Black Lake Forest Restoration and Workforce Sustainability Project

Grant # CFRP 09-08

Multiparty Monitoring Report

forest GUILD

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Executive Summary

HR Vigil Small Products' (HRVSP) Collaborative Forest Restoration Program (CFRP) grant (#09-08), awarded in 2008, was aimed at implementing a 500 acre forest restoration and wildfire risk reduction treatment on land managed by the State Land Office near the community of Black Lake. A history of overgrazing and fire suppression in the project area has led to stands of overly dense trees that are susceptible to catastrophic wildfire. To compound this danger, many of New Mexico's communities, including Black Lake, have been identified as being below the statewide median for capacity to protect themselves from wildfire as well as being identified as an at-risk community by the state. .

The project had seven main goals:

1) Protecting communities and land from catastrophic wildfire;
2) Restoring ponderosa pine and mixed conifer forests by returning structure and process, including re-establishment of natural fire regime;
3) Improving wildlife habitat for elk, deer, and turkey;
4) Developing a burn plan for prescribed fire after CFRP project completion;
5) Preserving old and large trees for wildlife and genetic diversity;
6) Demonstrating ecologically sound forest practices in two of New Mexico's forest types (ponderosa pine and mixed conifer); and
7) Incorporating data into development of a long-term forest management plan for the entire 12,000 acres of state land.

This report addresses the extent to which these goals were reached based on analysis of ecological monitoring indicators. Of primary importance, the HRVSP restored forest structure in preparation for prescribed fire across 300 acres of transitional ponderosa pine – mixed conifer forest. The project acreage was reduced from 500 acres due to reduced funding by the CFRP.

Overall, pre- and post-treatment ecological monitoring indicates that implementation of this project served to both improve the ecological health of the treatment site and reduce the risk of catastrophic wildfire to the nearby community. Adult tree densities were reduced by 48% from 129 to 67 trees per acre. Sapling densities were reduced by 73% and, although seedling densities increased by 62%, the change was due to an increase in the number of aspen seedlings. Because aspen are in decline around the west, this change may, in fact, be beneficial. Lower densities of adult trees and saplings will reduce competition among trees and between trees and herbaceous understory species. This will improve forest health, wildlife habitat, and watershed conditions, as well as reduce ladder fuel loadings. Mean adult tree size increased by 17%, which suggests retention of large trees. Basal area was reduced from 80 ft^2/ac to 44 ft^2/ac, which is within the range of values currently accepted as typical of "healthy" ponderosa pine forests. Treatment activities reduced canopy cover slightly, which will benefit understory vegetation by allowing more sunlight to reach the ground. Grass and forb cover percentages increased while litter and bare soil/rock decreased, which supports this prediction.

The monitoring results point to changes in the treatment area's ecology that will be positive for ponderosa pine, aspen, and mixed conifer ecosystems. Additionally, greater focus on monitoring effects on use of treatment sites by wildlife will indicate the effects treatment activities may have had on improving habitat quality.

Socioeconomic data indicate the project generated considerable employment both in people employed and in durability of employment measured in full time equivalent. The project also afforded educational opportunities to local youth related to ecological monitoring. Also important were the strong partnerships created between HRVSP and Griego Logging and Richard Vigil Logging. These partnerships have increased the availability of fuelwood in the area, enabled HRVSP to meet site prescription, and provided with HRVSP with valuable business development insights that have already been applied in a successful 2010 planning CFRP.

Image 1. Retained ponderosa pine

Image 2. Wood removal from site via partnerships

Image 3. Reestablishing openings with grass understory

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Introduction

In 2008, HR Vigil Small Products was awarded a grant through the Collaborative Forest Restoration Program (CFRP) to implement a 500 acre restoration treatment on State-managed lands near the community of Black Lake in Colfax County. The treatment area consists of ponderosa pine (*Pinus ponderosa*) interspersed with aspen (*Populus tremuloides*); patches of mixed conifer composed of Douglas fir, (*Pseudotsuga menziesii),* white fir (*Abies concolor),* and blue spruce (*Picea pungens*); and meadow. Common understory species include Gambel oak (*Quercus gambelii*), common juniper (*Juniperus communis),* snowberry (*Symphoriocarpus oreophilus*), mountain muhly (*Muhlenbergia montanus),* Kentucky bluegrass *(Poa pratensis),* and forest fescue (*Festuca sororia)* (Bowers 2009).

A history of overgrazing and fire suppression in the project area has led to stands of overly dense trees that are susceptible to catastrophic wildfire. To compound this danger, many of New Mexico's communities, including Black Lake, have been identified as being below the statewide median for capacity to protect themselves from wildfire. Given this context, this project had seven goals:

1) Protecting communities and land from catastrophic wildfire;
2) Restoring ponderosa pine and mixed conifer forests by returning structure and process, including re-establishment of natural fire regime;
3) Improving wildlife habitat for elk, deer, and turkey;
4) Developing a burn plan for prescribed fire after CFRP project completion;
5) Preserving old and large trees for wildlife and genetic diversity;
6) Demonstrating ecologically sound forest practices in two of New Mexico's forest types (ponderosa pine and mixed conifer); and
7) Incorporating data into development of a long-term forest management plan for the entire 12,000 acres of state land.

Accomplishing these goals was to be completed through nine restoration objectives. These are:

1) Preserving old and large (16-18 in DBH and greater) trees (can be either old or large, or both) wherever they occur in the project
2) Reducing tree density in ponderosa pine cover areas to 60-80 trees per acre
3) Reducing tree density in mixed conifer cover areas to 80-100 trees per acre on high-quality growing sites with lower densities in poor sites
4) Maintaining tree species diversity, particularly regarding limber pine (southwestern white pine, *Pinus flexilis*)
5) Favoring Douglas-fir over white fir
6) Reducing canopy cover in ponderosa pine to 20-40%
7) Achieving a clumpy appearance, likely determined by existing forest structure
    a. These clumps would contain more than five trees with a minimum of five inches DBH, and the trees would have interlocking or nearly interlocking crowns.
8) Removing mistletoe-infected trees if infection is determined to be extensive
9) Removing wood products and lopping and scattering remaining slash to a depth not to exceed 24-36"

This report details the structure and findings of ecological monitoring activities conducted in conjunction with this project.

Collaboration and Adaptive Management

HRVSP and its partners pursued a collaborative multiparty monitoring process with strong support from the NM State Land Office. Three field meetings were held, each to further the restoration dialogue between parties. At the first meeting, baseline stand data were used to collaboratively develop the restoration prescription. This was also used for the purpose and need for compliance with the National Environmental Policy Act. The second meeting was held when the site was halfway treated. At this meeting new partnerships surfaced between HRVSP and Griegos Logging which brought the sight to desired conditions for fuel loading. It also brought an adjacent landowner into the collaborative. Also at this meeting southwestern white pine were observed and were protected by HRVSP from removal. The discussion at this meeting centered on returning prescribed fire to the stand and achieving the clumpy appearance. The attendees agreed that HRVSP was expertly implementing the somewhat complicated restoration prescription. The final collaborative meeting was held via phone and email to discuss the pre treatment and post treatment data comparison. There were some recommendations on removal of mistletoe and poor form trees that were applied to the next 40 acres funded under a 2010 CFRP. The Ecological Data Analysis section addresses this.

Ecological Monitoring Indicators

To determine the extent to which the project's ecological goals are met, a multiparty monitoring team was formed to develop and implement an ecological monitoring program. The Forest Guild contracted HR Vigil Small Products to lead the multiparty monitoring team and implement monitoring activities. The multiparty monitoring team first met on January 21, 2009, when it set monitoring goals for the project. Notes from this meeting can be found in Appendix A. The monitoring indicators chosen were:

1. Tree density
2. Tree size
3. Tree species
4. Crown base height
5. Canopy cover
6. Basal area
7. Surface fuels
8. Understory cover
9. Understory species composition
10. Deer, elk and turkey site use[1]
11. Butterfly abundance
12. Photographic documentation

[1] These indicators, recommended by the multiparty team, were not monitored due to reduced project budget and time constraints. Butterfly abundance was determined to be a sufficient indicator of habitat quality in discussions with the NM SLO forester.

The Forest Guild, with the assistance of the Las Vegas YCC crew, collected data for all of the above indicators with the exception of understory species composition and wildlife site use. Data regarding these indicators were collected before and after treatment on the project site. These data were then analyzed by the Forest Guild. Results are presented below.

Socioeconomic Monitoring Indicators

At the initial multiparty meeting, Forest Guild and the other partners developed socioeconomic indicators for the project to track progress towards or away from grant goals. These indicators are listed in the Multiparty Monitoring Plan (Appendix A). The following indicators were monitored:

1. Jobs (person and full time equivalent)
2. Trainings
3. Wood products generated
4. Education
5. Grantee experience

Monitoring Protocol

Monitoring protocol was derived from *Handbook 4 – Monitoring Ecological Effects* of the CFRP monitoring handbook series (Derr *et al.* 2004) and *Multiparty Monitoring Assessment of Collaborative Forest Restoration Projects* (Moote *et al*. 2010). Sampling was conducted along 300 ft transects, each of which contain six tree plots, five understory plots, two surface fuels transects, and 11 canopy cover readings. A handheld Geographic Positioning System (GPS) unit using the UTM coordinate system and North American Datum 1983 was used to record the beginning point of each transect. Data were recorded on data sheets from the above listed handbooks. These data sheets and the GPS coordinates of the transects can be found in the project's monitoring notebook, which is housed at the Forest Guild office in Santa Fe. Socioeconomic data were tracked by Forest Guild on an annual basis using CFRP protocols (Moote *et al.* 2010).

Sampling Design

Pre-treatment ecological monitoring was conducted in June 2009 by Marcos Roybal of the Forest Guild, Mark Meyers of the State Land Office, and the Forest Guild YCC crew based in Las Vegas. Five transects were established in the unit. Trees were sampled in an area totaling 0.62 acres, canopy cover was sampled at 55 points, understory cover was sampled in 50 plots, and 40 photo points were established.

Post-treatment ecological monitoring was conducted in August 2010 by Eytan Krasilovsky and Marcos Roybal of the Forest Guild and the Forest Guild YCC crew based in Las Vegas. Data were collected on the five original transects.

Ecological Data Analysis

Data were analyzed using Microsoft Excel. Table 1 displays the tree species density on a per-acre basis before and after treatment as well as percent change for adult live trees (>5 in DBH), saplings (<5 in DBH but > 4.5 ft height), snags (dead standing trees >5 in DBH), and seedlings (<4.5 ft height). With the exception of adult aspen, density of all live adult and sapling tree species decreased with treatment. Total stems per acre of adult live trees and saplings decreased by 48% and 73% respectively. Ponderosa pine and aspen snags decreased while Douglas-fir snags increased, for an overall decrease in snags of 20%. With the exception of aspen, all seedlings decreased with treatment. The number of aspen seedlings more than doubled, resulting in an overall increase in the number of seedlings per acre by 62%.

Table 1. Per-acre density of trees by species, pre and post treatment

Adult Live Trees	**Per Acre PRE**	**Per Acre POST**	**% Change**
Ponderosa pine	67	39	-41%
Douglas-fir	21	3	-84%
White fir	22	2	-93%
Aspen	20	23	15%
TOTAL	**129**	**67**	**-48%**
Saplings	**Per Acre PRE**	**Per Acre POST**	**% Change**
Ponderosa pine	241	0	-100%
Douglas-fir	51	2	-97%
Spruce	7	0	-100%
White fir	50	5	-90%
Aspen	135	123	-9%
TOTAL	**483**	**129**	**-73%**
Snags	**Per Acre PRE**	**Per Acre POST**	**% Change**
Ponderosa pine	2	2	-30%
Douglas-fir	1	2	40%
Aspen	5	3	-30%
TOTAL	**8**	**6**	**-20%**
Total Live, Dead, Saplings	**Per Acre PRE**	**Per Acre POST**	**% Change**
All Trees	**620**	**202**	**-67%**
Seedlings	**Per Acre PRE**	**Per Acre POST**	**% Change**
Ponderosa pine	22	15	-34%
Douglas-fir	86	27	-68%
Spruce	10	6	-38%
White fir	121	118	-3%
Aspen	410	891	117%
Oak	1	0	-100%
TOTAL	**651**	**1057**	**62%**

Data for all other monitoring indicators were tallied and calculated for all sampled transects. Percent change over time was calculated for all quantitative indicators. Table 2 displays the pre- and post-treatment measurements for all indicators along with their percent change.

Post-treatment monitoring indicates a 3% decrease in canopy cover. Adult tree density decreased by 48%, sapling density decreased by 73%, seedling density increased by 62%, and snag density decreased by 20%. Mean adult live tree diameter after treatment increased by 17%, mean snag size increased by 20%, basal area per acre of adult live trees decreased by 38%, and crown base height increased by 41%. Surface fuels increased by 413%. Grass and forb cover increased by 9% and 38% respectively, and bare soil/rock and litter cover decreased by 23% and 1% respectively.

Table 2. Pre- and post-treatment measures of ecological monitoring indicators

Indicator	Metric	PRE	POST	% Change
Canopy cover	%	29	28	-3%
Adult density	trees per acre	129	67	-48%
Saplings per acre	# per acre	483	129	-73%
Seedlings per acre	# per acre	651	1057	62%
Snags per acre	# per acre	8	6	-20%
Mean adult size	inches	9.1	10.6	17%
Mean snag size	inches	10.3	12.4	20%
Mean adult live CBH	feet	11.6	16.4	41%
Basal Area	ft^2/ac	70.9	44.2	-38%
Surface Fuel*	tons/acre	1.6	8.2	413%
Understory % Cover				
Grass	%	8	9	9%
Forb	%	3	4	38%
Bare Soil/Rock	%	25	19	-23%
Litter	%	68	68	-1%
*Note: 50% of post treatment surface fuels were in the 100hr class.				

Table 3 and Figure 1 list the number of trees per acre by size class. The number of trees per acre decreased for all size classes below 19 inches DBH as a result of treatment. Overall, the number of adult trees and saplings per acre decreased by 68 percent from 612 to 196.

Table 3 and Figure 1. Pre- and post-treatment trees per acre by size class

Size Class	PRE	POST	% Change
Saplings	483	129	-73%
5-6.9”	55	24	-56%
7-8.9”	30	13	-57%
9-10.9”	10	5	-53%
11-12.9”	9	8	-13%
13-14.9”	10	8	-22%
15-16.9”	3	2	-53%
17-18.9”	3	0	-100%
19-20.9”	5	5	0%
21”+	2	2	0%
TOTAL	612	196	-68%

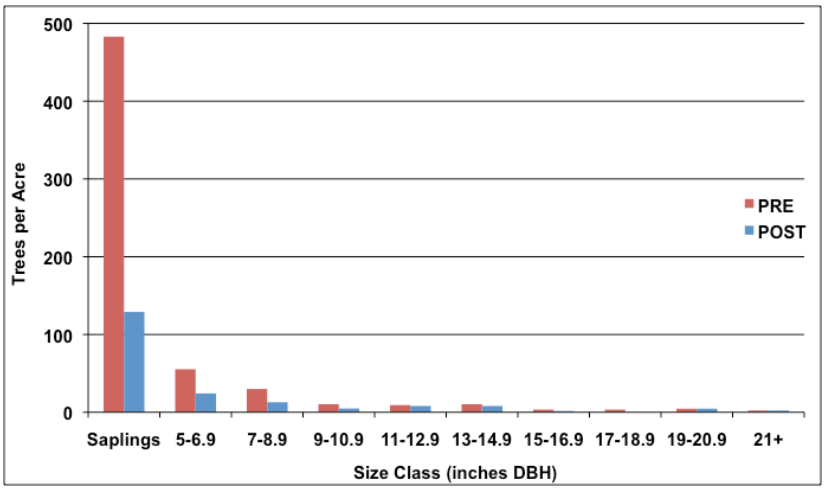
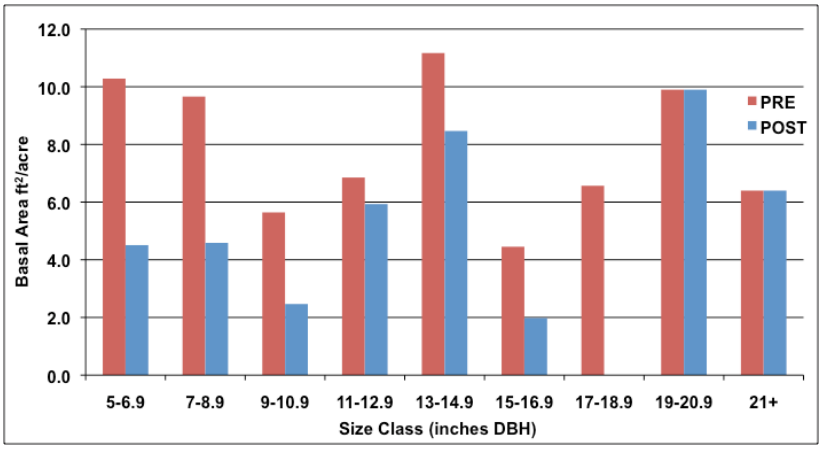


Table 4 and Figure 2 list basal area per acre by size class. Basal area per acre decreased for all size classes below 17 inches DBH as a result of treatment. Overall, basal area decreased by 34 percent from 141 ft^2/ac to 92 ft^2/ac.

Table 4 and Figure 2. Pre- and post-treatment basal area (ft^2)/acre by size class

Size class	BA PRE	BA POST	% Change
5-6.9	10.3	4.5	-56%
7-8.9	9.7	4.6	-53%
9-10.9	5.6	2.5	-56%
11-12.9	6.9	5.9	-13%
13-14.9	11.2	8.5	-24%
15-16.9	4.5	2.0	-56%
17-18.9	6.6	0.0	-100%
19-20.9	9.9	9.9	0%
21+	6.4	6.4	0%
TOTAL	70.9	44.2	-38%



Butterfly abundance and species diversity can be used as a measure of habitat quality. Data regarding butterfly species richness and overall abundance were noted before treatment (Table 5), but due to time constraints these data were not collected after treatment. However, post-treatment butterfly data will be collected in 2011 under a new CFRP grant.

Table 5. Pre-treatment butterfly species diversity and abundance

Butterfly Diversity and Abundance	Metric	PRE	POST	% Change
Richness	color/size groups encountered	5		
Overall Abundance	# encountered per point	1.25		
Note: POST butterfly data to be collected in 2011 under new CFRP				

Table 6. Sampling error for tree size

	PRE	POST
Plots	40	40
T = 95%	1.97	1.97
Coefficient of Variation	48%	48%
Sampling Error	**15%**	**16%**

Socioeconomic Data Analysis

Data were analyzed using Microsoft Excel. Table 7 displays full time direct and indirect equivalent jobs. Direct jobs were paid by the grant while indirect jobs were jobs that helped accomplish grant goals but were not paid by the grant. A full time equivalent (FTE) jobs is a 2080 hours per year job. Table 8 displays person jobs which reflect the number of people who worked.

Table 7. Direct and indirect jobs by full time equivalent (FTE)

FTE	Direct	Indirect	Totals
2008	0.265	0.0	0.269
2009	2.057	0.13	2.183
2010	1.231	0.21	1.442
Average FTE per year	**1.18**	**.11**	**1.29**

Table 8. Direct and indirect person jobs

Person Jobs	Direct	Indirect	Total
2008	3	0	**3**
2009	13	1	**14**
2010	12	2	**14**
Total	**28**	**3**	**31**

Table 9 displays worker and youth trainings by people trained and training hours. Table 10 indicates cords removed by the project by product type and wood volume (as cords or latillas).

Table 9. Trainings

Date	Duration	Total Trainings Hours	Type of training or experience	Training provider	Who received training?	Number of people who received training	Type of certification received (if any)
October, 2008	5	10	CFRP Administration	Carson	Pauline Abeyta	2	none
every quarter, through September 2009	18	18	Payroll/income taxes for HR Vigil Small Products	Online	Pauline Abeyta	1	none
In 2009	8	24	Forest Worker Safety annual recertification	NMFIA	HR Vigil Small Products Crew	3	safety certified/first aid
In 2009	32	160	Forest Worker Safety full certification	NMFIA	HR Vigil Small Products Crew	5	safety certified/first aid
Monitoring Training	8	80	CFRP Monitoring	Forest Guild	Las Vegas YCC	10	none
Monitoring Training	8	16	CFRP Monitoring	Forest Guild	Las Vegas YCC	2	none
2010, January	8	48	Recert's	NMFIA	HR Vigil Small Products Crew	6	safety certified/first aid
2010, January	32	32	4 day training	NMFIA	HR Vigil Small Products Crew	1	safety certified/first aid
2010, August	8	80	CFRP Monitoring	Forest Guild	Las Vegas YCC	10	none
Totals	**127**	**468**				**23**	

Table 10 indicates over 1100 cords were removed as fuelwood and after drying were sold to markets in Mora and Taos Counties. These cords represent over $100,000 at market value. Sales from fuelwood were returned to the grant either to cover unpaid staff time or other costs.

Table 10. Wood products

Period	Type of wood product	Sizes of wood used	Amount produced	Value (per unit)	Estimated value produced if sold as logs	Notes
July - September 30, 2009 (HR Vigil)	Fuelwood (cords)	<16"dbh	120	$69	*$10,200*	
July - September 30, 2009 (Griegos Logging)	Fuelwood (cords)	<16"dbh	120	$85	$10,200	Exchange for removal assistance services
July - September 30, 2009 (HR Vigil)	Latillas	<16"dbh	~2500	$1	$2,500	Sale recovered cost of unpaid time donated to grant by grantee
October - December 31, 2009 (HR Vigil)	Fuelwood (cords)	<16"dbh	120	$69	*$10,200*	
October - December 31, 2009 (Griegos Logging)	Fuelwood (cords)	<16"dbh	120	$85	$10,200	Exchange for removal assistance services
January - August (Robert Griego)	Fuelwood (cords)	<16"dbh	240	$85	$20,400	Exchange for removal assistance services
January - August 2010 (Richard Vigil for transportation but wood went to Herman)	Fuelwood (cords)	<16"dbh	440	$ 65	*$37,400*	Herman paid Richard 10K to supplement wood removal
Sale to Lorenzo Summer 2010	Fuelwood (cords)	<16"dbh	120	$ 50	$6,000	Sale recovered cost of unpaid time donated to grant by grantee
Totals			**1160**		**$107,100**	
Note: All species removed were ponderosa pine, white fir, and Douglas fir. All trees were less than 16” dbh.						

Table 11. Grantee experience

Prescription, 2009

"The acreage was more work than initially expected"

"The collaboratively developed restoration prescription was asking a lot. It initially asked for removal of 40% pine and 60% of the white fir but in actuality, due to poor form needed to remove 60% pine and 70% white fir"

"The forest was thicker than initially expected:"

"Although the terrain was relatively gentle, volcanic rock caused difficulties."

"To meet the desired openness and deal with poor form and mistletoe infections we had to remove more larger trees than expected"

"The budgeted $375/acre didn't cover enough of the removal costs"

"We made road improvements, and gave wood to Griegos Logging to cover their costs”

Operations, 2010

“The last 100 acres where much tougher than the ponderosa. It was twice as thick. If I had to bid separately I would double my $/acre. After we thinned the ladder fuels and took out poor form and diseased trees, we were left with large Douglas-fir and aspen.”

"Meeting the prescription took the whole community of loggers to get the project done."

“The 2008 thinning crew moved from unemployment to partial employment that filled employment gaps"

"Without the CFRP grant, and being new to managing a CFRP and learning site costs, gave HRV knowledge that was then employed to get 2nd grant with more realistic treatment dollars

"The first grant afforded opportunity to learn that payment per acre and more incentives (bonuses and competition) improved efficiency on site from initial structure"

"Going over the same acre more than once is bad news"

"Paying per acre makes the crew compete over acres completed which increases productivity.”

"Crew at a per/hour rate worked 3 times as slow"

"Tracking wood removal more accurately with the use of load tickets helped business planning"

Table 11 captures observations by HRVSP about implementing the grant, the prescription, and managing a growing restoration thinning business.

Ecological Data Interpretation

Ecological monitoring was conducted in a ponderosa pine-mixed conifer transitional area. Treatments associated with this project reduced canopy cover by 3%, from 29% to 28%. This is likely a result of a two tiered canopy structure where most of the project efforts were focused on removing the lower canopy while the remnant canopy from the larger retained trees remains. Although this reduction is relatively small, it maintains a canopy cover within the desired 20-40% range. Canopy cover of this density has a reduced potential for uncharacteristic crown fire in ponderosa pine, and allows more sunlight to reach the ground. This may result in a long-term improvement of herbaceous understory vegetation, which serves both as soil stabilization and forage for wildlife.

The sampling error for tree size remained low from pre and post treatment indicating that the number of plots installed at the site (40 30'x 30' plots) provided sufficient confidence in the data for its use in implementation and effectiveness monitoring as well as adaptive management.

Pre and post treatment monitoring indicates increases in both grass and forb cover and decreases in bare soil/rock and litter. This is a desirable change, as herbaceous understory vegetation is an important component of high-quality habitat and helps to reduce erosion. This trend is likely to continue, as reductions in tree density and canopy cover will decrease competition and allow herbaceous species greater access to nutrients and sunlight.

Treatment reduced densities of adult live trees, saplings, and snags, but seedling densities actually increased. Adult trees were reduced from 129 to 67 trees per acre, which brings adult tree densities to within the target range for ponderosa pine of 60-80 trees per acre. Reduction in the density of adult trees and saplings decreases competition between trees, which may increase the trees' health and thus their ability to withstand adverse conditions (e.g. drought and related pathogens). This will improve both wildlife habitat and watershed conditions. In addition, the reduction in tree density, particularly of smaller diameter trees, reduces ladder fuels that may result in a surface fire becoming a crown fire. Many of the aspen-dominated patches in the project area contained numerous aspen snags. Although snags are desirable for wildlife habitat, a number of aspen snags were intentionally cut to reduce hazards during treatment and to reduce snag densities in areas where they were excessively high. Reductions in snags were slight (resulting in decreases in densities from 8 to 6 snags per acre), so it is likely that there will be no adverse impacts on wildlife habitat. The increase in seedlings seen from pre- to post-treatment is a result of the more than doubling of aspen seedlings. This may either be a result of sampling error (aspen seedlings are often abundant and small, making accurate counts difficult) or be a response to the wet winter in 2009-2010 combined with reduced aspen browse from the disturbance which likely displaced ungulates in the short term.

Basal area was reduced from 71 ft^2/ac to 44 ft^2/ac. This is a desirable change, since the treated area borders several large meadows and basal areas at these sites was likely historically low.

Prior to treatment, most trees in the treatment area were less than 5 inches in diameter. Treatment resulted in significant reductions in tree density in this size category, which will reduce ladder fuel loadings and competition. Basal area by size class is relatively randomly distributed, which

is likely due to stand diversity in age and species. Treatment reduced basal areas for size classes below 19 inches DBH. Large trees (>19 inches DBH) were retained.

Surface fuels displayed a large (413%) increase from pre- to post-treatment. This is to be expected, given the prescription of lopping and scattering slash. Approximately 50% of surface fuels observed where in the 100 hour class (1 inch to 3 inches in diameter), which is consistent with what would be expected with slash after fuelwood removal.

The return of the key ecological process, low intensity surface fire, is critical at this site for several factors including to:

1) reduce surface fuels,
2) create snags,
3) encourage grass and forb establishment,
4) cycle nutrients, and
5) encourage ponderosa pine and aspen regeneration.

Several CFRP restoration sites have already been revisited 4-6 years after thinning treatment where prescribed fire has **not** been returned and seedling regeneration is already transitioning to the sapling size class. The same natural regeneration response can be expected at this site which further emphasizes the need for the return of fire every 5 – 7 years.

Socioeconomic Data Interpretation

Socioeconomic data indicates that the grantees were very successful in generating direct and indirect jobs. Unfortunately many indirect jobs associated with wood products were not able to be captured and indirect jobs are under-reported. Compared with other CFRP projects (Krasilovsky 2008) which generated over 4100 hours in forest work in total, this project generated over 7,200 hours of direct jobs for similar acres. This increase is likely due to the thicker mixed conifer forest. The grant also generated more than 1000 hours in product removal (skidding, loading, and trucking) which is a very labor intensive, even with mechanized equipment. Overall the project was very successful in generating direct jobs.

The project did not achieve the public outreach goals from the proposal since the project was not fully funded. Public outreach was reduced accordingly. However, the majority of the youth who engaged with the project in 2009 and 2010 were from the Mora and Guadalupita area and spread the word about the project through their informal social networks.

Each summer youth from the Forest Guild's Las Vegas District Youth Conservation Corps were trained in ecological data collection. Additional paid summer opportunities for local youth would likely be very beneficial to the surrounding communities.

Socioeconomic data indicate a high volume of wood products were removed (see Table 16). This extensive utilization indicates that the highest value for small wood in the Mora and Black Lake area is as fuel wood. In fact, it was too costly to process the fuelwood and it was sold as roundwood. Transportation capacity is critical HR Vigil Small Products have indicated that without the CFRP grant subsidizing the thinning, skidding, loading, and trucking, the wood would not have been able to be removed from the forest.

Conclusion

The ecological monitoring of HR Vigil Small Products CFRP (#09-08) indicates that, overall, grant and program objectives were met. Adult tree and sapling densities were reduced, as was basal area. This will reduce competition, thereby facilitating an improvement in tree health, wildlife habitat, and watershed health. This also reduces competition between trees and understory vegetation and allows understory vegetation more access to sunlight, water, and nutrients. Post-treatment monitoring of understory cover indicates an increase in grasses and forbs, which is consistent with this prediction. Herbaceous understory cover is an important component of both wildlife habitat and watershed health. Crown fire potential was also reduced, thereby decreasing the risk of catastrophic wild fire in the Black Lake area. Overall seedling densities increased between pre- and post-treatment monitoring, which may be a result of either sampling error or favorable moisture conditions prior to and during the 2010 growing season. Most of these additional seedlings are aspen, which may actually be desirable given declining aspen populations in New Mexico and other parts of the West.

Further monitoring will be required to determine the project's effects on wildlife. Post-treatment monitoring of butterfly abundance and species richness in 2011 will serve as an indicator of changes in habitat, as would monitoring site use by elk, deer, and turkey.

Analysis of these results is complicated by the presence of significant quantities of mixed conifer and aspen in the sampling areas. However, the results of monitoring point to changes in the treatment area's ecology that will be positive for ponderosa pine, aspen, and mixed conifer ecosystems. Analysis of the ecological effects of future projects will likely benefit from separating data collected in these different ecosystems.

References

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Appendix A

Notes from January 21, 2009 Multiparty Meeting

Attendees: Ignacio Peralta, Wilfred Borrego, Willie Cruz, Mark Meyers, Herman Vigil, Jim Norwick, Kent Reid, Orlando Romero, Ernie Lopez, Robert Dello-Russo, and Eytan Krasilovsky

Notes: After introductions, the group began working through agenda items. Next the group reviewed the project deliverables highlighted from the handout and discussed some components that remained unclear.

A review of current operations followed covering environmental and cultural clearances. Robert introduced the cultural survey report, the three main sites, and his recommended mitigation measures. The archaeology crew also flagged these three main sites in orange with a 50' buffer. Robert also discussed the process he expects the State Land Office needs to follow to secure a "findings" letter from the State Historic Preservation Office (SHPO). Robert also agreed to share the shapefiles of the site buffer's in case they needed to be re-flagged. Ignacio asked that the SHPO "findings" be attached to the Decision Memo. Mark then said the Biological Survey, conducted by State Land Office biologist Clay Bowers is complete. To complete the NEPA analysis, a proposed action (see below) needs to be formalized so the Decision Memo can assess its affects on the natural resources indentified in the Biological Survey.

The group then developed a multiparty monitoring plan (see attached) for both ecological and socioeconomic indicators while concurrently making prescription recommendations for the site. The discussion for the monitoring plan identified that ecological monitoring will need to occur separately for both the ponderosa pine and mixed conifer cover areas. The plan also developed restoration targets for ecological indicators.

At the same time the group also made prescription recommendations that could form the foundation for the proposed action component for the Decision Memo to evaluate. Elements of the proposed action are to:

- conduct forest restoration thinning in both ponderosa pine and mixed conifer forest types.
- where meadow openings show recent tree encroachment, remove encroaching trees
- in areas dominated by aspen trees, favor aspen over other species, and remove competing white fir

More specifically the group suggested the restoration:

- preserve old and large trees (can be either old or large, or both) wherever they occur in the project area – multiparty team will more precisely define old and large trees once baseline data are a collected however it is unlikely that trees larger than 16" – 18" dbh will need to be removed to achieve density goals
- reduce tree density in ponderosa pine cover areas to 60 – 80 trees per acre
- reduce tree density in mixed conifer cover areas to 80 – 100 trees per acre on high quality growing sites with lower densities in poor sites
- maintain tree species diversity, particularly regarding limber pine (Southwestern White Pine) with the exception of white fir in aspen dominated areas
- favor douglas fir over white fir
- reduce canopy cover in ponderosa pine to 20 – 40% cover in ponderosa pine areas
- achieve a clumpy appearance, likely determined by existing forest structure

    - o These clumps would contain more than five trees with a minimum of five inches DBH, and the trees would have interlocking or nearly interlocking crowns.
- remove mistletoe infected trees if infection is determined to be extensive
- remove wood products and lop and scatter remaining slash to a depth not to exceed 24" – 36"

Eytan then outlined a process for moving forward with monitoring, demonstration sites, and treatments. He suggested that monitoring occur in both ponderosa and mixed conifer areas in early summer in the first 100 acres slated to treatment in year one. The group would then meet at the site in the fall with pre and post treatment data in hand (and restoration indicator targets) to evaluate the treatments and make recommendations for adjustments to year tow treatments.

Jim then suggested the group meet at the site when the crew is roughly 20 acres into year one treatments to collaboratively assess if the prescription and implementation are meeting expectations before all 100 acres are cut.

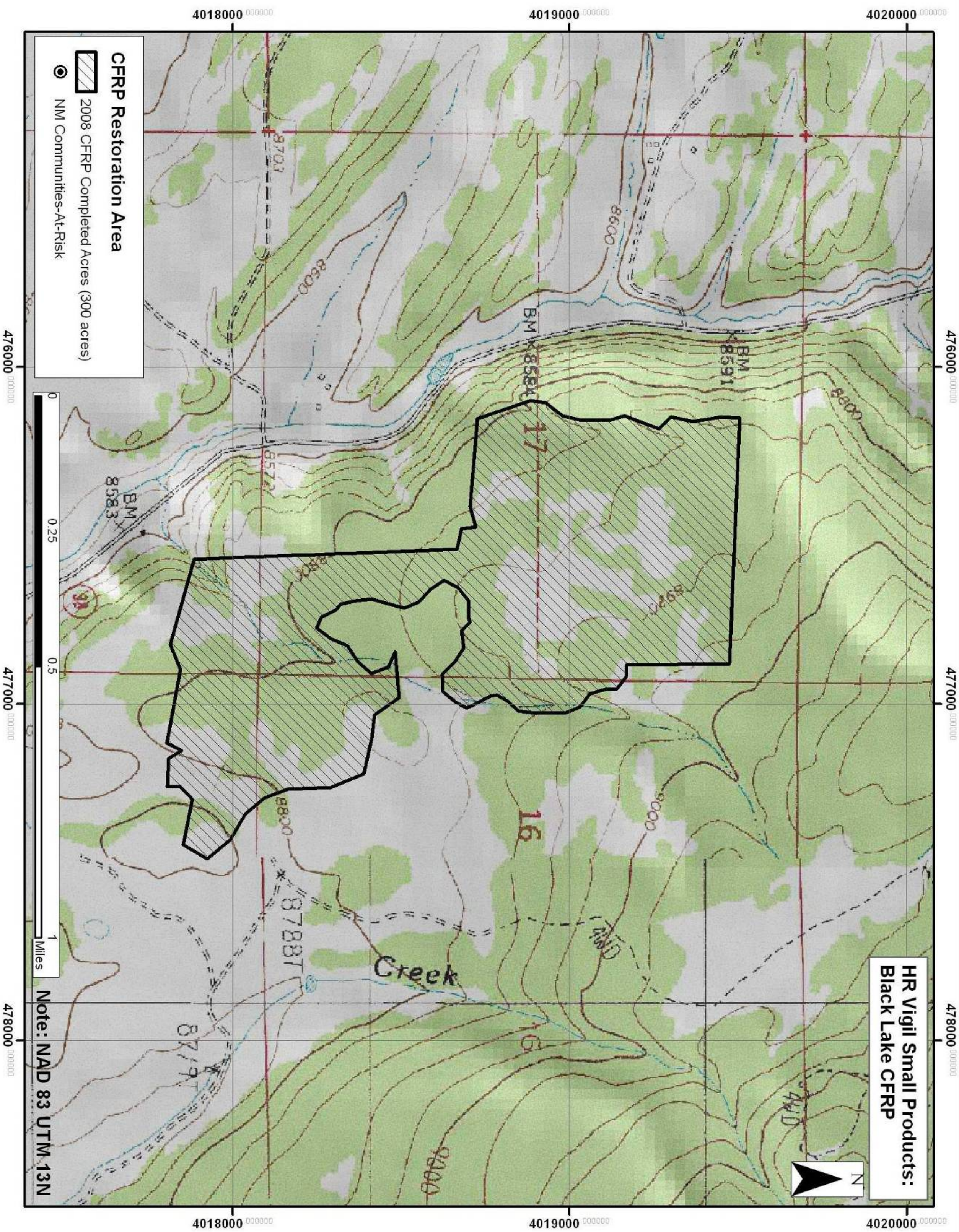
The demonstration sites will also need to be identified and flagged with attention to access with potential demonstration meeting and events in the spring and summer of 2010.

Thanks for everyone for attending the meeting and participating in the discussions, great work!

Indicator	**Metric**	**Restoration Targets**	**Protocol**	**Who will do it?**	**When will it be done?**
Ecological					
Tree density, size, and speices	Trees per acre, diameter at breast height (dbh)	60-80 tpa; 80-100 tpa; Increase dbh	NMFWRI from Ocate site	NMFWRI, Forest Guild (FG), Las Vegas YCC	Before and after treatments for ponderosa and mixed conifer
Canopy closure	%	20 – 40%	NMFWRI or CFRP	Same as above	Same as above
Crown base height	Feet or meters	increase	NMFWRI	Same as above	Same as above
Surface fuel	Tons per acre	Decrease	Brown's lines	Same as above	Same as above
Understory species composition	Relative abundance	No increase of invasives	CFRP	Same as above	Late summer
Ground cover	% grass, % forbs, % bare rock/soil, % litter	Increase grass and forb cover and reduce bare rock/soil	NMFWRI or CFRP	Same as above	Before and after treatments for ponderosa and mixed conifer
Deer and Elk site use	Pellet group counts	Maintain or increase	CFRP	Same as above	Same as above
Turkey site use	Evidence of turkey sign	Maintain or increase	CFRP	Same as above	Same as above
Clumpy arrangement of trees	Clumps per acre	1 – 3 clumps per acre	FG	Same as above	After treatment only

Indicator	Metric	Restoration Targets	Protocol	Who will do it?	When will it be done?
Socioeconomic					
Restoration Jobs	Job type, duration, full time equivalent, and sustainability	Increase, maintain workers working	CFRP and narrative	HR Vigil Small Products and Forest Guild	For each project year
Distance to work	Cost of travel, value of time, comparison to other projects	Lower cost of travel and miles traveled	CFRP	Same as above	For each project year
Equipment	Type and quantity purchased, value to restoration businesses		Track purchases and narrative	Same as above	For each purchase, summarized each project year
Skills gained	Type, duration, and value of trainings		CFRP	Same as above	For each training, summarized each year
Wood Products	Type, amount, value to either business or community (if fuelwood)	Increase amount and diversity of products	CFRP	Same as above	For each project year
Product Removal Analysis	Assessment of efficiencies	Baseline knowledge	Na	FG, HR Vigil Small Products, and Silver Dollar Racing and Shavings	One time
Outreach and education	# and type of materials developed, # of students, public, or professionals engaged	25 people exposed to demonstration sites minimum	CFRP	HR Vigil Small Products and Forest Guild	For each event, summarized each project year
Burn Plan	Developed? Y/N			State Land Office with multiparty team	End of grant
Collaborate with other businesses	Narrative of success or barriers		Na	Multiparty Team	End of grant

Appendix B


CFRP Restoration Area
2008 CFRP Completed Acres (300 acres)
NM Communities-At-Risk
HR Vigil Small Products:
Black Lake CFRP
Note: NAD 83 UTM 13N
0
0.25
0.5
1
Miles
N
4018000
4019000
4020000
476000
477000
478000
Creek
BM 8584
BM 8591
BM 8583
17
16
4WD