

Nevada County – CWPP (Interim)

Community Wildfire Protection Plan Framework

All Lands, All Tools, All Society Approach



Prepared by:

Fire Safe Council of Nevada County

February 2024

Preface

The last Nevada County-wide Community Wildfire Protection Plan (CWPP) was coordinated and compiled by the Fire Safe Council of Nevada County in April 2016, with extensive partner and community collaboration. Since that time there have been many changes in Nevada County, including wildfire events and trends throughout the Sierra Nevada region and beyond. FSCNC recognizes that this requires newly developed approaches for organizing, planning, and implementing community wildfire protection networks serving as a bridge between the outdated CWPP and the development of an updated and comprehensive document that Nevada County is currently drafting. New best-practice applications include developing flexible, readily updated, broader frameworks that can adapt to ever-changing conditions, needs, and available post-wildfire opportunities.

*It also allows an **All-society, All-lands** approach within our regional wildfire resiliency framework to capitalize on the combined strengths of individual organizations and communities in coordination with fire-safety organizations to maximize contributions by all for increased wildland fire safety.*

An overarching landscape approach recognizing different situations is required to address the specific needs in varied parts of our County must be adopted. Rather than identifying priorities from a county-wide perspective as in the past, it is crucial to incorporate a more flexible model incorporating specific differences in regional and local priorities. Wildfires will occur anywhere in our County and there are varying critical priorities for our residents, whether they live in Truckee, the San Juan Ridge, Lake Wildwood, or elsewhere. Applying a broader framework approach ensures that all regions, communities, and organizations can take advantage of available grant funding to apply various mitigation treatments.

A current CWPP is required to access available grant funding from both federal and state wildland fire safety programs. This document provides a solid basis for planning and implementing effective wildland fire protection projects allowing the ability to apply for and obtain funds to support those efforts. The required overall CWPP document is more than local organizations, agencies, and communities can afford to develop on their own. We will include links to all regional municipal and agency CWPP annex document links for specified regional treatment planning references.

A key element of all national, state, and local strategic fire plans is community-based wildland fire planning and collaboration. This CWPP Framework uses a multi-faceted approach to collaboration by engaging the depth and breadth of expertise and wildland fire experience within the group of authors the Fire Safe Council of Nevada County has assembled including individuals with local, state, and federal agency experience specific to wildland fire.

Community relationships built from past and current professional experience and involvement were used to obtain input and secure broad-based community involvement in developing this CWPP Framework. This includes Firewise Communities, local fire districts, CAL FIRE, Tahoe National Forest/USDA, Nevada County Biomass Taskforce, Yuba Bear Land Stewardship (Resource Conservation District, Yuba Watershed Institute, NID, CAL FIRE, US Forest Service, Northern Sierra Air Quality Management District, Yuba Bear Burn Cooperative, Sierra Streams Institute, Bear Yuba Land Trust, and Nevada City Rancheria Nisenan).

Preparers

Lead Analyst

Alan Doerr: Fire Safe Council Board Director; US Forest Service/retired. With a BA in Forest Science from Humboldt State University and a graduate-level, Advanced Program in Forest Ecology and Silviculture at UC Berkley, Alan served 36 years. in the USFS/USDA in a variety of positions including Inventory and Analysis Forester, District Certified Silviculturist, Environmental (NEPA) Planner/Team Leader, and Geospatial Analysis (GIS). Alan also served as an expert GIS witness in Federal Court, assisted with fire management, and was a qualified Engine Boss, Dozer Boss, Strike Team Leader, Field Observer, Resource Unit Leader, and Situation Unit Leader on an Incident Management Team. Before federal service, Alan worked five seasons for the California Division of Forestry as a firefighter.

Contributors

Jim Mathias: Fire Safe Council of Nevada County Fire Prevention and Safety Manager and Nevada County native, Jim retired in 2022 as the Assistant Chief for Northern Operations of the CAL FIRE Nevada-Yuba-Placer Unit and past Division Chief with an extensive background in fire suppression and Incident Management working for fire agencies throughout California. Starting as a volunteer with the City of Grass Valley Fire Department in 1986, Jim also served 30+ years as a Sierra Nevada Ambulance paramedic, retiring in 2023. His professional fire service began at the Penn Valley Fire Protection District as an Engineer/Paramedic, moving to CAL FIRE in 1997 with assignments in the San Mateo-Santa Cruz and Amador-El Dorado units assigned to multiple large-scale wildland fires throughout the state and as Incident Commander for many wildfire events in Nevada and Yuba Counties. He served on CAL FIRE's Type-I Incident Command and Serious Accident Review Teams developing and updating California's State Fire Training curriculum. Jim is a qualified CA State Fire Marshal, National Wildfire Coordination Group member, and a USFA Federal Emergency Management Instructor and recently directed the Washington Ridge Hand Crews and California National Guard Hand Crew based in Nevada City for CAL FIRE allowing him to become CAL FIRE's Incident Commander on the Ponderosa West Grass Valley Defense Zone Project from the governor's 35 Priority Projects Community Wildfire Prevention & Mitigation Report list.

Jo Ann Fites-Kaufman: A retired USFS/USDA Forest Ecologist/Fire Scientist, Jo Ann is a FSCNC volunteer, conducts Firewise Community Fire Hazard and Risk Assessments, is a Salmon Mine-East Sages Firewise Community Leader, California Certified Burn Boss (CARX), Federally qualified Technical Specialist/Fire Behavior and Fire Effects Monitor, a Region-5 Planning Team Member, a Fire Behavior Assessment Team Leader with over 30 years' wildfire and prescribed burn experience, and serves on the YBBC Executive Committee. She is a 60+ year Northern Sierra Nevada resident.

Jamie Jones: Executive Director of the Fire Safe Council of Nevada County, Jamie is a native of Nevada City, California. Jamie holds degrees in Computer Information Systems, Business Management, and Accounting. With fifteen years of experience creating financial plans, training, and operational programs, plus managing corporate expansion for national brands in diverse markets, she returned to Nevada County with her family, serving the community the past 6-years at FSCNC. Jamie's diverse background and leadership style is evident when discussing wildfire prevention and preparedness during community outreach to numerous organizations throughout our regional communities.

Duane Strawser: Fire Safe Council of Nevada County Management Analyst and Community Outreach. With experience on CDF wildland fire ground crews and heavy equipment operation, Northern Sierra Air Quality Management District APCS/Planner/Field Operator/Code Enforcement, plus Duane's municipal positions as 3-term Nevada City Mayor/City Councilman with CWPP oversight, NC Transit Commission Chair, NCTC Board member and local business owner, he brings a vast array of multi-faceted experience to all aspects of FSCNC's daily operations, finance and long-term goals.

Steve Eubanks: Fire Safe Council Board Director. With a B.S. in Forest Engineering from Oregon State University, Steve's 39-year career with the U.S. Forest Service/USDA included Forester, Forest Supervisor and District Ranger positions, with extensive work in fire suppression and management during assignments in Oregon, Washington, Washington, D.C., Minnesota and as Supervisor of the Tahoe National Forest in Northern California. Retiring in 2008, Steve Chairs the Nevada County Biomass Task Force focusing on construction of a regional biomass facility, and as a forestry consultant to the Sierra Nevada Conservancy, Placer County, and Placer County Air Pollution Control District. As an advisor to Russia in sustainable forestry from 1995 to present, he also chairs a National Science Foundation committee promoting environmental careers while also serving locally as a Squirrel Creek Firewise Community group leader.

Jason Hajduk-Dorworth: Tahoe Donner/General Manager, FSCNC Eastern Firewise & Resiliency Coordinator (past). Jason retired as Fire Chief for the City of Santa Cruz after 30+ years in emergency services with a degree in Sociology from UC Santa Cruz emphasizing statistical analysis. Serving in a wide range of positions, Jason has extensive knowledge and experience related to wildfire safety and forest health dynamics, including Paramedic/Firefighter, EMS Consultant, Fire Investigator, Strike Team Leader, Operational Area Coordinator, CICC review committee member, Marine Rescue expert, and Incident Commander & Liaison Officer on a type-3 management team and helped start the first recognized Firewise Community in Santa Cruz County. Residing in Truckee off and on since childhood, he attended Truckee Elementary and resides with his family in the Martis Peak region of Truckee, a recognized Firewise USA® Community.

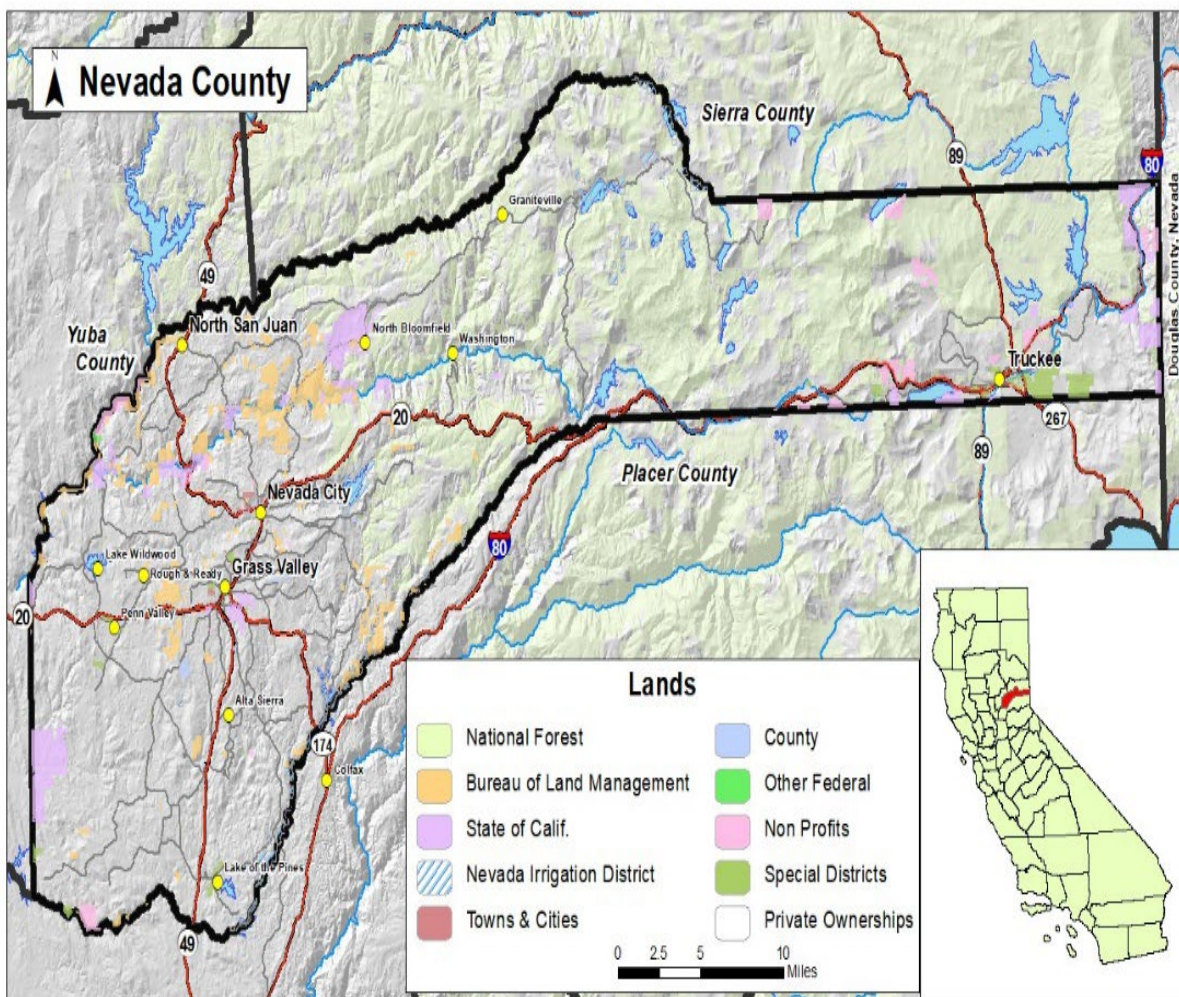
Executive Summary

Background and Approach:

- The Fire Safe Council developed the previous community wildfire protection plan (CWPP) in April 2016.
- Wildland conditions and patterns have changed dramatically, resulting in the current CWPP becoming outdated.
 - Fuels have continued to accumulate, with little or no mitigation, increasing fire hazard exponentially.
 - Wildfires throughout California are becoming more intense and of larger scope with greater impacts on communities and the surrounding environment both within and outside of the traditional WUI zones.
 - Population density has increased, risking more lives and property, both residential and commercial.
- New science and wildfire mitigation treatment options have changed over time, requiring us to embrace innovative approaches to organize community wildfire protection plans so our communities are safer than ever from wildfire hazards and risks. Currently, the most appropriate of these region-specific treatment plans are identified in the following living documents, with the realization that future changes will be an ongoing need.
 - California: Wildfire and Forest Resilience Action Plan updated Strategic Fire Plan, CAL FIRE NEU Unit Plan, Northern Sierra State Park District Vegetation Management Plan, California Strategic Plan to Increase the Use of Beneficial Fire, Local Hazard Mitigation Plan (LHMP).
 - Nationally: updated National Cohesive Strategy, National Wildfire Crisis Action Plan, 1990 Land and Resource Management Plan for the Tahoe National Forest, Bureau of Land Management Programmatic Fuel Hazard Reduction Plans.
 - New science: information and/or technology on roadside and wildfire evacuation/access safety (Safe Separation Distance, evacuation modeling), extreme fire behaviors, wildfire risk assessments, integrated project and landscape planning, fire event detection and suppression, ingress/egress strategies.

Nevada County: Land Ownership and Location

- Nevada County is in the Northern Sierra Nevada Mountain Range complex.
- Occupying 612,900 acres or 978 square miles, approximately 40% comprises private residential land, and 35% federal land (mostly the Tahoe National Forest), this includes the recent acquisition of 267 acres in Placer and Nevada Counties near the headwaters of the Bear River for a new state demonstration forest.
- The remaining 25% is comprised of private forests, state parks, Non-profit open space (BYLT), and local municipal government parklands/open space (including Special Districts, i.e., Nevada Irrigation District/N.I.D.)



People and Communities:

- As per the 2021 census, 103,487 people live in Nevada County, of which 29.5% are senior citizens.
- Nevada County is considered a **rural county**, populated by a combination of small towns, developed communities, and rural areas with widely spaced and/or intermediate-spaced homes.
- Most year-round residents live in Western Nevada County, with the highest percentage of second-dwelling homeowners and visitors residing part-time in Eastern Nevada County, primarily the Truckee Basin.

People:

• Nevada County was the heart of the California Gold Rush when settled in 1849, drawing scores of immigrants from around the world, reshaping California and the nation.

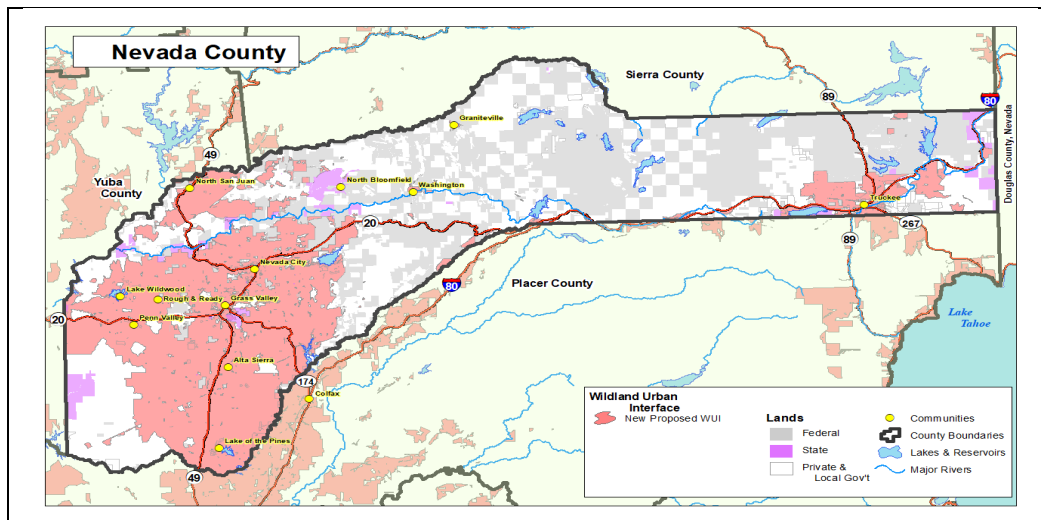
Common employment sectors for Nevada County, CA, residents include Health Care & Social Assistance, Retail Trades, Construction, Parks/Environmental and Service/Tourism. Median property values in Nevada County, CA were \$474,100 in 2021, or 1.94 times higher than the \$244,900. national average.

• Between 2020 and 2021 the median property values increased from \$446,100 to \$474,100, a 6.28% increase. The homeownership rate in Nevada County is approximately 75.4%, which is slightly above the most recently tracked national average of 64.6%.

NEVADA COUNTY DEMOGRAPHICS		
TOPIC	STATISTIC	REFERENCE
2020 Population	102,241	2020 UNITED STATES CENSUS
2010 Population	98,746	
City Populations		
-Grass Valley	14,016	
-Nevada City	3,152	
-Truckee	16,729	
Population per mile ² 2020	106.8	
Population per mile ² 2010	103.1	
Persons per household	2.44	
Housing Units	54,366	
Poverty Rate	10.6%	
Median Household Income	\$78,401	
Total Employment	26,683	
Median Age	50.2	

Communities and WUI:

- Wildland Urban Interface, populated areas of high or extremely high severity zones within reach of wildland fire events, comprise approximately 37% of the County, or 71% of private lands, totaling 227,200 acres.
- CAL FIRE has updated their Fire Hazard Severity Zones (FHSZ) for land in the State Responsibility Area (SRA) as required by state law. Per the update, 303,863 acres of 382,036 in the SRA are classified in a Very High Hazard Zone with 76,021 acres in High Hazard, and only 2,153 acres considered as Moderate Hazard level.



Firewise Communities:

- In the past 10 years, the number of Firewise Communities (FWCs) has increased to over 100, with 38 +/- potential new FWCs on the waitlist to complete the qualification process.
- FSCNC is updating 22 Risk Assessments for existing FWCs in Nevada County.
- Nevada County is the leader in the state for the number of FWCs, and as of 8/2024, top 3 in the Nation.
- Eastern Nevada County is expanding with 18 current FWCs and 7 new FWCs in training plus ongoing outreach for new FWC recruitment in critical regions throughout the Eastern slope of the County.
- The level of engagement by members of the FWCs varies widely, with approximately 32% actively engaged in community-wide efforts. Engagement is increasing, but slowly as FSCNC increases its outreach efforts.

Collaboration Capacity:

- A large and diverse number of organizations, agencies, businesses, and organized residential communities are engaged in wildland fire hazard reduction, protection efforts, and ongoing educational activities.
- There are varied levels and types of active collaborations between individuals and/or multiple entities.

Fire Environment:

Vegetation Types, Past Fire, Fuels and Effects:

- There are over 763 native plant species in Nevada County including mixed conifer forests, oak woodlands, chaparral, and meadows. Higher elevations host mixed conifers like Ponderosa Pine and Douglas Fir, while lower elevations feature oak woodlands with primarily California Black Oak stands. Chaparral, with drought-resistant shrubs covers most dry slopes, and meadows provide diverse habitats across elevation ranges.

Current Fuels:

- Dense underbrush, overgrown forests, dead trees, and dry vegetation consisting of grasses and shrubs.

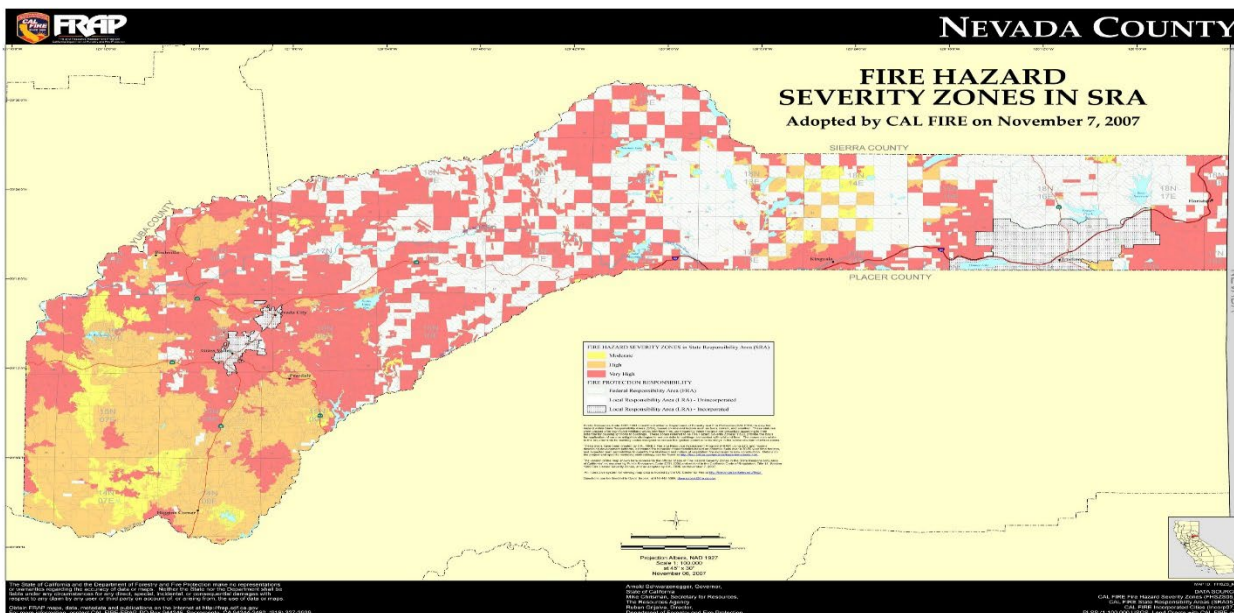
Tree Mortality:

- Tree mortality in Nevada County and across the Sierra Nevada has been significantly impacted by on-going drought, insects (bark beetles), and disease (root rot, pitch canker, blue stain fungus). Current trends show that higher-elevation fir forests in the Sierra Nevada are more affected, shifting from previous patterns in which lower-elevation pine forests were being impacted. These forests' health and resistance to wildfires and disease depend on future weather patterns, forest health treatments, and ongoing forest reduction and restoration efforts.

Resilience to Fire: Can vegetation and forests survive fire?

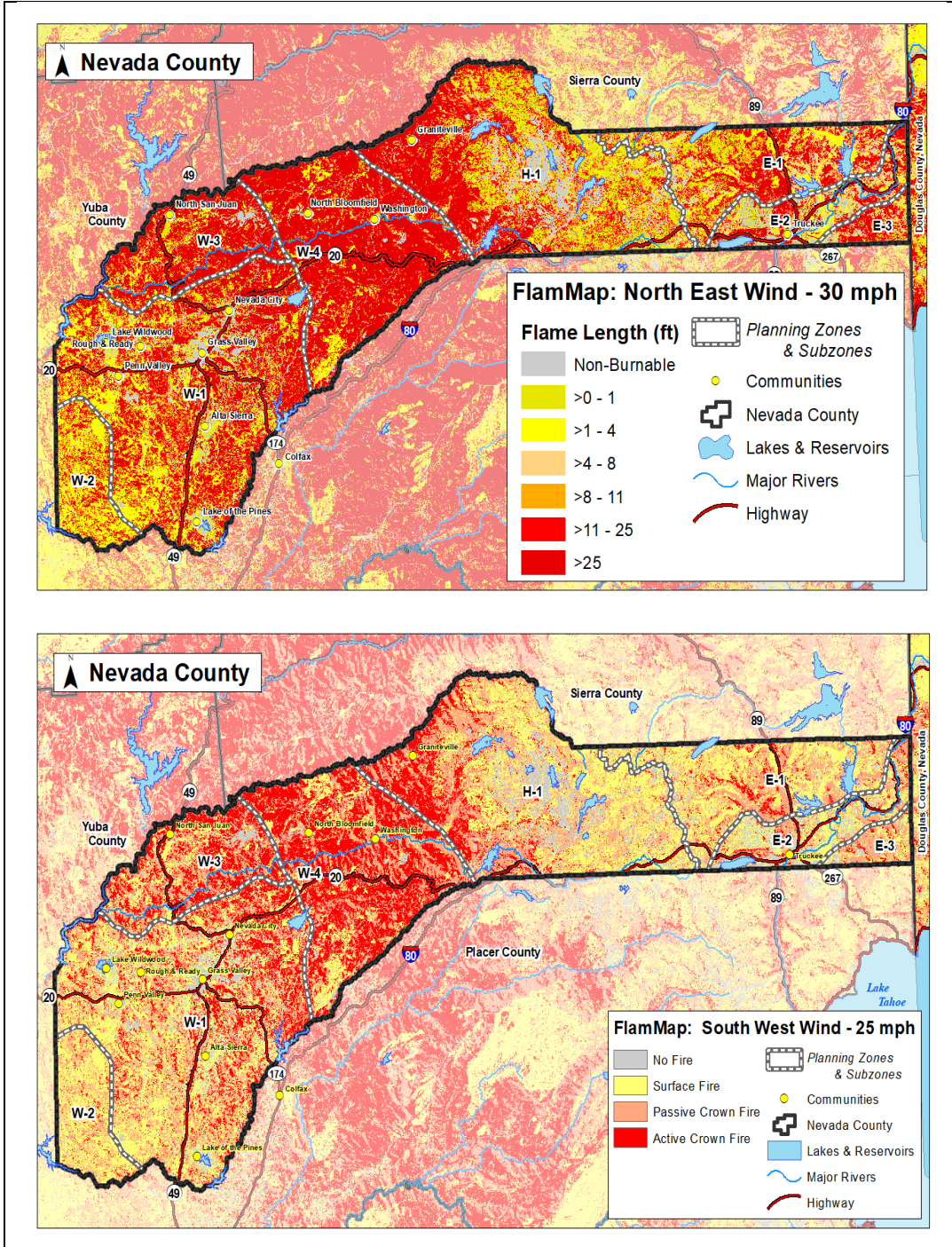
- Nevada County's wildland fire resilience varies by area and is influenced by vegetation, management, and environmental conditions. Dense, untreated forests are less resilient, while regions with proactive management practices show greater sustainability. Drought and pest infestations also reduce resilience by weakening tree health. Effective forest management, such as thinning and prescribed burns, enhances overall wildfire resilience.

Wildfire Hazard Severity Zones in Nevada County, on CA Wildfire Responsibility lands.



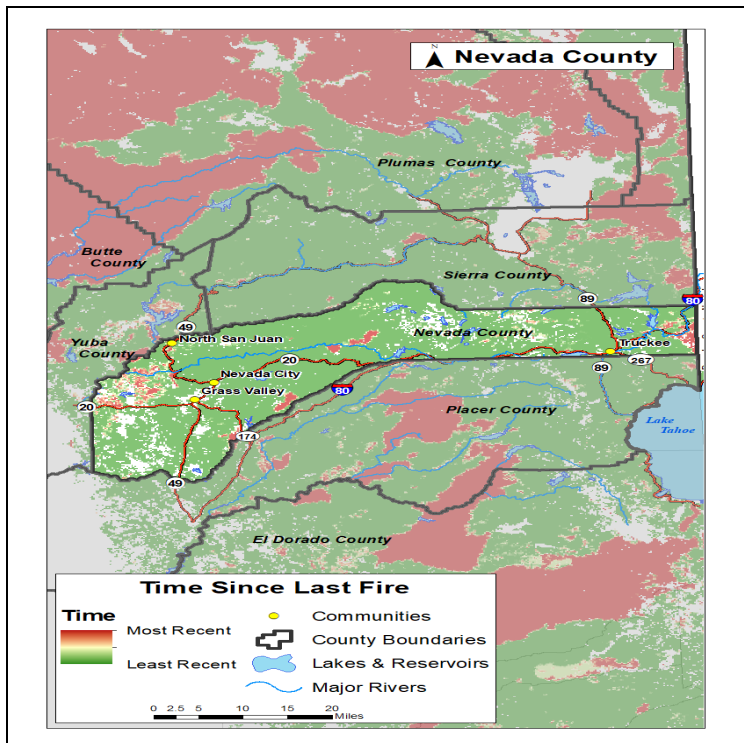
Fire Hazards and Risk: Fuel Hazard Zones & Fire Potential:

Fuels Hazard / Likelihood / Potential Fire Behavior



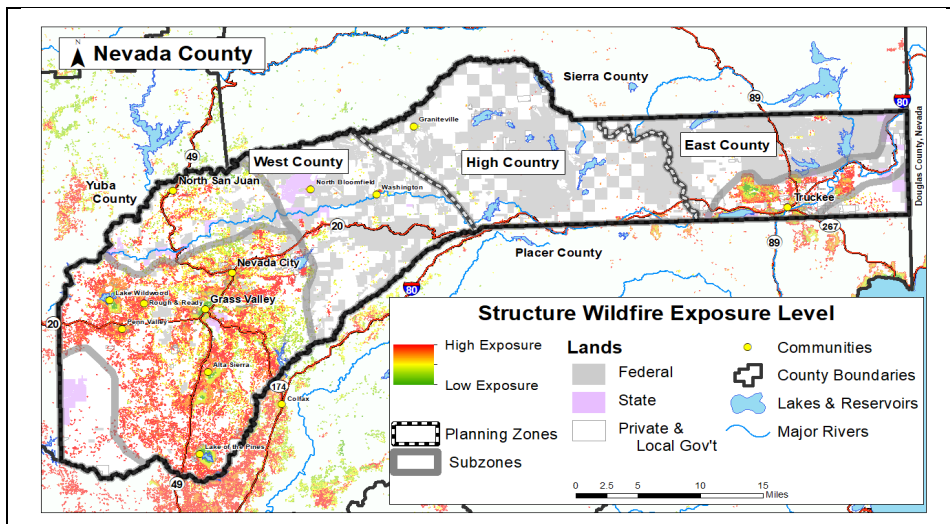
Susceptibility and Risk:

Values at Risk / WUI and Structure Exposure / Fire History and Trends (Nevada County and surrounding)



Wildfire Response:

Potential Severity and Impacts / WUI and structures at risk



Critical Protection Segment Considerations:

- Vulnerable populations
- Infrastructure
- Business and Industry
- Recreation

*All of which are critical to maintaining a vibrant community, quality of life, and strong economy

Roads: Ingress/Egress - Evacuation Corridors:

- Roadside Fuels
- Evacuation/Access Readiness (include powerlines crossing, gates, multiple egress options)
- Strategic Wildland Fire Response Use
- Control lines
- Fuel treatment access and control
- Multi-Jurisdictional Cooperation / Planning phases and During Emergency Events

Improved Risk Assessment Information Needs:

Protection Plan

What do we want and need?

The goal is to enhance wildfire preparedness, reduce the vulnerability of communities and natural resources, and ensure effective response strategies.

Where are we at?

We've made significant progress toward our goals through dedicated community efforts and improved collaboration in the past 4+ years, yet there remains a considerable journey ahead to fully realize our goals.

How can we get there?

- **Landscape Resilience:**
Integrating landscape resilience education and applied practices focuses on reducing wildfire risks through ecosystem restoration, sustainable land use, and community engagement. It aims to create a balanced approach that enhances the natural and community defenses against wildfires while preserving ecological integrity.
- **Community Preparedness and Resilience:**
Empowering residents through education with the knowledge, resources, and strategies to effectively anticipate, respond to, and recover from wildfires, fostering a culture of readiness and adaptability that strengthens the community's overall safety and sustainability.
- **Wildfire Response:**
Training and equipping residents to serve as first responders or volunteer firefighters can provide immediate action and support during the initial stages of a wildfire, potentially saving lives and properties.
- **Cross-Cutting Areas:**
By linking our traditionally separate and independent agencies and municipalities, we are realizing the critical importance of developing a multi-agency, cross-cutting approach on Wildfire mitigation moving forward.
- **Roads:**
We can no longer rely on any single agency to develop a comprehensive emergency ingress/egress evacuation plan. This outdated "singular" model has proven ineffective in recent Wildfire events such as the Camp Fire, Caldor, Dixie etc. We are currently developing a strategy within our regional Transportation Master Plan to encourage collaboration between all appropriate Federal, State, County, City and private property roadway managers.

Workforce and Collaboration Capacity:

- Building Workforce capacity is a crucial aspect of any organization. It involves developing the skills, knowledge, and abilities of employees to improve their performance and productivity. Evidence shows that effective workforce planning is essential to enable a strong and capable workforce. The increasing scope and scale of collaborative action places greater demands on potential partners to develop their capacity for working in concert with others. Capacity for collaboration is key for effective joint working of all partnering entities. We must promote specific skills and attributes that enable working across multiple, cross-jurisdictional agency boundaries. Nevada County agencies and municipalities recently embraced this model and are currently structuring numerous committees and commissions that meet regularly to forge strong partnerships providing cooperative future Wildfire prevention planning efforts.

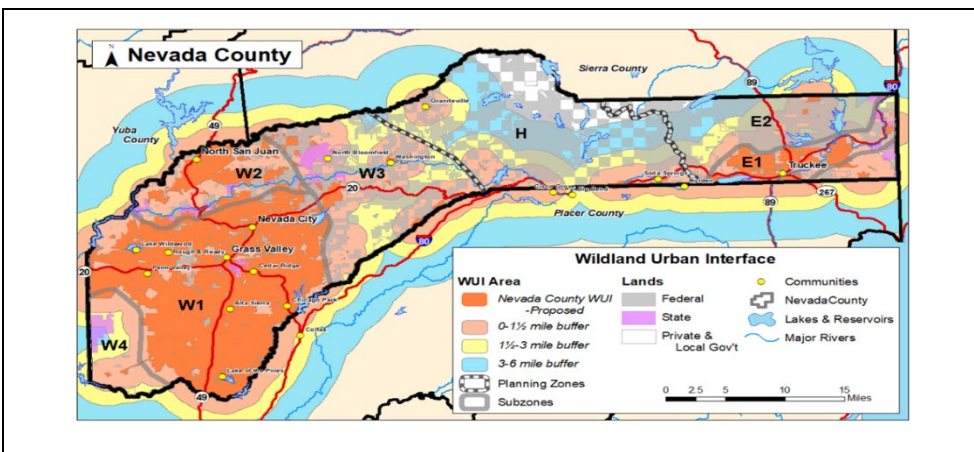
Technology:

- Members of the FSCNC and related Fire Safety agencies and municipality partners are actively researching all newest technological advancements for immediate implementation in county-wide vegetation management and fire fuels reduction projects through future grant funding awards. These advancements will allow removal of exponentially higher volumes of Greenwaste vegetation within an accelerated timeline while also reducing the associated costs involved in past vegetation removal models. Additionally, these technologies will provide reduced air pollution contributions, greatly improve environmental protection county-wide in regions currently rated Ozone non-compliant by the EPA which may soon face PM2.5 non-compliance ratings also. When obtained and implemented, the newest Greenwaste mitigation technologies will also provide vastly greater opportunities for Business and Workforce Development related programs in the immediate future.

Integrated Approach:

- An integrated approach to community preparedness and resilience in a CWPP combines education, engagement, and infrastructure improvements involves educating residents on wildfire risks and preparedness, planning and emergency drills, enhancing communication systems for timely alerts, and advocating for fire-resistant building practices. Additionally, it includes clear evacuation planning, establishing resource distribution centers, supporting local first responders, and ensuring recovery resources are readily available. This strategy prepares communities for immediate wildfire threats and aids in rapid recovery, fostering an informed community capable of navigating wildfire events.

CWPP zones for prioritizing projects, strategies and actions. Varies by location, WUI/structures at risk, fuels, and factors that influence potential fire behavior and impact.



Characteristics and types of priority actions by the CWPP Planning Zones are summarized in the table below:

Location	WUI Area	Vegetation/Fuel Types	Topography	Priority Project/Strategies/Actions
Eastside				
1 – Truckee	WUI – developed areas & influence zones	Eastside pine, sage, grass and large meadows, high elevation conifer and rock	Flat and canyon	<ul style="list-style-type: none"> • Strategic fuel breaks • Evacuation routes and areas • Buffers around key infrastructure • Treat undeveloped parcels
2 - Rural area	Influence zones	Eastside pine, sage, grass and large meadows, high elevation conifer and rock	Mostly gentle, drainages	<ul style="list-style-type: none"> • Buffers around communities & key infrastructure • Evacuation routes • Manage large, open areas to reduce and maintain low fuels (i.e. grazing and prescribed burning)
High Country	Mid & outer influence zones	High elevation conifer, meadows, rock	Canyons, steep and sloping	<ul style="list-style-type: none"> • Buffers around developed areas & key infrastructure • Evacuation routes
Westside				
1-Dense developed	WUI-developed area	Landscaped vegetation, conifer forest, hardwood forest, oak/grass woodlands, meadows & pasture.	Drainages, canyons and moderate to gently sloping	<ul style="list-style-type: none"> • Strategic fuel breaks • Evacuation routes and areas • Buffers around key infrastructure • Treat undeveloped parcels
2- Intermixed, San Juan Ridge	WUI intermix and influence zones	Conifer and hardwood forest, oak/grass woodlands	Drainages, canyons and moderate to gently sloping	<ul style="list-style-type: none"> • Strategic fuel breaks • Evacuation routes and areas • Buffers around town center and key infrastructure • Treat undeveloped parcels • Manage large, open areas to reduce and maintain low fuels (i.e. grazing and prescribed burning)
3- Hwy 20, Washington	Local & Outer WUI influence zones	Conifer forest	Steep canyons and broad ridges	<ul style="list-style-type: none"> • Buffers around developed areas & key infrastructure • Evacuation routes
4-Rural west county	Influence zones		Mostly gentle, drainages	<ul style="list-style-type: none"> • Buffers for developed areas & key infrastructure • Evacuation routes • Manage large/open areas to reduce/maintain fuel (grazing etc.)

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Part I Understanding the Local Environment

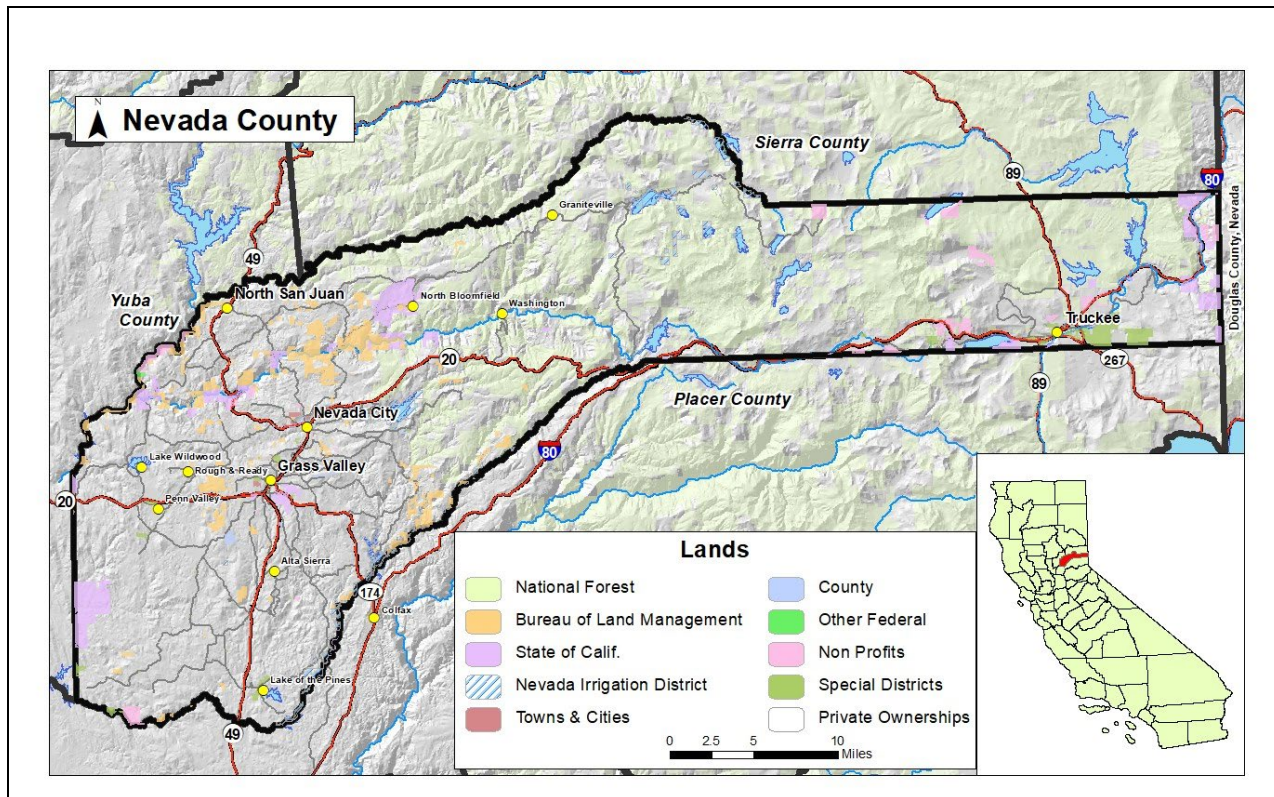
Overview

Planning starts with accurate information. In this section, the best available information is discussed. Community characteristics and factors influencing wildfire are described, including maps where available. Maps display a picture of how distinct aspects of our communities and potential wildfires vary across the county and interface with each other. Nevada County varies in all directions. Changes in elevation, climate, vegetation or fuels, and terrain are significant. Population density and community composition vary greatly throughout the county and land ownership from east to west and over the crest is quite diverse.

Area Description

Nevada County is nestled in the northern Sierra Nevada Mountain range, varying from the lower foothills in the and extending up the western slopes, over the crest and back down to the Nevada border near Reno. From south-west to north-east, there are changes in population density, wildland urban interface zones, weather, terrain, and vegetation. Nevada County is north of Placer and Eldorado Counties and south of Butte, Sierra and Plumas Counties, all sites of recent, large, catastrophic wildfires. Yuba county is to the immediate west and northwest and has had frequent fires as well, with Nevada County also not immune, experiencing the recent River and Highway fires in '21 and '23.

Figure 1. Nevada County location and land ownership.



Land Ownership

Nevada County encompasses 612,900 acres (approximately 978 square miles) and has one of the highest concentrations of wildland urban interface in California. Private residential lands cover the most area, about 40%, one-third is federal ownership, mostly the Tahoe National Forest, and the remainder is private forest, state park or other local government ownership.

Communities and People (Demographics)

The types and locations of communities, population and characteristics of people and communities in Nevada County are important to consider in a Community Wildfire Protection Plan. This includes age, such as the proportion of senior citizens, income level and geographic location. Some communities and groups of people are more affected by wildfire and/or have more challenges in preparing for wildfire.

The table below summarizes basic information on communities and residents of Nevada County.

NEVADA COUNTY DEMOGRAPHICS		
TOPIC	STATISTIC	REFERENCE
2020 Population	102,241	2020 UNITED STATES CENSUS
2010 Population	98,746	
City Populations		
-Grass Valley	14,016	
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Population per mile ² 2020	106.8	
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Persons per household	2.44	
Housing Units	54,366	
Poverty Rate	10.6%	
Median Household Income	\$78,401	
Total Employment	26,683	
Median Age	50.2	

Situation

- **People**

Residents in Nevada County include a considerable population of senior citizens. Many residents, including seniors, live in census blocks or rural areas, that have average incomes below the state median income.

- 102,241 people live in Nevada County (approx.)
- 29.5% are senior citizens
- Median household income is \$78,401
- Workforce employment is 26,683
- Poverty rate is 10.6%

- **Communities and population patterns**

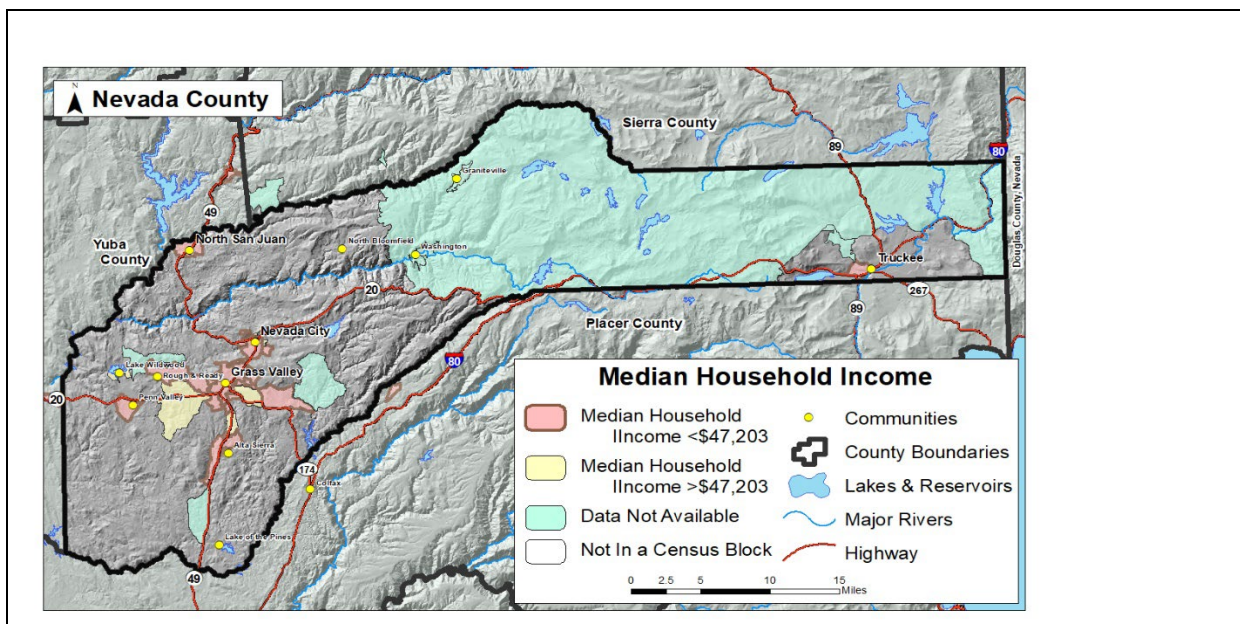
The county’s population densities are not evenly distributed and vary from east to west, along with land ownership. Figure 4 shows the relationship between structure density, and threat from wildfire to land ownership. Western Nevada County is predominantly developed with private residential ownership. The Tahoe National Forest, private industrial forest, and scattered small towns and homes, characterize the central 1/3. Eastern Nevada County has densely populated Truckee, nearby recreational areas, and seasonal homes, surrounded by the Tahoe National Forest.

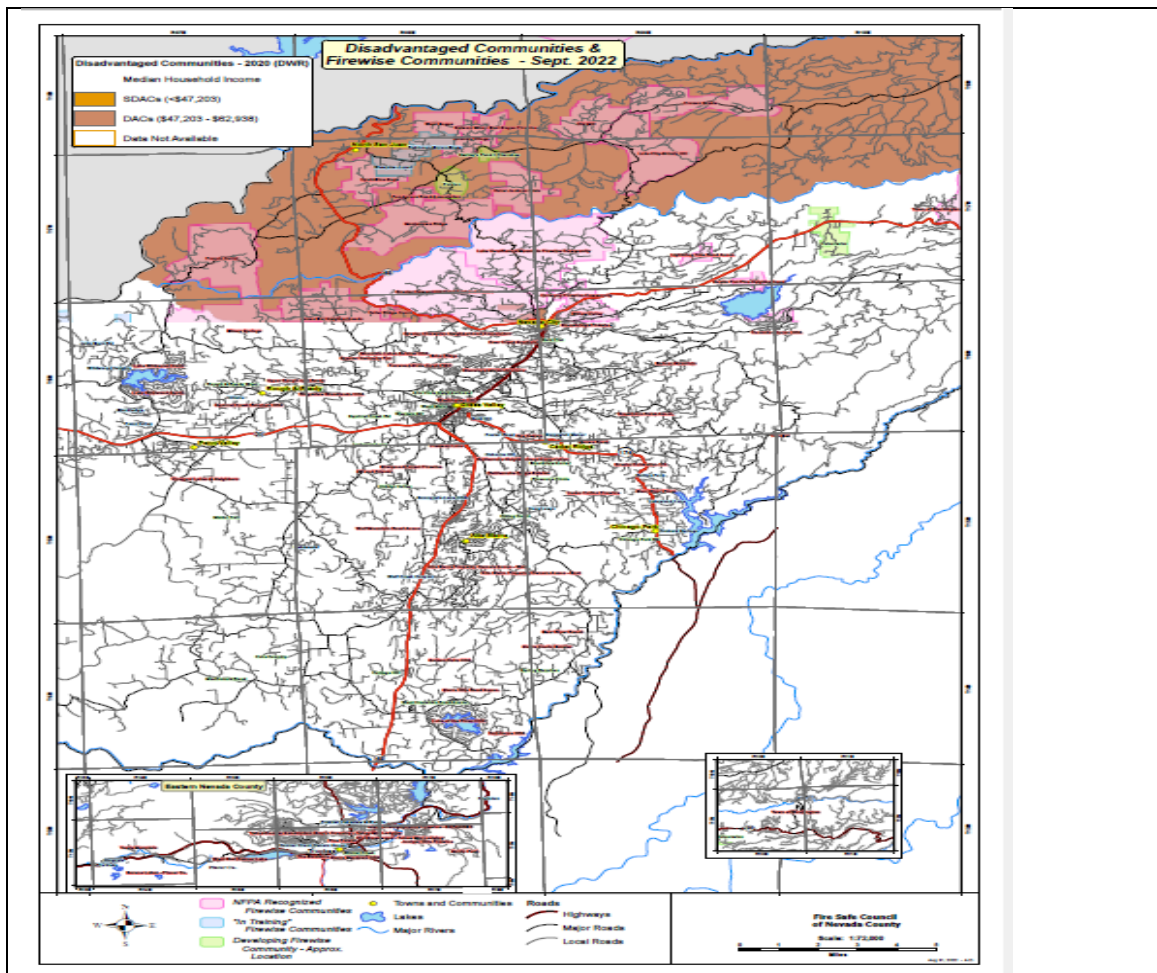
- Nevada county is considered a rural county.
- Most of the population lives in western Nevada County, where there is more private land.
- Most of the county is populated by small towns, developed communities and rural areas with widely spaced or spaced homes.
- There are three major cities/towns including Nevada City, Grass Valley, and Truckee. These all include historic areas, legacies of mining and logging industries in the 1800’s.
- There are numerous, historic legacy towns like Washington, Graniteville, North Bloomfield, and Floristan.

What it means

- **Many of the residents are vulnerable to fire.** There is a high likelihood they will be impacted by wildfire.
 - Homes in areas with lower median income tend to be more vulnerable to fire, with less home hardening features and older construction.
 - Seniors often lack the physical ability and financial resources to create and maintain defensible space and harden their home.
 - Residents in rural areas are surrounded by more wildland fuels and have a higher fire risk. They often live in areas where evacuation is more difficult.
 - Residents with lower incomes, seniors and those with disabilities have more difficulty independently evacuating from wildfires.

Median Household Income. Based on the California Department of Water Resources 2020 of Disadvantaged Communities.





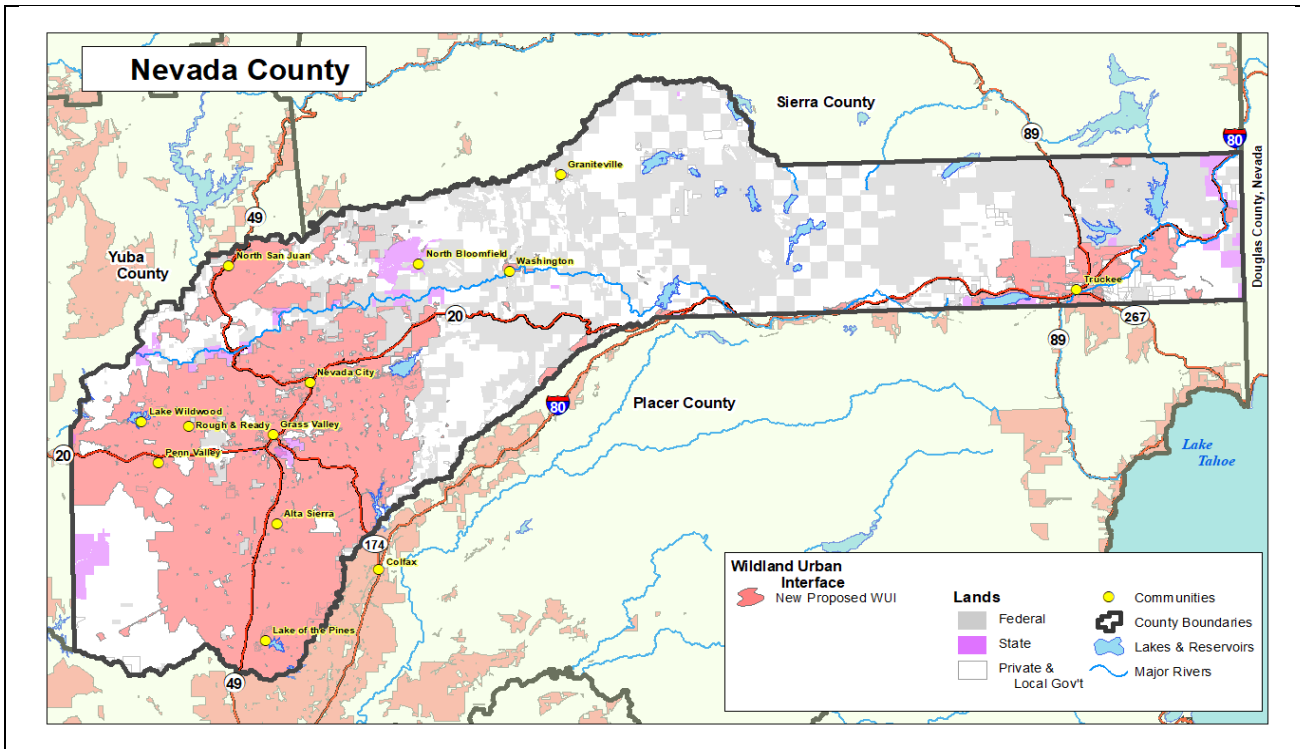
Wildland Urban Interface:

The wildland-urban interface (WUI) is where towns, cities, developed areas, and areas with homes meet up with and intermingle with undeveloped areas with wildland vegetation. In rural areas, such as much of Nevada County, there are many areas where homes or buildings are more widely spaced, parcels are larger, and wildland vegetation is “intermixed” with homes and other buildings.

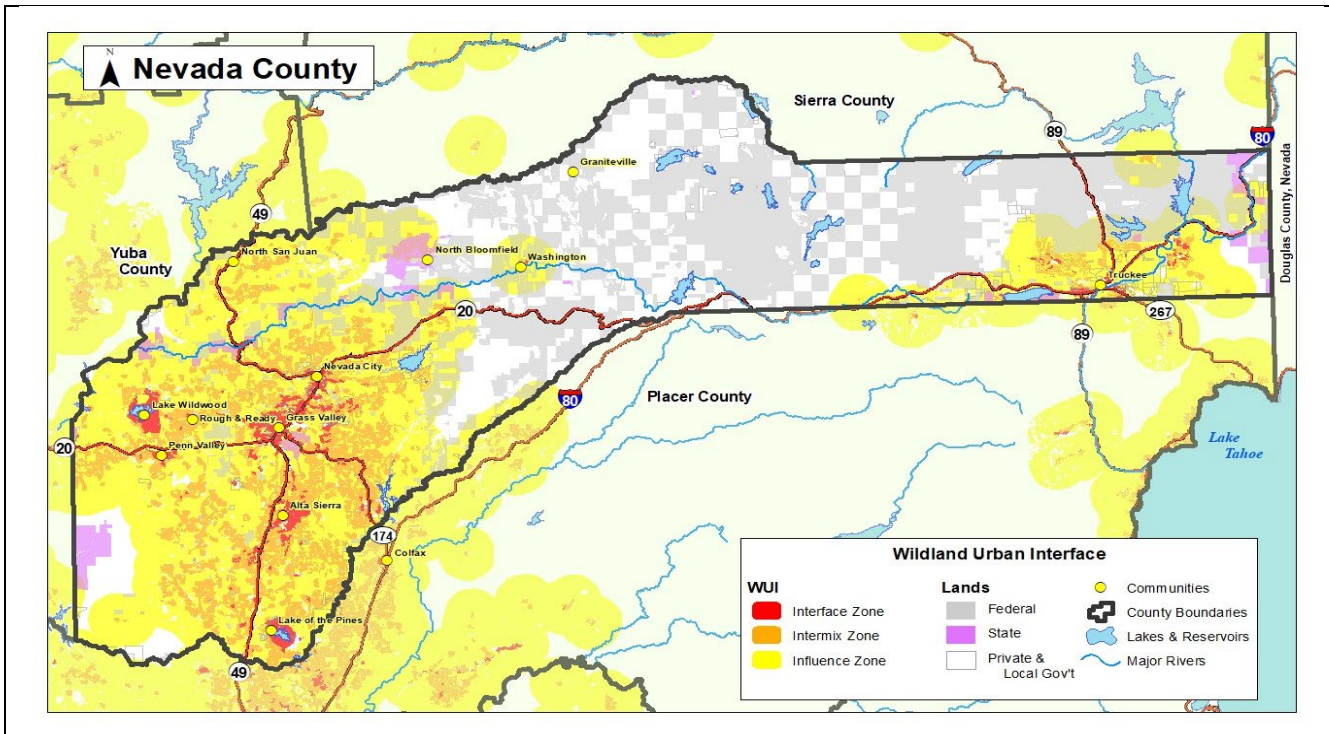
The current CAL FIRE WUI map combines wildland-urban interface and intermixed areas. (Figure x below). Previously, the CA WUI map included larger WUI buffer zones extending from the WUI. Federal land management agencies, such as the US Forest Service and BLM, use the buffer zones to plan strategies and prioritize fuel reduction treatments that occur on national forest lands adjacent to WUI.

The previous CA WUI map includes these buffer zones, called WUI influence zones (Figure x below). Both are useful in making a Community Wildfire Protection Plan.

CA Wildland Urban Interface (WUI) areas, proposed in 2023. (Source, CA Wildfire and Forest Resilience Taskforce)



CA Wildland Urban Interface (WUI) areas (Source, CAL FIRE FRAPP).

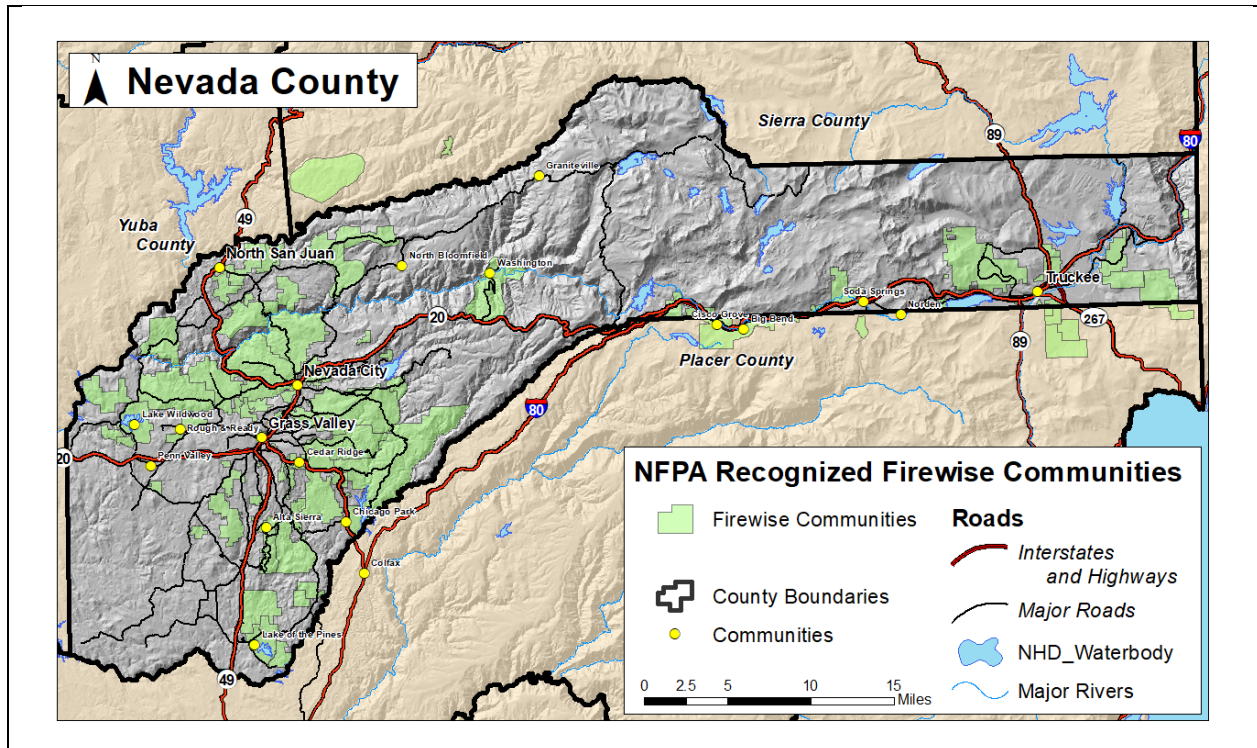


Situation

- Almost all communities and rural inhabited zones are in the Wildland Urban Interface.
- WUI influences zones representing more than 40% of Nevada County and continues to increase.
- Nevada County and adjacent counties in the Sierra Nevada have the highest concentration of WUI in northern California.

Community Fire Preparedness (Firewise communities i.e.-FWCs)

NFPA's Firewise USA Program recognized Firewise Communities in Nevada County.



Current FWC Situation

- There are a high number of FWCs in Nevada County, 91 recognized by NFPA
- Many of them are new, and just beginning to organize
- There is a varied level of engagement
- There is a substantial level of investment by the landowners
 - Since the first FWC in 2007 the total investment of time and money by all FWCs is \$73,559,005
 - In 2023 the 91 recognized FWCs in Nevada County recorded \$26,514,314 of fuels reduction time and money.
 - In 2022 the recognized FWCs in Nevada County recorded \$15,648,926 of fuels reduction time and money.

What it means

- There is a high level of awareness of the importance of defensible space, home hardening, and evacuation safety and community acknowledgement that there is an increasing need to attain a higher level of engagement.

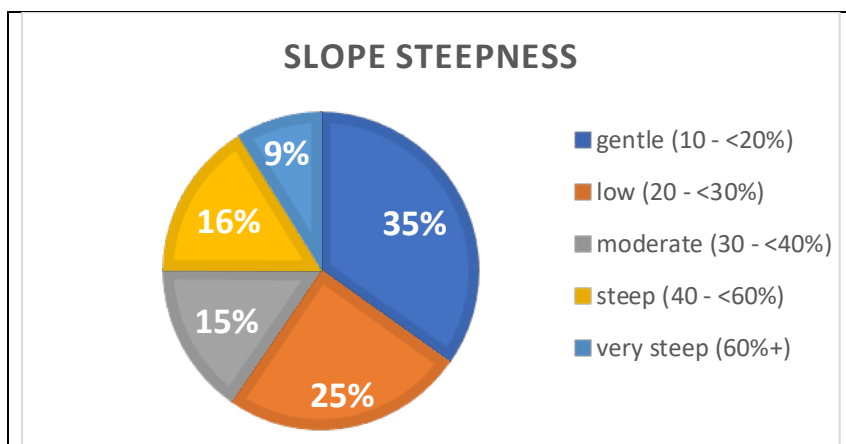
Fire Environment

Understanding the factors that can contribute to wildfires that potentially threaten homes and communities is a key step in developing a Community Wildfire Protection Plan. Those factors include topography or terrain, vegetation (fuels), general climate, and fire weather patterns. These factors combined with fire sources or ignitions (human and lightning) are the primary influences for a long history of wildfires and recent ones in Nevada County and nearby counties. In this section, the nature of these factors and a summary of recent fire activity helps understand the role and threats of wildfire in Nevada County.

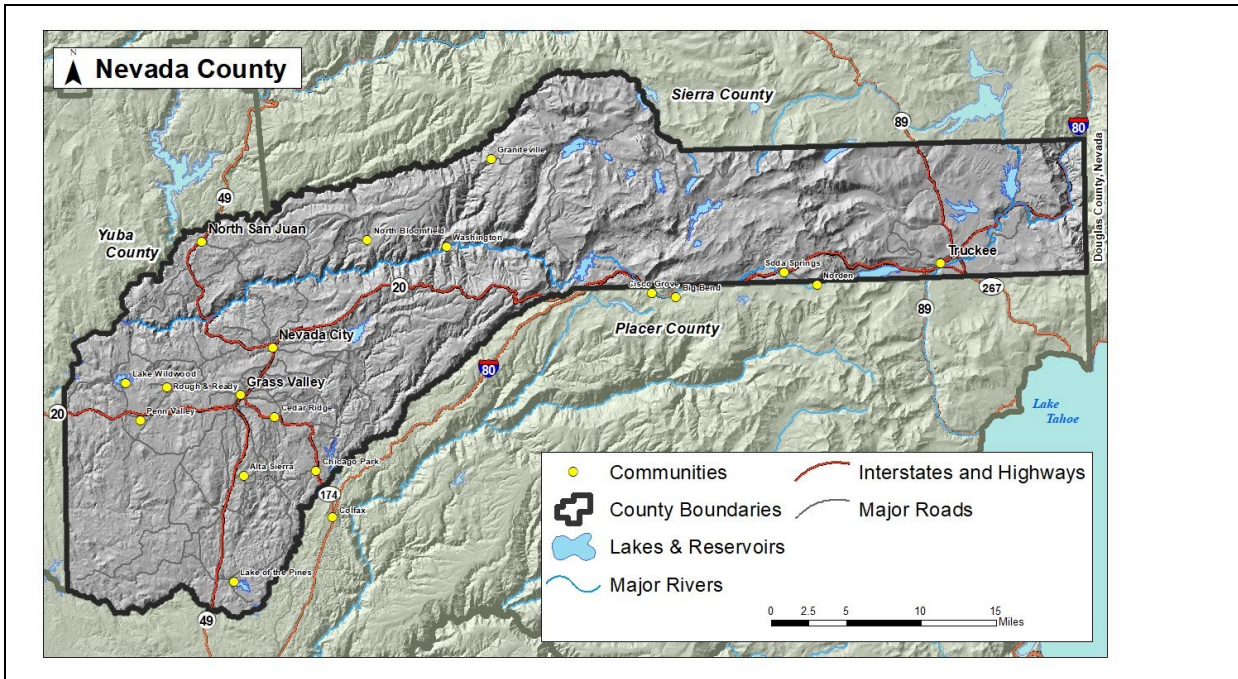
Topography

Nevada County is a mountainous region with four major river canyons. Topography or terrain influences wildfire in several ways. Fires burn faster and hotter on slopes and in canyons. When wind blows in the same direction as the canyons (either up or down), they funnel and increase windspeed. Steeper slopes and high windspeeds are the most common factors in hot and fast-moving wildfires. Even little side drainages or creek areas can funnel wind like a chimney. Not only do fires tend to move faster in drainages and canyons or up slopes, but they also produce super-heated and often deadly gases ahead of the flames. Think of a blowtorch. This super-heated air can “pre-heat” the fuels and air ahead of the flames, causing the fire to spread hotter and faster. All the four major river canyons in the County, the Middle and South Yuba, Bear River and Truckee River are “aligned” with “prevailing” winds. That is, they run East-West and the most common wind direction in the Sierra Nevada and California is southwest/west or east at times. This means that the potential for fast moving fires in canyons and nearby areas is very high. There are also many steep slopes and small drainages that can also increase potential fire speed and intensity. Deer Creek is one of the larger ones that goes through the heart of many communities including Nevada City and surrounding areas.

Slope steepness, & slope across Nevada County.



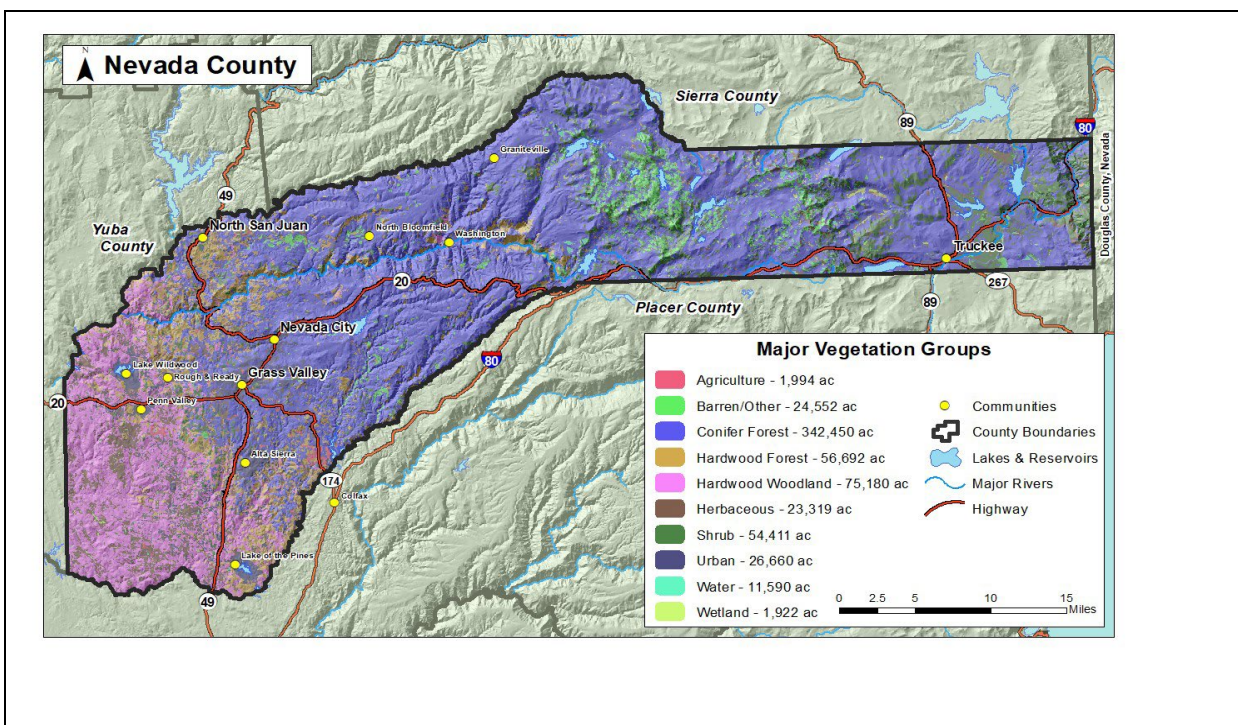
Map of Nevada County, showing topography with canyons, drainages, mountains and slope steepness.



Vegetation, Fuels and Fire Ecology

Conifer forests cover roughly 55% of the county, 12% oak woodland/grassland, 9% hardwood forest, and 14% shrub or grass/herbs combined.

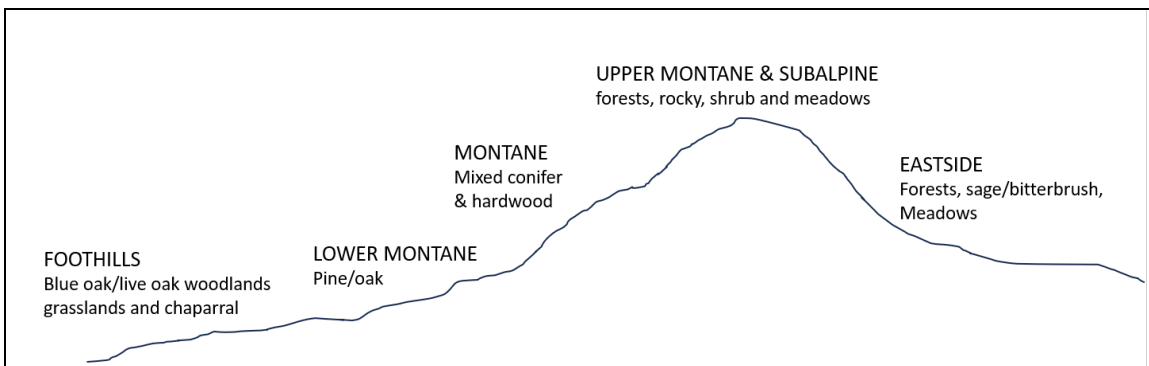
Major types of vegetation across the county.



Vegetation, Fuels and Fire Ecology - continued

As elevation increases from west to the east, over the crest and then down to the east toward Nevada, vegetation changes. Four major vegetation zones vary in dominant tree or plant types, climate, fuels and fire ecology. In the west, grass, and blue and live oak woodlands cover large areas. Moving upslope, ponderosa pine and black oak and then mixed conifer forests dominate most of the west slopes. At the highest elevations fir and lodgepole pine forests, intermixed with large meadows and rocky areas occur. Moving downslope, white fir, Jeffrey pine, and lodgepole pine occur in a mosaic with large meadows or eastside shrub and grasslands of sagebrush and bitterbrush. Each of these major vegetation zones are described below. Their primary plant types and species for each of these four zones and how they influence and respond to fire are described below. Understanding the differences is critical in planning best- strategies for management options to reduce wildfire threat and maintain healthy ecosystems.

Figure x. Major vegetation zones from west to east and low to high elevation in Nevada County.



For each type, the characteristic trees and plants, historic and current fire patterns are described. There are many changes other than fire that affected current forests. Changes from mining, whether hydraulic mining, or logging for trees to fuel mining or settlements all resulted in changes to forests.

For mining, large areas were cleared. Logging was often selective for certain desirable tree species, such as sugar pine or ponderosa pine, and more desirable large trees.

All these activities have changed the biological dynamics of our forests. Changes in fire frequency, ignition source, and pattern, more than other factors, have had a very long-term, great impact on the forests and vegetation we have now, and how it burns. But all these activities impacted the vegetation we see today and how it burns.

Western Foothill Grassland and Oak Woodlands

Westernmost Nevada County is in the foothills next to the Sacramento Valley and has blue oak and live oak woodlands, intermixed with a mosaic of dry grasslands and shrubs.

Photos of the western Nevada County foothill vegetation.



Vegetation and Fire / Before and Now

Historically, before fire suppression and European settlement, these areas burned frequently with low intensity, surface fire ignitions from both lightning and Native Americans resulted in frequent fire. Milder winters, less precipitation, and drier summer conditions combined with flammable grasses and shrubs, meant that fires spread readily. The frequent fire maintained low fuel levels and open woodlands, so that even though fires were frequent they were low intensity and often slowly spreading. Native Americans frequently used fire to enhance and manage food sources (plants and wildlife), basketry and other materials, medicinal uses, and ceremonies. Using their traditional practices, fire was regularly used every year, although not always in the same location.

Vegetation and Fire / Before and Now – Continued

Now, and for at least the past 100 years, fires have been suppressed. Non-native, annual grasses introduced during European settlement are now dominant, creating a flashier, more flammable surface fuel. Shrubs and live oak are denser, and blue oak has more old and dead branches.

This makes them easier to ignite and burn faster. Overall, fuels have accumulated and are more continuous and flashier.

Fires that burn now are more likely to burn more intensely and grow faster because of the fuel changes. Most fires start unintentionally from people in various ways and are more likely to occur during peak fire season.

Many native wildflowers and other plants, almost all adapted to fire, are less prevalent or less healthy from lack of fire, being crowded out by non-native grasses.

Some have flowering stimulated by fire, such as mariposa lilies or other bulbs, and were tended regularly by Native Americans with fire and other traditional management practices.

Montane Ponderosa Pine, Oak and Mixed Conifer

Going upslope toward Grass Valley, the San Juan Ridge, and Chicago Park, conifers, especially ponderosa pine increase, and black oak and madrone.

Chaparral of manzanita, buckbrush, and other shrubs occur in patches throughout both areas.

As elevation increases near Nevada City and above, other conifers, especially Douglas-fir, incense cedar, and sugar pine combine to form a large belt of mixed conifer forest.

Black oak, live oak, dogwood, madrone, and big-leaf maple occur throughout.

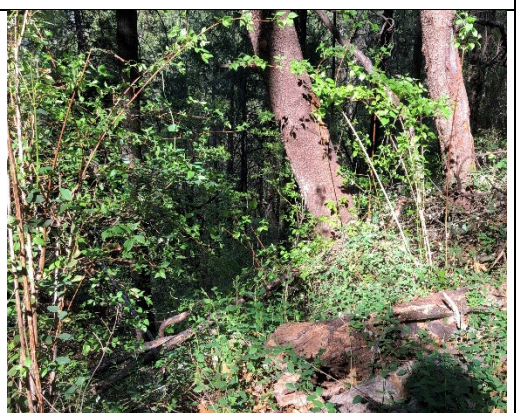
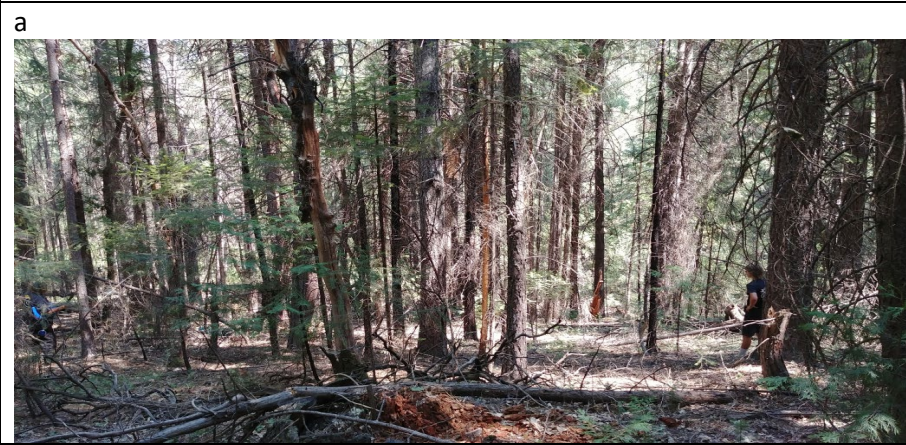
Higher up, mixed conifer transitions to white fir and Jeffrey pine-dominated forests and oaks drop out.

Shrub patches and some meadows occur throughout. Along streams and rivers, riparian forests and vegetation with willow, maple and alder occur.

More sun exposed ridges and south or west-facing slopes are drier and tend to be more dominated by drier ponderosa pine, black oak and incense cedar forests.

Less exposed lower slopes and north or east-facing slopes are more often dominated by various mixtures of Douglas-fir, incense cedar, sugar pine, some ponderosa pine, madrone, oak, maple and dogwood.

Photos of the montane landscape and forests in western Nevada County.



Vegetation and Fire Before - Continued

Like the foothills, historically the montane pine/oak and mixed conifer zone burned frequently. Fire was a regular and natural process, ignited by both lightning and Native Americans.

On average it burned every 5 to 25 years. Fires were mostly low intensity, surface fires, because although the forests are productive and can grow fast, fires kept fuel levels low, vegetation more open and naturally thinned the small trees so that large dense patches of taller trees were less common.

Vegetation was more irregular and a patchwork of clumps of trees, small openings, groves of open forest or widely spaced trees. Individual or groups of larger trees burned into the crowns, but widespread, intense wildfire was uncommon.

Pines were more prevalent because along with oaks, their seedlings are more resistant and tolerant to fire. Although Douglas-fir, incense cedar and white fir were present in varying amounts, they were less dominant than now because their seedlings, foliage, and/or bark is less resistant and tolerant of fire.

Wildflowers and other native plants, most fire-adapted, were more prevalent with more varied forest density, and lower surface fuel loads.

Vegetation and Fire Now - Continued

Forests and vegetation are much denser, more continuous and less patchy. Accumulated litter, wood, and understory vegetation created a much higher fuel load than when fire burned frequently at low intensity. Now, fires are much more likely to burn at high intensity and are more likely to go up into the crowns of trees, and during most peak fire weather, spread faster.

They are more difficult to control because the flames are taller, and the fire is hotter. There are more small and medium sized trees that have grown because frequent, low intensity fire was not there to naturally thin them before they got large.

The crowded forests are more susceptible to insect outbreaks and tree mortality from combined stresses or drought, insects and pathogens. More trees in the same amount of soil means there is less water available for each individual tree. They are more easily drought stressed.

This makes them more flammable and contributes to more intense and faster spreading wildfires. Wildflowers and other native plants are less prevalent or sparser, restrained by more uniformly dense forests, and dense litter on the forest floor.

Upper Montane and Subalpine Forests, and Landscapes - Continued

At the highest elevations, upper montane and subalpine forests, comprised of red fir, lodgepole pine, and Jeffrey pine, are intermixed with wet meadows, aspen groves, and open rocky areas.

The upper montane and subalpine forests go up from the western slopes, over the crest, and down the east side until conditions become too dry.

Photos of upper montane and subalpine forests and vegetation in Nevada County.



Vegetation and Fire Before - Continued

Fire occurred regularly in upper montane forests, but less frequently and in a patchier pattern or across smaller areas than lower elevation areas. Forests were less dense and patchier, and the forest floor was more open, with lower and/or patchier accumulations of dead wood (branches or logs) and litter. Tree mortality occurred but tended to be in lower amounts and in smaller patches.

Vegetation and Fire Now - Continued

The same changes in fire and vegetation have occurred in the upper montane forests as in the montane forests. They grow more slowly in the harsher, higher elevation conditions, so it takes longer for the forests to get denser, and fuels accumulate. After more than 100 years, forests are more uniformly dense across larger areas and surface fuel accumulations greater. Fires burn at higher intensity and severity. These forests are particularly affected by lower snowpack or earlier and faster snowmelt. Snow is the primary source of soil moisture. Drought and changing snow melt patterns have made them more susceptible to seasonal drying, with greater flammability. Large, high severity fires are more common, with wildfires to the north (North Complex and Dixie) and south (Caldor Fire) burning from low elevations in the west or east, up into the higher montane forests, over the crest and to the other side of the mountains. It is unlikely that this happened commonly if at all historically. If fires did burn across the crest, they were much more likely to be low to moderate intensity and severity compared to the fires now that are more high intensity and severity.

Eastside Nevada County

Over the crest, as climate becomes drier, a small band of upper montane forests intermix with larger meadows and valleys, transitions into large areas of eastside pine and mixed conifer, and large expanses of sagebrush, bitterbrush, and grasslands.

Photos of vegetation in eastern Nevada County. From top left, clockwise: mixed conifer and eastside pine from Truckee area, sagebrush and eastside pine, lodgepole pine-aspen, meadow.



Vegetation and Fire Before - Eastside

Historically, fires varied from the higher upper montane forests to the lower elevation pine, shrub and meadow areas. Fires in the upper montane east of the crest were like those to the west of the crest but a little more frequent and widespread. Fire was very frequent in the eastside pine fire and mixed conifer forests, sagebrush, bitterbrush, and grasslands. Low intensity fire, burning mostly on the forest floor, occurred every several to 15 years or so. Sagebrush, bitterbrush, dry grass and some of the drier meadows and edges of the wetter meadows also burned regularly. Fires were mostly low intensity, surface fires. Frequent fire kept fuel levels low, forests and vegetation more open and naturally thinned the small trees so that large dense patches of all uniformly sized trees were less common. Pines were more dominant than in most areas with little white fir because of its thinner bark that is more susceptible to fire of all intensities when young. Wildflowers and native perennial grasses, all fire-adapted, were more common, and better able to grow and thrive with less forest floor litter and open forests. Wet and moist meadows had less lodgepole pine crowding the edges and sometimes shrinking the size. Riparian areas also had more patchy or less continuous dense patches of lodgepole pine. The thin bark of lodgepole pine and the tendency to develop higher fuel accumulations on the forest floor made natural thinning from low-intensity fire regular. Numerous meadows were larger than currently.

Vegetation and Fire After - Eastside

Forests and vegetation are much denser, more continuous, and less patchy. Accumulated litter, wood, and understory vegetation have created a much higher fuel load than when fire burned frequently at low intensity. Shrubs are older with more dead branches and burn hotter and are more likely to be killed than pruned back naturally from fire. Now, fires are much more likely to burn at high intensity and are more likely to go up into the crowns of trees, and during most peak fire weather, spread faster.

Like other parts of the county on the west side, they are more difficult to control because the flames are taller, and the fire is hotter. There are more small and medium sized trees that have grown because frequent, low intensity fire was not there to naturally thin them before they got large.

The crowded forests are more susceptible to insect outbreaks and tree mortality from combined stresses or drought, insects, and pathogens. More trees in the same amount of soil means there is less water available for each individual tree. They are more easily drought stressed. This makes them more flammable and contributes to more intense and faster spreading wildfires. Wildflowers and other native plants are less prevalent or sparser, restrained by more uniformly dense forests, and dense litter on the forest floor.

Fuels

Fuels are any burnable material. For vegetated areas, this includes live (leaves, branches, stems and boles or trunks) and dead (dead leaves, needles, sticks, branches, and logs) plant material.

Live and dead vegetation are the primary fuels burned in wildland fires. Wood chips, shredded bark, and masticated material are all dead vegetation and fuel. Buildings, boats, cars, and other household items are also fuel.

This assessment focuses on the fuels from live and dead vegetation in wildlands and defensible space.

Buildings contain an extremely high amount of fuel loading, and when burned in areas intermixed with vegetation fuels, it can lead to higher-intensity fires and faster spread.

The map and descriptions below only apply to vegetation fuels in wildlands and defensible space, not urban areas, or structures.

Different fuel conditions are described by:

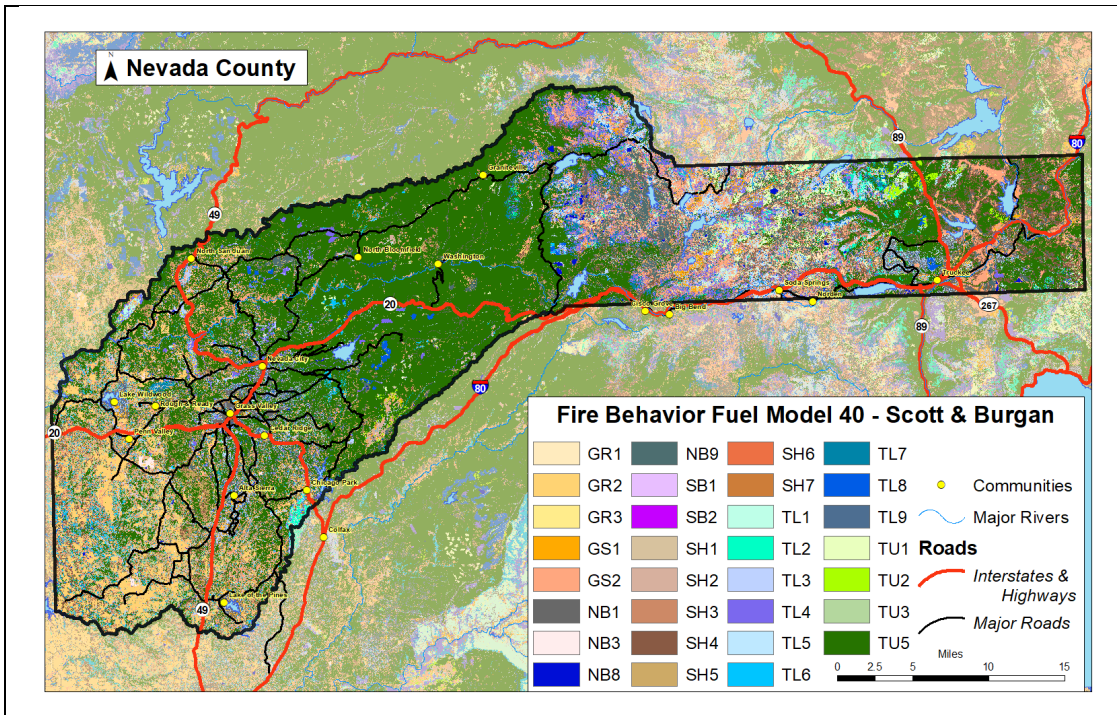
- Fuel type – categories of vegetation type combined with fuel loading that burns differently (i.e. low, medium or high intensity)
- Fuel loading- the amount of fuel measured in weight, density, and volume.
- Fuel moisture – how dry a fuel is, and flammability.
- Total fuel exposed to fire – a combination of fuel loading, how explosive it is or available to readily burn.

- The chart below shows fuel models used in fire behavior models to predict what type of fire would occur in different weather conditions.
- There are 40+, grouped by the main vegetation that will carry the fire. These groups are identified by the first two letters.

Example: *GR* refers to grass fuel types and models. The table below contains a summary of the different categories and where they are found.

Primary Fuel	Fuel Model	Description	Location
Grass	GR1, GR2, GR3 (1-sparse grass, 2- mod. grass, 3- dense, tall)	Grassy areas may have scattered or low cover of trees. May be dry &/or wet meadow areas.	South and west county, foothills. Eastside – valleys. High country – meadows.
Grass & Shrub	GS	Mix of grass and shrub. sage and bitterbrush.	Eastside, especially drier eastern areas.
Shrub	SH1, SH2, SH3, SH4, SH5, SH6, SH7	Manzanita, buckbrush, ceanothus, shrubby live oak, bitter brush, sagebrush.	All parts of the county. Large patches in canyons. Rocky areas in the high country and eastside areas
Forest with understory plants	TU	Mostly conifer but also hardwood forests with well-developed understory of shrub, small tree, vine, grass or herb. Often found with TL types	Most of the forested areas in the county, from the ponderosa pine and mixed conifer forests on the westside to the eastside mixed conifer and pine forest.
Forest with mostly dead debris on the forest floor.	TL	Conifer or hardwood (i.e. oak) forest with understory mostly of litter and woody debris. Often intermixed with TU types.	Many forested areas throughout the county, especially fir at higher elevations.
Slash/Down Wood	SB	Mostly down logs, from fire, wind or logging	Small areas throughout.
Non-burnable or unknown	NB	Rock outcrops.	Mostly in the high country but also canyons and old gold mine diggings/tailings.

Fuel model types in Nevada County, used to predict fire behavior.



Vegetation and Forest Density

Vegetation and forest density have different aspects or ways to describe its characteristics. Three of the most common and useful ways are canopy cover, tree density, and biomass. Canopy cover, tree density, and biomass are all used individually or as components of fuel load measurements. At higher levels of canopy cover, tree density, and biomass, there are higher fuel loads, and the potential for higher intensity fire. They are also used to assess how resilient a forest or vegetation type is to drought, insects and pathogens, or other stresses.

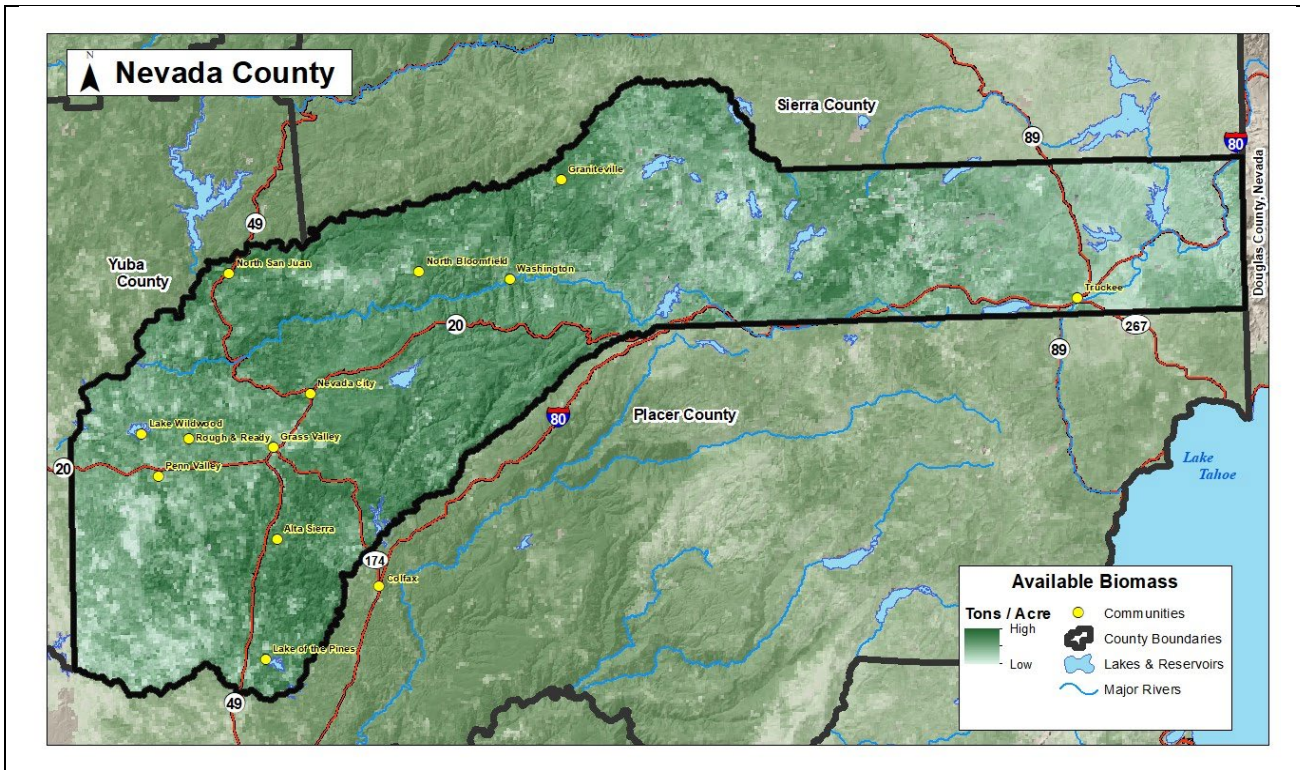
For all these characteristics, the pattern is similar across Nevada County, higher in forests and at higher elevations. But overall, as described above, forest and vegetation density, biomass and canopy cover are higher than historically, before fire suppression and settlement.

Available Biomass

Biomass is the weight of all live and/or dead vegetation material in each given region, measured and mapped by tons per acre. It is one way to measure the total amount of fuel loading from vegetation. In the map below, the highest biomass is in the westside, especially in the pine, oak, mixed conifer and fir forests.

The Western portion of the county has patchier levels of biomass, with higher levels where there are more trees and less where there is more open grassland. In the eastern part of the county, biomass levels are moderate and more uniform. This is where there is more continuous cover of moderate to low density eastside forests. The highest elevations, in the Grouse Lakes and areas near Donner Pass have areas of little to low biomass, where there are larger rocky areas.

Biomass in Nevada County. (Source: California Wildfire and Forest Resilience Taskforce)



Canopy Cover

Higher canopy cover is one measure of how continuous and dense live fuels are. Fires are more likely to spread farther and often fast when fuels are continuous across an area.

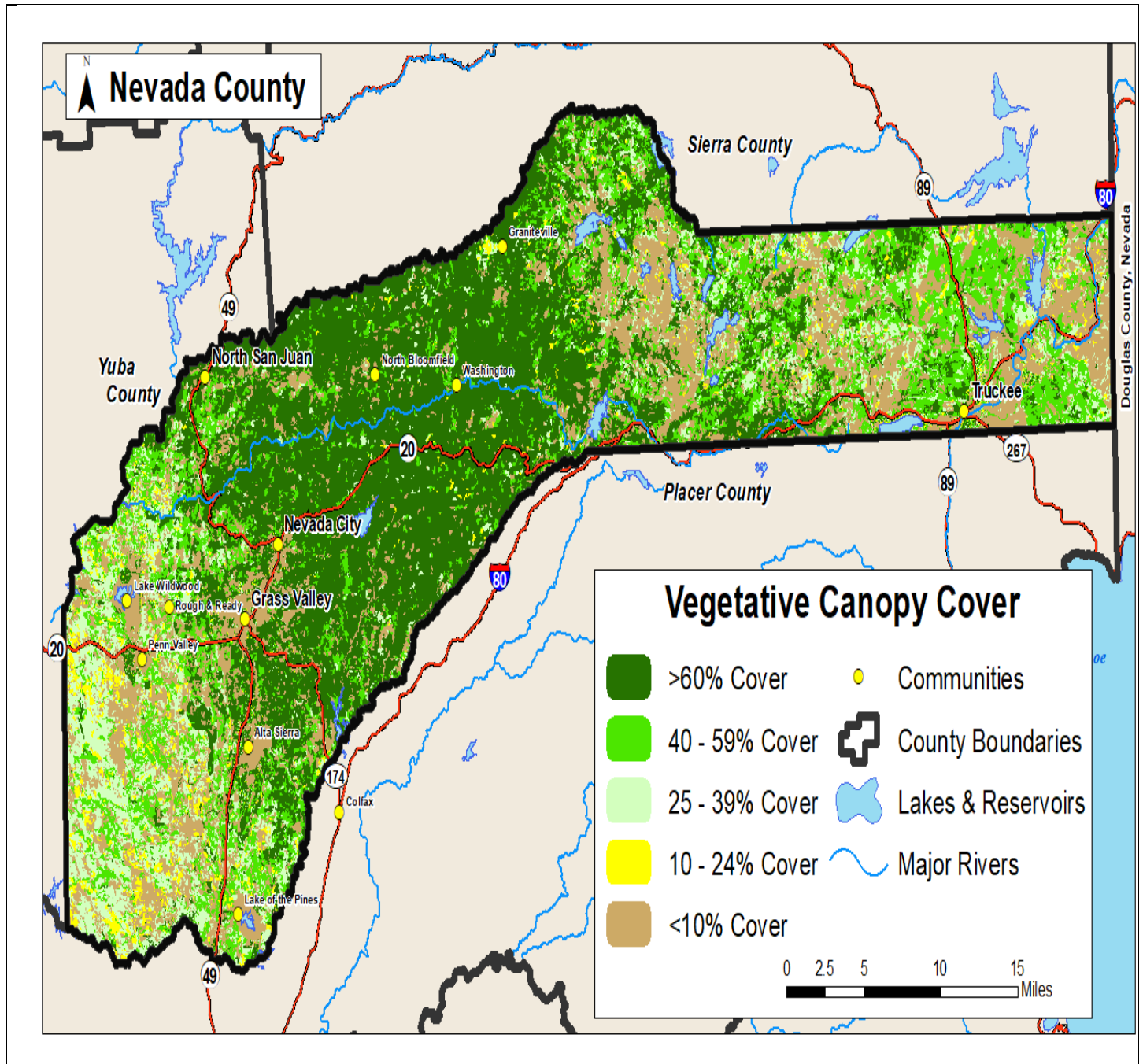
Canopy cover is the cover of plant crowns over an area. High canopy cover means that there are more plant crowns covering the ground from above. It can include tree crowns, shrubs, vines, grasses or herbs. Anything with leaves or needles. The highest canopy levels are 100%, meaning that from a drone, helicopter, plane or bird above, the ground would not be visible, only plant canopies. The first map shows the combined cover of trees, shrubs, grass and flowering plants. The second map shows only tree cover.

Overall vegetation canopy cover is moderate to high over much of the county, especially in the forests. The large areas of uniformly high canopy cover are much different than a century or more ago, when frequent low intensity fires maintained a lower tree density.

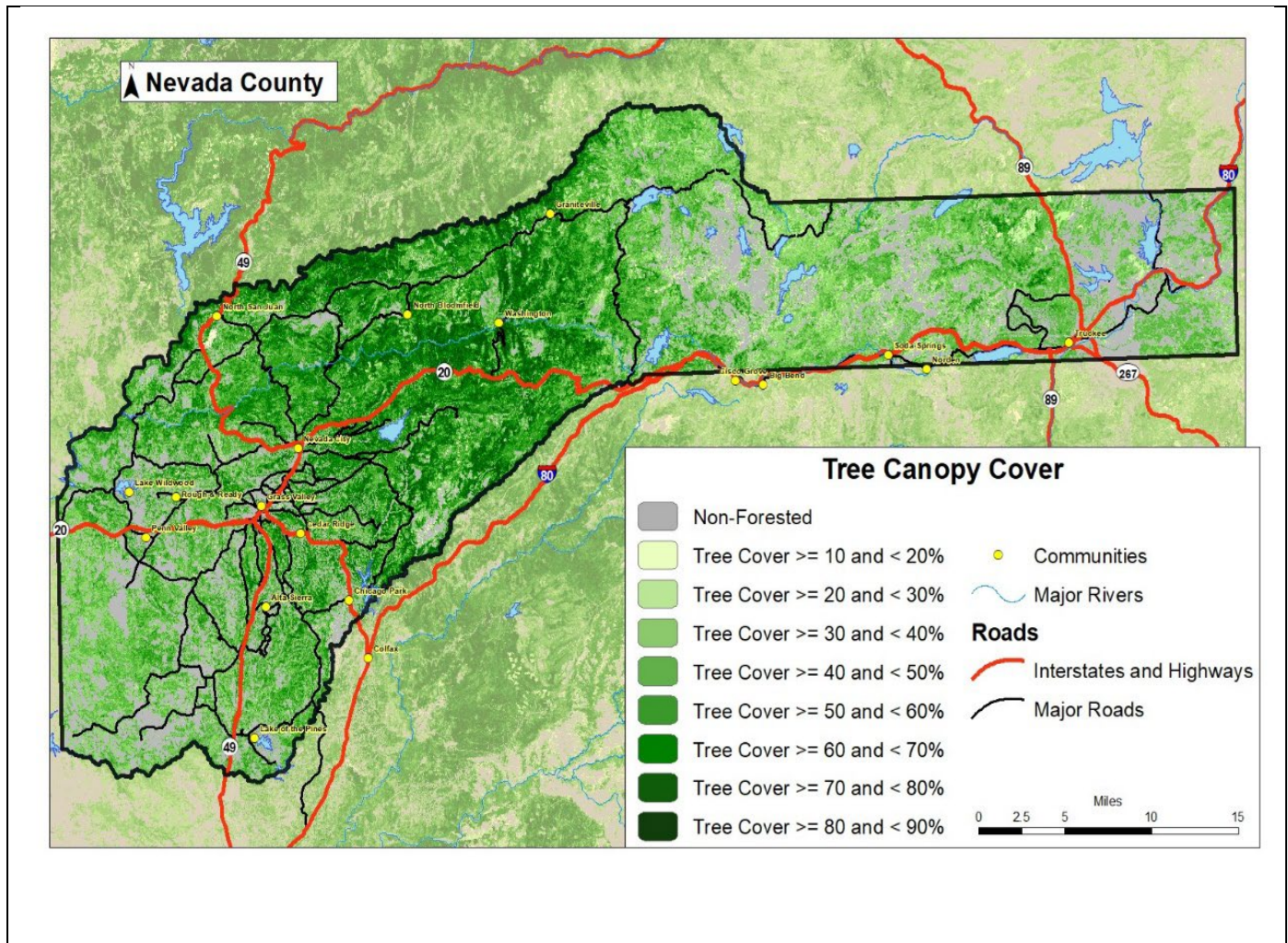
Tree canopy cover is high to very high in the county's mid-elevations. It is especially high in western Nevada County from about 2,500 to 6,000 feet in elevation, in the ponderosa pine and mixed conifer belt. Although tree canopy cover is not as high in eastern Nevada County, the climate is drier, and trees are highly susceptible to drought, insects, pathogens and wildfire.

Vegetation canopy cover. (Source: California CALFIRE Forest and Resource Assessment Program).

Cover represents the cover of plant crowns, from a birds-eye view. It is the percent of the ground covered by foliage. This map shows the combined cover of trees, shrubs, grass and flowering plants.



Tree canopy-cover in Nevada County. (Source: California CALFIRE Forest and Resource Assessment Program).



Tree Mortality

Trees die naturally from various causes, and across a forest it is called tree mortality. Trees die from numerous causes, including age, although many species can live hundreds of years.

Some like giant sequoias can live thousands of years.

Most forest insects, like bark beetles, that attack trees, are native and some level of mortality from them is expected in healthy forests.

Tree mortality is a natural process, and the amount and extent of tree mortality is usually low in a healthy forest. When they die at higher levels than are typical, or at a background rate, this can be a cause for concern.

Patch, or stand, of trees with high tree mortality, numerous dead trees.



Tree mortality is important in understanding forest resilience and wildfire hazard and risk.

Tree mortality can affect wildfires in multiple ways.

- Areas of dead trees make it harder to control wildfires. It takes longer to construct fire lines and is more dangerous for firefighters to work in and around.
- Dead trees are more likely to ignite from embers that land in the crown than live trees.
- They affect fire behavior in different ways, depending on weather and fuel moisture conditions. Sometimes they can burn more readily and hotter but not always. When they fall to the ground and result in areas with many logs, these areas can burn at very high intensity that can contribute to crown fire in live trees around them. Large areas with high down log areas can burn explosively in high and extreme fire conditions.

Higher levels of dead trees can be a sign of unhealthy forests, which are more susceptible to drought, insects or pathogens, weather, climate or other stresses. Higher levels of tree mortality tend to occur in cycles, with drought, insect outbreaks or other changes that don't occur every year.

In the last 20 years, tree mortality has increased dramatically to severe levels in parts of the southern Sierra Nevada. In many parts of the pine and mixed conifer forests of the southern Sierra Nevada, most of the conifer trees have died across large areas, thousands of acres and more.