United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Mother Lode Field Office
5152 Hillsdale Circle
El Dorado Hills, CA 95762
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Lily Gap biomass demonstration project (CA-180-10-25)
Finding of No Significant Impact
April 2011

It is my determination that this decision will not result in significant impacts to the quality of the human environment. Anticipated impacts are within the range of impacts addressed in the Sierra Resource Management Plan (RMP)/Final Environmental Impact Statement. The proposed action does not constitute a major federal action having a significant effect on the human environment; therefore, an environmental impact statement is not necessary and will not be prepared. This conclusion is based on my consideration of CEQ's following criteria for significance (40 CFR §1508.27), regarding the context and intensity of the impacts described in the EA, and based on my understanding of the project:

1) Impacts can be both beneficial and adverse and a significant effect may exist regardless of the perceived balance of effects. Potential impacts include negligible soil disturbance caused by improving dirt roads, the use of a rubber-tracked chipper, masticator, and other mechanized equipment, and temporary dust due to mastication of vegetation and temporary smoke due to burning vegetation in the biomass plant near Ione, CA. However, with the project design features, none of these impacts would be significant at the local or regional scale (cumulatively) because of the small scale of the proposed action.

2) The degree of the impact on public health or safety. No aspects of the proposed action have been identified as having the potential to significantly and adversely impact public health or safety. In fact, the project is designed to help firefighters fight wildfire and to protect nearby private residences from wildfire; therefore protecting public health and safety, especially for local residents.

3) Unique characteristics of the geographic area. The area affected by the proposed action does not have any unique characteristics. Soils, vegetation, wildlife, and cultural resources are all typical for the elevation and terrain in the central Sierra Nevada.

4) The degree to which the effects on the quality of the human environment are likely to be highly controversial effects. No anticipated effects have been identified that are scientifically controversial. As a factor for determining within the meaning of 40 C.F.R. § 1508.27(b)(4) whether or not to prepare a detailed environmental impact statement, "controversy" is not equated with "the existence of opposition to a use." *Northwest Environmental Defense Center v. Bonneville Power Administration*, 117 F.3d 1520, 1536 (9th Cir. 1997). "The term „highly controversial' refers to instances in which „a substantial dispute exists as to the size, nature, or effect of the major federal action rather than the mere existence of opposition to a use.'" *Hells Canyon Preservation Council v. Jacoby*, 9 F.Supp.2d 1216, 1242 (D. Or. 1998).

5) The degree to which the possible effects on the human environment are likely to be highly uncertain or involve unique or unknown risks. The analysis does not show that the proposed action would involve any unique or unknown risks.

6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. Fuels reduction using hand crews and mechanized equipment (i.e., rubber-tracked chipper, masticator, etc.) is not precedent setting. BLM undertakes these types of projects on a regular basis. Biomass utilization is somewhat new to the Mother Lode Field Office, but the environmental impacts are similar to fuels projects with a pile-burning component, which are nothing new to the field office and are not precedent setting.

7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. No significant cumulative impacts have been identified. The proposed action is relatively small in scale and is consistent with the actions and impacts anticipated in the Sierra RMP. BLM has not recently proposed any projects of this scope within the Mokelumne River watershed. Nothing like this is planned in the foreseeable future.

8) The degree to which the action may adversely affect National Historic Register listed or eligible to be listed sites or may cause loss or destruction of significant scientific, cultural or historical resources. The proposed action would not affect cultural resources listed on or eligible for the National Register of Historic Places.

9) The degree to which the action may adversely affect ESA listed species or critical habitat. No ESA listed species (or their habitat) would be affected by the proposed action.

10) Whether the action threatens a violation of environmental protection law or requirements. There is no indication that this decision would result in actions that would threaten such a violation.

_____ _____

William S. Haigh Date
Field Manager, Mother Lode Field Office

United States Department of the Interior

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EA Number: CA-180-10-25

Project Name: Lily Gap biomass demonstration project

Location: MDM T 7 N, R 13 E, Sections 24, 25, 26, and 36,
T 7 N, R 14 E, Section 30
Lily Gap area near West Point, Calaveras County, CA
(See attached project area maps in Appendix B)

1.0 Purpose of and Need for Action

1.1 Need for Action

The Bureau of Land Management's Mother Lode Field Office (BLM) manages scattered public lands off of Winton Road, north of West Point—what is referred to as the Lily Gap area. Much of this area has not experienced wildfire in decades. Shrub stands have aged and now contain a larger proportion of dead fuels, and in some forest stands understory fuels have increased, creating unhealthy forest conditions and making the probability that the area will experience a devastating wildfire more likely. At the same time, the local communities have grown. There are now numerous private residences in the area, many of them adjacent to BLM-administered parcels containing dense fuels. Local residents are concerned about wildfire and are anxious to see public land managers like BLM take action to reduce fuels on public lands. The Lily Gap area is considered to be within the wild land-urban interface (WUI) and the local communities are considered "at risk."

With this need in mind, the primary purpose of the proposed action is to create healthy forest conditions on approximately 450 acres of forested public land managed by BLM in the Lily Gap area. Our definition of forest health within the project area draws from the findings of long-term US Forest Service research in the montane/mixed conifer forests of the western central Sierra Nevada (North et al. 2009). A key finding of this (and related) research is that mixed coniferous forests of the west central slopes of the Sierra Nevada (including forests types within the project area) are well adapted to, and perhaps dependent upon, regular low severity, low intensity wildfire—something that the Lily Gap area has not experienced for decades. In other words, wildfire was likely an integral part of the lifecycle of western Sierran forests. Within the project area the consequences of decades of suppression have been, most obviously, the buildup of dead brush, slash, and litter debris in the understory and dense thickets of conifers (especially incense-cedar and ponderosa pine). These conditions are considered unhealthy with many potential downsides, such as loss of ecological diversity, and greater susceptibility to disease/insect infestation. Critically, these conditions are more likely to support a high severity, high intensity

fire—such as a crown fire—that could be devastating to the environment, not to mention property and lives. A key consideration, then, is how to restore the healthier pre-suppression conditions to the project area. This outcome would have the important effect of increasing the resilience of the forest to future wildfires and reducing the possibility of a high severity, high intensity fire in the Lily Gap area. This is good for the environment as well as for local residents. The title of this EA is "Lily Gap biomass demonstration project." If BLM decides to implement the proposed action, what would we be demonstrating? An important aspect of the proposed action is to determine which treatment method would help us achieve our goal of creating healthy forest conditions within the project area in the most cost effective manner. The treatment methods are laid out in Section 2.1.

The most basic question is what would this forest look like if fire had been left to play its natural role? There would be far less brush and shrubs, fewer small diameter trees (including thickets of ponderosa pine and incense cedar), and widely spaced large diameter dominant trees of diverse species (sugar pine, Douglas fir, ponderosa pine, incense cedar, black oak, canyon live oak, madrone, etc.). The majority of trees would be ponderosa pine. There would also be more diversity in the herbaceous layer. This is the desired future condition we are working toward in the proposed action.

If a fire were to occur in this stand during the time of year fires normally start in California, it would likely move into the upper story burning virtually all the trees and vegetation within the project area. By doing proposed treatment, we can move this stand to a healthier, more resilient condition so if a fire were to occur after treatment, it would just kill the small evergreens trees and remove much of the shrub and forb understory—which is what likely occurred historically.

Of note, broadcast prescribed fire seems to be the most obvious and effective way to restore forest health. If healthy forest conditions are seemingly dependent on regular low intensity fire, why not reintroduce fire under controlled conditions? Due to the project area's close proximity to several homes/communities, air quality issues, the massive accumulation of fuels, budget constraints, and other factors, it is extremely unlikely that BLM would be able to do broadcast prescribed burning within the project area at this time. This treatment is not considered in this EA. Therefore, the treatment options considered would involve cutting vegetation either by hand or by mechanical means (i.e., chipper, masticator, etc.) or both.

Cutting does not, by itself, reduce vegetation/fuels; it rearranges them. Since it is possible that a biomass electric generation plant may be in operation near Ione, Amador County by the time this project is implemented, one goal of the proposed action is to determine which method of treatment could generate biomass for this plant in the most feasible and cost effective manner. This could help to remove unwanted cut vegetation. If hauling cut vegetation to the biomass plant is not feasible, BLM would consider pile burning as an alternative. Regardless of the treatment method demonstrated, the desired future condition of a healthy forest will remain the primary goal.

1.2 Conformance with Applicable Land Use Plans

The proposed action—to improve the health of forests on public land in the Lily Gap area and to make this forest more fire resistant to help protect adjacent private property—is consistent with the Sierra Resource Management Plan, approved in February 2008. The Sierra Resource Management Plan's Record of Decision (pages 15-16) gives BLM the goal of establishing a cost-efficient fire management program commensurate with threats to life, property, public safety, and environmental resources. BLM's objectives for meeting these goals are to 1). reduce the risk of wildfire in WUI communities; 2). reduce the risk of catastrophic wildfire through fuels management; 3). use prescribed fire, mechanical, and biological treatments to reduce fuels and promote ecosystem diversity and resilience, control invasive species, reduce fuel hazard, improve wildlife habitat, increase water yield, and enhance watersheds. The Folsom/Mother Lode Field Office Fire Management Plan, approved in March 2008 gives BLM various fire and fuels treatment objectives and strategies for specific lands under BLM's administration. Specific objectives and strategies for the fire management unit, in which the project area is located, are laid out in the plan. The proposed action is consistent with these objectives and strategies.

1.3 Silvicultural Prescriptions for Sierran Mixed-Confier/Lower Montane Forest

Our definition of healthy forest conditions within the project area draws heavily from the research of North et al. (2009) in the western Sierra Nevada. Their recent report titled *An ecosystem management strategy for Sierran mixed-conifer forests* (North et al. 2009) contains key concepts and silvicutlural principles that we have incorporated into the proposed action to achieve the goal of creating a healthy forest conditions within the project area. Appendix A presents a summary of this research.

2.0 Proposed Action and Alternatives

2.1 Proposed Action

BLM proposes to treat Lily Gap as a "demonstration project," that is, as a venue for applying a variety of different treatment methods to determine which are the most ecologically effective and economically feasible. Regardless of the treatment method demonstrated, the goal would be to create healthy forest conditions within the project area by applying the management ideas of North et al. (2009) (see Appendix A).

Silvicultural Strategy: The silvicultural strategy laid out in Appendix A (especially section A.3) would be applied to all portions of the project area that have the characteristics of a Sierran mixed-conifer/lower montane forest type. This would include nearly the entire the project area with the exception of a dry meadow area and a small wet meadow.

Dead and decadent stands of manzanita and other brush would be removed. All oaks would be retained regardless of canopy position unless they constitute a potential ladder fuel. Other tree species such as madrone and dogwood would be left to create diversity.

All conifers less than 8 inches diameter at breast height (DBH) would be removed. This includes the dense thickets of incense-cedar and pine. Large pines and groups of large pines would be retained, with strategic clearing of potential ladder fuels around them to give them additional protection and to create some open gaps in the canopy. This means that some trees greater than 8 inches DBH would be removed if they are potential ladder fuels and to decrease overall stand

density. Any conifers greater than 8 inches DBH that are to be removed to protect the larger "leave" trees and tree clusters would be marked by a BLM forester or fuels specialist. The cut trees would be sold at their highest and best use. Trees larger than 12 inches DBH generally would be sold as sawtimber.

A higher density of tree stems and canopy cover would be retained in the cooler moister microsites, such as along the prominent drainage (outside of the riparian buffer) near the center of Section 25. Defect trees, snags, and downed logs would be retained for wildlife to the extent feasible. In particular, snags greater than 24 inches DBH provide hiding, denning, nesting, and food storage sites for a variety of wildlife. These large snags would be retained unless to do so would create an unusually unsafe concentration of fuels.

Treatment Methods: The different treatment methods to be demonstrated are outlined below. The majority of the work would be done by a hand crew (i.e., BLM fuels crew, inmates, Hotshots, contractors, etc.) under the supervision of BLM's fuel/fire management specialists.

1. **Brush Chipper with Pile Burning.** The crew would feed cut vegetation into a rubber-tracked brush chipper staged on existing roads. The crew would pile and prep vegetation in 6 x 6 ft piles for burning at a later date in accordance with a BLM-approved burn plan and other BLM policy. Approximately 60 piles per acre would be constructed.

2. **Mechanical Masticator.** The crew would use a mechanical masticator to grind, chip, and chew vegetation. The masticated vegetation would be broadcasted across the project area, leaving an altered fuel type, which does not reduce the quantity of fuels, but rearranges them so they are more manageable in the event of wildfire suppression. Equipment selected to carry out this task would be designed to minimize ground disturbance. Multiple cutting attachments would be used to adapt to the terrain and fuels.

3. **Biomass.** If the proposed biomass plant is built near Ione, BLM may attempt to harvest biomass size material. The likely method for harvesting biomass within the project areas is as follows. Fallers would use chainsaws to cut brush and trees less than 8 inches diameter at breast height (unless the trees are a potential ladder fuels that threatens the larger "leave" pines). Cut vegetation would be bucked into manageable lengths for the crew to feed into a rubber-tracked chipper. The chips would be fed directly into a trailer towed by a small rubber-tracked vehicle. The vehicle would tow the chips to designated staging areas (existing roads, pullouts, and landings). Here, the chips would be loaded into a semi-truck trailer and transported to the biomass plant.

4. **Biomass Using Feller Buncher.** Another method for harvesting biomass that may be used involves a feller buncher—a tractor with an attachment that can rapidly cut and gather several trees. The feller buncher would cut and position trees and other vegetation into piles at the harvest site. A rubber-tracked skidder would then move the vegetation from the harvest sites to designated staging areas (existing roads, pullouts, and landings). Here, a large-scale tub grinder would chip the vegetation directly into the trailer of a semi-truck for transport to the biomass plant near Ione. Trees of larger diameter which could be utilized as sawtimber would be loaded on log trucks to be hauled to the closest

mill. It would be necessary to create tracks into the project area to access harvest sites and to, then, transport vegetation from the harvest sites to the designated staging areas for further processing and loading. Ground disturbance would be kept to a minimum and would occur only where necessary. No new roads would be built. The number of new tracks into the project area would be minimized. The tracks would be put to bed after work at the harvest site is completed. Only existing roads, pullouts, and landings would be used as designated staging areas.

5. **Dozer and Brush Rake.** BLM would demonstrate for the public the use of a dozer and brush rake to pile vegetation for chipping and biomass utilization in a 5-acre area in the project area. BLM would study the environmental effects of this kind of treatment on the 5-acre area.

The project area may see fuels work at any time over the following 10 years. At the end of this 10-year period, fuels work of any kind within the project area would need to be reauthorized, if necessary with a "fresh" NEPA document. The present EA will be reviewed by staff to determine whether it is adequate to use to reauthorize the proposed action and/or other kinds of fuels work.

Any fuels treatment work (i.e., broadcast prescribed burn, etc.) that BLM may propose in the future outside of the scope of the above described proposed action and/or affecting land outside of the project area analyzed in this EA would be subject to BLM's full environmental review/decision-making process. In other words, a new NEPA document may be needed, including new cultural and biological recommendations.

2.2 Project Design Features

All treatment work would be conducted subject to the following stipulations.

1. **Minimize New Ground Disturbance.** Cut vegetation would be forwarded to designated staging areas: existing roads, road pullouts, and landings on BLM-administered land for further processing and loading into trucks. No new landings would be built. In some cases, it would be necessary to create tracks into the project area. The tracks are needed to drive heavy equipment to harvest sites and to, then, transport the harvested vegetation to the designated staging areas. Wherever possible, a hand crew with chainsaws and a rubber-tracked chipping and hauling equipment would be used (rather than a feller buncher) to harvest biomass and sawtimber. Biomass material would not be harvested unless the biomass plant is built at Ione, as proposed. Berms, large boulders, and other kinds of barriers may be placed at strategic locations after harvest to prevent dirt bikes and other off-highway vehicles from driving in the treated area and causing erosion.

2. **Erosion and Sedimentation Control.** Erosion and sedimentation are potential issues affecting the drainages near where the center line (running east-west) of the section 25, crosses the drainage that appears on the USGS 1:24,000 topographic map. This stream drainage has been degraded by previous land use. Mining and timber harvest have left an

areas of un-vegetated slope and has caused some sedimentation in the channel. To prevent any further potential degradation, streamside buffers (100 ft minimum from the centerline of the stream) would be established for the perennial streams that flow through the project area. No equipment operation would be allowed on slopes greater than 35 percent; hand work would be allowed.

3. **Weed Control.** To minimize the potential for introduction or spread of invasive weeds, equipment used for the proposed action would be cleaned prior to entering area and, where possible, would avoid operating within weed-infested areas, such as stands of scotch broom, or oblong spurge. Occurrences of these weed species were found only at the edge of the public land and avoidance should be feasible.

4. **Cultural Resources.** Flagging-tape buffers would be established around identified cultural resources. These cultural resources would be protected during project implementation.

5. **Wildlife.** Attempt to implement the project outside the breeding season, generally spring (March-June) so as not to disrupt nests, dens, and young animals.

6. **Wildlife.** Avoid wood rat nests and large woody debris when creating burn piles. If a potential nest cannot be avoided, check the pile for signs of wildlife before lighting. If nests or dens are found, leave the pile alone. If it must be burned, restack it nearby or give the animal a path to escape from the fire.

7. **Wildlife.** Leave an uncut patch (minimum of 0.25 acres) for every 10 acres harvested, with patches totaling 5 percent of the area. Use leave trees or large snags as the center for uncut patches. Riparian and other buffers can help to satisfy this goal.

8. **Wildlife.** Retain live trees with existing cavities.

9. **Wildlife.** Avoid damaging existing downed woody debris, especially large (18+ inches) hollow or rotten logs and rotten stumps during all harvesting operations. Leave all existing coarse woody material (more than 6 inches in diameter at the large end) and snags as possible.

10. **Wildlife.** Retention of coarse woody debris in managed stands should more closely model coarse woody debris found in natural stands. Retain and scatter tops and limbs from 20 percent of the trees harvested.

11. **Mining Activity.** There are several active mining claims in the project area. BLM is regulating the use of these claims under the federal mining regulations at 43 CFR 3809 and 3715. Mining claimant Louis Saltzer has been authorized by BLM under these regulations to live on one of his mining claims, now within the project area analyzed in this EA. BLM would work with Louis Saltzer to ensure that his mining activity and related occupancy, as allowed under the regulations, is not negatively affected by the proposed action.

2.3 No Action

Under the no action alternative, BLM would not treat fuels in the project area. Fuels would not be harvested for biomass.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

Due to the project area's close proximity to several homes/communities, air quality issues, budget constraints, and other factors, it is extremely unlikely that BLM would be able to do broadcast prescribed burning within the project area. This alternative is eliminated from detailed analysis.

3.0 Affected Environment

The project area is approximately 420 acres of public land located off of Lily Gap Road/Winton Road, two air miles north east of the town of West Point, in the central Sierra Nevada foothills. Specifically, the project area is located just northwest of Skull Flat, on the divide between the north and south forks of the Mokelumne River. Elevations within the project area range from 3760 to 2840 ft above sea level. There are several unnamed seasonal streams in the project area that drain to the North Fork of the Mokelumne River. One of the drainages (known historically as Skull Flat Gulch or Skull Flat Creek) runs east-west through the project area in Section 25. This drainage is, in some sections, deeply incised and flows perennially. Please refer to the project area maps in Appendix B.

Vegetation in the project area varies depending on elevation, aspect, soils, etc. While westside Ponderosa pine forest tends to be the dominate overstory species over much of the area, the occurrence of Douglas fir, incense-cedar, sugar pine and oak, lends portions of the project area to being classified as mixed conifer type. Whiteleaf manzanita and mountain misery dominate the understory layers. On more north facing slopes the amount of Douglas fir, incense-cedar, and sugar pine as well as canyon live oak increases. Along Skull Flat Creek, big leaf maple, mock orange, white alder, and mountain dogwood become prominent. Other associated woody species include black oak, madrone, deer brush, buckbrush, pinemat ceanothus, toyon, Sierra gooseberry, golden fleece, and poison oak. Due to the lack of disturbance, the area has become thick with brush and suppressed conifers of many species. There are numerous places where the whiteleaf manzanita is so thick, it is impossible to walk through.

The drainages do not support riparian vegetation for the most part. The prominent east-west drainage in Section 25, known as Skull Flat Creek, does support some riparian vegetation (as indicated in the paragraph above), but it is not well developed probably because of the steepness of the grade. Of note, near where the center line (running east-west) of Section 25 crosses Skull Flat Creek, there is a wet meadow dominated by horsetail, with leopard lily, digitalis, columbine, mugwort, sedges, and rushes. There is a dry meadow in the southern portion of the parcel in Section 36.

The vegetation within the project area provides habitat for a variety of wildlife typical for the central Sierra foothills, including black bear, coyote, bobcat, grey fox, California quail, Steller's jay, raven, hawks, and eagles.

The project area is generally within the Mother Lode (east belt), a region of California that experienced substantial gold mining beginning shortly after the discovery of gold in the region in 1848 and lasting to approximately the time that the USA entered World War II (and, in some cases, after World War II). In fact, gold mining (and later logging) was historically the backbone of the region's economy. Many of the current towns in the vicinity of the project area (such as West Point and Railroad Flat) were founded during the Gold Rush (1848 to ca. 1858). Logging took off after World War II. Evidence of mining and logging activity within the project area is a legacy of the region's historic mining and logging economies, an economies that helped to support these and other towns. For more information about the cultural resources found within the project area, refer to the attached cultural resources inventory report by the BLM archaeologist.

The project area is near the boundary of the Stanislaus National Forest. There are numerous residences on private land in the general area, including along the boundaries of BLM-administered land within the project area. The level of recreational use in the project area is quite low. The project area may see some use by hunters. There has been off-highway vehicle use within the project area, as well. Under the 2008 Sierra RMP this use is not allowed off of roads designated for motorized use.

BLM manages this area in accordance with class III visual resource management (VRM) standards. BLM's objective for class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat basic elements found in the predominant natural features of the characteristic landscape.

There are several active mining claims within the project area. BLM is regulating the use of these claims under the federal mining regulations at 43 CFR 3809 and 3715. Mining claimant Louis Saltzer has been authorized by BLM under these regulations to live on one of his mining claims, now within the project area analyzed in this EA.

4.0 Environmental Effects

The following critical elements have been considered in this environmental assessment and have been determined to be unaffected by the proposal: areas of critical environmental concern, prime/unique farmlands, floodplains, wetlands and riparian zones, wilderness, and environmental justice.

4.1 Impacts of the Proposed Action and Alternatives

Forestry. Using data from the Forest Inventory and Analysis gathered by the Forest Service and field observations by the BLM forester, we were able to visually depict what the forest looks like now and what it would look like after we have fully implemented the proposed action. This was accomplished by processing the data through the Forest Vegetation Simulator (FVS). This computer program takes stand data and allows you to set parameters for different types of treatments, and then project the stand into the future to see what would happen after the treatments have been implemented. It is important to remember that this is a "representation" of

this stand using real data, and not an exact duplication. Figure 1 depicts the stand as it is today. Figure 2 represents what the stand would generally look like after treatment is fully implemented. All the trees less than 8 inches DBH have been removed and some of the larger diameter trees have been removed to increase spacing and reduce overall density. Keep in mind that snags and areas of brush would be retained to provide habitat for certain wildlife.

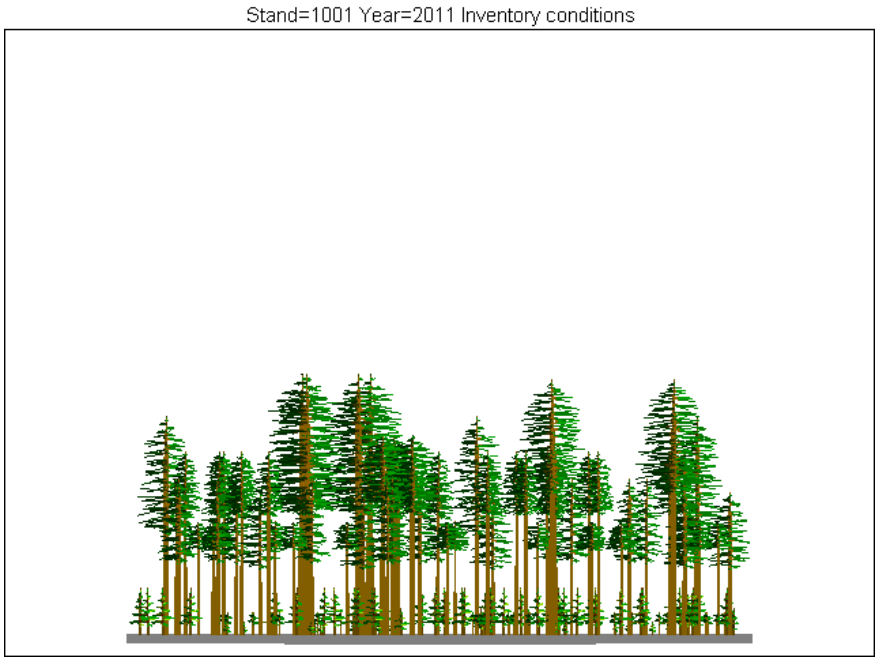

Figure 1. Before Treatment

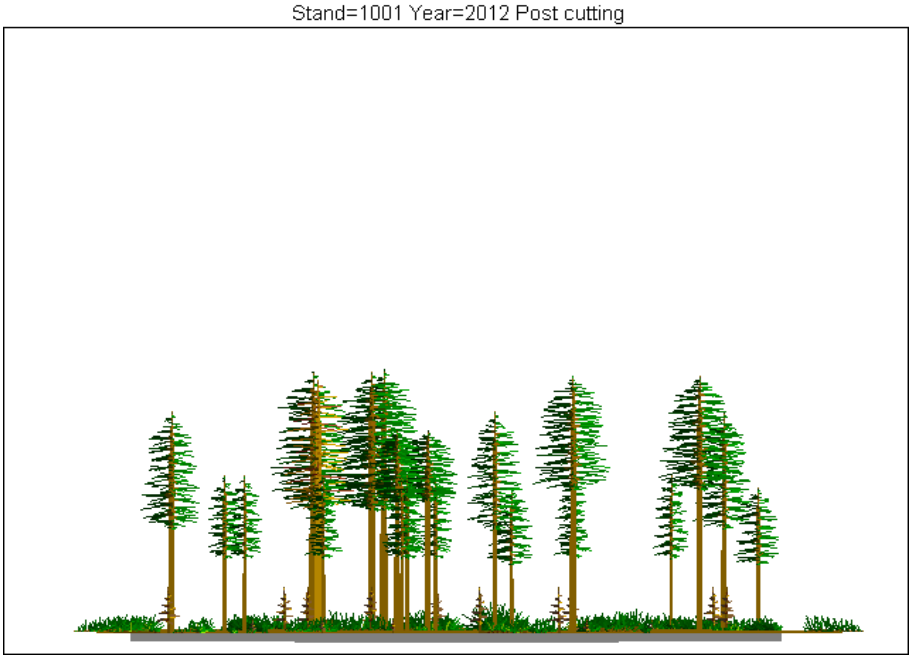

Figure 2. After Treatment

Soil – Air – Water. The proposed action would have negligible short-term negative impacts on atmospheric, water, and soil resources in the project area, especially if heavy equipment is not used to harvest vegetation for biomass. There are small seasonal streams in the area that feed into the North Fork of the Mokelumne River, a mile or so to the west. The proposed action could cause erosion and some additional sediment to flow into these streams and into the river. BLM has recommended that the river, from Tiger Creek Reservoir to Highway 49 be incorporated into the national wild and scenic river system. Water quality is one of the outstandingly remarkable values that, in BLM's view, makes this stretch of river potentially eligible for wild and scenic designation. The area that would be treated is relatively small in size and ground disturbance would be minimized using the project design features in Section 2.2 of this EA. In particular, heavy equipment would not operate on slopes greater than 30 percent and/or within 100 ft of perennial streams. Equipment used for the project is small in terms of size and power and would be equipped with rubber-tracked tires to minimize ground disturbance. The proposed action would not have more than a negligible impact on soils and water quality. Cutting and chipping of vegetation, as proposed, would create some dust, but again dust created by the proposed action is small and not enough to seriously affect air quality. The same can be said for potentially burning vegetation harvested in the project area in a biomass plant. The proposed action is too small to seriously affect air quality on a local or regional scale.

Botany. BLM botanists analyzed the impacts of the proposed action on botanical/vegetation resources, especially special status plants. The analysis is designed to help BLM meet its obligations under the Endangered Species Act and meet other authorities and BLM policies. The botanist recommended that the proposed actions would not affect threatened and endangered plants or other BLM special status plants. White leaf manzanita chaparral and ponderosa pine/black oak forest are project area plant communities adapted to periodic wildfire. It is likely that the project area has experienced natural wildfire events in the past and has recovered after the wholesale removal of shrubs and other understory vegetation. Likewise, the common woody species (e.g., white leaf manzanita) that would be cut in the course of the proposed action would reestablish themselves within the project area over time. However the relative abundance of species can be altered by the treatment method used to reduce fuels. For instance, cutting shrubs with a chainsaw or masticator favors sprouting species like chamise or toyon that are not killed by cutting. These species can reestablish themselves quickly. Obligate seeding species like white leaf manzanita may become less abundant in the stand after this kind of treatment.

Wildlife. The BLM wildlife biologist analyzed the impacts of the proposed action on wildlife, especially on special status wildlife. Her analysis was designed to help BLM meet its obligations under the Endangered Species Act and other authorities and BLM policies. The biologist recommended that the proposed action would not affect threatened and endangered wildlife or other BLM special status wildlife.

While mechanical fuels treatments can decrease the risk of catastrophic fire, they do not provide the ecosystem benefits of low intensity low severity fire, and they alter habitat needed by wildlife. In general, fire-dependent species, species preferring open habitats, and species that are associated with early successional vegetation or that consume seeds and fruit appear to benefit from mechanical fuel reduction activities. Increasing understory light for shrub patch development can increase habitat for some small mammals and birds. In contrast, species that

prefer closed-canopy forests or dense understory, and species closely associated with those habitat elements that may be removed or consumed by fuel reductions, would likely be negatively affected by fuel reductions. Some habitat loss may persist for only a few months or a few years, such as the loss of shrubby understory vegetation which can recover quickly. The loss of large-diameter snags and down wood, which are important habitat elements for many wildlife and invertebrate species, may take decades to recover and thus represent some of the most important habitat elements to conserve during fuel reduction treatments. Retention of snags is addressed in the proposed action. Downed wood retention is addressed in project design features 10 and 11. These measures would reduce this impact.

Overall, direct mortality of wildlife owing to crushing from heavy equipment during fuel reduction is considered to be low, but this is mostly based on anecdotal information. It is believed that most species are able to find refuge microsites (e.g., inside burrows or under surface objects) or move away from approaching equipment. However, spring-season thinning during the breeding season may result in mortality of ground- and shrub-nesting bird nestlings and species living within litter such as small mammals, reptiles, amphibians, and invertebrates. Project design feature 6 that attempts to avoid the breeding/nesting period would reduce this impact.

Black bear. By volume, about 25 percent of black bear diet can consist of insects (mainly ants and yellowjackets) obtained primarily from down logs. A decrease in down wood would result in fewer ants and yellowjacket nests available to black bears. Project design features 10 and 11 address the retention of coarse woody material. Fuels reduction would likely increase the amount of grasses and berries used by black bears for foraging.

Deer. The proposed fuels reduction strategy would increase forage quantity and quality for deer. However, escape cover for mule deer, and other animals that need high shrub cover to avoid predators would be reduced. Project design feature 8 which calls for the retention of uncut patches of vegetation would reduce the impacts of less escape cover.

Small Mammals. Shrubs, down wood, and snags provide important cover from predators thus the loss of these habitat elements may have negative consequences for some small mammal species. The silvicultural strategy to be implemented, along with project design features 10 and 11, address snag and down wood retention and would reduce this impact. Small mammal species that need high shrub cover to avoid predators may be negatively affected by shrub removal for the first few years post-treatment, but then exceed pretreatment population levels when shrubs recover and food sources are high from increased light, herbaceous growth, and seed production. Project design feature 8 that retains patches of uncut vegetation would reduce the impacts of shrub removal. However, other species prefer open habitat conditions and may benefit from the food resources provided by plentiful grasses and forbs that may establish after fuel reduction. Some species of small mammals prefer high canopy closure, such as northern flying squirrel, and thus may be adversely affected by thinning treatments. Thinned stands would likely be poor bushy tailed woodrat habitat due to their association with abundant large snags, mistletoe brooms and soft log cover. Project design feature 10 that addresses retention of pre-harvest coarse woody material and the proposed action which addresses retention of snags will reduce these impacts.

Bats. Several species of bats roost under the bark of tall, large-diameter trees or in cavities of large snags. If large-diameter snags and trees are protected during fuel reduction as proposed, it is likely that fuels reduction may have minimal or even positive effects on bat populations. Retention of large trees and snags is addressed in the proposed action and project design features.

Birds. Fuels reduction conducted during the nesting season is more likely to result in high mortality of nestlings, especially for species nesting on the ground and in shrubs and small trees. Project design feature 3 that attempts to avoid the breeding/nesting period would reduce this impact. Fuels reduction prior to the nesting season is likely to reduce nesting habitat for ground- and shrub-nesting species. At the population level, the proposed project would not have a measurable negative effect on migratory bird populations. This is in part because the project is relatively small compared to the amount of mixed conifer forest within the field office boundary. The impact is further reduced by project design feature 8 which leaves patches of uncut vegetation.
Bird responses to fuels reduction are dependent on the species and other factors. Some bird species prefer early successional and open habitats, and these species are likely to increase in abundance after fuel reduction. In contrast, some bird species may be less abundant after fuel reduction. Hurteau et. al (2008) found that mountain chickadee and yellow-rumped warbler were particularly sensitive to thinning treatment in his study at the Southwestern Plateau. Removal of large trees or snags would likely affect species nesting in tree canopies and cavities of snags or live tree boles. Recruitment of large snags for cavity nesters may take decades or longer, depending on existing stand conditions. The proposed action which addresses the retention of large trees and snags would reduce these impacts. Further, project design feature 9 that addresses retention of live trees with cavities would reduce these impacts.

Cavity-nesting birds. If fuel treatments involve removing or eliminating snags, then a net loss of nesting habitat for primary and secondary cavity-nesting birds might be expected for many years. The majority of research studies report that fuel treatments result in a decrease in populations of cavity nesters owing to loss of dead trees used for nesting and roosting. The proposed action which addresses the retention of large trees and snags would reduce these impacts. Further, project design feature 9 that addresses retention of live trees with cavities would reduce these impacts.

Raptors. The more open understory created by fuel reduction may be advantageous to some species of hawks, owls, and eagles that prey on small mammals and birds in open forests and small clearings. Prey species that have less cover are more easily captured, and some prey species prefer open forests (for example, deer mice). However, some raptor species and some small mammals and avian prey prefer closed canopy forests and thus may avoid stands that have been treated to reduce fuels. Raptor species that prefer closed canopy forest, such as California spotted owl and northern goshawk, were not detected in the project area so these raptors will not be impacted by the project. The removal of trees with dwarf mistletoe brooms during thinning treatments would likely be detrimental to wildlife species that nest in mistletoe brooms, including great horned owl, northern goshawk, Cooper's hawk, California spotted owl, and red-tailed hawk. Retention of defect trees which is addressed in the proposed action would reduce this impact.

Thinning from below, while still retaining large trees, snags, large downed wood, and high canopy closure should allow continued habitat suitability for northern goshawk and California spotted owl. Although vegetation manipulation to reduce wildfire hazard may create less than optimum habitat for northern goshawk and California spotted owl, this should be weighed against the hazard for stand replacement fires and complete loss of habitat over large areas. Retaining large trees, snags, large downed wood, and patches of high canopy closure is addressed in the proposed action and the project design features. In addition, northern goshawk and California spotted owl were not detected in the project area, and therefore would not be impacted by the proposed action.

Amphibians. A few amphibians are strictly aquatic, but most use upland habitats at various times during the year, and a few species are strictly terrestrial. Upland habitat use by forest amphibians largely depends on the availability of moist duff and litter and rotting down wood. Amphibian response to reducing canopy cover would likely be unfavorable because of the warmer and drier conditions created in the understory vegetation, down wood, litter, and soil. Most terrestrial salamanders require moist soils or decomposing wood to maintain water balance, and dry conditions usually result in suppressed populations. Project design features 10 and 11 that address retention of downed wood would reduce this impact. Anurans (frogs and toads) may be less affected by changes in environmental conditions associated with the proposed fuel reduction project because of their tendency to travel at night and during rain events, their greater vagility than salamanders, and their close association with wetlands. Still, species that frequently occupy terrestrial habitats such as many salamanders, boreal toads, and tree frogs may be killed during fuel treatments or find post-treatment conditions unsuitable. These negative effects would be expected to be short-term. The direct mortality of amphibians during fuels reduction treatment is not anticipated to be high. Fuels reduction treatments may contribute fine sediment to streams because of increased surface runoff. Sedimentation causes reduced survivorship of eggs and tadpoles of some stream-breeding amphibians that lay their eggs and rear tadpoles under rocks or within interstitial spaces in the substratum. Project design feature 2 that establishes stream buffer zones would reduce sedimentation into the stream, thus reducing this impact.

Reptiles. James and M'Closkey (2003) found that the removal of dead trees (standing and prone) during fuels treatment on the Colorado Plateau may limit the local distribution, abundance, and diversity of lizards, which include dead trees in their microhabitat for shelter, perching, foraging, courting, and defending territories. Removal of dead trees could seriously affect the local abundance and diversity of lizard species, which spend substantial time in this microhabitat. Project design features 10 and 11 address the retention of coarse woody debris, and the proposed action addresses retention of snags. The retention of snags and coarse woody debris would reduce these impacts.

Coarse Woody Debris. One of the key differences between biomass removal and a traditional timber harvest is the reduction of dead wood on the forest floor. Besides providing wildlife habitat, dead wood serves as a seedbed for regeneration, releases nutrients back into the soil and forest, decreases runoff and erosion, facilitates nitrogen fixation, and stores forest carbon.

Butts and McComb (2000) found in their study site in western Oregon that coarse woody debris reductions associated with thinning of stands may negatively impact salamanders and shrews.

The abundance of ensatina and clouded salamanders increased with the volume of coarse woody debris. In addition, the probability of encountering either ensatina or Trowbridge's shrew increased with cover of coarse woody debris on the forest floor. The study suggests that current management guidelines for coarse woody debris retention may not provide adequate habitat for forest-floor vertebrates that depend on this component of the habitat. The authors suggest that the retention of coarse woody debris in managed stands should more closely model coarse woody debris found in natural stands, and thus recommend coarse woody debris retention in the range of 100-300 m3/hectare. This is more likely to provide coarse woody debris for terrestrial salamanders.

In three regions (West, North and East) of south and central Sweden, Gunnarson et. al. (2004) studied short-term effects of slash removal on species richness and abundance of beetles in coniferous and mixed forests. The study concluded that extensive slash removal leads to impoverished species richness of beetles at a local scale. Slash heaps left on site may provide important refuges for ground-active beetles. Moreover, the results support the general theory that microhabitat structure affects arthropod abundance and diversity. Project design features 10 and 11 that address the retention of coarse woody debris would reduce these impacts.

Cultural Resources. The BLM archaeologist has conducted a cultural resource study of the proposed action to determine whether significant cultural resources could be affected by the proposed action. The study includes a background records search and field inventory. The study is designed to help BLM meet its obligations under Section 106 of the Historic Preservation Act. The backgrounds record search and field inventory indicate very low sensitivity for prehistoric resources, especially village sites. The terrain is mostly steep and heavily forested. The project area has a much higher sensitivity for historic-era gold-mining- and logging-related resources. Logging during the last 30 to 50 years has also left a mark on the project area in the form of skid roads, stumps, and eroded areas. All cultural resources found within the project that could be affected by the proposed action would be flagged for avoidance. In other words, no cultural resources would be affected by the proposed action. It is anticipated that the proposed actions would not affect significant cultural resources. Consultation with Native Americans is occurring as this EA is put out for public review. All Native American input will be carefully considered. We do not anticipate that any places of traditional religious and cultural significance to Native Americans would be affected. If we do identify such places we will work with the affected Native Americans to modify the proposed action to avoid negative effects.

Recreation. The proposed action could have negligible short-term negative impacts on recreational use. Hunters and motorists on designated routes might be inconvenienced temporarily during project implementation due to the noise and the dust caused by cutting and chipping fuels, and the use of the roads in the area by project-related vehicles including a semi-truck/trailer. Recreationists would continue to use the project area after the proposed action is implemented with no additional inconvenience. As noted in the affected environment section, there has been off-highway vehicle use within the project area. Under the 2008 Sierra RMP this use is not allowed off of designated roads. The proposed action would be done in a way that does not increase unauthorized use of off-highway vehicles within the project area.

Visual Resources. The project area is not known for its visual resources. The proposed project could have a negligible negative impact on visual resources. Vegetation would be removed. Some might consider this an improvement to the scenery. Most importantly, the proposed action would be consistent with BLM's VRM class III management objective under the 2008 Sierra RMP, which is to partially retain the existing character of the landscape.

4.2 Impacts of the No Action Alternative

There would be no direct impacts to environmental resources, such as atmospheric, soil, water, biological, and cultural resources. Though highly variable and difficult to predict with certainty, not implementing the proposed action could lead to detrimental impacts to forest health, firefighting efforts, and adjacent private properties. If a fire were to occur within the project area during the usual California fire season, it would likely move into the upper story—a crown fire—burning virtually all the trees and vegetation within the project area. By doing proposed treatment, we can move this stand to a healthier, more resilient condition so if a fire were to occur after treatment, it would just kill the small evergreens trees and remove much of the shrub and forb understory—which is what likely occurred historically. The BLM may also miss an opportunity to provide vegetation to a biomass plant near Ione. We would miss an opportunity to help produce energy and increase economic growth. Quantifying this impact is impossible.

4.3 Cumulative Impacts

Negative cumulative impacts on the larger watershed scale are not anticipated. The proposed action would have negligible negative impacts on commonplace plants and wildlife. The current condition of the vegetation has been influenced by decades of wildfire suppression. Other than prescribed fire (or an uncontrolled wildfire), which has been removed from further consideration in this EA for a variety of reasons (refer to Section 2.4), there is not at present a better way to reduce dense understory vegetation that would have been reduced by wildfire in the past, before fire suppression was practiced. Prescribed burning is severely limited by safety and air quality concerns, especially in the wildland urban interface. The number of homes in close proximity to the project area would make burning here problematic. The proposed action is expected to have beneficial cumulative impact on wildfire suppression in the area, as long as BLM maintains the treatment area.

With respect to atmospheric, soil, and water resources, negative cumulative impacts on the watershed scale are not anticipated. The project design features would greatly limit the amount of potential erosion of sediments into the drainages/tributaries of the North Fork of the Mokelumne River. BLM has not recently proposed any projects of this scope within the Mokelumne River watershed. Nothing like this is planned in the foreseeable future.

5.0 Agencies and Persons Consulted

5.1 Authors

James Barnes, BLM NEPA coordinator/archaeologist
Keith Johnson, BLM forester
Al Franklin, BLM botanist
Peggy Cranston, BLM wildlife biologist
Brian Mulhollen, BLM fuels specialist

5.2 BLM Interdisciplinary Team/Reviewers:

/s/ James Barnes	*3/1/11*
NEPA coordinator/Archaeologist	Date
/s/ Brian Mulhollen	*3/1/11*
Fuels specialist	Date
/s/ Keith Johnson	*3/1/11*
Forester	Date
/s/ Jeff Horn	*2/25/11*
Outdoor recreation planner/VRM specialist	Date
/s/ Lauren Fety	*2/24/11*
Botanist	Date
/s/ Peggy Cranston	*2/25/11*
Wildlife biologist	Date

5.3 Availability of Document and Comment Procedures

This EA will be posted on Mother Lode Field Office's website (www.blm.gov/ca/motherlode) under NEPA and will be available for a 30-day public review period. The EA is also available by mail upon request during this 30-day public review period. Comments should be sent to James Barnes at Bureau of Land Management, Mother Lode Field Office, 5152 Hillsdale Circle, El Dorado Hills, California 95762 or emailed to jjbarnes@blm.gov.

5.4 References Cited and Sources of Information

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Appendix A

Silvicultural Prescription for Sierran Mixed-Confier/Lower Montane Forest

A.1 Background and the Importance of Fire

Our definition of healthy forest conditions within the project area draws heavily from the research of North et al. (2009) in the western Sierra Nevada. Their recent report titled *An ecosystem management strategy for Sierran mixed-conifer forests* (North et al. 2009) contains key concepts and silvicutlural principles that we feel can be incorporated into the proposed action to achieve the goal of creating a healthy forest conditions within the project area.

Chief among these concepts is the importance of wildfire. North et al (2009) explains that:

> Fire plays a pivotal role in reshaping and maintaining mixed-conifer ecosystems. Fire was once very common in most of the western Sierra and has been a primary force shaping the structure, composition, and function of mixed-conifer forests. … [Most of the fires were of low intensity and returned at frequent intervals.] The main effect of low-intensity fire is its reduction of natural and human-created (i.e., resulting from management activities) fuels, litter, shrub cover, and small trees. These reductions open growing space, provide a flush of soil nutrients, and increase the diversity of plants and invertebrates. By reducing canopy cover, fire also increases habitat and microclimate heterogeneity at site, stand, and landscape levels [North et al. 2009:5-6].
>
> Forest fuels are usually assessed in three general categories: surface, ladder, and canopy bulk density. Fuel treatments often focus on ladder fuels (generally defined to be variably sized understory trees that provide vertical continuity of fuels from the forest floor to the crowns of overstory trees.) Some studies and models, however, suggest a crown fire entering a stand is rarely sustained (i.e., sustained only under extreme weather conditions) if understory fuels are too sparse to generate sufficient radiant and convective heat. [North et al. 2009:3].
>
> By itself, prescribed fire is difficult to apply in some forests owing to fuel accumulations, changes in stand structure, and operational limitations on its use. Mechanical treatments can be effective tools to modify stand structure and influence subsequent fire severity and extent and are often a required first treatment in forests containing excessive fuel loads. [North et al. 2009:6-7]
>
> Prescribed fire is generally implemented very carefully, killing only the smaller size class trees. In some cases, it is ineffective for restoring resilience, at least in the first pass. For example, prescribed fire may not kill many of the larger ladder-fuel or co-dominant true fir trees that have grown in with fire suppression. In many stands, mechanical thinning followed by prescribed fire may be necessary to achieve forest resilience much faster than with prescribed fire alone. [North et al. 2009:7]
>
> Some forests cannot be prescription burned, at least as an initial treatment, because of air quality regulations, increasing wildland home construction, and limited budgets. Yet restoration of these forests still depends on modifying fuels because it reduces wildfire intensity when a fire does occur and can produce stand conditions that simulate **some** of fire's ecological effects. [North et al. 2009:7]

One measure of resilience is that fire disturbance produces mortality patterns consistent with the dynamics under which the forest evolved. Mixed-conifer resilience might be best ensured by (1) reducing fuels such that if the forest burned, the fire would most likely be a low severity surface and (2) producing a forest structure that keeps insect and pathogen

mortality at low, chronic levels. Where intermediate-size trees are abundant, they may present a fire and fuels risk, especially when live crowns are continuous to the forest floor (North et al. 2009:v).

Intermediate-size trees can contribute to overly dense stands that are moisture stressed and at risk of bark beetle attacks:

> In addition to ladder and surface fuels, managers have been concerned with reducing canopy bulk density in DFPZs and the defense zone of wildland urban interfaces (WUI). Overstory trees are commonly removed, and residual trees are evenly spaced to increase crown separation. The efficacy of canopy bulk density reduction in modifying fire behavior is largely a function of weather conditions. Research has suggested there is often limited reduction in crown fire potential through overstory thinning alone, without also treating surface fuels. [North et al. 2009:4]
>
> A concern with the widespread use of canopy bulk density thinning in defensible fuel profile and defense zones is the ecological effects of the regular tree spacing. In the Sierra Nevada, historical data, narratives, and reconstruction studies indicate mixed conifer forests were highly clustered with groups of trees separated by sparsely treed or open gap conditions. This clustering can be important for regenerating shade-intolerant pine, increasing plant diversity and shrub cover moderating surface and canopy microclimate conditions within the tree cluster and providing a variety of microhabitat conditions for birds and small mammals. [North et al. 2009:4]

A.2 Importance of Stand Heterogeneity and Density

Recent studies have shown that spatial heterogeneity was a key feature in forest resiliency and characteristic of frequent fire's effect on mixed-conifer forests. Fuel treatments that produce uniform tree spacing reduce this ecologically important spatial heterogeneity. North et al. (2009) explains that:

> Horizontal heterogeneity, however, used to be relatively common in Sierran mixed-conifer forests [due to logging/reforestation practices]. All of the Sierran reconstruction studies suggest mixed-conifer forests, under an active fire regime, had a naturally clumped distribution containing a variety of size and age classes. [North et al. 2009:15]
>
> At the stand level, vertical heterogeneity can still be provided by separating groups of trees by their canopy strata. For example, a group of intermediate-size trees that could serve as ladder fuels might be thinned or removed if they are growing under large overstory trees. The same size trees in a discrete group, however, might be lightly thinned to accelerate residual tree growth or left alone if the group does not present a ladder fuel hazard for large, overstory trees. [North et al. 2009:15-16]
>
> To increase horizontal heterogeneity, we suggest using microtopography as a template. Wetter areas, such as seeps, concave pockets, and cold air drainages, may have burned less frequently or at lower intensity. Limiting thinning to ladder fuels in these areas is suggested because with their potentially higher productivity and cooler microclimate, they can support greater stem densities, higher canopy cover, and reduced fire effects. A concern with current uniform fuel reduction is that these microsite habitats associated with sensitive species would be eliminated. Surface fuel loads at these microsites should still be reduced to lower their vulnerability to high-intensity fire.
>
> In contrast, upslope areas, where soils may be shallower and drier and where fire can burn with greater intensity, historically had lower stem densities and canopy cover. On these sites, thinning might reduce the density of small or, where appropriate, intermediate trees and ladder and surface fuels toward a more open condition. In some circumstances this thinning may reduce water stress,

> accelerating the development of large residual trees. Within a stand, varying stem density according to potential fire intensity effects on stand structure would create horizontal heterogeneity. [North et al. 2009:16-18]

> Historical forests can provide a better understanding of the ecological processes that have shaped mixed-conifer forest and the habitat conditions to which wildlife have adapted. All reconstruction studies, old forest survey data sets, and 19th-century photographs suggest that frequently burned forests had very low tree densities. … Studies reconstructing pre-European conditions all indicate that forests had a greater percentage of pine, a clustered pattern with highly variable canopy cover, and a high percentage of the growing stock in more fire resistant, large-diameter classes. … What these reconstructions do provide is inference about the cumulative process effects of fire, insects, pathogens, wind, and forest dynamics on stand structure and composition, producing forests resilient to most disturbances, including wildfire. … [Modeling] found a low-density forest dominated by large pines was most resilient to wildfire, sequestered the most carbon, and had the lowest carbon dioxide (CO2) emissions and thus contributed less to global warming. An analysis of carbon emissions and storage from different fuel treatments, found understory thinning followed by prescribed fire produced the greatest reduction in potential wildfire severity without severely reducing carbon stocks. [North et al. 2009:9].

> In fire-suppressed forests, shrubs are often shaded out, reducing their size, abundance, and fruit and seed production in low-light forest understories. Anecdotal narratives, a forest reconstruction, and a few early plot maps suggest shrub cover in active-fire conditions might have been much higher than in current forests, mostly owing to large shrub patches that occupied some of the gaps between tree clusters. [North et al. 2009:12]

> Studies in the Sierra Nevada and Klamath Mountains found that mixed-conifer structure and composition varied by fire patterns that were controlled by landscape physiographic features. Fire intensity, and consequently a more open forest condition, increased with higher slope positions and more southwesterly aspects. … Cumulatively these studies suggest that forest landscapes varied depending on what structural conditions would be produced by topography's influence on fire frequency and intensity. [North et al. 2009:19]

A.3 Silvicultural Strategy

North et al. (2009) asserts that a new silviculture for Sierran mixed-conifer forest that

> balances ecological restoration and wildlife habitat with fuel reduction can meet multiple forest objectives. By necessity, recent Sierran silviculture has first been focused on reducing fire severity through fuel reduction. For many reasons, including maintaining or restoring resilient forests, public safety, and property loss, fuel reduction remains a priority. We suggest that , with some modification, wildlife and ecological objectives can also be met. [North et. al. 2009:22]

> Diameter-limit prescriptions applied equally to all species will not remedy the significant deficit of hardwoods and pines in current forests. Prescriptions that differ by species can retain hardwoods, which are important for wildlife, and favor pines that can increase the forest's fire resilience. Given their current scarcity in many locations, there are few instances that warrant cutting either hardwoods or pines in mixed-conifer forests. [Id.]

In general, leaving pine and thinning white fir, Douglas-fir, and incense-cedar will help restore historical species composition and increase the forest's fire resilience. There are times, however, where removing pine can reduce fuels, decrease the risk of drought or insect induced mortality, and accelerate the growth of the residual pine trees.

> We suggest creating landscape heterogeneity in the Sierra Nevada by mimicking the forest conditions that would be created by the fire behavior and return interval associated with differences in slope position, aspect, and slope steepness. In general, stem density and canopy cover would be highest in drainages and riparian areas, and then decrease over the midslope and become lowest near and on ridgetops. Stem density and canopy cover in all three areas would be higher on northeast aspects compared to southwest. Stand density would also vary with slope becoming more open as slopes steepen. [North et al. 2009:20]

Locating gaps in areas with thinner soils or lower productivity may be logical to foster lower canopy cover since these areas historically supported lower tree densities and fuel loads. In the forest matrix between tree groups and gaps, frequent-fire forests generally consisted of widely spaced, large trees, most of which were pines. The relative proportion of these conditions (i.e., low density, dispersed large trees, and large and small gaps and tree groups) and their composition could be varied depending on existing forest conditions and topographic position.

> The proposed silvicultural approach is a multiaged-stand strategy driven by the need for wildlife habitat, fire-resistant stand structures, and restoration of stand and landscape patterns similar to active-fire conditions in mixed-conifer forests. Although we use the term multiage, we are most interested in size and structure, and their associated ecological attributes. Multiaged stands are a flexible means of including variable stand structures with two or more age classes and integrating existing stand structures into silvicultural prescriptions. [North et al. 2009:22]

> Clusters of intermediate to large trees (i.e., >20 inches diameter at breast height [DBH]) are sometimes marked for thinning with the belief that they are overstocked and thinning would reduce moisture stress. Some evidence, however, suggests these groups of large trees may not be moisture stressed by within-group competition…. Reconstructions of Sierran forests with active fire regimes have consistently found large trees in groups. These groups, however, can be at risk if intermediate and small trees grow within the large tree groups. Thinning these small and intermediate trees will reduce fire laddering. [North et al. 2009:23-24]

What is considered a ladder fuel differs from stand to stand, but typically these are trees in the 10- to 16-inch DBH classes. Trees larger than this may be thinned, for additional fuel reduction by reducing canopy bulk density in strategic locations. Removal of some of the intermediate sized trees would also have the economic benefit of providing revenue to help offset the costs of the fuels reduction and could fund additional projects (North et al. 2009:24).

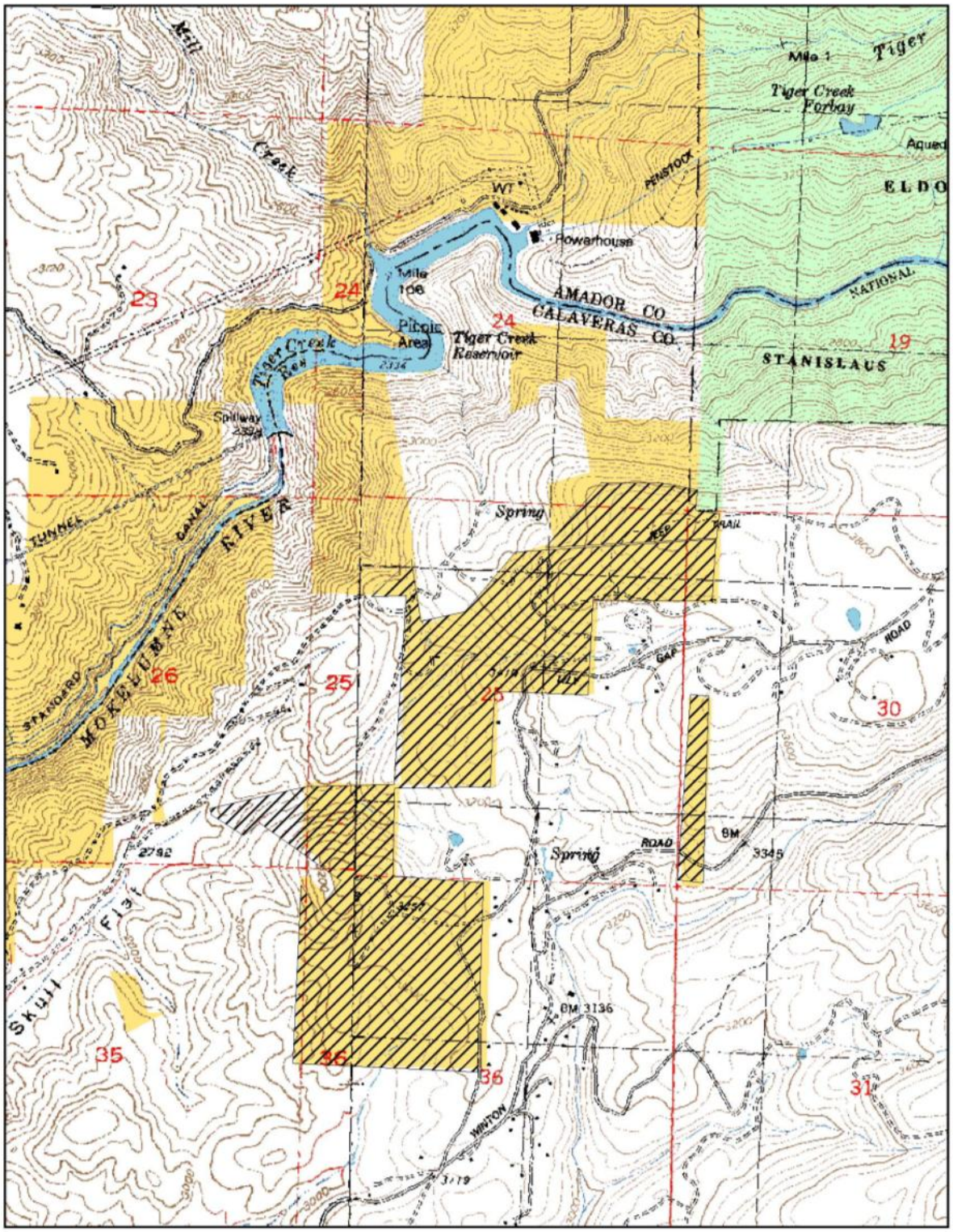
> Thinned intermediate-size trees should only be fire-sensitive, shade-tolerant species such as white fir, Douglas-fir, and incense-cedar. In mixed-conifer forest, attempt to keep intermediate-size pines and hardwoods because of their relative scarcity and importance to wildlife and fire resilience. . . Some intermediate-size trees can still function as ladder fuel, particularly those that were initially grown in more open conditions. These trees can have live and dead limbs that extend down close to the forest floor providing a continuous fuel ladder. . . [In] middle to upper slope topographic position … some thinning of intermediate-size trees may help accelerate the development of large "leave" trees. We suggest, however, that these criteria not be applied to riparian areas, moist microsites often associated with deeper soils, concave topography, or drainage bottoms because these areas may have supported higher tree densities and probably greater numbers of intermediate size trees. [North et al. 2009:24-25]

Appendix B

Project area maps

R13E R14E

T7N T7N



Lilly Gap Biomass Demonstration Project

US Department of the Interior
BUREAU OF LAND MANAGEMENT
Mother Lode Field Office
El Dorado Hills, California
(916) 941-3101
www.ca.blm.gov/motherlode
Date Prepared: 3/15/2011
Project: LillyGapBiomassEA_8x10.mxd

Harvest Area, 450 acres