Date of Report: 7/25/2021

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: Bear Canyon

B. Fire Number: AZASF-00624

C. State: AZ

D. County: Greenlee

E. Region: Region 3

F. Forest: Apache-Sitgreaves National Forests

G. District: Clifton RD

H. Fire Incident Job Code: P3N28C

I. Date Fire Started: 06/16/2021

J. Date Fire Contained: not contained as of 07/27/2021

K. Suppression Cost: 150K

L. Fire Suppression Damages Repaired with Suppression Funds (estimates): Click here to enter text.
1. **Fireline repaired (miles): 0**
2. **Other (identify):** Click here to enter text.

M. Watershed Numbers:

Table 1: Acres Burned by Watershed (see soil burn severity map on Figure 1 located at the end of the report)

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
150400050205	Bear Canyon	14,983	3,609	24%
150400050202	East Eagle Creek	28,095	14,491	52%
150400040701	Strayhorse Creek	18,622	4,491	24%
150400050206	Mud Springs Canyon-Eagle Creek	32,239	947	3%

N. Total Acres Burned:

Table 2: Total Acres Burned by Ownership

OWNERSHIP	ACRES
NFS	23,868
OTHER FEDERAL (LIST AGENCY AND ACRES)	
STATE	
PRIVATE	
TOTAL	23,868

O. Vegetation Types:

Vegetation Type	Acres	Percentage
Douglas-Fir and Mixed Conifer	122	0.5%
Juniper Woodland (Alligator, Utah, One-seed)	5,527	23.5%
No Data	321	1.4%
Oak Woodland	1,506	6.4%
Pinyon-Juniper	4,073	17.3%
Ponderosa Pine	11,977	50.8%
Southwestern White Pine	39	0.2%

P. Dominant Soils:

Dominant Soils	Acres	%
Lithic Argiustolls	12,996	54%
Lithic Haplustalfs	2,011	8%
Typic Argiustolls	2,552	11%
Udic Haplustalfs	6,240	26%

Q. Geologic Types:

Geology Types	Acres	%
Basalt	10714	45%
Basalt or Conglomerate	2985	13%
Basalt, Limestone, Granite, or Rhyolite	9865	42%

R. Channels by Order or Class:

Table 3: Miles of Stream Channels by Order or Class

STREAM TYPE	MILES OF STREAM
PERRENIAL	7.0
INTERMITTENT	66.0
EPHEMERAL	16.3
OTHER (DEFINE)	

S. Transportation System:

Trails: *National Forest (miles):* 54 *Other (miles):*
Roads: *National Forest (miles):* 11.2 *Other (miles):* 16

PART III - WATERSHED CONDITION

A. Burn Severity (acres) (see Figure 1):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity (SBS)	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	4,267					18%
Low	13,741					58%
Moderate	5,581					23%
High	275					1%
Null(obscured)	4					<1%
Total	23,868					

B. Water-Repellent Soil (acres): approx. 210ac. Area in the high soil burn severity had patchy hydrophobicity, estimate ~75% of the high SBS has hydrophobic properties

C. Soil Erosion Hazard Rating: Severe 18,035ac., Moderate 3,406ac., Slight 2,428ac.

D. Erosion Potential: 1.25 tons/ac **Sediment Potential:** 26,739 tons

F. Estimated Vegetative Recovery Period (years): 1-3yrs for shrubs and forage; ~5-10yr for overstory species to establish new growth, this could take longer, up to 25 years in areas of extensive high or moderate soil burn severity

G. Estimated Hydrologic Response (brief description): Hydrologic response was estimated for two HUC-6 watersheds that feed into Eagle Creek, namely Bear Canyon and East Eagle. Hot Air Canyon is a sub-basin of East Eagle and was also modeled independently. Robinson Canyon is a sub-basin of Mud Springs Canyon and was also modeled. Strayhorse Canyon watershed was modeled which empties into the Blue River. Four small catchments surrounding Rose Peak were modeled due to their potential effects on US Highway 191. Changes in runoff between pre-fire and post-fire conditions was estimated using the Wildcat5 model. A typical 10-year (1.65 in/hr) precipitation event for this area was modeled. Precipitation frequency data was taken from the NOAA Atlas 14 dataset. Curve Numbers used to calculate runoff partitions were taken from the 2017 USDA Engineering Handbook, and Wildcat5 model suggestions. Time to concentration of peak runoff was estimated with Kirpich's equation. Results are shown in the table below.

Model	Area (Acres)	High & Moderate SBS Acres	Low SBS Acres	10-year Storm Pre-fire Flows (cfs)	10-year Storm Post-fire Flows (cfs) +Increase	Flood Hazard Potential
Bear Canyon Watershed	14,983	1,313 (9%)	1,110 (7%)	1550	1,915 (+24%)	Low
East Eagle Watershed	28,095	3,227 (11%)	9,816 (35%)	1620	2,820 (+74%)	Moderate
Strayhorse Watershed	18,622	1,283 (7%)	2,149 (12%)	1615	2,030 (+26%)	Low
Robinson Canyon	1,047	21 (2%)	637 (61%)	530	660 (+24%)	Low
Hot Air Canyon	4,668	1,396 (30%)	2,899 (62%)	550	1,930 (+250%)	High
Rose Peak Catchment 1	41	41 (100%)	0 (0%)	3	70 (+2233%)	High
Rose Peak Catchment 2	26	25 (96%)	1 (4%)	4	95 (+2275%)	High
Rose Peak Catchment 3	62	45 (73%)	11 (18%)	20	125 (+525%)	High
Rose Peak Catchment 4	80	18 (23%)	9 (11%)	30	55 (+83%)	Moderate

Estimated flood potential results were **Low** out of Bear Canyon, Strayhorse Canyon and Robinson Canyon. Flood activity should be monitored at these locations. East Eagle Creek was **Moderate**. Floods from East Eagle Creek will perpetuate downstream into the Mud Springs Canyon watershed, where several forest in-holding properties and a county road are located along the mainstream corridor of Eagle Creek. Therefore, elevated flood threats are pertinent to the county road and all the in-holdings along the stream. Three out of four small catchments surrounding Rose Peak were **High** flood potential, and the other was moderate. Channel gradients for the small catchments range from 30 – 60%. As summer monsoonal rainfall season is underway in the White Mountains Region, floods along Highway 191 from these catchments are imminent.

The US Geological Survey has estimated the probability and magnitude of debris flows within and from the burned area and developed a debris flow hazard rating from the combination of these factors for various rainfall intensities for watersheds within the burned area. They have developed debris flow hazard ratings for both basins (catchments) and stream channels. Their models estimate a low level of debris-flow hazard for most of the area burned by the Bear Fire. Most stream reaches and basins have a 20% or less likelihood of debris-flow occurrence at the modeled rainfall intensity. A higher level of debris-flow hazard occurs in a much smaller number of watersheds above Little Strayhorse Creek, along the eastern burn perimeter, and along a few stream reaches near Bear Canyon, west of Hwy 191. Most of the burn area requires rainfall rates greater than 36 mm/h to exceed a 50% likelihood of debris-flow occurrence. High hazard areas require much more modest rainfall rates between 16-28 mm/h to exceed a 50% likelihood of debris-flow occurrence. Most watersheds are estimated to produce volumes between 1,000 – 100,000 m^3, resulting in a low to moderate combined debris-flow hazard for most of the burn area. The model-estimated rainfall thresholds (segment-scale) for years 1 and 2, and the corresponding recurrence intervals are as follows:

YEAR 1:
15-minute: 46 mm/h, or 0.45 inches in 15 minutes, RI = 0.8 years
30-minute: 34 mm/h, or 0.70 inches in 30 minutes, RI = 0.9 years
60-minute: 32 mm/h, or 1.30 inches in 60 minutes, RI = 3.5 years

YEAR 2:
15-minute: 60 mm/h, or 0.60 inches in 15 minutes, RI = 1.5 years
30-minute: 44 mm/h, or 0.90 inches in 30 minutes, RI = 2.0 years
60-minute: 43 mm/h, or 1.75 inches in 60 minutes, RI = 13.0 years

PART V - SUMMARY OF ANALYSIS

Introduction/Background

The Bear Fire resulted in approximately 23 % moderate and 1 % high soil burn severities, with the remainder at unburned or low. A significant portion (52%) of the upper subwatershed Eagle Creek was within the fire perimeter. Modeling results for larger catchments showed Hot Air Canyon and Eagle Creek with the highest increases, 250% and 74 % respectively, in post-fire peakflows. Peakflow increases and debris flow probabilities were dramatic on the slopes of Rose Peak.

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):

US Highway 191 is immediately below portions of high soil burn severity and rated as 'very high' risk based on a 'major' magnitude of risk for potential flooding and debris flow incidents and 'very likely' of an event occurring. Forest Service Road (FR) 501 provides the only vehicular access to the active Rose Peak Lookout tower. Given the road's location on a steep slope with high soil burn severity (very high probability of damage) and a 'major' magnitude of consequence it rated out as a 'very high' risk. County Road 217 is less likely to see impacts therefore was rated as a 'high' risk as it is several miles downstream of the burned area. This road is susceptible to flooding and washing out at a number stream crossings and locations along Eagle Creek. Several hiking trails were within or downstream/downslope of high and moderate soil burn severity areas were considered to be in 'high' to 'very high' risk categories, these include trails 345, 19, 46, 16, 346, and 22.

Table 6. Recreation trails affected by the fire.

Trail No.	Trail Name	Trail Length	High Severity	Mod Severity	Low Severity
46	BEAR CANYON	4.6945	0.00	1.00	1.61
19	BEAR SPRINGS	2.36	0.34	1.02	0.87
346	COTTONWOOD TANK TRAIL	4.03	0.00	0.91	0.82
22	CRABTREE	4.87	0.00	0.08	3.44
348	CRABTREE PARK TRAIL	2.5	0.00	0.00	0.35
79	EAGLE NATIONAL RECREATION TR	22.74	0.34	2.80	5.35
33	EAST EAGLE	10.99	0.00	0.04	5.33
31	HAGAN CORRAL	2.82	0.00	0.08	0.91
47	HIGHLINE	17.63	0.00	0.02	0.07
15	HOT AIR	5.12	0.08	1.22	3.60
91	HOT AIR SPUR	1.1	0.00	0.04	1.01
89	LENGTHY CANYON	3.42	0.00	0.10	0.20
49	MUD SPRINGS	1.2	0.00	0.00	0.01
25	RED MOUNTAIN	7.22	0.00	0.06	0.12
27	ROBINSON MESA	11.2451	0.00	1.52	6.21
345	ROSE PEAK TRAIL	0.52	0.13	0.23	0.01
18	SALTHOUSE	6.68	0.00	0.00	0.01
16	SHEEP SADDLE	1.46	0.03	1.26	0.19
20	STRAYHORSE	12.3	0.00	0.04	0.00
9	WAR FINANCE	2.28	0.00	0.16	1.77
	TOTAL MILES PER BURN SEVERITY		**0.92**	**10.58**	**31.88**

2. **Property (P):**All the aforementioned roads and trails are at risk of damage. There are a properties location downstream along Eagle Creek, however based on their location and relative position above the floodplain are at 'low risk'
3. **Natural Resources (NR):**There are no wildlife BAER VARs at risk from the fire. Regarding aquatics resources, Eagle Creek has loach minnow and is designated critical habitat as well has spikedace and is considered Proposed Critical Habitat. Also, roundtail chub occupied habitat is located along Eagle Creek. This year a federal judge ordered the U.S. Fish and Wildlife Service (FWS) move forward with evaluating the status of a rare river fish in New Mexico and Arizona and potentially list it for federal protections under the Endangered Species Act. Potential post-fire effects and resulting impacts to the candidate species and associated habitat are: short and long term modification of suitable and occupied habitat due to scouring, sediment and debris flows, modifications to water quality due to sediment and ash, modification of streamside vegetation and stream bank conditions,

loss of population due to ash flow. The magnitude of consequence for the occupied habitat is rated 'minor' with a probability of damage or loss 'likely' giving an overall risk of 'low'.

4. **Cultural and Heritage Resources:**The Apache-Sitgreaves National Forests contains high densities of cultural resources. However, much of the Baer Fire burn area has not been inventoried for cultural resources. At present, roughly 5000 acres of the 23867-acre burn area have been inventoried for cultural resources. A total of 43 known archaeological resources are located within the Bear fire burn area. Increased flows of runoff and sediments as well as hazard trees pose a threat to archaeological sites and historic properties. A total of ten of these known cultural resources were revisited for the current Bear Fire BAER assessment. Of the resources visited during the Bear Fire BAER assessment four sites were previously recommended as being eligible for NRHP status (AR 03-01-01-418, AR 03-01-01-519, AR 03-01-01-522, and AR 03-01-01-523), four sites were never fully evaluated for NRHP status and are considered "unevaluated" (AR 03-01-01-269, AR 03-01-01-394, AR 03-01-01-517, and AR 03-01-01-520), and two were previously evaluated as being not eligible for NRHP status (AR 03-01-03-270 and AR 03-01-03-518). Portions of the Coronado Scenic Byway (US Highway 191) were also assessed during the current assessment. Portions of this historic travel route are recorded as a NRHP eligible archaeological site (AR 03-01-01-317). For many of these resources the probability of damage or loss associated with post-fire effects is "possible" (10-50% probability) and the magnitude of consequences is minor resulting in a relatively low risk in the BAER matrix. Because of the low risk assessment potentially associated with post-fire effects to heritage resources, no site-specific treatments are warranted for the current BAER analyses. However, site AR 03-01-01-317, the Coronado Scenic Byway/US Highway 191, bisects the fire perimeter. While many of the features contributing to the site's significance were within low burn severity areas or were unburned, some portions of the current route of US 191 would benefit from treatments. This is especially so for those areas that experienced a high severity burn north and west of Rose Peak. If treatments such as mulching and/or seeding are conducted in these areas, these treatments would also benefit deposits associated with site AR 03-01-03-394, the remains of an historic camp located at the base of Rose Peak. These treatments would limit the amount soil displacement and runoff potentially washing over site AR 03-01-03-394.

Range Infrastructure: Several miles of pasture fencing were impacted by fire. A separate Minor facilities and Infrastructure Rehabilitation Pilot request of funding will be submitted.

Table 7. Miles of fence affected by the Bear Fire by burn severity.

Severity	Sum of Fence Miles Impacted
High	0.57
Moderate	6.84
Low	13.07
Unburned/Very Low	4.89
Grand Total	**25.38**

B. Emergency Treatment Objectives: Reduce risk to public health and safety by means of working with cooperative agencies including Greenlee County government, the National Weather Service, United States Geological Society, and the Arizona Department of Transportation. The National Weather Service was contacted to provide a burn scar flood warning for the area. The National Forest worked with Arizona Department of Transportation to temporary close an at-risk stretch of US Highway 191 until the recent high impact storm systems had passed. Communication with the public via press releases and social media regarding post-wildfire hazards is occurring. We are requesting funding for installation of warning signs to place near roads and trails regarding potential post-wildfire hazards. Several at 'very high' risk trails are closed until after the conclusion of the monsoon season. In addition, funding is requested to prevent road prism deterioration via road inspection and response actions on likely impacted Forest Service maintained roads. ADOT has been taking storm proofing actions on US Highway 191.

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

Roads and Trail Treatments: (see Figure 2) $1,500 for each storm inspection and response x 15 responses = $22,500

Protection/Safety Treatments: (see Figure 2) Road sign installation: Signs $150/ each x 18 = 1,800 (+) Labor 2 people per day installation @ $700/day x 2 days = $1,400 for a total of $3,200 or $178/sign

I. Monitoring Narrative:

None requested

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										
				$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 Inspection and Respor	event	1,500	15	$22,500	$0		$0		$0	$22,500
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road and Trails				$22,500	$0		$0		$0	$22,500
D. Protection/Safety										
Installation of signs on trails and roads		178	18	$3,204	$0		$0		$0	$3,204
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Protection/Safety				$3,204	$0		$0		$0	$3,204
E. BAER Evaluation										
Initial Assessment	Report	$8,259	1	---	$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										
				$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				$25,704	$0		**$0**		**$0**	**$25,704**
Previously approved										
Total for this request				**$25,704**						

PART VII - APPROVALS

1. _____ July 30, 2021
Forest Supervisor Date

Land NA **Channel** NA
Roads/Trails high probability, no damaging storm yet **Protection/Safety** high probability

D. Probability of Treatment Success

Table 8: Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land			
Channel			
Roads/Trails	90%	95%	100%
Protection/Safety	100%	100%	100%

E. Cost of No-Action (Including Loss): Loss of 1 mile of ML-2 Road at $40,000/mile is $40,000. Also, could restrict vehicular access to active lookout tower. Would not protect the public via signage from entering hazardous during flooding trails and roads.

F. Cost of Selected Alternative (Including Loss): $25,704 for road inspection and response and warning signs.

G. Click here to enter text.**Skills Represented on Burned-Area Survey Team:**

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

Team Leader: Paul Brown
Email:paul.a.brown@usda.gov **Phone(s) (928) 333-6308**

Forest BAER Coordinator: Paul Brown
Email:paul.a.brown@usda.gov **Phone(s):(928) 333-6308**

Team Members: *Table 9: BAER Team Members by Skill*

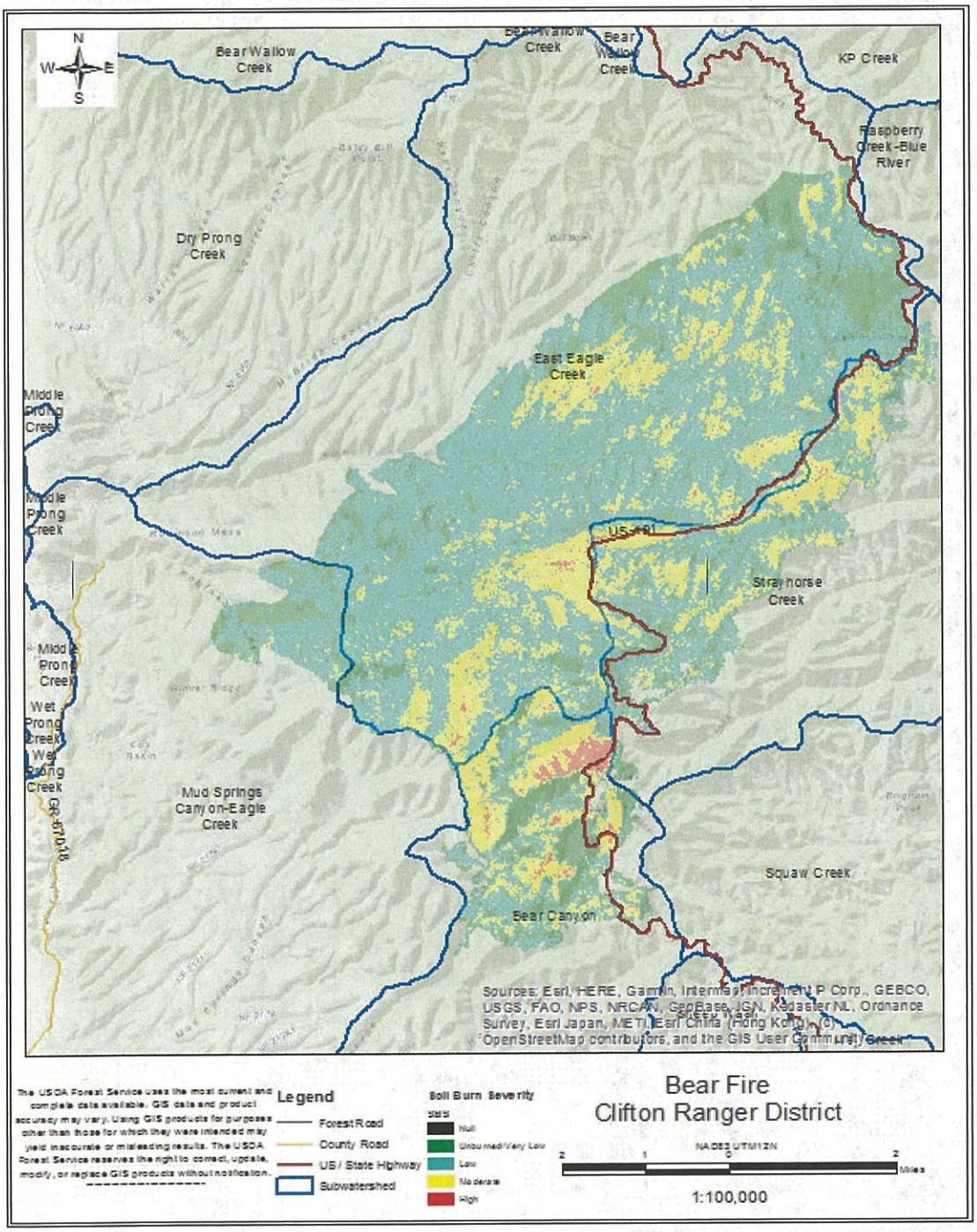
Skill	Team Member Name
Team Lead(s)	Paul Brown
Soils	Kristi Meier
Hydrology	Dan Bone
Engineering	Chris Miller
GIS	
Archaeology	Matt Taliaferro
Weeds	
Recreation	Chris Miller
Other	

H. Treatment Narrative:

Land Treatments: Aerial mulching using wood shreds was considered on 67 acres that burned at high and moderate soil burn severity above Highway 191, however the ability to implement this treatment before the first damaging storm was not thought to be feasible. The suppression team did complete contour felling on the slopes of concern above Highway 191. Additional tree contour felling is planned to occur through non-BAER funding means. ADOT is removing hazard trees within their road right-way along Highway 191. The Greenlee County is monitoring and has prepared for potential impacts to County Road 217.

Channel Treatments: None requested

Figure 1.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Bear Wallow Creek
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Raspberry Creek-Blue River
Dry Prong Creek
East Eagle Creek
Middle Prong Creek
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GR-67018
Mud Springs Canyon-Eagle Creek
Squaw Creek
Bear Canyon
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), (c) OpenStreetMap contributors, and the GIS User Community
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Legend
Forest Road
County Road
US / State Highway
Subwatershed
Soil Burn Severity
Null
Unburned/Very Low
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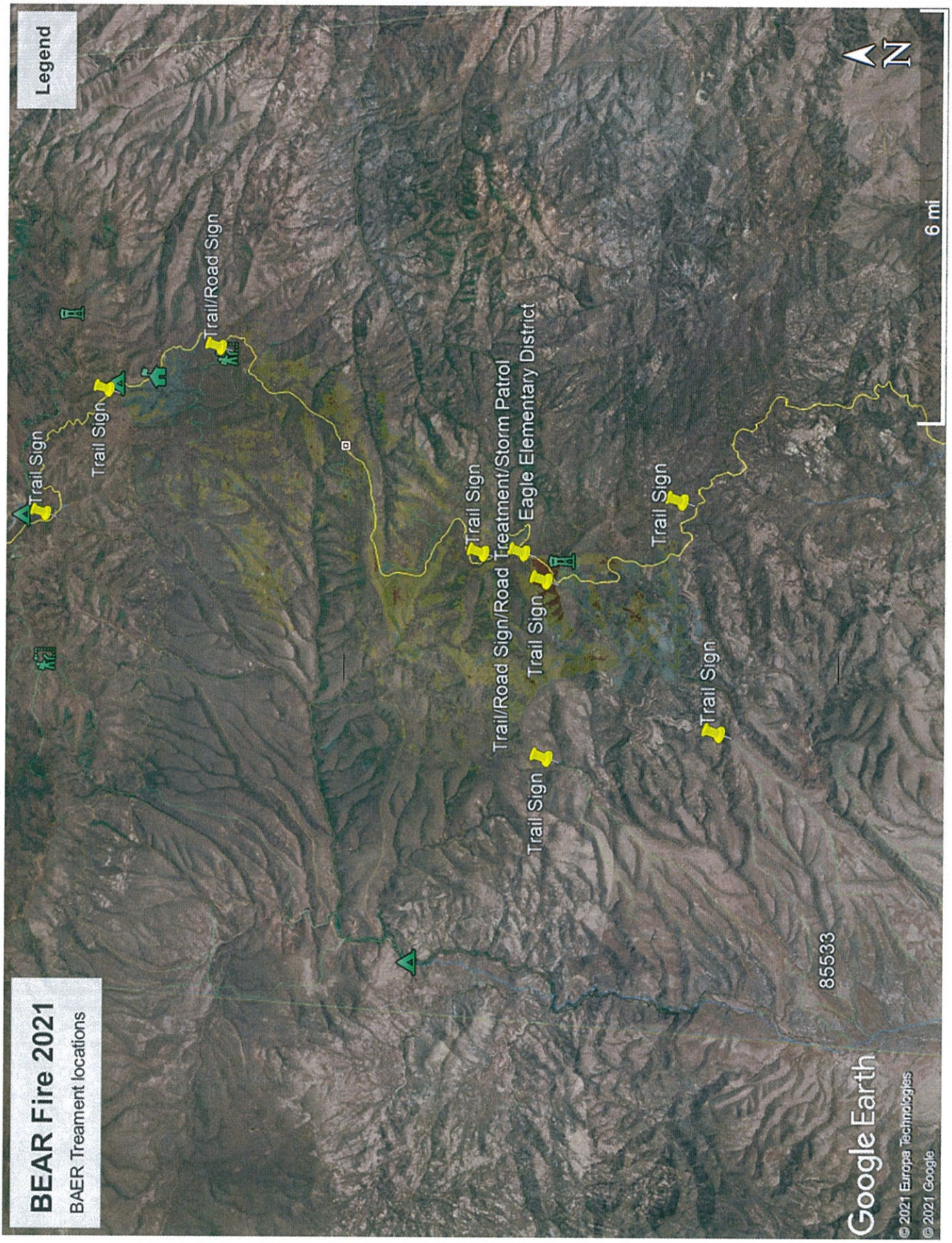
Figure 2.


BEAR Fire 2021
BAER Treament locations
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Trail/Road Sign
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Trail/Road Sign/Road Treatment/Storm Patrol
Eagle Elementary District
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