

HUMBOLDT COUNTY COMMUNITY WILDFIRE PROTECTION PLAN, 2019

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5.1 ASSETS AND VALUES AT RISK

Assets and 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 items and conditions such as homes, businesses, critical 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** may not fully convey the community value found in particular items and intangibles such as air quality. 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 creates what could be described as high community value, springing from a shared sense of place, strong family and neighbor ties, and the enjoyment of community life within a unique *bioregion*.

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 around Humboldt Bay and the Highway 101 corridor contain the county's most critical facilities: hospitals, government facilities, major thoroughfares, schools, fire stations, etc., giving the area 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 on fire hazards, see Map 2.3.1, Fire Hazard Severity Zones, in Part 2, Risk-Assessment Summary.*

Bioregion: A natural ecological community of contiguous geographic terrain, delineated by natural rather than artificial borders: the region's climate, local aspects of seasons, particular landforms, watersheds, soils, native plants, and animals. Humans are also an integral aspect of life within a bioregion.

Hazardous fuels: Accumulations of burnable materials including but not limited to living or dead vegetation, structures, and chemicals that can feed a fire.

This chapter provides a brief introduction to Humboldt County and identifies those elements most at risk from loss due to wildfire.

5.1.1 INTRODUCTION TO THE PLANNING AREA: HUMBOLDT COUNTY

The planning area for this CWPP includes all the area within the boundaries of the County of Humboldt, with an emphasis on unincorporated areas. At 3,570 square miles (2.3 million acres), Humboldt County is the 14th-largest county in California. Nearly 34% of the county is either in public ownership or tribal lands. Incorporated cities occupy 23,011 acres, 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.

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 Map 5.1.1, CWPP Planning Area*). 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 sites 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. The Bay is also a significant

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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, defining the Eel, Van Duzen, Mattole, and Mad River *watersheds* in the central and southern areas, and the Redwood Creek watershed in the northwest. In the furthest northeastern reaches of the county, the Klamath Mountains include some of the higher elevations, with steep slopes that descend to the Klamath and Trinity rivers.

Watersheds: All the land that drains water runoff into a specific body of water is the watershed of that river or lake, also referred to as a drainage area or drainage basin. Ridges of higher elevation usually form the boundaries between watersheds by directing the water to one side of the ridge or the other. The water then flows to the low point of the watershed.

Humboldt County's hydrologic features are abundant. Humboldt Bay, nestled into the coast at the county's midpoint, is the only deep-water port between San Francisco and Coos Bay, 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, mainstem Eel, Mattole, Van Duzen, Mad, South Fork Trinity, Trinity, and the Klamath. Redwood Creek is a significant watershed that covers half the length of the county. These watersheds can be grouped into four larger basins: Klamath-Trinity, Mad-Redwood, Eel, and Mattole.

Eighty percent of the county's 2.3 million acres is forested. Fifty percent of this forested land is private commercial timberland (the county typically leads the state in timber production), and 35% is state or federal public land, including Redwood National and State Parks, Six Rivers National Forest, the King Range National Conservation Area, and Humboldt Redwoods State Park.

While Douglas fir represents the predominant forest type, the more emblematic tree is the coast redwood, of which towering groves thrive in areas of the county with a 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.

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% of the county land base.



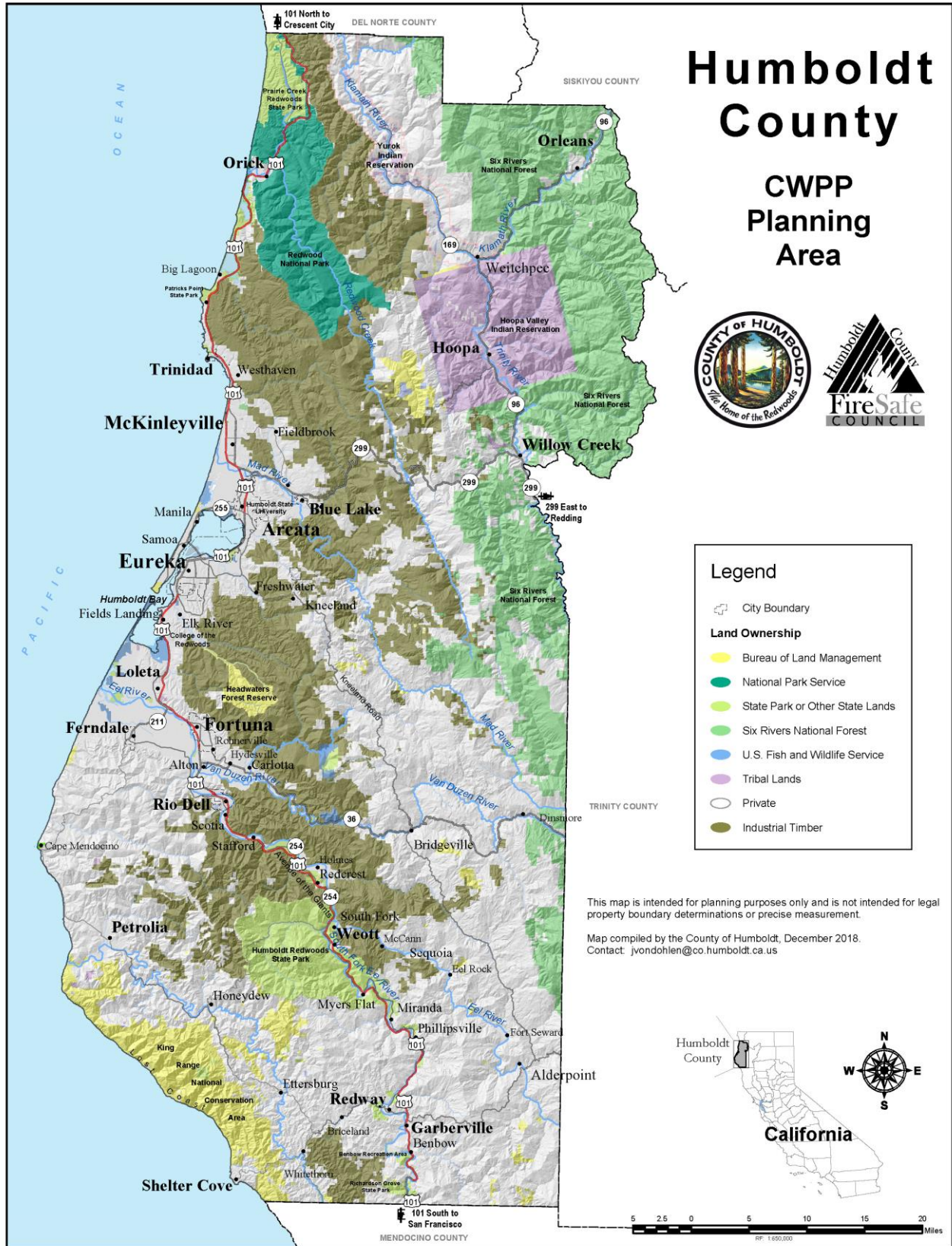
Avenue of the Giants



Mattole Estuary

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Map 5.1.1 CWPP Planning Area



5.1.2 COMMUNITY AND ECONOMY

Population and Demographics

According to the US Census, the total population of Humboldt County was 136,754 in July 2017, which represents a 1.6% increase since the 2010 Census.¹ 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% per year over the last thirty-five years.²

In 2016, approximately 53.2% of Humboldt County's residents lived in unincorporated areas, outside of the county's seven cities, down from almost 57% in 1970.³ This is important in regard to *wildfire*, as unincorporated areas in Humboldt County generally have a higher *fire hazard* rating than incorporated areas; unincorporated areas often lack adequate fire services, are rural and/or remote, and have homes surrounded by dense vegetation. 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 constitute the Humboldt Bay region and the economic center of the county. Forty-seven percent reside in the county's seven cities. *See Map D.1, Population and Communities at Risk in Appendix D, Background Information for Assets and Values at Risk for more information.*

Wildfire: An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

Fire hazard: A fuel complex, defined by volume, type, condition, arrangement, and location that determines the degree of ease of ignition and of resistance to control.

Based on the U.S. Census, per capita income in Humboldt County was \$25,208 in 2017, and the median household income was \$43,718.⁴ It was estimated in 2017 that there are 3,997 households with less than \$10,000 in income and benefits per year and 11,356 households with \$10,000 to \$25,000 in income and benefits per year. In total, this represents 28.4% of all households in the county.⁵ Additionally, 56.5% of homes were owner occupied from 2013-2017, with median gross rent \$914.⁶ It should be noted that Humboldt State University's student population represents about 6% of the county's population (average of 8,294 2011-2018).⁷ Students often do not work, or they are employed in 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 the poverty line.

Based on 2017 U.S. Census Population Estimates Program, 17.2% of Humboldt County's population is 65 or older. This is greater than the state average of 13.9%.⁸ Thirty-seven percent of the County's over-

¹ U.S. Census Bureau. (2017). Quick Facts: Humboldt County, California. Retrieved from <https://www.census.gov/quickfacts/fact/table/humboldtcountycalifornia/PST045216>

² County of Humboldt, Department of Planning & Building. (2017). Humboldt County General Plan – Revised Draft Environmental Impact Report. Section 2.1: Project Location and Setting, Tables 2.1-1 and 2.1-2. (pp. 2-2 and 2-3). Retrieved from <https://humboldt.gov.org/DocumentCenter/View/58838>

³ County of Humboldt, Department of Planning & Building. (2017). Humboldt County General Plan – Revised Draft Environmental Impact Report. Section 2.1: Project Location and Setting. (p. 2-2).

⁴ U.S. Census. Quick Facts: Humboldt. (2017).

⁵ U.S. Census Bureau. American FactFinder. 2013-2017 American Community Survey 5-Year Estimates. Retrieved from <https://www.census.gov/acs/www/data/data-tables-and-tools/american-factfinder>

⁶ U.S. Census. Quick Facts: Humboldt. (2017).

⁷ Humboldt State University. (2018). Data: Reports. Fall Semester 2011-2018. Retrieved from <https://www2.humboldt.edu/data>

⁸ U.S. Census Bureau. Quick Facts: California [vs.] Humboldt County [as of July 2017]. Retrieved from <https://www.census.gov/quickfacts/fact/table/CA,humboldtcountycalifornia/AGE295216>

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65 population has disabilities of some kind, and 8% have incomes below the poverty line.⁹ **These residents may be less able to prepare for wildfire and other disasters, or to undertake other fire-safety and prevention actions, and so may require assistance to ensure their homes and properties are fire safe.** It is also estimated that 19.2% of the county's population is 18 or younger, slightly less than the state average of 22.9%.¹⁰

Communities at Risk

Nearly all populated areas within the county have been designated a state or federally recognized Community at Risk (CAR). CARs are defined as wildland-urban interface communities that are at high risk of damage from wildfire. *Existing CARs are shown in Figure D.1, Humboldt County Designated Communities at Risk in Appendix D, Background Information for Assets and Values at Risk. Map D.1, Population and Communities at Risk in that same appendix also displays these existing CARs geographically.*

Homes and Structures

Property values range from moderate to moderately high. Prices are continuing to rise as people leave warmer areas for the cool coastal climate. Although real estate prices peaked in the first quarter of 2017 following recreational marijuana legalization and are now declining, they are still high in rural areas, with urban values consistently climbing.¹¹ **On a statewide scale, real estate values in Humboldt County are considered moderate.**

Some land uses, such as single-family rural residential, are more vulnerable to wildfire. According to the Revised Draft of the Humboldt County General Plan,

6 Rural residential land, which may also contain timber, agriculture, and grazing lands, occupies approximately 152,863 acres of the unincorporated area. Single-family residential-zoned lands cover 21,412 acres and an additional 560 acres are designated for multi-family housing.¹² 9

An analysis of Humboldt County Assessor data found that 62% of all unincorporated area parcels fall within High or Very High Fire Hazard Severity Zones (as determined by CAL FIRE) and that approximately 86% of those are residential dwelling parcels.¹³ (See section 5.2.3 in Chapter 5.2, *Wildfire Environment*, for more information on Fire Hazard Severity Zones.) This indicates that a large majority of the parcels within areas of the greatest Fire Hazard Severity zoning are liable to contain existing homes or accommodate new homes in the future—one of the county's most valued community assets. In fact, based on an evaluation of parcels with development potential in Humboldt County, 67% of General Plan build-out¹⁴ county-wide could be expected to occur in High and Very High Fire Hazard Severity Zones. 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. The Humboldt County Planning and Building Department is administering the Safe Homes Program through the year 2022 in an effort to incentivize

⁹ U.S. Census Bureau. American Fact Finder. 2013-2017 American Community Survey 5-year Estimates.

¹⁰ U.S. Census Bureau. Quick Facts: California vs. Humboldt County.

¹¹ Kyla and Charlie Tripodi, The Land Man Office, "Rural land valuation trends: cannabis and timber," University of California Cooperative Extension: Redwood Region Forest Management and Market Trends workshop, April 4, 2018.

¹² Revised Draft EIR. (p. 2-1).

¹³ A parcel that is categorized by the Assessor for use as single family, multiple family, or rural residential development, including Agriculture and Timber parcels.

¹⁴ The potential development based on the allowed density according to the Humboldt County General Plan.

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building permit compliance for existing unpermitted structures.¹⁵ There are also many homes in the county that were built before building code compliance was required; building codes include standards intended to harden homes against damage from wildfire. In addition, in some instances, alternative owner builder permit procedures can be used, for which many of the standard permit requirements do not apply, including those intended to harden homes against wildfire. Many of these unpermitted, pre-code, and alternative owner builder permitted homes are especially vulnerable to wildfire ignition. That being said, and based on recent examples in neighboring counties, all homes in Humboldt County have vulnerabilities to wildfire and steps should be taken to mitigate wildfire impacts.

SAFE HOMES PROGRAM

Do you have an unpermitted residential structure, residential accessory structure, or addition on your property?

Through December 31, 2022, the Humboldt County Planning and Building Department and the Humboldt County Division of Environmental Health will waive penalty fees associated with construction permits. Please note that all customary permit fees will apply during this program.

For additional information and submittal requirements contact:

Humboldt County Building Inspection Division **707-445-7245**

Humboldt County Planning Division **707-445-7541**

Humboldt County Environmental Health Division **707-445-6215**

<https://humboldt.gov/156/Planning-Building>

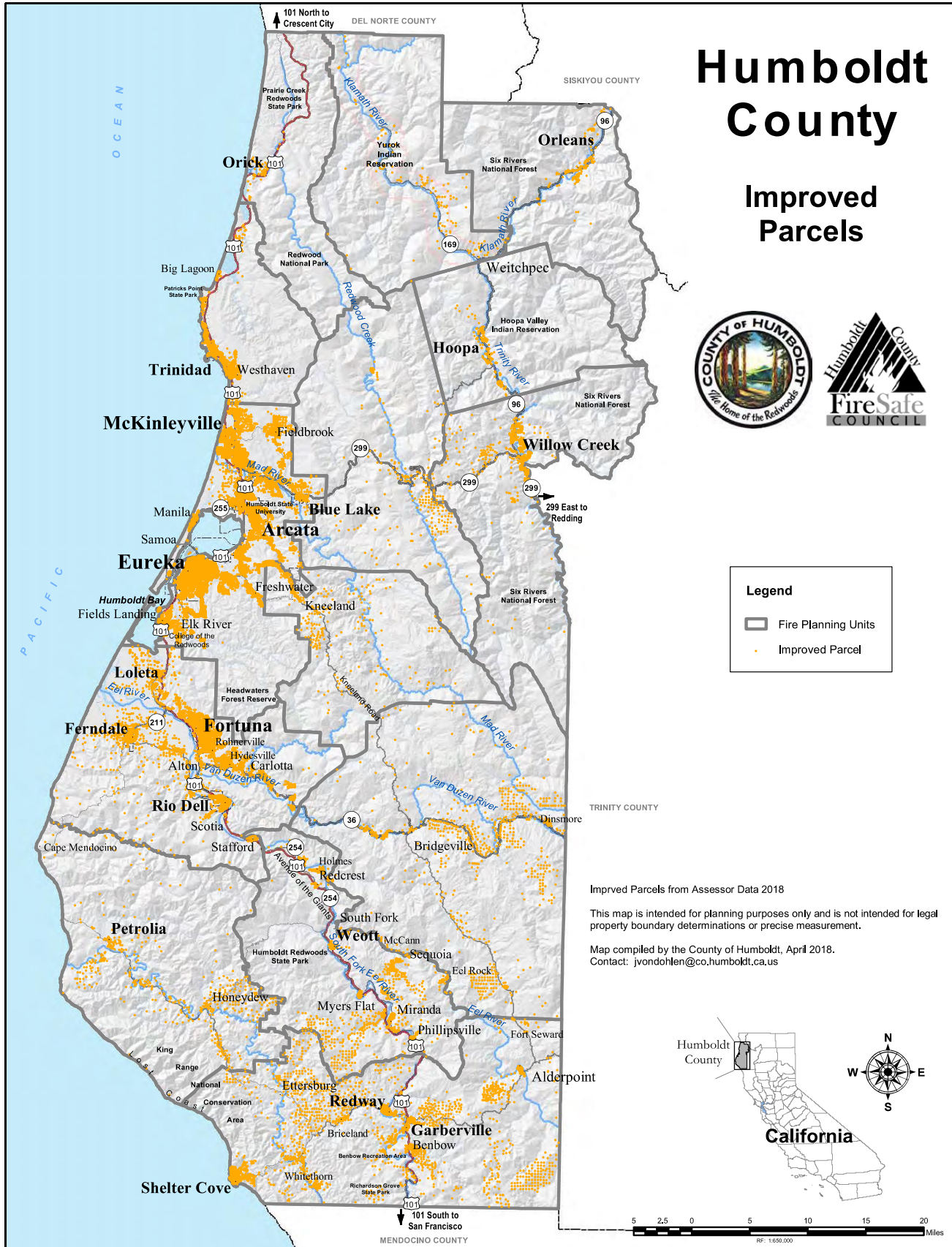
One way to identify development that is not reflected in building permit data is through an analysis of the assessed value of parcels. If a property is assessed at a higher value than the base land value, it can be surmised that there is some type of improvement, most likely a structure. The *Improved Parcels* map on the following page (*Map 5.1.2*) provides an illustration of parcels with improvements. Each orange dot signifies a parcel containing an assessed improvement, most likely a structure. This map shows the extent of the *wildland-urban interface* (WUI) in the rural southern and eastern portions of the county, where dispersed development creates both land management and fire preparedness and protection challenges. (It must be noted that this map only shows assessed parcels and will not include some parcels such as Tribal trust lands, which is a limitation in the data source). Another, more general way to illustrate where homes and structures are located, with a focus on unincorporated areas (based on 2010 Census data) is shown in *Map 5.1.3, Development Density*.

Wildland Urban Interface (WUI): The zone where structures and other human developments meet, or intermingle with, undeveloped wildlands.

¹⁵ Humboldt County, Building Inspection Division Homepage: <https://humboldt.gov/153/Building-Inspection>

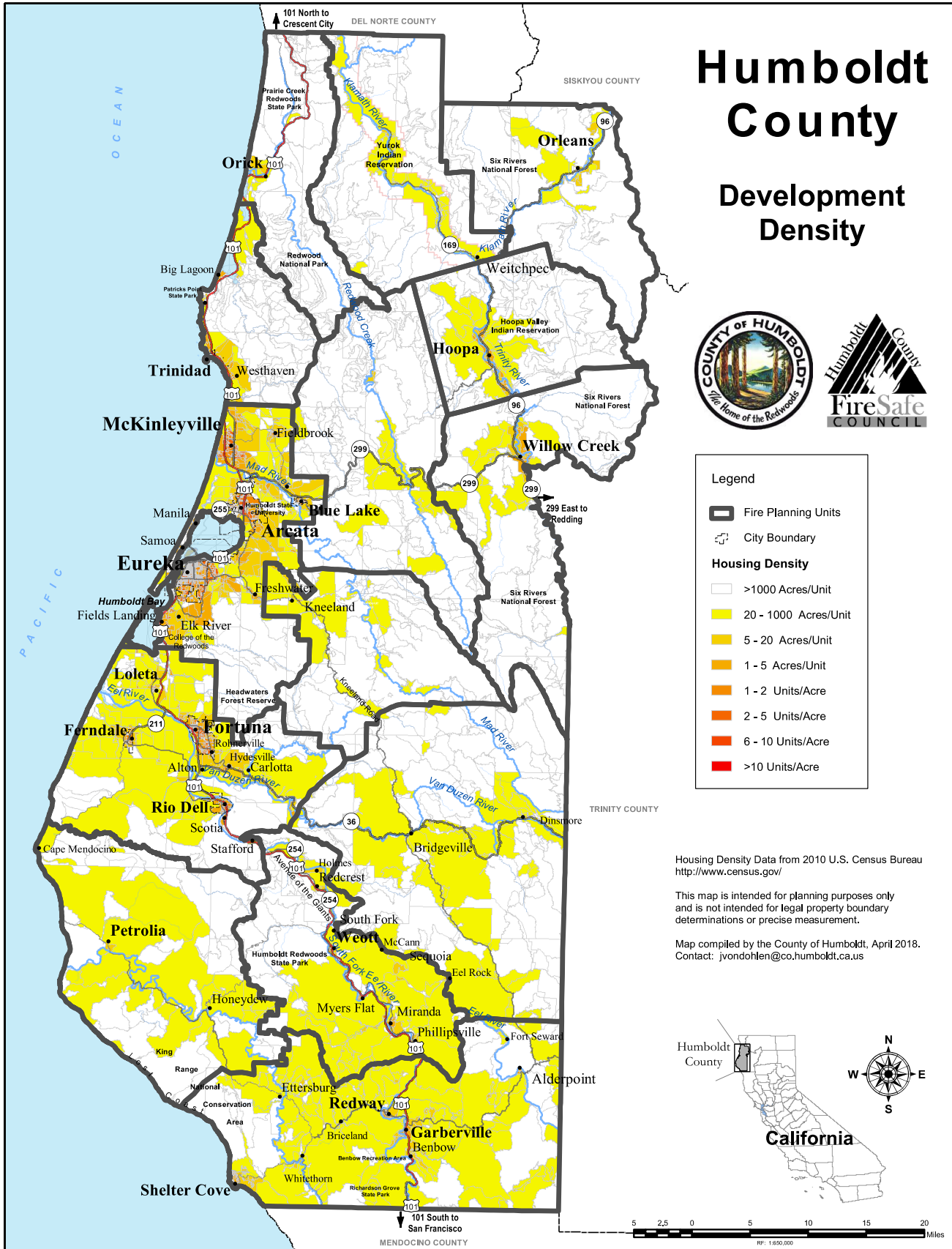
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Map 5.1.2 Improved Parcels



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Map 5.1.3 Development Density



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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 seasonal 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. It is unclear how this trend will be influenced by the legalization of marijuana and the associated regulation and oversight of the legal industry. *For more information, see **Marijuana** in section 5.1.3 below.*

Structural Ignitability

Most homes in Humboldt County are built in towns—or the more urban areas of the county—principally in the coastal zone surrounding Humboldt Bay. There are a vast range of construction types in the county, from non-permitted cabins off the electrical grid to state-of-the-art newer homes. Older wooden homes generally have higher *structural ignitability* than newer homes, meaning they can catch fire more easily. That is, unless they have been retrofitted to current building standards, which is not common here.

Generally, **structural ignitability of homes in Humboldt County is very high**, with most homes made of wood and built before the 2007 WUI Building Codes (CA Building Code Chapter 7A) came into effect. The dominant construction style uses local wood products, especially Douglas fir and redwood, which are highly flammable when dry. Homes here generally have many small openings where embers could penetrate the building envelope and ignite the structure during a wind-driven ember storm. Ember storms are becoming more common throughout California, leaving entire neighborhoods and even towns destroyed.

Homes with non-fire-safe roofing and siding are common, as are cantilevered decks with flammable materials stored underneath (e.g. lumber, cardboard boxes, etc.). 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.

The relatively low occurrence of recent wildfire, in combination with the coastal climate, leads many Humboldt residents along the coast to assume that their risk of wildfire is low, which is often untrue. As a result, many local residents do not consider fire safety activities as part of their regular home maintenance. This could leave many homes here highly vulnerable to the types of urban wildfire recently seen throughout California.

Anecdotal evidence from fire service personnel indicates that structure loss from fire (not wildfire) in Humboldt County has increased over the past decades. Some link this trend to indoor growing of marijuana, with the most common ignition occurrence resulting from faulty, poorly modified, and/or unpermitted wiring, or more recently, explosions from extraction operations. 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 straw, which are sometimes used as soundproofing material to limit noise produced by generators. The ignition potential for these structures is very high and poses an ignition risk to the surrounding wildlands or urban neighborhoods, as the case may be. This risk could begin to decline with marijuana legalization, as legal operations will have to come into compliance, and the black market will continue to decline. On the other hand, one could conjecture that marijuana growers, unaccustomed to

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the cost and complexity of compliance with legal marijuana regulations may choose to move back indoors and underground, which could mean a continued risk of structure fires from indoor marijuana operations. It is still too early to know; this is a risk to monitor closely and for which to prepare possible solutions.

Commercial and Economic

The local economy was built on natural resource-based industries such as timber production and manufacturing, fishing, ranching, and dairy farming. These industries, although diminishing to varying degrees from historic levels, are still important contributors to the local economy. Agricultural land and timberlands are an important element of Humboldt County's identity. Fire was historically used as a land-management tool in local rangeland and timber management. Prescribed fire is now seeing a resurgence in the county, especially in range and oak woodland management.

*For more information on prescribed fire, see **Recent Fire History** in Chapter 5.2, **Wildfire Environment**, and Chapter 3.5, **Restoration of Beneficial Fire**.*

There are many dense, overstocked timber stands resulting from decades of clearcutting and fire suppression. Without strategic and effective pre-fire thinning treatments, wildland fire could have potentially disastrous consequences to timber 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. However, many enterprises are still dependent on wildlands and agricultural lands, both of which could be vulnerable to wildfire. According to the *Economic Development Element* of the 2017 *Humboldt County General Plan*:

6 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.¹⁶

Based on the 2012–2016 American Community Survey 5-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 34% of the working population. A contributing factor to this employment category reflecting the greatest number of workers, is the inclusion of most of those employed by Humboldt State University, a significant employer in the county. Continuing down the list, the “sales and office occupations” are 24%, “service occupations” are 23%, “natural resources, construction and maintenance occupations” are 10%, and finally “production, transportation, and material moving occupations” make up 9% of total employment in Humboldt County.¹⁷

¹⁶ County of Humboldt, Department of Planning & Building. (2012). Humboldt County General Plan Update. Chapter 9: Economic Development Element. Planning Commission Approved Draft General Plan. Retrieved from www.co.humboldt.ca.us/gpu/documentsplan.aspx

¹⁷ U.S. Census Bureau. American Fact Finder. Occupation by class of worker for civilian employed population 16 years and over. 2013-2017 American Community Survey 5-Year Estimates. Retrieved December 28, 2018, from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S2406&prodType=table

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Figure 5.1.1 Occupations by Measurable Employment Industry Type



Public and private service and retail sectors are less vulnerable to impacts from wildfire. Tourism, recreation, and most of the natural resource-based sectors of the local economy however could be significantly impacted by a large wildfire, including deterioration of air quality from excessive smoke.

Humboldt Bay is the commercial focal point of the county, serving as the major port and center of exchange. The Bay provides most of California’s oyster production and is a significant natural resource. 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. Many of these coastal urban and suburban areas are categorized by CAL FIRE as Moderate Fire Hazard Severity Zones, or are not ranked at all. Yet these areas have excessive fuels that could be ignited under the wrong combination of conditions.

Marijuana production has been a fundamental component of the Humboldt County economy for decades. It is estimated to have a \$4 billion cash value in the county (in comparison to about \$350 million for timber and other agriculture combined).¹⁸ The commercial and economic changes to the local economy with the 2018 statewide legalization of recreational marijuana, more recently called “cannabis,” are still being documented.^{19,20} However, there are indications of a rapid economic shift; some areas of the local economy are growing, and others—most notably retail businesses in rural areas—are declining rapidly, presumably with less cash availability in the hands of local residents.

*See the descriptions of **Forests, Agriculture, and Marijuana** below for more information on commercial natural-resource-based assets in Humboldt County.*

Schools

There are 32 school districts in Humboldt County.²¹ The districts collectively operate 71 schools including elementary, middle, and high schools, as well as many local charter schools. Many schools are designated Red Cross emergency shelters. In rural communities with high fire risk, many schools have been identified by local residents at community workshops as potential wildfire evacuation sites.

¹⁸ Forsburg, R. (2018). American Ag Credit, “Redwood Region timber market: regional, national and international influences.” Redwood Region Forest Management and Market Trends. Workshop, April 4, 2018. University of California Cooperative Extension (UCCE), Eureka, CA. USA.

¹⁹ Wilson, S. & Awal, K. (2018). Outlaw weed comes into the light. The Washington Post. Retrieved from https://www.washingtonpost.com/news/national/wp/2018/03/16/feature/californias-outlaw-marijuana-culture-faces-a-harsh-reckoning-legal-weed/?utm_term=.939bcde838ed

²⁰ Fuller, T. (2017). Legal Marijuana is almost here: If only pot farmers were on board. The New York Times. Retrieved from <https://www.nytimes.com/2017/09/09/us/california-marijuana-growers.html>

²¹ County of Humboldt, Office of Education. (n.d.). Humboldt County School Districts. Retrieved December 28, 2018, from <https://hcoe.org/schools>

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Medical Facilities

Four hospitals are located within Humboldt County. These critical assets become increasingly valuable in emergency situations and during wildfire incidences. *Figure D.3, Medical Facilities in Appendix D contains a list of these facilities with contact information.*

Critical Infrastructure

Critical infrastructure includes the roads, utilities, water, and 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. It is not uncommon for all four of these highways—all major routes in and out of the County—to be closed at the same time. A major wildfire could easily leave Humboldt County isolated for days, weeks, or more.

Fire-suppression efforts rely on roads to strategically place equipment and firefighting personnel during wildfires. 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 making repairs.

Power lines are at significant risk of wildfire, not only due to increasing winds with climate change; many power poles are made of wood and are therefore susceptible to burning. Power lines have become an increasing risk to starting wildfires throughout the state, as seen in the 2017 Wine Country Fires.

Wildfire typically does not have a major direct impact on bridges. However, wildfires can create conditions in which bridges are obstructed. This is especially true for rain events following wildfire, which can lead to excessive erosion. Many bridges in areas of high to moderate fire risk are critical to provide the only ingress and egress for large areas and, in some cases, for isolated neighborhoods. Additionally, under a worst-case scenario of an earthquake during fire season initiating a wildfire, bridges could be unsafe or unusable, causing major evacuation problems.

Public and private utilities within Humboldt County are 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 county water sources. There are approximately 24 different local agencies²² that provide water service, 2 regulated public utilities²³, and an additional 35 mutual water associations²⁴ 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 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. *See Figure D.4 in Appendix D, for a list of local airports.*

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

²² City and District providers regulated by an elected board.

²³ Regulated by the California Public Utilities Commission (CPUC) and the utility establishes rates through a CPUC rate making process.

²⁴ Landowners own shares in these systems rather than paying rates.

5.1.3 NATURAL

Natural resources are one of the defining characteristics of Humboldt County and are highly valued for their contribution to quality of life. They are also important because they attract tourist-related income and outdoor enthusiasts.

As discussed in *Chapter 5.2, Wildfire Environment*, fire is a natural process in this bioregion; low-intensity fire can promote *ecosystem* health. However, the suppression of wildfire for decades has resulted in a buildup of hazardous fuels, increasing the potential for large fires that could severely damage Humboldt County's natural assets, including protected and recreational areas as well as the extensive timber industry lands. (See section 5.2.2 and Appendix E, *Background for Wildfire Environment*, for more information on fire ecology.)

Ecosystem: A community of organisms that makes up a specific area. Examples of ecosystem types include a pond or a forest.

Biodiversity: The abundance and variety of plant, fungi, and animal species found in an ecosystem, including the diversity of genetics, species, and ecological types.

Forests

As stated in *section 5.1.1* above, forestlands define much of the visual landscape of Humboldt County, covering more than eighty percent of the land area and totaling nearly 1.9 million acres. Forest types vary across the county, with Douglas fir/mixed-evergreen forests dominant, including oaks and pines, with yew, cedar, and hemlock trees. Other forest types include redwood forests, montane hardwood forests, and oak woodlands, which provide a wide range of wildlife habitat. Forest ecosystems support a wealth of *biodiversity*, facilitate wildlife migration patterns, and provide sanctuary for many threatened, endangered, or otherwise sensitive species. These valuable ecosystems also support watersheds by retaining significant amounts of water.

In addition to their vulnerability to lightning-caused fires, forestlands can draw large numbers of people for their beauty and recreational opportunities, increasing the likelihood of human-caused fire ignitions. The scenic value of forestlands, whether viewed from within or afar, is of great local importance; their vast expanses being emblematic of the visual character of the county.

As previously mentioned, the timber industry has long been a cornerstone of Humboldt County, with approximately half of all forestlands being private commercial timberlands. Timberlands can be highly threatened by wildfire, and contribute to higher fuel hazards across the landscape. The timber cycle of cutting the larger trees, planting with young seedlings, and aggressively suppressing fire to protect those seedlings, results in dense, young forests on both public and private lands that are very susceptible to wildfire. These young forests could carry fire quickly across the landscape. Fire suppression within such forests has contributed to the accumulation of heavy fuel in forest understories, increasing the likelihood of high-intensity fires damaging significant forested areas.

Of note is the industrial timber industry use of the "hack and squirt" (or "frilling") forestry practice, where trees (principally tanoak and some madrone) are cut into and sprayed with concentrated herbicides, leaving large areas of highly flammable standing dead trees. These patches can put nearby areas of healthy trees and wildlife habitat at greater wildfire risk. This practice has led to community concern and protests, especially in the North Fork Mattole watershed.

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Finally, another result of fire suppression in Humboldt County's forests is the loss of oak woodlands, a phenomenon seen throughout California. Frequent fire historically kept ridgetop prairies open and reduced Douglas fir (conifer) encroachment into oak woodlands by killing the fir seedlings. With continued fire suppression, conifers have increasingly overtopped the oak canopy and converted declining oak woodland ecosystems to mixed-conifer forests. California adopted new regulations in 2018 to allow for restoration of oak woodlands. The new oak regulations include a "special prescription" for timber harvest or an "exemption." Both options are being tested for 6 years.²⁵

Agricultural Lands

Large swaths of working agricultural land around Humboldt County lend a pastoral charm to the local scenery. 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 larger dairies and bulb farms, numerous small, organic farms are sprinkled throughout the county. There are a number of "heritage landscapes" within Humboldt County—lands with combined historical, cultural, and scenic values, such as the Arcata and Ferndale Bottoms.

These open areas can act as wildlife corridors and facilitate species migration throughout the region. They can also serve as important fuel breaks for larger wildfires—a place where fire could slow its spread—especially when irrigated. Although these agricultural landscapes may not be especially vulnerable to wildfire directly, they may be impacted by large fires that produce an abundance of smoke, which can have negative impacts on air quality and sun exposure, and even scatter ash on crops. On the other hand, they can potentially function as public escape areas for nearby residents in the event of a large-scale wildfire.

Marijuana

Humboldt County is currently undergoing a rapid economic shift as California's 2018 legalization of marijuana production and recreational use is implemented. It is uncertain what this means for the county's future but several local trends have begun to emerge.

- Since the decriminalization of medical marijuana, there has been an increasing trend of large-scale marijuana production throughout the county, including many greenhouses to facilitate year-round production. Google Earth shows an



Known marijuana cultivation sites in 2015 in a remote area of the county, visible from Google Earth.

²⁵ For more information, see:

1. Board of Forestry and Fire Protection. (2017). Initial Statement of Reasons, "Oak Woodland Management Exception". [PDF]. Retrieved from http://bofdata.fire.ca.gov/board_business/binder_materials/2017/july_17/full/full_10.0_draft_oak_woodland_exemption_isor.pdf
2. Board of Forestry and Fire Protection. (2016). Final statement of Reasons, "White and Black Oak Woodland Management Special Prescription". [PDF]. Retrieved from http://bofdata.fire.ca.gov/board_business/binder_materials/2016/july_2016/full/full_8.1_fsor_white_and_black_oak_woodland_special_prescription.pdf
3. Forestry: Timberlands: Restoration and Conservation Forest Management Activities. California Legislative Information, Assembly Bill 1958, Chapter 583 (2016). Retrieved from https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB1958

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abundance of greenhouses used for marijuana production throughout the county. Nearly all of these were put in without any environmental review, and can have significant negative environmental impacts.

- Many formerly underground sectors of the economy are now in the process of becoming legal, including the processing side of marijuana end products. These have driven up urban real estate prices for warehouses and other industrial sites. Safety factors are still new or do not exist for this developing industry.²⁶
- Many new and existing growers, especially those with larger operations, applied for a limited number of County permits; several applicants, and even more considering “going legal,” are overwhelmed by the steps necessary to function as a legal business. There are many smaller producers who are unable to obtain permits for a variety of reasons; many of whom are continuing underground operations.
- Local prices for marijuana are declining rapidly as Humboldt County competes with less expensive marijuana produced elsewhere around California.
- Humboldt County real estate prices peaked at an average price per listing of \$1.4 million in the first quarter of 2017, and began declining immediately after, dropping to approximately half that value in one year.²⁷
- Many smaller marijuana farmers who were historically reliant on black-market marijuana production are leaving. This is resulting in rapid changes in rural land ownership. It is unclear what this will mean for future ownership trends in the county.
- Some community members have reported that this land turnover is also affecting the availability of volunteer firefighters, and the amount of donations made to their volunteer fire departments, many of which operate without a stable funding source.



Marijuana cultivation greenhouses in the middle of dense forested lands.



Future marijuana cultivation site clearing.

²⁶ Roman, J. (2016). Hazards of the Trade. National Fire Protection Association Journal. Retrieved from <https://www.nfpa.org/News-and-Research/Publications/NFPA-Journal/2016/September-October-2016/Features/Growing-Pains/Hazards-of-the-Trade>

²⁷ Tripodi K. & Tripodi, C. The Land Man Office, “Rural land valuation trends: cannabis and timber.” Workshop, April 4, 2018. Redwood Region Forest Management and Market Trends. University of California Cooperative Extension (UCCE), Eureka, CA. USA.

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The newly legal marijuana production industry is especially vulnerable to wildfire. Many report significant losses to their 2017 crops from smoke damage from that fire season. *The New York Times* wrote after the 2017 Wine Country Fires:

“ Even the crops that were not in the direct line of fire could lose value or become unusable because of smoke damage, soot and ash. Growers will have to sort out whether the damage is merely aesthetic or whether it could include contaminants that would present a health risk to consumers, Mr. Allen said. Smoke tends to stick to the plants, which is bad news for a product that depends largely on flavor and scent for its value.”²⁸

Economic loss from wildfire can be even more devastating for producers who are not able to obtain insurance since marijuana is still considered an illegal drug by the federal government.²⁹ That said, a recent settlement for over \$1 million was paid out to a marijuana production facility following the Thomas Fire.³⁰

Additionally, there is the very real threat of fighting fire and running into someone’s marijuana crop. This has been a serious issue in Humboldt County for decades, especially when marijuana is grown illegally on public lands (via trespass). This could change with legalization, although it could take years for the outlaw mentality of marijuana production to change.

“ Marijuana growers fear they’ll lose their crop or even be jailed when fire personnel encounter their rural gardens. And, at the same time, firefighters fear that growers will get violent or that possibly booby traps set (very rarely) to protect a grow, might injure crew members who encounter them.”³¹

The National Fire Protection Association is developing standards for *Marijuana Growing, Production, and Extraction Facilities* (NFPA 1. Fire Code, Chapter 38³²). These standards are based in part on the experience of legalization in Colorado. Those growing, producing, or extracting marijuana in Humboldt County should review this NFPA code to ensure the safety and compliance of operations.

The legal marijuana industry is still in its infancy in Humboldt County. Regulations provide the opportunity to reduce fire risks and hazards associated with the industry. Reducing ignitions in this sector is targeted in this CWPP’s *Countywide Action Plan, Chapter 3.1, Wildfire Ignition Prevention*.

Map 5.1.4 Resources and Economic Assets at Risk below shows resource lands in Humboldt County (agriculture, grazing, and timber production; marijuana cultivation sights are not yet included in available data sets) as well as primary residential areas. These are areas of assets and values potentially at risk to wildfire.

²⁸ Fuller, T. (2017). Legal Marijuana is almost here: If only pot farmers were on board. *The New York Times*. Retrieved from <https://www.nytimes.com/2017/09/09/us/california-marijuana-growers.html>

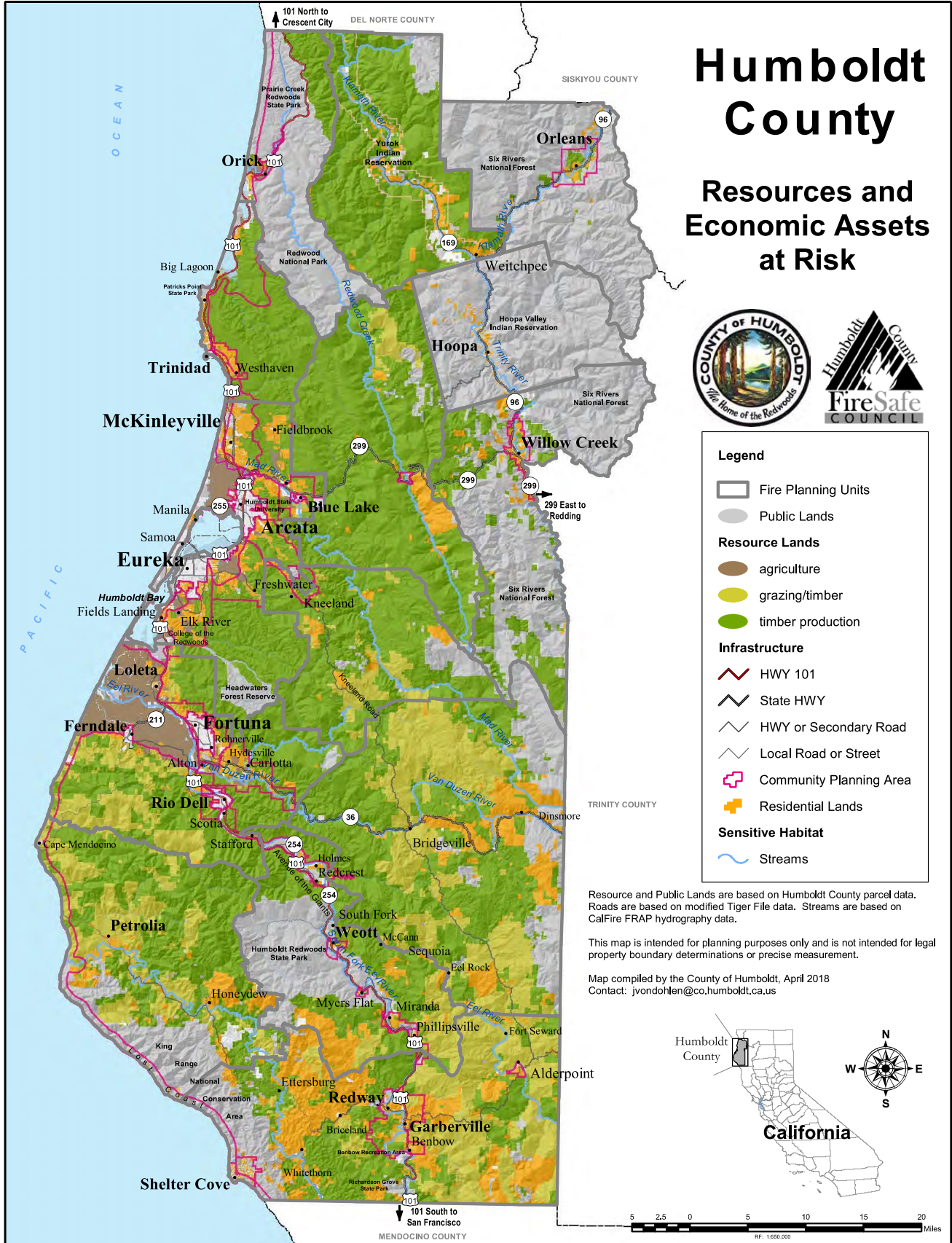
²⁹ Fuller, T. (2017).

³⁰ Brugger, K. (2018). Cannabis farmer gets over \$1 million insurance payout. *Santa Barbara Independent*. Retrieved from <https://www.independent.com/news/2018/mar/19/cannabis-farmer-gets-over-1-million-insurance-payo>

³¹ Kemp, K. (2014). Feeling Threatened: When Firefighters Encounter Marijuana Growers. *Redheaded Blackbelt*. Retrieved from <http://kymkemp.com/2014/10/20/fire-and-pot>

³² NFPA 1: Fire Code. (2018). Chapter 38: Marijuana Growing, Production, and Extraction Facilities. National Fire Protection Association. Retrieved from <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1> (The codes may be viewed for free at this link.)

Map 5.1.4 Resources and Economic Assets at Risk



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Wildlife

Wildlife in Humboldt County includes animals, fish, plants, insects, and other invertebrates. The diversity of organisms here is extensive. All species found within the county, from the marbled murrelet (*Brachyramphus marmoratus*) to the coho salmon (*Oncorhynchus kisutch*) to the Humboldt milk-vetch (*Astragalus agnicidus*), depend on the environment around them to provide the food, water, and shelter they need to survive. *(More information on at-risk species can be found in Appendix D.)*

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. What is known is that that much of the forest exhibits conditions different from those wildlife species are adapted to; it can reasonably be assumed there are at least some negative impacts.

It is important to note that some species depend on downed or standing dead trees for shelter and forage. Fuel reduction efforts have the potential to reduce or eliminate these resources in some areas. Fuel reduction projects can also open the canopy and enable the spread of invasive species that may in turn, affect the wildlife that were dependent on the displaced plant life. Connecting current and evolving research on this topic with fuels reduction practitioners will be important as wildfire hazard mitigation projects are designed and implemented.

All 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.

Aquatic Systems and Fish

The effects of wildfire on aquatic systems and fish have been linked to the *direct* or immediate influence of fire on water quality, and the *indirect* or subsequent effects on watershed characteristics and processes that influence water quality and quantity, stream channels, and aquatic biota.³³

The effects of fire and fire-related management are of particular importance to those interested in, or responsible for, management of native fish, especially salmonids. Fish and associated fisheries constitute an asset of cultural and economic importance to Humboldt County. The sometimes dramatic, short-term effects of fire and post-fire disturbance on stream channels, water quality, and mortality of individual organisms can be readily apparent.

Circumstances shape the effects of wildfire on populations and communities of native fish. Fish are most vulnerable to both direct and indirect effects of fire where populations are restricted to relatively small areas of habitat, and risk is greatest in isolated stream segments or small networks in steep, confined drainages where severe fires are likely to burn a large proportion of the headwaters and riparian corridors. Where populations are relatively large, have access to diverse, well-connected habitats and/or the capacity to adapt to changing environments, vulnerability is lessened; in many cases, the capacity and even the productivity of habitat can even be improved following wildfire.

Managers have responded to the challenges posed by changing fire regimes and the conservation of native fish and diverse aquatic ecosystems in different ways. In general, options can be categorized as management before, during, and after fire (Dale et al., 2001; Dunham et al., 2003), but a framework for

³³ Gresswell, R.E. (1999). Fire and aquatic ecosystems in forested biomes of North America. *Transactions of the American Fisheries Society* 128(2). (pp. 193-221).

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monitoring and adaptation is critical in all cases (Dunham et al., 2003). Management before fire includes maintaining or restoring the resistance or resilience to disturbance before the next disturbance occurs.³⁴

Vulnerable salmonid populations are at significant risk to sediment and erosion following wildfires, yet inversion layers created from smoke in late summer and fall can cool streams and help those same populations. Riparian areas are highly vulnerable to wildfire disturbance. Erosion can cause large sediment loads in streams, which can be transported and deposited into rivers and damage aquatic habitat.

Wildlife Habitat

Changing disturbance regimes associated with climate change will impact wildlife species in complex ways in the future. Species that require older, denser, and more structurally complex forest conditions, like the Pacific fisher and the northern spotted owl, would likely be negatively impacted by changes in fire regimes associated with climate change.³⁵ Researchers note that fisher habitat is driven to a great extent by local vegetation features, and stand-level implications of fire have been examined under a series of future fire scenarios, since fire occurrence and behavior—largely driven by climate and weather—have substantial effects on local vegetation.³⁶ Research recommends protecting fisher habitat through targeted fuel-reduction treatments, and applying more liberal fire-management policies to naturally ignited fires during moderate weather conditions. Sensitive benthic invertebrate populations may also be reduced by increases in large and severe wildfires that are likely to be associated with climate warming. Larger effects will likely be observed in small, first-order streams.³⁷

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. This is particularly important for landscape level projects.

Before doing any ground-disturbing activities like fuel reduction, residents and land managers must:

- Identify applicable laws and regulations,
- Develop compliance plans,
- Apply measures to avoid the potential spread of invasive species,
- Review existing compliance resources and best management practices, and
- Determine if additional guidance materials are necessary.

For more information on wildlife, and a case-study on the California Condor, see Appendix D.3. For more information on regulations and compliance requirements, see Appendix I.

³⁴ Rieman, B., Gresswell, R. & Rinne, J. (2012). Fire and fish: A synthesis of observation and experience. Climate change, forests, fire, water, and fish: Building resilient landscapes, streams, and managers. General Technical Report RMRS-GTR-290. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado. (pp. 159-175).

³⁵ Scheller, R. M., W. D. Spencer, H. Rustigian-Romsos, A. D. Syphard, B. C. Ward, & J. R. Strittholt. (2011). Using stochastic simulation to evaluate competing risks of wildfires and fuels management on an isolated forest carnivore. *Landscape Ecology* 26: 1491–1504.

³⁶ Lawler, J. J., H. D. Safford, & E. H. Girvetz (2012). Martens and fishers in a changing climate. In K. B. Aubry, W. J. Zielinski, M. G. Raphael, G. Proulx, & S. W. Buskirk (eds). *Biology and Conservation of Martens, Sables, and Fishers: A New Synthesis*. Cornell University Press, Ithaca, NY.

³⁷ Oliver, A. A., M. T. Bogan, D. B. Herbst, & R. A. Dahlgren (2012). Short-term changes in in-stream macroinvertebrate communities following a severe fire in the Lake Tahoe basin, California. *Hydrobiologia*, advance online publication. DOI 10.1007/s10750-012-1136-7.

Rivers

Two of California's three largest river systems—Klamath and Eel—flow through Humboldt County, along with several other major rivers. Portions of many of these rivers are designated as part of the National and/or California Wild and Scenic Rivers Systems. Humboldt County rivers are 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 dollars. They provide crucial habitat for a variety of fish species, many with important ecological, commercial, cultural, and recreational values. They help sustain a variety of local vegetation and wildlife species throughout their watershed boundaries. Finally, they can serve as strategic fuel breaks to manage fire at the landscape scale.

Riparian assets are highly vulnerable to disturbance from wildfires. 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. Risk of fire starts near river areas is amplified by the popularity of river recreation during summer months when fire risk is greatest. Wildfires that occur near rivers can also make river recreation unappealing or dangerous, and diminish tourism. Finally, firefighting can have significant impacts on local rivers, including water removal during critical late-season flows and use of retardants.

Riparian: A strip of land along the bank of a natural freshwater stream, river, creek, or lake that provides vast diversity and productivity of plants and animals.

Sediment: Particles of topsoil, sand, and minerals that come from soil erosion or decomposing plants and animals; wind, water, and ice carry these particles. When excessive sediment collects in waterways it can harm fish and wildlife habitat.

Upslope restoration to improve fish habitat and reduce hazardous fuels is an activity that benefits both Humboldt County's forests and rivers. These restoration activities have long-term economic benefits to both the forestry and fisheries sectors of the local economy.

Protected or Environmentally Significant Areas

More than 550,000 acres in Humboldt County are protected open space, forests, and/or recreational areas, with four federal parks and beaches, ten state parks, and sixteen county parks and beaches, including Redwood National Park, Six Rivers National Forest, Redwoods State Park, Headwaters Forest Reserve, and Kings Range National Conservation Area.

These protected areas provide valuable habitat for an array of wildlife, fisheries, and *special-status species*. There are 22 listed species of plants and animals, with another four candidate species as Endangered or Threatened under federal and state classification systems (see *Figure D.6 in Appendix D, Background Information for Assets and Values at Risk* for a list of these species).

Natural 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 sites. 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 the 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.

Special-status species: Animal or plant species that are officially listed, proposed for listing, or are a candidate for possible listing under the State and/or Federal Endangered Species Act. Also includes species that are biologically rare, very restricted in distribution, declining throughout their range, or have a critical, vulnerable stage in their life cycle that warrants monitoring.

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Recreational Areas (Seasonal Use)

Numerous opportunities for outdoor recreation add to the significance of Humboldt County's many natural assets, containing hiking trails, campgrounds, river access points, and a number of accessible coastal areas. Lonely Planet, a top travel guide publisher, gave the Redwood Coast its number-one tourism destination for 2018.³⁸ These natural assets attract backpackers, rock climbers, mountain bikers, and day hikers, as well as fishermen, river rafters, sea-kayakers, sail boaters, and surfers, among others.

Parks, recreation areas, and open spaces are vulnerable to negative impacts from wildfire events. Some areas could be directly affected by wildfire. Other areas are at risk of poor air and water quality, as well as decreased recreational appeal due to fires blocking access roads or diminishing views.

Scenic

Forested hillsides, working agricultural lands, river corridors, coastal areas, and scenic highways provide a range of stunning vistas throughout Humboldt County. Severe wildfire could have a significant negative impact on this important scenery.

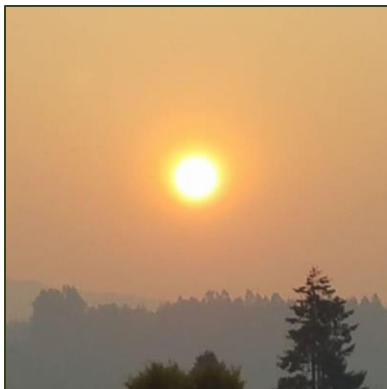
Humboldt County's extensive coastline allows for a wide range of exceptional scenic vistas and recreational opportunities. It is assumed that these coastal areas are not often affected by wildfire. However, there have been large historical fires near the Trinidad area, as well as the 2003 Honeydew Fire that burned to the ocean. Finally, large, enduring fires further inland can produce heavy smoke that can negatively affect scenic areas on the coast. *See Figure D.5 for a list of scenic highways.*

Air Quality

Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (e.g. soot, tar, water vapor, and minerals), gases (e.g. carbon monoxide, carbon dioxide, nitrogen oxides), and toxins (e.g. 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.

Humboldt County is prone to temperature inversions, which occur when a layer of warm air traps cool air near the surface and inhibits the vertical dispersion of smoke and other pollutants. In 2017, the North Coast Unified Air Quality Management District (NCUAQMD) issued one *Air Quality Alert* for

Moisture content/levels: The dry weight of a material, such as wood or soil, compared to the wet weight of the same material. It is not unusual for live material to have moisture content greater than 100% because it could contain more water than solid material by weight.



*Smoky sky over Fortuna (Sept. 2017).
Photo: Connie Rose for Lost Coast
Outpost.*

Hazardous Conditions and eight *Air Quality Advisories for Unhealthy Conditions* due to wildfire smoke impacts. These smoke impacts came from fires in Siskiyou and Modoc counties, the Chetco Bar Fire in Oregon, and smoke from the Thomas Fire, Redwood Valley Complex, and Wine Country Fires.

The Mid Klamath area is documenting the difference between smoke from prescribed fire versus wildfire to help residents understand the benefit of being proactive: prescribed fire creates some smoke in the near-term but it will help avoid the unhealthy, even dangerous, air quality conditions that can accompany wildfire. The following graph from the USFS³⁹ documents these differences by comparing the impacts of smoke produced by the Wallow wildfire and smoke produced by the 2017 prescribed fire Training Exchange (TREX).

³⁸ Forgione, M. (2018). Lonely Planet chooses California's Redwood Coast as top U.S. place to go in 2018. Los Angeles Times. Retrieved from <http://www.latimes.com/travel/la-tr-california-redwood-coast-selected-lonely-planet-top-destination-20180205-story.html>

³⁹ Leland Tarnay, USFS Region 5 Remote Sensing Lab, and USFS AirfireTeam. Retrieved from <https://tools.airfire.org>

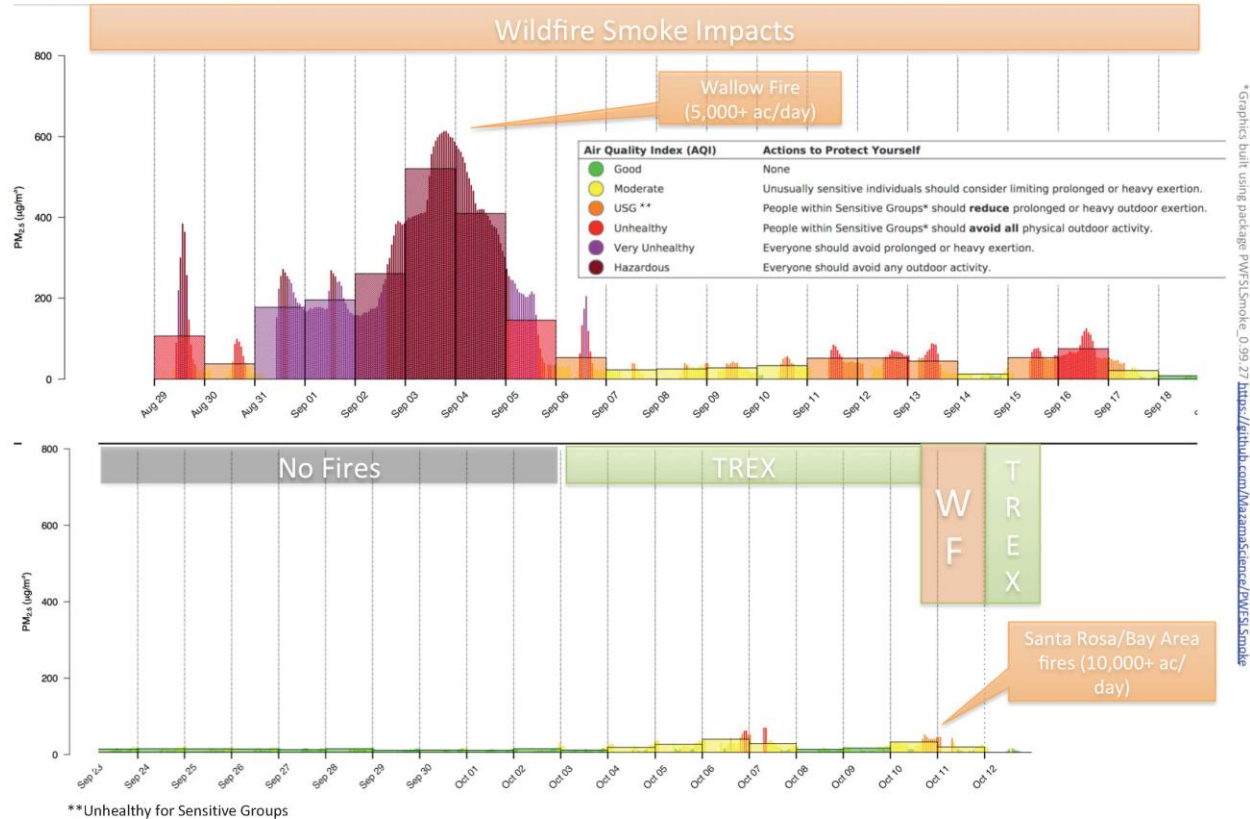
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Public health impacts associated with wildfire include difficulty breathing, odor, and reduction in visibility. Wood smoke raises health risks for everyone, but especially for people in sensitive groups, including the elderly, small children, those with heart disease, and those with respiratory disease (such as asthma)⁴⁰. *For more information on local air quality, visit the North Coast Unified Air Quality Management District at www.ncuaqmd.org.*

Figure 5.1.1 2017 Orleans Smoke Impacts

2017 Orleans Smoke Impacts: Wallow Wildfire vs. TRES Rx Fire

(Wider, transparent bars are daily 24-hr average Air Quality Index (AQI) values; narrow bars are hourly NOWCAST values. See <https://www.airnow.gov/> for more AQI/Nowcast details. Data are raw, preliminary values for qualitative illustration* only)



For information on Air Quality Regulations see Appendix I, **Regulations and Compliance**. For prioritized actions related to air quality, see Metric 3.6.7 in Chapter 3.6, **Integrated Planning**.

5.1.4 CULTURAL

As summarized in the 2017 Humboldt County General Plan:

Cultural resources are elements of cultural heritage. From a land use perspective, important cultural resources include archaeological sites, historic architecture, industrial relics, artifacts, cultural landscapes, spiritual places, and historic districts. These elements provide traces of Humboldt County’s rich history and add to the unique character and identity of the county.

The importance of history to local residents can be seen in the many celebrations and expressions of Native American cultural heritage, the architectural preservation efforts of

⁴⁰ North Coast Unified Air Quality Management District. Wildfire Smoke - Air Quality Information. (2018). Retrieved from <http://www.ncuaqmd.org/index.php?page=wildfire>

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numerous local home and business owners, and the high level of support for local museums and historical societies...

Over one thousand sites of cultural significance have been surveyed and officially designated as cultural resources in Humboldt County. The participation of state and federal historic registration programs include 13 sites as California Historical Landmarks, 16 sites included on the National Register of Historic Places, 58 sites as California Historical Resources, and nearly 700 sites as historical and prehistoric archeological sites. Many of these sites, as well as numerous unlisted sites, are of cultural and religious significance for Native American populations. Any scientific archeological interest in such sites must be respectful of the cultural and religious significance they may hold.⁴¹

Many cultural sites can be damaged by wildfire, whether they be historical sites that can be directly lost to fire, or spiritual or gathering sites that can be damaged by fire at the wrong time or under heavy fuel conditions. Pre-fire work also can damage cultural sites. Any ground-disturbing actions to reduce fuels must include an archeological survey, to ensure no damage is done to cultural resources. *For more information on related compliance issues, see Appendix I, **Regulations and Compliance**.*

In addition to historic sites and resources, Humboldt County has a rich Native American culture. As the home of more than a dozen local tribes, speaking languages from three different linguistic affiliations, the Wiyot, Yurok, Hupa (or Hoopa), Karuk, Chilula, Whilkut, and the southern Athabascans, including the Mattole and Nongatl, practiced lifeways carefully prescribed by cultural and religious mores. These cultures all include a long and, sometimes continuing active use of fire as a land-management tool.

Like most indigenous territories in California and the US, cultural resources and traditions were regularly, often systematically, damaged or destroyed. The following text from the Karuk Tribe Department of Natural Resources, *Eco-Cultural Resources Management Plan*, summarizes modern destructive practices:

6 Many federal land management practices have failed to adequately protect cultural resources. Many sacred sites have been decimated (Holmlund 2006). The primary ceremonial lands; Panamaniik, Katimiin, Aamaikiaraam, Helkau, and Inam, as physiographic cultural settings all have experienced major disturbances from mining, logging (Jewett 2007), road construction, fire exclusion and suppression, fire salvage recovery, and recreational uses (Crosby 1977, Halford 2001, Hanes n.d.). Forest uses overall have negatively affected many sacred, traditional, contemporary, or cultural use areas, values and resources.⁴² 9

Although these practices have lessened, some continue. Additionally, cultural sites could be at risk of destruction from wildfire, potentially destroying artifacts and structures. Prescribed fire, as was traditionally used by local native cultures, can reduce ground fuels, exposing new cultural sites and artifacts without causing damage. The discovery of these cultural sites can be beneficial to local tribes. However, they can also present problems of looting and vandalism.

⁴¹ County of Humboldt, Department of Planning & Building. Humboldt County General Plan. (2017). (p. 10-38). Retrieved from <https://humboldtqov.org/205/General-Plan>

⁴² Karuk Tribe. Department of Natural Resources. (2010). Draft Eco-Cultural Resources Management Plan. [PDF]. (pp. 23-24). Retrieved from http://www.karuk.us/imaqes/docs/dnr/ECRMP_6-15-10_doc.pdf

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The *Humboldt County General Plan* provides guidance regarding culturally sensitive resources:

- 6 The County has the highest per capita Native American population of any county in California. Tribal governments in Humboldt County govern significant land area and are important partners in stewardship of natural resources. There is a rich cultural resource history associated with Humboldt County and culturally sensitive areas need tribal consultation when development proposals are being considered.⁴³

Culturally sensitive areas exist on tribal, public, and private lands. While some locations are publicly identified, others are held as confidential information by local tribes. Any ground-disturbing activities on potential cultural sites must be reviewed by official tribal representatives to ensure protection of culturally significant sites. *See Appendix I, Regulations and Compliance for a list of tribal contact information for project review.*

Local tribes have been leading efforts to bring prescribed fire back onto the landscape in their traditional lands and beyond. The Cultural Fire Management Council⁴⁴ and the Karuk⁴⁵ Tribe's work with the Western Klamath Restoration Partnership⁴⁶ are both examples of innovative projects to restore native landscapes and the cultural use of fire.

- 6 The mission of the Cultural Fire Management Council (CFMC) is to facilitate the practice of cultural burning on the Yurok Reservation and Ancestral lands, which will lead to a healthier ecosystem for all plants and animals, long term fire protection for residents, and provide a platform that will in turn support the traditional hunting and gathering activities of Yurok.⁴⁷

*For more information on local indigenous burning practices, see **Native American Fire History**, in section 5.2.5 in the following chapter.*

5.1.5 COMMUNITY-IDENTIFIED LOCAL ASSETS

In late 2017, fourteen public workshops were held throughout the county as part of this CWPP process. At these events, local community assets from the 2013 CWPP were reviewed and confirmed, and in several cases, new assets were added. Some of the most important community assets and values identified at these and previous events included schools, community centers, churches, fire stations, hospitals, senior centers, neighborhoods, commercial districts, campgrounds, and more.

*Community-identified assets are detailed in each **Planning Unit Action Plan** and shown on their respective maps in Part 4 of this CWPP. Information about the identified assets can also be accessed on the **Humboldt County Web GIS Portal**: https://webgis.co.humboldt.ca.us/HCEGIS2.6_CWPP.*

5.1.6 CONFLICTS BETWEEN NATURAL ASSETS AND HUMAN OCCUPATION

Humans evolved with fire. In recent decades, that relationship has been characterized by conflict more often than symbiosis. This is especially evident in the wildland-urban interface (WUI), where a mix of fuel, weather, and topographical conditions create circumstances that could put a community at risk of wildfire, or alternatively where a community fire could threaten nearby wildlands. New developments in areas such as steep or windy canyons, or areas with limited ingress and egress put residents,

⁴³ Humboldt County General Plan. (2017). Chapter 3: Governance Policy, Section 3.3: Background. Retrieved from <https://humboldtqov.org/205/General-Plan>

⁴⁴ Cultural Fire Management Council: www.culturalfire.org

⁴⁵Karuk Tribe, Official Website: www.karuk.us/index.php/departments/natural-resources

⁴⁶ Western Klamath Restoration Partnership: www.wkrp.network

⁴⁷ Cultural Fire Management Council. About Us. [Webpage]. Retrieved from <http://culturalfire.org/our-mission>

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firefighters, and native ecosystems at risk. Human encroachment into wildland areas with higher fuel hazards creates conflicts that can threaten life, property, and the natural environment.

All vegetation types found within Humboldt County have the potential to burn. In fact, most vegetation communities in the county are dependent to some extent on frequent fire to remain healthy and viable, even the redwoods need fire to open their cones. As will be shown in the following chapter, decades of fire suppression means local fuel levels are often critically high.

Wildfire can cause destruction to homes located well inside of urban areas, especially in the case of large ember storms, as seen in many recent wildfires around the state. Given WUI communities' exposure and vulnerability to wildfire, taking steps to enhance local fire awareness and preparedness should be a top priority for local residents. Many residents around Humboldt Bay don't consider wildfire a threat to their safety and well-being, yet they live surrounded by high levels of flammable vegetation and in houses that could readily ignite in an ember storm.

Further, 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. Disagreements have arisen in the past over bucket dipping into, and water drafting out of rivers for firefighting during late summer when native salmon and steelhead and their habitat are most vulnerable.

Finally, the increase in temporary workers in the marijuana industry during this same higher-risk period—usually in the more remote areas of the county—is an example of another conflict between human occupation and natural assets. Many of these seasonal workers do not have experience living in high-fire-hazard rural environments, not to mention the simple increase in human occupation of wildlands and their related activities during the driest time of the year.

The consequences of human influences on *fire-adapted ecosystems* must be better understood to establish an ecological framework for planning and policy to reduce the threat of wildfire to Humboldt communities, especially in the WUI.

The following chapters of this *Risk Assessment* endeavor to improve our understanding of the factors that contribute to fire in Humboldt County. The resulting *Countywide Action Plan* in Part 3 is a summary of Humboldt County Fire Safe Council's efforts to prioritize steps to reduce these conflicts, and the risks and hazards of a wildfire conflagration in Humboldt County, while returning beneficial fire to its natural role in native ecosystems.

Fire-adapted ecosystems: Where plant species have, over time, assumed certain traits or characteristics that enable them to respond favorably to reoccurring fire events specific to the part of the ecosystem they inhabit and that allow them to survive and/or regenerate.