

2-9-11 FINAL UPDATE

**2011 LONG-RANGE STRATEGY FOR THE
LAKEVIEW FEDERAL STEWARDSHIP UNIT**

Prepared by the Lakeview Stewardship Group

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(Maps prepared by Chris Weller and Bo Wilmer with The Wilderness Society's Center for Landscape Analysis (2005) and by Chris Zanger with The Nature Conservancy's Fire Learning Network (2010))

EXECUTIVE SUMMARY

LONG-RANGE STRATEGY FOR THE LAKEVIEW FEDERAL STEWARDSHIP UNIT

The Lakeview Stewardship Group envisions a sustainable forest ecosystem that, through a new understanding of the interrelationships between the people and the land, will ensure quality of life for present and future generations.

This updated long-range strategy is part of a unique, collaborative effort to help restore the ecological health of the 500,000-acre Lakeview Federal Stewardship Unit in the Fremont-Winema National Forest and provide economic and social benefits for the local community. The strategy is based on a common vision and set of goals and objectives developed by the Lakeview Stewardship Group and adopted by the U.S. Forest Service. The Lakeview Stewardship Group includes conservationists, timber workers, local government officials, the Bureau of Land Management, and other civic leaders working in cooperation with the Forest Service. Originally released in November 2005, the strategy has been updated in 2010 and 2011.

The Lakeview Federal Stewardship Unit was originally established in 1950 as the Lakeview Federal Sustained Yield Unit for the purpose of supplying timber to local mills in the communities of Lakeview and Paisley in Lake County. In 2001, the Chief of the Forest Service re-authorized the Unit with a revised policy statement that established new goals and updated its name to the Lakeview Federal Stewardship Unit.

The goals of the Stewardship Unit are as follows:

- Sustain and restore a healthy, diverse, and resilient forest ecosystem that can accommodate human and natural disturbances.
- Sustain and restore the land's capacity to absorb, store, and distribute quality water.
- Provide opportunities for people to realize their material, spiritual, and recreational values and relationships with the forest.

To achieve the collaborative vision and goals of the Unit, the long-range strategy takes a holistic and scientific approach toward restoration. The strategy builds on regional ecosystem assessments and local watershed analyses by the Forest Service and BLM, as well as independent scientific and university studies. It is also informed by the results of an intensive seven-year monitoring program conducted by Lakeview-area high school graduates under the supervision of experienced scientists.

The strategy recognizes that restoration of the Unit will require comprehensive solutions to a variety of often inter-related problems. For example, decades of aggressive fire suppression and intensive logging of old-growth ponderosa pine trees have created unnaturally dense young forests, excessive fuel loads, and much greater risk of severe fires. Absence of fire has altered the forest species composition with increases in white fir, lodgepole pine, and western juniper above historic levels. Lodgepole pine has spread

into wetlands and riparian systems. Changes in forest species composition and density have increased the incidence and risk of insects and disease, reduced biodiversity and resiliency of trees, and affected the hydrologic regime. Also, past road building and grazing have altered the hydrologic regime through the timing and magnitude of stream flows, removed and altered riparian area vegetation, changed channel morphology, altered sediment transport, and reduced in-stream habitat. In addition, invasive plants such as cheatgrass are spreading rapidly to the detriment of native grasses, aspen groves, sagebrush, meadows, and other important habitats. Climate change may be exacerbating these problems now and in the future.

To address the risks associated with climate change, altered forest structure, and altered fire regimes, we have developed a strategic approach that prioritizes treatments based on restoration of key values and fuels reduction. The strategy recommends an accelerated thinning and prescribed burning program, focused on the relatively dry, low-elevation ponderosa pine and mixed conifer forests. Where appropriate, proposed treatment areas may extend onto adjacent BLM administered lands. The remaining large, fire-resistant, old-growth trees should be retained wherever possible. Additionally, considerable care must be taken to monitor watershed processes, and to protect the soil from excessive disturbance, compaction, erosion, loss of nutrients, and invasive plants. Restoration treatments will require no new permanent roads, and any temporary roads will be promptly decommissioned as part of the stewardship contract.

The strategy calls for continuing and expanding the Lakeview monitoring program to ensure that management actions are having the intended effect and can be quickly modified based on locally relevant new information. It also points out the need to upgrade logging equipment and develop new equipment that is affordable in order to minimize roads, soil compaction, and other potential impacts of an expanded thinning program.

Additional actions are needed to restore high-quality habitat and healthy populations of fish and wildlife. Closing unnecessary roads will benefit big game populations as well as improve water quality and stream habitats. Native riparian vegetation such as willows and aspen should be restored, and barriers to fish passage removed.

The strategy recognizes that not all the Lakeview Unit is equally in need of restoration work. About one-eighth of the Unit is in either the Gearheart Mountain Wilderness or the Unit's seven inventoried roadless areas. The strategy recommends keeping the roadless areas free of road building and logging.

The Lakeview Unit provides important social and economic benefits to the nearby communities. It supplies about 10-15 percent of the timber processed by the Fremont Sawmill and its 100 employees. Many local residents obtain their firewood, Christmas trees, and other forest products from the Unit. About 34 businesses and families graze livestock within the Unit for part of the year.

The Unit also offers many recreational facilities, attractions, and opportunities that contribute to the enjoyment and quality of life for local residents and visitors alike. However, widespread mortality of mature lodgepole forests and reduced federal funding for recreation have put some campgrounds and other recreation sites in jeopardy.

The communities of Lake County have struggled to maintain or diversify their economies. While fairly typical of rural Northwest communities in regard to socio-economic distress, Lake County's remote location and lack of transportation options pose special difficulties for economic development. Local contractors need to have easier access to job opportunities created within the Unit.

The Collins Companies' addition of a \$6.8 million small-log mill to the Fremont Sawmill in 2007 was an important investment in the future of the Lakeview community, as well as a turning point for restoration forestry in the Lakeview Stewardship Unit. In order to promote steady supply and utilization of small-diameter trees in the Unit, Collins and the Forest Service that same year created the first and only ten-year stewardship contract in the Pacific Northwest. The stewardship contract was also intended to increase implementation of other restoration activities in the Unit through trading of goods-for-services. However, the severe economic recession that hit the wood products industry beginning in 2008 has limited the amount of restoration work that can be accomplished through stewardship contracting.

Building an economically viable and appropriately sized biomass plant has been a key objective to improving the local economy and helping accomplish ecologically beneficial thinning projects within the Unit. In 2007, under the auspices of the Oregon Solutions program, numerous public and private entities signed a 20-year memorandum of understanding to develop a woody biomass industry in the Lakeview community. In November 2010, Iberdrola Renewables began construction of a 26.8-megawatt biomass-fired power plant in Lakeview, adjacent to the Collins Companies' sawmill. The biomass plant is the last major piece of industrial infrastructure needed to effectively utilize the large amount of small-diameter trees and woody biomass that will be generated as by-products of restoration treatments in the Unit.

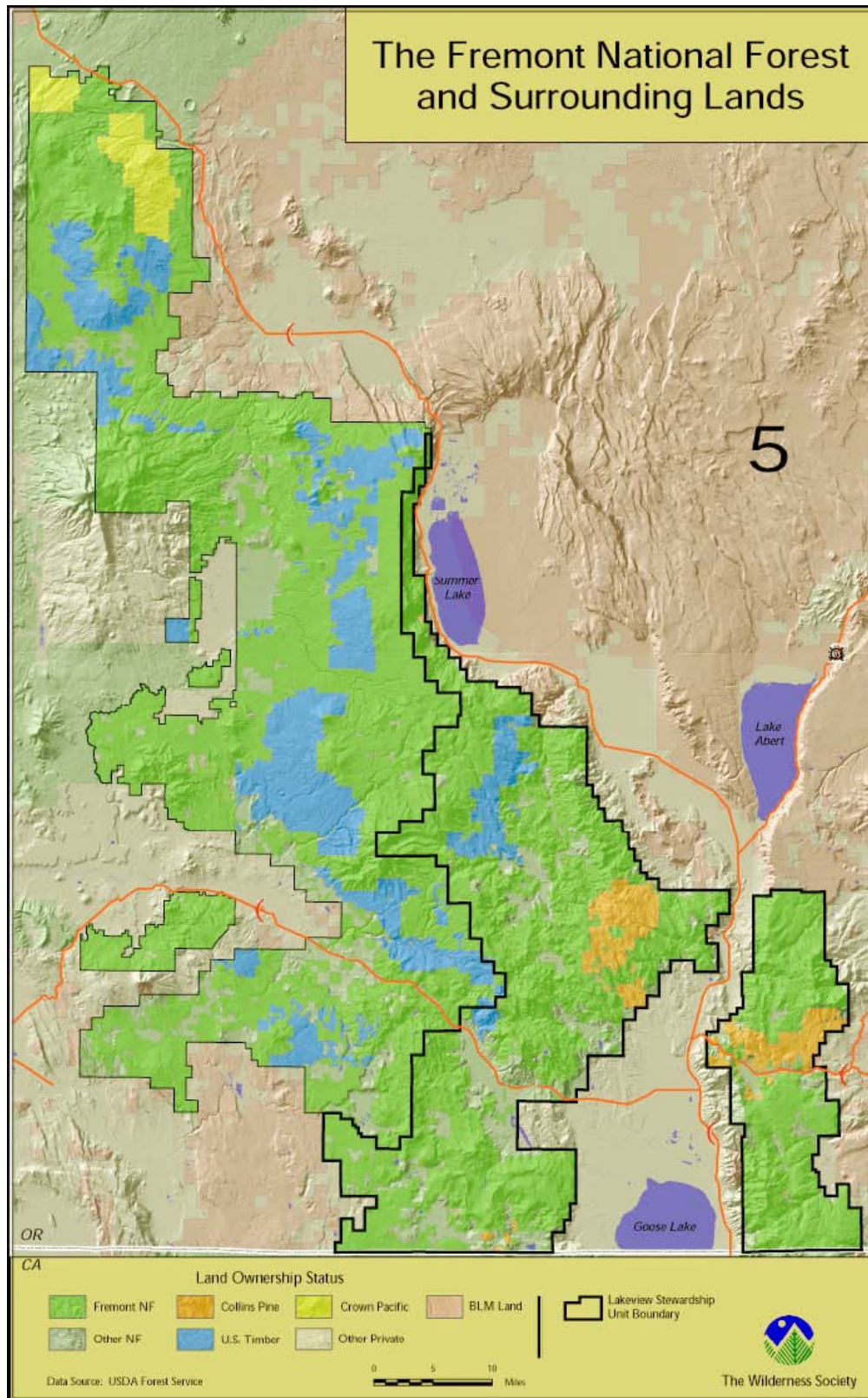
Since the Long-Range Strategy was adopted in 2005, the Forest Service has collaboratively planned and implemented several restoration projects in the Unit that are consistent with the goals of the Unit and the recommended guidelines of the Strategy. The West Draws project, for example, authorized 15,000 acres of thinning, 26,000 acres of prescribed burning, and 90 miles of road decommissioning – all with a single environmental assessment and without an administrative appeal.

In the coming ten years, given adequate funding, the Forest Service should be able to plan and conduct various forms of restorative treatments on about 200,000 acres in and around the Lakeview Stewardship Unit. Major landscape-scale projects on the drawing board include Deuce in the Paisley District and East Draws in the Lakeview District. A ten-year schedule of planned and potential vegetation management projects is included in this Strategy.

Additional funding from Congress or other sources will likely be necessary to accomplish the forest health restoration treatments, monitoring, and logging equipment upgrades recommended by this long-range strategy. The Collaborative Forest Landscape Restoration Program established by Congress in 2009 could provide a much-needed new source of funding to eliminate at least some of the budget shortfall. Working with the BLM when administrative lines bisect watershed boundaries will add opportunities to manage larger landscapes in a more holistic manner and may help leverage funding.

The Lakeview Stewardship Group welcomes all feedback on this collaborative strategy and intends to update, expand, and improve the strategy as more and better information becomes available. We consider the strategy to be an important step towards achieving the collaborative vision and goals of the Lakeview Federal Stewardship Unit.

I. Introduction



Fremont National Forest and Surrounding Lands

The Lakeview Federal Stewardship Unit within the Fremont National Forest (now Fremont-Winema National Forests) was originally established in 1950 as the Lakeview Federal Sustained Yield Unit for the purpose of enhancing the economic stability of the communities of Lakeview and Paisley in Lake County, Oregon. In 2001, the Chief of the Forest Service re-authorized the Unit with a revised policy statement that established a new name for the Unit, a common vision and a set of new goals and objectives that were developed by the Lakeview Stewardship Group and adopted by the US Forest Service.

Lakeview Federal Stewardship Unit Vision: We envision a sustainable forest ecosystem that, through a new understanding of the interrelationships between the people and the land, will ensure quality of life for present and future generations.

The Goals of the Stewardship Unit are as follows:

- Sustain and restore a healthy, diverse, and resilient forest ecosystem that can accommodate human and natural disturbances.
- Sustain and restore the land's capacity to absorb, store, and distribute quality water.
- Provide opportunities for people to realize their material, spiritual, and recreational values and relationships with the forest.

The goals and objectives of the Unit are addressed in the Key Issues section of this strategy and are set out in Appendix A.

In order to help achieve these goals, the Lakeview Stewardship Group has developed this long-range strategy as guidance to the Forest Service and others involved in managing the Unit. We view this long-range strategy as part of a unique, collaborative effort to help restore the ecological health of the 500,000-acre Stewardship Unit and to provide economic and social benefits for the local community. The Lakeview Stewardship Group includes conservationists, timber workers, forest managers, local government officials, and other civic leaders. Forest Service and BLM managers are regularly invited to participate with the Group.

The strategy is intended to provide an overall management framework for the Unit as well as help identify funding needs and prioritize areas for active restoration. The strategy should also make it easier for the Forest Service to revise its land and resource management plan for the Fremont-Winema National Forests in the next few years.

In 2009, the Group decided to update the strategy in order to take advantage of the funding opportunities provided by the Forest Service's new Collaborative Forest Landscape Restoration Program. A proposal for CFLRP funding must be based on a "landscape restoration strategy" that:

- identifies and prioritizes ecological restoration treatments for at least a 10-year period;
- encompasses a landscape that is at least 50,000 acres in size and is comprised primarily of National Forest System (NFS) forest lands;
- involves active ecosystem restoration in support of the purposes of the Forest Landscape Restoration Act of 2009;
- includes ecological restoration treatments that will contribute by-products to existing or proposed wood-processing and/or biomass processing infrastructure;
- incorporates the best available science and application tools;
- maximizes retention of large trees and fully maintains, or contributes to the restoration of pre-suppression old growth conditions;
- modifies fire behavior by focusing on the removal of smaller diameter trees in thinnings, strategic fuel break construction and maintenance, and fire use;
- does not involve the establishment of permanent roads to carry out the strategy; and,
- includes funding provisions to decommission all temporary roads constructed to carry out the strategy.

This updated strategy for the Lakeview Federal Stewardship Unit builds on numerous scientific assessments and planning efforts by the Forest Service and independent experts. These past assessments and plans range in scale from the regional Interior Columbia Basin Ecosystem Management Project to several watershed analyses and transportation plans within the Unit completed by the Fremont-Winema National Forests in recent years. The long-range strategy also incorporates elements of the Klamath Tribes' forest management plan developed by the Klamath Tribes for their former reservation land that is managed by the Fremont-Winema National Forests.

We will continue to update, expand, and improve this strategy as more and better information becomes available and can be incorporated. An “adaptive management” planning approach is especially appropriate and feasible here because of the Chewaucan Biophysical Monitoring Project. Beginning in 2002, this monitoring effort has been gathering a great deal of data about the trees, plants, wildlife, insects, soils, streams, and other ecosystem elements within a large part of the Stewardship Unit. The detailed monitoring information about site-specific ecological conditions and trends supplement the data that were used in the initial strategy.

This long-range strategy begins with an overview of how to approach restoration in the context of eastern Oregon and the Lakeview Federal Stewardship Unit. Next, it reviews past studies and existing data relevant to planning for the Unit. The strategy then focuses on eight main issues: (1) forest and rangeland health, (2) soils and water, (3) fish and wildlife, (4) roads, (5) roadless areas and wilderness, (6) recreation, (7) community benefits, and (8) implementation and economics. Finally, the strategy presents a ten-year schedule of management activities, along with a proposed budget.

The Lakeview Stewardship Group appreciates the assistance of the Forest Service in developing and updating this long-range strategy. Several staff members of the Fremont-Winema National Forests generously provided information that we requested, reviewed

drafts, and participated in the Group's discussions about the strategy. The purpose of the long-range strategy is to provide collaborative input to help the Forest Service achieve the goals of the Lakeview Unit. The update is also intended to provide a strong scientific, social, and economic foundation for a proposal to the agency's Collaborative Forest Landscape Restoration Program. The long-range strategy does not affect the standards and guidelines, management area prescriptions, or other components of the Fremont land and resource management plan, but strives to contribute information and knowledge of current science.

II. Restoration Planning Overview

In developing this long-range strategy, the Lakeview Stewardship Group attempted to take a scientifically sound approach. During the past 15 years, scientists from numerous government agencies, universities, and non-governmental organizations have examined environmental and social conditions within and around the Lakeview Federal Stewardship Unit. Many studies have focused on the need to restore the ecological health of forests, rangelands, watersheds, and fish and wildlife habitats. As discussed in Section III, much of the information produced by these studies is relevant to the Unit and useful for this long-range strategy.

Our overall planning effort generally follows the strategic approach presented by Rick Brown in a report, *Thinning, Fire and Forest Restoration: A Science-Based Approach for National Forests in the Interior Northwest* (Defenders of Wildlife 2000). Rick Brown is a long-time member of the Lakeview Stewardship Group and a senior resource specialist for Defenders of Wildlife. In his report, Brown suggests that active forest restoration efforts that reflect the following guidelines will be most likely to succeed:

- Be part of comprehensive ecosystem and watershed restoration that addresses roads, livestock grazing, invasive exotic species, off-road vehicles, etc.;
- Consider landscape context, including watershed condition and both populations and habitats of fish and wildlife;
- Address causes of degradation, not just symptoms;
- Provide timber only as a by-product of primary restoration objectives;
- Avoid construction of new roads;
- Be based on local assessment of pre-settlement conditions;
- Take place in dry forest types;
- Use fire as a restoration treatment, either alone or following thinning;
- Treat thinning slash and other surface fuels (preferably with fire);
- Retain all large, old (presettlement) trees and large snags, and provide for their replacement over time;
- Have negligible adverse effects on soils;
- Address other vegetation in addition to trees, including noxious weeds;
- Incorporate monitoring as an essential element and cost of the project;
- Learn from monitoring and adapt management accordingly.

These guidelines continue to provide a scientifically sound basis for restoration management in the Lakeview Unit and many other areas of the Interior Northwest.

In 2009, Dr. Norm Johnson from Oregon State University and Dr. Jerry Franklin from University of Washington issued a paper on forest management in the Pacific Northwest that is directly relevant to the Lakeview Unit. The information and recommendations in this paper have been carefully considered in updating the long-range strategy.

III. Relevant Studies and Existing Data

A. Regional Context

Interior Columbia Basin Assessment (ICBEMP)

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) was a massive interagency scientific study that included all of eastern Oregon and the interior Columbia River Basin. The ICBEMP examined changes in the terrestrial and aquatic ecosystems that have occurred throughout the Basin since European settlement. Areas that had changed markedly were considered to have lower ecological integrity than areas that had not changed much. The Fremont National Forest, BLM Lakeview District, and LFSU were considered as part of a cluster of forests that have low forest integrity and low or moderate aquatic integrity. The area is dominated by dry forests that are extensively roaded and have little, if any, Wilderness. Forest structure and composition have been substantially altered from historical conditions. These forests show large changes in fire frequency but less change in fire severity. (Status of the Interior Columbia Basin: Summary of Scientific Findings, PNW-GTR-385, p. 122)

The ICBEMP study also found that the amount of forest in the Basin with “lethal” fire regimes has more than doubled, posing a significant risk to ecological integrity, water quality, species recovery, and homes in rural areas. Drought, fire suppression, overgrazing, and logging have contributed to significant changes in forest and range landscapes. Native grasslands and shrublands have declined and noxious weeds are spreading rapidly. Uniform stands of middle-aged trees have replaced old and mixed age stands, and much more of the timber volume consists of small-diameter trees. (Highlighted Scientific Findings of the Interior Columbia Basin Ecosystem Management Project, PNW-GTR-404, p. 13-14)

Based on the ICBEMP study, the Forest Service and BLM recommended a management alternative that aggressively restores ecosystem health through active management using an integrated ecosystem management approach. However, the agencies did not make a final decision on the ICBEMP plan and instead adopted a strategy in 2003 to incorporate the science data into local forest plans and projects. (The Interior Columbia Basin Strategy, www.icbemp.org).

Johnson and Franklin

Dr. Norm Johnson and Dr. Jerry Franklin have extensively studied forest conditions in the Fremont-Winema National Forest and elsewhere in the region and have proposed authoritative restoration strategies. In 2008 they completed a detailed forest restoration plan for the Klamath Tribe's former reservation land in the Fremont-Winema. (Norman K. Johnson, Jerry F. Franklin, Deborah Johnson, "A Plan for the Klamath Tribes' Management of the Klamath Forest," May 2008, http://www.klamathtribes.org/information/background/documents/Klamath_Plan_Final_May_2008.pdf).

The following year they produced an influential forest management proposal for both dry and moist Pacific Northwest forests. (Johnson and Franklin, "Restoration of federal forests in the Pacific Northwest: Strategies and management implications," 2009). Johnson and Franklin recommend active restoration management of the dry forest types, including both ponderosa pine and mixed conifer stands. They suggest treating approximately two-thirds of the forests within a landscape to restore ecological integrity.

B. Local Studies

Third Party Review

In 1999, at the request of Sustainable Northwest and Lake County, a consulting team of four scientists and management specialists conducted a study of the LFSU. (Wayne Elmore, Robert Hrubes, Chris Maser, Walter Smith, "A Third Party Review of the Lakeview Federal Sustained Yield Unit," March 1999). While admittedly not an in-depth analysis of ecological conditions within the Unit, the review was informed by the results of several site-specific watershed analyses that the Fremont National Forest completed between 1995 and 1998. The consultants found considerable ecological alteration and degradation due to past management emphasis and practices, along with significant restoration and stand-improvement needs. More specifically, the team concluded that past practices had resulted in:

- loss of habitat diversity leading toward management-created homogeneity across the landscape as a whole;
- soil compaction;
- high road densities;
- loss of mature forest structure;
- increased density and risk of fire;
- species conversion from Pine-associated to Fir-associated forest types;
- loss of habitat for threatened and endangered species; and
- lack of a comprehensive monitoring system.

Watershed Analyses

As noted above, the Forest Service and BLM completed several site-specific watershed analyses covering large portions of the LFSU – including the Upper and Lower Chewaucan River, Deep Creek, and Thomas Creek during the late 1990s. The watershed analyses identify issues, describe current and historical (reference) conditions, synthesize

and interpret data, and make recommendations for management. This long-range strategy relies significantly on the resource information and recommendations contained in the watershed analyses.

University of Washington Fire Study

In 2003, the University of Washington's Rural Technology Center completed a study of fire conditions and potential fuel treatments in the Fremont National Forest. (Mason et al. 2003, Investigation of Alternative Strategies for Design, Layout and Administration of Fuel Removal Projects). Using Continuous Vegetation Survey data collected on 502 plots, the UW study calculated proportions of the Fremont with high, moderate, and low levels of fire risk. The UW study also used computer models to evaluate the effectiveness of various types of fuel treatments in reducing fire risk. Results of this study are presented in the Fuels and Fire section below.

Nature Conservancy Fire Learning Network

Conducted in 2007-2009, the goal of this project was to develop scientifically sound and socially acceptable solutions to the problem of altered fire regimes and degraded forest health. These were key issues identified in the *Oregon Conservation Strategy*. The project has produced a collaboratively developed treatment prioritization map for the 500,000-acre Lakeview Stewardship Unit in Southern Oregon.

Because it is important to understand the ecological trade-offs that occur when management is required to balance many stakeholder preferences, it was of interest to compare and assess the stakeholder-designed priority map with a Treatment Optimization scenario to determine which approach maximizes landscape restoration while simultaneously reducing the threat of uncharacteristic fire. In addition, the assessment provided an up-to-date vegetation assessment for the Lakeview Stewardship Unit. This information can be used to assess the effects of management actions to reduce the threats of wildfire, and to analyze how climate change will influence fire behavior and the effectiveness of the restoration approaches.

The work and products provide a foundation for strategic federal land management decision-making and project selection in the Lakeview Stewardship Unit for the next ten years. Working in cooperation with stakeholders and federal partners, it was possible to prioritize approximately 110,000 acres for active restoration. Treatment of the priority sites will support restoration and conservation of multiple ecosystem services including wildlife habitat. By identifying high-priority places for treatment in a collaborative framework, the Forest Service will have the benefit of knowing locations where there is likely to be public support for management (and therefore potentially less conflict) and where each management dollar spent will yield multiple resource benefits.

An analysis of focal wildlife species habitat was also completed. The analyses identified species representative of each plant community and evaluated the historic and current habitat conditions. Habitat assessments identified species and areas where management

would best meet ecological requirements. The focal species assessment was met with enthusiasm by state and federal wildlife biologists, who will use the analysis to help inform forest plan revisions.

The actions and products facilitated by this analysis create a compelling case for why restoration is needed in ecologically degraded fire-dependent forests. It builds the case for restoration through a habitat analysis conducted for focal species in the Lakeview Stewardship Unit. Through modeling, it was possible to demonstrate that current habitat conditions will favor those species that prefer dense conditions at the cost of those species that require open canopy. Open canopy-dependent species are declining, much to the alarm of wildlife managers, academic scientists, and stakeholders. In addition, their habitat is vulnerable to significant loss due to uncharacteristic fire, insect and disease outbreaks, and the stress induced by climate change.

Biomass Supply Study

In 2005 Catherine Mater of Mater Engineering completed a Coordinated Offering Protocol (CROP) for a 100-mile radius around Lakeview. This analysis covered portions of 3 states, 4 National Forests, 14 Ranger Districts, 8 BLM Districts, 9 counties, State lands and tribal lands. The analysis demonstrated that there was enough volume to support a small diameter sawmill and a biomass energy plant.

In 2007 TSS Consultants analyzed Lakeview's biomass potential for Marubeni Sustainable Energy. The information, while proprietary, was used by Marubeni to develop plans for building a 15 MW plant. In 2009 Iberdrola Renewables purchased the development rights for the Lakeview Biomass project.

In the past two years, monitoring of completed operations under Forest Service Stewardship authorities has improved the understanding of volume per acre that could be expected under the new 10-year Stewardship Contract. Greater knowledge of actual volumes, more efficient biomass technology, and additional acres from Jen-Weld Timber Resource lands and lands south into California showed that a 25 MW biomass plant would be sustainable for the 20-25 year life of a biomass plant.

IV. Key Issues

A. Forest and Rangeland Health

Goal: Sustain and restore a healthy, diverse, and resilient forest ecosystem that can accommodate human and natural disturbances.

1. Fuels and Fire

Objectives:

- *Restore stand-maintenance fire regimes.*

- *Restore forest conditions that approximate historical species composition and stand ages.*

The major tree species in the Fremont National Forest are ponderosa pine, juniper, lodgepole pine, and at higher elevations white fir. Most of these trees are adapted to summer drought and extreme temperature fluctuations due to the nature of the arid region. Annual precipitation is 10-20 inches from autumn through spring, and summers are hot and dry. (Mason et al., p. 17.)

Historically, the ponderosa pine forests were maintained by relatively frequent, low-severity surface fires. Lodgepole pine forests were maintained by infrequent, intense insect attack followed by high-severity stand-replacing fire. In mixed conifer and white fir stands, fire and insect disturbances were variable in frequency and intensity, resulting in a wide range of conditions. (Upper Chewaucan Watershed Analysis (WA), p. RC-4 & 5)

Ponderosa pine stands were typically park-like with large, well-spaced trees and sparse shrubs and down wood, maintained by frequent light surface fires at 1-25 year intervals. Ponderosa pine dominated below 6,000 feet and on south-west slopes above 6,000 feet. Mixed conifer stands were “jumbled up” with complex structure and severe fire return intervals of 25-300 years. (Lower Chewaucan WA, p. RC-4 & 5)

Lake County Resources Initiative has collected data on the number and acreage of wild fires that burned within and adjacent to the Unit for the past 25 years. Notably, in the first decade the fires averaged about 430 acres, but between 1995 and 2005 the average exceeded 6,000 acres. Over the 25-year period, most of the acreage burned in 2002 due to the large Grizzly, Toolbox, and Winter Rim fires. Even omitting the 2002 fires, average acreage in the past decade exceeds 1500 acres, triple the previous decade.

The Klamath Tribes’ Forest Plan contains some useful historical data about forest conditions in Lake County prior to widespread logging and fire suppression. These data suggest that ponderosa pine stands generally contained about 15 trees/acre larger than 20 inches in diameter and about 40 trees/acre between 20 and 4 inches in diameter. The Chewaucan Biophysical Monitoring Project is also providing useful data on local reference conditions.

As in many other eastside forests, years of fire suppression, extensive high-grading of the dominant ponderosa pine overstory, and extensive livestock grazing have resulted in many acres of the Fremont being increasingly converted to a forest that is dominated by white fir. Forest stands dominated by white fir are more susceptible to drought stress and associated outbreaks of insects and disease, increasing the risk of large-scale wildfires. (Elmore et al., p. 16 & 17).

With fire exclusion, formerly single-storied, park-like ponderosa pine stands are becoming increasingly multi-storied. The practice of high grading has left many stands with a large stagnant component of white fir that normally would have been absent

historically. Current stand density is higher than the historical level in many areas of the forest. White fir and mixed conifer stands have high densities that place them at risk of disease, insect attack, and density-related mortality. (Deep Creek WA, p. CC-11; Lower Chewaucan WA, p. CC-8)

The University of Washington study of high severity fire risk on the Fremont National Forest found that 31% of the forest was at high risk, 47% moderate risk, and 22% low risk. The dominant tree species in high risk stands are 53% white fir, 25% ponderosa pine, and 21% lodgepole pine. Low risk stands are 73% ponderosa pine and 21% lodgepole. The study found that thinning to remove one-half of the basal area would result in shifting the high-risk stands to 66% moderate risk and 27% low risk, while thinning to leave 45 sq. ft. of basal area per acre would change the high-risk stands to 27% moderate risk and 71% low risk. However, under any treatment scenario, nearly all stands would return to high risk within 15-20 years unless there was follow-up treatment. (Mason et al.)

The Forest Service has been underburning ponderosa pine stands since the 1970s. Very little underburning has occurred in mixed conifer forests. (Lower Chewaucan WA, p. CC-11). During the past decade, the Forest Service has been thinning ponderosa pine stands to remove the white fir understory and reduce overall stand density.

KEY VEGETATIVE TREATMENT ACTIVITIES IN LAKEVIEW FEDERAL STEWARDSHIP UNITY, 2001-2009

Year	Commercial Treatment Acres	Non-Commercial Fuel Reduction Acres	Prescribed Burning Acres
2001	3,647	2,872	3,750
2002	1,048	2,708	4,000
2003	2,833	1,343	9,187
2004	5,626	4,453	10,487
2005	507	5,357	0
2006	1,783	5,302	9,864
2007	3,562	4,614	12,178
2008	5,712	3,209	167
2009	2,203	5,927	0
Totals	26,921	35,785	49,633

These data need some interpretation and explanation. First, the commercial treatment numbers include both commercially-driven post-fire salvage logging of large dead trees and ecologically-driven “green” commercial thinning of generally small diameter trees. For the years 2001-2005, the acres of commercial treatment primarily consisted of fire salvage treatments, whereas since 2006 commercial treatments have focused on green tree thinning. Second, the annual prescribed burn numbers fluctuate widely because the Forest Service’s burn program focused on areas within the Unit in some years and moved to other parts of the Forest in other years. The large burns have generally occurred in

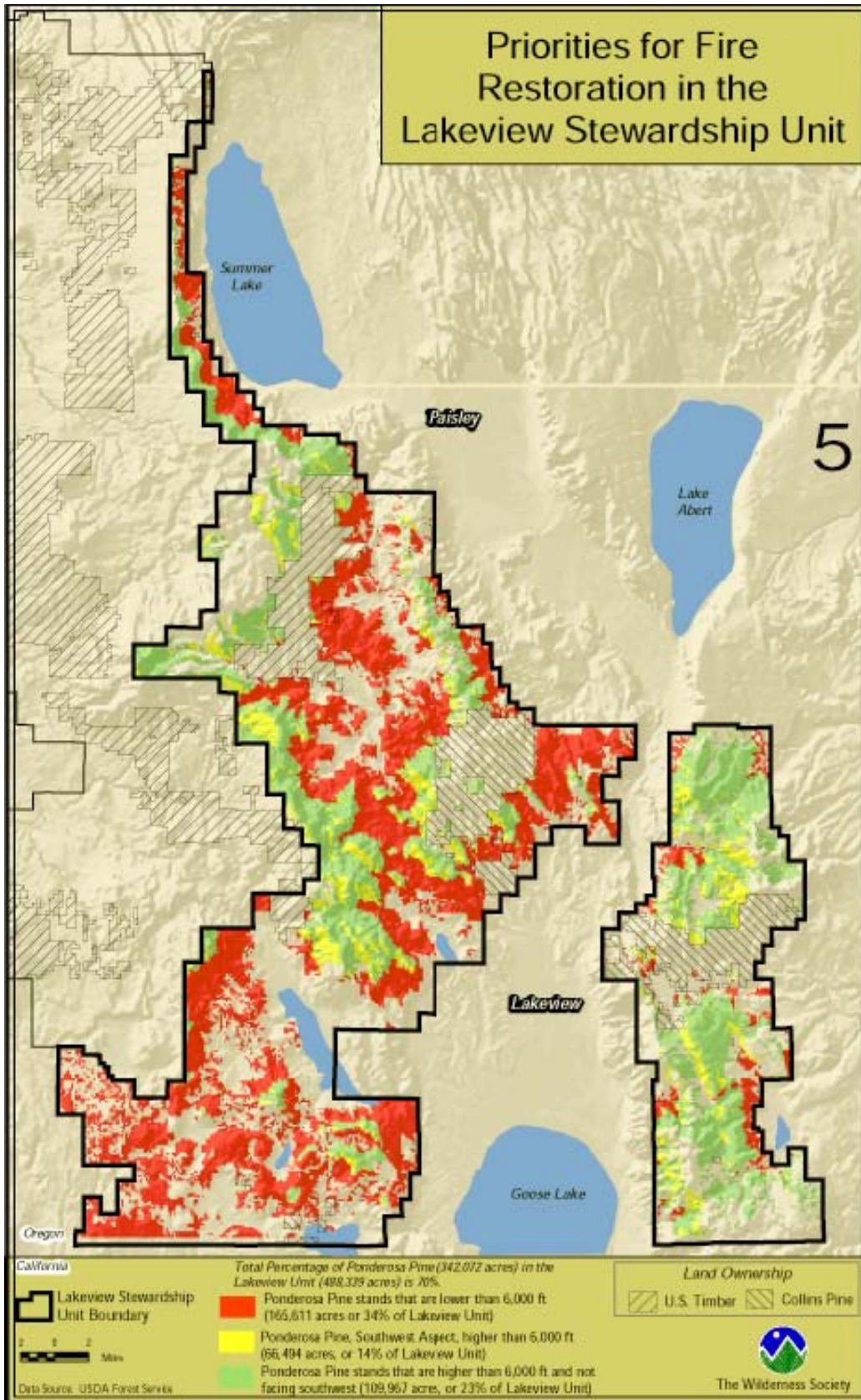
relatively open forest lands, where per-acre costs are low compared to the more heavily forested lands that require substantial thinning and other treatment before they can be burned.

2005 Analysis of Potential Restoration Treatment Areas

For the 2005 Long-Range Strategy, The Wilderness Society conducted a GIS analysis of forest vegetation within the Unit to determine the approximate amount and location of areas that have relatively frequent fire return intervals and potentially would benefit from restoration treatment. Specifically, the analysis identified stands that are in the ponderosa pine ecotype, are located below 6,000 feet in elevation, and are located above 6,000 feet on southwest-facing slopes. As indicated in the table and map below, the analysis found that about 342,000 acres, or 70 percent of the Unit, are ponderosa pine stands. Of these, about 232,000 acres, or 48 percent of the Unit, are below 6,000 feet elevation or at higher elevations on southwest-facing aspect.

ACREAGE OF PONDEROSA PINE ECOCLASS ABOVE AND BELOW 6,000 FEET ELEVATION AND ON SOUTHWEST ASPECT

Total LFSU Acreage	488,339 acres
Total Ponderosa pine Ecotype	342,072 acres
Low Elevation Ponderosa pine (<6,000 ft)	165,611 acres
High Elevation Ponderosa pine (>6,000 ft)	176,461 acres
High Elevation Ponderosa pine on SW Facing Aspects	66,494 acres
Low Elevation PPine and SW Aspect High Elevation PPine	232,105 acres



Priorities for Fire Restoration in the Unit (2005)

TNC Assessment of Values Mapping

This 2010 Long-Range Strategy has utilized The Nature Conservancy's (TNC) state-of-the-art Fire Learning Network to help identify the highest priority areas for restoration treatments. The goal was to develop a practical adaptation planning process to guide selection and integration of forest management recommendations into existing policies and programs. This process aimed to facilitate restoration treatments across a broad geography and engage the Forest Service and Lakeview Stewardship Group (LSG) in conservation action at scale. Benefits of this approach are in evaluation of the effectiveness of alternative restoration treatments using an active adaptive management approach.

Collaboratively derived forest restoration prescriptions are the result of negotiations that attempt to balance values, ideology, and ecology. Although policy makers, land managers and stakeholders all agree that management action should be based on the best available science, this good intent rapidly erodes without site specific information on the historic conditions from which to ground truth and compare proposed treatments.

The process of building trust in management decisions is with scientifically defensible methods and transparency. Federal land managers and stakeholders need site-specific data on historic stand structure, fire-return intervals, and species composition as a starting point for prescription design. These data create a picture of the last time forests were resilient, where the full complement of biodiversity was present and the entire ecosystem was in dynamic balance with landscape processes and function. Without this information there is no ability to evaluate the effectiveness of management actions for meeting ecological goals. In addition, stakeholders and managers need this data to evaluate how proposed variation from historic site conditions (based on ideology or values) will affect long-term ecological sustainability at the site.

Providing baseline data on historical stand structure, fire return intervals, site potential, and current forest conditions is essential to monitor the effectiveness of forest treatments. It may be the best strategy in our adaptation management arsenal to assess forest health with climate change. Current predictions are that the climate will be warmer in areas of the Pacific Northwest. Recent research shows that fire seasons are already lengthening and fire duration is increasing (Westerling¹, et.al. 2006). Reducing fuel loads and focusing on building resiliency in old trees that have the genetic code for surviving long periods of drought in the past is urgently needed in the face of rapidly changing conditions.

¹ Westerling, A.L., H. G. Hidalgo, D. R. Cayan, and T. W. Swetnam. 2006. "Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity. *Science*. V 313: pp.940-943. www.sciencemag.org

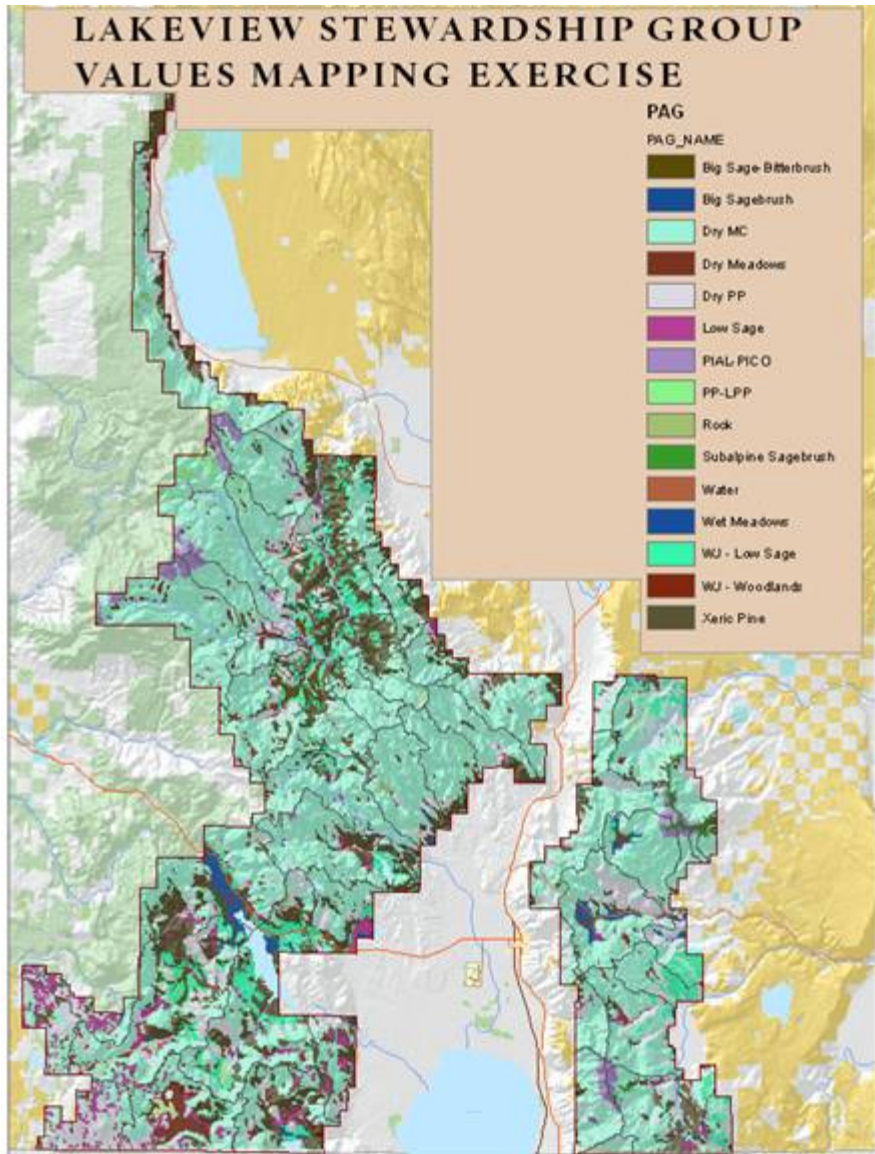
Consistent with the Forest Service's new approach to forest management through collaboration and managing for a full suite of ecosystem benefits (Vilsack², 2009), this analysis demonstrates how collaborative efforts can accelerate restoration of fire-adapted forests on federal lands at meaningful scales. Results of this effort have: 1) increased capacity with landscape assessments to prioritize restoration; 2) provided ecological data to ground truth and monitor management effectiveness; 3) added implementation capacity to restoration areas; and 4) developed an active adaptive management approach to evaluate the success of restoration treatments.

Objectives. Using a “nominal group technique,” the LSG engaged in identifying, prioritizing, and weighting the places they felt need restoration action. The process was bounded by the realities of the land management agencies, data types, and the timeframe under which the data can maintain relevance to the federal agencies. The LSG identified eleven values which included: Mule deer winter range, Invasive species, Forested Ecosystems within Natural Range of Variability, Old Growth, Critical Infrastructure, Private lands buffer, Rare and sensitive plants, Recreation areas, Riparian Areas, Water Quality, and Wildland Urban Interface areas. The values assessment narrowed the final list to Forested Ecosystems within the Natural Range of Variability and Old Growth.

Forest Ecosystems within the Natural Range of Variability (NRV) were assessed as forests that are in mid- to late-succession with frequent fire regimes. The assessment was based on USFS Regional 6 Plant Association Guide (PAG) (Table 2) and LANDFIRE (Structural and FRCC) data. TNC used the FRCC data for Fire regime 1 and Condition Class 3 with mid-successional closed canopy stands. Through the assessment 200,000 acres were identified where treatments would restore NRV.

Treatable Stands. Treatable Stands are identified as Frequent Fire Stands that are highly departed and are over-abundant in a Closed Canopy state. In the initial analysis TNC used the PAG in our classification of Frequent Fire Systems. The analysis required using an updated PAG layer that was also correlated to current conditions. This data was then used to develop the Restoration Priority Scenario. Treatable Stands/Restoration Priority Areas data is the result of the LSG values assessment. We provide this information here to disclose the criteria and process used in the treatment prioritization classification knowing that there will be updates in data and methods, which will ultimately change the acres where treatment will occur.

² Vilsack, T.2009. AGRICULTURE SECRETARY VILSACK ANNOUNCES NEW DIRECTION AND VISION FOR AMERICA'S FORESTS. August 14, 2009. Seattle, Washington.
<http://www.usda.gov/wps/portal/!ut/p/ s.7 0 A/7 0 1OB?contentidonly=true&contentid=2009/08/0383.xml>



Region 6 Plant Association Guide data for the Lakeview Stewardship Unit

Plant Associations	Total		Federal	Non-Federal
		Frequent Fire		
Total acres in LSU	662,289		487,923	174,366
Non-Forested				
Big Sage/bitterbrush	6,727		2,248	4,479
Big sage	2,000		12	1,988
Dry meadows	15,472		6,279	9,193
Low sage	19,223		15,733	3,490
Wet meadow	8,242		1,180	7,062
Juniper / Low sage	37,187		21,705	15,482
Woodlands/juniper	1,670		826	844
Sub-alpine sage	2,336		2,148	188

TOTAL	90,521		47,983	42,538
Percentage	0.14		0.10	0.24
Rock	2,146		1,875	271
Water	3,547		840	2,707
Forested				
Dry mixed Con	381,395	381,395	294,691	86,704
Dry Ponderosa Pine	75,667	75,667	55,381	20,286
PIAL/PICO	10,563		9,855	708
PP/LPP	3,023	3,023	2,935	88
Xeric pine	93,091	93,091	72,215	20,876
TOTAL	563,739	553,176	435,077	128,662
Percentage	0.85	0.84	0.89	0.74

Climate Change is expected to change the intensity and magnitude of fire behavior. Most climate models for south central Oregon identify hotter and dryer conditions. TNC conducted a sensitivity analysis by increasing temperature 5 degrees and dropping humidity 5%. The results suggest that there may be slight difference in fire behavior (flame length changed in the highest category 7% and Crown Fire Activity Changed 18%). Additionally, we may need to change the previous two fire behavior metrics to include the factor of *contagion*. Fire is a contagious process. As we model fire behavior we can see that everywhere we treated the hazard dropped significantly. But, the cumulative benefit of treatments may not be accurately reflected through the fire modeling.

Modeling Forest Management to Reduce Fuel Loads and Restore Natural Stand Conditions

The 2005 Long-Range Strategy used Landscape Management System (LMS) to predict changes in stand conditions under one set of possible management options, modeling an approach similar in some respects to that proposed in the Klamath Tribes' draft forest plan. The model demonstrated that, on average, open stands dominated by trees generally 21 inches in diameter or larger can be created in 30 to 50 years for the ponderosa pine and mixed conifer habitat types, significantly reducing the risk of crown fire and allowing the forests to sequester and store carbon. The modeling also suggested that restrictions on cutting trees larger than 21 inches in diameter should be relaxed in 30 to 40 years to allow maintenance of desired stocking levels and stand characteristics. Surveys by the Chewaucan Biophysical Monitoring Team from 2006-2009 indicate that many stands are currently stocked with trees larger than 21 inches.

Some of the simplifications necessary to conduct this modeling include thinning to basal areas at or below the lower range suggested in the Klamath Tribes' plan and reaching the target basal area in the first thinning, rather than through successive entries. The model

was also used to achieve open stands in moist mixed-conifer habitat types where complex, multi-species, multi-layered stands were probably common historically. Refining these models to more closely reflect anticipated on-the-ground management is an ongoing process.

Mountain Pine Beetle

Mountain pine beetles are currently ravaging the Upper Chewaucan watershed, infecting more than 300,000 acres in and around the Unit. Data gathered by the Chewaucan Biophysical Monitoring Team from 2007-2009 indicates that there is almost 100 percent mortality in all lodgepole pine larger than 12 inches in diameter and almost no mortality in trees smaller than 4 inches in diameter. Even though the big trees are dead, about 60 percent of the original stand is unaffected, leaving stands stocked with trees from 30 to 50 feet tall that become visible as the red needles fall off the large dead trees. There are several stands with unaffected big lodgepole pine in which the stocking levels of the large trees were at 35 basal area, though the stand had a basal area greater than 200. This hints at a management plan that limits the basal area of large lodgepole pine. More surveys need to be conducted to determine the significance of this finding. For more details, see [www.lcri.org/monitoring/reports/Beetle Kill in the Upper Chewaucan](http://www.lcri.org/monitoring/reports/Beetle%20Kill%20in%20the%20Upper%20Chewaucan).

These areas appear to be at high risk for catastrophic stand-replacing fires. As the large trees fall in the next few years (many large trees fell during 2009), the soils may be at risk of undesirable adverse effects of fire. This issue is discussed further in [www.lcri.org/monitoring/reports/Potential Effect of Catastrophic Fires on Mazama Ash Soils in the Upper Chewaucan Red Zone](http://www.lcri.org/monitoring/reports/Potential%20Effect%20of%20Catastrophic%20Fires%20on%20Mazama%20Ash%20Soils%20in%20the%20Upper%20Chewaucan%20Red%20Zone).

The current outbreak of mountain pine beetle in south-central Oregon has led forest managers to consider thinning as a means of decreasing residual tree susceptibility to attack and subsequent mortality. Previous research indicates that susceptibility of lodgepole pine to mountain pine beetle is a function of a tree's physiological vigor and the intensity of attack. Trees able to produce ≥ 80 g (g) of wood per m^2 of projected leaf area annually are highly resistant, because they are able to shift resource allocation locally from wood to resin production to isolate blue-stain fungi introduced by attacking beetles. Typically, the leaf area of susceptible stands must be reduced by two-thirds to permit most residual trees to increase their vigor to a safe level.

Generally, outbreaks of mountain pine beetle are more likely to occur in lodgepole pine stands with trees older than 60 years and larger than 25 cm in diameter (Cole & Amman, 1969; Amman, 1978; Wellner, 1978). Larger diameter trees have thicker bark, which facilitates the construction of egg galleries, provides better protection from natural predators, and insulates against external temperature extremes and desiccation (Safranyik & Carroll, 2006). In addition, there is a positive relationship between tree diameter and phloem thickness (Amman, 1969; Shrimpton & Thomson, 1985), with the phloem being the primary nutrient source for the beetles and their larvae (Amman, 1972; Amman & Pace, 1976; Berryman, 1976; Klein et al., 1978). Thicker phloem results in larger broods, larger beetles, and enhanced survival rates (Safranyik & Carroll, 2006);

however, phloem thickness is not directly related to a tree's ability to resist beetle attack (Shepherd, 1966). Large diameter trees appear more susceptible when their growth becomes reduced — either temporarily, through an event such as severe drought, or permanently, as a result of disease or mechanical damage.

There is debate over whether thinning is an effective treatment for managing mountain pine beetle infestations because it increases tree vigor (Mitchell et al., 1983; Waring & Pitman, 1985) or because thinning alters the microclimate (e.g., temperature and wind patterns), producing unfavorable conditions for beetles (Bartos & Amman, 1989; Amman & Logan, 1998). Regardless, increases to tree vigor and alterations to stand microclimate are both known outcomes of thinning treatments (Waring & O'Hara, 2005), and likely play some role in reducing stand susceptibility and subsequent mortality due to mountain pine beetle attack, although perhaps over different time horizons (Amman et al., 1977). In this context, we use vigor as an indicator of stand susceptibility, although we acknowledge the role of microclimate and stand dynamics in determining susceptibility.

In 2009, the Forest Service, in consultation with the Lakeview Stewardship Group, approved a Red Zone Safety Project to improve public and employee safety by removing beetle-killed lodgepole along 200 miles of roads and within 25 recreation sites in and around the Lakeview Unit. Implementation of this project will produce logs and biomass for commercial use as well as create strategic fuel breaks to help control fires.

Fuels and Fire Guidelines:

- Use Fire Learning Network, Landscape Management System, or similar GIS analyses and computer tools to model and inform forest restoration activity in the Unit.
- Undertake an accelerated thinning and prescribed burning program, using the Klamath Tribes' plan as a model, supplemented, as appropriate, by local or more recent information.
- Identify priority areas for treatment, including:
 1. near residences;
 2. adjacent to private forest lands that have approved management plans;
 3. in stands with remnant old-growth ponderosa pine (in ponderosa pine or mixed-conifer plant association groups) where dense younger trees put the stands at risk of uncharacteristically severe fire or drought stress;
 4. in other ponderosa pine and dry mixed-conifer stands with existing road access.
- Base restoration treatment prescriptions on Chewaucan Biophysical Monitoring and other local data about reference conditions, as well as other appropriate data and models.
- Restore more natural fire conditions in appropriate areas and circumstances through prescribed fire, modified suppression tactics, and updated fire management plans.

2. Old Growth

Objective: Restore forest conditions that approximate historical species composition and stand ages.

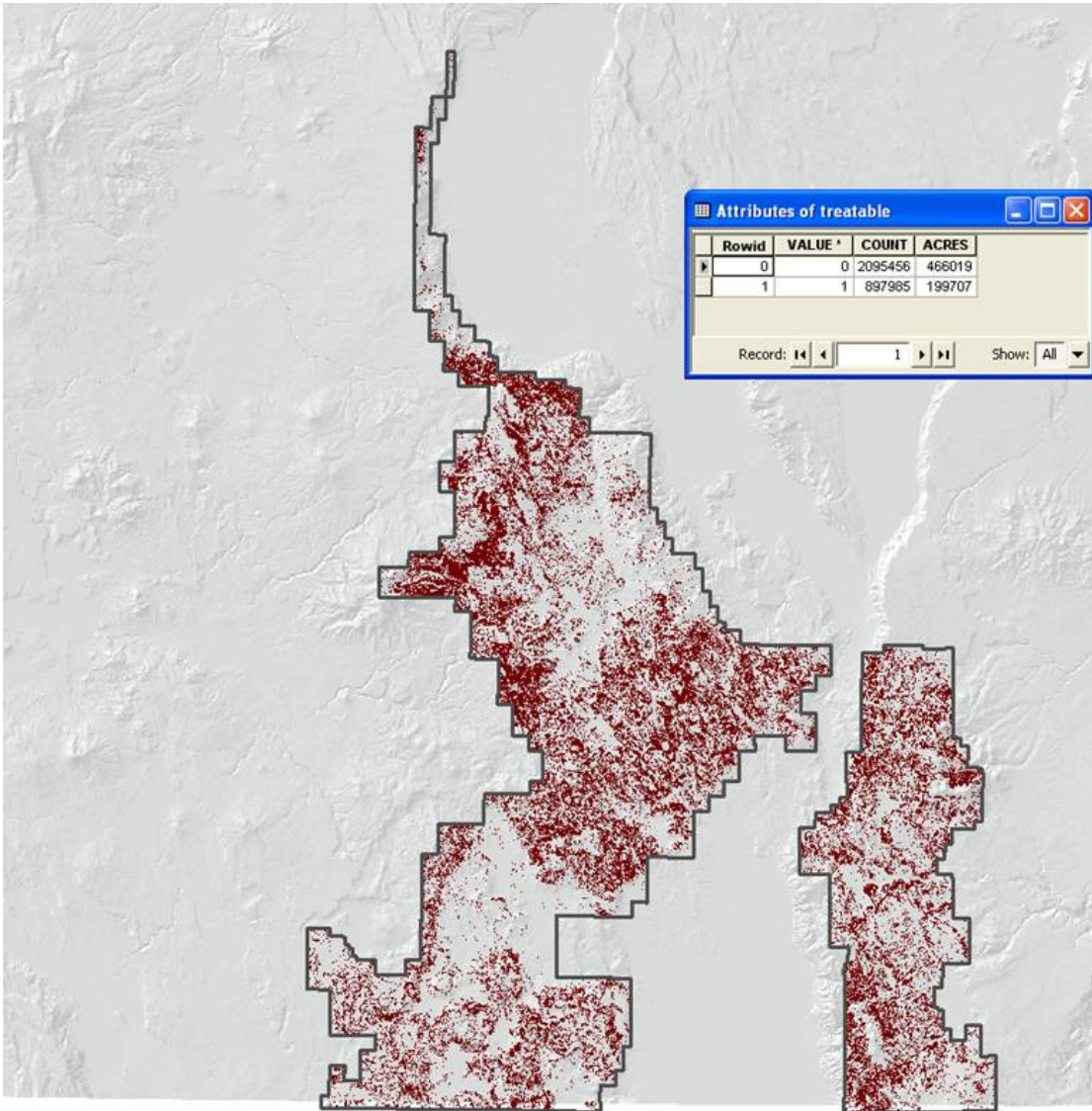
Historic and Current Conditions

Historically, ponderosa pine forests were mostly in large park-like pine stands with occasional small openings; 60-80 percent were in old structural condition. Mixed conifer forests had variable conditions due to infrequent, stand-replacing fires following insect mortality and high fuel loads; 40-70 percent were in old and late structural condition. Lodgepole pine forests had large, even-aged patches due to frequent stand-replacing disturbances; 30-90 percent were in early structural condition. (Upper Chewaucan WA, p. RC-4; Lower Chewaucan WA, p. RC-4). Continuing Forest Service analysis suggests that the old structural condition in ponderosa pine may have been somewhat lower (40-50%) than the estimate in the Chewaucan WA; preliminary national-level documentation can be found at http://www.frcc.gov/docs/reference/WEST_Forest_BpS_01.11.05.pdf.

There are many different definitions for late successional, old, or old growth forest, and most of them center on age, size, and structure. The following table summarizes the attributes from the 1992 Region 6 Green Book definitions for old growth. The vegetation assessment used these definitions. The method to assess existing old growth incorporated Gradient Nearest Neighbor (GNN) data, which was calibrated using Forest Vegetation Simulation (FVS), and Viable. The methods used to assess the number of acres of old growth are in Appendix B.

Factor	Cold Forest	Moist Forest	Dry Forest	Lodgepole Pine cover type
DBH	21	21	21	12
Trees per acre	10	10-20	10	60
Age	150	150	150	120
Variation in Tree Diameter	yes	yes	yes	yes
Tree Decadence	yes	yes	N.A.	N.A.
Tree Canopy Layers		1	1	1
Dead DBH	12	14	14	12
Dead TPA	2	1	3	5
Down Diameter	12	12	-	-
Down Pieces per acre	4	5	0	0

According to this analysis, there are 199,707 acres of old growth on Federal lands in the Lakeview Stewardship Unit. This is equivalent to 46% of the forested acres. The general distribution of old growth is displayed on the following map where 30 meter pixels are highlighted in red where old growth currently exists.



During the past three years, the Chewaucan Biophysical Monitoring Team has collected data and analyzed old-growth conditions on 21 forest sites within the Upper Chewaucan watershed. According to the Monitoring Team's analysis, the population of ponderosa pine within old-growth sites seems to be declining overall. Much of the ponderosa pine old growth is in very late seral condition and will need thinning from below in order to maintain a strong presence of old ponderosa pine trees and restore appropriate site capacity. There are a few sites with heavy ponderosa pine reproduction, but these sites too will need management to maintain the health of the old ponderosa pine.

The lodgepole pine in the old-growth ponderosa pine sites is almost entirely in mid to late seral condition, with one site showing only recent appearance of lodgepole. The lodgepole pine is reproducing very heavily where present and will surpass, and perhaps replace, ponderosa pine if left alone.

The white fir is very similar to the lodgepole pine, showing signs of recent entry in places and mid to late seral condition for most of the old growth. However, on some sites white fir is in very late condition. Like the lodgepole pine, the white fir is reproducing very well where present and could come to dominate or co-dominate the watershed.

Forest Service watershed analyses report similar findings. They indicate that overstocked understories in many stands are causing overstory mortality of large trees and an unraveling of late/old seral forest characteristics. (Upper Chewaucan, p. CC-20; Deep Creek, p. CC-37 and Lower Chewaucan, p. CC-37).

Current Management Direction

Current Forest Service management direction for old growth is based on the “Eastside Screens,” which were adopted in 1994 and amended in 1995. Timber sale harvest activities are not allowed in late and old structural stage forests that are below historical range of variability, except where it will enhance the LOS character. All remnant late and old seral and/or structural live trees greater than 21 inches in diameter must be maintained. In stands that are not in late and old structural condition, treatments must move stands toward appropriate late and old structural conditions to meet historical range of variability. Open, park-like stand conditions must be maintained where this condition occurred historically. Treatments must encourage the development and maintenance of large diameter, open canopy structure. (ICBEMP Eastside Draft EIS, p. 3-71)

Fire and Salvage Impacts

In recent years, wildfires have caused significant losses of mature and old-growth forests. In 2002, the Winter Fire burned 34,000 acres, killing 50-80% of the trees across 70% of the burn area. The Grizzly Fire burned 3,760 acres of national forest land and 2,065 acres of adjacent private land. The Eastside Screens require salvage sales to provide 100% of potential population levels of woodpeckers and other primary cavity excavators. The Fremont forest plan standard calls for leaving a minimum of three snags per acre greater than 15 inches in diameter, plus one 10-inch snag. However, in portions of the Cub salvage sale the Fremont Sawmill agreed to retain all ponderosa pine trees larger than 28 inches in diameter as large tree snag habitat, and in the Winter Salvage Sale the Forest Service left additional snags in wildlife patches. The Klamath Tribes’ forest management plan and Johnson and Franklin (2009) support leaving large dead trees following burns.

Recent surveys by the Chewaucan Biophysical Monitoring Team raise concerns about natural recruitment of trees in severely burned areas, some of which have virtually no trees growing on hundreds of contiguous acres. More than 50 percent of the areas surveyed 4 to 7 years after catastrophic wildfire had fewer than 25 trees per acre replacing mature trees that were destroyed. The tool used to fund tree regeneration may need revision allowing for planting in non-harvested areas. These areas of no regeneration would make excellent candidates for planting trees as part of a carbon

sequestration project that might pay some or all of the planting costs. However, as Johnson and Franklin (2009) point out, it will be desirable to avoid overly dense, uniform stands that would result from applying conventional standards of “full stocking.”

Old-Growth Guidelines:

- Retain all large (>21”), old (presettlement, > 120 years) trees and large snags, and provide for their replacement over time. In the long run, as more trees grow and age to old-growth condition, proportional removal of those trees may be appropriate.
- Propose adjustments to Eastside Screens to allow cutting of large (>21”, but less than 120 years old) white fir in stands currently or historically dominated by ponderosa pine (like Klamath Tribe plan).
- Identify old-growth stands that should be high priority for restoration treatment.
- Propose guidelines for salvage logging to retain large dead trees (like Klamath Tribe plan, but bias retention of >21” snags toward largest available).

3. Invasive Species and Noxious Weeds

Objective: Eliminate and control spread of noxious weeds.

Habitat for noxious weeds is prevalent throughout much of the LFSU due to past management activities, overgrazing, and road construction. Weeds seem to be expanding each year. (Upper Chewaucan WA, p. CC-10; Deep Creek WA, p. CC-21).

The spread of non-native cheatgrass (*Bromus tectorum*, not formally designated as a noxious weed) is an especially serious problem in much of the Unit. Cheatgrass crowds out the native vegetations, hoards critical resources like water and potassium, and destroys the forage and habitat for wildlife. Also, when cheatgrass takes hold, it can change the site’s fire regime, increasing fire frequency and intensity.

Another non-native grass, Medusahead (*Taeniatherum caput-madusa*) may also be making its way into the Unit. It is very competitive against native grasses, helps introduce fire into non-fire prone areas, and may combine with cheatgrass to cause havoc. A few species of Thistle (Musk, Scotch, Bull) also are increasing on disturbed, bare soils throughout the Unit, primarily on landings and along roadways. Knapweeds are being effectively controlled.

Noxious grasses are a telltale sign that the Unit is being degraded. Much of the area is not carpeted by an effective ground cover, creating openings for the invasive grasses and weeds. Sub-soiling has contributed to this condition at all elevations, according to recent monitoring. The non-native grasses pull vital and limited elements and minerals such as potassium out of circulation, which harms the conifers.

One problem with efforts to restore native grasses has been the absence of adequate seed and nursery stock. One possible solution is to use another non-native grass like crested wheatgrass as a way to prevent the spread of cheatgrass and as a transition to native grasses.

The Forest Service has accomplished noxious weed treatments on an average of 653 acres in the past seven years, of which 35 percent have been treated manually and 65 percent have been sprayed with herbicides.

Noxious Weed Treatments in the Lakeview Federal Stewardship Unit, 2003-2009

	2003	2004	2005	2006	2007	2008	2009
Manual	182.9	130.3	214	363.3	293.1	173.8	231.8
Herbicide	277.5	601.6	359.1	623.6	566.7	300.7	254.8
Total	460.4	731.9	573.1	986.9	859.8	474.5	486.6

Invasive Species and Noxious Weeds Guidelines:

- Take precautions to ensure that weeds do not spread into areas where they do not currently exist – e.g. by avoiding sub-soiling and maintaining effective ground cover.
- Increase weed monitoring and eradication efforts, especially in juniper treatment areas. Secure access to a soil lab to analyze monitoring samples on a regular basis.

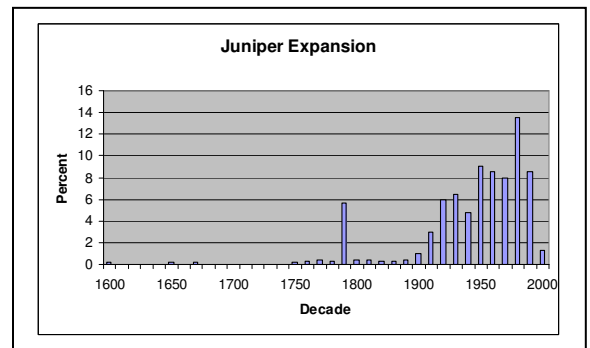
4. Juniper Encroachment

Objective: Restore forest conditions that approximate historical species composition and stand ages.

Prior to Euro-American settlement, many dry areas supported native bunchgrasses and sagebrush-steppe. Juniper was confined to rocky hillsides, ridges, and outcrops. Fire exclusion and overgrazing have allowed juniper to expand into communities historically dominated by sagebrush. (Lower Chewaucan WA, p. RC-8). With fire suppression, livestock grazing and, possibly, climate variation and change, juniper has come to dominate many areas. The juniper pockets have expanded and become more densely stocked, encroaching in aspen stands, riparian areas, and meadows.

The spread of juniper woodlands into rangelands poses a serious threat to watershed and ecosystem health on many sites. (Deep Creek WA, p. S&I-10).

Juniper expansion has increased the amount of overland flow and erosion. Twelve years of studies done by the Eastern Oregon Agricultural Research Center has shown both



erosion and runoff increase dramatically in a juniper woodland landscape versus area returned to a more natural open condition. With treatment the area goes from a little over 2 plants per square yard when dominated by juniper to 11-12 plants per square yard, increasing water absorption and reducing erosion. If these juniper areas and further encroachment are not managed, juniper will eventually dominate a much larger portion of the Unit. The expected result will be increased watershed degradation affecting site productivity, water quality and quantity, with ecological consequences. (Lower Chewaucan WA, p. S&I-1). Juniper expansion results in the displacement of some wildlife species, as trees dominate areas that previously provided habitat for ground and shrub nesters.

The Forest Service and BLM have undertaken juniper removal within the lower Chewaucan Watershed since 2002. This work is continued with the Jakabe Juniper/Aspen/Meadow Recovery Projects which are designed to restore historical conditions through removal of junipers followed by prescribed fire. No old-growth juniper will be cut. Research studies are showing differences in impacts from spring and fall burns of juniper. Data collected in the juniper treated areas along the Chewaucan River indicate that fall burning exposes and destroys soil structure so that for the next 3 or more years invasive pioneering plants alternately dominate the site along with cheatgrass. Juniper burned on snow has a much lower impact on soil structure and follows a succession similar to the juniper that is left unburned. Plant communities under the juniper are slowly being succeeded by plant associations common to the surrounding area. The process is very slow and may take longer than the 12 years suggested.

Initial monitoring of the juniper removal program has raised concerns about accelerating the spread of cheatgrass through soil disturbance and prescribed fire. A review of the studies done by Eastern Oregon Agricultural Research Center shows that while cheatgrass enters following disturbance, within twelve years native vegetation out-competes the cheatgrass and only small amounts remain. In one area with 7 sites, we have seen cheatgrass being replaced by Japanese brome. Cheatgrass trends need to be monitored, as twelve years is a very short time in ecosystem terms, and the sites in the study are different from those in the Unit.

Juniper Guidelines:

- Use prescribed fire and control grazing to avoid spread of juniper.
- Take an adaptive management approach toward juniper removal, including careful monitoring of impacts on effective ground cover, cheatgrass spread and burning times. Assess and attempt to improve vigor of existing herbaceous vegetation before removing juniper.

B. Soils and Water

Goal: Sustain and restore the land's capacity to absorb, store, and distribute quality water.

Objectives:

- *Manage upland vegetation to maintain and restore water and moisture absorption, retention, and release capacity over time.*
- *Maintain and improve aquatic and riparian habitat for native species.*
- *Lower stream temperature and sediment loads.*
- *Improve biophysical structure of soils.*
- *Restore forest health through treatments without undue disturbance.*

Soil and water are two interdependent critical resources at the landscape level. Water and soil quality are intimately linked to nature's activity at the topsoil and subsurface levels. Soil quality is intimately linked to the infiltrating moisture to dissolve minerals and move nutrients within the root zone where plants can access them.

Soil Functions and Repair

Topsoil is an atmospheric sink that collects solar inputs, gases, fuels, particulate matter, nutrients, litter and precipitation. It has to both utilize and buffer these inputs. Forest topsoil is created and supported by a specific architecture and mix of bacterial, fungal and soil animal populations to process not only what lands on top but what is underneath. The architecture or aggregate has to support the passage of air and water and feeder roots or the life above it is compromised. Compaction, displacement, erosion, and desiccation are the chief modifiers and destroyers of this habitat, its inhabitants and its functioning. Unacceptable levels of soil compaction and displacement have been observed across many areas of the Unit. (Lower Chewaucan WA, p. S&I-7).

During the last 3 years the Chewaucan Biophysical Monitoring Team has studied the impact of ground-based logging following revised Forest Service protocols on 56 sites. Sites show less compaction on cutting lanes, higher recruitment of down woody debris throughout the projects, and wide swaths of untouched soils in the corridors between the cutting lanes. Future studies will analyze vegetation recovery and compaction trends. Sites harvested over snow show little to no compaction or soil displacement. Plant responses following harvest over snow are immediate and demonstrate a wider range of species diversity. Soils conservation must remain a priority. A forest lives or dies from the ground up.

Soil development is a top-down process that takes millennia to create an adequate and functional topsoil. The Chewaucan monitoring team has found that the average organic soil layer is 2.2 inches thick, the product of 6,900 years of formation. Much of it lies on top of the soft unconsolidated ash and pumice from the eruption of Mt. Mazama. In the Upper Chewaucan Mazama ash soils tend to lie on top of older, thicker Western Cascade soils. Though it may have experienced many cycles of vegetative life, it is still young and developing in most areas throughout the watershed. Some exposed areas may never

have been able to build an organic layer, while others have become exposed and contain remnant organics.

An effective ground cover is critical in order to establish and maintain soil repair. There are three general classes of effective ground cover:

- cryptobiotic crusts of mosses and lichen (rare within the Chewaucan);
- grasses and forbs (quite common, yet in various levels of health); and
- thatched duff (primarily found in the mixed coniferous stands and old growth).

Exposed organic and bare mineral soils are subject to frost heaving and accelerated erosion from heavy seasonal rains. The exposed remnant organic soils can be protected from further erosion through planting of native grasses and forbs. We need to identify ways to restore the nutrient base without further disturbing the effective ground cover. The effectiveness of sub-soiling continues to be monitored. Surveys of subsoiled areas have shown that the sub-soiled areas, while initially releasing the compaction, ultimately become more compacted than their immediate surroundings. The furrows formed by the rippers become beds for invasive plants. Loss of effective ground cover is also dramatic in comparison to the immediate surroundings (*Assessing The Use of Sub-Soiling Within the Upper Chewaucan Watershed*. Report of June 4, 2004).

Surveys of landings and decommissioned roads using vegetative recovery as an indicator of soil recovery indicate that lightly scarified areas (4 – 6 inches) recover 1.8 times faster than blocked areas which recover 4 - 8 times faster than subsoiled areas. Many subsoiled areas are still predominately bare after 30 to 40 years. ([www.lcri.org/monitoring/reports/road decommissioning](http://www.lcri.org/monitoring/reports/road%20decommissioning) (2 reports)).

The Chewaucan Biophysical Monitoring Crew began analyzing soils in all sites using a LaMotte Smart 2 Soil Colorimeter in 2006. This spectrophotometer is highly reliable, giving repeatable results in concentrations of parts per hundred million (mg/100L). This tool is revealing soil nutrient levels following wildfire, prescribed fire, juniper treatment, harvest, and wood decomposition. Trend studies using this tool will be invaluable in determining soil health. Current data and discussions can be accessed at [www.lcri.org/monitoring/reports/soil chemistry](http://www.lcri.org/monitoring/reports/soil%20chemistry).

Ecosystem Changes

The Chewaucan Biophysical Monitoring program is addressing system mosaics along the sub-watershed gradients to provide insight into compositional changes and potential gains or losses of biodiversity and ecological complexity within the Unit. The changes coming into view are synergistic, as plant assemblages seem to be simplifying due to climate change and invasive species incursions. Predictable plant associations are less dominant, giving way to varying plant assemblages on similar sites. Stand types have become compromised because of species incursions due to fire suppression. Site capacities have been exceeded because of large populations of trees and prolonged drought. Appropriate

thinning in critical areas will give needed relief in many stands as well as reduce their fuel and fire hazards.

One of the consequences of past logging has been an interruption of the natural process of dead wood formation by altering the rates of formation and the number, size, and species of woody substrates. These alterations have affected natural reproduction, the mix of vascular and non-vascular plants, and fungi populations. Past logging has also modified the rates and amounts of nutrient cycling, carbon sequestration and soil development, primarily through compaction and displacement. Whole tree harvesting has the potential to increase nutrient removal because of the concentrations of nutrients in branches and needles, which are higher than in the stems.

Stream Functioning

The stream system that has been monitored shows an average of high water clarity, high macroinvertebrate diversity, fair to good channel stability and warm to very warm water. Increased width to depth ratios in stream channels and reduced shading from loss of riparian vegetation are the primary causes of elevated temperatures. (Deep Creek WA, p. C-6). Stream degradation in the Unit and elsewhere in the Interior West has been caused by the cumulative effects of overgrazing, road development, logging, water diversion and impoundment, and other human activities.

Fish, especially redband trout, seem to have acclimated to the temperature, but fish passage is still an issue that is being addressed. Between 2002 and 2007, culvert replacements have opened up many miles of streams to redband trout. The Chewaucan Biophysical Monitoring Team has been monitoring many of these culverts and streams for upstream fish use. A notable success has been Puppydog Creek, where the crew observed successful fish migration for more than two miles upstream, using freshwater mussels as an indicator of fish migration. The glochidia (mussel larva) attach to redband trout gills to move upstream. Redband trout have been observed in many of the streams above replaced culverts.

Peak flows appear to be higher currently than in historic times. The Chewaucan River experienced peak flows exceeding the 100-year event during extreme rain-on-snow events in 1964 and 1997. Peak flows have the potential to be higher with increased drainage efficiency from roads. Current drainage efficiency increases have been calculated in the range of 35% to 170%. Also, high levels of compacted soils are contributing to higher peak flows. (Upper Chewaucan WA, p. C-3)

Riparian Areas

Present riparian vegetation generally occurs in narrow bands along the streams, springs, seeps, and lake shores due to lowered water table caused by stream incision or reduced contributions from upland sources, sometimes resulting from increased density of conifer cover. Generally, willows and other deciduous species such as black cottonwood are lower in extent, density and cover than in historic times. Stream downcutting resulting

from overgrazing and, to a lesser extent, recreational pressure, is very evident in some areas. (Upper Chewaucan WA, p. CC-10). Areas that have been resurveyed show a marked improvement in vegetative stabilization and bank healing as grazing practices change or are enforced.

Soil and Water Guidelines:

- Initiate Unit-specific research to determine the distribution of nutrients in different parts (needles, branches, boles) in trees of various sizes so that nutrient removals from logging can be determined and reflected in the biomass harvest plans. Answers are needed for the following: What would be the magnitude of loss of nutrients, snag and down wood habitat under the proposed biomass utilization within the Unit? How sustainable are these losses of nutrients and large down wood? Will natural weathering rates and other inputs compensate for nutrient removal in the harvested logs within the Unit? Baseline surveys by the Chewaucan Biophysical Monitoring Team show a slight decrease in soil nutrient levels. Will soil nutrient levels increase to pre-harvest levels over the next few years? If not, the decrease becomes significant. Over the next few years as soil nutrients cycle, a clear picture of nutrient cycling will begin to emerge to answer these questions. Baseline data can be accessed at [www.lcri.org/monitoring/reports/soil chemistry](http://www.lcri.org/monitoring/reports/soil%20chemistry).
- Timber sale planning needs to address both the spatial distribution and intensity of disturbance to the soils and their vegetative cover. Baseline data in the Bull Stewardship and Jakabe Project areas (46 sites) have been analyzed for soil and vegetation changes. They have also been modeled in Landscape Management Systems (LMS). The preliminary data can be viewed at www.lcri.org/monitoring/queries and www.lcri.org/monitoring/reports/LMS.
- Restore and enhance the Unit's effective ground cover. A disproportionate amount of bare mineral soil within the Unit has been subject to wind and water erosion.
- Utilize old skid trails to the extent necessary, limiting new permanent logging skid trails to approximately 7% of the total area. Survey and choose those skid trails where the soils are shallow, rocky, and/or on previously disturbed ridge areas. The sales administrator or contract field officer needs to convey to the logging boss and crew the necessity to stay on flagged roads and away from recovering soils, with the exception of well developed grass areas. Monitoring by the Chewaucan Biophysical Monitoring Team indicate that these practices **are** being implemented and **are** responsible for monitoring data showing less damage to soils than older timber sale the team has monitored.
- Accurately map and record the areas that are or will be occupied by a permanent road system and retain this information in the monitoring records.

- Sub-soiling needs to be monitored and analyzed before more area is treated to determine the effectiveness of the treatment. Present monitoring data show that many disturbed areas that haven't been sub-soiled are repairing themselves and are showing similar conifer growth as the treated areas. Sample monitoring of treated areas should continue.
- Continue to improve fish passage and habitat. Aquatic macroinvertebrate sampling shows healthy diversity and populations in all sub-sheds within the Upper Chewaucan. Sampling needs to extend to the rest of the Unit.
- Map and protect from grazing and OHV use those riparian and stream channel areas that are vulnerable to adverse effects or are not recovering at optimal rates.

C. Fish and Wildlife

Objectives:

- *Reduce road density and improve remaining roads to minimize impacts on water quality and flow.*
- *Maintain and improve aquatic and riparian habitat for native species.*
- *Lower stream temperature and sediment loads.*
- *Improve opportunities for people to fish, hunt, and view nature.*
- *Maintain and restore habitat for focal species.*

The Lakeview Stewardship Unit is the home of many mammals, birds, fish, and other species that are typically found in the relatively dry, high elevation forests, rangelands, streams, and lakes of south-central Oregon, as well as some species that are unique to the area. Threatened and endangered species within the Unit are the northern bald eagle and Warner sucker; American peregrine falcon was de-listed in 2000. Species that have administrative status are the redband trout (USFS Region 6 sensitive, ODFW sensitive), Goose Lake sucker (USFS Region 6 sensitive, ODFW sensitive), Goose Lake lamprey (USFS Region 6 sensitive, ODFW sensitive), and pit roach (USFS Region 6 sensitive-proposed, ODFW sensitive). Indicator species associated with old growth forests include the pileated woodpecker, goshawk, American marten, three-toed woodpecker and black-backed woodpecker. White-headed woodpeckers, while not currently abundant in the area, should benefit from protection and restoration of old-growth ponderosa pine. The Red-naped Sapsucker is an indicator species for aspen groves. Other important species in the Unit include elk, deer, California bighorn sheep, and beaver.

The Forest Service Regional Office is currently leading an effort to identify focal (or surrogate) species to be used in the process of revising forest plans. Information from that effort may be incorporated into future versions of this long-range strategy.

Terrestrial Species and Habitats

Big Game: Elk started reestablishing themselves in the 1960s, and their population for a long time seemed to be on the increase. Those increases have leveled off due in part to a disease known as red water. The deer populations seem to have stabilized from the lows of the 1960s. Reducing forest stocking levels and reintroducing fire should provide habitat favorable to both these species. Variable-density thinning and road closures will help provide hiding cover and security.

Northern Bald Eagle, Pileated Woodpecker, Goshawk, American Marten, Three-toed Woodpecker and Black-backed Woodpecker: These species have been affected by timber harvest, plant succession, fire suppression and road density. Managing according to the Unit objectives and goals will improve habitat availability for these species by variously favoring the retention and development of large trees and snags and the development of complex forest landscapes. Snags are an essential habitat component, both as nesting and foraging sites for woodpeckers and for a variety of birds and mammals that secondarily make use of woodpecker nesting and roosting cavities. Snag-retention guidelines for both green and post-fire stands need to be updated to reflect current understanding of the needs of species associated with this habitat component. Encouraging firewood cutting in lodgepole pine versus taking large ponderosa pine snags will also help.

Red-naped Sapsucker: Aspen is gradually being replaced by conifers over time as a result of plant succession and fire suppression. Livestock and big game grazing on aspen is setting back regeneration. Reintroduction of fire and conifer management is needed to restore stands to later structural stages. Some stands will need temporary or full livestock exclusion in order to reach the desired future condition.

White-headed woodpecker: Like other woodpeckers, this species nests in snags but generally forages for insects on the bark rather than drilling into trees for beetle larvae. It is unique among woodpeckers in using the seeds of ponderosa pine as a winter food source. Larger, older ponderosa pine are particularly important because they produce more cones and seeds. Populations of this species are depressed throughout eastern Oregon. Unit objectives of retaining large, old ponderosa pine, improving their vigor, and growing more large pine should benefit this species over time.

Aquatic/Riparian Species and Habitats

Forest Vegetation Conditions: Over 50% of the forested community is outside recommended canopy ranges and are functioning inappropriately. Conifers have expanded into nearly every meadow and most riparian areas throughout the Unit, promoting competition with riparian vegetation (willows, aspen, cottonwood, alder) necessary to maintain proper stream types and bank stability. The woodlands are replacing numerous vegetative types, leaving soils prone to erosion and reducing late summer stream flows. The increased conifer densities are likely contributing to lower base flows, but the extent is unknown.

The Unit goals of restoring natural stand structures and fire regimes will improve these conditions. Conifers that have encroached into riparian areas should be thinned and fire reintroduced.

Road Density, Location and Drainage: Road density and location are for the most part causing streams to be in a “functioning appropriately but-at-risk” condition. Goals for the Unit should be a maximum road density of 1.7 mi/mi² and a priority placed on removing or fixing roads within 300’ of streams. The remaining roads should be properly drained to reduce hydrological connection to stream channels, resulting in less water and sediment flowing down roads and their ditches. This will also improve spawning gravel fines in most streams.

Riparian Vegetation and Associated Bank Stability: Within the Unit the majority of type B and E streams are functioning appropriately and characterized as having an abundance of late seral vegetation and high bank stability. The Upper Chewaucan Watershed Assessment reports that Type C streams that are predominately associated with large meadows are not functioning appropriately because of low bank stability and lack of sedge, rush and willow. Because gravel point bars are common in C stream types, greater densities of willow are expected relative to other stream types. Grazing standards need to promote willows and late-seral plant conditions to solve this problem on type C streams.

There is evidence that some of the large meadows with type C streams may never have had an abundance of willows. Several long-term livestock exclosures in these large meadows have not resulted in willow re-establishment. On numerous sites as these large meadows narrow into smaller draws, we find an abundance of willows with the same level of livestock grazing occurring. It appears that the soils combined with higher water tables may be the main reason willows never established in these large meadows. In the past, private land meadows were sprayed to control willows. This, along with the lack of beaver activity, may be another reason for low populations of willows in these large meadows under private ownership. Considering these differences, each meadow needs to be evaluated as to whether or not willows ever grew there and can be restored.

Large Woody Debris (LWD): Large wood in streams is important for controlling sediment transport, stabilizing stream banks, creating channel structure, and dissipating energy of water. Almost all streams in the Unit have low LWD numbers. This is probably due to past timber harvest practices and removal of LWD from streams. In the short term LWD needs to be artificially put into streams. In the long term LWD recruitment will be achieved by following Unit goals.

Fish Passage: In the original 2005 Strategy the three irrigation weirs on the Chewaucan River were identified as blockages for redband trout for over 50 years. Since that time the major ranches involved in the project -- the J-Spear, ZX, Murphy and O’Leary ranches -- undertook a major project to remove the Paisley Weir. The Oregon Department of Fish and Wildlife installed fish ladders on the Redhouse and Narrows weirs. The ranches undertook an almost \$3 million dollar project to remove the Paisley Weir and install a new diversion that did not block fish passage. In total this project has opened up over 120

miles of stream to Redband Trout. The next immediate blockage is the down cut on Thomas Creek that currently prevents fish migration into the Unit. On other streams in the Unit, culverts are barriers.

Macroinvertebrates: The Chewaucan River has excellent macroinvertebrate populations and diversity, the Thomas Creek watershed has low populations, and we lack information on other streams. Macroinvertebrate diversity is an indicator of water quality. More data are needed to determine what water quality parameters are causing the decline of macroinvertebrates in Thomas Creek.

Beaver: Beavers provide a number of benefits to riparian and aquatic ecosystems. Higher stream levels and water tables due to beaver dams increase and diversify vegetation adjacent to streams. In summer, the increased woody vegetation shades and cools the water, improving fish habitat. Pools behind beaver dams provide more living space for trout, while improving water quality in the stream. Water is re-oxygenated as it falls over beaver dams. By backing up and deepening water, beaver dams help keep it from freezing solid in winter and reduce its temperature in summer. They also allow cooler groundwater to enter the stream from adjacent land. It percolates back into the stream during low-flow periods, increasing water in the channel. In addition, beaver dams reduce the stream's energy by slowing its velocity. Spring runoff is retarded, and its scouring effect reduced. Instead of causing streambank erosion, sediment is deposited. Responding to new water elevations, channels are constantly forming and old ones are filling in.

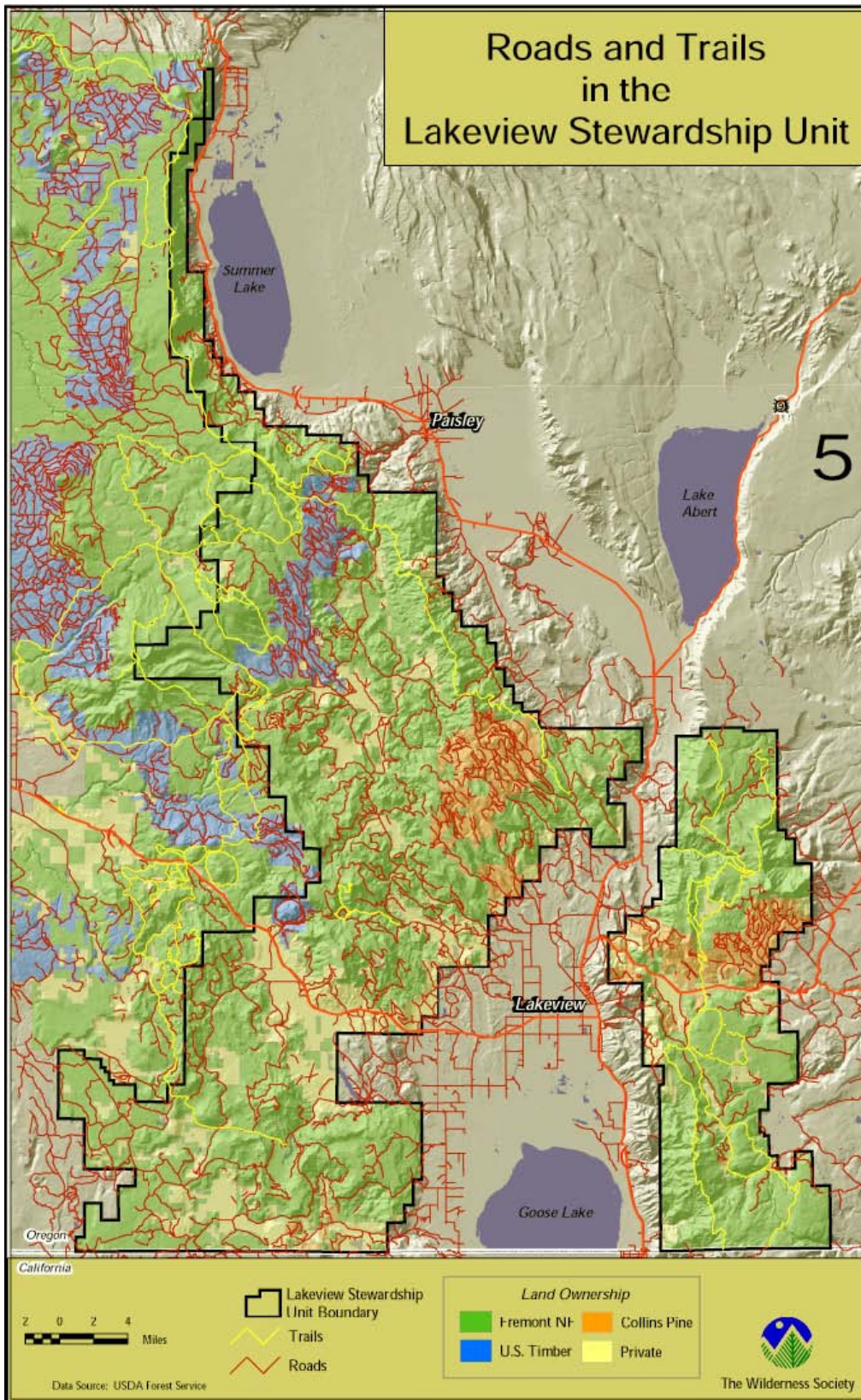
Beginning in the 1800s, beaver populations were systematically decimated by trapping and their habitats were degraded by overgrazing. Populations and habitats have been slowly improving for several decades, but some currently suitable habitat remains unoccupied and more habitat can be restored.

Fish and Wildlife Guidelines:

- Implement recommendations for big game and old-growth associated species contained in the Forest Service watershed analyses.
- Restore native riparian vegetation (willows, aspen, shrubs) and improve water quality through appropriate grazing standards, careful thinning and burning of encroaching conifers, and reintroduction of beaver.
- Reduce road densities and improve road drainage, particularly near streams.
- Complete fish passage improvements (e.g. replacing road culverts) to restore fish populations in the Unit.

D. Roads

Objective: Reduce road density and improve remaining roads to minimize impacts on water quality and flow.



Roads and Trails

High density of open roads is a critical issue for the area. (Deep Creek WA, p. SI-2). Roads are producing the highest rates of soil loss on a per acre basis and are partially responsible for decreased base flow in perennial streams. (Upper Chewaucan, p. SI-1, SI-7).

Data contained in Forest Service watershed analyses indicate that high road densities are prevalent in much of the LFSU. In the Upper Chewaucan watershed the average road density is 2.9 miles per square mile. In the Lower Chewaucan, average road density is 2.8 miles per square mile. In Deep Creek, average road density is 2.4 miles per square mile. The Forest Service watershed analyses recommend reducing road densities to 1-2 miles per square mile. (Upper Chewaucan WA, p. R-2; Lower Chewaucan WA, p. R-1).

The existing road system was designed and constructed primarily to accommodate logging systems that required a significantly denser road network than is required by the systems commonly used today. Furthermore, funding for road maintenance is insufficient to sustain the existing road network. Consequently, the Forest Service rarely builds new roads and instead has begun to close and decommission many roads in order to restore hydrological function and reduce maintenance costs.

During the late 1990s, the Lakeview Ranger District completed transportation plans for the North and South Warner Mountains and Thomas Creek Watershed. The plans identified numerous roads that were no longer needed for the forest transportation system. The Forest Service subsequently decommissioned 100 miles of old roads in 2001 and another 20 miles in 2002. (LFSU 2001-2002 Annual Report). Additional road decommissioning has been planned, approved, and partly implemented in subsequent restoration projects such as West Drews where 90 miles of roads have been identified for decommissioning or closure.

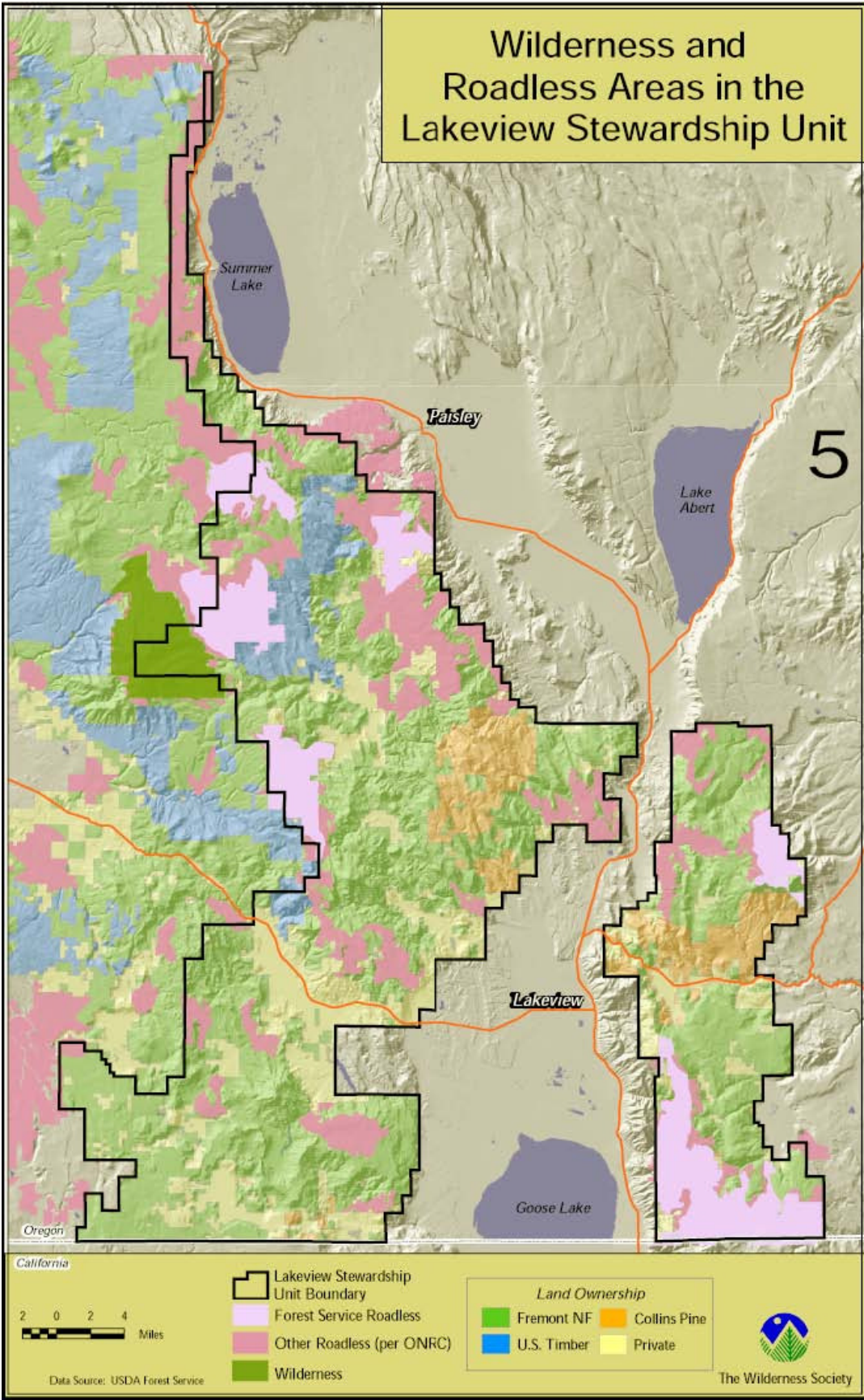
Road Guidelines:

- Identify road access needs for restoration work, fire control, private land management, recreation, and other uses.
- Identify priorities for road closures and improvements, including relocation of roads away from streams. Consider opportunities for road closures to improve habitat connectivity and enlarge roadless areas. Wherever possible, replace problem culverts with broad-based dips.
- Design restoration treatments to avoid any permanent road construction. Avoid temporary road construction to the extent feasible.
- Provide adequate funding or contract stipulations to ensure that temporary access roads are promptly decommissioned as part of the project.

- Reduce overall road density initially to less than 2 miles per square mile, with a long-term goal of reducing roads to the minimum necessary to achieve Unit goals and objectives.

E. Wilderness and Roadless Areas

Wilderness and Roadless Areas in the Lakeview Stewardship Unit



California



Data Source: USDA Forest Service

- Lakeview Stewardship Unit Boundary
- Forest Service Roadless
- Other Roadless (per ONRC)
- Wilderness

- Land Ownership*
- Fremont NF
 - U.S. Timber
 - Collins Pine
 - Private



The Wilderness Society

Wilderness and Roadless areas

Wilderness

The Fremont National Forest has one designated wilderness area, Gearhart Mountain Wilderness (22,809 acres), of which about 30 percent (6,832 acres) is located within the LFSU. Gearhart Mountain Wilderness was originally designated in the Wilderness Act of 1964, and the Oregon Wilderness Act of 1984 added 4,114 acres.

In wilderness areas, allowable recreational uses include hunting, fishing, hiking, horse riding, backcountry camping, and cross-country skiing. However, motorized and mechanized recreation vehicles, including ATVs, snowmobiles, and mountain bikes are not allowed. Livestock grazing is permitted in wilderness areas, but not logging or mining.

According to the 1989 Fremont Forest Plan EIS, recreation use in Gearhart Wilderness is concentrated in a few small areas, with Blue Lake receiving 70 percent of use, mostly fishing. The EIS estimated 3,100 RVDs of wilderness use in 1981 and predicted that recreation demand would exceed carrying capacity by year 2000.

The Forest Service will consider recommending additional wilderness areas for the Fremont National Forest when it revises the Fremont-Winema National Forests plan in the coming years. The review of potential wilderness areas is required by the Oregon Wilderness Act.

Roadless Areas

The 1989 Fremont National Forest Plan EIS evaluated 10 inventoried roadless areas, totaling 83,360 acres. Of these, all or parts of 7 are within the LFSU, for a total of 64,259 acres. Three are located in the Warner Mountains east of Lakeview: Crane Mountain (23,261 acres), Mount Bidwell (4,679 acres adjacent to Crane Mountain), and Drake-McDowell (5,768 acres). Four are located west of Lakeview and Paisley: Deadhorse Rim (12,420 acres), Coleman Rim (8,393 acres), Hanan Trail (9,039 acres), and Brattain Butte (5,880 acres).

The 1989 Fremont National Forest Plan allocated the roadless areas to a variety of management areas, such as semi-primitive motorized recreation, semi-primitive non-motorized recreation, timber/forage production, etc. The 2001 Roadless Area Conservation Rule generally prohibited road building and commercial logging within inventoried roadless areas, with various exceptions such as logging to reduce fire risk. In May 2005, the Roadless Rule was replaced with a state petition process that allows governors for 18 months to request roadless area protection or management changes within their respective states. If no petition is filed, roadless area management direction reverts to the local forest plan.

Additional areas larger than 1,000 acres have been identified by Oregon Natural Resources Council. These unroaded areas are shown on the Wilderness and Roadless Areas map along with the Forest Service inventoried roadless areas.

Within the Upper Chewaucan watersheds are two inventoried roadless areas, Deadhorse and Coleman, and a portion of the Gearhart Mountain Wilderness. These vast primitive and semi-primitive areas provide a unique recreation experience for the forest user and offer an undisturbed habitat for the growing deer and elk herds. (Upper Chewaucan WA, p. C-12-13)

Of the 64,219 acres of inventoried roadless areas, 4,294 acres (7%) are low-elevation ponderosa pine stands, while another 5,984 acres (9%) are high-elevation ponderosa pine on southwest-facing slopes. Most of the low-elevation pine is located in portions of the Coleman and Brattain Butte inventoried roadless areas. As discussed in the Fuels and Fire section, 25% of the total Unit is low-elevation ponderosa pine and another 10% is high-elevation ponderosa pine on southwest-facing slopes. Thus, a relatively small amount of the inventoried roadless areas appears to be in priority areas for treatment to reduce fuels and fire risk. Of course, what types of treatment, if any, are needed and appropriate will depend on site-specific inspection and analysis of actual stand conditions and other factors.

Organizational Views of LSG Members

In seeking to find common ground on the often-contentious wilderness and roadless area issues, it is important to understand the positions that organizations represented in the Lakeview Stewardship Group have taken in the past.

For example, The Collins Companies' Position Statement on Federal Land Management (January 2001) includes the following statement – "We believe that the U.S. National Forests should be looked upon as providing both wilderness preserves and sustainable resources for the benefit of all. To this extent, we offer the following recommendations:
1. Maintain as wilderness areas, those areas that have been so designated through 1996.
2. Maintain as roadless areas, those areas of at least 5,000 acres that were roadless in 1996." The full Collins position statement on federal land management is at http://www.collinswood.com/M4_MediaEvents/Resources/PositionStatement.html

On the other hand, The Wilderness Society's National Forest Vision Statement (February 1999) contains the following recommendations --

- "Designate substantial additional wilderness to conserve biological diversity, ensure representation of all ecosystem types, meet recreation needs, and protect other wildland values."
- "Identify and protect from disruption all roadless areas larger than 1000 acres and other landscapes with high ecological integrity."

Wilderness and Roadless Area Guidelines:

- Identify and evaluate potential wilderness areas based on compatibility with existing motorized and non-motorized recreation uses, fuels reduction/fire restoration needs, wildlife habitat values, etc.
- Avoid road construction and commercial logging in roadless areas >5,000 acres. The roadless values and characteristics of areas between 1,000 and 5,000 acres should be evaluated on a case-by-case basis and protected where appropriate.

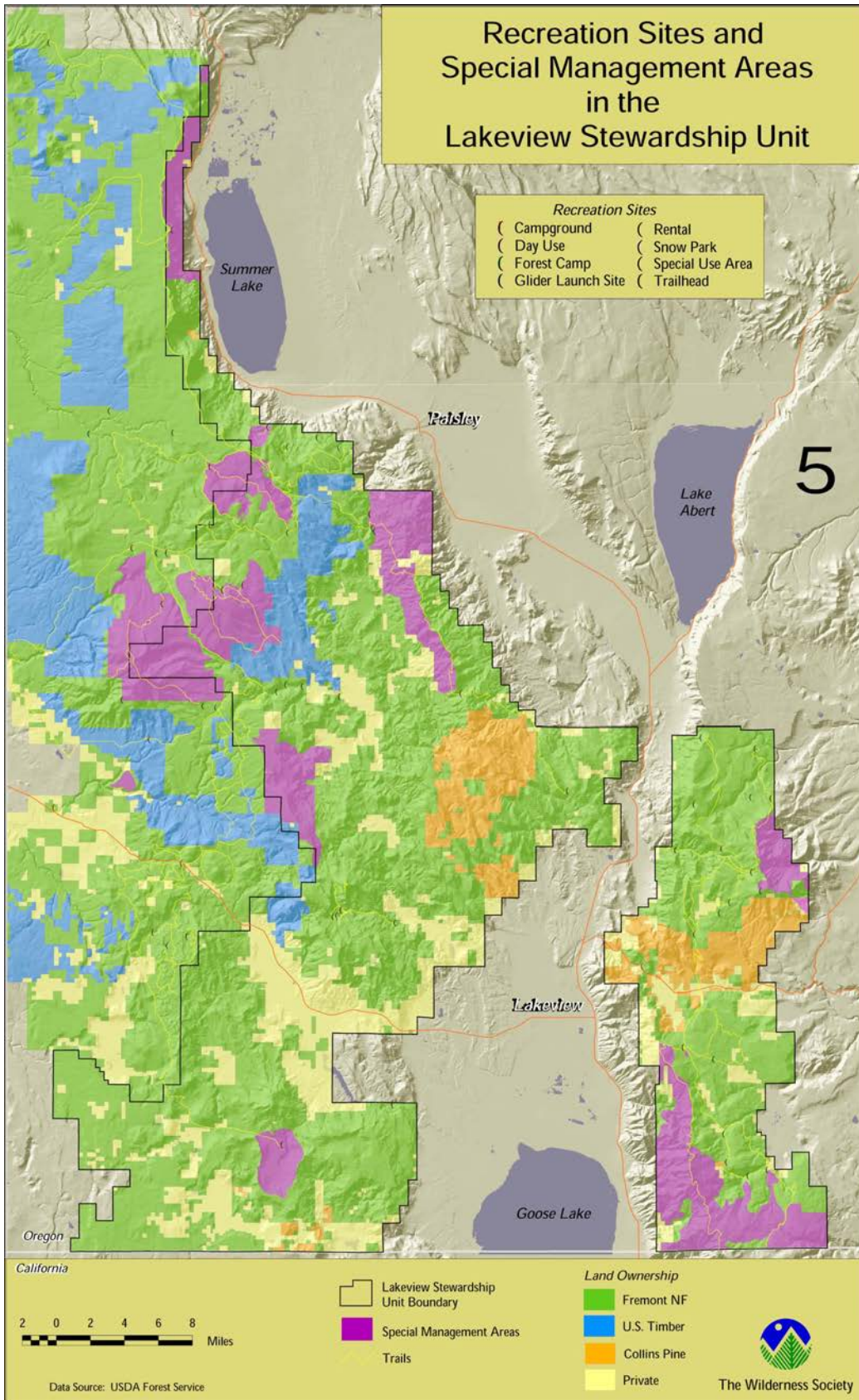
F. Recreation

Goal: Provide opportunities for people to realize their material, spiritual, and recreational values and relationships with the forest.

Objectives:

- *Protect and maintain areas of cultural significance within the forest.*
- *Improve opportunities for people to fish, hunt, and view nature.*
- *Promote environmentally responsible recreation.*

The Lakeview Federal Stewardship Unit has many recreational opportunities and growing numbers of visitors. Outstanding features that attract recreational visitors to the area are the lakes and streams, the roadless semi-primitive areas, the trail systems, and big game hunting opportunities. (Upper Chewaucan WA, p. S&I-38). Recreational activities include hunting, fishing, hiking, horse riding, motorized recreation, backcountry camping, and cross-country skiing. In some areas, use of dispersed and developed recreation sites is increasing at a rate of 10-20% per year, and this trend is expected to continue for the foreseeable future. (Lower Chewaucan WA, p. CC-41).



Recreation and Special Mgmt Areas

Presently, the Unit contains the following recreation sites and facilities:

- 12 trailheads accessing a total of 381 miles of trails (of this total, only 8 miles are motorized trails for ATV use).
- 3 rental cabins.
- 2 hang glider launch areas (Tague's Butte and Hadley Butte).
- Warner Canyon Ski Area (privately-owned)
- Hike-in rustic camping at Slide Lake and the semi-primitive recreational areas in Drake-McDowell Basin and the Crane-Bidwell area.
- 4 day-use/picnicking areas at Clear Springs, Withers Lake, Can Springs and Overton Reservoir.
- 6 forest camps located at Upper Jones, Twin Springs, Mud Creek, Dismal Creek, Deep Creek and Deadhorse Creek with a total of 28 campsites.
- 15 fully developed campgrounds with 105 camp sites along with outhouses, water, picnic areas, fireplaces and fishing at Willow Creek, Marster Springs, Happy Camp, Dog Lake, Drews Creek, Deadhorse Lake, Dairy Point, Cottonwood, Campbell Lake and Chewaucan Crossing.
- 118.5 miles of groomed snowmobile trails, 30 miles of nordic trails and 142.7 miles of summer hiking trails.
- 2 snow parks with toilet facilities, one at Moss Meadow and the other at Camas Prairie.
- A variety of low-impact activities, including bird-watching, wildlife viewing, rock-hounding, archaeological sites, petroglyphs, pictographs and dendroglyphs.

The LFSU has 93,331 acres of Special Management Areas, including the North Brattain, South Brattain, Fort Bidwell, and Crane Mountain Semi-primitive Motorized Recreation Areas; Drake-McDowell Semi-primitive Non-motorized Recreation Area; Dog Lake Special Management Area; Gearhart Mountain Wilderness; and Coleman Rim, Deadhorse Rim, and Hanan Trail Roadless Areas. Covering nearly 20 percent of the Unit, these Special Management Areas contain many of the trails and other recreational attractions.

In 2004, the Forest Service reconstructed and maintained the 24-mile trail system in the Deadhorse Rim Roadless Area, including the Cache Cabin Trail, Dead Horse Rim Trail, Dead Cow Trail, and Lakes Loop Trail. This trail system is an integral part of the highest use recreation area on the Fremont National Forest, providing loop trails between two high elevation lakes and their very popular campgrounds. The trails also provide public access to scenic vistas of the lakes and surrounding country and to some of the largest stands of white-bark pine and old-growth ponderosa pine in Oregon.

Also in 2004, volunteers from several equestrian groups built a horse camp at Moss Meadows near the Fremont Trail. The project was partly funded by a grant from the Oregon State Parks and Recreation Department.

Key Recreation Issues

With recent budget constraints, the LSG is concerned that maintenance of these recreation sites and facilities could be jeopardized. In the past, the Regional Office had given direction to implement a fee demo program, but this has not been accomplished. A fee program could ease the potential impact of possible budget cuts on maintenance of recreation sites.

Current conditions, trends, and development needs should be identified to assist the LSG in making recommendations for the upcoming forest plan revision.

Consideration must be given to the growing use of ORVs and the resulting impact on lands within the Unit. In 2005, the USFS Washington office adopted new policies for ORV use in the national forests. The Fremont-Winema National Forest has traditionally been open to ORV use except in places that are specifically closed to such use, such as the Gearhart Mountain Wilderness. Under the new policies, ORV use may be allowed only on designated routes. Since the Unit currently has just 8 miles of motorized ATV trails, a much more extensive system of designated ATV/ORV trails could be established.

In April 2010, the Fremont-Winema released for public comment an environmental assessment of several alternatives that would prohibit cross-country travel by ORVs and establish a system of designated routes for ORV use. The Forest Service preferred alternative would convert 177 miles of currently closed roads to motorized trails forest-wide, while closing 136 miles of roads that are currently open to motorized use.

Recreation Guidelines:

- Identify funding needs to maintain and improve recreational sites.
- Evaluate ORV recreation opportunities and establish a system of designated routes.

G. Community Benefits

Goal: Provide opportunities for people to realize their material, spiritual, and recreational values and relationships with the forest.

Objectives:

- *Provide opportunities for local people to realize economic benefits from innovative contractual mechanisms and technologies focused on linking stewardship activities and community well-being.*
- *Pursue compensation of local workers at a state-average family wage or higher to accomplish ecosystem management.*
- *Design contracts to promote opportunities for year-round, long-duration, stable employment.*

- *Design unit product sales and service contracts to promote participation (e.g. bidding and contract awards) by local vendors, purchasers, and contractors.*
- *Promote a local business environment that can take advantage of the products and services of ecosystem management (e.g. small diameter and under-utilized species).*

Timber

The wood products industry has been a mainstay of the local economy since World War II. The Lakeview Federal Sustained Yield Unit was established in 1950 to maintain community stability by providing wood products firms in Lakeview and Paisley the exclusive right to bid on timber sales within 500,000 acres of the Fremont National Forest. During the 1980s, local mills bought and processed about 60 million board feet of federal timber per year. However, declining federal timber sales and other economic factors during the 1990s resulted in mill closures.

Currently, the Collins Companies Sawmill is the only sawmill operating in the area. The Collins Sawmill has 80 hourly employees, and about 100 total employees, and operates two shifts daily, markets permitting. The company has spent about \$10.3 million in new capital equipment over the last nine years. Part of this investment, \$6.8 million, was for a small diameter sawmill in 2007. This investment was possible because the Collins Companies obtained a 10-year Stewardship contract for timber sales and associated work within the Unit. The Collins mill processes about 60 million board feet of lumber annually, with about 70 percent being ponderosa pine and 24 percent white fir. About 15 to 20 percent is harvested from Fremont-Collins lands, with the rest from public and private sources. The Collins Companies owns and sustainably manages 47,500 acres of private timberland adjacent to the Fremont National Forest in Lake County. Collins is widely regarded as a timber industry leader in environmental stewardship. The Collins Company forests are one of the largest blocks of forest land in Oregon certified by the Forest Stewardship Council.

During the past decade, the Forest Service has sold a total of 87 million board feet (mmbf) of timber in the Lakeview Federal Stewardship Unit. The annual totals have ranged from a high of 21.7 mmbf in 2007 to nearly zero in 2001. During the first half of the decade, the timber sale program focused on post-fire salvage logging. Major salvage sales included Cub in 2003, Winter in 2004, and Grassy in 2005. Subsequently, the timber sales program shifted to “green” thinning projects, starting with Bull Stewardship and two Jakabe project sales in 2006. More recently, major stewardship thinning projects have included Burnt Willow and Trail in 2007, Abe in 2008, and Launch and Dent North in 2009.

Lakeview Federal Stewardship Unit Timber Sales, 2000-2009

Year offered /awarded	Green (mbf)	Salvage (mbf)	Harvest Acres	Value in \$/ccf
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2000	0	5,349	2,600	\$23.05
2001	0	36	737	\$13.50
2002	0	5,053	556	\$64.54
2003	0	11,348	1,579	\$58.79
2004	1	10,539	1,360	\$6.09
2005	462	4,229	736	\$36.20
2006	8,791	95	2,750	\$53.43
2007	21,623	0	5,644	\$17.22
2008	9,900	1,358	4,013	\$26.28
2009	8,334	1	2,164	\$2.21
Grand Total	49,111	38,008	22,139	\$29.18

Timber Guidelines:

- Design thinning projects to ensure they are marketable to local mills.
- Estimate potential long-term supply of small and medium-sized trees as restoration by-products.
- Evaluate additional agency resources and funding to prepare sufficient timber sales or stewardship contracts to accomplish needed restoration.
- Annually monitor and report statistics on the timber supply on the stewardship unit, including sold vs. planned, no bids, and green vs. salvage sales.

Biomass and Other Small Wood Utilization

The 2002 University of Washington study on the Fremont National Forest showed that to restore the Fremont National Forest to natural stand conditions and fire regimes would require an extensive thinning and under-burning program resulting in tremendous volumes of small diameter material. The only proven technology that could consume this large volume would be a biomass plant. Following this study the Governor made the Lakeview Biomass Project an Oregon Solutions project with Hal Salwasser, Dean of Forestry at Oregon State University, convener of the process. At the end of one year industry, agencies (local, State and federal), environmental groups and non-profits signed on to a declaration of cooperation to assist in moving the Lakeview Biomass project to completion. A 20-year MOU for biomass supply was developed between the Forest Service, BLM, Lake County, DG Energy, The Collins Companies, Town of Lakeview, City of Paisley and Lake County Resources Initiative. A fundamental point of agreement within the Lakeview Stewardship Group and the Lake County Resources Initiative is that a biomass plant must be a tool to meet the goals of the Unit and not an industrial facility that creates an unsustainable demand for resources.

Following the 20-year MOU, the Forest Service developed a 10-year stewardship contract within the Unit and the Collins Companies successfully bid on that contract. The 10-year contract and 20-year MOU gave more of an assurance than had been seen in the past that there would be supply for the sawmill and biomass plant so these companies could justify their investments. Similarly, the BLM is currently issuing a new stewardship contract for the Lakeview District which will allow for multiple task orders to be issued over the next 10 years. In 2009 the Governor again endorsed the project by making it an Oregon Way Project to compete for stimulus dollars. The State of Oregon Business Energy Tax Credit (BETC) and federal energy credits are key factors in making a biomass plant an economically viable enterprise.

All of these preparatory efforts came to fruition in November 2010, when Iberdrola Renewables commenced construction of the 26.8-megawatt Lakeview Biomass Cogeneration Plant. The Lakeview Biomass Plant is expected to employ 150 to 200 construction workers until the plant is completed and begins operating in the fall of 2012. In the longer term, an additional 50 new jobs will be created to harvest and transport excess woody material from the forest, along with 18 jobs to operate the plant. Collins Companies will provide fuel from a combination of logging and sawmill residuals from its Fremont Sawmill, which is located adjacent to the biomass plant site. Collins will also purchase the equivalent of two megawatts of steam from the project to run their lumber drying process more efficiently and with lower air emissions.

Biomass Guidelines:

- Implement the 10-year Stewardship contract for a minimum of 3,000 acres of thinning per year within the Lakeview Federal Stewardship Unit and an additional 3,000 acres per year outside the Unit.
- Develop a 10-year Stewardship contract with BLM for 2,000 acres per year of Juniper treatment.
- The contracts should go toward supplying the Lakeview Biomass Cogeneration Plant.
- Ensure that the size of the biomass plant is sustainable for the life of the plant and used as a tool to achieve this strategy's goals.

Carbon Accounting

Scientists differ on whether thinning to reduce uncharacteristically large fires is actually a carbon savings. However, recent research clearly indicates that net carbon benefits from fuel reduction treatments are unlikely and will be small at best, since many treated acres will not subsequently burn while the treatment is still effective (Mitchell et al. 2009, Cathcart et al. 2009, Law and Harmon 2011). Other research suggests that carbon benefits are most likely to be realized when treated stands are fire-prone and contain large fire-resistant trees, which is fully consistent with other objectives of this strategy (North et al. 2009). Lake County Resources Initiative is under contract with Winrock

International under a program by the West Coast Regional Carbon Sequestration Partnership to help determine if there is a carbon savings from forest thinning to restore more natural fire events. Spring of 2010 was the fourth year of collecting data.

One area that may be especially appropriate for the carbon market is tree planting following uncharacteristically large fires. The monitoring in the Unit has shown that there is virtually no regeneration in some areas following these large fires because of the impact on the soils. Since monitoring plots only go back 10 years, the duration of this condition is unknown, but tree planting would provide at least 10 years of carbon reforestation credits. This does not mean that the Lakeview Stewardship Group supports salvage logging; the group’s priority is to have a steady green program.

Carbon Guidelines:

- Continue to develop and refine carbon sequestration information and accounting methods.
- If Congress passes legislation that addresses carbon emissions and recognizes forest management as a means of carbon emission mitigation, develop a second 10-year contract that would record, verify, monitor and sell carbon credits applicable to qualifying practices.

Non-Timber Forest Products

The LFSU provides many non-timber forest products to the community on a permit basis for non-commercial purposes. While the fees collected for these permits are not a significant source of revenue for the Forest Service, the benefit to the community is significant. From 2004 through 2009, public use permits were issued on the Paisley and Lakeview Ranger Districts for the following:

Public Use Permits Issued at Lakeview & Paisley Ranger Districts from 2004 through 2009		
	<u># of Permits</u>	<u>Value</u>
Free Use Firewood	1,174	\$19,554
Personal Use Firewood	2,210	\$49,860
Commercial Boughs	14	\$460
Commercial Christmas Trees	4	\$765
Commercial Firewood	55	\$5,170
Personal Use Christmas Trees	88	\$8,265
Commercial Mushrooms	6	\$200
Free Use Cones	2	\$7
Free Use Limbs & Boughs	6	\$101
Free Use Mushrooms	119	\$1,744
Personal Use Post & Poles	131	\$2,966
Vendor Christmas Trees	12	\$1,530

Free Use Transplants	35	\$441
Free Use Mountain Mahogany	2	\$10
Plant Collection--Washington Herbarium	1	\$20
Totals	3,859	\$91,094

Key Issues

Issuing permits for non-timber forest products is generally compatible with Unit goals. For example, permits for harvesting pushed-down juniper complements juniper removal projects and provides a healthy benefit to the community. Issuing firewood permits helps remove unmarketable wood products from the forest. Harvesting of all these products helps meet the goal of “providing opportunities for people to realize their material, spiritual and recreational values and relationships with the forest.”

Guidelines:

- Continue to issue permits for non-commercial personal use of non-timber forest products where compatible with ecological objectives.
- Promote environmentally responsible removal of non-timber forest products.

Grazing

Most livestock grazing on Lakeview Federal Stewardship Unit lands has occurred in the areas currently grazed, in a variety of forms, for over a hundred years. Typically during that time numerous grazing systems have been implemented along with accompanying range improvements. Stocking rates and seasons of use have been adjusted, and the timing, intensity, frequency, and duration of grazing have been continually fine tuned over time. More recently, further adjustments have been made on many allotments to provide for the needs of species listed under the Endangered Species Act.

Livestock production is an important industry in Lake County. The emphasis in livestock production has been based on the cow-calf operations. Unit lands are important because they provide high quality forage during the period that home pastures are growing or being harvested for hay. Many local ranch operations are dependent for some part of their yearly operation on lands within the Unit.

Currently, all or a significant part of 38 allotments are located in the Unit. About 33,900 AUM's (Animal Unit Months = a cow and calf for one month) are permitted every year within the Unit. This equates to about 5,600 head of adult livestock every year, assuming an average 6-month season of use. About 34 business or family ranching operations have grazing permits within the Unit.

Riparian areas are an important attribute of the Unit, providing important habitat for a host of fish and wildlife species as well as forage and water for cattle. Many of these

riparian areas are vulnerable to damage from grazing. Accordingly, livestock use of these areas must be carefully managed.

Grazing allotments have been classified according to the level of intensity at which they are managed. These levels include intensive, deferred, and season-long grazing. Twenty-nine of the allotments in the Unit are managed intensively. Under such management, livestock are regularly rotated among pastures in coordination with different stages of plant growth. Four allotments are operating under deferred grazing systems. Under this type of system, livestock are not moved onto an allotment until plant growth has reached the stage of maximum nutrient reserve in the root system. Livestock are generally free to choose their own foraging areas unless constrained by topography and/or boundary fences. Season-long grazing is in effect on five allotments. Typically, livestock enter these allotments on a specific date in spring or summer and forage at random until removed at a specific date in fall, or when monitoring shows use standards have been met.

On thirteen of the allotments in the Unit, grazing of private land is done in conjunction with the owners' federal land permit. This "Private Land Permit" arrangement allows the private land owner flexibility in management and movement of livestock. Private land can be incorporated into grazing systems to provide proper management of plant growth.

Successful grazing management requires that standards and guidelines for allowable ("proper") use be established – i.e., a set of measurable benchmarks that, when reached, trigger moving livestock. Proper use is defined as a degree of utilization of current year's growth that if continued, will achieve management objectives and maintain or improve long-term productivity of the site (Society of Range Management 1979). For federal lands within the Unit, standards and guidelines have been established in the forest plan and modified in Biological Opinions as required by the Endangered Species Act. Of the thirty-eight allotments in the Unit, eighteen are under consultation Biological Opinions for Warner, Shortnose, and Lost River Suckers. Standards and guidelines vary from allotment to allotment, and pasture to pasture depending on the condition, trend, and goals for the various resources in the allotment/pasture. For example, a pasture with a riparian area that is functioning at risk with a downward trend would not be allowed as much use as a riparian area functioning at risk with an upward trend.

The frequency and intensity of monitoring varies depending on the condition of the resources to be monitored and the goals to be achieved for identified resources. More monitoring is done in pastures with less than desirable resource conditions and/or the presence of very sensitive resource conditions or issues such as Threatened and Endangered (T&E) species. Monitoring guidelines can be found in the Fremont Forest Plan, the Meadow Riparian Monitoring Guide produced by the Fremont National Forest in 1997, and the Biological Opinions for Warner, Shortnose, and Lost River suckers (May 1997) on file with the Fremont National Forest.

The goal of modern livestock grazing is to maintain or improve rangeland health. Rangeland health is the degree to which the integrity of the soil, vegetation, water and air,

as well as the ecological processes of the rangeland ecosystem, is balanced and sustained. Integrity is defined as the maintenance of the functional attributes characteristic of a locale, including normal variability. In the case of livestock grazing lands within the Unit, health has mostly been defined as the condition of riparian areas as measured against desired future condition. Riparian areas have been described as the weak link in our arid ecosystem.

Guidelines

- Continue the use of modern grazing systems and grazing techniques within the Unit. As opportunity arises, convert or incorporate season-long grazing allotments to deferred/rotational grazing systems.
- Practice adaptive management. Make adjustments to grazing based on monitoring results.
- Further define rangeland health and the desired future condition for riparian areas in the Unit.

H. Forest Restoration Implementation and Economics

Introduction

It is the specific intent of the Lakeview Stewardship Group to chart new ground, develop holistic solutions, and establish a standard of excellence in the implementation of forest restoration work. Considering the Restoration Planning Overview and the other Key Issues of this strategy, an integrated approach to forest restoration is warranted. Restoration objectives, prescriptions, and equipment should be designed to integrate multi-resource objectives for forest vegetation, soils and water, road density, wilderness and roadless areas, recreation opportunities, and other forest values. Economic and contracting strategies and mechanisms should be designed to facilitate ecosystem restoration and capture the greatest benefit for the local economy.

Implementation Principles & Guidelines

- It is implicitly understood that management actions will likely have both short- and long-term effects on a compendium of forest resources and attributes. The decision to take action acknowledges that impacts will occur and tolerance of such impacts, expected and unexpected, positive and negative, will be necessary to make progress. Monitoring and adaptive management tools will be consistently used to assess the effects of management implementation and to make informed changes.
- Forest restoration prescriptions will be designed to achieve desired conditions, at the forest stand level, suitable for the habitat type present.

- Restoration prescriptions will accommodate existing forest plan and regional direction, unless such direction is modified as a result of acquiring new, scientific information and codified through the normal public and environmental review process.
- Restoration prescriptions will define soil and water protection standards in a performance-based manner at the forest stand level. Real-time Monitoring and Adaptive Management will be used to validate compliance and improve protection performance.
- Meeting the habitat needs of forest wildlife during management implementation will be defined in a performance-based manner. Monitoring will reveal effects and Adaptive Management will improve performance.
- Management implementation strategies and desired or suggested equipment configurations to be used will be designated based on integrated criteria of desired protection levels and economic opportunity, to effectively manage overall management costs and impacts.
- Management implementation strategies and equipment used will be integrated to allow for efficient and economical implementation of subsequent management actions to be performed.
- Trees harvested during forest restoration operations will be fully utilized consistent with Unit goals and objectives. This will include small diameter trees, downed wood and other previously underutilized material, all the while satisfying necessary fire risk reduction, soil structure protection, soil nutrient cycling capability and large woody debris for soil and habitat objectives.
- Local processing of derived raw materials and the use of local employment for forest management services will be strongly encouraged to foster the development of new, local, economic opportunities for wood products manufacturing and other businesses associated with forest restoration.

Logging Systems & Machinery

*The availability and skillful use of appropriate logging equipment will be critical to achieving the restoration goals of the Lakeview Stewardship Unit. There is a huge disparity in actual soil impacts with different ground-based timber harvesting and wood extraction systems and equipment. Consideration of *how* the particular equipment systems are to be used and the level of operator skill, care, and attention to detail are critical factors in limiting adverse impacts. Different operators on the same machine can have disparate levels of impacts. This issue can be addressed with training and education workshops for forest restoration operators.*

An example to illustrate the trade offs and attributes of different systems could be the consideration of building a temporary access road to reduce skidder travel distances to 1500', or the consideration of a forwarder extraction system, which would not need the additional temporary road and shorter travel distance to be cost effective. In this case, the expense of the temporary road and its subsequent negative impacts on soil productivity, water infiltration, etc., coupled with the expense of the skidder system, would be weighed against the additional expense of the forwarder system and no need for the expense or impacts of the temporary road.

Another example could be the desired underburning of the treated forest stand after designated trees have been removed. The use of a tree length harvesting system in this situation would necessitate that landing logging slash be returned to the forest, so that sufficient surface fuels were present to carry the underburn and to facilitate the return of nutrients from the cut trees' limbs and needles. In this scenario, it would make sense to use a different harvest method and equipment systems to reduce soil impacts (traveling back over the same ground again with the skidder), leave the needles and branches in the forest in the first place and to improve the economics of the overall operation.

With many of the anticipated forest restoration treatment areas in the Stewardship Unit, machinery and logging systems will need to be selected relative to the anticipated soil protection, road density, snag retention, tree removal, follow-up underburning, and nutrient retention guidelines. New, affordable machinery systems, different from those currently available with existing contractors in the Unit's geographic area, may be best suited to meet these objectives. Training, education, and re-tooling of the current contractor workforce may also be needed, as well as availability of financial assistance enabling local contractors to procure the new equipment systems and integrate these new systems into their businesses.

Actual choices of suitable timber harvesting and extraction systems should be made on a site-specific basis and should include specific consideration of the forest type, soil type, desired implementation prescriptions, desired snag density, follow-up prescribed fire, season of operation, existing road density and many other site and area specific parameters. Off-site impacts also need to be considered. For example: helicopter extraction does not require a high density road network, but because helicopters have to work at a very high extraction rate to be economical, the resulting volume of log truck traffic and the wear and tear, and erosion, on the road system may lead to other, negative environmental impacts.

Many innovative developments are occurring with respect to relatively new machinery systems and the pairing of various machinery platforms. For example: the pairing of excavators (excavators fitted with winch drums) and high capacity forwarders can negate the need for additional road networks, as would be required with conventional cable extraction systems.

With respect to salvage harvesting and extraction after wildfire events, the season of operation becomes the most critical aspect for consideration. Harvesting systems that can

operate during frozen winter conditions (where they exist) and which do not require any new roads or road upgrades will likely have the least negative impacts on soil resources and potential additional erosion and subsequent sediment delivery to streams. This is a particular conundrum at the moment as analysis timeframes often negate the possibility of authorizing salvage harvesting the first winter season after a wildfire, when the additional negative impacts caused by the salvage harvesting will be at their most benign and the remaining economic value of the burned timber remains relatively high.

Helicopter extraction operations have few negative effects on soil and water resources and are a valuable salvage tool. However, they are limited in application, particularly as burned timber rapidly loses its economic value when springtime conditions arrive. Helicopter operations are also very hazardous in burned areas, requiring the removal of nearly all the burned trees, including the desirable snags, which provide a critical resource for many wildlife species.

Logging Systems Guidelines:

- Utilize an integrated approach to match logging systems to topography, road access, soil attributes, treatment prescriptions, and seasons of operation.
- Provide the financial and technical assistance necessary for local contractors to procure and operate new logging equipment appropriate for restoration implementation.
- Provide training and education workshops for forest restoration equipment operators to minimize negative impacts on soils and other resources.

V. Monitoring

Biophysical Monitoring Component

The purpose of inventorying and monitoring is to periodically collect direct information about the composition, structure and functional condition from hundreds of permanent plots located across the Unit. Direct information reduces assumptions and second-hand information about an area of the Unit and how it is performing. Such information supports adaptive and effective management. The Upper Chewaucan River drainage was chosen by the Lakeview Stewardship Group as the location to begin the biophysical monitoring, since it reflects many characteristics found across the Unit. Since May, 2002, the Fremont-Winema Resource Advisory Committee (RAC) has authorized Forest Service Title II funding to pursue the following objectives:

- 1) Inventory the critical ecosystem indicators across the 275 square mile watershed by establishing a large sample population of tenth-acre permanent plots.
- 2) Establish permanent plots throughout restoration project areas to monitor the effectiveness of the treatments over time.

- 3) Analyze the acquired data to determine the present condition of the Chewaucan and its trend toward health, given sufficient time to determine such trending.
- 4) Make a geographic information system (GIS) database, a narrative and methods employed to gather that data available to the Forest Service, the community and the general public through a website.
- 5) Perform surveys of specific ecosystem information needs requested by the Forest Service and report them to the Forest Service and the community.

An 8- to 12-member monitoring team is recruited annually from high school students and recent graduates in the Lakeview and Paisley communities. Generally two new high school students are added yearly as apprentices. On average 60 percent of the crew is in college or post college and 40 percent are in high school. Their training has been provided by Clair Thomas, past Lakeview High School science teacher and presently Natural Resource Coordinator for Tillamook School District #9. Richard Hart, forest ecologist and soil scientist, designed the original protocols and directed the monitoring effort through 2005. Clair Thomas began directing the monitoring effort in 2006. The administration of the project is provided by the Lake County Resources Initiative (LCRI), with Jim Walls as its executive director.

A selection of 35 indicators* was chosen to measure and record on more than 300 tenth-acre permanent plots spread across the Upper Chewaucan. More than 800 1/50-acre plots have been established and put into Landscape Management Systems (LMS) to model forest structure and behavior. Plots were established to seek answers to the questions about the effectiveness of restoration projects and the general health of the watershed. These questions are currently being answered. Many of the insights gained from these surveys have been included in this update of the Long-Range Strategy for the Lakeview Unit. The Forest Service, the community, and environmental organizations who have participated in the Unit's resurgence and reauthorization provided these questions.

The eight years of collected data is stored on a dedicated server in the form of a relational GIS database and narratives. The address is www.lcri.org/monitoring. With enough time and essential data, trends toward Unit health and treatment effectiveness can be identified, and adaptive measures can be implemented.

The data from the 35 indicators will soon be analyzed to determine which core biophysical indicators give us the best information and choose those to proceed with. This proposed reduction will allow the present team to establish permanent plots across the entire Unit. What has been learned from the 35 indicators will be extrapolated where

* The monitored indicators cover the following: type and percentage of effective ground cover; vegetation species ID and populations; soil texture and chemistry; rhizosphere zone level, soil temperature and available moisture; soil compaction; stand structure (tree species, rates of growth, girth, stem health, canopy structure, down woody material, pathogenic activity); stream channel morphology; water chemistry; benthic macroinvertebrate feeding group inventory; and pebble counts performed. Each permanent plot is GPS identified, their coordinates measured to the nearest landmark, permanent tags installed and the plot's surface and surroundings are photo-documented.

appropriate to give an enhanced understanding of the data collected and analyzed from the rest of the Unit.

Biophysical Monitoring Guidelines

- Continue and build on the successes of the Chewaucan Biophysical Monitoring Project.
- The collaborative monitoring program should be spread across the whole Unit.
- Integrate Forest Service staffing and finances for monitoring to the extent feasible.
- Basic information about how the Unit functions has been skimpy, with historical data that is not easily retrievable. Thus, the Unit needs a databank that is accessible to anyone who has need of it.
- Continue the formal partnership created by the community and the Forest Service, through the RAC and the LCRI, that supports the monitoring program financially and by appropriate policy.
- Indicator information needs to be collected in a systematic and continuous basis across the whole Unit with regards to the restoration activities.
- The indicator data collection needs to be continued by a trained and paid crew whose membership is bonded to the landscape and the community.
- The biophysical monitoring program needs an advisory committee composed of community, agency and team members.

Socio Economic Status of Lake County

The economy of Lake County is fairly typical of natural resource dependent counties in the Pacific Northwest. However, the county's geographic isolation poses special challenges. Although other counties with similar economic profiles have managed to diversify their economic bases, Lake County has continued to lag behind.

In a recent report by the Sonoran Institute entitled "Profile of the Rural Inland Northwest" Lake County was rated number 35 in a list of the most stressed rural counties in the Inland Northwest. This ranking comes from a composite of ratings comparing the 104 rural inland northwest counties on their placement in such indicators as unemployment rates, housing affordability, families living in poverty, educational attainment and employment change.

In order to get a better picture of Lake County's socio economic status consider the following economic statistics gleaned from the Profile of the Rural Inland Northwest:

- Percent Population Change 1970-2002 – 16% (25 out of 104)
- Long Term Employment Change 1970-2002 – 40% (24 out of 104)
- Short Term Employment Change 2000-2002 – 0.5% (36 out of 104)
- Annual Average Unemployment Rate 2003 – 10.4% (13 out of 104)
- Per Capita Income 2002 - \$21,854 (43 out of 104)
- Families living in Poverty 2000 – 13% (12 out of 104)
- Adult Population with College Degree – 15% (47 out of 104)
- Housing Affordability Index 2000 – 195 (index of 100 is affordable)
(101 out of 104)

The 2000 United States Census provides the following additional economic information:

- Employed Population Engaged in Agriculture, Forestry, Fishing and Hunting, and Mining – 20.4%
- Employed Workers in Private Industry - 54.8%
- Employed Government Workers – 28.1%
- Self Employed Workers – 15.6%

The 2000 United States Census reveals the following social information about Lake County:

- 2003 Estimated Population – 7440
- 1990-2000 Population Change – 3.3% (Oregon 20.4%)
- Persons with Disability Age 5+ - 1,519 or 21% of total population
- Civilian Veterans - 19.8%
- People Living in Same House as in 1995 – 55.1%
- People Who Lived In a Different County in 1995 – 25.2%
- People Living in a Home With English as the Only Language – 95.2%
- People Who Were Born Outside the United States – 3.4%
- School Enrollment (K-12) 1,497
- School Enrollment (College or Graduate School) 101

Although many factors contribute to Lake County's distressed socio-economic status none has a greater impact than the County's geographic location. Consider the relative isolation of Lake County. Lack of transportation alternatives are often cited as reasons that new businesses hesitate to locate in Lake County. The closest commercial airport to Lakeview is Klamath Falls, 90 miles away. The closest freeway access is at Medford, 170 miles away. In order for trucks over 60 feet in length to travel legally east to west on Highway 140, costly renovations will be required. Freight can travel to Alturas, California on Lake County's railroad, but capacity is limited and connections are not timely. Many rural counties that are experiencing economic vitality have a healthy tourism sector. Lake County, however, has not yet proved to be a tourism draw.

Construction of a minimum-security prison near Lakeview has provided a significant economic boost for the County. Since it opened in September 2005, the Warner Creek Correctional Facility has brought approximately 140 new jobs and an annual operating budget of \$25 million.

Renewable energy development is a promising long-term economic opportunity for the Lakeview area. It became clear as work began on the Lakeview Biomass Project that Lake County sits in a very unique position for other renewable energy projects including wind, solar, hydro and geothermal. In 2006 the Town of Lakeview, City of Paisley, Lake County, South Central Oregon Economic Development District, Lake County Chamber of Commerce, the Oregon Renewable Energy Center at Oregon Institute of Technology (OIT) and Lake County Resources Initiative came together to form the Lake County Renewable Energy Working Group. Realizing all the renewable energy potential, the group set as their goal to be fossil fuel-free from an energy standpoint in five years. Since that time:

- in 2007 the Town of Lakeview completed feasibility studies for a small hydro project, a geothermal heating district and geothermal electricity production;
- the Surprise Valley Electrification Corporation and a local landowner are in the final stages of a feasibility for geothermal electricity production and a geothermal heating district;
- Nevada Geothermal has leased the Grump Geysers in Plush;
- Lake County is pursuing solar and wind in conjunction with the Oregon National Guard at the outdated Backscatter Radar Site in Christmas Valley;
- Lake County Resources Initiative (LCRI) is working with Obsidian Finance Group, LLC to install the State's largest solar farm in Christmas Valley;
- in 2007 the Lake County Chamber of Commerce held meetings throughout the county on renewable energy potential and out of these meetings a great interest developed from ranchers and farmers in ground source heat pumps, solar watering pumps and small on-farm wind generation.

As a result of all this interest, LCRI hired a Renewable Energy Director (RED) position to lead this effort, working with local units of government, industry and landowners in developing these renewable energy potentials and to achieve the vision of being "*Oregon's Most Renewable Energy County.*" Bob Rogers, who helped establish the Oregon Renewable Energy Center at OIT, is working under contract to Lake County Resources Initiative to assist in developing these resources on an industrial scale, as well as for smaller businesses, homes and ranches. In 2009 LCRI developed a renewable energy implementation plan that would make Lake County a net exporter of renewable energy. In 2010 LCRI and others are already discussing a revision of that plan to double the original goals. LCRI is also completing a carbon footprint analysis of Lake County to determine whether it is possible for renewable energy to offset Lake County's entire carbon footprint.

All in all, however, Lake County’s socio-economic status is not likely to change rapidly. Natural resources in the form of timber and agriculture will most likely remain the economic mainstays of the County. With over 78% of Lake County’s land base in government ownership, changes in federal land policies will continue to have a great impact on Lake County’s socio-economic status.

Key Issues

- Decline in natural resource based jobs over the past generation has had a significant impact on the socio economic stability of Lake County’s communities
- Inability to replace or improve natural resource based jobs has caused a significant decrease in the available workforce

Socio-economic Monitoring Guidelines

- Continue to work towards restoring natural resource based industry such as biomass plant, ten-year stewardship contracts, geothermal industries such as greenhouse and other agricultural based businesses.
- Utilize Oregon Economic and Community Development Department’s annual review of County Economic Data
- Review and analyze upcoming Oregon State University Extension study of Lake County.
- Review and analyze 2010 census data when available.

VI. Ten-Year Schedule of Activities

Vegetation and Fuels

The Forest Service considers the use of mechanical thinning and prescribed fire as its primary forest restoration tools, capable of accomplishing a broad range of resource goals beyond fuel reduction. Restoring fire to the landscape is needed to improve wildlife habitat and water flows, reduce insect and disease damage, protect large old growth trees, restore and reinvigorate forage plants and riparian vegetation, etc. The Forest Service has been working toward fully integrating vegetation and fuels management into project planning, focusing on areas in greatest need of restoration and on using landscape scale treatments to make forests resilient to fire and other natural disturbances. The Forest Service has a 10-Year Vegetation Management Planning Schedule for the lands within the Lakeview Stewardship Unit. In total, the schedule includes 53,773 acres of commercial thinning treatment, 77,423 acres of fuels reduction with potential biomass removal, and 128,570 acres of prescribed fire. The agency anticipates that the schedule will be updated to reflect any changes due to funding, priorities and to incorporate new information (i.e. TNC Values Mapping) as it becomes available.

Forest Service 10 Year Vegetation Management Projects Schedule

Fiscal Year	Unit	NEPA Planning Area	Project Name	Acres Commercial	Acres Fuels Reduction-	Acres Prescribed
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				Treatment	Biomass	Fire
2011						
	LKV	West Drews	Dent North Stewardship	207	324	
	LKV	Burnt Willow	Burnt Willow Stewardship	1,279	1,198	
	LKV	Abe	Abe Stewardship	48	439	
	LKV	West Drews	Dent South Stewardship	1,071	1,110	
	LKV	West Drews	Stack Stewardship	714	1,400	
	LKV	West Drews	Last Stewardship	2,010	3,015	
	LKV	Abe	Camp Creek Thinning	500	500	
	LKV	Abe	Abe Projects		700	800
	LKV	Strawberry Underburn	Strawberry Underburn	-	-	2,000
	LKV	Upper Thomas Creek	UTC Underburn	-	-	480
	LKV	N Warner Sage/Shrub	N Warner Sage/Shrub		300	200
	LKV	Booth Thin/Underburn	Booth Thin/Underburn		160	160
	PAI	Jakabe	Jakabe Plantation Thinning	-	352	
	PAI	Launch Fuels & Veg	LA Stewardship	1,750	500	
	PAI	Red Zone Safety	Mad	600	600	
	PAI	Red Zone Safety	Clear	440	440	
TOTALS				8,619	11,038	3,640

Forest Service 10 Year Vegetation Management Projects Schedule (continued)

2012						
	LKV	West Drews	Hay Stewardship	1,500	2,250	
	LKV	Burnt Willow	Burnt Willow Projects	-	-	1,500
	LKV	West Drews	West Drews Projects	-	2,400	
	LKV	Strawberry Underburn	Strawberry Underburn	-	-	5,000
	LKV	N Warner Sage/Shrub	N Warner Juniper	-	300	500
	PAI	Deuce	Day Stewardship	2,100	2,345	
	PAI	Jackabe	Trail Underburn	-	-	1,000
	PAI	Jackabe	Kava Underburn	-	-	1,000
TOTALS				3,600	7,295	9,000
2013						
	LKV	East Drews	Green Dog Stewardship	3,500	7,350	
	LKV	West Drews	West Drews Projects	-	2,100	5,600
	LKV	Strawberry Underburn	Strawberry Underburn	-	-	6,700
	LKV	N Warner Sage/Shrub	N Warner Juniper	-	-	300
	LKV	Burnt Willow	Burnt Willow Underburn	-	-	1,500
	LKV	Abe	Abe Projects	-	700	3,000
	PAI	Deuce	Senior Stewardship	2,100	2,841	
	PAI	Red Zone Safety	Cycle	1,200	500	
	PAI	Red Zone Safety	Ring	1,200	500	
TOTALS				8,000	13,991	17,100
2014						
	LKV	East Drews	Horseshoe Stewardship	3,500	6,310	
	LKV	West Drews	West Drews Projects	-	4,400	10,000
	LKV	N Warner Sage/Shrub	N Warner Juniper	-	-	500
	LKV	Burnt Willow	Burnt Willow Underburn	-	-	2,000

	PAI	Deuce	Drill Stewardship	2,100	1,730	
TOTALS				5,600	12,440	12,500
2015						
	LKV	East Drews	Little Stewardship	3,500	6,300	
	LKV	N Warner Sage/Shrub	N Warner Juniper	-	-	500
	LKV	West Drews	West Drews Underburn	-	-	5,000
	LKV	East Drews	East Drews Underburn	-	-	5,000
	PAI	Deuce	Shoe Stewardship	2,100	1,730	
	PAI	Launch Fuels & Veg	LA Underburn	-	-	1,000
TOTALS				5,600	8,030	11,500
2016						
	LKV	Camas Horse	Camas Horse Stewardship	2,500	5,950	
	LKV	West Drews	West Drews Projects	-	5,200	5,000
	LKV	East Drews	East Drews Underburn	-	-	5,000
	PAI	Launch Fuels & Veg	LA Underburn	-	-	1,000
	PAI	Deuce	Camp Stewardship	2,100	1,730	2,000
	PAI	Shake/Merritt	Shake Stewardship	2,600	400	
TOTALS				7,200	13,280	13,000

Forest Service 10 Year Vegetation Management Projects Schedule (continued)

2017						
	LKV	Wild Dry Rock	WDR Stewardship	3,600	7,700	
	LKV	East Drews	East Drews Underburn	-	-	5,000
	LKV	Camas Horse	Camas Horse Underburn	-	-	5,000
	PAI	Launch Fuels & Veg	LA Underburn	-	-	1,000
	PAI	Deuce	No Name Stewardship	1,600	1,250	2,000
TOTALS				5,200	8,950	13,000
2018						
	LKV	Crooked Mud Honey	L Honey Stewardship	3,500	5,600	
	LKV	East Drews	East Drews Underburn	-	-	5,000
	LKV	Camas Horse	Camas Horse Underburn	-	-	5,000
	PAI	Deuce	No Name Stewardship	1,300	730	2,000
TOTALS				4,800	6,330	12,000
2019						
	LKV	Crooked Mud Honey	CM Stewardship	3,500	5,550	
	LKV	Wild Dry Rock	Wild Dry Rock Underburn	-	-	5,000
	LKV	Camas Horse	Camas Horse Underburn	-	-	5,000
	PAI	Deuce	Deuce Underburn			2,000
	PAI	Baja	Baja Stewardship	1,500	250	
TOTALS				5,000	5,800	12,000
2020						
	LKV	Shinglemill	Mesmin Stewardship	3,500	5,780	
	LKV	Wild Dry Rock	Wild Dry Rock Underburn	-	-	3,000
	LKV	Crooked Mud Honey	Crooked Mud Underburn			5,000
Totals				3,500	5,780	8,000
Ten Year Totals				57,119	92,934	111,740

Appendix A: Goals and Objectives of Unit

- 1) Sustain and restore a healthy, diverse, and resilient forest ecosystem that can accommodate human and natural disturbances.
 - Restore stand-maintenance fire regimes where they historically occurred.
 - Maintain and restore habitat for focal species.
 - Sustain and restore healthy soils.
 - Restore forest conditions that approximate historical species composition and stand ages.
 - Eliminate, where possible, and control the spread of invasive, non-native species (especially noxious weeds).

- 2) Sustain and restore the land's capacity to absorb, store, and distribute quality water.
 - Manage upland vegetation to maintain and restore water and moisture absorption, retention, and release capacity over time.
 - Reduce road density and improve remaining roads to minimize impacts on water quality and flow.
 - Maintain and improve aquatic and riparian habitat for native species.
 - Lower stream temperature and sediment loads.
 - Improve biophysical structure of soils.

- 3) Provide opportunities for people to realize their material, spiritual, and recreational values and relationships with the forest.
 - Provide opportunities for local people to realize economic benefits from innovative contractual mechanisms and technologies focused on linking stewardship activities and community well-being.
 - Pursue compensation of local workers at a state-average family wage or higher to accomplish ecosystem management.
 - Design contracts to promote opportunities for year-round, long-duration, stable employment.
 - Design unit product sales and service contracts to promote participation (e.g. bidding and contract awards) by local vendors, purchasers, and contractors.
 - Promote a local business environment that can take advantage of the products and services of ecosystem management (e.g. small diameter and under-utilized species).
 - Protect and maintain areas of cultural significance within the forest.

- Improve opportunities for people to fish, hunt, and view nature.
- Promote environmentally responsible recreation.

Appendix B: Methods to Assess Old Growth Acres in the Lakeview Stewardship Unit

Gradient Nearest Neighbor data was compiled in treelists from the master tree list database Lemma_data.mdb were evaluated using SPMCDBH compute function in FVS. For each tree in the list the following attributes were calculated:

1. Trees / Acre (TPA)
2. Percent Cover (Cover)

The TPA values were then summed for each species and each size class. Cover by species and size class was summed using the cover extension to FVS. In addition, Total Cover for all trees regardless of species or size class was estimated for the density class analysis.

Note the cover estimates by species and size class do not equal total cover for the plot which was calculated summing all trees per plot. This is due to the random overlap built into the cover extension.

Species Composition (Seral State)

1. For each Plant Association Group (PAG) rate every possible species (all species in the tree dataset) as shade tolerant or shade intolerant.
2. Sum the cover of shade tolerant vs. shade intolerant species.
3. If shade intolerant relative cover is >75% then Seral State is Early Seral (1)
4. If shade intolerant relative cover is between 25-75% then Seral State is Mid Seral (2)
5. Shade intolerant relative cover is <25% then Seral State is Late Seral (3)

Size Classes (Structure Stage)

1. 2 sets of size classes were evaluated for each pixel.
2. The 1st set has 5 classes and was used to compare to local HRV estimates for each state:
 1. Grass/Forb/Shrub
 2. Seedling/Sapling (.1 - 4.9" dbh)
 3. Pole (5 - 9.9" dbh)
 4. Small (10 – 20.9" dbh)
 5. Large (21+” dbh)

3. The 2nd set has 7 classes and was developed primarily for wildlife habitat analysis. This set also matches the IMAP size classes.

1. Grass/Forb/Shrub
2. Seedling/Sapling (.1 - 4.9" dbh)
3. Pole (5 - 9.9" dbh)
4. Small (10 -14.9" dbh)
5. Medium (15 -19.9" dbh)
6. Large (20 – 29.9" dbh)
7. X-Large (30+” dbh)

The size classes for each set of classes were evaluated from the largest size classes down to the smallest. Large and X-Large classes were tested 2 times.

1. If canopy cover of the X-Large class is the greatest cover by % then class = 7 else if the TPA for the X-Large class > the threshold in the R6 Interim Old-Growth definitions for the PAG then Class = 7.
2. If canopy cover of the Large + X-Large class is the greatest cover by % then class = 6 else if the TPA for the Large + X-Large class > the threshold in the R6 Interim Old-Growth definitions for the PAG then Class = 6.

The Medium – Seedling/Sapling classes were evaluated based on the largest class with a plurality of cover.

3. If the Size Class is not Large or X-Large, then cover of the Large and X-Large are added to first the Medium class and tested for plurality of cover. If Plurality is medium then Class = 5
4. If Size class is not Medium then cover of the Medium + Large + X-Large are added to the Small class and tested for plurality of cover. If Plurality is small then Class = 4.
5. If Size class is not Small then cover of the Small + Medium + Large + X-Large are added to the Pole class and tested for plurality of cover. If Plurality is pole then Class = 3.
6. If Size class is not Pole then cover of the Pole + Small + Medium + Large + X-Large are added to the Seed/Sap class and tested for plurality of cover. If Plurality is Seed/Sap then Class = 2.
7. Total tree cover < 10% = Class 1

The Density Class is based on a total cover class threshold for each PAG. This threshold changes from 25% in the Juniper and Dry PP PAGs to 55% cover in the Moist Mixed Conifer and Mountain Hemlock PAGs. If the total cover is greater than or equal to the threshold then Density Class = 1 Else if the Cover is less than the threshold Density Class = 2.