

Tres Piedras CFRP # 26-02 Project and Multiparty Assessment Report

Forest Restoration



Prescribed Burning



Youth Education



Fuels Management



Collaboration



Multiparty Monitoring



Submitted by:

The logo for Forest Guild, featuring a stylized green leaf icon to the left of the text "forest GUILD". "forest" is in a lowercase, italicized serif font, and "GUILD" is in a bold, uppercase sans-serif font.

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Executive Summary

Forest Guild completed the Tres Piedras Collaborative Forest Restoration Program (CFRP) Grant (#26-02) in December 2006. During the course of the 4 year grant, Forest Guild, the Tres Piedras District of the Carson National Forest, the El Rito Youth Conservation Corps (YCC) crew, and others collaboratively worked to restore forest structure to 392 acres, contributed to the reintroduction of a surface fire regime to 6000 acres, and processed slash on 936 acres of fire adapted ponderosa pine dominated forests in northern New Mexico. Ecological and socioeconomic data were collected throughout the grant to assess grant performance, to measure if objectives were met, and to determine the extent of the project's impact.

Based on pre and post treatment monitoring conducted by Forest Guild and the multiparty team from 2003 to 2006, the "on the ground results" of the grant indicate that objectives of both the Tres Piedras CFRP grant and the larger program in general were achieved (H.R.2389 Pub. L. No. 106-393). Nevertheless, some project targets including returning high-frequency, low-intensity fires to the ecosystem were not fully met.

By reducing the density of trees and the extent canopy cover, the project reduced the risk of large, high intensity crown fires to the Village of Tres Piedras in accordance with sections 603(5) and 605(B)(1)(3)(5)(6) of H.R.2389 Pub. L. No. 106-393. The ecological monitoring data indicated with a high degree of confidence that percent canopy cover was reduced between 26% and 95% across all restored acres. The increase of mean diameter at breast height (DBH) shows that old and large trees were preserved in accordance with section 605(B)(1) of the enabling legislation. The youth component of the grant (35 local youth trained in ecological monitoring) fulfills the eligibility requirements of the enabling legislation Sec. 605 (B)(6) (H.R.2389 Pub. L. No. 106-393). The grant funds contributed to 6000 acres of restored surface fire regime meeting the program objectives in section 605(B)(1)(b).

The Tres Piedras CFRP also met grant and CFRP program objectives that relate to improving capacity to use small diameter wood and creating sustainable communities. The grant created 6.8 full time employee (FTE) direct (paid through grant funds) jobs and .2 FTE indirect (paid by a source other than CFRP grant # 26-02), provided for professional and educational job trainings, and saw an estimated 784 cords (392 mbf) of wood (including 252 poles) removed from the project sites by businesses and fuelwood collectors.

The ecological and socioeconomic monitoring efforts for the Tres Piedras CFRP grant indicate that this grant successfully reduced the potential for crown fire at the treated sites, created multiple learning opportunities for local youth, and created jobs and trained the local workforce. A legacy of the grant is Herman Vigil's successful forest restoration business now working year-round in northern New Mexico. The grant also provided wood product and utilization assistance to a local business, protected the larger locale of Tres Piedras by creating a break in the continuity of the forest canopy and reduced the previously high density of trees upwind of the community.

Lessons Learned

- While the Forest Guild's crew was approved to conduct prescribed burning as part of the CFRP grant, the sponsoring ranger district would not allow the Guild's crew to conduct prescribed burning. For CFRP projects that have a prescribed burning component, the USFS and Grantees will need to develop a mechanism to conduct the prescribed burning

with USFS staff or develop a waiver/agreement that permits grantees to conduct the work themselves.

- While implementing treatments, the Guild discovered discrepancies between hazardous fuel reduction prescriptions and forest restoration prescriptions in regards to snag retention. Monitoring data indicate that snags were reduced by 92%. In the future, silvicultural prescriptions can be developed that meet fuel reduction targets while maintaining certain ecological targets, like snags. Collaboratively developing prescriptions at the start of the project will ensure that values important to stakeholders are considered.
- Continuity is critical to success. Between the time when the Guild developed the grant proposal and when work began, a change in leadership occurred at the district ranger position. As a result of the change in leadership, the new ranger did not have familiarity with the project and did not have the same level of buy-in as his predecessor. Staff turnover slowed the implementation of the project and made certain project objectives harder to achieve. While turnover is common, the Guild suggests that other district staff members, in addition to the district Ranger, be involved in development and implementation of CFRP projects. This way, when staff turnover does occur, someone remains in a position of authority that can insure project continuity.
- Continuity is critical to success in monitoring, too. During the four operating years of the grant, support from USFS staff who remained at the local districts during the course of the grant, was critical to meet our monitoring and reporting needs. Staff at both the El Rito and Tres Piedras Districts kept accurate and precise records pertaining to the project and project monitoring in areas of workforce, equipment, acre treatment types, trainings, and education and outreach. Specifically, David Lawrence and Loren Suazo were the district level employees whose commitment to the project continued over the four year life of the grant. It was their notes and records that supported quality grant monitoring and reporting.

There seems to be a general lack of understanding of CFRP among some USFS personnel. It may be useful for CFRP program staff and coordinators to conduct internal training sessions for district level staff about CFRP. The training should focus on what CFRP is, what it is intended to be used for, roles and responsibilities of land managers and grantees.

One of the best outcomes of this project was the development of Herman Vigil's forest crew. The fact that Mr. Vigil was able to develop and maintain his business beyond the life of the grant reflects positively on Mr. Vigil and the project. As the Guild's first forest crew for the project was not successful, we learned a tremendous amount about how to develop a successful forest crew by working with Mr. Vigil. We learned that the key to developing a successful forest crew is identifying and developing a competent and dedicated crew leader. Without strong leadership, a crew will flounder and fail.

Our work with Las Comunidades on an analysis of wood product removal and utilization reinforced the notion that not all harvesting and utilization endeavors are profitable. Distance from the treatment site to the process facility and then to the end user seems to be the biggest driver of whether small diameter wood product utilization is profitable or not. Species, size, quality, equipment used, and skill and training of workforce are also important factors to consider when planning treatments. Careful selection of treatment sites and a realistic estimate of local capacity to access and utilize forest products are essential to the successful planning of future CFRP projects with a utilization component.

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Introduction/Project Background

Fire suppression activities during the last century have permitted increased growth and survival of seedling trees, resulting in overstocked forests with closed canopies and less understory foliage for wildlife. The Carson National Forest adjacent to the community of Tres Piedras, New Mexico is no exception. The Tusas Ridge to the south and west of Tres Piedras has an extremely high occurrence of lightning-ignited wildfires and is directly upwind of the community. In June 1999, the Kiowa Fire spread quickly and threatened structures in the Rio Tusas drainage before it was suppressed at 100 acres. In response to the wildfire risk facing the community of Tres Piedras, the Forest Guild in partnership with the Tres Piedras Ranger District developed a project proposal to address the wildfire threat problem. In the fall of 2002, the Forest Guild was awarded the Collaborative Forest Restoration Program grant (Grant # 26-02) by Region 3 of the USDA Forest Service to reduce the threat of wildfire, build community understanding of forest restoration and the natural role of fire in forest ecosystems, and create a local workforce for restoration activities with particular skill in prescribed fire.

Grant Objectives

- To reduce the risk of catastrophic wildfire by reducing the number and density of small diameter trees, reducing the density of dead and down timber crowding the understory, and returning high-frequency, low-intensity fires to the ecosystem, and increasing the proportion of large, old trees.
- To create a trained and competent workforce to perform restoration work and to serve as a source of information and income to the community.
- To contribute to the local economy by providing small diameter material to local businesses with the capacity to add value to this material.
- To empower the local community by involving members in all stages of project planning and implementation and by improving communication and collaboration among the various stakeholders, including the Forest Service, the community of Tres Piedras, and local environmentalists and landowners.

Grant Experience and Outcomes

The Forest Guild's Tres Piedras CFRP grant successfully met most of the project objectives; nevertheless, certain project targets and outcomes varied from what was included in the proposal. The following discussion of grant experiences and outcomes, broken out by project focus area, is intended to describe what worked, what didn't work, and why.

Workforce Development

The Guild proposed to train a local workforce to perform thinning and burning activities on 5000 acres in the Tres Piedras Ranger District. By collaborating with Northern New Mexico College and the Forest Service, the Guild would provide training in chainsaw operations, burning techniques and safety, and environmental monitoring to a crew of eight. The goal was to develop a fully functional crew of certified chainsaw operators, burn technicians, and firefighters.

The grant created 6.8 full time employees (FTE) direct (paid through grant funds) jobs and .2 FTE indirect (paid by a source other than CFRP grant # 26-02). Work accomplished by Herman Vigil's crew (by job type: forest restoration, fuels technician, and fire suppression) and by Las

Comunidades are known to continue beyond the grant. Forest Guild continues to communicate with Herman Vigil and knows his crew to be employed year-round in forest work.

Initially, the Tres Piedras Ranger District wanted the Guild's forest restoration crew to be certified to conduct prescribed burning, fire suppression, and mechanical treatment services on national forest system lands. The Guild recruited an eight person crew from the Tres Piedras area and provided training for crew members to meet all required certifications. Unfortunately, during the fire season, several crew members left the Guild's crew to seek more lucrative fire suppression work. The loss of crew members hindered the Guild's ability to complete forest restoration work by the planned timeline. For the second field season, the Guild recruited a local crew leader who was interested in starting his own forest thinning business. Together, the crew leader and the Guild recruited and trained a forest crew to meet the project's forest restoration initiatives. Herman Vigil was the crew leader and during the course of the Project, with strong technical support from the Guild, Mr. Vigil started his own forest thinning business. Additionally, Forest Guild trained Mr. Vigil's crew in a variety of forest work (such as fence creation/repair) to diversify their skill set and promote year round employability. Mr. Vigil's business continues to grow and has performed forest restoration work as part of numerous CFRP projects.

Problems encountered with the Guild's first forest crew, taught us that the key to developing a successful forest crew is identifying and developing a competent and dedicated crew leader. Crew members will come and go, but a strong and dedicated leader will keep a crew running. A significant amount of field-based and business development technical assistance was also required to help the new crew operate a successful business. In particular, the crew benefited from assistance with job costing, bid preparation, workers' compensation insurance, and forest operations. The Guild has been able to apply the lessons learned from the Tres Piedras CFRP experience to promote successful and sustainable forest crews and forest-based businesses in other parts of New Mexico.

During the first field season, the Guild used CFRP funds to supply the forest crew with fire fighting equipment. The equipment was used for forest restoration thinning, and to respond to several wildfire ignition suppression efforts on both the El Rito and Tres Piedras Ranger Districts. During the course of the project, the Guild discovered that USDA Forest Service ranger districts have a cache of fire fighting equipment for use by its own fire fighting crews. The Guild was able to reach an agreement with the local ranger district where the Guild crew was allowed to use the district's fire fighting equipment for work on national forest system lands. Other grantees may be able to develop similar agreements which would enable more CFRP funds to be applied to other areas.

Forest Restoration

The Forest Guild proposed forest restoration work including pre-commercial and commercial thinning, broadcast burning, and pile burning. The total area to be treated encompassed 5,000 in the Dry Lakes I and Dry Lakes II project areas. Approximately 1,600 acres was to be thinned, creating firewood and small diameter materials from trees less than 9", thus preserving large trees. An additional 3,400 acres was to be burned at the end of the project.

Restoration goals for the first stage of this project were to hire a workforce from the Tres Piedras area and train and certify them to conduct forest restoration and prescribed burning work on Dry Lakes I and II. Due to delays in securing required environmental clearances for Dry Lakes I and II, the crew ended up working on a variety of burn-related activities in the zone comprised by the

El Rito and Tres Piedras Ranger Districts. While working on these alternate activities, the grant reached the annual budget allocation limitations making the crew unable to thin on Dry Lakes I within the project year. The Tres Piedras Ranger District then elected to treat some of the CFRP Dry Lakes I project sites with their own crews. Thus some of the acres with environmental clearance slated for the CFRP were thinned outside of the grant and, as a result, the total acres reported are lower than our original targets set forth in the grant application. To address this shortfall the Forest Guild crew piled slash in preparation for prescribed burning and used unspent grant funds in the final year of the project to thin an additional 50 acres within the Dry Lakes II treatment area.

One of the primary objectives of the project was to have the Guild's forest restoration crew conduct prescribed burning activities. During grant development, the Tres Piedras District Ranger supported the idea of developing a restoration crew that was trained and certified to conduct prescribed burns on federal lands. However, after the grant was awarded a new district ranger was hired who was unsupportive of the idea of a non-USDA Forest Service crew performing prescribed burning. While the Guild went before the forest supervisor to resolve this issue, we were unable to secure a commitment from the Carson National Forest or the Tres Piedras Ranger District endorsing the prescribed burning portion of the project. The USDA Forest Service was unable or unwilling to sponsor, oversee, or assume liability for the Guild's prescribed fire crew, even though the crew met all the NWCG standards for qualifications and experience for personnel involved in prescribed burns. Inability to overcome this barrier prevented Forest Guild crews from being the primary crew to implement prescribed burning activities. Forest Guild crews, paid through CFRP # 26-02 grant funds did provide the Tres Piedras Ranger District with the needed stand-by fire suppression support that enabled the District to conduct the prescribed burns. Thus the CFRP worked to meet the prescribed burn targets set forth in the grant application, encountered barriers to implementation outlined in the application, but in the end worked to provide needed prescribed burning support that returned surface fire to the project sites.

In hindsight, the Guild should have anticipated the problem with non USDA Forest Crews conducting prescribed burning and taken measures to address potential problems prior to submitting the grant application.

Marketing of Small Diameter Material

The Guild planned to use its community-based forestry experience to market wood by-products from restoration in the second, third, and fourth years of the project. The Guild identified several local small businesses interested in utilizing the materials generated by the restoration activities. These businesses include two value-added producers (Las Comunidades and Madera Forest Products Association). The project also intended to generate firewood that would be made available, free of charge, to economically disadvantaged families in the community.

During the course of the project, La Madera Forest products ceased to be a viable value-added producer. As a result, the Forest Guild worked with Las Comunidades on utilization and marketing of materials from the treatment areas. In 2006, Forest Guild partnered with Las Comunidades on an effort to determine costs associated with wood removal and processing of forest products. The objective of this initiative was to determine the costs of removing usable materials from the Dry Lakes II treatment area, while reducing the amount of 1000 hour fuels. Over the course of four days, a crew of 3-5 workers bucked, piled, and removed 252 poles (8 foot length and ranging in tip diameter from 4-8 inches). While the exercise reduced the amount of

1000 hour fuels on the site, it demonstrated that removal of forest products from Dry lakes II was not profitable. The costs to remove, process, and transport materials exceeded revenues generated.

While the operation was not profitable, the exercise and subsequent data analysis identified several factors that, if addressed, could improve the economics of similar wood utilization operations. Crew sizing to meet specific project tasks, working longer days to reduce the number of trips to the site, improved thinning practices to reduce bucking and stacking work, selection of proper equipment to yard and remove materials from the treatment area, and selection of highest value materials all contributed to the financial viability of the project. Lessons learned on the Tres Piedras project have helped Las Comunidades improve their work practices and their ability to operate their forest-based business in a profitable way. A detailed description of Las Comunidades' forest product removal and utilization exercise can be found in the monitoring portion of this report.

The project intended to make fuelwood available free of charge to economically disadvantaged families in the community. The Tres Piedras Ranger District estimates that three cords of fuelwood per acre were cut and available for removal. The wood volume generated by the restoration treatment was estimated: 392 acres x 3 cords = 1176 cords (588 million board feet).¹ A site walk through by Forest Guild Senior Forester Orlando Romero estimated that on average, roughly 2 cords per acre were actually removed (392 acres x 2 cords = 784 cords or 392 mbf). This conservative estimation was then used to determine the value of the wood made available through the restoration treatment, and the costs associated with removing this wood from the site.

Forest Guild estimated the value of a cord of wood in the Tres Piedras area through discussions with local residents. It was estimated that it takes a minimum of 5 hours to travel to the site, cut the wood, load the wood, travel home, and unload a pick-up truck. Costs for travel, time, and equipment use were averaged at \$40.00/hour. A cost per cord was generated: \$40.00/ hr x 5 hours = \$200.00 /cord.

Forest Guild estimated that: 784 cords x \$200.00/cord = \$156,800.00. An estimated \$156K of fuelwood was removed from the site for use by local residents.

Travel distance to treatment sites and road conditions affected the ability of local residents to access and remove fuelwood. More fuelwood was removed from portions of treatment areas adjacent to access roads. Future CFRP projects that rely on public fuel collectors to reduce the amount of downed fuel, should consider travel distance, access and road conditions when planning projects.

Outreach and Education

The project proposed outreach efforts to the local community to develop an awareness of the importance of managed burning in maintaining forest health and reducing the risk of catastrophic wildfire. The project proposed an education component that would include classroom and on-the-ground training in restoration science for Mesa Vista Middle/High School students. Forestry students at Northern New Mexico College would also have the opportunity to visit areas being treated and to participate in monitoring and evaluating the success of treatment efforts.

¹ 1 cord = 2.0 million board feet

Local youth with the El Rito YCC (2003, 2004) and with the Las Comunidades Youth Crew (2006) were trained in ecological monitoring methods (including the role of fire in ponderosa pine ecosystems), while the El Rito YCC also received wildland fire training (S130/190 and S212) in collaboration with Northern New Mexico College. The trained crews were the primary collectors' of the ecological data along with representatives from the Forest Guild and members of the restoration workforce (Herman Vigil's crew). Roughly 35 local youth who attended Mesa Vista Middle and High Schools participated in the trainings and data collection. Forest Guild held two school assemblies with Mesa Vista Schools to conduct educational activities related to forest restoration, the CFRP program, and the Tres Piedras CFRP grant.

The outreach and education components of the project were successful as many local youth learned about the role of fire in ponderosa pine ecosystems and learned how to monitor change in forest structure. Learning occurred primarily in the field and to a lesser extent in the classroom. In addition, through the community meetings held by the Forest Guild, 113 local residents became exposed to and learned about the elements of the project, the availability of fuelwood, and the practice of forest restoration.

The outreach and education components of the project, though successful, would have benefited by a stronger partnership with the local school that included elements of ecology and forestry into the biology curriculum.

Research

The Guild proposed to collaborate with research organizations and forest scientists to analyze and synthesize experiences with various treatments and treatment combinations in different forest types. By coordinating data gathering and synthesis and preparing a report, the Guild hoped to inform forest restoration efforts throughout the state and provide a model for other communities and organizations interested in establishing a similar project.

The Forest restoration components of the project were supported by the Guild's ecological forestry initiatives. The Guild's national network of professional foresters and research scientists utilize the best available science to implement forestry projects that are ecologically, socially, and economically responsible. Treatments conducted as part of this project were designed to restore forested landscapes while reducing the threat of uncharacteristic wildfire. Data gathered through the multiparty monitoring process and the subsequent analysis and report will serve as a learning tool for other communities and entities engaged in similar projects. On a larger scale, the lessons learned from this project will feed into the Guild's national effort to develop best forestry practices for forest managers and allied resource professionals.

The Guild had hoped to collaborate with the scientific community on the implementation of prescribed burning of treatment sites. The Guild encountered a number of problems that hindered the accomplishment of this objective. Due to delays in securing necessary environmental clearances, treatment and subsequent prescribed burning of Dry Lakes I and II did not occur within the proposed timeline.

The Guild had also intended to directly engage scientists and research organizations in the analysis and synthesis of various treatments and treatment combinations. Delays in treating proposed sites limited the involvement of scientists and research organizations in the project. Early in the project, focus shifted from developing a crew to conduct collaboratively planned forest restoration projects, to finding work to keep the crew busy. Once environmental clearances

were obtained for the treatment sites, the restoration budget had already been spent on supporting the crew on other projects within the El Rito and Tres Piedras Ranger District zone. Had environmental clearances been secured on schedule, the ability to engage scientists in the implementation and analysis treatments would have been greater.

Socioeconomic and Ecological Monitoring

Forest Guild, members of Herman Vigil's thinning crew, the Las Comunidades youth crew and the El Rito crew of the Forest Guild Youth Conservation Corps collected ecological and socioeconomic monitoring data from 2003 to 2006. The monitoring data helped Forest Guild assess the implementation and effectiveness of the project in relation to the project goals and objectives.

Ecological data consisted of post burn data at the Madera site in the fall of 2003, pre treatment data at the Dry Lakes I site, in the summer of 2004, and pre and post restoration treatment data in the summer of 2005 on the Dry Lakes II site. Socioeconomic data consisted of document review, informal conversations with collaborators, and calculations of wood products and fuelwood made available and removed by local residents and businesses.

The multiparty team consisted of Tres Piedras District of the Carson National Forest, the El Rito crew of the Forest Guild Youth Conservation Corps (El Rito YCC), Las Comunidades, Northern New Mexico College, Kuykendall Lumber, Mesa Vista Schools and Herman Vigil's restoration crew. The section that follows describes the ecological and socioeconomic monitoring efforts undertaken by the Forest Guild and the youth crews, including the associated data and photos, analysis of the data, and an interpretation of the data.

Monitoring Goals and Indicators

This CFRP grant set out to restore fire adapted forests in northern New Mexico, southwest of the village of Tres Piedras in Rio Arriba County. Specific ecological objectives of the project were:

1. To reduce the risk of crown wildfire and negative post fire effects.
2. To re-establish pre-settlement fire regimes.²
3. To create conditions for a beneficial low-intensity surface fire.

Specific socioeconomic objectives of the project were:

1. To train a local workforce to perform thinning and burning activities. Training to include chainsaw operation, burning techniques, safety, and environmental monitoring.
2. To generate firewood and market small diameter wood to regional end users.
3. To create community awareness about forest health and the importance of managed burning, and to educate youth and college students about the ecological and socio-economic elements of the project.
4. To collaborate with research organizations and forest scientists.

² The ecological monitoring is primarily intended to capture changes at the site resulting from the tree thinning treatment. If prescribed or natural fire occurs at the site (within 10 years of the thinning treatment is optimal), all measurements for the ecological indicators should be replicated and fire effects data should also be collected.

Ecological Monitoring Indicators

Forest restoration was achieved by thinning the density of trees with a chainsaw crew, managing slash on the forest floor, and assisting the USFS in prescribed burning. The thinning was designed to reduce tree density and extent canopy cover. The treatments also intended to alter forest structure to a condition that inhibits the potential for crown fire which threatens community infrastructure (homes and businesses). The modified forest stands are expected to reduce the potential for crown fire events, increase the extent and diversity of the understory vegetation, and have conditions favorable to low-intensity surface fires.

The Madera, Dry Lakes I, and Dry Lakes II stands are all dominated by ponderosa pine vegetation. Only the Dry Lakes II site has pre and post treatment ecological data collected. The Madera site has only post treatment data while the Dry Lakes I site has only pre treatment data collected. In accordance with the recommendations and suggestions from the multiparty team, several indicators were selected to be monitored in the forest stands to be treated (See Table 1):

Ecological indicators monitored at the Madera site:

- Adult (<5"DBH) tree density, size, species, and live or dead status
- Sapling (>5"DBH, <4.5' height) species and density
- Percent understory cover. Grass, forbs, shrubs, litter, bare soil and rock, charred, and ash categories.
- Photo points
- Extent canopy cover (PVC method)
- Seedling density (>4.5' height)

Ecological indicators monitored at the Dry Lakes I site:

- Adult (<5"DBH) tree density, size, species, and live or dead
- Sapling (>5"DBH, <4.5' height) species and density
- Percent understory cover. Plant, bare soil and rock, and litter categories.
- Photo points
- Extent canopy cover (densiometer method)
- Surface Fuels (Brown's Lines – 1, 10, and 100hr fuels)

Ecological indicators monitored at the Dry Lakes II site:

- Adult (<5"DBH) tree density, size, species, and live or dead
- Sapling (>5"DBH, <4.5' height) species and density
- Photo points
- Hawksworth Mistletoe Rating (Pre only)
- Extent canopy cover (densiometer method)
- Surface fuels (Brown's Lines – 1, 10, 100, and 1000hr fuels)

Canopy cover was measured using the densiometer and PVC methods to determine the extent of canopy cover reduction, a primary indicator for crown fire potential.³ Adult and sapling trees were measured to determine changes in species composition, size and density which indicate if old and large trees were preserved as well as fire potential. Understory cover was measured at Madera and Dry Lakes I sites to assess the vegetative response to the increased sunlight, harvesting methods, and the potential for fine understory fuels to carry a beneficial ground fire. Photo point data were taken to visually represent the forest structure pre and post treatment.

³ Both methods have acceptable margins of error. Additional sampling points were taken with the PVC method to increase the confidence in the data.

Some sites (Dry Lakes I and II) collected surface fuel data to assess amount and type of dead and down woody material present. The Madera site collected seedling density data.

Socioeconomic Monitoring Indicators

Forest Guild and the multiparty team selected several indicators to measure and track over time to address the socioeconomic project goals. These were:

Workforce

- number of forest workers and youth employed and the number and type of trainings

Utilization

- amount of fuelwood generated and the amount of fuelwood removed,
- amount and type of wood products removed and processed for market,

Sustainability

- extent and type of technical assistance to local wood businesses,
- results of the technical assistance to local wood businesses, and Scientific Basis for Project
- extent and type of sharing project results and lessons learned with Forest Guild associate and professional members.

Youth Involvement in Monitoring

Another goal of the project was to train and involve local youth in the ecological monitoring of the project. Local youth with the El Rito Crew of the Forest Guild Youth Corps (2003, 2004) and with the Las Comunidades Youth Crew (2006) were trained in ecological monitoring methods.⁴ The trained crews were the primary collectors' of the ecological data along with representatives from the Forest Guild and members of the restoration workforce (Herman Vigil's crew). Roughly 35 local youth of high school age participated in the trainings and data collection. The youth component of this multiparty monitoring project fulfills the eligibility requirements of the enabling legislation Sec. 605 (B)(6) (H.R.2389 Pub. L. No. 106-393).

Monitoring Protocol

Ecological monitoring protocols for the Dry Lakes I and II sites followed those described in the CFRP monitoring handbook series (Derr *et al.* 2004). Ecological monitoring protocols for the Madera site followed protocols described in the Southwest Community Forest Research Center Working Paper 5: Community Monitoring for Restoration Projects In Southwestern Ponderosa Pine Forests (Savage 2002). In addition to the protocol listed in the CFRP monitoring handbook series, a handheld Geographic Positioning System (GPS) recorded the beginning and endpoint of each transect. The GPS was set to North American Datum 1983 and degrees, minutes, and

⁴ The Las Comunidades Youth Crew did not work on any of the treatment sites associated with this CFRP as the ecological monitoring was completed in 2005. However, there were still funds in 2006 to work towards socioeconomic objective 3 and Forest Guild partnered with Las Comuidades. A half day training session was held in Vallecitos for 12 youth which was followed by 2 days in the field with 6 youth. The Las Comunidades youth collected post treatment data on the nearby Ensenada CFRP project and pre treatment data on their 2006 CFRP grant.

seconds was the unit of measure.⁵ Socioeconomic monitoring protocols consisted of annual document review, informal discussions, and wood product valuation.

Sampling Design

Socioeconomic monitoring indicators were sampled as they occurred and tracked annually. The document review process continued throughout the project. Ecological monitoring transects were installed at the three treatment sites. Madera had 3 transects, Dry Lakes I had 3, and Dry Lakes II had 6 transects installed. These transects were sited throughout the treatment blocks at random azimuths. Most transects were not near the treatment block boundary, did not cross logging roads, and ran perpendicular to the fall line.

Table 1: Amount and Type of Sampling by Treatment Site

| | Method | # Pre Treatment | # Post Treatment | Remarks |
|----------------------------------|--|-----------------|------------------|---|
| Sampling at Madera | | | | |
| Adult, Dead, and Sapling Density | 30x30ft square plots | n/a | 18 | |
| Tree Species Composition | 30x30ft square plots | n/a | 18 | |
| Live and Dead Adult Tree Size | 30x30ft square plots | n/a | 18 | DBH for juniper trees were measured at their largest sized stem |
| Ground Cover Percentage | 3x3 ft square plots | n/a | 18 | |
| Extent Canopy cover | PVC pipe with cross hairs | n/a | 75 | |
| Seedling Density | 4ftx100ftf belt | n/a | 3 | |
| Photo Points | Photos of cardinal directions from transect endpoints. | n/a | 24 | |
| Sampling at Dry Lakes I | | | | |
| Adult, Dead, and Sapling Density | 30x30ft square | 18 | n/a | |
| Tree Species Composition | 30x30ft square | 18 | n/a | |
| Live and Dead Adult Tree Size | 30x30ft square | 18 | n/a | DBH for juniper trees were measured at their largest sized stem |
| Extent Canopy cover | Densiometer | 30 | n/a | |
| Ground Cover Percentage | 3x3 ft square | 15 | n/a | |

⁵ The GPS coordinates for each transect (beginning and endpoint) can be found in the monitoring notebook recorded on the photo point field sheets.

| | | # Pre Treatment | # Post Treatment | Remarks |
|----------------------------------|--|-----------------|------------------|---|
| Photo Points | Photos of cardinal directions from transect endpoints. | 24 | n/a | Diameters for 1000hr fuels not collected, only tally (use of surrogate site?) |
| Surface Fuels | Brown's Lines | 6 | n/a | |
| Sampling at Dry Lakes II | | | | |
| Adult, Dead, and Sapling Density | 1/10 th acre plots | 36 | 36 | |
| Tree Species Composition | 1/10 th acre plots | 36 | 36 | |
| Live and Dead Adult Tree Size | 1/10 th acre plots | 36 | 36 | |
| Mistletoe Rating | Hawksworth | 36 | 36 | |
| Extent Canopy cover | 30x30ft square | 60 | 60 | |
| Surface Fuels | Densiometer | 12 | 12 | |
| Photo Points | Brown's Lines | | | |
| | Photos of cardinal directions from transect endpoints. | 16 | 16 | |

Ecological Data Analysis

Only Dry Lakes II data can be analyzed for implementation monitoring as it is the only site where before and after treatment data were collected. Madera was a post prescribed burn assessment and Dry Lakes I was treated with district funds rather than CFRP program funds and post treatment monitoring was not deemed appropriate. Data from Madera and Dry Lakes I were worthwhile to collect for youth education purposes.

Dry Lakes II Data Analysis

Pre and post treatment data were analyzed and data were entered into Microsoft Excel spreadsheets (see monitoring notebooks for the original field data forms).

Ground cover percents were summed and averaged; percent change from pre to post was calculated. Tree size (DBH, diameter at breast height) was averaged and descriptive statistics were generated for live and dead trees. Density of adult live, dead, and sapling size trees were calculated. Extent canopy cover data were collected pre and post and percent cover was calculated.

See Table 2 for quantitative data analysis for pre and post treatment and % change. Descriptive statistics were generated for the size of adult live trees (See Table 3). Density was calculated for adult live and dead, and sapling trees.⁶ Species frequency and density were calculated (see Table 4). For photographic documentation, see monitoring notebooks.

Dry Lakes I Data Analysis

Pre treatment data were analyzed and data were entered into Microsoft Excel spreadsheets (see monitoring notebooks for the original field data forms).⁷

Madera Data Analysis

Post prescribed burn data were analyzed and data were entered into Microsoft Excel spreadsheets (see monitoring notebooks for the original field data forms).⁸

⁶ Dry Lakes II: Pre and post treatment tree plots = 156,816 ft.2 sampled (3.6 acres).

⁷ Dry Lakes I: Pre treatment tree plots = 16,200 ft.2 sampled (.3719 acres)

⁸ Madera: Post treatment tree plots = 16,200 ft.2 sampled (.3719 acres)

Table 2: Dry Lakes II Data Analysis

| Summary of Sampled Area | | | | |
|--------------------------------|------|-------|------------|--------------------|
| Indicator | Pre | Post | unit | % change over time |
| Density of Adult Trees | 91 | 41 | trees/acre | -55.00% |
| Average Diameter (DBH) <5" dbh | 9.96 | 11.89 | inches | 19.30% |
| Saplings per acre | 287 | 46 | trees/acre | -84.00% |
| Snags per acre | 4 | 0.3 | trees/acre | -92% |
| Stems per acre | 382 | 87.3 | stems/acre | -77% |
| Canopy Cover | 63 | 20 | % | -68.20% |
| Surface Fuels | 10.4 | 15.2 | tons/acre | 46.10% |
| Basal Area | 57 | 34 | ft2/acre | -40% |
| Hawksworth Mistletoe Rating | 1.91 | n/a | Hawksworth | n/a |

Table 3: Dry Lakes II, Descriptive Statistics for Adult Live Tree Size

| | PRE | POST |
|-------------------------|-------------|-------|
| Mean | 9.956140351 | 11.89 |
| Standard Error | 0.173098167 | 0.231 |
| Median | 10 | 12 |
| Mode | 9 | 12 |
| Standard Deviation | 3.201146287 | 2.823 |
| Sample Variance | 10.24733755 | 7.97 |
| Kurtosis | 0.682653957 | 1.875 |
| Skewness | 0.703099754 | 0.709 |
| Range | 19 | 19 |
| Minimum | 5 | 5 |
| Maximum | 24 | 24 |
| Sum | 3405 | 1783 |
| Count | 342 | 150 |
| Confidence Level(95.0%) | 0.340474584 | 0.455 |

Table 4: Dry Lakes II, Tree Species Sampled and Density

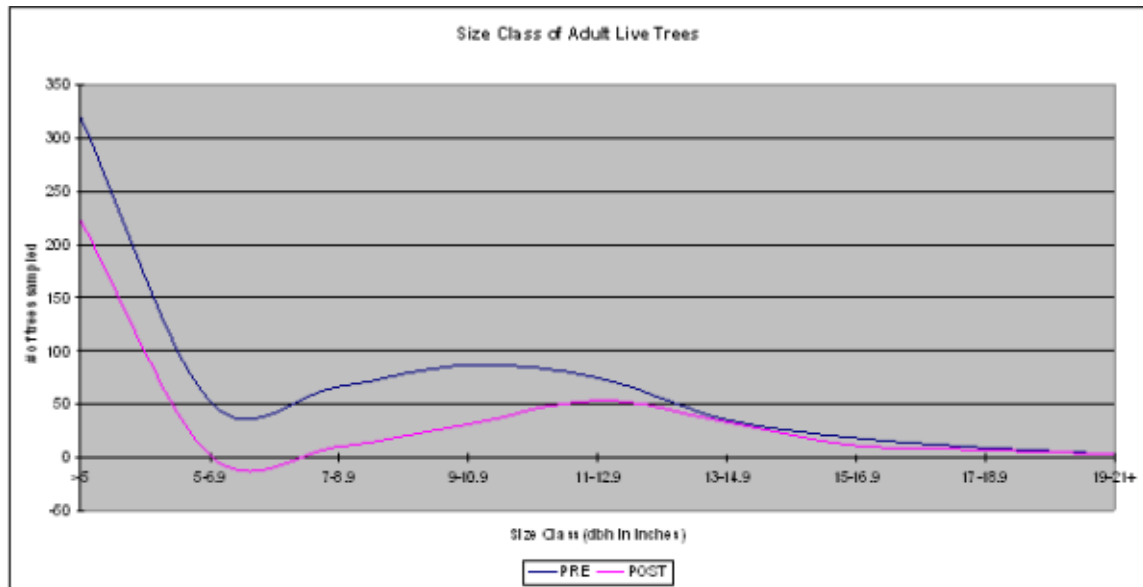
| Tree Species | Pre | Post | Density Pre | Density Post | % Change |
|-----------------------|--------|--------|-------------|--------------|----------|
| A. Adult Trees | | | | | |
| Ponderosa Pine | 303 | 142 | 84.2 | 39.6 | -53% |
| Gamble Oak | 1 | 0 | 0.3 | 0 | -100% |
| Douglas Fir | 14 | 6 | 3.8 | 1.6 | -57% |
| White Fir | 12 | 2 | 3.3 | 0.5 | -83% |
| Total Trees | 330.00 | 150.00 | 91.40 | 41.60 | -54% |
| B. Saplings | | | | | |
| Gamble Oak | 938 | 161 | 260.5 | 44.7 | -82% |
| Ponderosa Pine | 73 | 3 | 20.2 | 0.8 | -95% |

| Tree Species | Pre | Post | Density Pre | Density Post | % Change |
|-----------------------|----------------|--------------|-------------|--------------|-------------|
| White Fir | 12 | 0 | 3.3 | 0 | -100% |
| Douglas Fir | 5 | 0 | 1.3 | 0 | -100% |
| Pinyon Pine | 3 | 2 | 0.8 | 0.5 | -33% |
| Juniper | 1 | 0 | 0.3 | 0 | -100% |
| Rocky-Mtn Juniper | 1 | 0 | 0.3 | 0 | -100% |
| Total Saplings | 1033 | 166 | 287 | 46 | -84% |
| C. Snags | | | | | |
| Ponderosa Pine | 14 | 0 | 3.8 | 0 | -100% |
| Douglas Fir | 0 | 1 | 0 | 0.3 | 100% |
| Total Snags | 14(3.8) | 1(.3) | 3.8 | 0.3 | -92% |

Table 5. Surface Fuels

| Fuel Category | PRE | POST | % Change |
|---------------|------|------|----------|
| 1hr | 0.2 | 0.3 | 50% |
| 10hr | 0.7 | 1.8 | 157% |
| 100hr | 2.3 | 5.6 | 143% |
| 1000hr | 7.1 | 7.4 | 4% |
| Total: | 10.4 | 15.2 | 46% |

Table 6. Size Class Distribution of Adult Live Trees



Socioeconomic Analysis

Socioeconomic data were synthesized and analyzed using annual document review and informal discussions with project collaborators. Socioeconomic monitoring indicators were sorted into four categories: Workforce, Utilization, Sustainability, and Scientific basis for project.

Workforce Data Analysis

Forest Guild maintained data on forest worker employment and training associated with the grant. These data were compiled by project year, and type at the end of the grant using the worksheets found in *Short Guide for Grant Recipients* (Moote et al. 2007). Data in tables 7, 8, and 9 address socioeconomic indicators

Training

Forest Guild, working with the El Rito District provided trainings to forest workers from 2003 - 2006. These trainings related to fire suppression (S130.190), chainsaw operation (S212), CPR and First-Aid, in forest fuels analysis (regarding fuel ignitability), and in ecological monitoring.

Table 7. Training Data

| Year | # trained S130/190 | # trained S 212 | # trained CPR / First Aid | # trained in fuels analysis | # trained for ecological monitoring |
|--------|--------------------|-----------------|---------------------------|-----------------------------|-------------------------------------|
| 2003 | 8 | 8 | 8 | 0 | 4 |
| 2004 | 6 | 6 | 6 | 4 | 0 |
| 2005 | 8 | 4 | 4 | 0 | 0 |
| 2005 | 6 | 6 | 6 | 0 | 35 (youth) |
| Totals | 28 | 24 | 24 | 4 | 39 |

Employment

Job types consisted of fuels management (brushwork), fuels technicians (fuels analysis for fire risk) forest restoration, fire suppression, and wood utilization. Fire suppression and wood utilization were the only job types that were indirect or paid by sources outside of CFRP #26-02.

Table 8. Workforce Data

| Job Type | Employee # | Hours worked | FTE equivalent | Direct or Indirect | Known to continue outside of grant |
|--------------------|--------------|--------------|----------------|--------------------|------------------------------------|
| Fuels Management | 28 | 7840 | 3.7 | Direct | No |
| Forest Restoration | 15 | 5360 | 2.6 | Direct | Yes |
| Fuels Technician | 6 | 480 | .2 | Direct | Yes |
| Fire Suppression | 6 | 240 | .1 | Indirect | Yes |
| Wood Utilization | 8 | 640 | .3 | Direct | Yes |
| Wood Utilization | 5 | 200 | .1 | Indirect | Yes |
| Totals | 68 Employees | 14760 HRS | 7.0 FTE | n/a | n/a |

The grant created 6.8 full time employees (FTE) direct (paid through grant funds) jobs and .2 FTE indirect (paid by a source other than CFRP grant # 26-02). Work accomplished by Herman Vigil's crew (by job type: forest restoration, fuels technician, and fire suppression) and by Las Comunidades are known to continue beyond the grant. Forest Guild has been communicating with Herman Vigil and knows his crew to be employed year-round in forest work.

Utilization Data Analysis

The restoration by-product from the Dry Lakes II site (392 acres) was utilized as fuelwood by local collectors and as posts by Las Comunidades.

Fuelwood

The Tres Piedras Ranger District estimates that three cords per acre were cut and available for removal. After a site walk through, Forest Guild agreed with the District estimate. The wood volume generated by the restoration treatment was estimated: 392 acres x 3 cords = 1176 cords (588 million board feet).⁹ A site walk through by Forest Guild Senior Forester Orlando Romero estimated that on average, roughly 2 cords per acre were actually removed (392 acres x 2 cords = 784 cords or 392 mbf). This conservative estimation was then used to determine the value of the wood made available through the restoration treatment, and the costs associated with removing this wood from the site.

Forest Guild estimated the value of a cord of wood in the Tres Piedras area through discussions with local residents. It was estimated that it takes a minimum of 5 hours to travel to the site, cut the wood, load the wood, travel home, and unload a pick-up truck of fuelwood from the Dry Lakes II treatment site to Tres Piedras. Costs for travel, time, and equipment use were averaged at \$40.00/hour. A cost per cord was generated: \$40.00/ hr x 5 hours = \$200.00 /cord.

Forest Guild estimated that: 784 cords x \$200.00/cord = \$156,800.00. An estimated \$156K of fuelwood was removed from the site by fuelwood collectors.

Posts¹⁰

In 2006, Forest Guild partnered with Las Comunidades as an experiment to determine costs associated with wood removal and processing for posts. The objective of this experiment was to remove usable materials from the Dry Lakes II thinning area to reduce the amount of 1000-hour fuels and to determine the costs for doing so.

The Dry Lakes II site is near Tres Piedras, lying west of Highway 285, south of Route 64 and north of forest road 222. There are about 4 miles of unimproved dirt road leading to the site from 222 which is also unpaved between Tres Piedras and Las Tablas, but is graded on a regular basis. The Vallecitos mill is 52 miles away by the best paved route along 285 through Ojo Caliente, but is only 27 miles away using unpaved back roads.

The marketable products that were removed were small diameter trees that were already felled during the thinning project. These were to be machine peeled into the posts and poles by Las Comunidades using a Morbark PS8 at the mill site in Vallecitos. These logs had to be between 4 and 8 inch in diameter at their tips and no less than 8 foot 4 inches (100 inches) long in order to meet the market requirements for utilization by post treatment facilities in Raton and Bernalillo. The process began with locating the fallen logs, identifying those that were useable, cutting them to length, moving them to a temporary deck, loading them on a truck or trailer, and transporting and unloading them at the mill site in Vallecitos.

⁹ 1 cord = 2.0 million board feet

¹⁰ Contribution by J. Ussery, Las Comunidades

The operation was done in four days between November 27th and December 9th. On November 27th and the 3rd and 5th of December, a 3 to 5 person measuring and cutting crew located suitable logs and cut them to length. They also piled close by logs into small piles to be more efficiently loaded and moved. All members of the cutting and measuring crew had completed the Forest Worker Safety Training certification course at the beginning of November and were paid \$10 per hour with a Workmen's Compensation rate add on of \$3 per hour.

A Model 722 Bobcat skid-steer was rented from Cozarts Service in Tres Piedras at a rate of \$45 per hour including operator in order to forward materials to the deck and to load trucks and trailers on the 3rd and the 9th of December. A flatbed one-ton Ford F-350 with a 12 foot bed carried out two loads on the 3rd, while a two ton International with a 22 foot transport trailer was used on the 9th. All loads were transported over the unpaved Forest Service road to the mill. This route is almost half as far and is cheaper on a dollar per mile basis, but took a lot longer than the time it took to drive unloaded along 285. It is still a question which route would have been better.

Measuring where to cut the fallen log is usually done with a spring-loaded tape measure. The end of the tape is hooked over one end of a log and the tape is drawn out to where the cut is to be made for the desired length. This works but has some problems. Often the hook becomes undone and other times the end of the log is unusable because of knots or some other deformity and it is difficult to fasten the tape in the middle of the log. A simple method was developed that used a section plastic pipe cut to the 104 inches as a fixed length ruler for measuring the location of cuts. The original device had a right angle fitting with an 8 inch section of pipe that was marked at 4 and 6 inches for determining diameter. The device made it possible for one person to do the measuring for two cutters as long as they were working fairly close together. In the field additional rulers were cut from thin poles so cutters could even work without assistance in measuring. This freed the assistant to help with positioning the logs for cutting and for stacking the cut pieces for the grapple. Stacking is done to make it easier for the skid loader to pick up. A single tree can often produce two to three usable posts and it is fairly easy to flip the end pieces towards the base or middle to make a small stack out of each tree.

In order to efficiently prepare the logs for loading, the wood from all sections of the area were aggregated into a single central deck easily accessible from the road. The grapple on the Bobcat easily handled three to six posts in a load and spent most of its time forwarding the wood to the deck. It was also of great assistance in loading the truck and trailer. Since both the truck and the trailer had 8-foot wide beds, the eight and a half to nine foot long logs were placed crosswise, with only a few inches extending beyond the bed. The twelve foot length of the flatbed truck made it impossible for the grapple to place its loads at the front of the bed, but two of the crew working together easily moved the loads forward while the Bobcat went back to the deck for additional material. The transport trailer had ramps that allowed the Bobcat to drive onto the trailer and deliver the load the full length of the bed without worker assistance. Being still green and heavy, fewer posts could be carried in a load than if they had been dry. Not knowing how the truck would handle the rough road conditions, only 52 posts were on the first load, after a successful first trip, 76 logs were placed on the second load. The trailer carried 124 logs on its only trip. Even though it took two trips to carry about the same amount of wood, the one-ton truck was more maneuverable, could travel the back roads quicker and cost less per mile.

Overall, the project was not a profitable venture. Its total cost including administration was \$613 dollars more than the \$2000 projected budget. It was fairly successful in reducing the amount of fuel left from the thinning, but the 252 posts that were collected had a transported cost of \$7.80 each. Since peeled posts are sold wholesale for \$2 to \$3.5 each, this is a negative profit margin.

The 252 posts, sold at \$3 each, net \$756. At a cost for removal and processing of \$7.80 a post, the post experiment net -\$1209.

However, there were a fair number of posts with a tip diameter of 8 inches or more. If peeled smoothly and dressed for architectural use these can be sold for \$3.50 to \$4 per foot. So only through the higher priced sale of these large diameter pieces could this process be done at break-even or better. There were, however, several factors that could be addressed that could make for more favorable economics. The cutting crews worked for less than half a day on site on two of the days. With transportation time at 1 hour each way, 24 of the 66 hours of crew time were spent simply getting there and back. Fewer days with longer hours would improve the results. A change in the thinning process itself to cut the fallen trees to length and stack them at the time of felling would make it a simple matter to come back with a Bobcat to aggregate and load after allowing some time for the wood to dry. This would minimize the labor input and with the inclusion of enough larger diameter wood, might just make post removal and utilization break even.

Youth Involvement Analysis

Local youth were involved in the project as attendees in school assemblies, ecological monitoring trainees, and data collectors in ecological monitoring. 35 local youth were trained in ecological monitoring. In addition to the local youth who were involved in the ecological data collection, Forest Guild held two school assemblies with Mesa Vista Schools to conduct educational activities related to forest restoration, the CFRP program, and the Tres Piedras grant.

Table 9. Socioeconomic Data.

| Period* | # acres thinned | # acres Rx | # acres slash | equipment purchase | Meetings & presentations | Meeting & presentation attendees | Fuel Samples |
|-------------------|------------------------|-------------------|----------------------|---------------------------|-------------------------------------|---|---------------------|
| 01/01/03-12/31/03 | 0 | 6,000 | 400 | \$7,200 | 5 | 16 | 0 |
| 01/01/03-03/31/04 | 0 | 0 | 0 | 0 | 5 | 30 | 0 |
| 04/01/04-06/30/04 | 10 | 0 | 220 | 3,000 | 2 | 25 | 0 |
| 07/01/04-09/30/04 | 0 | 0 | 116 | \$500 | 0 | 19 | 50 |
| 04/01/04-06/30/05 | 100 | 0 | 100 | \$500 | 2 | 0 | 6 |
| 01/01/05-02/28/05 | 0 | 0 | 0 | \$841 | 2 | 0 | 0 |
| 03/01/05-09/30/05 | 120 | 0 | 100 | \$700 | 0 | 3 | 10 |
| 10/01/05-12/31/06 | 172 | 0 | 0 | 0 | 7 | 20 | 0 |
| Totals | 392 | 6,000 | 936 | \$12,741 | 23 | 113 | 66 |

* For an accounting of direct and indirect jobs generated by this project, go to the Workforce Analysis section.

Sustainability Analysis

Elements of the project fostered sustainability in the areas of youth education, increased local employment, increased and diverse trainings for forest workers, the development of a successful crew whose work continues beyond the grant, the market and operational research regarding a post operation in partnership with Las Comunidades.

Scientific Basis for Project

The forest restoration components of the project were supported by the Guild's ecological forestry initiatives. The Guild's national network of professional foresters and research scientists utilize the best available science to implement forestry projects that are ecologically, socially, and economically responsible. Treatments conducted as part of this project were designed to restore forested landscapes while reducing the threat of catastrophic wildfire. Data gathered through the multiparty monitoring process and the subsequent analysis and report will serve as a learning tool for other communities and entities engaged in similar projects. On a larger scale, the lessons learned from this project will feed into the Guild's national effort to develop best forestry practices for forest managers and allied resource professionals. One product of this effort will be an ecological forestry section of the Forest Guild website dedicated to providing a synthesis of information related to the restoration and management of various forest types. The Ecological Forestry Initiative website can be located by visiting www.forestguild.org/ecological_forestry.html.

Discussion and Interpretation

Ecological and socioeconomic monitoring data reveal that many grant and program objectives were met relating to fire risk, forest health, and sustainable communities. An interpretation and discussion of social and ecological monitoring data is provided below.

Ecological Data Interpretation

The ecological monitoring conducted on this project is generally considered to be implementation level monitoring. Implementation monitoring answers the question, "What was affected in the stand by the silvicultural prescription?" Based on the data analysis and what is known about forest type, structure, and wildfire in New Mexico, the monitoring results can indicate if the forest treatments were likely to be effective in meeting the project goals.

Quantitative data taken at Dry Lakes II from 6 transects contained 36 tree sub-plots which place the sampling level for tree data beyond 30 sampling points which is considered to be a minimum threshold for reliable ecological data (Derr *et al.* 2004). All of the pre treatment transect measurements were able to be replicated post treatment. Ecological monitoring at Dry Lakes II indicates that many of the grant objectives were met.

Tree density, measured in # of stems/acre, was reduced by 77%, reducing fuel and the likelihood for ground fire to become a crown fire. This reduction in tree density also indicates that tree competition has been reduced leading to the improved health of retained trees.

We are 95% confident that the mean DBH of all trees on the site sampled (total pop.) for PRE data is between 9.61 and 10.30. We are 95% Confident that the mean DBH of all trees on the site sampled (total pop.) for POST data is between 11.435 and 12.34. The change in the DBH of adult live trees sampled is said to be ecologically significant because the confidence interval of the DBH sampled after treatment is outside the confidence interval of the # of trees sampled before treatment.

For sapling size trees which are considered to be ladder fuels, density was reduced by 84% thus accomplishing another goal of the grant and CFRP program - reducing the risk of uncharacteristic crown fire.

These reductions, along with the 40% reduction in basal area from 57 to 34 ft.²/acre, also indicate that substantial reductions in standing fuels and woody mass were met, another goal of the grant.

Dead adult trees (snags) were reduced by 92%. Although snags were sampled post treatment, future treatments may consider writing prescriptions that promote snag retention or even creation, as snags are a valuable component of a healthy forest ecosystem and provide for wildlife habitat needs.

The restoration treatment generated increased (46%) surface fuels on site (these measurements were taken prior to wood removal by fuel wood collectors and Las Comunidades). Increased surface fuels can assist with the reintroduction of surface fire by providing a continuous fuel cover to carry surface fire. Increase surface fuels, if significant, can also impair site conditions by acting as ladder fuels to carry surface fire to tree crowns (contributing to post treatment mortality) and by creating a hot surface fire that can negatively understorey recovery.

The most significant change measured on the site is the reduction in canopy cover by 43 percentage points (pre treatment at 63% cover to post treatment at 20% cover), or a - 68% change. This reduction is particularly important as canopy cover is closely tied to crown fire potential and spread, major concerns of the grant and the larger grant program. A confidence interval for the canopy cover data was calculated to more accurately frame the effects of the treatment. For the whole treatment area, canopy cover was likely reduced between -41% and -95%. In other words, although our measured canopy cover reduction was 43 percentage points (-68% change), we are 95% confident that canopy cover was reduced by at least 26 percentage points (-41% change) on the low end to at most 60 percentage points (-95% change) on the high end.

Socioeconomic Data Interpretation

Interpreted quantitative data from the socioeconomic indicators indicate that grant and program objectives were met relating to three areas: Workforce, Sustainability, and Utilization.

Workforce:

- The grant provided employment and training to the equivalent of 7 FTE increasing the capacity and marketability of the forest restoration workforce in northern New Mexico.

Sustainability:

- An outcome of the workforce component of the grant is the continued year round work of the Herman Vigil forest restoration crew.

- The partnership with Las Comunidades provided on-the-ground market and operational data for a small diameter post operation in the Rio Vallecitos watershed laying the groundwork for increasing the sustainability of the communities served by the VFSYU.

Utilization:

- An estimated 784 cords of fuelwood with a comprehensive value of \$156,000 were made available to and removed by local communities.
- Las Comunidades removed 252 posts, processed those posts, and moved them to market.

Concluding Monitoring Remarks

Ecological and socioeconomic monitoring of the Tres Piedras CFRP provides meaningful quantitative data which to evaluate the success of the project. Ecological monitoring results from CFRP grant # 26-02 indicate that objectives of both the grant and the larger program in general were achieved (H.R.2389 Pub. L. No. 106-393):

By reducing the density of trees (especially saplings) and reducing canopy cover, the project reduced the threat of large, high intensity crown dominated wildfires in accordance with section 603 and 605 of H.R.2389 Pub. L. No. 106-393.

The increase of mean DBH across the site shows that old and large trees were preserved in accordance with section 605 of the enabling legislation.

Socioeconomic monitoring results from the grant indicate that grant and program objectives were achieved:

The grant funded 6.8 FTE and provided small diameter wood that enabled additional work equal to .2 FTE.

Workforce received training in a variety of tasks diversifying their skill set as contractors.

Fuelwood was made available to the local communities and much of it was removed, benefiting the site condition and the communities.

A local business, Las Comunidades was afforded the opportunity to test the potential for a profitable post operation while acquiring valuable business data within the safety of a grant atmosphere.

35 local youth were trained in ecological monitoring gaining valuable educational experience in the natural resource field while an additional 113 residents of the local communities (including many youth) participated in educational, wood utilization, and collaborative forest restoration activities (see Table 9).

Sources Cited

- Derr, Torri; Moote, Ann; Savage, Melissa; Schumann, Martha; Abrams, Jesse; McCarthy, Laura; Lowe, Kimberly. 2004. *Handbook 4 – Monitoring Ecological Effects*. Ecological Restoration Institute, Forest Guild, Four Corners Institute, USDA Forest Service, Collaborative Forest Restoration Program, NM.
- Moote, Ann; Savage, Melissa; Abrams, Jesse; Schumann, Martha; Derr, Tori; and Krasilovsky, Eytan. *Multiparty Monitoring and Assessment of Collaborative Forest Restoration Projects: Short Guide for Grant Recipients*. Ecological Restoration Institute, Four Corners Institute, Forest Guild. USDA Forest Service, Collaborative Forest Restoration Program, NM.
- Savage, Melissa. 2002. *Community Monitoring for Restoration Projects: In Southwestern Ponderosa Pine Forests*. Southwest Community Forestry Research Center Working Paper 5. Santa Fe, NM.

Appendix A. Monitoring Plan

Monitoring Plan

This ecological and socio-economic monitoring plan strives to capture the effects of the Tres Piedras CFRP project on forest structure, ecosystem components, and the surrounding communities and economies. The monitoring goals are restated below to provide context for the monitoring indicators.

Project Goals:

- The project will train a local workforce to perform thinning and burning activities. Training will include chainsaw operation, burning techniques, safety, and environmental monitoring.
- To pre-commercially and commercially thin, 1,600 acres and broadcast burn, and pile burn on 3,400 acres.
- To generate firewood and market small diameter wood to regional end users.
- To create community awareness about forest health and the importance of managed burning, and to educate youth and college students about the ecological and socio-economic elements of the project.
- To collaborate with research organizations and forest scientists.

Ecological Monitoring Indicators:

Madera Burn Monitoring (POST Only):

| Indicator | Metric | Sampling Method | Who will Monitor | When will Monitoring Occur |
|---|---|--------------------------------------|------------------|--|
| Forest Structure | Seedling Density, Density, Adult and Sapling Size, Density, Fire effects. | 36 30x30ft plots | FG, El Rito YCC | Fall 2003 Notes – was monitoring data collected too close to Rx burn? |
| Canopy Cover | % Cover | 150 sampling points using PVC method | | Fall 2003 |
| Understory Plant Cover | % Ground Cover | 36 3x3ft plots | FG, El Rito YCC | Fall 2003 |
| Physical Landscape Changes as a result of treatment | Photographic Documentation | 48 photos | FG, El Rito YCC | Fall 2003 |

Dry Lakes I Burn Monitoring (POST Only):

| Indicator | Metric | Sampling Method | Who will Monitor | When will Monitoring Occur |
|-----------|--------|-----------------|------------------|----------------------------|
|-----------|--------|-----------------|------------------|----------------------------|

| Indicator | Metric | Sampling Method | Who will Monitor | When will Monitoring Occur |
|---|---|------------------------------------|-------------------------|-----------------------------------|
| Forest Structure | Density and Size of live and dead trees. Sapling density, | Densiometer (CC), 18 30x30ft plots | El Rito YCC | July 2004 |
| Canopy Cover | % Cover | 30 densiometer plots | | July 2004 |
| Understory Plant Cover | % Ground Cover | 15 3x3ft plots | El Rito YCC | July 2004 |
| Ground Fuels | Tons per acre | 6 35ft Brown's Lines (no 1000hr) | El Rito YCC | July 2004 |
| Physical Landscape Changes as a result of treatment | Photographic Documentation (photo points in digital and 35mm) | 24 photos | El Rito YCC | July 2004 |

Dry Lakes II Monitoring (PRE and POST):

| Indicator | Metric | Sampling Method | Who will Monitor | When will Monitoring Occur |
|---|---|------------------------|--|------------------------------------|
| Forest Structure | Density and Size of live and dead trees. Sapling density, Hawthorn's mistletoe rating | See CFRP handbooks | Forest Guild and Restoration Work Crew | PRE – May 2005 POST – July 2005 |
| Canopy Cover | % Cover | 60 densiometer plots | Forest Guild and Restoration Work Crew | PRE – May 2005 POST – July 2005 |
| Understory Plant Cover | % Ground Cover | See CFRP handbooks | Forest Guild and Restoration Work Crew | PRE – May 2005 POST – July 2005 |
| Ground Fuels | Tons per acre | 12 35ft Brown's Lines | Forest Guild and Restoration Work Crew | PRE – May 2005 POST – July 2005 |
| Physical Landscape Changes as a result of treatment | Photographic Documentation (photo points in digital and 35mm) | See CFRP handbooks | Forest Guild and Restoration Work Crew | PRE – May 2005 POST – July 2005 |

Dry Lakes II monitoring followed the guidelines presented in **CFRP Handbook 4: Monitoring ecological effects**. This handbook can be downloaded at <http://www.fs.fed.us/r3/spf/cfrp/monitoring/pdf/mm4.pdf>.

Socioeconomic Monitoring:

Improve local restoration business and workforce skills

| Indicator | Metric | Who will Monitor | When will Monitoring Occur |
|------------------|---|-------------------------|-----------------------------------|
| Productivity | # of Jobs direct and indirect converted to FTE. Workforce training (S-212, First Aid/CPR, heavy equipment, etc.) | FG | To be compiled annually |

Goal 6: Establish value added use for small diameter

| Indicator | Metric | Who will Monitor | When will Monitoring Occur |
|--|-------------------------------------|-------------------------|-----------------------------------|
| Cost to remove and process small wood | Costs generated via document review | FG, Las Comunidades | Throughout project |
| Amount and type of wood removed or processed | Tons of wood, # cords, and # posts | FG, Las Comunidades | Throughout project |

Community Outreach and Education:

Goal: To generate awareness about the project and ecosystem restoration in the communities proximate to the project area.

| Indicator | Metric | Who will Monitor | When will Monitoring Occur |
|--|---|-------------------------|-----------------------------------|
| Community meetings where components of the project are presented | # of meetings and estimate of turnout | FG: Martha, Orlando | Throughout project |
| # of classroom presentations or field trips to the treatment areas | # of presentations and field trips and # of students involved | FG: Martha, Orlando | Throughout Project |