Date of Report: 9/17/21

BURNED-AREA REPORT

PART I - TYPE OF REQUEST

A. Type of Report

☒ 1. Funding request for estimated emergency stabilization funds

☐ 2. No Treatment Recommendation

B. Type of Action

☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)

☐ 2. Interim Request #___

☐ Updating the initial funding request based on more accurate site data or design analysis

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Oak Grove

B. Fire Number: UT-DIF-000792

C. State: UT

D. County: Washington

E. Region: 04

F. Forest: 07

G. District: 01

H. Fire Incident Job Code: N88Q

I. Date Fire Started: 8/29/2021

J. Date Fire Contained: 9/15/2021

K. Suppression Cost: $1,200,000

L. Fire Suppression Damages Repaired with Suppression Funds (estimates):

1. **Fireline repaired (miles): 0.5 miles**
2. **Other (identify):**

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
150100080906	Quail Creek	22,595.3	591	2.6
150100080904	Heath Wash	13,172.7	179.7	1.4

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	770.1
STATE	0
PRIVATE	0
TOTAL	770.1

O. Vegetation Types:

VCMQ Veg. Class	ACRES
Barren/Sparse Vegetation	3.355157
Douglas-fir Mix	27.716608
Gambel Oak	592.150453
Interior Chaparral	71.140908
Ponderosa Pine/Woodland	62.310497
Riparian Woody	6.104396
White Fir Mix	7.705193

P. Dominant Soils:

Soil Type	Soil Texture	Associated Eco-site	Acres
43	Sandy Loam	RO47XB430UT Mountain Loam (Mountain Big Sagebrush)	95
44	Very Stony Loam	RO29XY330UT Upland Stony Loam (Shrub-Live oak)	12
62	Very Stony Sandy Loam	RO47XB433UT Mountain Loam (PIPO)	422
63	65% Rock outcrop / extremely stony Sandy Loam	RO47XB539UT High Mountain Stony Loam (Mixed Conifer)	242

Q. Geologic Types:

The soils within the Oak Grove fire were formed in residuum, colluvium, and alluvium from quartz monzonite porphyry, a gray, coarse-grained, intrusive igneous rock similar to granite, primarily from the Pine Valley Laccolith. The Pine Valley Mountains, which are capped by an igneous, mushroom-shaped intrusion called the Pine Valley laccolith was emplaced about 21 million years ago as molten rock from deep within the earth moved upward into shallow overlying sedimentary rocks. There it spread out and crystallized into what is one of the largest such intrusions in the world; uplift and erosion have since uncovered this granite-like rock.

R. Miles of Stream Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	0.25
INTERMITTENT	6.2
EPHEMERAL	0
OTHER (DEFINE)	0

S. **Transportation System:**
Trails: *National Forest (miles):* 3.1 *Other (miles):*
Roads: *National Forest (miles):* 0.7 *Other (miles):*

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	93.5				93.5	12.1
Low	219.9				219.9	28.5
Moderate	407.2				407.2	52.8
High	50				50	6.5
Total	770.7				770.7	100

B. **Water-Repellent Soil (acres):** Surface hydrophobicity indicated some natural soil repellency. Soil burn severity testing across the fire indicated that roughly 30% of the high severity fire acres, or 15 acres, are water repellant.

C. Soil Erosion Hazard Rating:

The 242 acres of soil type 63 have a high erosion hazard rating, primarily due to slope. High erosion is primarily calculated using bare soil. Since only approximately 50 acres are high severity burns, the erosion hazard is minimized by surface cover left on the landscape.

D. Erosion Potential: 7.1 average ton/acre (2.9 to 18.2 tons/acre first year erosion rate)

E. Sediment Potential: 36,920 cubic yards / square mile

F. Estimated Vegetative Recovery Period (years): 5-10

G. Estimated Hydrologic Response (brief description): Late summer storms and snowmelt will cause damaging runoff to forest infrastructure (road and trail). Hydrologic response will not moderate until at least 3 years when gambel oak can recover with sufficient canopy.

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The 2021 Oak Grove Fire was a human-caused ignition that started on August 29, 2021. The fire has burned approximately 770 acres to date and was 50% contained on September 5, 2021. The burned area is mostly within the Pine Valley Wilderness on the Pine Valley Ranger District on the Dixie National Forest, West of the town of Leeds, UT. The soil burn severity (SBS) map shows approximately 59.3% of the area burned at high and moderate soil burn severity. The rest of the fire was either low soil burn severity or unburned. Generally the center of the fire burned at moderate severity with some patches of high severity. Low severity and unburned areas were sporadic within the center of the fire and more common on the edges. Soil burn severity investigations indicated that some of the areas listed as moderate and high on the south side of the fire were on the lower ends of those classifications. After the 2002 Sequioia Fire similar burn patterns of moderate and high severity just north of the current fire caused heavy runoff and debris flows from smaller subdrainages. Smaller 8th field HUC subdrainages were mapped within the 2021 Oak Grove Fire perimeter and the two subdrainages within the center of the fire had 19% and 33% of the drainages burned at moderate to high severity. These are compariable percentages to those that caused issues in smilar sized drianges following the Sequioa fire. Given the nature of soils and the slope of the area burned, increased post fire soil erosion, runoff and debris flows within and downstream from these areas is likely to cause flooding, scouring and/or deposition of materials. This is especially true in the two interior mapped 8th field HUC drainages on the fire. The Oak Grove campground, its access road (FSR 30032), along with several undersized culverts, are all at the base of these two interior subdrainages.

High intensity monsoonal thunderstorms are the precipitation events of primary concern. Based on historic precipitation patterns, thunderstorms are possible in the weeks and months following the Oak Grove Fire. In

fact, a monsoonal storm occurred two weeks prior to the fire and caused damage to existing transportation infrastcuture. The risk of flooding and erosional events has increased as a result of the fire, creating hazardous conditions within and downstream of the burned area.

The duration, volume, and location of debris flows and steam channel processes are highly influenced by rainstorm patterns and intensities. The predictive values represented in this report are based on rapid assessment models for specific high intensity/short duration storms.

Recovery of pre-fire slope stability and watershed hydrologic response is dependent on many factors and typically occurs within 3-5 years following the fire. Recovery of high burn severity areas is slower because little or no vegetative ground cover remains, the potential for needle cast and other duff recruitment is low and soils may be impacted by fire effects.

A. Describe Critical Values/Resources and Threats (narrative):

A list of values important to the Dixie National Forest was compiled by the BAER team during the assessment kickoff meeting. The BAER team subsequently evaluated this list of values through field assessment and associated analysis to determine the critical BAER values (FSM 2523.1 – Exhibit 01) that may be treated within the BAER program. The risk (FSM 2523.1 – Exhibit 02) to these critical values has been assessed by the BAER team and is described below. A list of treatment numbers has been included below each critical value description to ensure tracking between values and treatments.

Table 5: Critical Value Matrix

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**

1. **Human Life and Safety (HLS):**
   a. Very High risk to **forest visitors and Forest Service employees** on trails throughout the burn scar due to the increased threat of flooding and debris flow and falling trees and rocks.

   Risk Assessment: Elevated threat to human health and safety from deteriorating trails, flooding and debris flow, and falling trees and rocks on forest trails within the fire perimeter.
   Probability of Damage or Loss: Likely – Numerous snags along the trail will have potential risk to public safety, and summer monsoonal storms can occur quickly with very responsive flooding.
   Magnitude of Consequence: Major– Loss of life or injury to humans.
   Risk Level: Very High

   (*Treatments: See Public Safety and Roads and Trail Treatments*)

2. **Property (P):**
   a. Very High risk to the Oak Grove Campground **road infrastructure** downstream of the fire due to an increased threat of damage expected to the stream crossing from increased runoff, erosion and deposition. This is the only FS road infrastructure at risk.

   Risk Assessment: Threats to Forest Service roads and associated structure.
   Probability of Damage or Loss: Very Likely – Upstream flooding and erosion is highly likely, and the road infrastructure is directly below drainages most adversely affected by the fire. Culverts immediately downstream from the drainages that had the most acres of high severity burn and have a history of issues dealing with monsoon storm events. These culverts were already cleaned and repaired twice in 2021after monsoon storm events.
   Magnitude of Consequence: Moderate - loss of FS infrastructure and public access
   Risk Level: Very High
   (*Treatments: See Roads and Trail Treatments*)

b. Intermediate risk to the Leeds Municipal water supply due to the increased potential to damage and source contamination from flooding and debris flows. Approximately 6% of the municipal watershed burned.

Risk Assessment: Threat to municipal water supply infrastructure along Leeds Creek.
Probability of Damage or Loss: Unlikely – The highest portions of the municipal water supply infrastructure are located over 1.3 miles downstream from the fire perimeter and are high enough above the current stream elevation that inundation and damage seem unlikely.
Magnitude of Consequence: Major– Loss of water supply to the town of Leeds.
Risk Level: Intermediate
(No Treatments are recommended due to expected natural recovery over time and no critical values at high risk)

c. High risk to **trail infrastructure** throughout the fire due to an increased threat of damage expected to these forest investments from increased runoff, erosion and deposition. The burned area contains approximately 0.83 miles of trails at risk.

Risk Assessment: Threats to Forest Service trails and associated structure.
Probability of Damage or Loss: Likely – flooding, debris flows, and erosion is imminent.
Magnitude of Consequence:, Moderate - loss of FS infrastructure
Risk Level: High

3. Natural Resources (NR):

a. Low risk to **soil productivity and hydrologic function** due to the threat of increased soil erosion within those areas that burned at moderate to high severity. Because effective groundcover was marginally decreased as a whole within the fire burn perimeter (most of the soils have a very large proportion of rock greater than 2 inches in diameter), some duff remained unburned, fine root structure appeared mostly intact, and measured and predicted hydrophobicity was not spatially extensive. Hydrologic function of those drainages that sustained moderate to high burn severity is expected to be impacted by reduced infiltration, accelerated runoff and debris flows.

Risk Assessment: Threats to soil productivity and hydrologic functioning of watersheds
Probability of Damage or Loss: Likely,
Magnitude of Consequence: Minor.
Risk Level: Low
(No Treatments are recommended due to expected natural recovery over time and no critical values at high risk)

4. Cultural and Heritage Resources:

a. Low risk to known **cultural sites** that are **potentially eligible** for the NRHP due to the increased threat of erosion from upslope burned areas and flooding. Although artifacts exposure is greater due to the loss of groundcover, looting concerns are negligible due to the remoteness of the sites and recent flood events which have either washed away or inundated smaller artifacts and features. There are no sites within the burned area that were located during suppression and post fire recon operations.

Probability of Damage or Loss: Possible from erosion and exposure.
Magnitude of Consequence: Minor. Potential increase in looting; however, no known sites and the steepness of terrain will probably deter most people.
Risk Level: Low
(No Treatments are recommended due to expected natural recovery over time and no critical values at high risk)

B. Emergency Treatment Objectives:

The goal of the burned area emergency response treatments is to:

- Mitigate risk to Human Life and Safety, emergency ingress/egress, and impacts to water quality.

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

Land: NA
Channel: NA
Roads/Trails: 80%
Protection/Safety: 80%

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	*3 years after treatment*	*5 years after treatment*
Land	60%	60%	70%
Channel	NA		
Roads/Trails	90%/80%	90%/80%	90%/80%
Protection/Safety	80%	80%	80%

E. Cost of No-Action (Including Loss)

Value At Risk	Estimated Cost
Loss of Forest Roads	$225,000
Loss of Trail System (Wilderness and Non-Wilderness) & Recreational Opportunities	$100,400
Total	**$325,400**

F. Cost of Selected Alternative (Including Loss):

Value At Risk	Estimated Cost
Loss of Forest Roads • This treatment is estimated to be 90% effective in protecting the forest roads. • 10% failure rate of $225,000 plus $49,339 of the cost of the road treatments.	$274,339
Loss of Trail System and Recreational Opportunities • This treatment is estimated to be 80% effective in protecting the forest trails. • 20% failure rate of $100,400 plus $8,500 of the cost of the trail treatments.	$108,900
Total	**$ 383,239**

G. Skills Represented on Burned-Area Survey Team:

☒ Soils ☒ Hydrology ☒ Engineering ☒ GIS ☒ Archaeology
☒ Weeds ☒ Recreation ☒ Fisheries ☒ Wildlife
☒ Other:Botany

Team Leader: Mike Golden
Email: michael.golden@usda.gov **Phone(s)**: 435-559-0512

Forest BAER Coordinator:
Email: brooke.shakespeare@usda.gov **Phone(s):** 435-865-3721, 435-690-9277

Team Members: *Table 7: BAER Team Members by Skill*

Skill	**Team Member Name**
Team Lead(s)	Mike Golden (Fisheries)
Soils	Vaughn Thacker
Hydrology	Mike Golden/Vaughn Thacker
Engineering	Steven O'Neil
GIS	Laurie Parry
Archaeology	Laurel Glidden
Weeds	Mark Madsen/Rowdy Walch

Skill	Team Member Name
Recreation	Kyle Grambley
Other	Rhett Boswell (Wildlife)

H. Treatment Narrative (See Figure 1):

Roads and Trail Treatments:

ROADS - Increased runoff resulting from burned slopes and stream channels which are adjacent to roads will cause damage to roadway surfaces and drainage structures.

The minimal treatments required to reduce the threats are:

1. Culvert Replacement and Installation – The existing culverts will not have the capacity to pass potential runoff after the recent fire. New culverts will be installed in ditch lines on in-sloped road(s) that have insufficient relief culverts to prevent scouring of the ditch bottoms and resultant sediment delivery to streams.

2. Culvert Cleaning – Culvert cleaning includes the cleanout of catchment basins, inlets and outlets. The cleanout of catchment- basins below the inlet of the culvert is done to capture the sediment transported from the channel or ditch. Capturing the sediment will help in preventing the culvert inlet from being partially plugged or completely buried. Culvert outlet cleanout is done to remove any material that would impede the flow of water through the outlet of the culvert.

3. Roadside Streambank Stabilization – Placement of riprap to protect road fill slope from increased stream flows that leads to the loss of the road itself and to decrease the risk of washing road fill into adjacent streams.

The roads listed below were found to have or will have road drainage issues and at a minimum will require all or part of the treatments above. The roads and treatments are listed individually below:

FSR 30032

Culvert Cleaning: 3 Each – 24” diameter, 1 Each – 48” diameter

Culvert Replacement / Installation: 3 Replacement – 48” diameter x 50’ length

TRAILS - The trail treatments needed to provide for maximum effectiveness of water bars to efficiently route water and sediment from the trails, thereby preventing erosion of trail surface and minimizing impacts to water quality and additional sedimentation. Predicted increases in surface runoff/overland flow are expected to erode soils from the burned area and deliver sediment to adjacent streams. Trails within burn perimeter are excellent conveyors for routing significant volumes of sediment to nearby streams if drainage facilities are not adequate to process increased runoff. In addition, the increased flows can erode trail tread, delivering even greater amounts of sediment to nearby steams.

Trail treatments on Oak Grove Summit trail near high and moderate severity burned areas to ensure increased runoff will not destroy trail tread and contribute sediment to steams impacting water quality and additional sedimentation.
Design/Construction Specifications:

- Construct Check Dams
- Construct Grade Dips
- Construct Waterbars

Protection/Safety Treatments: Warning (Flood Hazard) Signs $1,000

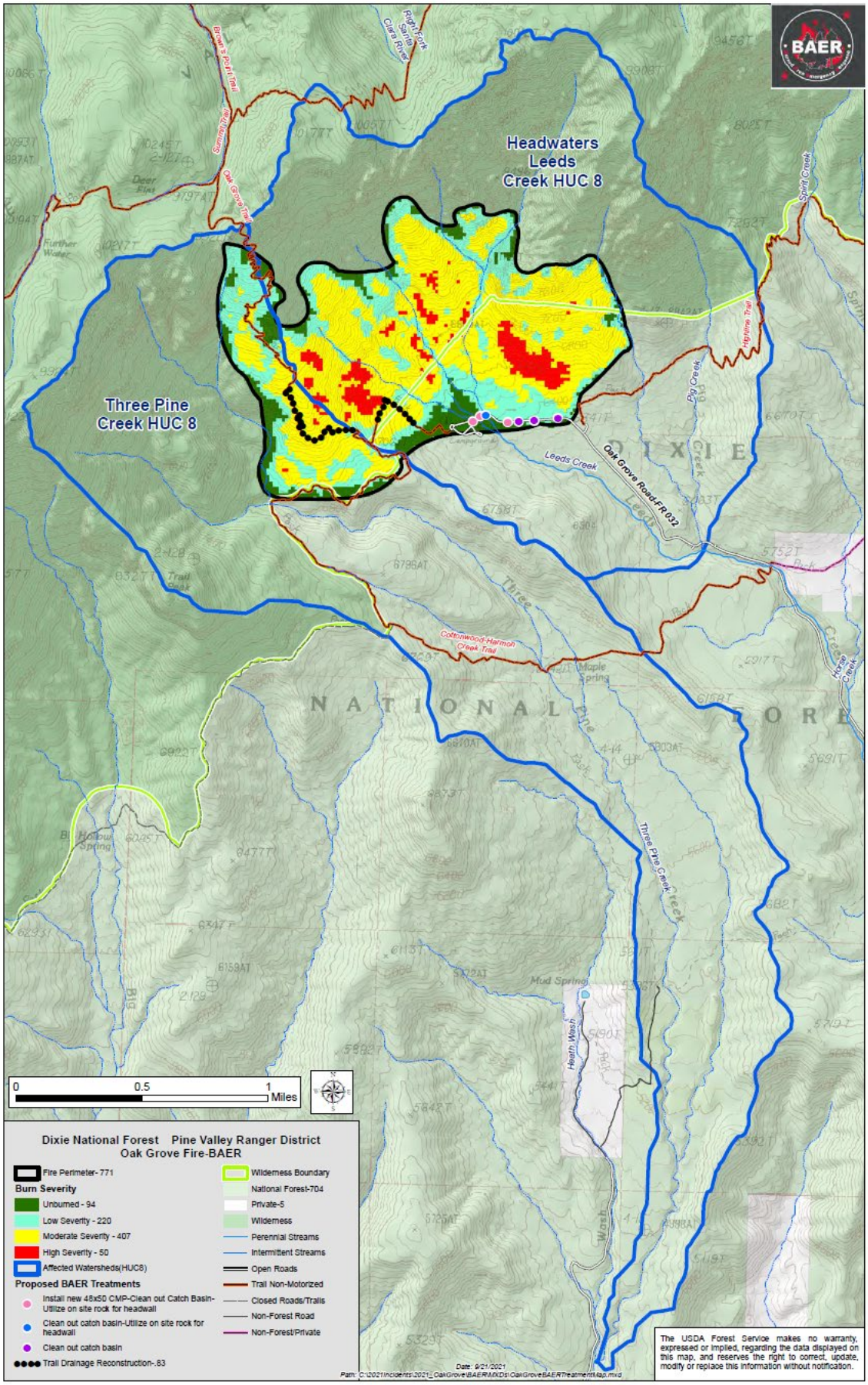

Figure 1. Map of 2021 Oak Grove Fire, it's burn severity and proposed BAER treatments.

I. Monitoring Narrative:

Roads and Trail Treatments:

Monitoring of the transportation system should begin immediately and take place after each significant rain event.

Protection/Safety Treatments:

Area will be gated (with existing gate system) when severe weather conditions are predicted.

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

			NFS Lands			Other Lands				All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
EDRR				$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	$0		$0		$0	$0
B. Channel Treatments										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treatments				$0	$0		$0		$0	$0
C. Road and Trails										
Road Treatments				$49,339	$5,446					$54,785
Trail Treatments				$8,500	$1,190					$9,690
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$57,839	$6,636		$0		$0	$64,475
D. Protection/Safety										
Warning Signage				$1,000	$0		$0		$0	$1,000
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$1,000	$0		$0		$0	$1,000
E. BAER Evaluation										
Initial Assessment	Report			---	$5,000		$0		$0	$5,000
				$0	$0		$0		$0	$0
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				$0	$5,000		$0		$0	$5,000
F. Monitoring										
				$0	$0		$0		$0	$0
				$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				$58,839	$11,636		**$0**		**$0**	**$70,475**
Previously approved										
Total for this request				**$58,839**						

PART VII - APPROVALS

KEVIN WRIGHT Digitally signed by KEVIN WRIGHT
Date: 2021.09.21 08:31:30 -06'00'

1. _____
Forest Supervisor Date