TRESTLE FOREST HEALTH PROJECT

ECONOMIC ANALYSIS

Tim Howard, January 3, 2014 updated by Dana Walsh March 13, 2017.

APPENDICIES

Appendix A – Cost and Value Estimates used to calculate value and cost of each Alternative

Appendix B – Cost Effectiveness definition

INTRODUCTON

This economic analysis involves the evaluation of the financial efficiency of the alternatives analyzed for the Trestle Forest Health Project. It compares the economic effects of the alternatives upon the costs and benefits of implementing the needed vegetation treatment and other activities proposed. Financial efficiency will be measured by the present net value (PNV) of the alternatives.

ANALYSIS FRAMEWORK: STATUTE, REGULATORY ENVIRONMENT, FOREST PLAN AND OTHER DIRECTION

EXECUTIVE ORDER 12898 – ENVIRONMENTAL JUSTICE

In February 1994, President Clinton signed an Executive Order 12898 on environmental justice, requiring federal agencies to conduct activities related to human health and the environment in a manner that does not discriminate or have the effect of discriminating against low-income or minority populations.

Sierra Nevada Forest Plan Amendment: Final Supplemental Environmental Impact Statement Record of Decision: Forest-wide Standards & Guidelines (USDA Forest Service, 2004)

The 2004 Forest Plan Amendment directs that treatments be economically efficient to reduce hazard fuels as a primary management objective to reduce hazardous fuels and promote forest health where consistent with habitat objectives.

SILVICULTURAL PRACTICES (FSH 2470)

2470.3 - POLICY

The policy on silvicultural practices directs the Forest to use only those silvicultural practices that are best suited to the land management objectives for the area while considering all resources, as directed in the forest plan. It also directs the silviculturist to prescribe treatments that are practical in terms of the cost of preparation, administration, transportation systems, and logging methods.

ASSUMPTIONS

The summary tables display the economic effect of various treatments using a timber sale (stewardship) or service contract to accomplish the desired work. The commercial harvest alternatives assume that the harvest would be conducted under Stewardship Contracting (Integrated Resource Timber Sale Contract) authority wherein merchantable-sized trees are removed and "paid" for with credits earned by the contractor (purchaser) by performing surface and ladder fuel treatments, including cutting and removing biomass, brush cutting, mastication and tractor piling. Some of the fuels work typically occurs concurrently with the logging while other fuel treatment work (piling) could occur as a follow-up measure by the timber sale purchaser, as subsequent forest, Force Account work; or as independent service contract(s).

The analysis uses estimates of timber cruise data in terms of species, tree numbers and tree sizes, various treatment costs based on similar projects, and, standardized transaction evidence appraisal (TEA) procedures in developing the estimated values and costs associated with each alternative. The costs and appraised values used in this analysis are based upon the predicted volumes and values for the entire project. These estimates may vary somewhat as the final cruise volumes and sampling errors, and sale values are refined.

APPRAISED VALUE

The Appraised Values were calculated for each alternative using information from similar recent timber sales on the Forest where logging cost, haul distance, and product removal are likely to result in similar revenue. Prior to the advertisement of a timber sale or stewardship contract an actual appraisal is run to determine the value of the products to be removed based on species composition, volume per acre, logging cost, haul distance, road work, and other factors. There are several variables such as log prices delivered to the mill and fuel costs that can only be estimated based on current market conditions prior to the Final Appraisal. Final product value and cost of any service work is determined through a bidding process, however this comparison using current market trends does provide for a reasonable comparison of alternatives.

The "Total Stumpage Generated" line items in the following tables do not reflect costs of treatment of sub-merchantable ladder fuels or surface fuel treatment, mastication or hand thinning. The treatment costs of these items are shown individually by Alternative in separate tables. The treatment of surface fuels and ladder fuels would be accomplished, to the extent possible, as stewardship items, wherein the potential purchasers submit bids to perform the required work and the stumpage value of the commercial products is used to "pay" for the fuels treatment. Additional, appropriated funds or retained receipts would be necessary to accomplish some of the work under all scenarios.

The Appraised Values identified in this report do not reflect any potential bid increase (overbid) that might occur during the bidding process. Overbids during the recent years on the Eldorado NF stewardship projects have not varied substantially from the appraised value. This low variability associated with overbids may be a reflection of markets, logging conditions, timber quality or individual purchaser situations with regard to volume under contract, marketing strategies or other factors. Most likely a variety of factors affect the aggressiveness of the bidding on any given project. Because the Trestle project is planned to be advertised during FY15, the predicted, somewhat depressed lumber market is expected to reduce the likelihood of any significant overbids. The fact that the project is located at low to mid-elevation where it is not particularly conducive to efficient winter operations also is likely to reduce the likelihood, or amount of over-bid.

SCHEDULING OF WORK

In all cases it is understood that surface and ladder fuels must be treated in a timely fashion as a follow-up measure or as part of the initial treatment if fuel treatment objectives are to be met.

Roadwork associated with the Timber Sale or Stewardship Contract is paid for directly out of timber value, though this analysis displays it as a separate cost. Where value of commercial products is sufficient to pay for other work after the road work is deducted,

fuels treatments that must occur concurrently are given priority (i.e. non-commercial thinning) since the most efficient cost and effective treatment depends on that work occurring concurrently with the commercial thinning. Other fuels treatments within mechanical units are also given a priority for retained receipts from the timber harvest activities. If sufficient funds remain after that work is allocated then additional fuels reduction activities and watershed and recreation improvement activities would be prioritized.

ROAD RECONSTRUCTION

Some road reconstruction needs (costs) are assumed to be a necessary expense regardless of whether commercial or non-commercial operations occur. It is recognized that some reconstruction costs would only be associated with alternatives that include the removal of products via log truck; however in some instances the needed reconstruction costs are associated with clearing brush from roads that prevents their use, even for the non-commercial Alternative. Some road reconstruction is also identified for watershed improvement. Where this work is associated with commercial timber harvest there is an opportunity to complete this work with a timber sale.

COST ASSUMPTIONS

This analysis displays (also see Appendix A) the estimated, average costs of planning, preparing and implementing this fuel reduction project and the costs associated with the processing of any potential appeals of the NEPA decision. In making the costs estimates it was necessary to make some broad assumptions and these are described in the following paragraphs. Although the cost assumptions are applicable to the costs associated with the "commercial" alternatives many of these costs could be fairly applied to the planning, implementation and administration costs associated with the non-commercial fuel treatment scenarios as well.

The costs of performing the requisite environmental analysis were considered to be equivalent for all alternatives since the analysis for all alternatives was contained within the same environmental assessment. Reducing or increasing the number of alternatives considered would likely change the costs associated with the over-all environmental assessment, but it is impossible to reasonably quantify the cost of analyzing each individual alternative.

Costs of sale preparation including unit layout are essentially constant for all action alternatives, i.e. the cost of performing unit layout, including the flagging, GPSing and boundary posting of all treatment units, does not vary by alternative. Intuitively it may seem that in terms of individual tree marking, alternatives that involve the harvesting of trees less than 12" dbh would be less costly than those alternatives that would remove more

trees, however the savings in marking costs would not be substantial. This is primarily because a marking crew would need to travel to each unit, traverse the same acreage looking for and selecting the appropriate trees to mark regardless of which action alternative were implemented.

It is further estimated that the costs of sale administration would remain largely the same among all action alternatives for the same general reasons described above, i.e. approximately the same acreage of land would require layout, the same number of skid roads and landings would likely be needed.

Recognizing the difficulty and inherent inaccuracies of making specific project or alternative cost estimates, the following costs are considered to be reasonable estimates for the Trestle Forest Health Project. This information is based upon experience related to the planning, preparation and implementation of several dozen understory thinning/fuels reduction projects over the last 18 years on the Eldorado National Forest.

SOCIO-ECONOMICS ENVIRONMENT & SOCIAL JUSTICE

The Trestle project is located primarily within Eldorado County – near the small (pop. 1,066) rural community of Grizzly Flat, CA, located northwest of the project area. El Dorado County encompasses 1,711 square miles and is part of the Greater Sacramento Metro Region (GSMR), which also includes the Counties of Placer, Sacramento, Sutter, Yolo, and Yuba. The County Seat is in Placerville.

Approximately 73% of the of the almost 600,000 acre Eldorado National Forest (ENF) is located in El Dorado County. Private lands within and adjacent to the boundary of the project area are primarily owned by individuals.

The socio-economic environment affected by the Trestle project is primarily associated with the benefits/costs and opportunities that are present and of value, either monetarily or spiritually, to the public. The socio-economic environment of the Trestle project can be described in a multitude of ways, however for purposes of this analysis, the local socio-economic environment consisting of El Dorado County and the Greater Sacramento Regional area is considered to be the affected environment and is briefly described in this section.

POPULATION, RACE, AND GENDER[1]

Based upon the 2010 U.S. Census Bureau data, the population estimate for El Dorado County in 2010 was 182,019. The percent growth from the 2000 U.S. Census to the 2010 Census

[1] United States Census Bureau State and County Quick Facts.
http://quickfacts.census.gov/qfd/states/06/06017.html

was approximately 15 percent. The racial distribution is 84% Caucasian and the gender distribution in 2010 was 50% female and 50 % male. Native Americans and Hispanics represent approximately less than 1% and 11% of the total population, respectively. The median age distribution is 43 years.

TRIBES

Important considerations in the fulfillment of the Forest Service mission is the trust relationship the Forest Service has with American Indians and Alaska Natives (Tribes) and the potential impact Forest Service policy, program, and project decisions may have on Tribes. The ENF serves as a source of traditional medicines, food, firewood, and basket making materials. Within the administrative boundaries of the ENF are important historical and spiritual areas that have cultural significance for Tribes. Certain areas are particularly sacred and valued for their importance in sustaining cultural traditions and beliefs. Native people do utilize the project area for the above mentioned activities; however no known, sacred or culturally significant areas exist within the project area. Impacts to important cultural resources are analyzed in the Cultural Resources Report for the Trestle Project.

LOCAL ECONOMY[2]

Like most areas of the country, economic conditions in El Dorado County have suffered during the recent years. El Dorado County's economy is slightly more diversified than the larger Sacramento Region, but both are much less diversified than the state overall. Major sectors where the County is specialized include Construction: Accommodation and Food Services; and Agriculture, Forestry, Fishing and Hunting; and Utilities. Businesses with one to four employees were the most common in El Dorado County, and made up 62 percent of all establishments. Another 17 percent of the businesses in El Dorado County consisted of five to nine employees, suggesting a strong trend of small local businesses in the county.

FOREST PRODUCTS

The forest products industry provides about 27,692 jobs in California compared to approximately 13 million total employment statewide. The forest products industry represents about 1.6% of the overall California payroll at the state-wide level.

[2] Eldorado County Economic and Demographic Profile 2010-11. Center For Economic Development. California State Unitversity, Chico, CA.
http://www.eldoradocounty.org/pdf/ElDoradoProfile10_11.pdf

Over the past decade three large wood products manufacturing facilities in the GSMR have closed. One of these was the Sierra Pacific Industries (SPI) sawmill in Camino, El Dorado County.

At the present time, the SPI sawmill in Lincoln is the only significant wood products manufacturing facility operating within the GSMR. The SPI sawmill in Lincoln is among the largest sawmills on the west coast and currently has approximately 315 employees and ranks about 13th in terms of number of workers employed by the private sector in Placer County.

National Forest management directly affects the socioeconomic environment of the Sierra Nevada through employment and income derived from resource extraction, production and use. Timber harvest from National Forest System lands provides a flow of products to area industries. Direct and indirect employment is produced by the jobs associated with the harvest and processing of timber. In terms of gross revenue, timber is one of the Sierra Nevada's most valuable products. Timber harvest activities have commonly been associated with the jobs they create in rural communities.

The majority of timber production in the Sierra Nevada now comes from private harvests. Timber harvesting on private lands accounts for 67-90 percent of total timber harvests in the Sierra Nevada. A decrease in available timber harvest continues to result in mill closings, lost jobs, and decreasing potential financial capital. During the last decade the Eldorado National Forest has annually offered for sale approximately 20 million board feet of timber. This volume was bought by Sierra Pacific Industries or other purchasers, and primarily processed at the Lincoln, CA sawmill. The Lincoln mill sawlog capacity is 170 million board feet/year and annually relies on purchasing 20% (34 million boardfeet) of timber from national forest timber sales to sustain its operations.

Within the Trestle project area the primary uses by the local community are firewood collection, dispersed camping, motorized recreation, and hunting.

EFFECTS ANALYSIS

The term commercial is used in the context that these alternatives seek to remove and market the timber products in the traditional manner of using timber sale purchasers, loggers and logging equipment for the removal and utilization of those products that are typically processed into lumber. For Alternative 3 several different treatment approaches were considered in terms of both operational feasibility and economics, however, for purposes of this analysis, cutting and removal of material to landings was used.

ALTERNATIVE 1 NO ACTION

No direct or indirect costs would be incurred by implementing this Alternative. In the event of a wildfire, suppression and rehabilitation costs would likely be much higher than with the implementation of action alternatives. The costs expended on the planning and environmental analysis work are displayed in Appendix A.

ALTERNATIVE 2 PROPOSED ACTION

Timber volume associated with this would help satisfy the demand by local mills for timber supplies. Funds received from the sale of timber products would be used to finance or partially off-set the need for the use of appropriated funds or retained receipts to accomplish the proposed fuel treatments. The proposed treatments would also provide employment to local business directly and indirectly associated with harvest activities, road reconstruction, fuels work and associated equipment use and maintenance. Stewardship contracting, as proposed for implementation of this project, provides the mechanism to enter into long-term contracts. These long-term contracts provide more stability for forest workers than several short-term contracts.

Sawmill and logging full-time equivalent (FTE) employment related conversion factors used in this analysis are adopted from "Economic Impacts of Revised 2001 Ancient Trees Initiative" (McKillop, 2001)[3] and show 6.4 jobs per million board feet (mmbf) and 2.1 for an economic multiplier. The conversion factors used for other activities, such as tractor piling, herbicide treatment and mastication are estimated based upon labor intensity associated with the activities. A labor cost of $30,000 is assumed to be equivalent to 1 FTE.

Direct employment is very sensitive to harvest volume whereas indirect jobs are not as immediately sensitive to harvest volume fluctuations. As income is recycled from direct jobs to indirect jobs and via consumption to other support services within the community the number of indirect jobs can be quite high. Additional jobs are also produced by profits from harvesting and from mills where profits are reinvested by forest landowners and timber companies.

As this project would not be expected to fully fund the work associated with mechanical fuels treatment activities, that work would be prioritized to best accomplish fuels reduction activities associated with mechanical treatment units. Additional allocated funding and grants would be needed to accomplish both work within the mechanical treatment units such as follow-up tractor piling in addition to fuels reduction and watershed and recreation improvement activities that are not associated with the mechanical vegetation treatment units.

[3] McKillop, William. 2001. Economic impacts of Revised 2001 Ancient Trees Initiative. Proffessor Emeritus of Forest Economics, University of California Berkeley. Unpublished.

TABLE 1 ALTERNATIVE 2 INFORMATION DIRECTLY ASSOCIATED WITH COMMERCIAL HARVEST COMPONENT

Measure	Total
Volume in Trees 10" dbh or larger proposed for removal	18,193 MBF
Volume in Trees 10" dbh or larger proposed for removal	36,386 CCF
Estimated Sale Value not including cost of associated road work	$1,455,441
Number of Direct & Indirect Full-Time Equivalent (FTE) Jobs Created Associated With Harvested Volume	116 direct and 243 indirect

By adhering to applicable laws, regulations and policies, there would be no disproportionately high impact to low-income or minority populations as a result of project implementation.

ALTERNATIVE 4

Compared to Alternative 2, this alternative commercially thins fewer acres and relies more on additional funding sources to complete project activities. This alternative decreases the amount of full-time equivalent jobs that are estimated to be supported by activities directly and indirectly associated with timber harvest, but would support a similar about of jobs for other project work.

TABLE 2 ALTERNATIVE 2 INFORMATION DIRECTLY ASSOCIATED WITH COMMERCIAL HARVEST COMPONENT

Measure	Total
Volume in Trees 10" dbh or larger proposed for removal	9,864 MBF
Volume in Trees 10" dbh or larger proposed for removal	19,728 CCF
Estimated Sale Value not including cost of associated road work	$789,098
Number of Direct & Indirect Full-Time Equivalent (FTE) Jobs Created Associated With Harvested Volume	63 direct and 132 indirect

By adhering to applicable laws, regulations and policies, there would be no disproportionately high impact to low-income or minority populations as a result of project implementation.

Like Alternative 2, additional allocated and grant funding would be needed to accomplish project activities.

ALTERNATIVE 5

Compared to Alternative 2, this alternative commercially thins fewer acres and relies more on additional funding sources to complete project activities. This alternative decreases the amount of full-time equivalent jobs that are estimated to be supported by activities directly

and indirectly associated with timber harvest, but would support a similar about of jobs for other project work.

TABLE 3 ALTERNATIVE 2 INFORMATION DIRECTLY ASSOCIATED WITH COMMERCIAL HARVEST COMPONENT

Measure	Total
Volume in Trees 10" dbh or larger proposed for removal	13,827 MBF
Volume in Trees 10" dbh or larger proposed for removal	27,654 CCF
Estimated Sale Value not including cost of associated road work	$1,106,122
Number of Direct & Indirect Full-Time Equivalent (FTE) Jobs Created Associated With Harvested Volume	88 direct and 185 indirect

By adhering to applicable laws, regulations and policies, there would be no disproportionately high impact to low-income or minority populations as a result of project implementation.

TABLE 4 VALUE AND COST ESTIMATES FOR TRESTLE PROJECT ACTIVITIES WITH EACH ALTERNATIVE

Treatment (Initial in Bold)	Alt 2		Alt 4		Alt 5	
	Acres / Miles/ Number	Cost/ Value	Acres / Miles/ Number	Cost/ Value	Acres / Miles/ Number	Cost/ Value
Units with Commerical Thinning Treatments						
Cable Thin	76	$24,451	0	$-	0	$-
Biomass, Brush Cut, Pile	29	$(10,865)				
Biomass	48	$(5,738)				
Commercial Thin	4315	$1,380,800	2304	$737,376	3295	$1,054,400
Biomass, Brush Cut	64	$(21,030)	49	$(16,261)	117	$(38,585)
Biomass, Brush Cut, Pile	1180	$(448,294)	739	$(280,652)	873	$(331,571)
Biomass	837	$(100,487)	390	$(46,845)	391	$(46,871)
Biomass, Grapple Pile	15	$(4,098)	15	$(4,098)	15	$(4,098)
Biomass, Pile	304	$(66,880)	240	$(52,800)	288	$(63,360)
Brush Cut	94	$(19,837)	17	$(3,549)	51	$(10,768)
Brush Cut, Pile	14	$(3,609)		$-		$-
Pile	70	$(6,993)	70	$(6,993)	70	$(6,993)
Plantation - Commercial Thin	418	$50,190	431	$51,722	431	$51,722
Biomass, Brush Cut, Pile	103	$(39,112)	103	$(39,112)	103	$(39,112)
Biomass	44	$(5,279)	55	$(6,595)	55	$(6,595)
Biomass, Pile	88	$(19,386)	88	$(19,386)	88	$(19,386)
Brush Cut		$-	6	$(1,253)	6	$(1,253)
Brush Cut, Pile	13	$(3,505)	15	$(3,972)	15	$(3,972)
Pile	81	$(8,146)	81	$(8,146)	81	$(8,146)
Total cost associated with units with commercial thinning treatments (not including burning)		**$(763,259)**		**$(489,662)**		**$(580,710)**
Units with Only Non-Commercial Thinning Treatments						
Non-Commercial Mech	25	$(27,896)	79	$(86,545)	25	$(27,896)
Biomass, Brush Cut		$-	45	$(14,816)		$-

Treatment (Initial in Bold)	Alt 2		Alt 4		Alt 5	
	Acres / Miles/ Number	Cost/ Value	Acres / Miles/ Number	Cost/ Value	Acres / Miles/ Number	Cost/ Value
Biomass, Brush Cut, Pile		$-	8	$(3,200)		$-
Brush Cut, Pile	25	$(6,594)	25	$(6,594)	25	$(6,594)
Non-Com Mech Roadside	57	$(62,418)	59	$(64,939)	59	$(64,974)
Total cost associated with units with only non commercial mechanical thinning treatments (not including burning)		**$(96,908)**		**$(176,094)**		**$(99,464)**
Mandatory Activities Associated with Mechanical Vegetation Treatment						
Road Construction Associated With Mechanical Treatments	84.1	$(841,000)	57.7	$(577,000)	61.4	$(614,000)
New Barriers Associated with Mechanical Treatments	3	$(9,000)	3	$(9,000)	3	$(9,000)
New Gates Associated with Mechanical Treatments	6	$(42,000)	6	$(42,000)	6	$(42,000)
Ripping Skid Roads	5	$(2,400)	5	$(2,400)	5	$(2,400)
Noxious Weed Treatments	3.5	$(1,750)	3.5	$(1,750)	3.5	$(1,750)
Value compared to cost for treatment of mechanical units (not including understory burn)		**$ (300,875)**		**$ (508,807)**		**$ (243,202)**
Other Initial and Follow-up Vegetation Treatments						
500' Hand Cut Pile Burn	1044	$(1,252,416)	483	$(579,430)	470	$(563,794)
Hand Cut Pile Burn	448	$(537,600)	640	$(767,518)	642	$(770,367)
Non-Commercial Hand	6	$(7,461)	6	$(7,486)	6	$(7,486)
Total cost of hand thinning treatments		**$(1,797,477)**		**$(1,354,344)**		**$(1,341,647)**

Treatment (Initial in Bold)	Alt 2		Alt 4		Alt 5	
	Acres / Miles/ Number	Cost/ Value	Acres / Miles/ Number	Cost/ Value	Acres / Miles/ Number	Cost/ Value
Roadside Brushing	88	$(52,715)	167	$(99,978)	143	$(85,776)
Raking Legacy Pine	15,447	$46,341	14,748	$44,244	14,746	$44,238
RX Burn Treatments	15,812	$3,162,400	15,113	$3,022,600	15,111	$3,022,200
Other Project Activities Proposed						
Road Obliteration	3.1	$(3,100)	3.9	$(3,900)	4.4	$(4,400)
Road Reconstruction not associated with Mechanical Treatments	0	$-	8.1	$(81,000)	8.1	$(81,000)
New Barriers Not Associated with Mechanical Treatments	5	$(15,000)	5	$(15,000)	5	$(15,000)
New Gates Not Associated with Mechanical Treatments	3	$(21,000)	3	$(21,000)	3	$(21,000)
Mine Closure - Foam	1	$(5,000.00)	1	$(5,000)	1	$(5,000)
Mine Closure - Cupola	1	$(3,000.00)	1	$(3,000)	1	$(3,000)
Pull Barbed Wire from 622-089	20 person days	$(4,000.00)	20 person days	$(4,000)	20 person days	$(4,000)
Dispersed Recreation Site Rehab		$(48,500.00)		$(48,500.00)		$(48,500.00)
System OHV Trail Work		$(11,500)		$(11,500)		$(11,500)
Non-System OHV Trail Obliteration		$(2,100.00)		$(2,100.00)		$(2,100.00)

APPENDIX A – COST AND VALUE ESTIMATES FOR THE TRESTLE PROJECT

TABLE A-1PLANNING AND ANALYSIS COSTS

Activity	Person days (pd)[1] and/or Production Rates	Cost/ac (rounded to nearest dollar)
Initial Layout		
Initial Project Layout	33 ac/pd	10
NEPA Process		
Scoping Document	10 pd for document	4
Arch Surveys	Approx 40 ac/pd	8
Arch Report	20 pd for report	8
Bio Surveys	2 annual surveys @$20,000.00 ea	52
Bio Report	30 pd for report	12
Aquatic Surveys	33 ac pd	10
Aquatic Report	20 pd for report	8
CWE Analysis	30 pd for field work and report	12
MIS Analysis	20 pd for report	8
Fuels Analysis	10 pd for report	4
Stand Exams	50 ac/pd	6
Marking Prescription	3 pd for project	1
Roads Analysis	10 pd for field work & report	4
IDT Meetings	40 pd for project	16
Write Draft EA	40 pd for project	16
Respond to Comment	5 pd for project	2
Write Final EA	5 pd for project	2
Write Decision	10 pd for project	4
Appeal Resolution	20 pd for project	8
Marking, Appraisal and Contract Preparation		
Marking Timber	5 ac/pd[2]	40
Sale Contract/Appraise	20 pd for project	8
Administer Sale	8 ac/pd	38

[1] Person day cost is estimated at $300.00/day, including misc. travel and material costs.
[2] A rate of $200.00/day used because of seasonal markers @ lower salary rate.

TABLE A-2. ACTIVITY COSTS/VALUES

Item	Measure	Dollars	Assumptions
Vegetation Treatments			

Item	Measure	Dollars	Assumptions
Value of Commercial Removal (excluding road costs).	per mbf	$ 80	at 4mbf acre for natural stands and 1.5 mbf for plantations
Non-Commercial mechanical thinning and removal to landing in units and road side treatments	per acre	$ 1,100	
Biomass removal concurrent with mechanical thinning	per acre	$ 120	
Landing Pile Burn	per pile	$ 250	one pile every 20 acres of mechanical thin
Brush Cut, Pile	per acre	$ 210	
Pile	per acre	$ 50	
Grapple Pile	per acre	$ 100	
Pile Burn	per acre	$ 50	
Lop and Scatter	per acre	$ 490	
Hand Cut and Pile	per acre	$ 1,200	
Raking Legacy Pine	per acre	$ 3	$32/tree with a tree estimated every 10 acres
Hand Pile Burn	per acre	$ 200	
Understory burn	per acre	$ 200	
Roadside Brushing	per acre	$ 600	mastication
Noxious Weed Treatment	per acre	$ 500	
Road Work and Area Restoration Work			
Barriers	each	$ 3,000	
Gates	each	$ 7,000	
Boulders Installed	each	$ 100	
Gravel/Agg Base installation	mile	$ 80,000	
Road Reconstruction	per mile	$ 10,000	
Road Ripping	per mile	$ 480	$120/hr with 1/4 mi/hr expected
Installation of waterbars and outsloping	per mile	$ 520	
Native Seeding/Fertilizer/Straw	per acre	$ 1,900	
Other Activities			
Mine Closure Cupola	each	$ 30,000	
Mine Closure Foam	each	$ 5,000	
Barbed Wire Removal	per day/ person	$ 200	4-5 person crew for 3-4 days
Ripping Skid Roads	per mile	$ 480	

TABLE A-3 COST ESTIMATES FOR SITE RESTORATION ACTIVITIES AT EACH PROPOSED SITE

Site	Issue	Proposed Restoration Activities	Estimated Cost
DR_Steely_Fork_1	Dispersed Recreation Need for Drafting site	• Block access to stream crossing with boulders and gate to stop creek crossing, but leave access to water hole. Place boulders on the north side. (50+) • Rock road between gate and stream. • Re-establish existing lead-off ditches. • Manage dispersed camping by placing boulders at border of existing camping zone to allow dispersed recreation to continue. • Spot decompaction via sub soiler, ripping shanks, or by hand of dispersed camping areas away from underground lines and arch	Boulders - $5000, gate included elsewhere rocking $10,000 (est) included elsewhere decompaction - $1000 Total - $16,000
DR_Steely_Fork_2	Dispersed Recreation	Project 1: Replace the gate where the 9N73 Rd. intersects the 9N73A Rd. - blocking access to the 9N73A Rd. • Sign – gate, no turn around. • Construct waterbars on the stream approaches. • Block off access to non-system routes with boulders. Decompact via sub soiler, ripping shanks, or by hand the surface of the camping areas and spur road, plant vegetation Project 2: Meadow enhancement • Block entrance to meadow using conifers	included elsewhere $200 $500 $7000 Total - $7,700
		• Using hand tools remove encroaching conifers and use to block meadow entrance, protect deer bedding site and enhance great gray owl habitat. • Pull barbed wire • Hand pull invasive species. • Add nesting platform for GGO • Block and obscure OHV trails with logging created slash. Project 3: Identification of designated path with rehabbing non desired trail blending others with hand tools and natural materials.	Total - $5,000 $ 2000 Total - $2000

Site	Issue	Proposed Restoration Activities	Estimated Cost
DR_Steely_Fork_3	Dispersed Recreation	Project 1: • Block unauthorized route off 09N65B • Decompact soils in the dispersed site and the and unauthorized road providing access to the dispersed site. • Reseeding dispersed site with botanist recommended mix. Weed free straw for ripped surfaces. Plant riparian vegetation on denuded or suppressed streambanks. Project 2: • Obliterate 9N65B (decompact and reseed)	$300 $500 $1,000 Total - $1800 included elsewhere
RR_Big_Canyon_1	Dispersed Recreation/ Water hole use	• Reconstruct portion to water hole with spot graveling • reconstruction road past waterhole. • Decompact and obliterate 9N44B. Rip landing, plant vegetation and block access with gate or boulders (15+). • C road would be improved (gravel and water features as needed). • water hole at end of the 9N44C spur would be refurbished and maintained	included elsewhere included elsewhere $3,000 included elsewhere included elsewhere Total - $3,000
DR_Dogtown_1	Dispersed Recreation	Obliterate the camping area (rip, plant vegetation, and block vehicular access with barrier rocks.) (10+)	$3,500
DR_Dogtown_ 2	Dispersed Recreation	• Limit extent of vehicle access to dispersed site with boulders. (50+) • decompact soils in the restricted area • Reseeding with botanist recommended mix. • Weed free straw for short-term stabilization of ripped surfaces. Plant riparian vegetation on banks with absent or suppressed vegetation.	$7,500
Trail_14E31_1	System OHV Trail	Project 1: • Restoration activities include reconstruction of the 9N45 Rd. West of reconstruction for timber sale.	 Included in Road Work econ

Site	Issue	Proposed Restoration Activities	Estimated Cost
		• Rolling dips to be installed. • Sediment trap at this intersection should be cleaned out and re-shaped. Project 2: • Restore drainage by removing small diameter pipe by hand tools within drainage that is contributing to erosion issues while maintaining existing water source upslope for wildlife.	$500
Trail_14E31_2	System OHV Trail	• Install barriers to define and narrow the trail at this site. • Add ground cover to eroded areas. • Place coarse woody material in open areas.	$500 $2,000
Trail_14E31_3	System OHV Trail	• Realign trail to be parallel to the contour. • Rehabilitate landing by decompacting, water barring and placement of ground cover such as weed free straw or native organic material	$1,000 $1,000
Trail_14E31_4	System OHV Trail	• Realign trail 14E31 to be parallel with the contour. Obliterate, block and rehab abandoned trail.	$2,500
Trail_14E31_5	System OHV Trail	• Define and restore trail intersection. • Install OHV traffic control, boulders and trees. (75)	$1,000 $1,000
UAR17	Unauthorized OHV Trail	• Barrier Rocks, (50) along road at cut slope • coarse woody debris placement on slope, • Install dips to change drainage patterns of the road • Block and obscure access to this area from the 14E31 using natural material (hand fall trees) or boulders (10), obliterate and install short term erosion control on slopes.	$500 $100 included elsewhere 1500
UAR19	Unauthorized OHV Trail	• Block, obliterate, and obscure the trail/road. Decompact meadow portion using hand tools	$1,000
UAR01	Unauthorized OHV Trail	• Block, obscure and obliterate by hand falling small material across the trail.	$500

Site	Issue	Proposed Restoration Activities	Estimated Cost
RR_9N55	Road Reconstruct	• Convert the last 1.1 miles of road 09N55 into an OHV trail. • Legally designate this portion of trail as only allowing vehicles <50" in width. Install restrictor gate that only allows vehicles <50" in width to pass through. • Construct drainage features on trail. • Rehabilitate sides of existing road to blend in with adjacent ground. Reconstruct portion of 9N55 that leaves Elkins Flat area heading west.	included in road reconstruction. Constrictions and trail work est $2,000
Harrel Water Tank Meadow	Dispersed Recreation	• Restore meadow by removing public debris. • Blocking areas with onsite material to enable vegetation to recover.	$1,000
Sensitive plan barricade	Dispersed Recreation	Block using boulders (10+)	$1,000

TABLE A4. MECHANICAL PRECOMMERCIAL THINNING AND FUELS REMOVAL IN PLANTATIONS & NATURAL REGENERATION AREAS

Equipment	Hourly rate with Operator	Daily Cost (10 hr day)	Acre/ day	Cost/ Acre
Skidder	$97	$969		
Loader	$135	$1,346		
Feller-buncher	$185	$1,845		
Total	$416	$4,160	4	$1,102
*costs derived from Logcost equipment and labor calculators; equipment may be oversized for the work but reflects local contractor owned equipment				

APPENDIX B

COST EFFECTIVENESS-DEFINED AND DISCUSSED

Cost effectiveness, cost efficiency, economic efficiency and other related terms are generally used interchangeably throughout the Record of Decision (ROD) for the Final Supplemental Environmental Impact Statement (FSEIS) for the Sierra Nevada Forest Plan Amendment and within the FSEIS. The most specific definition is perhaps provided in the FEIS:

"Cost efficiency, as the term is used here, refers to the number of acres that can be treated for any given budget allocation. The efficiency of a given program mix depends on the extent to which direct project costs can be minimized and offset by project revenues. The cost efficiency of a given management alternative depends upon the prescriptions applied, the number of acres treated, the cost per acre, and the revenues generated by the sale of recovered woody materials." (vol 1, p 222).

The (ROD) and FSEIS discuss and identify economic considerations that are relevant to fuels treatments in the following manner:

*"... I am changing the way management occurs in those treated areas and directing field personnel to develop projects that make sense from an ecological and **financial** perspective."* (ROD, p 3).

"Modifications to some of the diameter size limits imposed by the SNFPA 2001 ROD will improve the cost-effectiveness of projects". (ROD, p 9).

"*Revenues from the sale of commercial forest products may be obtained from some fuels treatments. This increases the likelihood of accomplishing the projected acres of treatment, an essential first step in achieving the desired reductions in acres burned. Where consistent with desired conditions, area treatments are designed to be **economically efficient** and meet multiple objectives."* (ROD, p 35).

*Within the Defense Zone "Design **economically efficient** treatments to reduce hazardous fuels."* (ROD, p 45).

*"Design treatments in HRCAs (Spotted Owl Home Range Core Areas) to be **economically efficient** and to promote forest health where consistent with habitat objectives*." (ROD, p 46).

*Within Threat Zones "Design **economically efficient** treatments to reduce hazardous fuels."* (ROD, p 46).

*Within Old Forest Emphasis Zones "Design **economically efficient** treatments to reduce hazardous fuels."* (ROD, p 48).

*Within the General Forest Zones "Design **economically efficient** treatments to reduce hazardous fuels."* (ROD, p 45).

*"The SNFPA Review also recognized that the by-products of mechanical thinning present an **economic opportunity** for local communities. The Review identified measures to assess the degree to which fuels reduction programs are creating local **economic benefits.** Increasing the **economic value** of fuel treatment byproducts would also improve the Forest Service's ability to treat the desired acreage of hazardous fuels with available appropriated dollars*." (FSEIS, p 28).

"By-product production would offset the cost of fuels treatment and allow the desired program level acreage of hazardous fuels to be treated." (FSEIS, vol 1, p 30).

"*Forest product outputs would offset some of the costs of fuels treatment and allow a larger acreage of hazardous fuels to be treated. The intent is to provide more material for commercial timber sales as part of fuels treatments, making treatments more economical and generating raw material to provide for an industry infrastructure".* (FSEIS, vol 2, p 80).

The data indicates that higher bids are received when higher volumes of sawtimber per acre are offered. In general, tractor logging contracts begin to increase in value when volumes greater than 3 thousand board feet (mbf) per acre are offered. (FSEIS, vol 1, p 223).

Based upon the above referenced citations it is apparent that the Regional Forester understood and considered the importance of product generated revenue in terms of supplementing appropriated funding in order to off-set some of the inherent high costs of performing effective fuel treatment.

The cost of a fuel treatment operation is the sum total of a long list of component costs. These are broadly separated into fixed and variable costs. The basic costs associated with forest operations are relatively easy to quantify. Machine prices are readily available, labor rates can be estimated, interest rates and fuel prices can also be accurately defined, although as the analysis time frame expands, the costs become harder to assess. *(Bob Rummer: Forest Policy and Economics 10 (2008) Assessing the cost of fuel reduction treatments: A critical review).*

Studies of timber bid prices show that a variety of less tangible factors affect the cost of operations. Factors that increase potential value to a potential bidder include the amount of sawtimber and accessibility for harvest during winter months increases bid prices. Competition is also a significant factor with more bidders resulting in higher bids. Factors that increased operational costs decreased bid prices, namely selective cutting prescriptions, likely weather delays and more restrictive contractual provisions. Potential

reductions in market value of the products to be removed increases risk and therefore are accounted for by increased costs of operations. (Ibid.).