

Humboldt County Community Wildfire Protection Plan



2013 UPDATE

**HUMBOLDT COUNTY COMMUNITY WILDFIRE PROTECTION PLAN
2013 UPDATE**

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Humboldt County Community Wildfire Protection Plan Certification and Agreement

The Community Wildfire Protection Plan developed for the County of Humboldt:

- Was collaboratively developed. Interested parties and federal land management agencies managing land in the vicinity of Humboldt County have been consulted.
- This plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect Humboldt County Communities.
- This plan recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The following entities attest that the standards listed above have been met and mutually agree with the contents of this Community Wildfire Protection Plan:

Chairperson,
Humboldt County Board of Supervisors

Chairperson,
Humboldt County Fire Safe Council

Unit Chief,
California Department of Forestry and Fire Protection
Humboldt-Del Norte Unit

President,
Humboldt County Fire Chiefs' Association

ACKNOWLEDGEMENTS

The Humboldt County Community Wildfire Protection Plan is written as a resource guide for residents and communities of Humboldt County. It is designed to help residents become informed about, plan for, and prepare their properties for wildfire in a way that decreases their risk of loss and increases their chances of survival.

In the spirit of collaboration, the following people and organizations contributed to the completion of this Plan and/or had a role in the Community Wildfire Protection Plan certification process:

<p>Humboldt County Residents: All community members who attended fire planning workshops and contributed their local knowledge to the process.</p> <p>Humboldt County Fire Safe Council All members past and present who dedicated hours of their time to contribute to the development of this plan.</p> <p>County of Humboldt: Leadership: The Humboldt County Board of Supervisors and Staff:</p> <ul style="list-style-type: none"> ○ Cybelle Immitt, Public Works ○ Dan Larkin, Office of Emergency Services ○ Danielle Allred, Public Works ○ Jerry von Dohlen, Planning and Building, GIS ○ John Miller, Planning and Building ○ Todd Sobolik, Planning and Building <p>Local Fire Safe Councils</p> <ul style="list-style-type: none"> ○ Crooked Prairie FSC ○ Lower Mattole FSC ○ Orleans/Somes Bar FSC ○ Southern Humboldt FSC ○ Van Duzen Watershed FSC ○ Willow Creek FSC <p>Humboldt County Fire Chiefs Association Particular support for community meetings received by:</p> <ul style="list-style-type: none"> ○ Nathan Falk, Willow Creek Fire ○ John MacFarland, Arcata Fire ○ Rick Harden, Kneeland Fire ○ Lon Winburn, Fortuna Fire ○ Tom Grinsell and Daniel DelBiaggio, Ferndale Fire ○ Ken Nielson and Jeff Robinson, Loleta Fire ○ Shane Wilson, Rio Dell Fire ○ Tim Smith, Bridgeville Fire ○ Paul Rosenblatt, Westhaven Fire <p>CAL FIRE</p> <ul style="list-style-type: none"> ○ Battalion Chiefs Bob Ellis, Mark Rodgers, Jonni Mayberry, and Tom Nix 	<ul style="list-style-type: none"> ○ Hugh Scanlon, Battalion Chief ○ All of the firefighters who attended numerous public workshops <p>Six Rivers National Forest Service</p> <ul style="list-style-type: none"> ○ Amy Ziegler ○ Robert Rivelle <p>Redwood National and State Parks</p> <ul style="list-style-type: none"> ○ Rick L. Young <p>Community Workshop Speakers</p> <ul style="list-style-type: none"> ○ Linda Nellist, Judy Sears, and Judy Warren, Regional Training Institute-Community Disaster Preparedness, Office of Extended Education, Humboldt State University ○ James Erler, Forestry Director, Yurok Tribe Forestry ○ Jim Adams and Mike Alcorn, Green Diamond Resource Company ○ Bryan Buckman, City of Trinidad, Public Works ○ Mark Andre and Dennis Houghton, City of Arcata <p>Community Workshop Hosts</p> <ul style="list-style-type: none"> ○ Green Point Elementary School ○ Kneeland School ○ Trinity Valley Elementary School ○ Fieldbrook Elementary School ○ Yurok Tribal Council (Weitchpec Community Center) ○ Hoopa Tribal Council ○ Bayside Grange ○ Redwood Acres Fairgrounds ○ Healy Senior Center ○ Westhaven Fire Department ○ Fortuna Fire Department ○ Mattole Community Center ○ South Fork High School ○ Bridgeville Community Center ○ Mid Klamath Watershed Council, Panamnik Building ○ Orick Community Hall
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The Humboldt County Board of Supervisors supported this plan update process through the allocation of funding from Title III of the Secure Rural Schools and Community Self-Determination Act.

PLEASE COMMENT ON THIS DOCUMENT

Although a large number of people were involved in the community input process, not everyone was able to participate. Comments will continue to be useful because this plan is intended to be a living document. Community wildfire protection planning is an evolving process and will never truly be “done”. New comments will be incorporated into the next plan update.

Please email your comments to: cimmitt@co.humboldt.ca.us.

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Part I. Background and Introduction

Overview

This document constitutes a comprehensive update to the 2006 Humboldt County Master Fire Protection Plan (MFPP). In 2006, the County Board of Supervisors (BOS) certified that the MFPP met the standards of the 2003 *Healthy Forest Restoration Act* (HFRA) as a *Community Wildfire Protection Plan* (CWPP), and accepted the MFPP as a technical background study and support document for the Humboldt County General Plan Update (GPU). At that time, the Plan was also certified as a CWPP by the California Department of Forestry and Fire Protection (CAL FIRE) and the Humboldt County Fire Chiefs' Association. With the preparation of the MFPP, the County significantly broadened its role in fire planning and support for *wildfire mitigation* activities.

This update to the MFPP has been prepared at the direction of the BOS and under the guidance of the Humboldt County *Fire Safe Council* (HCFSC). Funding for this update was provided by the Secure Rural Schools and Community Self-Determination Act, Title III. For the sake of consistency with the terminology used in the HFRA, this update to the MFPP is named the Humboldt County Community Wildfire Protection Plan.

The first chapter within Part I is an **Introduction** that orients the reader to the planning area as well as the goals and objectives of the Plan. This chapter also provides an overview of how the entire plan is organized. Chapter I.2 discusses the **Plan Context** as it relates to the original concept of CWPPs born out of the 2001 National Fire Plan and the HFRA. Each criterion used to certify a fire plan as a CWPP is evaluated in this chapter. The more recent national and state fire-planning policy is also introduced in this chapter.

Chapter I.3 explains the **Planning Process** and the role of the HCFSC. Details are provided about the extensive community outreach and public participation efforts that took place in order to gather local knowledge regarding wildfire concerns and recommendations. Public participation was centered around a series of community workshops. The purpose of these workshops was to educate residents about fire safety as well as to seek information and participation from them regarding *fire hazards* in their communities, in order to effectively update and implement this CWPP.

Chapter I.4 contains the **2006 Plan Implementation Progress Review**. This chapter examines the development of fire-safety improvements throughout the County by revisiting priority project goals and recommendations listed in the 2006 MFPP and exploring the progress that has been made in achieving these goals. Each section discusses the steps that have been taken towards implementing projects that advance the following fire-safety priorities:

- *Fuel Modification/Biomass Utilization*
- Develop a Reliable Revenue Source for *Fire Protection*
- Develop a *Level of Service Standard*
- Improve *Emergency Dispatch Services*
- MFPP Policy Recommendation Integration into the General Plan Update
- *Fire-Safe Education*
- Fire-Safe Planning and Hazard Identification

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Humboldt County Community Wildfire Protection Plan

I.1. Introduction

I.1.1. Community Wildfire Protection Plan Purpose, Goals, and Objectives

CWPP Purpose

The Humboldt County Community Wildfire Protection Plan (CWPP) is intended to serve as the guiding document for reducing the risk of wildfire to Humboldt County communities, and to serve the following purposes:

- Prioritize wildfire mitigation projects to inspire future action and increase competitive advantage for funding;
- Educate residents regarding their level of risk to wildfire, how to reduce *structural ignitability* and other fire hazards in the *Home Ignition Zone*, and what to expect from fire protection service;
- Encourage Humboldt County residents to take responsibility for reducing *wildfire risk* to their homes and properties;
- Build capacity of local fire organizations—both *fire departments* and *Fire Safe Councils* (FSCs);
- Coordinate the activities of the local, state, tribal, and federal entities charged with fire protection and management responsibilities;
- Facilitate the incorporation of planning for *fire-safe/Firewise* communities into the County land-use planning process; and
- Identify funding sources to support organizations that provide *fire prevention* and protection services.

CWPP Goals

Goal 1. Fire Protection Capability – Assure adequate fire protection for people, property, communities, and natural resources.

Goal 2. Fire Safe Education – Promote fire-safe/Firewise planning, *fire-safe standards*, and fire-education programs addressing *fire risk* in Humboldt County.

Goal 3. Risk and Hazard Assessment – Encourage effective and risk-based allocation of fire prevention and suppression services and resources.

Goal 4. Risk Reduction and Management – Encourage countywide efforts to reduce or modify *hazardous fuel loads* for community protection and wildfire prevention, and promote measures that residents and communities can implement to reduce their vulnerability to loss from wildfire.

Goal 5. Community Preparedness and Response – Support efforts of fire-protection organizations and FSCs to maintain adequate staffing levels and to serve as public safety agents.

Goal 6. Fiscal Issues – Support the fire prevention and resource protection efforts of communities, FSCs, special districts with fire-safety responsibilities, fire organizations, tribes, and Joint Powers Authority (JPA) cooperative services, including *dispatching*, *hazardous materials (HazMat)*, training, and other cooperative opportunities.

CWPP Objectives

Objectives are statements of desired future conditions assuming that all goals are achieved. The core objectives for this plan are:

Humboldt County Community Wildfire Protection Plan

- Adequate fire-protection service and FSC support available to all Humboldt County communities;
- Adequate funding for fire-protection organizations and FSCs;
- Broad-based participation in CWPP implementation and maintenance, and Firewise Communities recognition (FSCs, fire departments, and property owners);
- Clearly mapped community assets, wildfire risks, potential mitigation projects, and fire *protection resources*;
- Successful completion and maintenance of priority hazardous *fuel reduction* projects (*prescribed burning, manual and mechanical thinning treatments, chipping, etc*);
- Federal, tribal, state, and local agencies and organizations cooperating to provide community wildfire prevention education;
- Increased number of residents with a basic understanding of fire safety and the home ignition zone who take appropriate action to reduce their vulnerability to loss from wildfire; and
- Cooperation between citizens, community-based organizations, and government to protect communities.

I.1.2. Plan Organization

This CWPP is organized into five parts. Part I. Background and Introduction, describes the planning-area context, the process used to develop this CWPP, and an update/progress report on the actions implemented since the 2006 version (Humboldt County Master Fire Protection Plan or MFPP). Part II. Risk Assessment, is a qualitative assessment of the various factors that contribute to wildfire in Humboldt County. Part III. Countywide Action Plan lists the mitigation measures proposed in this CWPP to reduce the risk to Humboldt County residents and environment from the destructive effects of wildfire. Part IV. Planning Unit Action Plans, contain a mini-CWPP for each of the thirteen *planning units* used in this process. Each contains a brief introduction to the planning area, discusses its wildfire environment, community preparedness, wildfire protection capabilities, evacuation issues and options, and then a list of proposed actions. Part V. Fire-Safe Communities, is written for Humboldt County residents to help them better co-exist with the eventuality of wildfire.

A set of Appendices follows these main Parts with background and supporting information. A Glossary is also included, which supplies definitions for the *italicized words* located throughout

Important Reading for Humboldt Residents

Part IV. Planning Unit Action Plans contains a wide range of useful, localized information on fire risks and preparedness specially tailored to each of the thirteen Planning Units within Humboldt County. These individualized Planning Unit Action Plans can act as resources for local residents and may even be used as the basis for a local CWPP or as a resource for the development of Firewise Assessments!

Part V. Fire-Safe Communities is an excellent resource for home and property owners in Humboldt County. It was designed as a stand-alone guide, independent of the rest of the CWPP. This section serves as a useful handbook for homeowners who want to take action to prepare their families, homes, and surrounding landscapes to successfully co-exist with wildfire. Finally, it contains resources for enhancing fire-safety awareness, and advice on how to meet local and state legal standards while fortifying your home and property against wildfire.

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the Plan chapters. The first time each Glossary term appears in the Plan it is *italicized*, indicating that its definition can be found in the Glossary. A list of all the Acronyms utilized throughout the Plan is also available in the Appendices.

The following lists each Part by name and the chapters contained within the Part.

PART I - Background and Introduction

- I.1. Introduction
- I.2. Plan Context
- I.3. Planning Process
- I.4. 2006 Plan Implementation Progress Review

PART II - Risk Assessment

- II.1. Wildfire Environment
- II.2. Values and Assets at Risk
- II.3. Wildfire Protection Capabilities
- II.4. Community Preparedness
- II.5. Risk Assessment Summary

PART III - Countywide Action Plan

- III.1. Enhancing Fire Protection: Helping Firefighters Protect the Community
- III.2. Creating Fire-Safe Communities: Empowering Residents to Take Responsibility
- III.3. Hardening Homes to Survive Wildfire: Reducing Structural Ignitability
- III.4. Encouraging and Implementing Defensible Space Throughout Humboldt County
- III.5. Reducing Hazardous Fuels Throughout Humboldt County
- III.6. Ensuring Safe and Effective Evacuation
- III.7. Enhancing Emergency Notification and Communications
- III.8. Preparing Humboldt Communities for Emergencies
- III.9. Promoting Fire-Safe Education
- III.10. Designating Communities at Risk
- III.11. Designating Wildland-Urban Interface Areas
- III.12. Integrating Fire-Safety Actions with Local Regulations and Policy
- III.13. Maintaining Air Quality
- III.14. Utilizing Excess Fuels
- III.15. Implementing and Maintaining this CWPP

PART IV - Planning Unit Action Plans

- | | |
|---------------------|----------------------------|
| IV.1. Redwood Park | IV.8. Eureka Plain |
| IV.2. Up River | IV.9. Kneeland-Maple Creek |
| IV.3. East Klamath | IV.10. Eel |
| IV.4. Hoopa | IV.11. Mad-Van Duzen |
| IV.5. Trinidad | IV.12. Mattole-Lost Coast |
| IV.6. Redwood Creek | IV.13. Southern Humboldt |
| IV.7. Trinity | |

PART V - Fire-Safe Communities

- V.1. From the House Out
- V.2. Ready, Set, Go!
- V.3. After the Fire

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V.4. Legal Requirements

PART VI – Appendices

Appendix A: Acronyms

Appendix B: Glossary

Appendix C: References

Appendix D: Mapping Exercise Instructions

Appendix E: Home Risk Assessment

Appendix F: County Fire Safe Standards

Appendix G: Descriptive Characteristics for Community Identified Projects Matrix

Appendix H: Humboldt County Fire Safe Regulations Checklist

Appendix I: Emergency Water Supply Systems

Appendix J: CAL FIRE Evacuation Tips

Appendix K: Public Resource Code (PRC) 4291

I.1.3. Introduction to the Planning Area: Humboldt County

The planning area for this CWPP includes all of the area within the boundaries of the County of Humboldt. At 3,570-square miles, Humboldt County is the 14th largest county in California. Nearly 34 percent of the county is either in public ownership or tribal lands. Incorporated cities occupy 23,011 acres, or just under one percent of the total land area. The National Forests, National Parks, and public land managed by the Bureau of Land Management (BLM) total 571,200 acres; the State Parks system encompasses 72,200 acres. The Yurok and Hoopa tribal lands total 127,512 acres, or 5.6 percent of the total land area in the county. Unincorporated lands subject to the County's land-use jurisdiction (areas outside cities, and federal, state, and tribal trust lands) total approximately 1,565,000 acres.

Timberland and agriculture account for the majority (60%) of the county's unincorporated rural land uses, including approximately 1,009,000 acres of Timberland Production Zone (TPZ) and 283,000 acres in Williamson Act agricultural preserves. Open space and parks occupy nearly 582,900 acres, representing 26%, and all other uses share 14% of Humboldt County's total land area, including *rural residential* as a primary use on 112,459 acres in the unincorporated county. Single-family residential lands (including mobile homes and mobile-home parks) cover 4,827 acres; an additional 611 acres are designated multi-family housing.

Humboldt County is among California's northernmost counties, serving as a gateway to the vast temperate rainforests of the Pacific Northwest and alternatively to the legendary California wine country to the south (see *Figure I.1-1. CWPP Planning Area Map*). The County's strikingly rugged coastline spans approximately 100 miles and includes Cape Mendocino, the westernmost portion of the continental United States. Offshore is an area of intensive ocean upwelling and rich marine productivity. It is also an area where three tectonic plates converge, creating one of the most seismically active areas in the world, known as the Triple Junction. The sheltered waters of Humboldt Bay serve as an economic focal point, functioning as the principal port and a center of commerce. It is also a significant natural resource area featuring extensive wetlands, fertile bottomlands, and wildlife *habitat*, including the Humboldt Bay National Wildlife Refuge.

Moving inland, the Coast Range mountains rise quickly and dominate most of the county's interior and include the Eel, Van Duzen, Mattole, and Mad River *drainages* in the central and southern areas, and the Redwood Creek drainage in the northwest. In the furthest northeastern reaches of the county, the Klamath Mountains represent some of the higher elevations, with steep *slopes* that feed the Klamath and Trinity rivers. Eighty percent of the county's 2.3 million acres are forested. Fifty percent of this acreage is private commercial timberland (the county typically

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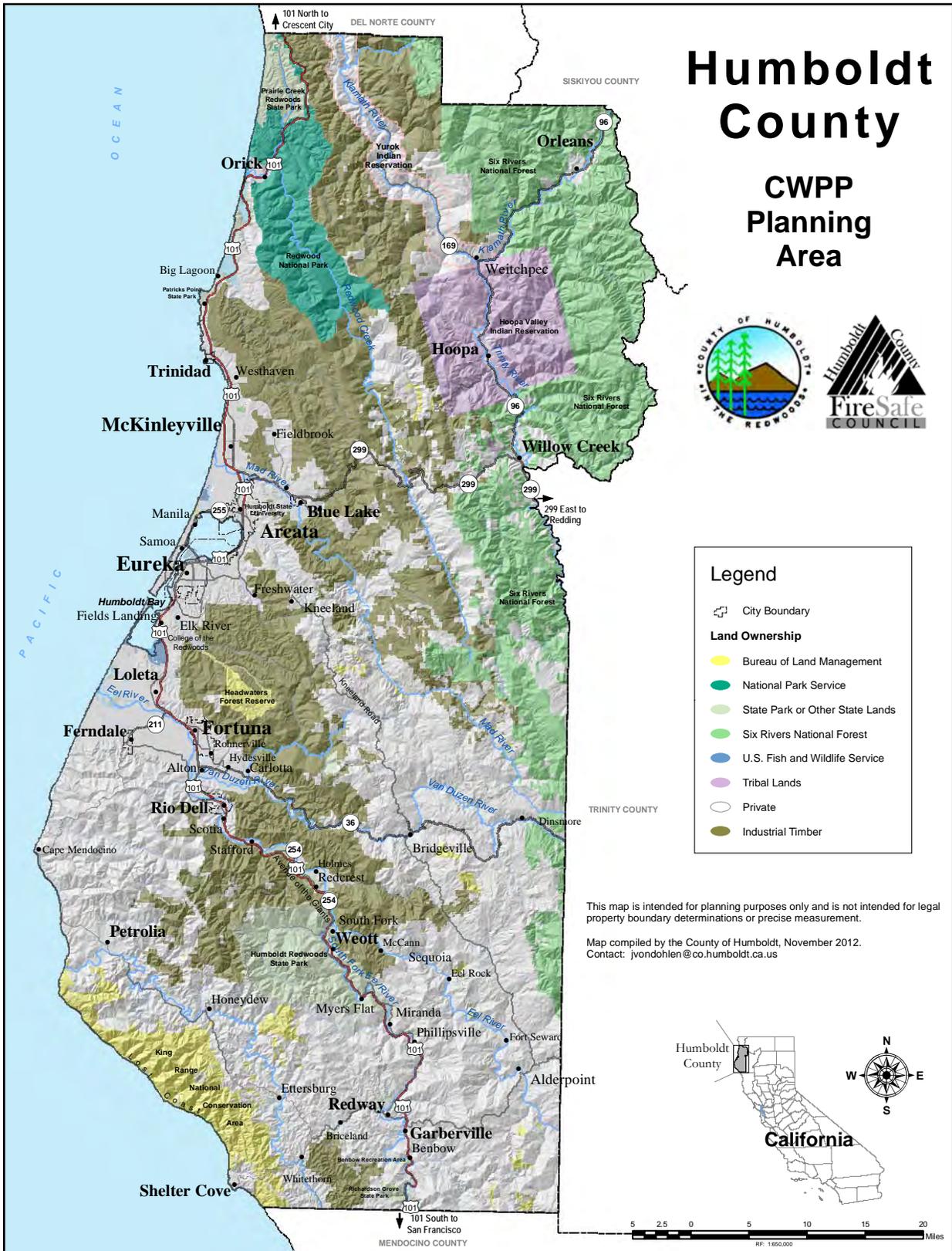
has led the state in timber production), and 35 percent is state or federal public land, including Redwood National and State Park, Six Rivers National Forest, the King Range National Conservation Area, and Humboldt Redwoods State Park. While Douglas-fir represents the most predominant forest type, the more emblematic tree is that of the Coast Redwood, of which towering groves thrive in the county's moist temperate climate. Though forests are a defining feature, agriculture is a key part of the *landscape* and remains an important base industry. Approximately one-quarter of Humboldt County (634,000 acres) remains agricultural.

Vistas of Humboldt County



Humboldt County Community Wildfire Protection Plan

Figure I.1-1. CWPP Planning Area Map



Humboldt County Community Wildfire Protection Plan

I.2. Plan Context

Healthy Forest Restoration Act Criteria for Certification as a Community Wildfire Protection Plan

The National Fire Plan¹ directed federal agencies to "work directly with communities to ensure adequate protection from wildfires, and to develop a collaborative effort to attain the desired future condition of the land."² The key wildland *fire management* agencies in California have chosen to accomplish this effort through the California Fire Alliance (The Alliance). To this end, The Alliance, on its website,³ encourages the development of CWPPs, as defined by the Healthy Forests Restoration Act (HFRA). A CWPP, as defined by the HFRA, is a plan for a community at risk that fulfills the following criteria:

Collaboration

A) The plan was developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and State agency responsible for forest management, in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community.

This CWPP was collaboratively developed. Significant efforts were made throughout the planning process to collaborate with local, state, and federal land and fire management agencies. The Humboldt County Fire Safe Council (HCFSC) was formed to collaboratively guide the planning process; it is made up of members and advisors from local FSCs, the Humboldt County Fire Chiefs Association (Fire Chiefs), individual local fire departments and companies, the Humboldt County Office of Emergency Services, the Hoopa Valley Tribe, California Department of Forestry and Fire Protection (CAL FIRE), Six Rives National Forest, the BLM, and the insurance industry. In addition, community workshops and outreach efforts were designed and conducted to maximize community input into the process. *For more information on the planning process, see Chapter I.3. Planning Process below.*

Prioritized Fuel Reduction

B) The plan identifies and prioritizes areas for hazardous fuel-reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure.

This CWPP identifies priority areas for hazardous fuel-reduction treatments and recommends types and methods of *treatment* to reduce the risk of wildfire to communities and resources within the planning area. Prioritized treatments can be found in Part III. Countywide Action Plan and Part IV. Planning Unit Action Plans. Detailed community-identified fuel reduction project data is stored and maintained through the use of a web-based Geographic Information System (GIS)

¹ An informative summary of the National Fire Plan can be found at: Forests and Rangelands. (2012 November 20). *Resources: Previous Wildland Fire Management Initiatives*. Retrieved from <http://www.forestsandrangelands.gov/resources/overview/index.shtml>

² California Fire Alliance. (2012). *Organization and History*. Retrieved from http://www.cafirealliance.org/organization_history/.

³ California Fire Alliance. (2012). *Community Wildfire Protection Plan Guidance*. Retrieved from <http://www.cafirealliance.org/cwpp/>

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mapping tool known as the Humboldt GIS Portal. The Portal can be accessed by going to: <http://gis.co.humboldt.ca.us/> then choosing “Fire Planning” from the list of mapping applications.

Treatment of Structural Ignitability

C) The plan recommends measures to reduce structural ignitability throughout the at-risk community.

This CWPP recommends measures to reduce the *ignitability* of structures throughout the planning area. These recommendations can be found in Part V. Fire-Safe Communities, Part III. Countywide Action Plan, and Part IV. Planning Unit Action Plans. In addition, the community workshops conducted during the development of the Plan served as an important venue to educate the public regarding reducing fire risks to structures, both through presentations by CAL FIRE and the local fire service, and through the distribution of educational materials.

Current National and State Fire-Planning Context

Although this Community Wildfire Protection Plan process originated with the directives of the 2001 National Fire Plan, new guidance has since been developed, policy titles have changed, and new priorities have been identified—all of which have also been incorporated in this CWPP.

In 2009, the President signed into law a bill which contained the Federal Land Assistance, Management and Enhancement (FLAME) Act, which was produced in response to several years of mounting, catastrophic wildfire events that occurred across the country. The FLAME Act established the Wildland Suppression Reserve Fund—a separate account for addressing the impacts of ongoing and increasing problems with wildfire *suppression* emergency costs. In addition to the funding language, the Act also directed the United States Forest Service and the Department of the Interior to submit a report containing a cohesive strategy for addressing *wildland fire* problems and determining how best to allocate fire budgets at the federal level. The FLAME Act has served as a catalyst for bringing fire leadership at all levels together and prompting a new approach to how wildland fire is managed.

In response to the budget allocation requirements of the FLAME Act, the Fire Program Analysis (FPA) System was developed. The FPA provides public-land managers with a common interagency process for fire management planning and budgeting to evaluate the effectiveness of alternative fire-management strategies through time, to meet land-management goals and objectives; it is updated and re-evaluated each year.⁴ In order to devise methods of addressing wildland fire problems, the Wildland Fire Leadership Council (WLFC)— an intergovernmental committee of federal, state, tribal, county, and municipal government officials, which provides strategic oversight to ensure policy coordination, accountability, and effective implementation of Federal Wildland Fire Management Policy—directed the development of the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy). The Cohesive Strategy is a collaborative process involving all levels of government, as well as non-governmental organizations and the public in pursuit of “all-lands” solutions to wildfire management issues. It is intended and envisioned “to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.”⁵ From that vision, three primary goals emerged:

- Restoring and Maintaining *Fire-Resilient* Landscapes,
- Creating *Fire-Adapted* Communities, and

⁴ Fire Program Analysis System. (n.d.). *Overview*. Retrieved November 16, 2012, from www.fpa.nifc.gov/

⁵ Forest and Rangelands. (2012 November 20). *National Cohesive Wildland Fire Management Strategy*. Retrieved November 16, 2012, from www.forestsandrangelands.gov/strategy/documents/reports/1_CohesiveStrategy03172011.pdf

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- Improving Response to Wildfires.

This CWPP shares the Cohesive Strategy’s goals and aims to promote the implementation of policies and actions to further these same ends. The Wildfire Environment chapter in Part II: Risk Assessment examines the factors that make landscapes more resilient or vulnerable to catastrophic wildfire events and acknowledges the crucial role that fire history plays in shaping healthy landscapes. Part V: Fire-Safe Communities emphasizes the importance of local residents doing their part to prepare and plan for emergencies and helping build communities that are adapted to the wildfire environments within which they are located; thus avoiding wildfire damages. The Countywide Action Plan in Part III addresses the importance of lending administrative and community support to fire-protection entities and identifies “Enhancing Fire Protection: Helping Firefighters Protect the Community” as the top priority for action in Humboldt County. Furthermore, the synergistic approach of the Cohesive Strategy coincides with the *collaborative* processes adopted within this CWPP; its development has been widely inclusive and recommendations for moving forward with its implementation advocate for the active involvement of all stakeholders and levels of government.

This County CWPP also aligns itself with the goals of the California State Fire Plan. Adopted in March 2010, the California State Fire Plan was a cooperative effort between State Board of Forestry and Fire Protection and CAL FIRE, and is designed to act as a road map for reducing the risk of wildfire in California. The Plan is built upon seven goals and their associated objectives; each goal is meant to build upon the previous one. “Collectively, these goals and objectives provide a framework to address the protection of lives, property and natural resources from wildland fire and improve environmental resilience to wildland fire.”⁶ The goals of this County CWPP are consistent with those of the state; they provide an excellent summation of the overarching aspirations and wider purpose of community wildfire protection planning.

⁶ California Department of Forestry and Fire Protection (CAL FIRE). (2012). *2010 Strategic Fire Plan for California*. Retrieved from <http://osfm.fire.ca.gov/fireplan/fireplanning.php>

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I.3. Planning Process

The planning process to update the 2006 MFPP was guided by the HCFSC with support from County staff and consultant services provided by ForEverGreen Forestry.⁷

I.3.1. Humboldt County Fire Safe Council's Role

The update of this Plan has been the primary 2011-2012 focus of the HCFSC. One of the first steps in the process was to evaluate the fire *planning compartments* used in the MFPP. These compartments were smaller units of analysis that allowed those areas to be studied in greater depth. The HCFSC decided to call these units of analysis “Fire Planning Units” (Planning Unit), which is a more commonly used term. It was also decided to change the boundaries of these Units to facilitate improved CWPP implementation.

A committee of the HCFSC was tasked with modifying Planning Units. The committee began with the original boundaries, which had previously been based on *watershed* planning boundaries modified slightly to consider the jurisdictional areas of fire districts. The major shift in approach that resulted in the most significant change to the boundaries was the decision to consider the areas served by local FSCs. The idea was to not break up FSC areas into different Planning Units, and to use them where they existed as the basis for the Unit boundary. This would make it easier to incorporate local CWPP planning areas into the County plan where local FSCs had developed or were in the process of developing them. The end result of the above process was an increase from eleven Planning Compartments to thirteen Planning Units.

The Southern Humboldt, Mad-Van Duzen, Willow Creek, Lower Mattole, and Orleans/Somes Bar local CWPP planning areas were used as the basis for the Planning Units in those areas. In some cases, alterations were made to accommodate overriding considerations in the County CWPP. For example, the Orleans/Somes Bar, Southern Humboldt, and Willow Creek CWPP planning areas extended into neighboring counties, but the Humboldt County Planning Units are cut off at the Humboldt County line. However, in the Community Preparedness chapter (II.4) of Part II. Risk Assessment, a map illustrates where these local FSC planning areas spill over into Del Norte, Siskiyou, Trinity, and Mendocino counties. In addition, changes to the Willow Creek CWPP planning-area boundary resulted in removing the Titlow Hill area and including it in the Redwood Creek Planning Unit which made more sense geographically and demographically. Lastly, the Lower Mattole CWPP planning area follows the Mattole Watershed boundary while the Mattole-Lost Coast Planning Unit extends a bit further on the north side and ends just north of Cape Mendocino.

A Planning Unit Action Plan (PUAP) was written for each Planning Unit and can be found in Part IV of this CWPP. The PUAPs include a summary of the action items from existing local CWPPs and hence can be used by the associated local FSC to help guide their actions. For the Planning Units without a local CWPP, the PUAP can be used to guide their action and potentially guide the process of developing a local CWPP or Firewise action plan. Each PUAP can be used as a resource when applying for project implementation grant funds. The PUAPs are designed to be stand-alone documents and can be pulled out of the larger document and used at the local level.

Following is the list of Planning Units by number. These are also illustrated on the map in Figure I.3-1 below.

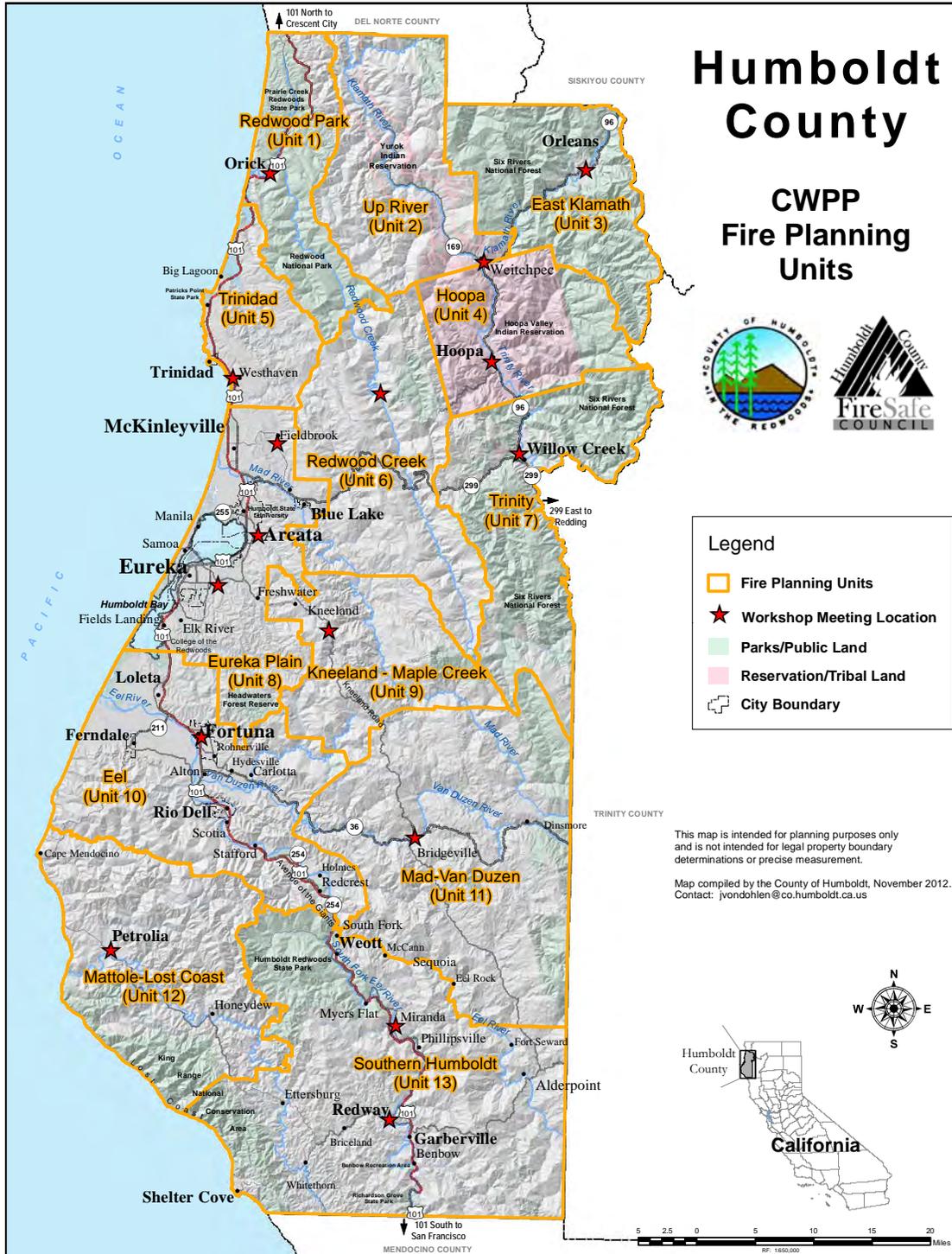
- | | |
|-----------------|-------------------------|
| 1. Redwood Park | 8. Eureka Plain |
| 2. Up River | 9. Kneeland-Maple Creek |

⁷ ForEverGreen Forestry. (n.d.). Retrieved November 16, 2012, from www.forevergreenforestry.com

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- | | |
|------------------|------------------------|
| 3. East Klamath | 10. Eel |
| 4. Hoopa | 11. Mad-Van Duzen |
| 5. Trinidad | 12. Mattole-Lost Coast |
| 6. Redwood Creek | 13. Southern Humboldt |
| 7. Trinity | |

Figure I.3-1. CWPP Fire-Planning Units Map



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Community Workshops

To meet CWPP requirements for public participation and collaboration, a series of Community CWPP workshops was organized and carried out. Sixteen workshops were held throughout Humboldt County between March and June of 2012. At least one workshop was held in each of the 13 CWPP Planning Units shown above in Figure I.3-1. CWPP Fire-Planning Units Map. Workshop locations are indicated with a red star on the map. A list of these workshops follows:

- Sunday, March 18th, **Mad Van Duzen Planning Unit** (Unit 11), *Bridgeville Community Center*
- Tuesday March 20th, **Southern Humboldt Planning Unit** (Unit 13), *South Fork High School Cafeteria*
- Friday, March 23rd, **East Klamath Planning Unit** (Unit 3), *Orleans Panamnik Building*
- Sunday, March 25th, **Mattole-Lost Coast Planning Unit** (Unit 12), *Mattole Valley Community Center*
- Thursday March 29th, **Southern Humboldt Planning Unit** (Unit 13), *Healy Senior Center*
- Saturday, May 12th, **Redwood Creek Planning Unit** (Unit 6), *Green Point Elementary School*
- Monday, May 14th, **Eureka Plain Planning Unit** (Unit 8), *Bayside Grange*
- Thursday, May 24th, **Trinity Planning Unit** (Unit 7), *Trinity Valley Elementary School*
- Monday, June 4th, **Kneeland-Maple Creek Planning Unit** (Unit 9), *Kneeland Elementary School*
- Thursday, June 14th, **Trinidad Planning Unit** (Unit 5), *Westhaven Fire Hall*
- Monday, June 18th, **Hoopa Planning Unit** (Unit 4), *Hoopa Valley Tribal Council Chambers*
- Wednesday, June 20th, **Up River Planning Unit** (Unit 2), *Weitchpec Tribal Office*
- Thursday, June 21st, **Eureka Plain Planning Unit** (Unit 8), *Fieldbrook Elementary School*
- Monday, June 25th, **Eureka Plain Planning Unit** (Unit 8), *Redwood Acres Fair Grounds*
- Tuesday, June 26th, **Redwood Park Planning Unit** (Unit 1), *Orick Community Hall*
- Thursday, June 28th, **Eel Planning Unit** (Unit 10), *Fortuna Fire Hall*

Workshop Design and Production

The HCFSC, County staff, planning consultant, and members of the Fire Chiefs worked together on the design and production of the workshops. Community members were encouraged to get involved and participate in the workshop provided for their Planning Unit area. All community members were encouraged to attend, especially residents living in forested areas and along narrow roads where there is only one way-in and one-way out access.

The focus of the workshops and one of the main objectives of the CWPP process was to engage in meaningful discussions at the community level in order to determine priorities and strategies to address the threat of wildfire to local communities. At each workshop local residents worked with firefighters and agency partners to identify projects to help prepare their homes, neighborhoods, and communities for wildfire. Local fire experts also shared information regarding how to prepare a property for fire and what to do before, during, and after a wildfire.

The overall purpose and desired outcomes of these workshops were as follows:

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Purpose

- Educate residents regarding fire safety, protection, the Home Ignition Zone, and CWPPs.
- Seek information and participation from residents to effectively update and implement the CWPP.

Desired Outcomes

- Basic understanding of fire safety and the home ignition zone, to allow residents to implement these on their property and throughout their community.
- Broad-based participation in local FSCs and CWPP development and implementation.
- Opportunity to provide direct input into priorities for community fire safety.
- Identify local concerns and priorities on maps and prioritize projects to inspire future action and increase competitive advantage for funding.
- An understanding of the advantages of *Community Emergency Response Teams* (CERTs) and information about how to initiate one locally.

Much was learned from the community workshop series. Community members benefited from their participation and local fire-service representatives had an opportunity to communicate what they need most from their public in order to provide the best possible service. Members of the public were given the opportunity to gain a better understanding of the complex nature of the fire-protection services provided by local fire departments, CAL FIRE and, in some cases, the United States Forest Service (USFS). Valuable information was also gathered regarding what community members, including local fire-service representatives, believe are important *values and assets at risk* to wildfire, wildfire hazards and risk, fire-protection resources, and potential wildfire mitigation projects. This was done using a group mapping exercise that involved community members marking the locations of these items/areas on a large, print-out map of their Planning Unit area (*see Appendix D: Mapping Exercise Instructions*).

Public Outreach

Many strategies were used to get the word out to communities about the CWPP workshops. The process was kicked off with a press release that was written in collaboration with the planning consultant, County staff, the HCFSC, CAL FIRE, Fire Chiefs, and the Six Rivers National Forest. The press release was picked up and published by several local newspapers and was used as the basis for follow-up public service announcements (PSAs) and press releases. Local radio stations used the information provided to announce the workshops to their listening audiences. County staff also participated in radio interviews on KMUD and KHSU to promote the workshop series.

Multiple email listserves were used to get the word out. Emails were drafted and distributed to the membership of the Humboldt County Fire Chiefs Association, the Southern Humboldt Fire Chiefs Association, individual contact lists of FSC members and fire chiefs, and people who had previously expressed interest in following the activities of the HCFSC. Recipients of these emails were asked to forward them to friends and neighbors who they thought would be interested in the workshops. Workshop posters were created and posted in high-traffic locations within communities and emailed out to potentially interested community members. The HCFSC on-line homepage was used to post news releases, PSAs, workshop posters and agendas, and general announcements about upcoming workshops.

Local FSCs and fire departments were key partners in spreading the word in their respective communities about the workshop series. In some cases, where these contacts were not as strong, and/or where there was a concentrated population, a mailing was sent out to residents announcing

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the workshop and providing information about fire planning. There was not sufficient funding available to do this widely but the practice was used on a few occasions.

Figure I.3-2. Sample Community Workshop Poster

**IS YOUR COMMUNITY
PREPARED
FOR WILDFIRE?**

Is your neighborhood ready?
Help identify priority projects in your community to survive the next fire.
Come learn about the new
Southern Humboldt Community Wildfire Protection Plan,
the updated Countywide Fire Planning Process, Fire Safe Councils, and how
you can help your community prepare for wildfire.

Avenue of the Giants Communities
Including Phillipsville, Miranda, Myers Flat, Fruitland Ridge, Weott, Redcrest,
and Humboldt Redwoods State Park areas.
Tuesday, March 20th, 5:30 pm - 8:30 pm
South Fork High School Cafeteria
6831 Avenue of the Giants, Miranda

For more information, call 923-9109 or 268-3736 or email bills@asis.com or dimmitt@co.humboldt.ca.us
Humboldt County Community Development Services: 707-268-3736

SOUTHERN HUMBOLDT FIRE SAFE COUNCIL
FIRE SAFE COUNCIL
SOUTH FORK HIGH SCHOOL CAFETERIA
HUMBOLDT COUNTY COMMUNITY DEVELOPMENT SERVICES

I.3.2. CWPP Review

Several opportunities were provided for public participation and review of the CWPP.

Administrative Review and the Community Review Committee

Based on all of the information collected during the process described above, an Administrative Draft of the CWPP was produced in September 2012. A special HCFSC meeting was held on September 6, 2012 to review the draft plan and kick-off the Internal Review period. The CWPP Administrative Draft was posted on the HCFSC website and HCFSC members, as well as people who had volunteered for, or were selected to be on a Community Review Committee (CRC), were asked to provide feedback. The CRC was informally created by community members indicating their desire to participate on CWPP workshop sign-in sheets. Additional members were invited to the CRC based on their particular experience or knowledge. The hope is that this experience will garner ownership and inspire members of the CRC to get involved in plan implementation.

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The results of this Internal Review were incorporated into the public review draft of the CWPP.

Public Review Draft

A public review version of this CWPP was released on November 30, 2012. The availability of the plan for public review was announced via newspaper articles, radio announcements, emails, and web-postings. The public was given approximately six weeks to review the CWPP and submit their comments for inclusion in the final version. After February 15, 2013, at the end of the Public Review period, all public feedback was considered and, as appropriate, incorporated into the final draft.

Final Review and Approval

The final draft CWPP was reviewed by the HCFSC at their April 15, 2013 meeting. The members of the HCFSC unanimously approved the plan to be forwarded to the Fire Chiefs, CAL FIRE, and Board of Supervisors for review and approval. All necessary signatures were secured and the CWPP was finalized in June of 2013. [This is a planned future action that will be included in the final draft if all approvals are granted].

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I.4. 2006 Plan Implementation Progress Review

In 2006, the Humboldt County BOS approved and certified the MFPP as a CWPP. The MFPP was developed for use as a framework for fire coordination, prevention, and protection throughout the county. The MFPP also made significant findings and recommendations relating to fire-protection capability, fire-safe education, fire hazard and *risk assessment*, fire-risk reduction and management, community preparedness and response, and fiscal issues relating to fire protection. The following pages contain activity summaries for progress made on the implementation of priority recommendations from the 2006 plan:

- Fuel Modification/Biomass Utilization
- Develop a Reliable Revenue Source for Fire Protection
- Level of Service Standard
- Improve Emergency Dispatch
- MFPP Policy Recommendation Integration into the GPU
- Firewise Recognition Program
- Community Wildfire Protection Plan Program

I.4.1. Fuel Modification/Biomass Utilization

Excerpts from the 2006 Master Fire Protection Plan that support this work:

FSC Goal: Encourage countywide efforts to reduce or modify fuel loads for community protection and fire prevention.

Recommendations:

- Emphasize increased countywide coordination of fuel modification projects by all involved agencies and organizations.
- Develop a biomass-utilization program to develop commercially viable markets for fuel-reduction project wood byproducts and residue such as *slash*, small diameter logs, foliage, wood chips, etc.

Progress

Humboldt County Hazardous Fuels Reduction Plan Update

A \$24,000 California Fire Safe Council State Clearinghouse grant was awarded to the HFSC by the US Forest Service to update the *hazardous fuels reduction* plan portion of the 2006 Humboldt County MFPP. The results of the update process are cataloged and displayed in the 2009-2010 Humboldt County Hazardous Fuels Reduction Plan Update which can be viewed on the County website at: www.co.humboldt.ca.us/natural-resources/fire_safe_council/.

Detailed maps and associated community-identified fuel reduction project data have continually been updated and managed through the Humboldt GIS Portal. The Portal can be accessed by going to: <http://gis.co.humboldt.ca.us/>, then choosing “Fire Planning” from the list of mapping applications. The fuels reduction project data described in the CWPP and displayed in the GIS Portal were generated through the evaluation of projects identified in the 2006 MFPP, the 2009-10 Humboldt County Hazardous Fuels Reduction Plan Update, gathered at subsequent community-based meetings including the 2012 CWPP Update community workshops mentioned above in I.3.2 “*Community Workshops*”, and subsequently reviewed and refined by local FSC representatives, Humboldt County staff, and fire-agency personnel.

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Northwest California Regional Fire Safe Council Conference

The grant also funded the 2009 “Northwest California Regional Fire Safe Council Conference.” Participation in planning the conference came from a diverse group representing Humboldt County, Orleans/Somes Bar, and Van Duzen Watershed FSCs, the Humboldt County Planning Division, University of California Cooperative Extension, Humboldt State University, the Mattole Restoration Council, the Fruitland Ridge and Miranda fire departments, Six River National Forest, CAL FIRE, the US Fish and Wildlife Service, and the Trinity County Resource Conservation District. Presentations and panelists were secured from most of the above organizations and agencies as well as the North Coast Unified Air Quality Management District, the Center for Forestry at the University of California Berkeley, Jeff Bryant Forestry, the Del Norte FSC, the Trinity County FSC, the FSC of Siskiyou County, the Mt. Shasta Area FSC, and Redwood National Park.

The two-day conference was held on December 10 and 11, 2009 at the Fortuna Fire Department Hall. Representatives from countywide FSCs were present from Humboldt, Siskiyou, Del Norte, and Trinity Counties. The smaller FSCs of the Lower Mattole, Southern Humboldt, Van Duzen Watershed, Orleans/Somes Bar, Willow Creek, and Mt. Shasta areas were also represented. Presentations were provided on several topics, including woody biomass utilization from both the landowner’s and researcher’s perspectives, and fuel treatments with particular attention to what’s next for areas that have already received treatment, and the impediments to the use of prescribed fire. Information was provided on building materials and design for home survival in wildfire-prone areas, *Best Management Practices* in regards to natural resources and environmental compliance, and a variety of cost-share programs designed to support wildfire mitigation and forest health projects. All of the PowerPoints for these presentations can be found on the Humboldt County FSC website at: www.co.humboldt.ca.us/natural-resources/fire_safe_council/.

FLASH Program

A \$300,000 California Fire Safe Council State Clearinghouse grant program funded by the USFS was successfully completed. These federal dollars were matched by over \$33,000 dollars of local in-kind and cash support. The program was named Fire-adapted Landscapes and Safe Homes (*FLASH*) and provided incentives to property owners to mitigate wildfire hazards through vegetation management. This was done by awarding a rebate for the creation of *defensible space* around homes and strategic *fuelbreaks* along escape routes and high-risk areas.

During the grant period, hazardous vegetation on slightly over 311 acres of land was treated to reduce the wildfire risk for homesteads and *access routes*. A total of 114 landowners completed work on their properties through this program. Eight local field technicians were trained and gained experience in assessing wildfire hazards, making fuel reduction treatment recommendations, and conducting inspections to ensure fuel-reduction work was correctly completed. These technicians conducted 267 site visits, over 114 of which included a *home risk assessment*.⁸ Many individuals received a portion of their income through this program including County staff, local target area program administration and field staff, fuel hazard reduction crews, as well as property owners who did the work themselves and were reimbursed through the program.

In 2012, additional funds to support the continuation of the FLASH program were awarded through the California Fire Safe Council State Clearinghouse in the amount of \$195,000. These federal dollars were matched by over \$195,000 dollars of local in-kind and cash support. The program covers approximately 50% of the cost of the work with a rebate and the property

⁸ See Appendix E: Home Risk Assessment.

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owner's payment or labor for the balance is counted as match. The goal of this program is to treat approximately 200 acres of hazardous vegetation by mid 2013.

This has been a very successful program and the HCFSC is grateful to have the opportunity to continue working in the target areas with additional support from the USFS. Target areas include the areas served by 1) the Orleans Somes Bar FSC, 2) the Willow Creek FSC, 3) the Van Duzen Watershed FSC, 4) the Lower Mattole FSC and the Mattole Restoration Council, and 5) and the Southern Humboldt FSC. Within the five target areas, there are now thriving community outreach programs educating property owners about how they can reduce their vulnerability to wildfire losses. Information for this program was also incorporated into multiple CWPP workshops and Firewise events. For more information on this program visit: www.co.humboldt.ca.us/natural-resources/fire_safe_council/fsc_flash.aspx

Fuel-Reduction Projects

CAL FIRE staff, in conjunction with Humboldt County staff and local FSCs, were able to implement several key fuel-reduction projects. These projects had been identified collaboratively through the Humboldt County and Humboldt Del Norte Unit CWPPs. They included the construction of *shaded fuelbreaks* to enhance and protect the public and emergency services personnel for purposes of *ingress and egress*. These projects also acted as demonstration projects in highly visible areas, allowing the public to interact with both CAL FIRE and local grassroots organizations, including local FSCs. Funds for these projects were awarded through a statewide hazardous fuels treatment grant.

The interactions that are fostered and supported through these types of fuel reduction projects are many. The countywide fuel reduction and fire-safe planning strategy supported these projects. Humboldt County's CWPP has been and remains a very important conduit allowing quick, flexible, and responsive implementation of fuel-reduction project work.

Biomass

Pertinent articles related to *biomass utilization* opportunities are continuously shared both with the Humboldt County FSC members and with the Humboldt Biomass listserve.

Interaction continues with the University of California Cooperative Extension, Humboldt State University Schatz Energy Center and the Redwood Coast Energy Authority (RCEA) to stay abreast of technology developments and opportunities and pass those on to the County and local FSC members.

Finally, communication continues with the three existing biomass facilities in the County: DG Fairhaven, Scotia, and Blue Lake Power (formerly Ultra Power).

I.4.2. Develop a Reliable Revenue Source for Fire Protection

Excerpts from the 2006 Master Fire Protection Plan that support this work:

FSC Goal: Support fire prevention and resource protection efforts of local communities, local FSCs, special districts with fire-safety responsibilities, fire organizations, and JPA cooperative services (dispatching, hazmat, training and other cooperative opportunities).

Recommendations:

- Develop reliable sources of ongoing funding for *fire protection districts* and departments, such as revenue exchange agreements, *benefit assessments*, mitigation *fees*, and user fees.
- Provide technical support to local organizations that seek to establish (tax) benefit assessment areas as well as alternative funding mechanisms. Coordinate with state/federal government funding programs (e.g., Amador) as sources of funding for community fire protection.

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- Encourage the provision of fire-protection services through a district or local agency that provides a stable source of revenue from property tax, assessments, fees, or other sources

Progress

Revenue Source for Fire Protection Committee

A committee of the HCFSC has been involved in exploring opportunities for generating sustainable revenue to support fire protection through fire district reorganization and formation. This committee has developed a reference guide for the various funding mechanisms available to local government fire protection entities. The guide is intended to provide initial descriptions, process explanations, government-code citations, practical tips and other information related to funding mechanisms and their implementation. The guide addresses benefit assessments, special taxes, and Mello Roos funding. Information is also included on formation, expansion, or *annexation* of fire districts. It is an informational guide for districts or potential districts, designed to give them an idea of the different types of funding measures available to districts and the requirements of each of the different types of measures. A compact disc (CD) containing the guide and additional resources can be obtained from the HCFSC. The guide will be updated as new information is available. District or potential district representatives are also encouraged to contact local fire officials who are able to supply information and resources related to funding mechanisms.

LAFCO

County staff and committee members have been helping *fire companies* and fire-protection districts navigate complex local agency formation and expansion, and local election processes. They have attended Fire Chiefs and Local Agency Formation Commission (*LAFCO*) meetings as well as community meetings to discuss various options and report progress. They have assisted with paperwork and document preparation as well as the interpretation of relevant state laws. These efforts are being coordinated with LAFCO Staff. County staff is currently working closely with several fire departments on a variety of initiatives.

Fire Protection District Formation

Four fire companies recently navigated a very complicated fire-district formation process in an attempt to create an official jurisdictional area and financial support through a special tax. The last step in the process was an election. The formation of the new fire-protection districts was contingent upon the approval of the special tax by two-thirds of the votes cast by voters on the measure within the proposed district boundaries. Briceland and Bridgeville fire companies received the required number of votes in support of the measure. Fruitland Ridge and Palo Verde fire companies did not receive the votes needed to become a new district supported by a special tax. Fruitland Ridge lost the election by only a few votes; the future of that fire company is now in jeopardy. The future of the Palo Verde fire company is also uncertain as leadership changes hands and the scope of services that they are able to provide is evaluated.

Fire Protection District Boundary Expansion

Ten existing fire protection districts are contemplating the possibility of expanding their boundaries to more accurately reflect where services are regularly provided. If they choose to move forward, these districts will need to work closely with LAFCO to complete a district annexation process. The majority of these districts are currently in the process of working with the County on negotiating potential tax sharing agreements that would support the provision of services beyond their current *jurisdictional area*. They may need to also explore other revenue-generating strategies such as special taxes or benefit assessments. These districts are:

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- Garberville Fire Protection District
- Redway Fire Protection District
- Telegraph Ridge Fire Protection District
- Whitethorn Fire Protection District
- Rio Dell Fire Protection District
- Fieldbrook Community Services District
- Ferndale Fire Protection District
- Petrolia Fire Protection District
- Blue Lake Fire Protection District
- Kneeland Fire Protection District

Other

In 2010, the Aircraft Rescue Fire Fighting (ARFF) grant was awarded by Homeland Security allowing firefighters protecting County airports to be formally trained for the first time in County history.

I.4.3. Level of Service Standard

Excerpts from the 2006 Master Fire Protection Plan that support this work:

FSC Goal: Promote local fire-safe planning, fire-safe standards, fire-education programs addressing fire risk in rural areas, and measures that local communities can implement to be fire safe.

Recommendations:

- Develop *level-of-service standards* for the provision of all fire protection services (fire, EMS, HazMat, rescue) in the County, and make such standards public so that landowners and residents understand what is and is not available to them.
- Establish minimum levels of fire protection service for Humboldt County communities.

Progress

Fire-Planning Mapping Application

The fire-planning mapping application in the Humboldt GIS Portal continues to be maintained as a tool to view elements of fire protection service. As new information is provided by fire departments it is uploaded to the application at this site: <http://gis.co.humboldt.ca.us/>. Choose 'Fire Planning' from the list of mapping applications and the program will load a map showing fire department response areas and display data regarding level of service. This information is for general reference only. For detailed planning purposes, users must contact the local fire department and/or a County GIS specialist. This is a disclosure tool that helps show the baseline of current level of service.

Fire Chiefs Association's Fire Services Annual Report

Beginning in 2008, the Fire Chiefs began producing a Fire Services Annual Report, to be presented to the BOS and posted on the HCFSC webpage.⁹ This report, which contains information on all the fire departments in the county, can be used as a directory. Each fire department is represented by its own page, which includes a brief description of the department and its capabilities, as well as its contact information, the fire chief's name, and a summary of the year's number of incident responses, volunteer hours, and personnel. The report also includes a letter from the President of the Fire Chiefs summarizing the year's activities, challenges, and accomplishments. Over the past few years, producing the Annual Report has become a coordinated effort between the Fire Chiefs, CAL FIRE, and the HCFSC. These three groups

⁹ Annual Reports are posted on the HCFSC Home Page at www.co.humboldt.ca.us/natural-resources/fire_safe_council/ and can be found under "Quick Links."

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recognize the value of this report as a tool for increasing awareness among elected officials and the public about who provides local community fire protection, what services they provide, and the level of volunteer effort needed to sustain the service. The Report is also used to update the level of service information provided in the Humboldt GIS Portal mentioned above.

Level of Service Standards Committee

An HCFSC committee continues to work closely with the Fire Chiefs to identify and agree on a minimum Level of Service standard. The standard will need to be tiered, acknowledging that there are different expectations and capacities in rural, suburban, and urban environments. It has been determined that training-level standards are the most critical focus area for this topic. The Fire Chiefs liaison to the FSC will continue to identify areas of needed collaboration.

I.4.4. Improve Emergency Dispatch Services

Excerpts from the 2006 Master Fire Protection Plan that support this work:

FSC Goal: Assure adequate fire protection for people, property, and communities.

Recommendations:

- Improve communication and coordination between local fire departments, state agencies, federal agencies, and other allied agencies during fires and other emergencies.
- Support communication and collaboration between fire and public safety agencies while maintaining the integrity of their distinct public service roles.

Progress

Improve Emergency Dispatch Services Committee

A committee of the HCFSC has focused its efforts on monitoring and contributing to activities countywide that are related to improving emergency services communications. Although not directly associated with the HCFSC, significant funding has been awarded to the local fire service that will help achieve the goal of improving *emergency dispatch services*. A \$775,000 federal grant has been approved that will help the fire service go from one of the oldest communication systems in the state, to one of the most state-of-the-art systems.

Humboldt Operational Area Communications Committee

The County continues to build a relationship with other agencies in the area and is talking to other places that have similar issues. The County has formed the Humboldt Operational Area Communications Committee (HOACC) composed of representatives of area local, state, and federal agencies and other area organizations operating radio communications systems in the County. Areas of known need are being addressed through partnering actions and continued expenditures (using both grant funding and local appropriations). HOACC partners are sharing information on their radio communications infrastructure, looking for common pathways of immediate development and cost savings, and paying particular attention to future system coordination and compatibility issues.

Dispatch

Community input provided through CWPP outreach indicates that there are still problems with how fire departments are being dispatched and confusion about how road names and home addresses are organized in some areas. Despite these problems the dispatch system run out of the CAL FIRE Command Center in Fortuna is very effective given the scale of the service area and the number of different service providers. Nonetheless, it has been identified that coordination between CAL FIRE, Sheriff, local fire departments, County Public Works, and County Planning

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could address some of the dispatch, addressing, and road name issues. It has also been recognized that it is a priority to educate the public regarding how to properly use 9-1-1, including how to effectively communicate the location of an incident to dispatchers. These continuing challenges are addressed in the Countywide Action Plan, in Part III of this CWPP.

Improve Communication and Coordination

Local Fire agencies and organizations in Humboldt County have made significant strides in the last several years to meet the demand for their services. Through the development of a countywide *mutual-aid agreement* and a standardized *apparatus* numbering system, the deployment of resources to emergency incidents is much more organized and efficient. Mutual-aid agreements provide a more reliable and supported response to emergencies, especially when there aren't sufficient resources available within any given response area. The basic premise is that all participating fire-service providers agree to mutually supplement each other's response capabilities when needed. The standardized numbering system helps avoid the confusion of having fire engines and other firefighting apparatus with the same number all responding to an incident. The new system facilitates and simplifies the dispatch of resources as well as their operational control on scene.

Another recent development that is supporting improvements in communication and coordination is the formation of an Incident Support Team. The Fire Chiefs Association is still in the process of forming this group, which is intended to increase the standardization of how incidents are handled. A team composed of individuals from multiple agencies is being trained in various overhead positions. This team will be available to any fire service organization to call upon during a large emergency to assist with communication, coordination, and decision-making.

I.4.5. MFPP Policy Recommendation Integration into the GPU

Excerpts from the 2006 Master Fire Protection Plan that support this work:

FSC Goal: Assure adequate fire protection for people, property, and communities.

Recommendations:

- Update the Humboldt County General Plan to include policies and standards that encourage new development in areas with adequate fire protection.
- Consider the *wildland-urban interface* (WUI) in the planning process, and address future fire-safety needs and requirements associated with development in WUI areas.
- Require fire-risk disclosures for new development in high fire-risk areas. Impose conditions on new development in these areas to provide onsite fire protection and prevention measures (e.g., fuelbreaks, adequate water sources).

Progress

The HCFSC coordinated their efforts with County Planning staff to integrate recommendations from the 2006 County fire plan into applicable elements of the General Plan Update (GPU). FSC members received drafts of GPU elements and plan-review materials and provided input to Planning staff and the Planning Commission, and additional recommendations as necessary. The FSC provided review and feedback for the Community Infrastructure and Services Element and the Safety Element of the GPU. All FSC recommendations were approved by the Planning Commission and are being forwarded to the BOS. For more information on the GPU, visit: www.planupdate.org.

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I.4.6. Fire Safe Education

Excerpts from the 2006 Master Fire Protection Plan that support this work:

FSC Goal: Promote local fire-safe planning, fire safe-standards, fire-education programs addressing fire risk and hazard in rural areas, and measures that local communities can implement to be fire safe.

Recommendations:

- Provide fire-safety education to residents, and the homebuilding, insurance, real estate, landscaping, and building supply industries.
- Provide education to residents connecting fire-safe forests, timber production, and ecological restoration efforts.
- Increase public awareness of fire as a tool for improving community fire safety, forest health, and ecological diversity through public education.

Progress

Firewise

The HCFSC and County staff have worked closely with local communities to get recognized as Firewise Communities/USA sites. Title III grants have been awarded by the County to local FSCs to conduct community risk assessments, write Firewise plans, and hold community Firewise days in coordination with local fire departments. The National Fire Protection Association's (NFPA) Firewise Communities program teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action to prevent losses. The program provides many tools and resources to communities.

Thus far, the communities of Bridgeville, Honeydew, Upper Jacoby Creek, Orleans, Petrolia, and Willow Creek have achieved national Firewise recognition. Several more communities are interested in participating in the program and have taken steps to organize their residents. Firewise assessments and action plans serve as excellent tools for communities to collaboratively learn about and identify actions to address wildfire hazards in their community. Firewise also provides an opportunity for communities, not only to raise awareness about wildfire risks, but to showcase what they are already doing to mitigate those risks. Community Firewise events have been used to share the results of successful projects such as: a new or updated local fire plan, educational brochures or videos, or mechanical treatments and prescribed burns to manage *hazardous vegetation* and improve forest health.

Communities that have achieved Firewise status were also eligible for, and in some cases awarded Title III grant funds from the County to implement components of their action plan. So far Willow Creek and Bridgeville have used funding to support annual community Firewise events and to design *Blue Dot Programs* that help identify and/or develop water sources that are appropriate for fighting fires. The Bridgeville project also includes posting of address and road signs to improve the ability of firefighters to find residences in an emergency.

I.4.7. Fire Safe Planning and Hazard Identification

Excerpts from the 2006 Master Fire Protection Plan that support this work:

FSC Goal: Support efforts of local fire organizations and FSCs to maintain adequate staffing levels and to serve as public safety agents, and monitor these efforts.

Recommendation:

- Work with local FSCs, fire protection organizations, and other applicable entities to incorporate wildfire safety measures, fire hazard mitigations, accessible roads data,

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emergency water supply locations, flammable vegetation clearance for defensible space techniques, and other fire safety techniques, into local community planning.

Progress

Local CWPP Updates

The countywide fuel reduction and fire-safe planning strategy is being supported through a coordinated update and refinement of Humboldt County's CWPP. As part of this project, the Humboldt County FSC and County staff have worked closely with the Willow Creek, Southern Humboldt, Van Duzen Watershed, Lower Mattole, and Orleans/Somes Bar FSCs to either update or complete their local CWPPs. These local CWPPs are being incorporated into and referenced in this countywide CWPP. Secure Rural Schools and Community Self-determination Act, Title III funding for this project is supporting County staff time associated with updating the County CWPP, assistance to local communities with developing and updating their local CWPPs, community outreach, and GIS database maintenances. Title III grants have also been awarded to the community groups involved in drafting and updating their local CWPPs. County staff is managing the distribution of these grant funds.

CWPP Community Workshops

County staff, with support from the Humboldt County FSC, completed 16 workshops throughout the County. These workshops were held in order to seek information and participation from residents, including local fire-service representatives, and to educate residents regarding fire safety, protection, the Home Ignition Zone, and the Humboldt County CWPP.¹⁰ Large amounts of data were collected at these workshops on community-identified wildfire risks and hazards, assets and values at risk to wildfire, fire protection resources, and proposed wildfire mitigation projects. This information is being incorporated into the County GIS database and will be used to update the Fire Planning application of the Humboldt GIS Portal.

¹⁰ For more information see Section I.3. Planning Process above.

Part II. Risk Assessment

Overview

This Risk Assessment is a summary of the factors that contribute to wildfire in Humboldt County, and a qualitative assessment of those factors. To assess fire risk in the county as systematically and comprehensively as possible, one must attempt to catalogue and analyze all the specific and unique aspects and features that combine and interact to make Humboldt County itself—Humboldt, and no other county like it. Useful comparisons and contrasts can be drawn with neighboring areas.

Chapter II.1. **Wildfire Environment** provides a broad introduction to wildfire in Humboldt County. This chapter describes aspects of fire behavior and discusses the environmental conditions within the county that influence that behavior, such as *topography* and weather patterns. There is also an examination of different *fuel compositions* and the types of wildfire they are liable to generate. This chapter provides an analysis of Humboldt County's fire history, including a discussion of the role fire has played in shaping the landscape and ecosystems here, probable *ignition sources*, as well as a discussion of the various fire management trends and regimes that have been implemented over the years and how they have impacted the natural environment. The contents of this chapter will lead to a greater understanding of fire, which can help residents learn how to better coexist with it.

Chapter II.2. **Values and Assets at Risk** outlines those things that are important to the quality of life in Humboldt County that can be threatened by wildfire. It lists the communities within Humboldt County that have been designated as at risk to wildfire and includes a description of some of the most valued resources within these communities, such as homes, schools, and medical facilities. This chapter describes the natural resources within the county that are of great value to residents (both human and non), and gives a general assessment of their vulnerability to wildfire.

Chapter II.3. **Wildfire Protection Capabilities** provides an overview of fire protection services in Humboldt County. This chapter describes the various fire-protection entities and jurisdictions that exist within the county as well as the types of services they provide to communities within their districts and response areas. It discusses factors impacting the efficient delivery of fire-protection services. Information in this chapter aims to educate residents about the firefighters and organizations devoted to protecting their lives and homes from fire and raise community awareness regarding how to support local firefighters in doing so.

Chapter II.4. **Community Preparedness** discusses community-based efforts to prepare Humboldt County residents for wildfire. The chapter lists the community groups within the county that have self-organized and taken steps to enhance fire safety in their communities. It also examines the efforts of local organizations to enhance wildfire awareness, and includes a variety of resources and programs available to communities seeking to take greater responsibility for protecting themselves against the risks of wildfire. This chapter directs residents to resources that can help prepare them in advance and prepare their communities for wildfire.

Finally, Chapter II.5. **Risk Assessment Summary** presents a summary analysis of each of the Risk Assessment chapters. The analysis is based on a qualitative scale from low to very high, with very high signifying the highest risk in most cases. These rankings informed the process of identifying priority actions on a countywide scale. This CWPP recommends undertaking an ongoing, detailed risks assessment at the local level to guide appropriate action for the level of wildfire risk faced by each community within Humboldt County.

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II.1. Wildfire Environment

II.1.1. Introduction: Defining the Wildfire Problem

According to the California Forestland Stewardship Program:

“Fire is an integral part of most California landscapes. Many of our native plants, including trees, are adapted to burn periodically; they need fire to be healthy, reproduce, and survive. Fire suppression activities over the last 100–150 years have largely taken fire out of the system, causing far-reaching changes in habitats and forest health.”¹

Understanding wildfire’s sources and behaviors, as well as its role in the *ecosystem*, can help residents to better coexist with it. Throughout the *wildland-urban interface* (WUI), where fire has been and continues to be a natural ecological feature of the *landscape*, wildfire also poses a perpetual threat to human property and safety. At the same time, increasing incidents of accidental human-caused fire simultaneously threaten the integrity of local *wildlands*.

This chapter explains fire history, fire behavior characteristics, fire’s relationship with *fuels*, and the fire science used as a basis for planning, preparation, and predicting fire effects on both human and non-human natural communities. This chapter also provides a broad introduction to wildfire in Humboldt County in particular. **The landscapes of Humboldt County have adapted to and evolved with fire, and fire will continue to shape them. Many Humboldt residents understand that it is not a question of if a wildfire will occur here, but rather when.**

Compared to fire patterns in California before European settlement, it is generally accepted that fires in today’s post-settlement California are less frequent and more severe. Humboldt County is no exception to this pattern. Wildfire is considered to be one of Humboldt County’s most dangerous natural disaster threats. Humboldt County exhibits extreme diversity in its potential for destructive fire, from nil to very high in severity classifications.²

The absence of natural fire events due to massive *fire suppression* efforts over recent decades, compounded by historic logging and land-management practices as well as urban and suburban development, has led to an increase in the density and type of live vegetation. This situation has also led to an increase in the size, amount, and distribution of dead fuel within the county. As a result, forests and *shrublands* are more crowded, trees are unable to retain their vigor, and are more vulnerable to insects, disease, and *stand-destroying* fires. In contrast, frequent, low-intensity surface fires (such as those that occurred historically) would have eliminated most fuels from the forest floor, and maintained more open forests and prairies. Frequent, low intensity fires help keep forests healthy. **A pressing challenge for Humboldt County, and most areas of the West, is how to remove high levels of fuel, while maintaining *ecosystem functions, processes, and health*. This CWPP explores those options.**

Both human activities and other environmental factors affect fire behavior and its consequences. Human factors include home design and landscaping, community wildfire preparedness, land-use planning, and regulation of accidental fire ignitions. Natural features include topography, weather, and the condition and type of vegetation and other fuels. Understanding all the environmental conditions present in an area helps us to formulate practices

¹ California Forestland Stewardship Program. (2010). *What can you do to protect your property from wildfire?* Retrieved from http://ceres.ca.gov/foreststeward/fire_and_fuels.html

² CAL FIRE. (2007). *Fire Resources Assessment Program (FRAP)*. [Map showing Fire Hazard Severity Zone ratings within various geographic areas, mapped by county]. Fire Hazard Severity Zones Map. Retrieved from <http://frap.cdf.ca.gov/>

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or actions that can best support individual and community decision making, as well as guide local changes to the environment that are intended to reduce the negative impacts of wildfire. This understanding will also assist Humboldt County *fire resiliency*—the ability to rebound after a wildfire.

II.1.2. Fire Behavior Characteristics

Knowing the attributes of *fire behavior* is important in order to communicate the various threats from any fire and the benefits of mitigation. *Flame length, fire intensity, heat output, rate of spread, residence time*, and whether the fire burns on the surface (forest floor) or crown (tops of trees) are all ways to describe fire behavior. These attributes also help build an understanding of a fire's resistance to *control*, as well as any potential damage and/or positive environmental impacts from fire. The following paragraphs provide an introductory definition to these fire behavior terms.

Surface Fires

On flat or moderate terrain (<30% slopes) in *light fuels*, fires usually burn as a *surface fire*; meaning the flames stay near the ground. Surface fires may advance quickly with short or long residence time and a range of heat output and, as such, they respond well to suppression. A manageable fire, such as occurs more frequently with surface fires, is one of the desired results of *fuel modifications*.

Crown Fire Potential

Crowning activity happens where fire is expected to travel into and possibly consume the crowns—or tops—of trees. *Crown fires* typify a fire of high intensity and exhibit high heat output and rates of spread. These attributes challenge suppression efforts. When a fire burns through tree crowns, countless *embers* are produced and distributed, sometimes over long distances. These embers can start new fires (known as *spot fires*), which can each grow and confound the finest fire suppression forces.

Crown fire initiation (or *torching*) occurs when *ladder fuels* are present, providing a connection between the surface fuels and the crown fuels. The higher the base (the bottom) of the tree canopy away from *surface fuels*, the more difficult it is for crown fires to ignite. Once in the tree *canopy*, crown fires are more likely to spread in dense canopies and conditions involving high wind speeds.

Fire Intensity

Fire intensity describes the amount of heat that is released by flaming *combustion* in a specific unit of time (BTU/ft./sec.³). This measurement captures the energy of a fire in any location; it is often confused with fire severity, which is a term describing fire effects (*see below*).

Fire Severity

Fire severity describes the resulting effects of a fire, based on the amount of soil damage and tree mortality. It is determined by observing vegetation and soil conditions *after* a fire. The relationship between predicted fire behavior characteristics (flame length, heat per unit area, *fireline* intensity, etc.) and fire severity are being explored, but are not yet well established. Long flame lengths, large amounts of torching, crown fire presence, high *fireline* intensity, and high heat per unit area are all indicators of potentially severe fires.

³ BTU: British Thermal Units (heat)/feet/second.

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Flame Length

Flame length is the span of the flame from the base to the tip, irrespective of its tilt. This factor most influences the probability of structure damage and ease of fire suppression. Flame length is highly correlated with fire intensity, which can help predict fire severity. Flame lengths less than four feet long are associated with fires that are more easily controlled—generally with *hand crews*⁴—and are also associated with the widespread low-intensity fires prevalent prior to European settlement. In contrast, flame lengths longer than twelve feet often thwart suppression efforts, and are associated with crown fires seen on the front pages of newspapers. Typically, fuel-management goals aim for conditions in which flame lengths are less than four feet.

Rate of Spread

The rate of spread measures how fast the *leading edge of a fire* advances. A rate of spread that is faster than fireline-building capacity will challenge fire-suppression efforts. High spread rates also indicate the potential for quick changes in fire spread direction, which could endanger firefighters and increase potential damages. High rates of spread in grass can exceed three hundred feet per minute. In rare crown fires, rates of spread can exceed one hundred feet per minute. A more acceptable rate of spread would be one that is slower than the line-building capacity of fire-suppression forces to encircle the fire. Slow-burning fires in forested fuel types spread at a rate of two-to-eight feet per minute.

Residence Time

The residence time of a fire defines how long the leading edge of the fire burns in any one location. Usually, grass fires are consumed quickly and have a short residence time (e.g. 30 seconds), in contrast to the residence time of fires in a deep *duff* layer, which can burn for hours. Foliage and *suspended dead material* are usually consumed in less than 90 seconds. Residence time is useful in predicting tree mortality and potential for fire-induced *hydrophobic soils*.

Heat Per Unit Area

Heat per unit area is defined as the total heat produced by flaming combustion in any one location. This does not include long *burn-out times* and smoldering. This factor is especially important in determining soil heating and is a fairly good predictor of potential root damage and *cambium* heating, all indicators of fire severity. Smoldering produces the vast majority of smoke in a fire, but most fire behavior models don't include smoldering combustion.

II.1.3. General Wildfire Environment Descriptions

Fire ecology is the study of fire and its relationship to the physical, chemical, and biological components of an ecosystem. Several ecosystem types are found within Humboldt County, most of which evolved with fire. **Humboldt County is located in a fire-dependent environment; fire has played a prominent role in shaping the natural environment here. Wildfire will happen. Exclusion of wildfire is not an option.**

Topography

Topographic features such as *slope* and *aspect*, as well as the overall form of the land, have a profound effect on fire behavior. *Topography* directly and indirectly affects the intensity, direction, and rate of spread of wildfire. Fires burning in flat or gently sloping areas tend to burn more slowly, and to spread in a wider ellipse than fires on steep slopes. Streams, rivers, and

⁴ *Hand crews* are diverse teams of career and temporary wildland firefighters

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canyons tend to channel local *diurnal* and general winds, which can accelerate the fire's speed and affect its direction, especially during *foehn* (warm, dry, and usually strong) wind events. Local winds are greatly affected by topography, which "bends the wind" as it flows around or over landforms. Topography also causes daily upslope and downslope winds. The topographic features of aspect and elevation affect vegetation. Solar exposure affects *fuel moisture*.

Humboldt County has a mixture of rugged mountains, rolling hills, and broad valleys. Elevations within the county range from the coastal sand-swept streets of Manila, just 13 ft. above sea level, to Salmon Mountain, the county's highest peak at 6,962 ft. (in the Trinity Alps Wilderness of Six Rivers National Forest). Due to the remoteness and steepness of slopes within the county, fire equipment and personnel can be limited in their access to wildfires. *Drainages* can act as *chimneys*, which can move wind and fire very quickly up a gentle or steep slope. This adds significant fire risks to Humboldt County communities.

Geological Features

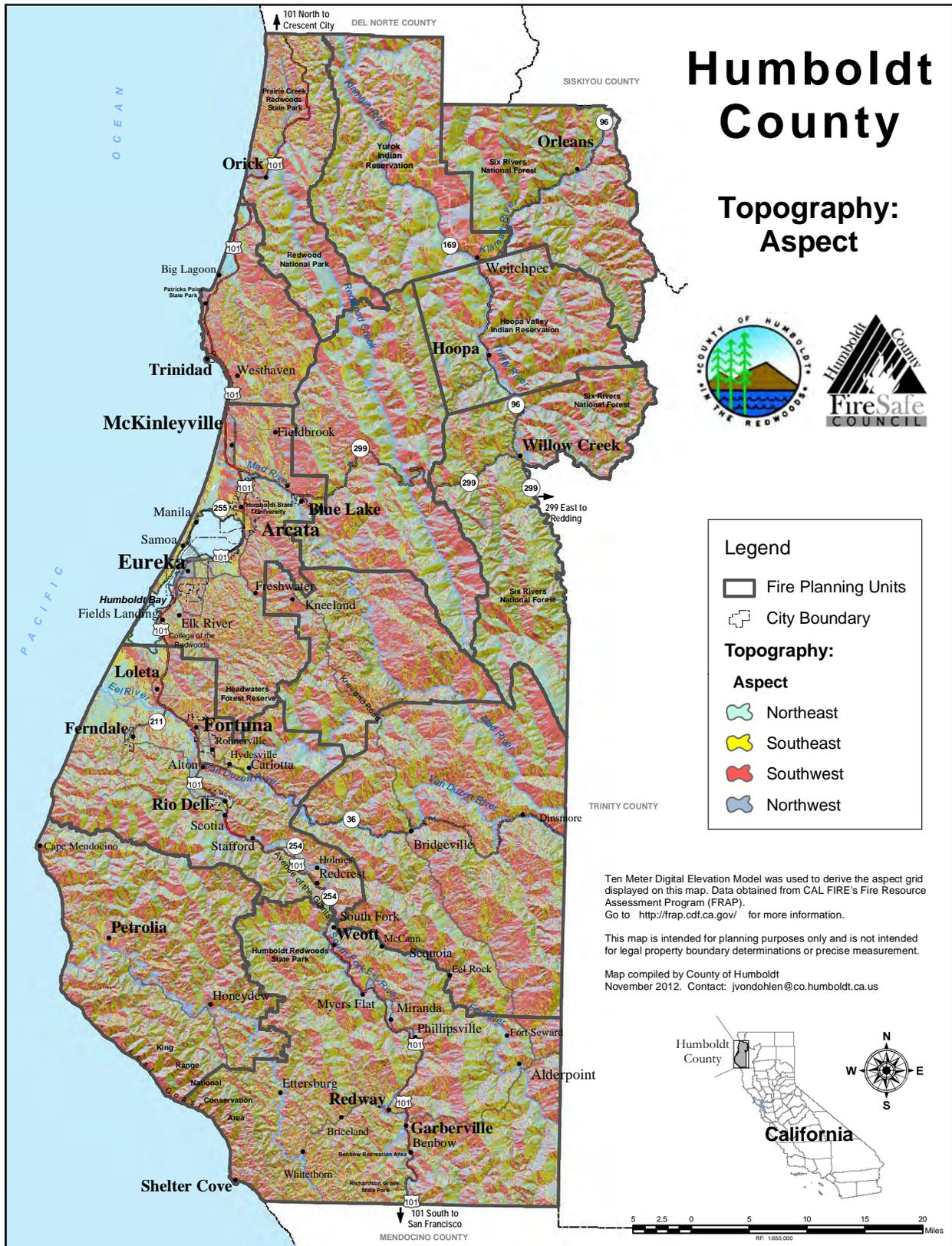
The bedrock geology of Humboldt County is divided generally into two provinces: the Klamath Mountains province in the northeast, and the Coast Ranges province in the central and southwest portion of the county. The dividing line between the two provinces is the South Fork Mountain Ridge, which separates the Trinity River *basin* from the Mad River and Redwood Creek drainages.

The Klamath Mountains province is an area beginning in northeastern Humboldt County and extending east of the County line with high alpine peaks, some attaining elevations of 8,000 feet or more. The province is drained by the Klamath and Trinity Rivers and farther north by the Smith River. Rocks in the Klamath Mountains province are generally older than those in the Coast Ranges. Rocks of sedimentary origin such as sandstone, chert, slate, and schist occur abundantly, with occasional granite intrusions.

The Coast Ranges province is the dominant geologic province in the county, trending northwest and drained by the Mad, Eel, and Mattole River drainages. The Franciscan and Yager complexes dominate inland, with sand and other alluvial deposits dominating in the lower reaches of the river basins and the area surrounding Humboldt Bay.

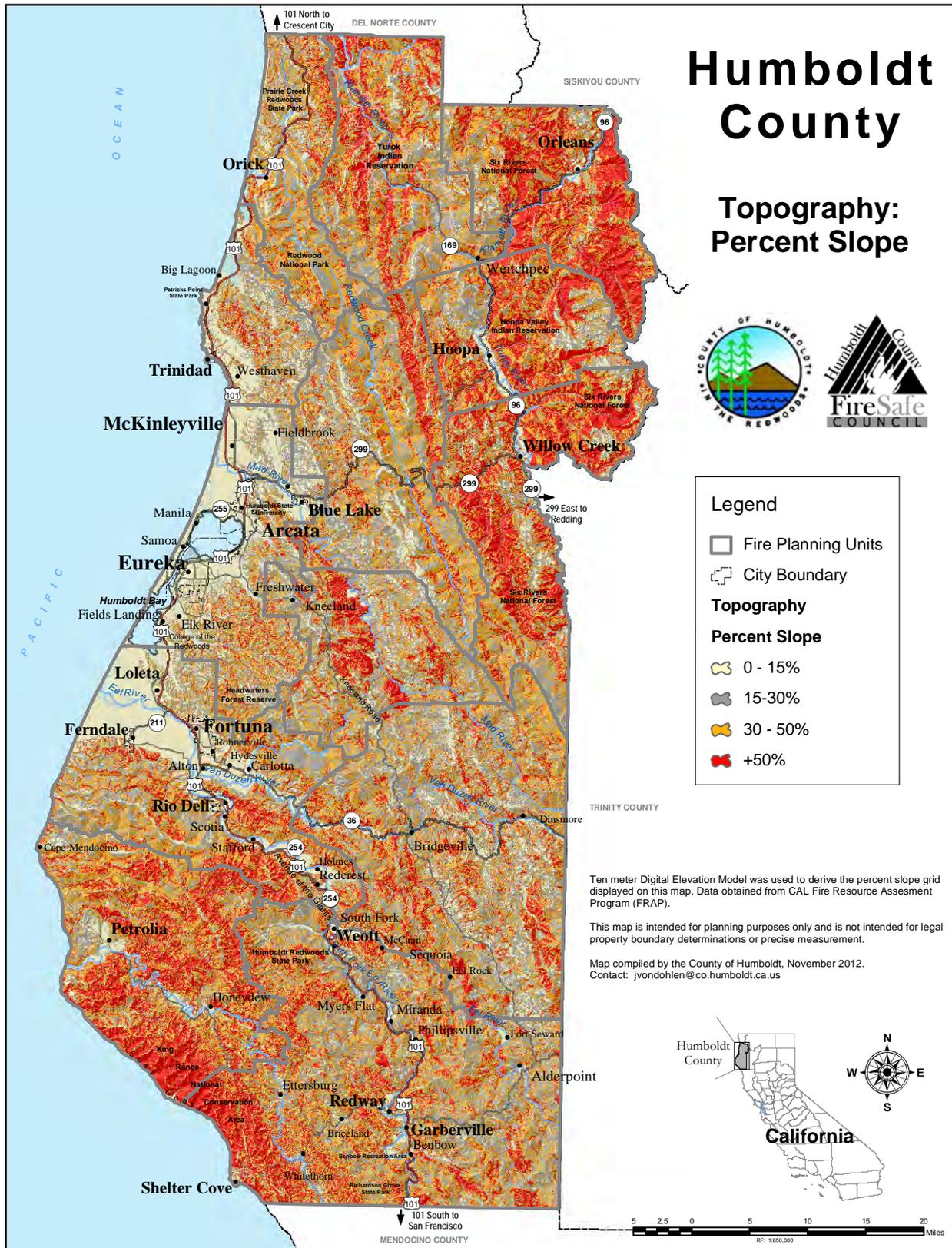
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Figure II.1-1. Topography: Aspect Map



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Figure II.1-2. Topography: Percent Slope Map



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Weather

Weather conditions significantly impact the potential for fire ignition, as well as rates of spread, intensity, and the direction(s) a fire burns. Wind, temperature, and *relative humidity* are the weather variables used to predict fire behavior.⁵ *Fire weather* refers to weather elements that influence fire *ignition*, behavior, and suppression; these elements include temperature, relative humidity, wind speed and direction, precipitation, atmospheric stability, and the presence of *aloft* (or upper-level) *winds*.

Humboldt County is an area of moderate temperatures and considerable precipitation. Temperatures along the coast vary only 10 degrees from summer to winter, although a greater range is found over inland areas. Temperatures of 32°F or lower are experienced nearly every winter throughout the county, and colder temperatures are common in the interior. Maximum readings for the year often do not exceed 80°F on the coast, while readings over 100°F occur frequently in the mountain valleys.

In most years, rainfall is experienced each month of the year, although amounts are negligible from June through August. Seasonal totals average more than 40 inches in the driest area, and exceed 100 inches in the wettest. Because of the moisture and moderate temperature, the average relative humidity is high.

Largely as a result of proximity to the cool Pacific Ocean, the adjoining coastal area has a cool, stable temperature regime. With increasing distance from the ocean, the marine influence is less pronounced, and inland areas experience wider variations of temperature and lower humidity. This marine influence can reduce fire hazards to those areas of the county that are affected by the moist air.

“The interesting relationship between fog-stratus and regional temperature is known to those who have lived on the redwood coast for any length of time. Cool water upwells offshore as the California current flows southward. Warmer air moving over this humid surface is chilled and condenses. When interior temperatures rise, this marine layer of air is pulled inland and gets forced against the coastal mountains and is vertically contained under an inversion associated regional high pressure. Given this persistence of this pattern during most years’ fire season, the local occurrence probability of fog-stratus helps define the fire hazard as well as the vegetation that is found there....

“It is common to observe the strongest fire activity in the interior Klamath mountains on days when this coastal fog-stratus pattern is best developed. Variation in fog-stratus over centuries can alter the fire occurrence probabilities...”⁶

Inland, thunderstorm activity typically begins in June with wet storms. These storms often turn dry—with little or no precipitation reaching the ground and are accompanied by lightning—as the season progresses into July and August. The combination of these dry thunderstorms and the lack of marine influence increase fire hazard in the eastern portion of the county.

Wind is considered the most variable and difficult weather element to predict. It increases the *flammability* of fuels (live or dead vegetation, as well as human-built structures) by removing

⁵ Husari, S., Nichols, T., Sugihara, N.G. & Stephens, S.L. (2006). Fuel management. In Sugihara, N.G., van Wagtenonk, J., Shaffer, K.E., Fites-Kaufman, J., & Thode, A.E. (Eds.). *Fire in California’s Ecosystems*. (pp. 444–465.) Berkeley: University of California Press.

⁶Coast Redwood Ecology and Management. (n.d.) *Climate Change in Coast Redwood Forests*. Retrieved December 13, 2012, from www.redwood.forestthreats.org/climatechange.htm

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moisture through evaporation, by pre-heating fuels in a fire's path, and by increasing spotting distances (the distance at which a spot fire might be ignited by a flying ember). Wind velocities and directions may vary across vertical gradients, with somewhat different impacts on fire behavior. The direction and velocity of surface winds can directly control the direction and rate at which the fire spreads. Winds that blow more than 20 ft. above the ground can carry embers and *firebrands* downwind, causing spot fires to precede the primary front.

Prevailing winds during Humboldt County's *fire season* (generally June through October) are out of the northwest. In July and August local winds (slope winds and sea breezes) predominate, with the Pacific jet stream weak and well to the north. By September, weak to moderate north-to-northeast winds can become more prevalent. These winds are more critical for bringing in moist ocean air than in the late spring. The more easterly flows in particular are problematic, being significantly drier. These drier winds are a major factor in many if not most of the larger fires and more extreme fire behavior locally, combined with their usual coincidence with the annual low ebb of both live and dead fuel moistures.

Fires during foehn events—or subsiding winds—usually result in extreme fire behavior because they are particularly strong and dry, thus reducing fuel moistures. This leads to easier ignitions and increased fire intensity and rate of spread. Foehn winds can also cause extreme fire behavior at night, when fires normally die down.

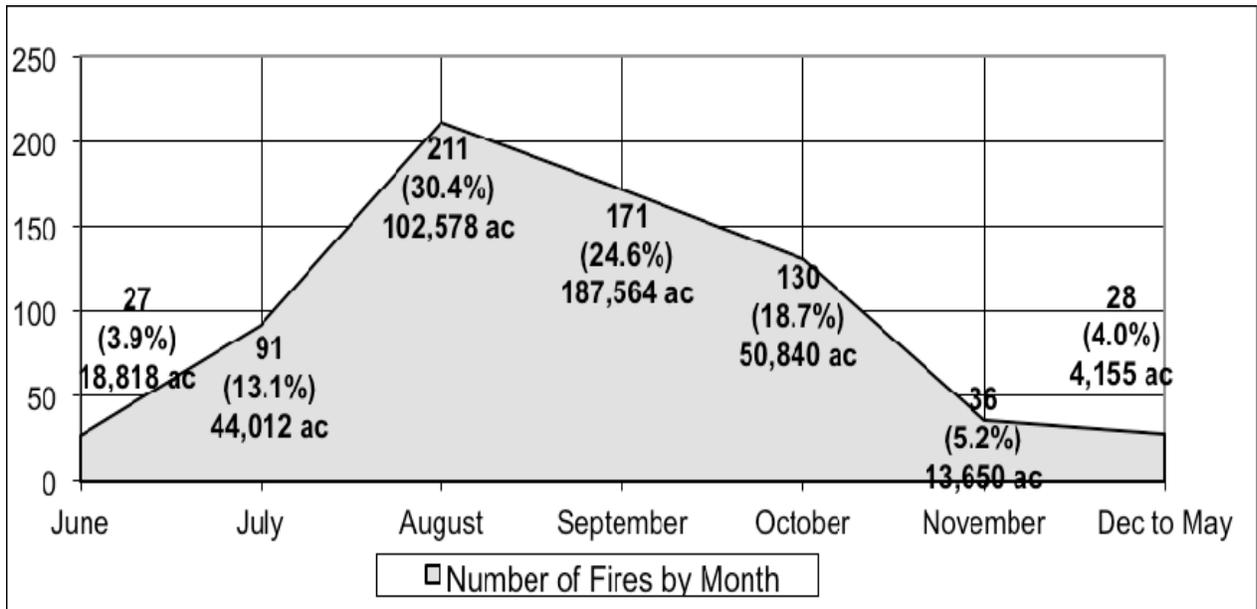
Weather conditions can change rapidly as upper-level wind currents and pressure systems in the western states shift locations, and both dry and wet frontal systems move through the mountainous terrain. Frontal winds associated with low-pressure systems moving across the area can create hazardous fire conditions. Winds in advance of the frontal system can reach speeds exceeding 60 mph over ridges. Winds associated with thunderstorms are particularly erratic, radiating in all directions from the center of the storm. Atmospheric instability dilutes and disperses smoke but also tends to increase fire intensity, analogous to opening the damper on a stovepipe. Wind in general is an important factor in initiating and maintaining crown fires.

A phenomenon worth noting is that which occurred with the Honeydew Fire (2003) in the King Range National Conservation Area. Instead of the usual and expected gradual cooling and humidity accumulation throughout the night, around midnight temperatures increased and relative humidities dropped for several hours, resulting in a more active nocturnal burning period. This increased nocturnal burning effect was observed in the Basin Fire at Big Sur (2008) as well, also a coastal area with similar topographical elements.

The following graph shows the average number of fires, the annual percentage, and the total acreages burned by month for the years 1908-2011. As explained above, Humboldt County's hottest and driest times of the year—as well as the time with the most inland lightning ignitions—are during the late summer and fall months. These are when we see both the most fires burning every year here, as well as the most total acreage burned by month.

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Figure II.1.3. Humboldt County, Average Number of Fires and Acreage by Month, 1908-2011⁷

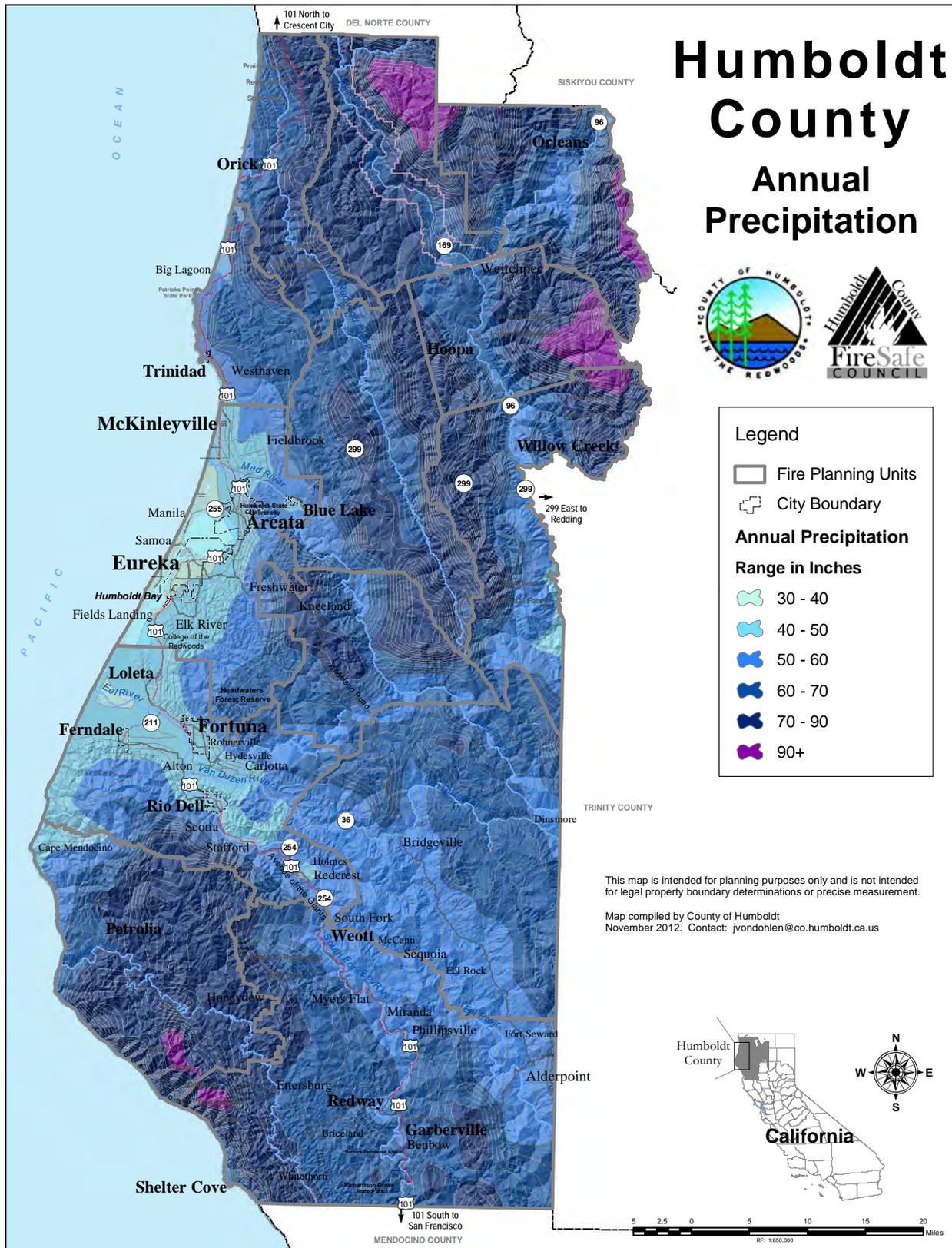


The National Weather Service provides daily fire weather forecasting for Humboldt County from their Eureka office. All fire weather forecasts are available at the Eureka office main web page: <http://www.wrh.noaa.gov/Eureka>.

⁷ CAL FIRE. (2007). *Fire Resources Assessment Program (FRAP)*. [Map showing Fire Hazard Severity Zone ratings within various geographic areas, mapped by county]. Fire Hazard Severity Zones Map. Retrieved from <http://frap.cdf.ca.gov/>

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Figure II.1-4. Precipitation Map



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Climate Change and Wildfire in Humboldt County⁸

In 2010, Forest Service ecologists summarized current research regarding climate change and its impact to Six Rivers National Forest and surrounding areas. The paper, entitled, *A summary of current trends and probable future trends in climate and climate driven processes for the Six Rivers National Forest and surrounding lands*, is an excellent resources for those interested in the impact of changing climate on Humboldt County, and what that might mean in terms of wildfire.

Local weather data from throughout the Six Rivers National Forest (Orleans, Gasquet, Willow Creek, and Mad River) show that most of the Forest “has experienced increases in mean annual temperature of about 1°C (1.8° F) over the last 3/4 century, although some coastal areas have seen a slight decrease in temperature.” Temperature increases are most dramatic during the nighttime (minimum temperatures) in interior areas.⁹ They also found that “year-to-year variability in precipitation has increased over the course of the last century.”¹⁰

Perhaps most important, in terms of wildfire:

“Analyses of hydrometeorological data from the lower Klamath Basin show a decrease in the percentage of precipitation falling as snow and accelerated snowpack melt, resulting in earlier peak runoff and lower base flows (Hamlet et al. 2005; Mote et al. 2005; Regonda et al. 2005; Stewart et al. 2005; Mote 2006; Van Kirk and Naman 2008).”¹¹

Lack of sufficient snowpack to provide adequate water flows in summer and into fall—during the times of historic fire season (*see Wildfire Risk and Fire History section below*)—can substantially increase both local fire hazard and fire risk.

“Although climate models diverge with respect to future trends in precipitation over NW California, there is widespread agreement that the trend toward lower SWE [snow water equivalent] and earlier snowmelt will continue (Leung and Wigmosta, 1999; McCabe and Wolock, 1999; Miller et al. 2003; Snyder et al. 2004; Barnett et al. 2005; Zhu et al. 2005; Vicuna et al. 2007; Van Kirk and Naman 2008).”¹²

With respect to forest fires, the authors state:

“Data on forest fire frequency, size, total area burned, and severity all show strong increases in California over the last two to three decades. Westerling et al. (2006) showed that increasing frequencies of large fires (>1000 acres) across the western United States since the 1980’s were strongly linked to increasing temperatures and earlier spring snowmelt. Northern California forests have had substantially increased wildfire activity, with most wildfires occurring in years with early springs (Westerling et al. 2006). This increase is likely attributable to both climate and land-use effects. Large percentage changes in moisture deficits in Northern California forests, according to Westerling et al. (2006), were strongly associated with advances in the timing of spring, but this area also

⁸ This section is based on the paper: Butz, R.J. and Stafford, H. (2010). *A summary of current trends and probable future trends in climate and climate driven processes for the Six Rivers National Forest and surrounding lands*. USDA Forest Service Pacific Southwest Region. Retrieved from www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5251124.pdf

⁹ Butz & Stafford. (2010.) p. 1.

¹⁰ Butz & Stafford. (2010.) p. 2.

¹¹ Butz & Stafford. (2010.) p. 8.

¹² Butz & Stafford. (2010.) p. 10.

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includes substantial forested area where fire exclusion, timber harvesting, and succession after mining activities have led to increased forest densities and fire risks (McKelvey et al. 1996; Gruell 2001).

“During 1987-2008, Miller et al. (2010) found [on the four National Forest of NW California] that the percentage of high-severity fire in conifer-dominated forests of smaller average diameter and lower percent cover was generally higher than in forests of larger diameter and higher cover.

And that

“forests near the coast were not more susceptible to high severity fire than interior forests, but the size of forest patches burned at high severity was positively related to proximity to the coast.”¹³

The authors conclude their analysis as follows:

“It is important to note that although much of northern California is projected to experience more frequent and severe fires under future scenarios, Lenihan et al. (2003, 2008) predict a decrease in mean annual area burned for coastal northern California (Fig. 19). Lenihan et al. simulated changes in mean annual area burned for the future period based on changes in vegetation types. For the northwest coast of California, they projected no significant increase in grass or shrub vegetation types that promote higher rates of fire spread in their models. Data from Miller et al. (2010) suggest that fires in the Klamath Mountains, particularly in wetter areas along the western slope, are not experiencing a trend in increasing fire severity (although the overall area of high severity fire is increasing due to increases in annual burned area). This is likely due to the more maritime climate, the importance of the maritime inversion layer over the area in the summer, and the strong influence of topography on fire behavior. Increased upwelling in the California Current under increased CO₂ conditions may intensify fog development and onshore flow during the summer months (Bakun 1990, Snyder et al. 2003), potentially further buffering wetter regions of the North Coast from intensifying fire regimes.”¹⁴

As described above, current data shows that temperatures, precipitation, and fire frequency and severity are changing in Humboldt County and throughout California. What that could mean regarding wildfire in Humboldt County is less predictable fire behavior. There may be more frequent and more erratic fires inland, perhaps with a decrease of wildfire along the coastal areas of the county. Such changes in fire behavior make community-based fire safety efforts all the more important (*see Chapter II.4. Community Preparedness and Part V. Fire-Safe Communities for more information*).

Hydrology

The *hydrology* of an area describes the flow of water across and through the land. Lakes, ponds, streams, wetlands, and springs are just a few examples of an area’s hydrological features. The presence of these features tends to increase the humidity of a local site and can make it more resistant to the effects of fire. In the case of ponds and lakes, their availability as water sources for fire suppression is also important.

Humboldt County’s hydrologic features are abundant. Humboldt Bay is nestled into the coast at the county’s midpoint, and is the only deep-water port between San Francisco and Coos Bay,

¹³ Butz & Stafford. (2010). p. 8.

¹⁴ Butz & Stafford (2010.) pp. 13-14.

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Oregon. Thousands of waterways flow through the region, from small ephemeral streams to large creeks and rivers, eventually making their way to the Pacific Ocean. Noteworthy rivers running through the county are the South Fork Eel, Eel, Mattole, Van Duzen, Mad, South Fork Trinity, Trinity, and the Klamath. Redwood Creek is a significant watershed that runs through half the length of the county. These watersheds can be grouped into four larger basins: Klamath-Trinity, Mad-Redwood, Eel, and Mattole.

Vegetation and Fuels^{15,16}

Vegetation usually provides most of the fuel that feeds wildfire, along with other flammable material on site (such as homes). It is highly variable in many respects, including size, height, density, and relative volatility/flammability. The volume, character, distribution, and arrangement, relative presence of volatile oils, and *moisture content* of fuels are all factors that greatly influence fire behavior.

Fuel includes anything that can burn: grass, shrubs, and trees, as well as fences, decks, furniture, cars, and houses. These can be described as *fuel models* (see below), or in terms of sizes, volumes, and arrangement: light fuels (e.g. grass, foliage, kindling-size twigs, or baskets and brooms), medium fuels (e.g. shrubs, branches, or fences), or *heavy fuels* (e.g. logs, tree trunks, or human-built homes). Light, medium, and heavy *fuel loadings* describe fuel volume. Fuel arrangement is commonly discussed in terms of continuity—both horizontal and vertical.

Nearly every major *fuel type* in California exists within Humboldt County. Examples include grasslands, oak woodlands, *brush*, mixed *conifer forests*, and hardwood forests. A significant portion of Humboldt County is comprised of temperate rainforest (designated as such due to the microclimate of high moisture, humidity, and fog created by stands of ancient trees such as coastal redwoods), with a large quantity of rainfall each year. Because of this ecosystem diversity, Humboldt County can experience virtually any type of wildfire that can occur in California, from fast-spreading grass fires to long-duration forest fires (for more information, see *Fuel Models* below).

The virtual exclusion of widespread low- to moderate-severity fire has affected the structure and *composition of vegetation types*. Conifer stands are generally denser, mainly in small- and medium-size classes of shade-tolerant and *fire-sensitive* tree species. Fuels have become more vertically continuous, contributing to more spatially homogeneous forests. Selective cutting of large *overstory* trees and the relatively warm, moist climate during much of the twentieth century may have enhanced conditions for tree seedling establishment.

A relatively recent and significant development in the consideration of local fuels is the incidence of *Sudden Oak Death* (SOD) within some parts of Humboldt County.¹⁷ SOD is a caused by *Phytophthora ramorum*, an invasive forest pathogen introduced to California in the mid-1990s through the horticultural plant trade (especially through rhododendron, camellia, and viburnum species). It was first identified in Humboldt County in 2002 in the Redway area. It has

¹⁵ Harrel, R.D. & Teie, W.C. (2001). *Will Your Home Survive? A Winner or Loser? A guide to help you improve the odds against Wildland Fire*. (pp. 17–26.) Deer Valley Press, (www.deervalleypress.com).

¹⁶ Anderson, H. E. (1982). Aids for Determining Fuel Models for Estimating Fire Behavior. *General Technical Report INT-122*. Ogden, UT: U.S. Department of Agriculture (USDA), Forest Service, Intermountain Forest and Range Experiment Station.

¹⁷ For more information on Sudden Oak Death in Humboldt County, see: Valachovic, Y., Lee, C., Glebocki, R., Scanlon, H., Varner J.M., & Rizzo, D.M. Understanding The Long-Term Fire Risks In Forests Affected By Sudden Oak Death. In: Frankel, S.J., Kliejunas, J.T., Palmieri, K.M. (2010). Proceedings of the Sudden Oak Death Fourth Science Symposium. *General Technical Report PSW-GTR-229*. (pp. 262-270.) Albany, CA: USDA, Forest Service, Pacific Southwest Research Station.

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since spread in southern Humboldt and occurs primarily in the South Fork Eel River watershed north to Weott. Other sites are found near Eel Rock, Blocksburg, and in the Redwood Creek watershed north of Highway 299.

This pathogen has caused widespread dieback of tanoak (*Notholithocarpus densiflorus*) and several other oak species throughout coastal California counties. Affected areas can have a significantly higher fire hazard due to higher proportions of *dead fuels* of all sizes, and a prevalence of snags.¹⁸ This disease spreads easily by wind-driven rain events; the affected area is anticipated to grow substantially. Recent research has helped to characterize the nature of the risk and will help to guide firefighter response.¹⁹

Several factors make the spread of SOD a particular concern here:²⁰

- The pathogen continues to spread in North Coastal wildlands. For example, one small infestation detected in Redway in 2002, has since grown to include patches scattered over several dozens of square miles, directly impacting over 14,000 acres. The pathogen could continue to spread and eventually affect tanoak throughout much of the North Coast.
- Ecologists expect Sudden Oak Death's impacts to area forest ecosystems (e.g. timber, tribal, wildlife, fire hazard, aesthetics, etc) to be significant.
- The wildlands and natural resources of Humboldt County are significant both in terms of their total acreages and in areas at high risk for the disease.²¹
- Concern continues to mount in Oregon and Washington regarding further pathogen spread from California and particularly whether Humboldt County will be the northern gateway for spread of the disease.
- A limited time window from the point of detection of a new wildland infested area exists for early response and pathogen control.

Given these facts, the effect of Sudden Oak Death on the wildfire environment in Humboldt County is significant. The disease and its ramification in local ecosystems must be taken into account in fuel-reduction and other *ground-disturbing* activities in the County to minimize its negative effects.

An aerial survey project conducted in 2006 mapped mortality of SOD hardwood hosts (primarily tan oak and coast live oak) and found 4,138 acres of tree mortality in Humboldt County.²² Mortality of conifers and hardwoods has resulted in areas of heavier fuel loadings and

¹⁸ *Snags* are standing dead trees, which can be very flammable. They are also often teeming with life such as insects and woodpeckers, and hence an important part of local forest biodiversity.

¹⁹ Valachovic, Y., Lee, C., Scanlon, H., Varner, J.M., Glebocki, R., Graham, B.D., & Rizzo, D.M. (2011). Sudden oak death-caused changes to surface fuel loading and potential fire behavior in Douglas-fir-tanoak forests. *Forest Ecology and Management*, 261, 1973-1986. Retrieved from www.cafiresci.org/storage/papers/psw.2011.valachovic.SODcausedchanges.FEM.pdf

²⁰ Valachovic, Y., personal communication, August 31, 2012.

More information can be found at either at: University of California Cooperative Extension (UCCE): Humboldt – Del Norte Counties. (2012). *Sudden Oak Death*. Retrieved from http://cehumboldt.ucdavis.edu/Sudden_Oak_Death/ (UCCE Humboldt coordinates monitoring and management of the disease under grant funds), *or:* California Oak Mortality Task Force. (n.d.). *What is Sudden Oak Death?* Retrieved from www.suddenoakdeath.org

²¹ *For more information, see:* UCCE: Humboldt – Del Norte Counties. (2012). Disease Locations and Pathogen Monitoring. Retrieved from http://cehumboldt.ucdavis.edu/Sudden_Oak_Death/Disease_Locations_and_Pathogen_Monitoring/

²² Bell, L. & Fischer, L. (2006). *2006 Accomplishment Report: Aerial & Targeted Ground-Based Monitoring for Sudden Oak Death*. USDA Forest Service, Pacific Southwest Region, State and Private

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increased flammability. Causes of mortality include insect damage, diseases (such as SOD), blow-downs, and damage from past fires. Mortality on private timberlands has also been observed due to active removal of harvestable material. Such disturbances result in changes in the ecosystem function, which often means mortality of trees and increased fuel loads for potential fires.

Fuel Models

A fuel model is a standardized description of fuels available to a fire, based on the amount, distribution, and continuity of vegetation and wood.²³ Among other things, fuel model information helps fire suppression agencies determine what kind of fire might be expected in different areas. Fuel models distinguish between vegetation such as tall and short grass, timber with and without an *understory*, and oak woodland with and without understory vegetation. Fire managers use fuel models within the Fire Behavior Prediction System (FBPS)—called FBPS #1, 4, 10, etc.—to forecast how fast a fire will spread, how damaging the fire might become (in terms of fire intensity), or whether it is likely to *torch* in the area. Information regarding fuel volumes and fire behavior descriptions is available from the USDA Forest Service publication *How to Predict the Spread and Intensity of Forest and Range Fires*.²⁴

Fuel models describe vegetation structure in addition to typical *species composition*; structure largely determines the fuel that will actually support the fire. The understory is more important than the overstory. The most significant factor is the amount and distribution of smaller-diameter fuels because these materials generally contribute to the spread of wildfires. A grassy field with oak trees that cover less than one-third of the slope would be classified as a grass fuel model, because the contribution of oak leaves and branches to fire behavior may be negligible (due to the minor amount of *leaf drop* or the relative height at which the first branches grow above the ground). Similarly, where brush covers less than one-third of a conifer stand, it would be classified as a conifer stand. The amount and size of dead material distinguishes among the three types of conifer fuel models. Another important factor in fuel models is the amount of dead *biomass* and the ratio of live-to-dead material where there are significant brush and tree stands. Dead biomass contributes fine fuel *litter* and carries flames more readily.

The table below shows the fuel models present in Humboldt County and their respective acreages. Surface fuels (based on these same fuel models) are illustrated in the map below, in Figure II.1-5.

Forestry, Forest Health Protection program. Retrieved from
<http://www.suddenoakdeath.org/pdf/2006SODAccomplishmentReport.pdf>

²³ National Park Service. (2012 December 13). *Glossary of Fire Terms*. Retrieved from
http://www.nps.gov/seki/naturescience/fic_firegloss.htm

²⁴ Rothermel, R.C. (1983). How to predict the spread and intensity of forest and range fires. *General Technical Report INT-143*. Ogden, UT: USDA, Forest Service, Intermountain Forest and Range Experiment Station.

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Figure II.1-5. Fuel Models Found in Humboldt County

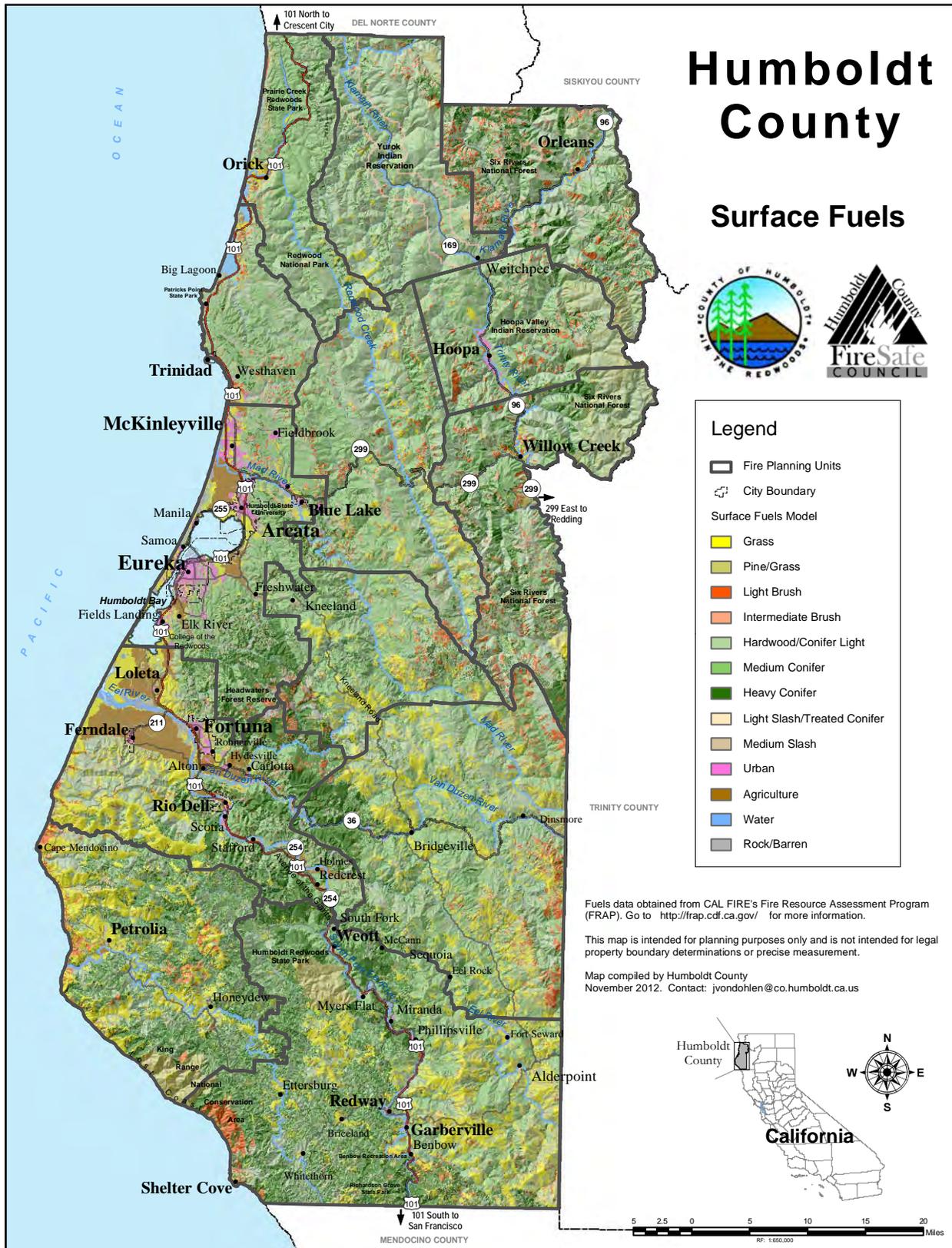
Fuel Model Description	<u>Typical Fuel Model</u>^{25, 26}	<u>Acres and Percentage found in Humboldt County</u>
Grass	1	233,415 (10%)
Pine/Grass	2	141,129 (6%)
Light Brush	5	89,295 (4%)
Intermediate Brush	6	7,497 (less than 1%)
Hardwood/Conifer Light	8	624,514 (27%)
Medium Conifer	9	748,023 (33%)
Heavy Conifer	10	295,454 (13%)
Light Slash/ Treated Conifer	11	9,353 (less than 1%)
Medium Slash	12	44,144 (2%)
Non-Burnables such as Urban, Agriculture, Water, and Rock/Barren	28, 97, 98, and 99	99,398 (4%)
<i>Source: CAL FIRE's Fire Resource Assessment Program (FRAP)</i>		

²⁵ There is a wide variety of fuel volume, structure, and size class distribution within vegetation types; fuel models should be determined by site-specific conditions. Fuel models can be classified by comparing photographs of fuel models with on-site conditions (Anderson 1982), by using expert opinion to translate vegetation types to fuel models, or by using a “key” provided in Rothermel (1983).

²⁶ Anderson, H.E. (1983). Predicting Wind-driven Wild Land Fire Size and Shape. *Research Paper INT-305*. (p. 26.) Ogden, UT: USDA, Forest Service, Intermountain Forest and Range Experiment Station.

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Figure II.1-6. Surface Fuels Map



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The following is a description of each of the Fuel Models found in Humboldt County.

Model 1 – 2 Grass Models

Fuel Model 1 – This model contains annual and perennial short grasses, about one foot tall, which are fairly uniform and homogenous. Less than 1/3 of the area contains other types of vegetation such as trees and shrubs. This fuel model is most commonly found distributed throughout the large ranchlands in the southwestern and southeastern portions of the county. Grazing is the predominant use of these areas. There is approximately 3/4 tons²⁷ per acre of fuel at a depth of about one foot. *Fire spread* is governed by the fine, very porous, and continuous *herbaceous fuels* that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured vegetation and contain flame lengths approximately 4-feet high.

Fuel Model 2 – This model is dominated by grasses approximately one- to two-feet tall. The grasses within this model generally occur under an open, wooded timber canopy. This fuel type constitutes a very small percentage of the land area within the county with concentrations located on Six Rivers National Forest lands at high elevations to the east of the Hoopa Valley Indian Reservation and within the King Range National Conservations Area and Humboldt Redwoods State Park. There is approximately four live/dead tons of <3-inch fuel per acre at a depth of about one foot. Also occurring within the 1-ft. *fuel bed* are approximately two tons of 1/4-inch dead material as well as a 1/2-ton of live (foliage) material. Fire spread occurs in the live/dead fine surface materials. Areas with high *fuel loads* associated with the hardwood and conifer component can be intense and cause firebrands. Fires within this model can produce flames over 9 feet.

Model 5 – 6 Shrub Models

Fuel Model 5 – This model consists of stands of mature shrubs with little or no dead material component. Most of the fuels within this model are alive, consisting of green vegetation that is not very volatile. This fuel model occurs on poor sites, on recent burns, and may occur under tree canopies. There are smatterings of this fuel model throughout the county collectively adding up to only about 4% of the land area. A coastal strip with concentrations near Orick, Big Lagoon, Cape Mendocino, and the southern portion of the King Range National Conservation Area include varying combinations of coyote brush, manzanita, and/or lupine; sometimes referred to as coastal scrub. Inland areas, particularly along the eastern edge of the county, are sprinkled with patches of this fuel model.

This fuel model consists of approximately 3.5 live/dead tons of <3-inch fuel per acre to a depth of about two feet. Also occurring within the 2-ft. fuel bed are approximately one ton of 1/4-inch dead material as well as 2 live tons per acre. Fires in this fuel model generally do not burn intensely or rapidly, due to high concentration of live material. Flames can reach heights of over 13 feet.

Fuel Model 6 – This model consists of vegetation that is taller and more flammable than that of Fuel Model 5. In many instances a Fuel Model 5 will evolve into a Fuel Model 6 by the latter part of the summer. Only one percent of the county is classified with this fuel model, showing up in a few patches on Six Rivers National Forest lands in the northeastern corner of the county and southwest of Willow Creek; this is likely brush related to logging operations in the mixed conifer forests of those areas. There is approximately 6 live/dead tons of <3-inch fuel per acre to a depth of about 2.5 feet. Also occurring within the 2.5-ft. fuel bed are approximately 1.5 tons of 1/4-inch

²⁷ This includes both live and dead vegetation. Dead vegetation, e.g. dead branches, responds quickly to weather conditions while live fuels, e.g. flowering branches, are slower to change with weather and are less flammable.

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dead material per acre. Fires in this model will burn in the foliage of standing vegetation, but only when wind speeds are greater than eight mph. Fires within this model can produce flames about 12-feet tall.

Model 8 – 10 Timber Litter Models

Fuel Model 8 – This model consists mainly of needles, leaves, and occasionally twigs below a conifer or hardwood canopy. Approximately 27% of the county can be associated with this fuel model making it second only to Model 9 in amount of area covered. Coastal areas are dominated in the north by coast redwood and in the south and east by conifer/hardwood forests with less of an understory than Fuel Model 9. There are approximately 5 live/dead tons of <3-inch fuel per acre to a depth of about 0.2 feet. Also occurring within the 0.2-ft. fuel bed are approximately 1.5 tons of 1/4-inch dead material per acre. Fires within this model are generally slow burning and of low intensity within the compacted vegetation, although the fire may encounter an occasional “jackpot” or heavy fuel concentration that can flare up. Fires in this model do not pose a control threat unless high temperatures, low relative humidity, and high winds allow the fire to spread into the canopy. Fires within this model can produce flames about 2 feet tall.

Fuel Model 9 – This model is similar to Fuel Model 8, except it has more fine fuels, which increase fire severity. This model represents 33% of the county and the associated vegetation type varies depending on geographic location. Coast redwood, Douglas-fir, and spruce are found in coastal areas. Inland areas classified under this model are dominated by Douglas-fir intermingled with hardwoods. There is approximately 3.5 live/dead tons of <3-in. fuel per acre to a depth of about 0.2 feet. Also occurring within the 0.2-ft. fuel bed are approximately 2.9 tons of 1/4-inch dead material per acre. Autumn fires in the hardwoods in this model are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting (spot fires) caused by rolling and blowing leaves. Concentrations of dead and *downed woody debris* will contribute to possible torching, crowning, and spotting. Fires within this model can produce 7-foot flames.

Fuel Model 10 – This model consists of a shrub, sapling, or immature tree understory with a diseased and/or mature overstory. Much of the county’s old growth forests fall into this category with a mature closed canopy and a thick, lush understory with large amounts of biomass. The largest concentration of this type is located along the South Fork Eel River and the lower Van Duzen River including parts of Humboldt Redwoods State Park, the Avenue of the Giants, and Humboldt Redwood Company and Green Diamond Resource Company lands. The predominant forest type falling into this fuel model is older coast redwood, with patches of Douglas-fir located in the northeastern portion of the county. There is approximately 12 live/dead tons of <3-inch fuel per acre to a depth of about 1 foot. Also occurring within the 1-ft. fuel bed are approximately 3 tons of 1/4-inch dead material as well as 2 live tons per acre. Fires in this model burn with a moderate rate of spread and can be very intense. *Crown scorch* (and/or torching) of individual trees and spot fires are common within Fuel Model 10. This fuel model poses the most control problem of all the fuel models within the three timber litter models. Fires within this model can produce flames over 100 feet high in extreme conditions.

Model 11 – 12 Logging Slash Models

Fuel Model 11 – This model consists mainly of logging slash produced by *thinning* operations or light, partial cuts within mixed conifer or hardwood stands, as well as herbaceous material intermixed with *slash*. Only 1% of the county is characterized by this model and it is lightly sprinkled over the landscape. It is found in many locations associated with past timber harvests. There is approximately 11.5 live/dead tons of <3-inch fuel per acre to a depth of about 1 foot. Also occurring within the 1-foot fuel bed are approximately 1.5 tons of 1/4-inch dead material, and there is typically no live material within the fuel bed. Fires in this model generally have a low rate

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of spread and burn at low intensities. Fire potential can be limited by wide spacing between light loads of mostly fine fuels, as well as shade from the remaining overstory. Fires within this model can produce flames 3.5 feet in length.

Fuel Model 12 – This model consists of heavy amounts of slash produced either by clearcuts, medium- or heavy-partial cuts, or heavily thinned mixed conifer or mixed conifer/hardwood stands. Similar to Fuel Model 11, there is a very small percentage of the county (2%) that is characterized by this model and it can generally be associated with areas where timber harvesting has occurred. There is approximately 34.6 live/dead tons of <3-inch fuel per acre to a depth of about 2.3 feet. Also occurring within the 2.3-ft. fuel bed are approximately 4 tons of ¼-inch dead material, and there is typically no live material within the fuel bed. Fires in this model can spread quite rapidly with moderate or high intensities and are capable of generating firebrands. Consistent, even distribution of the fuels within this model continue to sustain fires once they start, until a change or break in the *fuel continuity* is encountered. Fires within this model can produce 8-foot flames.

Wildlife

Wildlife in Humboldt County includes animals, fish, plants, insects, and other invertebrates. The variety of organisms in Humboldt County is extensive and reflects the ecosystem diversity mentioned above. According to the California Department of Fish and Game’s California Natural Diversity Database (CNDDDB), there are currently at least 158 rare or *endangered species* of flora and fauna found in Humboldt County.²⁸ (State and federally listed *Threatened and Endangered (T&E) species*, are often referred to as “listed” species.) Rare and endangered species aside, Humboldt’s vegetative diversity is home to several hundred species of wildlife. All of the species found within the county, from the marbled murrelet to the coho salmon to the Humboldt milk-vetch, depend on the environment around them to provide the food, water, and shelter they need to survive.

While most biologists acknowledge that fire plays a role in the environment in which these species live, little is known (or perhaps remembered) about the relationship of these species to fire. Their response to fire of varying intensities, frequencies, and seasons is also not well understood; even less understood are the effects of various *hazard reduction treatments* on rare species. All of the species found within the county have had to adapt to fire in some way in order to survive within this fire-evolved landscape. Some organisms learn to flee, others sprout as a result of fire, while others store extensive amounts of seed within the soil in order to re-occupy a site after a fire. These adaptations have helped to establish the flora and fauna found here.

The following table shows a list of federal and state listed species in Humboldt County.

Figure II.1-7. Federal and State Listed Species in Humboldt County²⁹

Scientific Name	Common Name	Occurrences
<i>Astragalus agnicidus</i>	Humboldt Milk-Vetch	5
<i>Bensoniella oregona</i>	Bensoniella	5
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	-
<i>Charadrius alexandrinus nivosus</i>	Western Snowy Plover	6

²⁸ California Department of Fish and Game. (n.d.). *California Natural Diversity Database (CNDDDB)*. [Interactive map that allows user to view species or natural communities that have been documented by the CNDDDB within specific topographic areas]. CNDDDB Quick Viewer. Retrieved December 13, 2012, from http://imaps.dfg.ca.gov/viewers/cnddb_quickviewer/app.asp

²⁹ California Department of Fish and Game, (n.d.) *CNDDDB*.

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Scientific Name	Common Name	Occurrences
<i>Empidonax traillii</i>	Willow Flycatcher	1
<i>Erysimum menziesii</i> ssp <i>eurekense</i>	Humboldt Bay Wallflower	6
<i>Eucyclogobius newberryi</i>	Tidewater Goby	6
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	2
<i>Haliaeetus leucocephalus</i>	Bald Eagle	5
<i>Layia carnosa</i>	Beach Layia	10
<i>Lilium occidentale</i>	Western Lily	9
<i>Oncorhynchus clarki clarki</i>	Coast Cutthroat Trout	32
<i>Oncorhynchus kisutch</i>	Coho Salmon - Central California ESU	3
<i>Oncorhynchus mykiss irideus</i>	Summer-Run Steelhead Trout	6
<i>Oncorhynchus mykiss irideus</i>	Northern California Steelhead Trout	-
<i>Oncorhynchus tshawytscha</i> spring-run	Spring-Run Chinook Salmon	1
<i>Rallus longirostris obsoletus</i>	California Clapper Rail	1
<i>Riparia riparia</i>	Bank Swallow	1
<i>Strix occidentalis caurina</i>	Northern Spotted Owl	318
<i>Thlaspi californicum</i>	Kneeland Prairie Pennycress	1

There are other plant and animal species that have not (as of publication) been listed as threatened or endangered at the federal or state level, but which are still rare enough to be listed in the CNDDDB. These species, such as the Pacific fisher, Humboldt marten, Pacific lamprey, and green sturgeon, would meet the criteria for listing but have not yet been formally listed or selected as candidates.

In order to reduce potential adverse effects to flora and fauna, and especially to listed species, fuel reduction planners in Humboldt County (such as Registered Professional Foresters) must use the best available information regarding each species within a project area. This includes considering critical habitat attributes that species need in order to survive. Important information such as breeding period, migration patterns, blooming period, and much more, can help planners reduce fire threat, while restoring, enhancing, and/or creating necessary *habitat* within Humboldt County.

II.1.4. Wildfire Hazard

The term “hazard” is mainly used in the fire community in relation to topography and *fuel complex* (the volume, type, condition, arrangement, and location of fuels).³⁰ “Fire hazard” is a description of the fuels available to burn in a given area and how they would burn. It can be influenced by past disturbances or management activities that alter the hazard for better or worse by changing the overall site moisture. It is also affected by the volume and spatial arrangement of fuels. Fire hazard is distinguished from *fire risk*, which incorporates the probability of wildfire occurrence—or ignitions—with fire hazard.

³⁰ Husari, S. et al. (2006). Fuel management.

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Hazard Assessment and Fire Hazard Severity Mapping

Fire hazard is a way to measure physical fire behavior to predict the damage a fire is likely to cause and how resistant it will be to control. Fire hazard measurement includes the speed at which a wildfire moves, the amount of heat produced by the fire, and most importantly, the burning firebrands that the fire sends ahead of the flaming front. Fire hazard elements include the following, which have been described in more detail in the General Wildfire Environment Descriptions section above:

- **Vegetation**—Whether live or dead, vegetation is "fuel" to a wildfire and it changes over time. The fire hazard severity rating considers the potential vegetation over a 50-year time horizon.
- **Topography**—Fire burns more intensely and spreads more rapidly on steep slopes.
- **Weather**—Fire burns faster and with more intensity when air temperature is high, relative humidity is low, and winds are strong.
- **Crown Fire Potential**—Under extreme conditions, fire burns upwards into tall brush and tree canopies.
- **Ember Production and Movement**—Firebrands are blown ahead of the main fire, which can ignite buildings and spread the fire (spotting).
- **Likelihood of Fire**—The likelihood of an area burning over a 30 – 50 year period.

A site's hazard ranking tells us the expected behavior of fire in severe weather (when wind speed, humidity, and temperature make conditions favorable for a catastrophic fire). *Fire Hazard Severity Zones* (FHSZs) are how the state of California assesses and defines fuel hazards. FHSZs range from Medium to High to Very High.

“Fire Hazard Severity Zones represent areas of variable size ranging from 20 acres in urbanized areas to at least 200 acres in wildland areas, with relatively homogeneous characteristics regarding expected burn probability and potential fire behavior attributes based on *climax fuel conditions* over a 30-50 year time horizon.”³¹

CAL FIRE completed a major effort to reclassify FHSZs in 2007 as a component of implementing the new Wildland-Urban Interface building code (*See Part V. Fire Safety of this CWPP for more information on building codes*). These reclassifications included *State Responsibility Areas* (SRA) and *Local Responsibility Areas* (LRA).³²

Humboldt County exhibits extreme diversity in its potential for destructive wildfire, ranging in severity classification from nil to very high, based on the wildfire hazard severity zone map. In SRA lands, the map generally reflects a “high” rating on the western portions of Humboldt, where the fuel potential is high but the climate is damp. The “very high” ratings are generally in the drier, eastern portions of the county, or in very steep terrain, such as found along the Lost Coast. “Moderate” ratings are in valley bottom areas, which are generally urban or agricultural. Those areas not generally prone to fire risk are concentrated in coastal and *estuary* lands. There

³¹ Sapsis, D. (n.d.) *Fire Hazard Severity Zoning (FHSZ) Draft Map Review And Validation* [PowerPoint slideshow]. CAL FIRE. Retrieved December 13, 2012, from http://frap.fire.ca.gov/projects/hazard/Fire_Hazard_Zoning_workshop_1_8.ppt.

³² *For more information on Fire Hazard Severity Zone mapping, please see:* CAL FIRE. (2007). *Fire Hazard Severity Zone Re-Mapping Project*. Retrieved from <http://frap.fire.ca.gov/projects/hazard/fhz.html> and for information on hazard mapping and associated building codes, please see: CAL FIRE. (2007). *Wildland Hazard/Building Codes*. Retrieved from http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland.php

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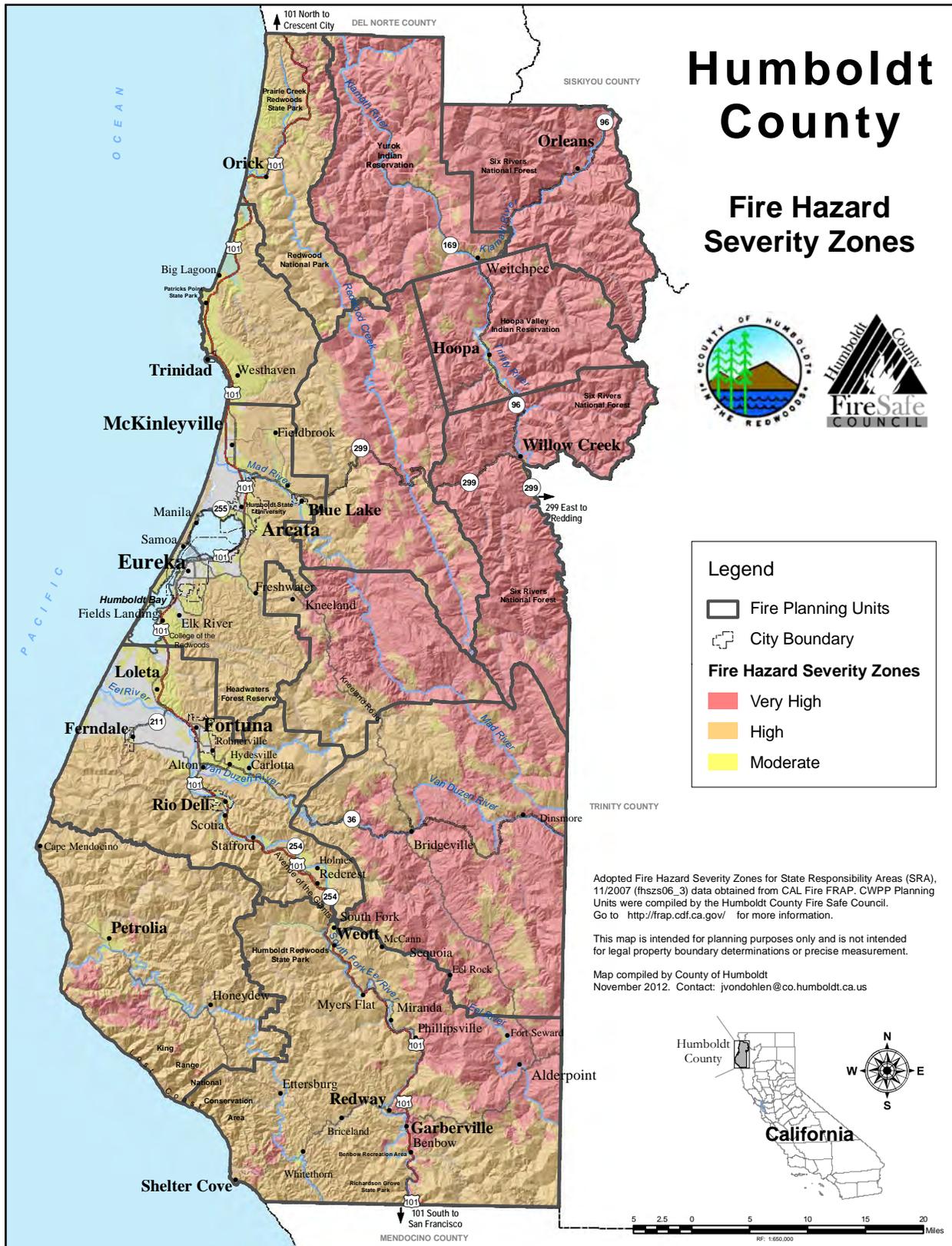
are no “very high” classifications in the LRA in Humboldt County. The table and map below illustrate the distribution of FHSZs in acres by planning unit and geographically throughout the county.

Figure II.1-8. Fire Hazard Severity by Planning Unit

Planning Unit	Fire Hazard Severity (Acres)			
	Very High	High	Moderate	Other*
East Klamath	134,403	78	37	949
Eel	20	160,893	27,845	33,865
Eureka Plain	1,017	97,084	25,127	20,552
Hoopa	107,678	4,771	544	1,152
Kneeland - Maple Creek	79,617	43,617	-	-
Up River	132,086	16,246	1,858	532
Mad-Van Duzen	189,618	109,836	1,207	-
Mattole-Lost Coast	13,826	180,300	6,079	58
Redwood Creek	117,952	72,015	103	-
Redwood Park	15,236	72,208	12,138	438
Southern Humboldt	77,573	292,392	5,442	201
Trinidad	6	45,999	21,344	30
Trinity	164,130	3,926	118	188
Total	1,033,162	1,099,364	101,841	58,265
<i>*Other = Non-Wildland/Non Urban or Urban Unzoned</i>				

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Figure II.1-9. Fire Hazard Severity Zones Map



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II.1.5. Wildfire Risk and Fire History

The fire history of an area is a description of the time, space, and cause of fires in the area. In fire jargon, “*fire risk*” is often associated with fire history, as this term describes the events that cause a fire to start (i.e. ignitions).

Fire history is important because it helps to illustrate the potential for future fires. Large fires often repeat themselves; hence it is useful to understand burning patterns over time. An area’s fire history also portrays ignition patterns that can target effective prevention programs. For example, if there is a history of frequent fires along a well-traveled route, roadside vegetation management may be in order. Additionally, fire history discerned through fire scars on tree rings may indicate the way fires have changed over time, both in frequency and intensity. This may point to appropriate goals for future fuel conditions, and their potential management or restoration to historic conditions.

Fire has been a significant factor in Humboldt County’s history. Evidence of this can be seen in the fire scars on ancient redwoods, some dating back more than a thousand years. Despite the generally damp climate prevailing in these forests, studies have suggested an historical *fire return interval* of 50 to 100 years in the northern part of the county, and 12 to 50 years in the south.³³ The County’s fire history map below includes the occurrence of several large fires along the coast from as early as 1908. Surprisingly, several of the more destructive historical fires have occurred on the coast around the Trinidad area, including the 7,432-acre Luffenholz Fire of 1908, the 17,527-acre A-Line Fire of 1936, and a 15,000 –acre unnamed fire near Patrick’s Point in 1945.

The wildfire season in Humboldt County generally begins in June and typically ends in mid-October; however, wildfires have occurred in every month of the year. Drought, light snow pack, and local weather conditions can expand or shorten the length of the fire season. As described above, changing climatic conditions are beginning to change the local fire season. The early and late shoulders of the fire season are usually associated with human-caused fires. The peak months of July, August, and September are usually related to thunderstorms and lightning strikes.

Typically, western Humboldt County’s wildfire season is shorter than the eastern half for a number of reasons: 1. The western half of the county receives more rainfall; 2. The West has spring seasons that are wetter and cooler than the East; 3. Temperatures in the eastern portion of the county are much higher in the summer months; and 4. Much of the precipitation received in the east falls as snow during the winter.

Fire Caused by Natural Lightning

Lightning fire ignitions are generally much less prevalent in Humboldt County than in much of the rest of the western United States. However, they do occur occasionally (including dozens of “Lightning Complex” Fires from single storms in both 2003 and 2008). The northeastern area has the highest prevalence of lightning in the county. Lightning fire ignitions are particularly problematic from a suppression standpoint, due to the likelihood of multiple ignitions within a few hours, and the increased likelihood of those starts (ignitions) occurring in more remote areas.

In *Fire in California’s Ecosystems*, Stuart and Stephens write about the history and ecology of fire in the North Coast Bioregion:

“Lightning fires are more numerous at higher elevations in the North Coast Ranges than in the coastal regions, but not as numerous as in the Klamath, Shasta, or Trinity National Forests (Show and Kotok 1923, Keeley 1981). Van

³³ CAL FIRE: Humboldt – Del Norte Unit (HUU). (2011). *Draft 2011 Unit Strategic Fire Plan Humboldt – Del Norte Unit*. (p. 11). Retrieved from http://www.co.humboldt.ca.us/natural-resources/fire_safe_council/pdf_files/2011%20hhuu%20strategic%20fire%20plan.pdf .

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Wagtendonk and Cayan (2007) found that lightning strike density increased with distance from the Pacific Ocean ... and increasing elevation for the period between 1985 and 2000.”³⁴

Native American Fire History³⁵

It is generally accepted that the original inhabitants of North Coastal California actively stewarded and extensively managed their lands with practices that included setting fires. These frequent, low-intensity burns helped to keep pest populations down, improved the health of the acorn crop and other desirable forest products, and improved hunting grounds. It is assumed that Native American burning occurred here for many thousands of years prior to European settlement. The first documented non-Native American confirmation of historical burning came from French explorer Jean Francois Galoup de la Perouse in 1786. From his ship sailing south along the Humboldt coast, he reported:

“At half-past seven we suddenly discovered, to the south-south-east, a considerable fire on Cape Mendocino; this fire covered the greater part of the hill, from the sea-shore to the summit, and it appeared to extend to the other side....”³⁶

Perouse attributed the fire to a volcano. This was later refuted by another Frenchman, Camille de Roquefeuil, under similar circumstances in 1818:

“Accurate inquiries at Saint Francisco convinced me that this fire, which at a distance might have been taken for a volcano, must be ascribed to the Indians, as well as other less considerable, and more distant ones, which we saw that and the preceding nights. The natives at this season (September) set fire to the grass....”³⁷

The acreage burned by California’s earliest humans was significant. Fire scientists Robert Martin and David Sapsis estimated that 5.6 to 13 million acres of California burned annually under both lightning and indigenous people’s *fire regimes*.³⁸ However, fire scientist Scott Stephens, Sapsis, and others have now estimated lower numbers. They estimate that 4,447,896 acres burned annually in California prior to 1800, excluding the southwestern deserts.³⁹ This estimate of prehistoric annual area burned in California is 88% of the total annual “extreme” wildfire area burned in the entire United States within a single decade (1994–2004).⁴⁰ From 1950 to 1999, the average annual area burned by wildfire in all vegetation types in California was

³⁴ Stuart, J.D. & Stephens, S.L. (2006). North Coast Bioregion. In: Sugihara, N.G., van Wagtendonk, J., Shaffer, K.E., Fites-Kaufman, J., & Thode, A.E. (Eds.). *Fire in California’s Ecosystems*. (p.153.) Berkeley: University of California Press.

³⁵ Much of the text for this section came from previous fire planning work of ForEverGreen Forestry, including: Mattole Restoration Council. (2004, August 9). *Final Upper Mattole Fire Plan*. Retrieved from http://classic.mattole.org/html/publications_publication_13.html and: County of Lake, California. (2010). *Wildfire Protection Plan*. Retrieved from www.co.lake.ca.us/Government/Boards/AdvisoryBoard/lcfsc/LCCWPP.htm.

³⁶ Roscoe, J. (1985). *An Ethnohistory of the Mattole, Humboldt County, California*. (p. 15.) Part of the Archaeology Field Survey Reports Contributed by BLM, Arcata Field Office. DOI:10.6067/XCV8T72FX0.

³⁷ Roscoe, J. (1985). p. 16.

³⁸ Anderson, M.K. (2005). *Tending the wild: Native American knowledge and the management of California’s natural resources*. Berkeley: University of California Press.

³⁹ Stephens, S.L., Martin, R.E., & Clinton, N.E. (2007). Prehistoric Fire Area and Emissions from California’s Forests, Woodlands, Shrublands, and Grasslands. *Forest Ecology and Management*, 251, 205–216.

⁴⁰ Stephens, S.L., et al. (2007).

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approximately 25,2047 acres per year, only approximately 5.6% of what traditionally burned in a similar timeframe.⁴¹ Regardless of errors in either estimation, prior to modern fire suppression, very large amounts of land burned in California. Skies were likely smoky much of the summer and fall in California, including Humboldt County, during this period.⁴²

As the home of over a dozen Native American Tribes speaking languages from three different linguistic affiliations, Humboldt County has a rich native cultural history. Native populations made use of fire and natural resources in many ways. For example, active stewardship of the prairies and forests was practiced through the use of fire. These burns improved wildlife habitat and enhanced the health and growth of the tanoak and plants used for basket making, such as bear grass.

European Settlement Fire History

European settlement in the area began with Spanish and Russian explorers in the late 1700s and early 1800s. The discovery of gold in the Klamath and Trinity Mountains brought miners, traders, and explorers, and forever changed the region. The gold rush brought settlement but mining was quickly replaced by timber as the dominant industry. Logging—primarily of the largest, oldest trees—became common, with subsequent changes in forest structure and fuel volumes. By 1854, there were nine lumber mills around the county involved in exporting lumber worldwide. Dairy and cattle operations also became essential to the county's economy. Many forms of impactful land management during this era (such as logging, grazing, development and, most notably, fire suppression) have significantly influenced the fire history of Humboldt County.

The arrival of European-descent settlers brought radical changes and upheavals to the indigenous populations, as well as to the “natural” landscape here. Because of the conflicts between white settlement and traditional subsistence use, violence erupted in many areas, such as in the Mattole Valley in the southwestern corner of the county. In order to resolve the resulting crisis, Mattole settlers decreed a resolution that was published in the September 18, 1858, *Humboldt Times*.⁴³ The resolution included "that the Indians must not set fire to the grass on the hills...."⁴⁴ Therefore, burning in the Mattole Valley and other areas of the county was virtually stopped for a short time, until the late 1800s/early 1900s, when ranchers then reinstated it on grasslands to promote better range conditions. The following quote summarizes fire management practices throughout Humboldt County at that time.

“During the settlement period (1875-1897) European settlers used fire for maintenance and enlarging the pasturelands and as a land clearing method. Major land activities during the post settlement period (1898-1940) were livestock grazing, farming, debarking of the tanoak for tannin production and logging of Douglas-fir and coast redwood. Logging was clearly a dominant activity during this time period.... In this time of unrefined mechanized equipment, the logging operations were simplified as much as possible. Logged areas were burned to assist with the removal of the logs and reduce the logging debris left behind. These fires were left to burn with no real control efforts. The same can be said

⁴¹ Stephens, S.L., et al. (2007).

⁴² Stephens, S.L., et al. (2007).

⁴³ CalIndianHistory.org. (2010). *California Newspaper Articles: September 18, 1958 Mattole*. Retrieved from http://calindianhistory.org/DocsNews/1858/09_18_1858Mattole.pdf

⁴⁴ Roscoe, J. (1985). p. 33.

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for the area ranchers who commonly set fire to their land in order to maintain the grazing.⁴⁵

The pattern of historic Native and early settlement burning, as well as random high-intensity wildfires, helps to explain the presence of dense old-growth forests in the drainages and open meadows along the ridges of many rural areas of the county, which can be seen in the earliest available aerial photographs from 1941. Regarding the effects on the landscape and the change in historic fire patterns in the Mattole watershed (applicable to much of southern and eastern Humboldt County today),

“An examination of these same forested areas today reveals that many of these clearings have become overgrown with brush and timber since aboriginal burning practices were curtailed by the Whites.⁴⁶

CAL FIRE summarizes the fire history during this period as follows:

“Reviews of area newspapers and various studies at Humboldt State University indicate that there was indeed a significant fire history from the late 1800’s through early 1950’s. Notable are 24 “fire seasons” between 1880 and 1952. During this time period the fire interval was 3.3 years. Some of these fires included entire towns being burned, such as the 1908 fire that destroyed the community of Luffenholz. People were left homeless, local mills and railroad tracks all perished from these large severe fires.⁴⁷

As a result of large destructive fires in the West and Midwest in the early part of the 1900s, the perception of fire as a beneficial tool, as seen by Native Americans, was overlooked and viewed instead as a major threat to lives, property, and natural resources. The outcome of this viewpoint was the “10 a.m. policy” adopted by the United States Forest Service (USFS) in 1935. This policy sought to aggressively suppress fires and have them extinguished by 10 a.m. the morning following a fire being discovered.

“Civilian Conservation Corps began work in the Humboldt-Del Norte area in the mid 1930s, developing an improved local firefighting infrastructure. After 1945, the severity and number of fires began to decline significantly.... World War II had taken the work force overseas; with the return of the soldiers came an active fire suppression program.”⁴⁸

Emanuel Fritz (Professor Emeritus of Forestry at University of California Berkeley and Founding Director of the Regional Parks Association) noted in 1951, “In the early days of forestry we were altogether too dogmatic about fire and never inquired into the influence of fire on shaping the kind of forests we inherited.”⁴⁹

Recent Fire History

Intensive fire suppression over the last seventy years or so, combined with increased development, a resulting lack of homeowner defensible space, and logging of the largest trees, has led to an increase in the amount of flammable materials now accumulated throughout Humboldt County. Today, it is widely accepted that fires burn longer and hotter than those prior to European settlement. “More area is burning at high intensity, and this is related, in part, to

⁴⁵ CALFIRE: HUU. (2011). pp. 5-6.

⁴⁶ Roscoe, J. (1985). p. 17.

⁴⁷ CAL FIRE: HUU. (2011). p. 6.

⁴⁸ CAL FIRE: HUU. (2011). p. 6.

⁴⁹ Stuart, J.D. & Stephens, S.L. (2006). North Coast Bioregion. (p.147.)

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higher quantities and more homogeneous fuels caused by accumulation during the fire-suppression period.”⁵⁰ Wildfire now *escapes* less than two percent of the time—but those few escaped fires find a choked, fuel-heavy landscape, and result in the vast majority of damage.

Prescribed fire (controlled burning) has been used in recent decades by logging companies, Native Americans, federal and state agencies, local ranchers, and to an increasing extent, homeowners, for fuel reduction and other landscape benefits. Due to concerted and participatory fire safety efforts led by local fire safe councils (FSC) (*see Community Preparedness Chapter in this CWPP for more information on local FSC activities*), public acceptance of prescribed fire has increased in Humboldt communities. In the town of Orleans for example, the Orleans/Somes Bar FSC has maintained over 400 acres of *shaded fuelbreaks* using prescribed fire in the last decade, with funding from the USFS, CAL FIRE, and other sources. Prescribed fire projects in the county range from small-scale, landowner-conducted individual burns through CAL FIRE’s *LE-5* and *LE-7* permit process, to large burns conducted by CAL FIRE under the Vegetation Management Program (VMP). Timberland managers use fire throughout the county to burn piles or *broadcast burn* larger areas.

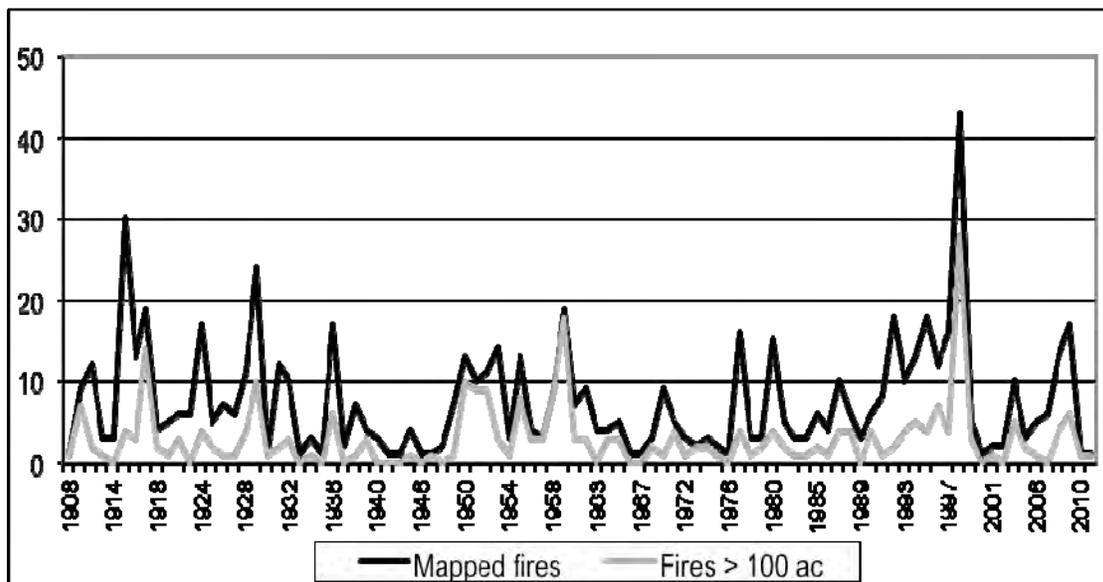
State and federal agencies—including CAL FIRE, State Parks, Redwood National Park, the Bureau of Land Management (BLM), and the USFS—all use prescribed fire where appropriate and when possible to achieve a variety of land management objectives. CAL FIRE is an active cooperator with other public agencies such as State Parks, providing equipment, crews, and other resources to assist with their burns. They also conduct “training burns,” which can produce a fuel-reduction benefit. There are several prescribed fire programs conducted on federal public lands. Redwood National Park has an active program that often uses CAL FIRE resources. BLM burns are usually coordinated with CAL FIRE, as most BLM areas are within the State’s Direct Protection Area by agreement.

Current fire history is maintained by CAL FIRE’S Fire and Resource Assessment Program (FRAP). Since 1908, CAL FIRE has been mapping all fires of 10 acres or larger in size. According to current FRAP data, 737 wildfires burned in Humboldt County between 1908 and 2011. The decade with the most fires was the 1950s, with 99 fires (although 2000-2009 had 58 fires), while the 1940s saw the lowest frequency with only 21 fires. As shown in Figure 11.1.10 below, there is a distinction between all fires, and those larger fires of 100 acres or more. Notable in this graphic is that the Lighting Complex fires of 1997 were the most in any one year in recorded history. This is important to keep in mind in terms of potential future lighting ignitions due to climate change

⁵⁰ Skinner, C.N., Taylor, A.H., & Agee, J.K. (2006). Klamath Mountain Bioregion. In: Sugihara, N.G., van Wagtenonk, J., Shaffer, K.E., Fites-Kaufman, J., & Thode, A.E. (Eds.). *Fire in California’s Ecosystems*. (p. 179.) Berkeley: University of California Press.

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Figure II.1.10. Humboldt County Number of Fires per Year, 1908-2011⁵¹



Recent and historic wildfire events in and around Humboldt County have shown the potential for extremely hazardous *burning conditions* resulting in threats to life, health, and property. Recent noteworthy wildfires in Humboldt County are (acres are for the entire fire, which may have extended beyond Humboldt):

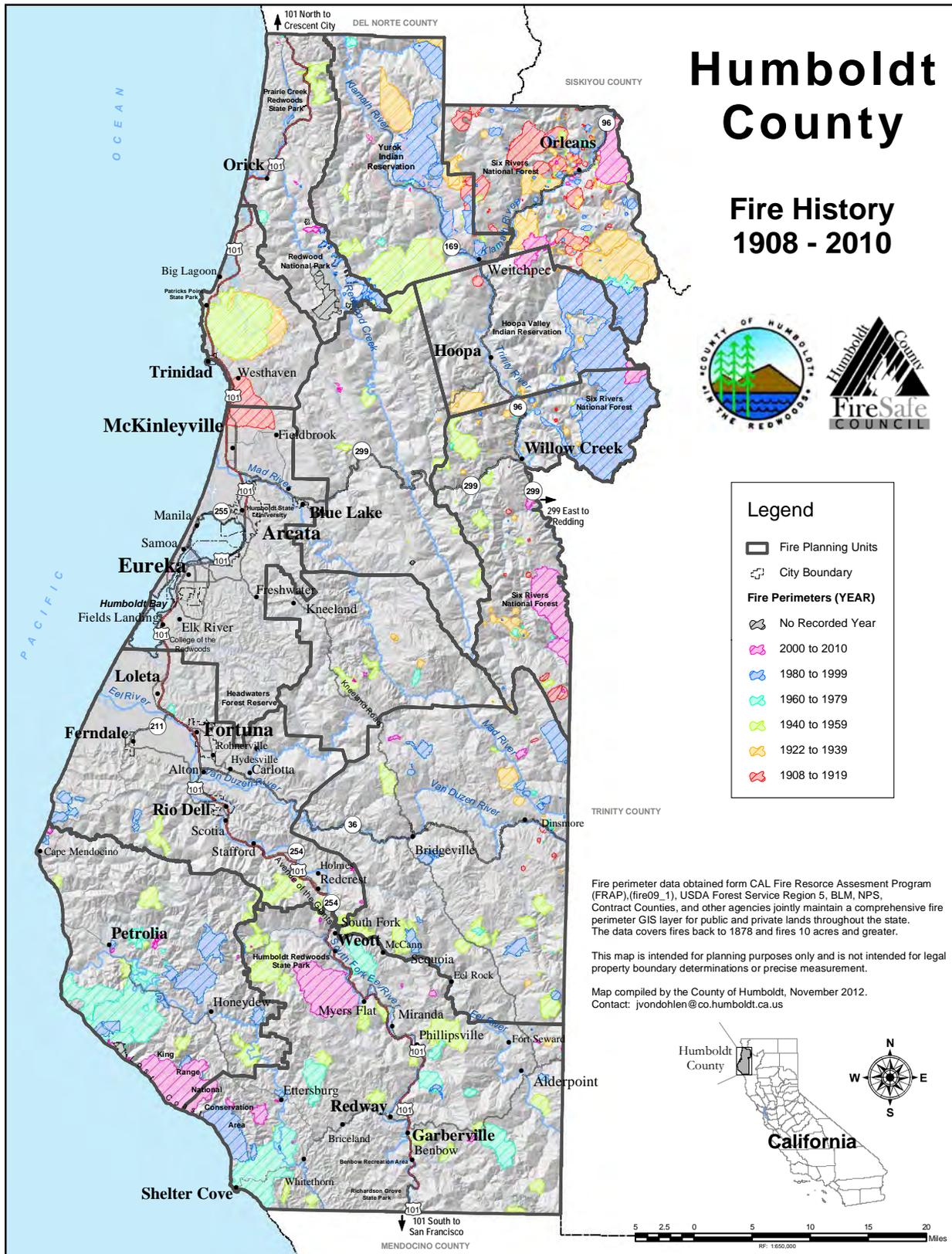
- Backbone Fire (2009), Six Rivers National Forest (NF) and Shasta-Trinity NF — 6,324 acres
- Canoe Fire (2003), Humboldt Redwoods State Park and environs — 10,000 acres
- Cedar Fire (2008), Shasta-Trinity NF (part of the Iron Complex) — 25,398 acres
- Friday Fire (2003), Willow Creek area — 389 acres
- Hell's Half Complex Fire (2008), Six Rivers and Shasta-Trinity NFs — 15,146 acres
- Honeydew Fire (2003), Lost Coast area — 10,831 acres
- Ironside Fire (2008), Shasta-Trinity NF (part of the Iron Complex) — 12,720 acres
- Lightning Complex Fire (2008), multiple small fires, various locations including area northeast of Shelter Cove — 1,325 acres
- Megram Fire (1999), Six Rivers and Shasta-Trinity NFs (part of the Big Bar Complex Fire)— 124,898 acres
- Onion Fire (1999), Shasta Trinity National Forest — 15,949 acres
- Paradise Ridge Fire (2008), King Range/Paradise Ridge area — 1,076 acres
- Somes Fire (2006)— 15,710 acres (6,494 of which were in Humboldt County)
- Ziegler Fire (2008), Shasta-Trinity NF (part of the Iron Complex) — 2,349 acres

The Humboldt County Fire History Map (Figure II.1.11 below) shows these fires and other fires over 10-acres in size, between 1908 and 2011. As described throughout this chapter, the highest occurrence of wildfire in the County occurs in the northeast and southwest portions of the county, although several significant fires have occurred along the northern coastal areas of Humboldt County

⁵¹ CAL FIRE. (2007). Fire Resources Assessment Program (FRAP).

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Figure II.1-11. Fire History Map 1908-2010



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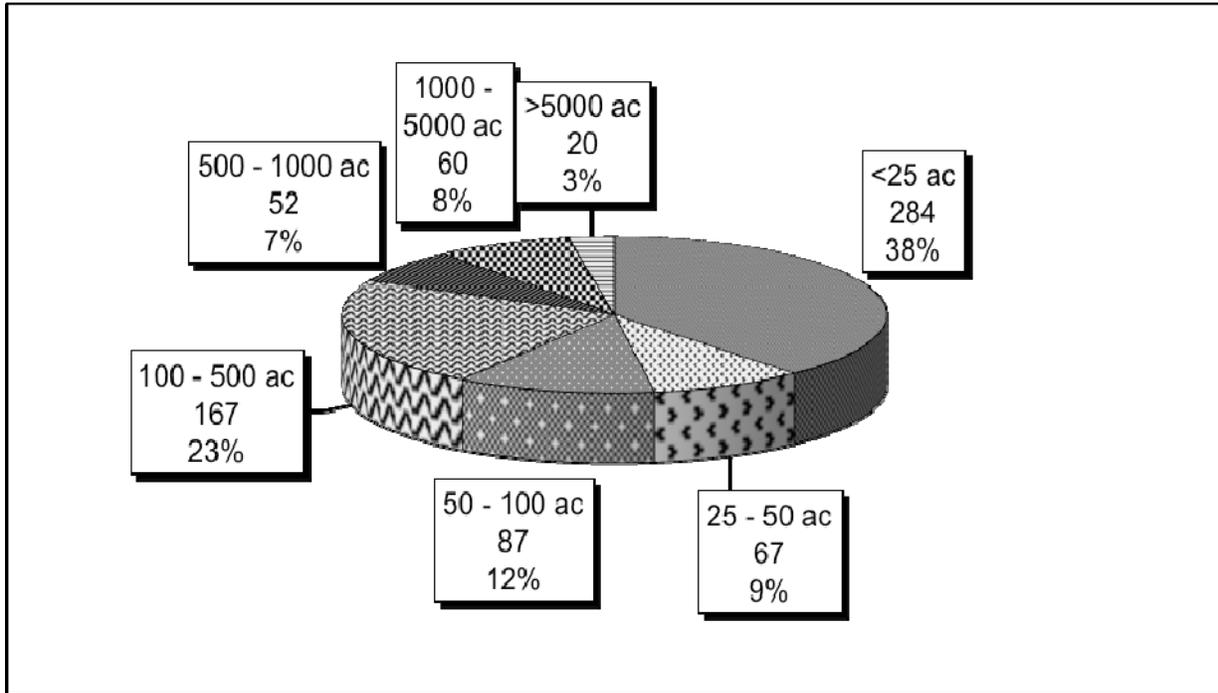
The following chart shows the average number of fires by size, between 1908 and 2011. As expected, most fires (284, or 38%) are small, in this case, less than 25 acres. Fires under 10 acres are not included in this data, so the small fires documented are between 10-25 acres; one can assume that fires under 10 acres have a much higher frequency. Beyond these small fires, the largest number of fires (167 fires or 23% of all fires in Humboldt County between 1908 and 2011), were between 100 to 500 acres. Although the list above shows the largest, and most memorable recent fires, the data indicates that there have been only 20 fires over 5000 acres since 1908, or only 3% of wildfires in Humboldt County in recorded history. Of those 20 large fires however, 7 have occurred since 1999.

Much credit for keeping fires small and manageable can be given to the presence of high-capacity fire services, situated for quick response throughout the county (*see Chapter II.1.3. Wildfire Protection for more information*). On the other hand, the history of effective fire suppression in Humboldt County is one of the factors contributing to a buildup of hazardous wildfire fuels in the wildlands as well as WUI areas. Add the projected impacts of climate change and SOD to this equation and this area could be facing even larger and more destructive wildfires in the future (destructive of both natural and community resources).

Considering the probability of significant increased wildfire threats, it is important that Humboldt County residents are increasingly vigilant regarding reducing wildfire risks and hazards in their homes and communities to improve their fire safety (*see Part V. Fire-Safe Communities for an in depth discussion on this topic*). Taking the steps recommended in this CWPP will decrease the vulnerability of communities to damage from wildfire. Fire hardened homes and communities will provide an opportunity for the more aggressive use of prescribed fire as a fuels reduction tool during the early and late fire season when conditions are good for low intensity burning. It will also be less risky to let low intensity wildfires take their natural course without jeopardizing community and natural resources. Maintaining high capacity fire services will continue to be important to manage all wildfires threatening valuable resources. If we choose to prioritize minimizing wildfire impacts in Humboldt County, we can likely make a significant difference in its effects here.

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Figure II.1.12. Humboldt County, Total Number of Fires by Acreage, 1908-2011⁵²



Ignition Sources

People start most wildfires, but those are not necessarily the ones that get big, at least in Humboldt County. Major human-caused fires include arson, recreational fires that get out of control, smokers' carelessness, debris burning, and children playing with fire. Figure II.1-13. Potential Incendiary Wildfire Ignition Sources, shows areas where fires are expected to start in Humboldt County: around residential areas, commercial or industrial lands, power lines, and railroad lines. This map shows that many of these potential ignition sources are located in the more populated, western areas of the county. However, this map does not show lightning occurrence areas, which is significant in the higher elevations of the county.

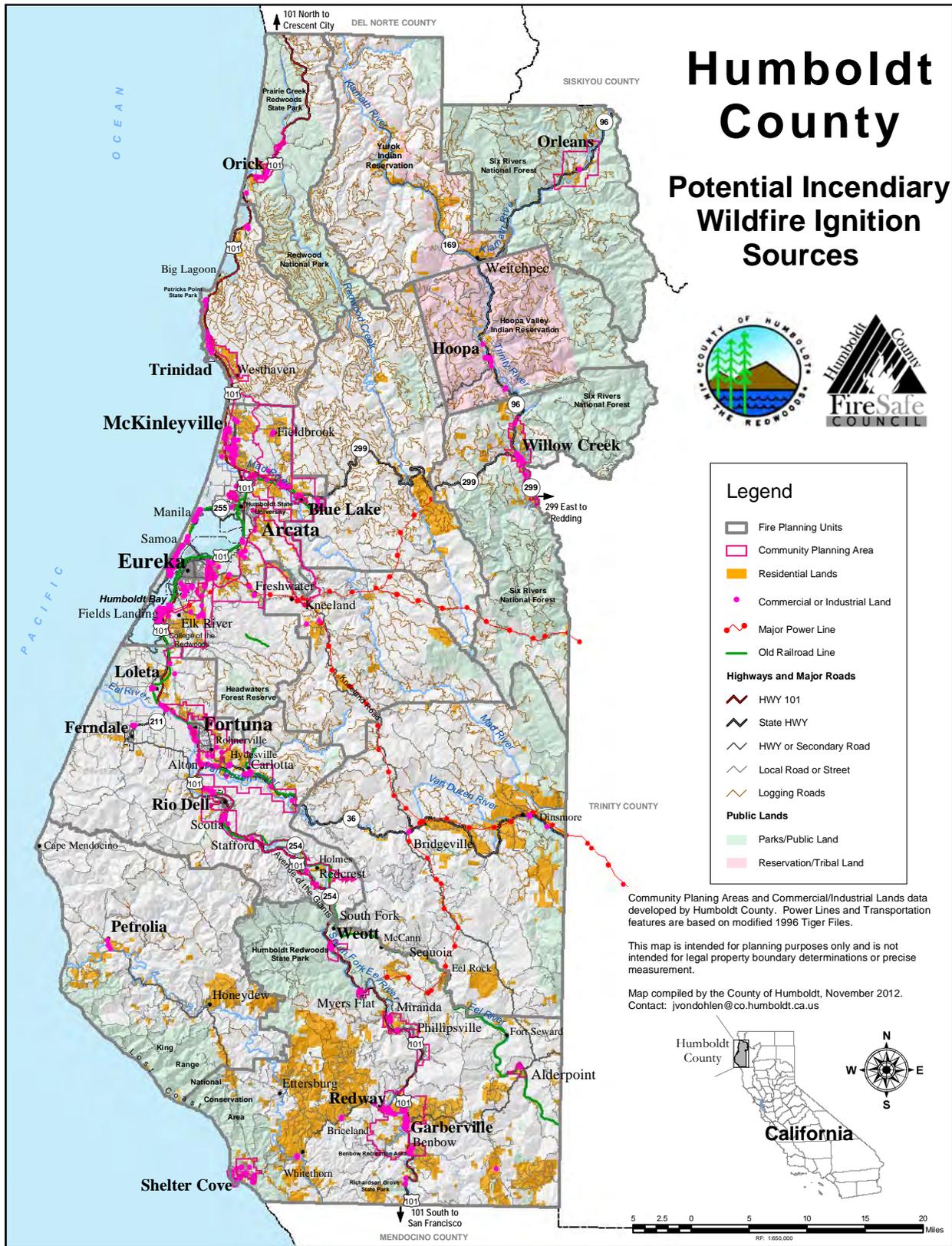
Figure II.1-14. Wildfire Starts Map shows that most actual wildfire ignitions (whether human-caused or lightning-initiated) have been heaviest in the less populated, eastern areas of the county. Of the fires over ten acres in size documented from 1908-2011 with known ignition sources, 44% were started by people and 41% were started by lightning.⁵³ However, human activities often influence the severity and number of fires caused by lightning strikes. Therefore, human activities either directly cause or significantly influence most wildfires in Humboldt County.

⁵² CAL FIRE. (2007). Fire Resources Assessment Program (FRAP).

⁵³ CAL FIRE. (2007). Fire Resources Assessment Program (FRAP).

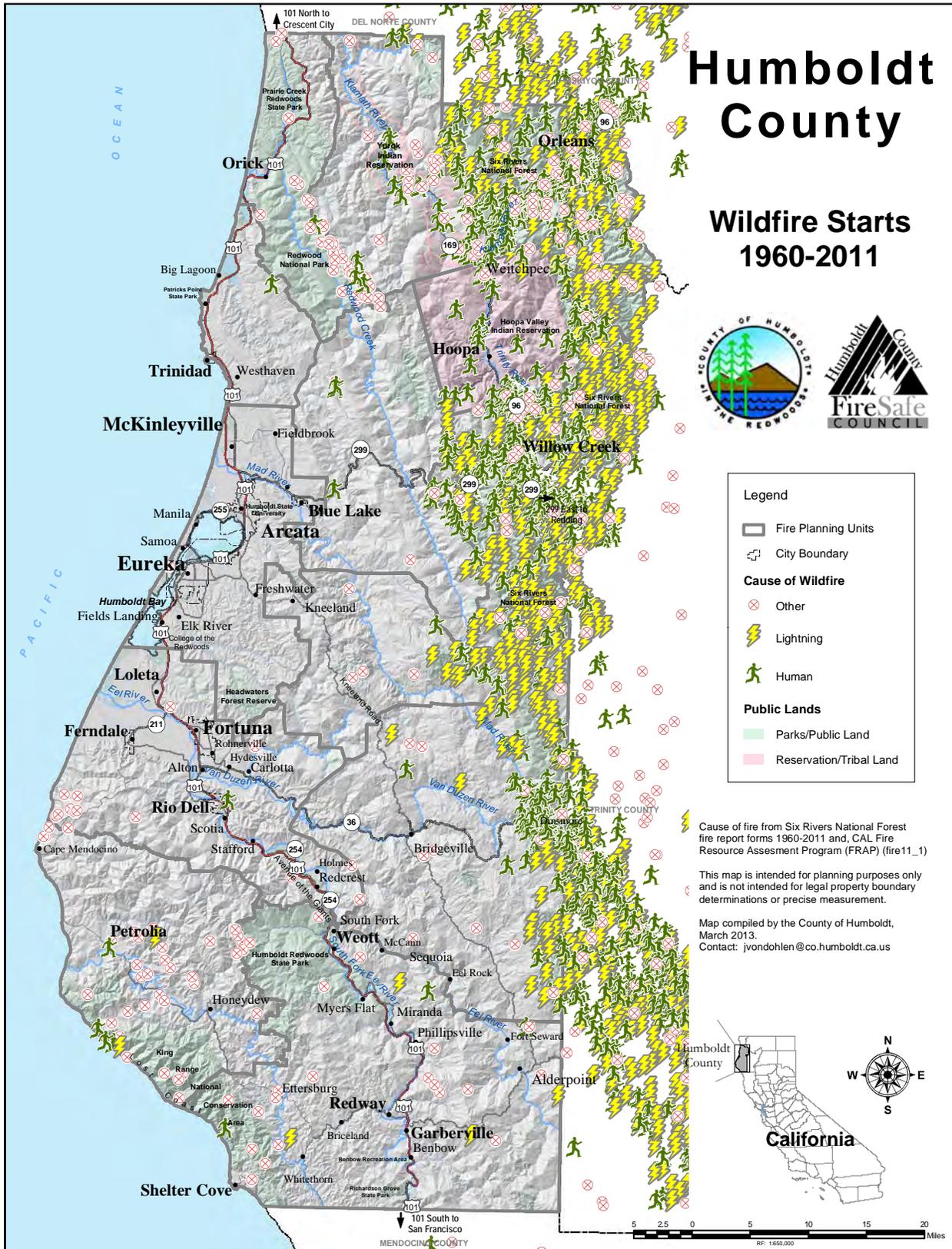
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Figure II.1-13. Potential Incendiary Wildfire Ignition Sources



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Figure II.1-14. Wildfire Starts Map



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II.1.6. Fire Regime

Fire regime is a description of fire's historic natural occurrence, variability, and influence on vegetation dynamics in the landscape. Fire regimes can provide information for fire planning, as they describe the frequency of fire and the effects a fire is expected to have on a particular area's vegetation. Generally based on fire history reconstructions, fire regime descriptions include the season, frequency, severity, size, and spatial distribution of fires. There is quite a wide variability of "natural" intervals, severities, and seasons, but some generalities have been made. Over the years, foresters and plant ecologists have come to use a small number of standardized fire regime classes to make general comparisons about the fire ecology of different ecosystems and geographic regions. The regimes listed below show fire regime classes commonly used by the USFS and other land management agencies.⁵⁴

The five historical fire regimes are classified based on the average number of years between fires (fire frequency) combined with the fire severity (amount of consumption of the dominant overstory vegetation). The five regimes are:

- I: 0 to 35-year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced);
- II: 0 to 35-year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);
- III: 35- to 100+-year frequency and mixed severity;
- IV: 35- to 100+-year frequency and high severity;
- V: 200+-year frequency and high severity.

The above classification system was used to make one of the first nationwide, coarse-scale maps of fire regimes. CAL FIRE used it to produce the somewhat more detailed (but still very coarse scale) statewide fire regime maps.⁵⁵ The LANDFIRE (also known as Landscape Fire Resource and Management Planning) program has since revised the fire regime class definitions and conducted a national analysis for the National Interagency Fire Coordinating Group. They have produced an elaborate methodology for conducting regional scale analyses that could be undertaken to produce more local-scale map products for Humboldt County.⁵⁶

The CAL FIRE fire regime data for Humboldt County is shown in Figure II.I-15 below. Although the fire regimes in Humboldt have been altered due to fire suppression and other land management activities, there are two pre-settlement fire regimes still found here today. According to information collected and analyzed by CAL FIRE, Humboldt County primarily has a natural

⁵⁴ Schmidt, K.M., Menakis, J.P., Hardy, C.C., Hann, W.J., & Bunnell, D.L. (2002). Development of coarse-scale spatial data for wildland fire and fuel management. *General Technical Report RMRS-GTR-87*. Fort Collins, CO.

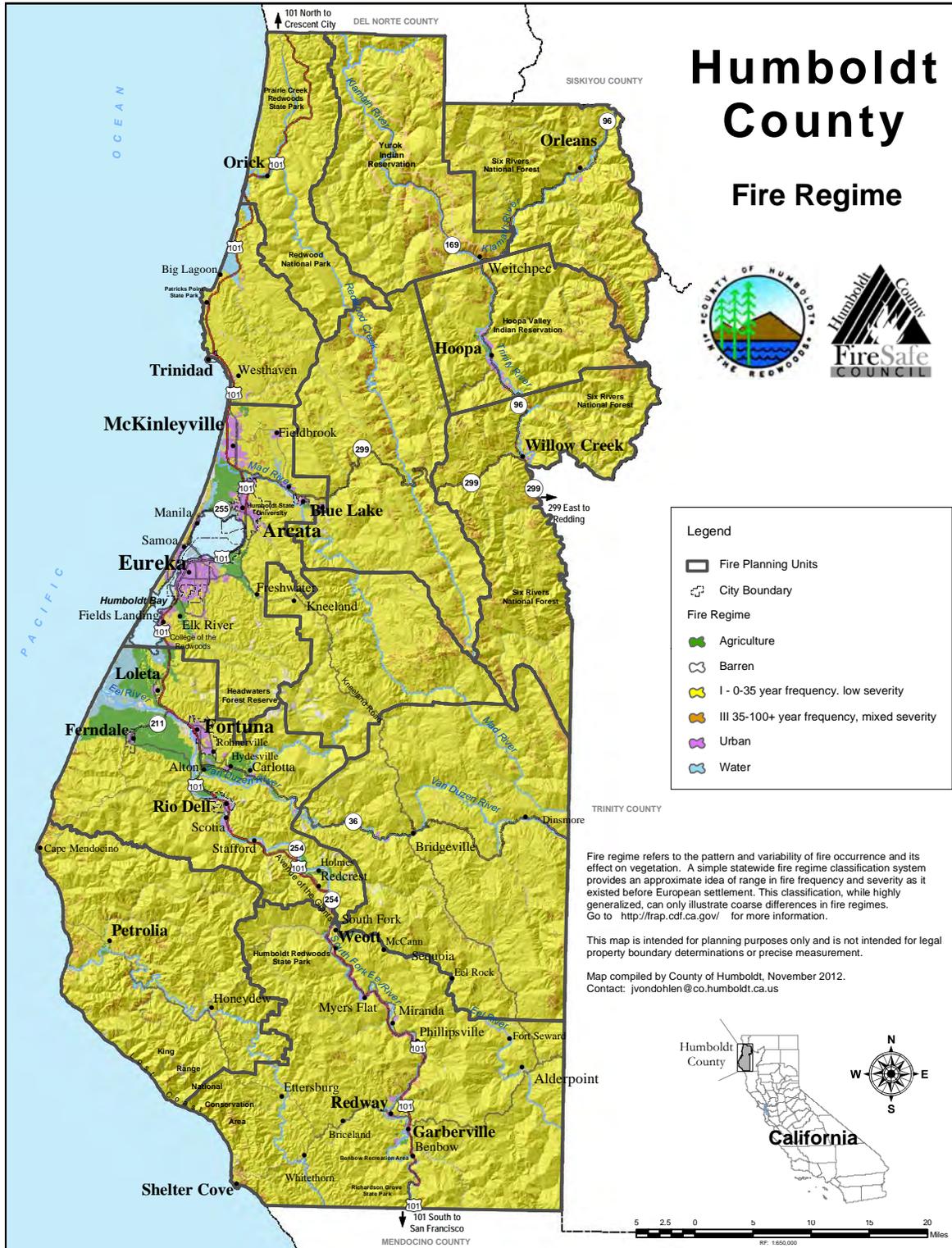
⁵⁵ CAL FIRE. (2003). *Fire Regime and Condition Class*. Geographic Information System data file [ArcInfo grid file]. Cafrc_03v2. Metadata. Retrieved from <http://frap.cdf.ca.gov/data/frapgisdata/download.asp?rec=cafrc>.

⁵⁶ Barrett, S., Havlina, D., Jones, J., Hann, W., Frame, C., Hamilton, D., Schon, K., Demeo, T., Hutter, L., & Menakis, J. (2010). *Interagency Fire Regime Condition Class Guidebook*. Version 3.0 [Homepage of the Interagency Fire Regime Condition Class website, USDA Forest Service, US Department of the Interior, and The Nature Conservancy]. [Online], Retrieved from: <http://www.frames.gov/partner-sites/frcc/frcc-guidebook-and-forms/>

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fire return interval between 0 – 35 years of low severity fire (Fire Regime I), as well as scattered areas of Fire Regime III (generally on ridgetops, and more often in the eastern parts of the county), with a 35 – 100+ year frequency of mixed severity fire.

Figure II.1-15. Fire Regime Map



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II.1.7. Condition Class

The difference in fire regime between pre- and post-European settlement is described by the *condition class*, or the degree of departure from the historical natural fire regime. Mapping of the fire regime condition class has been done nationwide and is widely used. Usually where the condition class indicates that fire has been absent for an unnaturally long time, the hazard and potential damages are high to both the environment and human developments in the area.

Fire Regime Condition Class (FRCC)⁵⁷ is based on a relative measure describing the degree of departure from the historical natural fire regime. The departure from natural fire regimes results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing, and drought). There are no wildland vegetation and fuel conditions or wildfire situations that do not fit within one of the three classes.

The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime. “Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.”⁵⁸ Areas considered at a high or moderate departure from the natural regime are experiencing dramatic increases in fire behavior, intensity, severity, and fire size.⁵⁹

The greater the departure from the natural fire regime, the greater the variations to ecological components and the higher the risk of losing *key ecosystem components*. For example, FRCC 3 classification means that fire regimes have been greatly altered from their natural range (e.g., from 3-10 years between fires, prior to European settlement, to 50 – 70 years since) and, likewise, vegetation characteristics have been dramatically altered from their natural range. For example, an area may have experienced a fire regime of small, frequent, low-intensity fires prior to European settlement. However, because fire suppression has been successful, only one fire has burned in the area in the past 100 years. The fuels have become voluminous and hence fire behavior is predicted to be intense, with the potential to kill trees that have survived other fires over the centuries. The fuels have also become more uniform, creating conditions that facilitate fire spread and result in larger fires. Therefore, the risk of losing key ecosystem components is high.

Fuel management projects can restore the vegetation type and structure through prescribed fire and/or other types of management techniques in a spatial distribution that can mimic the effect of natural fire regimes. Thus, fuel management can move a condition class to one more closely resembling pre-European settlement, regardless of recent fire history.

Condition class does not relate directly to fire hazard but is designed to better predict the effects of a fire, specifically the fire-related risks to ecosystems. All three condition classes (1, 2, and 3) exist in Humboldt County, as shown on the following map. Condition class is generally within or near fires’ historical range for the western and lower elevation/riparian areas of the county. As elevation increases, condition class changes from moderately altered to severely altered from historical range, as shown on the following map.

⁵⁷ Barrett, S. et al. (2010). *Interagency Fire Regime Condition Class (FRCC) Guidebook*.

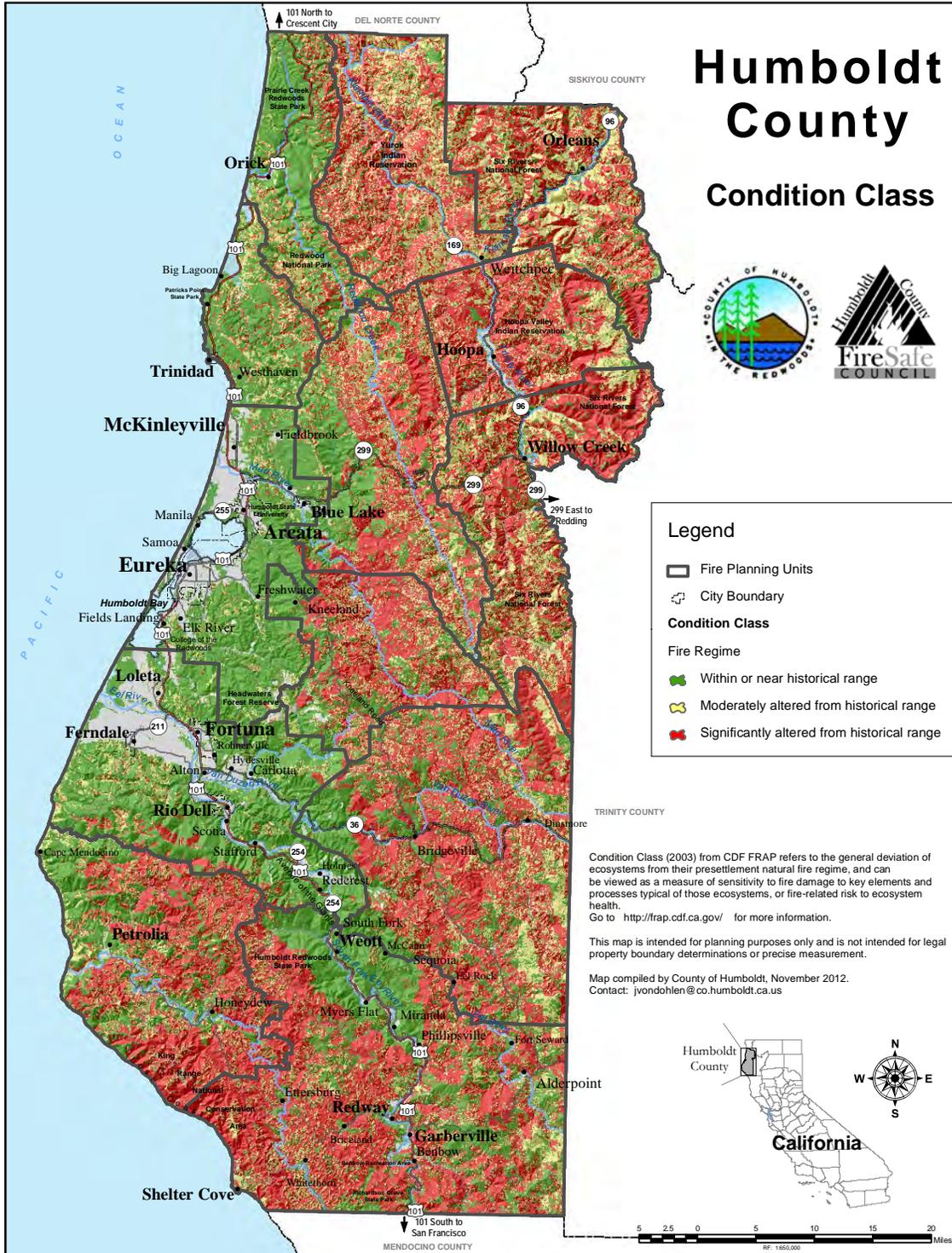
⁵⁸ National Wildfire Coordinating Group,. (2003, June). *Fire Regime Condition Class Definition*. Retrieved from <http://www.nwcg.gov/teams/wfewt/archive/message/FrccDefinitions.pdf>

⁵⁹ Barrett, S. et al. (2010). *Interagency Fire Regime Condition Class (FRCC) Guidebook*. .

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The influence of fire significantly shaped the ecosystems found throughout Humboldt County today. Understanding the local wildfire environment and people’s place in it—through fire history, fire behavior, and fire science—will help Humboldt communities to live safely within this fire-evolved landscape.

Figure II.1-16. Condition Class Map



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II.2. Values and Assets at Risk

Assets (values) at risk are those things that are important to quality of life that can be threatened with destruction or loss from wildfire. These include a variety of things, such as homes, businesses, infrastructure, cultural sites, wildlife *habitat*, natural resources, air quality, recreational facilities and areas, historical structures, and any other important attribute that individual communities rely on for their well being.

The term “assets” however may not fully convey the community value found in them. They are the precious and often unquantifiable elements that make up the quilted fabric of community life. Humboldt County’s communities have evolved with a connection to the land and its history. This has created what could be described as high community value, springing from a shared sense of place, strong family and neighbor ties, and enjoying community life with a *bioregional* flavor.

Some communities contain infrastructure that is critical to the entire county (e.g. hospitals or utilities), which naturally makes the risk of loss much graver in the event of a wildfire. Many of the more populated areas in Humboldt County contain the county’s most critical facilities: hospitals, government facilities, major thoroughfares, schools, fire stations, etc. These areas—mainly concentrated along Humboldt Bay and the Highway 101 corridor—have a higher concentration of community resources, thus having a higher asset value. When an area has a concentration of high-value assets in the presence of *hazardous fuels* and a high fire threat, it is considered an area more at risk of loss due to wildfire. (*For more information about fire hazards, see Figure II.1-9. Fire Hazard Severity Zones map in Chapter II.1. Wildfire Environment.*)

Property damage from wildfires can be severe and can significantly alter entire communities. Structures, above-ground infrastructure, critical facilities, and natural environments are vulnerable. Short-term loss caused by a *wildfire* can also include the destruction of commercial assets, timber, wildlife habitat, scenic vistas, and *watersheds*. Watershed destruction then leads to increased vulnerability to flooding. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural, ecological, and economic resources, and community infrastructure.

II.2.1. Community and Economic Assets

Population and Demographics

According to the 2010 Census, the total population of Humboldt County was 134,623, which represents a population increase of 8,105 persons (6.4%) since the 2000 Census. With the exception of a population decline that occurred between the years 1960 and 1970 due to reductions in the local lumber industry, the countywide average annual growth rate has been approximately 0.75 percent per year over the last 30 years.

In 2011, approximately 53 percent of Humboldt County’s residents lived outside of incorporated areas. Overall growth in incorporated areas was approximately 2.7 percent from 2000 to 2010, while the unincorporated areas of the County grew 3.7 percent during the same time.¹ This is important in regards to wildfire, as unincorporated areas in Humboldt County generally have a higher fire hazard rating than incorporated areas,

Three of the County’s seven cities have populations over 10,000: Arcata, Eureka, and Fortuna. Approximately one-third of the County’s population resides in Eureka and Arcata, which encompass the Humboldt Bay region, and is the economic center of the County.

Based on the 2010 U.S. Census, per capita income in Humboldt County was \$24,025, and the median household income was \$40,089 (2010 dollars, adjusted for inflation). It is estimated that

¹ United States (U.S.) Census Bureau. (2012). Humboldt County, California. *State & County QuickFacts*. Retrieved October 25, 2012, from <http://quickfacts.census.gov/qfd/states/06/06023.html>.

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there are 4,354 households with less than \$10,000 in income and benefits per year and 12,859 households with \$10,000 to \$25,000 in income and benefits per year. In total, this represents 23.7 percent of all households in the county.² It should be noted that Humboldt State University’s student population represents about 6 percent of the County’s population (8,046 in 2011).³ Students often do not work, or work part-time, low-wage service jobs. This can deflate the median household income for the County and inflate the numbers of those who are living below poverty.

Based on 2010 U.S. Census data, 13.2 percent of Humboldt County’s population is 65 or older. This is greater than the state average of 11.7 percent. Forty-one percent of the County’s over-65 population has disabilities of some kind, and 7.1 percent have incomes below the poverty line. These residents are likely to be less able to create and maintain defensible space and undertake other fire safety actions, hence may require assistance to ensure their homes and properties are fire safe. It is also estimated that 16.5 percent of the County’s population is 14 or younger, slightly less than the state average of 20.5 percent.⁴

Communities at Risk

On January 4, 2001, for the purposes of the National Fire Plan, the Department of Interior (DOI) published in the Federal Register a “Notice of Urban-Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk from Wildfire.” On August 17, 2001, the DOI added more communities to the Communities at Risk list. All the Humboldt County communities listed in the table below, were part of these original lists of communities designated as “communities within the vicinity of federal lands that are at high risk from wildfire,” more commonly known as “Communities at Risk” or CAR.

Nearly all of the populated areas within the county have already been designated CAR either at the federal or state level. The existing CARs are shown in the following table, Figure II.2.1. Humboldt County Designated Communities at Risk. Figure II.2-2. Population and Communities at Risk Map below also shows these existing CARs. **Two additional communities are proposed to be added to the CAR list in this CWPP: Redwood Valley and Titlow Hill.**

Figure II.2-1. Humboldt County Designated Communities at Risk⁵

Place Name	Federal Threat ⁶	Federally Regulated ⁷	Year Designated
Alderpoint			2001
Alton			2001
Arcata	x		2001

² U.S. Census Bureau, American FactFinder. (n.d.). *2006-2010 American Community Survey 5-Year Estimates*. Retrieved October 25, 2012, from <http://factfinder2.census.gov>.

³ Humboldt State University College Portrait. (n.d.). *Student Characteristics*. Retrieved October 25, 2012, from www.collegeportraits.org/CA/HSU/characteristics.

⁴ U.S. Census Bureau, American FactFinder. (n.d.) 2010 Profile of general population and housing characteristics: Humboldt County, California. Retrieved October 25, 2012, from <http://factfinder2.census.gov/>

⁵ California Fire Alliance. (2012). *Communities at Risk List*. Retrieved from www.cafirealliance.org/communities_at_risk/communities_at_risk_list

⁶ “Federal Threat” refers to communities within 1.5 miles of federal lands.

⁷ According to CAL FIRE: “Federally Regulated” refers to land owned by the Federal Government. In these cases, these communities are likely inholdings in federal lands.

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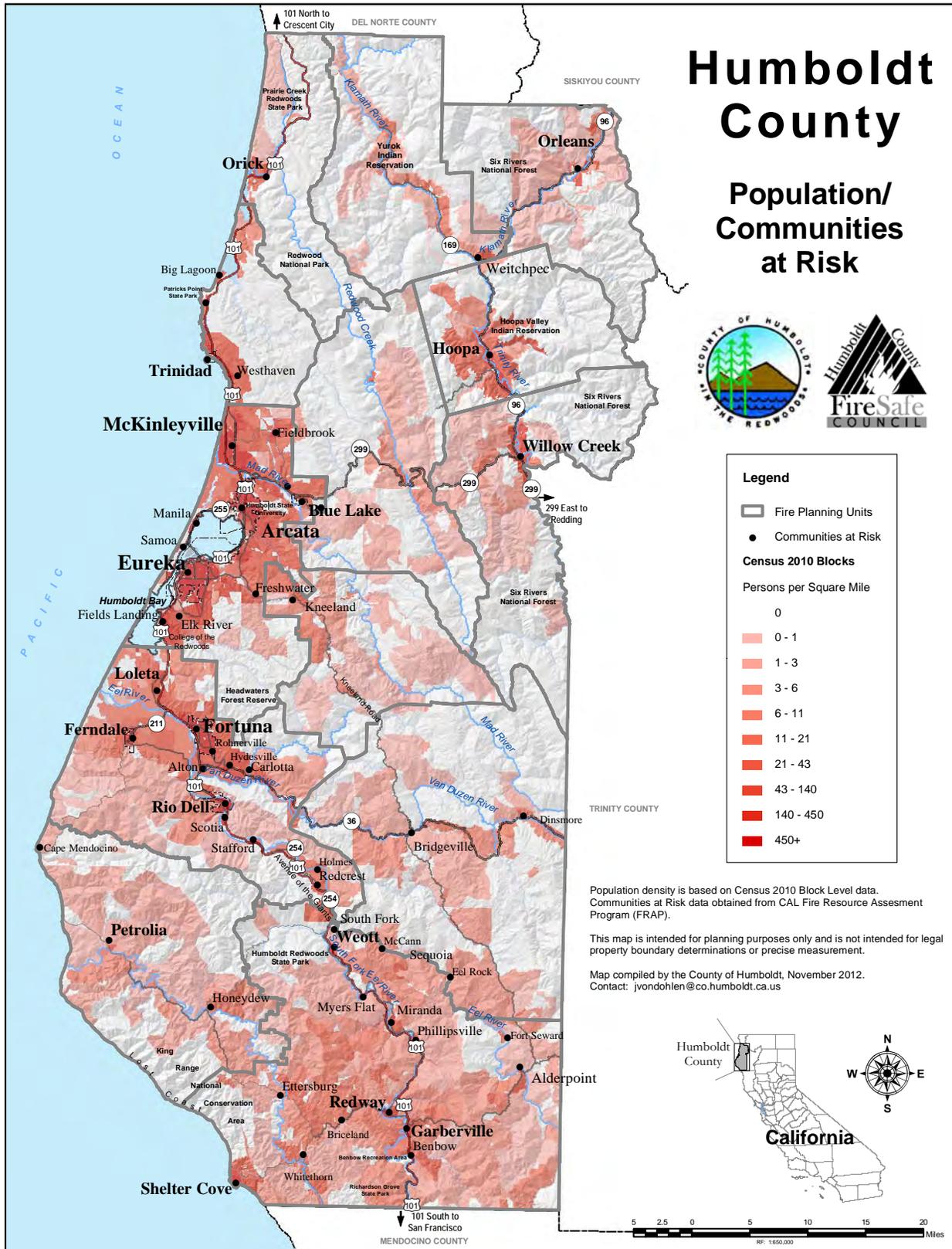
Place Name	Federal Threat⁶	Federally Regulated⁷	Year Designated
Bayside	x		2001
Bayview			2001
Beatrice	x		2001
Benbow			2001
Berry Glen	x	x	2001
Big Lagoon	x	x	2001
Big Lagoon Rancheria	x	x	2001
Blocksburg			2001
Blue Lake	x	x	2001
Blue Lake Rancheria	x	x	2001
Bracut	x		2001
Briceland			2001
Bridgeville	x	x	2001
Carlotta			2001
Crannell			2001
Cutten			2001
Essex			2001
Ettersburg	x	x	2001
Eureka			2001
Fickle Hill		x	2001
Fieldbrook			2001
Fortuna			2001
Freshwater			2001
Friday/Morton Ranch	x		2001
Fruitland			2001
Garberville			2001
Holmes			2001
Honeydew	x	x	2001
Hoop Valley Indian Reservation	x	x	2001
Humboldt Hill			2001
Hydesville			2001
Kneeland			2001
Korbel		x	2001
Kuhn Ranch/Ammon	x	x	2001
Mad River			2001
Maple Creek	x	x	2001
McKinleyville			2001
Miranda			2001
Myers Flat			2001
Myrtle town	x		2001
Orick	x	x	2001
Orleans	x	x	2001
Patrick's Point	x		2001
Pepperwood			2001
Petrolia		x	2001

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Place Name	Federal Threat⁶	Federally Regulated⁷	Year Designated
Phillipsville			2001
Pine Hills		x	2001
Pine Mountain			2001
Redcrest			2001
Redway			2001
Rio Dell			2001
Riverside Park/Swains Flat			2001
Rohnerville	x		2001
Scotia			2001
Shelter Cove	x	x	2001
Shivley			2001
Stafford			2001
Trinidad		x	2001
Trinidad Rancheria	x	x	2001
Weitchpec	x	x	2001
Weott			2001
Westhaven-Moonstone	x	x	2001
Whitethorn (Thorn)		x	2001
Willow Creek	x	x	2001

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Figure II.2-2. Population and Communities at Risk Map



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Homes and Structures

Some land uses, such as single-family rural residential, are more vulnerable to wildfire, while others, such as gravel mining, and cemeteries, are less vulnerable. An analysis of Humboldt County Assessor data found that 59% of all Humboldt County parcels fall within “High” or “Very High” *Fire Hazard Severity Zones* (as determined by CAL FIRE) and that just over 85% of those are residential dwelling parcels.⁸ This indicates that a large majority of the parcels within areas with the greatest Fire Hazard Severity zoning are liable to contain homes—one of our most venerable and valued assets. In fact, based on an evaluation of parcels with development potential in Humboldt County, 62% of general plan build-out⁹ county-wide could be expected to be in High and Very High Fire Hazard Severity Zones. Therefore, much of the future growth in the county is expected to occur in areas that are more vulnerable to wildfire risk.

It is a well known fact, albeit difficult to quantify, that there are many homes built in Humboldt County without permits. Much of this unpermitted building is believed to be located in rural areas beyond the urban fringe and off the beaten path. One way to identify development that is not reflected in building permit data is through an analysis of the assessed value of parcels. If a property is assessed at a higher value than the base land value, it can be surmised that there is some type of improvement, most likely a structure. The Improved Parcel Map below (Figure II.2-3) provides an illustration of relative location, parcel by parcel, of improvements (i.e. structures) across the county. Another, more general way to illustrate where homes and structures are located is shown in Figure II.2-4. Housing Density Map (based on 2010 Census data).

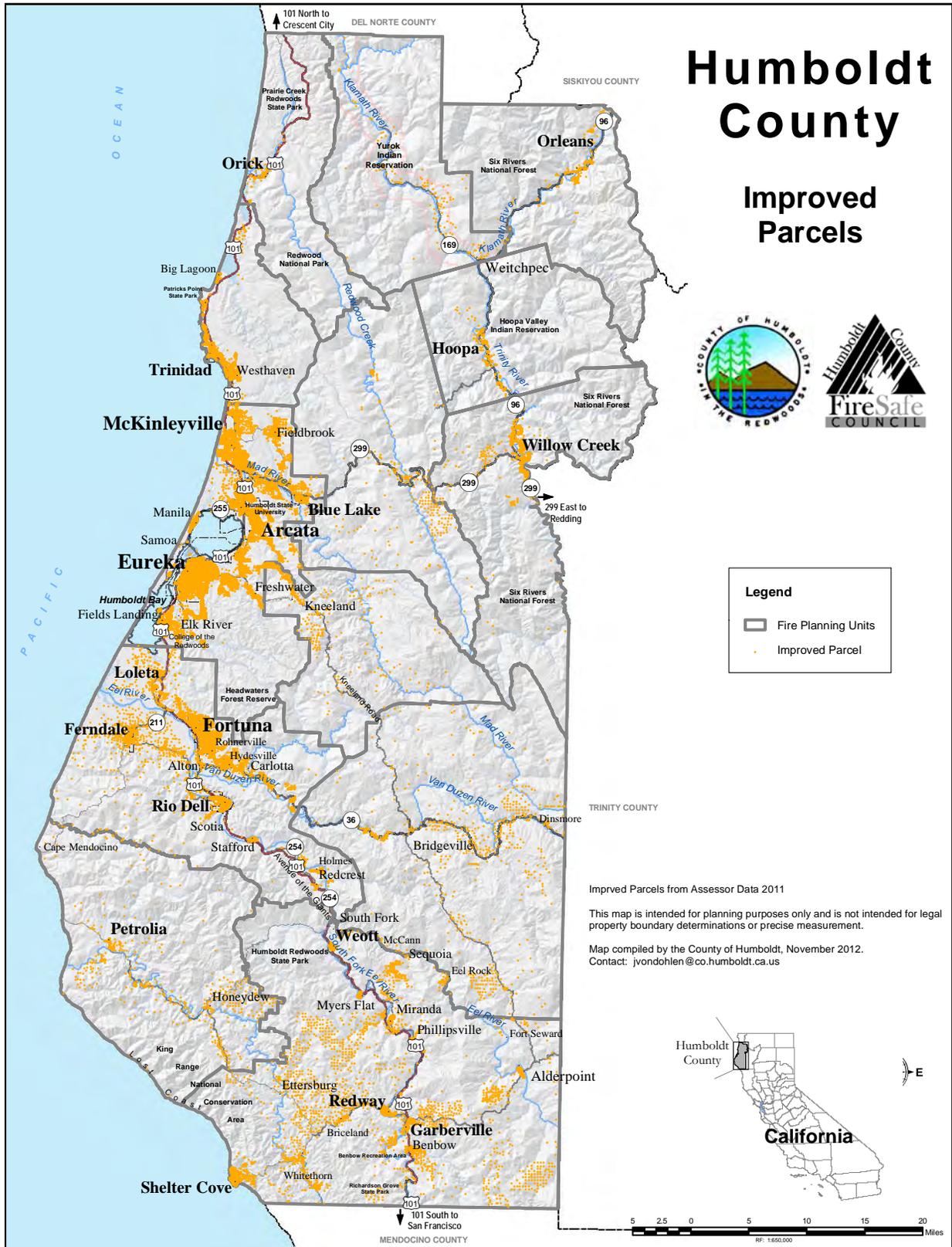
The seasonal use of some structures is also a factor in terms of wildfire threat. As described below, Humboldt County has a significant tourism economy, which generally means: 1. there are more people in the county during summer months, and 2. cabins and other structures that may be more vulnerable to wildfire are frequently occupied during this time. This is also true of the population increase in autumn, during the marijuana harvest. Many people who are unfamiliar with wildfire safety issues come to Humboldt County during the fall harvest season—which coincides with the time of greatest wildfire danger—and populate areas that are generally of higher fire risk and hazard. Although the total numbers of this population increase are not significant at the county level, they can be significant at the local level, and frequently occur in communities with High or Very High wildfire hazard and risk. Furthermore, these population increases, along with the activities and housing accommodations associated with marijuana harvesting, can contribute to the already considerable wildfire risk in these areas.

⁸ A parcel that is categorized by the Assessor for use as single family, multiple family, or rural residential development, including Agriculture and Timber parcels.

⁹ The potential development based on the allowed density according to the Humboldt County General Plan.

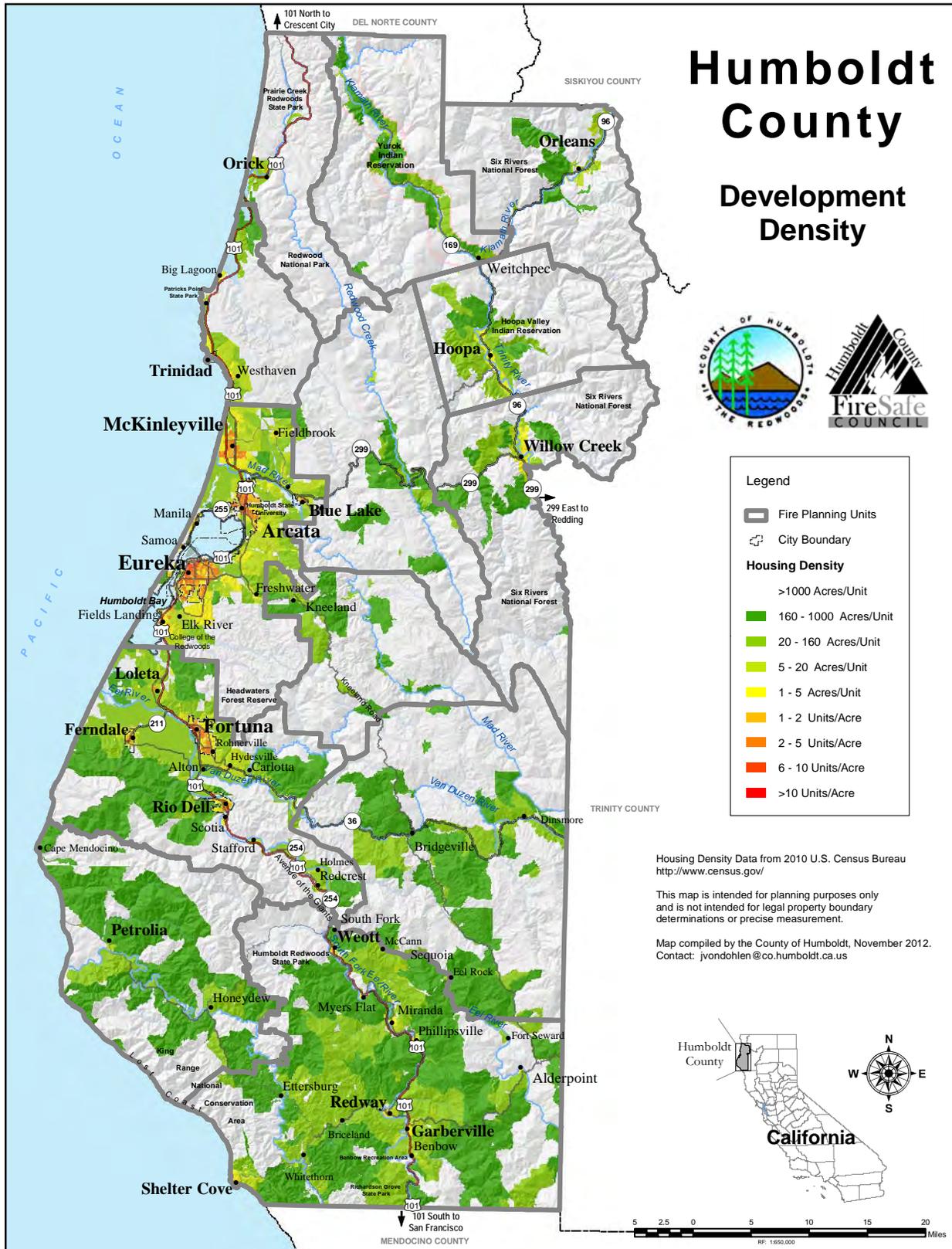
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Figure II.2-3. Improved Parcel Map



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Figure II.2-4. Housing Density Map



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Structural Ignitability

As stated, the majority of homes in Humboldt County are built in urban areas, principally those surrounding Humboldt Bay. Historically, redwood and Douglas-fir lumber was the primary building material and these are both extremely flammable when ignited. There is a vast range of construction types in the county, from non-permitted cabins off the electrical grid, to state-of-the-art new homes. Older wooden homes generally have higher *structural ignitability* than newer homes, unless they have been retrofitted to current building standards. Homes with non fire-safe roofing and siding are common, as are cantilevered decks with flammable items (e.g. lumber, cardboard boxes, etc.) stored underneath. Relatively few homes and structures in Humboldt County have been lost as a result of wildfire, although this may be due to the fact that few wildfires have burned close to urban areas rather than a reflection of fire-safe construction.

Anecdotal evidence from fire service personnel indicates that structure loss from fire (not wildfire) in Humboldt County has increased in the past decade. Some link this trend to indoor growing of marijuana with the most common *ignition* occurrence resulting from faulty, poorly modified, and/or unpermitted wiring. It is widely recognized that many homes in Humboldt County are now being used for indoor marijuana cultivation. These structures (or at least the wiring within them) are often not up to state *building code* standards. In many cases, there are hazardous items located near the structure, including propane and diesel tanks, generators, and even bales of hay, which are sometimes used as sound proofing material to limit noise produced by generators. The *ignition potential* for these structures is very high, and pose an ignition risk to the surrounding *wildlands*, or urban neighborhoods, as the case may be.

New residential construction permitted in Humboldt County's State Responsibility Areas (SRA) have been built according to the standards of the 2007 California Building Code Chapter 7A: "Materials and Construction Methods for Exterior Wildfire Exposure" (effective January 1, 2008). (Henceforth, in this plan, the Chapter 7A standards will be referred to as the *Wildland-Urban Interface (WUI) Building Standards*.) A noteworthy exception to the WUI standards is new residential construction built with a permit under the County's "Modified Limited Density Owner Built Rural Dwelling Regulations" for alternative owner builders (AOB).¹⁰ Homes built to AOB standards are exempt from the California Building Code (including the WUI code) but must meet the standards for the electrical, mechanical, and plumbing codes. County Building personnel encourage AOB permit applicants to follow California Building Code standards; however, there is no way to verify compliance.

The County began to keep digital records on building permit activity in 1993. Between 1993 and 2008 (up to the effective date of the WUI code) there were 1,263 permitted, new residential structures built. Records indicate that only three of those were built with an AOB permit. This report is believed to be massively understated, due to inaccuracies in permit coding; there were likely many more AOB permits granted in that time period. In 2011, the number of permitted new residential structures built since the effective date of the WUI code (2008) was approximately 313; of those, approximately 54 were constructed with an AOB permit. Confidence in the data is greater for the information provided within this second timeframe.

Commercial and Economic

The local economy was built on natural-resources based industries such as timber production and manufacturing, fishing, cattle ranching, and dairy farming. These industries, although diminishing to varying degrees from historic levels, still contribute a great deal to the local economy. Agricultural and timber lands are also an important element of Humboldt County's identity. Although fire has been used as a tool in rangeland and timber management, wildland fire

¹⁰ The County of Humboldt adopted the AOB regulations in 1984.

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can have disastrous consequences to such resources, removing them from production and necessitating lengthy *restoration* programs.

As Humboldt County shifts away from dominant natural resource extraction industries, new innovations are emerging to diversify the economy. According to the Economic Development Element of the 2012 Planning Commission Draft of the Humboldt County General Plan Update:

“New local industries have emerged that export more knowledge-based, specialty, and technology-driven products and services. In fact, our traditional industries have provided the basis for many of these emerging businesses. Habitat restoration, sustainable forest management, organic milk production, and computer network services are all examples of innovative local products and services that the world needs and wants to buy. These new industries have joined traditional natural resource and agricultural industries to diversify and integrate the County into the global economy.”¹¹

Although the impact is difficult to measure, it is important to mention that the production and sale of marijuana for medical and illicit use contributes significantly to the economy in Humboldt County. Many assume it is the largest single industry in Humboldt County. One indicator of its impact is that the retail and restaurant sector is much larger than what would be expected for reported income levels. While marijuana dollars spent on local products and services boosts the economy, the industry’s use of residential, agricultural, and timberlands can result in environmental impacts and have contributed to increased structure fire and wildfire hazards.

Based on the 2011 American Community Survey 1-Year Estimates, the measurable employment industry type responsible for the most occupations in Humboldt County is the “management, business, science, and arts” sector, making up 35% of the working population. A contributing factor to this employment category reflecting the greatest number of workers is that it includes most of those employed by Humboldt State University, a significant employer in the County. Continuing down the list, the “sales and office occupations” are 23%, “service occupations” are 19%, “natural resources, construction and maintenance occupations” are 15%, and finally “production, transportation, and material moving occupations” make up 8% of total employment in Humboldt County.¹²

The employed civilian population, 16 years and over, in Humboldt County totals 56,462. Of these working adults 50.2% are employees of private company workers; 3.5% are self-employed in their own incorporated businesses; 10.9% are private, not-for-profit wage and salary workers; 23.4% are local, state, and federal government workers; and 12% are self-employed in not-incorporated businesses or unpaid family workers.¹³

Humboldt Bay is the commercial focal point of the county, serving as the major port and center of exchange. The Bay also provides most of California’s oyster production and is a significant natural resource. It also includes the Humboldt Bay National Wildlife Area. Much of the county’s property value is concentrated around the Bay and surrounding coastal areas where the cities and larger population centers are located; particularly industrial and residential uses.

¹¹ Humboldt County General Plan Update. (2012). Chapter 9: Economic Development Element. *Planning Commission Approved Draft General Plan*. Retrieved from www.co.humboldt.ca.us/gpu/documentsplan.aspx

¹² U.S. Census Bureau, American FactFinder. (n.d.). Occupation by class of worker for civilian employed population 16 years and over. *2011 American Community Survey 1-Year Estimates*. Retrieved October 25, 2012, from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_1YR_S2406&prodType=table

¹³ U.S. Census Bureau, American FactFinder. (n.d.). Occupation by class of worker for civilian employed population 16 years and over. *2011 American Community Survey 1-Year Estimates*.

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Much of these coastal urban and suburban areas are categorized by CAL FIRE as Moderate Fire Hazard Severity Zones, or are not ranked at all. Figure II.2-5 below illustrates Improvement Value by Fire Hazard Severity Zone for comparative purposes.

Figure II.2-5. Improvement Value by Fire Hazard Severity Zone¹⁴

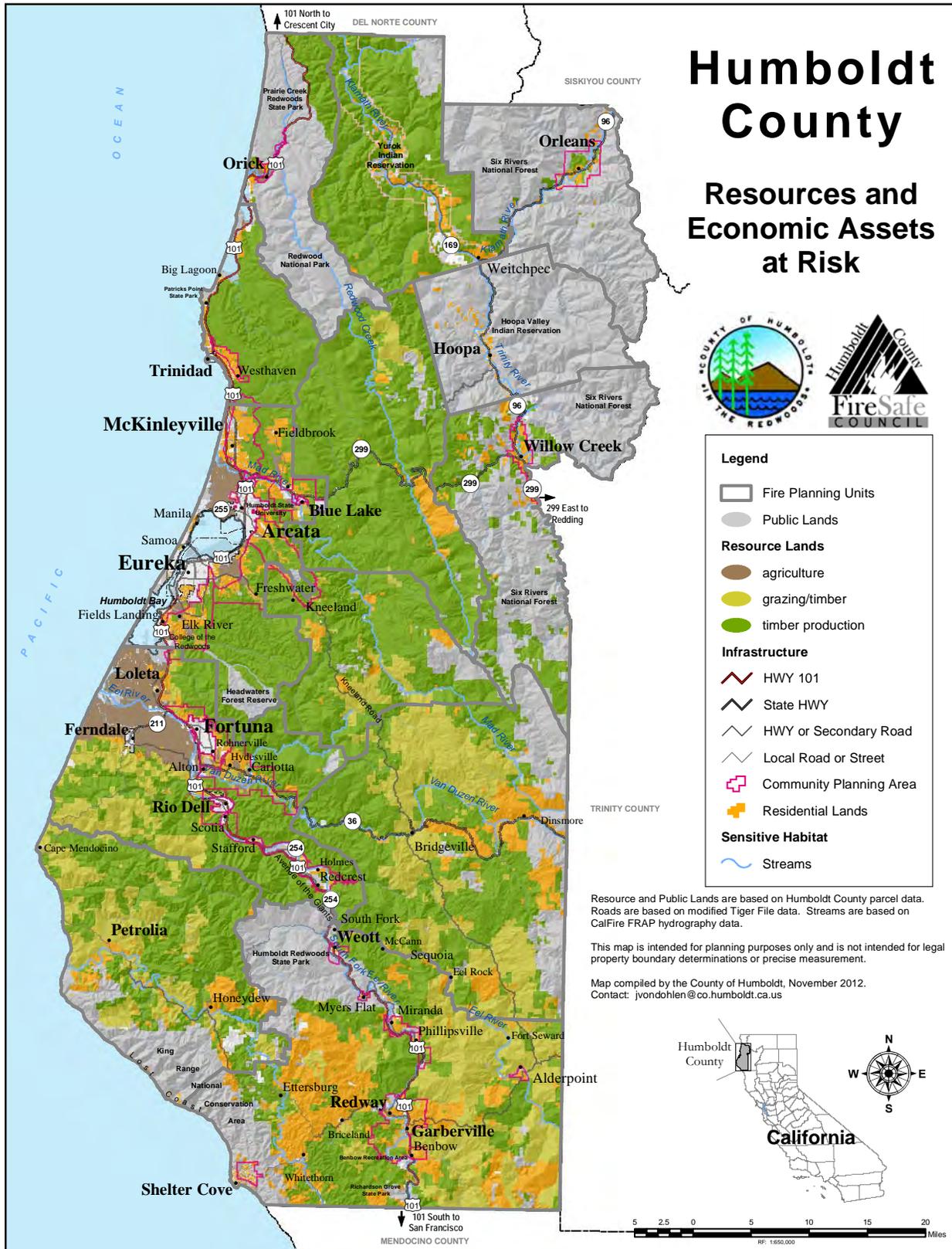
Property Type	Non-Wildland/ Non Urban	Urban Unzoned	Moderate	High	Very High	Total
Agriculture	\$6,518		\$3,781	\$43,785	\$11,349	\$65,433
Churches /Other Non-profit Org.	\$600	\$13,876	\$7,899	\$11,505	\$2,740	\$36,623
Entertainment & Recreation	\$792	\$16,459	\$23,388	\$15,462	\$5,060	\$61,161
Heavy Industrial	\$1,020	\$10,129	\$12,208		\$484	\$23,842
Institutional Dormitory		\$561	\$10,747	\$8,752		\$20,060
Light Industrial	\$158	\$36,182	\$9,514	\$1,750	\$175	\$47,778
Medical Office/Clinic		\$19,906	\$14,147	\$10,836	\$3,732	\$48,621
Single Family Dwelling	\$36,491	\$416,468	\$1,030,953	\$821,273	\$156,005	\$2,461,190
Multi-dwellings (3 to 4 units)	\$534	\$59,731	\$66,986	\$38,506	\$1,200	\$166,957
Multi-dwellings (5 to 9 units)	\$470	\$7,554	\$10,429	\$10,744	\$315	\$29,513
Multi-dwellings (10 + units)		\$17,728	\$2,578	\$5,538		\$25,843
Nursing Home			\$62	\$401		\$464
Personal and Repair Services	\$1,431	\$12,492	\$27,357	\$15,657	\$5,472	\$62,409
Professional/Technical Services		\$4,982	\$9,851	\$4,265	\$73	\$19,170
Public			\$0	\$0	\$0	\$0
Retail Trade		\$16,265	\$16,354	\$7,165	\$5,820	\$45,603
Temporary Lodging			\$1,884	\$15,010	\$3,103	\$19,997
Utilities		\$0	\$4	\$0	\$0	\$4
Vacant	\$25,060	\$3,741	\$139,187	\$172,675	\$45,271	\$385,935
Wholesale Trade		\$234	\$2,200	\$54	\$259	\$2,746
Total	\$73,077	\$636,304	\$1,389,530	\$1,183,337	\$241,059	\$3,523,347

The following map in Figure II.2-6 shows resource lands in Humboldt County (agriculture, grazing, and timber production) as well as primary residential areas. It also outlines the Community Planning Area boundaries used by the County for planning purposes.

¹⁴ Figures are in thousands of dollars.

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Figure II.2-6. Resources and Economic Assets at Risk Map



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Schools

There are 32 school districts in Humboldt County.¹⁵ The districts collectively operate 73 schools including elementary, middle, and high schools. There are also many local charter schools operating throughout the county. Many of these schools are designated Red Cross emergency shelters. In rural communities with high fire risk, many schools were identified by local residents at community workshops as wildfire *evacuation sites*.

Medical Facilities

Four hospitals are located within Humboldt County. These facilities are essential to the health, safety, and well being of local residents. These critical assets become increasingly valuable in emergency situations and during wildfire incidences. Figure II.2-7. Humboldt County Medical Facilities contains contact information for these facilities.

Figure II.2-7. Humboldt County Medical Facilities

Name	Address	Phone Number
Mad River Community Hospital	3800 Janes Road Arcata, CA 95521	707-822-3621
St Joseph Hospital	2700 Dolbeer Street Eureka, CA 95501	707-443-8051
Jerold Phelps Community Hospital	733 Cedar Street Garberville, CA 95542	707-923-3921
Redwood Memorial Hospital	3300 Renner Drive Fortuna, CA 95540	707-445-8121

General Infrastructure

As each individual community has developed in Humboldt County, vital infrastructure has been built in order to serve the needs of the growing population. Infrastructure includes all of the roads, utilities, water, and all other services that enable Humboldt County residents to live here. The major road systems within the county—Highways 101, 299, 36, and 96—are crucial assets. *Erosion* and landslides, which are likely to follow a wildfire event in the county, pose a significant threat to the transportation infrastructure. *Fire suppression* efforts also rely on roads to strategically place equipment and firefighting personnel during wildfires.

Power lines are at significant risk to wildfire because most poles are made of wood and are therefore susceptible to burning. Fires can create conditions that block or prevent access throughout the county; fires can isolate residents and prevent emergency service providers from reaching vulnerable populations or to making repairs. Wildfire typically does not have a major direct impact on bridges. However, wildfires can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they often provide the only *ingress and egress* for large areas and, in some cases, for isolated neighborhoods.

The public and private utilities within Humboldt County are also important assets. The security of clean water is fundamental to all communities. Increased surface runoff following a wildfire can cause inputs of nutrients, ash, and other particulate matter into the county water

15 Humboldt County Office of Education. (n.d.). *Humboldt County School Districts*. Retrieved October 29, 2012 from <http://www.humboldt.k12.ca.us/schdist/index.php>.

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sources. There are approximately 25 different local agencies¹⁶ that provide water service and an additional 30 mutual water associations¹⁷ of varying sizes throughout the county. These providers supply domestic water to residents and visitors. The larger providers also maintain water for fire suppression. All of these water suppliers are site-specific and service the needs of a particular location. Facilities maintained by these providers, such as treatment plants, pumps, and storage facilities can be damaged during or following a wildfire.

Airports

Nine public airports operate in Humboldt County:

- Arcata-Eureka Airport
- Garberville Airport
- Murray Field Airport
- Eureka Municipal Airport
- Hoopa Airport
- Dinsmore Airport
- Kneeland Airport
- Rohnerville Airport
- Shelter Cove Airport

All but the Eureka Municipal, Shelter Cove, and Hoopa Airports are owned and operated by Humboldt County. Airport master plans for Humboldt County airports are available from the Humboldt County Public Works Department at <http://co.humboldt.ca.us/aviation/>.

Airstrips are important infrastructure components, as they provide recreational opportunities, emergency landing sites, potential evacuation sites, and facilitate visitors and tourism. Private airstrips exist in Humboldt County that can be used as emergency landing or evacuation destinations; many of which are only known to local emergency responders.

II.2.2. Natural Assets

Natural resources are one of the defining characteristics of Humboldt County and are highly valued by residents for their contribution to the local quality of life. The County's natural resources are also highly significant as economic development assets that attract tourist-related expenditures and outdoor recreationists. Although fire is a natural process in this environment, and low-intensity burns can actually assist ecosystem health, the suppression of wildfire in recent decades has resulted in a buildup of *fuel* and has increased the potential for large fires, which burn with greater intensity than under what were traditionally "natural" conditions. When fires occur under these hazardous conditions (i.e. extreme weather and/or unusually dense fuel loading) they can quickly escalate out of control and threaten the destruction of natural assets that are highly valued by the community. (See Chapter II.2.1. *Wildfire Environment for more information on fire ecology.*)

Scenic

Forested hillsides, working agricultural land, river corridors, coastal areas, and scenic highways provide a range of stunning vistas in Humboldt County. Expanses of beautiful, natural scenery are signature to this region and are a large draw for many people who live in, recreate in, and visit the area.

Coastal Views

Humboldt County's extensive coastline allows for a wide range of exceptional scenic vistas from areas along US 101 and from beaches, state parks and coastal access points. Coastal areas are popular tourist destinations that offer vacationing and recreational opportunities, such as

¹⁶ City and District providers.

¹⁷ Landowners own shares in these systems rather than paying rates.

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hiking and fishing. One prominent example is Patrick's Point State Park, which provides campgrounds and hiking trails that line the craggy headlands. Trinidad Head also offers favorable views from which people can glimpse migratory whales, such as humpback and gray whales. These coastal areas are generally not greatly affected by wildfire; however, large, enduring fires located further inland that produce heavy smoke can negatively affect air quality on the coast.

Forests

Forestlands define much of the visual landscape of Humboldt County, covering more than 80% of the total land area. Forest types vary across the county, with Douglas-fir forests *dominant*, which include different varieties of oak and pine, along with yew, cedar, and hemlock trees. Other forest types include redwood forests, *montane* hardwood forests, and oak woodlands, which provide a range of excellent wildlife habitat. Forest *ecosystems* support a wealth of *biodiversity*, accommodate wildlife migration patterns, and provide sanctuary for many special status species that exist within the county. These valuable ecosystems also support watersheds in this area by retaining massive amounts of water within their healthy, viable soil compositions.

The scenic value of these forestlands, whether they are viewed from within or from afar, are also of great importance, and their vast expanses have become quintessential to the visual character of the area. These natural resources can be highly threatened by wildfire. In addition to their vulnerability to lightning-caused fires, the tendency for these natural resources to draw large numbers of people with their beauty and recreation opportunities increases the likelihood of human-caused ignitions. Furthermore, the logging of many *fire-resilient* old growth forests, followed by the seeding of Douglas-fir among second-generation redwoods have altered *stand compositions* in such a way that makes the forests more vulnerable to wildfire. Fire suppression within the County's forests have also allowed for the accumulation of heavy fuel in the forest *understories* that increases the likelihood of high-intensity fires damaging large amounts of forest cover.

Agricultural Lands

Large swaths of working agricultural land distributed throughout Humboldt County lend a pastoral charm to the scenery of the area. While vistas of immense forestlands create a sense of remote beauty, the rolling agricultural lands within the prairies and flatlands contribute to the rural character of the region. In addition to the dairies and bulb farms in the area, numerous small, organic farms are sprinkled throughout the county. The majority of these agricultural lands do not follow an industrial agriculture model (and therefore contain less chemicals and pesticides), which is beneficial to local biodiversity. These less-developed, ecologically tolerant expanses of land can act as wildlife corridors and facilitate species migration throughout the region. There are also a number of "heritage landscapes" within Humboldt County, which are lands with combined historical, cultural, and scenic values, such as the Arcata and Ferndale Bottoms areas. Although these agricultural landscapes are not especially vulnerable to wildfire directly, they may be impacted by large fires that produce an abundance of smoke, which can have substantial negative impacts on air quality, sun exposure, and may even scatter ash on crops in these areas.

Rivers

Two of California's three largest river systems flow through Humboldt County, along with several other major rivers, whose valley corridors contribute to the scenic quality of the mountainous forests in the region. Portions of many of these rivers are designated as part of the National and/or California Wild and Scenic Rivers Systems; sections of the Eel, Klamath, Trinity, and Van Duzen rivers are designated either "wild," "scenic," or recreational. The rivers in Humboldt County are highly significant natural assets; they are invaluable to the residents of this area, many of whom rely on the rivers for their water. They help attract tourist and recreationist expenditures that assist local economies. They provide crucial habitat for a variety of fish species,

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many with important ecological, commercial, cultural, and recreational fisheries value. These life-giving water bodies also help sustain a variety of local vegetation and wildlife species throughout their watershed boundaries.

Riparian assets are highly vulnerable to disturbance from wildfires that may occur in the forests through which the rivers flow. Erosion following fires can cause large *sediment* loads in streams, which may then be transported and deposited into rivers and damage aquatic habitat in riparian areas. By killing or consuming vegetation next to streams and ponds and diminishing the shade it provides, forest fires can have strong and lingering influences on water temperatures, raising them and threatening fish and other aquatic species.¹⁸ Risk of fire starts near river areas is amplified by the popularity of river recreation during summer months, when fire risk is greatest, due to the increase in human population. Wildfires that occur near rivers can also make river recreation unappealing or dangerous, and may dampen tourist enthusiasm for visiting the areas. Finally, firefighting can have significant impacts on local rivers, including water removal during critical late-season flows and use of retardants.

Scenic Highways

Multiple highways throughout Humboldt County have extraordinary scenic qualities because of their unique natural setting. A scenic road is defined as a roadway that, in addition to its transportation function, provides opportunities for the enjoyment of natural and scenic resources. Scenic roads direct views to areas of exceptional beauty, natural resources or landmarks, or historic and cultural interest. Although no highways in Humboldt County are officially designated as California State Scenic highways, several state highways are eligible for official designation:

- Route 36 from Route 101 near Fortuna to the Trinity County line
- Route 101 for its entire length in Humboldt County
- Route 299 from Arcata to Willow Creek
- Route 96 from Route 299 at Willow Creek north to Siskiyou County
- Highway 254, “the Avenue of the Giants,” branching off of Route 101 in the southern portion of the County

Local Humboldt County roadways also have significant scenic view values.¹⁹ These important transportation routes can all be compromised by wildfire.

Protected or Environmentally Significant Areas

More than 550,000 acres in Humboldt County are protected open space, forests, and recreational areas. Humboldt County contains four federal parks and beaches, ten state parks, and sixteen county parks and beaches, recreational areas and reserves, and National Parkland and National Forest lands. These protected areas provide valuable habitat for an array of wildlife, fisheries, and special status species. More than 20 species of plants and animals in Humboldt County are listed as *Endangered* or *Threatened* under federal and state classification systems.

Of the 1.9 million acres of forested land, 26% is either encompassed within protected areas or public forested lands; the remainder is privately owned timberland. Redwood National Park, Six Rivers National Forest, Redwoods State Park, Headwaters Forest Reserve, and Kings Range National Conservation Area are all significant, protected forests within the county. These protected forest areas provide natural habitat for a range of species types and enable residents and

¹⁸ Pilliod, D.S., Bury, R.B., Hyde, E.J., Pearl, C.A., & Corn, P.S. (2003). Fire and amphibians in North America. *Forest Ecology and Management* 178(1-2), 163–181.

¹⁹ Humboldt County General Plan Update. (2012). Chapter 8: Scenic Resources. *Natural Resources and Hazards (September 2002) Report*. Retrieved from www.co.humboldt.ca.us/gpu/documentsbackground.aspx

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tourists alike to appreciate and experience firsthand the majesty of these enduring natural landscapes.

Humboldt County contains numerous ecologically and economically valuable aquatic resources as well; these include wetlands, lagoons, streams, rivers, estuaries, and the Pacific Ocean. These resources are significant on both a regional and statewide level. Humboldt Bay, for instance, is California's second largest *estuary*, and combined with surrounding agricultural lands and the Eel River estuary, is one of the most important migratory waterfowl stopovers along the Pacific Flyway. Humboldt County also has some of the largest and most ecologically important coastal lagoons in the state, including Big Lagoon, Stone Lagoon, and Freshwater Lagoon.

The presence of these *special status species*, migratory birds, and other types of wildlife within protected areas contributes to the value of the County's natural assets, improving the quality of life for residents, attracting visitors from out of the area, and enhancing local ecosystems. These assets are at varying degrees of risk from wildfire. Protected forest and river areas experience the greatest threat, due to existing fuel loads and popularity of recreation locales. Wildlife species within these areas are at risk of habitat destruction from wildfire, which could be especially detrimental to threatened and endangered species whose habitat is already in short supply. Although estuaries and other aquatic resources near the coast are less vulnerable to negative effects from wildfire, smoke-caused air pollution could potentially impact migratory bird species and other sensitive wildlife. Furthermore, large-scale watershed disturbance generated by wildfires further inland can result in loss of vegetative cover near waterways, increased runoff, and severe erosion and sediment production.

Recreational Areas (Seasonal Use)

Numerous opportunities for multiple types of outdoor recreation add to the significance of Humboldt County's many natural assets. Public and protected forests, beaches, parks, and recreation areas contain hiking trails, campgrounds, river access points, and a number of accessible coastal areas that create opportunities for countless recreationists. These natural assets attract backpackers, rock climbers, mountain bikers, day hikers, as well as fisherman, river rafters, sea-kayakers, sail boaters, and surfers, to name a few.

The availability of these recreational areas and resources is necessary for Humboldt County to maintain its competitiveness as a tourist destination. The tourist industry in Humboldt County has continued to grow in significance since the decline of the timber industry, and the region has become well known for its abundance of outdoor recreation opportunities. As this trend in the economy continues, parks and recreational resources will prove of greater and greater value to Humboldt County's future.

Consequently, the degree to which humans impact these spaces will increase as well, and so too will the need to mitigate those impacts. Several regulatory agencies have a stake in and help manage the parks, recreation, and open spaces in Humboldt County, including: the Bureau of Land Management, California Department of Fish and Game, California State Parks, United States Forest Service, local city governments, Humboldt County, local Native American Tribes, and other state and federal regulatory agencies.

Parks, recreation locales, and open spaces are vulnerable to negative impacts from wildfire events. Some areas, such as forests and river valleys, are threatened by the immediate potential impacts of wildfire burning through forest stands and depreciating water quality in streams and rivers. Other areas are at risk of being impacted by poor air and water quality, as well as decreased recreational appeal due to fires blocking access roads, diminishing scenic views, or causing lingering smoke pollution.

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Air Quality

Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides) and toxics (formaldehyde, benzene). Emissions from wildfire depend on the type of fuel, the *moisture content* of the fuel, the efficiency (or temperature) of *combustion*, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

Humboldt County is prone to temperature inversions, which occur when a layer of warm air traps cool air near the surface and creates a lid that inhibits the vertical dispersion of smoke and other pollutants. The Megram Fire (Big Bar Complex Fire) burned 135,000 acres between late August and early November 1999 in eastern Humboldt and Trinity Counties, and resulted in the first air-quality related State of Emergency in California history. The smoke from the Honeydew and Canoe fires inundated Southern Humboldt for months. Smoke from the fire was trapped by an inversion layer between late September and early October, causing officials to close schools and encourage residents to leave the area. Those who remained in the affected area were encouraged to remain indoors. (*For more information on maintaining air quality, see Air Quality Regulations in Chapter V.4.2. Environmental Protection Compliance.*)

II.2.3. Cultural Assets

The indigenous people of what is today Humboldt County occupied specific territories, spoke languages of several different stocks, and had similar but distinct social and cultural structures. The Wiyot, Yurok, Hupa, Karuk, Chilula, Whilkut, and the southern Athabascans, including the Mattole and Nongatl practiced lifeways carefully prescribed by cultural and religious mores.

The Humboldt County General Plan Cultural Resources Section provides an overview of culturally sensitive resources in the county (Humboldt County, 1984):

“Before European settlement, the Humboldt County area was one of the most culturally diverse regions of California, being home to nearly a dozen distinct peoples. In large part, Native American tribes occupied land areas conforming largely to the natural watershed basins. Culturally sensitive areas are sites and regions of special importance to Native Americans, primarily coastlines and riverbanks with outstanding religious or resource-producing importance. Over 32,000 acres of land in Humboldt County are designated as culturally sensitive, with notable concentrations along the Lower Klamath, the Lower Trinity, lower end and North Fork of the Mad, and the Van Duzen Rivers, and the eastern shore of Humboldt Bay.”²⁰

Culturally sensitive areas exist on both public and private lands. While some locations are publicly identified, others are held as confidential information by local Native American organizations. Many cultural sites are at risk of incidents of wildfire. Fire can destroy artifacts and structures. However, a light fire can clean an area of *litter* and ground fuel, exposing new cultural sites and artifacts without causing significant damage. The discovery of these cultural sites can be a benefit to archeologists and Native American groups, but can also present problems of looting and vandalism.

II.2.4. Community-Identified Local Assets

In early 2012, sixteen Community Wildfire Protection Plan (CWPP) public meetings were held throughout Humboldt County. At these meetings, local community assets from the 2006

²⁰Humboldt County General Plan, Volume I, Framework Plan (1984) Chapter 3b: Biological Resources, Section 3500: Cultural Resources. Retrieved from <http://192.168.1.3/planning/Genplan/Framework/index.htm>

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Plan were reviewed and confirmed and, in some cases, additional assets were added. Some of the most important community assets and values identified at these meetings included schools, community centers, churches, fire stations, hospitals, senior centers, neighborhoods, commercial districts, golf courses, campgrounds, and more. A map at the end of each Planning Unit Action Plan in Part IV of this Plan illustrates these assets and values at risk to wildfire. These can be used as a key to access detailed descriptions of the identified assets on the Humboldt County Web GIS Portal, “Fire Planning” section, <http://gis.co.humboldt.ca.us/>.

II.2.5. Conflicts between Natural Assets and Human Occupation

Human settlement affects wildland fire, including the potential for wildfire starts and prescribed fire and wildland fire uses. Natural resource lands, primarily forestlands, surround many unincorporated communities in Humboldt County. The areas where communities abut natural resource lands are known as the wildland-urban interface (WUI). The interface is often an environmental condition where a mix of fuel, weather, and topographical conditions create conditions that put a community at risk to wildfire. A WUI is an area of increased human influence and land use conversion. Population and demographic trends, economic and tax issues, and land-use planning and policy issues all play a part in influencing the interface. These factors are important to understand, as are the consequences of human influences on forest ecosystems, in order to establish an ecological framework for planning and policy affecting the WUI.

Human encroachment into wildland areas with higher fuel hazards creates a conflict that often threatens life, property, and the natural environment. For example, most wildfires occur in Humboldt County in late summer and/or early fall, when water levels in local rivers and streams can be very low. Conflicts have arisen in the past over *bucket dipping* into and water drafting out of rivers for fire-fighting water during late summer when native salmon and steelhead, and their habitat, is most vulnerable.

All *vegetation types* found within Humboldt County have the potential to carry wildfires. In fact, most vegetation communities in the county are dependent to some extent on fire occurrence to remain healthy and viable. At the same time, wildland areas are often aesthetically pleasing and create an atmosphere in which many people seek to live. This is quite apparent here, as trends show residents slowly expanding into remote areas that are beautiful but flammable, such as Willow Creek, and the WUI areas east of Humboldt Bay, such as Kneeland. The greatest threat generally occurs on the border of human development where the wildland meets the edge of communities, although wildfire can cause destruction to houses located well inside these communities, especially in the case of large ember storms. Given these communities’ exposure and vulnerability to wildfire, taking steps to enhance local fire awareness and preparedness should be a top priority for residents living within the WUI in Humboldt County.

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II.3. Wildfire Protection Capabilities

Fires in Humboldt County fall into two general categories: *wildland fires*, which emanate from forest, grassland, or open *chaparral*; and *structural fires*, which damage homes and workplaces and may spread to other areas, including the *wildlands*. Three distinct types of wildland fire have been defined, they include: wildfire, wildland fire use, and *prescribed fire*. Wildland fire response is most often concerned with addressing *wildfires*, which are unplanned or unwanted wildland fires, such as unauthorized human-caused fires and escaped prescribed fire projects, where the objective is to put the fire out. In general, wildland fire management is the responsibility of federal and state agencies (especially in the case of public lands). Structural fire protection is the primary responsibility of local agencies and organizations, such as fire-related districts and volunteer fire companies.

The local fire protection organizations in this county provide *all-risk fire protection* meaning that they are called upon to provide *structural fire protection* as well as wildland fire management services, respond to medical emergencies, perform technical rescue, respond to *hazardous materials* incidents, and assist with general disaster management. State and federal firefighters will also respond to a broad array of emergencies beyond just wildfires depending on their availability. They do not, however, generally have the proper equipment to enter a burning structure and their primary focus is to protect federal and state wildland areas.

There are three specific land classifications to identify the agency with the financial responsibility for preventing and suppressing wildfire. These are the following:

- The Local Responsibility Area (LRA) is primarily the responsibility of the local jurisdiction.
- The State Responsibility Area (SRA) is primarily the responsibility of the state.
- Federal Responsibility Area (FRA) is primarily the responsibility of a federal government agency.

Only a small portion of the county is classified as LRA. The majority of the local fire agencies contain SRA lands within their jurisdictional boundaries (many are comprised solely of SRA). Although local agencies are responsible for structural fire protection and wildland fires that occur in the LRA, CAL FIRE retains responsibility for grass and forest fires in SRA lands that are within the boundaries of a local agency. CAL FIRE and local fire departments work together on fires that involve areas classified as SRA within local jurisdictional area.

Agencies will sometimes enter into agreements to assume responsibility for fire prevention and suppression in one another's responsibility areas. These contracted areas are then called Direct Protection Areas (DPA). There are several DPAs in the county and they are discussed in more detail in Section II.3.3 and illustrated in the map found in Figure II.3-8.

Humboldt County has an extraordinarily strong and effective *mutual aid* system, among all agencies and for all types of emergency response. Mutual aid is a reciprocal aid agreement between two or more agencies that defines what resources each will provide to the other in response to certain predetermined types of emergencies. Mutual aid response is provided upon request.

An automatic mutual aid (auto aid) agreement is another type of agreement to ensure that, within specified areas of a fire department's response area or for certain types of incidents, their automatic mutual aid partner will be automatically dispatched to an emergency and a special request for help will not be necessary. The auto aid responses provide an improved level of service to areas that are often adjacent to the boundaries of a neighboring agency. Having neighboring resources automatically assisting on these calls enables the responsible fire service

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provider to keep some resources within their response area in the event of additional calls. Several fire service providers within Humboldt County have auto aid agreements in place.

Regardless of their official responsibilities, and often beyond what might be considered within their capabilities, local fire departments are quick to assist each other as well as state and federal partners, and vice versa. Local firefighters, paid and volunteer, can often be found working alongside state and federal “resources” in their efforts to extinguish house fires, respond to medical emergencies, and manage wildfires within the county boundaries and beyond. Depending on the specific incident, fires may be managed under a unified command between multiple departments or one department may simply assist the other, depending on who has the protection responsibility.

Emergency response capability is ascertained in this Community Wildfire Protection Plan (CWPP) through the identification, definition, and analysis of the delivery of services and level of coverage provided by fire-protection organizations that currently exist in Humboldt County. The following sections contain a detailed discussion of five topics that shed light on the level and type of emergency response provided in Humboldt County, and what the critical needs are to sustain services and ensure community safety.

- Fire Protection Organizations
- Emergency Services Delivered
- Fire Protection Level of Service
- Fire Protection Support
- Evacuation Routes and Vulnerability

This assessment of countywide emergency response capabilities can be used to identify gaps in service and organizational needs. It can also inform important decisions related to the allocation of resources and provide a basis from which countywide fire-risk reduction measures can be implemented.

II.3.1. Fire Protection Organizations

In response to a diverse range of service demands, the County receives fire protection and related emergency services from a variety of fire organizations. The County’s fire organizations are divided into two primary categories: 1) federal, state, and tribal agencies; and 2) local fire organizations. Figure II.3-1 below lists types of fire departments in each of these two categories. Each Planning Unit Action Plan in Part IV of this CWPP provides additional, site-specific information about each of these organizations and agencies.

Figure II.3-1. Organizations Providing Fire Protection and Related Emergency Services in Humboldt County

Organization Type	Area Served
<i>Local Fire Organizations</i>	
City Fire Departments	Eureka (operationally combined with Humboldt Fire Protection District #1 as “Humboldt Bay Fire”), Trinidad
Fire Protection Districts (formal jurisdictional area with some type of tax support)	Arcata, Blue Lake, Bridgeville, Briceland, Ferndale, Fortuna, Garberville, Humboldt Fire Dist. #1 (operationally combined with Eureka City Fire as “Humboldt Bay Fire”), Kneeland, Loleta, Myers Flat, Petrolia, Redway, Rio Dell, Samoa Peninsula, Telegraph Ridge, Whitethorn, Willow Creek
Community Service Districts	Carlotta, Fieldbrook, Miranda, Orick, Ruth Lake, Scotia, Weott

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Organization Type	Area Served
Other Special Districts or Agencies	Humboldt County Service Area #4 (between Crannell and Orick), Resort Improvement District #1 (Shelter Cove)
Volunteer Fire Company (no formal jurisdictional area or tax support base)	Alderpoint, Fruitland Ridge, Korbel Fire Brigade, Honeydew, Orleans, Palo Verde, Phillipsville, Redcrest, Salmon Creek, Sprowel Creek, Westhaven, Whale Gulch
<i>Federal Agencies</i>	
US Forest Service	Six Rivers National Forest, with fire stations in Orleans, Willow Creek, and Fortuna
National Park Service	Redwood National Park, with a fire station near Orick
Bureau of Land Management	Arcata Field office, with a fire station near Whitethorn
State Agencies	California Department of Forestry and Fire Protection (CAL FIRE), Humboldt-Del Norte Unit, with fire stations in Honeydew, Whitethorn, Garberville, Alderpoint, Weott, Bridgeville, Fortuna, and Trinidad.
Tribal Agencies & Organizations	Hoopla Valley Wildland Fire Department, Hoopa Valley and Yurok Volunteer Fire Companies

Local Fire Organizations

Local fire departments are as diverse as the communities they represent. The County's fire departments range in composition from a paid, full-time city fire department (the City of Eureka), to very rural volunteer fire companies whose members house fire engines at their own residences. The diversity of Humboldt County's fire organizations becomes problematic when attempting to establish countywide standards of coverage, define operational capabilities, and analyze fire resource deployment. Gaining a better understanding of fire organization characteristics and response capabilities will aid in these endeavors.

Humboldt County's local fire service includes a combined total of 42 fire protection organizations. This includes seventeen Fire Protection Districts, seven Community Service Districts, fourteen Volunteer Fire Companies (two are tribal), two other Special Districts, and two City Fire Departments. Figure II.3-2 provides a summary of local fire department staffing, firefighting apparatus, and station capabilities. The service areas of these local fire departments and companies are illustrated in Figure II.3.3. Local Fire Protection map.

Local fire departments assume a number of different forms as agencies, joint powers authorities, and associations. The following is a description of local-level fire organizations in Humboldt County. Each sub-heading is followed by the number of fire organizations of that type, in parentheses.

County Service Area (CSA) – (1)

County Service Areas (CSAs), authorized under §25210.1 of the Government Code, are generally single purpose, dependent special districts governed by the County Board of Supervisors. In Humboldt County, there is one fire related CSA, called CSA No. 4. CSA No. 4 is essentially a funding mechanism developed to provide structural fire protection in the coastal area located south of Orick and north of Crannell, not including the City of Trinidad. Through an *Amador Agreement*,¹ the County contracts with the California Department of Forestry and Fire

¹ The Amador agreement continues CAL FIRE staffing and station coverage through the winter "off season" and is defined in: California Public Resources Code, sections 4143 & 4144 (2005).

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Protection (CAL FIRE) to provide structural fire protection within CSA No. 4. The Westhaven Volunteer Fire Company also provides service within CSA No. 4, but is not a recipient of CSA No. 4 funding.

Community Services Districts – (7)

Community Service Districts (CSDs) are sometimes called junior cities and are authorized under §61000 et seq. of the Government Code. CSDs can provide a broad range of municipal services (primarily to unincorporated areas), including fire protection. CSDs are normally governed by a five-member elected Board of Directors and can receive revenue from taxes and fees. In cases where a CSD is responsible for fire protection in Humboldt County, services are provided by a volunteer fire department with facilities and funding provided by the CSD. These are listed above in Figure II.3-1. Two CSDs in Humboldt County, Carlotta and Ruth Lake, provide fire protection and no other services. Most of the Ruth Lake CSD is located in Trinity County, along with the District's fire station and firefighters.

City Fire Departments – (2)

The cities of Eureka and Trinidad have city fire departments. The City of Eureka is the only city in Humboldt County that provides fire protection services with full-time staff members. The City of Eureka's fire department is staffed with career firefighters and the department also maintains a contingent of volunteer firefighters. The City fire department is operationally combined with Humboldt #1 Fire Protection District under a single fire chief. Humboldt Bay Fire represents the consolidation of the Eureka Fire Department (protecting the City of Eureka) and the Humboldt No. 1 Fire Protection District (protecting the greater Eureka area, outside the City limits). Consolidation talks were ongoing for 50+ years until finally in 2012 the Humboldt Bay Fire Joint Powers Agreement was signed in November of 2012, officially combining the two entities.

The City of Trinidad receives service from an all-volunteer city fire department. All other cities in the county receive fire protection services from a volunteer fire department associated with a fire protection district.

Fire Protection Districts – (17)

Fire Protection Districts (FPDs) are authorized under §13800 et seq. of the California Health and Safety Code to provide fire protection and emergency medical services. FPDs are generally governed by a three- or five-member, elected Board of Directors. The Board of Supervisors (BOS) governs three of the FPDs in Humboldt County and, in these cases, it is the BOS that appoints a local board of fire commissioners. The majority of the FPDs in Humboldt County are staffed entirely by all-volunteer fire departments. These are listed above in Figure II.3-1.

Volunteer Fire Companies – (14)

Volunteer firefighters are the fire protection backbone of rural Humboldt County. Although almost all fire departments in Humboldt County are staffed by volunteers, most departments are associated with a local government organization such as a city or special district. Ten local fire departments have no government affiliation; these are listed above in Figure II.3-1. Most *Volunteer Fire Companies* (VFCs) are organized pursuant to Health and Safety Code §14825 et seq., or by other means, and these organizations often establish themselves as non-profit 501(c)3 corporations. However, two VFCs in the County (Hoopa and Yurok) are supported by Tribal governments, and one (Korbel) is supported by a timber company.

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Resort Improvement District – (1)

Resort Improvement Districts (RIDs) are authorized under §13000 of the Public Resources Code to provide a broad range of services (similar to CSDs) to unincorporated areas that are occupied seasonally for recreation/resort purposes. In Humboldt County, RID No. 1 provides municipal services to the community of Shelter Cove; and the RID provides fire protection services through the Shelter Cove Volunteer Fire Department.

The following table summarizes the fire stations, equipment available, and number of firefighters (both paid and volunteer), for each of the 42 local fire organizations in Humboldt County.

Figure II.3-2. Local Fire Service: Station, Apparatus, and Staffing Capability

LOCAL FIRE ORGANIZATION ²	FIRE STATIONS ³	FIRE APPARATUS (water tender, engine, ladder, quick attack, & rescue)	FIREFIGHTERS	
			CAREER	VOLUNTEER
Alderpoint Fire Company	1	4	0	12
Arcata Fire Department	3	10	22	25
Briceland Fire Department	3	8	0	18
Blue Lake Fire Department	1	6	1	24
Bridgeville Fire Department	1	4	0	10
Carlotta Fire Department	2	6	0	12
County Service Area No. 4 ⁴	1	1	8	0
Fieldbrook Fire Department	1	4	0	<u>22</u>
Ferndale Fire Department	1	7	0	40
Fortuna Fire Department	3	15	1	68
Fruitland Ridge Fire Company	1	3	0	8
Garberville Fire Department	1	3	0	<u>12</u>
Honeydew Fire Company	4	5	0	<u>14</u>
Hoopa Fire Company	1	4	0	14
Humboldt Bay Fire Department ⁵	5	16	58	25
Kneeland Fire Department	1	3	0	8
Korbel Fire Brigade	1	1	0	<u>22</u>
Loleta Fire Department	1	7	0	<u>30</u>
Miranda Fire Department	1	3	0	12
Myers Flat Fire Department	1	2	0	3
Orick Fire Department	1	4	0	10

² The label “Fire Department” identifies service associated with a special district and “Fire Company” or “Brigade” identifies non-tax, non-district organizations.

³ Local fire stations, particularly in remote rural areas, can consist of only a basic fire apparatus shelter or even apparatus that is regularly stored at a volunteer firefighter’s home.

⁴ Services for CSA No. 4 are provided by CAL FIRE. The numbers reflected in this table are the year-round available resources. During the fire season there are two fire engines and 14 firefighters available.

⁵ Humboldt #1 Fire Protection District and City of Eureka Fire have operationally combined their resources under the name of Humboldt Bay Fire but have not yet officially consolidated their jurisdictions.

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LOCAL FIRE ORGANIZATION ²	FIRE STATIONS ³	FIRE APPARATUS (water tender, engine, ladder, quick attack, & rescue)	FIREFIGHTERS	
			CAREER	VOLUNTEER
Orleans Fire Company	1	4	0	12
Palo Verde Fire Company	1	2	0	8
Petrolia Fire Department	1	7	0	18
Phillipsville Fire Company	1	3	0	3
Redcrest Fire Company	1	2	0	6
Redway Fire Department	1	5	0	11
Rio Dell Fire Department	1	6	0	23
Salmon Creek Fire Company	1	2	0	8
Samoa Peninsula Fire Department	2	4	0	14
Scotia Fire Department	1	6	0	19
Shelter Cove Fire Department	1	9	0	12
Sprowel Creek Fire Company	2	2	0	30
Telegraph Ridge Fire Department	1	3	0	10
Trinidad Fire Department	1	3	0	10
Weott Fire Department	1	2	0	8
Westhaven Fire Company	1	5	0	15
Whale Gulch Fire Company	1	3	0	16
Whitethorn Fire Department	1	4	0	13
Willow Creek Fire Department	1	5	0	22
Yurok Fire Company	2	1	0	10
Total	58	194	90	657

Source: 2012 CWPP Local Fire Protection Survey, the 2012 Humboldt County Fire Chiefs' Association Annual Report, and personal communication.

Federal, State, and Tribal, Agencies

Federal, state, and tribal agencies providing wildland fire protection in Humboldt County include: the US Forest Service (USFS) – Six Rivers National Forest, Redwood National Park Service, Bureau of Land Management (BLM), Hoopa Wildland Fire Department, and CAL FIRE. The resources provided by these agencies are primarily funded for wildfire suppression operations. These agencies have the greatest number of resources available during *fire season*. (Fire season in Humboldt County normally spans from late May/early June through early October.) Collectively they provide services to Humboldt County from a total of 32 fire stations, with 41 fire engines, using 384 fire personnel (212 full time and 172 seasonal), and two *dispatch/communications* centers. A portion of these stations, engines, and personnel are located outside Humboldt County, but are available to provide service within the County.

II.3.2. Emergency Services Delivered

Fire-protection organizations are called upon to provide a range of emergency-response services, including wildfire and community (structure) fire protection, medical aid, technical rescue, hazardous materials containment and control, and general assistance with disaster

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management. In fact, all local fire organizations have a far greater percentage of calls for medical aid than calls for fire protection. Effective response to such a variety of emergency situations necessitates extensive coordination between fire-protection personnel and, in some cases, also requires involvement from other emergency-service agencies within the county and the state.

Initial Response and Dispatching Services

In order to initiate a response from fire-protection organizations for the services they provide, a call must go out, notifying them of an incident. This call can be initiated based on a variety of detection sources. For example, the detection mechanisms utilized by the Six Rivers National Forest (SRNF) include fire *lookouts*, fixed-wing reconnaissance aircraft, vehicle patrols during high fire danger, and automated lightning detection. Many structure fires and medical emergencies are called in by citizens who are involved in or witness an incident.

When 9-1-1 is dialed, the call goes to one of two locations, depending on where the call initiated. 9-1-1 calls that originate from cell phones are initially routed to the California Highway Patrol (CHP); calls that originate from a landline will be answered by a Public Safety Answering Point (PSAP). Some cities have their own PSAP (Eureka, Arcata, and Fortuna as well as Humboldt State University), while unincorporated areas are answered by the Sheriff's Department. The Sheriff's Department, the applicable PSAP, or the CHP will then determine the nature of the emergency call. If the incident is determined to require law enforcement resources, then the responsible law enforcement entity is dispatched. If the incident requires fire and/or ambulance response, then the call will be transferred to the appropriate dispatching facility. The choice of dispatch center depends on the location of the incident and the dispatching service utilized by the nearest fire protection organization and/or ambulance service.

The Fortuna Interagency Command Center (FICC) is the command and control point for many emergency agencies in Humboldt and Del Norte Counties. The FICC is located in Fortuna on the grounds of the CAL FIRE Humboldt-Del Norte Unit Administrative Headquarters. Personnel from CAL FIRE and the USFS jointly staff the FICC. CAL FIRE staff is available 24 hours a day, 7 days a week.

The FICC provides dispatching services for the Humboldt Dispatch Cooperative, which includes all but four of the 42 local fire protection organizations in Humboldt County, as well as the Fortuna Ambulance Company. Arcata Fire Department is dispatched by CAL FIRE but through a separate contract and not through the Humboldt Dispatch Cooperative. Humboldt Bay Fire is dispatched by the Eureka Police Department; the Fortuna Fire Department is dispatched by the Fortuna Police Department; and the Hoopa Fire Department, Hoopa Wildland Fire Department, and Hoopa Ambulance are dispatched by the Hoopa Tribal Police Department. The Sprowel Creek and Korbel Volunteer Fire Companies are dispatched through a variety of systems, including internal business communications, phone trees or *call downs*, C.B. radios, vehicle horns, and calls through 9-1-1. In addition to the dispatch services provided by CAL FIRE and local police departments, many fire departments have a backup system using cell phones, radios, and pagers.

The FICC operates as a secondary PSAP. As required by State law, 9-1-1 calls are initially answered by Law Enforcement agencies. The CAL FIRE dispatchers are all experienced fire captains with extensive field experience. They are also Emergency Medical Dispatcher (EMD) qualified, which allows them to initiate patient care during the call by providing instructions to the reporting party. They work straight through 72-hour shifts (three days on duty). This creates a situation in which the risk of mistakes increases due to fatigued staff. Some additional operators have been added but increased staffing will still need to be considered in the near future.

CAL FIRE staff answers calls and provides dispatch services for local fire protection resources under two separate Amador Agreements, one with the County of Humboldt and one with the Humboldt County Dispatch Cooperative. These agreements pay for the additional expenses

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incurred by CAL FIRE for staffing the FICC 24/7 year-round. CAL FIRE pays for the base costs of operating the FICC. The agreements currently cover less than 15% of the total operation costs. The agreement for local dispatch services is between CAL FIRE and the County and does not involve the Forest Service.

The Humboldt Fire Dispatch Cooperative was formed in the mid-1980s after the emergency 9-1-1-phone system was implemented throughout the county. The Fire Dispatch Cooperative was intended as a simple and cost effective means of notifying fire service providers in the event of an emergency. The Humboldt Fire Dispatch Cooperative is a Joint Powers Authority made up of 38 fire organizations (including FPDs, CSDs, a city fire department, and VFCs).

The *fees* that members of the Fire Dispatch Cooperative pay for the services of the FICC are based on the average number of calls received for that department over the last several years. The cost of providing the service is determined by CAL FIRE and billed to the Fire Dispatch Cooperative, who then charges each member department proportionately. The FICC is also the coordination point for fire and rescue mutual-aid resources through the State Office of Emergency Services (the CAL FIRE Unit Chief serves as the OES Operational-Area Coordinator). All requests for mutual aid from outside the area are funneled through the FICC.

The FICC is also the dispatch center for wildland-fire emergencies in the SRA in Humboldt and Del Norte Counties as well as for SRNF lands. Finally, the FICC is the centralized *logistical ordering point* for all federal agencies with wildfire potential on their lands. This includes Hoopa Valley Tribal lands, Redwood National Park, and Humboldt Bay National Wildlife Refuge.

Wildland Fire Response

Wildland fire response, typically the primary responsibility of the state and federal agencies within the SRA and FRA, is described in terms of “readiness to respond,” *fire hazard* considerations (e.g. weather), resources available, and the fire management objectives of the response. Federal, state, and tribal fire agencies have *fire suppression* responsibilities within the SRA and FRA. In many cases, local fire departments are the first unit on scene or are asked to assist in fire suppression by the responsible agency. However, local fire departments do not typically have the resources to manage a large wildfire incident, nor is wildfire protection a primary responsibility of most local departments.

The resources called upon to respond to a wildfire depend on the location of the fire, the time of year, and the availability of firefighting personnel and equipment. By agreement, CAL FIRE and the USFS operate using the “closest resource concept:” dispatching the closest fire protection resources to reported fires. Local government fire departments are also dispatched to fires within their response areas and to mutual aid requests.

Command of the incident is established upon arrival of the first fire protection unit at the scene. The *Incident Commander* then evaluates the conditions and the potential of the incident, and requests additional resources as needed. The resource order⁶ is then modified as required by the incident. This produces an appropriate, proportional response to wildfires, based upon predicted *fire behavior* conditions.

Large wildfires do not respect jurisdictional boundaries. Therefore, they are generally managed through a coordinated multi-jurisdictional effort, based on availability of resources, *assets at risk*, weather conditions, and many other logistical factors specific to each individual incident. Such fires are managed cooperatively through a unified fire incident command structure.

When large wildfires necessitate regional resources, the California Emergency Management Agency (Cal EMA) Fire and Rescue branch will act as support. In most cases, the Humboldt

⁶ Resource orders are made for the appropriate number of fire engines, firefighters, and other resources that are needed for the incident.

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County Operational Area (OA) Coordinator (in Humboldt County this is the CAL FIRE Unit Chief) will direct requests for mutual-aid assistance through the appropriate state Cal EMA Fire and Rescue Coordinator. Additionally, Cal EMA Fire and Rescue will provide the use of Cal EMA Apparatus Fleet, communication vans, and other Cal EMA fire service resources as needed.

On National Forest lands, wildland fires can be managed for one or more objectives based on the Land and Resource Management Plan and/or Fire Management Plan direction. These objectives could range from protection of life and property by aggressively suppressing the fire to managing the fire to meet resource-management objectives. All wildfires receive an initial dispatch response according to fire danger, resource availability, and response-area characteristics. This response may be changed according to changes in management objectives for the fire. Most fires escaping *initial attack* will initiate the Wildland Fire Decision Support System and the agency administrator will clarify their intent, as well as incident objectives and management requirements, for managing the fire.

Community (Structural) Fire Response

Defined in simple terms, community fire protection involves the suppression of structure fires and the protection of structures and other community resources from wildfire. Community fire protection response, typically the responsibility of the local fire agencies and companies, is most often described in terms of *response time*, which is the time that it takes for a fire department to arrive at the incident from the time that a call is made to the 911 dispatcher.

When a fire involves a structure or is determined to be a threat to a community, the local fire-protection organization responsible (based on the location of the fire) and their automatic-aid partners will be dispatched. As needed, additional resource orders are made at the discretion of the Incident Commander (usually the local agency fire chief). CAL FIRE is considered to be a local agency in the case of CSA No. 4 (the area between Orick and Trinidad); an area for which there is an agreement with the County to provide year-round structural fire protection.

Even in areas of the County for which there is no agreement, CAL FIRE will aid in community fire protection if their assistance is needed. Their capability to assist may vary, depending on the time of year and availability of resources. They are most likely to respond to such incidents if there is a significant threat to wildlands in the SRA.

Medical Response

Fire-protection organizations in Humboldt County have a vital and growing involvement in medical emergency response. Because they are dispersed so widely throughout the county, local fire stations are resources from which medical aid can be dispatched with relatively low response times. Much of the time, local firefighters are the first on the scene of medical emergencies and provide *Basic Life Support* (BLS) until an *Advance Life Support* (ALS) ambulance arrives. Because of geographic distances and limited resources, the wait for advanced life support can be significant. This is particularly true for the more remote areas of Humboldt County.

The medical emergency services provided by fire protection organizations are provided under the authority of the North Coast Emergency Medical Services Authority (North Coast EMS). North Coast EMS is a Joint Powers Authority created to develop a regional Emergency Medical Services (EMS) system. North Coast EMS coordinates the EMS system in order to reduce the occurrence of death and disability on the North Coast.

Generally, when an emergency medical dispatch is requested, the closest local fire departments are called in, as are the local ambulance services. Under the agreement with the County of Humboldt, the CAL FIRE station in Trinidad responds to all medical-aid calls within CSA No. 4, just as a local agency would. CAL FIRE also routinely responds to medical aid calls in rural areas during fire season, under the closest resource concept. CAL FIRE has both mutual aid and automatic aid agreements with local agencies to respond to fires and medical aids jointly

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and has been tasked by the North Coast EMS to coordinate helicopter responses for medical aids in Humboldt County.

Hazardous Materials Emergency Response

The resources necessary to manage a hazardous materials incident depend on the severity and location of the incident and the type of hazardous materials involved. If there is an accident involving hazardous materials on any roadway in the county, including highways and country roads, the CHP will assume incident command. If an incident occurs on a roadway other than a state highway within a city, the incident command responsibility will fall to city police, with support from the local fire department. If the accident does not occur on a road, its management will be within the jurisdictional responsibility of the County (most likely the Sheriff's Department).

If the materials involved are moderately hazardous and the accident is small scale, then the law enforcement command agency is adequately equipped to manage the situation with the assistance of local fire departments. However, if the incident involves an extremely toxic substance, then a specialized Hazardous Materials Response Team will be called in to assist. Humboldt Bay Fire⁷ provides the county with the services of a highly trained Hazardous Materials Response Team to manage particularly complicated situations.

Large-Scale Emergency Response

The County's Office of Emergency Services (OES)⁸ is responsible for coordinating emergency response planning for Humboldt County. Additionally, in the advent of a large-scale incident for which a local emergency is declared, OES will assist the Sheriff (the Director of Emergency Services for the County) in controlling and directing the response of emergency organizations. In response to a large-scale emergency such as an earthquake, flood, or tsunami, fire protection organizations and agencies will be dispatched as needed.

II.3.3. Fire Protection Level of Service

Level of Service, for the purposes of this Plan, is defined as the ability to provide, on a countywide basis, adequate and appropriate level of emergency service—that is, a level of service that is commensurate with the community's risks and the public safety responsibilities of the local fire agency/organization. Due to the highly diverse range of community characteristics and emergency service needs throughout Humboldt County, each fire service provider strives to develop an emergency response and deployment system that reflects its constituents' expectations, community needs, and local risks, while staying within the organization's revenue and support constraints. The following sections describe the level of service provided by each fire protection agency and organization in Humboldt County for all of the identified fire and emergency response services discussed above.

Community Fire Protection Level of Service

The following section describes the provision of local community fire protection services within the County; those services that are provided on a year-round basis by local fire departments and companies. "Year-round" service is distinct from the seasonal wildland fire protection services provided by CAL FIRE. During fire season, CAL FIRE will assist with community fire protection and other emergency services on an "as-available" basis. Figure II.3-3

⁷ Humboldt Bay Fire represents the operational consolidation of the City of Eureka Fire Department and Humboldt #1 Fire Protection District.

⁸ County of Humboldt, Office of Emergency Services (OES). (2003). *OES Home*. Retrieved December 20, 2012, from www.co.humboldt.ca.us/sheriff/oes/default.asp?page=oes

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below provides a geographic illustration of where and what type of local fire protection is provided throughout the County.

The map in Figure II.3-3 tells a story about how local fire protection is provided over the landscape. The majority of local fire service providers in Humboldt County are associated with a special district. Special districts providing fire protection services are identified in the map legend as “District.” These districts were formed to provide services within a specific jurisdictional boundary and are supported by revenue from a combination of taxes, fees, and fundraising. Many of these jurisdictional boundaries were created as far back as the 1930’s. Since that time, neighborhoods, scattered subdivisions, and rural residential development have emerged outside of district boundaries. This newer development requires year-round fire protection and emergency services, which it receives in a variety of ways.

Some areas outside the boundaries of an established district receive fire protection from district resources responding outside of their jurisdictional areas. This type of service is identified in the map legend, in Figure II.3-3 as “Out of District” and is often referred to as “*goodwill service*.” District fire departments provide service to these areas even though they are under no obligation to do so and receive no compensation for their service, other than donations. This practice can put a strain on already limited resources. Furthermore, property owners within the district may question why the services funded through their taxes are benefiting out of district residents, particularly if they pay a special tax or benefit assessment specifically for fire protection.

Several districts in Humboldt County are considering the possibility of expanding their boundaries to encompass their out of district response areas to which they regularly provide service. Preliminary studies and deliberations are underway to evaluate the possibility of *annexing*⁹ these areas. The annexation process is administered by Humboldt Local Agency Formation Commission (LAFCO)¹⁰. The districts that are exploring their annexation options are: the Ferndale, Garberville, Petrolia, Redway, Rio Dell, and Telegraph Ridge FPDs and the Fieldbrook CSD. Kneeland and Blue Lake FPDs are just beginning to explore the possibility of annexing additional territory into their respective districts.

Many areas outside the boundaries of an established district receive fire protection from a fire company that is not affiliated with a district at all. These fire companies receive no tax revenue and for that reason are identified on the map legend, in Figure II.3-3, as “Non-Tax”. The survival of these fire companies depends on revenue generated from community donations, fundraisers, and grants. Some communities are more supportive of their local fire companies than others and support can fluctuate dramatically depending on local economic conditions. Since the publication of the 2006 MFPP, the Maple Creek Fire Company was forced to close its doors as the cost of providing fire service outstripped available funds. Consequently, the level of service in that community has been significantly reduced and a strain has been placed on the neighboring fire departments of Kneeland and Blue Lake to fill the service gap.

Conversely, two fire companies recently received approval from LAFCO and the registered voters in their service area to form official FPDs. The Briceland and Bridgeville FPDs are the newest fire districts in the state of California¹¹. The property owners will now provide some level of sustainable funding through the annual payment of a special tax to support these two districts into the future.

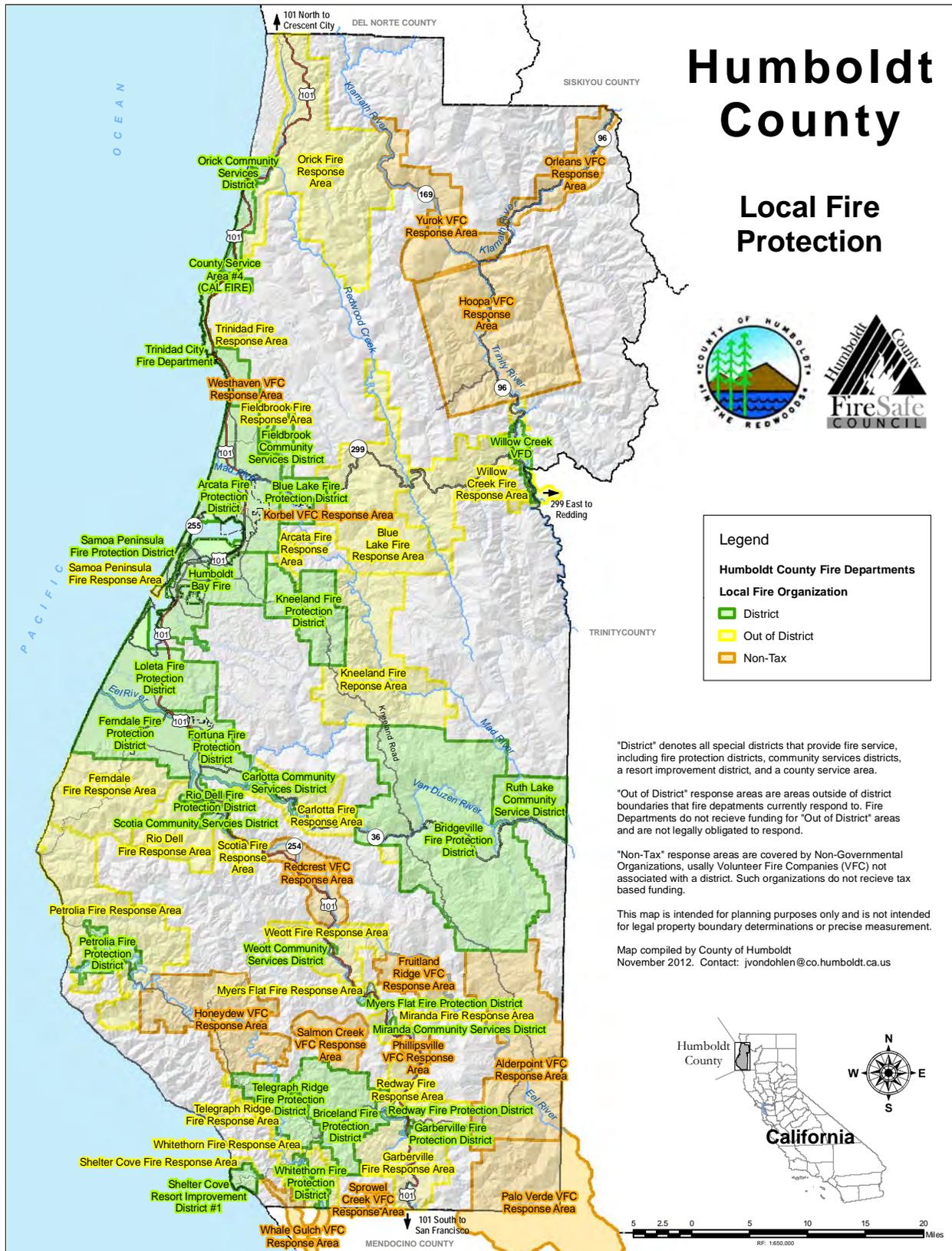
⁹ *Annexing* is officially bringing the areas into the jurisdictional boundary of the district.

¹⁰ Humboldt Local Agency Formation Commission (LAFCO). (n.d.). *Annexation*. Retrieved December 20, 2012, from <http://www.humboldtlafco.org/annexation>

¹¹ These districts were officially formed on September 26, 2012.

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Figure II.3-3. Local Fire Protection



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Organization, Operation, and Deployment

Even with the challenges of sustaining service and coordinating such a variety of different service types, Humboldt County is blessed with a formidable network of local fire and emergency responders. The total number of firefighters associated with local service providers in Humboldt County is 743; of this total number of firefighters, 657 are volunteers and 90 are paid (or career). The average number of firefighters (volunteer and career) per department is approximately 16. The department with the largest number of firefighters is Humboldt Bay (an operational consolidation of Humboldt #1 and Eureka) with 83 members. The departments with the fewest number of firefighters are Phillipsville and Myers Flat, each having 3 firefighters. These numbers are derived from the information provided in Figure II.3-2 in the previous section.

Although improvements have been made since the publication of the 2006 MFPP in the ability of local fire protection organizations' to efficiently, effectively, and safely deploy fire protection resources, these organizations experience a high degree of variability in their training levels, the amount and quality of equipment they possess, and the number of firefighting personnel at their disposal. These differences make it difficult to identify level of service standards that are realistically achievable for all fire service providers. Efforts to address this issue are being made and standards are slowly being developed with consideration for modifying levels of service expectations according to area type; e.g. rural, suburban, or urban.

Many local fire departments are faced with a myriad of challenges having to do with the high cost of insurance and workmen's compensation (although support from the County has greatly reduced the cost of workers compensation), a lack of capital for the replacement of safety equipment, barriers to seamless coordination and communication, and access to appropriate level of training. In addition, some local firefighting personnel have expressed frustration with perceived flaws in the current dispatching system. They appreciate the service but believe that because of misinformation and errors in judgment, the local departments are not always appropriately dispatched. Problems in this area may also be attributed to undefined boundaries and changes in local fire department management.

The Humboldt County Fire Chiefs' Association (Fire Chiefs) is a key organization that works to improve the level of service throughout the county through increased coordination, communication, standardization, and support. The Fire Chiefs meets monthly at various locations throughout the county and provides a venue for sharing information about training, prevention, standards, legislation grant writing, and new initiatives and innovations. The group receives a regular report from fire instructors/training and fire prevention officers, fire/arson investigation, Cal EMA, CAL FIRE, County OES, North Coast EMS, the Humboldt County Fire Safe Council (HCFSC), and others as available. These meetings are also a venue for special presentations on specific topics and for vendors to provide information about their products.

The Fire Chiefs is organized with several branches and affiliations, including: the Southern Humboldt Fire Chiefs, the Eel River Valley Fire Chiefs, Humboldt Bay Area Fire Chiefs, Fire Instructors/Training Officers, Fire Prevention Officers, Fire/Arson Investigation Unit, Hazardous Materials Response Team, Humboldt County Fire Radio Dispatch Coop, Humboldt Regional Occupational Program (HROP)¹², and College of the Redwoods (CR)¹³. "The Monitor" is a

¹² HROP provides the Volunteer Firefighter Recruitment Academy and Wildland Certificates, and acts as Fire Science Coordinator. For more information, see: Humboldt County Fire Services Training. (n.d.). *Programs*. Retrieved December 20, 2012, from http://www.humboldt.k12.ca.us/sps/wfp/hrop/fire_services/programs.php

¹³ CR provides the Firefighter 1 Academy, an AS Degree Program, Certified Fire Officer Program, and Wildland Certificates and a Fire Technology Coordinator. For more information, see: College of the Redwoods. (2010). *Fire Technology*. Retrieved from www.redwoods.edu/departments/fire/.

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monthly publication providing a message from the President of the Fire Chiefs and meeting notes from many of the above groups. The Monitor is edited and distributed by a staff member of the Eureka Fire Department. General support for the Fire Chiefs is provided by administrative staff from Humboldt Bay Fire, and Arcata Fire District. Logistical support is provided by Chief Officers from Humboldt Bay Fire, Arcata Fire District, Blue Lake Fire District, Fortuna Fire District, and CAL FIRE.

The Fire Chiefs coordinate and sustain several programs and innovations that work together to support an ever-increasing level of fire service in Humboldt County. An example is the production of an Annual Report which is presented to the Humboldt County BOS and posted on the HCFSC webpage¹⁴. The report includes a letter from the President of the Fire Chiefs summarizing the year's activities, challenges, and accomplishments, as well as a page for each fire department that includes a description and summary of the year's number of incident responses, volunteer hours, and personnel, and a tabulation of all volunteer hours contributed by all organizations for incident response, training, maintenance, and fund raising. This report is a valuable tool for increasing awareness among elected officials and the public about who provides local community fire protection, what services they provide, and the level of volunteer effort needed to sustain the service. The report can also be used as a directory.

Another initiative of the Fire Chiefs is to ensure that each local fire service provider uses a standardized numbering system to identify each of their units of apparatus. The assigned number identifies what region of the County the unit comes from, what department it belongs to, and what type of unit it is. For instance, just by looking at the number it can be determined that the unit was a medical rescue vehicle as apposed to a water-tender and that it hails from the Willow Creek Volunteer Fire Department in the Northern Humboldt Region. This clear identification of resources facilitates accurate dispatching and efficient operational control of resources on scene, and eliminates the possibility of duplicate engine numbers.

To provide quick and adequate response to fires, the Fire Chiefs developed, approved, and maintain a countywide mutual aid agreement. The agreement is in the form of a memorandum of understanding (MOU) made and entered into by and between all local fire service providers in the County as well as CAL FIRE. The MOU states that the equipment, facilities, and trained personnel of each fire department are available to the other participants in the agreement on an as requested basis. The MOU allows for a quick, decisive dispatch of resources and lays out expectations and responsibilities for both the requesting entity and the entity providing the mutual aid. Departments that are located near either National Forest or Recreation Area lands have mutual aid agreements with the USFS and BLM.

The Fire Chiefs is in the process of developing the Humboldt County Incident Support Team. This team will help standardize and increase the efficiency of incident response and management countywide. It is intended to support local fire service providers as needed and only when requested. The team, composed of individuals from multiple agencies, is being trained in the *Incident Command System* and roles are being assigned based on the necessary overhead positions. This team will be available to any fire service organization to call upon during a large emergency to assist with communication, coordination, and decision making.

Technical Rescue is a needed service in Humboldt County that demands a capability beyond that of any one fire department and is provided as a special operation through the joint efforts of several different departments. There are three technical rescue teams in Humboldt County: the Southern Humboldt Technical Rescue Team, the Eel River Valley Technical Resource Team, and the Humboldt Bay Fire and Arcata Fire Department Urban Search and Rescue (USAR) Type II Team. The Southern Humboldt Technical Rescue Team specializes in rope, water, and wilderness

¹⁴ County of Humboldt, Natural Resources Planning. (2012). *Humboldt County Fire Safe Council*. Retrieved from www.co.humboldt.ca.us/natural-resources/fire_safe_council/fireserviceannualreport.aspx

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rescue and responds through an auto aid agreement to all over-the-bank and water rescues in Southern Humboldt. This team is made up of members from seven different Southern Humboldt fire departments. The Eel River Valley Technical Rescue Team is a relatively new team and trains in low angle rope rescue, hazardous materials operations level, confined space rescue, swift water rescue, and rescue systems. This team is made up of members from the Bridgeville, Carlotta, Ferndale, Fortuna, Loleta, Rio Dell, and Scotia fire departments. The participating departments in the Humboldt Bay USAR Team are in the process of training eight personnel apiece (for a total of 24 personnel between the three agencies) in advanced rescue techniques in order to safely and efficiently use the equipment in a wide variety of disaster settings.

Initial Response and Dispatching

Based on a combination of information sources, there is ever-increasing pressure on fire protection organizations and agencies to expand department operations to effectively meet service demands. Because of limitations in the current incident reporting methods and insufficient data, it is difficult to provide an exact number for the percent increase in emergency calls for the entire County. However, there is consensus among fire fighting personnel that demand is increasing.

Fire protection organizations have, thus far, managed to respond to the demand with excellent service. However, if the annual rate of calls for service continues to increase, options for expanding service capabilities will need to be explored. Dispatch providers have indicated that if demand for services continues to increase they will require additional funding and staffing, expanded facilities, and, in some cases, an increased financial contribution from users.

As an example of the increased demand for emergency services, Figure II.3-4 displays a sample of incident reporting that is available from the FICC. The FICC accounts for a large portion of the emergency calls countywide, but not all of them. Dispatch records identify a rise in incident calls over the last 5 years. From 2007 to 2011, an approximate 22% increase in fire and medical emergency calls has been documented (see Figure II.3-4).

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Figure II.3-4. Fortuna Interagency Command Center Recorded Activity for Fire and Medical Aid¹⁵

Incident Type	Year				
	2007	2008	2009	2010	2011
Public Assist ¹⁶	1595	1826	1088	553	720
Medical Aid	3477	4726	4767	4749	5040
FMS-Hazmat ¹⁷	59	181	155	187	140
Structure Fire	102	178	158	132	164
Fire Other	368	677	786	734	913
Wildland Fire	199	407	239	176	118
Referral to other agency	73	52	183	138	68
Total	5,873	8,047	7,376	6,669	7,163
Percent Change		+37%	-8%	-9%	+7%
Average Increase per year	+7%				
Percent Increase 2007 to 2011	+22%				

Several local fire departments have an added enhancement that assists their dispatch and response and likely improves their level of service. The Arcata, Humboldt Bay (Humboldt #1 and Eureka Fire), Blue Lake, Fortuna, Rio Dell fire departments have contracted with a company named Iron Compass in order to maintain a mapping program and database that is linked to computers on-board duty officer vehicles and some fire engines. These on-board computers assist firefighters in their efforts to locate an incident and can be updated as they learn new details about their response areas, such as access codes to gates and unrated bridges. Participating departments use this program to build and access pre-fire planning information such as new structure locations, special hazards, and special information including fire department sprinkler connection information. Humboldt County Office of Emergency Services (OES) secured Homeland Security funding to purchase the necessary equipment, hardware, and software. As funding becomes available, other fire departments will participate in this program.

Insurance Services Office (ISO) Public Protection Classification Program

The Insurance Services Office (ISO) establishes fire insurance ratings for Humboldt County communities, as it does for all other communities in California. The ISO classification and rating system serves to provide an additional analysis tool in evaluating fire protection capability that exists within Humboldt County. A brief background and description of ISO and the classification/rating system is necessary to fully appreciate the value of their fire department evaluation process, and the implications of this classification in determining fire insurance rates for communities and rural areas within Humboldt County.

The ISO is the insurance industry standard source for information, products, and services related to property and liability risk rating. ISO provides statistical, actuarial underwriting and claims information and analyses for insurers, insurance agents and brokers, risk managers, fire departments, and other government agencies throughout the United States. One of ISO's better known services is to evaluate the fire suppression delivery systems of fire departments and districts. The result of those reviews is an individual Public Protection Classification (PPC) rating number assigned to the community that the respective fire department protects. The ISO then

¹⁵ CAL FIRE, Emergency Command Center. (2012). Fortuna Interagency Command Center, Fortuna, CA.

¹⁶ Public Assist means assisting the public in a non-emergency manor.

¹⁷ FMS-Hazmat means Hazardous Materials, Fire Menace Standby.

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distributes these ratings to fire insurance companies and carriers. Insurance companies use the PPC information to establish premiums for fire insurance within the community that was rated – generally offering lower premiums to communities with better fire protection.

It is important to recognize that insurance companies, and not ISO, establish the premiums charged to policyholders. Additionally, not all insurance companies use the ISO PPC rating. Some companies make their own analyses based on their record of historical loss data rather than on fire protection capabilities or, alternatively, create their own evaluation process for fire departments.

ISO Fire Suppression Rating Schedule

The Fire Suppression Rating Schedule is used by ISO to grade the response capabilities within a community. The schedule is the tool used to develop a numerical PPC grading for communities. The ISO has measured the major elements of most of Humboldt County’s community fire suppression systems and subsequently developed a numerical PPC grading. The ISO grading audit for Humboldt County communities measured their compliance with a national minimum standard in specific “capability” areas. Examples of evaluation criteria include:

- Can the emergency caller find the fire department number in the phone book?
- Does the water system match the needed fire flow requirements of residential and commercial buildings in the community?
- Is the fire department capable of suppressing the types and magnitudes of fires that are likely to occur in the community?
- Are the fire department’s ladders long enough to reach the buildings that they protect?

Specific ISO PPC rating criteria and grading weight percentages are further defined as follows:¹⁸

Fire Departments/Districts (50%)

Fifty percent of the overall grading is based on the number of engine companies and the amount of water a community needs to fight a fire. ISO personnel review the distribution of fire companies throughout the area. The ISO ensures that the fire department conducts regular testing of its pumps, and inventories each engine company's nozzles, hoses, breathing apparatus, and other equipment. ISO personnel also review individual fire company records to determine the type and extent of training provided to fire company personnel, the volunteer-to-staff (paid) ratio, the number of people who participate in training, firefighter response to emergencies, and the maintenance and testing of the fire department's equipment and apparatus. In order to receive a rating at all, a department must have at least four members available to respond to a structure fire.

Community Water Supply (40%)

Forty percent of the grading is based on the community's water supply. This part of the survey focuses on whether the community has sufficient water supply for fire suppression beyond daily maximum consumption. Sufficient water supply is defined as 250 gallons per minute for a two-hour duration, within five minutes of the arrival of the first firefighting apparatus. ISO surveys all components of the water supply system, including pumps, storage, and filtration. ISO rating personnel also observe fire-flow tests at representative locations in the community to determine the rate of flow the water mains provide. The distribution of fire hydrants that are within 1,000 feet from structural locations is also recorded.

Fire Alarms (10%)

¹⁸ For more information on PPC rating criteria and procedures, see: Insurance Service Office (ISO). (2012). *Public Protection Classification (PPC™) Service*. Retrieved from <http://www.iso.com/Products/Public-Protection-Classification-Service/Public-Protection-Classification-PPC-Service.html>

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Ten percent of the overall grading is based on how well the fire department receives and dispatches fire alarms. ISO field representatives evaluate: the communications center and the number of 911 operators at the center; the telephone service, including the number of phone lines that come into the center; how emergency numbers are listed in the telephone book; and how the center notifies firefighters about the location of the emergency.

ISO Public Protection Classification Rating

Based on the results of the ISO grading audit described above, a community is assigned a protection-class rating. The ratings are presented in a rating class structure which ranges from 1 to 10. Class 1 is the highest rating, representing excellent fire protection and Class 10 is the lowest, meaning the community's fire department did not meet the minimum requirements of the Fire Suppression Rating Schedule and is not recognized by ISO. A Class 9 is the lowest rating that a community can have with a recognized fire department and means that the department did not meet the criteria for adequate water supply.

ISO PPC Rating's Direct Relationship to Insurance Rates

An ISO Class 1 rating means that the community scores 90% or better on meeting the ISO national standards in communications, fire department capability and water supply; a Class 1 community pays the lowest possible fire insurance rates. A Class 5 community pays moderate fire insurance rates and meets 50 to 60% of the national standards. A Class 9 community scores 10 to 20% and receives the lowest grade given for any form of recognized fire protection, and pays high fire insurance rates.

A Class 10 community scores 1% or has not been classified by ISO. A Class 10 community may pay extremely high property insurance premium, and, under many circumstances, may not be eligible to receive insurance at all. It must be noted that in California, as of June 1st, 2003, if a residential property is over five road miles from a credible responding fire station it is automatically rated as a Class 10. This is the case no matter how much water is available to fight fire. Commercial insurance premiums will remain unaffected by this change as it was always necessary for commercial risks to be located under five miles from a fire station to receive a classification lower than a 10.

Many communities in Humboldt County last had their fire departments graded by ISO in the 1980s and 1990s when residential properties could receive a rating lower than a 10, up to 10 miles away from a recognized fire station. When these communities go through the reclassification process with ISO, many of their residential properties may change from an ISO PPC rating 8 or 9 to a 10, possibly resulting in higher residential property insurance premiums. Figure II.3-5 contains all of the rating points range for each possible rating class.

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Figure II.3-5. ISO PPC Rating Points Range for Each Rating Class

% Credit	Class	% Credit	Class
90.0 – 100	1	40.0 - 49.9	6
80.0 – 89.9	2	30.0 – 39.9	7
70.0 – 79.9	3	20.0 – 29.9	8
60.0 – 69.9	4	10.0 - 19.9	9
50.0 – 59.9	5	0.1 - 9.9	10 (No credible fire protection)

The following table illustrates the impact that different ISO PPC ratings have on an estimated insurance premium for an average Humboldt County home. There are likely other factors that have an influence on homeowners insurance but this example indicates that there is a direct financial benefit to improving the ISO PPC ratings of local fire departments.

Figure II.3-6. Potential Insurance Savings in Humboldt County with ISO PPC Ratings Change¹⁹

<i>Value of Home = \$200,000</i>		
ISO PPC Rating	Estimated Annual Insurance	Incremental Savings Per Rating Decrease
10	\$1,696 (if insurance can be obtained at all)	
9	\$1,367	19%
8	\$1,076	21%
7	\$952	12%
1 - 6	\$827	13%

Current ISO PPC Ratings in Humboldt County

Most of the fire departments/districts and some volunteer fire companies have been evaluated by ISO and their associated communities assigned a PPC rating. The ISO Community Mitigation and Public Protection branch based out of Chicago provided a list of ratings associated with each classified fire department in Humboldt County. Many of the volunteer fire companies, CSA No. 4, and one fire protection district have either not been classified or were determined not to have met the minimum requirements of the Fire Suppression Rating Schedule. These unrecognized departments automatically receive a Class 10. The ISO PPC ratings for all Humboldt County fire protection organizations are listed in Figure II.3-7.

The diversity of fire protection capability within Humboldt County is reflected in a wide diversity of ISO PPC ratings, which range from a Class 3 rating (City of Eureka) to a Class 10 rating. It appears that requesting a new ISO evaluation may be productive for some Humboldt County districts and/or community areas that have a split ISO rating (e.g., 5/9), a rural Class 9 rating, or no rating at all. For example, if a suburban/semi-rural risk is currently assigned to protection Class 9, or dual protection classes exists (e.g., 4/9), and the risk (e.g., house) meets all the criteria listed below, the risk may be eligible for a class reduction to a PPC class 8:

- Risk (home) is within five road miles of a responding fire department.
- Risk is visible by at least four other homes;
- Paved public roads lead to the risk;

¹⁹Gerald R. Becker Insurance (Ferndale, CA), personal communication, September 4, 2012.

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- Risk is accessible to fire equipment year round;
- Responding fire department has a tanker truck carrying at least 2,000 gallons of water (even if this capability is only available through the timely utilization of automatic aid and mutual aid);
- Risk is less than 40 years old; and
- Risk does not have a wood burner present (for example a wood stove or furnace).

It is difficult to make generalizations about how changes in PPC ratings will reduce or increase individual insurance policies in Humboldt County. However, ISO does provide some guidelines for how to understand the possible benefits of improved ratings. For example, ISO states that, based on their experience, a change in PPC rating could affect the price or availability of personal and commercial insurance coverage and, “assuming all other factors are equal, the price of property insurance in a community with a good PPC is lower than in a community with a poor PPC.”²⁰ **To gain the benefits of a good PPC rating, ISO emphasizes the importance of community support for local fire departments because “a community’s investment in fire mitigation is a proven and reliable predictor of future fire losses.”**²¹

Figure II.3-7. Current Humboldt County Fire Protection Organization ISO PPC Ratings²²

Fire Protection Agency or Organization	ISO PPC Rating	Effective Date
Arcata Fire Protection District	4/8B	12/01/2005
Blue Lake Fire Protection District	5/8B	02/01/2005
Briceland Fire Protection District		
Bridgeville Fire Protection District		
Carlotta Community Services District	8B	07/01/2004
Eureka City Fire Department	3/9	11/01/1998
Fairhaven Fire Protection District (now known as Samoa Peninsula Fire Protection District)	5/9	01/01/1984
Ferndale Fire Protection District	5/8B	02/01/2003
Fieldbrook Community Services District	5/8B	02/01/05
Fortuna Fire Protection District	4/7	03/01/05
Fruitland Volunteer Fire Company	9/9	12/01/99
Garberville Fire Protection District	6/9	01/01/1984
Hoopa Fire Department	7/9	02/01/1987
Humboldt #1 Fire Protection District	5/9	08/01/2005
Kneeland Fire Protection District	10	02/01/1990
Loleta Fire Protection District	6/8B	02/01/2005
Miranda Community Services District	7/9	05/01/1998
Myers Flat Fire Protection District	8/9	02/01/1996
Orick Community Services District	7/9	02/01/1996
Orleans Volunteer Fire Company	5/9	02/01/1989
Petrolia Fire Protection District	9/10	02/01/1997

²⁰ ISO, Mitigation Online. (2012). *How does PPC Information Affect Individual Insurance Policies?* Retrieved from <http://www.isomitigation.com/ppc/0000/ppc0006.html>.

²¹ ISO, Mitigation Online. (2012). *Benefits of the PPC™ Program for Communities*. Retrieved from www.isomitigation.com/ppc/0000/ppc0005.html.

²² List of ISO ratings produced by personal communications with local fire departments, and: ISO Community Mitigation and Public Protection. (2005). *CMC Manual Plus Community Report*. Chicago, IL.; and: Humboldt County Fire Chiefs Association. (2012). 2012 Local Fire Protection Survey..

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Fire Protection Agency or Organization	ISO PPC Rating	Effective Date
Phillipsville Volunteer Fire Company	10	05/01/1999
Redway Fire Protection District	5/9	12/01/2003
Rio Dell Fire Protection District	7/9	01/01/1984
Scotia Volunteer Fire Company	4/9	02/01/1997
Resort Improvement District No. 1 (aka Shelter Cove Fire Dept.)	6	08/01/1994
Trinidad City Fire Department	6/9	12/01/2003
Weott Community Services District	8/9	02/01/1997
Whitethorn Fire Protection District	9	12/03/2003
Willow Creek Fire Protection District	5/9	8/01/2005
Fire Protection Organizations not recognized by ISO	ISO PPC Rating	
Alderpoint Fire Company		
Westhaven Volunteer Fire Company	10	05/01/2005
Yurok Volunteer Fire Company	10	
Telegraph Ridge Fire Protection District	10	
Sprowel Creek Volunteer Fire Company	10	
Salmon Creek Volunteer Fire Company	10	
Redcrest Volunteer Fire Company	10	
Prosper Ridge Volunteer Fire Company	10	
Palo Verde Volunteer Fire Company	10	
Korbel Volunteer Fire Brigade	10	
County Service Area #4 District	10	05/01/2005
Honeydew Volunteer Fire Company	10	

Wildland Fire Protection Level of Service

While vegetation fires constitute a small percentage of the overall demand for emergency services, demand placed on local, state, and federal firefighting resources by wildfires can be substantially greater than most of the other types of calls combined. The Canoe and Honeydew Fires of 2003, which cost approximately \$28,500,000 dollars and lasted 42 days, and the Humboldt Lighting Complex Fires of 2008, which involved approximately 50 separate fires, are perfect examples of how wildfires can require a much greater response than a medical aid or structure fire. Wildfires can last for several days or even months, and can cost tens of millions of dollars. Wildfires frequently require aircraft of various types as well as fire engines, hand crews, and other specialized equipment. Acquiring these precious resources in an organized and timely manner involves coordination with multiple agencies around the state and country.

Local Fire Service

The local fire service in Humboldt County, although primarily responsible for community fire protection, has a key role in wildfire management. Local firefighters train and are equipped for wildfire response and are often called upon to assist CAL FIRE during wildfire events. Local firefighting resources respond from over 50 locations throughout the county, so they are well situated to supplement CAL FIRE resources, which can have longer *response times*. Local firefighters are frequently the first on the scene and are able to initiate suppression actions until CAL FIRE arrives, thus keeping the fires to a manageable size. Many local fire departments and companies also provide station coverage for CAL FIRE when state resources are called away to wildfires outside of Humboldt County. During station coverage assignments, local firefighters must fill the wildfire management role of CAL FIRE.

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Humboldt County also boasts a local government Type 3 Strike Team. CAL FIRE can hire this local strike team to supplement their resources during wildfire events both inside and outside of Humboldt County. Local fire department *apparatuses* have also been rented by the state and operated by CAL FIRE personnel. There are direct benefits to the local fire service from this arrangement in the form of money earned by the participating fire department and individual firefighters. This money supports local fire service and circulates back into the local economy. There is also a more indirect benefit to local firefighters, many of whom are volunteers, in gaining valuable wildfire management experience. This experience will benefit Humboldt County communities by developing more confident, capable local firefighters. Firefighters learn about wildfire management strategies, radio communication during a wildfire event, working together, the importance of training, and the realistic physical demands and expectations when working with professional agencies such as CAL FIRE and the USFS. All of this experience will increase the ability of local firefighters to quickly and efficiently pull resources together, should a large wildfire event take place in Humboldt County.

CAL FIRE

CAL FIRE maintains a significant presence in Humboldt County in both fire protection and resource management. The CAL-FIRE Humboldt-Del Norte Unit (CAL FIRE-HUU) Administrative Headquarters is located in Fortuna and houses the FICC dispatch center. CAL FIRE-HUU staffs a station in Trinidad year-round with firefighters under an Amador agreement with the County of Humboldt. CAL FIRE stations in Fortuna, Weott, and Garberville are staffed at varying levels throughout the year. Staffing levels at these three stations are adequate for emergency response most of the year. Additionally, the following CAL FIRE stations are staffed only during fire season: Elk Camp (in Redwood National Park), Bridgeville, Alderpoint, Mattole, and Thorn.

CAL FIRE also operates three Conservation Camps operated jointly with the Department of Corrections (Alder Camp in Del Norte County along with Eel River Camp and High Rock Camp in Humboldt County), where inmates serve out their sentences performing firefighting and conservation related tasks. Each camp provides five hand crews for firefighting purposes, and each crew is made up of up to 17 firefighters and a captain. These crews are an all-risk department resource used both within Humboldt County and on a statewide basis year-round. These camp assets are maintained fire/emergency ready year-round. During non-emergency response, these crews are deployed to work on fuel reduction projects and projects requested by other public agencies throughout the year. These crews are trained in emergency responses including, but not limited to, fire, flood, earthquake, medical, and vehicle accidents. CAL FIRE also operates the Rohnerville Air Attack Base, the Kneeland Helitack Base, and one fire lookout (only during times of high fire danger) at Grasshopper Peak. During past fire seasons, CAL FIRE has also operated the Schoolhouse Peak Fire Lookout, located on Redwood National Park lands.

CAL FIRE HUU, including areas outside of Humboldt, maintains 14 frontline engines, with two engines in reserve, two dozers, 15 inmate crews, one helicopter, one air attack, and one air tanker for fire suppression efforts. There are approximately 100 permanent fire suppression personnel, 12 resource management personnel, and six clerical personnel to support these efforts. Additionally, the Unit hires approximately 90 limited-term and seasonal personnel to supplement permanent staff during the fire season.

All Unit aircraft provide rapid initial attack and are especially valuable in the County's remote areas where steep terrain and narrow, winding roads greatly increase ground response times. In such situations, aircraft are often at scene and applying water or retardant before engines or bulldozers arrive, cooling the fire and giving ground resources the ability to achieve initial attack success. Aircraft also provide "eyes in the sky" for those on the ground, noting spot fires and giving helpful direction from their vantage point.

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The CAL FIRE-HUU protects 1,904,745 acres of SRA, and 1,962,817 acres of DPA²³ CAL FIRE provides DPA wildland fire protection for the Yurok Reservation through an agreement with the Bureau of Indian Affairs (BIA). CAL FIRE also has an agreement with BLM and the USFS to provide DPA protection to specified lands under their management. Figure II.3-8 presents these DPA protection areas. Additionally, certain SRAs are within the USFS DPA, which requires them to provide fire protection under an agreement with CAL FIRE.

The California Fire Plan states: “fire protection forces in California must have sufficient depth to respond to large, multiple wildfires and still prevent other small fires from becoming large damaging fires.” CAL FIRE-HUU is part of a larger statewide system and is consequently called upon to respond to fire incidents throughout the state. However, CAL FIRE does keep minimum level of staffing in Humboldt and will hire local resources to fill in as necessary.

During the declared fire season, CAL FIRE engines are staffed 24 hours a day. The objective for CAL FIRE is to successfully contain 95 percent of wildfires within the SRA and DPA at 10 acres or less. In addition to fire engines, CAL FIRE will respond with fire crews, bulldozers, air tankers, helicopters, air tactical supervisors, and battalion chiefs as a component of the initial dispatch. The standard dispatch for any given incident is based upon the current fire behavior indices, as developed through the *Unit Fire Weather Plan*.

Dispatch levels are set several times per day. An early day wildland fire dispatch will usually be at a Low to Medium dispatch level and is limited to two engines. During the heat of the day, the dispatch level will increase to High, with four fire engines, two bulldozers, two crews, a helicopter, two air tankers, air tactical supervisor, and two battalion chiefs. The dispatch can be modified by the Emergency FICC Officer based upon the initial report through the 911 system, lookout reports, or other information.

Six Rivers National Forest

The SRNF provides wildland fire suppression resources that respond to a variety of emergency incidents, the primary mission being wildfire. Staffing levels are based on the level of fire danger, with the greatest staffing levels during the months of May-October and reduced staffing levels the remainder of the year. During periods of increased fire danger, the SRNF staffs 12 engines, 13 patrol/prevention units, three Type-1 hand crews, one Type-2 *initial attack* hand crew, four *water tenders*, a bulldozer, and four lookouts. The SRNF employs approximately 300 emergency responders who perform a variety of functions in operational and non-operational roles; these include primary firefighters as well as support personnel in areas such as logistics, planning, resource advising, and public information. SRNF is also in agreement with the California Conservation Corps, Fortuna Center to mobilize a Type-2 hand crew staffed with members from both agencies, with a target response time of four hours or less. These are the resources provided from locations throughout the entire SRNF which covers an area larger than the County of Humboldt.

Fire season is not “declared” within the SRNF. The appropriate staffing levels are determined year-round, based on Fire Danger rating and the 90th percentile of when fires have occurred, historically. Suppression modules are fully staffed from approximately May 15 through October 15 and the daily operational period of on-duty fire resources is 9:30 AM to 6:00 PM, 7 days/week. Extended staffing may go into effect according to Fire Danger and *draw-down levels*. The portion of the season in which suppression modules are fully staffed may also be extended according to the severity of fire danger and fire activity that season.

The SRNF is divided into Response Areas, which are areas of land that receive the same responding forces in an initial dispatch. The predetermined responses for these areas are called “run cards” or the dispatch strategy. In Humboldt County, there are 20 SRNF response areas.

²³ Figures are for Humboldt and Del Norte Counties combined.

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Dispatch levels, which are described as High, Moderate, or Low Response, are set according to actual and predicted fire danger.

The SRNF operates nine Remote Automated Weather Stations (RAWS) and one Manual station. These stations provide hourly data for the four Fire Danger Rating Areas. Fire danger is calculated twice daily. Fire danger is calculated at 1:00 PM using current observations from the weather stations and this determines the “Actual Fire Danger” for the rest of the day; it is then calculated again at 3:30 PM, using the predicted weather forecast for the “Predicted Fire Danger” for the following day (which will be updated again with “Actual” again at 1:00, and so forth). During periods of increased fire danger, dispatch levels are set two times a day: at 9:30 AM from the previous day’s Predicted Fire Danger and again at 2:30 PM at that day’s Actual Fire Danger.

The SRNF portion of the FICC utilizes an automated computer-aided dispatching (CAD) system. -All firefighting resources are staffed daily using the CAD system, including cooperating agencies. Using the “closest resource concept,” cooperating agencies may be requested as an initial response in situations where they are the closest resource to the fire, based on the run card. The initial dispatch may be modified by the ‘first on scene’ or Incident Commander, or the FICC Commander, according to actual and predicted fire behavior and other local knowledge that may be pertinent to the situation.

Initial attack on wildfires that occur on SRNF lands is an aggressive suppression action, consistent with firefighter and public safety and values to be protected. Suppression tactics may vary from aggressive *direct attack* to efforts designed to limit the wildfire to an identified area, defined by manually or mechanically constructed *fireline*, *topographic breaks*, *natural barriers*, or vegetation breaks. Large fire management on the SRNF is guided by several strategic priorities, which include: availability of fire suppression resources; assets and values threatened; current and predicted weather conditions; availability of air support (helicopters and air tankers); access; fire potential analysis; and other logistical issues.

Under a cooperative agreement, the federal and state agencies have exchanged protection responsibilities in specific areas. For example, fire protection on most FRA public land managed by the BLM, including the King Range National Conservation Area, is the responsibility of CAL FIRE. Additionally, Willow Creek and Orleans are within the protection responsibility of the SRNF for wildfires, even though these communities are in the SRA. Figure II.3-8.State and Federal Fire Protection Map presents these DPA protection areas.

USFS statewide and regional-level cooperative fire agreements are as follows:

- Five Party Agreement with CAL FIRE, USFS, BLM, US Fish and Wildlife Service, and National Park Service (Provides for interagency response to wildfires within the state of California)
- California Fire Assistance Agreement with California OES, CAL FIRE, USFS, BLM and NPS (Cooperative Agreement for acquisition of local government resources by the Resource/ Wildland Fire agencies for assistance on wildfires within California).
- Northwest Area and Oregon Cooperative Fire Agreement
- California Fire Service and Rescue Emergency Mutual Aid Plan
- National Park Service Cooperative Agreement
- California Conservation Corps
- Memorandum of Agreement for the Development of a Collaborative Fuels Treatment Program (USDA, DOI, National Association of State Foresters, and the National Association of Counties)

SRNF forest-wide fire assistance agreements and local operating plans are as follows:

- Hoopa Valley Tribe (Fire Department)

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- CAL FIRE-Humboldt Del-Norte Unit
- Redwood National Park
- Bureau of Land Management (Kings Range)
- California Conservation Corps (Fortuna)
- Incident Service Agreement with The Native Service Crew
- Local Operating Plan with Six Rivers NF, Siskiyou NF, and Redwood NP
- Humboldt County (use of Rhonerville airport for landing aircraft involving wildfire suppression activities)
- Memorandum of Understanding Between the Karuk Tribe of California and USDA FS Six Rivers and Klamath National Forests
- Memorandum of Understanding Between the Yurok Tribe and USDA FS Six Rivers National Forest

SRNF agreements with Humboldt County local volunteer fire departments for fire suppression assistance and assistance-by-hire for wildfire incidents are as follows:

- Orleans Volunteer Fire Department
- Willow Creek Volunteer Fire Department
- Hoopa Volunteer Fire Department

Hoopa Wildland Fire Department

The Hoopa Valley Tribe is responsible for providing wildland fire management and fire protection for the Hoopa Reservation. In 1991, the Hoopa Tribe compacted the entire Fire Pre-Suppression and Suppression program from the BIA, meaning that they assumed responsibility and funding from BIA through a contract with the Department of Interior. Throughout the declared fire season, the Hoopa Wildland Fire Department is staffed during the day, seven days per week. The Hoopa Wildland Fire Department normally staffs two engines during fire season. A duty officer and an engine crew are available for call-back within 30-minutes during off-duty hours. The objective for the Hoopa Wildland Fire Department is to successfully contain 95 percent of fires within the Hoopa Valley Reservation within the first *burning period* (that part of each 24-hour period when fires spread most rapidly, typically from 10:00 a.m. to sundown). The standard dispatch for any given incident is based upon the current fire behavior indices. Additional flexibility is provided for increased staffing and equipment when extreme *fire weather* is forecast.

Upon arrival of the first unit on scene, command of the incident is established. The incident's potential and the resources needed are evaluated by the Incident Commander. Additional engine crews are ordered as needed through the local dispatch center. If additional resources are needed from other locations, a resource order is processed through the FICC, utilizing the agreement with SRNF.

Redwood National Park

During the declared fire season, Redwood National Park staffs two engines, five days a week from 9:30 AM to 6:00 PM. Fire fighting equipment is maintained at the Wolf Creek Fire Cache or the Hiouchi Fire Station. If the Park is experiencing extreme fire indices, based on readings from two Remote RAWS, the acting Duty Officer will determine if longer staffing hours are needed. It is National Park Service policy to meet or exceed a 95 percent initial attack success target.

Redwood National Park's daily staffing level is based on the Redwood National Park Preparedness Plan. The preparedness plan determines thresholds for Low, Medium, High, Very High, and Extreme fire danger based on daily Energy Release Component (ERC) predictions. The

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park currently uses RAWS stations located near the extreme north and south ends of the park to determine its daily ERC's.

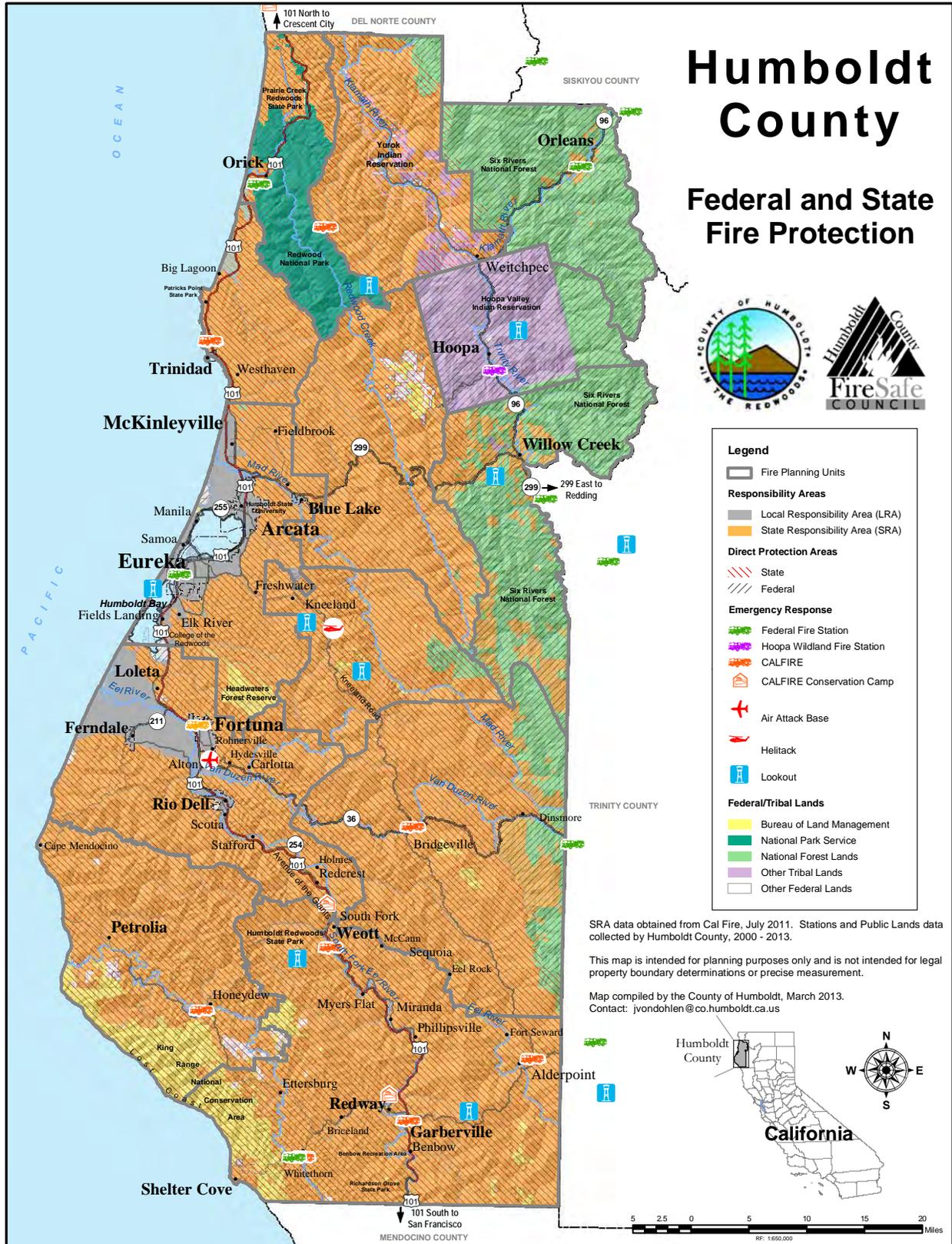
The standard dispatch for any given incident is determined by the Preparedness Plan. The standard dispatch generally includes one engine module. The Duty Officer will request that additional resources be dispatched through FICC, as fire conditions warrant. During the initial attack, the first unit on scene establishes incident command (IC). The initial attack IC then determines if there is a need for additional resources based on current and expected fire potential and orders the appropriate type and number of resources through the FICC.

Bureau of Land Management

The BLM-Arcata Field Officer administers 126 square miles of public lands in Humboldt County including the Headwaters Reserve, the King Range National Conservation Area, Samoa Dunes Recreation Area, and the Lost Coast Headlands. The CAL FIRE-HUU, through the California Cooperative Fire Protection Agreement, provides wildfire protection for Humboldt County BLM lands. The BLM augments CAL FIRE's initial attack resources during fire season by providing a BLM Type 4 engine and crew at the BLM King Range Project Office site (located between Garberville and Shelter Cove at the Whitethorn Junction.)

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Figure II.3-8. State and Federal Fire Protection Map



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II.3.4. Fire Protection Support

Fire protection support is the key to successfully and sustainably providing a high level of wildfire response in Humboldt County. It makes it easier for firefighters to do their job when the residents they serve and protect support them. This support can take many forms.

There is always a pressing need for financial support. The fire companies that are not associated with a special district in Humboldt County have no dependable revenue source and spend a considerable amount of their time fundraising. Even the District fire departments that receive revenue from a tax or fee, work hard to raise additional funds to cover expenses. It is very common for local fire service providers to hold large annual fundraisers, small bake sales, and various types of fundraisers. Continued support from their communities for these events and efforts is critical to their survival.

Another way that community members support their local fire service is through commitments of time and energy. Many local fire service providers are often in need of volunteer firefighters and auxiliary members to help with important activities, such as responding to emergencies, fundraising, book keeping, and dispatching. Volunteer firefighters need to be committed to the training, response, and general safety compliance demands of the “job.” As noted above, a large majority of the firefighters in Humboldt County are volunteers. Without the dedication of the hundreds of residents who step forward as volunteers, this County would have a significantly reduced level of service.

Firefighters’ ability to protect homes safely and effectively is greatly hindered or aided by how property owners prepare their homes and land. An important way that community members can support firefighters is to take personal responsibility for implementing fire safety measures on their properties. Firefighters can protect homes more effectively if they have access to them. Firefighter access can be facilitated by posting address signs, maintaining road surfaces so that they are passable, managing the buildup of vegetation along roads, and ensuring that firefighters can easily get through gates. In many areas throughout Humboldt County, firefighters study their response areas and test the ease of access. These efforts can be greatly abetted through the support of local residents.

Another measure that can be taken by property owners to assist firefighters is to provide adequate firefighting water and pressure. Firefighters in Humboldt County are concerned that many property owners do not have enough available water to help them suppress a structure fire or protect a home from wildfire. They would like residents to keep full water tanks dedicated to firefighting resources near their homes. These tanks must hold at least 2,500 gallons of water and be properly fitted with hardware that is compatible with firefighting hoses and fittings.

Maintaining adequate *defensible space* around structures is important for the protection of firefighters. They need that space as a buffer between them and an oncoming wildfire and if it’s not there, they can not safely protect the structure and will be forced to move on. Residents who maintain the vegetation around their homes are not only increasing the chance of structure survival but are also improving firefighter safety.

Another important way that residents can support the efforts of firefighters is to prepare for safe evacuation and to evacuate well in advance of an approaching wildfire. Timely evacuation allows firefighters to focus solely on structure protection. See the ‘Evacuation Routes and Vulnerability’ section below for more details about evacuation.

Following the recommendations above will greatly increase the capability of fire protection resources to access structures and safely defend them. Firefighters welcome residents to request a visit from them, so that they may evaluate preparedness measures and provide feedback to property owners. Firefighters have a high capability of providing *fire protection* when access, water, defensible space and timely evacuation are present. *Refer to Part V. Fire Safe*

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Communities in this CWPP to learn more about what you can do to support firefighters and protect your home and property from wildfire damage.

II.3.5. Evacuation Routes and Vulnerability

When wildfires threaten habited areas, the normal fire management response effort includes identifying evacuation *decision points*, routes, locations, and location support coordination needs. A team of fire management and local responder experts is assembled to generate the evacuation plan for that event. During that process, evacuation sites are identified which best suit the situation. That information is then quickly disseminated to the public.

Evacuation procedures are generally outlined in the Humboldt County Emergency Operations Plan. According to the Wildlands Fire Checklist contained in the Operations Plan²⁴, the following procedure is followed. The Incident Commander calls for an evacuation order and that message is communicated to emergency responders and the impacted residents. If evacuation of affected areas is requested by the Incident Commander, the following actions are taken in coordination with local law enforcement and fire agencies in the area:

- Identify safe evacuation routes;
- Identify and establish adequate evacuation reception areas;
- Request that the American Red Cross activate a shelter if long term evacuation is expected; and
- Provide security for evacuated areas.

A *Precautionary Evacuation* will be called in response to a fire reaching an area determined to be the outermost decision point and when it is expected to continue toward inhabited areas. An *Immediate Threat Evacuation* is announced during an immediate or immanent fire situation and residents are in danger of life-threatening events. The Sheriff's Office is responsible for implementing actual evacuation procedures. It must be noted that there is no statute which can be used to force residents from their homes. However, once they voluntarily evacuate they can be refused re-entry. Humboldt County Public Works, Road Maintenance Crews are tasked with performing traffic control duties as needed.

Common challenges to conducting a successful evacuation operation are the following:

- Narrow roads with heavy traffic;
- Roads with excessive amounts of flammable vegetating growing up to the roadside;
- Diminished visibility and air quality due to heavy smoke;
- Evacuees with special needs; and
- Citizens exhibiting over-reaction symptoms.

Much of Humboldt County has significant issues regarding the ability of residents and their animals to safely evacuate. The rugged terrain and remote nature of some communities can complicate access to and from residences. Poor or complete lack of *signage* at roads and intersections pose potential problems for emergency responders; this is especially true for the more remote, rural areas. The narrowness of smaller roads leading to these remote residences could create serious complications for emergency vehicle responders trying to gain access during simultaneous home evacuations. Many evacuation routes have been identified as being severally over grown with flammable vegetation, are poorly maintained, and have inadequate vehicle *turn-around spaces* at residences.

²⁴ County of Humboldt, OES. (2002, June). Wildland fires checklist. *Humboldt County Emergency Operations Plan, Part 2: Initial Response Operations*. (p. 2-H-19.) Retrieved from www.co.humboldt.ca.us/sheriff/oes/eop/pdf/part2.pdf.

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Unplanned subdivisions and historic developments that were not created with current *fire safety standards* in mind, and the general disparate nature of rural communities in Humboldt County, increase the number of people who may find themselves in these challenging circumstances when faced with possible evacuation. These areas are also characterized by low weight-bearing bridges and gated roads. Many *one-way-in, one-way-out roads*, and narrow or dead-end roads have also been identified by fire officials and community members through this planning process as one of the biggest hazards facing communities in the event of a large wildfire. These roads have been highlighted for potential mitigation projects and can be viewed on the Humboldt County Web GIS Portal at <http://gis.co.humboldt.ca.us/> by selecting the “Fire Planning” application.

Specific information related to evacuation routes is identified in each of the Planning Unit Action Plans in Part IV of this CWPP. Also see section V.2.3 in Part V. Fire-Safe Communities for more information on preparing for safe evacuation and evacuation planning for pets and livestock.