California Tahoe Conservancy
Agenda Item 11
March 20, 2014

FOREST IMPROVEMENT GUIDELINES

As a major landowner in the Lake Tahoe Basin, the Conservancy is responsible for managing forest resources on its lands. The management and enhancement of these resources is led by the Forest Improvement (FI) Program. Consistent with the Board-approved 1990 Forest Resource Management Guidelines, the FI Program follows a comprehensive forest management approach in order to provide a healthy, more diverse forest, achieve water quality objectives, enhance wildlife habitat, provide pest and fire protection and realize scenic and recreation benefits.

While many of the guidelines still apply, various events have occurred since their adoption that warrant an update, including the development of the Tahoe Basin Environmental Improvement Program, the Angora Fire, and an increase in public interest in forestry and fuels reduction efforts. In 2011, the Conservancy Board directed staff to review and propose updates to the guidelines to reflect current trends and available scientific research.

The Draft FI Guidelines (Attachment 1) now include seven primary objectives for forestry projects. The proposed guidelines address climate change and outline the desired forest conditions to create a sustainable and resilient forest ecosystem. The new guidelines also expand upon the benefits of forestry treatments on reducing the risk of a catastrophic wildfire event.

Staff looks forward to discussing the proposed guidelines and receiving feedback from the Board. After this discussion, staff will finalize the draft guidelines and bring them to the Board for possible adoption.

List of Attachments:

Attachment 1 – Draft Forest Improvement Guidelines

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CALIFORNIA TAHOE CONSERVANCY

FOREST IMPROVEMENT PROGRAM GUIDELINES

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March 20, 2014

State of California – Natural Resources Agency

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BACKGROUND

California Tahoe Conservancy Mission

The California Tahoe Conservancy (Conservancy) is a State agency with a mission to lead California's efforts to restore and enhance the extraordinary natural and recreational resources of the Lake Tahoe Basin. Established in 1984, the Conservancy's jurisdiction extends throughout the California side of the Lake Tahoe Basin, as defined in California Government Code Section 66905.5. In addition to property acquisition, the Conservancy also develops and implements projects, both directly and through grants to local governments and nonprofits, to improve water quality, preserve Lake Tahoe's scenic beauty, provide recreational opportunities and public access, preserve wildlife habitat area, and manage and restore lands to protect the natural environment.

Forest Improvement Program

The Conservancy's Forest Improvement (FI) Program is responsible for managing the agency's forest resources consistent with the Lake Tahoe Basin's Environmental Improvement Program (EIP), the Lake Tahoe Multi Jurisdictional Fuel Reduction and Wildfire Prevention Strategy and Community Wildfire Protection Plan (10-Year Plan), and California Government Code Section 66907.10, which states, "The Conservancy may improve or develop lands for the purpose of protecting the natural environment or otherwise meeting the objectives of this title."

The success of the Conservancy's FI Program is guided by a multi-disciplinary approach that leads to a sustainable and resilient forest ecosystem. The FI Program Guidelines will be modified in response to new scientific information, changing technology, and evolving issues. The Conservancy's FI Program has six primary objectives:

- Sustain adaptive and resilient forests
- Enhance the health and diversity of forest resources
- Provide for public safety and protection of property
- Improve water quality through forest management
- Enhance wildlife habitat
- Utilize public and private resources to implement projects
- Implement projects in a timely, comprehensive, and cost-effective manner

The Conservancy allocates capital outlay and support funds for projects undertaken directly by the agency. In addition, the Conservancy seeks external funding for the Conservancy or its partners to implement projects on Conservancy lands consistent with regional priorities such as community wildlife protection plans.

The Conservancy owns approximately 6,440 acres of land, comprised of nearly 4,900 separate parcels, of which an estimated 5,560 acres are forested and require regular review. These

numbers may expand or contract depending on future land acquisition and possible land exchange transactions. In addition, lodgepole pine (*Pinus contorta*) can encroach upon meadows in the absence of disturbance and turn them into a new forested area worthy of review and possible treatment.

GUIDING PRINCIPLES

In order to achieve FI Program objectives, Conservancy staff uses these guiding principles to make informed forest management decisions based on site-specific goals and conditions. These guidelines are portrayed as a menu of options used to accomplish Program objectives while protecting the soil, water and habitat that are essential to a healthy and sustainable forest ecosystem.

A. Sustain Adaptive and Resilient Forests

1. Climate Change

A. Continue to have forests act as "sinks," absorbing carbon from the atmosphere and storing it in biomass and soils
B. Minimize the risk of catastrophic forest fire as a source of greenhouse gas emissions through appropriate forest management practices
C. Reduce and adapt to climate change risks and impacts through monitoring and adaptive management

2. Role of the Conservancy in Creating Resilient Forests

A. Optimize multiple resource benefits
B. Promote technologies and practices that reduce emissions from prescribed burning, or non-burning methods of reducing hazardous forest fuels, when practical
C. Reduce accumulated fuel load through thinning and brush removal and perform fuel reduction treatments
D. Participate in the coordination of inter-agency reviews for fuels management adjacent to Conservancy property to improve forest health and reduce the risk of wildfire
E. Increase wildfire hazard education, fire prevention techniques, human-caused ignition reduction programs, and forest fuel management education opportunities through collaboration with local partners
F. Continue fire prevention activities on Conservancy property that help prevent the number of human-caused fires through public contact, education, and outreach

B. Restoration of Forest Species Mixture and Structure to Desired Conditions

Resilient forests will maintain different types and sizes of vegetation. Harvesting practices should maintain or improve representative patterns of multi-age classes, diversity and composition of forest vegetation present in the stand prior to harvest. Forests that contain a variety of vegetative types and successional stages provide a rich, diverse habitat for plant

and animal species. FI projects will also consider how a forest stand fits within the broader forest landscape.

1. ***Forest Health Thinning***
   A. Remove small trees which live in the understory and larger trees as necessary to allow larger, healthier trees room to grow
   B. Aim for historic stocking range (typically between 50 and 150 square feet of basal area per acre)
   C. Strive for a forest stand at desired stocking levels throughthinning and/or reintroduction of fire

2. ***Small Group Openings***
   Create small forest openings to allow new tree growth, forest structure diversity, and age diversity in forest stands over time

3. ***Riparian Restoration***
   Restore riparian areas by removing most or all competing conifers

4. ***Prescribed Fire***
   A. As appropriate, thin large parcels or contiguous ownerships, greater than one acre in size, with long term prescribed burning. **Note:** This prescription is appropriate for large parcels that are not within communities and areas for which prescribed fire would not threaten public safety.
   B. As appropriate, thin small parcels through piling and burning of small slash piles.

C. Hazardous Fuel Reduction

1. ***Forest Health Thinning***
   A. Remove small trees and larger trees, as necessary, to allow larger, healthier trees room to grow
   B. Aim for historic stocking range (typically between 50 and 150 square feet of basal area per acre)
   C. Strive for a forest stand at desired stocking levels through limited thinning and/or reintroduction of fire
   D. Remove larger trees when they appear to have health issues such as insect or disease outbreak (see Section E)
   E. Separate tree canopies from chaparral plant communities
   F. Phase treatments every ten years or as appropriate to achieve goals

D. Hazard Tree Identification and Removal

Inspect Conservancy parcels annually to identify and remove trees deemed hazardous to adjacent improvements.

E. Insect or Disease Outbreak

1. Forest Health Thinning

Thinning for forest health and fuels reduction purposes will usually mitigate the impacts of insects or disease and is generally seen by industry standards as the best treatment.

2. Active Forest Management

Active, and occasionally aggressive, forest management is necessary when quickly spreading insect or disease issues are identified.

F. Reforestation Following Catastrophic Events

Land management intervention, including tree planting and possible chaparral removal particularly within or adjoining urban areas, is recommended following catastrophic events.

G. Treatment of Sensitive Areas and Wildlife Considerations

Certain Conservancy lands are considered more sensitive to human impacts, or are of special value to wildlife, due to their unique placement within the Tahoe Basin or other special resource attribute. Lands which are not considered sensitive still require basic measures to protect its resources.

1. Coarse Woody Debris (CWD) and Snag Recruitment Standards

A. Urban Core and Wildland-Urban Interface (WUI)

i. Defined as parcels within the WUI that are not considered riparian
ii. Retain at least two of the largest non-hazardous snags per acre, all snags greater than 30” in diameter at breast height (DBH) and all those greater than 24” DBH in decay Class 6 or higher, meaning broken trees that contain multiple homes, unless they become so numerous as to pose an unacceptable fire risk. Snags may be created by cutting hazard trees or other trees marked for removal to specified height.
iii. Retain at least three to five of the largest logs per acre in decay Classes 1-3, meaning newly fallen to limbless logs.
iv. Create coarse woody debris as necessary by leaving the boles of cut trees.

B. General Forest (Not Urban Core or Wildland-Urban Interface)

i. Defined as parcels not within WUI or within an identified riparian zone
ii. Retain at least five of the largest non-hazardous snags per acre, all snags greater than 30” DBH and all those greater than 24”DBH in decay Class 6 or higher unless so numerous as to pose an unacceptable fire risk. Snags may be created by cutting hazard trees or other trees marked for removal to specified height.
iii. Retain at least five to ten of the largest logs per acre in decay Classes 1-3, meaning newly fallen to limbless.
iv. Coarse woody debris may be created by leaving the boles of cut trees.

C. Riparian/Streamside Zones
   i. Defined as portions of parcels that are wet or wet most of the year and are identified as a Stream Environment Zone (SEZ)[1] or Watercourse and Lake Protection Zone (WLPZ)[2]
   ii. Retain all non-hazardous snags greater than 16" DBH and all snags of riparian species unless such snags are so numerous as to pose an unacceptable fire risk or interfere significantly with riparian vegetation and function.
   iii. Retain all logs greater than 16" DBH and 20 feet long, unless so numerous as to pose an unacceptable fire risk or interfere significantly with riparian vegetation.

2. Riparian Habitat Identification and Protection

A. Identify boundaries of riparian habitat through characteristics such as soil type (i.e., changes from heavy clay soil to silt soil) and indicator species (e.g., presence of meadow grasses and sedges, willow and alder).
B. Protect riparian habitat using methods acceptable to Tahoe Regional Planning Agency (TRPA), Lahontan Water Quality Control Board (Lahontan), and CalFire.

3. Sensitive Habitat areas

A. Identify locations of threatened, endangered, special status, and regional indicator wildlife and biological species using the California Natural Diversity Database and surveys as required by federal, State and regional entities.
B. Protect these habitats using industry accepted methods for the enhancement of high quality habitat for sensitive wildlife and biological species.

4. Cultural Resource Identification and Protection[3]

A. Identify sites requiring protection through an Archaeological Assessment or literature or database review of available written resource information.
B. Conduct field assessments to identify known and new sites and determine level of significance. If new sites are identified or additional information discovered about a known site, the Archaeological database is updated. Mitigation measures are recommended for each site identified and reviewed by the appropriate regulatory

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[1] Tahoe Regional Planning Agency (TRPA) and Lahontan Regional Water Quality Control Board (Lahontan) regulations govern the range of permitted activities and methods (e.g., equipment restrictions) within an SEZ. These rules and regulations assure that sensitive resources are not adversely affected.

[2] The California Forest Practice Rules under the California Board of Forestry and California Department of Forestry and Fire Protection (CalFire) require establishment of a WLPZ to assure that sensitive resources are not adversely affected.

[3] Forestry projects typically fall within the provisions of the California Forest Practice Rules. For these projects, cultural resource identification and protection standards are identified through a MOU entitled "*Memorandum of Understanding Among the California Department of Forestry and Fire Protection, California State Board of Forestry and Fire Protection, California State office of Historic Preservation and the Information Centers of the California Historical Resources Information System* (revised 2006)"

Archaeologist, who must approve or modify the mitigation measures or deny the activity entirely.

5. Best Management Practices (BMPs)

Employ the maximum feasible BMP requirements to provide maximum water quality protection. The California Forest Practice Rules, along with TRPA and Lahontan regulations, stipulate which BMPs are minimally required based upon the scope of the project.

H. **Treatments**

Treatments which have not occurred since forest establishment or when past treatment was limited and did not establish the forest to a healthy state (see Section B) are necessary for forest management. Treatments are also necessary over time when prior treatment(s) have aged and the forest requires an additional treatment or the forest establishes new forestry problems. These treatments are phased and generally required every ten years (more frequently for landscapes dominated by brush species and adjoining improvements). These multiple phases of treatment can be accomplished through a variety of means such as low intensity (understory) burning or hand crew removal of fuels.

I. Monitoring and Adaptive Management

1. Fuel Reduction and Forest Health Project Effectiveness Monitoring

A. Monitor effectiveness of fuel reduction and forest health projects using pre and post-treatment data from Continuous Forest Inventory (CFI) plots. Additional data may be collected to answer specific questions regarding insect/disease outbreaks, soil compaction, etc.

B. Take photographs at CFI plot locations and/or other photo points before and after forestry treatments to document the project immediately before and after treatment and over time.

2. Quaking Aspen Status and Restoration Effectiveness Monitoring

Periodically assess stands of quaking aspen (*Populous tremuloides*) to track changes in stand status. Monitor aspen regeneration using transects to quantify aspen stems before treatment and periodically following treatment to determine the effectiveness of restoration projects.

3. Forest Status and Trend Monitoring

Monitor trends in forest health, structure, composition, forest pathogen occurrence, etc. through the periodic re-measurement of all CFI plots. The ideal cycle of re-measurement is every ten years or before and after each treatment.

4. Compliance monitoring

Monitor as necessary to comply with environmental and regulatory requirements.

5. Adaptive Management

Adapt management techniques and strategies as necessary in response to monitoring information, new scientific information, changing technology and evolving issues.

J. Prioritization of Project Areas

1. Projects

Give the highest treatment priority to projects located within the Urban Core (approximately 2,000 acres), followed by projects within the Wildland-Urban Interface (approximately 1,300 acres), then general forest lands that are outside the Urban Core or WUI (approximately 2,200 acres).

2. Hazard Trees

Give the highest management priority to hazard trees, regardless of location, identified by Conservancy staff and the public. Identification of hazard trees occurs independently of project prioritization.

K. Funding Considerations

1. Field Crews and Private Contractors

A. Employ seasonal forestry crews through the Tahoe Resource Conservation District, the California Conservation Corps, and other partners, particularly for steep, wet, and/or rocky sites
B. Use bidding process to secure private contractors for mechanical and hand forestry treatments at competitive rates

2. Mechanical and Hand Treatments

A. Mechanical treatments have the greatest utility within the WUI and on larger parcels where the slopes do not exceed 30 percent and the soil conditions permit
B. Hand crews are most often used on small parcels within the urban area and on steeper slopes where the use of equipment is either problematic or not permitted
C. The Conservancy completes initial treatment in one phase for the average mechanical treatment and in two to three phases for the average hand treatment
D. The cost of hand treatment per acre may be up to twice that of mechanical treatment

3. Partial Cost Recovery

Where possible, consider recovering treatment expenses through revenues from timber sales, biomass creation, and other marketable forestry resources.

4. External funding

Work collaboratively with partners to identify and obtain funding for forest health and fuels reduction projects. These opportunities may include work on Conservancy owned properties as well as lands outside of our ownership. In some instances, the

Conservancy may need to award grants or enter into other agreements with our partners in order to accomplish the goals of an external funding source.

L. Permitting and Environmental Compliance

Evaluate all Conservancy FI projects under the California Environmental Quality Act (CEQA) and for compliance with the California Forest Practice Rules, as directed by the California Board of Forestry and implemented through CalFire, the TRPA Code of Ordinances and Regional Plan, and applicable Lahontan regulations.

M. Community Involvement

1. For All Projects

A. Encourage all interested members of the community to participate in and comment on proposed forestry projects..
B. Respond to all public inquiries; if requested, potentially meet onsite to discuss the proposed project in greater detail.
C. Depending upon the volume and the nature of the comments, schedule one or more public meetings in the neighborhood to encourage communication with a wide audience.
D. Provide notice to Lake Tahoe media sources in advance of prescribed burning activities.
E. Distribute informational material related to prescribed burning and smoke exposure to the public upon request.

2. For Projects on Parcels Greater than Three Acres

Notify adjacent property owners by mail prior to project implementation. The notification will include: the proposed project area, description of treatment (e.g., mechanical, hand, pile/burn, etc.), and instructions for providing comment.

N. Forest By-products

Forestry projects on Conservancy lands typically generate at least one or more by-products. These by-products are used in various ways depending on the type of product generated.

1. Marketable Timber

A. Dimensional lumber
B. Engineered forest products such as fiberboard and plywood
C. Other (logs, non-dimensional products)

2. Woodchips

A. Biomass/alternative energy
B. Recycling for compost
C. Retain on site

3. Materials for Use in Restoration Projects

A. Fence poles
B. Cross-contoured logs for erosion control
C. Logs to block motorized access
D. Root balls, logs, etc used to stabilize stream banks
E. Chips/masticated material mulched into soil when restoring landings, roads, trails

4. Firewood

A. Commercial firewood sold by contractors
B. Non-commercial collected through community firewood program

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APPENDIX

FOREST IMPROVEMENT PROGRAM GUIDELINES
March 2014 Update

Conservancy forested lands vary by stand structure, age and species mixture, property size, and position within or surrounding urban areas. For example, a common forest upland in the south shore area typically contains a higher proportion of Jeffrey pine (*Pinus jeffreyi*) as opposed to the average upland parcel in the west shore area, which typically contains a higher proportion of white and red fir (*Abies concolor* and *Abies magnifica).* Parcels vary in size from a tenth of an acre to hundreds of acres, with the majority in the quarter-acre size range and situated amongst residential structures within the urban area. The topography varies from flat to very steep (80% grade).

In order to achieve Program objectives, the Forest Improvement (FI) Program utilizes the following principles, which also serve as a reference for developing prescriptions project and implementing projects:

- Sustain Adaptive and Resilient Forests
- Restoration of Forest Species Mixture and Structure to Desired Conditions
- Hazardous Fuel Reduction
- Hazard tree Identification and Removal
- Insect or Disease Outbreak
- Reforestation Following Catastrophic Events
- Treatment of Sensitive Areas and Wildlife Considerations
- Treatments
- Monitoring and Adaptive Management
- Prioritization of Project Areas
- Community Involvement
- Environmental Compliance and Permitting
- Funding Considerations

A. Sustain Adaptive and Resilient Forests

As described in the California Resources Agency's Draft "Safeguarding California and Reducing Climate Risk" document, California's forests help absorb carbon dioxide and counteract the greenhouse gas emissions that cause climate change. These forests need protective actions to prepare them to withstand mounting climate threats such as increasing temperatures, drought, increasing risk of pest infestations, and increasing risk of severe wildfires. Furthermore, our forested lands provide many other benefits, besides absorbing carbon dioxide, which will assist with climate problems. For instance, trees and forests help anchor soil and absorb rain and

snowmelt, so flooding and landslides are less severe. Forests also help regulate the timing and magnitude of water runoff and water flows; and they have very significant impacts on water quality, because they provide a filtering function that prevents impurities from entering streams, lakes, and groundwater.

1. ***Climate Change***

   Forests play a significant role in climate change mitigation by acting as "sinks," absorbing carbon from the atmosphere and storing it in biomass and soils. However, when forests are cleared or degraded, they are also significant sources of greenhouse gas emissions. Forests, therefore, play an important role in strategies for adapting to climate change.

   Without direct management interventions, climate change is likely to jeopardize forest ecosystem health, resilience, productivity, biodiversity and carbon storage, and forest degradation and loss will continue to contribute to climate change.

   Climate change places forest ecosystems at risk. Most of the urgent forest and grassland management challenges of the past 20 years, such as wildfires, changing water regimes, and expanding forest insect infestations, have been driven, in part, by a changing climate. Future impacts are projected to be even more severe. To ensure our forested lands are conserved, restored, and made more resilient to the impacts of climate change, we must reduce or adapt to the risks and the unavoidable impacts to our forested systems.

   Research in the Lake Tahoe Basin has found evidence of climate change impacts at the local level. Science shows that annual mean temperatures continue to increase, annual snowpack continues to decrease and the range and distributions of native plants and animals are also shifting. Climate change models project continued increases in temperatures which are expected to result in increased risk of drought, flooding, forest fires and other impacts to natural, built and human systems. Climatic changes will also impact the community and economy which are highly dependent on environmental resources such as snow packs that support the ski industry and a clear Lake Tahoe that drives the eco-tourism industry.

2. ***Role of the Conservancy in Creating Resilient Forests***

   Sustainability means meeting the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable forestry is a proactive form of management that provides for multiple uses of the forest by balancing a diversity of both present and future needs. It is a process of informed decision-making that takes into account resource needs, program objectives, site capabilities, existing regulations, economics and the best scientific information available at any given time.

   Healthy forest ecosystems sequester carbon dioxide, sustain the health of many of the Region's biological resources, and reduce the risk of wildfire. Protecting forest and

biological resources is important for sustainability of the Region's interconnected resources and the Region's identity, and can also result in greenhouse gas emission reductions.

Other methods for reducing green house gas emissions and building climate readiness actions are included in the guidelines.

B. **Restoration of Forest Species Mixture and Structure to Desired Conditions**

Prior to extensive depletion of timber resources and subsequent community development, Lake Tahoe forests were in relative equilibrium. These historic forests of Lake Tahoe were quite diverse and contained varied tree species as well as age distribution and stocking levels, and included vast expanses of riparian habitat, open areas and fully functioning meadows. The common denominator which held this system in balance was low intensity fire that burned in relatively small patches. These fires created a mosaic of different conditions across the landscape and maintained tree densities to a point as to be considered healthy, which minimized damages from widespread catastrophic fires, insect and disease outbreaks, as well as from drought cycles. There is general agreement that managing for a desired condition that mimics an historic forest structure to the extent practical, given current land use and constraints, will allow greater resilience into the future as the Sierra Nevada range prepares for the effects of climate change.

1. *Forest Health Thinning:*
Due to higher than desired forest stocking densities, Conservancy parcels often require thinning to reduce stocking to more resilient levels. Thinning operations use a prescription in which small trees are removed to allow larger, healthier trees room to grow, reducing competition for the limited water and nutrient resources. Larger trees may also be removed as part of a thinning prescription. As the desired condition for stocking levels is approached - typically 50 to 150 square feet of basal area per acre – maintenance of the forest stand can be accomplished through limited thinning and/or reintroduction of fire.

The low end of this range will seldom be seen, but small areas of a severely stressed stand with a large percentage of mortality and disease may, after treatment, be this low. However, for the large majority of stands that are relatively healthy but overstocked, the middle to upper end of the basal area range is the most common prescription recommended.

2. *Small Group Openings:*
Historic forests included openings of various sizes as well as small groups of trees of various ages. Currently, most area forests are dominated by trees of one age group. While younger trees exist among the older, single age group, they may die due to limited sunlight. Creating small forest openings will allow for new tree growth within the larger forest, create a more diverse forest structure, and encourage age diversity in forest

stands over time. A forest with greater age diversity is more likely to resist insect or disease outbreaks, and is more likely to resist large scale mortality, when wildfires occur.

3. *Riparian Restoration:*
Unique riparian habitats, which include riparian trees and natural meadows, are susceptible to conifer encroachment in the absence of fire. Competing conifers over time replace meadow plants or compete with riparian trees and replace these ecosystems with dense thickets which are usually unhealthy and susceptible to insect and disease outbreaks. Competing conifer thickets within riparian corridors also create a fire hazard. In the absence of wildfire, forest management will remain important to create balance of this important ecosystem.

Riparian restoration generally involves the removal of most or all of the competing conifers as a means of mimicking forest structure seen in the presence of frequent, low severity fire. The Conservancy currently has an active aspen restoration program, through which conifers are removed from aspen stands to stimulate aspen regeneration. Projects will be monitored and future prescriptions may be modified based on monitoring results, new scientific information and Continuous Forest Inventory (CFI) data.

4. *Prescribed Fire:*
Conservancy properties can be treated through forest health thinning followed by long term prescribed burning. This prescription is appropriate for large parcels or areas of contiguous Conservancy ownership that are not within communities. Due to public safety concerns, parcels within, or directly adjacent to, the urban community are not well suited to treatment through landscape level prescribed fires. Management options for smaller parcels may entail forest health thinning followed by phased thinning or piling and burning of smaller slash piles.

C. **Hazardous Fuel Reduction**

Hazardous fuels treatment is similar to that for forest health thinning. Indeed, the two objectives often overlap in a single treatment, though hazardous fuel removal is often of greater importance within and immediately surrounding the urban core. As with forest health thinning, hazardous fuel reduction removes smaller trees, while healthier, larger trees are retained for the future stand. Occasionally, larger trees may be proposed for removal when they appear to contain health issues such as insect or disease outbreak (see Insects and Disease). Separation of tree canopies and highly flammable chaparral is typical and has the benefit of reducing fuel levels to the point where most fires will burn at a lower intensity and are easier to contain.

A basal area of between 50 and 150 square feet per acre is the target zone for this type of treatment. The low end of this range will seldom be seen, but small areas of a severely stressed stand with a large percentage of mortality and disease may, after treatment, be this low. However, for the large majority of stands that are relatively healthy but overstocked, the

middle to upper end of the basal area range will typically be seen after treatment. Hazardous fuels will typically require a maintenance treatment once every ten years.

D. **Hazard Tree Identification and Removal**

Conservancy parcels are inspected annually to identify and remove trees deemed hazardous to adjacent improvements. If the trees are identified as part of a fuel reduction inspection, then they are taken down as part of the larger project. Most of the time, however, trees are identified as part of Staff's annual inspection or when a concerned neighbor notifies staff.

E. **Insect or Disease Outbreak**

Insects and disease are part of a natural process that slowly or dramatically alters the forest landscape. When insects or disease selectively affect the forest, they help take out weaker trees, thereby favoring healthier dominant tree growth. This process is beneficial, allowing stronger trees to thrive and grow with the limited moisture and nutrient resources available. Wildlife also benefit from limited occurrences of insect or disease attacks because these pathogens are a part of the natural ecosystem creating forest components that many wildlife species use, including dead trees and insects themselves, and encouraging healthier forests.

On the other hand, large scale insect or disease outbreaks are detrimental when a high percentage of trees in a particular forest are susceptible. Large insect and/or disease attacks are either started by natural drought cycles, which are common in the Tahoe Basin, or are an indicator of general stress such as overcrowding. In these instances, instead of selectively targeting unhealthy trees, a particular insect or disease can kill most or all of the trees in a given forest stand.

Thinning for forest health and fuels reduction purposes will generally mitigate the impacts of a massive beetle infestation.

F. **Reforestation Following Catastrophic Events**

When fire is excluded far beyond the natural recurrence interval for the area, fuels accumulate in large quantities, and large catastrophic fires are inevitable. Large, catastrophic fires consume most of the forest floor and canopy and in the absence of human intervention, leave the former forest with bare soil, initiating forest succession. Chaparrals usually dominate for some time, replacing the pioneering grasses and forbs. Over a timeframe averaging 10 to 60 years, small trees develop into a young forest, slowly replacing the chaparral.

Land management intervention, including tree planting and possible chaparral removal, accelerates the establishment of trees as the dominant species. Land management intervention is the preferred approach to natural forest succession, particularly within or adjoining the urban area.

G. **Treatment of Sensitive Areas and Wildlife Considerations**

Treatments in sensitive areas are lighter on the ground or exclude certain areas as opposed to less sensitive areas since sensitive areas present higher potential resource damages. For example, use of heavy machinery is limited to upland areas that are not steep because resource impacts (such as rutting and compaction) from their use are minimal/non-existent post treatment. A typical treatment in a sensitive area typically includes use of hand crews or other light impact techniques. Whether sensitive or not, all forestry treatments incorporate wildlife considerations into their design and treatment specifications.

1. *Coarse Woody Debris (CWD) and Snag Recruitment Standards:*
   Coarse woody debris and snags are beneficial for soil replenishment and for numerous animals and plants that live in Lake Tahoe forests. Once a tree dies and decomposes in the form of a snag or downed woody debris, it creates a unique opportunity for feeding, nesting and other functions that create the diverse food chain cycle necessary for wildlife to thrive. Within the wildland-urban interface (WUI) this natural cycle can create a fire and/or safety hazard to adjacent residential and commercial structures. To reduce these hazards to an acceptable level, a balanced approach is necessary in which excess fuels are removed for fire prevention and hazard trees are removed for safety, while at the same time retaining both coarse woody debris and snags where possible. To this end, standards have been established as described in the guidelines.

2. *Riparian Habitat Identification and Protection:*
   Targeted forest management work within riparian habitats or a SEZ may be necessary for fuels hazard reduction and may be desirable as part of a riparian restoration project (e.g., quaking aspen restoration). All proposed work first requires proper identification of the riparian boundaries. Soil type changes (i.e., heavy clay soil to silt soil) and indicator species (e.g., presence of meadow grasses and sedges, willow and alder) help identify the boundaries of riparian areas. The California Forest Practice Rules under the California Board of Forestry and California Department of Forestry and Fire Protection (CalFire) require establishment of a WLPZ and both Tahoe Regional Planning Agency (TRPA) and Lahontan Regional Water Quality Control Board (Lahontan) regulations govern the range of permitted activities and methods (e.g., equipment restrictions) within an SEZ. These rules and regulations assure that sensitive resources are not adversely affected.

3. *Sensitive Habitat Identification and Protection:*
   The Lake Tahoe Basin is home to endangered, threatened, special status, sensitive, and regional indicator species in both the wildlife and biological areas. Care is taken to identify these areas during a project's planning so that adequate protection of them can be planned into a project.

4. *Cultural Resource Identification and Protection:*
   Protection of historic and pre-historic activities within Lake Tahoe forests is required as a condition of all forest management activities. Sites requiring protection are first identified through an Archaeological Assessment, or a literature or database review of available written resource information. This initial literature review is followed by a field assessment to identify known and unknown sites to determine the level of significance. If new sites are identified or additional information discovered about a known site, the Archaeological database is updated. Mitigation measures are recommended for each identified site and reviewed by the appropriate regulatory Archaeologist, who must approve or modify the mitigation measures or deny the activity entirely.

5. *Best Management Practices (BMPs):*
   BMPs, as well as other erosion control measures, are necessary to minimize and/or eliminate the potential for dirt and suspended particles from entering streams and Lake Tahoe. An example of a typical BMP involves the establishment of erosion control structures, such as waterbars, prior to the completion of mechanically established or utilized road and trail networks.

   The California Forest Practice Rules and TRPA/Lahontan regulations stipulate which BMPs are minimally required based upon the scope of the project. Conservancy projects typically exceed the minimum BMP requirements to provide an extra measure of water quality protection.

H. **Treatments**

Treatments which have not occurred since forest establishment or when past treatment was limited and did not establish the forest to a healthy state (see Section B) are necessary for forest management. The Conservancy utilizes both mechanical and hand crews to accomplish their goals and chooses which type based on a number of factors which include but are not limited to project size, sensitive resources identified, steepness of the slope as well as location adjacent to the community. The cost of hand treatment may be up to twice that of mechanical treatment. Despite the higher cost, use of hand crew resources is often desirable/necessary due to the nature of the project area. Once these treatment(s) are complete the forest is in a relatively healthy state, but additional treatments will become necessary over time.

Additional treatments can be accomplished through a variety of means such as low intensity (understory) burning or hand crew removal of fuels, and are designed to continually achieve the desired forest health and/or fuels hazard reduction benefits. The possibility of mechanical maintenance treatments exist where mentioned in the funding consideration section. It is estimated that additional treatments are necessary on the average of every 10 years, more frequently for landscapes dominated by brush species and adjoining improvements, and less frequently for other areas. Additional treatment is usually two to three times less costly than initial treatment because there is drastically less vegetation to treat than in the first treatment.

I. Monitoring and Adaptive Management

Monitoring is performed for many reasons, including to measure the short and long-term effects of various forest management techniques, to gather data that can advance the science of forestry, to answer the public's questions about the effects of projects, to document regulatory compliance, and to gather data that can be used to support the use of new technology as part of an adaptive management strategy. Most projects require permits through various agencies, and each agency has terms such as "innovative technology," "in lieu practice" or "alternative prescription" which allow for alterations of typical practices. In order to qualify for non-typical practices, pre/post monitoring is typically required. Use of non-typical activity commonly saves time and money and is considered an adaptive management strategy. Finally, special forest resources such as quaking aspen stands are also monitored to determine if restoration efforts are effective.

Monitoring efforts are described in detail in the Forest Improvement Program Monitoring Guidelines, in progress, and some are summarized below.

1. *Fuel Reduction and Forest Health Project Effectiveness Monitoring:*
   Effectiveness of fuel reduction and forest health projects is monitored using pre and post-treatment data from Continuous Forest Inventory (CFI) plots. Additional plots may be installed to achieve better coverage of a project area, and additional data may be collected to answer specific questions regarding insect/disease outbreaks, soil compaction, etc. Photos are also taken at CFI plot locations and/or other photo points before and after forestry treatments. Such documentation provides valuable visual assessment of project effects before and after treatment and as time moves forward.

2. *Quaking Aspen Status and Restoration Effectiveness Monitoring:*
   All stands of quaking aspen (*Populous tremuloides*) on Conservancy properties have been mapped and their health and need for treatment assessed. Each stand is periodically re-assessed to track any change in stand status. Aspen regeneration is also monitored through the use of transects quantifying aspen stems before treatment and periodically following treatment to determine the effectiveness of restoration projects.

3. *Forest Status and Trend Monitoring:*
   Trends in forest health, structure, composition, etc., are monitored across Conservancy properties through the periodic re-measurement of all CFI plots. The purpose is to understand the overall condition of Conservancy forests, including treated project areas and properties that may have not yet been treated or treated for many decades. Analysis of trend data may include such questions as average changes in stand density over time on treated and untreated properties, incidence of forest pathogens over time, and forest structure and composition over time. Availability of funding will dictate periodicity of general CFI plot re-measurement, but an ideal cycle of re-measurement is every ten years or before and after each treatment.

J. **Prioritization of Project Areas**

Approximately 5,560 acres of the Conservancy's current 6,440 total acres require forest resource management review and possible treatment. About 4,920 acres are general upland forest, 62 acres are riparian trees and/or vegetation, and 578 acres consist of various shrub species, including the more flammable chaparral species.

Of the 5,560 acres eligible for active forest management consideration, approximately 2,015 acres are the highest priority for possible treatment because they are situated within the Urban Core. These areas pose the highest risk to adjacent improved property. Approximately 1,333 acres are considered the second priority for possible treatment because they are situated within the Wildland-Urban Interface (WUI). These areas pose the next highest risk since they are immediately adjacent to communities. The Conservancy's 2,212 general forest acres that are not within the Urban Core or WUI are considered to be of lower risk, and therefore given third priority for treatment.

As mentioned above, hazard trees are identified by Conservancy staff and the public, and become a high priority for management. This process occurs independently of project prioritization.

K. **Funding Considerations**

Forest health and fuels reduction projects currently require a public funding subsidy due to a variety of factors, the most significant of which include:

- Project attainment with consideration given to stated goals and objectives.
- Lack of available timber or non-timber markets.
- Small average size of Conservancy parcels as well as location adjacent to or within communities limit large scale projects.
- Projects in the Lake Tahoe Basin are under tight regulatory scrutiny.

Past projects have utilized revenue from timber sales to cover expense of treatments desired on forested landscapes. Currently, timber markets to offset these expenditures are poor and in many examples do not exist. There is the possibility to offset expenditures through the creation of biomass, but currently this resource is not well developed. Both markets currently serve to partially offset expenditures as well as create a location to remove the larger fuel offsite and further lower fuel concentrations as opposed to leaving the material onsite.

Competitive bidding is used to secure private contractors for mechanical and hand forestry treatments, and to drive down costs as much as possible. In addition to the use of private contractors, the Conservancy continues to employ one or more seasonal forestry crews through its relationship with the Tahoe Resource Conservation District and the California Conservation

Corps. These hand crews typically work on steeper, wetter and/or rockier sites than the private sector.

Mechanical treatments are less costly per acre than hand treatment, and have their greatest utility within the WUI and on larger parcels where the slopes do not exceed 30 percent and the soil conditions permit. Hand crews are most often used on the thousands of small parcels within the urban area and on steeper slopes where the use of equipment is either more problematic or not permitted at all.

Given funding considerations listed above, the Conservancy is able to complete first treatments in one phase for the average mechanical treatment and in two to three phases for the average hand crew treatment. The cost of hand treatment per entry may be up to twice that of mechanical treatment. Despite the higher cost, use of hand crew resources is often desirable/necessary due to the nature of the project area. Once initial treatment(s) are complete and the forest is in a relatively healthy state, maintenance level treatments will become necessary over time.

The Conservancy has worked collaboratively with local Fire Protection Districts/Departments, California Department of State Parks and other grant sources to provide funding for forest health and fuels reduction projects. The ability to expand this collaboration exists into the future. These opportunities may include work on Conservancy properties as well as lands outside of our ownership. In some instances, the Conservancy may need to award grants or enter into other agreements to implement the terms of external funding sources.

L. **Permitting and Environmental Compliance**

All Conservancy FI projects are evaluated under the California Environmental Quality Act (CEQA) and comply with the California Forest Practice Rules, as directed by the California Board of Forestry and implemented through CalFire, the TRPA Code of Ordinances and Regional Plan, and under applicable Lahontan regulations. All regulatory agencies, through their respective rules, designate the type of review necessary, issue mandatory permits if needed and require mitigation measures to address specific potential environmental impacts. The level of review and approval required depends on the proposed nature and scale of forest treatment.

M. **Community Involvement**

The Conservancy encourages all interested members of the community to participate in and comment on proposed forestry projects. Prior to implementation of forestry projects greater than three acres in size, the Conservancy notifies adjacent property owners by mail. The notification describes the proposed project area, summarizes the type of treatment (e.g., mechanical, hand, pile/burn, etc.), and provides the opportunity for input on the proposed project. Staff will respond to all public inquiries and will meet onsite to discuss the proposed project in greater detail if requested. Depending upon the volume and the nature of the comments, staff may schedule a public meeting in the neighborhood to encourage

communication with a wide audience at one time. In addition, informational materials are available for the public to advise them of prescribed burning and smoke impacts.

N. **Forest By-products**

1. *Marketable Timber*
This is a common by-product of larger acreage mechanical treatments. Timber is removed from the project site by a contractor and taken to a sawmill where it is processed into timber products. This includes products such as 2x4's, plywood, non-dimensional logs, and other products for which a market exists. Revenues from these products can help to offset treatment costs.

2. *Woodchips*
Woodchips are created from small diameter trees and slash that have been processed by a woodchipper. Chips are typically removed from the site and taken to a local resource recovery facility to be recycled for compost or taken to biomass facility (cogeneration plant) to be used for alternative energies. For example, the Conservancy worked with Placer County on a project that generated chips which were taken to a cogeneration plant and used to produce power. Sometimes chips are retained on site and broadcast on the forest floor when removal is difficult and not cost-effective. This is only done in upland areas (outside of SEZ and other sensitive resources), and where leaving chips on site doesn't create a heavy fuel load and unacceptable fire risk. Chips may also be used as a restoration material for other Conservancy projects.

3. *Restoration Materials*
By-products can remain on site and be re-used as material for restoration of areas before, during, and after forestry projects. They can also be used for other Conservancy restoration projects. Logs can be used as fence poles, barriers to block motorized access, and for erosion control. Chips and masticated material is also used to help restore roads, trails, and landings. For example, fence pole sized logs are used for building and maintaining about 2,000 feet of fence per year on Conservancy lands.

4. *Firewood*
On non-commercial projects, firewood is collected by the public through the community firewood program. This program issues an average of 350 free permits per year to the local community. Each permit is valid for up to two cords of wood for non-commercial uses only. For projects that are commercial, timber is owned by the contractor and can be sold as firewood to help offset treatment costs.

While not a by-product of forestry projects, burn piles are created on projects where removing by-products is not viable. This is typically due to limited access, steep slopes, or the existence of sensitive areas. On average, burn piles are created on 40-50 acres of Conservancy land per year.