Southwest Jemez Mountains Collaborative Forest Landscape Restoration

Proposal for Funding

Santa Fe National Forest
and
Valles Caldera National Preserve

May 2010

Collaboration Participants

Government Agencies and Tribes	
Los Alamos County, Fire Dept.	USGS Jemez Mountains Ecological Field Station
New Mexico Dept. of Game and Fish	USDA Forest Service
New Mexico ENMRD-State Forestry	USDA-FS Rocky Mountain Research Station
New Mexico Environment Dept, Surface Water	USDA Natural Resource Conservation Service
Pueblo of Jemez	USDI BIA, Northern & Southern Pueblos Agencies
Pueblo of Santa Clara	USDI Fish & Wildlife Service, Ecol. Svc. Field Office
Sandoval County, Fire Dept.	USDI NPS Bandelier National Monument
Soil and Water Conservation District, Cuba	Village of Jemez Springs
US DOE Los Alamos National Laboratory	

Non-Government Organizations	
Cuba Regional Economic Development Org.	Northern Arizona University
Forest Guild	Restoration Solutions
Four Corners Institute	Rocky Mountain Elk Foundation
Hawks Aloft	The Nature Conservancy, New Mexico
La Cueva Volunteer Fire Dept.	Thompson Ridge & Sierra de los Pinos POAs
Las Comunidades	Trout Unlimited, Truchas Chapter
Mid-Region Council of Governments	University of Arizona
National Wildlife Federation	University of New Mexico
NM Forest &Watershed Restoration Institute	USA Firewise, Gr. E. Jemez WUI Working Group
NM Forest Industry Association	Valdez Logging
NM State University	Valles Caldera Trust
NM Trout	WildEarth Guardians
Northern NM College, Forestry Dept.	Wild Turkey Federation

Contents

1. Proposed Treatment- Executive Summary

This section provides a summary of the Collaborative Forest Landscape Restoration Strategy (CFLR) strategy developed for the Southwest Jemez Mountains (SWJM) area. A more detailed description is in section12-Landscape Strategy.

The SWJM landscape area comprises 210,000 acres in the Jemez Mountains of central New Mexico (NM). The area is predominantly (93%) forested National Forest System (NFS) lands that are managed under two distinct land management jurisdictions: the US Forest Service-Santa Fe National Forest (52%) and Valles Caldera Trust-Valles Caldera National Preserve (41%). The remainder is owned by private landowners (4%) and the Pueblo of Jemez (3%). The SWJM area is in Sandoval County, where population growth has boomed over the past decade (36%). Clean, abundant water from this Jemez River watershed area is critical to numerous small communities and the greater Albuquerque-Rio Rancho area. (Refer to the vicinity map on the cover page, and Figure 11.1 showing a map of the SWJM area and land jurisdictions).

This SWJM area, primarily composed of the Upper and Middle Jemez River Watersheds and some additional lands, has been consistently identified as a top priority for ecological restoration treatments in a variety of assessments, including the Southern Rocky Mountains EcoRegional Assessment (TNC 2000), NM Unified Watersheds Assessment (NMED 2002), Forest-wide Watersheds Prioritization Assessment (USFS 2008), Community Wildfire Protection Plan (Sandoval County's 2008), NM Statewide Natural Resources Assessment (NM State Forestry 2010), and others. (Documents available on the SWJM restoration website)

***Goal**: improve the resilience of ecosystems to recover from wildfires and other natural disturbance events in order to sustain healthy forests and watersheds for future generations.*

***Objectives**:*

- *Reduce the risk of uncharacteristic wildfire*
- *Restore natural fire regimes*
- *Increase forest diversity and old growth characteristics*
- *Improve fish and wildlife habitat*
- *Improve water quality, and watershed functions*
- *Mitigate climate change impacts*
- *Utilize woody by-products*

The Santa Fe National Forest (Forest), Valles Caldera National Preserve (Preserve), and a very diverse mix of stakeholders easily reached consensus on the critical and urgent need for ecological restoration in this particular SWJM area. Using detailed assessments of ecological conditions, scientific research, and fire behavior models, we worked together to define restoration goals and objectives (see text box) and identify and prioritize treatments. We used the collaboratively developed New Mexico Forest Restoration Principles to guide treatment designs.

The SWJM strategy will undertake a wide variety of coordinated and integrated treatments involving forest thinning, prescribed fire, management of natural fires, road closures and decommissioning, riparian zone restoration projects, and fisheries and wildlife habitat improvement projects. These efforts will be conducted over many ecosystems, from grasslands and low elevation piñon-juniper woodlands to upper montane coniferous, sub-alpine and alpine forests. Past treatments in the area were more narrowly focused on hazardous fuel reduction or single resource needs, and conducted on small, disconnected parcels of land by each land jurisdiction. This SWJM treatment strategy prioritizes and integrates multiple ecosystem restoration needs across a large, complex landscape and different administrative boundaries.

The strategy primarily emphasizes recovering the resilience and adaptive capacity of all ecosystems within a large, contiguous, relatively unfragmented landscape. It reduces hazardous fuels, produces wood by-products, diversifies forest structure and species composition, and re-establishes natural fire regimes in order to sustain healthy forest and watershed conditions for future generations. This strategy is designed to fundamentally shift this entire contiguous forested landscape toward supporting characteristic wildfire regimes, native wildlife species, clean, abundant water flows and other desired conditions within a 10-year period. This strategy should yield tremendous long-term ecological, social and economic benefits to New Mexico's citizens and visitors.

The following paragraphs briefly summarize the proposed treatments, strategic locations, and desired outcomes, assuming just over 9 years of implementation, from the end of fiscal year 2010 through 2019 (see section 12-Landscape Strategy for details).

In all forested ecosystems, based on natural fire regimes, we will use combinations of thinning and prescribed burning on a total of 156,403 acres of NFS land, and on 10,140 acres of non-NFS land on Jemez and Santa Clara Pueblos (Pueblos) and Bandelier National Monument (Bandelier). This includes:

- Thinning 87,493 acres NFS land and 2,910 acres non-NFS in irregularly-spaced patterns based on forest type, fire regime, aspect, habitat needs, and other factors. Of those acres, merchantable wood can be harvested from 62,000 acres of NFS land and 680 acres non-NFS land. Remaining slash (tree tops, limbs) will be lopped-scattered or piled. When dried, slash will be burned.
- Using prescribed fire to maintain some pre-treated and open areas as well as to modify stand conditions in some steep higher elevation sites; on 68,910 acres NFS land and 7,230 acres non-NFS land. Naturally-ignited fire will be used where forest conditions will safely support a low intensity surface fire.

All thinning and burning treatments are strategically located and prioritized in areas having the most highly altered fire regime condition class (FRCC 2 to 3), emphasizing drier aspects and ridgetops to mimic historic fire patterns. These treatments will promote more open canopies on drier aspects and sites, with higher density patches retained on north slopes, canyon bottoms, and high elevation spruce-fir forests. These treatments are further prioritized and located to improve threatened, endangered and sensitive (TES) species habitat in this landscape, as well as to promote old growth conditions.

The strategy includes closing and decommissioning excess roads, especially where they are causing resource damage. No new roads will be constructed, and temporary roads that are used will be decommissioned after use. Some roads will be improved to support wood product removal.

This strategy includes treatments on adjoining Jemez Pueblo, Santa Clara Pueblo, and Bandelier National Monument (Bandelier) lands. Some of the thinning, burning, and riparian restoration treatments span across different jurisdictional boundaries. The thinning and burning treatments on non-NFS lands are important to this landscape strategy due to the continuity of highly altered forest conditions in ponderosa pine and dry mixed conifer forests across administrative boundaries, logical fuelbreak locations, scheduling needs, and the prevailing winds that would promote crown fire spread from the NFS lands directly into Santa Clara Pueblo, Bandelier, Los Alamos, and Los Alamos National Laboratory (a $6 billion dollar complex of nuclear research facilities). Thinning and burning acreage on non-NFS land (10,140 acres) that is included in this landscape restoration strategy is as follows:

- Bandelier National Monument (4,140 acres)
- Santa Clara Pueblo (2,230 acres)
- Jemez Pueblo (3,770 acres).

Desired outcomes include increasing: vertical and horizontal structural diversity; old growth characteristics including large trees, snags and logs; herbaceous understory vegetation, meadows and

grasslands; aspen patches; fire-adapted species; habitat diversity and suitability for TES wildlife species; water infiltration and availability; and long-term soil productivity.

Riparian ecosystem restoration treatment activities primarily involve removing small conifers, revegetating bare soils, stabilizing streambanks, and planting riparian vegetation in selected locations along the streams and in riparian ecosystem within this landscape. These riparian restoration treatments will occur on 245 acres on the Forest, 55 acres on the Preserve, 60 acres on Santa Clara Pueblo, strategically prioritized where there is severe water quality and riparian ecosystem degradation, especially in habitat for TES fish, amphibians, birds, and small mammals.

Other restoration actions to be used on the NFS lands, are listed below. They are located and prioritized based on the degree of impact to riparian areas, water quality, TES fish and wildlife, and heritage resources. They are primarily in riparian areas and some will be conducted in conjunction with previously described riparian restoration treatments. Some of these activities will also be implemented in upland forested ecosystems and specific wildlife habitat areas.

- Invasive plant control (1500 acres)
- Road and trail decommissioning, rehabilitation, closure, and improvement (1600 miles)
- In-stream aquatic-fish habitat structures (along 27 stream miles)
- Reintroduction of native trout (at least 4 stream miles)
- Water tank decommissioning, repair, or new installations for riparian and wildlife habitat improvement purposes (94 water sources)
- Riparian exclosure fences and barriers to limit cattle, elk and human uses (15 miles)
- Conservation education, focused on reducing damaging activity in riparian areas

Desired outcomes of these riparian and associated other restoration activities include improving: native plant communities and biodiversity; soil productivity and water quality; natural moisture regimes and water availability; stream meandering and pool formation; fish migration; properly functioning aquatic and riparian habitat characteristics; and TES species abundance and diversity.

The strategy integrates multiple ecosystem and habitat needs in a variety of treatments across six different land jurisdictions within one large, contiguous landscape

Additional restoration treatments will likely occur on some private land in-holdings, through our partnerships with willing landowners, State Forestry, National Resource Conservation Service (NRCS), and the Soil and Water Conservation District (SWCD). Other complementary restoration treatments that support this strategy are planned on adjacent forest lands, including treatments planned by interagency groups on Los Alamos County and Laboratory lands to the north and east, other Forest lands to the north and west, and Jemez Pueblo land to the south.

Past and on-going restoration treatments conducted in this area complement the SWJM strategy and demonstrate a high potential for continued success. These include thinning and burning over 10,000 acres, aquatic and riparian ecosystem restoration actions on over 10 miles of stream and streamside habitat (through Respect the Rio, EPA-319 grants, and other partnerships), fuel reduction projects on 57 private properties through State Forestry/Firewise programs, wildlife habitat improvement- Habitat Stamp projects, and management of recreation and cattle grazing activities to reduce impacts to water, riparian, wildlife and fish.

Implementation involves using a wide variety of grants and cost-sharing agreements among our numerous partners, interagency crews and volunteers. Thinning will primarily be conducted through stewardship contracts, along with CFRP projects or other partnership agreements. Qualified federal,

state, county and tribal fire fighting resources are locally available to conduct prescribed fire operations. A broad workforce will help implement and monitor treatments, including grantees and volunteers from conservation organizations, scout groups, Youth Conservation Corps, schools, and outdoor recreation clubs, as well as permit-holders, prisoners, property owners, and others (described further in other sections of this proposal).

National Environmental Policy Act (NEPA) analyses and decision documents are completed that cover the first 1 to 3 years of proposed restoration treatments on NFS land, and all proposed treatments on non-NFS lands (displayed on a map in the Landscape Strategy section, and in documents on the SWJM website). In 2011, Forest and Preserve managers will have completed NEPA decisions on treatments proposed for the next few years, and subsequent NEPA decisions will be completed at least 1 to 2 years ahead of the implementation schedule. Likewise, mandatory surveys will be completed well ahead of when implementation funds are received. Additionally, the consensus and trust that has been established through the on-going collaborative process should foster the timely completion of remaining NEPA decisions with a low risk of appeals or litigation.

A multi-party monitoring and adaptive management plan was collaboratively developed and will be collaboratively implemented by numerous partners (section 13. Monitoring and Adaptive Management). It is built on an established multi-party monitoring program that includes 50 permanent monitoring sites, five climate stations (including a NOAA station that is part of a global climate change monitoring network), two carbon flux towers, a series of riparian exclosures, and a system of water quality and quantity instrumentation. Using state-of-the-art approaches, restoration partners will measure and evaluate the extent and rate to which restoration treatments are reducing the risk of uncharacteristic wildfire and restoring natural fire regimes, reducing invasive species, improving wildlife and fish habitat, restoring water quality and watershed functions, maintaining or promoting old growth conditions, mitigating climate change impacts, and utilizing woody by-products. Results from monitoring will be used to modify treatment prescriptions as needed, and analyze cumulative effects at the landscape level. Success will be measured by determining the change in conditions and trends for each monitoring element, tied to each restoration objective. Changes can be gauged in consideration of the extensive data available on historic fire regimes, distributions of plants and wildlife species, long term water quality and availability, and other ecosystem conditions. Success will be measured through a carefully-designed network of replicated monitoring plots, untreated control areas, and other experimental design methods to evaluate the restoration strategy as a whole across the landscape. Monitoring will continue for at least 15 years after project implementation commences. Partners will prepare and review monitoring and evaluation reports, to develop adaptations and publish peer-reviewed literature on lessons learned. Refer to the Monitoring and Adaptive Management section.

2. Ecological Context

Restoration Needs

Collaborators involved in developing this restoration strategy identified the ecological context and restoration needs for this area based on various landscape assessments, scientific research, and other documents that describe the current conditions that depart from historic reference conditions (available on the SWJM website). These documents show that fire regimes have been radically altered in this area and ecosystems are in an unsustainable condition.

The forest ecosystems that dominate this area, primarily ponderosa pine and dry mixed conifer forests, and to a lesser extent the piñon-juniper, have significantly departed from historic reference conditions. Nearly the entire forested landscape is in fire regime condition class (FRCC) 2-3, moderately to highly

departed, which poses a serious risk of uncharacteristically large and intense wildfires and loss of key ecosystem components. These arid forests were historically much more open and clumpy than they are today. Over 80% of the ponderosa pine and 93% of mixed conifer are in a homogenous, mid-age, closed canopy state. The ponderosa pine and dry mixed conifer forests that were dominated by large fire-resistant tree species are now dominated by small fire-intolerant trees. These forests have experienced a substantial decline in mature and old growth structures, open meadows, aspen, and understory grasses, forbs and shrubs. For example, the proportion of ponderosa pine forest in a late-successional open-canopy condition is 3% currently as compared to over 60% historically, and 98% of the ponderosa pine ecosystem is in FRCC 2-3 (82% FRCC 3, 16% FRCC 2). (See FRCC and crown fire risk maps and documents on the SWJM website).

This landscape has lost its ecological resilience and become highly susceptible to significant losses from wildfires, insect and disease outbreaks, and climate-change impacts.

The extensive closed canopied forests intercept and sublimate the snowfall so it never reaches the forest floor. Surface vegetation and water availability have severely declined, and soil erosion rates have greatly increased. Ecologically departed conditions increase the forest susceptibility to damage from insect and disease outbreaks, and over 60,000 acres have already experienced tree defoliation or mortality from insects or diseases over the past decade. Wildlife habitat is degraded and declining for over 25 TES species that occupy or have potential habitat in the area. Native wildlife species that were adapted to more open and diverse forest conditions have drastically declined and current conditions indicate a high risk of a large high-severity wildfire (over 10,000 acres in size) that would result in a long term loss of forested habitat.

Riparian ecosystems, including large wet meadows are severely degraded and impacting important TES fish and wildlife habitats and water quality, primarily due to recreational uses, roads, grazing, invasive plants, and conifer encroachment. Over 1400 acres of NFS lands in this area are dominated by invasive non-native plant species (10 different species), primarily in the riparian corridors of lower elevation streams. Over 1200 miles of primitive roads in the Preserve and 400 miles on the Forest are in excess of public access needs and adversely impacting streams, wildlife, and other resources. Many are in poor condition and cross drainages without adequate stream protection. Most of the 96 miles of perennial streams in the area do not meet water quality standards, with primary concerns being excess sediment and temperature. They also do not meet standards and guidelines for aquatic and fish habitat conditions (Forest Service stream inventory handbook), primarily due to an excess of sediment in riffles, insufficient pool development, and lack of large woody debris. Native Rio Grande cutthroat trout have been eliminated, largely due to the non-native (invasive) rainbow and brown trout. The highly altered forest vegetation and hydrologic regimes have reduced the quality and abundance of water that is so critical to sustaining the natural resources in the area as well as to the municipal water supplies for the large populations living directly downstream.

This landscape has continuously been ranked as a top priority for restoration by a variety of groups. The Southern Rocky Mountains Eco-Regional Assessment identified the Jemez Mountains as a critical conservation area for preserving the region's biological diversity (TNC 2000). The State's Unified Watersheds Assessment and Jemez Mountains Watershed Restoration Action Strategy classified this Jemez Watershed area as Category 1- in most urgent need of restoration (NMED 2005). A State-wide Climate Change Vulnerability Assessment identified the Jemez Mountains a priority area for monitoring climate change impacts, as it has both a high climate change exposure (significant warming and drying trends) and high density of species vulnerable to climate change compared to other parts of New Mexico (TNC 2008). Documented trends involving larger than normal wildfires, bark beetle outbreaks, forest dieback, and wildlife population declines may be exacerbated by climate change impacts.

Fire behavior models show a high probability of a large stand-replacing fire occurring in the area in the near future, and over 90% of the Forest and private lands in the area are in a wildland urban interface (WUI). The Sandoval County Community Wildfire Protection Plan identifies several "at-risk communities" in the SWJM area and ranks the area as a top priority for reducing the risk of uncharacteristic wildfire (Sandoval County 2008). The 2010 Statewide Natural Resources Assessment analyzed and ranked this area as a top priority in the State for restoring forest and watershed health (NM-ENRND 2010).

Treatments Addressing Restoration Needs

The SWJM strategy proposes a variety of treatments to address the key ecological trends and threats to forest and riparian ecosystems. Proposed riparian and aquatic habitat treatment actions will substantially improve fish and wildlife habitat, especially for TES species. Riparian treatments such as: eliminating invasive non-native plants and conifers; planting native riparian plants; revegetating barren areas; installing riparian exclosure fences and upland water developments; stabilizing streambanks; eliminating unneeded roads/trails; and using education materials and programs, are expected to substantially improve riparian and wet meadow resilience and habitat diversity for many species, including New Mexico meadow jumping mouse, northern leopard frog, beavers, and many riparian-dependent birds and small mammals. The combination of riparian and aquatic ecosystem treatments will increase or improve habitat for four sensitive fish species in 60 miles of streams, potential Rio Grande cutthroat trout habitat in 28 miles of streams, riffle and pool quality, channel structure, stream temperatures, water quality, fish spawning habitat, and macroinvertebrates.

Treatments are designed to improve terrestrial wildlife habitat for a wide variety of native species. Removing conifers and restoring historic meadows and grasslands, and increasing forest openings filled with herbaceous vegetation will greatly improve foraging habitat for northern goshawk, Mexican spotted owl, peregrine falcon, and other TES species, as well as for deer, elk, bear, small mammals and many bird species. The thinning and burning treatments will significantly reduce the risk of losing forested habitat in a stand-replacing fire, while increasing foraging habitat. These treatments will increase structural diversity and promote mature and old growth forest conditions currently lacking on this landscape. Treatments provide opportunities to improve habitat quality within portions of 15,000 acres of suitable spotted owl habitat and 2,100 acres of protected activity centers; over 60,000 acres of potential northern goshawk habitat and 5900 acres of goshawk nesting/post-fledgling areas, and 26,000 acres of peregrine falcon nesting and foraging zones. Treatments will regenerate aspen in scattered areas within approximately 7000 acres of aspen/mixed conifer forests. Treatments will maintain or improve habitat for Jemez Mountain salamander in selected locations within approximately 18,000 acres of occupied or potential habitat, such as by increasing the amount of downed logs and reducing the risk of stand-replacing fires. Throughout the landscape, treatments will increase the relative abundance of large trees, snags and downed logs, which will benefit many different species. Increasing the proportion of open canopied forest, understory plants, aspen, and old growth structures are all important habitat components that are currently deficit in relation to reference conditions. Treatments in TES species habitat will be designed in close coordination with US Fish and Wildlife Service and NM Game and Fish, and will follow the applicable TES species recovery or conservation plans, along with forest plan standards and guidelines.

Water quality and watershed function will be greatly improved by proposed treatments. Water quality and watershed conditions will be less susceptible to a large, high-intensity fire causing severe floods and mass movement of soil and ash into stream channels. Water quality and hydrologic functions will also be improved by: removing invasive plants and increasing native plant communities; creating forest openings that allow precipitation to infiltrate into the soil; increasing ground vegetation that reduces soil erosion and stream sedimentation while increasing soil productivity; eliminating primitive roads/trails

along streams; stabilizing streambanks; revegetating denuded soils; and reducing camping, parking, driving, and cattle grazing along streams.

Invasive/exotic plant populations will be greatly reduced on over 1,400 acres of NFS lands where they are known to occur, and on additional sites where and when they are newly discovered. We will work with willing landowners and partners (State, NRCS, and SWCD) to reduce invasive plants on intermixed private lands. Treatments will reduce the abundance of Siberian elm, Russian olive, tamarisk, and other exotic species that are degrading riparian ecosystems, while increasing native riparian plant communities. Treatments will also reduce the thistles, cheatgrass, and other exotic plants occurring along roads and other disturbed sites. Additionally, project implementation will include methods to reduce the potential for introduction or spread of invasive plants, such as by requiring pressure washing of vehicles and equipment before they enter NFS lands to conduct treatments.

Roads and trails causing damage to water quality, TES species habitats, and other natural resources will be decommissioned, rehabilitated, closed or improved to reduce those impacts. In particular, the 1200 miles of roads to be eliminated on the Preserve should greatly improve conditions in the headwaters of this Jemez watershed. The forest-wide travel management decision, expected by the end of 2010, will be used to prioritize road and trail treatments for this strategy, while reducing off-road travel impacts.

Expected Outcomes

The combination of treatment activities will have synergistic results in restoring resiliency to ecosystems on this landscape. The restored landscape will be significantly more diverse, dominated by a mosaic of different forest age-classes and densities. The ponderosa pine, dry mixed conifer and piñon-juniper forest types will be dominated by large fire-adapted species, variable-size canopy openings, and an understory of herbaceous vegetation. Reducing conifer density, particularly in historic meadows, grasslands, riparian areas, and aspen stands, will reestablish these vital ecosystems, improve water quality and availability, and restore habitat for many TES species. Patches of young aspen will emerge from within the mid-elevation forests, and there will be an abundance of large downed logs and snags. The north slopes and higher elevation spruce-fir forests will retain greater proportions of closed canopy forest, with increased structural complexity that can recover from infrequent mixed-severity fires. The structurally, compositionally, and biologically diverse landscape will support a richer array of native flora and fauna, much more productive soils, and natural hydrologic functions.

The thinning and prescribed fire treatments will restore forest conditions that allow fire to play a natural and beneficial role in sustaining ecosystem resiliency. The restored landscape will have a significantly reduced risk of experiencing a large high-severity wildfire, thereby providing the best protection against damage to water quality, wildlife habitat, heritage resource sites, homes and communities. Increases in forest ecosystem resilience will help sustain these forest and watershed resources despite potential climate change impacts that are hypothesized to result in significant warming and drying trends in the southwestern U.S. In summary, proposed treatments will restore resilient, adaptive forests that survive endemic insect and disease outbreaks, frequent wildfires, droughts and climatic change impacts without severe damage or loss of ecological, social, or economic values.

3. Collaboration

Collaborators who developed the SWJM strategy represent a broad range of perspectives and values, and include parties who have been collaborating on forest and watershed management in the SWJM area for the past decade. They have become not only cooperators but active forest restoration partners, including groups with a previous adversarial relationship with the Forest Service. Their capacity to partner with managers on the Forest and Preserve has greatly expanded over the past 10 years as they

worked together on landscape and watershed assessments, research studies, land management policies and restoration projects in the area (see Collaboration Participants). The recent collaboration to complete this SWJM strategy and proposal was an exhilarating peak in a long upward journey together. It showed how the years of collaborative efforts could be synthesized to create a highly integrated strategic plan to accelerate the restoration of this large landscape.

Cross-jurisdictional partnerships in the Jemez Mountains were mobilized and intensified in 2000 by the Cerro Grande Fire that swept through 45,000 acres of forest and the city of Los Alamos, directly adjacent to the SWJM area. Representatives of the Forest, Preserve, Jemez and Santa Clara Pueblos, Bandelier National Monument, Los Alamos National Lab (LANL), Los Alamos County, and others teamed up to rehabilitate the fire-ravaged lands and reduce the future risk of large high-intensity wildfires in the Jemez Mountains. This led to the Jemez Mountains Fire Learning Network, a highly diverse collaborative group that completed an assessment of ecosystem conditions and restoration needs in the SWJM/Jemez Watershed area (TNC 2003). In 2004, the State Environment Department convened the Jemez Watershed Group collaborative that completed a watershed conditions assessment and Watershed Restoration Action Strategy (WRAS) for this area (NMED 2005). Restoration goals and objectives from the FLN and WRAS reports were used in developing the SWJM restoration strategy (those documents are available on the SWJM website). From 2001-2007, seven successful Community Forest Restoration Program (CFRP) projects were collaboratively designed and initiated in the SWJM landscape, based on the New Mexico Community Forest Restoration Act of 2000. These projects involved a high level of collaboration among agencies, tribes, conservation groups, research scientists, landowners and business partners to plan, implement and monitor. They demonstrate a variety of restoration prescriptions and contract mechanisms, involved youth groups and stimulated local rural economies. They provided important research on old growth ponderosa pine, hazardous fuel reduction, goshawk habitat restoration, changes in water yield, small wood utilization, beaver habitat restoration, wetland firebreaks, and job creation for youth.

In 2008 to 2010, other highly collaborative efforts in the SWJM area integral to developing the SWJM strategy included the following (documents available on SWJM website):

- Completing a Community Wildfire Protection Plan the covers the area (Sandoval County 2008)
- Planning and initiating several wetland and riparian area restoration projects (Respect the Rio and San Antonio Wetlands)
- Planning and implementing a comprehensive, multi-faceted restoration education program
- Developing a Climate Change Adaptation Planning Framework of strategies to reduce climate change impacts by enhancing the resilience of forests and watersheds
- Developing the Statewide Natural Resources Assessment that further analyzed conditions and restoration needs, highlighting the urgent need for restoration in the SWJM landscape
- Developing management protocols for Jemez Mountain salamander that blend forest restoration treatments with salamander habitat objectives

Collaboration specific to developing the SWJM strategy was clearly built on the foundations established for collaborative forest restoration in this area over the past 10 years. Then, starting in 2008, the Forest and VCT met regularly to accelerate forest and watershed restoration in the SWJM area and lead development of a landscape strategy based on the Forest Landscape Restoration Act. The New Mexico Forest and Watershed Restoration Institute (NMFWRI) and TNC joined in, and these four entities became the “lead restoration partners” group that led the collaborative strategy development process. While the Forest and Preserve scientists completed assessments of the SWJM landscape conditions, the

lead partners group completed a Collaboration Plan and reached out to potentially interested collaborators. Other collaboration actions completed in 2009-2010 specific to creating the SWJM strategy and proposal are summarized as follows:

- Met with many stakeholder groups, including industry and environmental groups, state agencies, tribes, counties, homeowners associations, and rural economic development groups
- Used phone calls and email exchanges to actively engage and dialog with over 15 government and 20 non-government organizations about the SWJM restoration strategy
- Developed and widely distributed a status report (newsletter) describing the SWJM restoration project and how to get involved
- Created and managed an interactive SWJM restoration website that includes draft documents and maps for public review, public comment forms, participation interest surveys, status reports, how to get involved, questions/answers, other weblinks, and more
- Conducted a field trip to demonstration areas and restoration challenge areas (Oct. 2009)
- Worked with adjacent land managers from Pueblos and Bandelier to partner on planning, implementing, and monitoring forest restoration treatments across administrative boundaries, where needed for the SWJM landscape strategy, and pulled their GIS inventory data into the Forest database for this project
- Engaged leading southwestern forest ecology research scientists to help develop and review the strategy, as part of a unique on-going partnership between research and land managers
- Held a 3-day facilitated workshop with over 60 participants representing over 30 different organizations, agencies and tribes; collaboratively developed a restoration vision of success, and restoration needs, goals, objectives, and identified and prioritized treatments and locations
- Formed smaller working groups that continued working together through April 2010 to complete the treatment strategy and cost analysis, wood products utilization analysis, multi-party monitoring plan, implementation and funding plans
- Created a comprehensive multi-party monitoring strategy that includes many non-Forest Service partners who will have roles in monitoring the SWJM strategy, consolidating and evaluating data, identifying adaptive changes, and completing annual reports

Past and on-going collaboration among very diverse parties is one of the unique strengths of the SWJM restoration strategy, along with the research-land management partnership. The workshops stimulated group cohesion and a heightened level of collaboration, focusing on common goals for the Jemez Mountains. In developing the SWJM strategy, collaborators were able to quickly agree on their participation roles, group structure, and ground-rules for working together. The collaborative group adopted objectives from New Mexico Forest Restoration Principals and Title IV-Forest Landscape Restoration Act to guide the treatment strategy, as they were found to be consistent with objectives from the ecosystem assessments. The on-going collaboration built a sense of trust, teamwork and unity around common set of forest and watershed restoration objectives, which yielded a consensus-based strategy for restoring the SWJM landscape. Partners invested considerable time and funding to contribute to this restoration strategy and are committed to continued involvement.

4. Wildfire

Scientists from the USFS-Fire Sciences Lab and other interagency professionals analyzed potential fire behavior on this landscape using Landfire, FlamMap, and other modeling tools (see Landscape Strategy Scientific Methods sections). The FlamMap analysis showed approximately 77,000 acres (37%) of the SWJM area is susceptible to crown fire behavior (active or passive) under severe fire weather (95th percentile). Fuel inventory data and observations of past fires in the area suggest an even greater proportion of this landscape supports crown fire behavior under those conditions. The PROBACRE computer modeling tool indicated a 65% chance of a very large fire (over 4000 acres) in this area within the next 20 years. The FRCC analysis and map show approximately 60% of the Forest land in the area, dominated by ponderosa pine, dry mixed conifer and piñon-juniper, is in fire regime condition class (FRCC) 3, which is highly departed from historic conditions and appears likely to support crown fire spread. Another 38% is in FRCC 2-moderately departed. On the Preserve land, 15% in FRCC 3 due to the higher elevation forest ecosystems, although 75% is in FRCC 2, as those ecosystems are moderately departed. The moist meadows and wetlands in the Preserve should be relatively resistant to fire spread. Modeling fire spread in the SWJM area indicates that within just 6 hours a crown fire can be expected to consume 900-3,000 acres with rates of spread between 2-4 miles per hour (or up to 12,000 acres per day). The Cerro Grande (2000) fire burned in similar forest conditions on adjacent lands, consuming 45,000 acres and devastating the city of Los Alamos.

The risk of uncharacteristic wildfire will be substantially reduced, especially in the ponderosa pine and dry mixed conifer forests, through the combination of thinning and use of prescribed fire. Areas infeasible to mechanically thin will be treated using mixed-intensity prescribed fire, once adequate fuelbreaks are established. Unplanned natural ignitions will be used as another prescribed fire method to meet objectives in sufficiently opened areas that support low intensity fire, when conditions are determined to be safe. Treatments will reduce surface fuels and disrupt horizontal and vertical continuity of fuels. Thinning and burning treatments were prioritized and strategically located based primarily on the following criteria: (a) emphasize locations that mimic historic fire patterns on this landscape, such as on drier south aspects in all ecosystems, and in ponderosa pine and dry mixed conifer ecosystems that are the most departed from reference conditions (in FRCC 2-3), and (b) emphasize locations that help protect WUI communities based on CWPPs. Areas of lower priority for thinning or burning included the moist north aspects, drainage bottoms, and high elevation forests that are in FRCC 1-2. Treatments will result in a very patchy mosaic of forest densities and successional classes. Results will be monitored and fire behavior models used to analyze effectiveness and adjust treatment prescriptions as needed.

Natural fire regimes will be reestablished with repeated prescribed burns using historical fire return intervals as a guide to determine appropriate frequencies. In areas where forest density, fuel arrangement, or tree size compromises prescribed fire effectiveness or safety, mechanical treatment will be done prior to burning. Eventually, conditions in the pine and dry mixed conifer forests should support more frequent fires that are mostly surface fires. Wildfire behavior in the restored landscape can be expected to mimic fire behavior prior to about 1880 in this area, when fires in ponderosa pine forest burned about 1-2 times per decade. Wildfires would be expected to continue to burn with a wide range of intensities and rates of spread depending on fuel type and topography. Wildfire behavior in the mixed conifer/aspen type will be predominately surface fire with varied intensities and rates of spread with patchy torching. Wildfires in the higher elevation spruce and fir forests in the Preserve can be expected to continue to burn less frequently and at higher intensities, adding to the patchiness and diversity of forest structure and species composition across the landscape.

A restored landscape will provide more opportunity to manage unplanned ignitions other than with full suppression, consistent with the Forest's Fire Management Plan and other policies, guided by the Wildfire Decision Support System (WFDDS). Full suppression may still occur if the fire begins under conditions where private property is at risk or public safety is compromised. However, unplanned ignitions can be managed as prescribed fires and will gradually be used more as a tool for maintaining restored forest and meadow ecosystems in this area.

In developing this landscape strategy, the collaborators reviewed and used the Sandoval County Community Wildfire Protection Plan (CWPP), especially to identify particular areas of concern for prioritizing treatments. The CWPP shows that about 75% of the Forest land within the SWJM area is in a Wildland Urban Interface (WUI), due to the numerous at-risk communities, public facilities and domestic water sources intermixed with dense forests— all at risk of a severe wildfire. The collaborators also considered information in these CWPPs covering adjacent lands: Greater Cuba Area CWPP, Los Alamos County CWPP, and Santa Clara Pueblo CWPP. The Los Alamos CWPP and Santa Clara Pueblo CWPP were used to extend and prioritize treatments on Bandelier and Pueblo land, as part of this SWJM strategy. Those adjoining lands to the northeast, including LANL, are highly vulnerable to crown fire spread from NFS land in this area due to the prevailing wind direction. The strategy was designed to be consistent with the goals, objectives, and priorities laid out in the applicable CWPPs.

Restoring this large landscape toward fire regime conditions class 1 will make it more resilient to wildfire such that most fires will burn as surface fires. There will be many fuelbreaks and conditions across this landscape should support natural fire regimes. This should significantly reduce the cost of wildfire suppression, burned-area rehabilitation, and other direct and indirect costs.

In a restored landscape, more lightning-caused fires can be managed rather than fully suppressed, which reduces management costs compared to full suppression (Snider et al 2006). Suppression costs for the Forest for the past 20 years averaged $911 per acre, while the cost for the managing natural (unplanned) fire ignitions averaged $372 per acre (for responses other than full suppression). Thus, managing lightning-caused fires rather than suppressing them could save an average of $539 per acre. Another cost savings is associated with reduced post-fire rehabilitation costs. As the threat of stand-replacing fire is reduced through restoration treatments, the costs associated with post-fire rehabilitation will also be reduced. An economic cost analysis conducted for this SWJM landscape using a Quicksilver program calculated potential present net value change in rehabilitation and fire damage costs for high value areas at $929 per acre.

The true cost of wildfires in the western U.S. is typically 2 to 30 times greater than just the suppression costs (Western Forest Leadership Coalition 2010). The Cerro Grande fire that burned in similar forest conditions on adjacent lands cost $33.5 million in direct suppression cost, $864.5 million in other direct costs, $72.4 million in immediate rehabilitation costs, and an additional $341 million in costs to repair LANL and Dept. of Energy facilities and equipment (Western Forest Leadership Coalition 2010). The "other direct costs" included costs for private property losses, damage to utility lines and recreation facilities, and aid to the evacuated residents. Additional long-term or indirect costs not accounted for in that cost analyses includes long-term water quality degradation, loss of timber value, declines in residential property values and business revenues, smoke impacts and related healthcare costs, highway shutdowns, loss of revenues to evacuated residents and businesses, loss of a host of ecosystem services (aesthetic beauty, wildlife value, and others), and cost associated with firefighter injuries.

5. Utilization

This section summarizes information regarding potential wood utilization associated with the SWJM strategy, and additional details are in section 12-Landscape Strategy section, under Wood Utilization).

The total harvestable acreage from all NFS land in the SWJM landscape is approximately 62,000 acres (see Table 1). Harvestable acreage includes forested slopes with less than 40% grade within prioritized forest areas in fire regime condition classes 2-3 (moderately or highly altered), excluding riparian corridors. The table below shows the estimated harvestable acres and associated wood volumes on NFS land in the SWJM area, as well as estimates from surrounding lands on the Santa Fe and Cibola National Forests, within the next 10 years. Both Forests are in central New Mexico, within easy access of Interstate Highways I-25 and I-40, and in close proximity to the State's largest population centers. Forest road networks are extensive. No new permanent roads will be constructed. Some roads will be improved as needed to support wood removal activities.

Table 1: 10-Year Harvest Acreage and Volume Available in SWJM Area and Adjacent Santa Fe and Cibola National Forest Lands

NFS Land Area	Acres	Volume (ccf)
SWJM Landscape Area- NFS land *(Forest, Preserve)*	62,000 *(53,030, 8,880)*	527,000 *(450,755, 75,480)*
Other Santa Fe National Forest areas	7,000	59,500
Cibola National Forest – all Districts	32,800	190,000
Total over 10 years	102,800	776,500

Based on average 8.5 ccf/acre for utilizing all 5-inch and larger diameter material for Forest and Preserve

Treatment cost for contracted thinning, wood removal, and slash preparation services in SWJM area is estimated to average $620 per acre, excluding slash burning (average $130 per acre). Total 10-year cost for contracted thinning with removal services will be approximately $38 million. These costs will be offset by the price contractors will pay for the value of the harvested material, which is uncertain at this time and varies widely among different wood processors. The total offset based on forest product value is estimated to be $2.5 million (7% offset), based on Forest Service standard minimum rates and prices paid recently paid by thinning contractors in the area. Higher value products and greater offsets will be realized if new businesses decide to locate in the SWJM area.

Several existing proprietor-owned businesses in and immediately around the SWJM area produce a variety of wood products, including specialty building materials (latillas, vigas and beams), specialty carvings for homes, wood chips, wood stove pellets, small furniture, and firewood. Both commercial and household firewood is an important use of woody material in the region. It provides a cost savings in the form of reduced heating expenses, and an economic opportunity for entrepreneurs. Over 36% of houses in the Jemez Pueblo area are heated from wood (US Census 2000), and the Santa Fe National Forest sells thousands of personal-use firewood permits annually.

In 2009, the Regional Office published and mailed out a Sources Sought ad to solicit interest from forest products industries in New Mexico and gather information for the CFLRP proposals. Additionally, the forest product industry members of the SWJM collaborative group continued to network with potential wood utilization businesses. Expressions of interest have been received from businesses that would like

to use the raw material expected as a by-product of this restoration strategy. Some business owners were reluctant to complete surveys, and others completed the surveys but did not want their names or financial information (product values) disclosed. Some wood utilization businesses we spoke with said supply is not keeping pace with product demand; thus, they are seeking additional forestry contracts.

Expressions of interest in bidding on SWJM forest restoration contracts includes the following (correspondence and other records are available in the SWJM project file): local wood pellet companies in New Mexico and Arizona; a company that produces posts and poles in Raton who would locate another plant in the Jemez Mountains and employ local employees to debark and process the raw material; a local commercial firewood company that sells packaged firewood in local city supermarkets; various businesses from Oregon with significant experience, equipment, and capacity to conduct large-scale forest restoration thinning and wood utilization operations; a company that produces a composite lumber product interested in establishing a new plant in the SWJM area who could produce higher-value products that would off-set treatment costs 100% while also utilizing the bark and waste material as landscape mulch; a Texas based company interested in utilizing wood biomass from at least 5,000 acres annually and masticating the non-merchantable material; companies that utilize wood biomass to create heat energy, which has been successful at small scales in this area to heat a college in Santa Fe and schools in the Jemez Mountains, and could be done at a larger-scale to power local communities or the nuclear research facilities at Los Alamos National Laboratory (LANL 2008, Renewable Energy Feasibility Study); and a sustainable energy development company of consultants who provide expertise to connect technology with commercial enterprises desiring to convert wood biomass into useful products for local markets (described in more detail in the Landscape Strategy section). Table 2 displays the wood utilization products that can reasonably be expected from this area, based on informal expressions of interest by local/regional industry representatives. Products not on this list are unlikely to be economically viable due to the cost of establishing new processing plants in the area, such as for reconstituted products like particleboard, fiberboard, veneer, plywood, and paper.

Table 2. Potential Wood Products from SWJM Area Currently Processed by Firms in FS Region-3 (New Mexico or Arizona)

Firewood, commercial use
Firewood, personal use
Biomass for energy: electricity and heat; wood stove pellets
Milled and preserved lumber, bolts, posts, poles, treated lumber, latillas, vigas
Wood containers and pallets, including wood boxes, flats, baskets, casks, crates
Engineered wood members, trusses, composite lumber materials
Prefabricated wood building materials
Landscape mulch and bark, animal bedding, woodchips

Cumulatively, there is a high potential for providing economically viable wood utilization business opportunities in central and northern New Mexico. Existing wood products businesses declined in the past 20 years, partially due to lack of a steady and centralized wood supply and limited biomass utilization technologies. Retail demand for lumber in the U.S. is expected to increase 6.1% in 2010 and by 9.7% in 2011 (Western Wood Products Association 2010). The SWJM strategy provides an important opportunity to help meet public demand and improve economic trends in New Mexico by providing a reliable supply from a central, contiguously forested landscape, in additional to supplies from neighboring land, although uncertainties remain. Based on the quantities of raw material to be made available from restoration projects in central New Mexico over the next 10 to 20 years, and the interest expressed by wood products businesses, it seems reasonable to assume that new businesses will come to this area and utilize the woody byproducts from the SWJM project and surrounding lands.

Stewardship contracting will be the primary contract tool used for the thinning, wood removal and transport of raw material, and the contractor will also be required to lop-scatter, pile, masticate, or remove the slash (tree tops and limbs). While there are no guarantees that stewardship contracts will be awarded to local operators, there are several local wood utilization companies who have expressed interest in bidding on contracts to be offered from the SWJM area. Other contracts may also be offered.

Tree species to be harvested from this landscape is estimated as: 45% ponderosa pine, 15 to 20% each of white fir and Douglas fir, and about 5% each of juniper, piñon pine, spruce, and aspen. Tree sizes will primarily be 10 to 16-inches in diameter (65%), with about 30% in 5 to 9-inch and 5% in trees over 16-inches in diameter. Cutting prescriptions will be variable, depending on site-specific conditions.

Restoration treatments are designed to meet ecosystem objectives rather than to maximize wood product outputs; however, there will be an ample supply of wood by-products available to meet social and economic needs. Utilizing wood from this area will reduce the amount of forest fuels that need to be burned, thereby reducing smoke production and prescribed burning costs. Proposed wood utilization from this landscape and surrounding land could significantly reduce treatment costs while supporting a wide variety of businesses, provide new jobs, and stimulate the economies of local rural communities in the Jemez Mountains area.

6. Investments

Expenditures and funding sources to implement and monitor this SWJM landscape strategy are displayed in section 7-Funding Estimate, and total just over $72 million for implementation and $6.4 million for monitoring. Of the roughly $79 million in investments, the federal and non-federal distributions are about $62 million and $17 million respectively. Federal investments include direct investments by USDA and USDI agencies, as well as various federal grants. A large proportion of the Forest and Preserve budget will focus on this SWJM strategy for the next 10 years.

The Forest and Preserve managers intend to continue investing their time and staffing resources, and other organizations are also expected to contribute to implementing or monitoring this strategy. Investments will be made by Jemez and Santa Clara Pueblo, and Bandelier National Monument, to implement and monitor 10,100 acres of thinning and burning treatments on their lands within this SWJM strategy. The NRCS and SWCD are invested in this and will help implement treatment on private lands. Implementation and monitoring will be conducted across administrative boundaries. The State is very committed to this strategy. New Mexico Environment Dept. already invested over $1 million in federal 319 funds to improve water quality in this watershed, and plans to continue this high level of investment in the area. State Forestry is invested, as is New Mexico Game and Fish.

Non-federal investments *outside* the SWJM landscape will contribute to the success of the SWJM strategy. The same non-federal partners working on the SWJM strategy will continue to restore forests and watersheds on adjacent lands. Those investments in treating adjacent lands will complement the restoration work within the SWJM area, especially in reducing the risk of uncharacteristic wildfire. Non-federal investments on adjacent forests and watersheds by the State, County, private landowners, resource conservation groups, and others will continue to improve aquatic and riparian ecosystems and wildlife habitat, reduce invasive plants, and reduce hazardous fuels.

Restoration capacity will be increased, and future restoration costs decreased, through implementing and monitoring this SWJM strategy, particularly due to the partnerships and treating relatively large contiguous areas. These trends have already occurred through partnering with members of the Preserve, tribes, Bandelier, and others to implement and monitor smaller projects in this area.

Investments in establishing and managing the new Science and Education Center in Jemez Springs will significantly enhance opportunities for training, volunteers, and research work associated with this restoration project. Working together and sharing resources has reduced duplication of efforts and staff specialists, streamlined processes, and effectively reduced costs to each agency. Thus, this strategy will continue to expand restoration capacity and reduce costs by *continuing* to:

- Share data and centralize GIS inventory and monitoring databases across jurisdictions
- Share some key resource specialists and scientists across jurisdictions
- Share communications with the public, including sharing a common interactive website
- Train and share field crews, volunteers and partners who will likely retain and continue to use their skills over the long term, reducing costs of hiring or training new field personnel
- Use the new science and educational center to facilitate restoration training and provide housing for field-workers, volunteers and research teams implementing and monitoring the strategy
- Streamline planning, implementing, and monitoring processes through cooperative efforts
- Cover larger land areas in our NEPA planning, survey work, and individual treatment areas, thereby reducing fixed costs
- Concentrate restoration efforts in this focal area rather than scattering efforts forest-wide

The largest cost savings will be achieved by accelerating and concentrating treatments in one large focal landscape. This will substantially change fire behavior over a broad area, reducing long-term costs of thinning, suppressing wildfires, and rehabilitating fire-damaged areas. Shifting from restoration and rehabilitation to maintenance activities will yield significant savings.

Jobs will be created as a result of implementing and monitoring a wide range of restoration treatments. A Forest Service economist used the new TREAT economic impact analysis model to estimate employment and labor income to be generated by the SWJM strategy, as described in section 12-Landscape Strategy. The table below distinguishes between the contracted and non-contract force account jobs and income for implementing and monitoring the strategy on NFS lands (Forest and Preserve). Results show over 575 jobs and $22 million in labor income could be generated (in 2009 dollars). Additional details about jobs and how they were estimated are in the Landscape Strategy section, under Other Social-Economic Outcomes and in Table 12.7).

Table 1: Jobs and Labor Income Generated by the SWJM Strategy

Job-Related Activity	Jobs	Labor Income
Contract Work		
Wood Product Manufacturing and Selling	407.2	$15,794,877
Wood Product Thinning with Removal	77.2	$2,030,324
Implementing Non-Wood Removal Actions	56.4	$2,192,305
Monitoring	1.9	$92,259
Force-Account Work (Forest, Preserve staff)		
Implementation and Monitoring	32.8	$1,971,194
TOTALS	**575.5**	**$22,080,959**

The increase in jobs will last for at least the 10-year duration of the strategy, and probably longer due to creation of jobs and training of forest workers in the local area, and additional restoration activities that will be on-going on the surrounding multi-jurisdictional forested lands. Therefore it is assumed that these jobs will be present for the long run.

Thus, employment and training opportunities will be increased for local private, nonprofit, cooperative entities, youth groups, small businesses, and under-represented (minority) groups. The Forest, Preserve, and partners like TNC, Forest Guild, NMFWRI, NMED, NM Game and Fish, NRCS, NM State Forestry, CREDO, Los Amigos de Valles Caldera, and others on the Collaboration Participants list expressed interest in offering training to help implement and monitor the SWJM strategy. Training opportunities include how to develop business plans and apply for grants, navigate FedBizOpps, get on contract bid lists and submit contract proposals, conduct resource inventories or monitoring work, thin forests, prepare slash for burning, and other training programs. These programs will support jobs while improving the capacity of the labor force and allowing more jobs to remain local. Restoration training and jobs for youth have been provided through past CFRP projects. These training and employment opportunities will be stimulated in this area by this SWJM strategy, involving Pueblo youth, Youth Conservation Corps, local school students, Boy and Girl Scouts, Student Conservation Association, and others. The SWJM strategy will train youth-groups and adult volunteer groups to help collect inventory data, rehabilitate damaged areas (seed, mulch, plant), decommission roads-trails, prepare sites for thinning and burning, and work on fences, water tanks, fish and wildlife habitat, riparian restoration and monitoring activities. The new science and education center in Jemez Springs will provide a wonderful venue for training and housing a variety of youth groups and volunteers involved in implementing and monitoring the SWJM strategy.

Overall, the SWJM restoration strategy will significantly stimulate the depressed local rural economy and provide an influx of new socio-economic opportunities.

7. Funding Estimate

Funding estimates in the following tables display the total expenditures expected, the CFLRP funding request, and other funding sources for each fiscal year, from the end of 2010 through 2019 (in 2010 dollars). They are based on collaboratively developed and detailed cost analysis spreadsheets. Funding estimates include all implementation and monitoring costs, including costs for mandatory wildlife and archaeology surveys, field and contract preparation, contracted work, and administration. Planning costs are not included, and will be covered by other agency appropriations. Cost estimation spreadsheets for each treatment were used to determine the total funding needs to implement and monitor the strategy (cost estimating spreadsheets are available in the project record).

The first table is the total, 10-year summary table, followed by a funding distribution table for each year. Top sections of each table display funds to be applied to work on NFS land; the bottom sections show funding to be used for work for non-NFS land. Implementation and monitoring on the two Pueblos and Bandelier will be funded by a combination of USDI (BIA and NPS) funds, other federal grants (ARRA, TFRA, and others), and tribal funds. Partnership funds and in-kind service values are based on estimated investments from the collaboration participants and other organizations and volunteers.

The first table shows the total 10 year funding, and subsequent tables are for each fiscal year.

TOTAL 10-YEAR SUMMARY: Fiscal Years 2010-2019	Dollars Planned
FY 2010-2019: Funding on NFS land for Implementation- total expenditures expected	$72,430,000
FY 2010-2019 Funding on NFS land for Monitoring- total expenditures expected	$6,460,000

1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$31,750,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$2,700,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$3,850,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$8,310,000
5. Estimated Forest Product Value—see Utilization section for details	$2,500,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$49,110,000
CFLRP request (equal to or less than above)	$35,080,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds—BIA ($1.50 mil); NPS-Bandelier ($1.28 mil)	$2,780,000
Other Funds: Santa Clara Pueblo $2.5 mil; Jemez Pueblo $1.5 mil (includes USDA grants)	$4,000,000

Fiscal Year 2010	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$780,000
Funding on NFS land for Monitoring- total expenditures expected	$419,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$567,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$135,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$70,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$151,000
5. Estimated Forest Product Value—see Utilization section for details	$12,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$935,000
CFLRP request (equal to or less than above)	$841,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds—BIA and NPS-Bandelier	$20,000
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$40,000

Fiscal Year 2011	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$4,418,000
Funding on NFS land for Monitoring- total expenditures expected	$650,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$1,712,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$200,000

3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$163,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$3,401,000
CFLRP request (equal to or less than above)	$2,535,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$220,000
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$550,000

Fiscal Year 2012	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$7,266,000
Funding on NFS land for Monitoring- total expenditures expected	$676,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$2,786,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$210,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$240,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$4,562,000
CFLRP request (equal to or less than above)	$3,972,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$490,000
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$780,000

Fiscal Year 2013	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$6,757,000
Funding on NFS land for Monitoring- total expenditures expected	$704,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$2,569,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$245,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000

5. Estimated Forest Product Value—see Utilization section for details	$240,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$4,380,000
CFLRP request (equal to or less than above)	$3,731,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$570,000
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$780,000

Fiscal Year 2014	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$7,559,000
Funding on NFS land for Monitoring- total expenditures expected	$731,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$2,997,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$275,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$266,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$4,864,000
CFLRP request (equal to or less than above)	$4,000,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$570,000
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$880,000

Fiscal Year 2015	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$7,794,000
Funding on NFS land for Monitoring- total expenditures expected	$669,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$3,135,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$290,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$285,000
6. Other (specify)—	$0

Total of 1-6 for matching CFLRP request	$5,036,000
CFLRP request (equal to or less than above)	$4,000,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$305,000
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$650,000

Fiscal Year 2016	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$10,244,000
Funding on NFS land for Monitoring- total expenditures expected	$697,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$5,264,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$335,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$380,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$7,305,000
CFLRP request (equal to or less than above)	$4,000,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$305,000
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$620,000

Fiscal Year 2017	Dollars Planned
Funding on NFS land for Implementation- total expenditures expected	$10,005,000
Funding on NFS land for Monitoring- total expenditures expected	$533,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$4,910,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$335,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$344,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$6,915,000
CFLRP request (equal to or less than above)	$4,000,000

Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$0
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$0

Fiscal Year 2018	Dollars Planned
Funding on NFS land for Implementation- (total expenditures expected)	$9,787,000
Funding on NFS land for Monitoring- (total expenditures expected)	$555,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$4,738,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$335,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$344,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$6,743,000
CFLRP request (equal to or less than above)	$4,000,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$0
Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$0

Fiscal Year 2019	Dollars Planned
Funding on NFS land for Implementation (total expenditures expected)	$7,819,000
Funding on NFS land for Monitoring (total expenditures expected)	$827,000
1. USFS Appropriated Funds- Forest (63%), Preserve (29%), CFRP (8%)	$3,249,000
2. USFS Permanent & Trust Funds- RTRT, KV, SSS	$335,000
3. Partnership Funds- NMED-319, NM-Habitat Stamp, conservation organizations…	$419,000
4. Partnership In-Kind Services Value— other agencies, tribes, organizations…	$907,000
5. Estimated Forest Product Value—see Utilization section for details	$227,000
6. Other (specify)—	$0
Total of 1-6 for matching CFLRP request	$5,137,000
CFLRP request (equal to or less than above)	$4,000,000
Funding off NFS lands associated with proposal (does not count toward CFLRP funds or matching funds)	
USDI Funds— BIA and NPS-Bandelier	$0

Other Funds: -Santa Clara Pueblo and Jemez Pueblo (includes fed. grants)	$0

8. Funding Plan

Planning

The Regional Office is committing funds to support a dedicated NEPA Team whose priority will be placed on landscape-scale forest and watershed restoration in New Mexico. This Team, in partnership with Forest personnel, will be responsible for completing NEPA requirements necessary to implement this restoration strategy. This Regional commitment is comprised of equal parts WFHF (Hazardous Fuels), NFTM (Forest Products), and NFVW (Vegetation/Watershed) budget line items.

National Environmental Policy Act (NEPA) analysis and decisions are completed that cover the first 1 to 3 years of proposed restoration treatments on NFS lands, and all of the treatments proposed on the two Pueblos and Bandelier. NEPA analysis and decisions for thinning and prescribed burning activities cover over 60% of the Forest land identified for thinning and burning in this strategy, although a few of those analysis and decision documents need to be reviewed to ensure they still reflect current conditions and proposed activities. In 2011, NEPA decisions will be completed for remaining treatments on NFS lands for the next few years, and subsequent NEPA decisions will be completed for the remaining years at least 1 to 2 years ahead of the implementation schedule. The consensus and trust built through the on-going collaboration process is expected to foster the timely completion of remaining NEPA decisions, with a low risk of appeals or litigation. The mandatory wildlife and archaeology surveys will also be completed well ahead of the implementation schedule.

Implementation and Monitoring

As described under Investments and Funding Estimates, the Forest and Preserve managers expect to dedicate a large proportion of annual appropriated funds for the next 10 years toward planning, implementing and monitoring ecological restoration activities in this SWJM area, and all CFLRP funds and matching funds will exclusively be used for implementation and monitoring (not planning). To help reduce costs, collaborators made tremendous efforts to consolidate treatments into one large, contiguous landscape that could be effectively restored in a 10-year period, to prioritize treatments to increase cost effectiveness, and create partnership agreements to help offset federal investments.

The Forest, Preserve and partners involved in this strategy do not expect to add new permanent positions to existing organizations in order to implement and monitor this strategy. Additional temporary help will be obtained through contracts, interagency agreements, Forest Service enterprise teams, or other temporary hiring authorities. Cost savings will be realized by sharing resources among partner organizations; reducing wildfire suppression and rehabilitation costs; covering a large landscape area to reduce fixed costs per acre; and increasing workforce capacity to conduct restoration treatments.

The multi-party monitoring and adaptive management strategy is described in detail in section 13. Monitoring and Adaptive Management. It is comprehensive and well-funded, with significant contributions coming from many different partners, various grants and agreements, and volunteer groups. It is being led by Dr. Robert Parmenter, Chief Scientist on the Preserve, and is built on an established multi-party monitoring program that includes 50 permanent monitoring sites, five climate stations (including a NOAA station that is part of a global climate change monitoring network), two carbon flux towers, a series of riparian exclosures, and a system of water quality and quantity instrumentation. Using state-of-the-art approaches, restoration partners will measure and evaluate the

extent and rate to which restoration treatments are reducing the risk of uncharacteristic wildfire and restoring natural fire regimes, reducing invasive species, improving wildlife and fish habitat, restoring water quality and watershed functions, maintaining or promoting old growth conditions, mitigating climate change impacts, and utilizing woody by-products. Monitoring will continue for at least 15 years after project implementation commences. Partners will prepare and review monitoring and evaluation reports, to develop adaptations and publish peer-reviewed literature on lessons learned.

9. USDI Funding

Restoration treatment actions under the US Department of Interior's Bureau of Indian Affairs (BIA) and National Park Service (NPS) jurisdiction are proposed as part of this SWJM landscape area strategy. Representatives from the Pueblo of Jemez, Pueblo of Santa Clara, BIA (Northern Pueblos and Southern Pueblos Agencies) and Bandelier National Monument (Bandelier) have been key partners with the Forest, Preserve and others in collaboratively developing the strategy. These parties ensured that treatments on all jurisdictions are fully compatible with mutually-developed restoration objectives used in this strategy.

Funding for treatments on non-NFS land included in this strategy total $6.78 million, including treatments on the Santa Clara Pueblo, Jemez Pueblo, and Bandelier that will occur through a combination of USDI appropriations, other federal grants, and other tribal funds. Total funding estimated to implement and monitor treatments on those non-NFS lands are as follows:

- Santa Clara Pueblo/USDI-BIA/Fed.Grants.....$3.25 million
- Jemez Pueblo/USDI-BIA/Fed.Grants……$2.25 million
- USDI-NPS-Bandelier National Monument…..$1.28 million

The selected treatments on those non-NFS lands are critical to the success of the strategy. They not only complement the ability to achieve mutual restoration objectives, they significantly reduce the risk of a destructive crown fire spreading directly from the NFS land to Santa Clara Pueblo, Bandelier, Los Alamos, and Los Alamos National Laboratory land. Some of the thinning, prescribed burns, and riparian restoration treatments will be conducted across administrative boundaries. Cooperative efforts among these land management partners will improve treatment effectiveness while reducing costs.

The BIA, Pueblo, and NPS will fund restoration treatments on their lands, and the CFLRP funds and matching funds will be used exclusively on NFS land.

Regional Directors of the USDI-BIA and USDI-NPS, along with the Governors of each Pueblo, submitted letters of commitment and support to the Forest Service Regional Forester, indicating their plans to invest in and support this strategy (available on the SWJM restoration website at http://www.fs.fed.us/r3/sfe/jemez_mtn_rest/docs.htm).

10. Other Funding

The State Forestry, NRCS, and SWCD have expressed interest in obtaining grants to help fund some thinning, burning, invasive plant control, and riparian restoration activities on some private land inholdings in this area, with willing landowners and the Forest. This has already been successful on over 50 private properties in the area. Thecollaborative group would like to continue these efforts with additional willing landowners, particularly in the Jemez River corridor area.

Other organizations such as The Nature Conservancy, WildEarth Guardians, Rocky Mountain Elk Foundation, NM Environment Dept, and others have expressed interest obtaining grant funding to help

implement and monitor this restoration strategy, as well as investing their staff's time (in-kind services contribution). Refer to Funding Estimates to see the partnerships and in-kind service values expected to come from other partners. Letters of Support from these collaboration partners are on the website, indicating their plans to invest in and support this strategy.

11. Maps

The cover page of this proposal document includes a vicinity map showing where the SWJM landscape area is located in New Mexico. Section 12-Landscape Strategy includes a map showing restoration treatment types and locations (blocks). The map (figure 11.1) below displays the SWJM Area and Land Jurisdictions. Maps showing watersheds, streams, vegetation, fire history, fire behavior, wildland urban interface, soil erosion hazards, management areas, inventoried roadless areas, recreation facilities, heritage resource site density, and other ecological and social conditions in this area are on the SWJM restoration website (http://www.fs.fed.us/r3/sfe/jemez_mtn_rest/maps.htm).

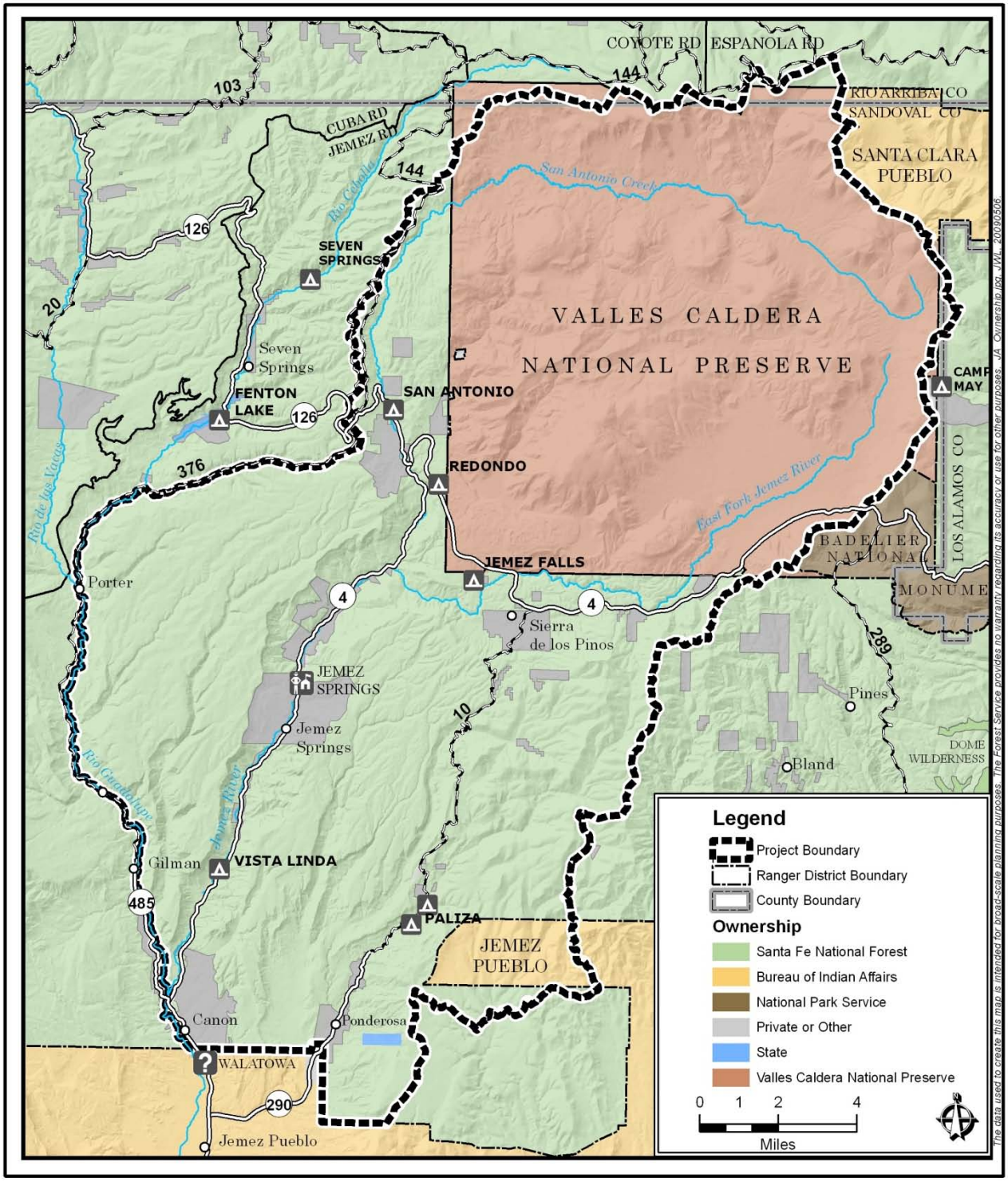

Figure 11.1. Map of SWJM Landscape Area and Land Jurisdictions

12. Landscape Strategy

The Landscape Strategy section is a larger, separately attached file that contains additional details about the restoration treatments along with photographs and maps. This section includes the following:

- Area Overview
- Collaboration
- Scientific Methods
- Ecological Context- Restoration Needs
- Restoration Goals and Objectives
- Treatment Strategy and Actions
- Expected Outcomes- including outcomes expected for each restoration goal and objective
- Summaries of Treatments Identified and Prioritized

13. Monitoring and Adaptive Management

The Monitoring and Adaptive Management section is a larger, separately attached file that contains a comprehensive monitoring and evaluation plan in support of the SWJM landscape strategy. It includes:

- Goals- Measures of Success
- Adaptive Management and Research Approach
- Data Management, Analysis and Dissemination
- Monitoring for Ecosystem Changes
    - Climate Change Adaptations
    - Hydrology
    - Vegetation
    - Wildlife: mammals, birds, reptiles/amphibians, fish, invertebrates
- Monitoring for Social and Economic Changes
    - Heritage Resource Preservation
    - Social and Economic; Community Benefits
    - Recreation Uses and Human Impacts to Resources

Literature Cited

The Literature Cited section is a separately attached file that contains a bibliography of all literature cited in the Proposal documents, sections 1 through 13.