Date of Report: 05/17/2022

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 safety and 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: Crooks

B. Fire Number: AZ-PNF-000271

C. State: AZ

D. County: Yavapai

E. Region: Southwestern R3

F. Forest: Prescott

G. District: Bradshaw

H. Fire Incident Job Code: P3PKW922 (0309)

I. Date Fire Started: 4/18/2022

J. Date Fire Contained: 96% - 5/17/2022

K. Suppression Cost: $29,000,000 (Projected)

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

1. **Fireline repaired (miles): Dozerline – 10.3; handline – 12.5**
2. **Other (identify):**

M. Watershed Numbers:

Table 1: Acres Burned by Watershed

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
150701020403	Big Bug Creek	38,326	133	Trace
150701030103	Crooks Canyon	11,978	2,564	21
150701030101	Groom Creek-Upper Hassayampa River	22,933	60	Trace
150701020205	Lynx Creek	26,682	1	Trace
150701030105	Milk Creek	25,419	5,998	24
150701020303	Upper Turkey Creek	16,400	553	3

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	8551
OTHER FEDERAL (LIST AGENCY AND ACRES)	
STATE	
PRIVATE	758
TOTAL	

O. Vegetation Types:

Chaparral, mixed conifer, and Ponderosa Forests.

P. Dominant Soils:

Table 3:Dominant Soil and Modeled Soil Loss

TES Map Unit	Total Acres	Parent Material	Veg Type	Slope Range	Erosion Hazard	Tolerance (T) Value t/ha	Average 1st Year Soil Loss t/ha
443	593	metamorphic	chaparral	16-39%	Moderate	4.5	37.3
448	838	granite	chaparral	16-39%	Moderate	4.5	25.1
453	207	metamorphic	chaparral	40+%	Severe	4.5	47.6
475	1880	granite	chaparral	40+%	Severe	4.5	51.3
479	38	granite	pinyon juniper	40+%	Severe	4.5	19.1
540	1505	metamorphic	ponderosa	40+%	Severe	6.7	22
545	787	granite	chaparral	16-39%	Severe	4.5	43.5
546	122	granite	ponderosa	16-39%	Moderate	6.7	17.1
547	337	granite	ponderosa	16-39%	Severe	4.5	9.6
555	868	metamorphic	chaparral	40+%	Severe	4.5	26.4
565	9	granite	ponderosa	6-15%	Moderate	4.5	0.04
581	225	basalt	ponderosa	16-39%	Severe	6.7	15.4
610	113	granite / metamorphic	mixed conifer	40+%	Severe	6.7	8.5
625	548	granite / metamorphic	mixed conifer	40+%	Severe	4.5	11.4
640	167	granite / metamorphic	mixed conifer	16-39%	Moderate	6.7	5
650	158	granite / metamorphic	mixed conifer	16-39%	Severe	6.7	7.7
660	881	granite / metamorphic	mixed conifer	40+%	Severe	6.7	15.6

Q. Geologic Types:

a. Granite, Metamorphic

R. Miles of Stream Channels by Order or Class:

Table 4: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERENNIAL	0.23
INTERMITTENT	14.2
EPHEMERAL	55.9
OTHER (DEFINE)	--

S. **Transportation System:**
Trails: *National Forest (miles):* 9.67 *Other (miles):*
Roads: *National Forest (miles):* 12.44 *Other (miles):* Private-1.12, County-5.92

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 5: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	623			99	722	8
Low	2165			345	2510	27
Moderate	3400			267	3667	39
High	2360			47	2407	26
Total	8548			758	9306	100

B. **Water-Repellent Soil (acres):** 9003
Prolonged drought conditions are resulting in water repellent soils pre-fire due to dry soil organic materials found in the surface horizons especially in the chaparral types. Drought induced repellency was reduced as you went up in elevation into the forested ponderosa and mixed conifer systems. However fire induced repellency went to deeper depths in these forested systems where there were longer residence times.

C. Soil Erosion Hazard Rating:

a. Slight - 0 acres

b. Moderate – 1736 acres

c. Severe – 7572 acres

D. Erosion Potential:
The average one year post-fire erosion rate for the entire fire was 24.6 t/ha based on a 5 year event (20% chance of exceedance).

E. Sediment Potential:
4559 cubic yards per square mile

F. Estimated Vegetative Recovery Period (years):
3-8 years. The Ponderosa Pine and Mixed conifer forest ecosystems have been identified as vulnerable do to climate change.

G. Estimated Hydrologic Response (brief description):
Watershed conditions following a fire, such as loss of stabilizing vegetation, decreased soil porosity, and increased hydrophobicity in soils, are all factors that can increase the magnitude, timing, and volume of stormwater runoff. Additionally, 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 pose a threat to life, property, and resources within and below the burned area.

Post-fire hydrologic response for 2, 5,10, 25, and 100 year 1-hour precipitation events were modeled using WildCat 5 for four small sub-watersheds within the Milk Creek and Crooks Canyon 6th code watersheds. Wildcat was chosen as the modeling method due to the size of the watersheds of interest. Storm events were taken from NOAA Atlas 14.

Runoff from the 2-year one-hour storm event (~1.18") was modeled to result in an average of 6 times greater flow than unburned conditions as a function of burn severity distribution throughout the 4 sub-watersheds. Runoff from the 5-year storm (~1.59") was modeled to result in **a**pproximately 3 times greater flow from unburned conditions. the 10-year one-hour storm (~1.92") resulted in 2 times increase from unburned conditions. Additional results are available in the Hydrologic Specialist report and table 7 below. The decrease in percent change as recurrence intervals lower in probability is due to increased precipitation depths **r**esulting in higher peakflows instead of curve numbers and change in vegetation composition dictating the model outputs.

Average of Four Sub-basin Wildcat Results (Percent Change: Prefire to Postfire)

Storm Event	Percent chance of occurrence, any given yr.	Precipitation Depth (in.)	Post-Fire Increase (%)
2-year	50%	1.18	631%
5-year	20%	1.59	308%
10-year	10%	1.92	202%
25-year	4%	2.38	138%
100-year	1%	3.13	92%

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Crooks Fire was discovered on April 18th, 2022 on the Prescott National Forest in a dispersed camping area approximatley 10 miles south of Prescott, AZ. The fire originated in a Pondorosa and mixed conifer forest vegetation type and strong winds combined with uphill topography allowed the fire to move quickly to the northeast and toward Prescott, AZ. The mixed conifer/Ponderosa Pine forest were located in the northern half of the fire above Palace Station and experienced mixed soil burn severity with moderate comprising the largest amount (about 40%). High severity displayed complete consumption of overstory cover and vegetative ground cover. These areas were subjected to longer residence times resulting in water repellency to deeper depths and complete loss of distinguisable vegetative ground cover. The majority of the high soil burn severity (over 80%) was in interior chaparral and was located in the southern half of the fire below Palace Station and just north of Battleship Butte. Complete consumption of shrub cover and vegetative ground cover was seen, while water repellency was present at shallower depths. Highest predicted post fire soils loss is predicted to occur within the steep slopes of chaparral systems in high burn severity (~24-69 tons/ha). Natural recovery is recommended due to rapid response of chaparral systems post-fire as well as the relatively small amount of acres of high severity in forested systems.

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

Table 8: 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. Public Use: The probability of usuage within drainages or stream crossings during a design storm event is *Possible* and the magnitude of consequence is *Major*. RISK**: High.**

b. Trail & Road: Trail and road use within the fire perimeter and within drainages downstream from the burned area pose a **High** risk. Probability of post fire flooding, unstable soils and falling rocks and trees is *Likely*. Magnitude of Consequence to human life and safety could potentially be *Moderate*.

2. Property (P):

a. Roads. Damage to road infrastructure relates to risks associated with post-fire flooding impacts. Road crossing are stable and have undergone previous armoring treatments. The probability of post fire high flows at road stream crossings is *Very Likely*. The magnitude of damage is *Minor* because road crossings are hardened. Risk **Low**.
However, on the Senator Highway (52), north of Palace Station (Registered National Historic Site), a drainage crossing with a culvert has been identified with the majority of the contributing watershed subjected to moderate burn severity. The probability of damage/loss to the road crossing road segment is *Likely* and magnitude of damage is *Moderate*. Risk: **High**.

b. Trails. There is a **very high** risk to approximately 3.85 miles of trails out of 9.66 miles within the burned area. These trail sections occur within or below moderate and high soil burn severity on soils with a severe erosion hazard in steep terrain. The major threat to these trail sections include first year erosion rates ranging from 29 t/ha to 60 t/ha. Post-fire accelerated soil loss levels are expected to exceed tolerable levels. Probability of trail loss is *Very Likely* and consequence is *Moderate.* Risk: **Very High**.

4. Natural Resources (NR):

a. Hydrology: There is increased threat to hydrologic function (magnitude, timing, and volume of storm water runoff) and changes in the condition of stream channels from post fire runoff and sediment. The probability of altered hydrologic function during a design storm event is *Likely* and the magnitude of consequence is *Minor*. **RISK: Low**. *Likely but temporary.

b. Soil: The forested systems with moderate soil burn severity had a *possible* probability of damage with a *moderate* magnitude of consequence leading to an **intermediate risk**. In the chaparral type the probability of damage is *very likely* but the magnitude of consequence is *minor* leading to risk of **low**. In areas of light soil burn severity the probability of damage is *unlikely* with a *minor* magnitude of consequence leading to a **very low risk**.
Soil productivity in the forested types where there was high soil burn severity had a *very likely* probability of damage with a *major* magnitude of consequence leading to a **very high risk**. This only accounted for less than five percent of the fire.

c. Aquatics: The probability of damage to Lowland leopard frog and Arizona toad aquatic resources within and downstream of the Crooks Fire is *Likely* and the magnitude of consequence is *Minor.* **Risk: Low.**

d. Minerals/Mines: Within the Crooks Fire, up to 15 historical mines were documented on NFS lands of various features and stages: prospects, adits, shafts, and associated mines spoils. Mining at the time was for the recovery of precious metals which has led

to concerns of heavy metals and related contaminants being present. The probability of damage or loss related to post fire impacts to water quality from mine spoils is ***likely*** with a magnitude of consequence of ***minor***. Risk: **Low.**

e. Wildlife: The probability of an adverse effect to Mexican spotted owl population and critical habitat from soil impairment affecting PCEs and increased risk of pest outbreaks is ***possible*** with a Magnitude of Consequence of ***minor***. Risk to MSO population and critical habitat is **Low**. Within the area of influence, probability of adverse effect to Northern Goshawk and Sonoran Desert Tortoise populations is ***unlikely*** with a Magnitude of Consequence of ***minor***. As such, risk to these species and their associated habitat is **Very Low**.

f. Dalmatian toadflax was present in burned areas, and its likelihood of expansion from the fire is high due to its proximity to high soil burn severity. Probability of Damage or Loss = *Likely*. Magnitude of Consequence = *Moderate*. Risk**: High**.

5. **Cultural and Heritage Resources:**There are 18 sites located within the Crooks Fire boundary—5 are eligible for listing in the National Register of Historic Places, 10 are not eligible, and 3 are unevaluated. There are no known National Register eligible sites in the high severity areas. The high soil burn severity areas with steep slopes are the most susceptible to erosion, where there is a low probability for archaeological sites. There is very little chance that post fire natural processes, such as erosion, will have an adverse effect on heritage resources. Post fire impacts to heritage resources is ***unlikely*** with a magnitude of consequence of ***moderate***, therefore the post fire risk to heritage resources is **Low**.

B. Emergency Treatment Objectives:

Human Life and Safety – Post warning signs to inform the public of post-wildfire hazards that exist within the burned area and downstream.

Trail Infrastructure – Minimal work should be completed to save prioritized trail segments from total loss requiring full redesign and reconstruction.

Road Infrastructure – Ensure the primary route of Senator Hwy remains accessible and FSR 70 and 81 to Lookout Tower.

Invasives Early Detection/ Rapid Response – Early detection and rapid response to targeted areas to detect infestation of invasive and noxious weeds in burned areas as well as locations impacted by fire suppression activities.

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

Land: N/A
Channel: N/A
Roads/Trails: 90
Protection/Safety: 100

D. Probability of Treatment Success

Table 9: Probability of Treatment Success

	1 year after treatment	***3 years after treatment***	***5 years after treatment***
Land			
Channel			
Roads/Trails	75	90	95
Protection/Safety	80	90	95

E. Cost of No-Action (Including Loss): $845,900

F. Cost of Selected Alternative (Including Loss): $264,900

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: David Moore
Email: david.moore@usda.gov **Phone(s)**: 928-778-3753

Forest BAER Coordinator: David Moore (PNF),
Email:david.moore@usda.gov
Phone(s): 928-778-3753

Team Members: *Table 10: BAER Team Members by Skill*

Skill	Team Member Name
Team Lead	David Moore
Soils	Nori Koehler
Hydrology	Chad Yocum
Engineering	Sergio Montanez(t)
GIS	Hillary Hudson
Minerals	Frances Alvarado
Archaeology	John Rose
Weeds	Francisco Anaya
Recreation	Paul Dawson, Michael Reveile (t)
Aquatics	Albert Sillas
Wildlife	Amber Bishop (t), Michael Kellett

H. Treatment Narrative:

Land Treatments:
Early Detection Rapid Response is recommended to protect naturalized plant communities within Ponderosa Pine Ecosystem high soil burn severity areas and suppression disturbance areas. Detection survey is expected to allow for protection of ecological integrity of native plant communities. Surveys and rapid response eradication treatments will begin in the fall of 2022 or 2023 during the flowering periods of weed species. A biological control method will be used to treat for Dalmatian toadflax (Linaria dalmatica) infestations which is outlined and approved in the FEIS for Integrated Treatment of Noxious or Invasive Weeds for the Prescott National Forests. This treatment method is appropriate due to the amount and size of the burned area and a high risk potential for the spread of this noxious weed species.

Noxious Weed Early Detection – Rapid Response

Item	Unit	Cost	Total
Linaria dalmatica biocontrol	10 boxes	$150.00	$1,500.00

Channel Treatments: N/A

Trail Treatments:
Trail storm proofing is recommended to protect trail infrastructure within the burned area. Minimal work should be done to stabilize trail alignments preventing total loss. Total trail loss would not only require total reconstruction, but once the alignments are undetectable the entire trail would need a total redesign and layout. The work would include rapid trail benching, removing backslope sloughing to keep the trail alignment identifiable, focused on priority trail segments in or below high and moderate soil burn severity on soils with a severe erosion hazard in steep terrain. Trail treatments will be completed by one 5- 8person crew. The Prescott NF will modify existing agreements to expedite the treatments being completed. See trail treatment map for specific locations.

Trail Justification Treatment and Mileage

Number	Trail Name	Priority	Miles	Justification
281	E Cross L	1	2.3	Access to historic cabin listed on the national register; provides fire response to remote area
282	Collins	2	0.52	Provides access to remote area for fire response
284	Yankee Doodle	3	1.01	Provides multi-use motorized recreation in remote and scenic area of the Bradshaw Mountains; provides access to remote area for fire response

The Conservation Corps Crew is anticipated to conduct the storm proofing which equates to ~ $1,875/ day for 8 days or $3,900/ mile @ 3.85 miles for a grand total of $15,000

Road Treatments.

One culvert will be removed and low water crossing will be armored to protect Senator Highway (52) crossing integrity north of Palace Station (Registered National Historic Site). One Culvert removal and drainage crossing armoring @ $800.

Culvert/Low Water Crossing	Quantity	Cost	Total
Senator Highway (52)	1	$800	$800

Protection/Safety Treatments:

An administrative closure is currently in place due to suppression repair. However this is not part of BAER but has ancillary benefits for post-fire risks. Sign proposed locations are strategical located to warn the public of potential post-fire hazards. Trail signage is predominantly affiliated with trailheads. The highest risk from the burned area occurs within the footprint and downstream of the fire scar to the confluence with the Milk Creek.

Prescott NF -Install 10 warning sides on roads and 4 warning signs on trails as depicted within the treatment map.

Sign Cost Estimate

Item	Quantity	Cost	Total
Trail Warning Sign	4	$130.00	$520.00
Road Warning Sign	10	$130.00	$1300.00
		Total	$1,820.00

I. Monitoring Narrative:As part of General Force Account, With the importance of Senator Hwy, periodic Road Storm Inspection and Response will be conducted to protect road infrastructure for ingress.

Road Storm Inspection and Response

Item	Cost/Event	Events	Total
Labor	$600.00	2	$1,200.00
Prescott National Forest	**NON-BAER Request**		**$1,200.00**

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

Line Items	Units	Unit Cost	# of Units	BAER $	Other $	# of units	Fed $	# of Units	Non Fed $	Total $
A. Land Treatments										
NW Early Detection/Treatme	bio contro	$150	10	$1,500	$0		$0		$0	$1,500
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$1,500	$0		$0		$0	$1,500
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										
Trail Storm Proofing	miles	$3,900	4	$15,015	$0		$0		$0	$15,015
Senator Hwy Culvert	removal	$800	1	$800	$0		$0		$0	$800
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$15,815	$0		$0		$0	$15,815
D. Protection/Safety										
Road/Trail Hazard Signs	signs	$130	14	$1,820	$0		$0		$0	$1,820
Road Closure Gate				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$1,820	$0		$0		$0	$1,820
E. BAER Evaluation										
Initial Assessment	Report	$31,250		---	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				$0	$0		$0		$0	$0
F. Monitoring										
Force-Senator Hwy Storm Patrol				$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				$19,135	$0		**$0**		**$0**	**$19,135**
Previously approved										
Total for this request				**$19,135**						

PART VII - APPROVALS

1._____

Forest Supervisor Date