USDA-FOREST SERVICE

FS-2500-8 (7/00)

Date of Report: 9/13/2017

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated WFSU-SULT 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 or design analysis
[ ] Status of accomplishments to date

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

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Sartin Draw

B. Fire Number: MCD-[illegible]

C. State: MT

D. County: Powder River

E. Region: 01

F. Forest: Custer Gallatin

G. District: Ashland

H. Date Fire Started: 8/30/2017

I. Date Fire Contained: 9/5/2017

J. Suppression Cost: $1.2 million

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles):
2. Fireline seeded (miles):
3. Other (identify): **Approximately 24.5 perimeter miles rehabilitated adjacent to NFS lands (does not include bladed two tracks within the fire perimeter that served as fuel breaks). Approximately 140 miles of fireline were mapped within or adjacent to the burn perimeter.**

L. Watershed Number: Liscom Creek (HUC12 ID 100901020703), and Middle Beaver Creek (HUC12 ID 100901020603)

M. Total Acres Burned: 99,735

Acres burned within Ashland RD administrative boundary:

Ownership	Acres
Forest Service	8415
Private	8
Total within administrative boundary	8423

N. Vegetation Types: **Ponderosa pine, grassland, and eastern Montana deciduous woody draw/riparian zone ecotypes**

O. Dominant Soils: **Predominant soil series within the burn perimeter include Ringling-Cabba association, 15 to 50 percent slopes, and Midway clay. Soils are loamy-skeletal over fragmental (Ringling) to loamy (Cabba), mixed, superactive, calcareous (Cabba), frigid, Typic Haplustolls (Ringling)/Ustorthents (Cabba). Midway series soils are clayey-smectitic, calcareous, mesic, shallow Ustic Torriorthents.**

P. Geologic Types: **Primariiy Clinker (QTcl) underlain by the Tongue River Member of the Fort Union Formation (Tftr).**

QTcl- Red, pink, orange, black, and yellow, very resistant metamorphosed sandstone, siltstone, and shale of the Fort Union Formation and Wasatch Formations.

Tftr—Yellowish orange sandstone, sandy and silty carbonaceous shale, and coal.

Q. Miles of Stream Channels by Order or Class: **ephemeral: 71.3, intermittent: 7.1**

R. Transportation System:

Trails: 4.7* miles Roads: 3.5 miles

***motorized trails; open to and passable by 4x4 truck**

PART III - WATERSHED CONDITION

A. Burn Severity (acres): within FS administrative boundary-

5876 (low) 2036 (moderate) 2 (high)

B. Water-Repellent Soil (acres): **approx. 4221**

C. Soil Erosion Hazard Rating (acres):+

___(low) __ (moderate) _____ (high)

D. Erosion Potential: ____ tons/acre+

E. Sediment Potential: ____ cubic yards / square mile+

+Assessment of erosion potential was largely qualitative; specific rates of erosion and sediment yield potential were not calculated as a part of this assessment. See Sartin Draw Fire BAER Hydrologic and Soils Assessment Report for more detailed discussion.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	**10**
B. Design Chance of Success, (percent):	**80**
C. Equivalent Design Recurrence Interval, (years):	**25**
D. Design Storm Duration, (hours):	**6 hr and 24 hr***
E. Design Storm Magnitude, (inches):	**2.0 and 2.8**
F. Design Flow, (cubic feet / second/ square mile):	**25****
G. Estimated Reduction in Infiltration, (percent):	**50*****
H. Adjusted Design Flow, (cfs per square mile):	**37.5**

*Actual model input was an SCS Type II rainfall distribution, which captures shorter duration events **Mean estimated post-fire normalized flow ***Percent of burned area approximated as having some soil water repellency. Includes estimate of forested area burned under low severity.

PART V - SUMMARY OF ANALYSIS

Background: See Figure 1 for Vicinity Map. Initial assessment of the lightning-caused Sartin Draw Fire identified a limited number and type of FS Values at Risk post-fire. Commensurate with scope and complexity of identified FS values at risk, the Sartin Draw BAER assessment consisted of a focused effort with few ID team members. Identified FS critical values were assessed for risk of loss and potential treatments were explored. In accordance with Forest Service Manual, the risk matrix (Table 1: Exhibit 2 of Interim Directive No.: 2520-2010-1) was used to evaluate the risk level for potential loss or impairment of FS Values at Risk.

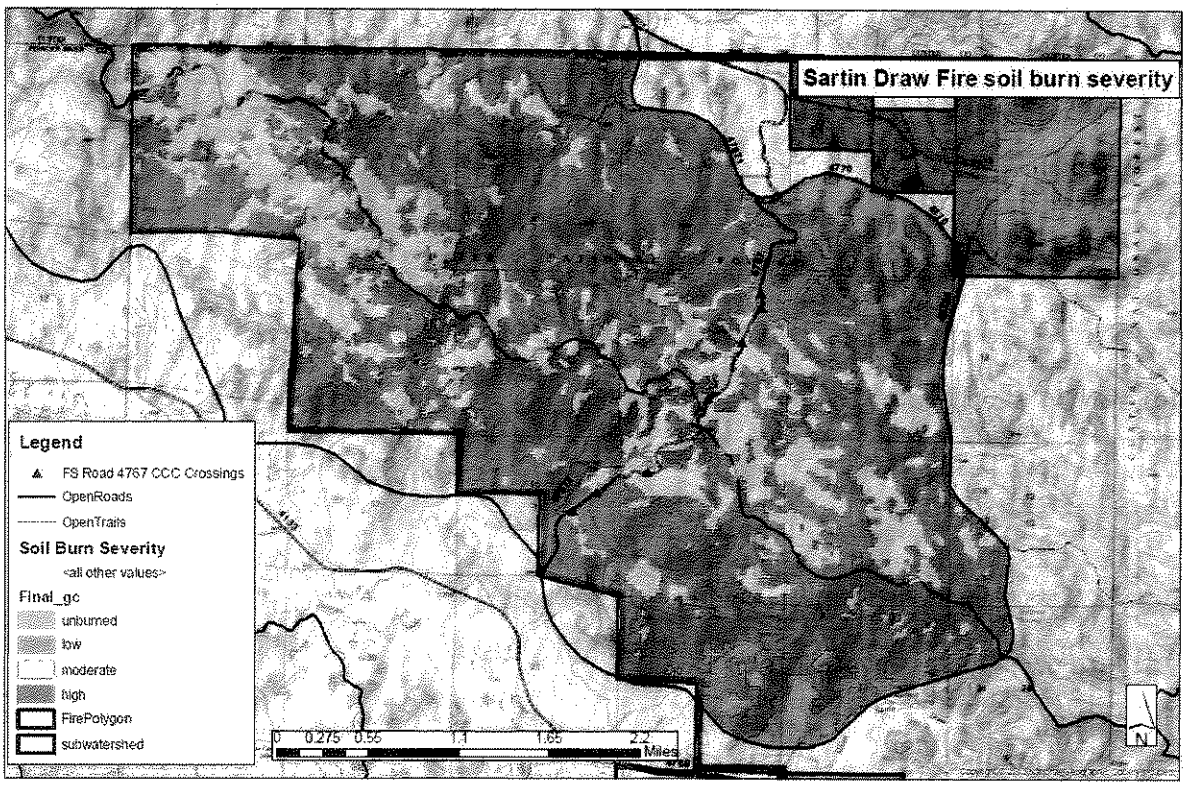

Figure 1. Sartin Draw Fire soil burn severity map.

Table 1. BAER Risk Assessment Matrix (WO Interim Directive 2523.1- Exhibit 02).

Probability of Damage or Loss	**Magnitude of Consequences**		
	Major	Moderate	Minor
	RISK		
Very Likely	**Very High**	**Very High**	**Low**
Likely	**Very High**	**High**	**Low**
Possible	**High**	**Intermediate**	**Low**
Unlikely	**Intermediate**	**Low**	**Very Low**

Probability of Damage or Loss: The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within one to three years (depending on the resource):

Very likely - nearly certain occurrence (>90%)
Likely - likely occurrence (>50% to < 90%)
Possible - possible occurrence (>10% to <50%)
Unlikely - unlikely occurrence (<10%)

Magnitude of Consequences:

Major - Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources.

Moderate - Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects.

Minor - Property damage is limited in economic value and/or to few investments; damage to natural or cultural resources resulting in minimal, recoverable or localized effects.

A. Describe Watershed Emergency/Critical Values/Resources and Threats:

1. Non-FS Values at Risk:

Non-FS Values at Risk are not evaluated as a part of BAER Assessments. There were no Non-FS Values at Risk assessed as a part of the Sartin Draw BAER Assessment. Per discussion with BLM resource advising personnel on the fire, no Emergency Stabilization and Rehabilitation (ESR) fundings were solicited for Sartin Draw Fire.

2. FS Critical Infrastructure Values:

Low Risk (Possible, Minor) **of damage or loss to Open Roads and Motorized Trails within the burn perimeter resulting from post-fire exacerbated runoff and erosion.**

Road drainage and surfacing was installed along Forest Road 4767 following the 2011 Mill Fire to address post-fire erosion concerns. These improvements remain in place and functional following the Sartin Draw Fire. Other roads within the burn perimeter are primarily ML2 or motorized trails that exist as two tracks with limited to no drainage features. **Accordingly, no treatment is warranted to protect road infrastructure within the burn perimeter.**

3. FS Critical Cultural Resource Values:

High Risk (Possible, Major) **of damage or loss to two National Historic Register-eligible road-draw crossings constructed by the Civil Conservation Corps along Forest Road 4767.**

Forest Road 4767 and its associated drainage structures were built by CCC crews in the mid 1930's. Seven constructed drainages structures can be found along the roadway. These crossings consist of corrugated metal culverts ranging from 18-36 inches in diameter. The culverts have been flanked with flat sandstones stacked around the inlet and outlet, a signature design feature for crossings constructed during that era. Forest Road 4767 has the most pristine (least disturbed) CCC-constructed roadbed and crossings found within the Ashland RD.

Model outputs for two of the seven crossing locations suggest that 25-year post-fire peak flow events would be at least double the predicted pre-fire flows. Cursory assessment of culvert hydraulic capacity suggests that neither of the culverts have the capacity to convey estimated post-fire peak flows and throughfills may overtop during a large post-fire peak flow event. Of note is that all but one of the crossings is at least partially plugged (if not fully plugged) with sediment, including one of the two at risk of washout from post-fire flows, further reducing their hydraulic capacity and thereby exacerbating risk of failure in the event of a large peak flow.

4. FS Critical Natural Resource Values:

High Risk (Likely, Moderate) **to native vegetation and ecological integrity due to fire-induced weed spread.** Existing weed infestations, thankfully, are limited within and adjacent to the burn

perimeter. Known patches, however, of spotted knapweed can be found to the east of the burn perimeter. No weed wash station was available to suppression resources, increasing the risk of propagation post-fire.

Without action (detection monitoring and treatment), it is **"Likely"** to have loss of native vegetation and ecological integrity as weeds will proliferate throughout the burned area due to weed seed/propugule sources from weed infestions found in and adjacent to the burned area as well as having potential weed seed transport via suppression dozer activity. The magnitude of consequences is considered **"Moderate"** since weed establishment and spread is not irreversible with treatment. However, as infestation density increases, significant financial input will be required to attempt reversing the invasion over a long-term due to the aggressive nature of the species. The risk of potential loss of native vegetation and ecological integrity due to weed spread have high risk levels. **Because of the limited existing infestation extent, BAER funding is only being request for monitoring at this time.**

Without action (grazing deferment), it is **"Likely"** to slow down native vegetation recovery and soil stabilization as plants and litter will take longer to due to eestablish. The magnitude of consequences is considered **"Moderate"** since preciptiation or drought is variable as it relates to a recovery trajectory and speed of recovery. Early establishment of a good grass and litter cover, and subsequent conservative management, provides for more soil stability and low sediment yields on moderate slopes and gentle slopes.The risk of potential loss of native vegetation recovery and soil stabilization due to livestock grazing have high risk levels. **Deferment can be accomplished through administrative action through permit administration and is not recommended for BAER funding per policy.**

Low Risk (possible, minor) **to soil productivity** as a result of post-fire erosion in areas burned under moderate severity. Loss of ground and overstory cover may contribute to accelerated erosion within the burn perimeter. Over the long-term, loss of surface soils can lead to decreased site productivity.

Water repellency was observed under areas burned with both low and moderate severity. Where observed in low severity burned areas, water repellency was likely not fire induced and rather a byproduct of pine tree litter naturally falling to the forest floor and leaching resins. Throughout the burn perimeter, surface soil structure and even surface was observed to be largely intact except for in the most severely burned areas. Char depth was generally shallow, and roots ranged from brittle/breakable under higher burn severities to pliable under low severity. Contiguous extent of high burn severity was limited to areas smaller than one or two grid cells (approx. 900-1800 m^2) within the soil burn severity map. These observations suggest that, while post-fire site conditions are conducive to accelerated erosion, there is a minimal likelihood of significant loss of soil productivity. **No treatments are warranted.**

B. Emergency Treatment Objectives:

- Detect invasive plants that are a threat to naturalized ecosystems, in doing so allowing for rapid response and minimizing the expansion of existing populations into the burned area.
- Address the potential impairment to native and naturalized vegetation communities through changes in annual grazing strategies.
- Mitigate the post-fire impacts to critical cultural resources within and adjacent to the burn perimeter.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm: **90%**

Land ___ % Channel ____ % Roads 90 % Other ____ %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land			
Channel			
Roads	90	90	90
Other			

E. Cost of No-Action (Including Loss): **$8,000**

Cost of No-Action Alternative assumes that FR# 4767 would have to be completely at each failed crossing at the cost of approximately $8,000. Cost of No-Action does not include increased cost of noxious weeds management resulting from post-fire proliferation in the event that funding is not available for post-fire detection within the burn perimeter. Cost of No-Action cannot be applied to cultural resources; damage to these resources is irreplaceable.

F. Cost of Selected Alternative (Including Loss): **$7,420**

G. Skills Represented on Burned-Area Survey Team:

[**X**] Hydrology	[**X**] Soils	[ ] Geology	[**X**] Range	[ ]
[ ] Forestry	[ ] Wildlife	[ ] Fire Mgmt.	[**X**] Engineering	[ ]
[ ] Contracting	[ ] Ecology	[**X**] Botany	[**X**] Archaeology	[ ]
[ ] Fisheries	[ ] Research	[ ] Landscape Arch	[**X**] GIS	

Team Leader: **Andy Efta**

Email: **jefta@fs.fed.us** Phone: **406-255-1407** FAX: _____

Core Team Members:

- Andy Efta – Soils/Hydrology
- Kim Reid – Range/Botany/Noxious Weeds
- Dave Shimek – Engineering
- Andy Wilber – Engineering
- Halcyon LaPoint – Heritage
- Mike Bergstrom – Heritage

H. Treatment Narrative:

Land Treatments:

Land Treatment - Weed Detection Monitoring
BAER team personnel assessed areas at risk from invasion and potential seed sources into these areas. These areas are identified for monitoring to determine where treatment will be needed to protect vulnerable vegetation resources and ecological integrity. One of the most important steps of prevention is early detection and rapid response. Weeds are far easier to control in the early stages of development. If the weeds do get a strong foothold it makes it very hard to control and/or eradicate.

Detection monitoring will be prioritized in the fire area where weeds were known prior to the fire in the moderate and high soil burn severity areas (2036 and 2 acres, respectively) and areas of heavy fire suppression activity such as dozer lines (~ 25 miles of dozer line equates to about 36 acres). The entire burn area should be monitored for possible introduction of invasive species inadvertently brought in on fire suppression equipment and vehicles. Despite the awareness and active efforts to prevent weed spread by introduction of seed or vegetative propagules, the problem is often documented in areas following wildfire. Monitoring and treatment would occur this fall and continue throughout the subsequent growing season. Documentation of weed locations, by species, and other observations regarding density and spread will be recorded following the guidelines in NRM and GIS corporate databases.

Should weeds become established within the burn perimeter, a one-time herbicide treatment for noxious weeds will not be effective. Outyear non-BAER-related management and control efforts must be planned for several consecutive growing seasons in order to prevent new sprouting and seed formation/dispersal and at the same time deplete the associated seed banks that have built up in the soil.

Land Treatment – Vegetation Recovery and Soil Stabilization through Grazing Deferment[1].

It is understood that deferment periods may impose financial hardship to permittees. The Forest Service goal in the post-fire setting is to increase ground cover with plants and litter as quickly as possible. Deferment of grazing that includes time for plants to recover during the growing season is important to protect the soil and allow a desirable plant community to become re-established. Improper livestock grazing following a fire can offset the benefits that can be obtained from fire. Timing and amount of use should be controlled in order to allow ground cover to recover. The results from post-fire defoliation and grazing studies suggest that timing, use, and duration of grazing of burned rangelands are more important than a specific period of rest after fire. Studies also suggest benefits of deferment of grazing until after the first growing season after fire.

Grazing Deferment Strategy. After fire, it is recommended that rangelands receive a period of grazing deferment to foster recovery of residual plants, regeneration of desirable plant species and accumulation of litter for soil stability. The decision to graze or not to graze *after* the first full growing season following the fire will vary from one pasture to another within an allotment, depending on the many variables affecting plant survival, growth and reproduction. Because of the many variables involved, deferment decisions should be made on a case by case basis when determining deferment duration and entry dates.

[1] Since livestock deferment is considered a land treatment under BAER, but can be addressed through administrative action, BAER funding is not requested.

The following Table displays a pasture by pasture preliminary deferment strategy which is largely based upon the amount and degree of fire severity within a pasture, the amount of burned area within a pasture, time of year grazed and amount of grazing pressure/grazing patterns.

Table 2 Coyote Allotment Soil Burn Severity by Pasture (Acres)

Coyote Pastures	Unburned Outside Perimeter (Ac)	Unburned inside Perimeter (Ac)	Low Severity (Ac)	Moderate Severity (Ac)	High Severity (Ac)	Total Pasture Acres	% of Pasture burned	Post-fire Grazing Strategy
East	870	501	2935	927	2	5235	74%	At a minimum, defer until **after** the first growing season in 2018
West	0	0	3255	1144	0	4399	100%	At a minimum, defer until **after** the first growing season in 2018

Roads and Trail Treatments:

Road and Trail Treatment- Armored Dip for protection of CCC Crossing

As noted above, all seven crossings along FR 4767 were affected to some degree by the Sartin Draw Fire. Only two of the seven were deemed to have significant enough change in post-fire flows to warrant exploration of BAER Treatments. All of these structures fall in dry draws that support ephemeral flow in the vicinity of the road.

The further south of the two treatments, denoted as Feature 3 within the Custer National Forest Heritage Resource Program Site Record for this site, has a 36" diameter culvert that is currently completely plugged with sediment. BAER team specialists explored multiple treatments for this crossing. Given the age of the culverts and the potential damage that may occur by attempting to it clean it out, is was deemed most appropriate to leave the crossing as is rather than risking damage to the structure. There is some capacity for water impoundment upstream of the throughfill- the draw is relatively wide (approx. 100' at the top of the throughfill) and approximately 5 feet to the top of the road surface from the surface of the upstream deposited sediment. Spot surface has been proposed for the top of this crossing to minimize the likelihood of complete roadbed washout should the crossing overtop

The second of these two crossings, known as Feature 5 in the CNF Heritage Resource Program Site Record (Figure 3), has a rock wingwall that redirects flow from 500 acres of drainage area running roughly parallel to the road through a 36" diameter culvert crossing under the road. This culvert was mostly unplugged at the time of survey. Given the projected change in post-fire flow (approxmately 2.4 times pre-fire estimated design flows), an armored relief dip has been proposed to the north of the culvert and wingwall to augment crossing capacity in the event of upstream inundation.

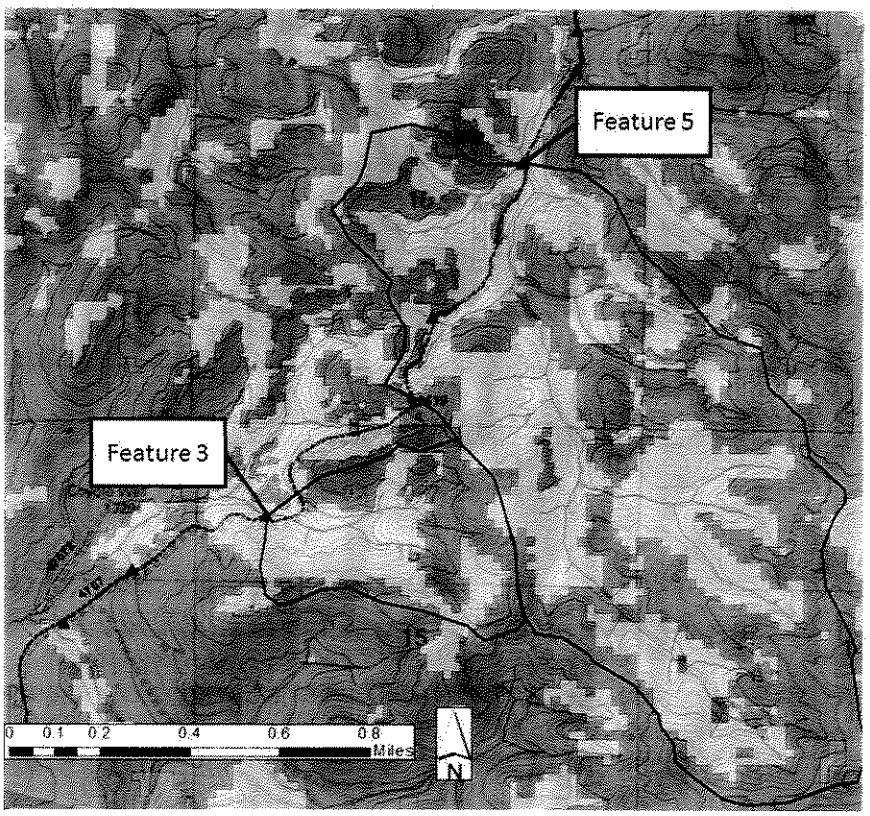

Figure 2. Catchment map for two CCC crossings of concern within the Sartin Draw burn perimeter.

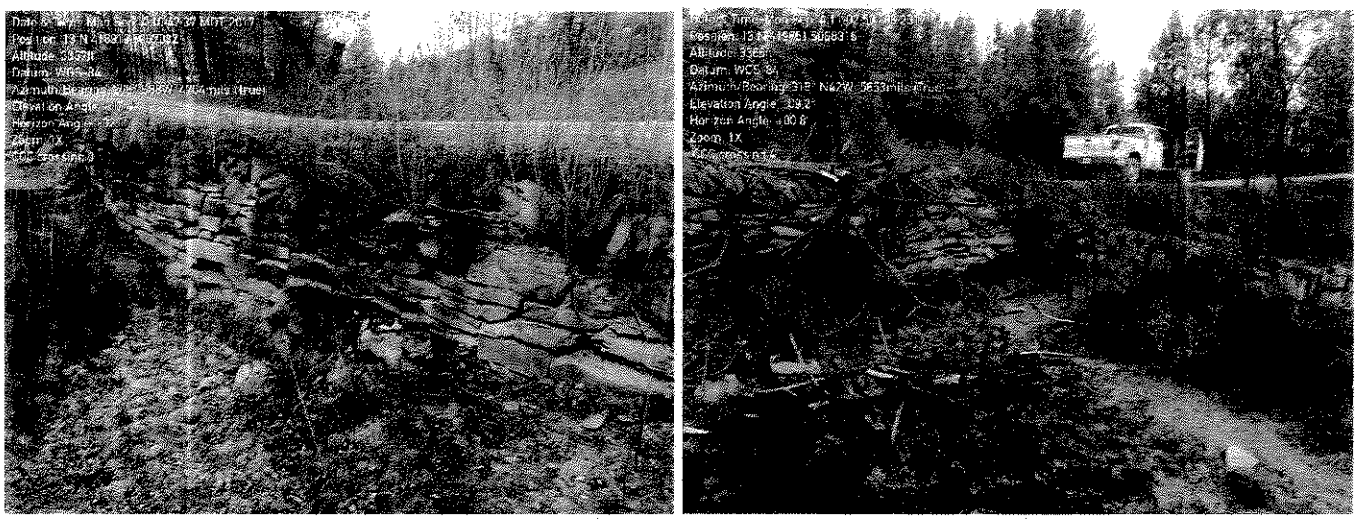

Figure 3. Crossing Feature 3 (left) and Feature 5 (right) built by the CCC along the Forest Road 4767.

I. **Monitoring Narrative:**

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

			NFS Lands				Other Lands				All
Line Items	Units	Unit Cost	# of Units	WFSU SULT $	Other $	# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments											
Weed detection/monitoring/treatment				$0	$2000		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$0	$2000		$0		$0	$0
B. Channel Treatments											
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails											
Spot surfacing for plugged crossing	Cy	40	60	$0	$2400		$0		$0	$0
Armored dip construction	Lump sum	3020	1	$0	$3020		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$0	$5420		$0		$0	$0
D. Structures											
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$0	$0		$0		$0	$0
E. BAER Evaluation											
	days	400	9	$0	$3600		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Evaluation				$0	$3600		$0		$0	$0
F. Monitoring											
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				**$0**	**$11020**		**$0**		**$0**	**$0**

Appendix B. Engineer's estimate/IDIQ task order

IDIQ Contract Task Order

Project Information (fill in all fields, completed form will be submitted to contractor)

Contractor, Contract:	Otter Creek Dirt Work, Ashland District IDIQ Road Maintenance
Forest/District:	Custer Gallatin
Date of Task Order:	(To be filled in by CO)
Title for Task Order:	Ashland IDIQ FY17
Task Order Number:	(To be filled in by CO)
Requisition Number:	AG-0343-C-16-0030
Gov't Contact Name, Phone:	Andy Wilber 406-255-1420

Bid Item number as stated on contract:

Contractor	Item No.	Description	units	Cost per Unit	Total Price
		Sartin Draw BAER Site #5			
	205	Equipment Rental Motor Grader	2hrs	$125	$250
	207	Spot Surfacing Furnished	60cy	$40	$2,400
	209	Mobilization	1	$300	$300
	210	Equipment Moving Motor Grader	35miles	$2	$70
		Sartin Draw Site #3			
	208	Spot Surfacing Gov Furnished	60cy	$40	$2,400

Estimated $ Amount:	$5,420
Number of Miles:	1
Work Start Date:	**TBD**
Work Stop Date:	**TBD**
Location of project narrative (attach vicinity maps to end of this task order):	Ashland Ranger District, Sartin Draw BAER

PART VII - APPROVALS

1. _____ 10/3/2017
Forest Supervisor (signature) Date

2. _____ 10/6/17
Regional Forester (signature) Date

Appendix A. Post-fire runoff estimates for Feature 3 and 5 along FS Road 4767 (from Fire Hydro). Note that cfs/mi^2 values have been normalized using exponents from applicable regional regression equations.

3		peak flow (cfs)							cfs/mi2					
	return period	2	5	10	**25**	50	100		2	5	10	25	50	100
	pre-fire	3	12	26	**53**	64	87		4	8	12	18	19	23
	post-fire	25	55	79	**122**	138	173		12	18	21	27	28	32

5		peak flow (cfs)							cfs/mi2					
	return period	2	5	10	**25**	50	100		2	5	10	25	50	100
	pre-fire	11	44	93	**197**	238	328		3	7	10	15	16	19
	post-fire	94	206	300	**465**	529	663		10	15	18	23	24	27