USDA-FOREST SERVICE FS-2500-8 (7/00)

Date of Report: 08/30/01

BURNED-AREA REPORT
(Reference FSH 2509.13)
PART I - TYPE OF REQUEST

A. Type of Report

[ ] 1. Funding request for estimated WFSU-SULT funds
[X] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[ ] 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation measures)

[ ] 2. Interim Report
[ ] Updating the initial funding request based on more accurate site data or design analysis
[ ] Status of accomplishments to date

[X] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Highway
B. Fire Number:CA-SQF
C. State California
D. County: Tulare
E. Region: 05
F. Forest: Sequoia
G. District: Hume Lake Ranger District
H. Date Fire Started:08/19/2001 1845
I. Date Fire Controlled: Unknown
J. Suppression Cost: 6,615,655
K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 14.9
2. Fireline seeded (miles): 11.7
3. Other (identify): Brushed 11.7
L. Watershed Number:1803001005

M. Total Acres Burned: 4151
NFS Acres (3338) Other Federal ( ) State (89) Private (724)

N. Vegetation Types: : Mixed conifer, Mixed chaparral (dominated by Interior and Canyon Live oak, (Mariposa manzanita) California buckeye)

O. Dominant Soils: Hotaw Variant derived from metasedimentary/metamorphic rocks and Holland derived from granitic rock.

P. Geologic Types: Granite and meta-sediment/metamorphic rock

Q. Miles of Stream Channels by Order or Class:
54.2 (Ephemeral) 2.4 (Perennial) .24 (Seasonal)

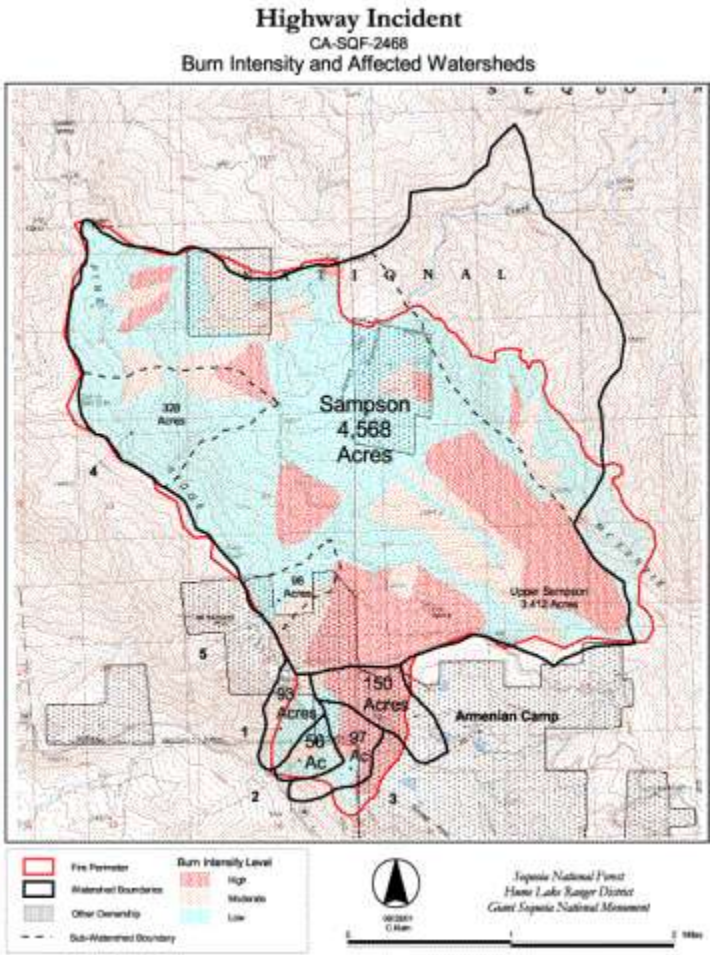
R. Transportation System
Trails: .8 miles Roads: 24 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 2478 (low) 585 (moderate) 1087 (high)
B. Water-Repellent Soil (acres): 1672
C. Soil Erosion Hazard Rating (acres):
134 (low) 2373 (moderate) 1555 (high) 89 (no coverage)
D. Erosion Potential: 10 tons/acre
E. Sediment Potential: 309 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	15
B. Design Chance of Success, (percent):	85 [1]
C. Equivalent Design Recurrence Interval, (years):	2
D. Design Storm Duration, (hours):	24
E. Design Storm Magnitude, (inches):	3.5
F. Design Flow, (cubic feet / second/ square mile):	15.4
G. Estimated Reduction in Infiltration, (percent):	40%
H. Adjusted Design Flow, (cfs per square mile):	89



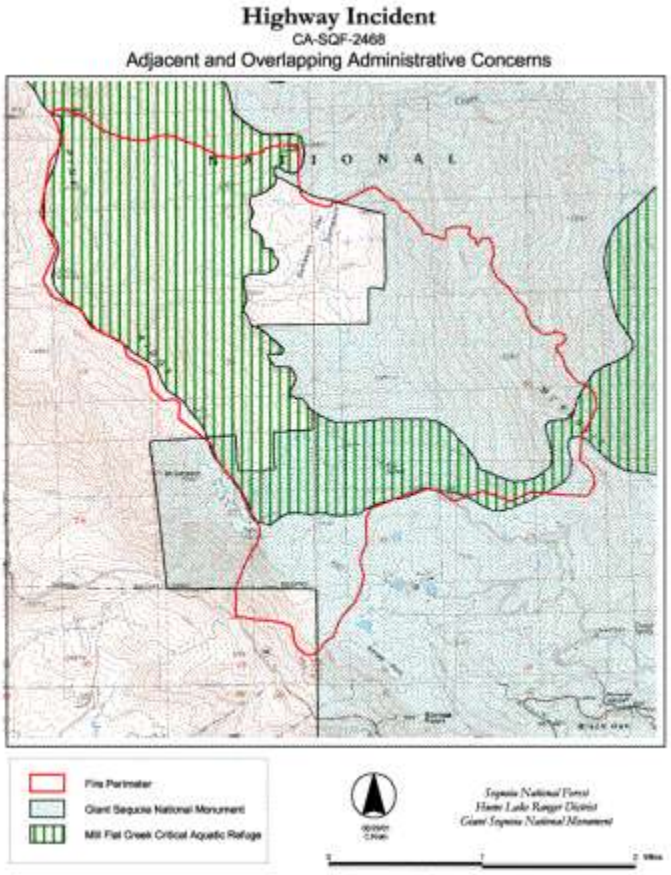
PART V - SUMMARY OF ANALYSIS

The Highway Fire started in a small, steep unnamed watershed draining to a culvert on State Route 180 in the Lower Fork of the Kings River Basin. It spread into the Sampson Creek subwatershed of Mill Creek, which is tributary to Middle Fork of the Kings River. Sampson Creek contains most of the burned area, however, several relatively small face drainages, tributary to Mill Flat Creek, on the northeast flank of McKenzie Ridge burned at moderate to high intensity. The "point of origin" area contains four small drainages two of which are unburned or burned at low intensity. One of the remaining two drainages has aproximately a third of its acerage burned high and the remaining acerage low or unburned; while the other drainage that flows through an Armenian Church Camp has aproximately two-thirds burned high and the remainder unbruned. The burn intensity map illustrates the patchey nature of this burn and areas of concern.

Highway fire is located within the Hume Lake Ranger District and burned portions of the Giant Sequoia National Monument and the Mill Creek Critical Aquatic Refuge. Additionally the a portion of the Giant Sequoia National

[1] 2000, Evaluation the Effectiveness of Postfire Rehabilitation Treatments, Robichaud, Byers, Neary, USDA, Rocky Mountain Research Station, GTR, RMRS-GTR-63, 83p. Mulching was rated "excellent" and ground seeding "good".

Monument within the fire also includes a portion of the Kings River Special Management Area. Thus the area is located in an area of overlapping adminstrative concerns. The adjacent map shows these adminstrative boundaries.



The values at risk which the team assessed in relation to a potential watershed emergency are:

- Pine Flat Reservoir – protection from sedimentation
- Mill Flat Critical Aquatic Refuge – protection of Western Pond Turtle and native trout habitats
- Private property, residences and roads in Sampson Creek and Armenian Camp watershed
- Protection of the prism and drainage structures of FS roads in the Sampson Creek Watershed
- Spread of noxious weeds (Medusahead and yellow star thistle) on the barren suspectible burn area

The risks which were assessed are loss of control of water, loss of soil and associated sedimentation, threats to property (private and Forest Service) and resources, and threats to ecosystem integrity.

The Risk of Loss of Control of Water

The risk of loss of control of water affecting Highway 180 is minimal due to adequate design of the drainage structure and associated fill, as well as the stable, bedrock channel. Similarly, this risk is deemed low for Mill Creek both above the confluence of Sampson Creek (small burned face drainages) and below. Although Sampson Ck. Watershed burned at significant intensities (40% moderate and high), its affect on Mill creek channel and the aquatic values from flooding are not thought to constitute a watershed emergency due to the presence of Sampson Flat which is a low energy environment and the size of the fire area relative to the size of Mill Creek Watershed. The Critical Aquatic Refuge in Mill Creek is 31,400 acres. The Burn affects 13 percent of this watershed.

The Armenian Camp watershed poses a concern as there is a potential for 14% increase in water yield a a result of the fire. Sixty-seven percent of the watershed burnt at high and moderate severity. The channel that drains this area has the potential to affect the Armenian Camp structures, roads, and one of the ponds located on the property. Forest lands occupy the headwaters of this watershed immediately upstream from these features. Don Athon, CDF and the land owner, Mr Langley, have been contacted about these concerns and encouraged to treat private land. Table 1. displays the increase in design flows that are cause for concern.

Other areas of concern for loss of control of water are the Davis road and its ability to deal with increased flows. Subwatershed analysis for increased flows and existing major culverts verified sizing of these culverts is appropriate for their drainage areas. Culvert replacement is identified at numerous minor culverts 12–18 inches where increased flows are in exceedence of design capacity. More information is contained within the

Table 1. Adjusted Design Flow for Specific Subwatersheds of Concern

Subwatershed	*Pre Fire CFSM*	*Adjusted CFSM*	*Area in miles*
Sampson Creek	15.4	89	7.14
Upper Sampson Ck	15.9	128	5.33
Hwy 180-1	24	53	.15
Hwy 180-2	26	94	.09
Hwy 180-3	25	305	.15
Armenian Camp	23	330	.23
Sampson Sub 4	21	112	.51
Sampson Sub 5	25	193	.15

Threats to Water Quality
The risk of sedimentation affecting Pine Flat reservoir was estimated to be small. Although all of the burned area drains to the reservoir, the portion of the drainage area it affects is relatively small (4.7%). For the Critical Aquatic Refuge, there is the risk of fine sediment affecting habitat. Sampson Creek is located within the Mill Critical Aquatic Refuge; therefore the drainages within the fire have already been affected. The Sierra Nevada Forest Plan Amendment identifies this drainage as having special aquatic species, which include western pond turtles, and native fish species.

The effects of the fire in Sampson Creek is not be expected to be delivered beyond Sampson Flat because of the very large low gradient grassy flat exists at the bottom of the burn. The coarse sediment produced by the face drainages on the north side of McKenzie Ridge will have a direct delivery route to Mill Flat. One of these, in particular (unnamed in SE¼ Sec17), burned partly at high intensity and appears to be deeper soils than the others. This soil is perched on a moderately steep hillside and as with all of the moderate and high severity burned landscape has hydrophobic soils. Soils on the high severly burned area have hydrophobic soils up to 8 inches deep while the moderate severity soils have hydrophobic layers up to 4 inches deep. These soils have the potential to mobilize under the increased water yields expected to occur from this event.

Another threat to water quality is the potential for hazardous materials to be transported from a burnt over dump-site/residence on private lands in E½.Sec25 to the Armenian Camp watershed. Burned cars, trash, house-hold appliances, batteries, paint and other items are now exposed to rain and snow, with a high probability that the toxic material will leach into the soil and eventually into ground water. Toxic chemicals have the potential to be transported downstream into drainages and ultimately be transported to the pond at the Armenian Camp. This has been reported to Don Athon, CDF.

Threats to Soil Productivity
Threat to soil productivity exists on the lands with high fire severity. Ground cover is essentially absent in the high severity fire areas. Although the more intensely burnt areas occupy ridge tops gully erosion is currently present and the effects of the fire on the delicate soils is expected to result in extreme erosion if ground cover is not provided. This threat is closely related to threats to resources in the Critical Aquatic Refuge area as soil loss results in water quality sedimentation threats.

The dominate in the burned area are; 693 Holland- Hotaw association, 10 to 30 percent slopes, 694 Holland – Hotaw association, 30 to 50 percent slopes, 601 Brownlee family-Hotaw Variant complex, 30 to 50 percent slopes, 685 Holland-Shaver, 20 to 50 percent slopes, 635 Hotaw Variant-Brownlee family-Rock outcrop complex, 40 to 75 percent slopes, 201 Cieneba-Rock outcrop complex, 15 to 50 percent slopes, 205 Chualar family-Rock outcrop complex, 50 to 75 percent slopes, and 202 Cieneba-Rock outcrop complex, 50 to 75 percent slopes. The physiography is characterized by a series of parallel ridges. Geology is mainly metasedimentary and granitic rock type. The average annual precipitation is 30 inches and water is difficult to find in the burn area. Dominant overstory vegetation consists of Ponderosa Pine and oak. Potential for erosion on these soils ranges from low on rock outcrops to high on land types 601 and 685. in the burn are distributed with 2373 acres of moderate soil erosion hazard in the bottom and center of the drainage basin and 1555 acres have high soil erosion hazard on the steeper flanks and ridges tops. Rock outcrops are located on peaks to the north and south.

Threats to Ecological Integrity
Wildfire has burned an area of scattered ponderosa pine and grass with high to moderate severity. The grass seed bank has been affected so that recovery back to 100% ground cover cannot be expected. Nearby infestations of Medusahead and yellow star thistle are expected to move into the burned area. Freshly disked and burnt fuel brakes provide additional "prepared sites" for the establishment of these noxious species. The situation was exacerbated by the fact that initial attack dozers were not washed and may have been contaminated.

Fire burned the top of Pine Ridge above Sampson drainage basin. The high severity fire killed all the tree and shrubs and destroyed the natural seed bank in the soil. There are currently deep gullies in this area. Gully erosion is moving large amounts of sediment into the Critical Aquatic Refuge, which is habitat for western pond turtles and native fisheries. This area is in the Giant Sequoia National Monument and is not in the commercial base for the Forest.

B. Emergency Treatment Objectives:
The goal of the burned area emergency rehabilitation is to:

- Re-establish vegetation in a timely fashion in order to reduce or eliminate threats to long-term soil productivity, water quality and the ecological integrity of the watersheds.

Treatment objectives to achieve the goal are:

- Control expected noxious weed invasions through mulching and seeding grass. Mulch applied at a rate of 2 tons/acre reduced erosion 6 to 10 cubic yards and is highly effective for post fire rehabilitation treatments.
- Control expected soil erosion by application of grass and forb seeding and by establishing erosion control structures such as check dams.
- Restore vegetation severly burnt ridges within the Giant Sequoia National Monument and Mill creek Critical Aquatic Refuge.
- Control livestock grazing to prevent damage to hay bale check dams through protective fencing
- Promote the re-establishment of vigorous vegetal ground cover to protect soils and watershed values.
- Plant Ponderosa Pine (pinus ponderosa) at a rate of 100 trees per acre in highly impacted areas to restore ecosystem integrity.

Threat to Property and Resources

As previously mentioned there is a threat to the Armenian Camp and associated facilities including the road and pond and the Davis road. Resource values include range, archeology and wildlife. The major portion of the fire is in the Sampson allotment and a portion of the Deliah unit, White Deer allotment. Damaged and destroyed improvements will be replaced with range funds. Damages were approxmately $200,000 and include loss of 200 AUM's. Long-term range management will benefit from the fire and will be realized as increased forage, accessibillity and improved browse. Archeology will not be affected by any of the proposed treatments. Feature wildlife species for the burned area include western pond turtle, deer transition and winter range, wild turkey, California and mountain quail, and downstream assemblage of native fish. The area is included in the Mill Critical Aquatic Refuge. A California red-legged frog was reported from the Sampson Flat area in 1926.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm:
Land 95 % Channel 95 % Roads 60 % Protective Fence 95 %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land			
Noxious Weeds	65	75	75
Hand Seeding and Straw Mulching	85	85	85
Channel			
Straw Bale Dams	70	80	85
Roads			
Road Retrofit	95	95	95
Other			
Protective Fencing	95	90	80

E. Cost of No-Action (Including Loss): $722,650

The cost of the resources include the cost of the loss of soil productivity, recreation loss, risk to health from particles in the air, impacts to private lands especially the Armenian camp, and the loss of road system. It is impossible to put a value on the the Mill Creek critical aquatic refuge and sensitive and threatened species.

F. Cost of Selected Alternative (Including Loss): $405, 130

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology: Robie VandeWater [x] Soils: Dan Dagnan [x] Range: Steve Anderson
[x] Forestry: Tom Henry [x] Wildlife: Steve Anderson [x] Engineering: John Grenz
[x] Botany: Steve Anderson [x] GIS: Cherie Klein

Team Leader:Terry A. Kaplan-Henry

Email: tkaplanhenry@fs.fed.us Phone: 559-784-1500 1181 FAX: 559-781-4744

H. **Treatment Narrative:**

Land Treatments:

Land treatments are intended to provide soil stabilization, vegetative cover for moderate to high intensity burn areas, reduce sedimentation to critical aquatic refuge, and for direct control of noxious weed expansion caused by the fire and exiting conditions. Treatment for the prevention of noxious weeds would occupy the site with grasses, forbs, and trees so non-natives cannot invade.

Treatments include:

- Hand seeding with a grass mixture of Sitation hystirx (squirrel tail), 15 lbs/acre; Bromus interganis (smooth brome) at 10 lbs/acre; and cereal rye, wheat or barley at 80 lbs/acre. We would like to achieve 40 to 60 pure live seeds per foot (as per seed test). The seeds per square foot will be finalized once availability is determined. The seeding will be done at four locations of high burn intensity on moderate to moderately steep gradient slopes in sections 17, 13, 24 and 30. Inquiries to the seed company will determine the percentage of pure live seed per pound to aid in the calculations for ordering.

- Hand mulching with weed free rice straw at a rate of 2 tons/acre. Locations are the same as for hand seeding. Mulching would be applied directly on seed and would provide the added protection from birds, erosion control, and competition from noxious weeds.

- Tree planting with ponderosa pine at a rate of 100 trees/acre on intensively burned area with erosive soils in section 30. Tree planting has been proposed to stabilize the ecosystem and to prevent soil instability problems.

Channel Treatments:

Channel treatments are intended to reduce the potential for debris flows. There are two locations proposed for straw bale check dams. Both are located in relatively gentle gradient swales associated with active gully erosion and head cutting in sections 12 and 30. Approximately a total of 14 structures are to be constructed at thse two sites.

Roads Treatments:

Road treatment are intended to protect the existing road resource, reduce impacts to the channel, reduce erosion downstream to the Mill Creek critical aquatic refuge and provide for armoring of areas susceptible to water concentration. The Davis road is proposed for treatment in the vicinity of those area most susceptible to the effects of the fire. These areas are located in sections 30 and 24 and include roughly four miles of road. For more information see. Treatments include:

- Retrofit of drainage sturctures commensurate with increased design flow.
- Armoring of outlets below overside drains and culverts.
- Placement of large rip-rap and filter cloth to reduce the erosion of the large headcuts associated with the road drainage.
- Installation of metal end sections to increase effenciency and effectively pass fire caused debris.
- Installation of overside drains to reduce the velocity of water on intensively burned fill slopes.

Structures:

A temporaty protection fence will be installed in section 30 for protection of treatments and riparian area. These include one of the straw bale check dam sites mentioned above and the riparian area. Protection is from cattle grazing as an allotment is located within and adjacent to the burn area. The allotment will be suspended for up to one year following the fire however given the proximity to private land it would be impossible to keep cattle out of this area.

H. **Monitoring Narrative:**

Monitoring will be critical to determine the success of the rehabilitation efforts as well as determining the amount of sediment loss and transport to drainage ways. Monitoring will consist of both implementation (was a proposed or prescribed treatment applied), and effectiveness (was the treatment successful in its purpose). Monitoring costs displayed in Part VI are for two years for all items the costs include the cost of a vehicle, perdiem and travel for two people.

- Monitor seeding success and noxious weed spread for the next three years to determine implementation success and effectiveness in controlling erosion and noxious weed control. If monitoring indicates these treatments are ineffective or inadequate, develop alternative treatments and request subsequent funding. A transect similar to the vegetation transects for range would be utilized to evaluate this item. This would occur 1 day per year for 2 years and utilize two people.

- For a period of two years after the fire monitor areas for seeding and mulching effectiveness. Local staff will conduct the monitoring. Monitoring will occur at least once during the spring and once during the fall and utilize 2 people for 2 days a year. Transects similar to soil transects for ground cover will be used to perform this item.

- Previously established photo points will continue to be monitored for the next 5 years. Monitoring will be conducted with local staff. No additional costs have been added for this item since it will be accomplished during other activities.

- Monitor straw bale dams for implementation success and effectiveness for 2 years. There are two locations and would require 2 people for 3.5 days per year. Dams would be evaluated for effectiveness and the stream channels immediately down stream would be evaluated for effects.

- Watch for unauthorized livestock use within the straw bale dam area. It is imperative that livestock be excluded from the burned area until vegetation can be re-established. No additional cost will be covered above.

- A team assembled by the Hume Lake Ranger District will conduct monitoring. Monitoring of the overall project area will occur at a minimum during each fall following the first two years after the burn. This monitoring team should be comprised of a Botanist, Hydrologist, Soil Scientist, Forester, Range Conservationist and Engineer depending on availability. ***Cost for this item has not been included in the request.***

- Determine if cereal grains out compete the native grasses in the combined seed mix. The area above the Armenian Camp has great potential for monitoring the success of seeding and mulching treatments affect upon controlling erosion and noxious weeds. Hence, a study is needed to help determine the effectiveness of treatments for sediment deposition and erosion control. The district botanist will monitor the best seeding mixture rates for the control of noxious weeds. Seed will be applied at a rate of 40 to 60 pure live seed per square foot. ***Cost for this item has not been included in the request.***

  Method

  Install 4 metal sediment troughs to trap sediment on gentle upland slopes. The plot sizes should be @ 3 feet x 7 feet in size. Design specifications; help with installing, and collecting soil erosion data may be obtained by contacting zoned or adjacent forest soil Scientist. Photo points would be set up.

  Study Areas

Plot # 1	No seeding or mulching
Plot # 2	Seed at the rate of 40 lbs / ac cereal grain, mulch, and native seed
Plot # 3	Seed at the rate of 80 lbs / ac cereal grain, mulch, and native seed
Plot # 4	Seed at the rate of 120 lbs / ac cereal grain, mulch, and native seed

  Empty troughs following major storm events and weigh sediment. Record the weight of sediment and compare results with Revised Universal Soil Loss Equation calculations.

  Estimate the percent ground cover of noxious weeds, cereal grain, seeded native grasses, and species component. The results should validate the best seeding rate mixtures for including cereal grains use in conjunction with native seeding.

If any of the treatments are determined to be ineffective after the first two seasons following implementation, the Hume Lake District may request additional funding to re-seed, or re-apply other prescriptions for rehabilitation of the Highway Fire.

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land Ownership

A. Land Treatments											
Hand Mulching	Acres	500	100	$50,000				$0		$0	$50,000
Hand Seeding	Acres	300	100	$30,000				$0			$30,000
Tree Planting	Acres	100	164	$16,400				$0		$0	$16,400
Subtotal Land Treatments				$96,400				$0		$0	$96,400
B. Channel Treatments											
Straw Bale Dams	EA	250	14	$3,500				$0		$0	$3,500
Subtotal Channel Treat.				$3,500				$0		$0	$3,500
C. Road and Trails											
Remove Exist culvert	EA	350	23	$8,050				$0		$0	$8,050
Const 24" Culvert	EA	2800	22	$61,600				$0		$0	$61,600
Const 30" Culvert	EA	3850	1	$3,850				$0		$0	$3,850
8" Riprap	CY	140	51	$7,140				$0		$0	$7,140
Class II Riprap	CY	147	70	$10,290				$0		$0	$10,290
MES	EA	350	8	$2,800				$0		$0	$2,800
Install SIA	EA	210	6	$1,260				$0		$0	$1,260
Flume	LF	70	60	$4,200				$0		$0	$4,200
Subtotal Road & Trails				$99,190				$0		$0	$99,190
D. Structures											
Protection Fence	LF	3	550	$1,650				$0		$0	$1,650
Subtotal Structures				$1,650				$0		$0	$1,650
E. BAER Evaluation											
Personnel	LS	23520	1	$23,520				$0		$0	$23,520
Travel	LS	2000	1	$2,000				$0		$0	$2,000
Per Diem	LS	1194	1	$1,194				$0		$0	$1,194
Subtotal Evaluation				$4,050				$0		$0	$4,050
G. Monitoring Cost											
Mulching	Days	450	4	$1,800				$0		$0	$1,800
Seeding	Days	450	4	$1,800				$0		$0	$1,800
Roads	Days	675	4	$2,700				$0		$0	$2,700
Aquatic Haitat	Days	450	7	$3,150				$0		$0	$3,150
Monitor Ecological Treatments	Days	450	2	$900				$0		$0	$900
Subtotal Monitoring				$10,350				$0		$0	$10,350
H. Totals				**$215,140**				**$0**		**$0**	**$215,140**

PART VII - APPROVALS

1. ___/s/ Arthur L. Gaffrey ___ _8/31/01
   Forest Supervisor (signature) Date

2. _____ _____
   Regional Forester (signature) Date