# Genesee Valley Wildfire Restoration Plan
# Plumas County, California

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**Summary**

This Genesee Valley Wildfire Restoration Plan outlines a stewardship strategy for a 33,000-acre planning area encompassing Genesee and Franks Valleys, the Wheeler Peak Unit of Mud Lake Research Natural Area, and adjacent areas. This plan addresses wildfire risk and restoration opportunities on public and private lands and aims to facilitate collaboration and community involvement in the management of these lands. There is an imminent threat of wildfire to residences in the planning area due to the very high fuel load in forests surrounding Genesee Valley. The purpose of this plan is to bring collaborators and landowners together to accomplish more forest thinning on private lands and adjacent national forest, particularly in the Wildland Urban Interface, and with innovative approaches such as green firewood cutting areas. The plan also proposes the establishment of under-burn areas in the Wildland Urban Interface for long-term maintenance of forest fuels. A critical finding of the planning process is the urgent necessity of Genesee Valley area forest restoration planning and implementation by the Plumas National Forest. This plan's development was funded by the National Forest Foundation Community Capacity and Land Stewardship Program. Input and other assistance was provided by project partners and collaborators including the Feather River Land Trust, Feather River Resource Conservation District, Greenville Rancheria, Plumas National Forest, and private landowners.




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*Funding provided by*

*Founded by Congress in 1991, the National Forest Foundation works to conserve, restore and enhance America's 193-million-acre National Forest System. Through community-based strategies and public-private partnerships, the NFF helps enhance wildlife habitat, revitalizes wildfire-damaged landscapes, restores watershed, and improves recreational resources for the benefit of all Americans.*

*The following partner organizations provided input and other assistance*

Greenville Rancheria

Feather River Land Trust

Plumas National Forest

Feather River RCD

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# Introduction: Purpose and Need

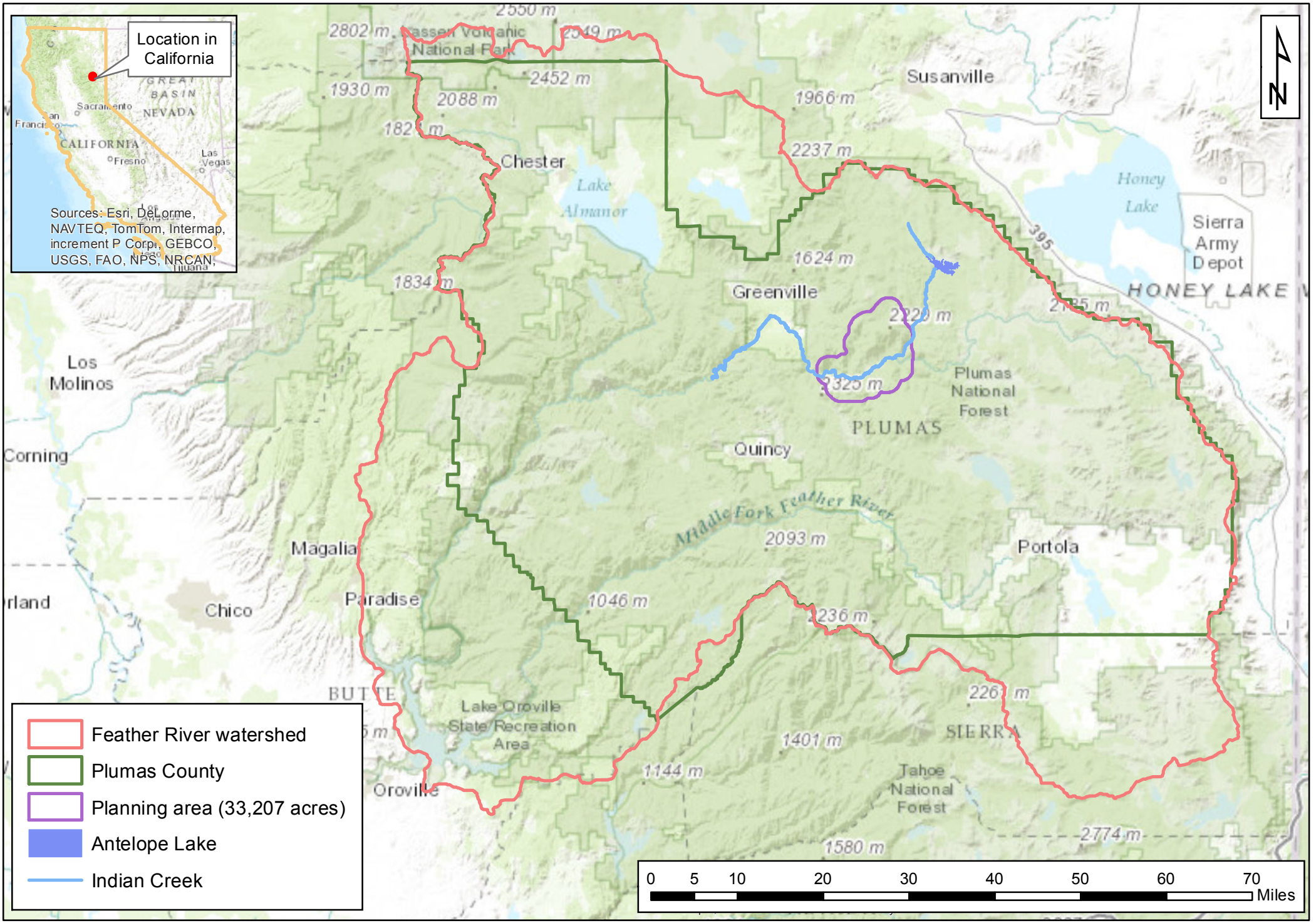
The purpose of this plan is to facilitate collaboration and community involvement in the management of a 33,000-acre area encompassing Genesee and Franks Valleys, the Wheeler Unit of Mud Lake Research Natural Area (RNA), and adjacent areas (Figure 1). Plan goals include creating a mosaic of different fire regimes and related habitats and biodiversity on the landscape and applying management actions on a site-specific basis while considering all relevant information. Specific objectives include reducing the threat of wildfire to residences in the planning area through forest thinning and under burning prioritized based on FlamMap and FRI maps, developing a plan to regenerate Baker cypress in the Wheeler Unit of the Mud Lake RNA with moderate to high-severity wildfire, managing for tree and under-story plant species diversity as well as age class heterogeneity, and maintaining community outreach and education efforts that foster collaboration and help build consensus. Project collaborators, including the Feather River Land Trust, Feather River Resource Conservation District, Greenville Rancheria, Plumas Audubon Society, Plumas Firesafe Council, and Plumas National Forest, have been working for the last eight years on private and adjacent federal lands to reduce fuel loads through thinning and under-burning.

Genesee is listed as a Community at Risk in the Plumas County Communities Wildfire Mitigation Plan (PCFSC 2013) and the CAL FIRE Unit Strategic Fire Plan: Lassen-Modoc-Plumas (CAL FIRE 2014). Millions of acres of forest in the northern Sierra Nevada are classified as 'high priority' by CAL FIRE for treatment to prevent severe wildfire threats. In fact, 74% of Sierra forest land has not had a single wildfire or prescribed burn in the last 103 years (Kocher and Beckwitt 2012). Restoring wildfire in the Feather River watershed requires collaboration between private land owners and public land managers. More than 75% of the land area in Plumas County is managed by the USDA Forest Service and over 20% is privately owned (Kocher and Beckwitt 2012).

Fire plays an integral role in Sierra Nevada ecosystems, but high-severity forest can pose a threat to people and natural resources (Buckley et al. 2014). Proactive forest management can reduce the risks of high-severity wildfire and is important because the economic benefits of landscape-scale fuel-reduction treatments far outweigh the costs of some wildfires (Buckley et al. 2014). Recent wildfires in California have destroyed lives and property, degraded water quality, damaged wildlife habitat and cost hundreds of millions of dollars. For example, the 2013 Rim Fire in the central Sierra Nevada burned nearly 257,000 acres and cost more than 127 million, not including the costs to the economy and tourism (Buckley et al. 2014).

In the northern Sierra Nevada, including the Plumas National Forest, fire activity in the last 15–20 years has been higher than in the rest of the range (Collins 2014). Since 2000, there have been three mega-fires (covering more than 10,000 ha) on the Plumas National Forest, burning a total of 73,000 ha (Stephens et al. 2014). These fires burned predominantly in mixed-conifer forests, encompassing approximately 60 California Spotted Owl territories (Stephens et al. 2014). Cumulatively, 34% of the area burned in these three fires suffered high-severity fire (more than 95% dominant tree mortality; Stephens et al. 2014; Miller et al. 2009).

Figure 1. Location of the Genesee Valley Wildfire Management Planning Area in Plumas County and the Feather River watershed.




Map by Plumas Audubon Society, March 2015

## California's Forests and Fire

California's Mediterranean climate of mild winters and long, dry summers favors fire. Forests in California evolved with fires that accompanied extended dry periods. Ponderosa pine (*Pinus ponderosa*) and black oak (*Quercus kelloggii*) forests historically experienced fire every 11 years on average (Table 1). Both of these species have adapted to low-intensity, frequent fire. Ponderosa pine have a very thick bark and drop low branches (self-pruning) to remove ladder fuels. Black oak are not as resistant to fire as ponderosa pine, yet are resilient. In addition to lightning-caused fires, Native Californians used fire as a tool to remove vegetation, manage plants for the production of food and materials, and to improve wildlife habitat (Cunningham 2007). Many native Californians used acorns as a staple of their diet. Fire was used to clear areas beneath oaks so it was easier to collect acorns and to reduce insect infestation and improve the quality of the acorn crop.

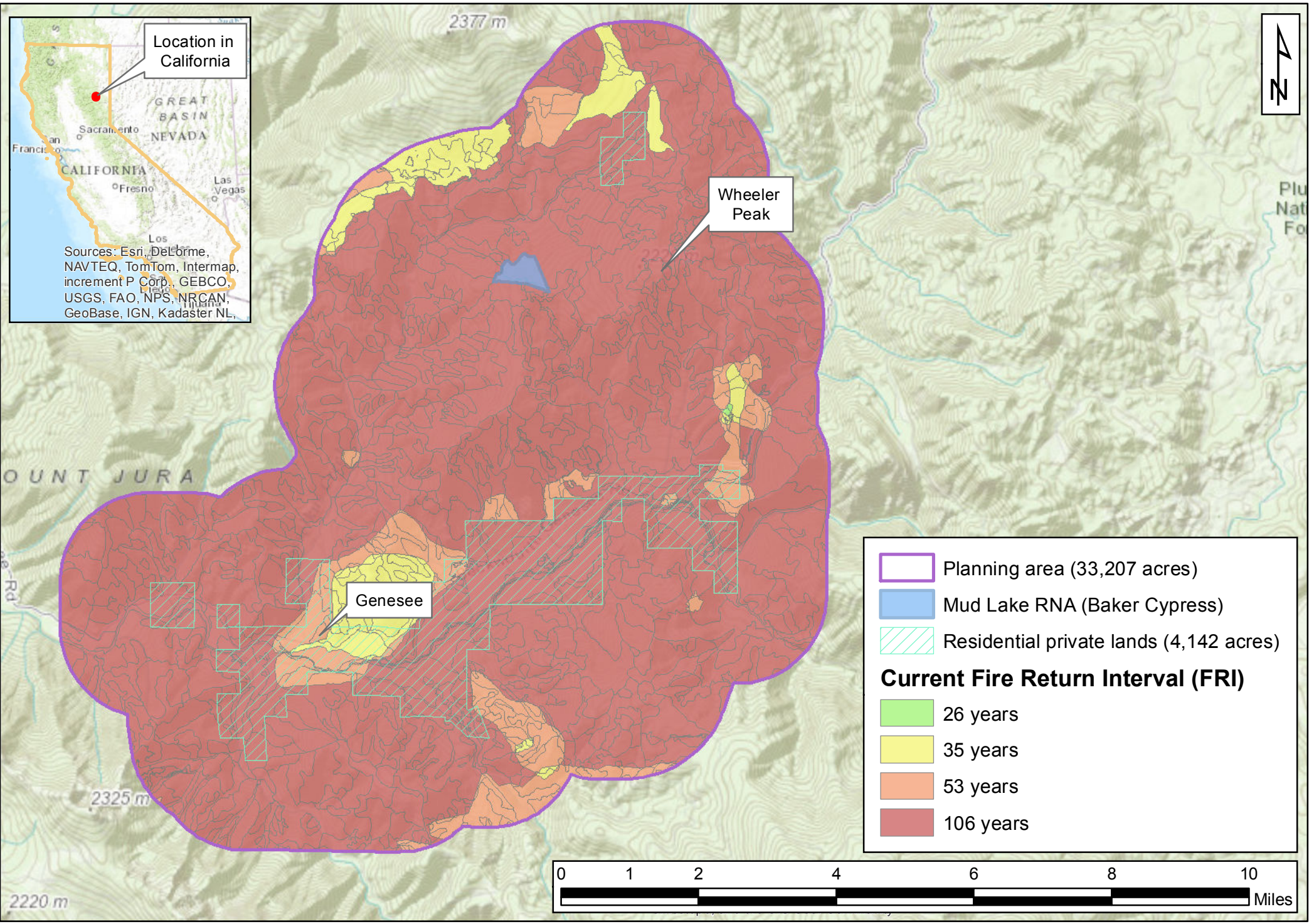
Dendrochronology, the science of dating events by using the characteristic patterns of annual growth rings of trees, has been used to evaluate fire scars on trees and determine the frequency of fire in different vegetation types (Moody et al. 2006, Van de Water and Safford 2011). The mean Fire Return Intervals (FRIs) for productive drier forests including yellow pine, dry and moist mixed conifer, and oak woodland (7-12 year FRIs, Table 1) were the lowest of all forest and shrub lands in California (Van de Water and Safford 2011). That means that most of the forest and shrub lands in the Genesee Valley planning area are among those vegetation types in California that burned most frequently prior to Euro-American management.

*Table 1. The average prehistoric (~1500-1850) Fire Return Intervals (FRI) for forested and shrub land in the Genesee Valley planning area (FRIs from Van de Water and Safford 2011).*

| Vegetation type | Associated species | Average FRI | FRI range |
|---|---|---|---|
| Yellow Pine | Ponderosa, Jeffrey, and sugar pine, black oak | 11 | 5-40 |
| Dry Mixed Conifer | Ponderosa and sugar pine, incense cedar, white fir, black oak | 11 | 5-50 |
| Moist Mixed Conifer | White and Douglas fir, incense cedar, ponderosa, sugar, and lodgepole pine | 16 | 5-80 |
| Aspen | Aspen, various conifers | 19 | 10-90 |
| Montane Chaparral | Manzanita, huckleberry oak, chinquapin | 27 | 15-50 |

The Current FRI map shows the majority of the planning area has not had a fire since fire history records began 105 years ago (Figure 2). With a backlog of over 100 years of vegetation growth, the Genesee Valley is shown as a Very High Fire Hazard Area on the State Responsible Areas map. The Plumas County Wildfire Protection Plan specifies that this Wildland Urban Interface (WUI) area is in need of fuels reduction (PCFSC 2013).

Figure 2. Current Fire Return Interval (FRI) in the planning area (the average number of years between fires from 1908 to 2010).




Map by Plumas Audubon Society, March 2015

## Fire, Plants, and Wildlife

Fire suppression and past forest management practices in the Sierra Nevada Mountains have increased forest stand densities and reduced vegetation heterogeneity (Beaty and Taylor 2008; Collins et al. 2011). Because the current structure of many Sierra Nevada forests is believed to increase their vulnerability to stand-replacing fire, managers are increasingly concerned with reducing vulnerability through the mechanical removal of fuels (North et al. 2009; Collins et al. 2010; Safford et al. 2012). These fuels treatments generally involve reducing understory vegetation and thinning medium-sized trees in order to slow the rate at which fires spread, reduce the intensity with which they burn, and increase human safety (Collins et al. 2007). Because fuels reduction treatments have become one of the primary forest management tools in western North American forests, it is important to understand the degree to which they impact ecological conditions including plant and wildlife habitat (Safford et al. 2012, Stephens et al. 2012).

Forest fuels treatments such as forest thinning, masticating brush, and creating fuel breaks that can effectively reduce wildfire risks, but they are not a substitute for the ecological benefits of fire in Sierra forests. In California, fire regimes and the related ecosystem processes have been altered by management practices of Euro-American culture (Safford and Van de Water 2014). Inclusion of fire as a landscape-level process is considered essential to successful ecological restoration in many ecosystems, and pre-settlement fire regimes provide foundational information for ecosystem restoration (Van de Water and Safford 2011). While stand replacing fires may be characteristic for Douglas-fir and associated species forests in the Pacific Northwest, they are less characteristic of ponderosa pine and mixed conifer forests in western North America. For these western forests, low to moderate intensity fires would have been more common prior to 20th century fire suppression (Franklin and Agee 2003).

Many plants and animals benefit from fire. For example, aspen (*Populus tremuloides*) restoration is most effective after fire stimulates new shoots to grow up where old trees have burned. The planning area contains territories of Spotted Owl (*Strix occidentalis*) and Northern Goshawk (*Accipiter gentilis*) as well as a population of Pulsifer's milk vetch (*Astragalus pulsiferae* var. pulsiferae). These plants and animals benefit from low-intensity under burning, but are negatively affected by catastrophic wildfire. On the other hand, some species benefit or are even dependent on forests burned by higher intensity fires such as Baker cypress (*Cupressus bakeri*), which need the chemical stimulus of fire to germinate (Merriam and Rentz 2008), and Black-backed Woodpeckers (*Picoides arcticus*) that live almost exclusively in recently burned forests (Hanson 2012).

Results from the Plumas-Lassen Administrative Study (PLAS) green forest study suggests the use of prescribed fire has far more positive effects on the avian community compared to the use of mechanical mastication in shrub habitats in the region (Burnett et al. 2009, 2013). Mechanical thinning reduces snag density while under-burning creates new snags. Some cavity-nesting species require snag densities of 40 per acre (Burnett et al. 2012). A full range of fire-based disturbances is necessary to maintain a full complement of wildlife and plant species, including fire-sensitive taxa. This is especially true for high-severity fire, where positive responses from many bird species suggest that this disturbance (either as wildfire or prescribed fire) should be included in management plans where it is consistent with historic fire regimes and where maintenance of regional plant and wildlife diversity is a goal (Fontaine and Kennedy 2012).

# Planning Area

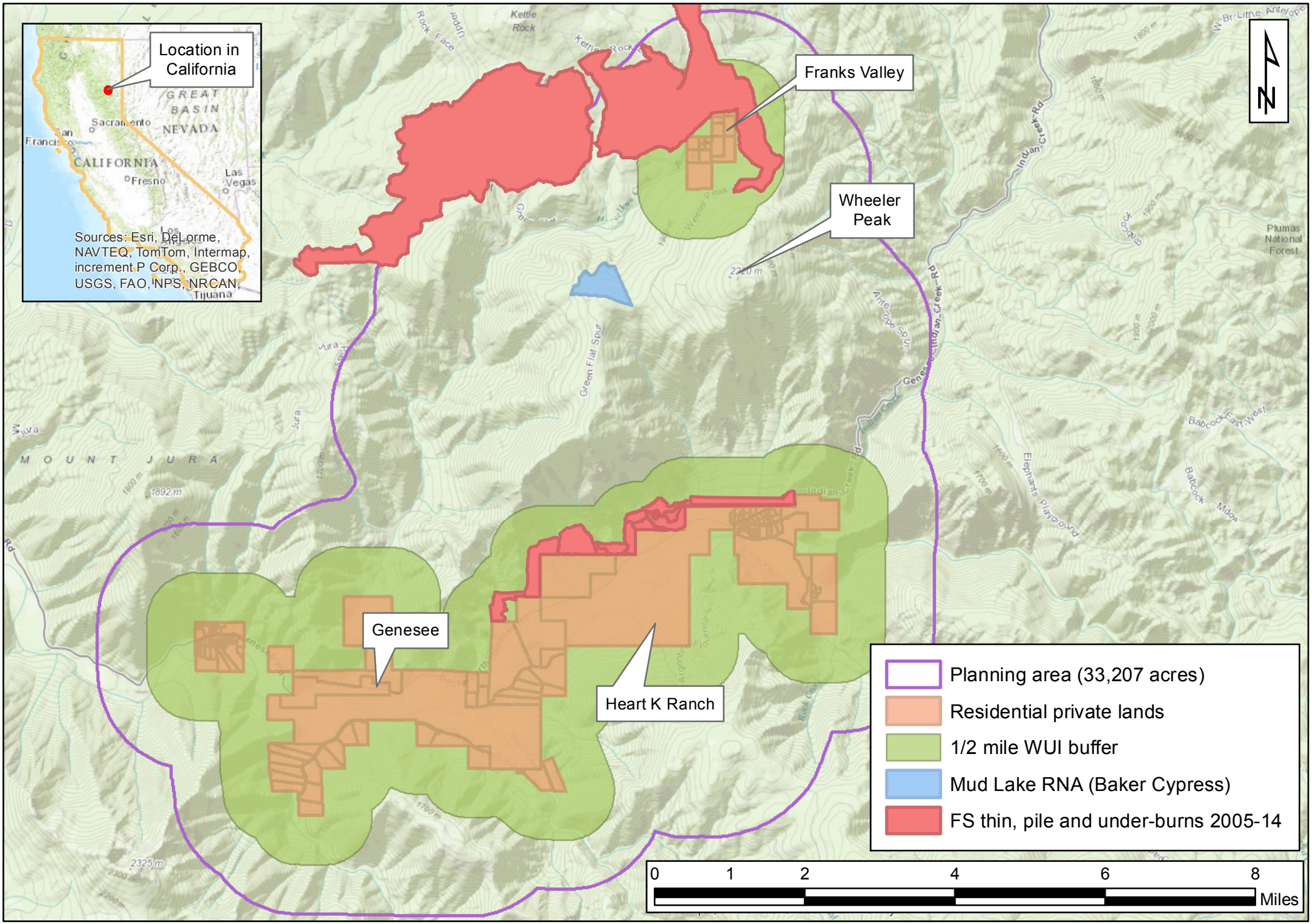
The planning area is located in Plumas County, northeastern California and includes Genesee and Franks Valleys, a ½ mile Wildland Urban Interface (WUI) buffer of those valleys, the Mud Lake Research Natural Area (RNA)- Wheeler Peak Unit, and surrounding areas (Figure 3). The planning area was selected because project collaborators had been working on the Heart K Ranch in Genesee Valley and there was an obvious need to include all of the residential private lands in the area due to the Very High Fire Hazard Area surrounding the valley as shown on CAL FIRE's State Responsible Areas (SRA) map. The planning process also revealed that if forest thinning and under-burning efforts were increased in the planning area, the Mud Lake RNA- Wheeler Peak Unit needed to be included because of the need for moderate to high intensity fire to occur in the RNA for the Baker cypress to germinate.

Elevation in the planning area extends from 3,600 feet (Indian Creek) to 7,349 feet (Wheeler Peak). The climate is Mediterranean, with warm, dry summers and cool, wet winters, which is when most precipitation (41 inches per year) occurs. The planning area encompasses a variety of forest types (Figure 4, Table 2). Each forest type has a unique relationship with fire as they have developed different adaptations allowing them to persist over time. The vegetation is primarily mixed-conifer forest, consisting of white fir (*Abies concolor*), Douglas-fir (*Pseudotsuga menziesii*), sugar pine (*Pinus lambertiana*), ponderosa pine, Jeffrey pine (*Pinus jeffreyi*), incense-cedar (*Calocedrus decurrens*), California black oak, and other less common hardwood species. White fir is the most abundant tree, although large stumps of pines encountered frequently in the forest attest to a change in composition and structure in recent history. Dogwood (*Cornus* spp.), willow (*Salix* spp.), aspen, and cottonwood (*Populus* spp.) is found in moister riparian areas. Montane chaparral, with Manzanitas (*Arctostaphylos* spp.), huckleberry oak (*Quercus vaccinifolia*), chinquapin (*Chrysolepis sempervirens*), and other shrubs as well as some meadows are interspersed in the landscape. Tree density varies as a result of recent fire- and timber-management history, elevation, slope, aspect, and soil conditions. Historical fire occurrence, which can be inferred from fire scars recorded in tree rings, suggests that the fire regime was predominantly frequent, low- to moderate-severity fires, at intervals ranging from 7–19 years, with the last widespread fires occurring 85–125 years ago (Table 1 and 2; Figures 2, 5, and 6; Moody et al. 2006, Van de Water and Safford 2011).

## Fire Return Intervals

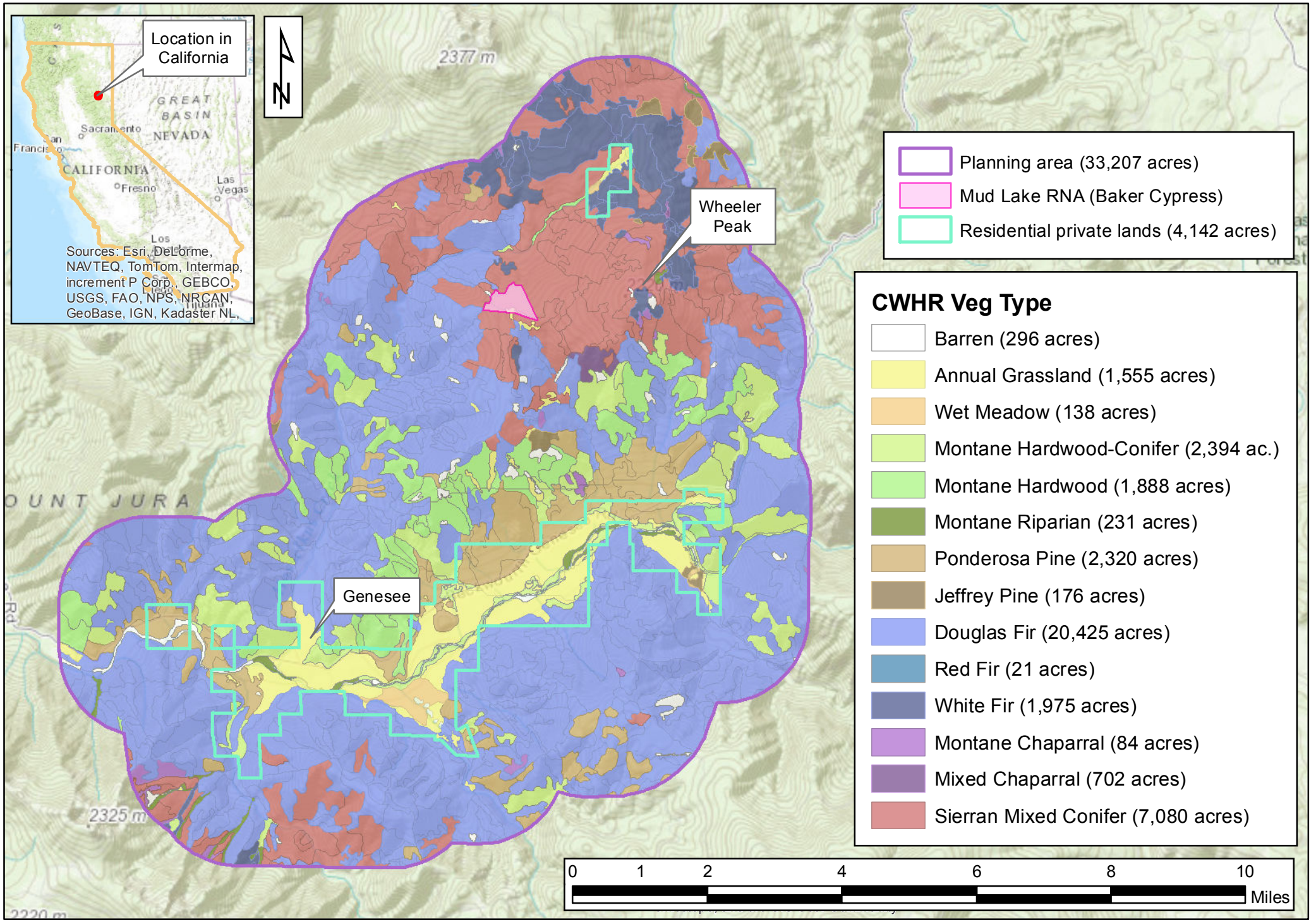
Fire Return Interval Departure (FRID) analysis quantifies the difference between current and pre-settlement fire frequencies, allowing managers to target areas at risk of high-severity wildfire. Comparisons between historical and current fire regimes can assist managers in prioritizing areas for ecological restoration and other management actions (Safford and Van de Water 2014). The current Fire Return Interval (FRI) is calculated by dividing the number of years in the fire record (starting in 1908- the first year that the US Forest Service began to formally record information on size and location of major fires) by the number of fires occurring since then. The average current FRI for most of the Genesee Valley planning area is over 100 years (Figure 2).

Figure 3. Forest Service thinning and under-burning completed on national forest in the planning area in the last ten years.




Map by Plumas Audubon Society, March 2015

Figure 4. Current vegetation classification in the planning area based on the California Wildlife Habitat Relationships (CWHR, Mayer and Laudenslayer 1988).




Map by Plumas Audubon Society, March 2015

The mean reference FRI is an approximation of how often, on average, a given area likely burned in the three or four centuries prior to significant Euro-American settlement (i.e., before the middle of the 19th century). The reference FRI values were taken from an exhaustive review of the published and unpublished literature pertaining to pre-Euro-American settlement fire occurrence, mostly from small-scale (<4 ha) composite fire histories (Safford and Van de Water 2014). The reference FRIs for most of the Genesee Valley planning area range from 1-19 years (Figure 5).

The mean percent Fire Return Interval Departure (FRID) is a measure of the extent to which contemporary fires (i.e. since 1908) are burning at frequencies similar to the frequencies that occurred prior to Euro-American settlement. The mean percent FRID measures the departure of current FRI from mean reference FRI in percent (Safford and Van de Water 2014). Most of the planning area has mean percent FRIDs of more than 50% (Figure 6).

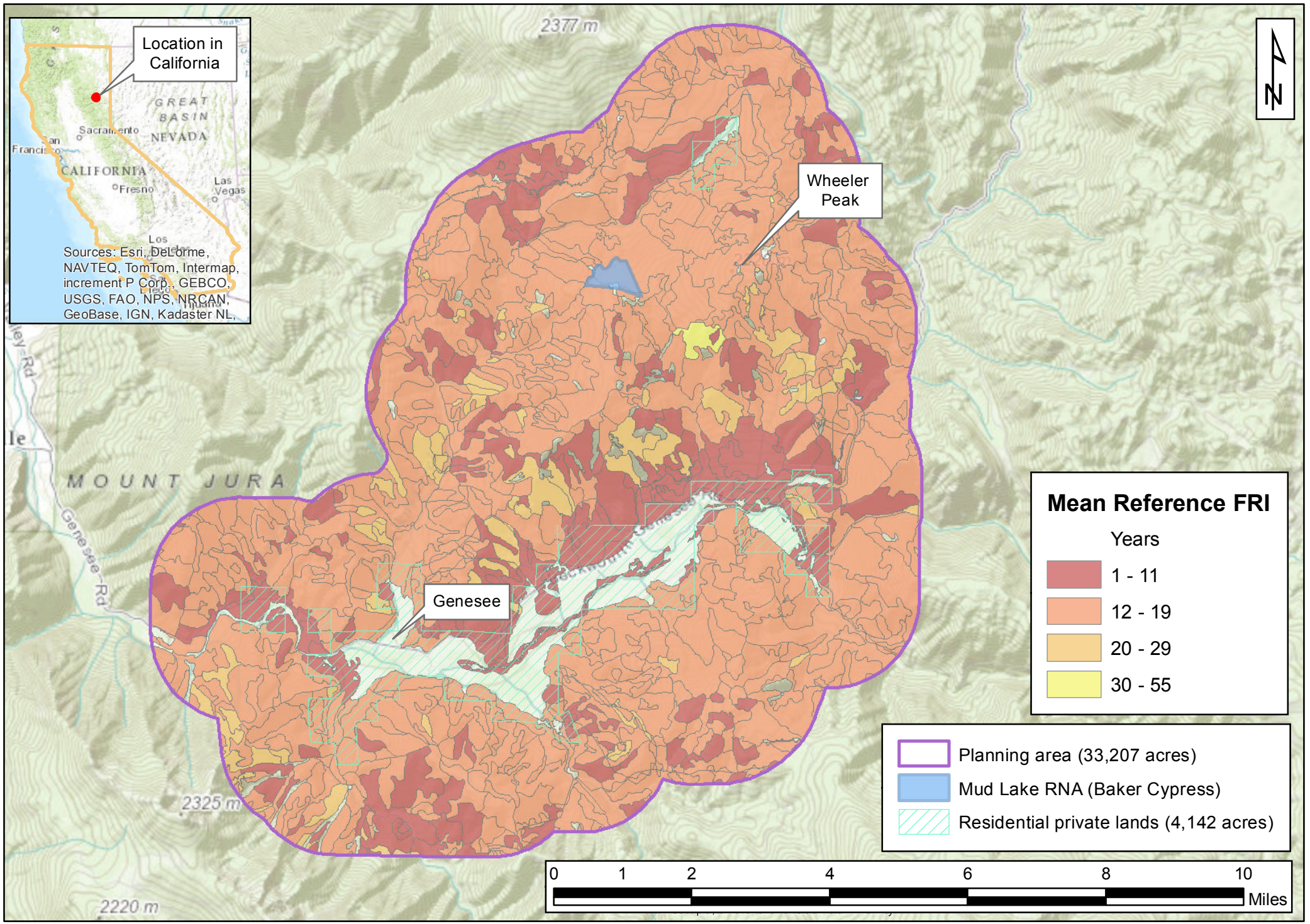
The result of our Fire Return Interval analysis is that most of the planning area has not had fires in over 100 years. The reference FRI is helpful in determining how frequently under-burning should occur in the planning area (Figure 5, Table 2). Areas with a reference FRI of 0-11 years located within the WUI should be prioritized for thinning and under-burning projects.

## FlamMap

The FlamMap fire mapping and analysis system (Finney 2006; Stratton 2006) is a PC-based program that describes potential fire behavior for constant environmental conditions (weather and fuel moisture). Fire behavior is calculated for each pixel within the landscape file independently. Outputs are well-suited for landscape-level comparisons of fuel treatment effectiveness because fuel is the only variable that changes. Outputs and comparisons can be used to identify combinations of hazardous fuel and topography, aiding in prioritizing fuel treatments. FlamMap is widely used by the U.S. Forest Service, National Park Service, and other federal and state land management agencies in support of fire management activities.

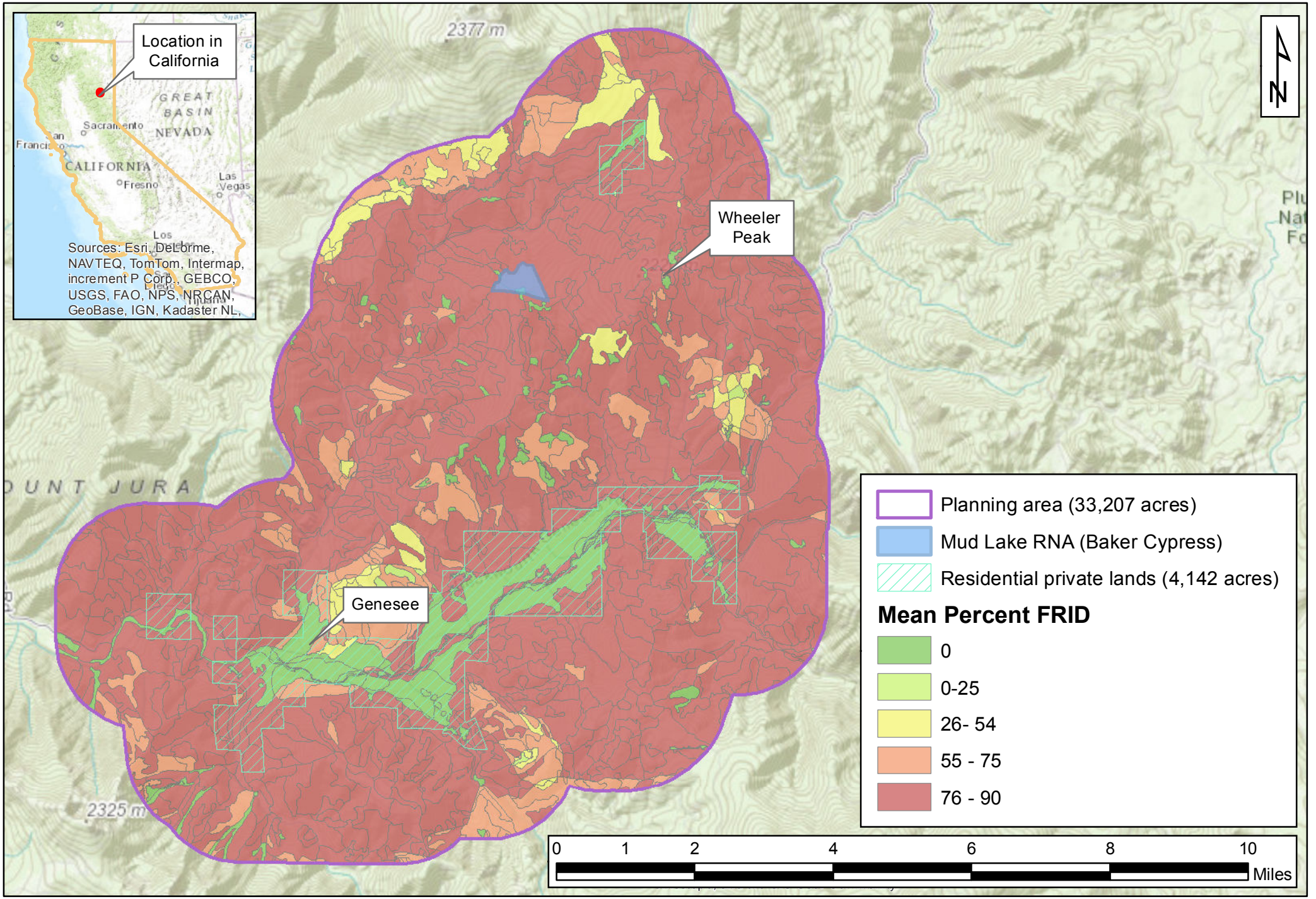
Dave Kinateder, Plumas National Forest Mt. Hough Ranger District fuels ecologist, used FlamMap to predict flame lengths for potential fires in the Genesee Valley planning area (Figure 7). The results of the FlamMap analysis should be used in conjunction with the FRI maps to prioritize areas for thinning and determine how frequently under-burning should occur. The FlamMap in the WUI (Figure 8) shows that the western and southern portions of the Genesee Valley WUI are currently in greatest need of thinning and under-burning.

Figure 5. Mean Reference Fire Return Interval (FRI) in the planning area. This is an approximation of how often, on average, a given area likely burned in the three or four centuries prior to the middle of the 19th century.



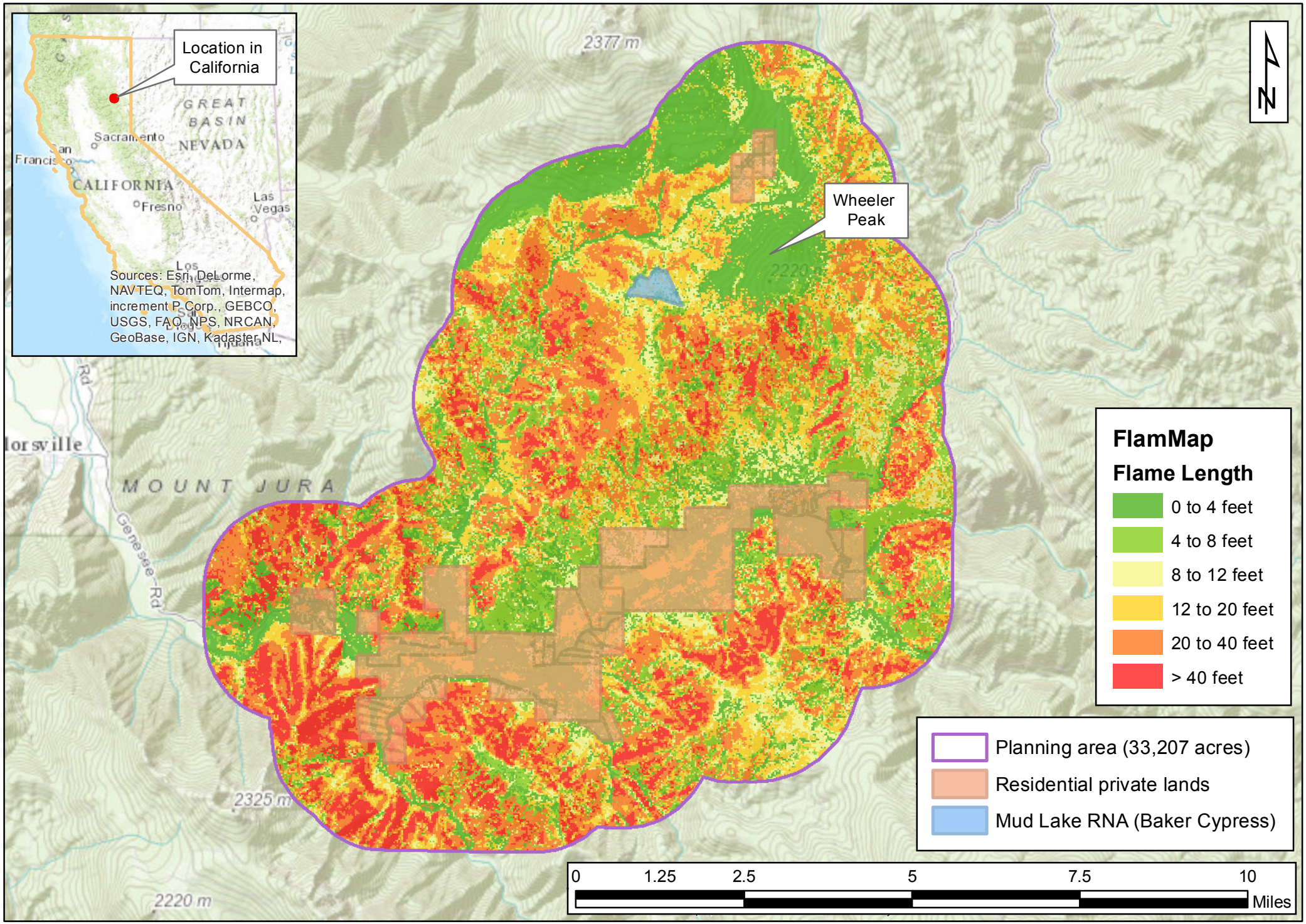

Map by Plumas Audubon Society, March 2015

Figure 6. Percent Fire Return Interval Departure (PFRID) in the planning area. This is a measure of the extent to which contemporary fires (i.e. since 1908) are burning at frequencies similar to the frequencies that occurred prior to Euro-American settlement. The higher the percentage, the less similar current fire frequencies are to pre-historic fire.



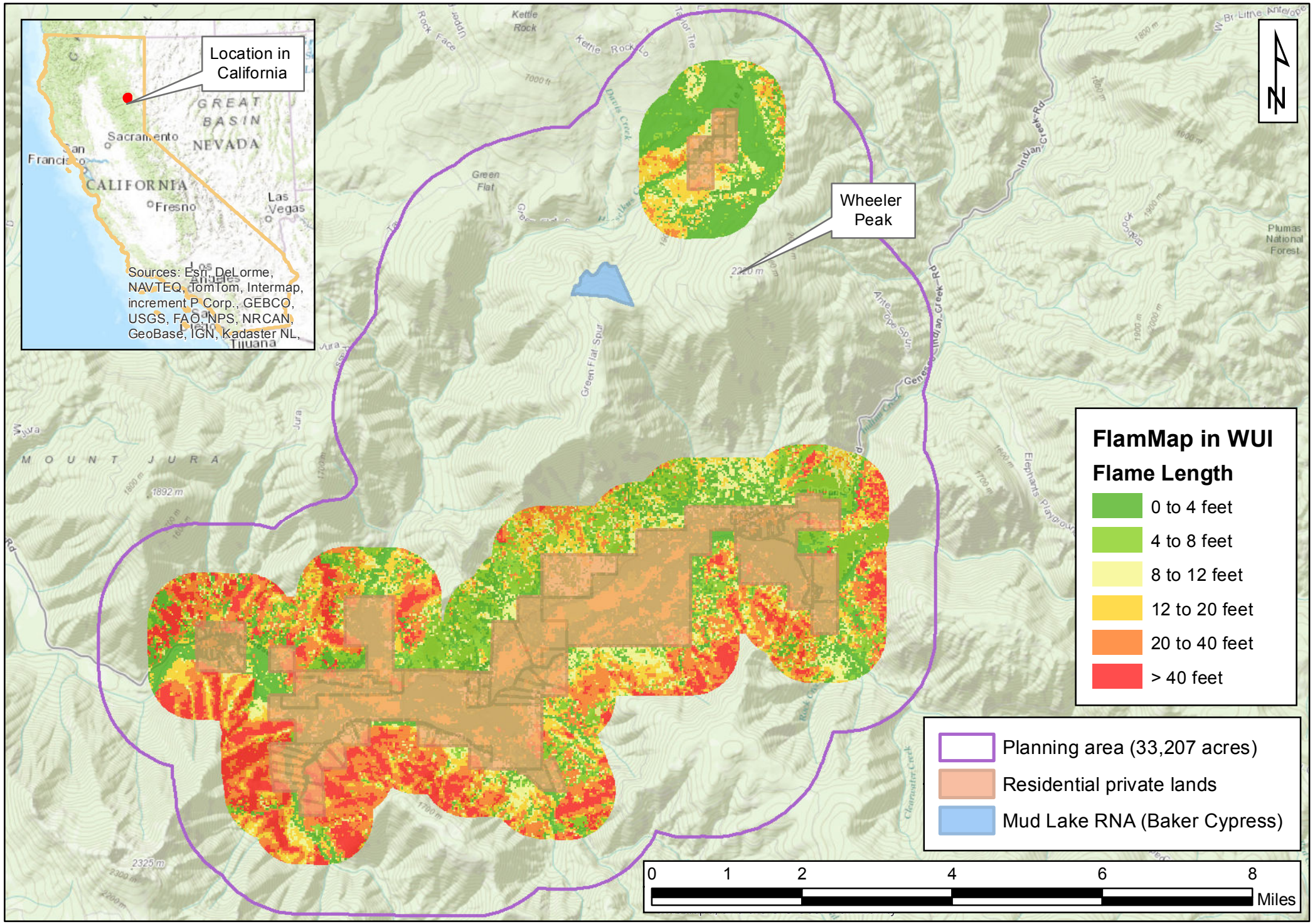

Map by Plumas Audubon Society, March 2015

Figure 7. FlamMap flame length predictions for national forest in the planning area.




Map by Plumas Audubon Society, March 2015

Figure 8. FlamMap flame length predictions for national forest lands in the Wildland Urban Interface.




Map by Plumas Audubon Society, March 2015

## Management Direction

The planning area is comprised mostly of Plumas National Forest lands managed under the direction of the Plumas National Forest Land and Resource Management Plan (USDA 1988) and the Sierra Nevada Framework Plan (USDA 2004). A Wildfire Risk Assessment and Fuel Treatment Analysis is currently being conducted for national forest lands in the entire Sierra Nevada range and is scheduled to be completed in 2016. The analysis will be used in the next Plumas National Forest Land Management Plan revision. The current Plumas National Forest 5-Year Program of Work (2013-2017) includes a landscape assessment of the forest that will be completed prior to NEPA planning and analysis for individual projects. Planning for a Genesee Valley area landscape-scale ecological restoration project including fuel reduction is scheduled to begin in the next few years.

### Completed and Planned Projects

Completed and planned project areas are shown on Figures 3 and 9. Project descriptions are provided below.

CAL FIRE SRA Funding: The Feather River Resource Conservation District and Greenville submitted proposals for CAL FIRE SRA (California Department of Forestry and Fire Protection State Responsibility Area) funding to conduct hazardous fuels reduction and under-burning on private lands in the Genesee Valley planning area. Prior to submitting their proposal, the Feather River Resource Conservation District mailed notices to all private landowners in the planning area and received responses from nine requesting help with treating approximately 100 acres total. Unfortunately, the projects were not funded by CAL FIRE, but with participating landowners the project is ready to apply for additional funding.

Stephens Funds Under-burns I and II: The U.S. Forest Service Plumas National Forest Fuels Manager Ryan Bauer secured Stephens Funds to complete 2 under-burns on the Heart K Ranch in Genesee Valley. The first under-burn (60 acres, Figure 9) was completed in April 2014 and the second is planned for 2015 or 2016.

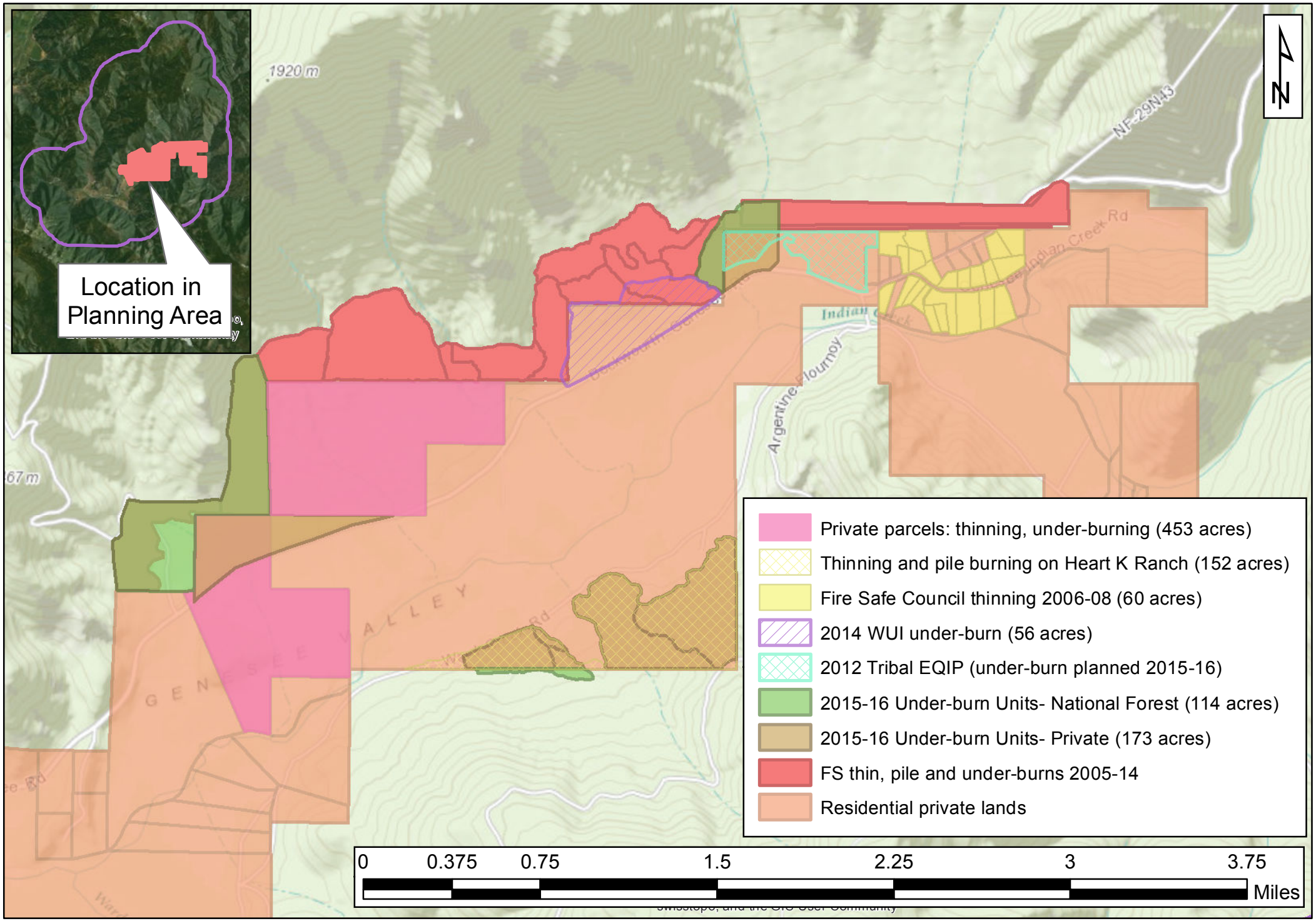
Sierra Nevada Conservancy (SNC) Forest Health Grant: The Feather River Resource Conservation District secured SNC funds to thin 120 acres of forest on the Heart K Ranch, which has been completed by the Greenville Rancheria. This project also includes monitoring wildlife in the treatment areas.

Natural Resource Conservation Service (NRCS) Tribal Environmental Quality Improvement Program (EQIP): In 2012, the Greenville Indian Rancheria and Feather River Land Trust established a 5-year use agreement allowing the Rancheria to qualify for Tribal EQIP funds to reduce hazardous fuels on 40 acres north of the Heart K Ranch Main House.

Plumas County Resource Advisory Committee- Hazardous Fuel Reduction Project: The Plumas Fire Safe Council and Plumas Corporation thinned 73 acres of private land in the Red Clover subdivision in east Genesee completed in 2006 and 2007.

Private landowner thinning and under-burning: Several private landowners in the planning area have carried out their own thinning and under-burning (Figure 9). One goal of this plan is to increase forest management efforts by private landowners.

Figure 9. Completed and planned thinning, pile burning, and under-burn areas in Genesee Valley since 2005.




Map by Plumas Audubon Society, March 2015

## Forest Treatments: Goals and Objectives

These are recommendations for developing site/project-specific management plans. The recommendations are based on past and present thinning and under-burning in the planning area, input received during the planning process, and relevant information from credible sources. Goals include creating a mosaic of different fire regimes and related habitats and biodiversity on the landscape and applying management actions on a site-specific basis while considering all relevant information.

Specific objectives include:

1. Plan and manage adaptively on a site-specific basis, employing science, monitoring, and best available practices including Traditional Ecological Knowledge;
2. Reduce the potential risk to residential areas from high-intensity wildfires by thinning and under-burning forests in the WUI and prioritizing areas based on the FlamMap and FRI maps;
3. Manage the Baker Cypress population by ensuring that sufficient fuel loads occur in the vicinity, while ensuring that residential areas in Franks Valley are buffered, so that either a naturally-occurring wildfire or a managed fire will burn hot enough to ensure sufficient cypress reproduction;
4. Manage for tree and under-story plant species diversity as well as age class heterogeneity, and maintain patches of dense shrubs and high snag densities;
5. Work with the Plumas National Forest to develop a Genesee Valley area forest restoration plan; and
6. Seek collaboration and public involvement with project planning and implementation.

*Table 2. CWHR vegetation types in the planning area (Figure 4) and their respective Fire Return Intervals (from Van de Water and Safford 2011).*

| **Vegetation Type*** | **Acres** | **FRI** |
|---|---|---|
| Barren | 296 | - |
| Annual Grassland | 1,555 | ? |
| Wet Meadow | 138 | ? |
| Montane Hardwood-Conifer | 2,394 | 11 |
| Montane Hardwood | 1,888 | 11 |
| Ponderosa Pine | 2,320 | 11 |
| Jeffrey Pine | 176 | 11 |
| Sierran Mixed Conifer | 7,080 | 16 |
| Douglas Fir | 20,425 | 16 |
| White Fir | 1,975 | 16 |
| Montane Riparian | 231 | 19 |
| Montane Chaparral | 84 | 27 |
| Mixed Chaparral | 702 | 27 |
| Red Fir | 21 | 40 |

*California Wildlife Habitat Relationships (CWHR, Mayer and Laudenslayer 1988).

Most of the planning area is classified as Douglas fir CWHR vegetation type (Table 2). The other most common CWHR vegetation classifications are Sierran Mixed Conifer, Montane Hardwood-Conifer, Ponderosa Pine, White Fir, Montane Hardwood, and Annual Grassland (Table 2). Mixed-conifer forests support the highest vertebrate diversity of California forests (Verner and Boss 1980), and studies suggest that this may result from habitat variability associated with the observed range of tree species diversity, canopy cover, microclimate, and deadwood conditions (Rambo and North 2009, Ma et al. 2010, White et al. 2013). Oak woodlands also support wildlife abundance with over 330 species of birds, mammals, reptiles, and amphibians depending on them at some stage in their life cycle (CalPIF 2002).

# Management Recommendations

## Under-burning

Under-burning in pine, oak and mixed conifer forests helps reduce fuel loads, increasing plant species diversity and heterogeneity of tree age classes, maintaining wildlife and plant diversity, maintaining soils and water quality, and perpetuating traditional uses. Low to medium-intensity fire should be reintroduced at intervals of 15-30 years in mixed conifer and 5-14 years in pine-oak forests to thin understory shrubs and small trees (Table 2). Under-burning units on private and forest service lands were developed for the central Genesee Valley (Figure 9). Under-burning requires experience, proper equipment, and sufficient personnel. Under-burning should only be conducted by qualified individuals, organizations, or agencies.

During public outreach meetings, the community expressed concern with monitoring under-burn areas after under-burning was complete. People requested that more effort be placed on informing residents about pile- and under-burning schedules and having monitors and information available until the fires were completely extinguished. The idea of forming committees to help with outreach and monitoring was suggested.

## Thinning, Piling and Burning Guidelines

These guidelines are based on those developed by the Feather River Resource Conservation District for the Heart K Forest Health Project. They are provided as a recommendation and example of forest thinning and burning guidelines in the Genesee Valley planning area.

Tree Removal- Tree removal should be limited to conifers up to 10 inches diameter at breast height (DBH), hardwoods less than 10 inches DBH that are growing in clumps of 5 or more trees, where clumps can be thinned to 1-2 dominant stems, and snags that can fall on structures, parking areas, gathering areas, and roads. In areas where oaks are present, preference can be taken to release these oaks from conifer encroachment, opening up the canopy to allow light to reach the oaks and the forest floor. On conifers larger than 10 inches DBH, remove lower limbs (from ground level to at least 6') that may act as ladder fuels, and pile limbs in slash piles. All tree removal should be manual using chainsaws or hand tools. Maintaining tree species diversity, and therefore, habitat diversity is a key component of forest thinning projects; preference of species to keep (in order of high to low priority) should be oak, cedar,

sugar pine, ponderosa pine, Douglas fir, and white fir. All riparian species (willow, cottonwood, chokecherry, and alder) and edible species such as currants and, huckleberry, should be retained. It is important to maintain a diversity of understory shrubs and trees less than 10 inch DBH. It is not necessary to remove all seedling trees in the understory because they are important for tree regeneration and add important habitat components to the forest understory.

Spacing- In general trees should be removed so that there is 12-18 foot spacing between the boles of residual trees. Most conifers up to 10 inches DBH should be removed from the drip line of established hardwoods greater than 8 inches DBH. In order to create habitat diversity, small islands (~0.5 acres) of denser tree stands should be retained in project areas.

Timing- Thinning in pine dominated stands should occur only between August 1 and December 1 and in mixed conifer stands between August 1 and April 1. Thinning in any forest or shrub type should be avoided between April 1 and August 1 every year to avoid impacts to nesting wildlife.

Snags- Only snags that pose a direct hazard to life and property in areas around houses, parking areas, and designated trails should be removed. Outside of these areas, all hardwood snags greater than 6 inches DBH and conifer snags greater than 12 inches DBH should be retained at a minimum. Where possible, retain snags with sign of woodpecker foraging or existing woodpecker cavities even if they are less than 6 inches DBH for hardwoods or 12 inches DBH for conifers.

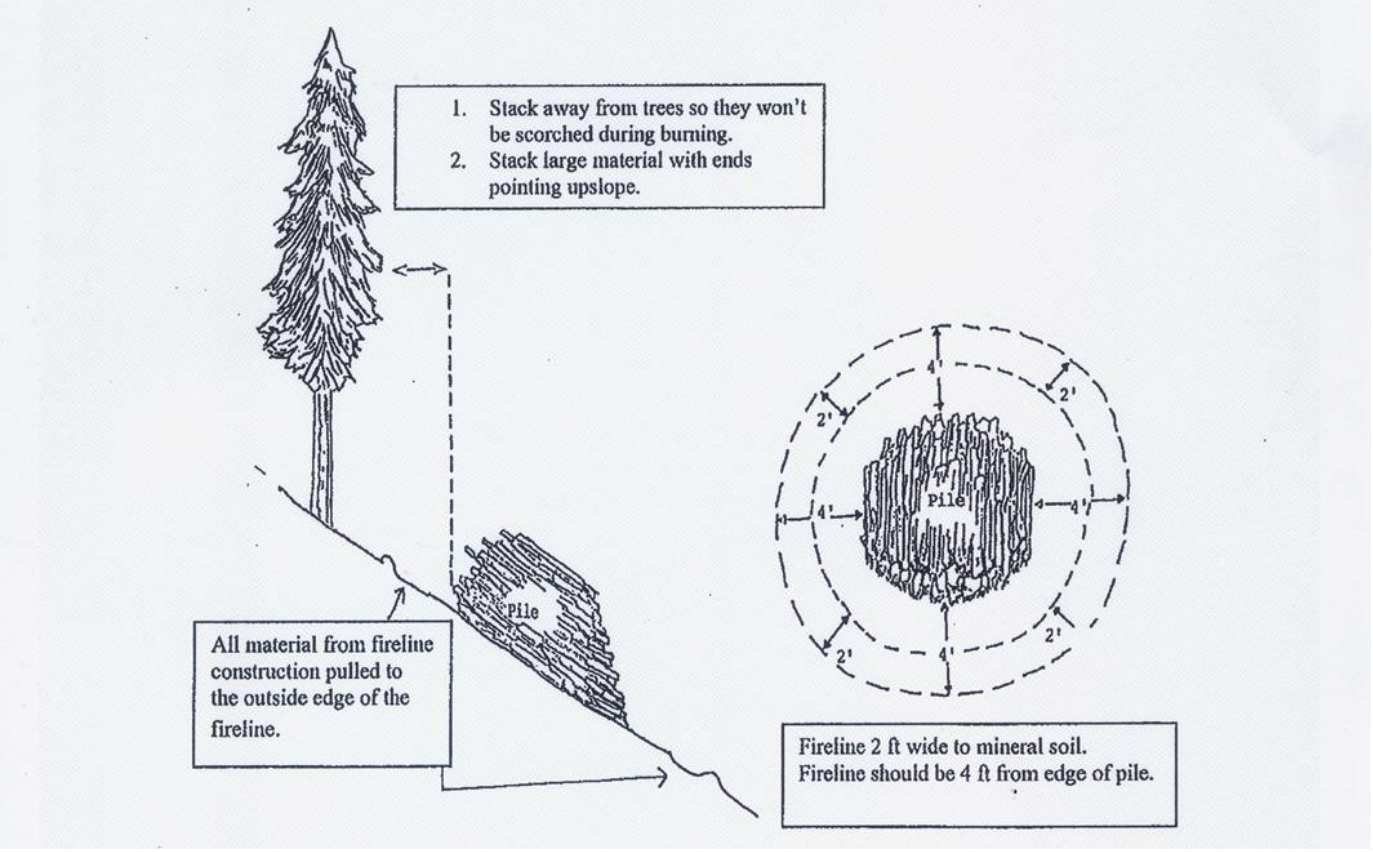
Downed Woody Debris- Large downed woody debris greater than 10 inches in diameter, with preference to hardwoods, should be left on the ground for nutrient cycling and small mammal habitat; 2-3 per acre when possible. Woody debris less than 10 inches in diameter and slash will be piled for burning.

Brush- Brush (*ceanothus* and manzanita) species should be removed where they act as a ladder fuels interacting with conifers or within 150 feet of existing structures and roads. Brush should be retained in areas where possible and also included in under-burning units.

Firewood- Material less than 4 inches in diameter will be piled and burned (see Pile and Burning section below). Pine that is greater than 4 inches in diameter should be cut to 16” lengths and used as firewood. Keeping 4” diameter boles out of burn piles will result in faster burn times and reduces risk of forest fire. Cutting pine to 16” lengths will reduce the risk of Ips beetle damage to residual trees and provide firewood.

Piles and Burning- Material less than 6 inches in diameter should be piled and burned. Piles should be constructed in open areas exposed to sun and placed as far away from residual trees as possible to reduce the spread of Ips beetle and minimize scorch of residual trees (Figure 10). Piles should not be constructed on stumps or downed logs. Keep slash piles as far away from piles constructed in previous years as possible to reduce the spread of Ips beetles. Piles should not be wider than they are tall and should not include material larger than 6 inch diameter. To facilitate winter burning, piles should be

*Figure 10. Pile burning guidelines.*

covered with heavy kraft paper before the onset of winter rain or snow (Figure 10). Slash piles should be burned when fire risk and air quality conditions are appropriate and it is a permissive burn day. Northern Sierra Air Quality Control should be called prior to any burning activities and all appropriate permits obtained and an approved Smoke Management Plan (SMP), where necessary.

Culturally Sensitive Areas- All thinning activities should avoid areas identified as culturally sensitive including burial sites and other culturally sensitive sites.

Important Plant and Wildlife Habitats- Thinning should not occur in areas identified as important for plants and wildlife, such as the area in and around the Baker cypress population, shrub areas, riparian areas, Spotted Owl and Northern Goshawk territories, etc.

Additional recommendations for planning and project implementation in the Genesee Valley planning area are provided in the following sections.

## Mud Lake Research Natural Area- Wheeler Peak Unit

Fire suppression policies of the past decades have severely limited reproduction of Baker Cypress, a fire-dependent species that requires high-intensity fire to reproduce (Rentz and Merriam 2009). The Wheeler Unit of Plumas National Forest's Mud Lake Research Natural Area (RNA) is located within the Genesee Valley Wildfire Restoration Planning Area. The RNA was established in 1985 to protect the southern-most stand of Baker cypress (*Hesperocyparis bakeri*). RNAs are designated in perpetuity for research, education, and to maintain biological diversity (Coppoletta 2006). The Wheeler Unit is one of only 11 widely scattered Baker cypress populations in the world occurring across the northern Sierra Nevada, Cascade, and Siskiyou Mountains (Merriam and Rentz 2008). It contains the world's largest Baker cypress with a diameter at breast height of 56 inches and height of 71 feet. Most of the cypress forest is characterized by small, dense groves of Baker cypress isolated from one another by bare rocky soil (Coppoletta 2006). Dense thickets of shade-tolerant conifers can result in high levels of cypress mortality (Keeler-Wolf 1989).

High severity fire produces favorable conditions for cypress germination and seedling survival, such as high light and bare mineral soil (Vogl et al. 1977). Cypress retain numerous dead lower branches and often grow in dense thickets, which are conducive to crown fires. In fact, fire severity is the strongest predictor of post-fire seedling density in Baker cypress (Merriam and Rentz 2008). Plots with higher scorch and char heights, and more percent crown scorch volume, had greater numbers of seedlings and plots with higher soil burn severity also had significantly higher seedling density (Merriam and Rentz 2008). Fire suppression is not recommended for the Wheeler Peak unit, where older trees likely have sufficient seed storage to regenerate the population (Merriam and Rentz 2008). In addition, it is unlikely that under-story burning can create the kind of conditions necessary for cypress recruitment and survival. Therefore, the Baker cypress population needs to be managed so that the forest service can either let a wildfire in the area burn or intentionally set a wildfire with the goal of burning the cypress population at moderate to high-intensity.

## Green Firewood Cutting Areas

Green firewood cutting areas are tree cutting areas designated by the U.S. Forest Service where live trees of certain sizes can be harvested for firewood. Green firewood cutting areas have been established in the Lake Davis area, managed by the Plumas National Forest Beckwourth Ranger District, and more recently in the Snake Lake area, managed by the Mt. Hough Ranger District. Firewood permits for these areas have rapidly sold out and so are a popular method for firewood harvest. This plan proposes to increase the number of green firewood harvesting areas on the Plumas National Forest in the WUI around residential areas of Genesee Valley. Residents would have an accessible source of firewood while helping thin forests in the WUI and reducing fire risk to the community. In addition, harvesting green firewood reduces the number of large snags harvested for firewood, leaving more of these important wildlife habitats remaining in the forest.

## Noxious Weed Management

Historically, fire has been important in grassland ecosystems. Many native grassland plants (legumes, perennial native grasses) are adapted to periodic disturbance by fire, and prescribed burning has been shown to favor germination and subsequent establishment of many native species. In contrast, many noxious weeds such as yellow starthistle (*Centaurea solstitialis*) and invasive annual grasses have shown potential for control by prescribed burning. By shifting the competitive advantage to fire-adapted species, prescribed burning can increase plant diversity as well as control noxious weeds. Prescribed burning, as part of an integrated weed management plan, has proven to be an effective tool in eradicating yellow starthistle from a 40-acre Caltrans mitigation site located in nearby Indian Valley (Feather River Resource Conservation District). Large areas of Genesee Valley are heavily infested with yellow starthistle which threatens to continue to spread further up into forested lands and reduce native plant diversity. Canada thistle (*Cirsium arvense*), another Plumas National Forest priority invasive plant species, is also found in the planning area.

To reduce the spread of noxious weeds in the planning area, we recommend:

- Do not stage equipment, materials, or crews in noxious weed infested areas;
- Flag and avoid known weed sites in and near proposed treatment areas;
- Require contractors to clean vehicles and equipment prior to entering the project area to prevent and control the introduction, establishment, and spread of invasive species;
- Use weed-free equipment, mulches, and seed sources;
- Remove yellow starthistle by hand to reduce the seed bank and reproduction.

## Traditional Ecological Knowledge

The Mountain Maidu homeland is located in the northeastern part of northern California. The area extends roughly from Mount Lassen in the northwest, to the Elysian Valley in the northeast, and from the middle area of the North Fork Feather River canyon vicinity in the southwest, to the Sierra Valley in the southeast (Cunningham 2007). The Genesee Valley area is of critical cultural importance to the local indigenous Mountain Maidu community. Prior to European arrival, Mountain Maidu significantly

influenced the ecology of the valley through the use of fire to manage forest, meadow, and riparian areas. Traditional practices increased diversity and reduced the potential for catastrophic wildfire. Understanding these practices and uses is known as Traditional Ecological Knowledge (TEK). This plan encourages incorporating land stewardship that helps conserve and restore Maidu relationship to the land. For example, acorns are of cultural significance to Native California Indians as they were a primary food source and the wood used for many purposes, including the center pole in roundhouses. Shoots from gray willow, found along Indian Creek, were traditionally used to make baskets by Mountain Maidu people. Periodic burning of gray willow and oak improves the quality of gray willow shoots and acorns.

### TEK Management Recommendations

Cunningham (2007) outlined the Maidu Summit Consortium's plan for managing lands in Humbug Valley. We outline components of the plan as recommendations to be incorporated into forest treatments on private and public lands in the planning area.

Centuries before the U.S. Forest Service was created, Mountain Maidu Indians were tending the forests of what is now northeastern California. They cultivated oaks, encouraging low branches and big bushy heads to produce acorns, the mainstay of their diet. They farmed camas bulbs for food, harvested wormwood for medicines, and pruned willows and maples for basket materials. It was the forest understory, not the towering pines and firs, which provided the Maidu people with the necessities of their lives (Little 2006). The Maidu maximized ecosystem diversity, health, and population sustainability, while also enabling the ecosystem/human relationship to be interactive, reciprocal, and sacred (Cunningham 2007). The Maidu used fire as a land management technique to minimize catastrophic fire risk for untold generations. In the Maidu-affected landscape, fire was incorporated as a tool and human-induced, moderate-heat, landscape-level fires were common and catastrophic fire risk was minimal. Favoring of fire resistant tree species as well as burning of various brush and plant species at different times during the year further helped to minimize fire risk while maintaining the mix of valued plant and animal species (Little 2002).

Basketry, one of the central arts of the Maidu, is threatened because the people do not have access to the quantity and quality of materials that they need. A Maidu-managed landscape includes streamside willow stands relatively free of disease and dead wood and open spaces that provide hunting and foraging habitat for riparian bird and animal species. Open spaces will also provide habitat for sun-loving riparian plant species (Cunningham 2007). The Maidu manage pine and oak forests for a healthy understory vegetation such as pennyroyal, wild celery, yampa, brodiaea, mules ear, and an abundant mix of native grasses. Healthy and abundant understory vegetation will allow for the maintenance of a larger herbivore (deer) population within a smaller land area and will also provide fuel for periodic low intensity under-burning and resultant rapid nutrient recycling. Maidu understanding and utilization of understory vegetation was extensive and diverse. Therefore, taking care of the plant and animal populations found therein resulted in optimum living conditions for the human people of the land (Cunningham 2007).

## Community Involvement and Support

Although many people understand that California's forests have evolved with fire and that fire is integral to forest health, fire is still a contentious topic. Some people are opposed to understory burning because of the smoke and related health concerns. Others are concerned about the threats wildfire

poses to personal property. Several homes in Genesee Valley have burned due to escaped burn piles, which has led to a heightened level of concern with the use of fire as a restoration tool. On the other hand, there is much concern among residents about the threat of wildfire due to the over-stocked forests in and around the valley, increasingly hot summer temperatures, and the continued drought conditions. Both the Genesee Woods Homeowners Association (West Genesee) and the Red Clover Creek Recreation Association (East Genesee) are willing participants in fuel reduction efforts. Residents throughout the planning area have indicated that they want to be involved in forest thinning and under-burning efforts.

## Needed Actions

Project partners and collaborators, including many private landowners in the planning area have worked together to improve forest health and reduce the threat of high-severity wildfire to residential property. However, there is much more work to do. We hope that this plan helps facilitate that work. There is a large responsibility of the Plumas National Forest to develop and implement a Genesee Valley area forest restoration plan. A critical finding of this planning process is the imminent need for Genesee Valley area forest management planning and project implementation by the Plumas National Forest Mt. Hough Ranger District. Research has shown that it is necessary to treat forests in the national forest surrounding communities and not just within the WUI. Fuel treatments well outside of WUIs can significantly reduce wildfire threats to residential property. Ager et al. (2010) found significant reductions in the burn probability and fire size after treating only 10% of the landscape, and wildland fuel treatments may provide longer term reduction of wildfire threats to both resource and property values than treatments focused on WUI areas alone.

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