htm for information on fire-resistant plants and grasses that can augment defensible space efforts.

Efforts can be encouraged and coordinated annually through community meetings, planned spring cleanups, and organized disposal efforts. Although most of the work can be accomplished by individual homeowners in a phased approach over time, neighborhood cooperation and support is essential to help those who are unable, or to provide access to critical hazardous areas. Table 14 outlines a manageable phased implementation schedule.

Table 14. Community-Based Defensible Space Project Schedule

Year	Project	Actions
1	Annual spring outreach	<ul style="list-style-type: none"> Contact and/or organize homeowners.
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> Clean roofs and gutters. Trim limbs/bushes within 3 to 5 feet of home. Rake yard. Help a neighbor. Organize debris disposal.
2	Annual spring outreach	<ul style="list-style-type: none"> Contact and/or organize homeowners.
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> Clean up brush along property lines. Repeat basic yard cleanup. Organize debris disposal.
3	Annual spring outreach	<ul style="list-style-type: none"> Contact and/or organize homeowners. Advise individual homeowners on needed improvements to construction features.
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> If necessary, coordinate defensible space efforts between homeowner groups who have created defensible space and adjacent open space land managers.
4	Annual spring outreach	<ul style="list-style-type: none"> Contact and/or organize homeowners. Follow-up on construction feature recommendations.
	Annual spring mitigation (defensible space)	<ul style="list-style-type: none"> Complete any outstanding projects from previous years. Begin maintenance phase. Initiate construction feature improvements.

Building Improvements: Improving the fire-resistant characteristics of a structure goes hand-in-hand with the development of defensible space. Extensive recommendations can be found in CSFS publications available at <http://csfs.colostate.edu/library.htm>. The most significant improvement that can be made to many of the homes in the assessment areas is the replacement of wood shake roofing with noncombustible roofing material, as is required for all new and replaced roofs in Jefferson County's WUI. All homeowners should keep roofs and gutters clear of leaves and pine needles. Screening of gutters and roof vents is recommended. Embers from a wildfire can become windborne and travel long distances before settling.

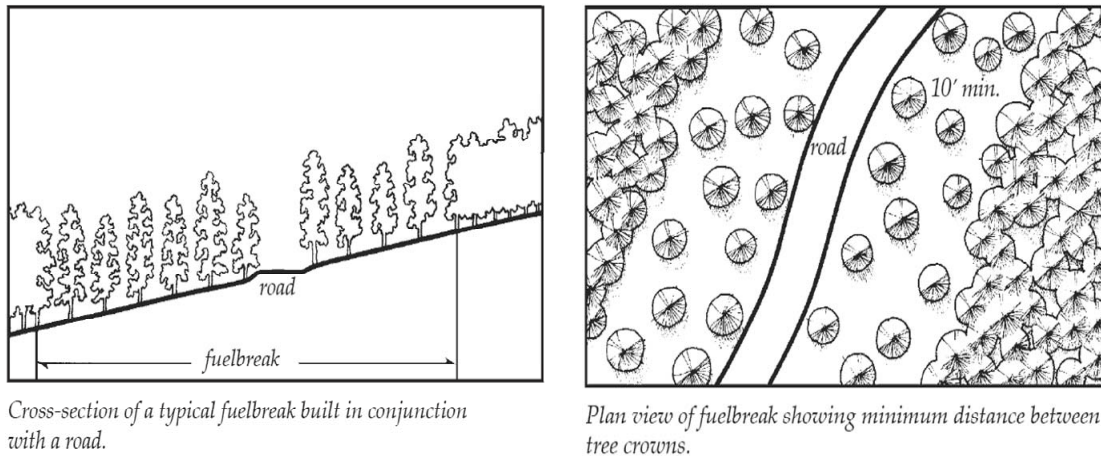
Common structural fuel hazards associated with homes in the WUI include:

- Combustible decks with exposed undersides;
- Combustible material under decks;
- Open attic vents;
- Propane tanks adjacent or downhill from home;
- Combustible fencing; and

- Woody debris in gutters.

Action Item: Provide for community education, outreach, and information distribution through HOAs and other neighborhood associations. Coordinate public education through existing spring cleanup programs. Grass-roots public awareness can be as simple and straightforward as coordinating with a local scout troop to distribute applicable CSFS flyers door-to-door.

Shaded Fuelbreaks: All forested access roads should be maintained as shaded fuelbreaks zones where possible. Reducing the forest canopy along access roads enhances the effectiveness of the physical canopy break the road provides, as well as critical safety factors along likely evacuation and incident access routes. This creates a safer emergency ingress/egress scenario while greatly aiding potential tactical suppression efforts. Fuels treatment along roadways reduces removal costs as well as project complexity (Figure 12). Visit <http://csfs.colostate.edu/library> for fuelbreak guidelines (Appendix F).



Source: Dennis, undated

Figure 12. Shaded Fuelbreak

Action Item: All access roads within the EFPD with vegetation or timber encroachment should be targeted for mitigation or seasonal mowing. Treatments may be coordinated with property owners along private roads and coordinated with county and state transportation departments for any public roads. Conifer regeneration along road margins should be addressed. Due to emergency response concerns, monitoring the progress and evaluation of effectiveness by a certified forester is recommended.

Treatment Zones: Treatment recommendations may target areas that are not directly adjacent to a neighborhood or roads, but provide a critical wildfire buffer in areas where ignitions are likely and topography and fuel loads combine to create a hazardous situation for a subdivision at a higher elevation or downwind prevailing fire weather situations. Zone locations are influenced by topography, forest composition, access, and expected fire behavior in spatial relation to subdivisions at-risk. Any alternative treatment zones should be considered and prioritized should variables change such as access, ownership, cooperation, as well as forest characteristics through fire or infestation. Such treatments

also benefit the diversity of wildlife and vegetation. Specific treatments should be identified only with the assistance of a certified forester and take into consideration other fuels and forest management plans within the area. Fuel treatments of this scale are often subject to a number of hurdles that may include presiding agency staffing levels, current available funding levels, environmental impact concerns, public support, and private ownership.

Action Item: Forest management plans for public lands often focus on fuel reduction activities that address forest health and wildfire risk reduction concerns. Strategic development for these plans should take into account wildfire hazard factors that exist for adjacent WUIs and target forest management activities that are beneficial to both public and private lands.

Weeds: Weed abatement programs will reduce fuel hazards around and within communities and improve the health of grasslands. Post-fire treatment management such as the seeding of native grasses and spreading mulch is beneficial and may be necessary to establish a productive plant community.

Action Item: An ecological evaluation of the status of prairie and shrub rehabilitation is recommended for local areas affected by fires within the last few years. Analysis should focus on the presence of noxious weeds and aggressive non-native species as well as mortality rates in shrubs. Studies may foster modifications to county burned area rehabilitation seeding practices for future wildfire incidents.

Access: Access is an important component of any community's wildfire hazard and risk profile. Availability of ingress/egress, characteristics of road surface, road layout and design, treatment of dead ends, grade, characteristics of switchbacks, and width all factor into access assessment. In areas of limited access, secondary emergency access route development may be recommended. Typically this involves improvement of existing roads or trails from a WUI to a main road. Improvement is not intended to increase recreational use and emergency access only gating is recommended.

Action Item: The EFPD is large and diverse with access characteristics unique to each assessed WUI. Specific access characteristics and recommendations assessed are defined for each WUI in the survey summaries located in Appendix C.

Emergency Preparedness: Community assessments surveyed several resources directly related to safety and emergency response including emergency water supply, potential safety zones and potential dip sites for helicopter operations.

Action Item: Identified sites for potential water supplies should be further surveyed. Sites are generally located at subdivision entrances and favor gravity feed if possible. Available draft sources for dry hydrant installations are also identified. Access usually involves negotiations with landowners or holders of right-of-way road easements. Potential dip sites involve access negotiations for water rights holders and a careful survey of overhead obstructions. Potential safety zones require ground survey, landowner negotiations, and improvements. All resource locations require annual maintenance. Locations should be GPS'd and included in any operational pre-plan developed for the community.

Table 15 provides a summary of the community surveys and outlines a prioritized approach to specific mitigation and related hazard reduction recommendations.

Table 15. Community Mitigation Recommendation Summary

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY				LOWER
EXTREME	5 - Echo Hills, Castlewood Acres	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Fuel reduction in identified treatment zones	Develop and maintain emergency access to Old Squaw Pass Road through Castlewood Gulch	Emergency water source development at subdivision entrance	Safety zone development and access improvement in meadow south of Sinton Road. Shelter in place training	Street signage, home addressing, and turnaround improvement
	20 - Brook Forest Estates, Upper Cub Creek	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access routes including Forest Estates, Crowfoot, and Black Mountain Roads and utility right of ways	Improve or construct secondary road turnarounds at dead ends	Develop emergency water availability on Brook forest Road at entrance	Develop and maintain emergency access options; Ski Rd to Strandsky, crowfoot to Brook Forest	Shelter in place training
	12- Rosedale Acres, Segar Acres	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including Skyline Dr, Valley View Dr, Meadow Brook Ln,	Turnaround improvement and construction and at critical dead ends	Develop emergency water availability at pond near meadow near Meadow Brook and Upper Bear Creek	Potential safety zone in meadow near Meadow Brook and Upper Bear Creek. Shelter in place training	Street signage, home addressing, improvement
	1 - Beaver Brook Canyon, Highland Hills, Chase Subdivision, Elmgreen Acres, Pleasant Lane, Homestead Hideaway	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Street signage, home addressing, improvement and turnaround improvements on Ponderosa and Hyland	Develop and maintain emergency access options; W. Beaver Brook Rd. to Sante Fe Mt. Rd.; E. Beaver Brook Rd to Elm Green Rd.; High School To Elm Green Rd.	Fuel reduction in identified treatment zones	ICP development in school compound. Shelter in place training

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY				LOWER
	21 - Buffalo Park Estates, Evergreen Hills	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Develop and maintain emergency access options Brook Forest to Bluebell (Buffalo Park); and/or Fawn Path/Weasel to Stransky	Fuel reduction in identified treatment zones	Develop emergency water availability along Cub Creek/Brook Forest Road	Improve or construct secondary road turnarounds at dead ends; visible and consistent home addressing Shelter in place training
HIGH	7 - Evergreen West	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Improve or construct secondary road turnarounds at dead ends	Develop emergency water availability at upper Witter Gulch Road and Hwy 103	Potential safety zone in meadow along Witter Gulch Road below Aspenwood. Shelter in place training	Visible and consistent home addressing
	30 - Greystone Estates	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop emergency water availability at Bergen Mountain and Stagecoach	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing	Potential safety zone in meadow near Alpine and Stagecoach	NA
	13 - Independence Heights, Forest Hill, Mountain Park Homes	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Expand emergency water availability in the upper portions of Independence Heights, Forest Hill and Mountain Park Homes. Improve visibility of existing hydrants	Improve or construct secondary road turnarounds at dead ends	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking. Visible and consistent home addressing	Potential safety zone in meadow near Independence and Hilltop	Develop and maintain emergency access options; Fern Gulch to Independence and Hilltop to Independence
	18 - Bear Mountain Vista, Stanley Park	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes	Develop emergency water availability in the Bear Mountain, Giant Gulch area	Develop and maintain emergency access options along Fern Gulch and Independence	Fuel reduction in identified treatment zones	Potential safety zones in meadows near sunrise, Chris, Burro, North Mountain Park Area. Shelter in place training

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY				LOWER
	29 - French Springs	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including Yankee Creek, Normandy, and private drives	Fuel reduction in identified treatment zones	Develop emergency water availability in existing stock ponds along Yankee Creek Rd	Potential safety zone in meadow system along Yankee Creek	Visible and consistent home addressing
	23 - Cub Creek Ranch, Evergreen Highlands, Timbers Estates, North Marshner, South Marshner	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain an emergency access Timbers and Olympus, and along Little Cub Creek	Develop emergency water availability at pond located at Little Cub Creek Road and Annapurna	Potential safety zone in meadows near Little Cub Creek Road and Annapurna	Visible and consistent home addressing
	2 - Soda Creek, Fox Ridge	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads including Woodside, Soda Creek, Snyder Gulch, Woodland, and Deep Forest	Develop emergency water availability at Hwy 103 and Old Squaw Pass/Snyder Gulch Rd, at the ponds along Alta Vista Road and in the Fox Ridge area.	Develop and maintain an emergency access from Meadow to Old Squaw Pass	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing
	11 - Circle K, Bendemeer Valley, Golden Willow, Greystone Lazy Acres, Bear Creek Estates, Diamond Park, Wilderness Point	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Improve or construct secondary road turnarounds at dead ends	Develop emergency water availability at Witter Gulch and Upper Bear Creek	Visible and consistent home addressing	
	3 - Beaver Brook, Beaver Brook Lodge Estates, Hoffer Heights, Pine Valley Estates	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop and maintain an emergency access from Meadow to Old Squaw Pass	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Develop emergency water supply at Hwy 103 and Old Squaw Pass/Snyder Gulch	Visible and consistent home addressing

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY			LOWER	
	25 - Evergreen Meadows East	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary access roads including Armadillo and Grizzly	Improve emergency water availability at Gray Fox and County Highway 73 to support multiple tenders	Intersection signage improvements and visible and consistent home addressing		
	22 - Estates of Blue Creek, Blue Creek Rd	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop emergency water availability at Brook Forest and Blue Creek	Develop and maintain a emergency access between Gray Hawk, Lynx Lair and Frog Hollow	Fuel reduction in identified treatment zones. Potential safety zone development in Frog Hollow treatment area	Switchback improvements, Intersection signage improvements and visible and consistent home addressing
	9 - Hiwan Hills, Hidden Village at Hiwan, Douglas Park, Hiwan Homestead Museum	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing		
	19 - Pine Valley Estates, Hillcrest Village, Peaceful Hills	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads including Peaceful Hills to North Turkey Creek Road, High to North Turkey Creek, High around Meadow and Caldwell	Develop emergency water availability at primary accesses along North Turkey Creek and South Mountain Park.	Fuel reduction in identified treatment zones	Potential safety zone in meadows in the southeast portion of the assessment area	Visible and consistent home addressing
	17 - Herzman Mesa, Wonderview, Pine Crest Park, Sunset Heights, High Prairie, Far View Acres, Craigmont Estates, Marshdale Park, Marshdale	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Develop emergency water access along Cub Creek, Skyline, Herzman, and Highway 73, Tresne area	Improve or construct secondary road turnarounds at dead ends	Visible and constant home addressing	

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY			LOWER	
	8 - Tanoa, Overlook, Palo Verde, Troutdale Estates, Glen Erie, Bear Creek	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain a emergency access between Troutdale Scenic Drive and Wildflower and Upper Bear Creek; and between Upper Bear Creek and Stagecoach along Overlook	Fuel reduction in identified treatment zones	Improve or construct secondary road turnarounds at dead ends	Intersection signage improvements and visible and consistent home addressing
	26 - The Ridge at Hiwan	Reduce structural ignitability; reduce percentage of flammable roofs	Develop and maintain a emergency access between South keystone and Kittredge Park	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Establish pre-plan for apparatus response to ~ 45 single lane dead end secondary roads	Visible and consistent home addressing
	16 - Evergreen Park Estates, Evergreen Heights, Evergreen Golf Course, Evergreen Valley Estates, Columbine Road	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Develop emergency water supply at Clearwater	Potential safety zone in meadow along Buffalo Park west of Evergreen Heights	Visible and consistent home addressing
	27 - El Pinal, El Pinal Acres	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop and maintain emergency access between Larkspur and Troublesome Gulch and between Yucca and Sulky	Improve turnarounds and intersections	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Visible and consistent home addressing
	10 - Kittredge, Quartz Mountain, Pine Valley Acres, Meadow Mountain Heights	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain emergency access between Kittredge Park and Keystone and between Troublesome Gulch and Lewis Ridge	Visible and consistent home addressing		

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY				LOWER
	24 - Evergreen Meadows West	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Develop and maintain emergency access from Centaur along Frog Hollow	Develop emergency water supply in the central portion of the assessment area	Fuel reduction in identified treatment zones	Intersection signage improvements and visible and consistent home addressing
	4 - Hidden Valley, Ruby Ranch, Nob Hill, Avery Acres, El Rancho	Develop and maintain emergency access between Ruby Ranch and Humphrey	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Fuel reduction in identified treatment zones	Develop emergency water supplies for Pine crest and Ruby Ranch areas	Improve or construct secondary road turnarounds at dead ends	Visible and consistent home addressing
MODERATE	14 - Hagan Ranch, Elk Ridge, Elephant Park, Westhaven Heights, Our-Lady-of-the-Rockies	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Shaded fuel breaks along forested primary and secondary roads	Develop emergency water supply in designated stock pond along Bluebell Rd	Potential safety zones in meadows along Buffalo Park Rd and Bluebell Rd	Visible and consistent home addressing	
	28 - Wah Keeney Park	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Develop and maintain emergency access between Yucca and Sulky and from Stagecoach to Troublesome Gulch	Visibly mark hydrants where obscured	Visible and consistent home addressing		
	15 - Greenwood, Wilmont Woods, Evergreen Hill	Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking	Improve or construct secondary road turnarounds at dead ends	Possible hydrant line extension to Hazel and Gigi			

HAZARD RATING	WUI ID - SUBDIVISIONS	HAZARD REDUCTION RECOMMENDATIONS					
		HIGHER	PRIORITY			LOWER	
	6 - Hiwan Country Club	Reduce structural ignitability; reduce percentage of flammable roofs	Develop and maintain a emergency access between Pebble Beach and Lewis Ridge (water treatment plant)	Shaded fuel breaks along forested primary, secondary, and designated emergency access roads	Access and turnaround improvements on secondary roads	Visible and consistent home addressing	ICP development in school compounds or EFR Station 2 area

5.3 Treatment Options

Fuels treatment recommendations for the EFPD focus primarily on the creation of defensible space around structures and shaded fuel breaks along roads. Each of the recommended fuel mitigation projects can be achieved by a variety of methods (Table 16). Selecting the most appropriate, cost-effective option is an important planning step. This brief synopsis of treatment options and cost estimates is provided to assist in this process. Cost estimates for treatments should be considered as very general guidelines. Timber treatment costs can vary tremendously based on project complexity, but generally run \$300 to \$1,200 per acre depending upon:

- Type of fuel;
- Diameter of materials;
- Acreage of project;
- Steepness of slope;
- Density of fuels;
- Proximity to structures;
- Access; and
- Transportation costs.

It is imperative that implementers plan for the long-term monitoring and maintenance of all treatments. Post-treatment rehabilitation including seeding with native plants and erosion control may be necessary.

Table 16. Treatment Methods

Treatment	Estimated Cost	Comments
Machine Mowing	\$90 - \$200 per acre	<ul style="list-style-type: none"> ▪ Appropriate for large, flat grassy areas on relatively flat topography.
Prescribed Fire	\$75 - \$300 per acre	<ul style="list-style-type: none"> ▪ Can be very cost effective. ▪ Ecologically beneficial. ▪ Can be used as training opportunities for firefighters. ▪ Cost varies with complexity. ▪ Carries risk of escape, which may be unacceptable in some WUI areas.

Treatment	Estimated Cost	Comments
		<ul style="list-style-type: none"> Unreliable scheduling due to weather and smoke management constraints.
Brush Mastication	\$300 - \$500 per acre	<ul style="list-style-type: none"> Brush species (Gamble oak in particular) tend to resprout vigorously after mechanical treatment. Follow-up treatments with herbicides, fire, grazing, or further mechanical treatments are typically necessary. Mastication tends to be less expensive than manual treatment and eliminates disposal issues.
Timber Mastication	\$300 - \$1,200 per acre	<ul style="list-style-type: none"> Materials up to 10 inches in diameter and slopes up to 30 percent can be treated. Eliminates disposal issues. Environmental impacts of residue being left onsite are still under study.
Manual Treatment with Chipping or Pile Burning	\$300 - \$1,200 per acre	<ul style="list-style-type: none"> Allows for removal of merchantable materials or firewood in timber. Requires chipping, hauling, and pile burning of slash.
Feller Buncher	\$750 and up per acre	<ul style="list-style-type: none"> Mechanical treatment on slopes over 30 percent of materials over 10 inches in diameter may require a feller buncher rather than a masticator. Costs tend to be considerably higher than mastication. May allow for removal of merchantable material.

5.4 Project Support

This section provides information that will be helpful in planning and preparing for fuels mitigation projects.

Funding and Grants: Grant funding support is often a necessary component of a fuels treatment project and can facilitate recommended mitigation on both private and public lands. In addition to opportunities that may be available through Jefferson County Division of Emergency Management, an excellent resource for researching available public funding sources is the Rocky Mountain Wildland Fire website (www.rockymountainwildlandfire.info).

Public Land Planning: Public lands within the EFPD include those managed by the USFS, Jefferson County Open Space, Denver Mountain Parks, Colorado Division of Wildlife, Clear Creek County, and State Land Board. The CWPP development process is designed to facilitate dialog with these agencies and coordinate public and private wildfire and forest management strategies. As the CWPP strategic plan is implemented, dialogue and collaboration should be maintained with these agencies to coordinate strategies and treatments, and make adjustments if necessary.

Regulatory Support: One of the major issues confronting defensible space and hazardous fuels mitigation is the need for ongoing maintenance. Treatment projects in timber or brush fuels have an effective life span of approximately 10 to 15 years before regrowth fuel loads again become hazardous. On the other hand, defensible buffers and fuelbreaks mowed in grasslands are beneficial only through that growing season. For defensible space to be consistently successful some regulatory impetus is recommended. Jefferson County should examine the options for requiring the maintenance of defensible space. This could be associated with the sale of a home or based on time since initial

treatment. Those communities with local statutes or covenants should consider similar regulation as an interim step and to help drive the initiative from the bottom up. This is a public safety issue where failure to maintain one's property can create a hazard for firefighters, adjacent properties, and the community as a whole.

6 EMERGENCY OPERATIONS

6.1 Wildfire Response Capability and Recommendations

Emergency fire, medical, and rescue services within the EFPD are provided by EFR, which is comprised of 85 volunteer firefighters, 33 full-time paid staff, and 12 part-time paid staff. There are currently eight lieutenants, six captains, two assistant chiefs, and one operations chief under the command of the Chief of EFR. EFR maintains eight fully equipped stations and 29 pieces of apparatus.

The number and availability of firefighters within the District make EFR stand out among volunteer-dependent organizations. With a solid volunteer core available 24 hours a day and a sizeable paid staff, EFR has a comparably strong response capability. The vast majority of firefighters, over 90 percent, are red-carded as wildland firefighters. This response capability, combined with good quality equipment and apparatus, provides a strong foundation for building a wildland fire suppression organization. The District should increase the number of overhead positions to support advanced wildland fire operations, especially in the engine boss/crew boss/task force/strike team level of management. Participation in the Jefferson County IMT will strengthen the department capabilities and provide risk incident management experience.

Mutual Aid

EFPD is a participant in the Jefferson County and Clear Creek County AOPs, which provide intergovernmental wildland fire response memos of understanding between all fire districts in the counties, and includes Denver Mountain Parks, Jefferson County Open Space, CSFS, and USFS. The AOPs provide agreements that outline all management aspects of the wildland fire within both counties that includes: reimbursement, operational responsibilities, financial responsibilities, and other general areas of interface between the organizations and agencies responsible for wildland fire response. The Clear Creek AOP commits EFR to initial attack within the Arapaho National Forest, the Bear Creek Basin, and areas along Highway 103 (Squaw Pass Road) that are west of the District boundaries.

The department is also a member of the I-70 engine task force that includes the Genesee and Foothills fire protection districts (FPDs). Jefferson County maintains a qualified Type 3 IMT for additional overhead support in the event of a large-scale incident.

Training and National Wildfire Coordinating Group Positions

EFR has developed a draft Wildland Fire Plan that addresses operational goals and objectives. The plan's goals are reflected in this CWPP and include training targets and performance standards.

Currently EFR has one Incident Commander Type 3 (ICT3), two Crew Bosses (CRWB), two Engine Bosses (ENGB), and two Taskforce Leaders (TFLD). Target levels in the plan for NWCG positions are five TFLDs, 20 ENGBs, five CRWBs, five CRWB trainees, and all fire fighters trained to the advanced level of firefighter 1 (FFT1).

Training and maintaining this level of fireline leadership will require an ambitious commitment from the department and its firefighters. These standards can be met through a local certification program. There is latitude within the state and federal certification process for the department to set its own local certification program as long as the District personnel only deploy within the District and normal mutual aid. It is recommended the District develop standards that mirror the NWCG certification process by using NWCG courses and locally developed Position Task Books (PTB). PTBs should be developed for Squad Boss (FFT1), Crew Boss/Engine Boss (Single Resource), and Task Force/Strike Team Leader. ICT5 PTB should not be modified and officers should be able to complete without going on a wildland fire assignment.

EFR should provide a process for individuals who want to deploy on national incidents. This process could be developed similar to the program Fairmount Fire Department is using to provide AD positions at the national level. Completion of the required PTB for these positions can be facilitated by participation on prescribed fires but is still subject to the availability of wildfire assignments.

EFR should sponsor the required courses using its new training facilities and hiring the instructors. The costs of these courses can be born by the outside participants. This process will allow the department to set times and the location that is convenient to EFR personnel.

The District should develop the following interim position/training targets:

- Year 1: Officers/Officer Candidates/Interested Firefighters initiate FFT1/ICT5 EFR PTB, classes: S-131 Firefighter Type 1, S-133 Look Up, Look Down, Look Around; officers complete I-300 Intermediate ICS.
- Year 2: Officers/Officer Candidates/Interested Firefighters complete FFT1/ICT5 EFR PTB, classes: S-290 Intermediate Wildland Fire Behavior, S-230/231 Crew Boss/Engine Boss (Single Resource) (for ENGB); officers complete I-400 Advanced ICS.
- Year 3: Officers/Officer Candidates/Interested Firefighters initiate ENGB EFR PTB, classes: S-215 Fire Operations in the Wildland/Urban Interface.
- Year 4: Officers/Officer Candidates/Interested Firefighters complete ENGB EFR PTB and work towards Engine Strike Team Leader (STEN) and ICT4 as able, classes: S-330 Task Force/Strike Team Leader.

Performance Standards

Target standards for wildland fire response as outlined in the existing draft of the Evergreen Fire Rescue Wildland Fire Plan are divided into two categories, wildland fire and WUI fires. These target performance standards are based on daytime turnout response and the threat to values at risk. These benchmarks should be monitored against actual response time over the next few years. It can then be determined if they require adjustment or if operational modifications are required in order to meet these objectives.

- Wildland Fire

- Size-up and scouting completed within 30 minutes of smoke report;
 - Hand crew stage within 30 minutes of smoke report;
 - Hand crew on the fire within 1 hour of smoke report;
 - Fire behavior forecast transmit within 30 minutes of smoke report;
 - Maintain type 4 incident management to termination or relief by a county type 3 incident management team;
 - Maintain a 20-person handcrew for the duration of an in-district incident; and
 - Activate air support within 30 minutes of smoke report.
- Wildland-Urban Interface Fire
- Size-up and scouting completed within 10 minutes of smoke report;
 - Task force stage within 20 minutes of smoke report;
 - Fire behavior forecast transmit within 10 minutes of smoke report;
 - Maintain type 4 incident management to termination or relief by a county type 3 incident management team;
 - Maintain a 20-person task force for the duration of an in-district incident; and
 - Request air support within 10 minutes of smoke support.

Suppression Requirements

For illustration purposes, Table 17 compares initial attack capabilities for an average engine crew as determined from the “Line Production Rates for Initial Action by Engine Crews” charts (NWCG 2004) with predicted fire spread under 50th percentile climatic conditions as determined from the Corral Creek RAWS data. These are generalized figures provided to illustrate the potential gap between potential fire behavior and available suppression resources and do not account for response time.

Table 17. Wildland Fire Production Rates vs. Fire Growth

Initial Attack Fire Line Production Rates Using 3-Person Engine Crew			
FBFM	Predicted Fireline Production Rates (chains/hr)	Fire Acreage and Perimeter (chains) After First Hour	Predicted Fire Spread (chains/hr) Under Average Conditions
1 – Short grass	24	222 acres/183 chains	72
2 – Grass with Timber/Shrub Overstory	15	47 acres/84 chains	33
4 – Mature Brush	8	16 acres/157 chains	61
5 – Young Brush	12	15 acres/47 chains	19
6 – Intermediate or Dormant Brush	12	39 acres/77 chains	30
8 – Closed or Short-Needle Timber Litter – Light Fuel Load	15	0.1 acres/5 chains	2
9 – Hardwood or Long-Needle or Timber Litter – Moderate Ground Fuel	12	2 acres/18 chains	7

Initial Attack Fire Line Production Rates Using 3-Person Engine Crew			
10 – Mature/Overstory Timber and Understory	12	2 acres/18 chains	7

1 chain = 66 feet

Source for production rates: NWCG 2004. *Fireline Handbook*

Source for fire size and rate of spread: BehavePlus Fire Behavior Modeling System

As indicated in Table 17, a single-engine company can make good process in containing a surface fire in timber fuels under average climatic conditions. Three or four engine companies should be able to catch a fire in light brush. Heavy brush, grass fuels that can't be quickly accessed by fire fighters during severe climatic conditions will pose a challenge to containment, highlighting the importance of mutual aid and aerial support.

Table 18 is based on the time a crew can prepare a structure for a wildland fire using a Type-1 engine. The accepted standard is 20 minutes for a four-firefighter crew and 30 minutes for a three-firefighter crew.

Table 18. Structural Protection Rates

Structural Protection Rates Per Hour Using Type-1 Engine		
Firefighters	Rates	Total Structures per Hour
3	30 minutes/structure	2
4	20 minutes/structure	3

A very similar discussion regarding production rates is included in the Evergreen Fire/Rescue Wildland Fire Plan. The aforementioned performance standards included in the plan are designed to address these suppression needs. As with the response targets, these production standards should be trained to and monitored for attainability.

6.2 Emergency Procedures and Evacuation Routes

In the event that the Jefferson County or Clear Creek Sheriff orders a community to evacuate because of threatening wildfire, residents should leave in an orderly manner. The Sheriff would proclaim the preferred evacuation routes and safe sites. However, the need for evacuation can occur without notice when conditions for wildfire are favorable. Homeowners should be prepared to evacuate without formal notice. Human safety is the number one concern in an evacuation.

Residents of the WUI should have a predetermined action plan for the eventuality of a wildfire. This should include closing windows and doors while leaving a door unlocked for firefighter access, placing a ladder to the roof for firefighter access, and leaving porch lights on so that the home can be seen at night. Families should have meeting locations in place and phone numbers to call in case family members are separated. A plan to quickly leave with essential items should be included. Some refer to these items as the "four P's:" pets, papers, pills (medication), and photos.

Evacuation procedures vary according to subdivision. The EFPD should ensure that every resident has the opportunity to become familiar with these procedures. Evacuation plans should outline available evacuation centers and the procedures to activate them. Large-animal evacuation centers also need to be identified. These procedures should be addressed in public or HOA meetings with information eventually being distributed door-to-door.

Upon returning to a home after a fire, residents should be told to monitor the exterior of the house for smoke for several days. Embers may lodge in small cracks and crevices and smolder for several hours or days before flaming.

Shelter-In-Place Training

Shelter-In-Place training should be considered for WUI areas that evacuation will be difficult or impossible. These areas are Brook Forest Estates, Upper Cub Creek, Beaver Brook Canyon, Highland Hills, and Saddleback Estates WUI areas. There may be a need to shelter-in-place in other areas depending on fire behavior, but the above areas pose a real egress problem and residents should be trained to remain at their structures until the fire moves through. There are some considerations that need to be included in the training: 1) residents need to be prepared; 2) residents need to have some basic firefighting hand tools available; 3) residents should not plan on having water; 4) residents should not, if water is available, waste it by presoaking; 5) residents should have some proper work clothing; 6) residents should identify their safety zone; and 7) residents should determine whether they are mentally and physically able to stay.

7 EVERGREEN FIRE PROTECTION DISTRICT, COMMUNITY WILDFIRE PROTECTION PLAN, MONITORING AND EVALUATION

7.1 Community Wildfire Protection Plan Adoption

The EFPD CWPP is a strategic planning document that is developed and approved by the Core Team. An important component of the development process includes building a stakeholder group that will move the plan forward, implement prioritized recommendations, and maintain the CWPP as the characteristics of the WUI change over time. Organizing and maintaining this team are often the most challenging components of the CWPP process. They are, however, essential in the process of converting the CWPP from a strategic plan into action.

This team will oversee the implementation and maintenance of the CWPP by working with fire authorities, community organizations, private landowners, and public agencies to coordinate and implement hazardous fuels treatment projects management and other mitigation projects. Building partnerships among neighborhood-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners is necessary in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation is a long-term effort that requires the commitment of all partners involved. The CWPP encourages citizens to take an active role in identifying needs, developing strategies, and implementing solutions to address wildfire risk by assisting with the development of local community wildfire plans and participating in countywide fire prevention activities.

Public meetings were convened in September of 2007 to present the EFPD CWPP to the Core Team, fire authorities, stakeholders, and public. The draft CWPP was posted on the Jefferson County Division of Emergency Management website to allow public review and comment. A two-week response period provided the public an opportunity to comment on the draft CWPP. In addition, a questionnaire was handed out at the two public meetings and other public events to provide opportunities for people to provide input on the CWPP. The final draft of the CWPP was formally adopted by the Core Team, composed of representatives from the EFPD, Jefferson County Division of Emergency Management, Jefferson County Open Space, and CSFS.

The EFPD CWPP provides the foundation and resources for understanding wildfire risk and presents opportunities to reduce potential losses from wildfire. Individual communities and private landowners can take action by developing specific fire plans or by participating in district-wide activities for prevention and protection.

The HFRA authority for the CWPP requires adoption of this plan, as does the FEMA Disaster Mitigation Act of 2000. With formal adoption by the Core Team, participating agencies and WUI neighborhoods will be competitive for available hazardous fuels and non-fuels mitigation funding that may assist with plan implementation. Furthermore,

adoption of this plan highlights a collaborative planning and development process between the EFPD, local government, public agencies, and neighborhood organizations.

7.2 Sustaining Community Wildfire Protection Plan Efforts

A CWPP can serve as the foundation for a safer and healthier WUI through hazard assessment and strategic planning focusing on the threat of wildfire. The mitigation strategies outlined in this plan will greatly reduce that risk, but only if implemented. Converting strategy into action is the key to achieving this important goal.

Communities can be made safer, and this CWPP has outlined realistic measures to achieve that goal. The CWPP process encourages homeowners to take an active role as fuel treatment strategies are developed and prioritized. Ownership of CWPP implementation at that same local level is the most effective means to achieving successful results and sustaining the effort from year to year.

Proactive neighborhoods can seek support and guidance through a variety of local, state, and federal resources identified in this plan including the CSFS, Jefferson County Division of Emergency Management, and EFPD.

7.3 Community Wildfire Protection Plan Oversight, Monitoring, and Evaluation

Maintaining the momentum created by this process is critical to successful implementation and ongoing community wildfire hazard reduction. Ownership of this responsibility lies with each community, neighborhood, and HOAs identified in the CWPP.

As wildfire hazard reduction efforts are implemented over time and the characteristics of particular WUIs change, neighborhoods may wish to reassess particular areas and update the findings of the original CWPP. Monitoring the progress of project implementation and evaluating the effectiveness of treatments are an important components of CWPP oversight and maintenance. The assessment methodology utilized in this plan is a standardized, well-documented hazard and risk survey approach that is designed to provide a benchmark against which future assessments can be compared. Successes, challenges, and new concerns should be noted and subsequently guide any modifications to the CWPP that better accommodate the changing landscape.

Stakeholders will be responsible for CWPP monitoring and evaluation through regular meetings, public involvement, and coordination with EFPD, neighborhood communities, and HOAs. Monitoring is the collection and analysis of information acquired over time to assist with decision making and accountability and to provide the basis for change. Evaluation includes analysis of the effectiveness of past fuels reduction and non-fuels mitigation projects, as well as recent wildfire suppression efforts. Monitoring and evaluation measures should progress overtime in a way that will determine whether the CWPP goals and objectives are being attained (Table 19).

Table 19. Monitoring and Evaluation Tasks

Objective	Tasks	Timeline
Risk Assessment	<ul style="list-style-type: none"> Use reliable data that is compatible among partner agencies. Update the CWPP as new information becomes available. Continue to assess wildfire risk to communities and private landowners. 	Annual Annual Biennial
Fuels Reduction	<ul style="list-style-type: none"> Identify and prioritize fuels treatment projects on public land through development of a 5-year plan. Track fuels reduction projects and defensible space projects on private land. Monitor fuels reduction projects on evacuation routes. Track grants and other funding sources and make appropriate application. 	Annual Biennial Annual Ongoing
Emergency Management	<ul style="list-style-type: none"> Review suitability and the need for fuels reduction along evacuation routes. 	Annual
Public Outreach	<ul style="list-style-type: none"> Plan and hold Firewise education week. Provide Firewise pamphlets at public events. Evaluate techniques used to motivate and educate private landowners. 	Annual Annual Annual

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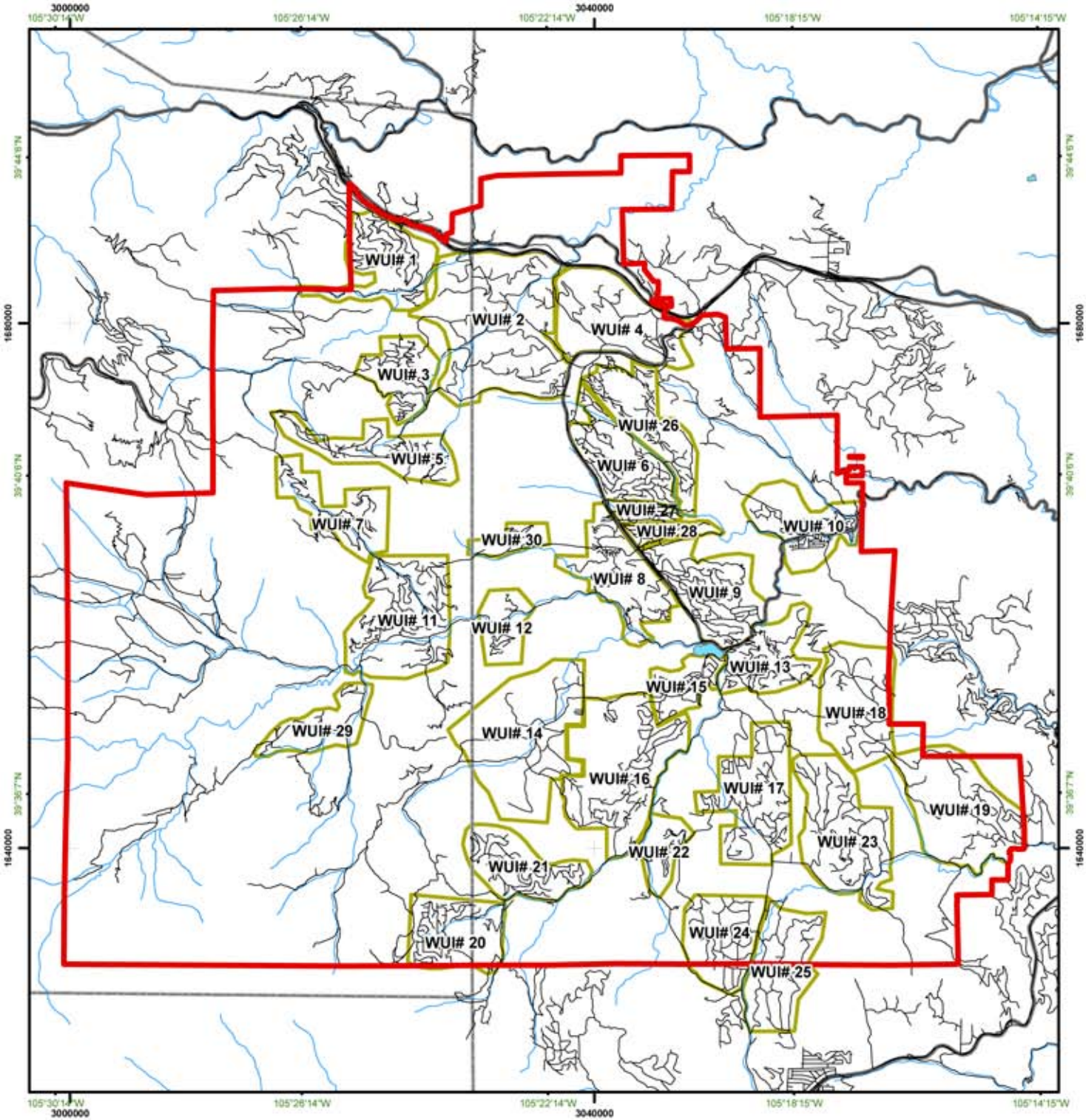
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APPENDIX A PROJECT MAPS

- MAP 1. ASSESSMENT AREA OVERVIEW
- MAP 2. WUI SUBDIVISIONS AND HAZARD RATINGS
- MAP 3. PUBLIC LANDS
- MAP 4A. FIRE BEHAVIOR FUEL MODEL - LANDFIRE
- MAP 4B. FIRE BEHAVIOR FUEL MODEL - SPOT
- MAP 5. AGENCY FUEL TREATMENT ZONES

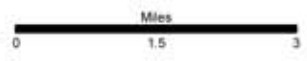


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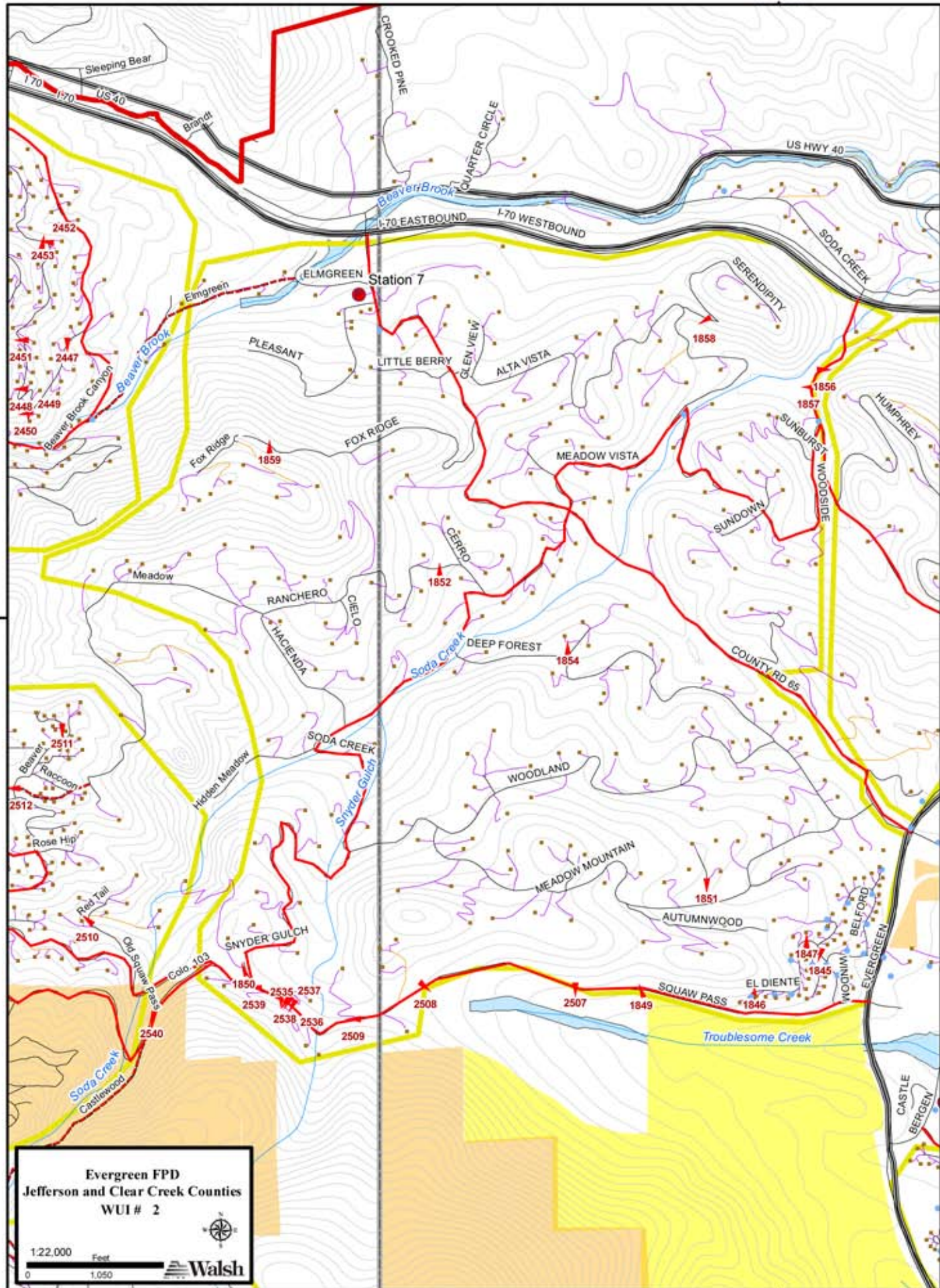
- WUI
- Road
- Road Update
- Driveways
- Highways
- Primary Evac
- Proposed Evac
- Contour 40'
- Streams
- 100 Year Floodplain
- Structures
- ▲ Photo Location
- Hydrant
- Fire Station

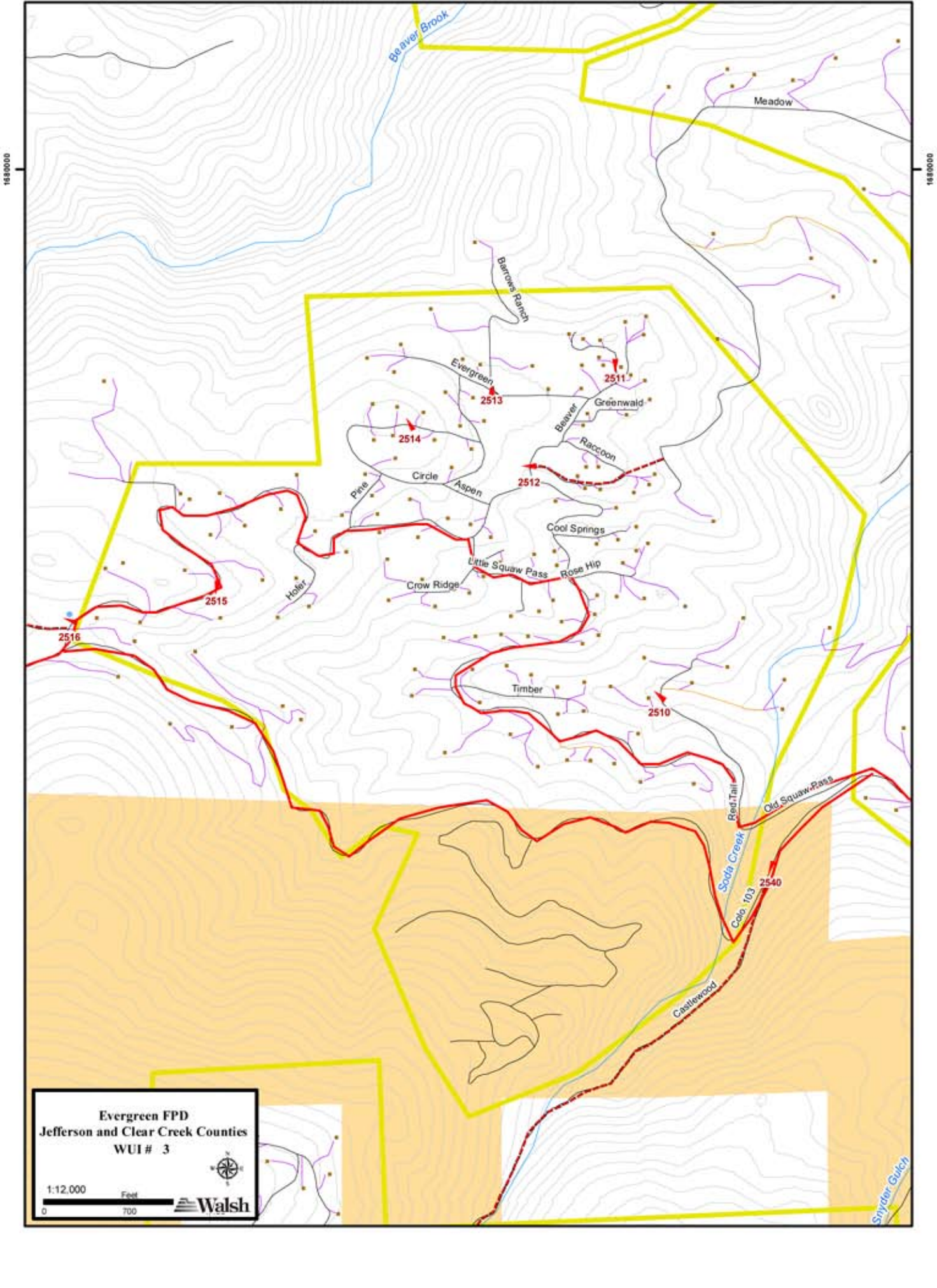
Managed Lands

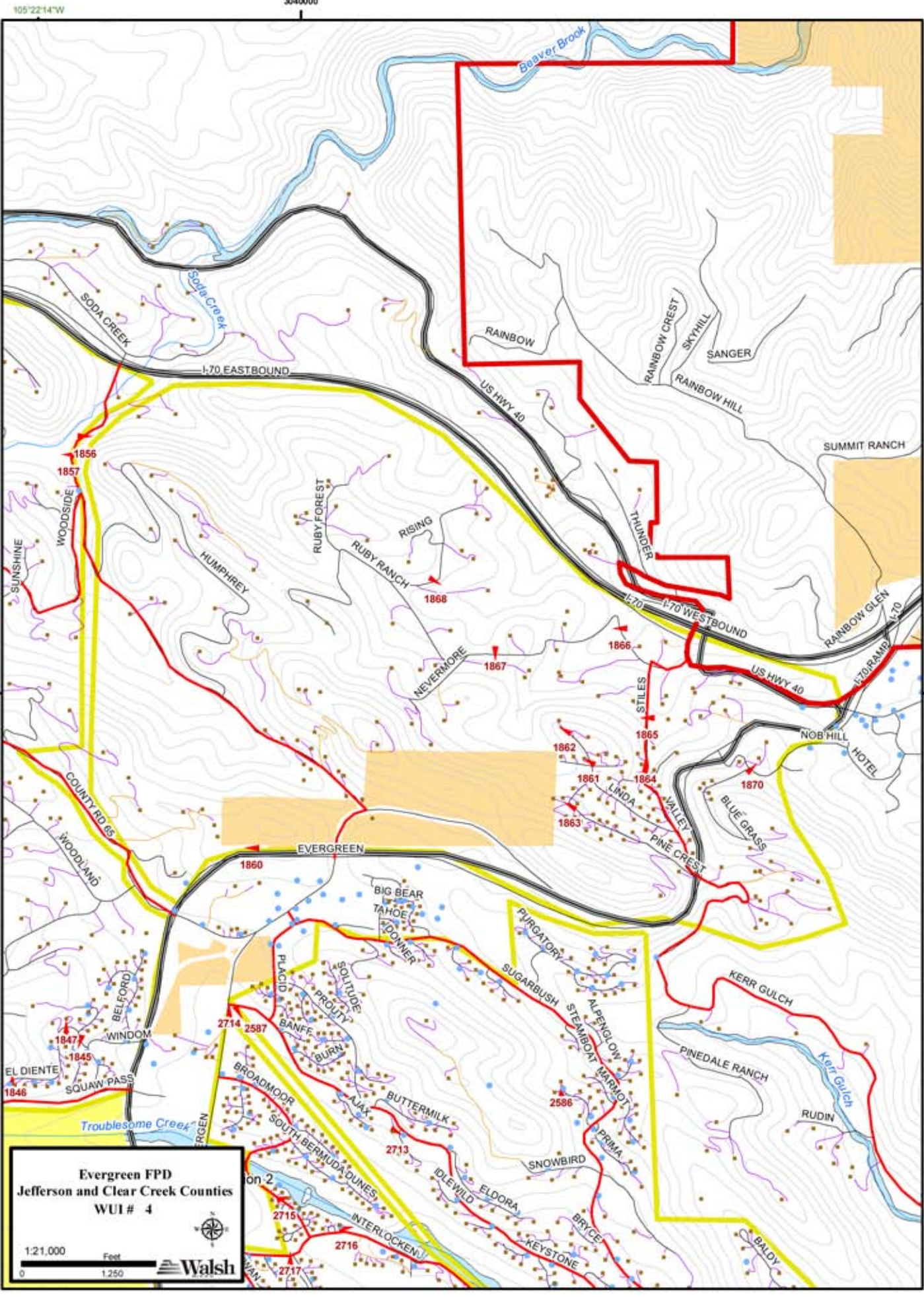
- Arapaho National Forest
- Arapaho National Forest/Private
- BLM/Northeast Res
- Denver Mountain Park
- Mount Evans SWA
- Mount Evans Wilderness/Arapaho NF
- State Land Board
- Jeffco Open Space
- State Parks

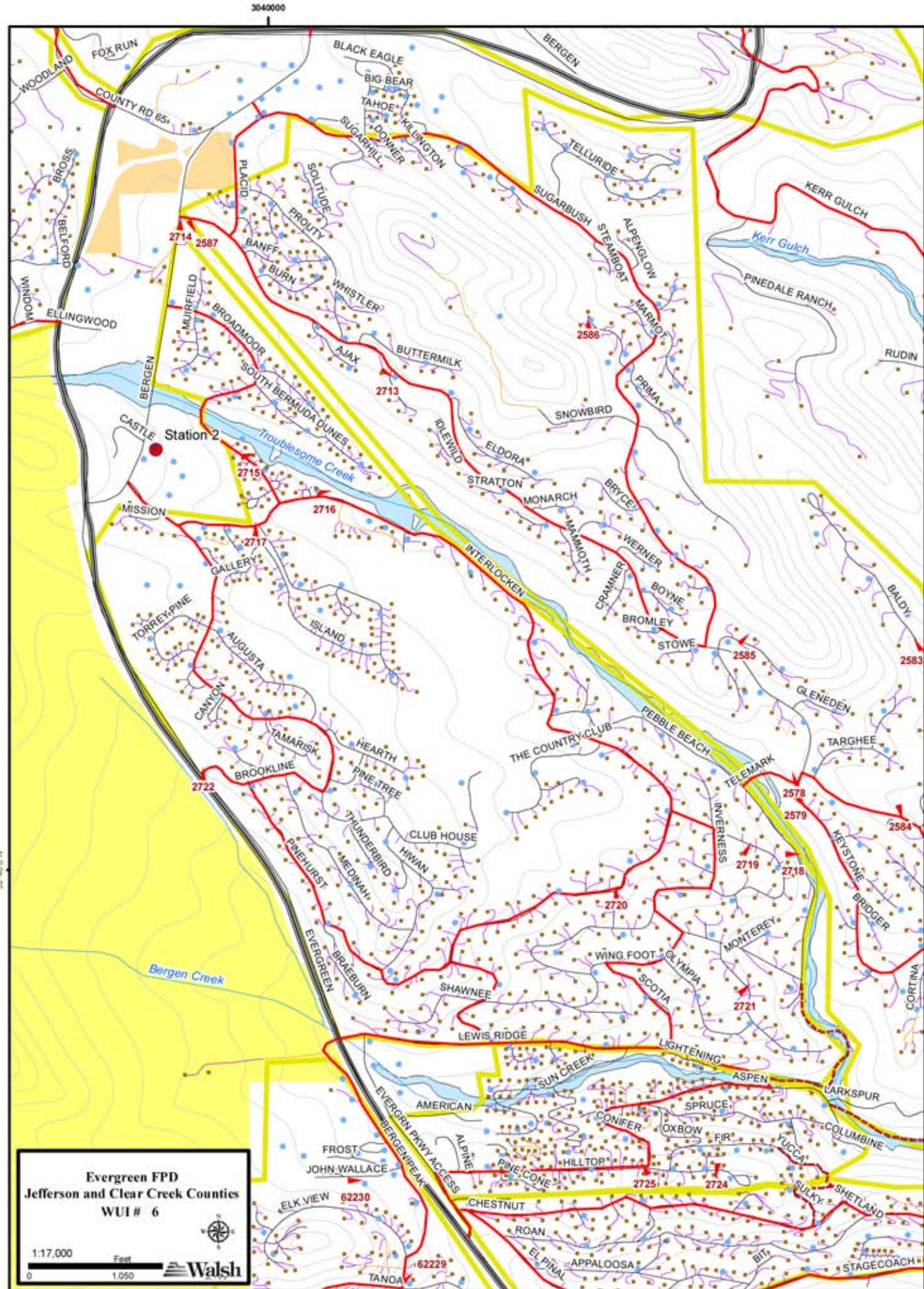


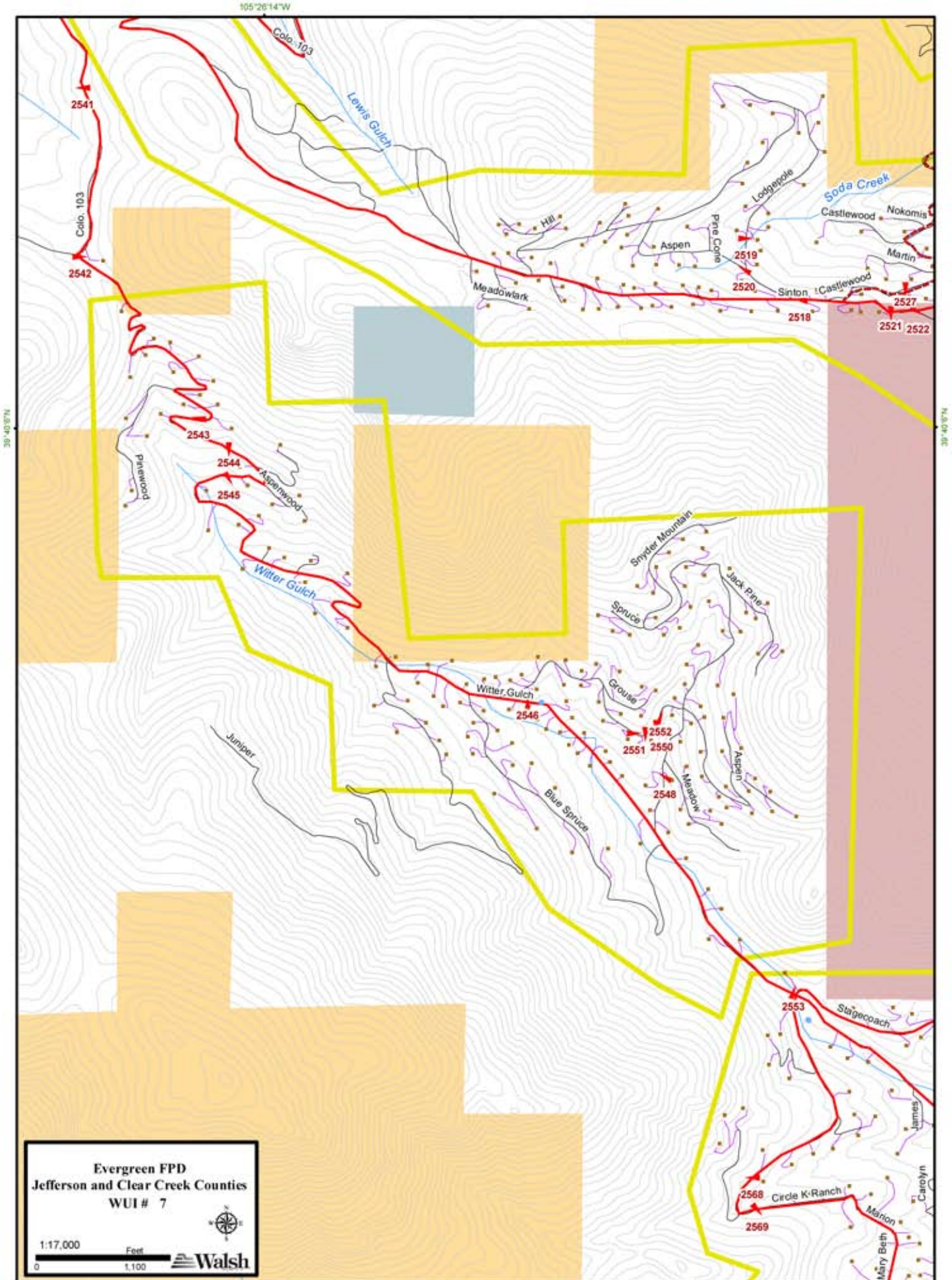
Evergreen FPD
Jefferson and Clear Creek Counties
Appendix C
Wildland Urban Interface (WUI)
Community Assessment
Index Legend









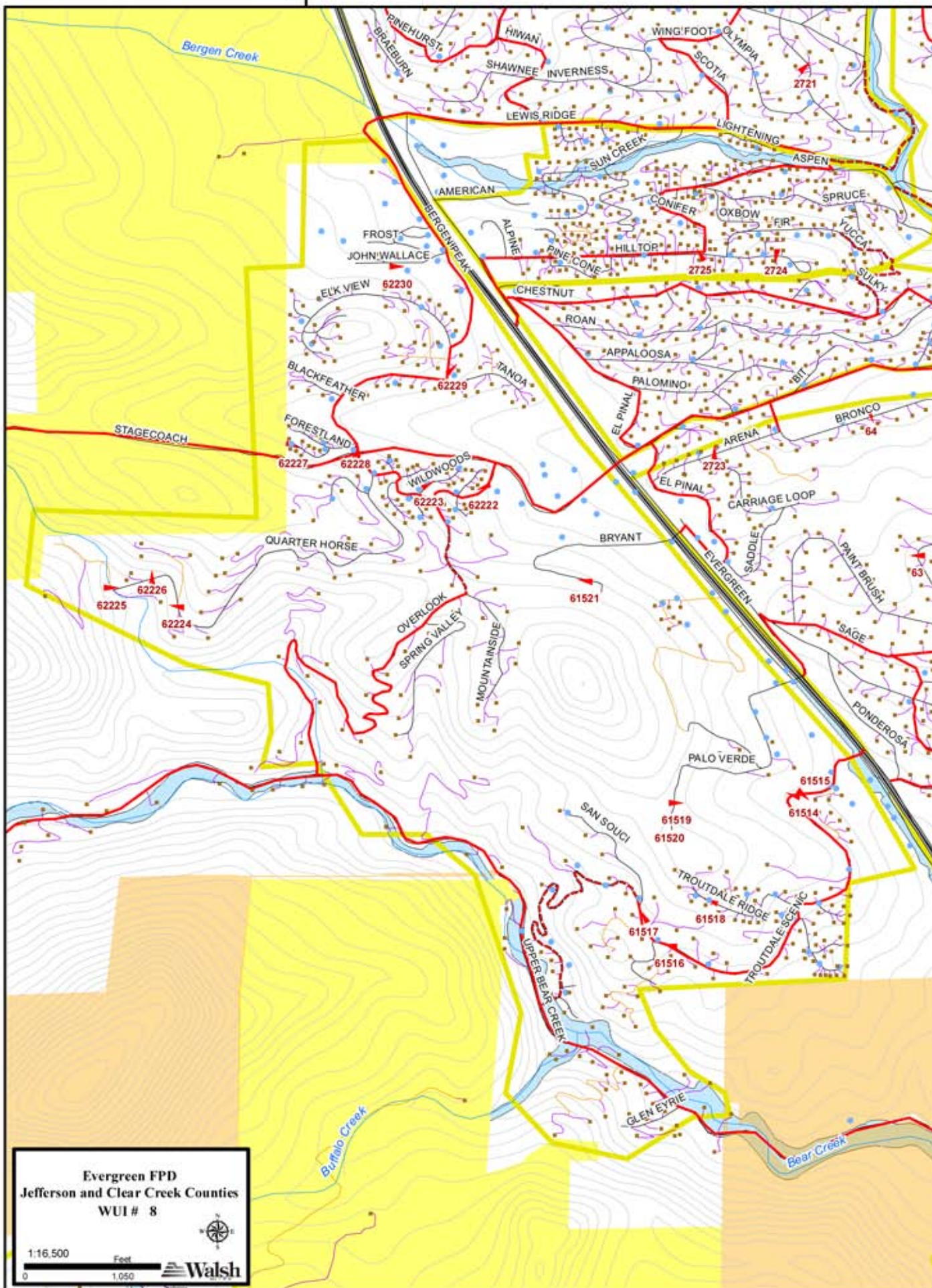


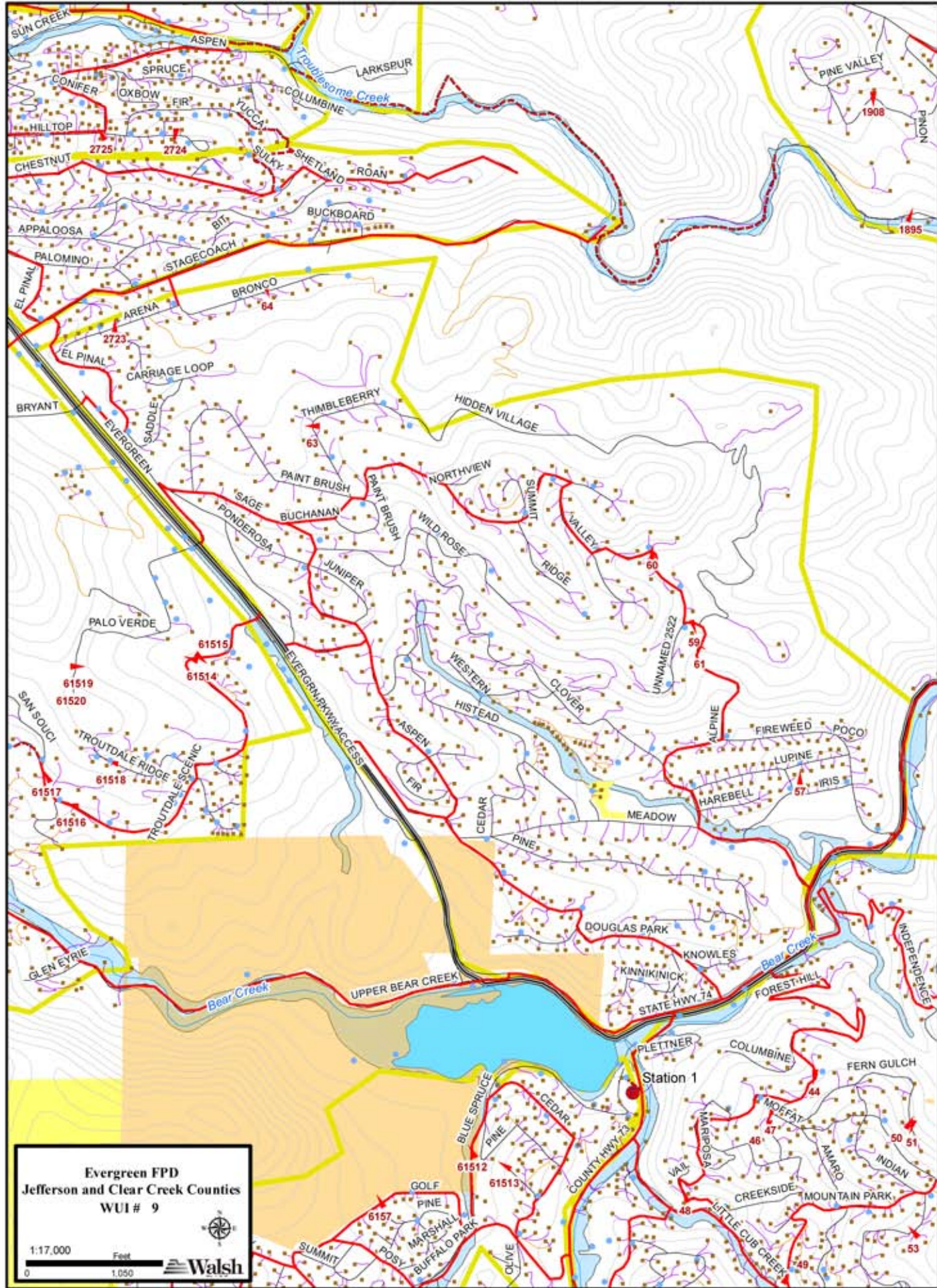
Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 7



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Feet
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Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 9

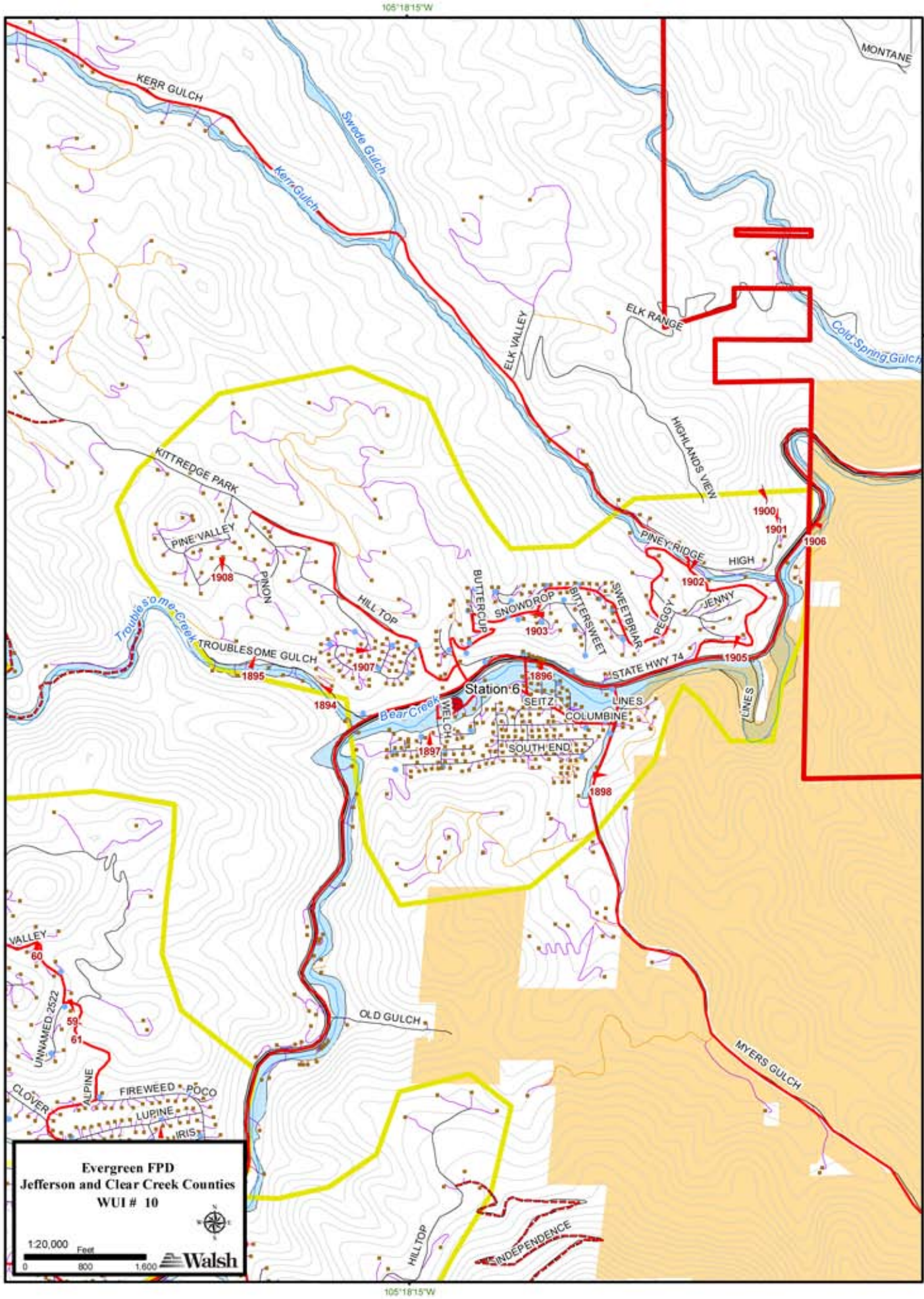
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Feet

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Walsh

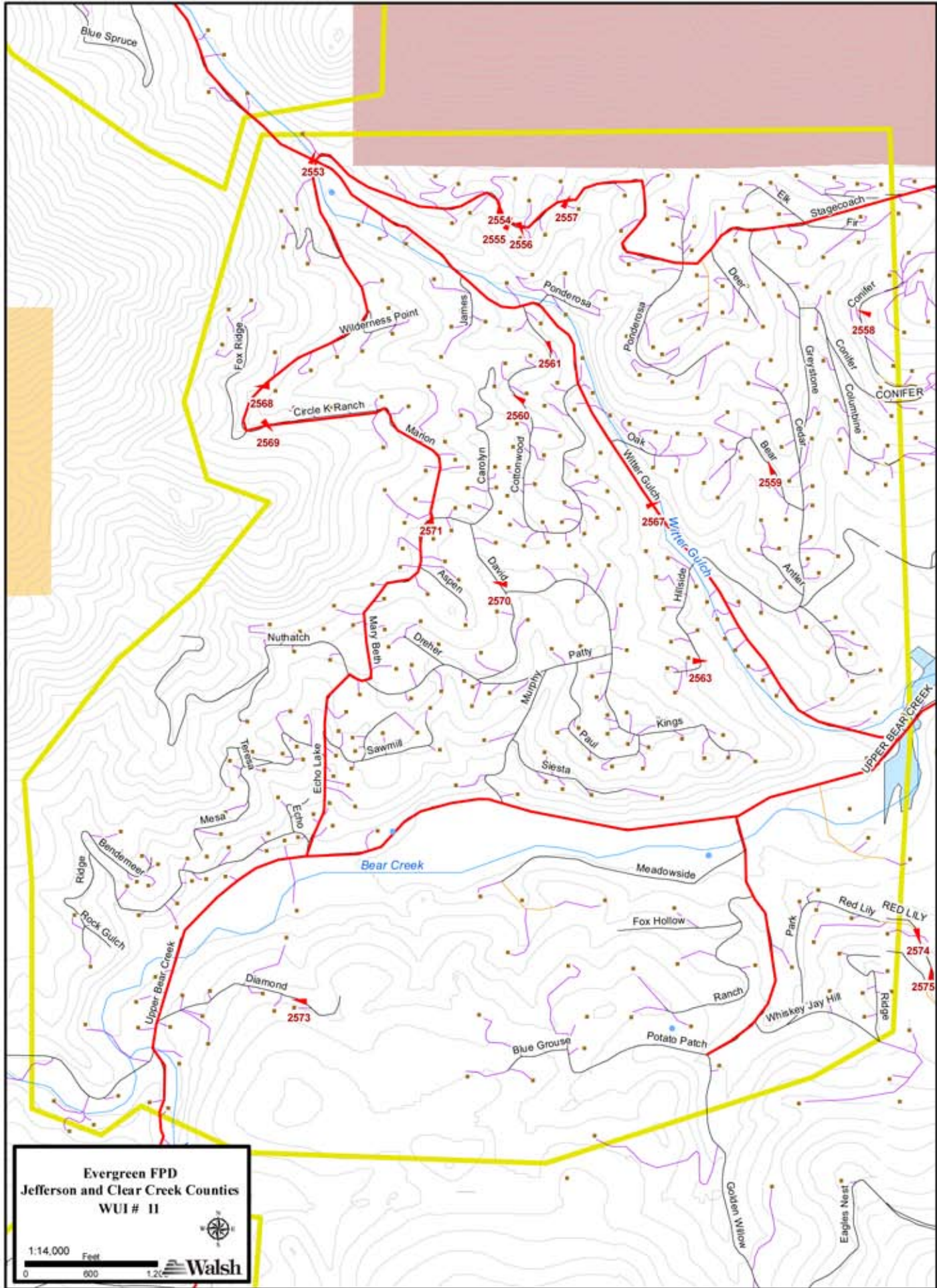


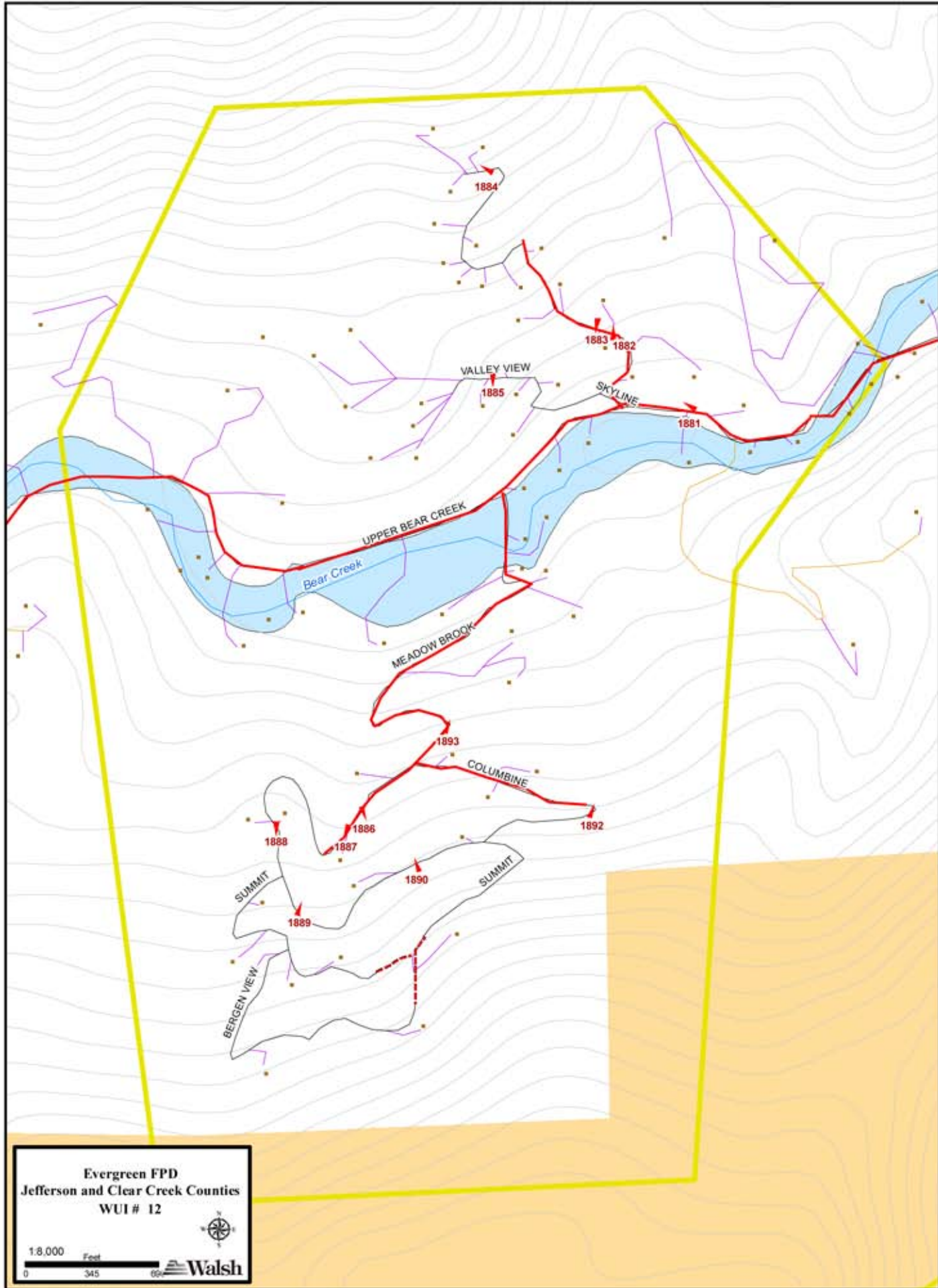
Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 10

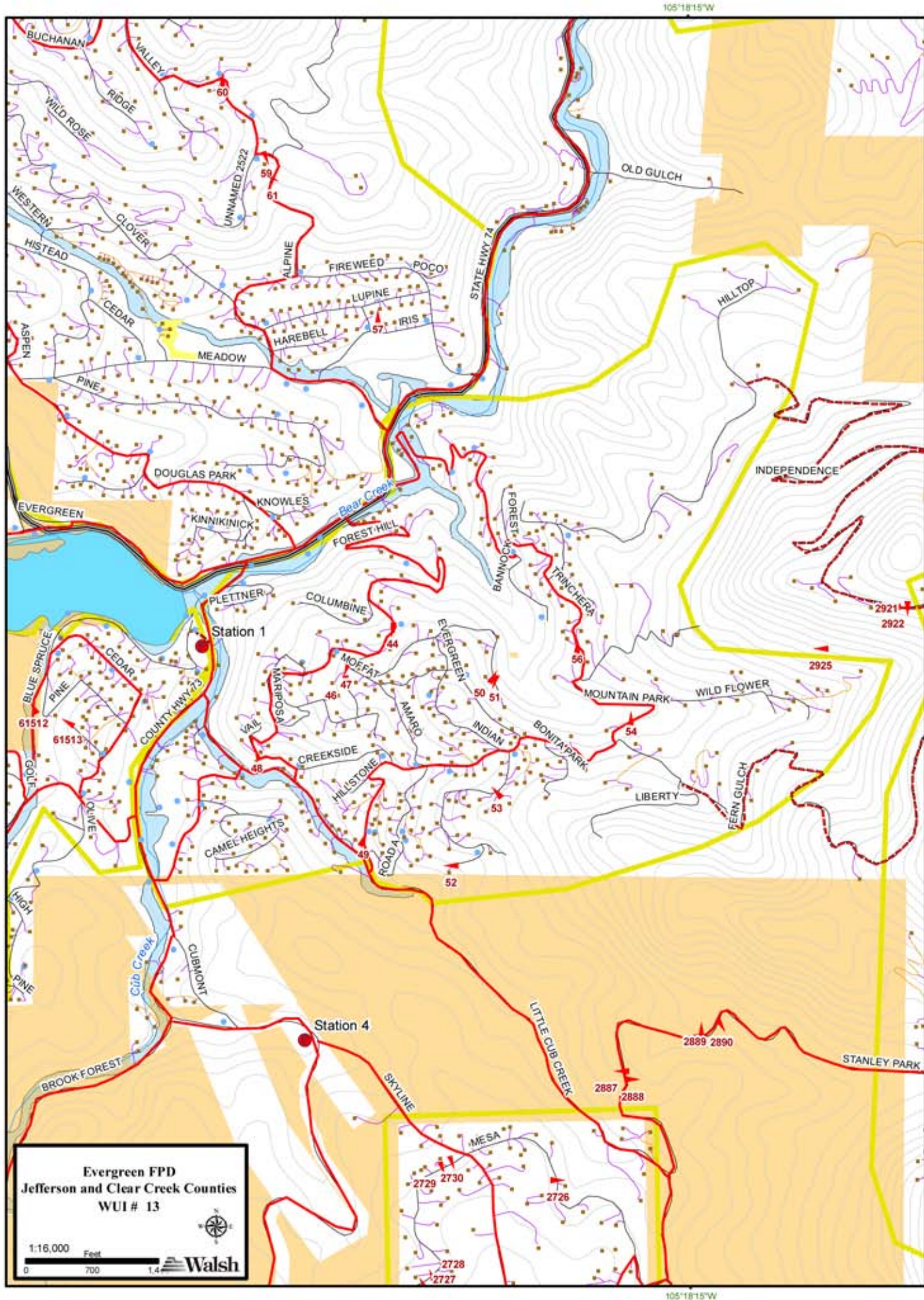
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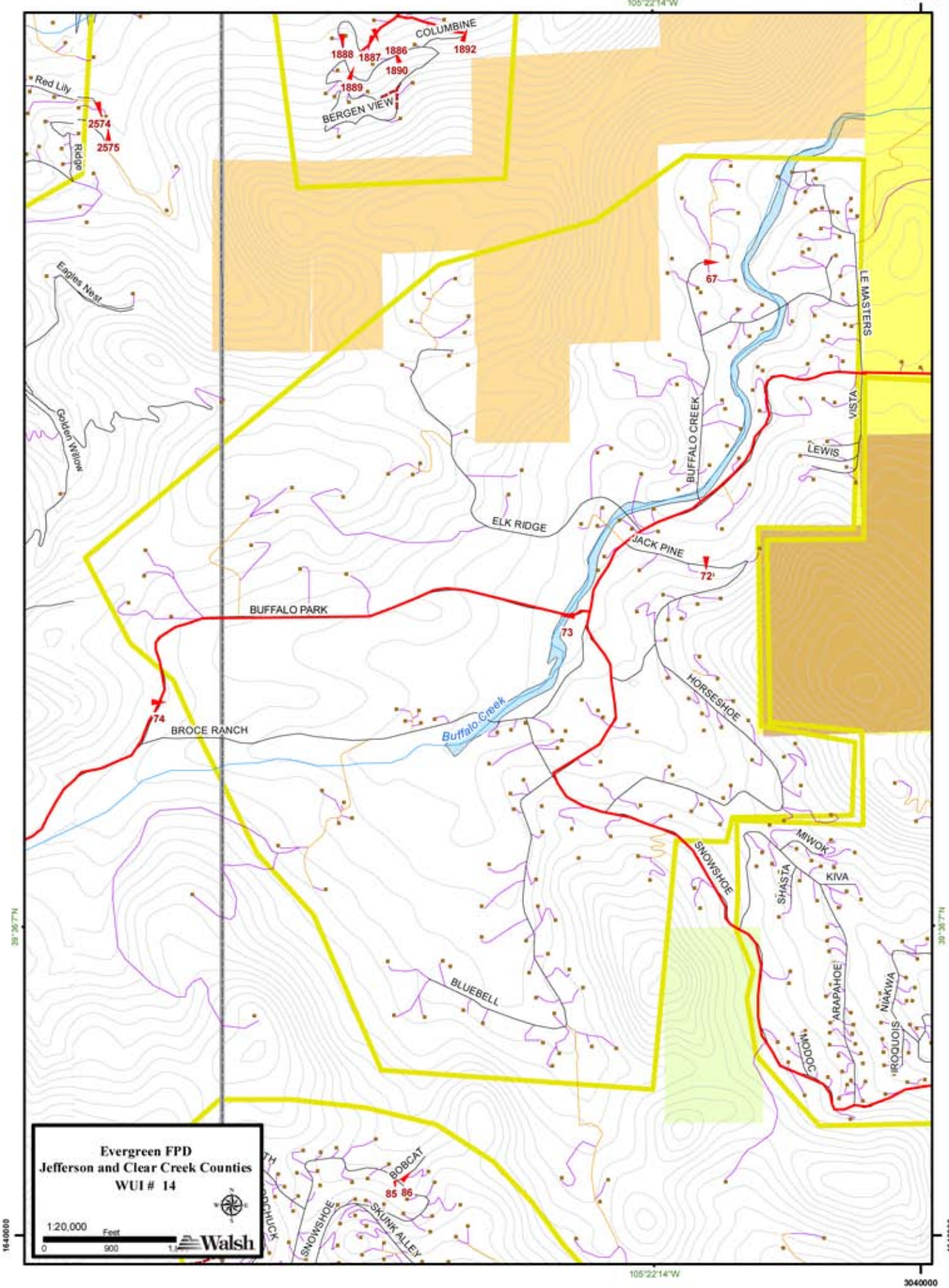
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Walsh







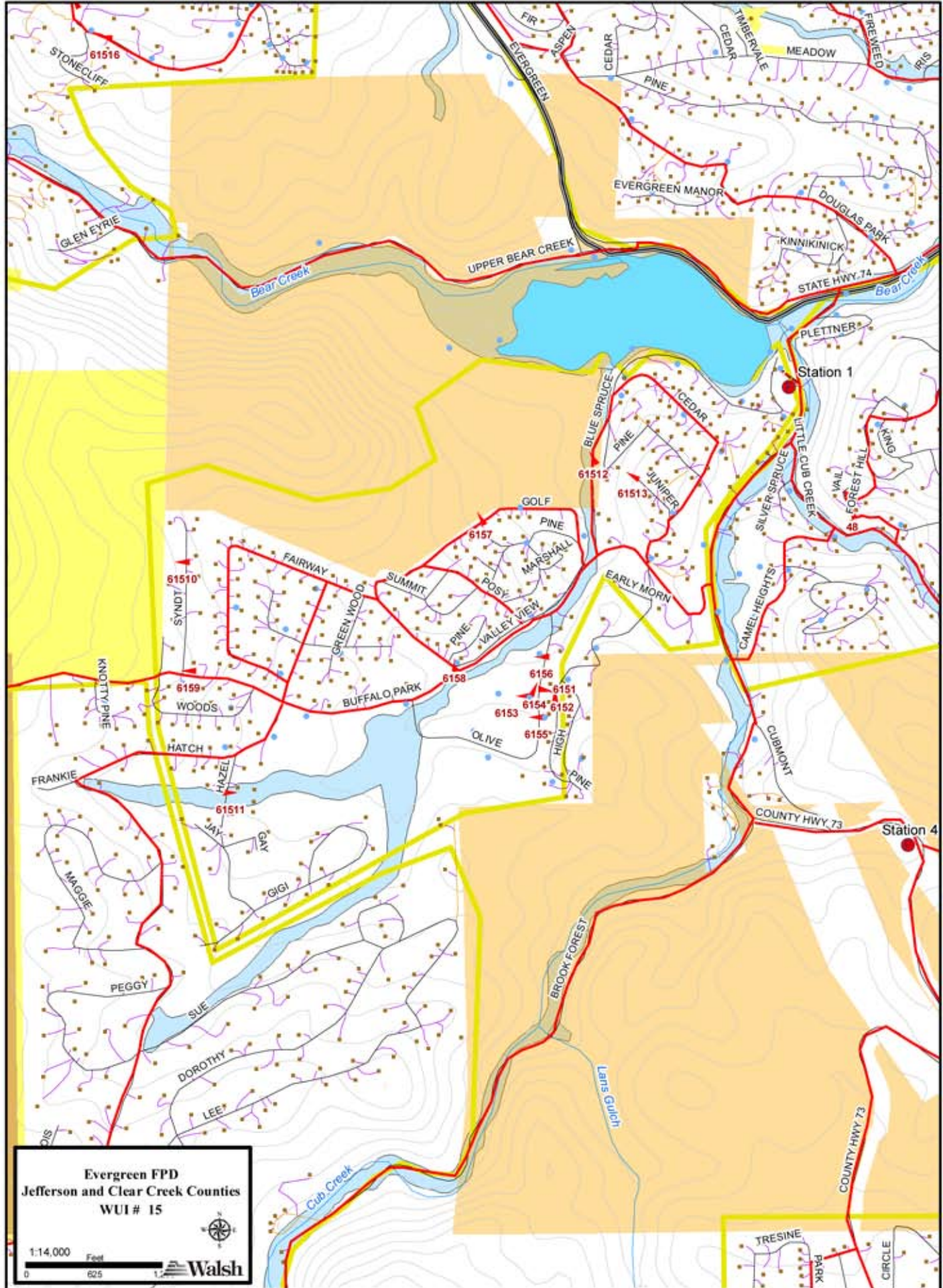


Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 14




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Feet
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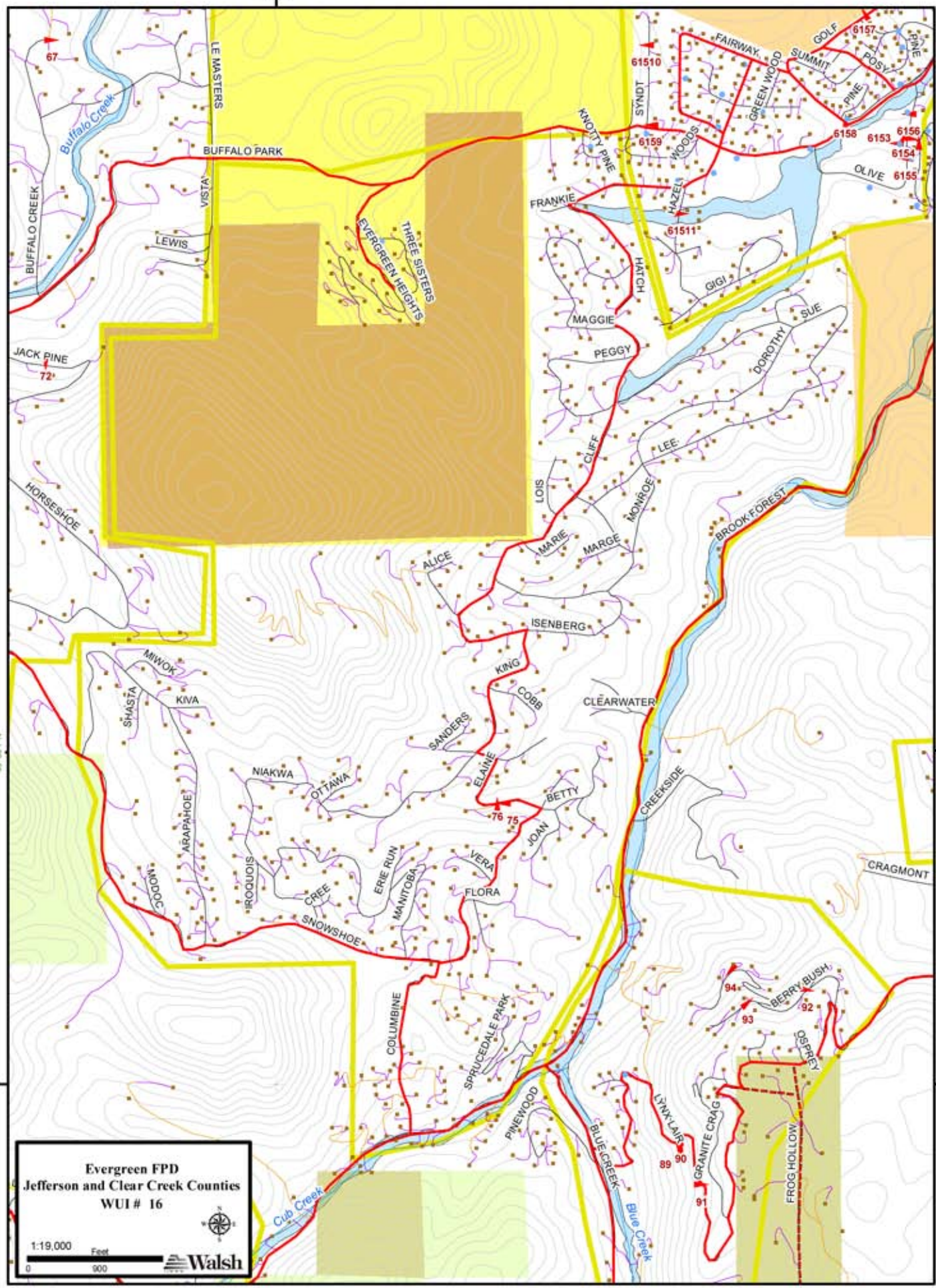
Walsh



Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 15

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 Walsh

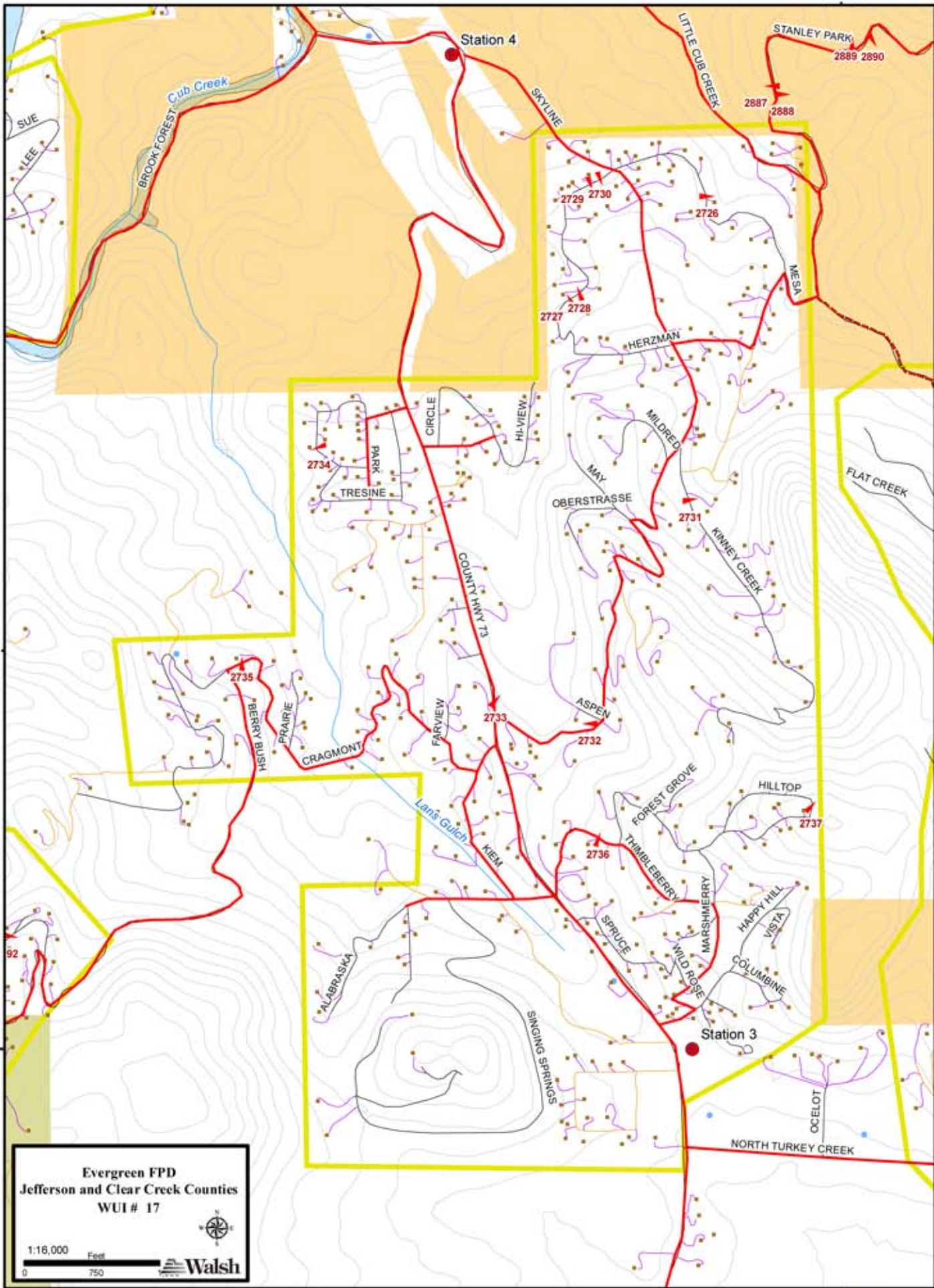


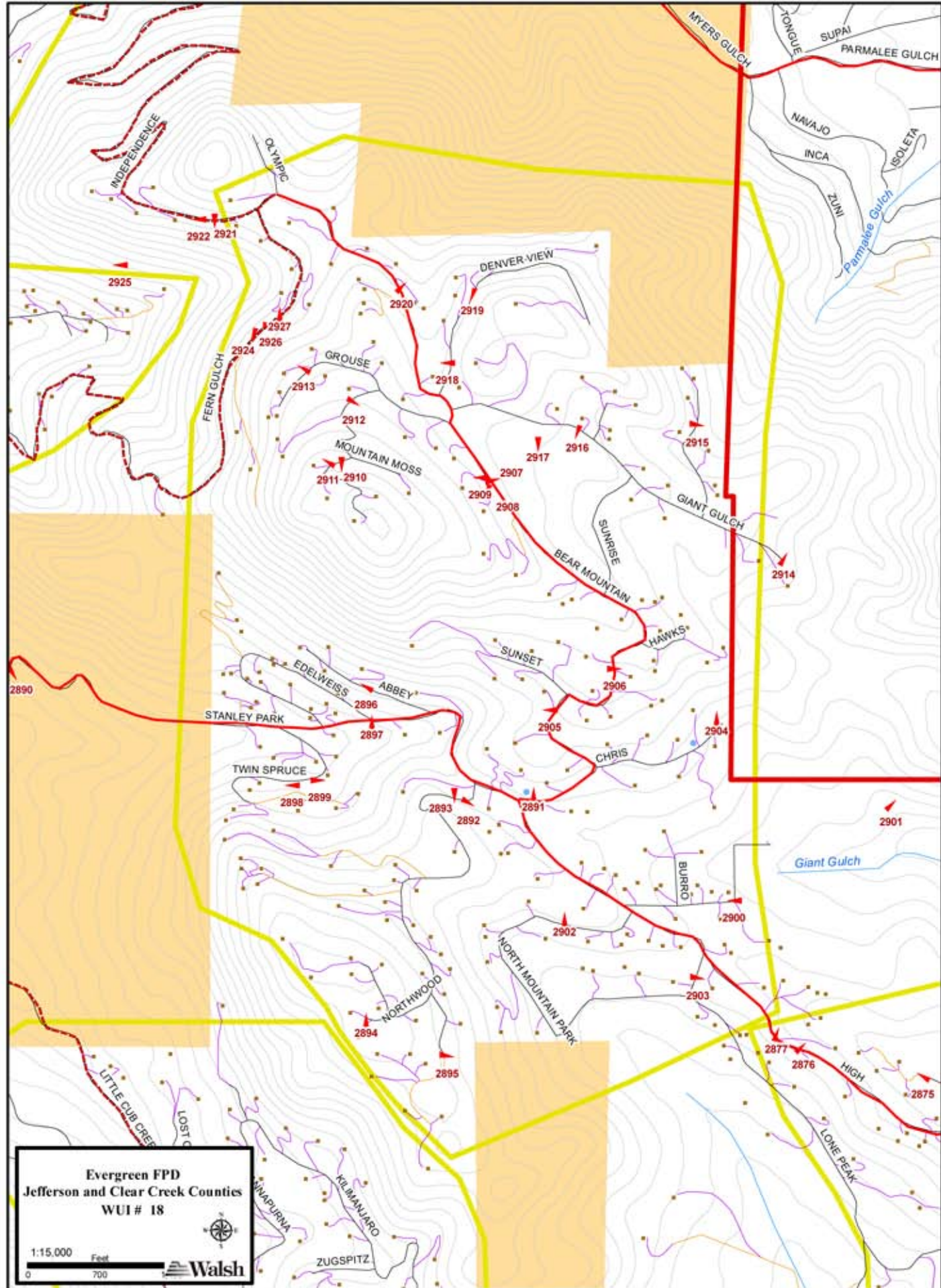
Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 16

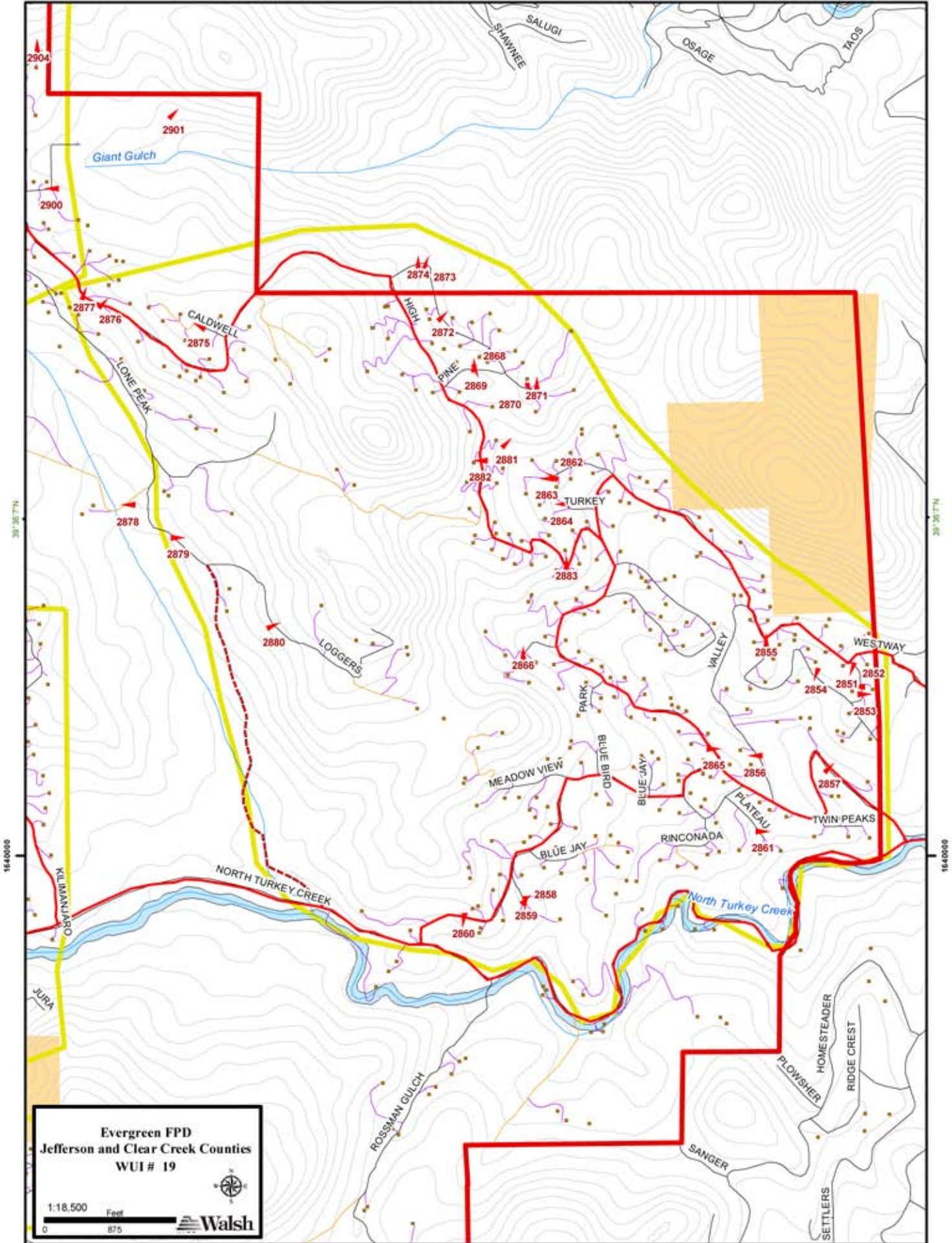
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Walsh





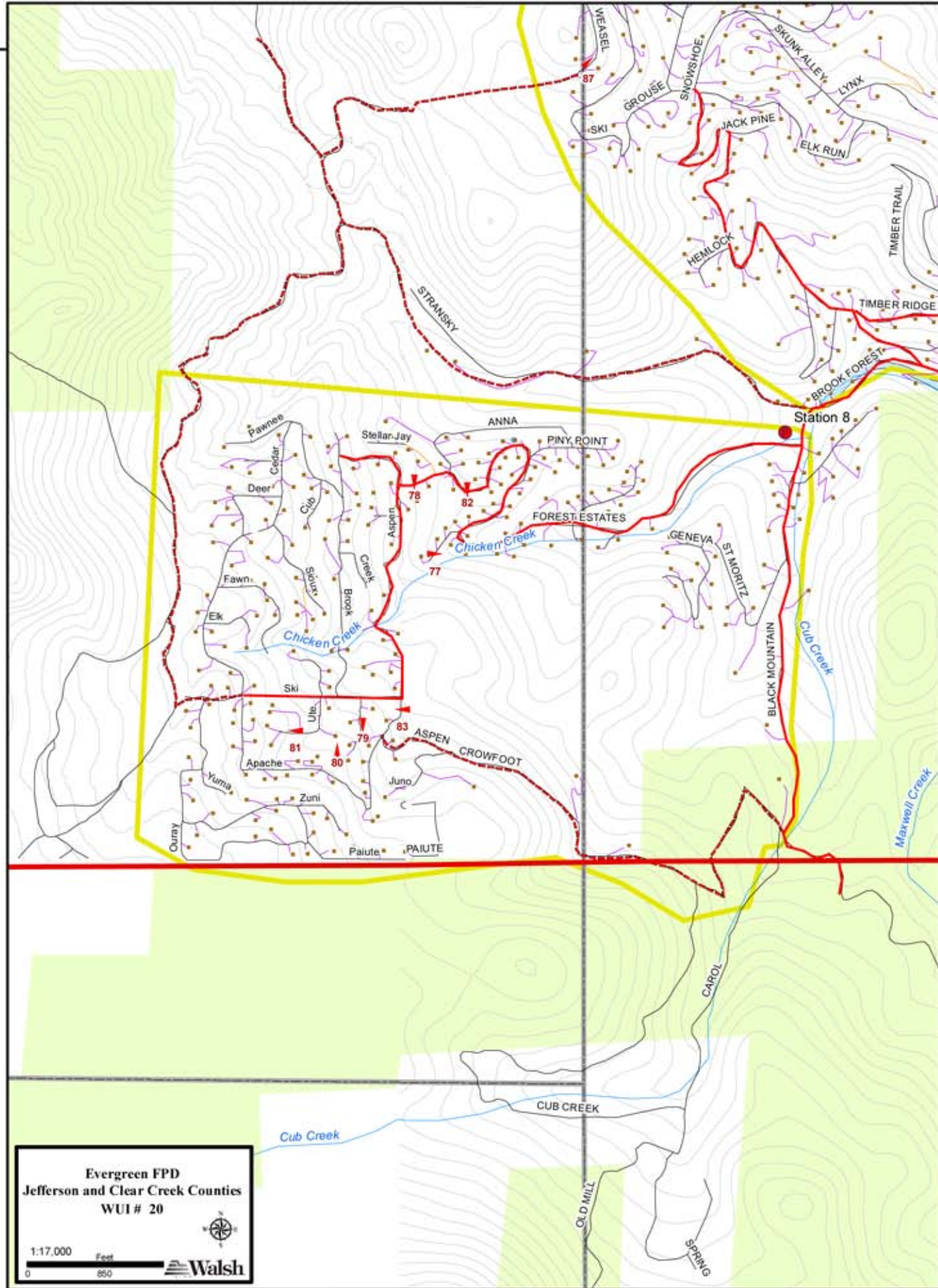


Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 19

1:18,500
Feet
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Walsh





Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 20

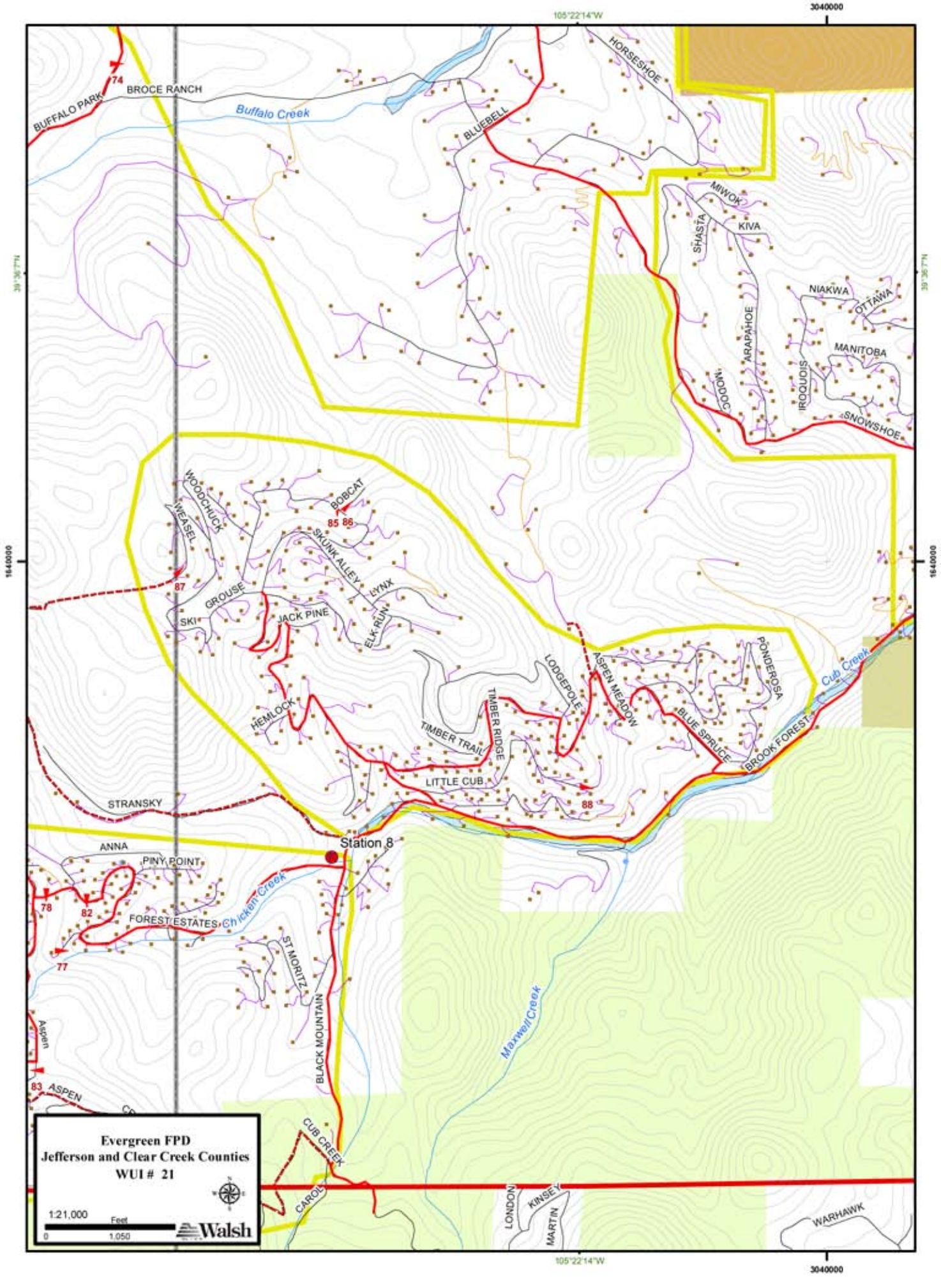


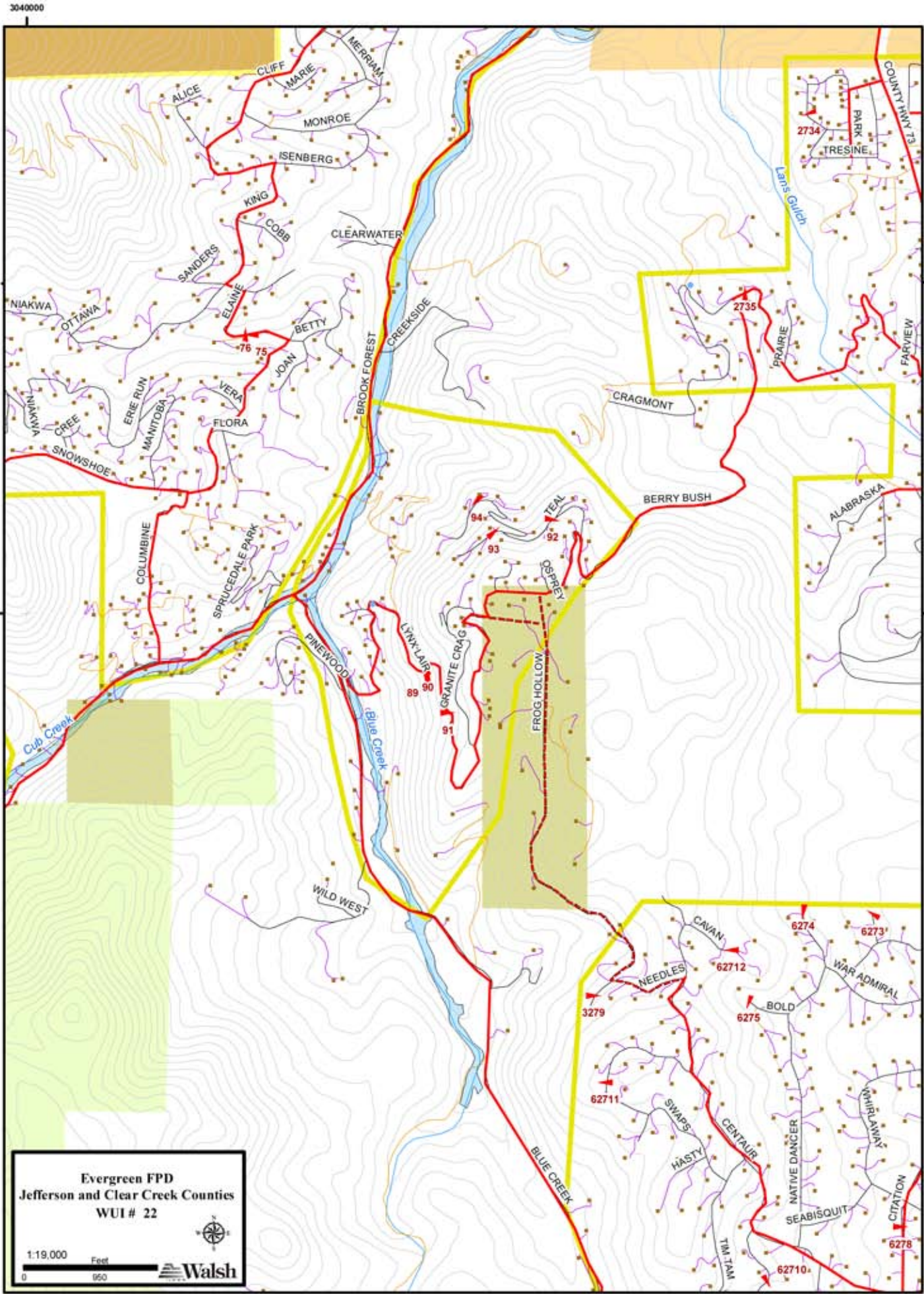
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Feet

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Walsh





Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 22

1:19,000 Feet

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Walsh

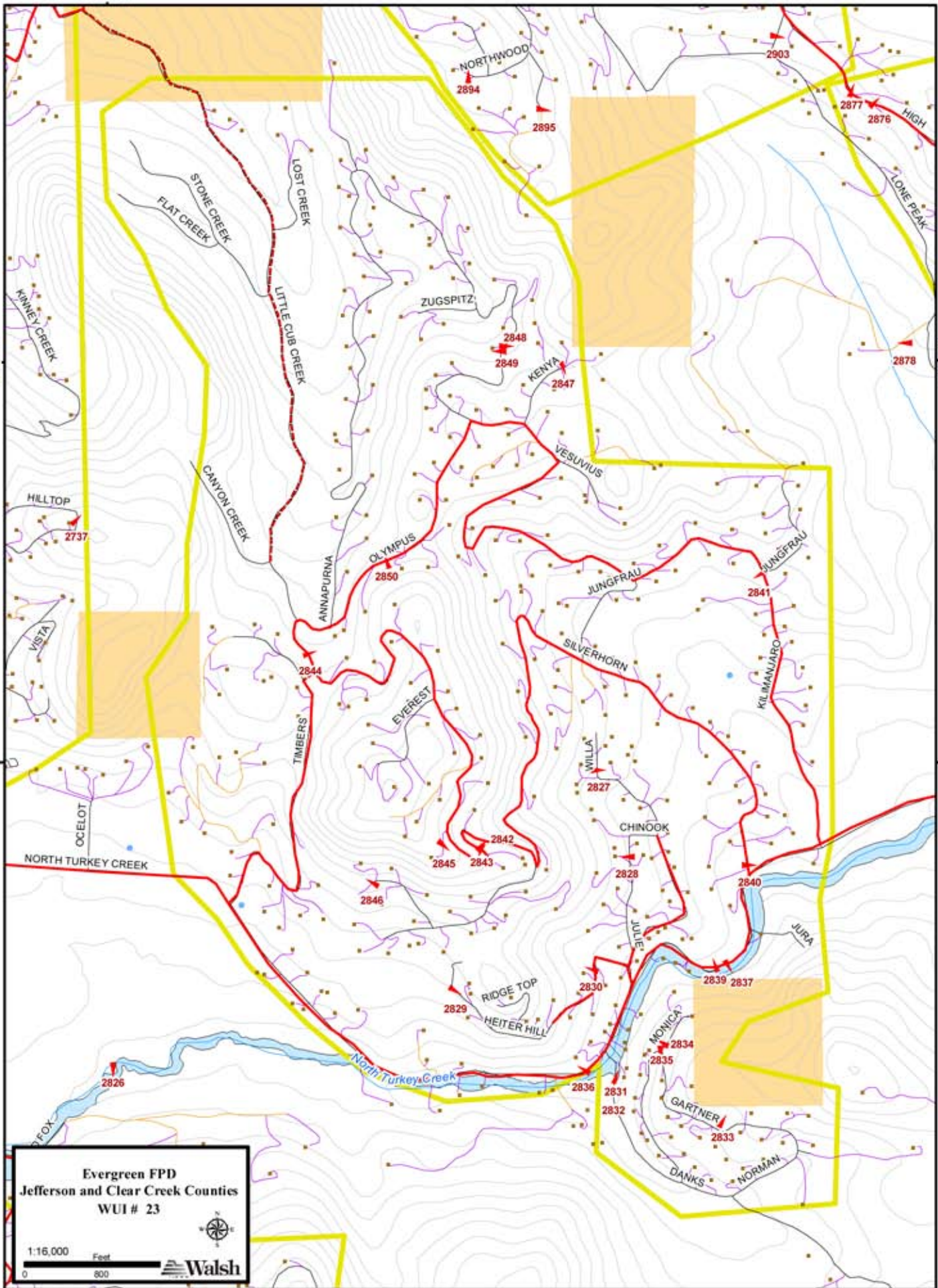
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39°36'7"N

39°36'7"N

1640000

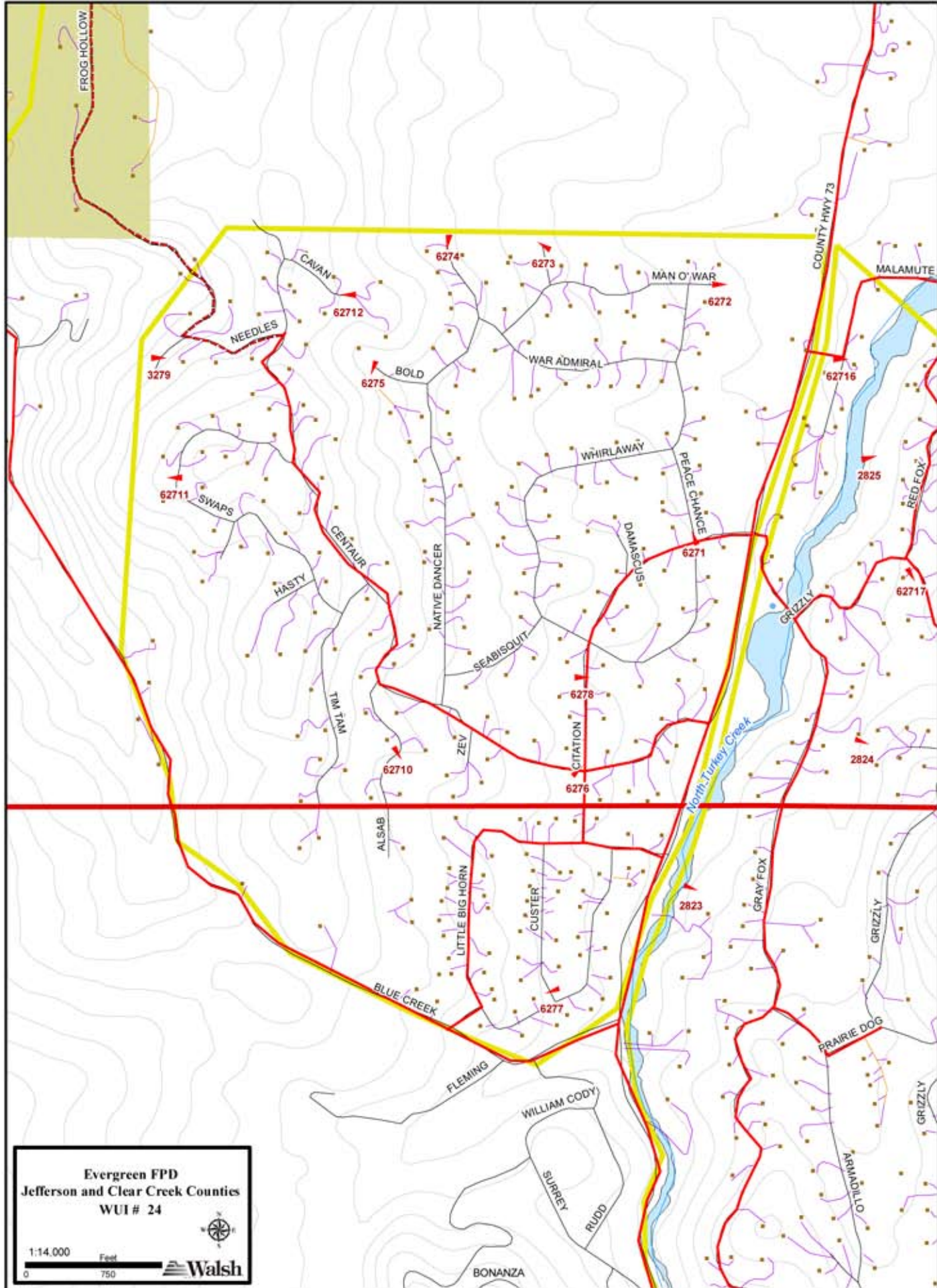
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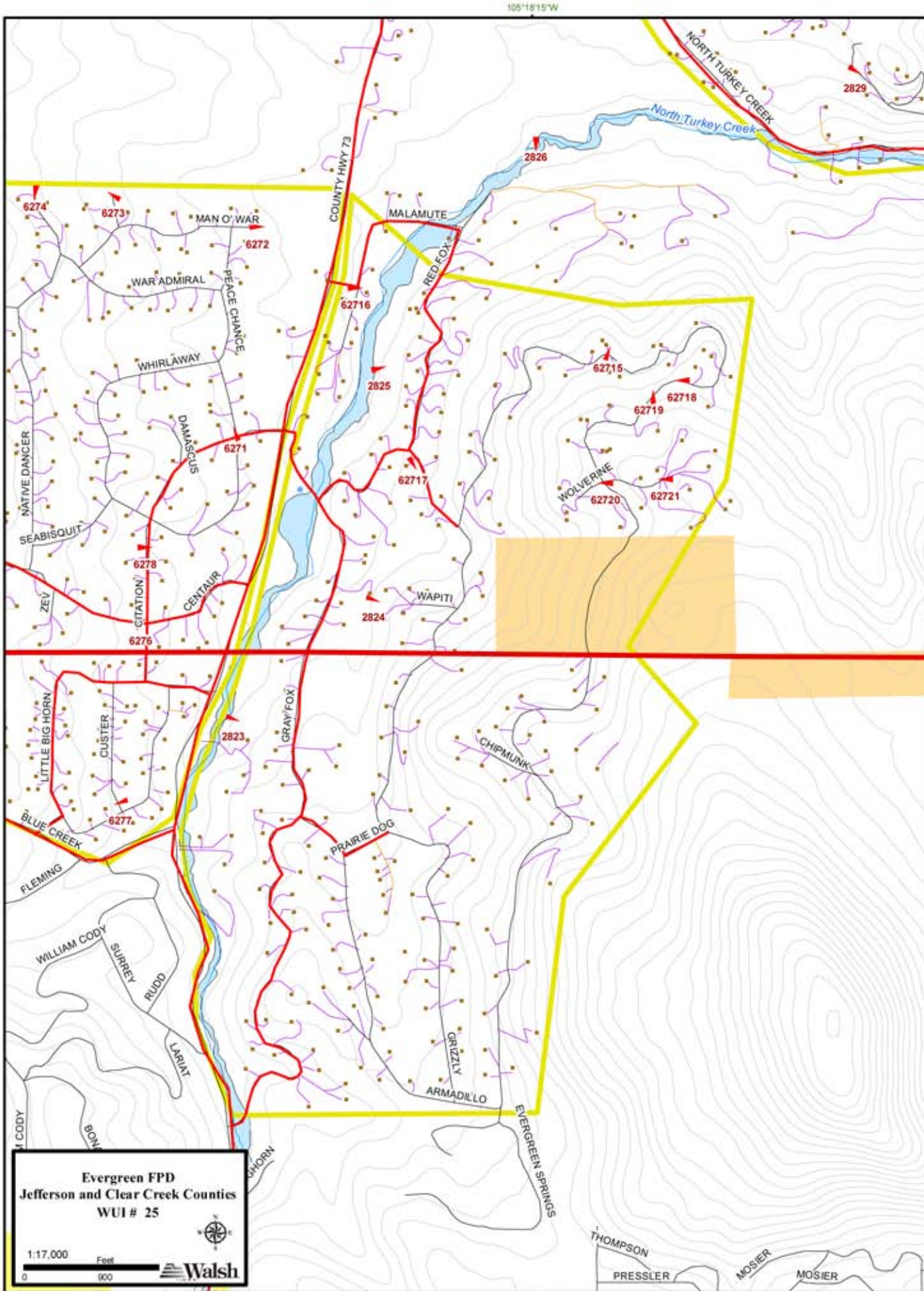


Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 23

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Feet
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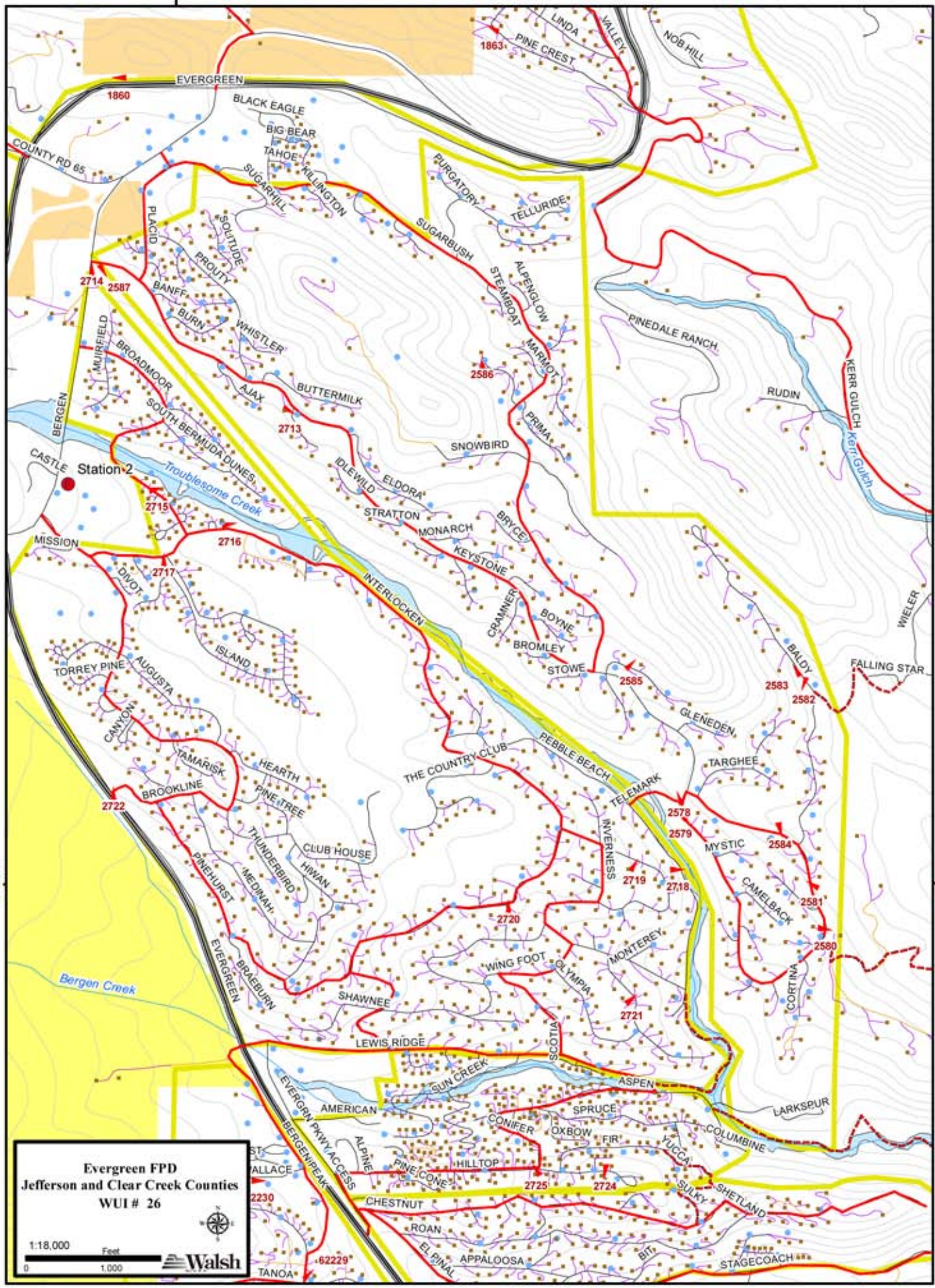




Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 25

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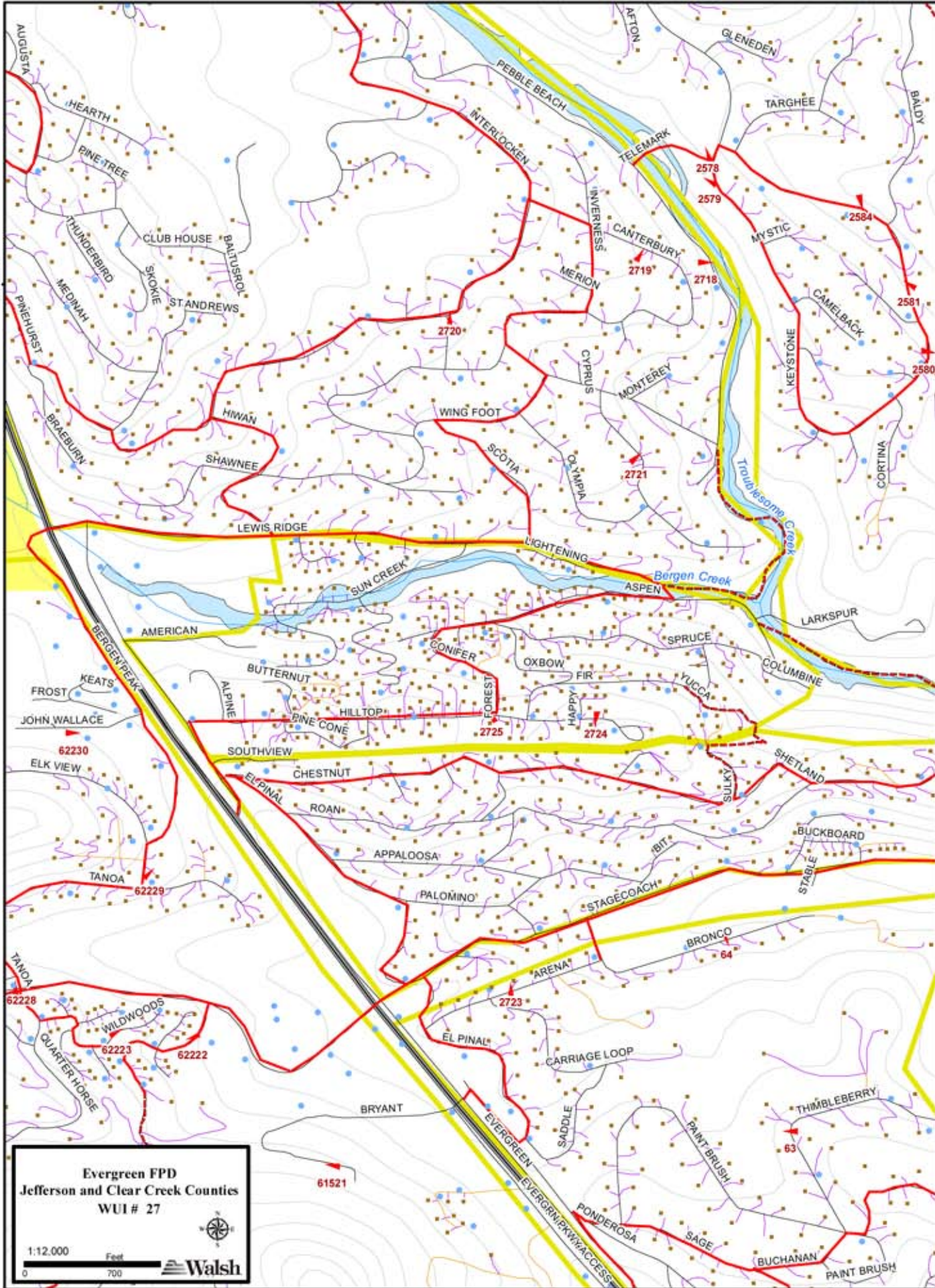
Walsh



Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 26

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Walsh

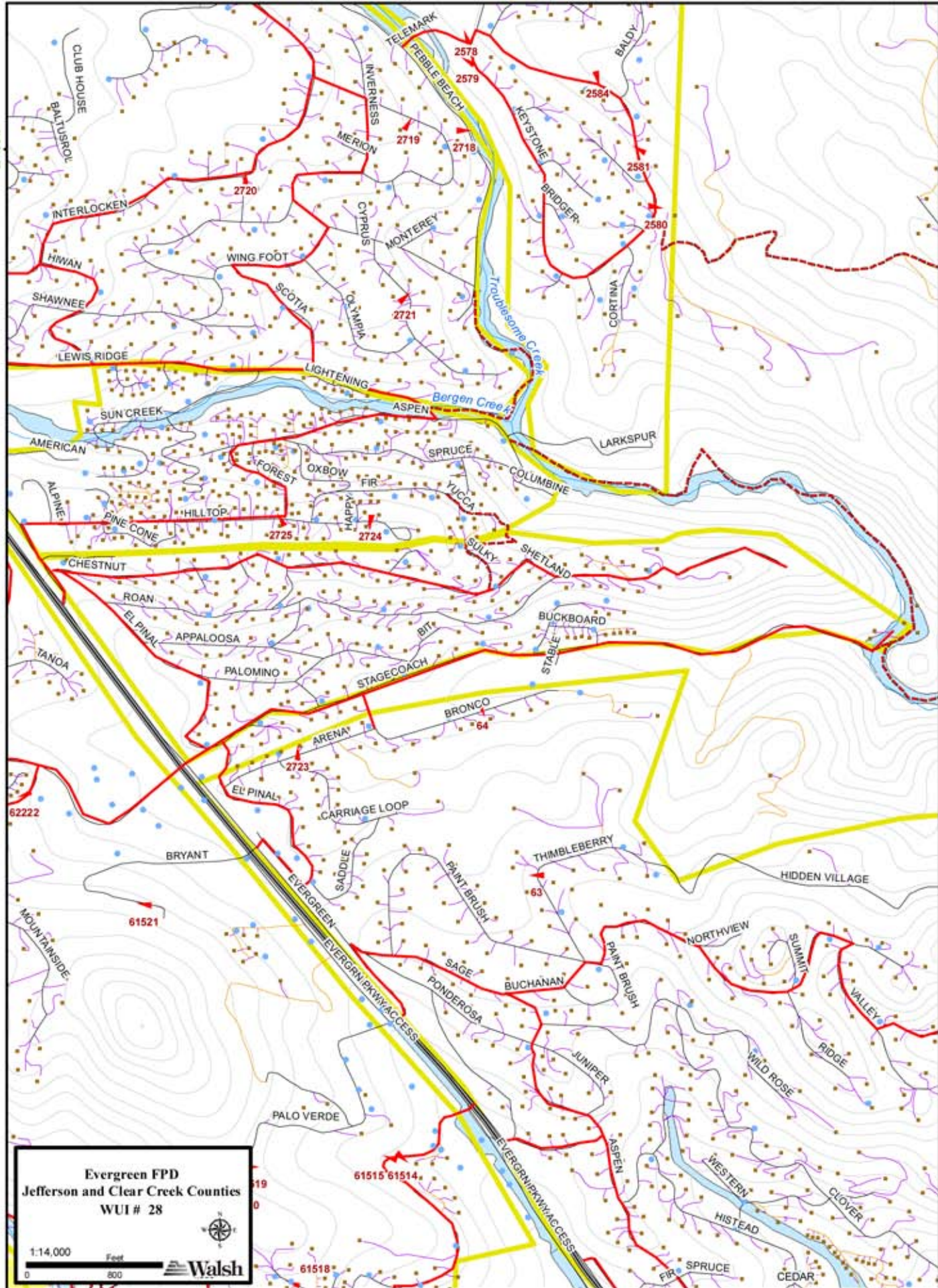


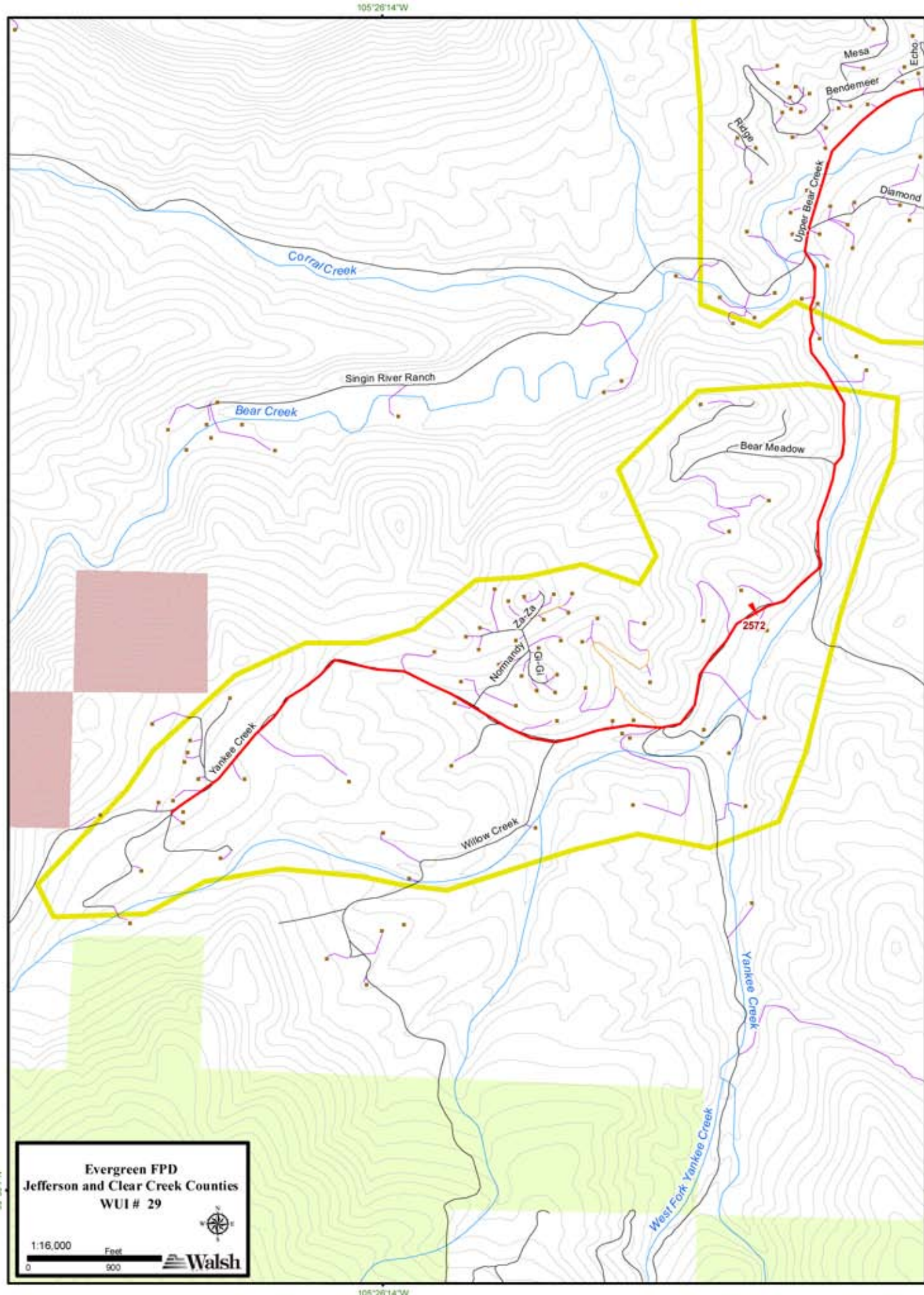
Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 27

1:12,000

Feet







Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 29



1:16,000
Feet
0 900





Bergen Creek

BERGEN MOUNTAIN

ALPINE

STAGE COACH

SKYLINE

Bear Creek

Evergreen FPD
Jefferson and Clear Creek Counties
WUI # 30

1:11,000
Feet
0 650

Walsh

APPENDIX B

NFPA WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM 1144

WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT FORM		
Assign a value to the most appropriate element in each category and place the number of points in the column on the right.		
Element	Points	
A. Means of Access		
1. Ingress and egress		
a. Two or more roads in/out	0	
b. One road in/out	7	
2. Road width		
a. ≥ 7.3 m (24 ft)	0	
b. ≥ 6.1 m (20 ft) and < 7.3 m (24 ft)	2	
c. < 6.1 m (20 ft)	4	
3. All-season road condition		
a. Surfaced road, grade $< 5\%$	0	
b. Surfaced road, grade $> 5\%$	2	
c. Non-surfaced road, grade $< 5\%$	2	
d. Non-surfaced road, grade $> 5\%$	5	
e. Other than all-season	7	
4. Fire Service Access		
a. ≤ 91.4 m (300 ft) with turnaround	0	
b. > 91.4 m (300 ft) with turnaround	2	
c. < 91.4 m (300 ft) with no turnaround	4	
d. ≥ 91.4 m (300 ft) with no turnaround	5	
5. Street signs		
a. Present [10.2 cm (4 in.) in size and reflectorized]	0	
b. Not present	5	
B. Vegetation (Fuel Models)		
1. Characteristics of predominate vegetation within 91.4 m (300 ft)		
a. Light (e.g., grasses, forbs, sawgrasses, and tundra) NFDRS Fuel Models A, C, L, N, S, and T	5	
b. Medium (e.g., light brush and small trees) NFDRS Fuel Models D, E, F, H, P, Q, and U	10	
c. Heavy (e.g., dense brush, timber, and hardwoods) NFDRS Fuel Models B, G, and O	20	
d. Slash (e.g., timber harvesting residue) NFDRS Fuel Models J, K, and L	25	
2. Defensible space		
a. More than 30.48 m (100 ft) of vegetation treatment from the structure(s)	1	
b. 21.6 m to 30.48 m (71 ft to 100 ft) of vegetation treatment from the structure(s)	3	
c. 9.14 m to 21.3 m (30 ft to 70 ft) of vegetation treatment from the structure(s)	10	
d. < 9.14 m (30 ft) of vegetation treatment from the structure(s)	25	
C. Topography Within 91.4 m (300 ft) of Structure(s)		
1. Slope $< 9\%$	1	
2. Slope 10% to 20%	4	
3. Slope 21% to 30%	7	
4. Slope 31% to 40%	8	
5. Slope $> 41\%$	10	

(NFPA 1144, 1 of 2)

Copyright NFPA

Element	Points
D. Additional Rating Factors (rate all that apply)	
1. Topographical features that adversely affect wildland fire behavior	0–5 _____
2. Areas with a history of higher fire occurrence than surrounding areas due to special situations (e.g., heavy lightning, railroads, escaped debris burning, and arson)	0–5 _____
3. Areas that are periodically exposed to unusually severe fire weather and strong dry winds	0–5 _____
4. Separation of adjacent structures that can contribute to fire spread	0–5 _____
E. Roofing Assembly	
1. Class A roof	0 _____
2. Class B roof	3 _____
3. Class C roof	15 _____
4. Nonrated	25 _____
F. Building Construction	
1. Materials (predominate)	
a. Noncombustible/fire-resistive siding, eaves, and deck (<i>see Chapter 8</i>)	0 _____
b. Noncombustible/fire-resistive siding and combustible deck	5 _____
c. Combustible siding and deck	10 _____
2. Building setback relative to slopes of 30% or more	
a. ≥ 9.14 m (30 ft) to slope	1 _____
b. < 9.14 m (30 ft) to slope	5 _____
G. Available Fire Protection	
1. Water source availability	
a. Pressurized water source availability	
1892.7 L/min (500 gpm) hydrants ≤ 304.8 m (1000 ft) apart	0 _____
946.4 L/min (250 gpm) hydrants ≤ 304.8 m (1000 ft) apart	1 _____
b. Nonpressurized water source availability (off site)	
≥ 946.4 L/min (250 gpm) continuous for 2 hours	3 _____
< 946.4 L/min (250 gpm) continuous for 2 hours	5 _____
c. Water unavailable	10 _____
2. Organized response resources	
a. Station ≤ 8 km (5 mi.) from structure	1 _____
b. Station > 8 km (5 mi.) from structure	3 _____
3. Fixed fire protection	
a. NFPA 13, 13R, 13D sprinkler system	0 _____
b. None	5 _____
H. Placement of Gas and Electric Utilities	
1. Both underground	0 _____
2. One underground, one aboveground	3 _____
3. Both aboveground	5 _____
I. Totals for Home or Subdivision (Total of all points)	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>

Hazard Assessment	Total Points
Low hazard	< 40
Moderate hazard	40–69
High hazard	70–112
Extreme hazard	> 112

(NFPA 1144, 2 of 2)

1144 digital field survey form example:

Wildfire Fire Risk and Hazard Severity Field Form NFPA 1144		
Community		Rating
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		0
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		0
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		0
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fuel models)		
Characteristics of predominant veg w/in 300 ft		0
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		0
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		0
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		0
Topographic features that adversely affect fire behavior (0 - 5)		0
Areas with a history of high fire occurrence - ignition potential (0 - 5)		0
Severe fire weather potential (0 - 5)		0
Separation of adjacent structures contributing to fire spread (0 - 5)		0
Roofing Assembly		
Roofing		0
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		0
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		0
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		0
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		0
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		0
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		0
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		
		0
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		

APPENDIX C

COMMUNITY/NEIGHBORHOOD/SUBDIVISION HAZARD AND RISK SURVEY SUMMARIES

SUBDIVISION AND WUI INDEX

SUBDIVISION	WUI ID
Area above CDOT shops	10
Avery Acres	4
Bear Creek	8
Bear Creek Estates	11
Bear Mountain Vista	18
Beaver Brook Canyon,	1
Beaver Brook Lodge Estates	3
Beaver Brook,	3
Bendemeer Valley	11
Blue Creek Road	22
Brook Forest Estates	20
Buffalo Park Estates	21
Castlewood Acres	5
Chase Sub,	1
Circle K	11
Columbine Road	16
Craigmont Estates	17
Cub Creek Ranch,	23
Diamond Park	11
Douglas Park	9
Echo Hills	5
El Pinal	27
El Pinal Acres	27
El Rancho	4
Elephant Park	14
Elk Ridge	14
Elmgreen Acres,	1
Estates of Blue Creek	22
Evergreen Golf Course	16
Evergreen Heights	16
Evergreen Highlands,	23
Evergreen Hills	15
Evergreen Hills	21
Evergreen Meadows East	25
Evergreen Meadows West	24
Evergreen Park Estates	16
Evergreen Valley Estates	16
Evergreen West	7
Far View Acres	17
Forest Hill	13
Fox Ridge	2
French Springs	29
Glen Erie	8
Golden Willow	11
Greenwood	15
Greystone Estates	30

SUBDIVISION	WUI ID
Hagan Ranch	14
Herzman Mesa,	17
Hidden Valley Ranch	4
Hidden Village at Hiwan	9
High Prairie	17
Highland Hills,	1
Hillcrest Village	19
Hiwan Country Club	6
Hiwan Hills	9
Hiwan Homestead Museum	9
Hoffer Heights,	3
Homestead Hideaway	1
Independent Heights	13
Kittredge	10
Marshdale	17
Marshdale Park	17
Meadow Mountain Heights	10
Mountain Park Homes	13
Nob Hill	4
North Marshner,	23
Our-Lady-of-the-Rockies	14
Overlook	8
Palo Verde	8
Peacefull Hills	19
Pine Crest Park	17
Pine Valley Acres	10
Pine Valley Estates	3
Pine Valley Estates	19
Pleasant Lane,	1
Quartz Mountain	10
Rosdale Acres	12
Ruby Ranch	4
Segar Acres	12
Soda Creek	2
South Marshner	23
Stanlet Park	18
Sunset Hieghts	17
Sunset Ridg	10
Tanoa	8
The Ridge at Hiwan	26
Troutdale Estates	8
Upper Cub Creek	20
Wah Keeney Parl	28
Westhaven Heights	14
Wilderness Point	11
Wilmont Woods	15
Wonderview	17

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Beaver Brook Canyon, Highland Hills, Chase Sub, Elmgreen Acres, Pleasant Lane, Homestead Hideaway		
WUI 1 Hazard Rating		EXTREME
Means of Access		
Ingress and Egress		7
2 or more roads in & out		0
One road in & out		7
Road Width		3
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		4
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		5
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		3
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		12
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		21
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		7
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		15
Topographic features that adversely affect fire behavior (0 - 5)		5
Areas with a history of high fire occurrence - ignition potential (0 - 5)		3
Severe fire weather potential (0 - 5)		3
Separation of adjacent structures contributing to fire spread (0 - 5)		4
Roofing Assembly		
Roofing		3
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		13
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		5
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		3
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		4
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		115
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 900 acres; 236 observed homes; elevation 7,700 to 8,800 ft; housing is constructed on the east and northeast aspect of the lower slopes of Saddleback Mtn; several topographic chimneys converging at the top of the subdivision are present; single ingress/egress route for main subdivision and Beaver Brook Canyon; road surface is mixed paved and non-surfaced but generally good with 2-way access throughout; grade is steep at switchbacks; two +2,000 ft secondary roads with very tight turnarounds were noted; sinuous road layout; street signs are standard reflective but missing at several intersections; home addressing is inconsistent; housing density is moderate with 1 to 5 acre lots; defensible space – 49% < 30', 46% 30' to 70'; roofing – 86% asphalt, 6% wood shake, 8% non-combustible; construction – 95% combustible siding; utilities are above ground; emergency water supply sources were not observed.

Vegetation: 50% light, 30% medium, 20% light; vegetation type is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2, 4 & 9) predominant on south and southeast facing slopes, and heavier stands of mixed conifer, Lodgepole pine and Douglas-fir (FBFM 8 & 10) on most north facing slopes; vegetation has an upslope linear consistency with meadows forming.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability, reduce percentage of combustible siding, roofing, and flammable decking
- Shaded fuel breaks along all forested access roads and forested emergency access routes including Upper Beaver Brook Canyon Rd
- Road access improvements including switchback widening and turnarounds on S. Ponderosa and S. Hyland
- Street signage and home addressing improvements
- Emergency access W. Beaver Brook Rd. to Sante Fe Mt. Rd.; E. Beaver Brook Rd to Elm Green Rd.; High School to Elm Green Rd; out-of-district with Clear Creek County-Sawmill Creek Rd to I-70 corridor
- Potential Forest treatment areas west of WUI on saddles between Saddleback Mtn and Sante Fe Mtn
- Local school ideal for area evacuation enter, ICP, emergency water source location
- Community training for “shelter-in-place”

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Soda Creek, Fox Ridge	
WUI 2 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	3
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	4
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	12
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	15
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	6
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	14
Topographic features that adversely affect fire behavior (0 - 5)	4
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	15
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	8
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	4
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	3
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	94
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



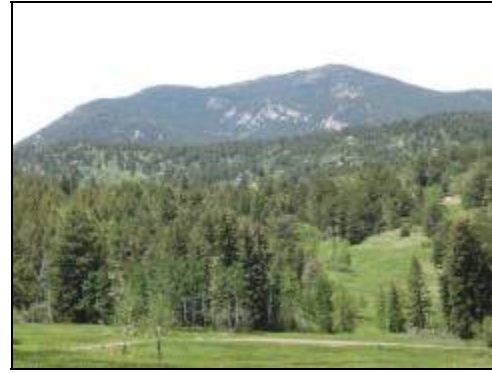
Description: 2,300 acres; 214 observed homes; elevation 7,500 to 8,400 ft at the summit of Schaffer Hill with topography sloping centrally into the soda creek drainage; 4 primary ingress/egress routes are accessible; approximately 60% of roads are paved and generally support 2-way traffic; most secondary roads have adequate turnarounds; several long driveways and gated private drives prevented observation; both paved and non-surfaced roads in the northwest area tend to be steep and narrow, with no turnarounds; reflective street signs present, home addressing inconsistent; housing density is generally low with a predominance of 5-acre parcels with nearly half on slopes of over 20%; defensible space – 14% < 30', 79% 30' to 70'; roofing – 72% asphalt, 14% wood shake' construction – 63% combustible siding; placement of utilities varied on location within the WUI with 1/3 buried, 1/3 above ground, and 1/3 one buried; 3 cisterns are noted as sources for strategic passive water supply; a separate subdivision with differing predominant characteristics is located at the southeast corner of the area at the intersection of Evergreen Parkway and Squaw Pass Rd; housing is dense, hydrants are present, roads are paved, and turnarounds are largely absent.

Vegetation: 50% light, 30% medium, 20% heavy; vegetation type is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on south and southeast facing slopes; heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on most north facing slopes; significant Lodgepole pine stands observed along Snyder Gulch, meadow Mountain, and Fox Ridge.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads including Woodside, Soda Creek, Snyder Gulch, Woodland, and Deep Forest Access improvements including addressing, and turnarounds near Evergreen Parkway and Squaw Pass Rd
- Develop emergency water availability at Hwy 103 and Snyder Gulch Rd, at the ponds along Alta Vista Road and in the Fox Ridge area; emergency water access in the area of Squaw Pass Rd and Snyder Gulch
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Develop and maintain a emergency access from Meadow to Old Squaw Pass
- Improve or construct secondary road turnarounds at dead-ends
- Visible and constant home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Beaver Brook, Beaver Brook Lodge Estates, Hoffer Heights, Pine Valley Estates	
WUI 3 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	0
2 or more roads in & out	0
One road in & out	7
Road Width	3
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	4
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	4
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	4
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	9
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	15
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	3
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	13
Topographic features that adversely affect fire behavior (0 - 5)	2
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	3
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	5
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	3
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	91
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 600 acres; 102 observed homes; elevation 8,000 to 8,600 ft; predominant southeast aspect; 2 primary ingress/egress; roads are 10% paved, 2 lane; 70% secondary groomed good grade, 1½ to 2 lanes; 20% secondary single lane, rough, or steep; 4 turnarounds; 7 dead-ends; some non-standard streets signs, some intersections with no signage; areas of dense housing ,<1 acre in some areas; defensible space - 35% < 30', 57% 30' to 70'; roofing - 80% asphalt 15% non-combustible; construction 96% combustible siding; above ground utilities; existing emergency water supply noted as cistern near Old Squaw Pass and Colo 103 at west end of assessment area.

Vegetation: 60% light, 30% medium, 10% heavy; vegetation type is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on south and southeast facing slopes. Heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) are on most north facing slopes. Lower north slopes of Mount Pence and north slopes facing Beaver Brook support dense Lodgepole pine stands and mixed stands of Lodgepole pine and Douglas-fir. A stand of old-growth Douglas-fir was noted near Timber Lane; open south-facing slopes dominate the area and support grass, shrub, and open stands of Ponderosa pine.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Develop and maintain a emergency access from Meadow to Old Squaw Pass
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Fuel reduction in identified treatment zones
- Develop emergency water supply at Hwy 103 and Old Squaw Pass/Snyder Gulch
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Hidden Valley, Ruby Ranch, Nob hill, Avery Acres, El Rancho	
WUI 4 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	1
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	10
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	12
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	5
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	13
Topographic features that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	5
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	11
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	1
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	3
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	73
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 1200 acres; 86 observed homes; elevation 7,400 to 8,000 ft; prominent ridge tends northwest through WUI; predominant northeast aspect; 2 subdivisions have 2-way access, 1 subdivision single access; roads are 60%, low to moderate grade, 30% unpaved groomed and low to moderate grade, 10 % steep grade; 14 turnarounds observed with dead ends on most private drives; street signage is standard and present although some are damaged in Pinecrest/Linda area; addressing inconsistent; housing density is generally low (1 - 5+ acre parcels), high density in Pinecrest/Linda area (1/4 to 1/2 acre parcels); defensible space – 31% , 30', 69% 30' to 70'; roofing – 76% asphalt, 5% wood shake, 20% non-combustible; construction – 72% combustible, 28% non-combustible; utilities were generally above, with gas buried in the Pinecrest/Linda subdivision; hydrants are located along some areas of Evergreen Parkway but no water supplies are observed in the interior of the assessment area.

Vegetation: 30% light, 60% medium, 10% heavy; slope aspect controls vegetation type with grass, brush and open Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on south facing slopes; dense Ponderosa pine with some mix of Douglas-fir (10% - 20%) (FBFM 8, 9, & 10) dominate most north, east, and west slopes of the area; Lodgepole pine is mostly absent.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal; reduce structural ignitability
- Develop and maintain emergency access between Ruby Ranch and Humphrey
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Fuel reduction in identified treatment zones
- Develop emergency water supplies for Pine Crest and Ruby Ranch areas
- Improve or construct secondary road turnarounds at dead-ends
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Echo Hills, Castlewood Acres	
WUI 5 Hazard Rating EXTREME	
Means of Access	
Ingress and Egress	7
2 or more roads in & out	0
One road in & out	7
Road Width	3
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	4
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	4
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	3
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	18
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	21
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	7
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	15
Topographic features that adversely affect fire behavior (0 - 5)	5
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	3
Separation of adjacent structures contributing to fire spread (0 - 5)	3
Roofing Assembly	
Roofing	4
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	4
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	5
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	4
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	4
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	123
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 780 acres; 110 observed homes; elevation 9,000 to 9,800 ft; subdivision is located on the north aspect of the ridge that runs between Bergen Peak and the Mount Pence/Snyder Mountain saddle; single access from CO 103 climbs 600 vertical feet through a topographic chimney to subdivision; entrance is paved then groomed unpaved roads throughout; all are 1½ to 2 lanes with the exception of a group of steep narrow roads in the upper Castlewood Gulch area; 1 out of 14 dead ends has a turnaround; standard street signage was observed for 50% of the roads; home addressing inconsistent; housing density is moderate with a predominance of 1 acre lots with majority on slopes exceeding 20%; defensible space – 69% < 30', 31% 30' to 70'; roofing – 82% asphalt, 8% wood shake, 19% non-combustible; construction – 98% combustible siding; utilities are above ground; one cistern was observed at the east end of the subdivision.

Vegetation: 45% medium, 55% heavy; predominant north aspect and high elevation favors the growth of dense stands of Lodgepole pine; in the Echo Hills WUI many of these stands are over-mature with a large amount of timber litter on the ground in addition to short needle conifer litter.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal; reduce structural ignitability
- Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes
- Fuel reduction in identified treatment zones
- Develop and maintain emergency access to Old Squaw Pass Road through Castlewood Gulch
- Emergency water source development at subdivision entrance
- Safety zone development and access improvement in meadow south of Sinton Road
- Street signage, home addressing, and turnaround improvements
- Community training for “shelter-in-place”

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Hiwan County Club		
WUI 6 Hazard Rating		MOD
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		0
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		0
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		1
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		6
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		4
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		3
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		12
Topographic features that adversely affect fire behavior (0 - 5)		1
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		3
Roofing Assembly		
Roofing		15
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		13
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		2
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		0
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		1
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		0
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		0
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		57
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 842 acres; 590 observed homes; elevation 7,300 to 7,800 ft; subdivision is constructed in low rolling terrain between Troublesome creek and Bergen Creek, characterized by wide, open and grassy drainages; central to the area is the Hiwan Country Club with an expansive golf course; multiple ingress/egress routes are available; primary and secondary roads are paved and support 2-way traffic flow; all 20 dead ends had turnarounds; standard street signs for all intersections; inconsistent home addressing; housing density is moderate to high and includes multifamily condominiums; low slopes; general southern aspect; grassy understory and irrigated yards characterize the area; defensible space – 6% < 30', 33% 30' to 70', 37% 70' 100', 25% > 100'; roofing – 47% asphalt, 37% wood shake, 16% non-combustible; construction – 85% combustible siding; utilities are buried; a residential hydrant grid is observed throughout the area.

Vegetation: 90% light, 10% medium; predominant south and southeast aspect and 7,000 ft favors Ponderosa pine growth. Closed canopy is evident in several locations but with high housing density clean prairie grass or irrigated lawns comprise the understory in both closed and open stands; approximately 25% of the area is occupied by the 18-hole Hiwan golf course.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Develop and maintain a emergency access between Pebble Beach and Lewis Ridge
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Access and turnaround improvements on secondary roads
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Evergreen West	
WUI 7 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	3
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	3
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	13
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	20
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	7
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	15
Topographic features that adversely affect fire behavior (0 - 5)	5
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	10
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	13
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	4
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	3
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	3
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	4
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	105
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 740 acres; 145 observed homes; elevation 7,880 to 9,400 ft; homes situated at the west end of Witter Gulch, a southeast trending canyon that terminates in a high saddle between Mount Judge and Snyder Mountain; majority of homes on south facing aspect; primary road provides through ingress/egress with 2 lanes, 50% paved lower, 50% groomed unpaved upper and 13 switchbacks on upper portion; secondary roads generally 1½ lanes groomed unpaved, steep in some areas; 2 private drives, 2 good turnarounds, 3 tight turnarounds, 2 dead ends; street signs present and standard; home addressing inconsistent; housing density is light to moderate with some concentrated lots along Witter Gulch Creek and Snyder Mountain Road; defensible space - 51% < 30', 48% 30' to 70'; roofing - 76% asphalt, 20% combustible wood shake; construction - 88% combustible siding; most utilities above ground, 1 subdivision with buried electric; emergency water supply – 1 large cistern at Witter Gulch & Aspen Dr, flowing creek along Witter Gulch Road, multiple ponds along valley floor.

Vegetation: 20% light, 60% medium, 20% heavy; vegetation type is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on south facing aspects, denser stands of short needle Lodgepole pine, Douglas-fir, and Spruce (FBFM 8 & 10) favoring north facing aspects; upper Witter Gulch Lodgepole pine, expansive valley meadow at base of climb to the west saddle, Ponderosa pine, grass/shrub on south aspects, mixed short needle conifer on north aspects, old growth noted south side of lower Witter Gulch, dense mixed conifer in Snyder Mountain Road chimney.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes
- Improve or construct secondary road turnarounds at dead-ends
- Develop emergency water availability at upper Witter Gulch Road and Hwy 103
- Potential safety zone in meadow along Witter Gulch Road below Aspenwood
- Visible and consistent home addressing
- Community training for "shelter-in-place"

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Tanoa, Overlook, Palo Verde, Troutdale Estates, Glen Erie, Bear Creek		
WUI 8 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		3
2 or more roads in & out	0	
One road in & out	7	
Road Width		2
> 24 ft	0	
> 20 ft < 24 ft	2	
< 20 ft	4	
All-Season Road Condition		2
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-surfaced Road, grade <5%	2	
Non-surfaced Road, grade >5%	5	
Other than all season	7	
Fire Service Access		3
< 300 ft with turnaround	0	
> 300 ft with turnaround	2	
< 300 ft with no turnaround	4	
> 300 ft with no turnaround	5	
Street Signs (predominant)		2
Present - reflective	0	
Not present	5	
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		9
Light - 1, 2, 3	5	
Medium - 5, 6, 7, 8, 9	10	
Heavy - 4, 10	20	
Slash - 11, 12, 13	25	
Defensible Space - vegetation treatment around structure		12
> 100 ft around structure	1	
> 70 ft < 100 ft around structure	3	
> 30 ft < 70 ft around structure	10	
< 30 ft around structure	25	
Topography Within 300 ft of Structures		
Slope		5
< 9%	1	
10% to 20%	4	
21% to 30%	7	
31% to 40%	8	
> 41%	10	
Additional Rating Factors (rate all that apply)		
Additional factors		13
Topographic features that adversely affect fire behavior (0 - 5)	3	
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4	
Severe fire weather potential (0 - 5)	4	
Separation of adjacent structures contributing to fire spread (0 - 5)	2	
Roofing Assembly		
Roofing		5
Class A	0	
Class B	3	
Class C	15	
Unrated	25	
Building construction		
Materials (predominant)		11
Non-combustible fire-resistive siding, eaves and deck	0	
Non-combustible siding, eaves and combustible deck	5	
Combustible siding and deck	15	
Building set-back relative to slope of 30% or more		2
> 30 ft to slope	1	
< 30 ft to slope	5	
Available Fire Protection		
Water source availability		1
Hydrants 500 gpm < 1000 ft apart	0	
Hydrants 250 gpm < 1000 ft apart	1	
Non-pressurized water source > 250 gpm for 2 hours	3	
Non-pressurized water source < 250 gpm for 2 hours	5	
Water unavailable	10	
Organized response resources		1
Station < 5 mi from structure	1	
Station > 5 mi from structure	3	
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system	0	
None	5	
Placement of gas and Electric Utilities		
Utilities		3
Both underground	0	
One above, one below	3	
Both above ground	5	
Totals for home or subdivision		77
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 950 acres; 288 observed homes; elevation 7,120 to 7,840 ft; central high point dominates the topography; area is bounded by Evergreen Parkway to the east, Upper Bear Creek, Troutdale, and Dedisse Park to the south, and Elk Mountain Park to the north; significant commercial infrastructure is located along Evergreen Parkway; the central residential areas are accessed through 4 main roads, 2 provide through access to Upper Bear Creek although they are gated and private where they descent into the creek's valley, some dead ends had turnarounds although many are restricted; roads are generally 60% paved, 40% non-surfaced with ease of access degrading in higher areas; signage at several intersections is absent; home addressing is inconsistent; structure density is moderate to high; defensible space – 12% < 30', 88% 30' to 70'; roofing – 93% asphalt, 5% wood shake; construction – 54% combustible, 46% non-combustible; placement of utilities is mixed; hydrants are available for all commercial areas and approximately 80% of residential structures; placement of utilities is mixed.

Vegetation: 60% light, 30% medium, 10% heavy; vegetation type is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on south and southeast facing slopes; heavier stands of mixed conifer (FBFM 8, 9 & 10) are more common on most north facing slopes; most of the assessment area is forested with open Ponderosa pine allowing the development of a grassy understory that is best characterized as FBFM 2 although some areas of dense shrubs are also established; in some drainages pine stands are dense and on north aspects stands of mixed conifer are more common.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Develop and maintain a emergency access between Troutdale Scenic Drive and Wildflower and Upper Bear Creek; and between Upper Bear Creek and Stagecoach along Overlook
- Fuel reduction in identified treatment zones
- Improve or construct secondary road turnarounds at dead-ends
- Intersection signage improvements
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Hiwan Hills, Hidden Village at Hiwan, Douglas Park, Hiwan Homestead Museum	
WUI 9 Hazard Rating	HIGH
Means of Access	
Ingress and Egress	0
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	9
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	20
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	4
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	14
Topographic features that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	3
Roofing Assembly	
Roofing	4
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	4
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	0
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	1
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	81
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 1,010 acres; 647 observed homes; elevation 6,960 to 7,680 ft; predominant south aspect; multiple ingress/egress to the south and west; majority of roads (65%) are paved and 2 lane, unpaved roads are groomed and 1½ to 2 lane; of 22 dead end roads, 15 have adequate turnarounds, 3 have tight turnarounds, 4 have no turnarounds; street signs are standard and present; home addressing is inconsistent; structure density is high; defensible space – 45% < 30' concentrated in the central portion of the area, 33% 30' to 70', 22% 70' to 100'; roofing – 90% asphalt, 5% wood shake; construction – 95% combustible; residential hydrants are observed throughout the area, most utilities are buried with the exception of approximately 30% with overhead electric.

Vegetation: 60% light, 40% medium; vegetation type is controlled largely by slope aspect with grass, brush and Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on most south facing aspects; heavier stands of mixed conifer (FBFM 8, 9, & 10) are more common on most north facing slopes; approximately 75% of the area is forested but high density of structures and associated irrigated and groomed ground cover alter natural surface fuel conditions to favor FBFM 1 & 2 rather than timber litter, especially in the north and south sections, the central section has lower housing density and larger expanses of unmanaged forest with needle and timber litter.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary roads
- Improve or construct secondary road turnarounds at dead-ends
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Kittredge, Quartz Mountain, Pine Valley Acres, Sunset Ridge, Meadow Mountain Heights, Area above DOT shops		
WUI 10 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		2
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		3
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		4
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		7
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		13
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		6
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		16
Topographic features that adversely affect fire behavior (0 - 5)		3
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		5
Roofing Assembly		
Roofing		5
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		8
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		2
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		0
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		1
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		75
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 820 acres; 426 observed homes; elevation 6,720 to 7,680 ft; east-west trending valley with north and south facing aspects; assessment area includes the town of Kittredge; Hwy 74 is main through road with Myers Gulch and Kerr Gulch roads providing additional primary access to the highway; Hilltop and Kittredge Park areas are limited to single access route; south of Hwy 74, Kittredge is characterized by dense housing and steep single-lane paved roads with limited/no turnarounds; outlying areas have lower housing density, narrow steep roads with a mix of paved and unpaved surfaces many lacking adequate turnarounds; defensible space – 10% < 30', 88% 30' to 70'; roofing – 94% asphalt; utility placement is varied depending on subdivision, hydrant grid in-place for 80% of homes.

Vegetation: 65% light, 35% medium; vegetation type is controlled largely by slope aspect with grass, brush and Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on most south facing aspects. Heavier stands of mixed conifer (FBFM 8, 9, & 10) are more common on most north facing slopes; high density housing is concentrated in areas of light to no-timber.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Develop and maintain emergency access between Kittredge Park and Keystone, and between Troublesome Gulch and Lewis Ridge
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Circle K, Bendemeer Valley, Golden Willow, Greystone Lazy Acres, Bear Creek Estates, Diamond Park, Wilderness Point		
WUI 11 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		3
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		4
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		4
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		8
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		21
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		3
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		14
Topographic features that adversely affect fire behavior (0 - 5)		4
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		2
Roofing Assembly		
Roofing		3
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		14
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		2
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		3
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		92
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 1450 acres; 378 observed homes; elevation 7,400 to 8,200 ft; the eastern-most shoulder of Hicks Mountain forms a low rise between Witter Gulch and Bear Creek and is central to the assessment area, which is situated on the low slopes and valleys formed at the confluence of Witter Gulch and Bear Creek/Bendemeer Valley; predominant aspect is south/south east, the area is served by several main through roads and most neighborhoods have multiple ingress/egress routes; primary and main secondary roads are 2-lane, paved or well groomed, low to moderate grade except lower Witter Gulch (steep grade), tertiary roads generally 1-lane and limited maintenance; of > 20 dead ends, 5 had adequate runarounds; street signs are standard and present at all intersections but with looping road infrastructure, somewhat confusing; home addressing is inconsistent; housing density is moderate; defensible space – 56% < 30', 38% 30' to 70'; roofing – 82% asphalt, 10% non-combustible; utilities are above ground; static emergency water sources at Witter Gulch and Stagecoach, and along Upper Bear Creek Rd.

Vegetation: 60% light, 35% medium; 5% heavy; vegetation type is controlled largely by slope aspect with grass, brush and Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on most south facing aspects. Heavier stands of mixed conifer (FBFM 8, 9, & 10) are more common on most north facing slopes; majority of homes are located in Ponderosa pine with grassy understory; several drainages maintain heavy mixed conifer stands on north aspects; Bendemeer Valley forms a broad flat grassy meadow through which Bear Creek meanders.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary roads
- Improve or construct secondary road turnarounds at dead-ends
- Develop emergency water availability at Witter Gulch and Upper Bear Creek
- Visible and constant home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Rosedale Acres, Segar Acres		
WUI 12 Hazard Rating		EXTREME
Means of Access		
Ingress and Egress		6
2 or more roads in & out	0	
One road in & out	7	
Road Width		4
> 24 ft	0	
> 20 ft < 24 ft	2	
< 20 ft	4	
All-Season Road Condition		6
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-surfaced Road, grade <5%	2	
Non-surfaced Road, grade >5%	5	
Other than all season	7	
Fire Service Access		5
< 300 ft with turnaround	0	
> 300 ft with turnaround	2	
< 300 ft with no turnaround	4	
> 300 ft with no turnaround	5	
Street Signs (predominant)		3
Present - reflective	0	
Not present	5	
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		13
Light - 1, 2, 3	5	
Medium - 5, 6, 7, 8, 9	10	
Heavy - 4, 10	20	
Slash - 11, 12, 13	25	
Defensible Space - vegetation treatment around structure		16
> 100 ft around structure	1	
> 70 ft < 100 ft around structure	3	
> 30 ft < 70 ft around structure	10	
< 30 ft around structure	25	
Topography Within 300 ft of Structures		
Slope		7
< 9%	1	
10% to 20%	4	
21% to 30%	7	
31% to 40%	8	
> 41%	10	
Additional Rating Factors (rate all that apply)		
Additional factors		15
Topographic features that adversely affect fire behavior (0 - 5)	5	
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4	
Severe fire weather potential (0 - 5)	4	
Separation of adjacent structures contributing to fire spread (0 - 5)	2	
Roofing Assembly		
Roofing		12
Class A	0	
Class B	3	
Class C	15	
Unrated	25	
Building construction		
Materials (predominant)		10
Non-combustible fire-resistive siding, eaves and deck	0	
Non-combustible siding, eaves and combustible deck	5	
Combustible siding and deck	15	
Building set-back relative to slope of 30% or more		4
> 30 ft to slope	1	
< 30 ft to slope	5	
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart	0	
Hydrants 250 gpm < 1000 ft apart	1	
Non-pressurized water source > 250 gpm for 2 hours	3	
Non-pressurized water source < 250 gpm for 2 hours	5	
Water unavailable	10	
Organized response resources		1
Station < 5 mi from structure	1	
Station > 5 mi from structure	3	
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system	0	
None	5	
Placement of gas and Electric Utilities		
Utilities		5
Both underground	0	
One above, one below	3	
Both above ground	5	
Totals for home or subdivision		115
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 420 acres; 63 observed homes; elevation 7,300 to 8,200 ft; WUI spans steep valley and includes subdivisions on both north and south facing aspects; single ingress/egress to each subdivision from Upper Bear Creek Rd; main valley road paved 2 lane, Skyline and Valley View to the north paved 1½ lane to non-surfaced, restricted turnaround, 1 lane, steep; Meadow Brook south of main road single lane steep 4WD, no turns; street signage inconsistent, home addressing inconsistent; structure density low; majority of homes in close proximity to steep slopes; defensible space – 25% < 30', 70% 30' to 70'; roofing – 75% asphalt, 25% combustible wood shake; utilities are above ground; no observed established emergency water sources.

Vegetation: 25% light, 55% medium, 20% heavy; vegetation type is controlled by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; some Ponderosa pine stands with grassy understory, others dense with needle litter and timber litter; dense over-mature Lodgepole pine stands present on some north aspect slopes.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary access roads including Skyline Dr, Valley View Dr, and Meadow Brook Lane
- Turnaround improvement and construction and at critical dead-ends
- Develop emergency water availability at pond near meadow near Meadow Brook and Upper Bear Creek
- Potential safety zone in meadow near Meadow Brook and Upper Bear Creek
- Street signage, home addressing, improvement
- Community training for "shelter-in-place"

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Independent Heights, Forest Hill, Mountain Park Homes	
WUI 13 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	2
2 or more roads in & out	0
One road in & out	7
Road Width	4
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	6
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	5
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	11
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	22
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	7
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	15
Topographic features that adversely affect fire behavior (0 - 5)	5
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	0
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	101
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 700 acres; 422 observed homes; elevation 7,000 to 8,000 ft; includes south side old town Evergreen and the town of Evergreen proper; bounded on the north by State HWY 74 and on the west by County HWY 73; predominant north aspect although most homes are constructed on west facing aspects; slopes are steep, roads are steep, 1 to 1½ lanes, unpaved, several roads in GIS are inaccessible; 18 dead-ends with 3 tight turnarounds; housing density is moderate; defensible space – 75% < 30', 25% 30' to 70'; roofing – 95% asphalt, 4% non-combustible; utilities are above ground; hydrants are observed in the central and lower portions of the area but difficult to locate.

Vegetation: 25% light, 60% medium, 15% heavy; vegetation type is controlled by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; predominant south facing aspect favors dry open Ponderosa pine, shrub and grass; predominant aspect favors dense timber growth with a mix of Douglas-fir, Spruce, Lodgepole pine, and Ponderosa pine dominating west and south aspects; Aspen and Blue Spruce are also present in the central and southern sections.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes
- Expand emergency water availability in the upper portions of Independence Heights, Forest Hill and Mountain Park Homes; improve visibility of existing hydrants
- Improve or construct secondary road turnarounds at dead-ends
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking. Visible and consistent home address
- Improve hydrant flow
- Potential safety zone in meadow near Independence and Hilltop
- Develop and maintain emergency access options; Fern Gulch to Independence and Hilltop to Independence

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Hagan Ranch, Elk Ridge, Elephant Park, Westhaven Heights, Our-Lady-of-the-Rockies		
WUI 14 Hazard Rating		MOD
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		2
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		2
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		2
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		7
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		9
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		3
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		9
Topographic features that adversely affect fire behavior (0 - 5)		1
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		0
Roofing Assembly		
Roofing		2
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		14
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		1
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		3
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		67
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 1,850 acres; 122 observed homes; elevation 7,640 to 8,480 ft; the area is dominated by Buffalo Park, a broad flat meadow bisected by Buffalo Creek. Evergreen Mountain (8,500 ft) bounds the area to the east; the area supports several large ranches, a commercial camp, and over private 100 residences; several homes are constructed in the meadow with most located within the timbered margins; housing density is low; 2 major ingress/egress routes are available; most roads are 2 lane, unpaved, low grade, terminating in loops, turnarounds, or private ranch roads; observed defensible space – 26% < 30', 39% 30' to 70', 14% 70' to 100', 20% 100'; roofing – 76% asphalt, 16% noncombustible; construction – 93% combustible; above ground utilities; no established emergency water supply although Buffalo Creek and several stock ponds are observed.

Vegetation: 65% light, 25% medium, 10% heavy; vegetation type is controlled by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; the area is characterized by its broad flat valley floor and expansive meadows (FBFM 1); riparian aspen and willow are noted in the lower Buffalo Creek drainage.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary roads
- Develop emergency water supply in designated stock pond along Bluebell Rd
- Potential safety zones in meadows along Buffalo Park Rd and Bluebell Rd
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Greenwood, Wilmont Woods, Evergreen Hill	
WUI 15 Hazard Rating MOD	
Means of Access	
Ingress and Egress	0
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	1
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	3
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	5
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	10
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	3
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	11
Topographic features that adversely affect fire behavior (0 - 5)	1
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	10
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	1
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	0
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	58
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 400 acres; 337 observed homes; elevation 7,080 to 7,400 ft; the area is bounded by the town of Evergreen to the east, Evergreen Lake and Golf Course to the north, Alderfer/Three Sisters park to the west; multiple accesses available to Hwy 73, Buffalo Park, housing density is high with 2 large school complexes; looping secondary road design; 10 dead ends, 8 have turnarounds of varying radius; secondary road surface varied 1-lane paved, 2-lane paved, 2-lane unpaved groomed, all < 10% slope; defensible space – 19% < 30', 58% 30' to 70', 21% 70' to 100'; roofing – 97% asphalt, 3% wood shake; construction – 50% combustible, 50% non-combustible; above ground utilities; hydrant grid present in most of the area.

Vegetation: 95% light, 5% medium; irrigated grass, grassy understory, and some open Ponderosa pine stands characterized the area; moderate dense Ponderosa pine is observed on rise adjacent and south of Evergreen Lake.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Improve or construct secondary road turnarounds at dead-ends
- Possible hydrant line extension to Hazel and Gigi

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Evergreen Park Estates, Evergreen Heights, Evergreen Golf Course, Evergreen Valley Estates, Columbine Road		
WUI 16 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		1
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		2
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		3
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		7
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		15
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		3
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		12
Topographic features that adversely affect fire behavior (0 - 5)		2
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		2
Roofing Assembly		
Roofing		3
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		15
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		1
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		1
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		76
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 1,735 Acres; 506 observed homes; elevation 7,320 to 8,520 ft; Evergreen Mountain dominates the topography rising over 1,000 ft north and west of the subdivisions with Cub Creek bounding the area to the east; residential infrastructure is concentrated in dense timber on the lower slopes near Cub Creek and Brook Forest Rd; 10% to 20% slope characterized most home sites; 3 distributed primary ingress/egress routes are available; primary roads are 2-lane paved, secondary are unpaved, generally well groomed, with < 10% grade; 25 dead-ends with restricted turnarounds; street signage present and reflective; home addressing inconsistent; defensible space – 46% < 30', 37% 30' to 70', remaining homes located in open meadows; roofing – 96% asphalt, 3% non-combustible; construction – 97% combustible; above ground utilities; no hydrants observed.

Vegetation: 50% light, 30% medium, 20% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; rolling topography on the slower slopes of Evergreen Mountain form a number drainages with sufficient north aspect to support heavy mixed conifer growth in isolated stands; open Ponderosa pine and grassy understory dominate most south slopes, open meadows are common in broad open valley floors.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Fuel reduction in identified treatment zones
- Develop emergency water supply at Clearwater
- Potential safety zone in meadow along Buffalo Park west of Evergreen Heights
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Herzman Mesa, Wonderview, Pine Crest Park, Sunset Hieghts, High Prairie, Far View Acres, Craigmont Estates, Marshdale Park, Marshdale	
WUI 17 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	3
2 or more roads in & out	0
One road in & out	7
Road Width	3
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	4
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	3
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	10
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	14
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	3
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	13
Topographic features that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	0
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	15
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	3
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	0
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	4
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	80
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 1,180 acres; 317 observed homes; elevation 7,400 to 8,200 ft; WUI boundary was determined based on access, topography, and proximity of subdivisions to Hwy 73; subdivisions are diverse in character; large forested areas are segmented by several north-south trending meadows; Hwy 73 provides through access with Skyline and Berry Bush (gated) providing through secondary access, all 2-lane and paved, subdivision roads are unpaved and 1 – 1½lanes; ½ of dead ends had turnarounds; street signage was inconsistent in some areas, home addressing was inconsistent throughout; housing density ranged from moderate to low; defensible space – 26% < 30', 46% 30' to 100', 21% 70' to 100'; roofing – 87% asphalt, 11% non-combustible; construction – 97% combustible; above ground utilities; no hydrants observed.

Vegetation: 50% light, 35% medium, 15% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; several broad north-south trending meadows segmented forested areas.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary roads
- Develop emergency water access along Cub Creek, Skyline, Herzman, and Highway 73, Tresne area
- Improve or construct secondary road turnarounds at dead-ends
- Visible and constant home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Bear Mountain Vista, Stanley Park	
WUI 18 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	5
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	3
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	15
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	18
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	4
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	13
Topographic features that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	4
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	13
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	3
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	5
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	3
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	98
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 1,090 acres; 175 observed homes; elevation 7,720 to 8,600 ft; WUI is isolated with no direct access to primary county roads; 3 large meadows break forest continuity but most home sites are located on forested slopes, many on steep slopes with heavy timber; main roads are paved 2 lane; secondary roads are unpaved and tend to degrade with distance from main roads; street signage is present; home addressing is inconsistent; housing density is light; slope varies widely with homes scattered throughout; defensible space – 35% < 30', 48% 30' to 70', 13% 70' to 100'; roofing – 78% asphalt, 14% non-combustible, 9% wood shake; construction – 86% combustible siding; utilities are above ground; 1 fire department cistern noted at Bear Mountain Rd and Stanley Park Rd.

Vegetation: 25% light, 25% medium, 25% heavy; 25% slash; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; several broad meadows segment timber stands, enough dead and down in some FBFM 10 areas to warrant FBFM 11 designation.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes
- Develop emergency water availability in the Bear Mountain, Giant Gulch area
- Develop and maintain emergency access options along Fern Gulch and Independence
- Fuel reduction in identified treatment zones
- Potential safety zones in meadows near sunrise, Chris, Burro, North Mountain Park Area
- Visible and consistent home addressing
- Community training for "shelter-in-place"

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Pine Valley Estates, Hillcrest Village, Peaceful Hills		
WUI 19 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		2
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		2
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		2
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		9
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		19
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		3
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		12
Topographic features that adversely affect fire behavior (0 - 5)		2
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		2
Roofing Assembly		
Roofing		3
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		14
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		1
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		1
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		81
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 1,400 acres; 216 observed homes; elevation 7,200 to 8,200 ft; area is characterized by rolling open meadows, open Ponderosa pine with grassy understory, and some areas dense mixed conifer on north facing slopes; home sites are distributed around a large central hill; main road is paved and provides through access, secondary roads and mixed paved and unpaved 2 lane; signage is present, home addressing is inconsistent; housing density is moderate; defensible space – 32% < 30', 37% 30' to 70', 17% 70' to 100', 14% > 100'; roofing – 86%% asphalt, 6% non-combustible, 8% wood shake; construction – 93% combustible siding; utilities are above ground; established emergency water supply not observed.

Vegetation: 40% light, 40% medium, 20% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; open grassy meadows characterize the southeast portion of the area, a long, broad north-south trending meadow borders the west margin.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary roads including Peaceful Hills to North Turkey Creek Road, High to North Turkey Creek, High around Meadow and Caldwell
- Develop emergency water availability at primary accesses along North Turkey Creek and South Mountain Park
- Fuel reduction in identified treatment zones
- Potential safety zone in meadows in the southeast portion of the assessment area
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Brook Forest Estates, Upper Cub Creek		
WUI 20 Hazard Rating		EXTREME
Means of Access		
Ingress and Egress		6
2 or more roads in & out		0
One road in & out		7
Road Width		4
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		5
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		5
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		2
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		18
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		20
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		5
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		15
Topographic features that adversely affect fire behavior (0 - 5)		5
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		3
Separation of adjacent structures contributing to fire spread (0 - 5)		3
Roofing Assembly		
Roofing		3
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		15
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		4
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		2
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		4
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		118
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 860 acres; 285 observed homes; elevation 8,100 to 9,100 ft; the Brook Forest assessment area is characterized as an isolated subdivision with home sites concentrated on north and east facing slopes in a primarily dense Lodgepole pine forest; single access road is paved, 2 lane in the lower portion of the area and constructed in a topographic chimney, roads in the upper half are unpaved and range from 2 lane low slope to steep 4WD; 17 dead-ends were noted with no turnarounds; street signage was present; home addressing was inconsistent; defensible space – 48% < 30', 44% 30' to 70'; roofing – 91% asphalt; construction – 98% combustible siding; utilities are above ground; established emergency water supply not observed.

Vegetation: 70% medium, 30% heavy; Lodgepole pine dominates the assessment area (FBFM 8), and heavy dead and down timber in some areas (FBFM 10); south aspect in the north central area supports Ponderosa pine and Blue Spruce growth.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary roads including Peaceful Hills to North Turkey Creek Road, High to North Turkey Creek, High around Meadow and Caldwell
- Develop emergency water availability at primary accesses along North Turkey Creek and South Mountain Park.
- Fuel reduction in identified treatment zones
- Expand existing utility right of ways as fuel breaks
- Potential safety zone in meadows in the southeast portion of the assessment area
- Visible and consistent home addressing
- Community training for “shelter-in-place”

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Buffalo Park estates, Evergreen Hills		
WUI 21 Hazard Rating		EXTREME
Means of Access		
Ingress and Egress		6
2 or more roads in & out	0	
One road in & out	7	
Road Width		3
> 24 ft	0	
> 20 ft < 24 ft	2	
< 20 ft	4	
All-Season Road Condition		4
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-surfaced Road, grade <5%	2	
Non-surfaced Road, grade >5%	5	
Other than all season	7	
Fire Service Access		3
< 300 ft with turnaround	0	
> 300 ft with turnaround	2	
< 300 ft with no turnaround	4	
> 300 ft with no turnaround	5	
Street Signs (predominant)		4
Present - reflective	0	
Not present	5	
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		17
Light - 1, 2, 3	5	
Medium - 5, 6, 7, 8, 9	10	
Heavy - 4, 10	20	
Slash - 11, 12, 13	25	
Defensible Space - vegetation treatment around structure		16
> 100 ft around structure	1	
> 70 ft < 100 ft around structure	3	
> 30 ft < 70 ft around structure	10	
< 30 ft around structure	25	
Topography Within 300 ft of Structures		
Slope		7
< 9%	1	
10% to 20%	4	
21% to 30%	7	
31% to 40%	8	
> 41%	10	
Additional Rating Factors (rate all that apply)		
Additional factors		16
Topographic features that adversely affect fire behavior (0 - 5)	5	
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4	
Severe fire weather potential (0 - 5)	4	
Separation of adjacent structures contributing to fire spread (0 - 5)	3	
Roofing Assembly		
Roofing		3
Class A	0	
Class B	3	
Class C	15	
Unrated	25	
Building construction		
Materials (predominant)		15
Non-combustible fire-resistive siding, eaves and deck	0	
Non-combustible siding, eaves and combustible deck	5	
Combustible siding and deck	15	
Building set-back relative to slope of 30% or more		3
> 30 ft to slope	1	
< 30 ft to slope	5	
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart	0	
Hydrants 250 gpm < 1000 ft apart	1	
Non-pressurized water source > 250 gpm for 2 hours	3	
Non-pressurized water source < 250 gpm for 2 hours	5	
Water unavailable	10	
Organized response resources		2
Station < 5 mi from structure	1	
Station > 5 mi from structure	3	
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system	0	
None	5	
Placement of gas and Electric Utilities		
Utilities		5
Both underground	0	
One above, one below	3	
Both above ground	5	
Totals for home or subdivision		112
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 780 acres; 288 observed homes; elevation 7,800 to 8,700 ft; most home sites are on south or southeast facing slopes of a ridge in the west-central portion of the assessment area; two distinct subdivisions are observed, with the lower 2/3 served by 2 primary access routes, the upper 1/3 by a single ingress egress; primary roads are paved 2 lane, secondary roads are unpaved and groomed with several steep 4WD access roads noted in the upper part of the area; street signage was inconsistent; home addressing inconsistent; housing density is moderate to high for the lower subdivision, moderate for the upper portion; defensible space – 40% < 30', 53% 30' to 70'; roofing – 91% asphalt; construction – 99% combustible siding; utilities are above ground; established emergency water supply not observed.

Vegetation: 30% light, 60% medium, 10% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; two small meadows were noted that may serve as safety zone but steep slopes with Ponderosa pine or heavier mixed conifer are predominant; beetle mortality noted in Aspen Meadow/ Lodgepole Drive area.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary access roads including designated emergency access routes
- Develop and maintain emergency access options for Brook Forest to Bluebell (Buffalo Park) and/or Fawn Path/Weasel to Stransky
- Fuel reduction in identified treatment zones
- Develop emergency water availability along Cub Creek/Brook Forest Road
- Improve or construct secondary road turnarounds at dead-ends
- Visible and consistent home addressing
- Expand existing utility right of ways as fuel breaks
- Community training for "shelter-in-place"

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Estates of Blue Creek, Blue Creek Road		
WUI 22 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		2
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		3
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		4
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		11
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		9
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		4
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		14
Topographic features that adversely affect fire behavior (0 - 5)		4
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		2
Roofing Assembly		
Roofing		3
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		15
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		3
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		3
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		3
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		82
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 360 acres; 108 observed homes; elevation 7,500 to 8,160 ft; home sites are positioned on steep west-facing slopes and the ridge top over looking Blue Creek and Cub Creek drainages; primary access is steep and rough but 2 lane turning paved past the ridge top where it turns to Berry Brush Rd and descends to Cragmont Estates; multiple tight switchbacks on secondary roads restrict apparatus access; street signage is inconsistent, home addressing is inconsistent; housing density is low; defensible space – 15% < 30', 34% 30' to 70', 23% 70' to 100, 28% > 100'; roofing – 94%% asphalt; construction – 99% combustible siding; electric is buried, propane tanks noted; 1 marked cistern on lower Lynx Lair observed.

Vegetation: 40% light, 50% medium, 10% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; dense timber on steep west and northwest slopes, significant beetle infestation throughout Lodgepole pine, open Ponderosa pine with grassy understory areas on top of ridge, expansive meadow at base of assessment area in the Blue Creek drainage.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Develop emergency water availability at Brook Forest and Blue Creek
- Develop and maintain a emergency access between Gray Hawk, Lynx Lair and Frog Hollow
- Fuel reduction in identified treatment zones; potential safety zone development in Frog Hollow treatment area
- Switchback improvements, intersection signage improvements
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Cub Creek Ranch, Evergreen Highlands, Timbers Estates, North Marshner, south Marshner		
WUI 23 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		6
2 or more roads in & out	0	
One road in & out	7	
Road Width		2
> 24 ft	0	
> 20 ft < 24 ft	2	
< 20 ft	4	
All-Season Road Condition		3
Surfaced Road, grade <5%	0	
Surfaced Road, grade >5%	2	
Non-surfaced Road, grade <5%	2	
Non-surfaced Road, grade >5%	5	
Other than all season	7	
Fire Service Access		2
< 300 ft with turnaround	0	
> 300 ft with turnaround	2	
< 300 ft with no turnaround	4	
> 300 ft with no turnaround	5	
Street Signs (predominant)		0
Present - reflective	0	
Not present	5	
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		12
Light - 1, 2, 3	5	
Medium - 5, 6, 7, 8, 9	10	
Heavy - 4, 10	20	
Slash - 11, 12, 13	25	
Defensible Space - vegetation treatment around structure		19
> 100 ft around structure	1	
> 70 ft < 100 ft around structure	3	
> 30 ft < 70 ft around structure	10	
< 30 ft around structure	25	
Topography Within 300 ft of Structures		
Slope		4
< 9%	1	
10% to 20%	4	
21% to 30%	7	
31% to 40%	8	
> 41%	10	
Additional Rating Factors (rate all that apply)		
Additional factors		13
Topographic features that adversely affect fire behavior (0 - 5)	3	
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4	
Severe fire weather potential (0 - 5)	4	
Separation of adjacent structures contributing to fire spread (0 - 5)	2	
Roofing Assembly		
Roofing		5
Class A	0	
Class B	3	
Class C	15	
Unrated	25	
Building construction		
Materials (predominant)		14
Non-combustible fire-resistive siding, eaves and deck	0	
Non-combustible siding, eaves and combustible deck	5	
Combustible siding and deck	15	
Building set-back relative to slope of 30% or more		2
> 30 ft to slope	1	
< 30 ft to slope	5	
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart	0	
Hydrants 250 gpm < 1000 ft apart	1	
Non-pressurized water source > 250 gpm for 2 hours	3	
Non-pressurized water source < 250 gpm for 2 hours	5	
Water unavailable	10	
Organized response resources		1
Station < 5 mi from structure	1	
Station > 5 mi from structure	3	
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system	0	
None	5	
Placement of gas and Electric Utilities		
Utilities		5
Both underground	0	
One above, one below	3	
Both above ground	5	
Totals for home or subdivision		96
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 1,380 acres; 275 observed homes; elevation 7,500 to 8,200 ft; prominent ridge rises between 2 large valley meadows with heavy mixed conifer on the north slopes and conifer and open conifer stand on the south aspect, homes are distributed throughout; they include several subdivisions that access North Turkey Creek Drive from single points of access, primary subdivision has dual access but entrances are separated by only 1/10 of a mile; roads are paved 2 lane or groomed unpaved 2 lane, some steep switchbacks, adequate turnarounds at all dead-ends; street signage standard, home addressing inconsistent; housing density is moderate to low; defensible space – 32% < 30', 37% 30' to 70', 17% 70' to 100', 13% > 100'; roofing – 80% asphalt, 13% combustible wood shake; construction – 92%; utilities are above ground; dry hydrant noted with pond in lower meadow, no other emergency water sources observed.

Vegetation: 30% light, 40% medium, 30% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; grassy irrigated(?) meadow dominates the southeast portion of the area, meadows are also found in the flat terrain along the Little Cub Creek drainage in the northwest section of the assessment area; beetle mortality is noted in the dense conifer stand south of North Turkey Creek Drive.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Develop and maintain an emergency access Timbers and Olympus, and along Little Cub Creek
- Develop emergency water availability at pond located at Little Cub Creek Road and Annapurna
- Potential safety zone in meadows near Little Cub Creek Road and Annapurna
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Evergreen Meadows West	
WUI 24 Hazard Rating	HIGH
Means of Access	
Ingress and Egress	2
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	8
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	12
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	3
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	13
Topographic features that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	11
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	2
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	5
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	74
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 830 acres; 291 observed homes; elevation 7,720 to 8,200 ft; low sloping topography on the eastern half supports light to moderate Ponderosa pine stands with grassy, sometimes irrigated understory, meadows bound area on most margins, low ridge to the west support heavier mixed conifer growth; 4 primary accesses provide adequate ingress/egress for the lower portion of the assessment area, the upper 1/3 is restricted to a single access route along Centaur, roads are paved 2 lane, turnaround adequate; street signage was inconsistent, home addressing was inconsistent; housing density is moderate with most home sites on slopes of <10%; defensible space – 16% < 30', 77% 30' to 70', 7% 70' to 100'; roofing – 92% asphalt, 6% wood shake; construction – 79% combustible siding; utilities above ground on upper Centaur, gas buried lower area; dry hydrant noted at pond on Hwy 73; no other emergency water supply observed.

Vegetation: 50% light, 45% medium, 5% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; open Ponderosa pine stands give way to dense mixed conifer and some Lodgepole pine stands on the ridge along the western margin.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Develop and maintain emergency access from Centaur along Frog Hollow
- Develop emergency water supply in the central portion of the assessment area
- Fuel reduction in identified treatment zones
- Intersection signage improvements
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
Evergreen Meadows East	
WUI 25 Hazard Rating HIGH	
Means of Access	
Ingress and Egress	0
2 or more roads in & out	0
One road in & out	7
Road Width	2
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	2
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	2
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	12
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	18
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	6
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	15
Topographic features that adversely affect fire behavior (0 - 5)	5
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	2
Roofing Assembly	
Roofing	3
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	12
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	3
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	5
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	3
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	5
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	89
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 950 acres; 210 observed homes; elevation 7,720 to 8,400 ft; homes in the assessment area are situated along Hwy 73 in light to moderate Ponderosa pine, in the broad grassy meadow the parallels Hwy 73 along North Turkey Creek, and further up the steep dense forested slopes of Berrian Mountain; roads are paved 2 lane with low to moderate grade; 3 primary access points provide adequate ingress/egress options for the subdivisions; street signage was inconsistent, home addressing was inconsistent; housing density is low to moderate; defensible space – 19% < 30', 74% 30' to 70', 8% 70' to 100'; roofing – 89% asphalt, 7% wood shake; construction – 69% combustible, 31% non-combustible; utilities above ground; dry hydrant noted at pond on Hwy 73; no other emergency water supply observed.

Vegetation: 35% light, 35% medium, 30% heavy; vegetation type and density is controlled largely by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; extensive wetland meadow along Hwy 73 and North Turkey Creek to comprise the western and northern area margins.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Develop and maintain emergency access from Centaur along Frog Hollow
- Develop emergency water supply in the central portion of the assessment area
- Fuel reduction in identified treatment zones
- Intersection signage improvements
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
The Ridge at Hiwan		
WUI 26 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		
2 or more roads in & out		0
One road in & out		7
Road Width		
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		
Topographic features that adversely affect fire behavior (0 - 5)		1
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		2
Roofing Assembly		
Roofing		
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		76
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 856 acres; 377 observed homes; elevation 7,300 to 8,040 ft; subdivision is constructed around a low forested southeast trending ridge adjacent to the Hiwan Country Club area; 4 available access routes; primary roads are paved and 2 lane, secondary roads are paved and generally 1 lane; 45 narrow secondary roads were observed with no turnarounds; majority of homes are accessed from secondary roads and any emergency response to these homes requires backing in; standard street signs observed at all intersections; home addressing inconsistent; housing density is moderate overall but high in areas where lots are clustered and < 1 acre; defensible space - 10% < 30', 60% 30' to 70', 29% 70' to 100', roofing - 21% asphalt, 57% wood shake, 22% non-combustible; construction - 71% combustible siding, 29% non-combustible siding; utilities are buried, residential hydrant grid is observed throughout the area.

Vegetation: 70% light, 25% medium, 5% heavy; undeveloped central areas of open space support large continuous stands of Ponderosa pine and heavier mixed conifer on some north and northeast slope aspects. Prairie grass and irrigated lawns characterize understory for most areas with light and medium Ponderosa pine; some areas of heavy Ponderosa pine regeneration (5' to 15') is noted; southeast trending linear grassy meadows bound the area to the west and east.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs
- Develop and maintain a emergency access between South Keystone and Kittredge Park
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Fuel reduction in identified treatment zones
- Establish pre-plan for apparatus response to ~ 45 single lane dead end secondary roads
- Visible and consistent home addressing
- ICP development in school compounds or EFR Station 2 area

Wildfire Fire Risk and Hazard Severity Form NFPA 1144	
El Pinal, El Pinal Acres	
WUI 27 Hazard Rating	HIGH
Means of Access	
Ingress and Egress	0
2 or more roads in & out	0
One road in & out	7
Road Width	4
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
All-Season Road Condition	4
Surfaced Road, grade <5%	0
Surfaced Road, grade >5%	2
Non-surfaced Road, grade <5%	2
Non-surfaced Road, grade >5%	5
Other than all season	7
Fire Service Access	4
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs (predominant)	0
Present - reflective	0
Not present	5
Vegetation (fire behavior fuel models)	
Characteristics of predominant veg w/in 300 ft	7
Light - 1, 2, 3	5
Medium - 5, 6, 7, 8, 9	10
Heavy - 4, 10	20
Slash - 11, 12, 13	25
Defensible Space - vegetation treatment around structure	9
> 100 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Topography Within 300 ft of Structures	
Slope	3
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
> 41%	10
Additional Rating Factors (rate all that apply)	
Additional factors	16
Topographic features that adversely affect fire behavior (0 - 5)	3
Areas with a history of high fire occurrence - ignition potential (0 - 5)	4
Severe fire weather potential (0 - 5)	4
Separation of adjacent structures contributing to fire spread (0 - 5)	5
Roofing Assembly	
Roofing	4
Class A	0
Class B	3
Class C	15
Unrated	25
Building construction	
Materials (predominant)	14
Non-combustible fire-resistive siding, eaves and deck	0
Non-combustible siding, eaves and combustible deck	5
Combustible siding and deck	15
Building set-back relative to slope of 30% or more	1
> 30 ft to slope	1
< 30 ft to slope	5
Available Fire Protection	
Water source availability	0
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized water source > 250 gpm for 2 hours	3
Non-pressurized water source < 250 gpm for 2 hours	5
Water unavailable	10
Organized response resources	1
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed fire protection	5
NFPA 13, 13R, 13D sprinkler system	0
None	5
Placement of gas and Electric Utilities	
Utilities	3
Both underground	0
One above, one below	3
Both above ground	5
Totals for home or subdivision	75
Hazard Rating Scale	
< 40 LOW	
> 40 MODERATE	
> 70 HIGH	
> 112 EXTREME	



Description: 149 acres; 259 observed homes/structures; elevation 7,280 to 7,580 ft; subdivision is constructed on the north slope of a forested east-west trending ridge; 2 primary ingress/egress routes to Evergreen Pkwy; several distinct zones are observed with a commercial/business margin along the east side of Evergreen Pkwy, large new single and multi-family dwellings along Lewis Ridge Rd and Sun Creek; smaller older homes along eastern Hilltop, Aspen, and Spruce; primary access Lewis Ridge is paved 2-way, Hilltop is paved for first 1/3 and restricted 1 to 1½ lanes and terminates in a tight turnaround; secondary roads in the newer zone are paved and 2 lane with dead ends and no turnaround on Sun Creek and Sun Creek Ridge; east zone end secondary roads are unpaved single lane with restricted intersections and dead end access lanes; street sign are present and standard; home addressing is inconsistent; housing density is high and includes at least 18 duplexes and 6 twelve-plexes; due largely to the high housing density; defensible space 15% < 30', 57% 30' to 70'; roofing – 88% asphalt, 12% wood shake; construction 98% combustible siding; all utilities are buried in the newer zones, electric was above ground in the older zone; hydrants are present throughout but difficult to observe in the older zone.

Vegetation: 65% light, 30% medium, 5% heavy; open to medium density Ponderosa pine characterize the north facing aspect of the ridge, grassy groundcover and tended yards comprise most of the understory; a dense stand of heavy mixed conifer is located just east of the structures on a steep north slope.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Develop and maintain emergency access between Larkspur and Troublesome Gulch and between Yucca and Sulky
- Improve turnarounds and intersections
- Shaded fuel breaks along forested primary, secondary, and designated emergency access roads
- Fuel reduction in identified treatment zones
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Wah Keeney Park		
WUI 28 Hazard Rating		MOD
Means of Access		
Ingress and Egress		0
2 or more roads in & out		0
One road in & out		7
Road Width		2
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		2
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		1
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		5
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		3
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		5
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		14
Topographic features that adversely affect fire behavior (0 - 5)		3
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		3
Roofing Assembly		
Roofing		4
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		14
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		2
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		0
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		1
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		3
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		59
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 190 acres; 146 observed homes; elevation 7,160 to 7,660 ft; subdivision is constructed on the south aspect of an east-west trending ridge; grass dominates the slope; 2 primary ingress/egress routes to Evergreen Pkwy, 1 south access to Hiwan Hills subdivision; roads are paved and 2 lane throughout, some steep switch backs; all 4 dead ends had turnarounds; street signs are standard and all intersections marked; home addressing inconsistent; housing density is high with several condominiums and multi-family units at the east end of the area; defensible space – 8% < 30' mostly ornamental conifer planted around homes, 75% > 100'; roofing - 98% asphalt roofing; construction - 99% combustible siding; gas utilities are buried, electric is above ground; hydrant grid is located throughout the area.

Vegetation: 100% light; dominated by open grassy slopes, some shrub and young conifer regeneration noted; many homes have planted a variety of conifer species in close proximity to structures for privacy; ground cover tends to be irrigated adjacent to structures but not on open slopes, which will dry out by mid-summer.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Develop and maintain emergency access between Yucca and Sulky and from Stagecoach to Troublesome Gulch
- Visibly mark hydrants where obscured
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
French Springs		
WUI 29 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		7
2 or more roads in & out		0
One road in & out		7
Road Width		2
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		2
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		4
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		10
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		21
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		3
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		13
Topographic features that adversely affect fire behavior (0 - 5)		3
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		2
Roofing Assembly		
Roofing		2
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		14
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		2
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		5
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		3
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		96
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 558 acres; 47 observed homes; elevation 7,560 to 8,300 ft; characterized by broad valley meadows dense forested slopes; home to Upper Yankee Creek ranches and 3 small subdivisions north of the valley; Yankee Creek Rd provides single ingress/egress, paved 2-lane low grade lower half, 1½ lane groomed unpaved moderate grade upper half, secondary roads - 4 unpaved, 1 paved, north side steep; 4 dead ends, 1 with turnaround; street signs present; home addressing inconsistent; housing density is low; defensible space – 51% < 30', 43% 30' to 70'; roofing – 75% asphalt, 25% non-combustible; utilities are above ground; no observed established emergency water sources.

Vegetation: 35% light, 55% medium; 10% light; vegetation type is controlled largely by slope aspect with grass, brush and Ponderosa pine stands (FBFM 1, 2, 4, & 9) predominant on most south facing aspects. Heavier stands of mixed conifer (FBFM 8, 9, & 10) are more common on most north facing slopes; broad open grassy meadow along primary and secondary drainages; heavier mixed conifer on north aspects; open Ponderosa pine slopes on direct south aspects, heavier stands, some mixed, on less direct aspects.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Shaded fuel breaks along forested primary and secondary access roads including Yankee Creek, Normandy, and private drives
- Fuel reduction in identified treatment zones
- Develop emergency water availability in existing stock ponds along Yankee Creek Rd
- Potential safety zone in meadow system along Yankee Creek
- Visible and consistent home addressing

Wildfire Fire Risk and Hazard Severity Form NFPA 1144		
Greystone Estates		
WUI 30 Hazard Rating		HIGH
Means of Access		
Ingress and Egress		6
2 or more roads in & out		0
One road in & out		7
Road Width		3
> 24 ft		0
> 20 ft < 24 ft		2
< 20 ft		4
All-Season Road Condition		4
Surfaced Road, grade <5%		0
Surfaced Road, grade >5%		2
Non-surfaced Road, grade <5%		2
Non-surfaced Road, grade >5%		5
Other than all season		7
Fire Service Access		3
< 300 ft with turnaround		0
> 300 ft with turnaround		2
< 300 ft with no turnaround		4
> 300 ft with no turnaround		5
Street Signs (predominant)		0
Present - reflective		0
Not present		5
Vegetation (fire behavior fuel models)		
Characteristics of predominant veg w/in 300 ft		7
Light - 1, 2, 3		5
Medium - 5, 6, 7, 8, 9		10
Heavy - 4, 10		20
Slash - 11, 12, 13		25
Defensible Space - vegetation treatment around structure		10
> 100 ft around structure		1
> 70 ft < 100 ft around structure		3
> 30 ft < 70 ft around structure		10
< 30 ft around structure		25
Topography Within 300 ft of Structures		
Slope		7
< 9%		1
10% to 20%		4
21% to 30%		7
31% to 40%		8
> 41%		10
Additional Rating Factors (rate all that apply)		
Additional factors		15
Topographic features that adversely affect fire behavior (0 - 5)		5
Areas with a history of high fire occurrence - ignition potential (0 - 5)		4
Severe fire weather potential (0 - 5)		4
Separation of adjacent structures contributing to fire spread (0 - 5)		2
Roofing Assembly		
Roofing		15
Class A		0
Class B		3
Class C		15
Unrated		25
Building construction		
Materials (predominant)		12
Non-combustible fire-resistive siding, eaves and deck		0
Non-combustible siding, eaves and combustible deck		5
Combustible siding and deck		15
Building set-back relative to slope of 30% or more		4
> 30 ft to slope		1
< 30 ft to slope		5
Available Fire Protection		
Water source availability		10
Hydrants 500 gpm < 1000 ft apart		0
Hydrants 250 gpm < 1000 ft apart		1
Non-pressurized water source > 250 gpm for 2 hours		3
Non-pressurized water source < 250 gpm for 2 hours		5
Water unavailable		10
Organized response resources		1
Station < 5 mi from structure		1
Station > 5 mi from structure		3
Fixed fire protection		3
NFPA 13, 13R, 13D sprinkler system		0
None		5
Placement of gas and Electric Utilities		
Utilities		5
Both underground		0
One above, one below		3
Both above ground		5
Totals for home or subdivision		105
Hazard Rating Scale		
< 40 LOW		
> 40 MODERATE		
> 70 HIGH		
> 112 EXTREME		



Description: 228 acres; 28 observed homes; elevation 7,700 to 8,700 ft; home sites situated on steep south-facing slopes of primarily scrub and grass; Stagecoach Rd provides dual ingress/egress but homes are accessed from dead end roads; primary road is paved, 3 secondary roads are groomed and generally 1½ lanes leading to steeper grades; 2 with turnarounds, 1 without, 1 tight switchback; street signs are present; home addressing is inconsistent; housing density is low with most home sites on slopes of over 20%; defensible space – 92% 30' to 70'; roofing – 54% asphalt, 38% combustible wood shake; utilities are above ground; no observed established emergency water sources.

Vegetation: 60% light, 30% medium, 10% heavy; vegetation type is controlled by slope aspect with grass, brush and open Ponderosa pine stands (FBFM 2 & 4) predominant on south and southeast facing aspects, and heavier stands of Lodgepole pine and Douglas-fir (FBFM 8 & 10) on north facing aspects; predominant south facing aspect favors dry open Ponderosa pine, shrub and grass; one small stand of very dense Ponderosa pine was noted on an east facing aspect; some dense brush rated heavy FBFM 4; most vegetation represents very flashy fuels that would support an extremely fast moving upslope fire.

Recommendations:

- Defensible space improvements including fuel reduction, seasonal mowing, and slash disposal
- Reduce structural ignitability; reduce percentage of flammable roofs, siding and decking
- Develop emergency water availability at Bergen Mountain and Stagecoach
- Improve or construct secondary road turnarounds at dead-ends
- Visible and consistent home addressing
- Potential safety zone in meadow near Alpine and Stagecoach

APPENDIX D

EVERGREEN FIRE PROTECTION DISTRICT

QUESTIONNAIRE

Questionnaire (original)
 Community Wildfire Protection Plan (CWPP)
 Jefferson County

Walsh Environmental Scientists and Engineers, LLC (WALSH) under contract with Jefferson County Department of Emergency Management and in collaboration with Colorado State Forest Service and US Forest Service is developing CWPPs for nine fire protection districts, which have significant wildland urban interface (WUI) lands. You can help by providing information and suggestions on your perceptions of wildland fire and potential mitigation projects by responding to the following question:

1. What community do you live in or are closest to? (please write in)	
2. How great of a risk does wildfire pose to your community?	<input type="checkbox"/> Extreme Risk <input type="checkbox"/> Moderate Risk <input type="checkbox"/> Low Risk <input type="checkbox"/> No Risk
3. What areas are an extreme fire hazard and pose a risk to homes or property?	<input type="checkbox"/> Forestlands <input type="checkbox"/> Grasslands <input type="checkbox"/> Shrublands <input type="checkbox"/> Juniper Stands <input type="checkbox"/> Other Areas: _____ Location:
4. What is the best way to mitigate or reduce wildfire hazards?	<input type="checkbox"/> Increase number of fire department personnel <input type="checkbox"/> Reduce vegetation (grasses, trees, etc.) on public lands by controlled burns. <input type="checkbox"/> Reduce vegetation (grasses, trees, etc.) on public lands by mechanical treatments. <input type="checkbox"/> Increase firefighting equipment (more trucks, water tenders, etc.) <input type="checkbox"/> Increase water availability <input type="checkbox"/> Encourage private landowners to reduce

	fuels and develop defensible spaces around structures.
5. What recent actions have been taken to reduce the risk of wildfire to your community?	<input type="checkbox"/> None that I am aware of. <input type="checkbox"/> If you know of actions that have been taken, please explain:
6. What fire education programs have occurred in your community?	<input type="checkbox"/> None that I am aware of. <input type="checkbox"/> If you know of programs that have occurred, please explain:
7. Is the community prepared to combat wildfire?	<input type="checkbox"/> No, if not, why: <input type="checkbox"/> Yes, if so, how come: <input type="checkbox"/> I do not know
8. What actions do you think need to be taken to reduce the risk of wildland fire?	
Additional Comments:	

Please provide **contact information** in case we have further questions:

Name	
Address	
Phone	

Please fill out this survey and mail, fax, or email your response to:

Walsh Environmental Jerry Barker 303-443-0367 (fax) 4888 Pearl E. Circle, Suite 108 Boulder, CO 80301-2475 jbarker@walshenv.com	Jeffco Emergency Management Rocco Snart 303-271-4905 (fax) 800 Jefferson County Parkway Golden, CO 80419 rsnart@jeffco.us
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Questionnaire for Evergreen Fire Protection District Community Wildfire Protection Plan (CWPP)

Walsh Environmental Scientists and Engineers LLC (WALSH), under contract with Jefferson County, is assessing the risk of wildfire and identifying hazardous fuel and non-fuel mitigation actions to reduce its risk. You can help by providing information and suggestions on your perceptions of wildland fire and potential mitigation projects.

1. Do you live in an identified community in the draft CWPP? If so which one:	_____
2. If not in a CWPP community, what road/location is your property located?	_____
3. Based on the draft CWPP what fire risk concerns do you have for your home or property?	<input type="checkbox"/> Create defensible space around home. <input type="checkbox"/> Create fuelbreaks on roads/topographic features. <input type="checkbox"/> General thinning/forest health work. <input type="checkbox"/> Install FireWise plant materials/grasses. <input type="checkbox"/> Install FireWise construction materials (i.e., replace shake shingle roof, enclose decks). <input type="checkbox"/> Other: _____
4. Based on the draft CWPP what fire risk concerns do you have for your community/area?	<input type="checkbox"/> Create defensible space around home. <input type="checkbox"/> Create fuelbreaks on roads/topographic features. <input type="checkbox"/> General thinning/forest health work. <input type="checkbox"/> Improve water supplies for suppression. <input type="checkbox"/> Create safety zones. <input type="checkbox"/> Create/identify additional evacuation routes. <input type="checkbox"/> Other: _____
5. Based on the suggestions in the draft CWPP what actions do you plan to take around your home or property?	<input type="checkbox"/> Create defensible space home. <input type="checkbox"/> Create fuelbreaks on roads/topographic features. <input type="checkbox"/> General thinning/forest health work. <input type="checkbox"/> Install FireWise plant materials/grasses. <input type="checkbox"/> Install FireWise construction materials (i.e. replace shake shingle roof, enclose decks). <input type="checkbox"/> Other: _____
6. Based on the suggestions in the draft CWPP what actions do you think your community should take?	<input type="checkbox"/> Create defensible space around home. <input type="checkbox"/> Create fuelbreaks on roads/topographic features. <input type="checkbox"/> General thinning/forest health work. <input type="checkbox"/> Improve water supplies for suppression. <input type="checkbox"/> Create safety zones. <input type="checkbox"/> Create/identify additional evacuation routes. <input type="checkbox"/> Other: _____
7. Based on the draft CWPP what is the top priority action item for EFPD?	<input type="checkbox"/> Create defensible space around homes. <input type="checkbox"/> Create fuelbreaks on roads/topographic features. <input type="checkbox"/> General thinning/forest health work.

	<input type="checkbox"/> Improve water supplies for suppression. <input type="checkbox"/> Create safety zones. <input type="checkbox"/> Create/identify additional evacuation routes. <input type="checkbox"/> Other: _____
8. Would you be willing to assist in implementing the CWPP for EFPD? If so how?	<input type="checkbox"/> Serve as member of Implementation Team-any. <input type="checkbox"/> Serve as member of Implementation Team-education. <input type="checkbox"/> Serve as member of Implementation Team-planning. <input type="checkbox"/> Serve as member of Implementation Team-grant applications. <input type="checkbox"/> Serve as member of Implementation Team-organize/manage projects. <input type="checkbox"/> Serve as community coordinator. <input type="checkbox"/> Other: _____
9. If you cannot assist in implementing the CWPP for EFPD, do you know of other parties that would be interested or able to participate? If so, who?	_____ (name) _____ (phone #, email) _____ (neighborhood, organization)
10. Additional Comments:	

Please provide **contact information** in case we have further questions:

Name	
Address	
Phone/ email	

Please fill out this survey and mail, fax, or email your response to:

Walsh Environmental
 Attn: Jefferson County CWPP
 4888 Pearl E. Circle, Suite 108
 Boulder, CO 80301-2475
ggreenwood@walshenv.com
 fax: 303-443-0367

APPENDIX E

EVERGREEN FIRE PROTECTION DISTRICT QUESTIONNAIRE FEEDBACK SUMMARY

Questionnaires were provided at public meetings convened on September 5 and 6, 2007, and at other public events such as slash cleanup days. Participants were asked to respond to the questionnaire and mail or fax their responses. Forty-seven questionnaires have been received as of September 14, 2007. The following tables summarize the responses of the questionnaires received.

Questionnaire Summary

Question		Number of Response
1. What community do you live in or closest to?	Evergreen	47
2. How great of risk do wildfires pose to your community?	Extreme	27
	Moderate	13
	Low	4
	No	1
3. What areas are at extreme fire hazard and pose a risk to homes and property?	Forestlands	37
	Grasslands	13
	Shrublands	11
	Juniper	8
	Other	1
4. What is the best way to mitigate or reduce wildfire hazards?	Reduce vegetation by controlled fire	19
	Reduce vegetation by mechanical treatments	10
	Increase fire fighting equipment	10
	Increase fire department volunteers	9
	Increase water availability	14
	Encourage private landowners to reduce fuels and develop defensible spaces around structures	42
5. What recent actions have been taken to reduce the risk of wildfire to your community? See Table A for responses.	None that I am aware of.	19
	If you know of actions that have been taken, please explain.	26
6. What fire education programs have occurred in your community? See Table B for responses.	None that I am aware of .	19
	If you know of programs that have occurred, please	21

Question		Number of Response
7. Is the community prepared to combat wildfire? See Table C for responses.	explain.	
	No, if not, why?	12
	Yes, if so, how come?	15
8. What actions do you think need to be taken to reduce wildfire risk?	I do not know	15
	See Table D for responses.	

Table A. Summary of Responses to Question Number 5: What actions have been taken to reduce the risk of wildfire to your community?

Comment	Number Received	Comment
1	13	Homeowners need to remove slash, thin trees, and remove ladder fuels.
2	1	County defensible space requirement for new structures is beneficial.
3	1	Colorado State Forest Service inspections are helpful.
4	1	HOA newsletter has provided information.
5	4	Home owners need to create defensible space.
6	1	County weed control has occurred.
7	5	EFR Training and outreach has occurred.
8	1	The addition of a fire station has reduced risk.
9	4	Prescribed fire has been used to reduce fuels.

Table B. Summary of Responses to Question Number 6: What fire education programs have occurred in you community?

Comment	Number Received	Comment
1	1	Fire department willingness to inspect properties.
2	4	Fire department presentations at meetings.
3	4	Fire department news letters.
4	2	Home owners' association newsletters.
5	3	Attended a community awareness meeting.
6	4	EFR home evaluations.
7	1	Fuels reduction projects.
8	2	Fire safety education at schools.
9	2	Newspaper articles.

Table C. Summary of Responses to Question Number 7: Is the community prepared to combat wildfire?

Comment	Number Received	Comment
1	1	No, escape routes need to be developed.
2	2	No, the community has limited equipment and skills
3	2	Yes, the fire department has skilled firefighters.
4	2	Yes, education has occurred.
5	1	No, ground fuels need to be removed.
6	1	Yes, good communication among communities.
7	3	Yes, due to a large number of volunteer firefighters.
8	2	No, lack of defensible space for many homes.
9	1	Yes, many people of prepared to evacuate.
10	2	Yes, well trained fire department.
11	1	No, a large fire would overtake resources.
12	1	Yes, construction of a new fire house.

Table D. Summary of Responses to Question Number 8: What actions do you think need to be taken to reduce the risk of wildland fire?

Comment	Number Received	Comment
1	1	Stop building in vulnerable areas.
2	1	Replace wood shingles.
3	17	Remove slash, thin trees, and develop defensible space.
4	2	Education is needed.
5	2	Prevent massive tree deaths.
6	1	Shoot people that throw smoking materials from vehicles.
7	6	Stringent punishment for arson and substantial rewards for reporting an arson event.
8	2	Stringent punishment for arsons and reward for reporting an arson event.
9	5	Increased public education.
10	1	More prescribed fires to reduce fuels.
11	1	Improved road maintenance for evacuation.
12	1	EFR needs paid firefighters and not volunteers.
13	1	The process to obtain a open burn permit for slash needs to be easier.
14	1	Volunteers are needed to create defensible space for senior citizens.

APPENDIX F FUELBREAK GUIDELINES FOR FORESTED SUBDIVISIONS AND COMMUNITIES



Fuelbreak Guidelines for Forested Subdivisions & Communities

By

Frank C. Derunis



This publication was developed for use by foresters, planners, developers, homeowners' associations and others. Implementation of these measures cannot guarantee safety from all wildfires, but will greatly increase the probability of containing them at more manageable levels.



Inadequate fire planning can result in loss of life or property and costly suppression activities.



Colorado's forested lands are experiencing severe impacts from continuing population increases and peoples' desire to escape urban pressures. Subdivisions and developments are opening new areas for homesite construction at an alarming rate, especially along the Front Range and around recreational areas such as Dillon, Vail, and Steamboat Springs.

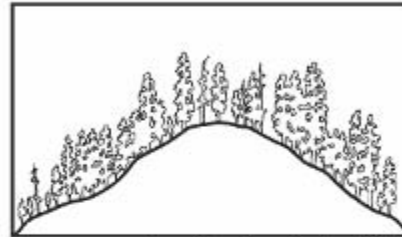
But with development inevitably comes a higher risk of wildfire as well as an ever-increasing potential for loss of life and property. Methods of fire suppression, pre-suppression needs, and homeowner and fire crew safety must all be considered in the planning and review of new developments as well as for the "retrofitting" of existing, older subdivisions.

Fuelbreaks should be considered in fire management planning for subdivisions and developments; however, the following are guidelines **only**. They should be customized to local areas by professional foresters experienced in Rocky Mountain wildfire behavior and suppression tactics.

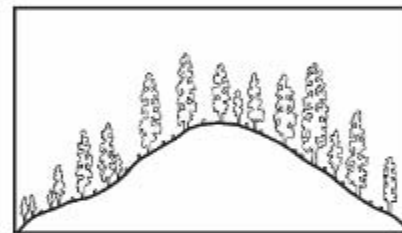
Fuelbreak vs Firebreak

Although the term fuelbreak is widely used in Colorado, it is often confused with firebreak. The two are entirely separate, and aesthetically different, forms of forest fuel modification and treatment.

- A firebreak is strip of land, 20 to 30 feet wide (or more), in which all vegetation is removed down to bare, mineral soil each year prior to fire season.



Above, cross section of mixed conifer stand before fuelbreak modification. Below, after modification.



- A fuelbreak (or shaded fuelbreak) is an easily accessible strip of land of varying width (depending on fuel and terrain), in which fuel density is reduced, thus improving fire control opportunities. The stand is thinned, and remaining trees are pruned to remove ladder fuels. Brush, heavy ground fuels, snags, and dead trees are disposed of and an open, park-like appearance is established.

The following is a discussion of the uses, limitations, and specifications of fuelbreaks in wildfire control and fuels management.

Fuelbreak Limitations

Fuelbreaks provide quick access for wildfire suppression. Control activities can be conducted more safely due to low fuel volumes. Strategically located, they break up large, continuous tracts of dense timber, thus limiting uncontrolled spread of wildfire.

Fuelbreaks can aid firefighters greatly by slowing fire spread under normal burning conditions. However, under extreme conditions, even the best fuelbreaks stand little chance of arresting a large



Before and after photos of a forest stand thinned to reduce fuel loads.

fire, regardless of firefighting efforts. Such fires, in a phenomenon called "spotting," can drop firebrands 1/8-mile or more ahead of the main fire, causing very rapid fire spread. These types of large fires may continue until there is a major change in weather conditions, topography, or fuel type.

It is critical to understand: A fuelbreak is the line of defense. The area (including any homes and developments) between it and the fire may remain vulnerable.

In spite of these somewhat gloomy limitations, fuelbreaks have proven themselves effective in Colorado. During the 1980 Crystal Lakes Subdivision Fire near Fort Collins, crown fires were stopped in areas with fuelbreak thinning, while other areas of dense lodgepole pine burned completely. A fire at O'Fallon Park in Jefferson County was successfully stopped and controlled at a fuelbreak. The Buffalo Creek Fire in Jefferson County (1996) and the High Meadow Fire in Park and Jefferson Counties (2000) slowed dramatically wherever intense forest thinning had been completed. During the 2002 Hayman Fire, Denver Water's entire complex of offices, shops and caretakers' homes at Cheesman Reservoir were saved by a fuelbreak with no firefighting intervention by a fuelbreak.



Burned area near Cheesman Reservoir as a result of the Hayman Fire. Note the unburned green trees in the middle right of the photo, a treated fuelbreak.

The Need For A Fuelbreak

Several factors determine the need for fuelbreaks in forested subdivisions, including: (1) potential problem indicators; (2) wildfire hazard areas; (3) slope; (4) topography; (5) crowning potential; and (6) ignition sources.

Potential Problem Indicator

The table below explains potential problem indicators for various hazards and characteristics common to Colorado's forest types. All major forest types, except aspen, indicate a high potential for wildfire hazard.

Fuel Type	Characteristics			Hazards		
	Aesthetics	Wildlife	Soil	Wildfire	Avalanche	Flood
Aspen	2	3	3	2	4	3
Douglas-fir	2	2	3	5	2	3
Greasewood-Saltbrush	4	2	2	2	1	3
Limber-Bristlecone Pine	3	2	4	3	4	2
Lodgepole Pine	2	2	3	5	4	2
Meadow	5	4	4	2	3	4
Mixed Conifer	2	1	1	5	3	1
Mountain Grassland	5	3	4	3	3	2
Mountain Shrub	3	5	4	4	2	2
Piñon-Juniper	2	3	4	4	2	3
Ponderosa Pine	2	3	1	5	2	2
Sagebrush	4	4	3	3	3	2
Spruce-Fir	2	3	3	4	5	3

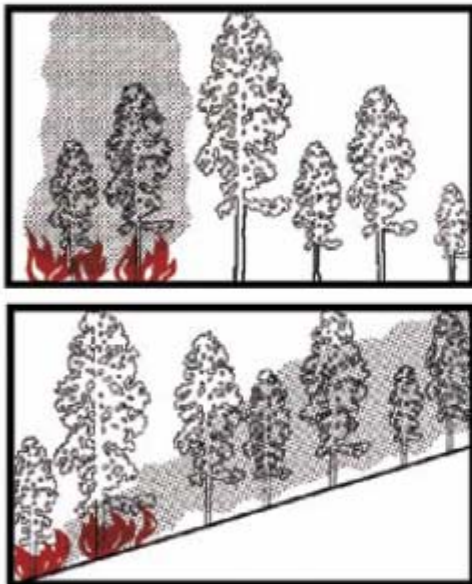
Legend: 5 – Problem may be crucial; 4 – Problem very likely;
3 – Exercise caution; 2 – Problem usually limited;
1 – No rating possible

Wildfire Hazard Maps

The Colorado State Forest Service (CSFS), numerous counties and some National Forests have completed wildfire hazard mapping for many areas within Colorado, particularly along the Front Range. These maps typically consider areas with 30 percent or greater slope; hazardous fuel types; and hazardous topographic features such as fire chimneys. Wildfire Hazard Ratings may be depicted in several ways. Whatever system is used, areas rated moderate or higher should be considered for fuel modification work.

Slope

Rate of fire spread increases as the slope of the land increases. Fuels are preheated by the rising smoke column or they may even come into contact with the flames themselves.



Fire effects, flat vs steep terrain. Note preheating of fuels on steep ground from passage of smoke column.

At 30 percent slope, rate of fire spread doubles compared to rates at level ground, drastically reducing firefighting effectiveness. Areas near 30 percent or greater slopes are critical and must be reviewed carefully.

Topography

Certain topographic features influence fire spread and should be evaluated. Included are fire chimneys, saddles, and V-shaped canyons. They are usually recognized by reviewing standard U.S.G.S. quad maps.

- Chimneys are densely vegetated drainages on slopes greater than 30 percent. Wind, as well as air pre-heated by a fire, tends to funnel up these drainages, rapidly spreading fire upslope.

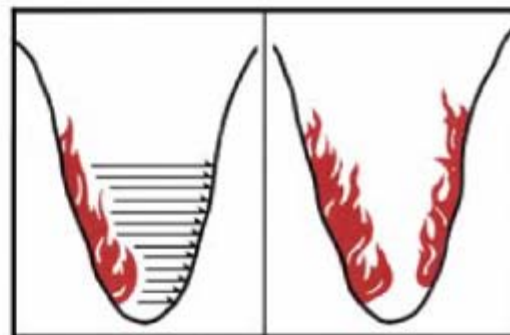


Chimney.



Saddle.

- Narrow, V-shaped valleys or canyons can ignite easily due to heat radiating from one side to the other. For example, a fire burning on one side of a narrow valley dries and preheats fuels on the opposite side until the fire "flashes over." The natural effect of slope on fire then takes over and fire spreads rapidly up drainage and uphill along both sides of the valley.



4 *Flashover in V-shaped valley.*

Crowning Potential

An on-site visit is required to accurately assess crowning potential. A key, below, helps determine this rating. Fuel modification is usually unnecessary if an area has a rating of 3 or less.

Crowning Potential Key

	Rating
A. Foliage present, trees living or dead — B	
B. Foliage living — C	
C. Leaves deciduous or, if evergreen, usually soft, pliant, and moist; never oily, waxy, or resinous.	0
CC. Leaves evergreen, not as above — D	
D. Foliage resinous, waxy, or oily — E	
E. Foliage dense — F	
F. Ladder fuels plentiful — G	
G. Crown closure > 75 percent	9
GG. Crown closure < 75 percent	7
FF. Ladder fuels sparse or absent — H	
H. Crown closure > 75 percent	7
HH. Crown closure < 75 percent	5
EE. Foliage open — I	
I. Ladder fuel plentiful	4
II. Ladder fuel sparse or absent	2
DD. Foliage not resinous, waxy, or oily — J	
J. Foliage dense — K	
K. Ladder fuels plentiful — L	
L. Crown closure > 75 percent	7
LL. Crown closure < 75 percent	4
KK. Ladder fuels sparse or absent — M	
M. Crown closure > 75 percent	5
MM. Crown closure < 75 percent	3
JJ. Foliage open — N	
N. Ladder fuels plentiful	3
NN. Ladder fuels sparse or absent	1
BB. Foliage dead	0

The majority of dead trees within the fuelbreak should be removed. Occasionally, large, dead trees (14 inches or larger in diameter at 4 1/2 feet above ground level) may be retained as wildlife trees. If retained, all ladder fuels must be cleared from around the tree's trunk.

Ignition Sources

Possible ignition sources, which may threaten planned or existing developments, must be investigated thoroughly. Included are other developments and homes, major roads, recreation sites, railroads, and other possible sources. These might be distant from the proposed development,

yet still able to channel fire into the area due to slope, continuous fuels, or other topographic features.

Fuelbreak Locations

In fire suppression, an effective fire line is connected, or "anchored," to natural or artificial fire barriers. Such anchor points might be rivers, creeks, large rock outcrops, wet meadows, or a less flammable timber type such as aspen. Similarly, properly designed and constructed fuelbreaks take advantage of these same barriers to eliminate "fuel bridges." (Fire often escapes control because of fuel bridges that carry the fire across control lines.)

Since fuelbreaks should normally provide quick, safer access to defensive positions, they are necessarily linked with road systems. Connected with county-specified roads within subdivisions, they provide good access and defensive positions for firefighting equipment and support vehicles. Cut-and fill slopes of roads are an integral part of a fuelbreak as they add to the effective width of modified fuels.

Fuelbreaks without an associated road system, such as those located along strategic ridge lines, are still useful in fire suppression. Here, they are often strengthened and held using aerial retardant drops until fire crews can walk in or be ferried in by helicopter.

Preferably, fuelbreaks are located along ridge tops to help arrest fires at the end of their runs. However, due to homesite locations and resource values, they can also be effective when established at the base of slopes. Mid-slope fuelbreaks are least desirable, but under certain circumstances and with modifications, these too, may be valuable.

Fuelbreaks are located so that the area under management is broken into small, manageable units. Thus, when a wildfire reaches modified fuels, defensive action is more easily taken, helping to keep the fire small. For example, a plan for a subdivision might recommend that fuelbreaks break up continuous forest fuels into units of 10 acres or less. This is an excellent plan, especially if defensible space thinning is completed around homes and structures, and thinning for forest management and forest health are combined with the fuelbreak.

When located along ridge tops, continuous length as well as width are critical elements. Extensive long-range planning is essential in positioning these types of fuelbreaks.

Aesthetics

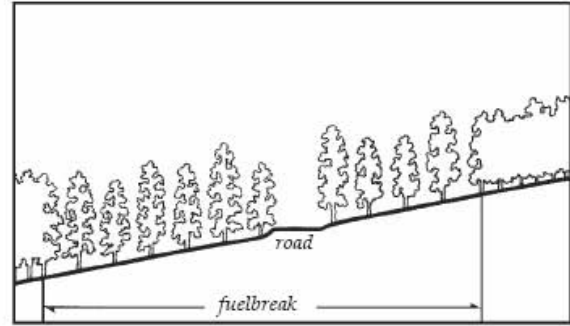
Improperly planned fuelbreaks can adversely impact an area's aesthetic qualities. Careful construction is necessary when combining mid-slope fuelbreaks with roads involving excessive cut-and-fill.



These photos, far- and near- views of the same site, illustrate that forest can be thinned without impacting aesthetics.

Care must also be taken in areas that are not thinned throughout for fuel hazard reduction. In such cases the fuelbreak visually sticks out like a "sore thumb" due to contrasting thinned and unthinned portions of the forest. (Especially noticeable are those portions of the fuelbreak above road cuts).

These guidelines are designed to minimize aesthetic impacts. However, some situations may require extensive thinning and, thus, result in a major visual change to an area. Additional thinning beyond the fuelbreak may be necessary to create an irregular edge and to "feather," or blend, the fuelbreak thinning into the unthinned portions of the forest. Any thinning beyond the fuelbreak improves its effectiveness and is highly recommended.



Cross-section of a typical fuelbreak built in conjunction with a road.

Constructing the Fuelbreak

Fuelbreak Width and Slope Adjustments

Note: Since road systems are so important to fuelbreak construction, the following measurements are from the toe of the fill for downslope distances, and above the edge of the cut for uphill distances.

The minimum recommended fuelbreak width is approximately 300 feet for level ground. Since fire activity intensifies as slope increases, the overall fuelbreak width must also increase. However, to minimize aesthetic impacts and to maximize fire crew safety, the majority of the increases should be made at the bottom of the fuelbreak, below the road cut.

Widths are also increased when severe topographic conditions are encountered. Guidelines for fuelbreak widths on slopes are given below:

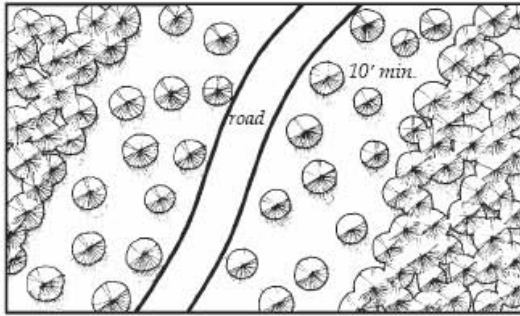
Fuelbreak Width/Slope

Percent Slope (%)	Minimum Uphill Distance (ft)	Minimum Downhill Distance (ft)	Total Width of Modified fuels (ft)*
0	150	150	300
10	140	165	303
20	130	180	310
30	120	195	315
40	110	210	320
50	100	225	325
60	100	240	340

*As slope increases, total distance for cut-and-fill for road construction rapidly increases, improving fuelbreak effective width.

Stand Densities

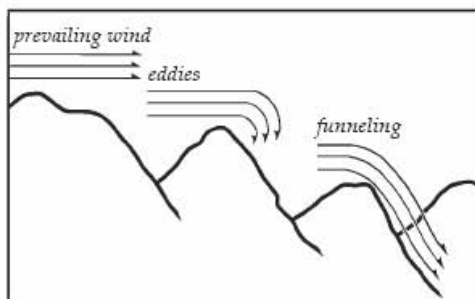
Crown separation is a more critical factor for fuelbreaks than a fixed tree density level. A *minimum* 10-foot spacing between the edges of tree crowns is recommended on level ground. As slope increases, crown spacing should also increase. However, small, isolated groups of trees may be retained for visual diversity. Increase crown spacing around any groups of trees left for aesthetic reasons and to reduce fire intensities and torching potential.



Plan view of fuelbreak showing minimum distance between tree crowns.

In technical terms, a fuelbreak thinning is classified as a heavy "sanitation and improvement cut, from below." Within fuelbreaks, trees that are suppressed, diseased, deformed, damaged, or of low vigor are removed along with all ladder fuels. Remaining trees are the largest, healthiest, most wind-firm trees from the dominant and co-dominant species of the stand.

Because such a thinning is quite heavy for an initial entry into a stand, prevailing winds, eddy effects, and wind funneling must be carefully evaluated to minimize the possibility of windthrow. It may be necessary to develop the fuelbreak over several years to allow the timber stand to "firm-up" — this especially applies to lodgepole pine and Engelmann spruce stands.



Topography affects wind behavior — an important consideration during fuelbreak construction.

Area-wide forest thinning is recommended for any subdivisions. Such thinning is not as severe as a fuelbreak thinning, but generally should be completed to fuelbreak specifications along the roads (as outlined on page 6.) In addition, "defensible space thinning" are highly recommended around all structures (see CSU Coop. Extension Fact sheet 6.302, *Creating Wildfire-Defensible Zones*).

Debris Removal

Limbs and branches left from thinning (slash) can add significant volumes of fuel to the forest floor, especially in lodgepole pine, mixed-conifer, or spruce/fir timber types. These materials can accumulate and serve as ladder fuels, or can become "jackpots," increasing the difficulty of defending the fuelbreak during a wildfire. Slash decomposes very slowly in Colorado and proper disposal is essential. Proper treatment reduces fire hazard, improves access for humans and livestock, encourages establishment of grasses and other vegetation, and improves aesthetics.

Three treatment methods are commonly used. These are lopping-and-scattering, piling and burning, and chipping. Mulching of small trees and slash using equipment similar to Hydro-axes or Timbcos equipped with mulching heads are becoming a popular method of treatment. Size, amount, and location of slash dictates the method used, in addition to cost and the final desired appearance. The method chosen will also depend on how soon an effective fuelbreak is needed prior to construction in new developments.



Lop and scatter: slash should be no deeper than 12" above ground surface.



Chipping is the most desirable, but also the most expensive method of slash disposal.



Piled slash can be burned but only during certain conditions, such as after a snowfall.

Fuelbreak Maintenance

Following initial thinning, trees continue to grow (usually at a faster rate). The increased light on the forest floor encourages heavy grass and brush growth where, in many cases, where little grew before. The site disturbance and exposed mineral soil created during fuelbreak development is a perfect seed bed for new trees that, in turn, create new ladder fuels. Thus, in the absence of maintenance, fuelbreak effectiveness will decrease over time.



Fuelbreak maintenance is essential. Ingrowth, shown above, will minimize the effectiveness of this fuelbreak within a few years.

Fuelbreak maintenance problems are most often the result of time and neglect. Misplaced records, lack of follow-up and funding, and apathy caused by a lack of fire events are some of the major obstacles. In addition, the responsibility for fuelbreak maintenance projects is often unclear. For example, control of a fuelbreak completed by a developer passes to a homeowner's association, usually with limited funds and authority to maintain fuelbreaks.

If fuelbreak maintenance is not planned and completed as scheduled, consider carefully whether the fuelbreak should be constructed. An un-maintained fuelbreak may lead to a false sense of security among residents and fire suppression personnel.

Conclusion

An image of well-designed communities for Colorado includes:

- Forested subdivisions where the total forest cover is well-managed through carefully planned, designed, and maintained thinnings. This contributes to reduced wildfire hazards and a much healthier forest — one that is more resistant to insects and disease.
- A system of roads and driveways with their associated fuelbreaks that break up the continuity of the forest cover and fuels. These help keep fires small, while also providing safer locations from which to mount fire suppression activities. In addition to allowing fire personnel in, they will allow residents to evacuate if necessary.
- Individual homes that all have defensible space around them, making them much easier to defend and protect from wildfire, while also protecting the surrounding forest from structure fires.

Creation of such communities is entirely feasible if recognition of the fire risks, a spirit of cooperation, an attitude of shared responsibility, and the political will exists.

Colorado's mountains comprise diverse slopes, fuel types, aspects, and topographic features. This variety makes it impossible to develop general fuelbreak prescriptions for all locations. The previous recommendations are guidelines only. A professional forester with fire suppression expertise should be consulted to "customize" fuelbreaks for particular areas.

APPENDIX G

CREATING WILDFIRE DEFENSIBLE ZONES



N A T U R A L R E S O U R C E S  S E R I E S

FORESTRY

Creating Wildfire-Defensible Zones no. 6.302

by F.C. Dennis¹

Quick Facts...

Wildfire will find the weakest links in the defense measures you have taken on your property.

The primary determinants of a home's ability to survive wildfire are its roofing material and the quality of the "defensible space" surrounding it.

Even small steps to protect your home and property will make them more able to withstand fire.

Consider these measures for all areas of your property, not just the immediate vicinity of the house.

Fire is capricious. It can find the weak link in your home's fire protection scheme and gain the upper hand because of a small, overlooked or seemingly inconsequential factor. While you may not be able to accomplish all measures below (and there are no guarantees), each will increase your home's, and possibly your family's, safety and survival during a wildfire.

Start with the easiest and least expensive actions. Begin your work closest to your house and move outward. Keep working on the more difficult items until you have completed your entire project.

Defensible Space

Two factors have emerged as the primary determinants of a home's ability to survive wildfire. These are the home's roofing material and the quality of the "defensible space" surrounding it.

Use fire-resistive materials (Class C or better rating), not wood or shake shingles, to roof homes in or near forests and grasslands. When your roof needs significant repairs or replacement, do so with a fire-resistant roofing material. Check with your county building department. Some counties now restrict wood roofs or require specific classifications of roofing material.

Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides *room for firefighters to do their jobs*. Your house is more likely to withstand a wildfire if grasses, brush, trees and other common forest fuels are managed to reduce a fire's intensity.

The measure of fuel hazard refers to its continuity, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous (i.e. produce a more intense fire) than light fuels such as grass.

Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels. Additional distance between fuels is required on slopes.

Creating an effective defensible space involves developing a series of management zones in which different treatment techniques are used. See Figure 1 for a general view of the relationships among these management zones. Develop defensible space around each building on your property. Include detached garages, storage buildings, barns and other structures in your plan.

The actual design and development of your defensible space depends on several factors: size and shape of buildings, materials used in their construction, the slope of the ground on which the structures are built, surrounding topography,

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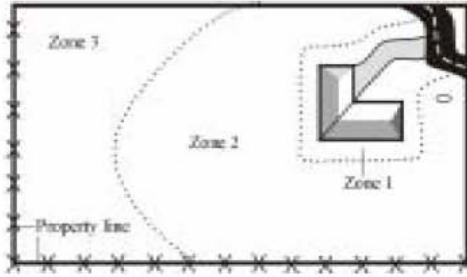


Figure 1: Forested property showing the three fire-defensible zones around a home or other structure.

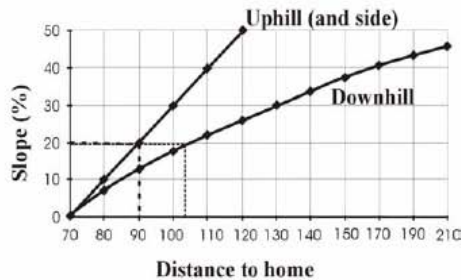


Figure 2: This chart indicates the minimum recommended dimensions for defensible space from the home to the outer edge of Zone 2. For example, if your home is situated on a 20 percent slope, the minimum defensible space dimensions would be 90 feet uphill and to the sides of the home and 104 feet downhill from the home.

and sizes and types of vegetation on your property. These factors all affect your design. You may want to request additional guidance from your local Colorado State Forest Service (CSFS) forester or fire department. (See the Special Recommendations section of this fact sheet for shrubs, lodgepole pine, Engelmann spruce, and aspen.)

Defensible Space Management Zones

Zone 1 is the area of maximum modification and treatment. It consists of an area of 15 feet around the structure in which all flammable vegetation is removed. This 15 feet is measured from the outside edge of the home's eaves and any attached structures, such as decks.

Zone 2 is an area of fuel reduction. It is a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend *at least* 75 to 125 feet from the structure. See Figure 2 for the appropriate distance for your home's defensible space. Within this zone, the continuity and arrangement of vegetation is modified. Remove stressed, diseased, dead or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing homesite safety and the aesthetics of the property.

Zone 3 is an area of traditional forest management and is of no particular size. It extends from the edge of your defensible space to your property boundaries.

Prescriptions

Zone 1

The size of Zone 1 is 15 feet, measured from the edges of the structure. Within this zone, several specific treatments are recommended.

Plant nothing within 3 to 5 feet of the structure, particularly if the building is sided with wood, logs or other flammable materials. Decorative rock, for example, creates an attractive, easily maintained, nonflammable ground cover.

If the house has noncombustible siding, widely spaced foundation plantings of low growing shrubs or other "fire wise" plants are acceptable. Do not plant directly beneath windows or next to foundation vents. Be sure there are no areas of continuous grass adjacent to plantings in this area.

Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems and leaves.

Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend the gravel coverage under the decks. Do not use areas under decks for storage.

Ideally, remove all trees from Zone 1 to reduce fire hazards. If you do keep a tree, consider it part of the structure and extend the distance of the entire defensible space accordingly. Isolate the tree from any other surrounding trees. Prune it to at least 10 feet above the ground. Remove any branches that interfere with the roof or are within 10 feet of the chimney. Remove all "ladder fuels" from beneath the tree. Ladder fuels are vegetation with vertical continuity that allows fire to burn from ground level up into the branches and crowns of trees. Ladder fuels are potentially very hazardous but are easy to mitigate. No ladder fuels can be allowed under tree canopies. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/2 the height, whichever is the least).

Zone 2

Zone 2 is an area of fuel reduction designed to reduce the intensity of any fire approaching your home. Follow these recommended management steps.

Thin trees and large shrubs so there is at least 10 feet between crowns. Crown separation is measured from the furthest branch of one tree to the nearest branch on the next tree (Figure 3). On steep slopes, allow more space between tree crowns. (See Figure 4 for *minimum recommended* spacing for trees on steep slopes.) Remove all ladder fuels from under these remaining trees. Carefully prune trees to a height of at least 10 feet.

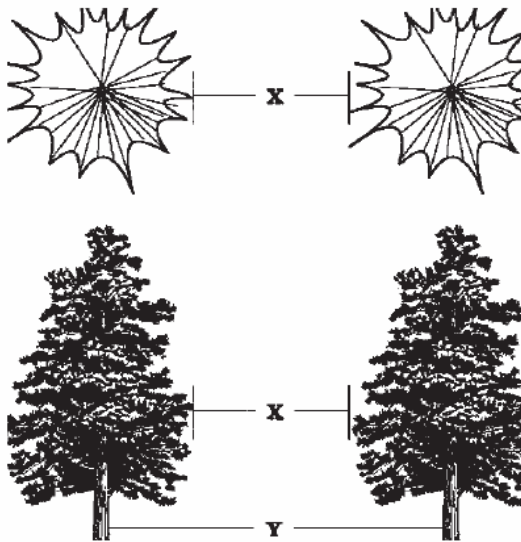


Figure 3: X = crown spacing; Y = stem spacing. Do not measure between stems for crown — measure between the edges of tree crowns.

Small clumps of 2 to 3 trees may be occasionally left in Zone 2. Leave more space between the crowns of these clumps and surrounding trees.

Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. Thin the portions of Zone 3 adjacent to Zone 2 more heavily than the outer portions.

Isolated shrubs may remain, provided they are not under tree crowns. Prune and maintain these plants periodically to maintain vigorous growth. Remove dead stems from trees and shrubs annually. Where shrubs are the primary fuel in Zone 2, refer to the Special Recommendations section of this fact sheet.

Limit the number of dead trees (snags) retained in this area. Wildlife needs only one or two snags per acre. Be sure any snags left for wildlife cannot fall onto the house or block access roads or driveways.

Mow grasses (or remove them with a weed trimmer) as needed through the growing season to keep them low, a maximum of 6 to 8 inches. This is extremely critical in the fall when grasses dry out and cure or in the spring after the snow is gone but before the plants green up.

Stack firewood and woodpiles uphill or on the same elevation as the structure but at least 30 feet away. Clear and keep away flammable vegetation within 10 feet of these woodpiles. Do not stack wood against your house or on or under your deck, even in winter. Many homes have burned from a woodpile that ignited as the fire passed. Wildfires can burn at almost any time in Colorado.

Locate propane tanks at least 30 feet from any structures, preferably on the same elevation as the house. You don't want the LP container below your house — if it ignites, the fire would tend to burn uphill. On the other hand, if the tank is above your house and it develops a leak, LP gas will flow downhill into your home. Clear and keep away flammable vegetation within 10 feet of these tanks. Do not screen propane tanks with shrubs or vegetation.

Dispose of slash (limbs, branches and other woody debris) from your trees and shrubs through chipping or by piling and burning. Contact your local CSFS office or county sheriff's office for information about burning slash piles. If neither of these alternatives is possible, lop and scatter slash by cutting it into very small pieces and distributing it over the ground. Avoid heavy accumulations

% slope	Tree Crown Spacing	Brush and Shrub Clump Spacing
0 -10 %	10'	2 1/2 x shrub height
11 - 20%	15'	3 x shrub height
21 - 40%	20'	4 x shrub height
> 40%	30'	6 x shrub height

Figure 4: Minimum tree crown and shrub clump spacing.

Grasses

Keep dead, dry or curing grasses mowed to less than 6 inches. Defensible space size where grass is the predominant fuel can be reduced (Figure 5) when applying this practice.

Windthrow

In Colorado, certain locations and tree species, including lodgepole pine and Engelmann spruce, are especially susceptible to damage and uprooting by high winds (windthrow). If you see evidence of this problem in or near your forest, or have these tree species, consider the following adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space.

Adjustments: If your trees or homesite are susceptible to windthrow and the trees have never been thinned, use a stem spacing of diameter plus five instead of the guides listed in the Zone 3 section. Over time (every 3 to 5 years) *gradually* remove additional trees. The time between cutting cycles allows trees to “firm up” by expanding their root systems. Continue this periodic thinning until the desired spacing is reached.

Also consider leaving small clumps of trees and creating small openings on their lee side (opposite of the predominant wind direction). Again, a professional forester can help you design the best situation for your specific homesite and tree species. Remember, with species such as lodgepole pine and Engelmann spruce, the likelihood of a wildfire running through the tree tops or crowns (crowning) is closely related to the overabundance of fuels on the forest floor. Be sure to remove downed logs, branches and *excess* brush and needle buildup.

Maintaining Your Defensible Space

Your home is located in a forest that is dynamic, always changing. Trees and shrubs continue to grow, plants die or are damaged, new plants begin to grow, and plants drop their leaves and needles. Like other parts of your home, defensible space requires maintenance. Use the following checklist each year to determine if additional work or maintenance is necessary.

% slope	D-space size (uphill, downhill, sidehill)
0 - 20 %	30'
21 - 40%	50'
> 40%	70'

Figure 6: Minimum defensible space size for grass fuels.

Defensible Space and FireWise Annual Checklist

- ☐ Trees and shrubs are properly thinned and pruned within the defensible space. Slash from the thinning is disposed of.
- ☐ Roof and gutters are clear of debris.
- ☐ Branches overhanging the roof and chimney are removed.
- ☐ Chimney screens are in place and in good condition.
- ☐ Grass and weeds are mowed to a low height.
- ☐ An outdoor water supply is available, complete with a hose and nozzle that can reach all parts of the house.
- ☐ Fire extinguishers are checked and in working condition.
- ☐ The driveway is wide enough. The clearance of trees and branches is adequate for fire and emergency equipment. (Check with your local fire department.)
- ☐ Road signs and your name and house number are posted and easily visible.
- ☐ There is an easily accessible tool storage area with rakes, hoes, axes and shovels for use in case of fire.
- ☐ You have practiced family fire drills and your fire evacuation plan.
- ☐ Your escape routes, meeting points and other details are known and understood by all family members.
- ☐ Attic, roof, eaves and foundation vents are screened and in good condition.



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Stilt foundations and decks are enclosed, screened or walled up.

- ☐ Trash and debris accumulations are removed from the defensible space.
 - ☐ A checklist for fire safety needs inside the home also has been completed.
- This is available from your local fire department.

References

Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303:

- *FireWise Construction — Design and Materials*
- *Home Fire Protection in the Wildland Urban Interface*
- *Wildfire Protection in the Wildland Urban Interface*
- *Landowner Guide to Thinning*

Colorado State University Cooperative Extension, 115 General Services Bldg., Fort Collins, CO 80523-4061; (970) 491-6198; E-mail: resourcecenter@ucm.colostate.edu:

- 6.303, *Fire-Resistant Landscaping*
- 6.304, *Forest Home Fire Safety*
- 6.305, *FireWise Plant Materials*
- 6.306, *Grass Seed Mixes to Reduce Wildfire Hazard*
- 7.205, *Pruning Evergreens*
- 7.206, *Pruning Shrubs*
- 7.207, *Pruning Deciduous Trees*



This fact sheet was produced in cooperation with the Colorado State Forest Service.

¹Wildfire Hazard Mitigation Coordinator,
Colorado State Forest Service.

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APPENDIX H PRESCRIBED PILE BURNING GUIDELINES



This handout is designed to be used by forest landowners, land managers, and fire department personnel in planning and conducting safe and effective burning of piled forest debris (“slash”) called “pile burns.” These guidelines cannot guarantee safety against accidents, unforeseen circumstances, changing burning conditions, or negligent actions of the individuals conducting the prescribed fire. By following the intent of these guidelines and using common sense, the landowner or forest manager can reduce slash accumulations, improve the appearance of their forest land, and reduce wildfire risk on their property. The reader should contact a local office of the Colorado State Forest Service (CSFS) or their local fire authority for updated versions of this publication and current requirements about the use of open fires.

DEFINITIONS:

- Slash:** The accumulation of vegetative materials such as tops, limbs, branches, brush, and miscellaneous residue resulting from forest management activities such as thinning, pruning, timber harvesting, and wildfire hazard mitigation.
- Pile Burning:** The treatment of slash by arranging limbs and tops into manageable piles. Piles are burned during safe burning conditions, generally during the winter following cutting.
- Chunking-In:** The process of moving unburned materials from the outside perimeter into the center of the still burning piles. This is done after the pile has initially burned down and is safe to approach, but before the hot coals in the center have cooled. Chunking-in allows greater consumption of the piled slash.
- Mop-up:** The final check of the fire to identify and extinguish any still-burning embers or materials. This is accomplished by mixing snow, water, or soil with the burning materials.

MATERIALS TO BE INCLUDED IN PILES:

All limbs, tops, brush, and miscellaneous materials recently cut in the area, no greater than 3 inches in diameter and from 1 to 8 feet in length. Older branches can be used as long as they still have needles/foilage attached or have not started decaying. Materials greater than 3 inches in diameter do not significantly help a fire spread rapidly, will generally burn longer and require more chunking-in or mopping-up than is cost-effective, produce greater amounts of smoke, and should be used for sawtimber, posts and poles, firewood, or left for wildlife habitat. **Do not place garbage or debris in the piles.**

LOCATION OF PILES:

Piles should be located in forest openings or between remaining trees, in unused logging roads and landings, meadows, and rock outcrops. Piles should be preferably at least 10 feet from the trunk of any overhead trees. In denser stands of trees, piles can be located closer to the trees and even under the overhanging branches, but these piles should be smaller in size and burned when snow or moisture is present in the tree crowns. Piles should NOT be located on active road surfaces, in ditches, near structures or poles, under or around power lines, or on top of logs or stumps that may catch fire and continue smoldering.

CONSTRUCTION OF PILES:

Piles should be constructed by hand whenever possible, but if constructed by machine they should clean of dirt and debris. Piles should be started with a core of kindling-like materials such as needles, small branches, or paper in the bottom of the pile. Pile slash soon after cutting (while still green) and before winter snowfall. Do not include wood products such as firewood and logs. Pile branches and tops with the butt ends towards the outside of the pile, and with the branches overlapping so as to form a series of dense layers piled upon each other. The piles should be compact, packed down during construction, and with no long branches that will not burn from sticking out into the surrounding snow. Piles should be up to 8 feet in diameter, and at least 4 to 6 feet high. These measures prevent snow and moisture from filtering down into the piles and extinguishing the fire before it gets going. If the fuels do not have sufficient needles or fine fuels to carry the fire or kept moisture out (such as oak brush or very old conifer branches), then you should cover the piles with 6 mil plastic to keep them dry until the day of the burn, and then remove it.

PLANNING YOUR BURNING EFFORT:

Individuals should check with the local CSFS office or fire authority for the current requirements on open fires. Generally, you must complete one or more of the following steps before burning slash:

1. Complete and have an approved open burning permit from the local (county) Health Department.
2. Obtain authorization from the legally constituted fire authority for your area. This may be part of the health department's permit process.
3. Land management agencies must complete and have approval of an open burning permit from the Colorado Department of Health - Air Pollution Control Division.

Copies of all permits should be available on-site during the burning operation. Burning activities should also include plans for safety, supplemental water sources, and extra assistance from the local fire authority or the landowner. The individual(s) planning the burning operation should notify the following entities on the day of a burn: the local fire authority, county sheriff's department, and adjacent landowners who may be affected by smoke. Notification should include the date, times, and exact location of the burn.

Pile burning must be conducted under suitable weather conditions. Periods of snow or light rain, with steady, light winds (for smoke dispersal), and sufficiently snow cover (6-12 inch depths) are ideal. Do not burn during periods of high winds, low humidity or drying conditions, temperature inversions (especially "Red Air Quality" days in metropolitan areas), with a lack of snow cover or these conditions are expected to develop after starting the burn. Persons burning slash piles should have the following: leather gloves; shovels; suitable footwear; masks for covering the mouth and nose; and proper eye protection.

BURNING SLASH PILES:

Piles may be ignited by several means. If the needles and fine fuels within the pile have dried though the summer, ignition can be easily started with matches and a large ball of newspaper placed within the bottom of the pile. If fuels are still partially green, or the pile is wet from rain or melting snow, then a hotter and longer burning source may be necessary. Drip torches (a specially designed gas can used by foresters for igniting fires) or sawdust soaked with diesel fuel can be used to ignite the pile. Flares used for highway emergencies can also be utilized to ignite the piles. **Do not use gasoline for this purpose.**

One test pile should be ignited to see if it burns and at what rate, prior to igniting other piles. If suitable burning conditions exist, then additional piles may be started. Ignite only those piles that can be controlled by the available manpower and resources until they have burned down. You can slow the rate of burning (and possible scorching of adjacent trees) by shoveling snow or spraying water into the pile and cooling the fire down. Depending upon weather conditions, pile size, and moisture content of the fuels, piles should burn down in 30-60 minutes. As a general rule, one person can manage three to six closely situated piles.

After the piles have burned down, chunk-in any unburned slash and wood into the hot coals in the center of the pile. As much as 95 percent of the original slash can be consumed by aggressive chunking-in. Do not start any new piles on fire after 2:00 pm, as they may continue burning into the evening, and will not burn as completely because of lower temperatures and higher relative humidity. Smoke inversions may be a problem for piles still burning after sunset. At all times, piles may need to be actively mopped-up if the weather conditions will not extinguish the fire, or if the fires could escape. If high winds or melting snow increases this risk, then all burning materials must be mopped-up.

ADDITIONAL ASSISTANCE:

If landowners have questions about burning slash, they should contact a local CSFS office (<http://csfs.colostate.edu/>). CSFS can assist landowners with planning or conducting prescribed fire activities such as pile burning or broadcast (area) burning. Local, state, and fire department authorities may require a burn plan, smoke management plan, and weather monitoring for complex burning operations.

APPENDIX I

WEB REFERENCE GLOSSARY

Resource	Web Site
Jefferson County Emergency Operating Plan	http://www.co.jefferson.co.us/ca/chap06016.htm#P6_19
Jefferson County Policies and Procedures	http://www.co.jefferson.co.us/ca/ca_T148_R2.htm
Jefferson County CWPP project site	http://www.co.jefferson.co.us/emerg/index.htm
Jefferson County Environmental Health Services	www.co.jefferson.co.us/health/health_T111_R38.htm
Colorado State Forest Service Library	http://csfs.colostate.edu/library.htm
Rocky Mountain Geographic Science Center – Wildfire Support	http://wildfire.cr.usgs.gov
Firewise National Firewise Community Program	http://www. Firewise.org.
Searchable Grants Database	http://www.rockymountainwildlandfire.info/
Jefferson County Department of Emergency Management	http://jeffco.us/sheriff/sheriff_T62_R191.htm
Evergreen FPD	http://www.evergreenfire.org/
Landfire Geospatial Data	http://www.landfire.gov/products_overview.php
Colorado State Forest Service	http://csfs.colostate.edu/
National Fire Weather	http://fire.boi.noaa.gov/
RAWS Station index for the Rocky Mountain Geographic Coordinating Area	http://raws.wrh.noaa.gov/cgi-bin/roman/raws_ca_monitor.cgi?state=RMCC&rawsflag=2
Fort Collins Interagency Wildfire Dispatch Center Web Index	http://www.fs.fed.us/r2/arnf/fire/fire.html
Colorado Forest Industries Directory	http://www.colostate.edu/programs/cowood/New_site/Publications/Articles/Colorado%20Forest%20Industry%20Directory.pdf
Current Weather Summary for Rocky Mountain Geographic Coordinating Area	http://raws.wrh.noaa.gov/cgi-bin/roman/raws_ca_monitor.cgi?state=RMCC&rawsflag=2
U.S. Forest Service, Kansas City Fire Access Software	http://famweb.nwcg.gov/kcfast
Fire Regime Condition Class	www.frcc.gov
National Climate Data Center	www.ncdc.noaa.gov

APPENDIX J LIST OF PREPARERS

Preparer	Company
George Greenwood, Wildland Fire Specialist	Walsh Environmental Scientists and Engineers, LLC
Fred Groth, Director of Geospatial Technologies	Walsh Environmental Scientists and Engineers, LLC
Geoff Butler, Wildland Fire Specialist	Alpenfire, LLC
Kelly Close, Fire Behavior Analyst	Independent Contractor
Pete Anderson	Evergreen Fire/Rescue
Einar Jenson	Evergreen Fire/Rescue

APPENDIX K

GRASS SEED MIXES TO REDUCE WILDFIRE HAZARD



N A T U R A L R E S O U R C E S  S E R I E S

FORESTRY

Grass Seed Mixes to Reduce Wildfire Hazard no. 6.306

by F.C. Dennis¹

Quick Facts...

Plant “FireWise” grass species to reduce the risk of wildfire damage.

“FireWise” grass mixes may contain only native species or a combination of native and non-native species.

Sow half the seed north to south and the other half east to west.

Rake the seed into the soil.

Mulch erosion-prone areas.

If possible, water often and lightly.

Maintain the area properly.

During much of the year, grasses ignite easily and burn rapidly. Tall grass will quickly carry fire to your house. Plant “FireWise” grasses in the defensible space around your home. Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire. See fact sheet 6.302, *Creating Wildfire-Defensible Zones*.

Seed Mixes for Colorado

Grass seed mixes developed for Colorado use native or a combination of native and non-native grass species. While the basic mixes (Tables 1 and 3) work reasonably well on all sites, they were modified for moist sites and/or those with northern exposures (Tables 2 and 4).

Grasses included in these mixes have the following characteristics:

- They are lower growing.
- They need less maintenance.
- Seed is readily available and relatively inexpensive.

Grass seed mixes made up entirely of native seed may take longer to establish — up to three years — than those with a percentage of non-native seed.

Planting

Use either a drop or a cyclone seeder to seed your defensible space.

A drop seeder is more accurate in placing seed, especially if wind is a problem. However, if the ground is rough or rocky, the cyclone seeder will be easier to use.

Seed at the rates shown in the tables below. Divide seed into two equal parts. Sow half of the seed by crossing the area north to south and the other half by crossing east to west.

Rake seed into the soil as soon as possible after sowing to reduce the chances of it blowing or washing out. Soil cover also helps to protect the young seedlings from drying out. When sowing on slopes prone to erosion, cover the seeded area with mulch. Recommended mulches include **clean** straw (straw with no seeds in it), netting or matting of some kind.

If you have water from a central community system or a well permit that allows outside irrigation, water the newly seeded areas frequently and lightly. Water enough to keep the soil moist but not so heavily as to cause soil washing and loss of the grass seed.

Maintenance

Even “FireWise” grasses need proper maintenance. See 6.303, *Fire-Resistant Landscaping*, for tips on proper mowing and other maintenance and landscaping suggestions.

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*Wildfire Hazard Mitigation Coordinator,
Colorado State Forest Service.*

Native Grass "Fire Mixes"

Table 1: All exposures.

Species	Variety	Percent of Mix	Broadcast Rate PLS* Lbs/Acre
Arizona fescue	Redondo	20	9.0 x .20 = 1.80
Western wheatgrass	Barton/Rosana	20	32.0 x .20 = 6.40
Streambank wheatgrass	Sodar	20	22.0 x .20 = 4.40
Indian ricegrass	Nezpar	20	25.0 x .20 = 5.00
Blue grama	Lovington	20	6.0 x .20 = 1.20
TOTALS		100%	18.80

Table 2: Northerly exposures and/or moist sites.

Species	Variety	Percent of Mix	Broadcast Rate PLS* Lbs/Acre
Arizona fescue	Redondo	25	9.0 x .25 = 2.25
Western wheatgrass	Barton/Rosana	25	32.0 x .25 = 8.00
Streambank wheatgrass	Sodar	25	22.0 x .25 = 5.50
Indian ricegrass	Nezpar	25	25.0 x .25 = 6.25
TOTALS		100%	22.00

Non-Native/Native Grass "Fire Mixes"

Table 3: All exposures.

Species	Variety	Percent of Mix	Broadcast Rate PLS* Lbs/Acre
Canada bluegrass	Reubens	10	2.0 x .10 = 0.20
Western wheatgrass	Barton/Rosana	20	32.0 x .20 = 6.40
Streambank wheatgrass	Sodar	15	22.0 x .15 = 3.30
Indian ricegrass	Nezpar	15	25.0 x .15 = 3.75
Sheep fescue	Covar	20	8.0 x .20 = 1.60
Blue grama	Lovington	20	6.0 x .20 = 1.20
TOTALS		100%	16.45

Table 4: Northerly exposures and/or moist sites.

Species	Variety	Percent of Mix	Broadcast Rate PLS* Lbs/Acre
Canada bluegrass	Reubens	15	2.0 x .15 = 0.30
Western wheatgrass	Barton/Rosana	20	32.0 x .20 = 6.40
Streambank wheatgrass	Sodar	20	22.0 x .20 = 4.40
Indian ricegrass	Nezpar	15	25.0 x .15 = 3.75
Sheep fescue	Covar	30	8.0 x .30 = 2.40
TOTALS		100%	17.25

*Pure Live Seed.

References

For additional information on protecting your homesite, see:

- 6.302, *Creating Wildfire-Defensible Zones*
- 6.303, *Fire-Resistant Landscaping*
- 6.304, *Forest Home Fire Safety*
- 6.305, *FireWise Plant Materials*

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APPENDIX L

WILDFIRE HISTORY

Significant Wildfire History within Wildland Urban Interface CSFS Golden District and Immediate Vicinity

(Prepared by Allen Gallamore, Colorado State Forest Service, 3/21/07 – subject to revision/correction)

Fire Name	Location	Size	Dates	Additional Information
Murphy Gulch	Jefferson County: Inter-Canyon FPD and Bancroft FPD; along foothills west of Ken-Caryl Ranch subdivision	Approx 3,300 acres	Sept. 21- 24, 1978	First EFF fire in Front Range, several structures lost, subdivisions evacuated, interagency resources ordered to supplement local fire departments' resources. CSFS Type 2 IMT (?) takes over and manages to closeout.
North Table Mountain	Jefferson County: Fairmount FPD. Top, west, and east sides of North Table Mountain.	Approx 1,300 - 2,000 acres	Sept. 7 - 9, 1988	Human caused fire off CO 93 crossed mountain to threaten subdivisions on east side of mountain. Over 250 firefighters from 20 fire departments and National Guard respond as well as a helicopter. Structure protection and evacuations in many areas.
Mt. Falcon	Jefferson County: Indian Hills FPD; primarily on Jefferson County Open Space (Mt. Falcon Park)	Approx 125 acres	April 23 - 24, 1989	Fire within open space property, leading to voluntary fire reimbursement program by county open space agencies to local fire departments to support initial attack.
O'Fallon	Jefferson County: Evergreen FPD; Indian Hills FPD; DMP parkland east of Kittredge	Approx 52 acres	March 24 - 25, 1991	Fire within Denver Mountain Parks' (O'Fallon Park) open space, leading to 100 firefighters from 5 departments responding. Dry winter conditions, gusty winds, and limited access slowed control efforts.
Elk Creek	Jefferson County: Golden Gate FPD. North of Clear Creek Canyon and east of Centennial Cone, in Michigan Creek and Elk Creek drainages.	Approx 102 acres	May 14 - 15, 1991	Fire in steep terrain with limited access, leading to use of handcrews formed from 80+ firefighters representing 15 fire departments from several counties. Fire managed jointly by FPD and Jefferson County Sheriff's Office's newly formed Incident Management Group (IMG).
Carpenter Peak/Chatfield	Douglas County: USFS and West Metro (then Roxborough FPD). Two fires, one uphill from Roxborough State Park and one across South Platte River from Jefferson County	Approx 45 acres and 23 acres	July 9 - 11, 1994	Dry lightning caused fires during larger fire bust throughout Front Range – multiple initial attacks occurring in all locations with limited availability of air resources. Evacuations of Roxborough Park and structure protection occurred using 300 firefighters and 40 engines from throughout Denver metro area, and National Guard helicopters.
Rooney Rd	Jefferson County: West Metro (Lakewood-Bancroft Fire Authority) FPD; along Dakota Hogback between C-470, I-70, and Alameda Pkwy	Approx 185 acres	Dec. 19, 1994	High winds and faulty electrical transformer outside "normal" fire season; rates of spread, flame lengths and limited access had fire threatening to cross several man-made barriers (roads). Fire departments from throughout Denver Metro area responded, and several structures were threatened.

Fire Name	Location	Size	Dates	Additional Information
Buffalo Creek	Jefferson County: USFS and North Fork FPD	Approx 10,400 acres	May 18 - 25, 1996	High winds and human cause; extreme fire behavior; 10 mile run in 6 hours; 10 homes or outbuildings lost; first "large" fire in Front Range WUI. Type 1 IMT takes over on day 2 from local IMT3 and manages until closeout.
Beartracks	Clear Creek County: USFS lands, within Evergreen FPD and Clear Creek Fire Authority boundaries; Arapahoe National Forest/Mount Evans Wilderness immediately southwest of Mt Evans State Wildlife Area	Approx 285 acres	June 27, 1998 - July 5, 1998	Heavy fuel loading in roadless area and human caused fire leads to heavy initial attack and extended attack by local fire agencies along with air resources; fire poses threat to Upper Bear Creek drainage and numerous homes; Type 2 IMT takes over from local IMG on day 3 and manages to closeout.
Lining Mountain	Jefferson County: Genesee FPD and Foothills FPD; immediately southeast of Genesee community	Approx 35 acres	Feb. 26 - 28, 1999	Dry conditions outside "normal" fire season leads to wildfire threatening several subdivisions and utilizing local fire resources for several days.
Green Mountain	Jefferson County: West Metro FPD; Green Mountain Park from C-470 to homes on north and east sides of park	Approx 200 acres	March 8, 1999	Multiple departments responding to human caused fire in grass fuels with high rates of spread, high flame lengths and limited access, outside "normal" fire season; homes, communications sites were threatened.
Hi Meadow	Park County and Jefferson County: Platte Canyon FPD, Elk Creek FPD, North Fork FPD; from Burland Ranchettes on west to CO 126 on east, and south to Buffalo Creek fire and town of Pine	Approx 10,800 acres	June 12 - 25, 2000	Human cause fire under initial attack by local FPD, blows up on same day as 10,000 acre Bobcat fire in Larimer County. 52 homes lost and misc. structures; considered "benchmark" WUI fire for Colorado at the time. Type 1 IMT takes over on day 2 from local IMT3 and manages until closeout.
El Dorado/ Walker Ranch	Boulder County: Cherryvale FPD and Coal Creek FPD; west of El Dorado Canyon State Park, through Walker Ranch park to Gross Reservoir; adjacent to border with Jefferson County.	Approx 1,100 acres	Sept. 16 - 22, 2000	Heavy fuel loading in steep terrain leads to heavy initial attack and extended attack by local fire agencies from Boulder, Gilpin, and Jefferson Counties along with air resources; fire poses threat to Gross Reservoir and numerous homes in Boulder and Jefferson County; Type 2 IMT takes over from zone Type 3 IMT on day 2 and manages to closeout.
Snaking	Park County: USFS and Platte Canyon FPD; north of US 285 from Platte Canyon HS to Crow Hill.	Approx 3,000 acres	April 22 - May 2, 2002	High winds and human cause outside "normal" fire season; heavy initial attack and extended attack by local fire agencies from Jefferson and Park Counties along with air resources; fire poses threat to numerous homes. Type 1 IMT takes over from local Type 3 IMT on day 2 and manages until closeout.

Fire Name	Location	Size	Dates	Additional Information
Black Mountain	Park County, Jefferson County, Clear Creek County: USFS, Elk Creek FPD and Evergreen FPD; north of Conifer Mountain and south of Brook Forest	Approx 300 acres	May 5 - 11, 2002	Heavy fuel loading in steep terrain leads to heavy initial attack and extended attack by local fire agencies from Jefferson and Park Counties along with air resources; fire poses threat to multiple subdivisions in Conifer and Evergreen; Type 2 IMT takes over from local Type 3 IMT on day 2 and manages to closeout.
Schoonover	Douglas County: USFS and North Fork FPD (Trumbull VFD in 2002); immediately south across S. Platte River from Jefferson County, from west of Deckers to near Moonridge.	Approx 3,000 acres	May 21 - 31, 2002	Lightning cause fire under initial attack by USFS and local FPDs, blows up on 2 nd day, and makes 3,000 acre/4 mile run in steep terrain. Fire threatens homes, camps businesses, watershed, regional powerline; approx. cabins and misc. structures lost. Type 1 IMT takes over on day 3 from local IMT3 and manages until closeout.
Hayman	Park, Douglas, Teller, and Jefferson Counties: USFS, multiple FPDs and county sheriffs (North Fork FPD in Jefferson County); from Lake George in Park County to Deckers/CO 126 in Jefferson County to Schoonover fire area and Manitou Exp. Station in Douglas/Teller Counties.	Approx 138,000 + acres	June 8 - mid-July, 2002	Human cause fire under initial attack and extended attack by USFS and local FPDs under direction of interagency IMT3, blows up on 2 nd day for historic 17 mile run and 70,000 acres. Multiple evacuations over two-week period as fire made several additional "runs". Over 150 homes and misc. structures lost; large areas of damage to Cheeseman Reservoir and South Platte Watershed areas; fire is considered of nationally significant WUI fire for Colorado and Rocky Mountain region. Type 1 IMT takes over on day 3 from IMT3; fire is eventually managed by series of Type 1 IMTs under an Area Command team, until closeout.
Fountain Gulch	Clear Creek County and Gilpin County: Clear Creek Fire Authority, Central City FD, Clear Creek, and Gilpin County Sheriff's Offices. Along county line immediately north of I-70 at the Hidden Valley exit.	Approx 200 acres	June 29 - July 5, 2002	Significant fire activity in steep terrain with poor road access leads to heavy initial attack and extended attack by local fire agencies along with air resources; fire poses threat to I-70 and CO 119 travel corridors, businesses, and distant subdivisions. Interagency handcrews are ordered to replace local fire resources; continued use of air resources; fire is managed by local Type 3 IMT to closeout.
Blue Mountain	Jefferson County: Coal Creek FPD. Immediately south of CO 72 at mouth of Coal Creek Canyon.	Approx 35 acres	August 14 - 15, 2002	Railroad caused fire in light fuels spreads rapidly due to continued drought conditions into adjacent timber and subdivision, leading to heavy initial attack and extended attack by local fire agencies along with air resources; fire poses threat to CO 72 and Coal Creek Canyon, businesses, and multiple subdivisions. Fire is managed by local Type 3 IMT to closeout.
Cherokee Ranch	Douglas County: Littleton FPD, South Metro FPD, Louviers FPD. Between US 85 and Daniels Park Road.	Approx 1,200 acres	October 29 - 31, 2003	High winds and downed power line outside "normal" fire season; rates of spread, flame lengths and limited access had fire threatening to cross several man-made barriers (roads). Fire occurs in "open space" area on same day as 3,500 ac Overland fire in Boulder County. Multiple subdivisions on all sides of fire are threatened as fire resources from throughout Denver Metro area respond. Fire is managed by local IType 3 IMT to closeout.

Fire Name	Location	Size	Dates	Additional Information
North Table Mountain	Jefferson County: Fairmount FPD. Top of, and east, north, west sides of, North Table Mountain outside Golden, CO.	Approx 300 acres	July 22 - 24, 2005	Human cause fire in steep terrain on open space that escapes initial attack. Heavy use of air resources during transition from initial attack to structure protection on day 1. Multiple subdivisions on all sides of fire are threatened as fire resources from throughout Jefferson County respond. Fire is managed by local IMT3 to closeout.
Plainview	Jefferson County: Coal Creek FPD. Immediately north of CO 72 at mouth of Coal Creek Canyon and east to CO 93, north to approximately Boulder County line.	Approx 2,700 acres	Jan. 9 - 10, 2006	High winds and human cause outside "normal" fire season. Rates of spread, flame lengths, and limited access had fire threatening to cross several man-made barriers (roads) – 60 mph winds at midnight cause 2 mile fire run in under 5 minutes. Heavy initial attack and extended attack by local fire agencies from Jefferson and Boulder Counties; fire poses threat to numerous homes and businesses. Fire is managed by local IMT3 to closeout.
Rocky Flats	Jefferson, Boulder, Adams, and Broomfield Counties: multiple FPDs. Immediately north of CO 128 onto Rocky Flats NWR and east to Indiana Street.	Approx 1,200 acres	April 2, 2006	High winds and human cause outside "normal" fire season; fire occurs in "open space" area of Rocky Flats NWR and adjacent lands. Rates of spread, flame lengths and limited access had fire threatening to cross several man-made barriers (roads). Heavy initial attack and extended attack by local fire agencies from Jefferson, Boulder, Gilpin, and Adams Counties. Winds prevent use of air resources; multiple subdivisions, businesses, and Rocky Mountain Airport are threatened. Difficulties with communications and fire management across multiple jurisdictional boundaries noted.
Pine Valley	Jefferson County: Elk Creek FPD. Immediately northwest of Town of Pine.	Approx 100 acres	May 28 - 30, 2006	High winds and human cause near homes; heavy initial attack and extended attack by local fire agencies from Jefferson and Park Counties along with air resources, local USFS resources, and interagency handcrews. Fire poses threat to numerous homes, while winds limit use of air resources during initial attack. Fire is managed by local IMT3 to closeout.
Ralston Creek	Jefferson County: No-man's lands adjacent to Fairmount FPD and Golden Gate FPD. North end of White Ranch Open Space park and adjacent uranium mine (private).	Approx 26 acres	June 17 - 19, 2006	Fire within open space property under initial attack by local FPD, "blows up" and forces resources to retreat to safety zones. Significant fire activity in steep terrain with poor road access leads to heavy use of air resources; fire poses threat to Ralston Reservoir and numerous subdivisions. Interagency handcrews supplement local fire resources and continued use of air resources on day 2; fire is managed by local IMT3 to closeout.
Centennial Cone	Jefferson County: No-man's lands adjacent to Golden Gate FPD. Entirely within Centennial Cone Open Space park.	Approx 22 acres	July 21 - 23, 2006	Fire within open space property with significant fire activity in steep terrain with no road access during height of 2006 national fire season leads to limited initial attack; fire poses threat to US 6 in Clear Creek Canyon and distant subdivisions. Limited air resources are utilized to slow fire spread, and an interagency "hotshot" handcrew supplements local fire resources on day 2 for direct attack. Fire is controlled by day 3 as summer monsoons also reduce fire danger.

Other smaller wildfires within the WUI that posed high potential for significant impacts to adjacent communities, and had large initial attack response by local fire departments, include:

- Coal Creek fire, September 1988: 14 separate fires over 42 acres from train in Coal Creek Canyon area, resulting in response from multiple fire agencies and Single Engine Air Tanker, and CO National Guard Huey – dip site Ralston Reservoir.
- Beaver Brook, 7/20/98-7/21/98: 25-acre fire immediately downhill from Mt. Vernon Country Club in Clear Creek Canyon, resulting in air resources and structural protection.
- Red Rocks fire, 3/9/00: 10-acre grass and brush fire with high winds immediately southwest of Red Rocks amphitheatre, resulting in response from multiple fire agencies in Jefferson County.
- Bald Mountain fire, 5/6/00: 5-acre fire in Genesee park, immediately west of Mt. Vernon Country Club.
- Silver Bullet fire, 6/15/00: approximately 20-acre fire on South Table Mountain immediately above Coors Plant in Golden, requiring air tanker use to assist local fire departments. Fire occurred during same time that Hi Meadow fire was making significant run in southern Jefferson County.
- Mt Galbraith fire, 8/11/00: 2 acres in three dry lightning fires on top of Mt. Galbraith above City of Golden, threatening subdivisions in town.
- US 6 fire, 4/6/02: 50-acre grass and brush fire west of US 6 and south of 19th street in City of Golden, threatening multiple subdivisions.
- North Spring Gulch fire, 6/6 - 6/7/02: 20-acre fire northwest of Idaho Springs in Clear Creek County requiring significant air tanker use to assist local fire departments.
- Leyden fire, 1/18/05: 300-acre grass fire northwest of Arvada runs 5 miles in 25-30 mph winds, causing minor damage to numerous homes being protected by 60+ firefighters and multiple engines from Arvada, Evergreen, Rocky Flats, and Golden Fire departments.

APPENDIX M

EVERGREEN FIRE DEPARTMENT

WILDLAND FIRE PLAN

This plan has been developed by, and included at the request of, the Evergreen Fire Protection District. The plan has not been reviewed or endorsed by Walsh Environmental or the Jefferson County Division of Emergency Management.

Introduction

The Wildland Fire exposure within the Evergreen Fire Protection District is extreme. The potential for a major wildland fire is real and is growing. The community continues to build more structures within the Urban/Interface each year. The entire district is within the wildland urban interface. The accumulation of fuel continues, the moisture was above normal this past winter and spring, resulting in thick grasses. There have been multiple extreme snow storms that have increased the fuels on the forest floor. Factoring these conditions and the increase in warmer/dryer conditions throughout the west the chances for a major wildland fire are growing.

The fires are becoming larger and more destructive. Over the past 40 years the seven of the top 10 fires seasons (acreages and costs) have occurred since 1999. It is only a matter of time before the District experiences one of these fires. Fires have been burning longer, hotter and in wildland urban interface areas. Twenty years ago a wildland fire over 20,000 acres was very uncommon, now those fires are routine. Fires of over 100,000 acres are very common and even fires over 200,000 acres are becoming routine. Colorado is experiencing these large fires (Hayman & Missionary Ridge). Although in Colorado they are not as common as the other parts of the country, but they are more destructive due to the density of homes and the lack of attention by the public and elected officials.

Colorado is experiencing a change in the conditions of the fuels. The infestation of beetles has been a major problem in the Grand and Summit Counties. This infestation is moving over the divide, out breaks are becoming more common in Clear Creek and Jefferson Counties. There is controversy over how much these infestations increase the fire danger. But the trees dying will change the fuels on the forest floor increasing brush and grasses that can carry the fire. There has been historical evidence that supports a major fire after the beetle infestations. These changes will make a negative impact on the District's ability to suppress wildland fires.

This plan outlines three areas of concern: wildfire hazard mitigation, public education and wildland fire operations. The overall goal is to reduce the threat of destructive fires by preventing crown fires. This is accomplished by thinning the canopy, clearing brush, and suppressing fires before they can become large.

This plan outlines six goals with 19 supporting objectives. The goals are designed to be over reaching, they may never be accomplished. The mitigation actions may never be accomplished and will need a major budgetary and staff time commitment to make even a

small difference. This process to be effective will need the cooperation of many agencies and by the public. The USFS, Jeffco Open Space, Denver Mountain Parks, EFR personnel and homeowner associations will need to work hand in hand.

The Community Wildfire Protection Plan (CWPP) is complete but a process will need to be developed to institute the recommendations. Other successful CWPP's started with a planning committee consisting of community leaders, homeowner association members, fire department personnel, interagency representatives, county emergency management, and county planning board and land managers. This group would be tasked with monitoring the CWPP and making recommendations on developing and instituting the objectives.

The CWPP is a good planning document for mitigation and public education, but the CWPP does not go into detail about developing a wildland fire response. This document's intent is to provide that detail.

Goals and Objectives

Goal	Objectives
Facilitate a CWPP in Evergreen Fire Protection District including Jefferson, Clear Creek counties and ANF west of district boundaries	<ul style="list-style-type: none"> ▪ Provide oversight to all activities related to the CWPP. ▪ Ensure representation and coordination among agencies and interest groups. ▪ Develop a long-term framework for sustaining CWPP efforts.
Conduct and maintain a wildfire risk assessment	<ul style="list-style-type: none"> ▪ Conduct a district-wide wildfire risk assessment. ▪ Identify areas at risk and contributing factors. ▪ Determine the level of risk to structures that wildfires and contributing factors pose. ▪ Conduct an individual home assessment to facilitate mitigation and information tools for individual homeowners.
Develop a mitigation plan	<ul style="list-style-type: none"> ▪ Identify and prioritize hazardous fuel treatment projects. ▪ Identify and prioritize non-fuels mitigation needs.
Manage hazardous fuels	<ul style="list-style-type: none"> ▪ Identify communities at highest risk and prioritize hazard reduction treatments. ▪ Develop sustainable initiatives at the homeowner HOA level. ▪ Secure funding and assist project implementation.
Facilitate emergency planning and operations	<ul style="list-style-type: none"> ▪ Develop strategies and develop preplans to strengthen emergency management, response, and evacuation capabilities for wildfire. ▪ Develop standards to evaluate the effectiveness of wildland fire operational capabilities and develop plans to match potential capabilities with levels of ability. ▪ Build relationships among county government, fire authorities, and communities. ▪ Provide a database for assessment of individual home survivability during wildland fires. ▪ Provide a base map of potential fire assessments and exposures that meet national standards.
Facilitate public outreach	<ul style="list-style-type: none"> ▪ Develop strategies to increase citizen awareness and action for Firewise practices. ▪ Promote public outreach and cooperation for all fuels reduction projects to solicit community involvement and private landowner cooperation.

Wildland Fire Performance Standards

The following standards (Table 1) are based on two types of fires: Wildland Fires and Wildland Urban Interface fires (WUI). There are two types of wildland fires: fires out of

reach of engines and fires within reach of engines. The following wildland standard does not separate engine and handcrew operations, this is due to their many similarities. They are sized up the same, the apparatus will respond in spite of the need for the handcrew or the engines. There are production standards for each, wildland fires and urban/interface wildland fires.

Table 1. Wildland Fire Performance Standards

Wildland Fires					
#	Standard	Minimum Capability	Present Capability	Deviation	Training Needs
1	The District will complete a size-up and have the wildfire scouted within 30 minutes from the initial smoke report.	Minimum three officers with maps, GPS, and compass.	Adequate.	None.	UTM/Mapping department training every other year.
2	The District will have a local agency certified, 15-person hand crew, with a crew boss, assistant crew boss (or a trainee) two or three squad bosses at staging within 30 minutes of the smoke report.	For the District to be able to field a local agency-certified handcrew the following EFR certifications will be necessary: 1-crewboss, 1-crewboss trainee, 3-squadbosses, 15-firefighters. The District presently has 80 firefighters. This is 5.3 (80 divided by 15) crew equivalents and to be able to field one crew the department must maintain the following: 5 crew bosses, 5 crew boss trainees, 15 squad bosses and 55 firefighters ¹ .	The District has two NWCG certified crew bosses and two certified squad bosses (both are certified at a higher level and should be used for overhead and not at the single resource level); all firefighters have basic wildland training and should be red carded at basic firefighter.	The District needs to locally certify 5 crew bosses; have 5 crew boss trainees and 15 squad bosses. Some of these squad bosses may be trainees.	S-130/190 Firefighter Training/Introduction to Wildland Fire Behavior (maintenance of this training). S-230-231 Crew Boss/Engine Boss (Single Resource). S-290 Intermediate Wildland Fire Behavior Note: district needs to set local certification standards; development of local certified PTB is necessary.
3	The District will have a hand crew on the fire line within one hour of the original smoke report.	Crew transport may be problem. The District relies on POV's and may consider crew transportation in the future.	Adequate.	None.	None.
4	The District will be able to supply 30 gallons per minute from at least two 1 ½" lines within 90% of the district boundaries and	Able to meet this standard.	Adequate.	None.	Mark III pump training class every other year.

¹ Basic Wildland Fire Certified Firefighters

Wildland Fires					
#	Standard	Minimum Capability	Present Capability	Deviation	Training Needs
	within 2500 feet of access of apparatus.				
5	The District will be able to construct handline at 2/3's the type 2 handcrew production rate outlined in the Fireline Handbook.	The District will need to need to train on line construction techniques and handcrew line discipline.	Untested – need to evaluate this skill. Majority of the department has had the training, but have not used these skills in years.	Unknown until tested.	Need to teach class on formation of handcrews, line discipline, line construction techniques once every three years.
6	The District will be able to field two type 6 engines with two tactical water tenders with full staffing within 15 minutes of alarm time and be able to perform mobile and progressive hose attack to meet the production rates outlined in Table 3.	The District will need to train on forming personnel into engine companies, with an engine boss and two crew members then practice mobile attack and progressive hoselays.	Untested.	Untested.	Train on forming up engine crews, mobile attack and progressive hose lays in academy and at lease every other year.
7	The District will have qualified personnel predict fire behavior using weather information, fuel loading, and fire danger ratings and communicate the prediction to operations/planning within 30 minutes of the smoke report.	The District will need to maintain the NFDRS capability at Communications. Plus needs to expand this capability to able to predict fire behavior using the BEHAVE ² program.	NFDRS capable.	Wildland Fire behavior prediction capability using the BEHAVE software program.	S-190 Beginning Wildland Fire Behavior & BEHAVE for Dispatchers.
8	The District will be able to activate air support within 30 minutes of the smoke report.	Able to meet this standard.	Adequate.	None.	Review AOP's yearly for changes to process and train dispatchers/officers.
9	The District shall have the capability for sustained operations when the fire moves into extended attack operations. The District will be able to maintain Incident Management until relieved by the Jefferson County IMT Type III. The District will be able to maintain a single 20-person hand crew for the	Chief officers and senior officers must be able to management multiple divisions and resources until Jeffco IMT is able to assume command. Plus these officers need to be able to recognize when an incident is moving past their abilities and react correctly.	Chief officers and senior officers lack experience and training on large wildland fire incident management. One Assistant Chief is a Type III qualified Incident Commander.	See previous.	All officers need to have: I-300 Intermediate ICS I-400 Advanced ICS Need to encourage a cadre of officers/firefighter to have: S-330 Task Force/Strike Team Leader S-339 Division/Group Supervisor.

² Wildland Fire Behavior predictor software program.

Wildland Fires					
#	Standard	Minimum Capability	Present Capability	Deviation	Training Needs
	duration of the incident.				
7	The District will have qualified personnel predict fire behavior using weather information, fuel loading, and fire danger ratings and communicate the prediction to operations/planning within 30 minutes of the smoke report.	The District will need to maintain the NFDRS capability at Communications. Plus needs to expand this capability to able to predict fire behavior using the BEHAVE ³ program.	NFDRS capable.	Wildland Fire behavior prediction capability using the BEHAVE software program.	S-190 Beginning Wildland Fire Behavior & BEHAVE for Dispatchers.

Urban/Interface Wildland Fire					
#	Standard	Minimum Capability	Present Capability	Deviation	Training Needs
10	The District will complete a size-up and have the wildfire scouted by basic wildland qualified personnel ten minutes from the initial smoke report.	Minimum three officers with maps, GPS, and compass.	Adequate.	None.	UTM/Mapping department training every other year.
11	The District will have a full-red card certified, wildland task force, with a task force leader, at staging within 20 minutes of the smoke report. This task force shall include two type one engines, two wildland tactical water tenders, two type six engines and 20 personnel.	<p>For the District to be able to field a local agency certified task force the following certifications will be necessary:</p> <p>1-task force leader; 1 task force leader trainee; 4-engine foremen; 2-driver/operators; and 12 advanced firefighters.</p> <p>The District presently has 80 firefighters. This is 5.3 (80 divided by 15) task force equivalents and to be able to field one task force the department must maintain the following: 5 task force leaders, 20 engine foremen and 20 task</p>	The District has 2 task force leaders, 2 engine foremen and only a few advanced firefighters.	District needs 5 task force leaders; 20 engine foremen; and train all firefighters to advanced firefighter.	<p>S-130/190 Firefighter Training/Introduction to Wildland Fire Behavior (maintenance of this training)</p> <p>S-215 Fire Operations in the Wildland Urban/Interface</p> <p>S-230-231 Crew Boss/Engine Boss (Single Resource)</p> <p>S-290 Intermediate Wildland Fire Behavior</p> <p>Note: district needs to set local certification standards; development of local certified PTB may be necessary.</p>

³ Wildland Fire Behavior predictor software program.

Urban/Interface Wildland Fire					
#	Standard	Minimum Capability	Present Capability	Deviation	Training Needs
		force trainees, 55 advanced firefighters.			
12	The District will be able to protect four structures with each task force and suppress two spot fires within 20 minutes. This includes having two 1 ½" lines surrounding the structure, placement of a wet line, firing out for a distance to safely protect the structure without direct intervention by the engine crews, and preparing the structure for the fire front.	The District will need to train the department members to this standard.	See previous.	See previous.	Bi-Annual Structural Protection Hands-On Exercise; Mutual Aid training S-215 Fire Operations in the Wildland Urban/Interface.
13	The District will use direct fire attack whenever possible to stop the fire prior to the need to perform indirect structural protection.	This is advanced training of mixing Structural Protection capabilities with wildland fire suppression tactics.	See previous.	See previous.	Advance future trainings.
14	The District will have qualified personnel predict fire behavior using weather information, fuel loading, and fire danger ratings and communicate the prediction to operations/planning within 20 minutes of the smoke report.	The District will need to maintain the NFDRS capability at Communications. Plus needs to expand this capability to able to predict fire behavior using the BEHAVE ⁴ program.	NFDRS capable .	Wildland Fire behavior prediction capability using the BEHAVE software program.	S-190 Beginning Wildland Fire Behavior and BEHAVE for Dispatchers.
15	The District will be able to activate air support within 10 minutes of the smoke report.	Able to meet this standard.	Adequate.	None.	Review AOP's yearly for changes to process and train dispatchers/officers.
16	The District shall have the capability for sustained operations when the fire moves into extended attack operations. The District will be able to	Chief officers and senior officers must be able to management multiple divisions and resources until Jeffco IMT is able to assume command. Plus these	Chief officers and senior officers lack. experience and training on large wildland fire incident management. One Assistant Chief is a	See previous.	All officers need to have: I-300 Intermediate ICS I-400 Advanced ICS Need to encourage a cadre of officers/firefighter to

⁴ Wildland Fire Behavior prediction software

Urban/Interface Wildland Fire					
#	Standard	Minimum Capability	Present Capability	Deviation	Training Needs
	maintain Incident Management organization until relieved by the Jefferson County IMT Type III. The District will be able to maintain a single 20-person wildland task force for the duration of the incident.	officers need to be able to recognize when an incident is moving past their abilities and react correctly.	Type III qualified Incident Commander.		have: S-330 Task Force/Strike Team Leader S-339 Division/Group Supervisor .

Wildland Fire Capabilities

Wildland Fire Response: The following capabilities are based on standard daytime wildland response of 15 firefighters⁵. The following capabilities will be applied to production rates of a short hand crew (15) and two type 6 engines/two tactical water tenders; and three type 1 engines.

The following capabilities are based on a comparison of production rates applied to expected fire behavior.

Fire Behavior Analysis: Fire behavior is defined as the manner, in which a fire reacts to the influences of fuel, weather, and topography. Rate of spread is often expressed in chains per hour. A chain is 66 feet, and one chain per hour will be very close to a spread rate of 1.1 feet per minute.

BehavePlus is software that was used to assess potential fire behavior given the identified Fire Behavior Fuel Model's (FBFM), local topography, and local weather conditions (Table 2). The predicted fire behavior models are only for surface fire behavior. Fire moving through the forest canopy is not represented in the table. Canopy fires are extremely dangerous and all operations should be suspended.

Average and severe case weather and fuel moisture conditions were determined using records from local remote access weather stations (RAWS) during the summer wildfire season of June through August. The Corral Creek RAWS is located in the western part of the EFPD, approximately 7 miles west of the town of Evergreen. Data from the current Corral Creek RAWS only goes back through 2001. The Cheesman RAWS is 30 miles to the south and is the closest station at an appropriate elevation that has uninterrupted data through the 1990s. Closer weather stations have been identified but were not used because of their lack of appropriate data. Average and severe fire climate conditions were identified using 50th and 90th percentile conditions from the Corral Creek RAWS (2001-2006). These were compared to the more extensive data of the Cheesman RAWS (1987-2006) and found to be very similar. The same similarities were found when compared to the nearby Bailey RAWS (2000-2006).

⁵ The 2002 Strategic Plan states 15 firefighters is the average day time response

Table 2. BehavePlus Predictions of Fire Behavior

1 chain = 66 feet

Vegetation Type	Rate of Spread (chains/hr) Average Conditions	Acreage Growth (acre/hr) Average Conditions	Rate of Spread (chains/hr) Severe Conditions	Acreage Growth (acre/hr) Severe Conditions
1 Short grass	72	50	316	1,200
2 Open Timber with Grass Understory	33	10	133	500
4 Heavy Brush, under 6 ft. tall	61	50	213	200
5 Low Brush, above 3 ft.	19	1.6	69	75
6 Dormant Brush, above 6 ft.	30	18	87	100
8 Closed Timber Litter	2	0.8	5	0.7
9 Long-Needle Litter	7	1	26	12
10 Timber Litter with Heavy Dead and Down Litter	7	1	23	11

Wildland Fire Capabilities: The following production rates will be based on three firefighters assigned to each engine and three firefighters assigned to each tactical water tender (four fully staffed apparatus and three officers acting as overhead) and a short handcrew of 15. Additional engines or additional handcrews could be staffed during serve conditions, on evenings and weekends. The district's wildland firefighting capability is based on applying engine production rates (based on two type 6 engine and two tactical water tenders) and crew production rates with the Fire Behavior Fuel Models (FBFM) found within the district, then applying these engine production rates to predicted spread to determine if the present capabilities will be adequate for suppression.

Table 3 shows "Line Production Rates for Initial Action by Engine Crews" and the "Acreage Determination Factors" charts in the National Wildfire Coordinating Group (NWCG) Fireline Handbook. These are the rates for estimating initial attack productivity (scratch line construction, hotspotting, or wet lining) only. Other mitigating factors that could affect these estimates are if the crews need to construct sustained lines, burnout or holding operations. But this does provide a good estimate of the wildland fire capability of the district. For the sake of simplicity all production rates will be based on acres. Production rates are the same for the engines and the tenders, each will be staffed with 3 firefighters. The district's tactical water tenders can be used as engines during mobile attack.

Table 3. Wildland Fire Production Rates based on an Average Daytime Response

Wildland Fire Production Rates Per Hour With Type-6 Engine and Tactical Water Tender (3 firefighters)			
Anderson Fire Behavior Fuel Model (FBFM)	Chains	Acreage	Capability (acres)*
1 Short grass	24	2.9	11.6

2 Open Timber with Grass Understory	15	1	4
4 Heavy Brush, under 6 ft. tall	10	0.5	2
5 Low Brush, above 3 ft.	12	0.7	2.8
6 Dormant Brush, above 6 ft.	12	0.7	2.8
8 Closed Timber Litter	15	1	4
9 Long-Needle Litter	12	0.7	2.8
10 Timber Litter with Heavy Dead and Down Litter	12	0.7	2.8
Wildland Fire Production Rates Per Hour with Short Hand Crew (15 firefighters)			
1 Short grass	13.5	0.7	0.525
2 Open Timber with Grass Understory	12	0.7	0.525
4 Heavy Brush, under 6 ft. tall	2.25	0.04	0.03
5 Low Brush, above 3 ft.	3	0.04	0.03
6 Dormant Brush, above 6 ft.	3	0.04	0.03
8 Closed Timber Litter	3.75	0.08	0.06
9 Long-Needle Litter	12	0.7	0.525
10 Timber Litter with Heavy Dead and Down Litter	3	0.04	0.03

*Based on two Type-6 engines and two tactical water tenders; short handcrew of 15 firefighters

Table 4 shows a comparison of Table 2, Behave Predictions of Fire Behavior compares to Table 3, Wildland Fire Production Rates based on Average Daytime Response. This comparison provides a capability of the district ability to suppress fires during the day. The difference column is the percentage of ability to suppression the fire. These capabilities are for initial attack production only.

Table 4. Comparison of Production Rates to Capability for Average Day Time Response

Wildland Fire Production Rates Per Hour With Type-6 Engine (4 firefighters) and Tactical Water Tender (3 firefighters)						
Anderson Fire Behavior Fuel Model (FBFM)	Acreage Growth (acre/hr) Average Conditions	Capability (acres)*	Difference	Acreage Growth (acre/hr) Severe Conditions	Capability (acres)*	Difference
1 Short grass	50	70	140%	1,200	70	5%
2 Open Timber with Grass Understory	10	18	180%	500	18	3%
4 Heavy Brush, under 6 ft. tall	50	10	20%	200	10	5%
5 Low Brush, above 3 ft.	1.6	11	690%	75	11	14%
6 Dormant Brush, above 6 ft.	18	11	61%	100	11	11%
8 Closed Timber Litter	0.8	16	2,000%	0.7	16	2,714%
9 Long-Needle Litter	1	12	1,200%	12	12	100%
10 Timber Litter with Heavy Dead and Down Litter	1	11	1,100%	11	11	100%
Wildland Fire Production Rates Per Hour with Handcrew (20 firefighters)						
1 Short grass	50	3.2	6%	1,200	3.2	N/A
2 Open Timber with Grass Understory	10	2.6	26%	500	2.6	N/A
4 Heavy Brush, under 6 ft. tall	50	0.08	0.02%	200	0.08	N/A
5 Low Brush, above 3 ft.	1.6	0.16	10%	75	0.16	N/A
6 Dormant Brush, above 6 ft.	18	0.16	0.9%	100	0.16	N/A
8 Closed Timber Litter	0.8	0.24	30%	0.7	0.24	34%
9 Long-Needle Litter	1	2.6	260%	12	2.6	22%
10 Timber Litter with Heavy Dead and Down Litter	1	0.16	16%	11	0.16	1.4%

*Based on seven Type-6 engines and four tactical water tenders; two handcrews of 20 firefighters

Table 5, Wildland Fire Production Rates based on a Full Response outlines the capability of the district during non-daytime or major emergency response capabilities. This full response is just over 50% of the district's firefighters on scene of the incident (43 firefighters). The type 6 engines will be staffed with four firefighters (brush 1, 2, 3 & 7; SCAT 5 & 8) and the tactical water tenders (tenders 2, 3, 5 & 8) will be staffed with three firefighters. The overhead are two task force leaders and an incident commander for a total of 43 firefighters. The first number in the Chains and Acreage columns is for

engines (four firefighters) and the second is for the tactical water tenders (three firefighters). Capability is for all engines and tenders combined.

Table 5. Wildland Fire Production Rates based on a Full Response

Wildland Fire Production Rates Per Hour With Type-6 Engine (4 firefighters) and Tactical Water Tender (3 firefighters)			
Anderson Fire Behavior Fuel Model (FBFM)	Chains	Acreage	Capability (acres)*
1 Short grass	35/24	6.5/2.9	70
2 Open Timber with Grass Understory	21/15	2.4/1	18
4 Heavy Brush, under 6 ft. tall	15/10	1.3/0.5	10
55 Low Brush, above 3 ft.	16/12	1.3/0.7	11
6 Dormant Brush, above 6 ft.	16/12	1.3/0.7	11
8 Closed Timber Litter	20/15	2/1	16
9 Long-Needle Litter	18/12	1.6/0.7	12
10 Timber Litter with Heavy Dead and Down Litter	16/12	1.3/0.7	11
11 Light Slash	16/12	1.3/0.7	11
Wildland Fire Production Rates Per Hour with Handcrew (20 firefighters)			
1 Short grass	18	1.6	3.2
2 Open Timber with Grass Understory	16	1.3	2.6
4 Heavy Brush, under 6 ft. tall	3	0.04	0.08
5 Low Brush, above 3 ft.	4	0.08	0.16
6 Dormant Brush, above 6 ft.	4	0.08	0.16
8 Closed Timber Litter	5	0.12	0.24
9 Long-Needle Litter	16	1.3	2.6
10 Timber Litter with Heavy Dead and Down Litter	4	0.08	0.16
11 Light Slash	9	0.40	0.80

*Based on seven Type-6 engines and four tactical water tenders; two handcrews of 20 firefighters

Table 6 compares the districts capability with a full response with expected fire behavior (Table 2). The difference column is the percentage of ability to suppression the fire. These capabilities are for initial attack production only.

Table 6. Comparison of Wildland Firefighting Capability to Expected Fire Behavior

Wildland Fire Production Rates Per Hour With Type-6 Engine (4 firefighters) and Tactical Water Tender (3 firefighters)						
Anderson Fire Behavior Fuel Model (FBFM)	Acreage Growth (acre/hr) Average Conditions	Capability (acres)*	Difference	Acreage Growth (acre/hr) Severe Conditions	Capability (acres)*	Difference
1 Short grass	50	70	140%	1,200	70	5%
2 Open Timber with Grass Understory	10	18	180%	500	18	3%
4 Heavy Brush, under 6 ft. tall	50	10	20%	200	10	5%
5 Low Brush, above 3 ft.	1.6	11	690%	75	11	14%
6 Dormant Brush, above 6 ft.	18	11	61%	100	11	11%
8 Closed Timber Litter	0.8	16	2,000%	0.7	16	2,714%
9 Long-Needle Litter	1	12	1,200%	12	12	100%
10 Timber Litter with Heavy Dead and Down Litter	1	11	1,100%	11	11	100%
11 Light Slash	1.6	11	690%	3.9	11	282%
Wildland Fire Production Rates Per Hour with Handcrew (20 firefighters)						
1 Short grass	50	3.2	6%	1,200	3.2	N/A
2 Open Timber with Grass Understory	10	2.6	26%	500	2.6	N/A
4 Heavy Brush, under 6 ft. tall	50	0.08	0.02%	200	0.08	N/A
5 Low Brush, above 3 ft.	1.6	0.16	10%	75	0.16	N/A
6 Dormant Brush, above 6 ft.	18	0.16	0.9%	100	0.16	N/A
8 Closed Timber Litter	0.8	0.24	30%	0.7	0.24	34%
9 Long-Needle Litter	1	2.6	260%	12	2.6	22%
10 Timber Litter with Heavy Dead and Down Litter	1	0.16	16%	11	0.16	1.4%
11 Light Slash	1.6	0.80	50%	3.9	0.80	21%

*Based on seven Type-6 engines and four tactical water tenders; two handcrews of 20 firefighters

Wildland Urban/Interface Capabilities: The structure protection production table is based on the time a crew can prepare a structure for a wildland fire using a type 1 engine. The accepted standard is 20 minutes for a four firefighter crew. Using the standard daytime response the district will be able to field three type one engines with three additional overhead personnel. This means the district will be able to protect nine structures per hour with a standard daytime response. If during non-daytime operations

or during severe conditions and is able to staff all type 1 engines (engines 1, 21, 22, 3, 6, 7 and the reserve engine; 7 total) the district will be able to protect 21 homes per hour.

Wildfire Response Recommendations

The number and availability of firefighters within the district make EFR stand out among volunteer-dependent organizations. With a solid volunteer core available 24 hours a day and a sizeable paid staff, EFR has a comparably strong response capability. The vast majority of firefighters, over 90 percent, are red-carded as wildland firefighters. This response capability, combined with good quality equipment and apparatus, provides a strong foundation for building a wildland fire suppression organization. The department has a good basic wildland fire capability. But the exposures within the district dictate an advanced capability. This capability is based on trained overhead or management. EFR is short of this management capability.

In order for the District to meet the Goals, Objectives and the Wildland Fire Performance Standards EFR should increase the number of overhead positions to support advanced wildland fire operations, especially in the engine boss/crew boss/task force/strike team level of management. The Standards should be the basis of all training actions in wildland. The district should build a skill level based on these Standards. The following is a proposed training schedule (Table 7) to bring the department in line with the standards. This training is based on the recommendations outlined in Table 1, Wildland Fire Performance Standards.

Table 7. Proposed Training Schedule

Year	Session	Training	Detail
One	First	1, 10 – Size up/Mapping	Wildland fire and Urban Interface size up; wildland fire mapping; scouting Urban Interface fires
	Second	2, 3, 11 – Crew & task force formation; hand tools; line discipline; line construction	Two focuses – crew discipline and squad boss/task force leader formation tasks
	Third	5 – Handline building skills	Field work
Two	First	4 – Progressive hoselays;	Including Mark III pump training; field work.
	Second	6 – Mobile attack	Field work
	Third	7, 14 – Intermediate Fire Behavior refresher	This should be in conjunction with I-290 Intermediate Wildland Fire Behavior
Three	First	12, 13 – Structural Protection Techniques	Lecture
	Second	12, 13 – Structural Protection Techniques	Field Work
	Third	8, 9, 15, 16 – ICS Review, Jeffco and CC AOP review	In conjunction with all officers and officer candidates completing I-300 and I-400

Participation in the Jefferson County Incident Management team will strengthen the incident management capabilities of the department and provide all risk incident management experience.

Training and National Wildfire Coordinating Group (NWCG) Positions

Currently EFR has one Incident Commander Type 3 (ICT3), two Crew Bosses (CRWB), two Engine Bosses (ENGB), and two Taskforce Leaders (TFLD). Target levels in the plan for NWCG positions are five TFLDs, 20 ENGBs, five CRWBs, five CRWBs trainees, and all fire fighters trained to the advanced level of firefighter 1 (FFT1). Training and maintaining this level of fireline leadership will require an ambitious commitment from the department and its firefighters.

Local Certification Program

The above standards can be met through a local certification program. There is latitude within the state and federal certification process for the department to set its own local certification program as long as the district personnel only deploy within the district and normal mutual aid. It is recommended the district develop standards that mirror the NWCG certification process by using NWCG courses and locally developed Position Task Books (PTB). PTBs should be developed for Squad Boss (FFT1), Crew Boss/Engine Boss (Single Resource), and Task Force/Strike Team Leader (STEN/TFLD). ICT5 PTB should not be modified and officers should be able to complete without going on a wildland fire assignment.

The department should provide a process for individuals who want to deploy on national incidents. Completion of the required PTB for these positions can be facilitate by participation on prescribed fires but is still subject to the availability of wildfire assignments.

The department should sponsor the required courses using its new training facilities and hiring the instructors. The costs of these courses can be born by the outside participants. This process will allow the department to set times and the location that is convenient to EFR personnel.

The District should develop the following interim position/training targets:

- Year 1: Officers/Officer Candidates/Interested Firefighters initiate FFT1/ICT5 EFR PTB, classes: S-131 Firefighter Type 1, S-133 Look Up, Look Down, Look Around; officers complete I-300 Intermediate ICS;
- Year 2: Officers/Officer Candidates/Interested Firefighters complete FFT1/ICT5 EFR PTB, classes: S-290 Intermediate Wildland Fire Behavior, S-230/231 Crew Boss/Engine Boss (Single Resource) (for ENGB); officers complete I-400 Advanced ICS;
- Year 3: Officers/Officer Candidates/Interested Firefighters initiate ENGB EFR PTB, classes: S-215 Fire Operations in the Wildland/Urban Interface;

- Year 4: Officers/Officer Candidates/Interested Firefighters complete ENGB EFR PTB and work towards Engine Strike Team Leader (STEN/TFLD) and ICT4 as able, classes: S-330 Task Force/Strike Team Leader

APPENDIX N

HOUSE BILL 07-1168 FOREST IMPROVEMENT DISTRICTS

Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

HOUSE BILL 07-1168

BY REPRESENTATIVE(S) White, Buescher, Curry, Jahn, Kerr J., Levy, Liston, Madden, Merrifield, Romanoff, Rose, Frangas, King, Labuda, Roberts, and Todd; also SENATOR(S) Fitz-Gerald, Bacon, Boyd, Gordon, Groff, Hagedorn, Harvey, Isgar, Keller, Kester, Morse, Penry, Romer, Schwartz, Shaffer, Tapia, Taylor, Tochtrop, Tupa, Veiga, Ward, Wiens, Williams, and Windels.

CONCERNING FOREST IMPROVEMENT DISTRICTS.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. 32-1-103, Colorado Revised Statutes, is amended BY THE ADDITION OF A NEW SUBSECTION to read:

32-1-103. Definitions. As used in this article, unless the context otherwise requires:

(7.5) "FOREST IMPROVEMENT DISTRICT" MEANS A SPECIAL DISTRICT CREATED PURSUANT TO ARTICLE 18 OF THIS TITLE THAT PROTECTS COMMUNITIES FROM WILDFIRES AND IMPROVES THE CONDITION OF FORESTS IN THE DISTRICT.

NOTE: This bill has been prepared for the signature of the appropriate legislative officers and the Governor. To determine whether the Governor has signed the bill or taken other action on it, please consult the legislative status sheet, the legislative history, or the Session Laws.

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SECTION 2. Title 32, Colorado Revised Statutes, is amended BY

THE ADDITION OF A NEW ARTICLE to read:

ARTICLE 18

Forest Improvement Districts

32-18-101. Short title. THIS ARTICLE SHALL BE KNOWN AND MAY BE CITED AS THE "FOREST IMPROVEMENT DISTRICT ACT".

32-18-102. Definitions. AS USED IN THIS ARTICLE, UNLESS THE CONTEXT OTHERWISE REQUIRES:

- (1) "BOARD" MEANS THE BOARD OF DIRECTORS OF A FOREST IMPROVEMENT DISTRICT.
- (2) "DIRECTOR" MEANS A MEMBER OF THE BOARD OF DIRECTORS OF A FOREST IMPROVEMENT DISTRICT.
- (3) "DISTRICT" MEANS A FOREST IMPROVEMENT DISTRICT CREATED PURSUANT TO THIS ARTICLE.
- (4) "ELIGIBLE ELECTOR" HAS THE SAME MEANING AS SET FORTH IN SECTION 32-1-103 (5) (a).

32-18-103. Creation. (1) A FOREST IMPROVEMENT DISTRICT MAY BE CREATED IN THE FOLLOWING MANNER:

- (a) THE GOVERNING BODY OF A MUNICIPALITY OR COUNTY MAY ENACT AN ORDINANCE OR RESOLUTION PROPOSING THE CREATION OF A FOREST IMPROVEMENT DISTRICT. THE ORDINANCE OR RESOLUTION SHALL SET FORTH THE NAMES OF THE MUNICIPALITIES OR COUNTIES TO BE IN THE PROPOSED DISTRICT AND THE PROPOSED NAME OF THE DISTRICT.
- (b) THE GOVERNING BODY OF A MUNICIPALITY OR COUNTY THAT IS NAMED IN THE ORDINANCE OR RESOLUTION PROPOSING THE CREATION OF A FOREST IMPROVEMENT DISTRICT MAY ENACT AN ORDINANCE OR RESOLUTION PROPOSING TO JOIN THE DISTRICT, SETTING FORTH THE NAMES OF THE SAME MUNICIPALITIES AND COUNTIES.
- (c) THE CLERK OF A GOVERNING BODY THAT ENACTS AN ORDINANCE
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OR RESOLUTION PURSUANT TO PARAGRAPH (a) OR (b) OF THIS SUBSECTION (1) SHALL TRANSMIT A CERTIFIED COPY TO THE GOVERNING BODY OF EACH OTHER MUNICIPALITY OR COUNTY NAMED IN THE ORIGINAL ORDINANCE TO BE A PART OF THE PROPOSED DISTRICT.
- (d) THE GOVERNING BODY OF A MUNICIPALITY OR COUNTY THAT ENACTS AN ORDINANCE OR RESOLUTION PURSUANT TO PARAGRAPH (a) OR (b) OF THIS SUBSECTION (1) SHALL SUBMIT THE QUESTION OF THE CREATION OF A FOREST IMPROVEMENT DISTRICT INCLUDING THE ENTIRE TERRITORY OF THE MUNICIPALITY OR COUNTY TO THE ELIGIBLE ELECTORS OF THE MUNICIPALITY OR COUNTY AT A GENERAL OR SPECIAL ELECTION CONDUCTED IN ACCORDANCE WITH THE "UNIFORM ELECTION CODE OF 1992", ARTICLES 1 TO 13 OF TITLE 1, C.R.S. THE DISTRICT SHALL BE DEEMED CREATED IF A MAJORITY OF THE VOTES CAST IN THE ELECTION HELD IN ANY MUNICIPALITY OR COUNTY NAMED IN THE ORDINANCE OR RESOLUTION PROPOSING THE DISTRICT ARE IN FAVOR OF THE CREATION OF THE DISTRICT. THE TERRITORY OF THE DISTRICT SHALL COMPRISE THE COMBINED TERRITORY OF ALL MUNICIPALITIES AND COUNTIES IN WHICH THE ELIGIBLE ELECTORS APPROVE THE CREATION OF THE DISTRICT.

32-18-104. Board of directors - appointment - removal. (1) THE ORDINANCE OR RESOLUTION PROPOSING THE CREATION OF A FOREST IMPROVEMENT DISTRICT SHALL SPECIFY THE NUMBER OF DIRECTORS OF THE DISTRICT. A DISTRICT SHALL HAVE NO FEWER THAN SEVEN DIRECTORS. THE

GOVERNING BODY OF EACH COUNTY OR MUNICIPALITY IN THE DISTRICT SHALL HAVE THE POWER TO APPOINT AND REMOVE AT LEAST ONE DIRECTOR. THE BOARD SHALL INCLUDE ONE DIRECTOR REPRESENTING THE COLORADO STATE FOREST SERVICE, WHO SHALL BE APPOINTED AND MAY BE REMOVED BY THE STATE FORESTER. THE BOARD SHALL INCLUDE AT LEAST ONE REPRESENTATIVE OF AN ENVIRONMENTAL PROTECTION ORGANIZATION, ONE REPRESENTATIVE OF A CONSERVATION DISTRICT CREATED PURSUANT TO ARTICLE 70 OF TITLE 35, C.R.S., ANY PART OF WHICH IS WITHIN THE PROPOSED FOREST IMPROVEMENT DISTRICT, ONE REPRESENTATIVE OF A WATER CONSERVANCY DISTRICT CREATED PURSUANT TO ARTICLE 45 OF TITLE 37, C.R.S., ANY PART OF WHICH IS WITHIN THE PROPOSED FOREST IMPROVEMENT DISTRICT, AND ONE REPRESENTATIVE OF A FEDERAL LAND MANAGEMENT AGENCY, TO BE APPOINTED AND REMOVED IN THE MANNER PRESCRIBED BY THE ORDINANCE OR RESOLUTION PROPOSING THE CREATION OF THE DISTRICT.

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(2) A DIRECTOR APPOINTED TO THE BOARD SHALL SERVE FOR A TERM OF FIVE YEARS UNLESS REMOVED PURSUANT TO SUBSECTION (1) OF THIS SECTION. A DIRECTOR MAY BE APPOINTED TO ADDITIONAL TERMS WITHOUT LIMITATION.

32-18-105. Board of directors - powers and duties. (1) IN

ADDITION TO THE POWERS SPECIFIED IN SECTION 32-1-1001, THE BOARD HAS THE FOLLOWING POWERS FOR AND ON BEHALF OF THE DISTRICT:

- (a) TO REVIEW ANY REPORTS AND STUDIES MADE AND TO OBTAIN ANY ADDITIONAL REPORTS AND STUDIES IT DEEMS NECESSARY PERTAINING TO THE COST AND IMPLEMENTATION OF FOREST IMPROVEMENT PROJECTS;
- (b) TO RECEIVE AND ACCEPT FROM ANY SOURCE AID OR CONTRIBUTIONS OF MONEY, PROPERTY, LABOR, OR OTHER THINGS OF VALUE TO BE HELD, USED, AND APPLIED TO CARRY OUT THE PURPOSES OF THIS ARTICLE SUBJECT TO THE CONDITIONS UPON WHICH THE GRANTS OR CONTRIBUTIONS ARE MADE.
- (c) TO DEVELOP REPORTING AND REVIEW REQUIREMENTS GOVERNING THE RECEIPT AND EXPENDITURES OF MONEYS RECEIVED BY THE DISTRICT; AND
- (d) TO REVIEW AND TAKE ACTION ON A LANDOWNER'S APPLICATION TO CLAIM THE REIMBURSEMENT AUTHORIZED BY SECTION 32-18-109.

(2) IN EXERCISING ITS POWER UNDER THIS ARTICLE TO ENTER INTO CONTRACTS ON BEHALF OF THE DISTRICT, THE BOARD SHALL:

- (a) TO THE EXTENT POSSIBLE, USE COMPETITIVE BIDDING IN ACCORDANCE WITH ARTICLE 103 OF TITLE 24, C.R.S.; AND
- (b) GIVE DUE CONSIDERATION TO PERSONS AND BUSINESSES THAT ARE AUTHORIZED TO TRANSACT BUSINESS IN COLORADO.

32-18-106. Financial powers. (1) IN ADDITION TO THE GENERAL FINANCIAL POWERS SPECIFIED IN SECTION 32-1-1101, THE BOARD HAS THE POWER, FOR AND ON BEHALF OF THE DISTRICT, TO:

(a) LEVY AND COLLECT A SALES TAX IN ACCORDANCE WITH SECTION
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32-18-107, SUBJECT TO THE REQUIREMENTS OF SECTION 20 OF ARTICLE X OF THE STATE CONSTITUTION; AND

(b) PLEDGE SALES TAX REVENUES OR ANY PORTION THEREOF FOR THE PAYMENT OF ANY INDEBTEDNESS OF THE DISTRICT.

(2) THE ORDINANCE OR RESOLUTION PROPOSING THE CREATION OF A FOREST IMPROVEMENT DISTRICT MAY SPECIFY A LIMIT ON THE AMOUNT OF REVENUE THAT A DISTRICT MAY RECEIVE.

32-18-107. Sales tax - collection - administration. (1) UPON THE APPROVAL OF THE ELIGIBLE ELECTORS IN THE DISTRICT AT AN ELECTION HELD IN ACCORDANCE WITH SECTION 20 OF ARTICLE X OF THE STATE CONSTITUTION AND PART 8 OF ARTICLE 1 OF THIS TITLE, THE DISTRICT SHALL HAVE THE POWER TO LEVY A UNIFORM SALES TAX THROUGHOUT THE ENTIRE GEOGRAPHICAL AREA OF THE DISTRICT UPON EVERY TRANSACTION OR OTHER INCIDENT WITH RESPECT TO WHICH A SALES TAX IS LEVIED BY THE STATE PURSUANT TO THE PROVISIONS OF ARTICLE 26 OF TITLE 39, C.R.S. A SALES TAX LEVIED BY A DISTRICT SHALL TAKE EFFECT ON EITHER JANUARY 1 OR JULY 1 OF THE YEAR SPECIFIED IN THE BALLOT ISSUE SUBMITTED TO THE ELIGIBLE ELECTORS OF THE DISTRICT.

(2) (a) THE EXECUTIVE DIRECTOR OF THE DEPARTMENT OF REVENUE SHALL COLLECT, ADMINISTER, AND ENFORCE THE SALES TAX AUTHORIZED BY THIS SECTION IN THE SAME MANNER AS THE STATE SALES TAX IMPOSED PURSUANT TO ARTICLE 26 OF TITLE 39, C.R.S., INCLUDING, WITHOUT LIMITATION, THE RETENTION BY A VENDOR OF THE PERCENTAGE OF THE AMOUNT REMITTED TO COVER THE VENDOR'S EXPENSE IN THE COLLECTION AND REMITTANCE OF THE SALES TAX AS PROVIDED IN SECTION 39-26-105, C.R.S. THE EXECUTIVE DIRECTOR SHALL DISTRIBUTE SALES TAX COLLECTIONS TO THE DISTRICT MONTHLY. THE DISTRICT SHALL PAY THE NET INCREMENTAL COST INCURRED BY THE DEPARTMENT OF REVENUE IN THE ADMINISTRATION AND COLLECTION OF THE SALES TAX.

(b) (I) A QUALIFIED PURCHASER, AS DEFINED IN SECTION 39-26-102 (7.5), C.R.S., MAY PROVIDE A DIRECT PAYMENT PERMIT NUMBER ISSUED PURSUANT TO SECTION 39-26-103.5, C.R.S., TO ANY VENDOR OR RETAILER THAT IS LIABLE AND RESPONSIBLE FOR COLLECTING AND REMITTING ANY SALES TAX LEVIED ON ANY SALE MADE TO THE QUALIFIED PURCHASER PURSUANT TO THIS SECTION. A VENDOR OR RETAILER THAT HAS RECEIVED
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A DIRECT PAYMENT PERMIT NUMBER IN GOOD FAITH FROM A QUALIFIED PURCHASER SHALL NOT BE LIABLE OR RESPONSIBLE FOR COLLECTION AND REMITTANCE OF ANY SALES TAX IMPOSED ON THE SALE THAT IS PAID FOR

DIRECTLY FROM THE QUALIFIED PURCHASER'S FUNDS AND NOT THE PERSONAL FUNDS OF ANY INDIVIDUAL.

(II) A QUALIFIED PURCHASER THAT PROVIDES A DIRECT PAYMENT PERMIT NUMBER TO A VENDOR OR RETAILER SHALL BE LIABLE AND RESPONSIBLE FOR THE AMOUNT OF SALES TAX LEVIED ON ANY SALE MADE TO THE QUALIFIED PURCHASER PURSUANT TO THE PROVISIONS OF THIS ARTICLE IN THE SAME MANNER AS LIABILITY WOULD BE IMPOSED ON A QUALIFIED PURCHASER FOR STATE SALES TAX PURSUANT TO SECTION 39-26-105 (3), C.R.S.

(3) A SALES TAX LEVIED IN ACCORDANCE WITH THIS SECTION IS IN ADDITION TO ANY OTHER SALES OR USE TAX IMPOSED PURSUANT TO LAW AND IS EXEMPT FROM THE LIMITATION IMPOSED BY SECTION 29-2-108, C.R.S.

32-18-108. Use of revenue. (1) THE BOARD MAY USE THE REVENUE RECEIVED PURSUANT TO SECTION 32-18-106 TO:

- (a) PLAN AND IMPLEMENT FOREST IMPROVEMENT PROJECTS IN WILD LAND-URBAN INTERFACE AREAS, INCLUDING PROJECTS TO REDUCE HAZARDOUS FUELS AND PROTECT COMMUNITIES, IN COOPERATION WITH THE STATE FOREST SERVICE, THE DIVISION OF PARKS AND OUTDOOR RECREATION IN THE DEPARTMENT OF NATURAL RESOURCES, CONSERVATION DISTRICTS CREATED PURSUANT TO ARTICLE 70 OF TITLE 35, C.R.S., THE UNITED STATES FOREST SERVICE, AND THE FEDERAL BUREAU OF LAND MANAGEMENT AND OTHER AGENCIES IN THE UNITED STATES DEPARTMENT OF THE INTERIOR;
- (b) ESTABLISH FINANCIAL INCENTIVES FOR PRIVATE LANDOWNERS TO MITIGATE WILDFIRE RISKS ON THEIR PROPERTY, INCLUDING REIMBURSEMENT OF EXPENSES PURSUANT TO SECTION 32-18-109;
- (c) ESTABLISH INCENTIVES FOR LOCAL WOOD PRODUCTS INDUSTRIES TO IMPROVE THE USE OF OR ADD VALUE TO SMALL-DIAMETER OR BEETLE-INFESTED TREES;
- (d) MATCH STATE AND FEDERAL GRANTS FOR BIOHEATING
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CONVERSION AND INFRASTRUCTURE SUPPORT FOR BIOMASS COLLECTION AND DELIVERY; AND
- (e) ASSIST THE STATE FOREST SERVICE IN ENSURING THAT ALL COMMUNITIES AT RISK OF WILDFIRE WITHIN THE DISTRICT HAVE ADOPTED A COMMUNITY WILDFIRE PROTECTION PLAN AND ARE USING APPROPRIATE PLANNING, EDUCATION, AND OUTREACH TOOLS.

32-18-109. Wildfire mitigation measures - private land -

reimbursement. (1) A LANDOWNER WHO PERFORMS WILDFIRE MITIGATION MEASURES ON HIS OR HER LAND IN A DISTRICT IN ANY YEAR MAY REQUEST REIMBURSEMENT FROM THE DISTRICT, IN AN AMOUNT NOT TO EXCEED FIFTY PERCENT OF THE LANDOWNER'S DIRECT COSTS OF PERFORMING THE WILDFIRE MITIGATION MEASURES IN THAT YEAR OR TEN THOUSAND DOLLARS,

WHICHEVER IS LESS.

(2) A LANDOWNER WHO PERFORMS WILDFIRE MITIGATION MEASURES ON HIS OR HER LAND MAY REQUEST REIMBURSEMENT FROM A DISTRICT IN ACCORDANCE WITH THIS SECTION IF THE WILDFIRE MITIGATION MEASURES ARE:

- (a) PERFORMED WITHIN THE BOUNDARIES OF THE DISTRICT;
- (b) PERFORMED IN A WILD LAND-URBAN INTERFACE AREA;
- (c) AUTHORIZED BY A COMMUNITY WILDFIRE PROTECTION PLAN ADOPTED BY A LOCAL GOVERNMENT WITHIN THE DISTRICT; AND
- (d) APPROVED BY THE BOARD.

(3) A LANDOWNER WHO INTENDS TO REQUEST REIMBURSEMENT FROM A DISTRICT AS AUTHORIZED BY THIS SECTION SHALL FILE AN APPLICATION WITH THE BOARD IN THE FORM PRESCRIBED BY THE BOARD. IF THE BOARD DETERMINES THAT THE WILDFIRE MITIGATION MEASURES PERFORMED BY THE LANDOWNER MEET THE REQUIREMENTS OF THIS SECTION, THE BOARD MAY REIMBURSE THE LANDOWNER IN AN AMOUNT DETERMINED BY THE BOARD IN ITS DISCRETION; EXCEPT THAT THE AMOUNT OF REIMBURSEMENT PAID TO A LANDOWNER IN ANY YEAR SHALL NOT EXCEED FIFTY PERCENT OF THE LANDOWNER'S DIRECT COSTS OF PERFORMING THE WILDFIRE MITIGATION MEASURES IN THAT YEAR OR TEN THOUSAND DOLLARS, WHICHEVER IS LESS.

SECTION 3. 29-2-108 (3), Colorado Revised Statutes, is amended to read:

29-2-108. Limitation on amount. (3) A tax imposed pursuant to section 24-90-110.7 (3) (f), 29-1-204.5 (3) (f.1), 29-2-103.7, 29-2-103.9, 30-11-107.5, 30-11-107.7, or 37-50-110 SECTION 24-90-110.7 (3) (f), 29-1-204.5 (3) (f.1), 29-2-103.7, 29-2-103.9, 30-11-107.5, 30-11-107.7, 32-18-107, OR 37-50-110, C.R.S., and the additional tax authorized by section 30-20-604.5, C.R.S., if imposed, shall be exempt from the six and ninety one-hundredths percent limitation imposed by subsection (1) of this section.

SECTION 4. Safety clause. The general assembly hereby finds, determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Andrew Romanoff Joan Fitz-Gerald
SPEAKER OF THE HOUSE PRESIDENT OF
OF REPRESENTATIVES THE SENATE

Marilyn Eddins Karen Goldman
CHIEF CLERK OF THE HOUSE SECRETARY OF
OF REPRESENTATIVES THE SENATE

APPROVED _____
Bill Ritter, Jr.
GOVERNOR OF THE STATE OF COLORADO