MESSAGE SCAN FOR EARL C. RUBY

To T.Laurent:r05f05a
CC Father of Watershed Management

From: JO KITE:R05F05D52A
Postmark: Aug 16,94 9:37 PM Delivered: Aug 16,94 9:39 PM

Subject: BEAR FIRE INITIAL 2500-8

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USDA-FOREST SERVICE Date of Report: 8/16/94

BURNED-AREA REPORT
(Reference FSH 2509.13, Report FS-2500-8)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated EFFS-FW22 funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[X] 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 and design analysis
  [ ] Status of accomplishments to-date

[ ] 3. Final report - following completion of work

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: **Bear**
B. Fire Number: **KNF 2527*** **(* Part of Dillon Complex)**
C. State: **California**
D. County: **Siskiyou**
E. Region: **Pacific Southwest (5)**
F. Forest: **Klamath**
G. District: **Happy Camp**

H. Date Fire Started: 7/20/94
I. Date Fire Controlled: **No estimate**
J. Suppression Cost: **$ [Dillon Complex estimated at $25,000,000 with no separate estimate for the Bear Fire]**

K. Fire Suppression Damages Repaired with EFFS-PF12 Funds:
1. Fireline waterbarred (miles) 5.0
2. Fireline seeded (miles) 0
3. Other (identify) --

L. Watershed Number: 180102090105

M. NFS Acres Burned: 1931 Total Acres Burned: 1931
Ownership type:
( )State ( )BLM ( )PVT ( )____ _____

N. Vegetation Types: **Tanoak - Douglas-fir and Port-Orford-Cedar.**

O. Dominant Soils: **Nuens, Kindig, Cailgm very deep, Dubakella Soil Series**

P. Geologic Types: **Gabbro, altered Ultramaphic rock, minor metavolcanic rock, metasedimentary rock, diorite, and surficial Quaternary landslide deposits**

Q. Miles of Stream Channels by Order:
1 = 4.1 mi 2 = 1.7 mi 3 = 0.0 mi 4 = 1.44 mi

R. Transportation System:
Trails: 1.0 (miles) Roads: 0.4 (miles)

PART III - WATERSHED CONDITION

A. Fire Intensity (Acres): 1004 (low) 637 (moderate) 290 (high)

B. Water Repellant Soil (Acres): 290

C. Soil Erosion Hazard Rating (Acres):
100 (low) 904 (moderate) 927 (high)

D. Erosion Potential: 4.0 tons/acre
E. Sediment Potential: 6291 cu. yds/sq. mile

PART IV - HYDROLOGIC DESIGN FACTORS

		No-man's Ck.	Clear Ck.
A.	Estimated Vegetative Recovery Period:	5 yr.	5 yr.
B.	Design Chance of Success:	80 %	80 %
C.	Equivalent Design Recurrence Interval:	25 yr.	25 yr.
D.	Design Storm Duration:	6 hr.	6 hr.
E.	Design Storm Magnitude:	3.6 in.	3.6 in.
F.	Design Flow:	149 cfsm	149 cfsm
G.	Estimated Reduction in Infiltration:	50 %	50 %
H.	Adjusted Design Flow:	852 cfsm	151 cfsm

PART V - SUMMARY OF ANALYSIS

A. Describe Emergency:

Threats to human life in the form of sediment bulked increased peak stream flows, debris torrents, and landslides exist at the stream crossings of Forest Road 15N32 and the trail from the No-man's River Access Site upstream on the South side of Clear Creek towards the Siskiyou Wilderness Area. Slope debris may also pose a threat to humans on the same road and trail. Potential loss of culverted road crossings could result in stranding of forest visitors within the burn area, which inturn could result in their injury. Dispersed use in the burn by hunters, mushroom gathers, and families that make traditional use of parts of the fire area, could also present risks for these forest users during, or after storm events. Lastly, some rafters are known to make use of Clear Creek during times of high flows, and could be at increased risk from floatable debris and debris torrents that are expected to be delivered to Clear Creek from the No-man's creek watershed.

Threats to property in the form of damage to Forest Road 15N32 and the trail from the No-man's River Access Site upstream on the south side of Clear Creek towards the Siskiyou Wilderness Area also exist, as described above. All of the culverts and road drainage structures within the burn area on this Road and Trail are expected to fail as the result of the fire's effects on the watershed during the design storm event. **[No threat is seen for the foot and vehicle bridges over Clear Creek]**. Specifically, the two culverts and their associated fill material beyond the barricades at the No-Man's Creek Access Site, the No-Man's creek crossing of Forest Road 15N32, and the culvert just East of the No-Man's creek crossing of Forest Road 15N32, are expected to be at risk. Threats to natural resource "property" in the form of T.E.S. plants and

animals also exists as the result of the fire. A specific population of California ladyslipper in the No-man's Creek inner gorge (a Riparian Reserve) is at risk from having its habitat displaced by debris torrents or landslides. Summer Steelhead, Fall Chinook, and Winter Steelhead runs in Clear Creek have their spawning grounds, eggs, pools, over-wintering areas, and rearing habitat at risk due to the increased sediment expected to be delivered into Clear Creek. [Approximately 80 percent of the fish production of Clear Creek occurs downstream from the fire area]. Western pond turtle habitat and TES Orchid populations in the "Frog Pond" vicinity in the No-man's Creek watershed are at risk from sediment burial and pH increases as the result of the fire.

No emergency with regards to long term soil productivity as the result of erosion has been identified as the result of this fire. Erosion rates from the high intensity areas of the fire have been calculated to be just over 8 tons per acre, with an average over all burn intensities within the fire area of 4 tons per acre. Significant erosion from mass wasting and stream bank erosion are the primary source of the sediment of concern for most of the fire area.

The **potential for significant water quality** deterioration has been identifed for specific locations in this fire area. A temporary increase in turbidity, dissolved solids, and suspended sediment is expected in Clear Creek. All aspects of water quality are expected to be severely impacted in No-man's creek. No water quality concerns exist in Bear Valley Creek. The "Frog Pond" in the No-man's creek drainage is expected to have it's water quality effected by sediment and pH increase, but not by eutrophication. Mass wasting and debris slides are expected to yield approximately 17,000 cubic yards of sediment [over double what is expected from surface erosion] which will mostly be delivered into Clear Creek from the No-man's creek watershed, or directly from an un-named tirbutary watershed to Clear Creek. As the result of these mass wasting and debris slide events, major channel scour and bank erosion will be triggered in the tributaries to Clear Creek. [The 1990 "current situation" of total sediment for the entire Clear Creek watershed was estimated to be 420,000 cubic yards of sediment in the Baldy Fire Recovery E.I.S.]

In addition to the above mentioned emergency situations, a **loss of control of water** is expected as the result of this fire. Once again, the road and trail drainage sturcture locations mentioned above are likely to be locations of washouts, and possible diversion of water from its current channel. The No-man's channel may change course below the large earth flow in the mid-watershed as the result of the fire, resulting in the downcutting of a new channel through unconsolidated geologic materials. In addition, an old non-system road in the No-man's creek watershed is expected to intercept the increased runoff, and transport it across-(rather than down) slope, resulting in release of this significant quantity of water in a non-channel location, resulting in similar downcutting as described above.

B. Emergency Treatment Objectives:

To reduce the potential for loss of life and property caused by the effects of the Bear Fire on the watershed condition within and downstream from the fire area.

To reduce the potential for adverse impacts on water quality as the result of the Bear Fire.

To maintain control of water by preventing changes in the routing of water within the watershed, and by preventing the change of channel location as the result of the Bear Fire.

C. Probability of Completing Treatment Prior to First Major Damage Producing Storm:

Land 95 % Channel/Landslide 95 % Roads 95 %

D. Probability of Treatment Success

	<----Years after treatment-----> 1	3	5
Land	80%	95%	100%
Channel/ Landslide	25%	25%	25%
Roads	90%	95%	95%
Other			

E. Cost of No-Action (Including Loss): $ 278,069.50

F. Cost of Selected Alternative (Including Loss): $ 220,857.00

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology	[x] Soils	[x] Geology	[ ] Range
[x] Timber	[x] Wildlife	[ ] Fire Mgmt.	[ ] Engineering
[ ] Contracting	[x] Ecology	[ ] Research	[ ] Archaeology
[x] Botany	[x] Fisheries	[ ] _____	[ ] _____

Team Leader: **Rob Griffith (Survey Team Leader)(Guest50:R05F05D52A)**
Phone: (209) 962-7825 (home office) DG Address: R05F16D54A
(916) 493-2243 (Happy Camp RD)
Final 2500-8 **Tom Laurent**
Phone: (916) 842-6131 DG Address: R05F05A

H. Treatment Narrative:

Culvert Removal This treatment consists of removing two culverts, and their associated fill material from the trail (old road) beyond the No-man's River Access Site barricades, and placing energy dissipating rock armor on the resulting channel bottom. The purpose of this treatment is to prevent the uncontrolled failure of these culverts from eroding major amounts of the trail (old road) prism in an uncontrolled manner, and the introduction of over 850 cubic yards of additional sediment into Clear Creek. This treatment is expected to cost $10,000 due to the large amount of fill material which will need to be removed to a stable fill disposal area. This treatment is expected to be highly effective, based on results in other burned areas.

No-man's Creek Road Crossing This treatment consists of retaining the existing culverts, and constructing a large debris catching rack above the crossing. ($5,000). This treatment would be designed to prevent the washout of the crossing that would be otherwise expected as the result of bulked flows and

floatable material jams at the inlet of the culverts. This treatment have been tried and proven effective in other fire areas previously.

Snorkel Riser Pipe This treatment consists of installing a perforated riser pipe to the existing culvert to the east of the No-man's creek crossing on Forest Road 15N32. This treatment would take advantage of the freeboard between the top of the culvert and the road surface, as a storage location for sediment and debris, by placing a self maintaining variable height inlet on the culvert. This treatment will also prevent the loss of the culvert and road due to blockage of the existing culvert and overtopping of the roadway by the dammed water. This treatment has been used in burned areas and other high sediment yielding areas with success. ($1,000)

Flood Patrol This treatment consists of having equipment and personnel patrol the road and trail in the burned area to remove incipient culvert and drainage blocking debris which threatens the road or treatments which have been installed to protect this property. This treatment has been proven highly successful at preventing damage in other fire areas. ($7,500)

Signing This treatment consists of installing a warning sign to Forest users at the 15N32 road entrance to the burned area about the potential hazards in, or near the fire area, as the result of the fire's effect on the watershed. Aspects of this message would be intended to inform specific visitors of the specific hazards that are present, and to suggest that they self-evacuate the area when storms begin during the vegetative recovery perior of the burned area. This treatment is specifically intended to save lives, and is felt to be highly effective. ($500)

Gate and Road Closure This treatment consists of a temporary gate and road closure order for the first winter following the fire. This treatment is specifically intended to save lives during the first winter following the fire, and is felt to be highly effective. ($2,000)

Individual Contact with Specific User Family This treatment consists of providing written and verbal warning of the hazards to life that exist in and adjacent to the fire area to a family that is known to frequent the area regularly. This treatment is specifically intended to save lives, and is felt to be highly effective. ($10)

Non-system Road Drainage This treatment consists of machine waterbaring and widening the cross-sectional area of drainage crossing breaches in the road. ($5,000). The purpose of this treatment is to prevent the concentration of water on the roadway, and the re-direction of the water into new channels. This treatment is consistent with Best Management Practices for Water Quality Maintenance, and is used with success as a standard operating procedure.

Log Erosion Barriers This treatment would provide for the cutting of small (less than 18" diameter) dead trees, placing them in contact with the soil surface along the hillslope in a staggered pattern to intercept surface runoff, and reduce its velocity, and therefore its erosional energy, on 5 acres above the "Frog Pond" to reduce the amount of sediment introduced into the pond. This treatment is designed to lessen the sediment delivered to the "Frog Pond". Log erosion barriers have been used with success on site specific areas of burned areas with success in reducing impacts of erosion and sedimentation. ($1,750)

Willow Cuttings This treatment would place willow cuttings from within the area at the interface of the "Frog Pond" area, and the upland nearby to provide for rapid root replacement **this season** to provide for some buffering of the pond from sediment delivery from upland areas. This treatment would take avaantage of the moist soil conditions in the vicinity of the pond to establish willow establishment and growth prior to the first damaging storms of the upcoming winter, and as such is felt to be highly likely to succeed, as was demonstrated after the 1987 fires on the Forest. ($500)

Checkdams This treatment would reduce the energy of, and capture some debris flow and landslide sediment before it reaches a a relatively gentle sloped area of the fire, thereby increasing the potential of deposition of some of this sediment on this gently sloping area, and thus reducing the sediment delivered to Clear Creek. This treatment would build log jam structures on 1.67 miles of tributary channels to No-man's creek. ($8,800). This treatment would trap approximately 25% of the sediment expected to be created by debris flows and landslides, and would lessen the effect of these sediment sources on the down stream values. this treatment has been used successfully on the Salmon River District of the Klamath National Forest after the 1987 fires.

PART VI - EMERGENCY REHABILITATION TREATMENTS AND SOURCE OF FUNDS BY LAND OWNERSHIP

NOTE: Emergency rehabilitation is work done promptly following a wildfire and is not to solve watershed problems that existed prior to the wildfire.

			NFS Lands			Other Lands			All
Line Items	Units	Unit Cost $	Number of Units	EFFS-FW22 $	Other $ ident.	Number of Units	Fed $ ident.	Non-Fed $ ident.	Total $
A. LAND TREATMENTS									
Log Erosion Barriers	ac	350	5	1,750					1,750
Willow Cuttings	job	500	1	500					500
B. CHANNEL TREATMENTS									
Checkdams	mi	5270	1.67	8,800					8,800
C. ROADS AND TRAILS									
Culvert Removal	job	10000	1	10,000					10,000
No-man's Crossing	job	5000	1	5,000					5,000
Snorkel Riser Pipe	ea	1000	1	1,000					1,000
Flood Patrol	days	500	15	7,500					7,500
Temporary Gate	ea	2000	1	2,000					2,000
Non-system Road Drainage	job	5000	1	5,000					5,000
D. OTHER									
Signing	ea	500	1	500					500
Individual Contact	ea	10	1	10					10
E. BAER EVALUATION/ ADMINISTRATIVE SUPPORT									
BAER Survey Team	days	1735	9	15,615					15,615
Implementation Team	job	5000	1	5,000					5,000
F. TOTALS				62,675					62,675

PART VII - APPROVALS

1. /s/ _____ _____
Forest Supervisor (Signature) Date

2. /s/ _____ _____
Regional Forester (Signature) Date

BAER Survey Team

Rob Griffith, Team Leader
Tom Laurent, Soil Scientist
Barbara Williams, Botanist
Jules Riley, Hydrologist
Polly Haessig, Geologist
Robbie VandeWater, Hydrologist
Devi Sharp, Wildlife Biologist
Tony Hacking, Wildlife Biologist
Bill Schoeppach, Silviculturist
Fran Janemark, Fisheries biologist
Max Creasy, Ecologist
Plus support from many other District and Forest personnel and line officers

BEAR FIRE BOTANICAL RESOURCES REPORT

Dillon Complex Burn Area Emergency Rehabilitation Report
Klamath National Forest
August 14, 1994

Max Creasy, Forest Ecologist
Barbara Williams, Forest Botanist

DESCRIPTION OF THE VEGETATION

The dominant potential natural plant series within the Bear Fire are Tanoak/ Douglas-fir and Port-Orford-Cedar. Small areas of white fir may exist at elevations above 4000 feet in the No Mans Creek watershed, and the ridge on the northwest portion of the fire supports Douglas-fir/live oak series.

The tanoak series has the greatest areal coverage within the burn area. At seral stages beyond pole sized stands the overstory is dominated by Douglas-fir with lesser amounts of sugar pine and occasional ponderosa pine, incense cedar, white fir and Port-Orford-cedar (POC). This conifer overstory exists over a well developed understory of tanoak and madrone along with occasional Pacific dogwood, giant chinquapin, California bay and big-leaf maple. On the drier slopes canyon live oak increases in abundance. On north aspects such as found in No Mans Ck., a diverse shrub and herb layer often develops leading to an array of plant associations. Shrubs found in the general vicinity outside the burn (and presumably within the burned area) include Oregon-grape, California hazel, trailing blackberry and wild rose. Herbs commonly associated with these mesic tanoak plant communities include vanilla leaf, inside-out flower, modesty vine, twinflower, and trail plant. Few graminoids are commonly found in these plant associations, but some of the more common ones include Pacific brome, bulbous melic and western fescue.

The Port-Orford-cedar series is common throughout the riparian areas, including inner gorge terrain and the large dormant landslide with many small creeks and springs. The overstory is dominated by Port-Orford-cedar, but often contains significant amounts of Douglas-fir and occasional sugar pine. The understory is either dominated by tanoak or POC in the more xeric portions. In the draws, big leaf maple, California bay, POC and particularly alder (white and/or red) dominate the tree understory. The shrub layer can be diverse in this series and often includes hazel, salal, red huckleberry and Oregon grape. The herb layer is often diverse including many species of ferns such as chain fern, five-finger fern, and sword fern. Common herbs include western modesty vine, twinflower, saxifrages, fairybells and false solomon's seal. Graminoid layer can contain carex and other moist site grasses.

Fire scars on large old POC and the abundance of clumped, 8-12 inch hardwoods indicate past understory fires. It is also known that the local native americans often used fire in managing vegetation to favor basket materials (bear grass, woodwardia fern, five-finger fern, pine roots, hazel) and food sources (salal, vacciniums, rubus).

Early successional species associated with these vegetation types include blackcap raspberry, gooseberries, deer brush, hairy honeysuckle, creeping snowberry, whipple (modesty) vine, wild rose, California hazel and willow. The common willow in this drainage is Salix lasiolepis, which grows well on a wide range of soils including fairly droughty soils. Native grasses in open or disturbed sites in this drainage include California fescue, blue wild rye, western fescue and possibly mountain brome.

This vegetative information was based on field trips to the burn site, local personal knowledge of the area, and data from Klamath NF ecological unit inventory records.

SPECIFIC BOTANICAL VALUES

Port-Orford-Cedar (POC) is a species of particular concern on the Klamath National Forest. The populations here are near eastern extension of the species' range. As no infections of Port-Orford-cedar root rot have been documented on the Forest to date, all efforts are made to prevent introduction of the fungus into Klamath watersheds.

The stand of POC along No Man's Creek in the Bear Fire was of particular value as an outstanding low-elevation, inland example of the type. This population is one that is easily protectable from introduction of disease since there are no roads above the stand. With the adjacent tanoak/Douglas fir forests, this site has been under consideration by the District Ranger as a potential Research Natural Area. The site also contains a diversity of wetland microhabitats (seeps, springs, and a pond) that provide habitat for a rich herb layer, as well.

No Man's Creek has also provided habitat for several populations of Cypripedium californicum, California ladyslipper. This species is a riparian area plant of special concern, which is still monitored as a former Region 5 Sensitive species.

FIRE EFFECTS AND PREDICTIONS

Fifteen percent of the fire area burned at a high intensity consuming most of the stand of Port-Orford-cedar within No Man's Creek. Virtually all of the above-ground plant parts were destroyed in the high intensity burn areas, however, many species with underground burls, rhizomes or tubers were already starting to sprout new growth in these areas two weeks after the fire. All of the fern species in the riparian areas are showing signs of new growth. Other sprouting noted in these moist areas includes big leaf maple, tanoak, raspberry, thimbleberry, elderberry, willow, aralia and carex. The cover of these sprouting riparian species can be significant in terms of areal coverage in the first winter.

The size and intensity of the burn in the center of No Mans Ck leads to some concern for effective re-establishment of POC and alder, two very important species for maintaining hydrologic integrity. There appears to be limited immediate seed source available for these two species, but upslope from the dormant landslide area there are surviving trees of both species. These

species have small seed with good dispersal distance and are prolific seeders.

Natural vegetation recovery to date on the drier slopes is much slower than in the riparian areas. Regrowth there was limited to tanoak, madrone, trailing blackberry, bracken fern and bear grass.

The 1987 fireline that runs through the Bear Fire area might give us an idea of vegetative recovery where it did not reburn. This line was not seeded after 1987 fires. Species noted on the line include western modesty vine (as high as 60% cover in places), deerbrush (as high as 20% cover), California fescue (as high as 10% cover), wild blue rye, starflower, trailing blackberry, and tree seedlings include Douglas-fir, ponderosa pine, Port-Orford-cedar, California bay, madrone, willow, and tanoak.

After roads and rivers, fire is the most significant dispersal agent for distribution of plant species. This is important to many fire-following native species, but is also true for exotic weedy species, both naturally and potentially through rehab efforts such as the introduction of seed and straw. Exotics that may likely invade the fire area, without treatment involving seed or straw, include blackberries (Himalaya type), yellow star thistle, bull thistle, and orchard grass. Other weedy species are always present in agriculturally grown seed or straw crops, including those certified as noxious-weed-free (Ferlatte, 1994).

The potential research and biodiversity values that suited No Man's Creek for RNA status have been altered considerably. However, new research possibilities may have been created in the area of monitoring POC fire recovery.

The effects of the fire on populations of California ladyslipper are unknown.

IDENTIFICATION OF EMERGENCIES

No emergencies were identified for botanical values, however, the adequacy of seed sources for POC and alder (a non-sprouter) in the upper reaches of the drainage is perhaps questionable.

If the rootstocks of the California ladyslipper populations survived the high intensity fire, it is believed that the plants will recover naturally. Some possibility exists for inundation of the plants with silt from slopes above them, but even if these populations are lost, they are not significant to the continued existence of the species on the Klamath NF or throughout the species' range.

PROPOSED TREATMENTS

No emergencies were identified by the ID team that required seeding within the burn area. If site-specific areas are identified at a later time, seeding with species such as barley or wheatgrass X wheat sterile hybrid is believed to pose the least threat to native plant composition and long term vegetative recovery. Seeding with non-local native grasses may have a significant effect on the genetic integrity of the native species. Any seeding of the burn might present enough competition with naturally germinating and sprouting species to

inhibit or retard the natural vegetative recovery of the site in the first one to two years.

RECOMMENDATIONS FOR LONG-TERM RESTORATION

-Monitor early recovery of Port-Orford-cedar and alder along No Man's Creek to be sure that the native seed source is adequate for their reestablishment. These species are key to long-term riparian recovery in this area. Consider replanting POC and alder in riparian high intensity burn areas to speed and better assure long-term recovery.

-Consider planting locally obtained willow cuttings (Salix lasiolepis) to establish riparian vegetation along creek or pond where needed.

-Any conifer plantings should include Douglas-fir and sugar pine.

-Monitoring of vegetative recovery for the next five years would provide data useful for future fire rehabilitation assessments.

-Immediate collection of soil samples for germination trials would provide data on the existance of viable seed still remaining in the soil on the high intensity burn sites.

Citations:

Ferlatte, Bill; Siskiyou County Dept. of Agriculture. Personal communication.

Klamath National Forest Ecosystem Classification records on file at Ukonom Ranger District.

Klamath National Forest Sensitive Plant Species Atlas, on file at the Supervisor's Office.

Bear Fire Burned Area Emergency Rehabilitation Project

FISHERIES REPORT
Francine Janemark, Fisheries Biologist

Clear Creek is a tributary to the Klamath River and contains 25 miles of fish bearing waters, 18 of which are in the Siskiyou Wilderness. The Clear Creek basin has been identified as a Tier I Key Watershed in FEMAT. Its high quality water and high quality fish habitat support runs of summer and winter steelhead, spring and fall chinook and coho salmon, which have been identified as stocks at high risk of extinction. Other native fish species include resident rainbow trout, speckled dace, Klamath small scale suckers, and sculpin. These fish species are important to contemporary Native American uses and sport and commercial fisheries.

The Bear fire burned along approximately 1.5 miles of Clear Creek, 1 mile of Bear Valley Creek and through 1.7 miles of No Mans Creek. Bear Valley Creek and No Mans Creek are tributaries to Clear Creek. There are 17 miles of Clear Creek above the burn area and 8 miles through and below the burn. These 8 miles account for at least 80% of the fish production in Clear Creek.

Riparian reserves and streamside vegetation along both Clear Creek and Bear Valley Creek remain intact due to the low intensity of the burn. Negative impacts to fisheries as a result of the Bear Fire is not a concern in these two areas.

The No Mans drainage burned at mostly high and moderate intensities. As a result, only approximately 25% of the riparian reserve remains intact and is located in the upper portions of the drainage. Much of the lower consumed streamside vegetation will resprout and the remaining upslope vegetation will accelerate the recovery of the downstream areas. Because No Mans Creek basin makes up slightly over 1% of the entire Clear Creek watershed, fire effects to water quality and water temperature in No Mans are not a threat to Clear Creek. There are no known fish populations in No Mans Creek, however, the potential for No Mans Creek and associated drainages to produce a catastrophic landslide poses a threat to the loss of fisheries in Clear Creek.

Habitat inventories were completed in Clear Creek during 1990 and 1992. Clear Creek is a boulder dominated channel with high quality spawning grounds. Fine sediments in riffle sections average 10% of the total stream substrate and 60% of the total stream area is in pools. Although it is difficult to quantify the loss of differing life stages of fish due to increased sedimentation, the introduction of a large quantities of sediment could decrease the availability and quality of the spawning and rearing areas of chinook and coho salmon and steelhead. It could fill pools critical to the survival of adult summer steelhead holding in Clear Creek, and could impact the viability of eggs in the substrate. Due to the high transport capabilities of Clear Creek a landslide generated by No Mans Creek during high winter or spring flows would have less impact on the fishery than a landslide event occurring during a localized high intensity summer rainstorm event.

BURNED AREA EMERGENCY REHABILITATION
GEOLOGIC HAZARD REPORT

BEAR FIRE
HAPPY CAMP RANGER DISTRICT, KLAMATH NATIONAL FOREST

Polly A. Haessig, Geologist

INTRODUCTION

The following analysis of the geologic hazards presented by the Bear Fire (1,930 acres) is based on field visits to the area on August 11 and 12, 1994. The field review included examination of: the dormant landslide terrane below 3,000 feet elevation; a portion of the old road system; a brief overview of the channel in No Man's Creek and the intermittent and ephemeral channels that drain into it; and inspection of burn intensity and condition along the road and trail system affected by the fire. In addition, review of the Baldy EIS, (1990) provided important information about the geology, and landslide rates and process identified from the Clear Creek watershed.

GEOLOGY

Bedrock lithology in the Bear Fire area includes gabbro, altered ultramafic rocks, and minor metavolcanic rocks, metasedimentary rocks (Galice Formation), and diorite. Quaternary surficial unconsolidated deposits include large slump-earthflow landslide deposits. These deposits are a significant feature of the fire area and comprise about 70% of the total burned area.

The unconsolidated deposits that make up the landslide terrane possibly originated from deposition on old ancestral Klamath River valley floor surfaces. These deposits (valley floor benches) were uplifted and eroded during mountain building processes (Baldwin and de la Fuente, 1989). The landslide deposits are believed to be the result of landsliding during a wetter climate following glacial advances. Seismicity may have initiated these landslides and contributed to the subsequent activity of these landslides.

GEOMORPHIC TERRANES

Several geomorphic terranes were identified in the Bear Fire area, based on geologic, topographic, parent material, and mass movement characteristics (see Geomorphic Terrane Map of the Bear Fire Area). Stratification of the landscape into geomorphic terranes was used in the geologic hazard analysis to evaluate landslide potential due to fire effects. The geomorphic terranes consist of: Slump-Earthflow Deposits, Inner Gorges, and Mountain Slopes. These terranes were further subdivided according to rock and soil type, and slope steepness.

GEOLOGIC HAZARDS

Increased new landslide initiation, and reactivation of dormant landslide deposits due to the effects of high and moderate intensity burning by fire is recognized as the major geologic hazard. In the areas of high and moderate

fire intensity within the Bear Fire perimeter, geologic conditions and slope stability have been affected in the following ways:

1. Root support at shallow soil depths has been reduced.
2. Reduced transpiration. This is an adverse affect that leads to increased pore water pressures in the soil.
3. Increased dry ravel on steep slopes.

Earthflows are commonly reactivated during periods of wet climatic conditions. Earthflows present in the Baldy analysis area which includes part of the Bear Fire were active during the winters of 1964, 1972, 1974, 1982, 1983, and 1993. Debris slides, debris flows, and debris torrents may become active or initiated at any time during periods of intense precipitation.

Slumps and debris slides are likely to be generated at the toe zone of earthflows, along the channel bank regions of steep intermittent and ephemeral channels, and along unconsolidated inner gorges within the landslide deposit. Debris slides and slumps may become initiated in swales and at the heads of first and second order stream channels. Once initiated at the head of a channel, a shallow slump or debris slide can result in a debris torrent that can scour the entire downslope channel. Landslide activity often results in sediment delivery to a channel, and may deliver large amounts of fine sediment (sand size and smaller), as well as coarse gravel, cobbles and boulders. Fluidized debris torrents can carry coarse rock fragments along with logs and woody debris.

The No Man's Creek watershed has a history of significant landslide activity. The Noslip landslide occurred in response to the 1964 flood. Movement of the slide was accompanied by debris flows that carried sediment and debris through No Mans Creek to Clear Creek. There are five known active landslides in the Bear Fire area, encompassing approximately 30 acres. Three of these are in unconsolidated inner gorge areas or at the head of intermittent channels. A large slump-earthflow landslide occurs in the drainage area of the small stream that crosses the Clear Creek trail just west of the barricades.

During field visits to the No Man's watershed as part of this assessment, several spring-fed channels had large debris deposits from past storm or flood events. Though many of the channels showed evidence of sediment trapping and storage, the existing sediment and log debris in channels remains poised and ready for future mobilization. The channel banks of No Man's creek are comprised of unconsolidated landslide deposits. The channel banks and inner gorge areas within the high intensity burn area are presently raw and unvegetated due to the fire. Inner gorges developed in unconsolidated landslide deposits show high landslide rates when disturbed by fire or harvest, second only to inner gorges developed in granitic terrane (Salmon Sub-basin Sediment Analysis, 1993). Portions of the exisiting closed logging road system may experience cut and fill failures over the short term until vegetation gets re-established. Culverts and most of the fill has has been removed from the stream crossings, and the channels are flowing freely through. There may be some channel migration at the road crossings during a large storm event.

POTENTIAL LANDSLIDES AND SEDIMENT PRODUCTION

An assessment was made of potential landslide production rates over the short term following the Bear Fire. Assumptions in the analysis were that potential landslide initiation is more likely from areas burned at high to moderate intensity, and that a climatic sequence (storm events) similar to that which produced landslides in the period 1965-1975 would occur in the coming winter. Estimates of future sediment production from landslides was made using sediment production coefficients from Grider Creek, a nearby watershed.

Sediment Production from Landslides Predicted from High and Moderate Intensity Burn Areas of the Bear Fire Area.

Geomorphic Terrane Type	Areas Acres	% Area	Sediment Production Coefficient cu.yds/acre	Delivered Sediment cu. yds.
Slump-Earthflow Deposits	587	59%	7.0	4,109
Inner Gorge, Unconsolidated Material	70	7%	175.0	12,250
Inner Gorge, Non-Granitic Bedrock & Mountain Slopes	20	3%	16.5	330
Non-Granitic Mountain Slope, Steep, >65%	109	11%	3.5	381
Non-Granitic Mountain Slope, Low-Mod. 0-65%	169	17%	0.5	85
Granitic Mountain Slope, Low-Mod. 0-65%	30	3%	20.0	600
TOTAL	985			17,755

Notes: Acres of High and Moderate Intensity fire = 994. Road-related landslides from the existing road system in the burn area were not evaluated in this analysis.

DISCUSSION

The landslide production rate of 17,755 cubic yards is predicted for a moderate severity climatic sequence such as that which occurred from 1965-1975, excluding the 1964 flood. This is based on the forest sediment model, and measurements and inventories of landslides on the forest. Further, these type of intense storms, or extended periods of high precipitation are likely to occur at some time during a 25 year period. The magnitude of storm events may be greater than that modeled, or the climate may be dry and not produce landslides at all.

In general, on the west side of the forest, landslide rates from harvesting and wildfire are 5 times the undisturbed rate. Data from the Baldy EIS indicates that the potential landslide production in Clear Creek Watershed at existing disturbance levels (1990, prior to the Bear Fire) during a similar climatic sequence would produce 420,674 cubic yards of sediment, an increase of 13% over the background or undisturbed landslide rates. The estimated landslide production from high and moderate intensity burn areas in the Bear Fire is an increase of 4% over what would be expected at existing disturbance levels.

The sediment production rate from landslides in the Clear Creek watershed is 5.9 yds^3 based on the Baldy EIS data. The Bear fire area has a significantly higher estimated sediment production rate of 9.8 yds^3/acre.

Watershed	Total acres	Total Sediment Production cu. yds	Sediment Yield cu. yds/acre
Clear Creek	71,376	420,674	5.9
Bear Fire Area	1930	19,022	9.9

The estimated sediment produced from landslides considers only sediment delivered to channels, and available for transport in the stream system. In-channel storage is not quantified. Debris flows and debris torrents have the potential to deliver much greater volumes of sediment through channel scour and channel bank erosion. These potential added sediment contributions are also not quantified.

IDENTIFICATION OF EMERGENCIES AND POTENTIAL THREATS

Sediment and debris from mass wasting processes in the Bear Fire affected area pose threats to human life, property, water quality, and is likely to lead to the loss of the control of water. See Part V Summary of Analysis for a full discussion of the emergency conditions and and threats.

TREATMENTS

No treatment or mitigation will prevent the initiation or potential reactivation of landslides, debris flows or debris torrents in the short term. However, all alternatives except for the No Action alternative will in some way be effective in increasing in-channel storage of sediemnt and debris, controlling water and sediment from overland flow, controlling water from the road, and reducing the potential of the multiplying effects of debris flows in channels that drain into No Man's or Clear Creek.

Water Resources Report

BEAR FIRE BURNED AREA EMERGENCY REHABILITATION PROJECT

Jules Riley, Hydrologist
Roberta Van de Water, Hydrologist

Introduction

The objective of this report is to document the findings of a BAER survey of the Bear Fire to determine its effects on watershed functions. These functions include the production, transport and output of sediment, water and debris. This report assesses changes in runoff volume and timing, as well as changes in sediment yield from various sources. Conclusions are given regarding the potential to threaten life and property from the loss of control of water, and water quality.

The Survey

An interdisciplinary team surveyed the Bear Fire Area from August 8 through August 14, 1994. The entire fire area is located in the lower Clear Creek Watershed and comprises 2.7% of the Clear Creek watershed. It includes the watersheds of No Man's Creek, Bear Valley Creek and several unnamed streams which drain directly into Clear Creek. These have been labelled W1 through W5 for the purpose of this survey. W1, W4, and W5 were delineated to facilitate analysis and do not represent single watersheds. See Map for their locations.

A reconnaissance survey indicated that the greatest potential for emergency watershed conditions was in the No Man's watershed, W1, W2, W3, and W4. A more intensive survey was conducted by earth scientists and fisheries and wildlife biologists within these areas in order to evaluate potential effects and prescribe treatments.

Survey Results

Clear Creek is a Class I, "highly significant" stream; Bear Valley and No Man's Creeks are Class II, "moderately significant"; and the unnamed tributaries are Class III to IV. The beneficial uses of Clear Creek include domestic water supply for several households, several stocks of anadromous and other native cold water fish species, both contact and non-contact recreation, and aesthetic values.

No Man's watershed and W1 through W4 were burned at varying intensities, with nearly half in high and moderate. See Table 1. A portion of No Man's watershed also burned intensely in 1987. The main stream and portions of its tributaries are in inner gorges. This and other geologic terranes within the watershed are extremely unstable, and especially prone to landsliding when the vegetation or surface is disturbed. Landsliding processes and associated risks are discussed in detail in the Geologist's Report.

Loss of Control of Water

Based on the geologic sensitivity of the watershed, the location of the high intensity burn (center of No Man's watershed), and the loss of riparian vegetation, the hydrologists determined that runoff in the Clear Creek tributaries will greatly increase. Most of the processes in these watersheds are dominated by rainfall, rather than rain-on-snow events. A temporary doubling of runoff during storm events is assumed to result from the highly and moderately burned portions of the watershed. This increase is not significant for Clear Creek, amounting to 1.3 percent increase at the Klamath River confluence for a 25 year return interval storm. This assumes a 50 percent bulking by sediment in flows delivered from the burn, since the sediment carrying capacity and the availibility of mobilized sediment will greatly increase. This increase in peak flows will decrease as the watershed revegetates over the first decade following the fire. The increased runoff in No Man's Creek may initiate channel scour and widening. Combined with the debris and sediment it will carry, a 25 year flow will likely overwhelm the culvert at the mouth of No Man's Creek, W1, and two small culverts on the barricaded section of Road #15N32 between No Man's and Bear Valley Creek. See Threats to Property discussion below.

Water Quality

The sediment yields for No Man's watershed and W1 through W4 will potentially increase 200% for the 25 year storm event if it occurs before substantial watershed recovery. The sediment would be from a combination of sources: surface erosion, landsliding and channel bank and bottom scour. This increase would amount to a four percent increase for Clear Creek sediment yield if it occurred in the first year. Such an event has a one in 25 percent chance of occurring in any given year. In any case, the associated reduction in the water quality in Clear Creek should not impair domestic, recreation or aesthetic uses except for brief turbid periods immediately following storms the first precipitation season. Due to the high value fishery of Clear Creek, a four percent increase of sediment delivered to the channel could adversely effect fish populations and habitat in Clear Creek. This risk is discussed in the Fisheries Biologist's Report.

A small pond and associated wetland in No Man's drainage is potentially affected by the Bear Fire. The seven acre drainage area around the pond was mostly burned at a high intensity. There is a potential for sediment and ash to wash into the pond in the first couple of years prior to revegetation. While the amount of sediment would probably not exceed an inch thick layer in this one to two foot deep pond, the ash could have a deliterious effect on water quality for sensitive aquatic organisms. The pH could increase, becoming more alkaline. This change would be short term in duration. The riparian vegetation around the pond will reestablish rather quickly over time. This can also be accelerated by planting or seeding.

Threats to Property

Two 24 inch diameter culverts are located on the trail accessing Bear Valley beyond the barricade at the end of road 15N32. These culverts are located in unnamed tributaries which drain watersheds W2 and W3. Both of these culverts are now undersized as a result of anticipated increased runoff from the Bear fire. Currently the culvert in W3 is approximately 30% blocked by sediment.

Complete blockage of both culverts is likely. Blockage of the culverts would result in overflow of the culvert inlet basin and damage to the trail surface and likely erode the downstream fillslope. In addition, the old roadbed is at risk from failure due to saturation of the fill. These culverts need to be removed. Low maintenance structures should be installed which can handle water, sediment and debris as well as withstand foot and stock traffic.

The 36 inch culvert below W3 is damaged but still functional. The size of the culvert is considered adequate because much of the drainage area did not burn. Flows should therefore not increase significantly. However, there is the potential for this culvert to fail with the additional debris expected. A slotted riser pipe is recommended to prevent blockage of the culvert.

Peak streamflows in No Man's Creek are predicted to significantly increase and sediment bulking is likely to also be high, further increasing the discharge at 15N32 road crossing. In addition, a substantial amount of woody debris is expected to be generated by this watershed. In the event of a debris flow, large amounts of woody debris along with soil and rocks would be delivered to this location. Consequently, the double culvert which is in place is undersized for a 25 year design flow. This could result in the road washing out for a few hundred feet, and this additional material would be delivered directly to Clear Creek. Several treatment alternatives were proposed to address this concern.

Threats to Life

There is a low risk to human life due to loss of control of water in the burned area. The greatest risk to human life would result from persons in the burned area during large precipitation/flood events. Risk to human life is discussed in the BAER report as are appropriate treatments.

TABLE 1. Portion of Watersheds Burned by Intensity

Watershed	W.S. Area Acres	W.S. Area Burned (Ac.)	Percent W.S. Area Burned	Burn Intensity High Ac(%)	Mod. Ac(%)	Low Ac(%)
Clear Ck.	71,376	1931	2.7	298(15)	631(33)	1003(52)
No Man's	772	772	100.0	193(25)	455(59)	124(16)
W1,W2,W3,W4	439	439	100.0	105(24)	176(40)	158(36)
Bear Valley	2462	157	6.0	0	0	157(100)
W5	564	564	100.0	0	0	564(100)

SOIL REPORT FOR THE BEAR FIRE
KLAMATH NATIONAL FOREST
HAPPY CAMP RANGER DISTRICT
August 15, 1994

The upper higher elevation portion of the fire area consists of soils dominated by shallow (<20 inches) well drained residual soils formed from ultramafic rocks (MU 157). These soils have a thin reddish brown very gravelly loam surface over a reddish brown very gravelly loam to a yellowish red very cobbly clay loam subsoil. Approximately 30 percent of this area contains a deep (40-60 inches) somewhat excessively drained soil. This soil has a brown very gravelly loam surface over a reddish yellow very gravelly loam subsoil.

The area around No Mans Creek is dominated by dormant landslide deposits which consists of deep to very deep soils (MUs 110 and 114). These soils are very gravelly loams with about 30% surface gravel and cobbles.

The soils over the remainder of the burn area are moderately deep to deep very gravelly loams (MU 182). These soils formed in residium weathered from metamorphic rocks.

Table 1 lists the most important soil interpretations by soil map unit.

Table 1. Soil Interpretations

MAP UNIT	% COMP	SOIL DEPTH	POST-BURN EHR	K-FACTOR	INFILTRATION RATE	SOIL PROD. FSSC
157	60	<20"	HIGH	0.20	MODERATE	6-7
	30	40-60"	HIGH	0.20	MODERATE	4
182	70	20-40"	HIGH	0.20	MODERATE	4
	20	40-60"	HIGH	0.20	MODERATE	3
110	70	60+"	HIGH	0.17	MOD RAPID	3
114	60	40-60	HIGH	0.20	MODERATE	3
	20	40-60	HIGH	0.20	MODERATE	2-3

See the attached map for the locations and distribution of each soil map unit.

FIELD OBSERVATIONS

Field observations were made on August 11 and 12, 1994 in the No Mans Creek area. Field traverses were made following the old road system that bisects the area. Soil investigations were made off of this road. Cross country traverses were made across No Mans Creek to the small pond.

The area around No Mans Creek was subjected to a high intensity wildfire that consumed the litter/duff and most of the understory vegetation. The overstory vegetation, consisting of hardwoods and conifers, lost their leaves and needles in the fire leaving behind denuded tree skeletons.

This area contains numerous very steep sided draws (80-100+% slopes) that have no vegetative cover. Dry ravel is a dominate soil erosion process at this time in these draws. The draws appear to be loaded with sediment and coarse woody debri from past logging activities.

A more detailed investigation into the hydrologic properties of the surface soil was made on both days. Soil hydrofobicity was observed in the high burn intensity areas. It was speculated that this repellancy may be due in part to the prevasiveness of fungal mycelium that existed at the duff-mineral soil interface and extending into the soil in areas where tan oak dominates the understory vegetation. It's assumed that this mycelium mat existed in the lower portion of the duff layer. Presently, the white ash layer covers this mat. This mat has enough structural integrity to offer some resistence to raindrop splash for a portion of the first years precipitation. The severity of the surface repellancy will significantly increase storm runoff until the surface soil becomes wetted.

Calculated potential soil erosion losses and sedimentation from sheet and rill erosion were made. USLE calculated values were 8.7 T/A, 4.7 T/A and 2.3 T/A for the high, moderate and low burn intensity areas, respectively.

Sediment delivery factors were taken from the Salmon River Sediment Budget Analysis that was done in 1993. These were 90% for burned intergorge areas, 22% for steep (35-65%) slopes in high and moderate burn intensity areas and 15% for low burn intensity areas.

Table 2. Delivered Sediment by Drainage Area.

Basin Area	Delivered Sediment (yd^3)
No Mans Creek	867
Area 1	97
Area 2	81
Area 3	54
Bear Valley	168
TOTAL	1267

It was determined that the fire related increased soil erosion rates do not pose a significant soil productivity decrease when viewed over the estimated rotation time period for this area. The rotation age chosen is 100 to 150 years.

Grain or grass seding to reduce runoff was considered but was not chosen as an erosion and runoff control measure because the calculated sediment production rate form soil surface erosion was estimated to be approximately 7% of the total potential mass wasting derived sediment. This did not include existing inchannel sediment.

Tom Laurent
Soil Scientist

BEAR FIRE WILDLIFE RESOURCES REPORT

Dillon Complex Burn Area Emergency Rehabilitation Report
August 15, 1994

Devi Sharp, Wildlife Biologist- Stanislaus National Forest

Tony Hacking, Wildlife Biologist- Klamath National Forest

THREATENED AND ENDANGERED SPECIES

Four federally listed species occur on the Happy Camp and Ukonom Ranger Districts. Peregrine falcon and bald eagle are Endangered, spotted owl and marbled murrelet are Threatened. There are no listed reptile, amphibian or mammal species.

The area within, or immediately adjacent to the fire perimeter has suitable habitat for spotted owls, bald eagles and marbled murrelets. This area has never been surveyed for these species, nor are there records of occurrence. It seems likely that there could be spotted owls using the approximately 150 acres of Late Successional Reserve (LSR) on the eastern side of the burned area.

The establishment of a BAER team meets the guidelines for fire management in the Final Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (FEIS spotted owl). FM-5 directs Forests to "Immediately establish an emergency team to develop a rehabilitation treatment plan needed to attain Aquatic Conservation Strategy objectives whenever Riparian Reserves are significantly damaged by wildfire or a prescribed fire burning outside prescribed parameters." (FM-5, pg B-126 Volume II-Appendices).

There are no documented occurrences of marbled murrelets nesting in either of these Ranger Districts (although multiple detections of flying marbled murrelets were made on the Happy Camp Ranger District in 1994). Little is known about the habitat requirements of marbled murrelets. When written, a recovery plan will provide guidance for the conservation of this species.

Bald eagles have been seen on Clear Creek in the vicinity of Slipperly Creek, which is downstream of the burned area. There is no evidence that bald eagles regularly use the burned portion of Clear Creek.

FOREST SENSITIVE SPECIES

The Western pond turtle is a Forest Sensitive Species and is of concern when considering the effects of the fire on wildlife. The pond on the east side of No Mans creek is potential habitat for Western pond turtles and is currently in poor condition to sustain a population of turtles.

FIRE EFFECTS AND PREDICTIONS

Only 15% of this fire was mapped as a high intensity burn, 33% was moderate and 52% was low intensity. Much of the high and moderate intensity burned areas will be converted from late or mid seral stage forest to early seral stage

habitat. The west flank of the fire stopped at the 1987 burn, which is well vegetated with a high diversity of brush species. From this seven year old burn, one could predict the future of a portion of the bear fire. This early seral stage habitat is important to deer, bear, and many other species of wildlife. It seems likely that much of the wildlife formerly using the area that has experienced a high intensity burn will be displaced, at least for a while.

The areas that burned with a low intensity will not experience a significant stand structure change and thus not likely cause much disturbance to wildlife. The LSR area within the burn experienced moderate burn intensity.

IDENTIFICATION OF EMERGENCIES

The pond east of No Mans creek is in poor condition to support Western pond turtles, or amphibians. It seems likely that a storm event will create a large inflow of sediment from the surrounding hillsides. The loss of pond side vegetation is also a potential problem to the turtles, frog and songbirds using the pond.

PROPOSED TREATMENTS

The team proposes rehabilitation and prevention of excessive siltation of the pond by creating log erosion barriers and by planting willows around the pond. Prevention of excessive siltation and speeding up the pond side vegetation will return the pond to suitable pond turtle breeding habitat sooner than if no action was taken.

RECOMMENDATIONS FOR LONG-TERM RESTORATION

Allowing natural recovery processes to proceed in the burn area best meets the intent of biodiversity goals in the Klamath draft Forest Management plan, the President's Plan for late-successional forests, national Wilderness management direction, and Region 5 policy for restoring native plant and wildlife communities.

In addition, minor improvements could be made to the pond area to improve conditons for wildlife. These could consist of optimizing available Western pond turtle basking sites by severing the end of any logs partly in and partly out of the pond to reduce predation by terrestrial predators (making sure floating logs do not have an end on shore).

Nesting habitat for wood ducks, that may have been lost due to the fire, could be improved by the installation of wood duck nest boxes in proximity to the pond.