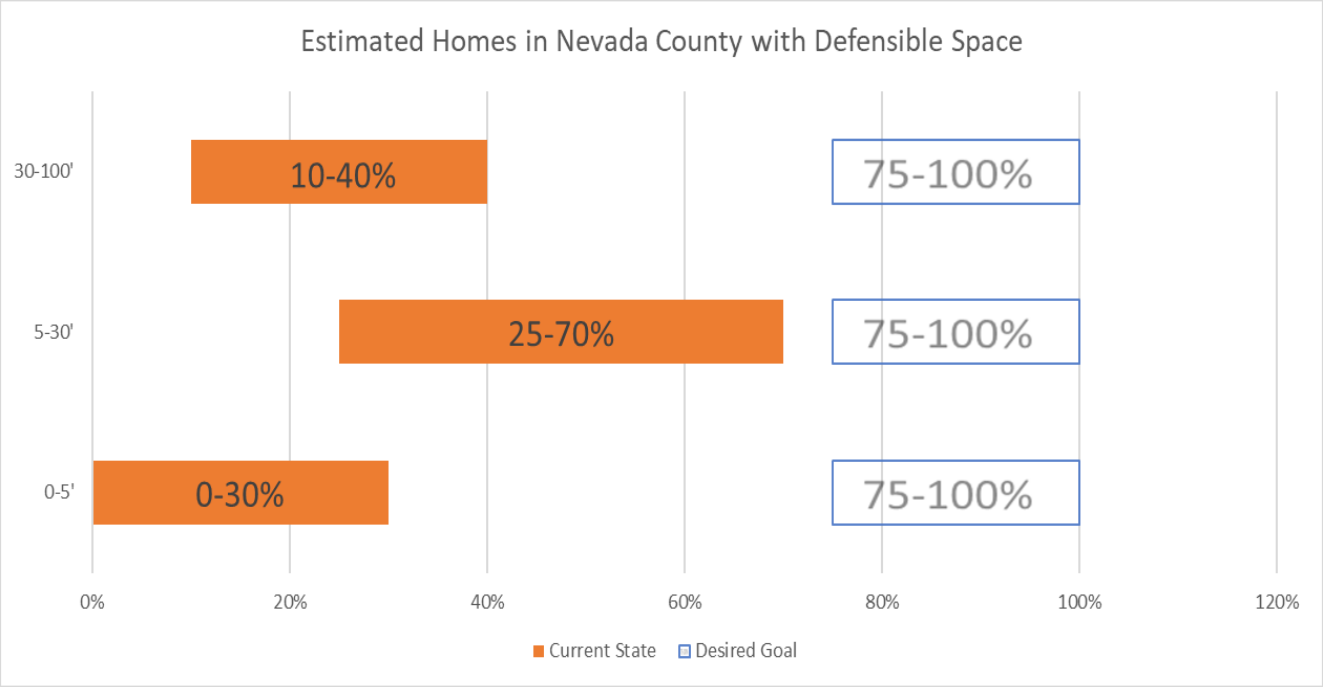
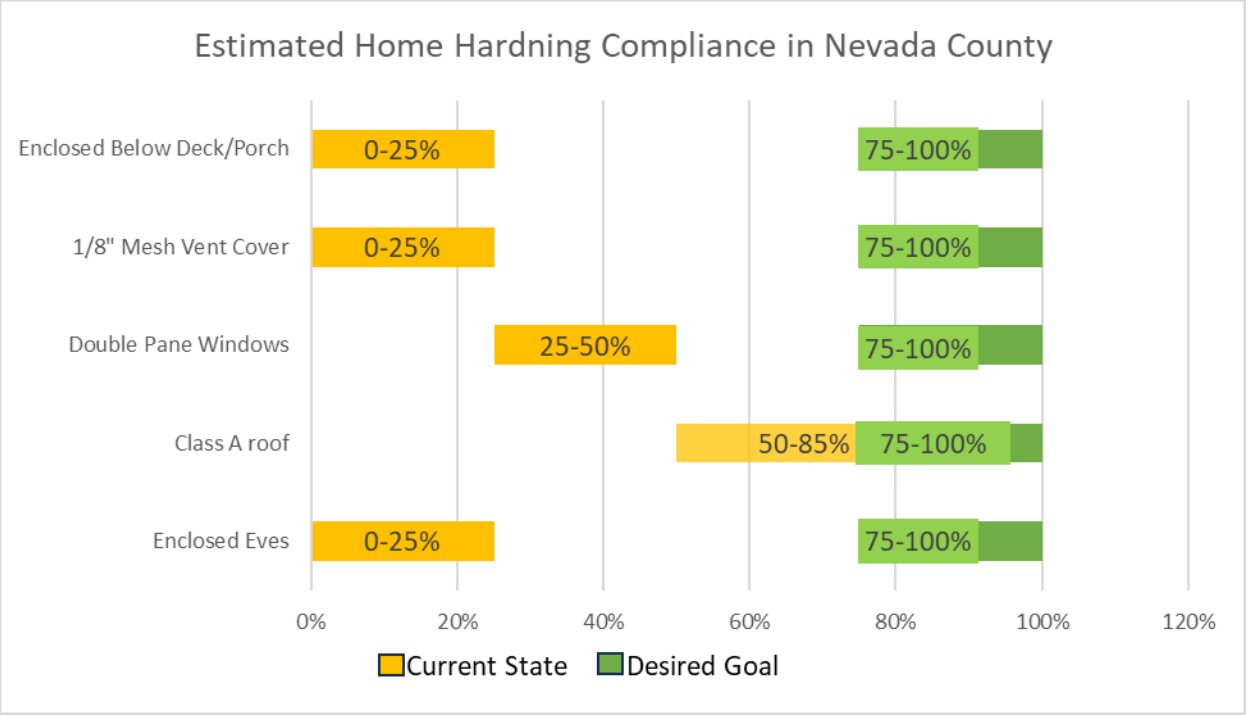

Estimated Homes in Nevada County with Defensible Space
30-100'
5-30'
0-5'
10-40%
25-70%
0-30%
75-100%
75-100%
75-100%
0%
20%
40%
60%
80%
100%
120%
Current State
Desired Goal

Home hardening

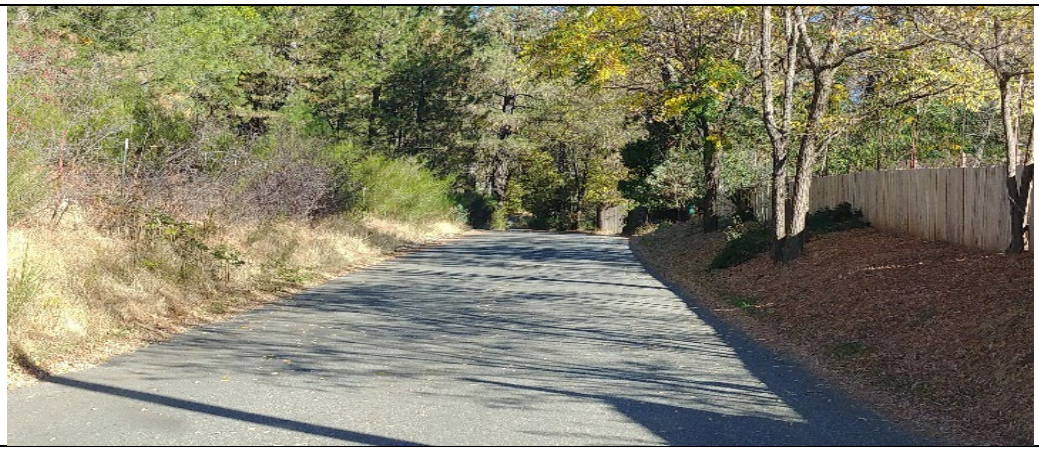


Evacuation Ready

- Roads
- Vulnerable populations
- Access and signed up to emergency notification systems (when not always reached)

Problems with zones, psychological and social aspects

Roads



Firewise and Fire Adapted Infrastructure

There are multiple factors that measure the preparedness and resilience of infrastructure to wildfire

- Surrounding area, landscape is resilient
- Defensible space
- Hardened structures/infrastructure

Wildfire response and emergency response agencies, from local to state to federal, all have inventories and maps of key infrastructure. The type and level of detail may vary at the local level, but in general there is a high overlap and similarity between state and federal information.

Fuel Treatments: Capacity and Effectiveness

There are a wide variety of treatments that are applied to reduce fuel hazard. These include hand-thinning or clearing, mechanical thinning or mastication or chipping, prescribed burning, grazing.

While there are a wide variety of tools applied, the capacity to get the work done is often limited and less than what is needed to address the problem's enormity.

The effectiveness of treatments, or how well they reduce fuels and fire potential, varies widely.

- **Many landowners or businesses lack the capacity to do fuel reduction work. Financial, physical ability, access to workforce and knowledge** of how to do the work are all limiting to landowners.

- **Many treatments rearrange the fuels instead of reducing them. This** includes mastication and chipping, and sometimes thinning or piling. This reduces the overall effectiveness of the treatment because the fuels are not removed. The amount stays the same.
  The type of potential fire may change from crown to surface, but there may be tradeoffs because the treatments can reduce water infiltration to the soil and increase the likelihood of tree mortality or soil damage from higher temperatures and duration of heat when the masticated or chip fuels burn

- **Many treatments effectively reduce ladder fuels, but not surface or crown fuels.** The most common example is pruning up trees but leaving a high density of trees, or crown fuels.
  These forests can still readily carry crown fire and are more susceptible to drought, insect and pathogen stress and mortality. Too many trees result in less water and nutrients to each individual tree, reducing their vigor and ability to withstand drought, insect and pathogen stress.

Photos of diverse types and levels of treatments. From the top left clockwise: thinned forest with untreated surface fuels; branches that serve as ladder fuels are pruned but trees are dense, leaving high crown fuel, "lollipop" trees only do part of the job.

- **Treatment effectiveness is limited because there are grossly inadequate means and places to get rid of excess fuels.** There are no nearby or readily available biomass facilities. Green waste collection sites are irregular and not distributed widely throughout the county.
- **Landowners and residents lack awareness of the varied tools and approaches that are available to reduce fuels.** This can limit the work getting done. It can result in resistance and limit the acceptance of neighbors and other residents toward treatment by neighbors or other community members. This is particularly true of prescribed burning as an effective tool for surface fuel reduction.

Increasing Wildfire Response Capacity and Effectiveness

Most fire agencies have statutory responsibilities for what each is tasked to protect and suppress. This includes planning and prevention. Throughout most of Nevada county there are long travel distances and much more potential than suppression resources can cover with high fire danger or rapidly expanding incidents. Fire agencies are limited by budgets that control the facilities each can build or improve. Apparatus is also limited by available funds. The largest expense and the most effective tool to suppress fires are personnel both paid and volunteer. Agencies have seen dwindling numbers in volunteer ranks due to participation and increasing requirements for required training.

California has a history of severe fire weather over the last few decades with devastating fires increasing in frequency and intensity. When severe fire weather occurs in California, it taxes the resources that agencies accommodate with mutual aid from across the state. This affects Nevada County by moving some of these resources to other areas of the state where fires are burning leaving a depleted force behind to protect the county during severe fire weather events when they could be needed most. The obvious reduction of this threat would be to add additional personnel and equipment to support all agencies with more resources. An identified need in Nevada County is a fuels crew that could concentrate on fuel reduction projects that would not be subject to wildfire response out of the area but could assist

with low intensity fires or mop up during periods of resource draw down locally. Geographically Nevada County is large enough that both Western and Eastern Nevada County could utilize a fuel crew to support this work.

Outside of staffing and infrastructure increases of fire agencies in Nevada County the fire threat could be reduced through a reliable water supply. Increasing the footprint of hydrated water supply in the county could reduce travel times for apparatus engaged in fire suppression operations.

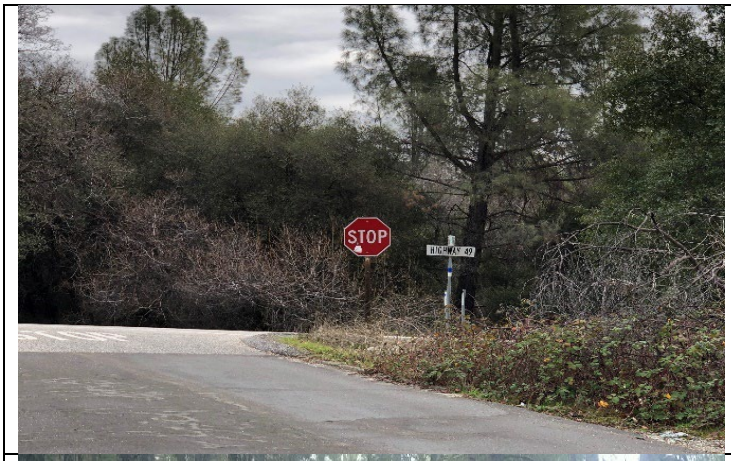
Another possibility to increase efficiency would be to increase capacity and/or redundancy of communications in Nevada County. Some rural areas have communities where existing radio dispatch infrastructure cannot adequately be used to communicate. There also is not an available backup system for radio communications in Nevada County outside of decades old infrastructure.

Nevada County lacks funding to both create and maintain functional ingress and egress roads throughout the county. County maintained roadways lag ideal clearance requirements and, in many cases, mandated clearance requirements. Private roadways are frequently less maintained even when large communities routinely use these routes. Establishing a reliable funding source for new and existing public and private roadways could contribute to increased safety of residents in the county.

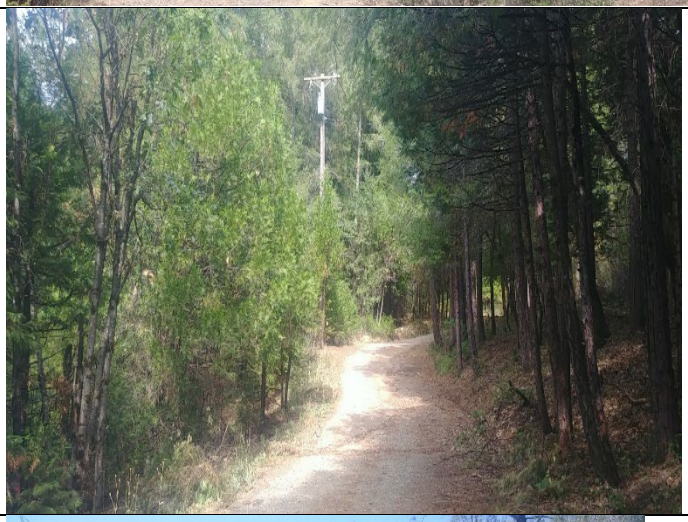
Evacuation/Fire Access Capacity, Safety, Strategic Value

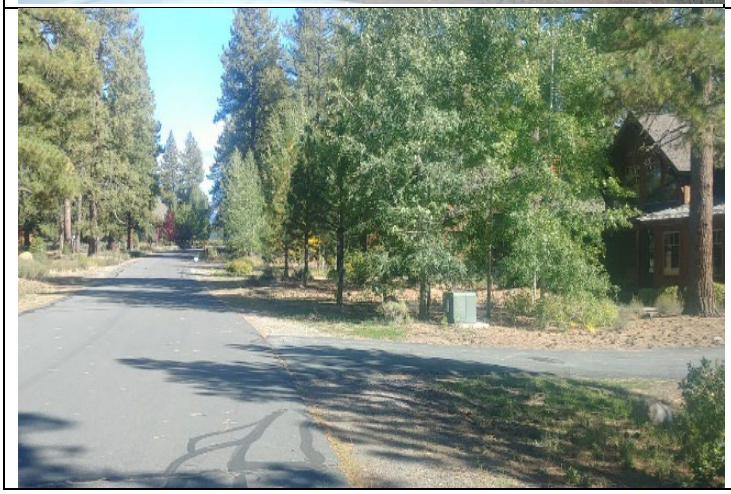
The capacity for safe evacuations and first responder access during wildfires is critical. The potential for wildfire is high and when combined with heavy fuel accumulations and most homes without adequate defensible space or hardened homes. This means that rapidly getting out of the way of fast-moving wildfires is vital to public safety. The ability to rapidly access fires is critical for firefighters and the sheriff's office, responsible for evacuations, to effectively suppress the fires and get people out safely. There are some aspects of evacuation/fire access that have a high capacity, but in general, the roads required for safe evacuations are in poor condition.

- **Fire agencies, the Nevada County Sheriff's Office and the California Highway Patrol during an incident and assisted by county Office of Emergency Services (OES) for planning are well coordinated and experienced in wildfire evacuations.** There have been effective evacuations during numerous recent fires and after each one, responsible officials and agencies work to improve the process based on those experiences. An example is the additional turn lanes that were added to Lake Wildwood after the 49er fire in 1988.
- **Recently, OES began utilizing AI informed evacuation planning tools.** The tools have been used for pre-planning by the county. There is availability of some aspects of the tools for the public to look at potential traffic during an evacuation of their area. However, it is only available on the web and current traffic patterns during actual evacuations are not available to the public. It has yet to be widely used by the county or of similar quality tools required for proposed development planning.
- **Overall, most roads used for evacuations have dense or sufficiently high fuel loading close to the road, resulting in severe injury or fatalities during evacuations if a fire is burning along a road. This includes private and county roads, state highways and roads through federal lands. There is an inadequate "Safe Separation Distance" between roadside fuels and associated potential wildfire heat and passengers or firefighters on a road evacuating from or accessing to fight a fire.** In conditions like the Camp Fire, the potential fire would be similar in many locations. A combination of no fuel clearance, inadequate fuel reduction, inadequate buffer distance of reduced fuels, or infrequent re-treatment schedules results in dangerous fuel conditions along roads. There are many flammable structures close to the road, especially wooden fences, that can cause high heat for people on the road.


STOP
HIGHWAY 49


EMERGENCY
FIRE ACCESS ONLY
TO
NEWTOWN RD





- **Equipment and other means to treat roadside fuels often spread highly flammable, invasive plants to extensive nearby and other roads where the same equipment is used.** Best practices are rarely applied by private, local or state agencies for avoiding or limiting the spread of invasive, flammable plants, such as scotch broom, starthistle, and grasses such as barbed goat-grass. The exception is commercial logging equipment required to utilize weed wash stations when operating on federally managed lands. For example, Robinson Enterprises has a commercial weed-wash station that is used routinely for these operations.

- **There is inadequate knowledge of residents, visitors, and businesses on how, when, and where to evacuate safely.** Although there are many efforts to educate residents, there are still many that lack sufficient knowledge of what to do. There is a general lack of awareness of the impacts of hauling trailers and driving larger or extra vehicles on evacuation speed and timeliness. There have been highly effective past evacuation practice drills organized by the Fire Safe Council in coordination with fire agencies, OES, and the Sheriff's Office, that have resulted in greater knowledge and practice of residents in evacuations. However, these have been limited in scope, number, and have not been held recently.

- **While there are some measures and plans in place to assist vulnerable residents, such as low mobility and/or elderly or infirm persons, it is unknown if the measures are comprehensive enough.**
- **The county has a roadside hazard abatement ordinance, but it is limited in the distance that it applies and associated enforcement.** There is a general lack of awareness and knowledge on the part of private landowners and businesses on what the ordinance is, how it applies to them, why it is in place and how it is expected to enhance wildfire safety along roads, and wildfire response. There are no centralized, readily accessible ways for private landowners to submit access waivers to allow organizations and agencies to help do the required fuel reduction work and maintenance. The ordinance is limited in buffer distance from the road and does not provide for a sufficient distance to ensure Safe Separation Distance, preventing potential severe injury and fatality to people on the roads during wildfires.
- **The county requirements for permitting and associated allowed traffic control by private individuals or Firewise Communities or other entities is difficult to navigate, slow to obtain, and beyond the financial means of most volunteer efforts to do roadside clearance on their own.** An example was a joint project by the Salmon Mine-East Sages and Ananda Firewise Communities to clear along a less than ½ mile stretch of Tyler-Foote Road. This is a primary evacuation route on the San Juan Ridge, a county road and had not been treated by the county in several years and had overgrown vegetation immediately adjacent to and in some instances overhanding the road. After several months, the FWCs obtained the help of the Fire Safe Council in getting the county permit and providing professional traffic control that the county required. This was in August, in the peak of fire season, and the ability to use power equipment was extremely limited.

Community Collaborations

Many different organizations, agencies and private individuals are **actively involved and reliant upon each other** on a wide variety of projects and efforts to improve wildland fire safety in Nevada County. The organizations range from larger state, federal and county agencies such as CAL FIRE, the Tahoe National Forest, and Nevada County Office of Emergency Services (OES), Nevada County Sheriff's Office to many local non-profit organizations, Fire Safe Council, Firewise Community organizations, and special districts (i.e., Fire Districts, Nevada Irrigation District, Nevada County Resource Conservation District). The scope, focus and role of each of these entities involved with wildland fire safety varies with their size, mission, and available funding.

BLM, NRCS, Tribal Agencies

Organizational Capacity and Responsiveness. A key role of these larger entities is to provide financial resources in the form of grants and contracts to smaller organizations to complete projects and conduct small to large projects themselves. Smaller and non-government organizations play a significant role in planning, attaining funding for, and implementing many projects from small to large. The Fire Safe Council takes on the widest variety of projects ranging from education to coordination of Firewise Communities to on-the-ground hazardous fuel reduction projects. Other smaller organizations contribute in significant ways but with a more focused land base and type of project. This includes the Yuba Watershed Institute, focusing on collaborative projects with BLM. The State Park conducts a lot of fuel reduction treatment on state park lands and the Bear Yuba Land Trust and Tahoe Donner Land Trust undertake education and on-the-ground projects on land trust properties and conservation easements. Nevada Irrigation District actively manages their land. PG&E undertakes on-going projects along powerline easements. And other organizations are also engaged in on-the ground projects focused on fuel reduction, at least in part, including the Sierra Streams Institute.

- **There are several types of collaborations that currently occur in Nevada County related to community wildfire safety, each with their own strengths and weaknesses.**

Dominant Lead Agency

- Can work but has weaknesses/inefficiencies for many efforts
- Capacity or administrative hurdle, other entities can come in and fill that gap and be more effective

Equal Collaboration

- Transparency in mission
- Work together collaboratively decides who does what
- Can take more time up front but potentially saving time in the long run (pre-planning)
- Capitalize on the strengths of each organization
- Volume input by quality numbers
- Agile
- Benefit the finances and
- Value-added community capacity
- Diversity of backgrounds, responsibilities, abilities and more of the community's needs are met because more are involved and can meet the greatest needs of the community.

Independent Operations

- Get specific things done quickly, but not sustainable or necessarily benefit the whole
- Can lead to redundancies and conflicts
- Issues with oversight and accountability

Jurisdictional and multi-jurisdictional (statutory responsibility)

- Wildfire response
- Agency specific land management
- May have more constraints, related to the specific agency mission and requirements
- Funding can be up and down within one jurisdiction but together more even
- Benefits for multiple jurisdictions – projects toward a landscape basis
- Ties into the equal collaboration model

Situation

Variety of Organizations, Scope and Scale of Projects

- **A core strength of Nevada County is that there are many different organizations and agencies at all levels, from small to large, that are working on wildland fire safety issues.** This ranges from the board of supervisors' annual objectives, to focus on wildfire planning, preparedness, and response to education to fuel reduction to wildfire response.
- **The diversity of organizations and funding sources and projects they are involved in results in a wide variety of projects that occur in various parts of the county.**
- **While there are priority projects at the county wide or state-wide or other larger scales that are the focus of larger agencies and organizations, there are many other projects that are accomplished throughout the county in areas that are also at high fire risk that need attention and may be critical at a more local level.**
- **Some of the funding and work is not maximizing landscape coordination and benefit.**
    - Many individuals operating independently without coordination and accountability
- **Do not have a comprehensive project tracking system to determine if projects are meeting maximum landscape wildfire safety benefits.**
- **No accountability for individual agency's sphere of responsibility/authority mandate**
    - Ie. Fire response, regulatory oversight (such as timely environmental review and clearance)
- **Environmental analysis and clearance are a bottleneck to many projects and ability to capture many available grant sources.**
- **Agencies impose extra requirements than necessary or legally required to conduct a fuel reduction project.** This results in delays, sometimes several years or more, to get needed work done. It results in higher costs and degrades organizational relationships.

Organizations: Collaboration and Cooperation

- **There are many different collaborative and cooperative efforts related to wildland fire safety in Nevada County.** Most of the collaborations on hazardous fuel reduction. Fewer on education and outreach.
- **Excellent and close cooperation amongst wildland fire responders.**
    - Mutual aid and automatic aid agreements
    - Fire protection contracts
    - Existing cooperative efforts include the Municipal departments, the Fire Chiefs and law enforcement. This provides essential coordination in fire response and preparedness.
- **Most of the CWPP related projects and programs fall into the categories of Dominant Lead Agency, Independent Operations, or Jurisdictional Approaches.** There is little use of the equal collaboration approach, which has the greatest advantages. When it is used, it tends to be between one or several organizations.
- **There is a lack of effective information sharing, transparency, and opportunities for equal collaboration amongst all organizations.** This results in poor communication, duplicate efforts in applying for the same grant or effort, inefficiencies, and less coordinated work that gets done on the ground and in communities.
- **Lack of transparency—results in duplication of efforts, missed collaboration opportunities, or removed opportunities for smaller organizations that may be more agile.**
- **Inadequate agreements or lack of or lengthy negotiations for mutual organizational agreements.**
- **Inability by key community collaborators to agree on mutually beneficial contract language.**
    - Lost opportunity costs, delayed work.
    - Incomplete and poor communication amongst entities.

Finances

- **NGO's and special districts have difficulty attaining sufficient indirect costs to cover overhead.** Smaller agencies and non-governmental organizations do not get sufficient indirect costs to cover basic administration and their ability to survive
- **Different funding mechanisms and collaboration structures exacerbate this difficulty in covering indirect costs.**
    - Delays in payments—
        - either because of lengthy federal, state, and county agency requirements (that could be streamlined) or
        - multiple organizations that are organized in a hierarchical manner in a grant or other funding mechanism that requires chains of invoicing and reimbursement
        - Staff capacity can inhibit abilities to process payments – becomes a bottleneck in work getting done on the ground
        - Changes in staffing create shifting priorities and loss of institutional knowledge, resulting in delays in project accomplishment. Creates a need to repeat communication and agreements previously in place. Resets the project progress.
    - Lack of understanding by oversight agencies on requirements that do not need to be met but the oversight agencies assert that it does (i.e., prevailing wages) and requires additional, extraneous research. Lack of trust of professional knowledge amongst different organizations.

Capitalizing on larger efforts/Projects

- **Larger, block grant or biomass efforts spin or do not happen or opportunities not considered because there is a lack of coherent collaboration to meet that need (i.e., North Yuba).**
- **There is an incomplete capacity to apply for and attain funding for large, longer-lasting programs, such as the State Sierra Conservancy Landscape Block Grants.** There are limited equal collaborative efforts related to effective, shared decision making, and broad-based participation. There is no single repository for fuel reduction projects that would allow for effective administration. Comprehensive and sufficient resources and facilities are lacking to handle removed biomass and fuels. The Yuba Bear Land Stewardship Roundtable, comprised of key agencies and organizations directly involved with on-the-ground fuel reduction projects is in the process of developing some of this capacity for fuel reduction projects, especially area and fuel break scale projects.
- **If the county and different organizations came together to promote biomass, then there would be an increased chance of having a facility sooner.** Lack of a lead agency that has capacity and authority with intent and follow through to prioritize and follow-through with a biomass facility. There has not been prioritization in the county for making suitable land available (i.e. existing county owned property).
- **Some organizations and agencies prioritize taking credit for potentially collaborative projects over getting the work done.**
- **Some projects have time requirements that exceed the agencies timelines or people's tenure in that agency.**

Strategies and Actions

Now that the desired conditions for community wildfire safety have been identified, and the current situation assessed, strategies and actions can be developed to improve safety where they differ. In general, across the county there are improvements in wildfire safety and upward trends, but there remains a lot of work to be done.

The strategies and actions outline what work needs to be done and the best approaches and ways to achieve wildfire safety. In this document, the emphasis is on a broader framework that allows for flexibility to adjust strategies and actions as conditions and needs change over time.

This approach also takes advantage of the strength of having many different organizations, agencies and individuals all working side by side, often on different projects, that achieve the same end goal of a safe community. Specific projects, such as individual fuel breaks are described in an appendix.

As unique needs or opportunities arise, the list of specific projects can be updated continuously.

The strategies and actions are organized by the same primary components of community wildfire safety:

- Restoring and Maintaining Resilient Landscapes
- Promoting Fire Resilient and Prepared Communities & Infrastructure
- Increasing Wildfire Response Capacity and Effectiveness

And important to all three major components of wildfire safety:

- Fuel Treatment Capacity and Effectiveness
- Evacuation capacity and safety
- Post-fire Recovery
- Community Collaboration

Restoring and Maintaining Resilient Landscapes

Reaching desired landscape resilience levels requires multi-partner, all-encompassing approaches. There is no one priority project or organization that can achieve all the needed projects to reach landscape resilience.

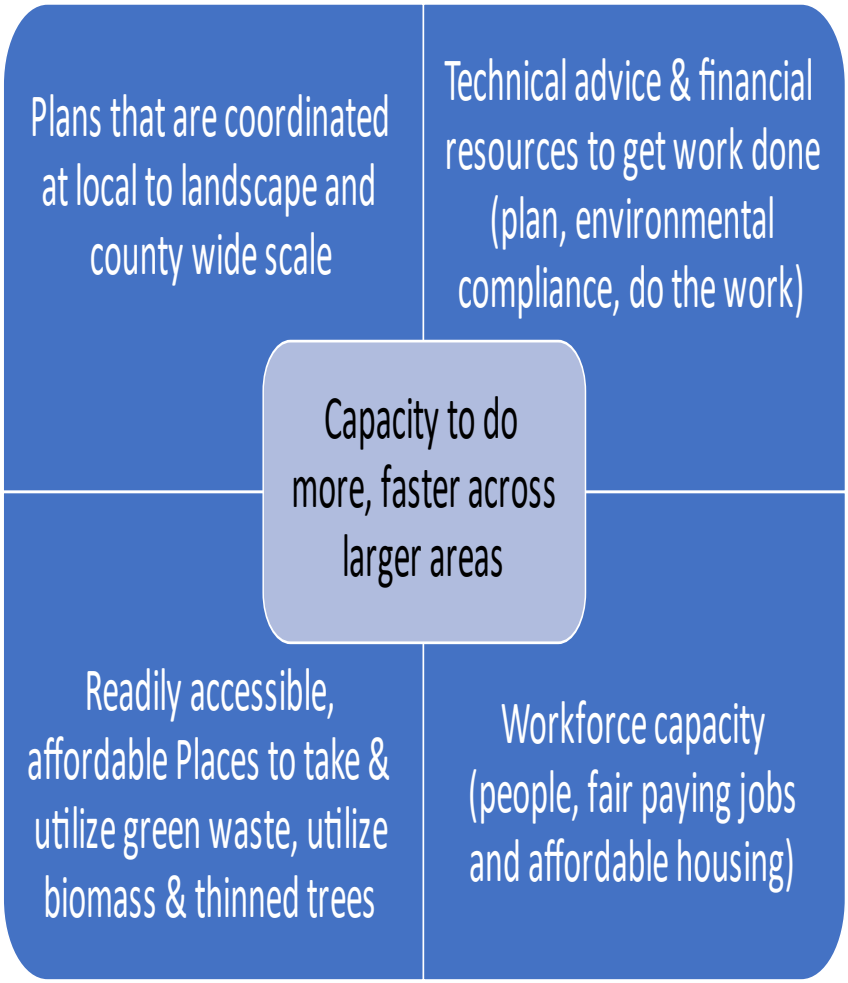
This also requires a capacity to improve landscape fire resilience across larger areas than is currently accomplished. Some key strategies to achieve this and potential actions are listed below.

There may be other ones that arise or are happening now that are single entity that would contribute to a greater whole if coordinated.

These strategies and actions are a starting point that needs to be continually evaluated and updated as conditions change, science and resources change.

In general, most of these strategies and actions have been identified or discussed. What is lacking is action that occurs in a timeframe that will result in needed resilience changes to the landscape at a pace and scale that will address the inevitably large, extreme wildfires, such as those in nearby counties.

Capacity to Improve Wildfire Resilience



Enhanced Fire Resilience Strategies Summary

1. Information Coordination and Project Efficiency

Landscape Treatment Coordination: Share updates on landscape treatments quarterly or in real-time to ensure alignment with goals.

Increased Project Efficiency: Improve the capacity to plan and implement projects rapidly with examples like:

- Creat**ing a landscape project resource hub f**or shelf-ready projects.

- Offering support for environmental assessments (CEQA, NEPA) on a sliding scale.

- Providing technical assistance (GIS, RPF, fuels/fire modeling) on a sliding scale.

2. Financial Resources Development **Finance Resource Accessibility**:

Make finance resources readily available for organizations and agencies to rapidly undertake fuel reduction and resilience projects, capitalizing on grant and funding opportunities for "on the shelf" ready projects.

3. Waste and Biomass Management

Green Waste Utilization: Increase capacity for affordable, accessible disposal and utilization of green waste, biomass, and thinned trees, both immediately and in the future.

4. Prescribed Burning and Fire Resiliency Tools **Enhanced Use of Prescribed Burning**: Develop capacity for all landowners to employ prescribed burning as a primary strategy for meeting strategic fire goals, especially for reducing non-native invasive plants.

5. Workforce Capacity and Collaboration

Barrier Reduction and Workforce Capacity: Identify and mitigate barriers to workforce capacity through collaborative efforts among non-profit, private, and agency groups.

Progress Troubleshooting Group: Form a team of key decision-makers to quickly identify and solve bottlenecks in processes, resources, or organizational relationships.

6. Regional Strategy Variation

Geographic Considerations: Tailor strategies and priorities to the specific needs and conditions of different county regions.

Additional Strategy: Adaptive Fuel Management

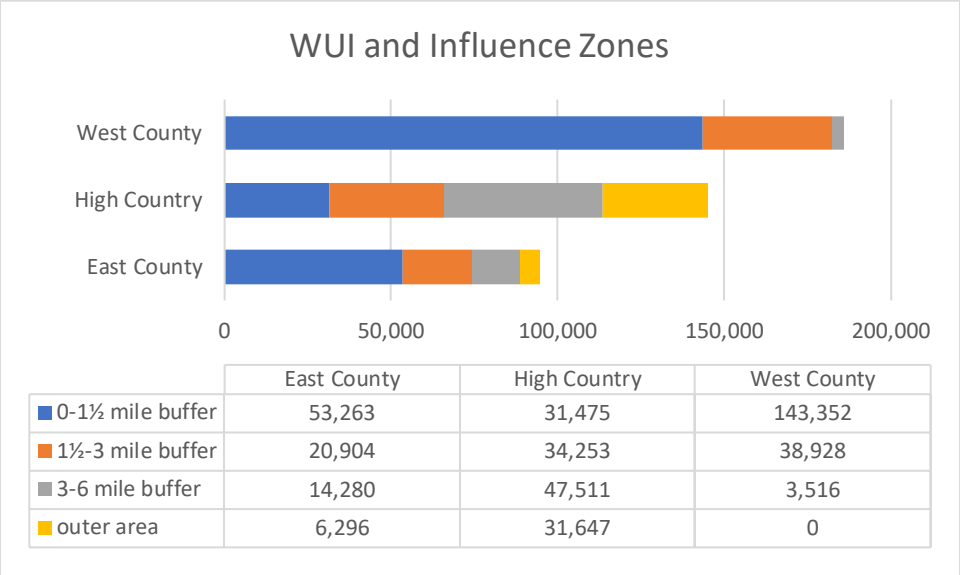
Monitoring and Adaptive Management: Implement a strategy for continuous monitoring of fuel conditions, including tree mortality, drought impact, and changes in fire season length. This should involve regular reassessment of landscape and fuel treatment plans to adapt to these dynamic conditions, ensuring resilience measures remain effective in the face of changing climate and vegetation health.

This organization and enhancement of strategies provide a comprehensive approach to promoting fire resilience, with an added focus on adapting to evolving fuel conditions to ensure long-term effectiveness.

Strategies

- **Coordinate and share information on planned and implemented landscape treatments**, **quarterly or real-time** so that goals are more likely to be met.
- Increase capacity to plan and implement projects rapidly and efficiently. Examples
    a. **Develop a landscape project resource hub to support development of shelf-ready projects**. Support for environmental assessments (i.e. teams to develop CEQA and NEPA on a sliding scale). Technical assistance (i.e. GIS, RPF, fuels/fire modeling) and advice available on a sliding scale.
    b. **Develop finance resources are widely available to organizations and agencies working on landscape or project level fuel reduction/resilience projects** to get work done rapidly and take advantage of grant or other funding opportunities dependent upon “on the shelf’ ready projects.
- **Developing more and sufficient capacity for affordable, readily accessible places to take and utilize green waste, biomass, and thinned trees is available immediately and soon.**
- **Develop capacity for all tools to improve fire resiliency including prescribed burning by all landowners (including private)** to meet national and state strategic fire goals and targets for prescribed fire treatments that reduce surface fuels and is a primary tool in reducing key, flammable and extensive non-native invasive plants (especially certain grasses).

- **Addressing and reducing barriers to having sufficient workforce capacity** are promptly identified and addressed by collaborative non-profit, private and agency groups.
- **Immediately form a progress troubleshooting group of decision makers and doers to identify bottlenecks and recommend immediate solutions in processes or resources or organizational relationships**.
- **Vary the strategies and priorities by geographic region of the county**.



	East County	High Country	West County
0-1½ mile buffer	53,263	31,475	143,352
1½-3 mile buffer	20,904	34,253	38,928
3-6 mile buffer	14,280	47,511	3,516
outer area	6,296	31,647	0

Actions

- **Organizations and agencies that are involved with land stewardship/resilience treatments commit to sharing location and basic treatment information**, following the format and data structure developed by the CA Wildfire and Forest Resilience Taskforce for state and federal land.
- **Identify lead organization(s) or entity to house, manage and share information**. May require pooling of funds or data expertise and capacity. Identify immediate and sustainable long-term data stewardship.
- **Responsible environmental compliance/regulatory agencies streamline environmental compliance review process** (county?), prioritize proving streamlined low-cost environmental compliance analysis documents to organizations and agencies involved in on-the-ground resilience projects.
- **A comprehensive approach to green waste and wood utilization is outlined in the extremely near future**, that combines all current individual approaches. Incorporates all scales of facilities and approaches from distributed very small to small facilities and operations (i.e. biomass boilers at individual schools or government sites, firewood distribution sites) to medium-scale (i.e. geographically distributed, across all parts of the county, facilities and operations (i.e. biochar, cross-laminated timber mills, green waste depositories, to large and very large biomass plants.
- **Provide education, training, and support to prescribed burning by private landowners and ranchers.** Provide outreach, hands-on education, and training in safe, responsible, and legal pile burns. Provide outreach, hands-on education and training, demonstration burns and technical support for safe, responsible, and legal broadcast or area burns to private landowners with parcels > 1 acre. Provide assistance to larger landowners (especially for more complex burns, such as late spring/early summer burns needed to control flammable invasive grasses). Education and training include practices and techniques to burn safely, legally,

and responsibly and includes permits, smoke management, planning, implementation, management, and post-burn monitoring.

- **Known barriers to workforce capacity are a consortium of agencies and organizations implements fast-tracked solutions.** Solutions that meet multiple barriers are prioritized. Access to affordable housing is accelerated and will enhance local resource use and employment.
- **A local task force of wildfire/fire agencies is formed to gather, review, and develop specific strategies and actions to address low-probability, high-impact wildfire events (i.e. canyons).** Utilize experience, case studies, and newer atmospheric-fire atmospheric interaction model studies. Assemble information on large-scale canyon area fuel mitigation treatments in other areas. Identify and strategize steps to implement larger, canyon area treatments including multiple potential approaches, building upon existing strategic treatments and projects (i.e., canyon rim fuel breaks, roadside fuel reduction enhancement), and realistic operational needs to accomplish.
- **At least 10-20% of the area within the Immediate and Near WUI Influence Zones should be treated every year until the desired resilience conditions are met.** This applies to all land ownerships (10-20% on private, 10-20% on federal, etc.)

- ***Home hardening***

- ***Evacuation Ready Roads***

    - Develop and follow best practices for more regular, intensive, and long-lasting fuel treatments that provide adequate safe separation distance
    - Facilitate easement agreements with individual landowners that can be in place and utilized regularly for roadside hazard reduction
    - PG & E
    - Develop a rating system for the level of fuel clearance, pullouts, and road surface drivability to apply to neighborhood, private, and county roads, and driveways to serve as an education and prioritization tool (see example from You Bet Firewise Community in Appendix X).
        - Develop an app that residents or others could use to make it user friendly.
        - Develop a road evacuation preparedness advisory visit and training program like DSAV
    - Support for removal of invasive flammable material.
    - County weed wash stations.

- ***Vulnerable Populations***
    - Develop support systems for vulnerable populations to get and maintain defensible space and evacuation readiness and systems in place.

- ***Notification Systems and Access***
    - Support fire districts, neighborhoods, Firewise communities in developing and enhancing the capacity for redundant notification systems
- ***Firewise and Fire Adapted Infrastructure***

    - Develop procedures and requirements so that public utility companies are required to remove all woody debris and excess project materials.
        - Ensure that PG&E is transparent about the option for people to check the box to remove wood.

- Education commercial property landowners on the defensible space requirements
    - Expand oversight and enforcement of commercial defensible space requirements
    - Encourage coordination and collaboration amongst municipalities and organizations to expand education and enforcement efforts
    - Develop a DSAV for commercial property owners

Actions

- ***Reach all Members of the Community***
- ***Defensible Space Preparedness***
- ***Home hardening***
- ***Vulnerable Populations***
- ***Notification Systems and Access***
- ***Firewise and Fire Adapted Infrastructure***
    - NID hydrants
    - Strategically placed water tanks

Increasing Wildfire Response Capacity and Effectiveness

Strategies

- Develop sustainable funding sources to increase staffing on existing fire apparatus
- Develop sustainable funding sources to create fuels crews in both Western and Eastern Nevada County
- Develop funding sources to increase number of staffed fire stations throughout the county that would reduce reflex time responding to emergencies
- Work with NID to increase the number of available fire hydrants throughout the county
- Develop sustainable funding sources to increase clearance and maintenance on both public and private roadways in Nevada county that would increase fire department access to emergencies and resident evacuations when needed

Actions

- Develop and identify advantageous locations for additional staffed fire equipment and crews
- Develop and identify advantageous locations for additional staffed fuels crews
- Research and apply for grants that could assist fire agencies to meet these staffing goals
- Solicit support from NID to increase footprint of municipal water supply in areas lacking constant water supply
- Research and apply for grants that could assist public and private entities to clear and maintain roadways

Fuel Treatment Capacity and Effectiveness *Strategies*

- Develop a multi-approach, multi-partner education program on the implications for potential fire behavior with different fuel conditions and levels of treatment completeness.
- Develop a taskforce to produce immediate, mid, and long-term ways and places for people to dispose of removed fuels. This includes thinned trees, biomass, chips, and other natural debris removed to reduce crown, ladder, and surface fuels.
- Develop hard timelines and specific roles and responsibilities for key parties and responsible agencies in development and support of biomass and other wood utilization facilities.
- Develop a specific, multi-partner plan, with concrete goals, objectives, actions, and timelines to expand workforce capacity for fuel reduction treatments in the county. Include consideration of needed support such as affordable housing, education, and training.

Actions

- Develop example areas in various parts of the county where residents can see what effective fuel treatments look like.
- Develop immersive, virtual reality or other tools and systems so that residents can visualize and experience what fire is like in different fuel conditions during the peak of fire season.
- Develop multiple locations throughout the county within a reasonable driving distance to temporarily hold fuel debris, biomass, and green waste while longer-term solutions are aggressively sought.
- County leadership must develop a county-wide requirement that utility companies remove all trees, debris and other biomass that is cut down or moved as a part of utility corridor hazard reduction projects in a timely manner. Include a requirement that the utility companies' forms have a default of material removal, and a full disclosure that is readily understandable of the negative impacts to leaving any debris or logs on site.
- Develop and provide education and training to residents in how to conduct different fuel reduction treatments including thinning, piling, pruning, prescribed burning, biochar, composting, chipping and mastication. Include the pros and cons for each of the treatment types and grant or other assistance resources available to landowners.
- Create a shared workforce pool, and associated MOU's, amongst varied partners, businesses, and landowners to get fuel reduction work done. This may include a vetted and current list of contractors, crews available for sharing amongst various organizations and agencies. This could include development of a local, county-wide wildfire safety Corp for younger people to develop skills and experience, while helping the community.

Evacuation/Fire Access Capacity, Safety, Strategic Value

Strategies

- Develop multiple approaches, using varied media (including virtual reality and AI) to educate the public, organizations, and agencies on the differences in fire behavior in untreated, partially treated, and treated areas.
- Strengthen the Hazardous Fuel Abatement Ordinance directed at making the target conditions Safe Separation Distance, reducing the risk of severe injury or fatality to persons on the roads during wildfires.
- Strengthen and make more specific county requirements for assessing and thresholds for the impacts of commercial and residential developments on wildfire evacuation capacity, traffic flows and safety.
- Make evacuation information more readily available and accessible to all residents and visitors of Nevada County.

Actions

- **Develop wildfire safe roadside condition descriptions (based on desired conditions- defensible space and fire behavior based- Safe Separation Distance) that are readily understandable by the public and contractors**
- **Create example areas throughout the county that meet roadside fuels desired conditions**, on different road types and vegetation/fuel types to provide as education and communication sites.
- **Develop and provide alternate funding sources and incentives for residents to do roadside fuel reduction regularly.** Micro grants. Property tax incentives.
- Greenwaste
- **Streamline and reduce or eliminate county barriers to private landowners and volunteer organizations conducting fuel hazard reduction work on county and private roads.** Reduce or eliminate traffic control and roadside fees and process for roadside work by volunteer organizations, such as Firewise Communities, or individual landowners. Develop and adopt a fuel hazard reduction and maintenance plan like the litter pick-up program. Develop a readily accessible and simplified process for landowners to provide easement access to agencies or organizations in helping reduce fuels on their part of an extended roadside buffer to ensure Safe Separation Distance.
- **Better utilize AI Evacuation Analysis Tools in land use planning**
- **Develop additional and innovative communication and education tools to increase awareness and knowledge of residents on what, when, where, and how to evacuate safely.** Expand modes of communication and use of AI evacuation planning and visualization tools.

Community Collaboration

Strategies

- Look at mini biomass and other wood utilization while longer, larger biomass and other wood utilization facilities
- Mediate workshop for a masterplan to implement the CWPP action plan
    - Strategic planning sessions with an outside entity: incorporating roundtable type approaches at different scales and areas of action
- Regularly align and prioritize projects in guiding documents (CWPP, LHMP, Unit Fire Plan, Tahoe Forest Plan) with wishes of agencies and communities. (ACTION is to update these guiding documents annually for alignment)
- Strengthen the Nevada County Biomass Taskforce.
- Create a market for excess biomass
- Encourage wood processing facilities of all sizes and types to get built and developed in Nevada County
    - Solicit cooperation of large timber companies and wood processing consortiums to facilitate development of wood processing facilities to achieve fuel reduction treatment residue removal.
    - Organize and develop an annual, geographically distributed Greenwaste drop-off system. Ownerships of all sizes could bring woody material.
    - Biomass facilities of varied sizes and locations
    - Biochar and air curtain burners
    - Cross-laminated lumber
    - Any other types of facilities that could be developed

- Leadership encourages transparent, equal oriented, communication, approaches, and accountability

- New regulations and insurance requirements have created more biomass (i.e. PRC 4291 expansion) that will come into play

- Prioritize and Take advantage economy of scale and ability for wood to be utilized for a county-wide project to treat miles and miles of roadsides, cutting trees to create safe fire egress and ingress, and strategic fire suppression value. Programmatic plan and project.

Actions

- Partnership amongst agencies and organizations to purchase and organize larger biomass processing locally.
- Regular, face-to-face meetings amongst collaborators specific to each project.
- Develop a forum of organizational leaders at the operational director level, with a narrow focus, involved with fuel reduction that get together in a facilitated way that create coordination, collaboration, and communication
    - Share updates on current projects
    - Regular, collaborative meetings for pre-planning.
    - Discuss collaborate opportunities
    - Provide information for shared project database.
    - Sets achievable and firm timelines for projects to start and complete
- Develop, adopt, and agree to best collaboration practices (such as)
    - Sets achievable and firm timelines for projects to start and complete

    - Regular face to face communication
    - Consider IMT type structure and process to some of larger fuel mitigation or other joint efforts where it is useful and applies
        - With checks and balances:
        - Allows for delegation of authority
        - Roundtable would inform that structure

- Specific to fire hazard reduction – improve capacity for effective collaboration and cooperation
    - Refer to the alignment
    - Communication the CWPP and what it contains

- Collaboration on education and wildfire safety awareness

- Develop best practices based on most current models

Combing it All: Integrated CWPP Planning Zones

There are diverse ways to classify the county into areas that share common considerations for planning community wildfire protection and safety.

This can include individual towns or Firewise Communities to broader groupings such as south county or east county or county supervisor zones.

A common approach in CWPPs (Community Wildfire Protection Plan) is to develop priorities across large areas, such as a county. In Nevada County, there are many areas that are important throughout the county, even with the westside or eastside areas.

Typically, priorities across larger areas focus on the most densely populated areas. In Nevada County, many of the residents live in large areas that are less densely populated. Residents in all areas have priorities for community wildfire protection.

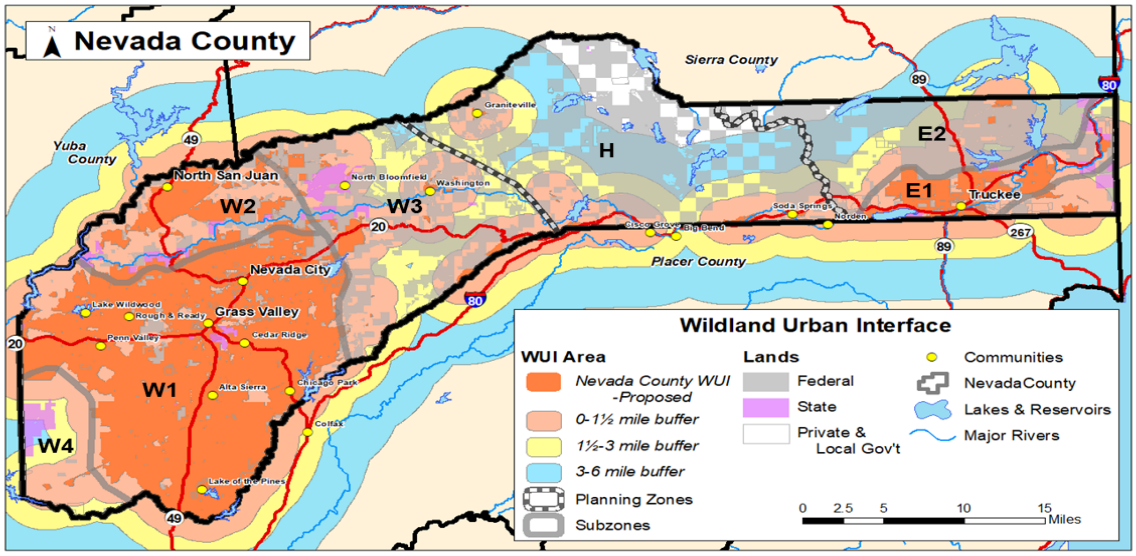
An approach that is based on different areas within the county with common factors affecting potential fire and communities at risk, allows multiple priorities to be developed that address fire protection needs in all parts of the county.

For this CWPP Framework, the combined patterns of the number of structures at risk and factors that affect potential fire were used to develop integrated planning zones (Figure x below).

These include location in the county, the amount of WUI and influence zones, vegetation and fuel type, and other influences on potential fire behavior such as topography (canyons and slope steepness).

The priorities for community wildfire protection projects, strategies and actions differ for each area.

CWPP planning zones for prioritizing projects, strategies, and actions. Vary with location in the county, amount of WUI and structures at risk, fuels, and factors that influence potential fire behavior and impact.



Common 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/action types
Eastside				
1 – Truckee area	WUI – developed area & immediate influence zone	Eastside pine, sage, grass and large meadows, high elevation conifer and rock	Flat and canyon	• 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	• 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 and outer influence zones	High elevation conifer, meadows, rock	Canyons, steep and sloping	• Buffers around developed areas & key infrastructure • Evacuation routes
Westside				
1-Dense developed	WUI-developed area	Landscaped vegetation, conifer & hardwood forest,	Drainages, canyons and moderate to	• Strategic fuel breaks • Evacuation routes and areas

		oak/grass woodlands, meadows & pasture.	gently sloping	• 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	• 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	Localized WUI and immediate influence zones, outer influence zones	Conifer forest	Steep canyons and broad ridges	• Buffers around developed areas & key infrastructure • Evacuation routes
4-Rural west county	Influence zones		Mostly gentle, drainages	• Buffers around developed areas & key infrastructure • Evacuation routes • Manage large, open areas to reduce and maintain low fuels (i.e. grazing and prescribed burning)

Summary

Overview

Fire Agencies with responsibility areas over private lands were queried for their input on this CWPP. A copy of that questionnaire is attached at the end of this document.

While CAL FIRE has the primary responsibility for wildland fire control on private lands there are significant contributions made by federal and local resources. Automatic aid allows closest resources to respond to fires outside of their responsibility areas. All fire agencies also participate in mutual aid and may have additional agreements that allow for response as requested by the agency having authority.

Response Capabilities

The collective response capabilities are summarized below and are listed by peak staffing periods available in Nevada County. Many agencies have additional resources that are available, this listing only includes staffed apparatus. "Cross staffed" indicates that a resource can be responded to in place of another depending on the need.

Agencies listed that are "volunteer" also make considerable contributions to emergency response but have varying levels of response capabilities. Most, if not all, volunteer agencies respond to emergencies with multiple personnel and apparatus.

AGENCY	RESOURCE TYPE	NUMBER AVAILABLE
CAL FIRE	Air Attack Fixed Wing	1
	Air Tanker	2
	Fire Engine	8
	Hand Crew	Currently 4 – max 7
	Bulldozer	1
USFS	Air Attack Fixed Wing	1
	Helicopter	1
	Fire Engine	7
	Water Tender	2
	Hand Crew	1
Nevada County Consolidated FPD	Fire Engine	4
	Water Tender	2 – cross staffed
	Type 6 Engine	1 – cross staffed
Rough and Ready FD	Fire Engine	1
Penn Valley FD	Fire Engine	2 – cross staffed
	Water Tender	1 – cross staffed
	Ambulance	2 – cross staffed
Higgins FD	Fire Engine	1
Ophir Hill FPD	Fire Engine	1 – cross staffed
	Water Tender	1 – cross staffed
AGENCY	RESOURCE TYPE	NUMBER AVAILABLE
Peardale / Chicago Park FPD	Fire Engine	1 – cross staffed
	Water Tender	1 – cross staffed
Grass Valley/Nevada City FD	Fire Engine	3
	Truck	1 – cross staffed
Truckee FPD	Fire Engine	4 – cross staffed
	Water Tender	1 – cross staffed

	Ambulance Truck	4 – cross staffed 1-cross staffed
North San Juan FPD	Various	volunteer
Washington	Various	volunteer
Graniteville Fire Company	Various	volunteer

Fire Service Questionnaire

The questionnaire sent out to fire agencies had 3 basic categories and a place for general input. The categories were fuel reduction projects, education, and staffing.

Fuel Reduction

Fuel Reduction was further broken down to request

- *General Wildland Urban Interface (WUI) areas or communities that could benefit from fuel reduction*
- *Shaded fuel breaks that could be created or improved to slow or prevent fire spread and would also be a tactical priority*
- *Fuel reduction projects that could enhance evacuation or access of emergency equipment*

General Fuel Reduction Areas

Some of the areas identified were large communities with a dense population while others were more remote. The areas that had more mention than others were as follows:

- Cascade Shores
- Deer Creek below Nevada City
- You Bet Rd.
- Banner Mountain
- Greenhorn Rd.
- Lake Wildwood
- Lake of the Pines
- Alta Sierra

Multiple other WUI areas were identified in no particular order:

- Shady Creek area
- Malakoff Diggins State Park

- Woodpecker Ravine
- Brooksview Acres
- Osborne Hill
- Retrac/Wolf Mountain
- North Bloomfield/Lake Vera Rd.
- Morgan Ranch
- Champion Mine
- Glenshire/Devonshire
- Armstrong Track
- Hobart Mills and Klondike Flat
- Yuba Pass/Cisco Grove
- Sunshine Valley
- Rough and Ready Rd.
- Wolf Rd.
- Manion Canyon Rd.

Potential Shaded Fuel Breaks in Tactical Priority Areas

Fire agencies identified areas where a shaded fuel break could be constructed to create tactical priority areas. In other words, if there were an area where a fire would start and spread rapidly, where could a shaded fuel break be created ahead of time to expediate and make suppression efforts more effective. Many ridge lines and roadways were identified. Some remote areas may also require construction of a fire service road to enhance access and maintenance. Below is a listing of those areas:

- South Yuba River Rim – both North and South sides of the canyon
- Newtown Rd./Bitney Springs
- Mt. Olive Rd.
- Osborne Hill
- Ponderosa Way
- Lowell Hill/Chalk Bluff Rd.
- Jones Ridge
- Spenceville Wildlife Area
- Harmony Ridge

- Pet Hill/Houghton Ranch Rd./Bald Ridge
- Buckboard Rd./Buck Mountain Rd.
- I-80 from the Donner Summit to Nevada State line
- Glenshire Dr./Martis Peak Rd./Juniper Hills/Waddle Ranch
- Brewer Canyon
- Bear River Canyon from Hwy 49 to Dog Bar Rd.
- South side of Middle Fork Yuba River Canyon Hwy 49 to Rice's Crossing
- Oak Tree Rd. and Tyler Foote Rd. from North San Juan to Hwy 49/Birchville Rd.
- Yuba River drainage from Hwy 49 to Edwards Crossing
- Rattlesnake Rd.

Some areas were also identified that might take advantage of fuel reduction to create a Temporary Refuge Area (TRA). These areas have a large population that may make a rapid evacuation difficult and a TRA may be advantageous where wildfire threatens the community. The agencies identified Cascade Shores, Banner Mountain, Alta Sierra, Rough and Ready, and Round Mountain Ranch as some communities that could be considered.

Evacuation Routes

Fire agencies identified areas where fuel reduction could complement evacuation to make it safer in an emergency. This fuel reduction would also allow emergency equipment to access the area concurrent with an ongoing evacuation. Other advantages could include reduction of potential obstructions to free access and egress (e.g., trees falling and blocking roadways), reduction of flame impingement on roadway, reduction of level of heat experienced along roadways by residents evacuating or firefighters responding to a fire, reduction of ignition potential along roadways, and support of fire containment to reduce spread of fire. As above, some areas received multiple recommendations as priority areas. Below is a listing of those areas:

- Banner Lava Cap/Idaho Maryland Rd./Red Dog Rd.
- Dog Bar Rd.
- McCourtney Rd./Wolf Rd.
- Lake Vera Purdon Rd.
- North Bloomfield Graniteville Rd.

Other roads in the county that were mentioned as a high priority are:

- Tyler Foote Rd.
- Birchville Rd.
- Lower Colfax Rd.
- Retrac Way

- Mt. Olive Rd.
- Brewer Rd.
- Ponderosa Way
- Squirrel Creek Rd.
- You Bet Rd.
- Willow Valley Rd.
- Scotts Valley Rd.
- Hidden Valley Rd.
- Old Auburn Rd.
- Magnolia Rd.
- Brookview Acres
- Brooks Rd.
- Osborne Hill Rd.
- Hwy 174
- Hwy 49 Grass Valley South
- Interstate 80 through Nevada County
- Pleasant Valley Bridgeport to Troost Trail
- Pasquale Rd.
- Glenshire Dr. Truckee to Interstate 80

Fire Safety Education

Agencies were asked what their focus is for Fire Safety Education. In their contact with the public do they focus on casual meetings, formal events, social media, or any other processes to educate the public. We want to know the best way to contact the public and educate about fire safety. We received some great input that can be categorized into three individual classifications.

- *Professionally produced handouts or flyers*
- *Formal meetings that include wildfire and/or evacuation as agenda items*
- *Items to hand out at events that draw people in while they have conversations about fire safety*

Professionally Produced Handouts

Over the last few years, the public has received a “Wildfire Season Guide” at large community events like the fair or with their local newspaper, but a better form of distribution must be identified to ensure a larger percentage of the public receives this document. This guide is a collaboration of many local agencies and organizations, including Nevada County's Fire Districts, Fire Safe Council of Nevada County, the Tahoe National Forest, Nevada Irrigation District, Nevada County's Office of Emergency Services, Nevada County Sheriff's Office, and more that has information and tools for wildfire safety.

Nevada County OES also produces a “Ready, Set, Go! Handbook” as a guide to wildfire safety and emergency preparedness.

This popular handout is made available at formal events and entry distributions at many locations throughout the county. Residents have information and check lists available in this document to centralize and have quick access to information they may need in an emergency.

State, Federal, Non-Profit, and insurance companies also produce information that is useful for wildfire safety and preparedness. Many handouts have valuable information but may be dated.

Our local fire agencies indicated they would like annual updates and increased availability of these handouts. All agencies indicated they would be willing to add and update content but did not have funding to produce documents on their own.

Regular Public Meetings

Agencies referenced the Town Hall style meetings in the year after the Camp Fire devastated Butte County. Attendance was excellent and the public received information from the experts on how to make their home and community safer from the effects of wildfire and increase resilience. These meetings should be regularly scheduled and early in the year to prepare for the wildfire season. Subjects requested would include fuels reduction programs and opportunities, home hardening, benefits of fire in the ecosystem, burning regulations, yard work safety, the evacuation process and tools, and map production that shows main evacuation routes.

The benefit of social media and traditional media to announce these meetings cannot be understated. Nevada County has shown to be increasingly difficult to reach all its citizens. All media resources, including mailers, should be used to publicize informational meetings.

School education was also mentioned to conduct public meetings and broaden education of wildfire safety. Fire agencies identified the need to educate school age children to reduce wildfires in the future. Local fire agencies can provide entertaining and informative educational programs if supported with age-appropriate educational material.

Promotional Products

Free promotional products help your fire department increase community awareness about fire safety, get fire prevention messages into news stories, and share information about fire and other safety issues that threaten lives in your community. Whether a large or small public event, including school presentations, promotional products were identified as an effective way to start conversations. The opportunity to provide a gift allowed experts to start a conversation about wildfire safety. Promotional products can be educational and entertaining such as a coloring book for young children. Distribution of these types of products can be used to make learning about fire and burn prevention and

life safety issues fun, entertaining, and non-threatening. Adults can be drawn to conversations with useful products like scarves or bags with checklists and pens that reference websites. The draw of these products allows the experts to initiate longer conversations about fire safety. Property owners can then leave with even more informative fire safety brochures and information to reduce the community wildfire threat in their area.

Fire Prevention Programs

Local agencies do participate in fire prevention programs addressing wildfire prevention and reduction throughout the county. The most successful programs have been free green waste disposal and free chipping. Many residents take advantage of the green waste programs available to dispose of their unwanted waste. Residents can transport green waste from their property to a community drop-off spot. At the disposal site workers have assisted the residents to unload their green waste. This program has been a huge help to the residents that want to dispose of green waste and do not want to burn or chip their materials. This free program is a huge advantage to disadvantaged communities and allows residents to reduce fuels and manage their property economically. This program is limited by available funding is not available all year. The free chipping program also allows residents to reduce fuels and is available year-round. Residents can cut and pile unwanted green waste in an area the chipper can access and choose to have the chips broadcast over a large area or piled for their later use. Both programs have a limit to the size of the rounds that can be processed. Invasive species such as Scotch Broom, poison oak, and blackberries cannot be accepted with either of these programs.

Fire extinguisher programs also are a high priority to support. This includes supply of extinguishers to the public and training. Some local agencies can support training at public events or safety fairs to demonstrate the safe use of fire extinguishers. If training can be combined with supply of fire extinguishers it may be possible to extinguish a small vehicle or debris fire before it spreads to the wildland.

Recommendations from local fire also suggested having trailers with hand tools and equipment available for road associations and communities to rent. This program could supply groups of people with tools that they could use to reduce fuel and clear evacuation routes. Once a group organized a fuel reduction event, the ability to supply tools could reduce one complexity for organizers. The process for registering for the use and renting the equipment also gives another opportunity to educate the public about correct methods of planning and clearing fuel breaks and preventing the spread of wildfire.

Truckee Fire can reimburse its citizens for the rental of green waste containers. These containers are delivered to a property, the homeowner fills the container with unwanted green waste, and then it is removed by waste management. Outside of Truckee there is not any available funding for this program but expanding it is another method of helping property owners to annually reduce fuels around their property. Initially the cost could be charged to the property owner and reimbursement could be issued after the work has been completed.

Additional Opportunities

Agencies were given the opportunity to comment on any other opportunities that might add to wildfire safety and resilience and what could be included in a CWPP. Multiple agencies listed available funding as an obstruction to increased resilience. Grants assistance to put the money to work is an essential need. Some property owners can fund annual clearance of their property. Property owners who are financially or physically unable to reduce fuels annually could benefit from grant funding that reduces fuels on their property. A cooperative effort should be executed to combine grant efforts and apply them with groundwork to reduce fuels. Grants should be a combined effort to

orchestrate the best outcomes and prioritized through recommendations by agencies. Government purchasing processes can slow the implementation of actual groundwork so consideration for lead agency should be considered in the application process.

Another opportunity to increase wildfire safety listed by some agencies was to improve evacuation routes. Road clearance of public roads is not kept up with annual growth of the vegetation despite increased grant funding above the budgeted county maintenance. County funding also does not allow for the multiple private roads to benefit from county road crews. Any program that clears and improves evacuation routes could add to the safety of evacuation from wildfire. Examples were listed such as annual clearing of roadways from winter storm damage and annual growth. Another example listed was to increase major roadways, such as Hwy 49, used during evacuations to two lanes each direction from Grass Valley to Auburn. This increased capacity could aid with evacuations and get citizens to safety.

A neoteric idea introduced to help the community was to construct a biomass cogeneration plant. Cogeneration is the simultaneous production of electricity and heat using a single primary fuel. Biomass cogeneration uses waste wood as fuel. Residents could deliver their unwanted yard debris to a collection site and the products could be utilized by the cogeneration plant to produce electricity while reducing the unwanted fuel. The availability of a local biomass cogeneration plant allows for residents to have a regular spot to dispose of annual yard debris and storm damage into the future.

Staffing

Firefighters on the ground extinguishing the fire is one of the most powerful defenses that can be provided to the public during an active firefight. Staffing can also be useful ahead of the fire to reduce fuels and improve escape routes. Agencies balance budgets with the demands of emergency response.

Recommendations from the fire agencies in Nevada County for staffing can be listed in two major categories.

- *Standard staffing model*
- *Local Fuels Crews*

Standard Staffing Model

Emergency response effectiveness is driven by four factors: 1) land management practices, 2) existing environmental conditions, 3) equipment resources available to fight a fire, and 4) the number of firefighters dispatched to an incident. When one variable is unbalanced (e.g., extreme environmental conditions or insufficient staffing) the result is an inability to effectively contain wildfires. Adequate resources and staffing to combat wildfires also directly impacts meeting fire suppression goals. Suppression failures happen when the resources available for an initial attack response are ineffective or insufficient at controlling the fire. This can occur when firefighting resources throughout a region are spread too thin due to excessive activity or when adequate resources are not provided, particularly at the outset of a wildfire event.

Dr. Rahn of Southern California conducted a study of wildland firefighters in 2010. Rahn (2010) staffing study was used to assess initial attack effectiveness under various staffing levels and environmental conditions. The results suggested that by increasing the number of firefighters on an engine, the efficiency, effectiveness, and the overall ability to potentially control a wildland fire significantly increased, thus enhancing emergency response and the ability to protect California from modern wildfires. This preliminary study also has serious implications for firefighters' health and safety. The most startling difference was the peak heart rates recorded by a three-person engine. During these trials, these firefighters had to travel ½ a mile longer than a four-person engine on the same 2,000-foot hose lay to resupply and complete the

task. Furthermore, adding a single firefighter to a three-person engine resulted in faster completion times that were up to 50 percent faster.

Firefighters on a three-person engine also sustained peak heart rates of over 220 beats per minute, well beyond acceptable limits, increasing the risks of complications and tachycardia.

Engine companies in Nevada County typically have two personnel on local government resources, three personnel on CAL FIRE engines, and five on USFS engines.

Variations of these numbers exist for staffing changes that can increase or decrease this number.

Examples can be increased staffing for summer months with seasonal staff and staffing decreases with dynamics of sick calls, training commitments, and vacations.

The goal would be to achieve four-person engines at some point but at least reach three-person engines to reach industry standards throughout the county.

Local Fuels Crew

Fire agencies suggested the county may benefit from a local fuels crew.

This crew would work year-round to reduce fuels and complete various fuels projects to reduce wildfire threat and increase resiliency throughout the county.

This crew's primary function would not be wildfire response but to concentrate on fuel reduction.

Both CAL FIRE and the USFS have fire crews that conduct fuels reduction work while not committed to wildfire.

There was no desire to replace those crews but rather to augment fuel reduction efforts.

During active fire seasons local hand crews can be deployed to other areas of the state which limits ongoing fuel reduction efforts in Nevada County.

Projects also can be interrupted by a fire crew responding to local fires which also will delay completion of projects.

Consideration of crew sponsorship should allow for any fuels crew to work on private roads and property.

Agency crews have limited ability to be assigned to private property projects while there is a substantial need for that work in the county.

The availability of a local fuels crew could meet many of the fuel reduction needs in the county and was widely supported by many fire agencies.

The goal would be to have the crews on the west and east side of the county.

These crews could eventually be certified to augment fire response in times of extreme drawdown of other resources but initially should concentrate on fuel reduction.