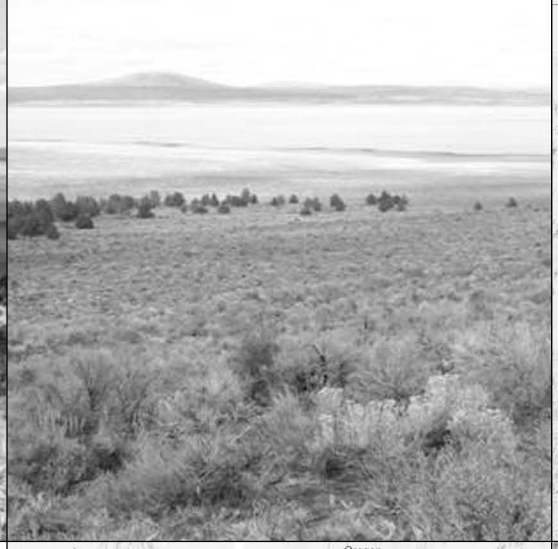
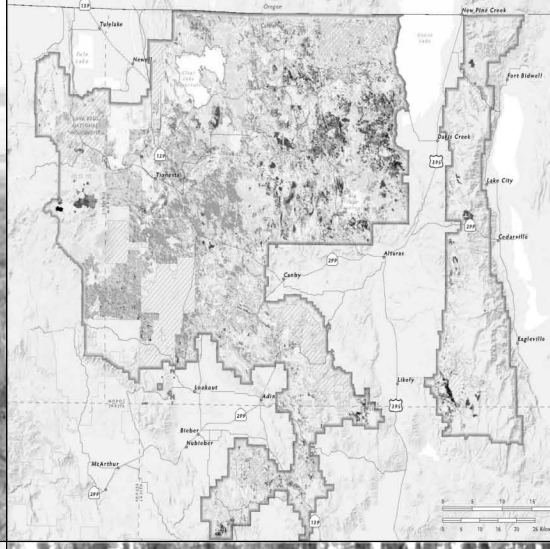
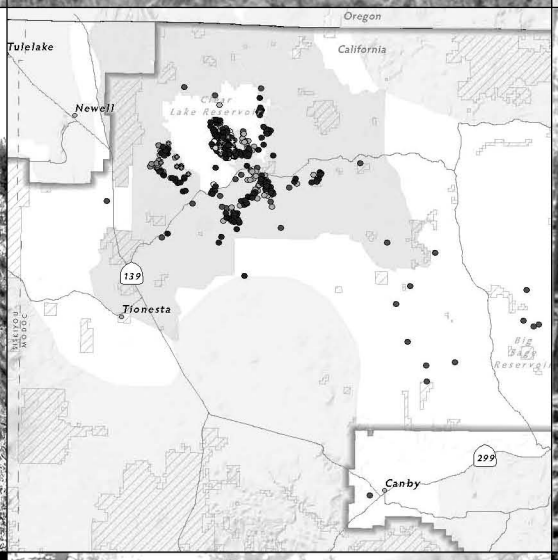
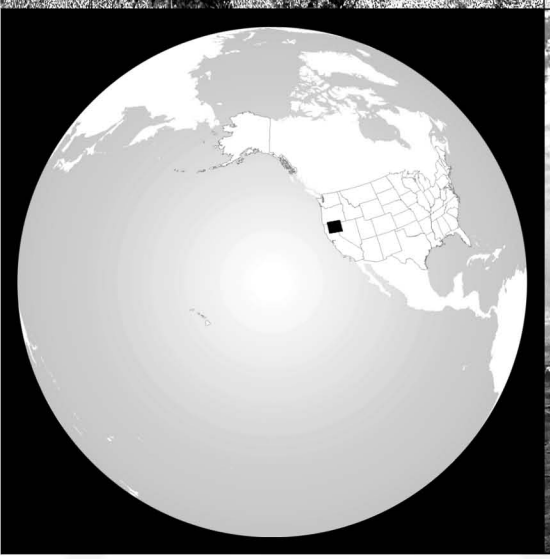
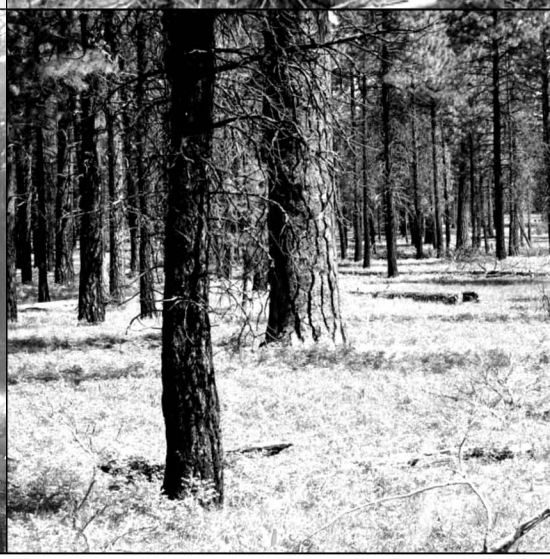










Collaborative Forest Landscape Restoration

Proposal:
Sage Steppe and Dry-Forest Restoration on the Modoc Plateau, Northeastern California and Western Nevada

Modoc National Forest

1. Proposed Treatment

This proposal describes a 10-year landscape level restoration strategy for the sage steppe and dry-forest ecosystems of the Modoc National Forest. This restoration strategy is established in the Modoc Land and Resource Management Plan (LRMP) as amended by the Sage Steppe Ecosystem Restoration Strategy FEIS and the Sierra Nevada Forest Plan Amendment FSEIS. It is a strategy, developed in collaboration with federal, state, and county agencies, the local public, special interest and advisory groups and private investors, that transcends administrative, jurisdictional, and ownership boundaries. This proposal addresses the urgent need for restoration in sage steppe and dry-forest habitats on the Modoc Plateau, where a combination of factors has compromised key ecosystem processes and resiliency. This proposal demonstrates an integrated approach to ecosystem restoration, fuels management and forest health that would create jobs by using existing authorities, (e.g., stewardship contracting) that can create a predictable and economically viable product stream from public lands. This predictable stream of wood products would be the critical catalyst for new renewable energy development. This project would stimulate biomass infrastructure investment, that once in place, would strengthen local community self-reliance and the economic viability of all future restoration activities in the Modoc Plateau bioregion. A concomitant benefit would be an increase in visual variety across the landscape, resulting in an enhanced recreation experience for forest visitors.

The sage steppe and dry-forest ecosystem restoration project encompasses a 6.5 million-acre landscape and is the focus area for interagency restoration efforts (Figure 1). This area includes portions of four national forests, three Bureau of Land Management (BLM) field office lands, two US Fish and Wildlife Service national wildlife refuges, as well as tribal and private lands. Private and tribal lands flank the federal lands. In this undertaking, the Modoc National Forest has engaged many partners; see Section 3, Collaboration, for a listing of them.

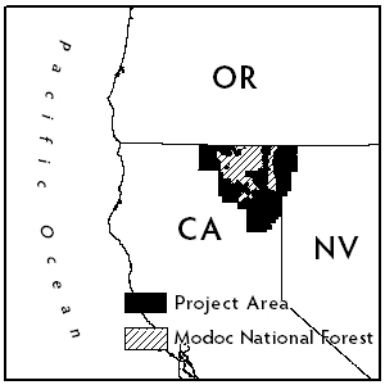


Figure 1. The sage steppe and dry-forest ecosystem restoration project area

Nestled in northeastern California, the Modoc NF is a land of ecological contrasts, including mountains, pine forests, meadows, lakes, streams, rugged canyons, wetlands, lava beds and high-desert plateaus. These features are highlighted in the Modoc Plateau, Medicine Lake Highlands and Warner Mountains eco-regions. These unique places, all near each other, provide a variety of habitats for wildlife, fish, and birds. As part of the Pacific Flyway, migratory birds provide a spectacular show at specific locations in the forest. Geologically, the forest is unique in the world for its obsidian sources, which have added to the rich prehistoric and settlement history. The vastness and remoteness of the Modoc and expansive adjacent ranches, create a penetrating solitude that is valued by both locals and visitors, while continuing the cultural heritage of this place.

The long-term treatment goal is to restore approximately 177,000 acres of sage steppe and dry-forest ecosystems over the 10-year span of this proposal. The Sage Steppe Ecosystem Restoration Strategy FEIS and the Modoc National Forest LRMP provide the strategy and framework for implementation that would enable the

Modoc National Forest and its partners to develop healthy and resilient ecosystems that, in turn, provide desired ecosystem services.

Sage steppe restoration efforts are focused on removing encroaching juniper from sage steppe habitats to provide habitat for sage obligate species such as greater sage-grouse, and enhancing native plant understories. Currently, sage steppe restoration activities have been focused in areas that either currently have sage grouse as identified in the Devil's Garden-Clear Lake Hills Sage-Grouse Working Group strategy, or are in or adjacent to historic sage grouse leks (strutting grounds)

Dry-forest ecosystems, those stands that are dominated by ponderosa pine, white fir and dry lodgepole pine potential vegetation types, comprise approximately 413,097 acres and occur throughout the Modoc National Forest. Specific treatment objectives in dry forests include 1) reducing stand density to improve forest health, 2) restoring and maintaining ecologically appropriate vegetation structure and diversity, 3) promoting fire-tolerant species, 4) increasing the large-tree component, and 5) reducing surface fuel and increasing canopy base height. The results of implementation of various projects would return the sage steppe and dry-forest stands to a more typical disturbance regime with frequent small fires that would burn in a heterogeneous pattern across the landscape. Selection of treatment locations in the dry forest would be based on vegetation structural stages (tree size and density), fuel conditions, and values at risk, and would be designed to interrupt wildfire spread across the landscape.

A variety of planning efforts is in place to support this initiative. Several programmatic decisions have been made that serve as a foundation for the project. Site-specific decisions have been made or will be made by August 2010 for activities covered under the grant for this fiscal year. The site-specific projects for this year's grant request are on the Modoc National Forest Fiscal Year 2010 Program of Work, and are available on the Modoc National Forest website. Existing NEPA documents and analysis currently underway address many, but not all, out-year restoration treatments in the Project area. Environmental analysis for out-year treatments are a committed portion of the future Modoc National Forest annual program of work.

Other, complementary, sage steppe restoration efforts, which are accomplishing the goals of sage-grouse habitat management, are occurring on adjacent federal and private lands. The U.S. Fish and Wildlife Service (USFWS) has begun treatments on the Clear Lake Wildlife Refuge, where the remaining core population of greater sage-grouse found on the Modoc Plateau occurs. As of April 2010, the USFWS Klamath Basin National Wildlife Refuge complex managers have removed 2,500 acres of encroaching juniper on the Clear Lake Refuge. Other future habitat enhancements on the refuge include treatments of noxious and exotic annual grasses, West Nile virus abatements, and fence improvements. Private landowners, in conjunction with NRCS, have treated an additional 13,000 acres of private lands in and adjacent to the Modoc National Forest. As of April 2010, approximately $2.25 million of both federal and private dollars have been spent on these sage steppe restoration efforts. Finally, the BLM has also been conducting sage steppe treatments, and it anticipates they will average 7,000 acres per year in the next decade.

In addition, the Modoc National Forest is coordinating with the Council of Western State Foresters/Western Forestry Leadership Coalition All Lands Project Proposal on its Western Juniper Sage Steppe Restoration Project. Our two projects are implementing the framework found in the Sage Steppe Restoration Strategy FEIS. These efforts expand the partnership on lands in Nevada and in the southern portion of our focal area near Susanville, California.

The desired 10-year outcome of the project is the restoration of vegetation and structural conditions to facilitate natural processes, and allow re-introduction of fire to maintain ecosystems over time. Treatments would include thinning, prescribed fire and fire for resource management, post-disturbance native plant restoration, chemical and mechanical treatment of noxious weeds, and mechanical fuel treatments. In addition to healthier, resilient ecosystems, by-products would include biomass, wood pellets, sawlogs, firewood, and miscellaneous forest products.

Gentle topography and abundant road access afford the Modoc National Forest a unique advantage to develop and apply forest restoration and fuels reduction treatments across broad landscapes in the sage steppe and dry-forest ecosystems. This integrated restoration strategy is an established practice on the Modoc National Forest. Removing excess trees to create healthy stands and restore sage dominated systems generates biomass for energy production and small sawlogs. Prescribed fire reduces surface and ladder fuels to better ensure future fires burn at ecologically appropriate intensities. Combined, these practices set the stage for reintroduction of natural fire, which is essential to cycle nutrients and foster other ecological functions that are important in this arid environment. These practices are effective and ecologically sound, and experience has shown that when wood products markets are healthy, they are also economically viable. The retention and expansion of existing wood products industry infrastructure is critical to achieving our widespread landscape restoration goals, and is a key element of this proposal.

The Modoc National Forest would use a combination of stewardship, timber, and service contracts; cooperative agreements, and force-account crews to implement restoration efforts. To pursue partnership opportunities and to build community and collaborative support, the forest would use “service first “contracts with partners, agreements in tandem with livestock permittees under NRCS initiatives, the Youth Conservation Corps, and it would expand opportunities for involvement of local tribes under the Tribal Forest Protection Act. We believe it is multi-year stewardship contracts, however, that are the cornerstone for implementation of this restoration strategy, and a reason the additional funding provided by this grant is key for ensuring lasting and successful large scale restoration.

To ensure that restoration objectives are being met and to build public and scientific support for this restoration strategy, required monitoring will be implemented on sage steppe restoration projects, as specified in the Sage Steppe Ecosystem Restoration FEIS, and further defined by an interagency work group in the 2009 Sage Steppe Ecosystem Restoration Strategy Vegetation Monitoring Protocols. The specific vegetation components to be monitored are 1) noxious weeds, 2) old-growth tree retention, 3) dense juniper retention, and 4) vegetation composition.

Dry-forest restoration monitoring would follow protocols established in the Modoc LRMP, and any monitoring identified in site-specific NEPA documents. Monitoring in the form of contract inspection, survival exams, and informal and formal evaluation of different phases of project preparation and implementation are all part of our monitoring strategy to ensure we are efficiently and effectively expending public funds and we are meeting management objectives.

Table 1. Restoration activities and CFLR requests for FY 2010 to FY 2019

Sage Steppe and Dry-Forest Ecosystem Restoration on the Modoc Plateau							
Monitoring 2010-2025	*FY10*	*FY11*	*FY12*	*FY13*	*FY14*	*FY15*	*FY 16-19*
Monitoring (implementation, effectiveness, validation)	0	224,449	225,000	225,374	222,228	205,760	203,352
Implementation 2010-2020	*FY10*	*FY11*	*FY12*	*FY13*	*FY14*	*FY15*	*FY 16-19*
Prescribed Burning (4,000 ac/yr)	50,000	75,000	31,500	29,250	29,250	33,000	33,000
Ecosystem Restoration Prep (hand/ mechanically treatment)	150,000	112,500	*73,500*	*68,250*	68,250	57,750	57,750
Stewardship contracts (commercial by-products (1000/ac FY11) (3000/ac FY12-19)		562,500	472,500	438,750	438,750	495,000	495,000
Service Contracts (3000/ac FY11) (6500/ac FY12-14) (5500 ac/FY 15-19)	8,750	562,500	761,250	706,875	706,785	540,375	540,375
Data Management		30,000	17,300	16,551	17,047	14,857	14,857
Invasive Species Control (200 ac/yr)		33,750	21,000	21,450	23,400	21,450	21,450
Native Seed Propagation & Seeding	50,000	37,500	33,600	31,200	31,200	26,400	26,400
Watershed restoration (40 mi/yr)	40,000	97,500	54,600	50,700	50,700	42,900	42,900
TOTAL CFLRP funds requested	298,750	1,735,699	1,690,250	1,588,400	1,587,610	1,437,492	1,440,000
TOTAL CFLRP Shasta Trinity			TBA	TBA	TBA	TBA	TBA

2. Ecological Context

Historic landscape vegetative patterns in the sage steppe habitats consisted of a mosaic of big and low sagebrush, grasslands, and western juniper. These vegetative patterns were formed by wildfire and other natural disturbances. During the past 100 to 150 years, the density of juniper has increased dramatically, drastically altering the sage steppe community composition and function.

Lakes and reservoirs: Water is a precious resource in this arid climate, so lakes and reservoirs are a big visitor attraction. Both warm and cold water, the lakes and streams provide quality fisheries habitat and nesting for waterfowl.

The Modoc Plateau: This large, floristic, unique high-desert plateau is flat and open with scattered pine, juniper, sage, and many sensitive plants found only here. Expansive wetlands on national forests and national wildlife refuges are an oasis in this setting, and provide rich waterfowl habitat.

Currently, habitats vary from sage dominated to those stands where juniper now dominates the site. Open juniper stands have a complementary understory composed of grasses, forbs, and shrubs important to several wildlife species. However, researchers have found a significant decrease in this understory vegetation with increasing juniper cover, especially shrubs. Dr. Miller, of Oregon State University, and others found a 75 percent reduction in the shrub understory once juniper canopy exceeded 30 percent.

There is also a reduction in hydrologic values, due to reduction of ground cover and increases in erosion caused by increased juniper density. Some of the streams in the project area are impaired by excess sediment and runoff that cause physical stream channel changes, which increase water temperatures and decrease fish habitat quality.

Some wildlife species that historically were an integral part of sage steppe habitats, have decreased in abundance. Thousands of greater sage-grouse, a Forest Service sensitive and USFWS candidate species, occupied the Devil's Garden Plateau until a major decline occurred, which appears to have begun in the 1950's. According to the Devil's Garden-Clear Lake Sage-grouse Working Group, increases in juniper density are the primary factor in the decrease in the amount and quality of greater sage-grouse habitat. Similarly, pronghorn antelope habitat also appears to be affected in part by juniper encroachment, as well as the expansion of noxious weeds and exotic annual grasses.

In the last century, largely as a result of fire suppression, livestock grazing, and timber management, dry east-side forests on the Modoc have experienced profound changes in fire regimes that have affected the patterns, density, and composition of vegetation. Historically, low-intensity, fire-controlled seedling numbers and growth promoted fire-tolerant species and maintained a variety of forest conditions, such that the historic forest included a higher proportion of low-density stands of trees than exists today. Fires naturally reduced accumulating fuels from leaves, branches and needles, and maintained wildlife habitat for species that require open stand structure. Forest stands that had fewer trees likely had higher general vigor and were less susceptible to attack from insects during dry summers and especially during sustained periods of drought.

Scientific models predicting the effects of climate change, indicate that dry forests may experience warmer, drier summers and warmer winters. It is also predicted that precipitation patterns will change, with the snow line becoming higher and less precipitation falling as snow. Summers are likely to be drier than they are currently. Historic temperature and precipitation data reflect these trends locally.

Dry forests on the Modoc are experiencing an increase in bark beetle activity and resultant tree mortality. This is the result of drought-induced stress and milder winters that prolong growing seasons and allow multiple generations of bark beetles. Currently, mountain pine beetle occurs at epidemic landscape scale on the Modoc and neighboring Fremont-Winema National Forest to the north. What was initially an outbreak in lodgepole pine, has expanded to include ponderosa and western white pine legacy old-growth trees. These trees, due to reduced vigor, are particularly vulnerable because of ongoing drought. Experts forecast continued increase in drought- and density-related mortality as a result of increased insect and pathogen activity. The warming and

drying trend predicted under climate-change scenarios will also increase the likelihood of fires that would be larger and more severe, especially at higher elevations.

Dry-forest restoration treatments would change forest stand susceptibility to insects and pathogens by reducing tree density and promoting fire-and drought-adapted tree species through selective thinning and planting with pine following disturbances. Historic conditions, as well as predicted future conditions that are anticipated as a result of climate changes, will drive site-specific treatment prescriptions that reduce tree density, shift tree species composition, and manage fuels. The desired forest structure at the landscape scale would be patchier and composed of even- and uneven-aged forest at variable, but overall lower densities that are based on site capacity. Managing forest density improves the health and reduces tree mortality, resulting in reduced fuel loadings and accumulation.

Dry-forest restoration treatments would increase landscape heterogeneity by use of strategically located treatments, and would change stand susceptibility to insects and pathogens by reducing tree density and changing tree species composition to promote fire- and drought-adapted pines. Historic conditions, as well as predicted future conditions anticipated from climate change, would drive site-specific treatment prescriptions. The desired forest structure at the landscape scale would be patchier and composed of uneven- and even-aged stands with lower but variable density. and overall tree-stocking levels based on site capacity.

Our goal is to develop resilient and adaptable forest stands that are better able to withstand inevitable environmental changes and disturbance. In general, treatments would work to restore historic patterns of stand structure, fire intensity, and fire frequency. Dry-forest ecosystems on the Modoc National Forest provide critical habitat for three Region 5 Sensitive species (bald eagle, Goose Lake redband trout, and great grey owl), as well as mule deer and elk.

Restoration efforts would have benefits to multiple resources. After treatment, stands would function closer to the pre-1870's landscape described in the Sage Steppe Ecosystem Restoration Strategy FEIS. Sage steppe stands would contain a mosaic of grasses, different stages of sagebrush with scattered juniper trees, and juniper woodlands. Frequent fires of varying intensities would help maintain restored stands. There would be increased native understory plants providing both wildlife habitat and the maintenance of soil productivity and watershed health. Sage-dependent species such as Swainson's hawk (Region 5 sensitive species), brewer's sparrow, loggerhead shrike, and mule deer would benefit from sage steppe improvements; pygmy rabbit (a California species of special concern), if found during future surveys, would benefit as well.

The increases in long-term ground cover and the use of BMPs would minimize soil erosion and maintain water quality. The implementation of watershed improvement projects proposed under this grant would improve watershed function. The amount of short-term disturbances and erosion would be minimal due to implementation of BMPs. The positive trends in long-term ground cover and stream function are consistent with the direction of the LRMP, with respect to watershed and soil resources.

Additional activities to enhance understory vegetation include the following: 1) monitoring understory plant and invasive species responses to juniper removal treatments; 2) noxious weed treatment, within the protocols of the 2008 Modoc National Forest Noxious Weed Treatment Project FEIS and ROD, including both physical and chemical treatments; and 3) restoration plantings to bolster the native plant community and increase its resistance to non-natives, using native seed sources from local genetic stock. Funding from the CFLR for noxious weed treatment would expand current levels of treatment implemented though cooperative agreements with the Pit River Tribe, Central Modoc Resource Conservation District, and the Alturas Field Office of the BLM.

In anticipation of the need for native grass seed of local genetic stock for sage steppe restoration, a native grass seed grow-out project was initiated in 2009. Funding was acquired to establish one acre of native grass seed production plantings at J. Herbert Stone Nursery, for three years of seed production. Native grass seed was collected from the Modoc National Forest in 2009, sufficient to plant 0.25 acre during fall 2009 sowing at the nursery. An additional $2,600 is currently obligated to the Bend Seed Extractory for seed cleaning and testing of

future Modoc National Forest native seed collections and for future seed increase grow-outs. A Resource Advisory Committee grant proposal was submitted for 2011 funding of further native seed collection, through a partnership with a local non-profit group, The River Center (Alturas), using a crew of local high school students.

Additional restoration of native tobacco (*NIcotiana attenuata*), a culturally important but declining species used by Native Americans, is being performed with Regional Native Plant Materials funding in cooperation with Cultural Advocates for Native Youth, an organization based in the Cedarville Indian Rancheria. This project would utilize burn piles from Sage Steppe Restoration projects, which provide the preferred habitat for native tobacco. CFLR funding would be used to increase production of seed from local native plant populations, as well as develop container stock for out-plantings. By bolstering native plant communities in areas at risk of noxious weed infestations, we have an opportunity to prevent large-scale infestations, which can be very expensive and very difficult to combat, particularly annual invasive grasses.

Use of local genetic stocks retains the genetically-based ecological adaptations to local climate and site characteristics. Use of seed or container stock plantings would be focused on those sites where the risk of noxious weeds exceeds the risk of ecological adaptation losses through dilution of native plant genetics already present. Wherever possible, treatments would strive for prevention of weed infestation and spread through support of the on-site native plant community. A project-specific noxious weed and rare plant survey would be performed, and a weed risk assessment would be developed for each project site.

Restored vegetation is expected to contain a diverse mix of native grasses, forbs, and shrubs, as well as retained old-growth juniper trees that reflect locally adapted genotypes of native vegetation. Long-term monitoring, in accordance with established protocols, would identify deviations from this anticipated goal, and would trigger an adaptive management response in project implementation protocols to achieve the desired outcome.

3. Collaboration

A multitude of partners have collaborated to begin sage steppe and dry-forest restoration planning and implementation:

Pit River Tribe and Cedarville Indian Rancheria

Federal Agencies

Surprise and Alturas Field Offices of the Bureau of Land Management, USDI Fish and Wildlife Service - Modoc and Klamath Basin National Wildlife Refuges and Klamath Falls Office, the Shasta-Trinity National Forest, and the USDA Natural Resource Conservation Service

State Agencies

California Department of Fish and Game, the University of California Cooperative Extension, Oregon State University

County Agencies

Modoc County Land Use Committee, Modoc County Resource Advisory Committee

Non-Governmental Organizations

Central Modoc Resource Conservation District, Rocky Mountain Elk Foundation, National Wild Turkey Federation, California Deer Association, Pacific Forest Trust, The River Center, North Cal-Neva Resource Conservation and Development, The Watershed Research and Training Center, and local landowners

These collaborative groups have not only helped develop overall management strategies, which are the foundation of the proposed project, but several have also begun implementation. Treatments have occurred on federal lands (USFS, BLM, and USFWS), as well as private lands. These groups have been working together for five to ten years on various stages of sage steppe and dry-forest restoration. However, these efforts are just the beginning; much remains to be accomplished.

The Devil's Garden/Clear Lake Sage-Grouse Working Group is made up of the various stakeholders involved with greater sage-grouse population and habitat management, including local livestock permittees, state and federal agency biologists, University of California Cooperative Extension staff, and NRCS personnel. The major stakeholders met over the span of six years to develop management strategies that could provide for everyone's needs from improved greater sage-grouse habitat to associated increases in livestock forage. Also, the group coordinates obtaining funds from various grants for restoration activities. By increased communication fostered by their meetings, they have been able to prioritize areas for restoration and remove duplication of efforts, thereby increasing efficiency of restoration activities.

NRCS and USFWS are partners in monitoring wildlife distributions, range production, and health, as well as conducting pre-treatment federally listed and sensitive plant and noxious weed surveys. Collaboration would be used to further leverage funding and expand multi-party monitoring.

Partners for noxious-weed treatment are the Central Modoc Resource Conservation District, with the Bureau of Land Management and Pit River Tribe being additional potential partners. The River Center (Alturas) is a partner for interpretative panels and native grass seed collection in support of native plant community restoration. Cultural Advocates for Native Youth, affiliated with the Cedarville Indian Rancheria, is a partner for native tobacco restoration.

An integral piece of this initiative lies in utilization of treatment by-products through stewardship contracting, allowing wood product value to contribute to restoration treatments. To this end, the forest is working with Modoc County, North Cal-Neva Resource Conservation and Development, The Watershed Research and Training Center, and others to attract and develop industry infrastructure and alternative markets to reduce biomass transportation costs and support local economic development. With the successful multi-year implementation

of this proposal, there would be opportunities for Modoc County to be an active recruiter of a new facility within a short haul of CFLR restoration activities. Long-term stewardship restoration contracts with reliable product streams are a key feature of this strategy. The premise that this collaborative strategy is built on is simple: If we can provide a dependable stream of restoration by-products (in this case, biomass) to the market, our working group firmly believes that we will have the ability to attract investors to site a power plant, a pellet plant, or both, to the vicinity of Alturas. This facility would be closer to where treatments are occurring, thus reducing the cost of transporting biomass. When haul costs are reduced, restoration treatments that were previously accomplished through service contracts costing the taxpayer an average of $300 per acre, could be accomplished with a forest products stewardship sale**.** These savings would allow us to restore more acres, while boosting the local economy and retaining valuable infrastructure and woodworking skills. On the contrary, if we continue with our present program level, the number of acres we will be able to restore would gradually decrease over time as appropriated budgets decrease. The skilled workforce and infrastructure critical to managing land and resources would continue to decline.

4. Wildfire

The Modoc Plateau is a landscape whose historical vegetative communities were created and maintained by fire; the absence of wildfire over the last 100 years has subsequently degraded natural plant community composition and function. Consequently, it is anticipated that future wildland fires would begin to exhibit augmented fire intensity and severity characteristics that increase risk and exposure to firefighters and the public, jeopardize resource values, and increase fire management costs.

Sage Steppe Ecosystem

The removal of fire from the sage steppe landscape, combined with heavy historic grazing, has altered vegetation in such a way that is difficult to anticipate future wildland fire behavior. In areas that have the most severe departure from historical conditions (condition class 3), junipers have dominated sites, resulting in the total removal of all brush, grasses, and forbs that historically carried frequent fires. In areas of condition class 2, juniper is less dominant but the density of sagebrush is having similar effects on the grasses and forbs. Cumulatively, the density of juniper and sagebrush has reduced the fine fuels (grasses and forbs) that would have burned frequently and maintained the mosaic pattern of grasses, brush, and sparse juniper that is characteristic of desired conditions within the sage steppe ecosystem. Without treatment, juniper and sagebrush would continue to homogenize the landscape, causing stand-replacing fires with unvarying severity that would continue to degrade this ecosystem.

Dry-Forest Ecosystem

Effective fire suppression and land-use practices over the last century have altered forest structure and increased fuel loads within the dry-forest ecosystems of the Modoc National Forest. Stands have continued to move away from historically frequent fire-return intervals and the vegetative conditions associated with low-intensity fire behavior. High accumulations of surface (needles, litter, branch wood), ladder (understory saplings, smaller trees, and brush), and canopy (continuous foliage and branch wood as a result of tree density) fuels have increased the potential for fires that are uncharacteristic of historical fire intensities and severity.

Our goal is to reduce potential wildfire severity, size, and cost by implementing and supporting ecological restoration treatments and natural processes that would re-establish the vegetative conditions associated with historical fire regimes.

Reduction of surface fuels, the interruption of the horizontal and vertical continuity of ladder and canopy fuels, and the mosaic of vegetative conditions created as a result of restorative activities such as multi-product thinning, prescribed fire, and management of wildland fire for resource benefit, would reduce expected fire intensity levels and therefore fire severity within treatment areas.

The reality is that we cannot presume to treat every acre identified in this landscape. However, we expect to realize a landscape-level reduction in fire spread, severity, and size as a result of the strategic placement and interaction of past, current, and future treatments identified within this proposal area. (The proposed treatments are in relation to past treatments. We are trying to capitalize on past treatments we have done.)

This proposal would reduce long-term costs by 1) creating vegetative conditions that exhibit reduced fire intensity levels that enable increased suppression efficiency, 2) creating vegetative conditions that reduce the threat to human and resource values, thereby providing additional suppression options for fire managers, 3) creating vegetative conditions within treatment areas that may allow for planned and unplanned wildland fire to play a natural and cost-effective role in the future maintenance of these treatments, and 4) identifying areas within the proposed landscape where unplanned wildland fire may be used to meet desired conditions and resource benefits in lieu of treatment.

Analysis of representative treatment areas (sage-steppe and dry forest) within the proposal area was conducted by the Region 5 Strategic Decision Support Cadre. Using components of the Wildland Fire Decision Support System (WFDSS) these simulations were used to create a Stratified Cost Index (SCI) and to identify fire

probability across the treated and untreated landscape. Within treated areas, results confirmed expectations that the reduction of fire-intensity levels (flame length) would reduce resistance to control, increase suppression efficiency, and ultimately decrease the average cost per acre of a 10,000-acre fire by up to 50 percent in both sage steppe and timber fuel types. In addition, analyses with the Fire Pro component of WFDSS simulated 2,500 randomly placed fires, lasting 1,500 minutes each within an 800,000-acre piece of the proposed landscape. Results revealed that not only would restoration activities significantly reduce burn probability within treated units, but it would also reduce the burn probability in the surrounding landscape by up to 30 percent by way of strategic placement of treatment units, and the resultant interruption of spread.

The circumstances of wildfire occurrence and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected continue to dictate our response to wildland fire. However, as a result of the treatments funded by this proposal, and the analyses that would be conducted in support of the actions described within it, we expect to increase management options with respect to response to wildland fire. A diminished threat to human and resource values through reduction in fire intensity levels, and the potential to base a suppression response on expected resource benefits (within and outside of treatment areas) would give fire managers the information and decision space necessary to mitigate risk and exposure for firefighters and potentially reduce suppression costs.

Reduced or favorable fire behavior is expected in treatment areas where vegetative attributes (species composition, structure, fuel loading) are intact and functioning within historical range. As part of this proposal we would utilize prescribed fire and the management of wildland fire for resource benefit as cost-effective tools for maintenance of treatment areas over time. This expectation is endorsed by the Fire Pro simulation, which identifies large portions of the landscape that may exhibit desirable fire intensity levels within the treatment areas themselves and on the surrounding landscape as a result of treatment placement. In addition, fire intensity levels (four-foot flame length) identified by the simulation are conducive to realizing resource benefits and consistent with desired conditions identified in the Modoc LRMP.

Finally, this proposal would reduce long-term costs by analyzing and identifying areas within the proposed landscape where expected fire behavior and fire effects are consistent with desired conditions, and management of wildland fire for resource benefit would be utilized.

Although community wildfire protection plans were not specifically used for this year's proposal, in the future we would incorporate them and use the restoration work as examples of restoring landscapes with hazardous fuels and the threats they pose to communities as the driver.

5. Utilization

An integral piece of this initiative lies in utilization of treatment by-products through stewardship contracting, allowing wood product revenue to contribute to restoration treatments. Topography and other environmental factors provide the Modoc National Forest an advantage over other national forests in California: most forest landscapes and vegetation types are well suited to whole-tree mechanical forest restoration treatments that can be followed up with prescribed underburning. Whole-tree mechanical logging produces biomass and small sawlogs.

The forest has a long history of proactive management that generates wood product for facilities in Modoc and adjacent counties. Haul costs are the single greatest factor limiting the acres of restoration treatments the forest can implement. Unfortunately, low-value biomass and sawlog by-products generate little revenue. However, production of biomass could support a green, renewable power-generating industry if given a jump-start by this project.

Often, particularly in the case of sage steppe restoration, where the value of juniper removed does not cover costs, projects must be augmented with appropriated funding. Multi-product timber sale or stewardship contracts in the dry-forest system are generally in a better position economically. When packaged strategically, sawlog value can support removal and biomass processing of small trees. Presently, poor market conditions, haul distance, and limited appropriated funding to implement projects presently significantly limit expansion of needed restoration treatments. There is overwhelming agreement among partners that the answer to accelerating restoration and reducing cost of treatments is long-term stewardship contracting. Sufficient and guaranteed product stream would attract and support development of local market for forest products. A biomass or pellet plant or located in the Canby-Alturas area, closer to restoration treatments on National forests, BLM lands, and private lands would increase by-product utilization, reduce haul costs, and thereby increase product value. This would create local jobs and fuel more restoration treatments. It would be a positive feedback loop. Several feasibility studies for local power plant siting have been completed, and one is underway in Klamath Falls, Oregon. Local public and private lands can easily provide sustainable product to support several small or one medium biomass or pellet facility—or both. But lack of guaranteed product stream over time is a major deterrent for investors.

Wood products from harvest activities on the forest currently go to facilities in (1) Bieber, California where there is a 10-megawatt power plant, and a post-and-pole operation and sawmill are slated to start up on August 10, 2010 with small- and large-log capacity; (2) Burney, California, which has three power plants and two sawmills; (3) Wendal, California, which has a 25-megawatt power plant, and (4) Klamath Falls, Oregon, which has an oriented strand board and co-generation facility. Susanville, California and Lakeview, Oregon both have biomass facilities planned, but they are not yet operational. Haul costs to all these facilities are too high to be economically feasible for most restoration treatments on the forest.

The Modoc's 15-year average of 1,500 acres per year in biomass thinning-underburn-type restoration treatment in dry forest is significant, but represents only about 5 per cent of the dry-forest land base on the forest. We are fortunate to have local markets for biomass; however, markets are too distant to support expanding treatments much beyond current accomplishments funding. Infrastructure investment is key to stretching limited partner and appropriated funding, and would increase restoration capacity over the long term. The forest is aggressively working with Modoc County, North Cal-Neva Resource Conservation and Development, The Watershed Research and Training Center, and others to develop industry infrastructure and alternative markets that would increase capacity and support local economic development. The Watershed Center is working on identifying an investor who would be willing to participate in the introduction of a technology developed in the United Kingdom, known as *Biojoule*. This is a moveable pellet manufacturing system with the capacity to utilize 10,000 BDT tons per year and generate about $165 per ton gross revenue. Installation of a single Biojoule system could provide up to 13 jobs. Roughly the same amount of jobs could be supported by a small (3 megawatt) biomass

facility. For every $1.00 spent in payroll, machinery, supplies for forest restoration and fuels reduction, and in the operating costs of the biomass and pellet plants, another $1.40 to $2.40 would circulate in the local economy (data from the Ecosystem Workforce Program, University of Oregon, 2010).

Table 2 (below) provides a conservatively projected volume of biomass and sawlogs that would result from restoration of sage steppe and dry forest over a period of 10 years. Mechanical whole-tree restoration treatments would generally remove excess conifers between 3 and 30 inches diameter at breast height, excluding old-growth juniper. Biomass stewardship contracts account for and utilize needles, limbs, and bole wood. Multi-product timber sales would generate sawlogs and biomass. In addition to biomass and sawlog utilization, firewood, post and pole, and other niche markets for forest products , i.e., juniper and cedar boughs, juniper collection for bonsai production, juniper processing for specialty applications, utilize restoration treatment by-products.

Table 2. Restoration activities and estimated costs for FY2010 to FY2020

	Acres of Restoration		**Projected Restoration By-Products**	
Activity year	*Mechanical Thinning*	*Prescribed burning*	*CCF Sawlog**	*Green Tons Biomass*
2010	7,500	4,000	7,266	74,474
2011	4,000	4,000	26,000	52,000
2012	4,500	4,000	18,000	97,500
2013	9,000	4,000	27,400	105,500
2014	4,000	4,000	24,400	106,000
2015	6,000	4,000	22,000	110,000
2016	6,000	4,000	26,000	135,000
2017	4,000	4,000	16,000	130,000
2018	4,000	4,000	26,000	145,000
2019	6,000	4,000	16,000	151,000
Project Totals	**55,000 ac**	**40,000 ac**	**209,066 CCF**	**1,106,474 tons**

*** CCF – 100 cubic feet**

6. Investments

A wide variety of federal investments is planned, and in some cases has been implemented, both by the Modoc National Forest and its various partners: grade and water control structures to restore wet-meadow hydrology (NRCS); prescribed fire (USFS and BLM); juniper thinning (USFS, USFWS, NRCS, BLM); fencing to enhance wildlife habitats (all); planting and establishment of native vegetation—grasses, forbs, shrubs and conifers (USFS and NRCS); conifer thinning (USFS); wildlife guzzler installation (USFS & sportsmen's groups); and greater sage-grouse habitat improvement (all).

There are also non-federal investments that add to the restoration activities conducted on federal lands. Livestock permittees have worked to improve their private lands within the forest boundary by developing and fencing springs, constructing stock ponds, and planting willows. Since components of ecosystems such as plants and animals cross ownership boundaries, these improvements enhance ecosystem function across the entire landscape.

This proposal outlines a strategy to accomplish approximately 177,000 acres of restoration in sage steppe and dry forest that would generate a dependable stream of a wood products through long-term stewardship contracts necessary to attract investment in a local biomass or wood pellet facility. The requirements and technology associated with mechanical removal for biomass and sawlogs is a well-established, proven methodology on the forest, and is the basis of our vegetation management program now. This approach is integral to this strategy. Treatments would generate products that would offset some, but far from all, of the restoration costs. Partner funding, appropriated funding, and wood product and bioenergy markets determine the extent of treatment opportunities on the Modoc National Forest. Since the Modoc National Forest funding levels are static to decreasing, it is even more critical to develop sustainable partnerships and product utilization opportunities. Development of local markets would reduce the cost of and expand future restoration treatments as well as reduce future fire-suppression costs. With added industry capacity, additional jobs and job training opportunities would be created. Big Valley Power recently secured funding from the Alliance for Workforce Development, Inc. to help pay for part of the training costs for new power-plant employees. Big Valley Power is also applying for the Lassen County Community Development block grant loan to help fund the sawmill construction.

All restoration treatments to be implemented in the sage steppe are designed to result in an increase in sage-steppe grass, forbs, and brush species resulting in a corresponding upward trend in overall range condition over time. Based on local research, forage production and quality increased eight- to ten-fold depending on the pre-treatment plant composition and post-treatment management. Crude protein levels in desired range plants were 50 percent greater in cut, as compared to uncut, juniper woodlands.

Once there are local outlets for products from restoration activities, future implementation costs are expected to decrease. In addition, there should be a corresponding decrease in fire-suppression costs; see the wildfire section for specifics. Restoration projects would increase, and sustain local employment opportunities related to development of a local pellet plant.

There are opportunities as well to increase community stability by offering employment to youth working on various aspects of restoration. The River Center (Alturas) would employ and train youth for native seed collection. The Youth Conservation Corps could help with the restoration activities that utilize hand-held equipment. Youth from the Cedarville Indian Rancheria are expected to assist with native plant restoration through an agreement with Cultural Advocates for Native Youth.

Small business opportunities have far-reaching benefits for our communities outside of simple employment opportunities. A local contractor, who has been awarded juniper contracts on the forest, produces juniper sawlogs and sells them to REACH, Inc. in Klamath Falls, Oregon. REACH, Inc., a non-profit organization, promotes equality and acceptance of people with disabilities; they produce juniper wood products such as decking, landscape bark, flooring, square posts, peeled poles, paneling, and lumber. Their goal is to teach skills

to people with disabilities, so that they can be productive members of society. The partnership that REACH has built with the community is aimed at encouraging the growth and development of these relationships.

Implementation of restoration activities has a ripple effect by allowing for the education of not only forest users, but also the public as a whole. Working with The River Center to collect native seed is a prime example of how holistic restoration activities benefit partners across the focal area. The River Center is a local, non-profit organization whose mission is to foster natural-resource stewardship and promote the sustainability of the local community. They are able to reach audiences not only through hands-on training programs like their natural resources summer camp and school field trips, but also their interpretative displays at their visitor, interpretive, and resource center. They are an invaluable partner in providing education about the restoration efforts that the federal agencies are engaged in, and the environmental, social, and economic benefits from these activities.

The Modoc County Resource Advisory Committee and Modoc National Forest have funded educational opportunities through the school systems. The Forestry Institute of Teachers is a multi-forest training opportunity, where Modoc County and other teachers are sent to four field locations in northern California for a hands-on workshop. One primary purpose is to instruct the teachers about multiple values of the forest, the competing demands of its resources, and the laws governing these forests. Once the teachers return, they disseminate their information both in the classroom and to their peers. The organizers of the event hope that providing these types of educational opportunities to teachers, especially those from urban environments, will enable us all to utilize these natural resources in a sustainable manner.

The Modoc County Resource Advisory Committee also funded the creation of interpretative panels in coordination with the Highway 139 Ecosystem Restoration Project. The panels, in part, describe watershed and habitat improvement projects; the habitats consist of sage steppe, aspen, and black oak. One panel details the changes that juniper expansion has had on the function of these systems and the importance of treatment. These handicapped-accessible panels and pullouts are located on one of the busiest byways on the Modoc National Forest. We expect them to enhance understanding of restoration efforts for all levels of cognitive abilities and visitor capabilities.

Modoc County is a poor county regardless of which set of statistics you use. The impending end to Secure Rural School funding will place an additional burden on county government. Consequently, the county is becoming proactive in seeking out opportunities that not only create new jobs, taxes and retail sales, but also generate a new revenue stream for the operation of county government. The county views this CFLR proposal as having the potential to help do all of the above.

With the successful implementation of this proposal there would be opportunities for the county to be an active recruiter of a new facility within a short haul of CFLR restoration activities. The use of long-term stewardship contracts, perhaps even partially held by the county, would go a long way in surmounting the largest obstacle to building a facility—the uncertainty of supply. In addition, with the supply questions answered, the county has an option to seek a portion of the construction capital through various lending sources available only for government entities. This would allow a portion of the income to return directly to the county to provide needed services for its citizens.

7. Funding Estimates

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2010 to 2019 to match funding from the Collaborative Forested Landscape Restoration Fund

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2010 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2010 Funding Type	Dollars Planned
FY 2010 Funding for Implementation and Monitoring	1,799,275
USFS Appropriated Funds	1,004,334
USFS Trust Funds	119,480
Partnership Funds	207,951
Partnership In-Kind Services Value	100,000
Estimated Forest Product Value (base rates)	5,200
Other	53,560
FY 2010 Total (total of 1-6 above for matching CFLRP request)	1,500,525
FY 2010 CFLRP request (must be equal to or less than above total)	298,750
Funding off NFS lands associated with proposal in FY 2010 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2010 Funding Type	Dollars Planned
USDI BLM Funds	50,000
USDI (other) Funds	10,000
Other Public Funding	800,000
Non-government Funding	418,500

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2011 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2011 Funding Type	Dollars Planned
FY 2011 Funding for Implementation and Monitoring	3,471,399
USFS Appropriated Funds	1,005,000
USFS Trust Funds	100,000
Partnership Funds	220,000
Partnership In-Kind Services Value	340,000
Estimated Forest Product Value	15,700
Other	55,000
FY 2011 Total (total of 1-6 above for matching CFLRP request)	1,735,700
FY 2011 CFLRP request (must be equal to or less than above total)	1,735,699
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2011 Funding Type	Dollars Planned
USDI BLM Funds	450,000
USDI (other) Funds	
Other Public Funding	1,000,000
Non-government Funding	

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2012 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2012 Funding Type	Dollars Planned
FY 2012 Funding for Implementation and Monitoring	3,380,500
USFS Appropriated Funds	1,005,000
USFS Trust Funds	50,000
Partnership Funds	220,000
Partnership In-Kind Services Value	340,000
Estimated Forest Product Value	20,250
Other	55,000
FY 2012 Total (total of 1-6 above for matching CFLRP request)	1,690,250
FY 2012 CFLRP request (must be equal to or less than above total)	1,690,250
Funding off NFS lands associated with proposal in FY 2012 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2012 Funding Type	Dollars Planned
USDI BLM Funds	425,000
USDI (other) Funds	
Other Public Funding	1,000,000
Non-government Funding	

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2013 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2013 Funding Type	Dollars Planned
FY 2013 Funding for Implementation and Monitoring	3,176,800
USFS Appropriated Funds	1,005,000
USFS Trust Funds	0
Partnership Funds	220,000
Partnership In-Kind Services Value	340,000
Estimated Forest Product Value	23,400
Other	0
FY 2013 Total (total of 1-6 above for matching CFLRP request)	1,588,400
FY 2013 CFLRP request (must be equal to or less than above total)	1,588,400
Funding off NFS lands associated with proposal in FY 2013 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2013 Funding Type	Dollars Planned
USDI BLM Funds	450,000
USDI (other) Funds	
Other Public Funding	1,000,000
Non-government Funding	

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2014 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2014 Funding Type	Dollars Planned
FY 2014 Funding for Implementation and Monitoring	3,175,310
USFS Appropriated Funds	1,005,000
USFS Trust Funds	0
Partnership Funds	220,000
Partnership In-Kind Services Value	340,000
Estimated Forest Product Value	22,700
Other	0
FY 2014 Total (total of 1-6 above for matching CFLRP request)	1,587,700
FY 2014 CFLRP request (must be equal to or less than above total)	1,587,610
Funding off NFS lands associated with proposal in FY 2014 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2014 Funding Type	Dollars Planned
USDI BLM Funds	500,000
USDI (other) Funds	
Other Public Funding	1,000,000
Non-government Funding	

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2015 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2015 Funding Type	Dollars Planned
FY 2015 Funding for Implementation and Monitoring	2,874,992
USFS Appropriated Funds	1,005,000
USFS Trust Funds	0
Partnership Funds	220,000
Partnership In-Kind Services Value	190,000
Estimated Forest Product Value	22,500
Other	0
FY 2015 Total (total of 1-6 above for matching CFLRP request)	1,437,500
FY 2015 CFLRP request (must be equal to or less than above total)	1,437,492
Funding off NFS lands associated with proposal in FY 2015 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2015 Funding Type	Dollars Planned
USDI BLM Funds	600,000
USDI (other) Funds	
Other Public Funding	
Non-government Funding	

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2016 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2016 Funding Type	Dollars Planned
FY 2016 Funding for Implementation and Monitoring	2,883,000
USFS Appropriated Funds	1,005,000
USFS Trust Funds	0
Partnership Funds	220,000
Partnership In-Kind Services Value	190,000
Estimated Forest Product Value	28,000
Other	0
FY 2016 Total (total of 1-6 above for matching CFLRP request)	1,443,000
FY 2016 CFLRP request (must be equal to or less than above total)	1,440,000
Funding off NFS lands associated with proposal in FY 2016 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2016 Funding Type	Dollars Planned
USDI BLM Funds	650,000
USDI (other) Funds	
Other Public Funding	
Non-government Funding	

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2017 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2017 Funding Type	Dollars Planned
FY 2017 Funding for Implementation and Monitoring	2,880,000
USFS Appropriated Funds	1,005,000
USFS Trust Funds	0
Partnership Funds	220,000
Partnership In-Kind Services Value	190,000
Estimated Forest Product Value	25,000
Other	0
FY 2017 Total (total of 1-6 above for matching CFLRP request)	1,440,000
FY 2017 CFLRP request (must be equal to or less than above total)	1,440,000
Funding off NFS lands associated with proposal in FY 2017 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2017 Funding Type	Dollars Planned
USDI BLM Funds	650,000
USDI (other) Funds	
Other Public Funding	
Non-government Funding	

Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2018 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2018 Funding Type	Dollars Planned
FY 2018 Funding for Implementation and Monitoring	2,884,000
USFS Appropriated Funds	1,005,000
USFS Trust Funds	0
Partnership Funds	220,000
Partnership In-Kind Services Value	190,000
Estimated Forest Product Value	29,000
Other	0
FY 2018 Total (total of 1-6 above for matching CFLRP request)	1,444,000
FY 2018 CFLRP request (must be equal to or less than above total)	1,440,000
Funding off NFS lands associated with proposal in FY 2018 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2018 Funding Type	Dollars Planned
USDI BLM Funds	650,000
USDI (other) Funds	
Other Public Funding	
Non-government Funding	

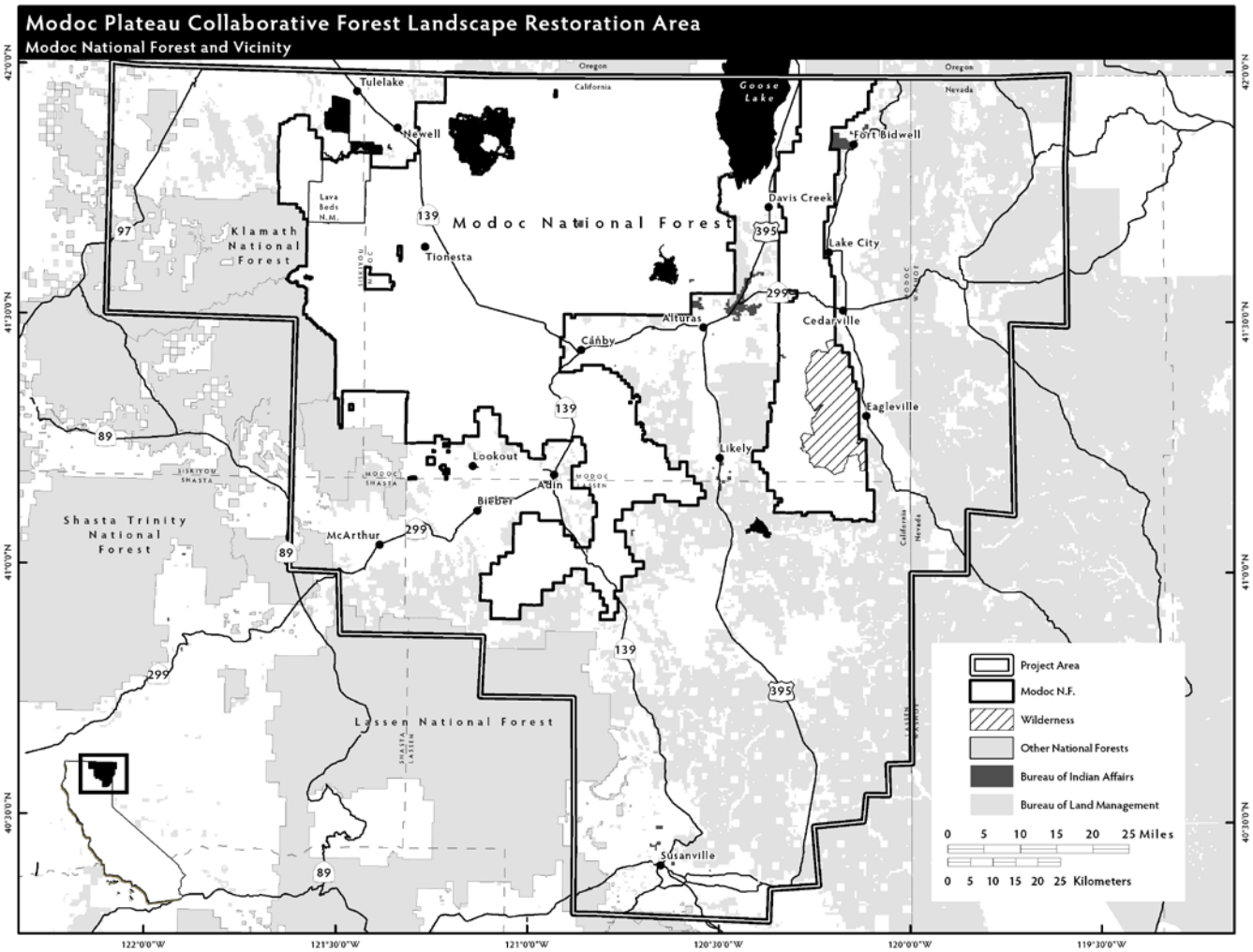
Funds to be used on NFS lands for ecological restoration treatments and monitoring that would be available to FY 2019 to match funding from the Collaborative Forested Landscape Restoration Fund	
Fiscal Year 2019 Funding Type	Dollars Planned
FY 2019 Funding for Implementation and Monitoring	2,882,100
USFS Appropriated Funds	1,005,000
USFS Trust Funds	0
Partnership Funds	220,000
Partnership In-Kind Services Value	190,000
Estimated Forest Product Value	27,100
Other	0
FY 2019 Total (total of 1-6 above for matching CFLRP request)	1,442,100
FY 2019 CFLRP request (must be equal to or less than above total)	1,440,000
Funding off NFS lands associated with proposal in FY 2019 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2019 Funding Type	Dollars Planned
USDI BLM Funds	700,000
USDI (other) Funds	
Other Public Funding	
Non-government Funding	

8. Funding Plan

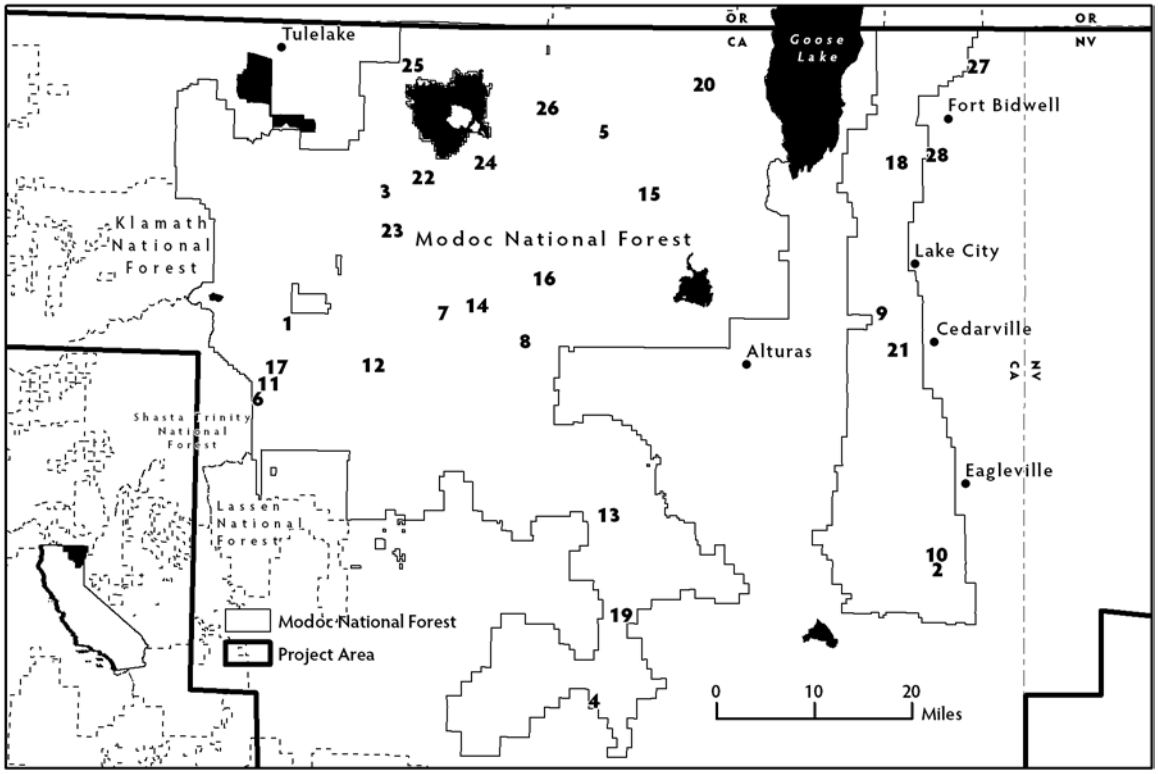
An initial estimate for environmental planning for 2010 is $650,000. Both contract and Forest Service specialists could accomplish these tasks. These funds will come from the Modoc National Forest budget.

See Table 1 in the Proposed Treatment section for specifics for the CFLR funds requested and the targets to be accomplished. See the Pacific Southwest Regional Forester's letter in support of the project.

Map 1. Vicinity map for grant



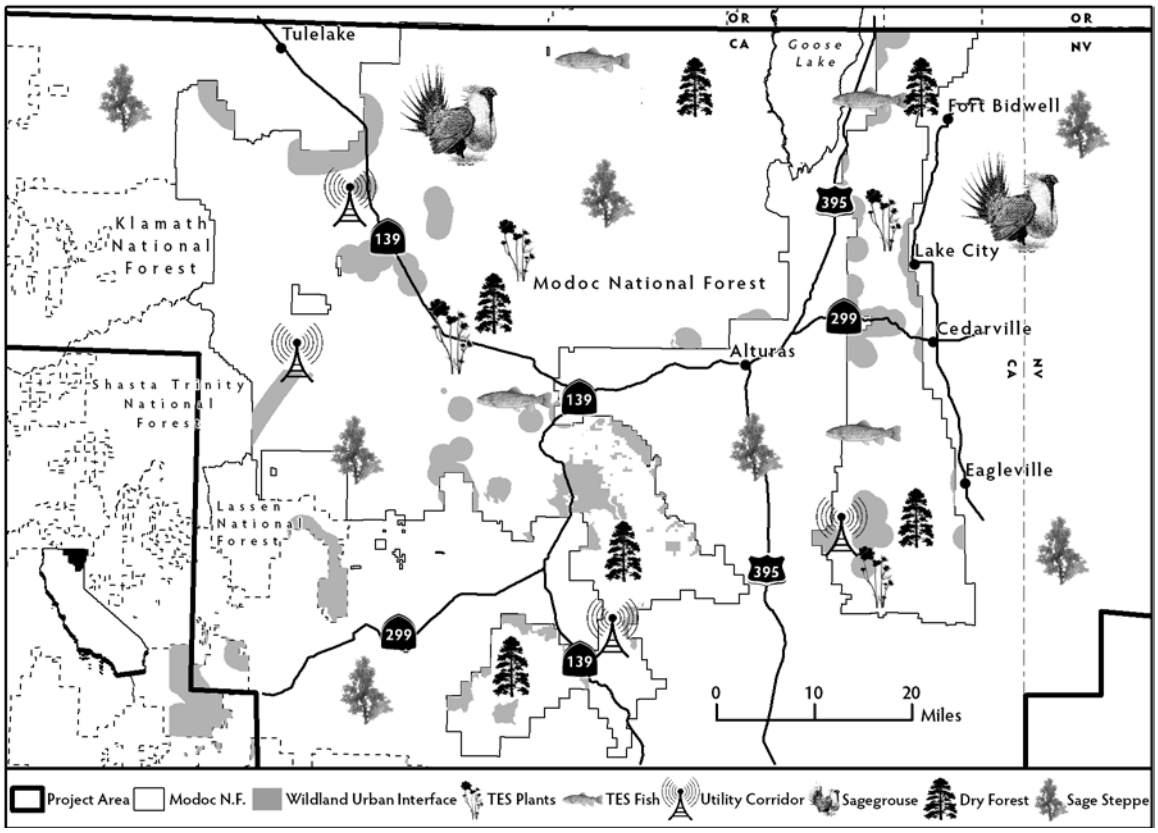
Map 2. CFLR proposed treatments



Project Name	Map Key	Year Implemented
Biyou	1	2010
Bear Aspen	2	2010
Miller Aspen	2	2010
Carr Juniper	3	2010
Lost Sunton	4	2010
Blue ARRA	5	2010
Snell Butte	6	2010
DG Plantation	7	2010
Grouser	8	2011
Cedar Pass	9	2011
Homestead	10	2012
Lava	11	2012
BVDH Plantation	12	2012-2019
Doe 1	13	2013
Doe 2	13	2014
Manzanita	13	2014
Sweagert	13	2015
North Spring	14	2013
Timbered Mtn.	15	2013
Widow	16	2013
Yellowjacket 1	17	2014
Yellow Jacket 2	17	2016
Yellow Jacket 3	17	2019

Project Name	Map Key	Year Implemented
Lassen 1	18	2015
Lassen 2	18	2016
Lassen 3	18	2018
Ash Creek	19	2015
Grizzlie/Elk 1	20	2017
Grizzlie/Elk 2	20	2019
Deep Creek	21	2018
MBS-Phase 2	22	2011
DH-SW	22	2011
Chandler	22	2013
Rimrock Lake	22	2015
Cummins Lake	22	2017
Lone Pine Lake	22	2016
North Dry Lake	23	2014
South Dry Lake	23	2013
Brick Plant	23	2014
Potters	23	2014
Sagegrouse Corridors	24	2011-2019
Fiddler's Green	25	2018
Pothole	26	2019
BLM	27	2010
BLM	28	2010

Map 3. Values at risk



10. Landscape Strategy

Below are the websites for the Sage Steppe Restoration EIS and Devil's Garden Sage-Grouse Working Group.

http://www.fs.fed.us/r5/modoc/projects/sagebrush-restoration-web/FEIS/FEIS%20Index.shtml

http://greatbasin.wr.usgs.gov/LWG/LWGdetail.asp?State=CA&LWG=35