USDA-FOREST SERVICE
(7/00)

FS-2500-8

Date of Report:

7/24/2018

BURNED-AREA REPORT

(Reference FSH 2509.13)

Part I - Type of Request

1. Type of Report
   a. ☒ Funding request for estimated WFSU-SULT funds
   b. ☐ Accomplishment Report
   c. ☐ No Treatment Recommendation

2. Type of Action
   a. ☒ Initial Request (Best estimate of funds needed to complete eligible rehabilitation measures)
   b. ☐ Interim Report
      i. ☐ Updating the initial funding request based on more accurate site data or design analysis
      ii. ☐ Status of accomplishments to date
   c. ☐ Final Report (Following completion of work)

Part II - Burned Area Description

Fire Name: Georges

Fire Number: CA-Inyo-001071

State: CA

County: Inyo

Region: 05

Forest: Inyo

District: Mt. Whitney

Fire Incident Job Code: P5LY9C

Date Fire Started: July 8, 2018

Date Fire Contained: 7/17/2018

Suppression Cost: 4.4 M

Fire Suppression Damages Repaired with Suppression Funds

- Fireline Waterbarred (Miles):
- Fireline Seeded (Miles):
- Other (backbladed and slashed): Dozerline: 4 miles; Trail widening for fire line: 2.8 miles.

Watershed Number

- Bairs Creek (180901030201): 17 Acres (1%)
- George Creek (180901030202): 1,823 Acres (62%)

- Coyote Canyon-Owens River (180901030203): 1,098 Acres (37%)
- Hogback Creek (180901030204): 3 Acres (< 1%)

Total Acres Burned

- NFS Acres: 2456
- Other Federal(BLM): 325
- State:
- Private: 160

Vegetation Types

- Sage/bitterbrush, Pinyon and Jeffrey Pine, Water Birch and Willow in Riparian areas (mostly along Georges Creek)

Dominant Soils (Top Five Soil Map Units)

- 360 (CA732) - Rock Outcrop-Powment Complex: 1,328 Acres (45%)
- 402 (CA732) - Bairs Family: 796 Acres (27%)
- 124 (CA802) - Bairs Bouldery Loamy Coarse Sand: 332 Acres (11%)
- 129 (CA802) - Berent-Glenbrook-Nanamkin Families Association: 331 Acres (11%)
- 335 (CA802) - Ulymeyer Gravelly Loamy Coarse Sand: 94 Acres (3%)

Geologic Types (Top Five Geologic Map Units)

- Qgy - Younger Alluvial & Debris Flow Gravels: 1,128 Acres (38%)
- Ki - Independence Pluton: 1,123 Acres (38%)
- Qgo - Older Alluvial & Debris Flow Gravels: 187 Acres (6%)
- Qt - Talus, Regolith, & Colluvium: 1147 Acres (5%)
- Klp - Granodiorite of Lone Pine Creek: 104 Acres (4%)

Miles of Stream Channels by Order or Class

- Ephemeral: 7.95 Miles
- Intermittent: 9.41 Miles
- Perennial: 1.90 Miles

Transportation System

- Trails:
- Roads: NFS: .31 miles, BLM: .82 miles, LADWP: .64 miles, NFS Motorized Trail: 1.19 miles (Georges Creek)

Part III - Watershed Condition

Soil Burn Severity (Acres)

- Unburned / Very Low: 339 (12%)
- Low: 843 (29%
- Moderate: 1,566 (53%)
- High: 193 (7%)

Water-Repellent Soil (Acres): 335 (11%)

Soil Erosion Hazard Rating (Acres

- Low: 579 (20%)
- Moderate: 688 (23%)
- High: 314(11%)
- Very High: 1,360 (46%)

Erosion Potential: .03 (Tons / Acre):

Sediment Potential 12 (Cubic Yards / Square Mile):

Part IV - Hydrologic Design Factors

Estimated Vegetative Recovery Period (Years): 3-5

Design Chance of Success (Percent):80

Equivalent Design Recurrence Interval (Years):5

Design Storm Duration (Hours):1.0

Design Storm Magnitude (Inches):.53

Design Flow (Cubic Feet / Second / Square Mile:114

Estimated Reduction in Infiltration (Percent):59

Adjusted Design Flow (CFS / Square Mile):183

Part V - Summary of Analysis

Describe Watershed Emergency

Soil Response

Soils found within the fire area have been heavily influenced by the local parent material (debris flow deposits, colluvium, and alluvium) forming sandy, often coarse and unconsolidated, soil textures.

Quantitative erosion figures were estimated using the Erosion Risk Management Tool (ERMiT) batch model. ERMiT is a Water Erosion Prediction Project (WEPP-based application developed by USFS Rocky Mountain Research Station USFS, RMRS-GTR-188, 2007) specifically for use with post-fire erosion modeling. The model estimates only sheet and rill erosion, which occurs when rainfall exceeds infiltration rates, and surface runoff entrains surface soil particles. The model does not account for shallow landslides or gullying, stream-bank erosion, road effects, or

fire-line erosion and gullying, which could present large additional sources of sediment entering the fluvial systems.

Various storm runoff-event magnitudes may be chosen in ERMiT for erosion response estimates; 2-year, 5-year, and 10-year events were modeled for this analysis ERMiT uses the PRISM module to generate climatic input parameters; a customized climate was generated from the Bishop Climate Station to the latitude/longitude and elevation of the fire area. Soil erosion modeling was completed for both the fire wide perimeter and the individual HUC 12 watersheds within the fire area. The reported values are in total tons and tons per acre. To help picture what a 1,000 tons of sediment might look like consider roughly 120 standard 10 cubic yard dump trucks filled up.

A 2-year storm event was modeled in ERMiT to determine if the estimated hillslope erosion rates could affect soil productivity. The modeled 2-year event (50% probability) produced 71 tons of sediment equivalent to 0.03 tons per acre or 12 cubic yards per square mile (using a conversion factor of 1.35 tons per cubic yard), see Table 1 below. Increased hillslope erosion is expected to occur throughout the fire area regardless of the soil burn severity. The stated accuracy of the model is +/- 50%.

Due to the rain shadow effect on the eastern side of the Sierras the annual precipitation was quite low which resulted in very low modeled post-fire erosion values. However if extreme rainfall events occur, high runoff and erosional events could ensue resulting in a further loss of soil productivity, affects to water quality, and an increase in the potential for damage or loss of resource values downstream. Thunderstorms from summer monsoons are common in this area, with rainfall amounts and intensities, while variable, are usually more intense than the modeled 2-year event. While soil erosion is always irreversible, the damage to soil productivity is considered recoverable in most cases, as forest soils are generally resilient and post-fire pulse erosion is a natural geomorphic process.

Table 1: Georges Fire ERMiT batch results

Area	50% (2 Year)		20% (5 Year)		10% (10 Year)	
	Tons/Acre	Total Sediment (Tons)	Tons/Acre	Total Sediment (Tons)	Tons/Acre	Total Sediment (Tons)
Georges Fire	0.03	71	0.57	1,230	2.24	4,765
Bairs Creek	0.04	< 1	0.44	3	1.96	10
George Creek	0.04	6	0.68	529	2.42	2,541
Coyote Canyon-Owens River	0.02	65	0.50	698	2.04	2,202
Hogback Creek	0.01	< 1	0.18	< 1	2.65	12

Watershed Response

Fire Effects on Watershed

The Georges Fire mostly burned with moderate severity, with lesser amounts of high soil burn severity noted during field observations. The fire was started by lightning. Most of the vegetation burned was upland plant types along the slopes and alluvial fans, and abundant riparian vegetation was severely burned along the stream channels. Burned soils showed strong hydrophobic conditions noted from samples taken in the 1-2 inch depth below ash and

organics. Large areas on the burned slopes have low amounts of groundcover remaining after the fire (moderate and high burn severity areas). Due to the high amount of hydrophobic soils and lack of ground cover resulting from the fire, increased runoff from storm events is expected, more during the first year after the fire. Adding to that, the steepness of the burned mountain slopes in the fire area can increase runoff velocity down slope and soil erosion.

Table 2: Soil Burn Severity Table by Watershed for the Georges Fire

Watershed	Total Acres	Unburned Acres	Low Severity Acres	Moderate Severity Acres	High Severity Acres
Watershed 1	173	4	8	83	79
Watershed 2	1272	428	257	471	115
Watershed 3	1288	691	209	360	28
Watershed 4	750	360	122	263	6
Watershed 5	1023	594	123	286	20
Georges Creek	6192	5983	67	117	24

Upland slopes burned significantly where large stands of Pinyon Pine and well developed shrubs existed. Along Georges Creek most of the well-developed riparian vegetation was consumed by the fire including ground cover and litter, almost all the canopy was burned. Large amounts of ash and debris are found along the stream banks and floodplains. Robust vegetation along the ephemeral and intermittent drainages also burned thoroughly during the fire, exposing layers of loose soil and sand more susceptible to wind and water erosion that can deposit and charge stream channels with ash and loose soil. In moderate and high burn severity areas, ground cover and vegetation is mostly missing, exposing soil to rainfall and runoff.

Watershed "1" is expected to have an increase of peak flow by 331% (Table 3). A BLM native surface road is located on the fan below this watershed. There are few other Values at Risk (Critical BAER Values) in this area.

Table 3: Peak Flows by Watershed for the Georges Fire.

Georges Fire BAER

**Design Flow for 5 year storm (South Lahontan/Colorado Desert Region)

			Pre-Fire Peak Flow in cubic feet per second (cfs)				Soil Burn Severity (acres)				In Cubic Feet per Second (cfs)						
Pour Point Analysis Watersheds	Drainage Acres	Drainage Area (mi2)	Q2	Q5	Q10	Q25	Unburned	Low	Moderate	High	Pre fire Q5	Q from unburned	Q from low	Q from moderate	Q from High	Post fireTotal Q5	Change in Q5 Flow
Watershed 1	173.51	0.27	5	31	78	208	4	8	83	79	31	1	1	37	94	134	331%
Watershed 2	1271.52	1.99	15	85	214	570	428	257	471	115	85	29	17	79	51	176	108%
Watershed 3	1287.82	2.01	15	85	215	574	691	209	360	28	85	46	14	60	12	132	55%
Watershed 4	749.79	1.17	11	65	164	437	360	122	263	6	65	31	11	57	3	102	58%
Watershed 5	1023.11	1.60	13	76	191	191	594	123	286	20	76	44	9	54	4	111	45%
Georges Creek	6191.69	9.67	32	189	476	476	5983	67	117	24	189	183	2	9	2	196	3%
All Fire	2491	3.89	20	119	300	300	339	843	1565	193	119	16	60	189	23	269	125%

From: Methods for Determining Magnitude and Frequency of Floods in California, Based on Data through Water Year 2006
By Anthony J. Gotvald, Nancy A. Barth, Andrea G. Veilleux, and Charles Parrett; 2012

*Change in flow is the increase in flow resulting from the reduction in soil infiltration after a fire based on a paper by Terry Henry.
Acres of unburned and low soil burn severity are modeled at Q5, acres of moderate soil burn severity are modeled at Q10 and acres of high soil are modeled at Q25. A weighted average is then calculated to arrive at post fire Q5.

Pre-Fire CFS/mi2 = 30.59
Post Fire CFS/mi2 = 69.15
125 % Increase Flow
60 minute 5 year return interval storm 0.58 "
Fire acres 2941

Water Quality

Water quality of Georges Creek is typically excellent. The fire burned only a small area of the watershed in the area where the stream exits the mountains and enters the alluvial fans (255 acres out of 6191 acres, from a point just below the fire area). The fire burned vegetation and soil severely along the reach of Georges Creek in the burn area, and most of the ground cover was removed and existing riparian vegetation was consumed. When significant rainfall and runoff occurs especially the first year post-fire, the burned areas along Georges Creek will contribute moderate amounts ash, burned debris and fine sediment that will cause periodic and short term episodes of degraded water quality and turbidity, and increase in channel sedimentation. This effect will be more significant along the reach of the creek in the fire area and for a distance downstream (< mile). Further downstream, this effect will be partially lessened as the plume of turbidity and fine sediment starts to dissipate and settle over the long

reach below the fire. It is possible the full length of Georges Creek will have increased turbidity and water quality impairment during large storms post-fire, and will likely diminish as runoff subsides.

Geology/geologic response:

This area is highly prone to debris flows and rock fall as evidenced by large boulders in the runouts below drainages and steeper slopes. USGS performed debris flow modeling displaying several stream segments and basin with moderate and high risk of debris flows (0.24in in 15min storm model)

Rock Fall: Rock fall occurred under pre-fire conditions below steep rockout crop areas through out the fire area. Rock fall will continue at an increased rate for the next 3-5 years following the fire due to loss of groundcover and will increase temporarily during runoff events. The risk for rock fall occurrence as a result of the fire is considered to be **Very High.**

Landslide: There are no previously mapped landslides recorded within the burn area, and evidence of past landslides were not observed. Based on the geologic information available, the risk of a potential landslide occurrence as a result of the fire is considered **Low**.

Debris Flow: Evidence of recent pre-fire debris flows within the burned area were observed. *"Watershed 1" (see watershed report and map in Appendix A)* - A prominent narrow canyon is present in "Watershed 1" on the North end of the fire that above a BLM maintained road. Slopes in "Watershed 1" are generally 30 to 90 percent. The ephemeral stream channel within "Watershed 1" is charged with sediment and rocks. An initial assessment indicates with the steep slopes and loss of groundcover, an above normal runoff event will mobilize material in the charged channel and likely result in a debris flow and deposit material on the alluvial fan, and onto the BLM road.

USGS performed debris flow modeling displaying several stream segments, "Watershed 1" and other basins with moderate and high risk of debris flows on the northern end of the fire. (0.24in in 15min storm model).

A. Describe Critical Values/Resources and Threats:

Threats to Life and Property

Forest Service Roads and motorized trails: There are approximately 1.3 miles of system roads and motorized trails within the Fire boundary with 1 mile being a motorized trail along Georges Creek (30E302) within the fire area. This road is native surface on decomposed granite which is very susceptible to erosion. Uncontrolled runoff can result in off-site damage and potential negative impacts to the transportation system.

The surrounding hillslopes burned at moderate and low soil burn severity. Georges Creek motorized trail 30E302 is managed for high-clearance vehicles and drainage structures were installed several years ago and were observed to be working effectively in the pre-fire environment. The Georges Creek motorized trail (30E302) contains road gradients between 7 and 15%. Post-fire conditions and predicted watershed response indicate increased runoff, excessive sedimentation, and limited rockfall will occur onto the transportation system impacting

existing roadway drainage features, such as roadway dips and lead-off ditches. We expect a high watershed response from the steep, adjacent hillslopes and the easily transportable sediments in the drainages above the road. . Once these drainage features become impacted and overwhelmed, their function fails, allowing uncontrolled water to divert, resulting in damage to the road and invested road improvements, loss of road function, and limiting access along some of the road segments. A secondary consequence of post-fire runoff to the transportation system is increase adverse effect of storm water runoff and decreased control of storm water runoff delivering high volumes of sediment into adjacent stream channels. In some cases, roads can become "hydrologically connected" to stream channels creating an efficient mechanism for delivering excessive sediment to the stream channels.

Imminent hazards to the road system vary from minor sloughing and rilling to overwhelming the existing erosion control structures leading to a partial or total loss of the road template.

Probability of Damage or Loss: Likely

Magnitude of consequences: Moderate

Risk Level: High

Threats to Critical Natural and Cultural Resources

Off Highway Vehicles (OHV's) are a threat to natural recovery from invasion if noxious weed spreading into the fire area, reduction in soil productivity, and damage to heritage sites from Off-Highway Vehicle incursion.

OHV's can cause erosion, compaction and alter hydrologic function which precludes or reduces vegetation re-establishment after a fire. OHV's can act as a vector for invasive species introduction when seeds are attached to tires and deposited on bare ground. Heritage resources can be negatively affected by OHV's through mechanical disturbance in the site.

Vegetative recovery, soil productive and a heritage resource site are at risk from OHV incursion along several areas within the fire. Two FS Unauthorized Trails entering the fire areas have a threat to increase OHV trespass into open areas created by the fire that may lead to soil impacts and hinder vegetative recovery. The natural vegetative recovery and barriers on these roads burned. Currently there are no closure signs or physical barricades in place to advise the public from using these trails.

The area of greatest incursion risk burned at low and moderate soil burn severity, with all the vegetation consumed and low gradient,with few large rocks, making it easily traversed by an OHV.

Threatened and Endangered Species:

Sierra Nevada bighorn sheep (SNBS) – the Williamson herd unit and critical habitat are within and adjacent to this fire. Natural processes of the fire are expected to have improved SNBS habitat by reducing pinion encroachment on lower slopes of rocky terrain. The loss of pinion and Jeffery pines trees at upper slopes adjacent to escarpments are expected to benefit sheep by reducing predator avoidance areas.

Threats to Ecosystem Stability

There is a hign risk that invasive weeds could get established in the Sagebrush-bitterbrush, pinyon, and in the Riparian stream habitat. During initial attach Fire vehicles and CalFire dozers were not washed before entry to the fire area. Approximately .2 miles of dozer line were constructed on the Forest along with 1 mile of handline. A weed washing station was set up after several days. Several invasive species are known from the forest, including cheatgrass and Russian thistle, which are scattered throughout the shrub vegetation, denser near roads. They will likely spread into the recovering shrub vegetation in the fire area, but there is no effective control for these species, so no treatment is proposed.

The California Invasive Plant Council has published a list of species not currently known in the fire area, but with a high risk of invasion (CalIPC , 2011). Because the fire vehicles and equipment were not washed before entering Forest Service land, these species could possibly invade: Russian knapweed (Acroptilon repens), Saharan mustard (Brassica tournefortii), starthistles (Centaurea species), fennel (Foeniculum vulgare), halogeton (Halogeton glomeratus), perennial pepperweed (Lepidium latifolium), Sisymbrium species, Russian thistle (Salsola tragus), Cardaria chalepensis, and Bromus species (including cheatgrass, red brome, and ripgut brome).

Also, new species of weeds may have been introduced by unwashed fire suppression vehicles, but these will not be evident for at least several months when the seeds germinate.

Emergency Determination:

Probability of damage or loss: Likely

Magnitude of Consequences: Moderate

Risk Level: High

Threat to Cultural Resources

There are a variety of known and newly discovered prehistoric to historic archaeological sites and isolated finds in the Georges Fire vicinity. A majority of the fire footprint, however, has not been surveyed. It remains possible that as yet unidentified cultural resources in high severity burn areas that may be at risk to mass wasting events. This potential risk cannot be meaningfully assessed or quantified in the absence of cultural survey and site data. No treatments are recommended at this time.

Table 1: Values at risk analysis table

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

Emergency Treatment Objectives

- Stabilize motorized trails
- Minimize the likelihood of Noxious/Invasive weeds in the fire area.
- Minimize the risk of OHV incursion on unauthorized routes within the fire area.

Probability of Completing Treatment Prior to First Major Damage-Producing Storm

- Land %:85
- Channel %:
- Roads %: 85
- Trails %:

Table 2: Probability of treatment success

Treatment	Years After Treatment		
	1	3	5
Land	85	100	100
Channel			
Roads	85	100	100
Trails			

Cost of No-Action (Including Loss):28,000

Cost of Selected Alternative (Including Loss): 23,160

Skills Represented on Burned-Area Survey Team

☒ Hydrology	☒ Soils	☒ Geology	☐ Range
☐ Forestry	☒ Wildlife	☐ Fire Management	☐ Engineering
☐ Contracting	☐ Ecology	☒ Botany	☒ Archaeology
☒ Fisheries	☐ Research	☐ Landscape Architect	☒ GIS

Team Leader: Todd Ellsworth

Email: tellsworth@fs.fed.us

Phone: 760-937-2033

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. For seeding treatments, include species, application rates and species selection rationale.)

Land Treatments:

Invasive weed early detection and rapid response: ***Threats related to suppression disturbances***: At minimum, survey the dozer line and part of the handline as well as other areas of disturbance such as around the LADWP gauging station and diversion ditches.

Small, isolated infestations will be eradicated by hand pulling. Fruiting individuals will be disposed of in garbage bags taken off site. Perennial pepperweed, a rhizomatous species, is most effectively controlled using herbicide. Some of the ones we'd be very concerned about include Russian knapweed (Acroptilon repens), Saharan mustard (Brassica tournefortii), starthistles (Centaurea species), fennel (Foeniculum vulgare), halogeton (Halogeton glomeratus), perennial pepperweed (Lepidium latifolium), Sisymbrium species, Russian thistle (Salsola tragus), Cardaria chalepensis, and Bromus species (including cheatgrass, red brome, and ripgut brome).

Weed Surveys and Rapid Response Costs				
Item	**Unit**	**Unit Cost**	**# of Units**	**Cost**
1 GS-11 botanist	Day	$355	2	$710
1 GS-7 weed technician	Day	$196	2	$392
Supplies	Each	$500	1	$500
Vehicle gas mileage	Miles	$0.50	200	$100
Total Cost				**$1,702**

Channel Treatments: N/A

Road Treatments:

Roads and Trail Treatments: Restore drainage function. Drainage function will be restored through upgrading, maintaining and installing new drainage features (waterbars and rolling dips) on Forest motorized trail # 34E40 (1 mile). FS Motorized Trail, install 4-6 rolling dip structures and improve and maintain seven existing rolling dip structures on the 1 mile section of trail above the LADWP property to the terminus at Georges Creek. Project layout, Botanical and Heritage clearances are included in the costs. Detailed cost breakdown contained below:

Road	Risk	Treatments	Estimated Cost
34e40	High	Maintain existing rolling dips and lead-off ditches, install new rolling dips and lead-off ditches (4-6), remove outside berm in designated areas.	$5000
Total			**$5,000**

Protection/Safety Treatment

Install closure signs and physical barricades at the Forest Boundary where unauthorized trails U-155101 and U- 155102 enter the burn area to discourage OHV trespass into open areas caused by the fire. The BAER Team considers this treatment to be the minimum necessary to achieve a reduction in risk to critical values and is less expensive and intrusive than installing fencing.

OHV closure signs and barricades				
Item	**Unit**	**Unit Cost**	**# of Units**	**Cost**
1 GS-5 OHV Technician	Day	$175	3	$525
1 GS-7 OHV technician	Day	$196	3	$784
Supplies (signs/barriers)	Each	$1000	1	$1000
Vehicle gas mileage	Miles	$0.50	300	$150
Total Cost				**$2,459**

- Trail Treatments: N/A
- Structures: N/A

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.) N/A

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

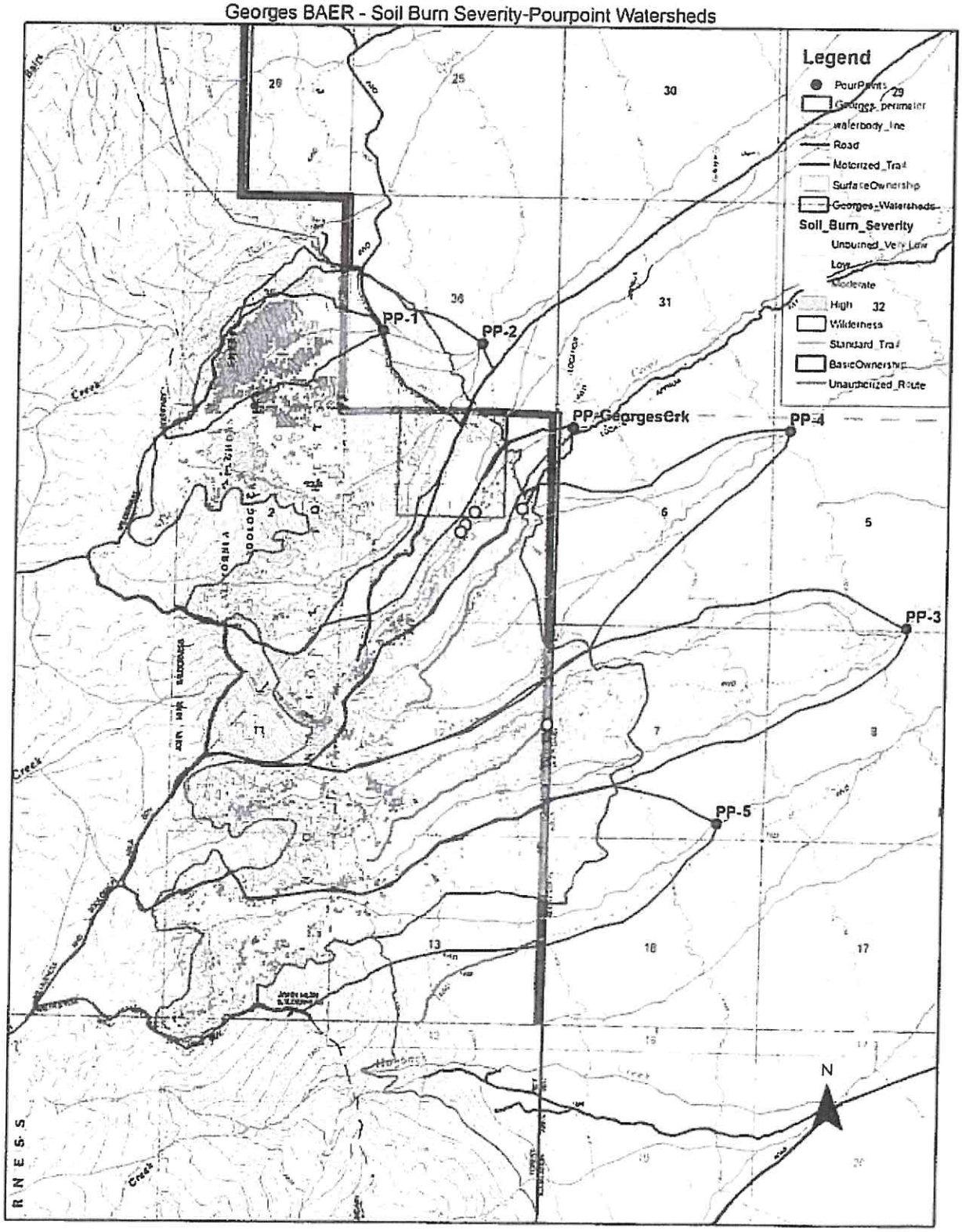
Line Items	NFS Lands					Other Lands				Totals $
	Units	Unit Cost	# of Units	WFSU SULT $	Other $	# of Units	Fed $	# of Units	Non Fed $	
A. Land Treatments										
EDRR Surveys & Control										
EDRR Surveys & Control	days	851	2	1702						
Subtotal Land Treatments				1702						
B. Channel Treatments										
None										
Subtotal Channel Treat.				N/A						
C. Road and Trails										
Storm Proofing	mi	5000	1	5000						
Subtotal Roads & Trails Treatments:				5000						
D. Protection										
OHV blocks	EA	1229	2	2,459						
Subtotal Protection:										
E. BAER Evaluation										
BAER team	Each	5500	1	5500						-
Subtotal Evaluation										-
F. Monitoring										
None				-						-
Subtotal Monitoring				-						-
G. Totals				$9,161						

Part VII - Approvals

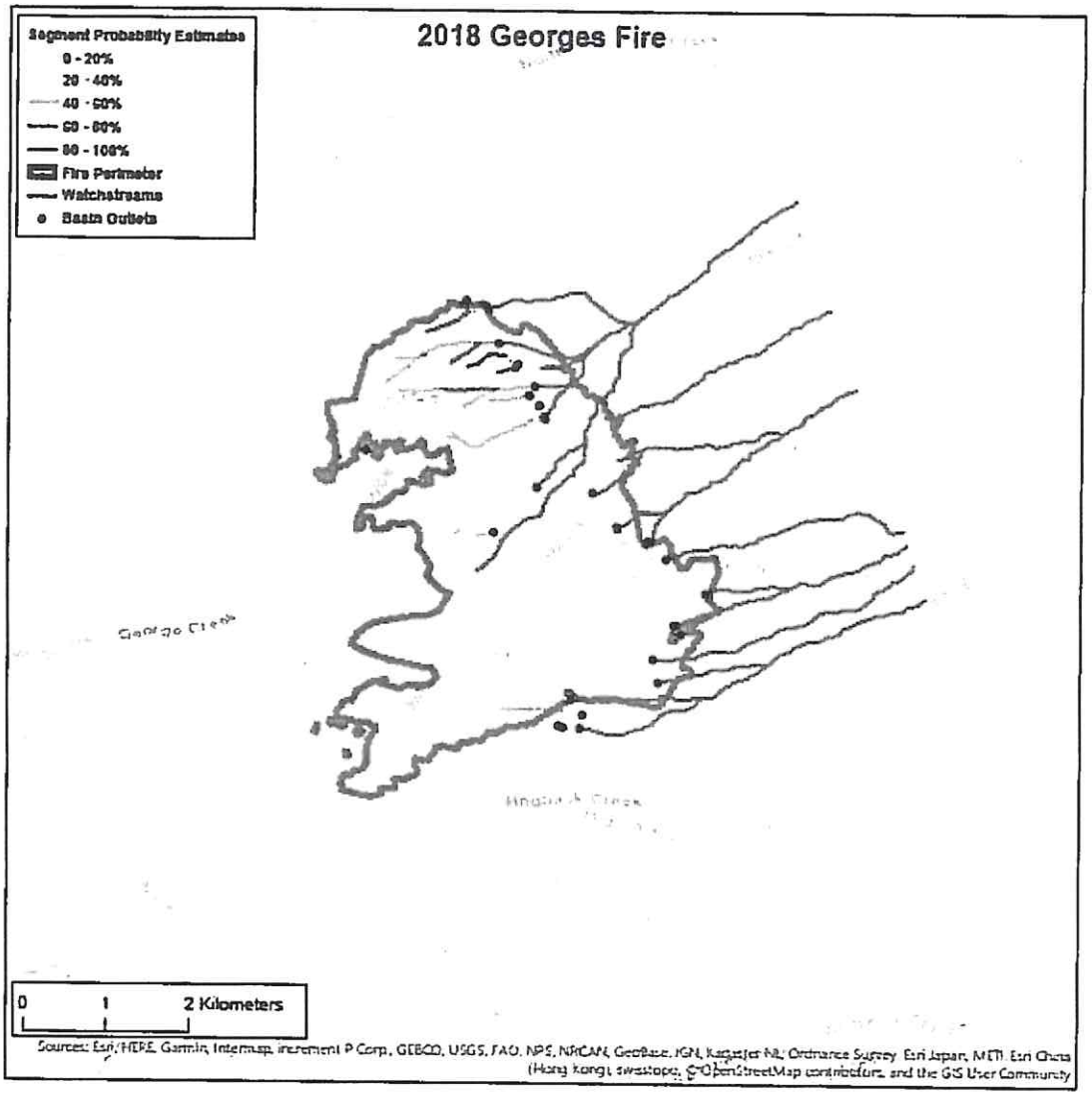
(A) _____ 7/31/2018
Forest Supervisor (Signature) Date

(B) _____ 8/2/18
Regional Forester (Signature) Date

Map 1: Watershed and Soil Burn Severity Map of the Georges Fire



Map 2: Stream segment probability for debris flow from USGS data.


2018 Georges Fire
Segment Probability Estimates
0 - 20%
20 - 40%
40 - 60%
60 - 80%
80 - 100%
Fire Perimeter
Watchstreams
Basin Outlets
0
1
2 Kilometers
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community