

Date of Report: 11/16/2020**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 #1 _____
☐ Updating the initial funding request based on more accurate site data or design analysis

PART II - BURNED-AREA DESCRIPTION**A. Fire Name: Sears****B. Fire Number: AZ-PNF-002852****C. State: Arizona****D. County: Maricopa****E. Region: 3****F. Forest: Tonto National Forest (TNF)****G. District: Cave Creek****H. Fire Incident Job Code: P3M9T3****I. Date Fire Started: September 25, 2020****J. Date Fire Contained: October 15, 2020****K. Suppression Cost: \$****L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**

1. Fireline repaired (miles): 0
2. Other (identify):

M. Watershed Numbers:*Table 1: Acres Burned by Watershed*

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
150602030507	Buck Basin-Verde River	56,834	6185	11.34
150602030701	Camp Creek	66,561	6011	10.23
150701020601	Seven Springs Wash-Cave Creek	65,970	1199	1.81
150602030702	Indian Spring Wash-Verde River	18,770	14	Trace

N. Total Acres Burned:*Table 2: Total Acres Burned by Ownership*

OWNERSHIP	ACRES
NFS	13409
OTHER FEDERAL (LIST AGENCY AND ACRES)	0
STATE	0
PRIVATE	64
TOTAL	13409

O. Vegetation Types: Interior Chaparral and Sonoran-Mojave Mixed-Salt Desert Scrub

P. Dominant Soils: There is a variety of parent material of the soils with granite, schist and conglomerate in the lower elevations to basalt mainly found in the higher life zones. The Sonoran Desert is dominated by Ustic Haplargids and Lithic Ustic Torriorthents that vary from shallow to deep with mostly clayey-skeletal particle size classes. The semidesert grasslands are dominated by Aridic and Typic Haplustalfs, which are primarily moderately deep, occurring on Basalt. The Juniper Grasslands and Chaparral are dominated by Typic and Lithic Argiustolls. The soils from these life zones are very fine textured and often have a smectitic (shrink-swell type clay) mineralogy class. About 7011 acres within the burn perimeter exhibited poor or unsatisfactory soil condition before the fire. All those acres are within the Sonoran Desert Map Units.

Q. Geologic Types: Basalt**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	1.5
INTERMITTENT	3.0
EPHEMERAL	115.1
OTHER (DEFINE)	

S. Transportation System:

Trails: *National Forest (miles):*19

Roads: *National Forest :* There are 63 roads within the burn perimeter

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	1512			4	1516	11
Low	8745			22	8767	65
Moderate	3092			33	3125	23
High	1			0	1	0
Total	13409			59	13409	100

B. Water-Repellent Soil (acres): 3,126**C. Soil Erosion Hazard Rating: 6,930****D. Erosion Potential: 2.27 ton/ac****E. Sediment Potential: 2.27 ton/ac****F. Estimated Vegetative Recovery Period (years): 5 years****F. Estimated Hydrologic Response (brief description):**

Estimated Hydrologic Response (brief description): A 60 minute/ 5-year, 10-year, and 25-year return interval were utilized to Within the three 6th-level subwatersheds with larger burned area, multiple catchments (smaller watersheds) were differentially affected by the fire. Catchments were delineated to evaluate the values-at-risk at a larger scale within these smaller watersheds. A pour point or drainage outlet was identified at the mouth of each of these catchments, and this point was utilized to delineate the drainage area above that point.

Two of the 6th – level watersheds had subwatersheds modeled using HEC HMS for pre and post burn runoff (Camp Creek and Seven Springs Wash-Cave Creek). One Wildcat5 model was used for subwatersheds within Buck Basin – Verde River 6th – level watershed. Drainage pour points were placed at identified downstream values at risk. Additional watersheds were delineated at recreation values at risk along the Verde River, but were not modeled because the entire watershed was outside of the burn area.

Both models required the following inputs: precipitation, curve numbers, time of concentration and a unit hydrograph. Precipitation data was downloaded from the NOAA Atlas-14 dataset for the centroid of the burned watershed area and models were run for the 24-hour storm with a 2, 5, 10, 25, and 100 year return interval. A 24-hour storm was chosen instead of the typical 1-hour storm because we are outside of monsoon season and NOAA confirmed that there is a near 0% chance of tropical storms this year (personal communication

Larry Hopper 10/8/2020). The Wildcat5 model used a custom storm distribution to simulate monsoon storms that is published in NOAA Atlas 14 (see Volume 1 Pg. 12, Table 4.1.3). Pre-fire curve numbers were assigned based on hydrologic soil groups and vegetation conditions provided from Forest Service Terrestrial Ecosystem Unit Inventory (TEUI) data. Post-fire curve numbers were determined by adding 2 CNs for light burn severity and 3 CNs for moderate burn severity to pre-fire CNs for the dominant TEUI units that were already represented by curve numbers between 87 and 89. For other TEUI units with CNs below 87 the normal procedure of adding 5+ CNs for light burn severity and 87 as a CN for moderate burn severity was used.

The US Geological Survey (USGS) Streamstats program was used to calculate the elevation change from the pour point to the highest point in the watershed and the longest flow path, both models used the Dunne and Leopold (1978) equation for determining Time of Concentration (Tc). Finally, the unit hydrograph was a SCS Dimensionless Cuvilinear hydrograph for both the HEC HMS and Wildcat5 models. Streamstats peak flow numbers are based on gaging station analysis rather than rainfall runoff relationships used by Wildcat5 and HEC HMS, which could account for overestimates or underestimates when comparing the correlation. Both the Wildcat5 and HEC HMS models were used to model post fire runoff conditions for clear-water flows (after ash and post fire debris have been flushed from the system); Wildcat5 for smaller watersheds and HEC HMS for larger watersheds

One Wildcat5 model and two HEC HMS models were built. Based on recreation concerns along the Verde River/Horseshoe Lake an additional sub-watershed was delineated, however, the watershed did not contain burn area so it was not modelled (see watersheds report for more).

PART V - SUMMARY OF ANALYSIS

Introduction/Background: The Sears Fire began September 25, 2020 near the Sear Kay picnic area within the Cave Creek Ranger District. Vegetation within the fire perimeter primarily consists of interior chaparral with senoran desert shrub in and along the southern boundary. The majority of the fire is affiliated with moderately steep and very steep gradients on mountain and hill landforms. The origins of the burn occurred southwest corner of the burn scar. Predominant parent material consists of basalt. Burn severity was determined using a number of metrics that include: Conversations with onsite personnel, BARC imagery, and infield analysis. Low burn severity occurred throughout the fire with areas of moderate and a trace area of high severity in the center area of the burn scar. Light burn severity is normally affiliated with an understory burn with charred black ash. Moderate and high burn severity had similar conditions due to the nature of how shrub species burn. Moderate burn severity areas were subject to fire within the shrub canopy with complete leaf consumption but skeletal formation of the shrub species has been retained. White smoke was primarily associated with the fire which normally indicates the soil was not subjected to intense heat. The majority of the area was exposed to light burn severity with the majority of the. Heavier fuels associated with down logs experienced periodic consumption that is associated with white ash which may exhibit hydrophobicity but the extent is minimal. High/moderate burn severity was limited to upper steep slopes primarily composed of shrubs. Shrub canopy cover was predominantly fully consumed and white ash is associated with these areas. These high/moderate burn severity sites are not expected to experience significant soil instability because they are rocky and well armored that protects the soil surface.

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

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. Recreational Residence
- b. Trails
- c. Roads
- d. Protection of forest visitors **RISK: Intermediate** (See Value at risk table for more)

2. Property (P):

- a. Recreational Residence
- b. Roads
- c. Trails (see recreation report for more)
- d. Regarding property during a storm event and the magnitude of consequence is *Minor*. **Risk: Very Low** (Area closure: there is a Forest closure in effect for the burn scar and the area with increased risk of flooding caused by the fire scar. The objective of this treatment is to prevent the public from entering the flood prone areas and areas with unstable rock and soil until after the increased threat of monsoon. Safety of public access will be re-evaluated to determine if the Forest closure needs to be extended or shortened. Management actions will investigate appropriate trail designation to account for post-fire public safety (i.e. unstable soils, falling rock, flooding, road infrastructure needs, and resource protection).

3. Natural Resources (NR):

- a. Hydrological Watershed conditions that increase the magnitude, timing, and volume of stormwater runoff and the volume of sediment and ash that these flows can transport can cause aggradation, down cutting, and/or widening of stream channels that can significantly reduce the functioning condition of these channels. The increased peak flows also pose a threat to , property and resources within and below the burned area. The probability of is *Unlikely* during a storm event and the magnitude of consequence is *Minor*. **Risk: Very Low**
- b. Regarding soils 65% of the fire was regarded as low-burn and 23% uh the fire was regarded as moderate burn. Probability of soil productivity damage from soil loss is unlikely and magnitude of consequences is *Minor*. Soil productivity and sedimentation production **Risk: Very Low**
- c. TNE species-There are no threatened or endangered species within this fire **Risk: N/A**
- e. Invasives: Within the Sears burn perimeter Stinknet, invasive thistles, Yellow Blue Stem and buffelgrass may become an issue postfire; It is very likely that I'll go in that fire suppression efforts have spread them It within the burned area. The BAER **Risk is high**.

4. Cultural and Heritage Resources:

The heritage analysis of the fire burn perimeter encompassed 107 sites. Ten of those sites were within the medium soil burn severity area. Close inspection of the documentation of these sites revealed they were all prehistoric sites in nature. Three of these sites were targeted for treatment as two of them were priority heritage assets (PHAs) and/or close to recreational opportunities/areas. They are larger multi-room, multi-compound sites.

Site 03120100074 Sears Kay Ruin

- a. Treatment Type: Remove burnt trees
- b. Treatment Objective: Prevent damage
- c. Treatment Description: Have sawyers remove burnt dead trees from around walls of structures to negate trees from toppling and pulling up roots destroying structure masonry walls.
- d. Treatment Cost: One or two district personnel (GS7) who are certified sawyers plus supervising archaeologist (GS9) for one day: approximately \$600.

Site 03120100190 Kentuck Ridge Ruin

- a. Treatment Type: Closure on FSR1058 and tree removal
- b. Treatment Objective: Dead tree removal helps prevent damage; closure keeps looting to a minimum.
- c. Treatment Description: Have sawyers remove burnt dead trees from around walls of structures to negate trees from toppling and pulling up roots destroying structure masonry walls. Keeping FSR1058 closed keeps recreationist away from the area and keep opportunistic looting low.
- d. Treatment Cost: Since FSR1058 is currently closed no costs are associated with the closure. Dead tree removal will need one or two district personnel (GS7) who are certified sawyers plus supervising archaeologist (GS9) for one day: approximately \$600.

Site 03120102243

- a. Treatment Type: Monitor
- b. Treatment Objective: To determine if trail access at the site is creating looting and to determine further treatment if necessary.
- c. Treatment Description: The Maricopa Trail was built within site boundaries, monitoring site in the late winter or early spring to determine if site is receiving damaging visitation and to consider additional treatment if necessary.
- d. Treatment Cost: Two days for GS9 Archaeologist. One day to determine baseline, second day to determine visitation: approximately \$1000.

B. Emergency Treatment Objectives: Protection of human life and safety. Protection of Forest Service property and resources.

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

Land Treatment of Ivasive weeds 100%

Channel N/A

Roads/Trails [Click here to enter text.](#)

Protection/Safety 100%

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	NA		
Channel	NA		
Roads/Trails	NA		
Protection/Safety	90%	95%	98%

E. Cost of No-Action (Including Loss): Increase risk of loss of life or injury during high flow events.

F. Cost of Selected Alternative (Including Loss): Click here to enter text.**Skills Represented on Burned-Area Survey Team:**

- ☒ Soils ☒ Hydrology ☒ Engineering ☐ GIS ☒ Archaeology
☒ Weeds ☒ Recreation ☐ Fisheries ☒ Wildlife
☐ Other: Range

Team Leader:

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Forest BAER Coordinator: Michael Martinez

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Team Members: Table 7: BAER Team Members by Skill

Skill	Team Member Name
Team Lead(s)	Ryan Nicholas
Soils	David Watson
Hydrology	Chad Yocum & Kelly Mott LaCroix
Engineering	Michelle Tom
GIS	
Archaeology	Clint Dalton
Weeds	Ryan Nicholas
Recreation	
Minerals	
Wildlife/Fisheries	Kelly Kelser
Range	
Other	Public Relations:

H. Treatment Narrative: Land Treatments: Invasive species treatment will be to conduct EDRR within this fire. Species to be expected is fountain grass , buffelgrass, Stinknet and yellow bluestem; Cultural and Heritage treatments: archeology.

Channel Treatments: No treatment

Roads and Trail Treatments: No treatment. Although no treatment is stated on this item it should be noted that direct recommendation of signage is still the plan for roads and trails as needed. The BAER team has a cache of signs that will be used for this effort

Protection/Safety Treatments: Area closure: there is a Forest closure in effect for the burn scar and the area with increased risk of flooding caused by the fire scar. The objective of this treatment is to prevent the public from entering the flood prone areas and areas with unstable rock and soil until after the increased threat of monsoon. Safety of public access will be re-evaluated to determine if the Forest closure needs to be extended or shortened. Management actions will investigate appropriate trail designation to account for post-fire public safety (i.e. unstable soils, falling rock, flooding, road infrastructure needs, and resource protection).

During and once the closure has been lifted, entrance to the burn scar will be signed: Burned Area Ahead: Hazardous Conditions, Flooding, Unstable Soils and Falling Rocks and Debris .

I. Monitoring Narrative: Monitoring of the area will occur prior to closure suspension to determine if road and trail closure order need extended due to continued precipitation events and/or impassible conditions.

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

Line Items	Units	Unit Cost	NFS Lands		Other \$	Other Lands				All Total \$
			# of Units	BAER \$		# of units	Fed \$	# of Units	Non Fed \$	
A. Land Treatments										
Archaeology Treatments	1	2,200	1	\$2,200	\$0		\$0		\$0	\$2,200
Invasives Species	1	3,500	1	\$3,500	\$0		\$0		\$0	\$3,500
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Land Treatments</i>				\$5,700	\$0		\$0		\$0	\$5,700
B. Channel Treatments										
				\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Channel Treatments</i>				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
Fencing Maricopa Trail				\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Road and Trails</i>				\$0	\$0		\$0		\$0	\$0
D. Protection/Safety										
				\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Protection/Safety</i>				\$0	\$0		\$0		\$0	\$0
E. BAER Evaluation										
Initial Assessment	Report			---	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				---	\$0		\$0		\$0	\$0
<i>Subtotal Evaluation</i>				\$0	\$0		\$0		\$0	\$0
F. Monitoring										
				\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Monitoring</i>				\$0	\$0		\$0		\$0	\$0
G. Totals				\$5,700	\$0		\$0		\$0	\$5,700
Previously approved										
Total for this request				\$5,700						

PART VII - APPROVALS

1. _____
 Forest Supervisor Date