

**GULCH FIRE BURNED-AREA REPORT**  
(Reference FSH 2509.13)

**PART I - TYPE OF REQUEST**



Gulch Fire looking at Little Round Mountain above Highway 36 and the town of Platina, CA

**A. Type of Report**

- ☒ 1. Funding request for estimated emergency stabilization funds
- ☐ 2. Accomplishment Report
- ☐ 3. No Treatment Recommendation

**B. Type of Action**

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- ☐ 2. Interim Report #\_\_\_\_\_
  - ☐ Updating the initial funding request based on more accurate site data or design analysis
  - ☐ Status of accomplishments to date
- ☐ 3. Final Report (Following completion of work)

**PART II - BURNED-AREA DESCRIPTION**

A. Fire Name: Gulch Fire

B. Fire Number: CA-SHF-1144

C. State: CA

D. County: Trinity

E. Region: 5

F. Forest: Shasta-Trinity

G. District: SFMU

H. Fire Incident Job Code: P5EJ8G

I. Date Fire Started: 9/7/2008

J. Date Fire Contained: 9/11/2008

K. Suppression Cost: \$2 million

L. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline waterbarred (miles):
2. Fireline seeded (miles):
3. Other (identify):

M. Watershed Number: Middle Cottonwood Creek – Harrison Gulch ( 180201530204 )

N. Total Acres Burned: 2,847

NFS Acres(2,787) Other Federal ( ) State ( ) Private ( 60 )

O. Vegetation Types: Ponderosa Pine and chaparral

P. Dominant Soils: Goulding, Holland, Neuns, and Marpa series

Q. Geologic Types: Great Valley sediments and Eastern Hayfork Terrane mdetasediments

R. Miles of Stream Channels by Order or Class: 8 miles intermittent; 4 miles ephemeral

S. Transportation System:

Trails: 5 miles Roads: 10 miles

### **PART III - WATERSHED CONDITION**

A. Burn Severity by total and FS (acres): 882 (31%) (low) 1,479 (52%) (moderate) 512 (18%) (high)

B. Water-Repellent Soil by total and FS (acres): Water repellency was low to moderate in severity and patchy in occurrence. No significant contiguous areas with moderate to severe repellency were discovered.

C. Soil Erosion Hazard Rating by total and FS (acres):

	EROSION HAZARD RATING				Total
	Low	Mod	High	Very High	
Acres	3	812	2006	24	2844
Percent	0.1%	28.6%	70.5%	0.8%	100%

D. Erosion Potential: Average winter: 23 tons per acre (range 11 to 34)  
10 Year winter: 63 tons per acre (range 32 to 94)

E. Sediment Potential: Average winter: 10,895 cu yd/sq mile (range 5,447 to 16,342)  
10 Year winter: 30,128 cu yd/sq mile (range 15,064 to 45,192)

### **PART IV - HYDROLOGIC DESIGN FACTORS**

A. Estimated Vegetative Recovery Period, (years): 30

B. Design Chance of Success, (percent): 70-90

C. Equivalent Design Recurrence Interval, (years): 2 & 10

D. Design Storm Duration, (hours): 6hr

E. Design Storm Magnitude, (inches):	<u>1.8 (2yr), 2.8 (10yr)</u>
F. Design Flow, (cubic feet / second/ square mile):	<u>35.1</u>
G. Estimated Reduction in Infiltration, (percent):	<u>5%</u>
H. Adjusted Design Flow, (cfs per square mile):	<u>66.7</u>

## **PART V - SUMMARY OF ANALYSIS**

### **A. Describe Critical Values/Resources and Threats:**

**Background:** The Gulch Fire started on Sunday, September 7, 2008 three miles west of Platina, California in Shasta County. The Gulch Fire spread rapidly due to being late in the season and very low fuel moisture and low relative humidities. In one day the fire grew to 2,280 acres consuming dry grass and chapparral burning into Ponderosa Pine plantations. Approximately 50% burned at high and moderate soil burn severity (see soil burn severity map below). The rest of the fires were either low or very low soil burn severity. General trends are forested areas that were north or east-facing slopes were low to moderate soil burn severity with 50 to 70 percent timber mortality. Forested areas that were south or west-facing slopes burned hotter and had high soil burn severities with total mortality (see pics below).



Gulch Fire East-facing slopes with mixed timber mortality



Gulch Fire South-facing slopes with total plantation mortality

Chapparral areas had moderately high to high soil burn severities and most vegetation removed.



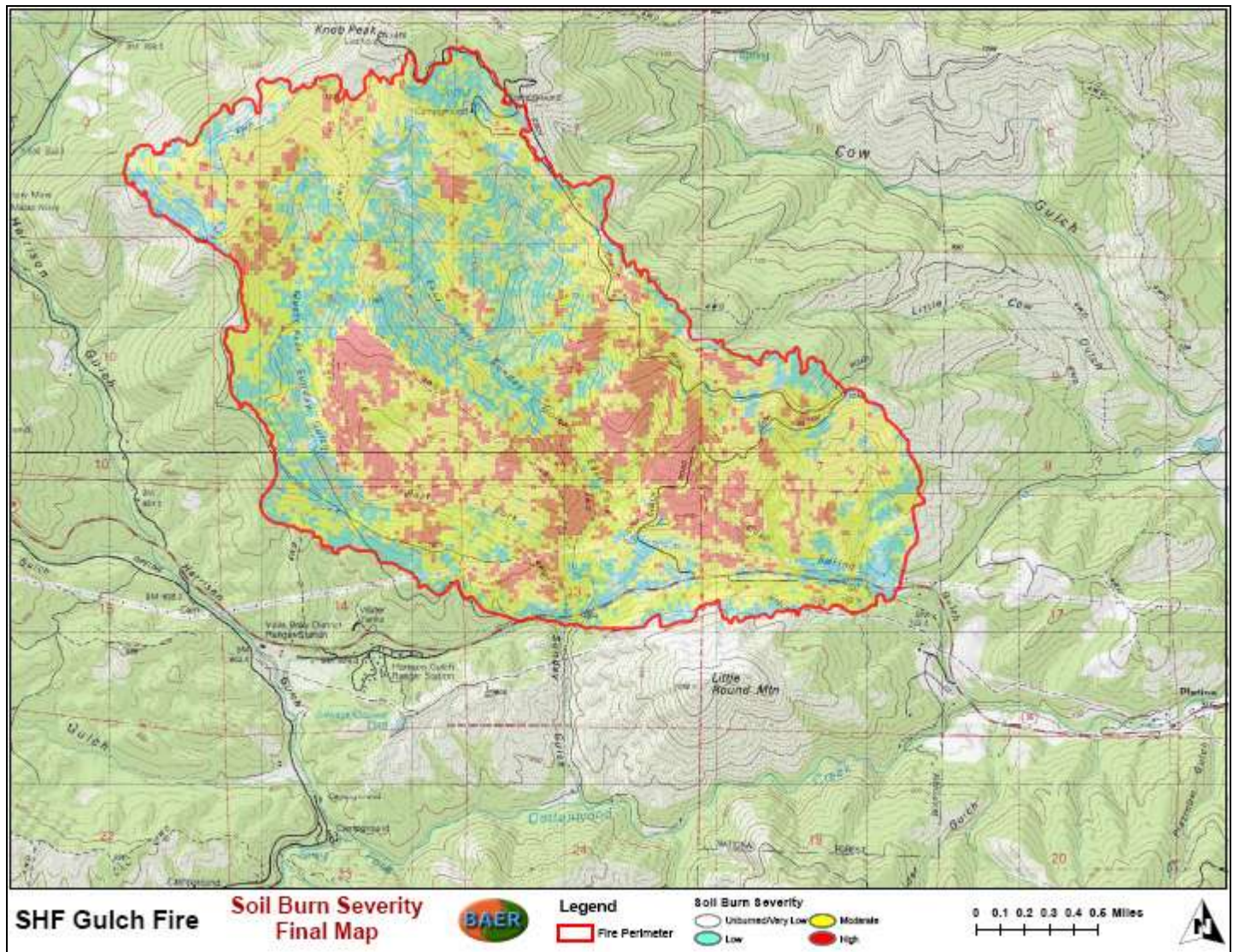
Gulch Fire South-facing burned brush fields



Gulch Fire South-facing high soil burn severity



## Gulch Fire Soil Burn Severity Map:



### Values at Risk:

- 1) **Facility structures and homes:** The Gulch Fires burned on mostly USFS administered lands but some structures that are at risk from erosion and flooding at the bottom of Sunday Gulch Creek and some residents along Middle Cottonwood Creek in Platina.
- 2) **Roads and Trails:** Two roads are now at risk due to increased flows from high soil burn severity with undersized culverts.
  - a) Cow Gulch road (29N01) and hwy 36 are at risk from anticipated increased stream flows from severely burned hillslopes due to undersized and plugged culverts.
  - b) Road 29N05 fill burn-outs that extend under the road prism and threaten vehicle traffic. Several culverts need cleaning and some are undersized that need critical dips for anticipated flows.

- 3) **Threats to Water Quality and Fisheries:** With moderate to high soil burn severity, water quality could be compromised and spawning habitat for Spring Chinook and Steelhead trout along due to steep burned soils and sediment loading.
- a) Cumulative sediment introduction into the upper Middle Cottonwood Creek that will add to the Front Country and Yolla Bolly fires effects (Moon, Deerlick, Noble, and the Vinegar fires) that will affect downstream domestic water users on main Cottonwood Creek.
  - b) Sediments will flow into Middle Cottonwood Creek that will affect domestic water users in the community of Platina.
  - c) Severely burned hillslopes will experience accelerated erosion and sediments that could affect fish habitat for Spring Chinook Salmon and Steelhead in the upper Middle Fork of Cottonwood Creek due to inputs from Sunday and Cold Gulch Creeks.
- 4) **Threats to Soil Productivity/Ecosystem Stability:** Areas that have moderate to high soil burn severity are at risk from accelerated erosion affecting stream bank stability, and debris flow potential.
- a) Severely burned hillslopes of West, East Sunday Gulch and Cold Gulch Creeks could experience accelerated erosion that could strip topsoil and decrease soil productivity significantly for large burned out plantations. Many areas could experience debris flows that could plug culverts and compromise roads. Cold Spring Gulch Creek lacks streambank woody debris and has perched sediments that will fail and erode easily into Middle Cottonwood Creek.
- 5) **Threats to Cultural Resources:** With loss of cover and possible erosion due to the fires, cultural resources are now exposed and are vulnerable to vandalism.
- a) Sunday Gulch creek historical heritage site is open and exposed to erosion and vandalism.
- 6) **Threats to Wildlife Resources:** Burned areas are a loss of habitat and soil productivity and could threaten wildlife viability. Lack of cover and easy access creates areas where OHV traffic can enter T&E habitat causing disruption.
- 7) **Botany (T&E, noxious weeds):** Noxious weed issue due to multi-dozer lines on the perimeter of the fires. These areas are prone to noxious weed spreading and introduction throughout the Gulch Fire.

**B. Emergency Treatment Objectives:** To allow safe passage of water to protect Forest Service infrastructures and watersheds from accelerated sheet and rill erosion. To protect fish habitat from degredation. To protect watersheds from the spread of noxious weeds and OHV unfettered access.

Risk determination is depenent on the design storm selected and downstream values at risk. By using an above average storm (10-year event) emergency planning measures can be designed to mitigate and minumize anticipated risks. Using a 10-year design storm the values at risk can be evaluated to determine if an emergency exists. Emergency determination matrix displayed below shows if an emergency exists, probability of failure if untreated or treated, and treatment proposed to mitigate the emergency.

### **Gulch Values @ Risk Emergency Determination Matrix**

<u><b>Value at Risk</b></u>	<u><b>Emergency</b></u> <u><b>U%(yes/no)T%</b></u>			<u><b>Reason</b></u>	<u><b>Treatment</b></u>
Sunday G. & Platina homes	55	M	35	Flooding potential?	Helimulching hillslopes ?
Cold S. Gulch, soil erosion	95	M	55	Hot Burned hillslopes	Helimulching hillslopes ?
Sunday G., mass wasting	70	M	50	Burned hillslopes	Helimulching hillslopes ?
Fish habitat – M. Cotton.	70	M	55	Eroded fine sediments	Helimulching hillslopes ?
Forest Plantations	90	N	50	Loss of prod. topsoil	Helimulching hillslopes ?
29N01 culverts	85	Y	20	Undersized culverts	Upsize culverts
29N05 culverts	60	Y	10	Undersized culverts	Critical dips
29N05 road-fill burnouts	80	Y	10	Burned out stumps - fill	Fill and compact
Sunday Gulch heritage site	50	N	25	Burned – has cover	Adequate cover – natural recov.
Noxious weed det. survey	70	Y	30	Weed invasion detect.	Detection survey
Fireline – road cx treat.	75	Y	25	Weed invasion potent.	Seed and mulch intersections
U = untreated; T = treated; Where Y = yes, M = maybe, and N = no					

### **C. Probability of Completing Treatment Prior to Damaging Storm or Event:**

Land **95** % Channel **-** % Roads/Trails **90** % Protection/Safety **95** %

### **D. Probability of Treatment Success**

	<u><b>Years after Treatment</b></u>		
	<b>1</b>	<b>3</b>	<b>5</b>
Land	95%	80%	70%
Channel	-	-	-
Roads/Trails	95%	90%	85%
Protection/Safety	90%	95%	95%

### **E. Cost of No-Action (Including Loss): **\$1,200,000****

### **F. Cost of Selected Alternative (Including Loss): **\$116,860****

### **G. Skills Represented on Burned-Area Survey Team:**

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input checked="" type="checkbox"/> Geology	<input type="checkbox"/> Range	<input type="checkbox"/>
<input type="checkbox"/> Forestry	<input checked="" type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input type="checkbox"/> Engineering	<input type="checkbox"/>
<input type="checkbox"/> Contracting	<input type="checkbox"/> Ecology	<input checked="" type="checkbox"/> Botany	<input checked="" type="checkbox"/> Archaeology	<input type="checkbox"/>
<input checked="" type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input type="checkbox"/> GIS	

Team Leader: Brad Rust

Email: brust@fs.fed.us

Phone: 530-226-2427

FAX: 530-226-2485

## **H. Treatment Narrative:**

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities.)

Land Treatments: Roadside mulching, noxious weed treatments, noxious weed detection surveys, and hazard tree removal are the selected treatments.

Helimulching of 185 acres in East Sunday Gulch and Cold Spring Gulch at 1.5 tons/ac was considered but calculated reduction in sediments was not enough to justify the cost vs. the benefits (see Appendix C, D, and E). The goal was to reduce erosion on sensitive erodible soils, to protect water quality for domestic water users, to reduce sediments into anadromous fish spawning habitat for Spring Chinook and steelhead, and to protect productive topsoil for adaptive management timber plantations destroyed by the fire. But erosion modeling showed only a 7% reduction in sediments for selected treatable acres (see Treatment Map Appendix C) and economic modeling showed marginal benefit/cost ratios (see Appendix D).

Roadside mulching will be used to protect denuded cutbanks and fillslopes on road 29N01 from accelerated erosion in areas that burned hot. Hazard tree will be removed where road crews are working for safe ingress and egress.

Noxious weed treatments of seeding and mulching the last 50 feet of fireline intersecting main roads will be employed to stop weed infestations. Noxious weed detection survey on firelines for introduced weeds due to suppression will consist of detection, handpulling and bagging. Areas found to be too large for bagging will be treated by hired handpulling crews.

Channel Treatments: none

Roads and Trail Treatments: Road stormproofing and storm patrol.

Road stormproofing will consist of outsloping when appropriate, replacing undersized culverts, culvert clean out, installing critical dips and rolling dips to allow safe passage of anticipated increased water flows due to burned landscapes. Road work will focus on 29N01 and 29N05 roads that are located in high soil burned areas of East and West Sunday Gulch and Cold Spring Gulch.

Protection/Safety Treatments: Burned area signing and traffic road signs.

Posting of areas burned will alert the public to potential dangers of falling trees and rolling rocks. Repair of road signs burned will insure public safety.

## **I. Monitoring Narrative:**

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator.)

See Appendix B below for roads monitoring.

Click red icons for notes.		NFS Lands				Other Lands				All
Line Items	Units	Unit Cost	# of Units	BAER \$	Other \$	# of Units	Fed \$	# of Units	Non Fed	Total \$
A. Land Treatments										
Roadside Mulching	mi	\$1,200	5	\$6,000			\$0		\$0	\$6,000
Nx Weed Treatment	ac	\$1,700	6	\$10,200			\$0		\$0	\$10,200
NX Weed Det. Surv.	mi	\$210	20	\$4,200			\$0		\$0	\$4,200
Hazard Trees	mi	\$950	2	\$1,900			\$0		\$0	\$1,900
Subtotal Land Treatments				\$22,300	\$0		\$0		\$0	\$22,300
B. Channel Treatments - none										
				\$0			\$0		\$0	\$0
				\$0			\$0		\$0	\$0
Subtotal Channel Treatments				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
Road Stormproof	mi	\$15,000	5	\$75,000			\$0		\$0	\$75,000
Culvert Replace.	ea	\$4,250	4	\$17,000			\$0		\$0	\$17,000
Subtotal Road & Trails				\$92,000	\$0		\$0		\$0	\$92,000
D. Protection/Safety										
Warning Signs	ea	\$130	12	\$1,560			\$0		\$0	\$1,560
				\$0			\$0		\$0	\$0
Subtotal Protection				\$1,560	\$0		\$0		\$0	\$1,560
E. BAER Evaluation										
Assessment Team	---	---	---	---	\$16,944	---		---		\$16,944
	---	---	---	---	\$0	---		---		\$0
Subtotal Evaluation				---	\$16,944	---	\$0	---	\$0	\$16,944
F. Monitoring										
Road Monitoring	ea	\$1,000	1	\$1,000			\$0		\$0	\$1,000
Subtotal Monitoring				\$1,000	\$0		\$0		\$0	\$1,000
G. Totals				\$116,860	\$16,944		\$0		\$0	\$133,804
Previously approved						Comments:				
Total for this request				\$116,860						

**PART VII - APPROVALS**

1. /s/ J. Sharon Heywood  
Forest Supervisor (signature)

24 Oct 08  
Date

2. /s/ Richard J. Cook (for)  
Regional Forester (signature)

5 Nov. 08  
Date



**APPENDICES: Supporting Information:**

Appendix A: Gulch Fire BAER Team

Appendix B: Monitoring for Roads

Appendix C: Vicinity and Ownership Map

Appendix D: Summary of Soil and Hydro Cals.

Appendix E: Summary of Cost-Risk Analysis

**Appendix A: Gulch Fire BAER Team:**

NAME	UNIT	FUNCTION	CELL PHONE	OFFICE PHONE
Brad Rust	Shasta-Trinity N.F.	Team Leader	530-917-0434	530-226-2427
Christine Mai	Shasta-Trinity N.F.	Hydrologist	916-708-0272	530-226-2428
Dave Young	North Province N.F.	Area Soil Scientist	530-227-9050	530-226-2545
Abel Jasso	Shasta-Trinity N.F.	Geologist	-	530-226-2423
Donnie Ratcliff	Shasta-Trinity N.F.	Fisheries Biologist	530-355-9386	530-242-5551
Julie Nelson	Shasta-Trinity N.F.	Botanist	-	530-623-1753
Justin Nettleton	Shasta-Trinity N.F.	Civil Engineer	530-945-6150	530-226-2332
Trish Johnson	Shasta-Trinity N.F.	Wildlife Biologist	530-351-2610	530-226-2315
Winfield Henn	Shasta-Trinity N.F.	Forest Archeologist	760-920-1464	530-226-2339

## Appendix B: Monitoring Protocol:

### Gulch Fire Road Effectiveness Monitoring

The 2500-8 report requests funds to monitor the effectiveness of road treatments on Gulch Fire roads.

#### 1. Monitoring Questions

- Is the road-tread stable?
- Is the road leading to concentrating runoff leading to unacceptable off-site consequences?

#### 2. Measurable Indicators

- Rills and/or gullies forming of the road
- Loss of road bed.

#### 3. Data Collection Techniques

- Photo documentation of site
- Inspection Checklist (attached)

#### 4. Analysis, evaluation, and reporting techniques

- Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing road and there is extensive loss of road bed or infrastructure an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

#### Road Inspection Checklist

Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Inspector \_\_\_\_\_  
Forest Road \_\_\_\_\_

Describe locations reviewed during inspection: \_\_\_\_\_

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Was there road damage?

Was culvert plugged? \_\_\_\_\_.

GPS \_\_\_\_\_

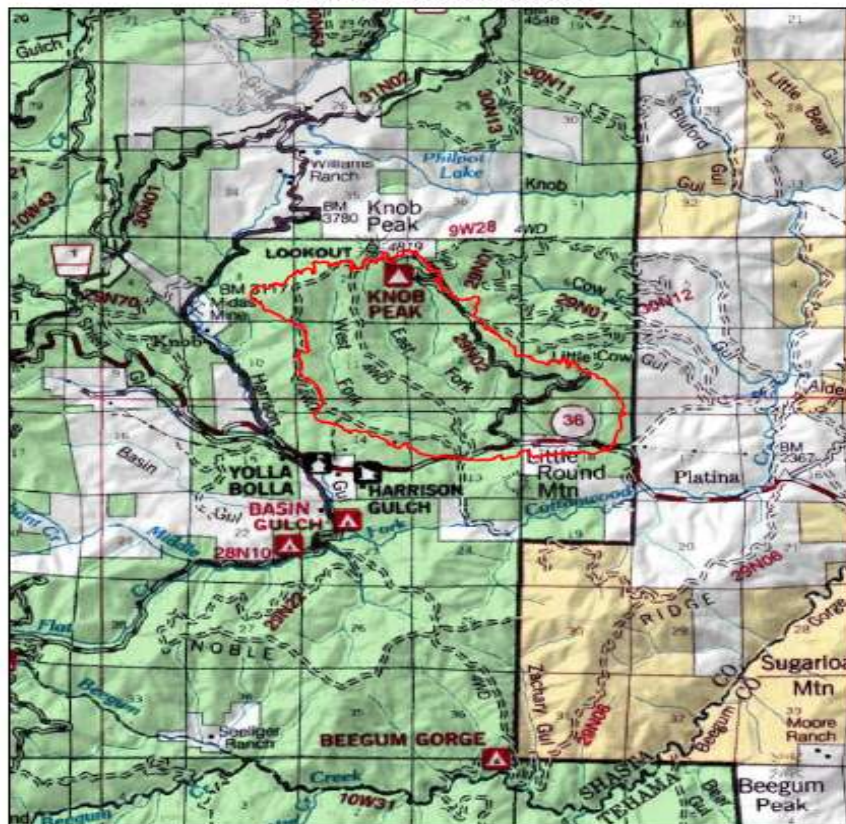
Describe damage and cost to repair? (GPS) \_\_\_\_\_

Photo taken of road damage \_\_\_\_\_

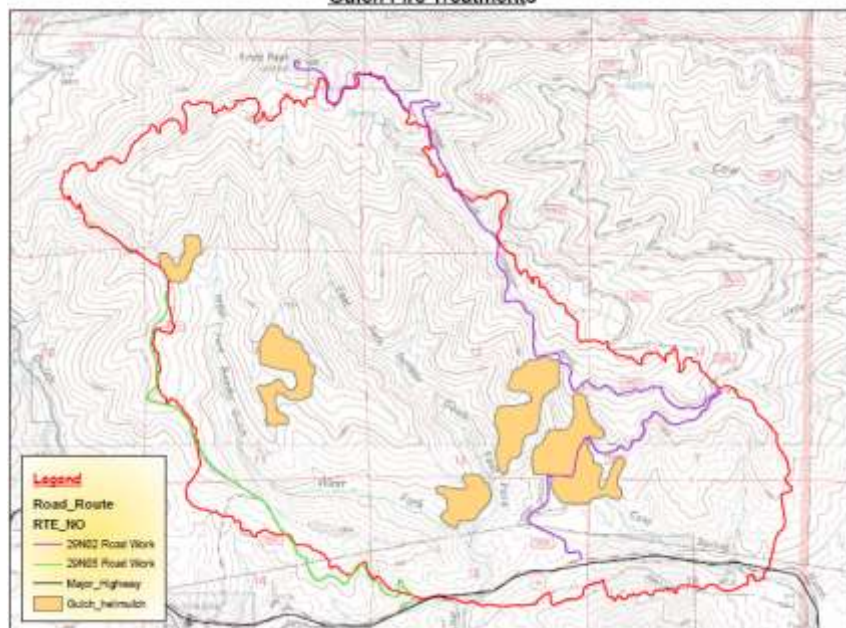
Recommended actions to repair: \_\_\_\_\_

## Appendix C: Vicinity/Ownership Map and Treatment Map:

Gulch Fire Location



Gulch Fire Treatments





## Appendix D: Summary of Hydro and Soil Cals.

### Hydrologic Calculations:

Watersheds					HUC 4-8	Wshed Area (ac)	High %	Mod %	Low %	Stream Gauge for calcs	Prefire						Post Fire		2-yr Peak Increase x normal	10-yr Peak Increase x normal
4	5	6	7	8 / Other Concern	2-yr Qp (cfs)						5-yr Qp (cfs)	10-yr Qp (cfs)	25-yr Qp (cfs)	50-yr Qp (cfs)	100-yr Qp (cfs)	2-yr Qp (cfs)	10-yr Qp (cfs)			
Cottonwood Cr*					18020153	603,609	0%	3%	5%	8	22344	37979	49,344	64,765	76,845	89,331	25,415	55,157	1.1	1.1
MF Cottonwood Cr*					1802015302	159,275	1%	6%	6%	4	6307	9995	12,594	15,993	18,591	21,190	7,741	14,992	1.2	1.2
Harrison Gulch*					180201530204	23,587	2%	6%	3%	4	1131	1826	2,345	3,036	3,529	4,022	1,411	2,811	1.2	1.2
Harrison Gulch					18020153020402	6358	0%	1%	1%	4	347	569	740	970	1,128	1,286	361	764	1.0	1.0
					1802011302040201	2036	0%	1%	1%	4	125	206	272	360	419	477	128	278	1.0	1.0
					1802011302040204	1788	0%	3%	3%	4	111	184	242	322	374	426	124	266	1.1	1.1
Little Round Mountain-MF Cottonwood Cr*					18020153020403*	6074	8%	23%	10%	4	333	546	711	933	1,084	1,236	633	1,219	1.9	1.7
					1802011302040301	2440	15%	42%	18%	4	147	242	319	422	490	559	390	740	2.7	2.3
					EFGSgingU29N05A	1125	15%	44%	23%	4	73	122	161	215	250	285	201	387	2.7	2.4
					W1UNxingHwy36	54	0%	1%	3%	4	5	8	11	15	18	20	5	12	1.1	1.0
					WFGSgingU29N05AB	422.7	11%	53%	25%	4	30	51	68	92	107	122	86	169	2.9	2.5
					1802011302040303	1778	7%	21%	5%	4	110	183	241	320	372	424	194	384	1.8	1.6
					CSxingHwy36	450.0	20%	45%	9%	4	32	54	72	97	113	128	89	173	2.8	2.4
					CSUNtribxingHwy36	142.0	6%	78%	15%	4	11	19	26	36	41	47	36	70	3.1	2.7
					UCSxing29N02	67.0	29%	38%	4%	4	6	10	13	18	21	24	17	33	2.9	2.4
Platina-MF Cottonwood Cr																				
					18020153020404	5687	0.0%	0.1%	0.3%	4	314	515	671	881	1,024	1,167	316	674	1.0	1.0
					1802011302040401	1812	0.0%	0.4%	0.5%	4	112	186	245	326	379	431	114	248	1.0	1.0
					1802011302040402	1707	0.0%	0.0%	0.3%	4	106	176	233	309	359	409	107	233	1.0	1.0

Fire effects on runoff are determined by modeling pre-fire and post-fire discharges for watersheds using methods specified in the USGS Magnitude and Frequency of Floods in California (Waananen and Crippen, 1977). Elevated streamflows can be expected in the burned watersheds, with greater flow increases in drainages having higher percentages of high burn severity. Projected flow increases resulting from increases in runoff from the burn areas are shown above.

### Soil Erosion Calculations:

#### Soil Erosion Hazard Rating:

	EROSION HAZARD RATING				Total
	Low	Mod	High	Very High	
Acres	3	812	2006	24	2844
Percent	0.1%	28.6%	70.5%	0.8%	100%

#### Erosion Potential:

Average winter: 23 tons per acre (range 11 to 34)

10 Year winter: 63 tons per acre (range 32 to 94)

#### Sediment Potential:

Average winter: 10,895 cu yd/sq mile (range 5,447 to 16,342)

10 Year winter: 30,128 cu yd/sq mile (range 15,064 to 45,192)

## Appendix E: Summary of Cost-Risk Analysis:

### Gulch Fire Benefit Cost Analysis:

Total benefits of resource:

Resource	Value \$
roads	\$300,000
native plants	\$100,000
water quality	\$100,000
aquatics/fisheries	\$500,000
soil productivity	\$60,000
public safety	\$100,000

Proability of loss without and with treatments:

Resource	Proability loss no treatments:	Proability loss w/ treatments:	Reduction in proability of loss
roads	80%	15%	65%
native plants	70%	30%	40%
water quality	70%	55%	15%
aquatics/fisheries	70%	55%	15%
soil productivity	90%	55%	35%
public safety	85%	15%	70%

Total cost of treatments:

<b>A. Land Treatments</b>					
Helmulching	ac	\$1,100	185	\$203,500	
Roadside Mulching	mi	\$1,000	5	\$5,000	
Nx Weed Treatment	ac	\$1,700	6	\$10,200	
NX Weed Det. Surv.	mi	\$210	20	\$4,200	
Hazard Trees	mi	\$950	2	\$1,900	
<b>Subtotal Land Treatments</b>				<b>\$224,800</b>	
<b>B. Channel Treatments - none</b>					
<b>Subtotal Channel Treatments</b>				<b>\$0</b>	
<b>C. Road and Trails</b>					
Road Stormproof	mi	\$15,000	5	\$75,000	
Culvert Replace.	ea	\$4,250	4	\$17,000	
<b>Subtotal Road &amp; Trails</b>				<b>\$92,000</b>	
<b>D. Protection/Safety</b>					
Warning Signs	ea	\$130	12	\$1,560	
<b>Subtotal Protection</b>				<b>\$1,560</b>	
<b>E. BAER Evaluation</b>					
Assessment Team	---	---	---	---	
<b>Subtotal Evaluation</b>				<b>---</b>	
<b>F. Monitoring</b>					
Hillslope Monitor	ea	\$1,000	1	\$1,000	
Road Monitoring	ea	\$1,000	1	\$1,000	
<b>Subtotal Monitoring</b>				<b>\$2,000</b>	
<b>G. Totals</b>				<b>\$320,360</b>	

Benefit of treatments:

Resource	Value \$	Reduction in proability of loss
roads	\$300,000	65%
native plants	\$100,000	40%
water quality	\$100,000	15%
aquatics/fisheries	\$500,000	15%
soil productivity	\$60,000	35%
public safety	\$100,000	70%
cummulative water,fish,land	\$660,000	25%

Benefit/cost ratio:

Resource	Benefit of treatment	Treatment Cost	B/C ratio	Justified
roads	\$195,000	\$92,000	2.1	yes
native plants	\$40,000	\$16,300	2.5	yes
water quality	\$15,000	\$208,500	0.1	no
aquatics/fisheries	\$75,000	\$208,500	0.4	no
soil productivity	\$21,000	\$208,500	0.1	no
public safety	\$70,000	\$3,460	20.2	yes
cummulative water,fish,land	\$165,000	\$208,500	0.8	no