

Woodbury Fire

BURNED AREA REHABILITATION PLAN

UNIT: Tonto National Monument (National Park Service)

LOCATION: Roosevelt, AZ

DATE: July 17, 2019

PREPARED BY: Salek Shafiqullah, Intermountain Regional Hydrologist
John Thornburg, Fire Management Officer Southern Arizona Fire Group

Submitted By: Duane C. Hubbard *Duane C. Hubbard*
Superintendent

FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	Woodbury Fire
Fire Number	L951
Agency Unit	Tonto National Monument
Region	Inter Mountain Region
State	Arizona
County	Gila
Ignition Date/Cause	June 8, 2019/Unknown Cause
Date Contained	July 15, 2019 @ 1900
Date Controlled	
Jurisdiction	Acres
NPS - Tonto National Monument	994
Arizona State	75
Private	194
USFS - Tonto National Forest	125,329
Total Acreage	126,591

Statement of Need

The Woodbury fire burned through Tonto NM on June 21, 2019. The fire burned 994 Acres within Tonto NM. Fire crews were successful in mitigating impacts to park infrastructure and many of the known archaeological features in the park. Fire severity within the park is low to moderate with some unburned pockets.

For park staff and visitor safety an assessment of hazard tree and cactus along trails, near park infrastructure and hazard mitigation is needed.

A quick assessment of known archeological features (both previously known sites and incidental discoveries) in the area of the Woodbury wildfire has been completed to identify sites receiving impacts from the fire. In order to fully understand the degree of impacts to known archeological sites in the area, a more substantial assessment is required. Follow-up reporting of mitigations is needed to stabilize these sites will also be required.

- Assess fire-caused danger to known archeological sites.
- Implement landscape treatments around sites.
- Monitor treatments and prepare a report outlining effectiveness of mitigations to impacted sites.

The park is currently closed to visitation due to the fire impacts to employee and visitor safety. The completion of several of the specifications contained in this report are critical for the re-opening of the park.

Woodbury Fire Background

The Woodbury Fire was reported on June 8, 2010 at 13:30 hours. This fire was located northwest of Superior, AZ in a remote area of the Tonto National Forest near the Woodbury Trailhead in the Superstition Wilderness. The fire reached a size of 123,875 acres on June 28, 2019, and has held at that size for the duration of the burn. 88% of Tonto National Monument was affected by the burn (994 Acres). The entire watershed upstream of the Monument was burned in the fire.

Woodbury Fire Hydrology

Morphology of the property is a south to north flowing creek bisecting the monument with the headwaters of Cave Canyon Creek originating on US Forest Service property to the south. Most of the administration and visitor infrastructure is located within the canyon corridor. Observed and interpreted soil burn severity was of low to moderate severity with pockets of unburned. The burn appeared to be a mosaic of patches.

The USFS BAER Team modeled runoff from the Cave Canyon Creek watershed for pre-fire and post-fire conditions. The downstream Point of Concentration within the Park, for the runoff models, were the double barrel culverts on the access road between the visitor center and the picnic area. This was determined to be the most probable downstream location for Life/Safety and Property risk from elevated flood flows within Cave Canyon Creek. Results show that for the same common precipitation event comparison between pre-fire and post-fire, an elevated flood flow multiplication factor of 1.6 to 4 times is predicted. See table below.

Cave Canyon Creek watershed outlet at Access Road Culvert Crossing.

Basic watershed information used in Models:

Watershed Drainage area	1.37 square miles
Channel Relief Ratio	0.09 feet per feet
Average Elevation	3600 feet
Soil Burn Severity (moderate and High)	0.06 fraction of entire watershed
Time of Concentration	29 minutes

Results:

	Hydro Models				
	USGS Stream Stats	Wildcat 5	Wildcat 5 (Water only)	Hyper Concentrated Flow (Water, ash, sediment)	
Rainfall recurrence Interval	PRE-FIRE flow (CFS)	PRE-FIRE flow (CFS)	POST FIRE flow (CFS)	POST FIRE flow (CFS)	Maximum Magnitude of Change (Stream stats vs Hyper)
2 year	194	310	340	815	4.2
5 year	1040	535	580	1683	1.6
10 year	1800	725	775	2932	1.6

Note: model correlation was low. Therefore, use of absolute values is not recommended.
Order of magnitude of change is an acceptable use of these values.

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

Woodbury Fire Risk Assessment for Tonto National Monument:

Life/Property/Resource	Critical Value	Threat to Value	Probability of Damage or Loss	Magnitude of Consequence	Risk from Matrix Table	Treatment to Minimize Risk	Probability of Treatment Success
Property: drinking water supply	Groundwater Well Pump House	Flooding and Debris Flow	Possible	Major	High	Jersey Barriers	Moderate
Life and Safety. And Property – Road	Entrance Road Side Slope	Flooding and Debris Flow	Possible	Major	High	Jersey Barriers	High
Life and Safety and Property - Trail	Lower Cliff Dwelling Trail	Hazard Tree and Saguaro, Flooding, Debris Flow, Loss of Trail, Rock Fall	Likely	Major	Very High	Hazard tree identification and cutting, Hazard signs	Very High
Life and Safety and Property - Trail	Upper Cliff Dwelling Trail	Hazard Tree and Saguaro, Flooding, Debris Flow, Loss of Trail, Rock Fall	Likely	Major	Very High	Hazard tree identification and cutting, Hazard signs	Very High
██████████ ██████████ ██████████	██████████ ██████████ ██████████ ██████████	██████████ ██████████ ██████████ ██████████	██████████	██████████	██████████	██████████ ██████████ ██████████ ██████████	██████████
Life and Safety and Property - Road	Culvert Crossing of main entrance road	Flooding, Debris Flow, Sediment	Likely	Major	Very High	Culvert cleaning and storm inspection/ maintenance	Very High

Management Recommendations

Groundwater well house and partially buried storage tank area: Located adjacent to Cave Canyon Creek. Storage tank is well armored with large boulders. The well house is downstream of the storage tank and would be impacted by elevated flood flows.

Recommend armoring the well house area on the west, south, and east sides with Concrete Jersey Barriers. See Specification titled: Emergency Erosion Control 1.

Entrance Road Side slope: Located between the picnic area and the culvert crossing, on the east side the road passes the toe of a hill with steep slopes. The entire slope is burned and the shoulder is narrow. Recommend placement of Concrete Jersey Barriers as a rock fall containment barrier to shield motor vehicles and protect the roadway and buried utilities. Jersey barriers should extend from culvert up canyon to the road crossing (where the double 8' culverts are located). See Specification titled: Emergency Erosion Control 2.

Lower Cliff Dwelling trail: Rock fall, debris and hazard trees and Saguaro Cactus could potentially impact employee and visitor safety. There is a need to conduct an assessment of scorch height and instability (leaning/exposed roots) for individual saguaros and hazard trees that could fall and impact the trail. Hazard tree/cactus removal may be warranted depending on this assessment and observations of deterioration following winds and precipitation events during the summer monsoon. See Specification titled: Hazard Tree/Cactus Assessment 3.

Upper Cliff Dwelling Trail: This trail winds through the creek bottom and is susceptible to significant changes from flooding, erosion, debris and hazard trees. Conduct a hazard tree assessment with focus on the mature Arizona Sycamore trees. Hazard tree removal may be necessary depending on this assessment and observations of deterioration following winds and precipitation events during the summer monsoon. See Specification titled: Hazard Tree/Cactus Assessment 3.

Cultural sites: [REDACTED]

Monitor and Report on the Effectiveness of Mitigation for Cultural Sites: Cultural sites within the burned area will be visited by Tonto National Monument archeologists and reported on within one year of the fire ignition date. Effectiveness of site resource stabilization will be evaluated, with particular attention paid to continued post-fire erosion and the appropriateness/adequacy of specific landscape treatments. See Specification titled: Site Monitor and Report 5.

Culvert cleaning: Fire related flood flows are normally elevated and typically move ash, soil/rock and floatable woody debris. Culverts are usually not designed to accommodate fire effects. Two locations will need culvert cleaning of creek bed load throughout the summer

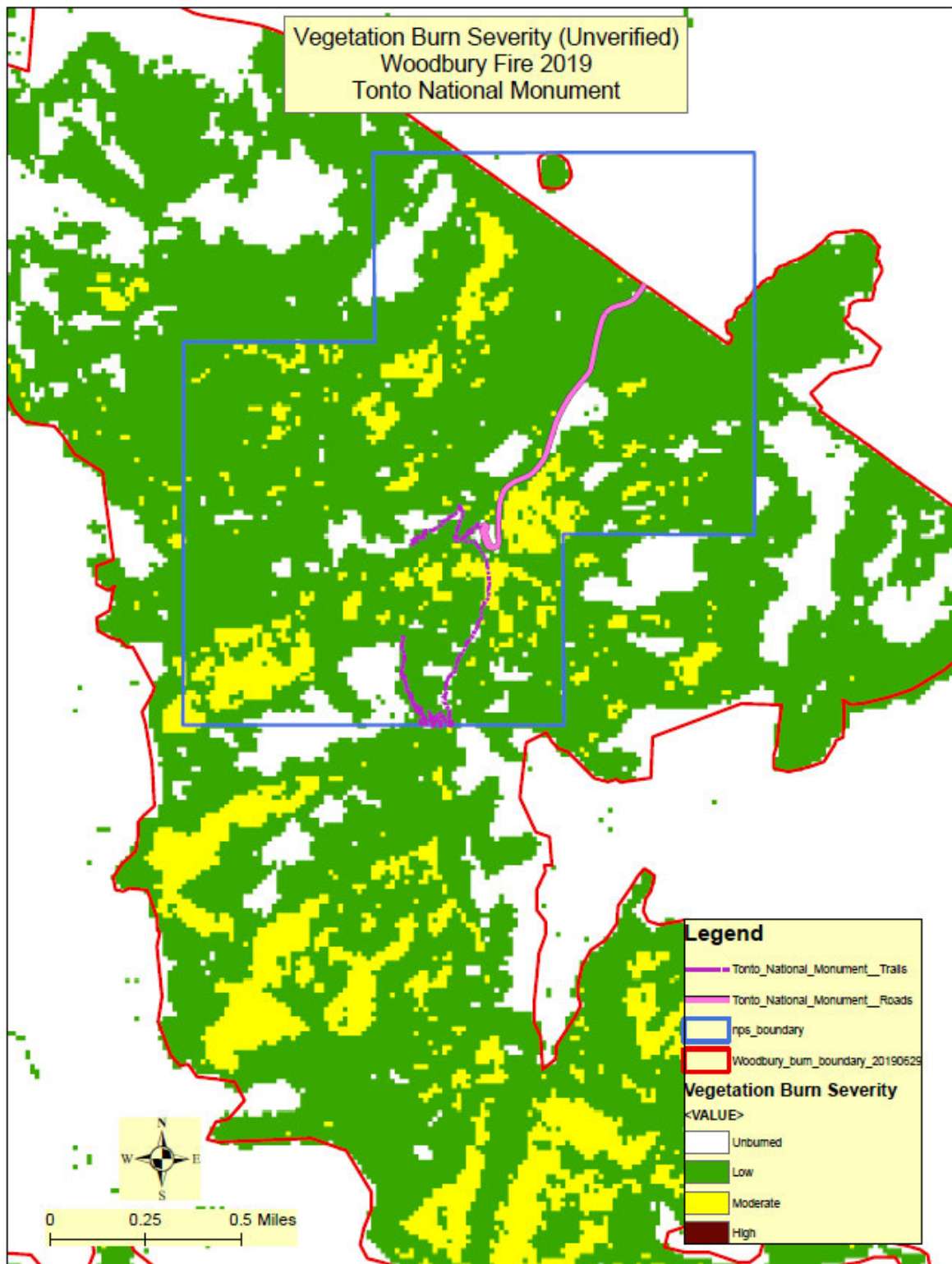
monsoon season and potentially for one year. One is the large 2 culvert crossing of the main park access road to the visitor center and the other is a small culvert near the groundwater well pump house. See Specification titled: Culvert Cleaning 6.

Hazard signs: Placement of new hazard signs at the trailheads and picnic areas. A disclosure of entering a recently burned area is warranted as abatement of all risks is not possible. Typically, after 1 or 2 years these can be removed as site conditions stabilize and vegetative groundcover is once again established. See Specification titled: Hazard Signs 7.

PART E - SUMMARY OF ACTIVITIES AND COSTS

LINE ITEM NUMBER	SPECIFICATION NUMBER	TITLE	UNIT	UNIT COST	NUMBER OF UNITS	FY 19	FY 20	WORK AGENT	COSTS
1	1	Emergency Erosion Control 1	each	\$ 9,234	1	\$ 9,234	\$ -	F	\$ 9,234
2	2	Emergency Erosion 2/Rockfall Mitigation	each	\$ 20,336	1	\$ 20,336	\$ -	F	\$ 20,336
3	3	Hazard tree/Cactus Mitigation	each	\$ 25,864	1	\$ 25,864	\$ -	F	\$ 25,864
4	4	Landscape treatments	each	\$ 17,734	1	\$ 17,734	\$ 11,833	F	\$ 29,567
5	5	Site Monitoring and Report	each	\$ 3,970	1	\$ -	\$ 3,970	F	\$ 3,970
6	6	Culvert Cleaning	each	\$ 7,850	1	\$ 7,850	\$ 7,850	F	\$ 15,700
7	7	Hazard Signs	each	\$ 216	10	\$ 2,160	\$ -	F	\$ 2,160
Fiscal Year Total:						\$ 83,178	\$ 23,653		
TOTAL COSTS									\$ 106,831

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer



Appendix A: Cultural Resources Report

Cultural Resources:

By Stephanie Mack, Tonto National Monument Archeologist

Assessment:

This is an assessment of the fire effects and damage in archeological sites at Tonto National Monument (NM). [REDACTED]

Site Monitoring:

The post fire site assessments includes filling out “Emergency Post-Fire Inspection Record” forms. This form collects data on the site type, location, fire-related damage, suppression-related damage, and recommended preservation treatments for each site. This includes describing the site burn severity:

Low: duff¹ partially consumed, none to little ladder fuels burned, no canopy burned.

Moderate: duff consumed, ladder fuel burned, isolated crown burn or torching.

Severe: duff, ladder and crown completely consumed.

Fire effects were also recorded at the site and these include:

[REDACTED]

Suppression impacts were also recorded at sites, these are impacts caused directly to activities tied to the suppression of wildfires.

Handline⁴

Drop point/safety zone

Dozer line⁵

Retardant drop impact/staining

Mop-up

Tree falling

Spike Camp

Safety Zone

Vegetation removal

Vehicle ruts

¹ As this fire occurred in a Sonoran desert landscape, duff was interpreted as the grasses growing on the site rather than the traditional definition of duff.

⁴ A fireline built with hand tools.

⁵ A fireline built with a bulldozer.

Next, erosional threats are measured. This includes documenting the slope and aspect of both the site and the watershed outside the site. The following erosional threats are documented:

Active gully⁶/riling⁷/scouring (depth and extent)

Stump hole/burned log erosion

Pedestaling

Duff absent

Hydrophobic⁸ Soils on site

Desiccated (powdery) soils on site

Finally, recommendations for preservation treatment are recorded for each site. For the sites effected by the Woodbury fire the recommendations included: monitoring the site over the Monsoon Season for further erosion, recommended jute matting and cut brush placement to limit erosion in sites, and no recommendations for unburned sites.

Other documentation at sites included mapping the burned areas and areas of damage in sites and photographing the sites from specific photographic spots.

Timeline:

It was important to complete a few rapid post fire site assessments to determine the damage impact on site within the park. Stephanie Mack (Tonto NM Archeologist) was assigned to the fire on June 23, 2019 as a resource advisor (READ) for Tonto National Monument. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The fire resistant wrapping was removed [REDACTED] on June 25, 2019 by Casa Grande and Capstone fire crews under the supervision of Stephanie Mack, Emery Manuel (archaeologist assigned to the Woodbury fire as a READ), Scott Hartman (archaeologist assigned to the Woodbury fire as a READ), and Mike Lewelling (Rocky Mountain FMO). The fire resistant wrapping was removed [REDACTED] on June 26, 2019 by Casa Grande and Capstone fire crews under the supervision of Stephanie Mack, Emery Manuel, and Scott Hartman.

The rapid post fire site assessments for backcountry sites began on June 27, 2019. Stephanie Mack, Emery Manuel, Scott Hartman, and Mike Lewelling [REDACTED]

[REDACTED] Therefore, it was decided to monitor the remaining sites based on slope and priority. Jake

⁶ Removal or movement of soil by concentrated water through streamlets or headcuts, more than 10cm deep.

⁷ Removal or movement of soil by concentrated water through streamlets or headcuts, less than 10cm deep.

⁸ Soil that repels water, causing it to collect on the surface rather than soak into the ground. This generally occurs in areas of intense burning.

⁹ Wrapping wooden elements of both dwelling with fire resistant wrap and reducing vegetation near the structures

DeGayner (SOAR Geographer) created a [REDACTED]
[REDACTED]



Post fire site assessments continued a week later on July 11, 2019. Stephanie Mack acted as crew chief and had help from several Tonto NM employees including: Brett Cockrell (Tonto NM Chief of Resources), Duane Hubbard (Tonto NM superintendent), Macie Monahan, Cassandra Hall, and Megan Parde. On July 15, 2019 Archaeologists from the Southern Arizona Office (SOAR) arrived at Tonto NM to assist with site assessments and in-depth site mapping, this crew included: Matthew Guebard (SOAR Archeologist), Lucas Hoedl (MOCA/TUZI Archeologist), Iraida Rodriguez (SOAR Archeologist) and Jake DeGayner (SOAR Geographer). [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] to prevent further erosional damage to backcountry sites. A wildland fire engine crew from Montana and Eric Schreiner (Tonto NM Chief of Resources) [REDACTED]
[REDACTED]

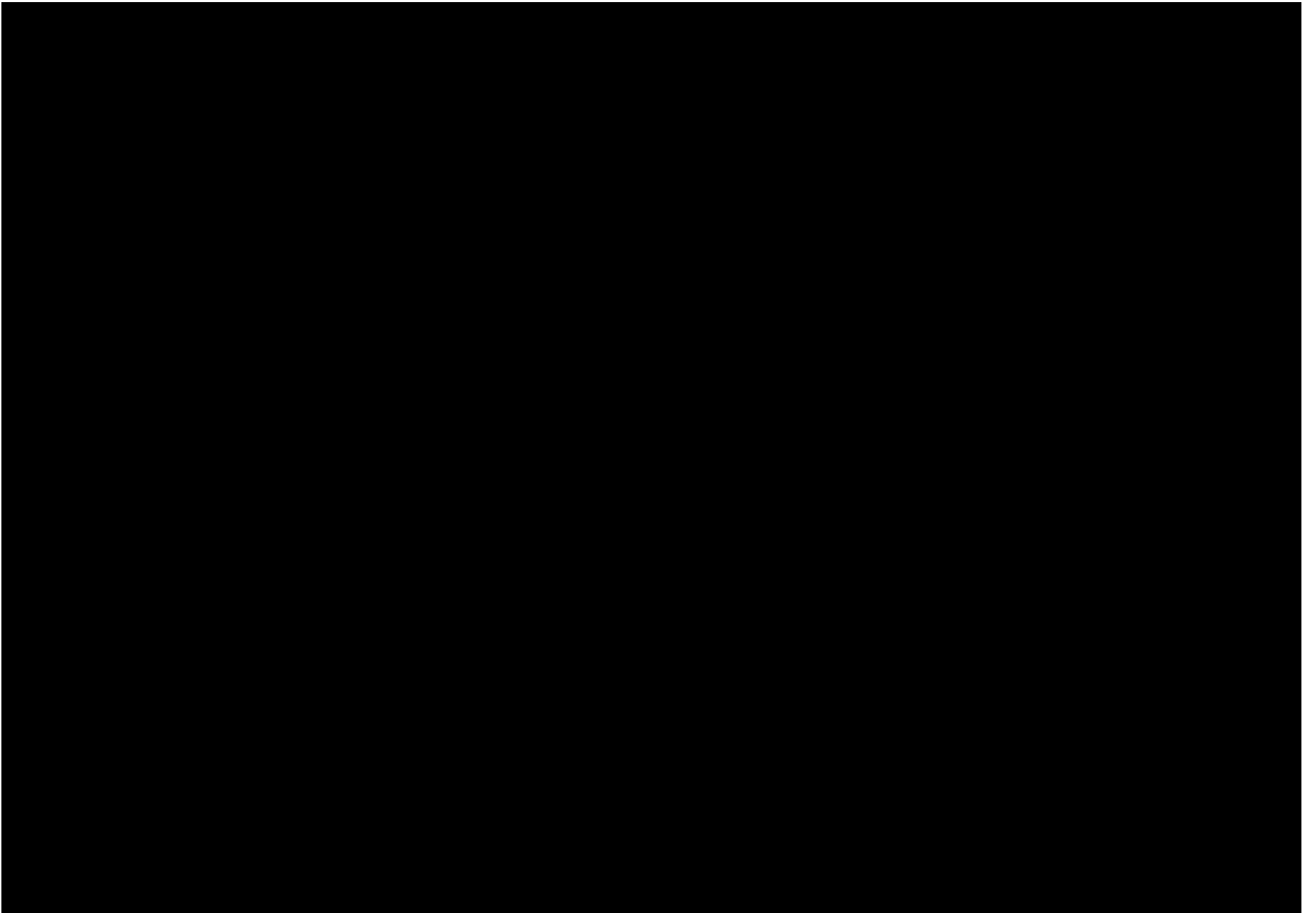
[REDACTED]

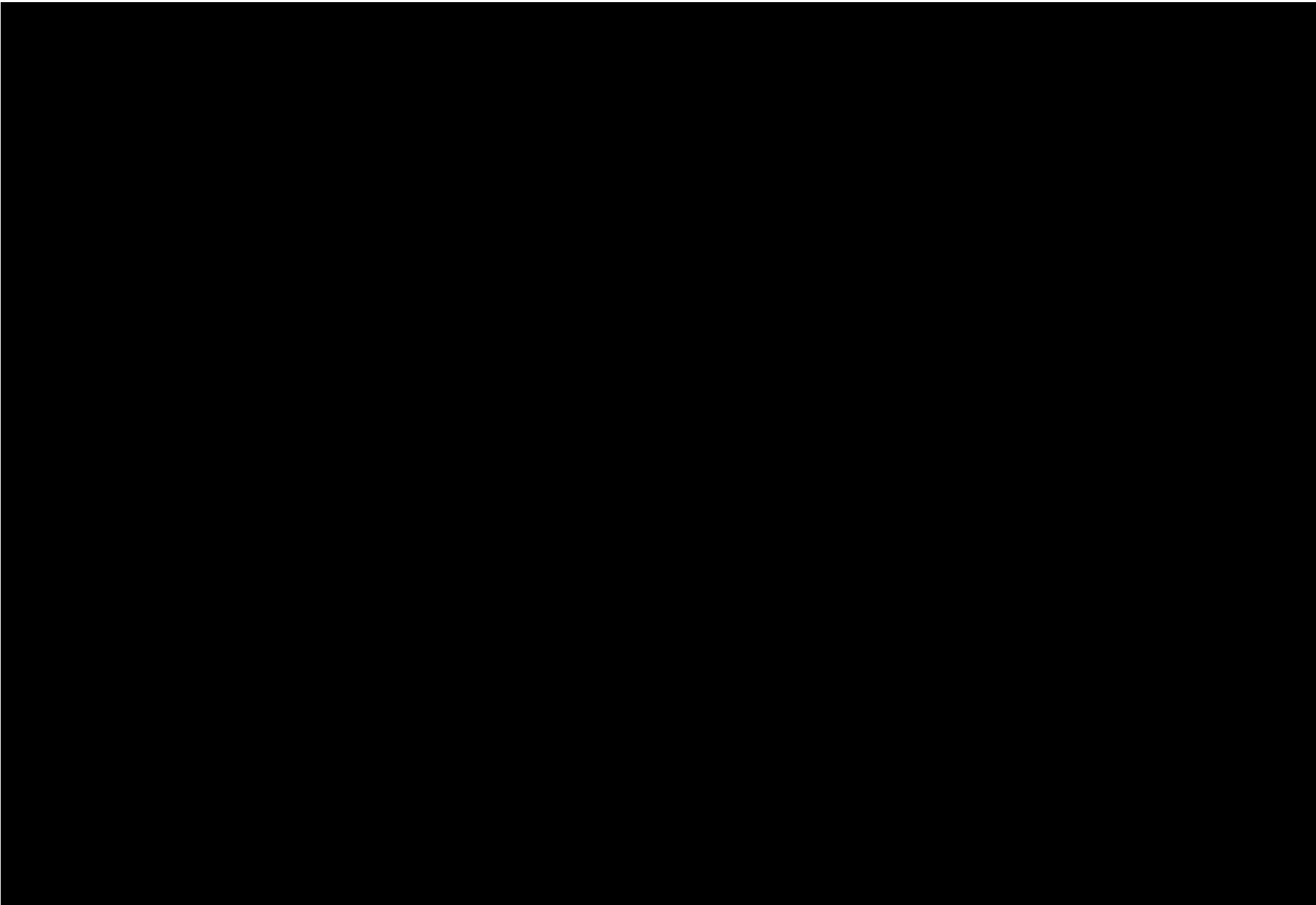
On July 18, 2019 post fire site monitoring continued and again the SOAR and Tonto NM teams split up the work. SOAR worked on [REDACTED]
[REDACTED]

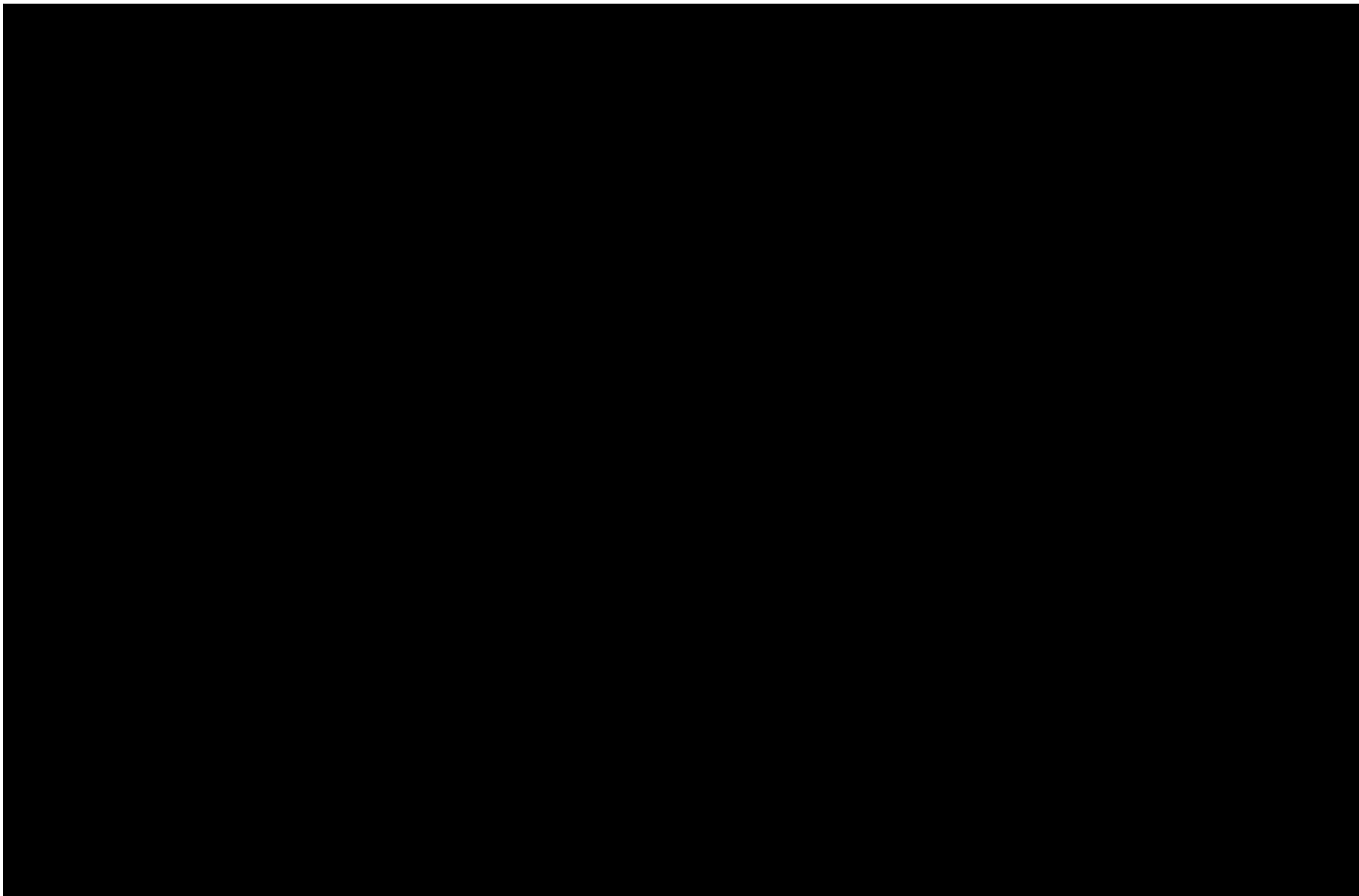
As there was a possibility of a monsoon storm on the evening of July 23, 2019 the morning before a Tonto NM crew (Stephanie Mack, Macie Monahan, and Jared Suydam) [REDACTED]
[REDACTED]

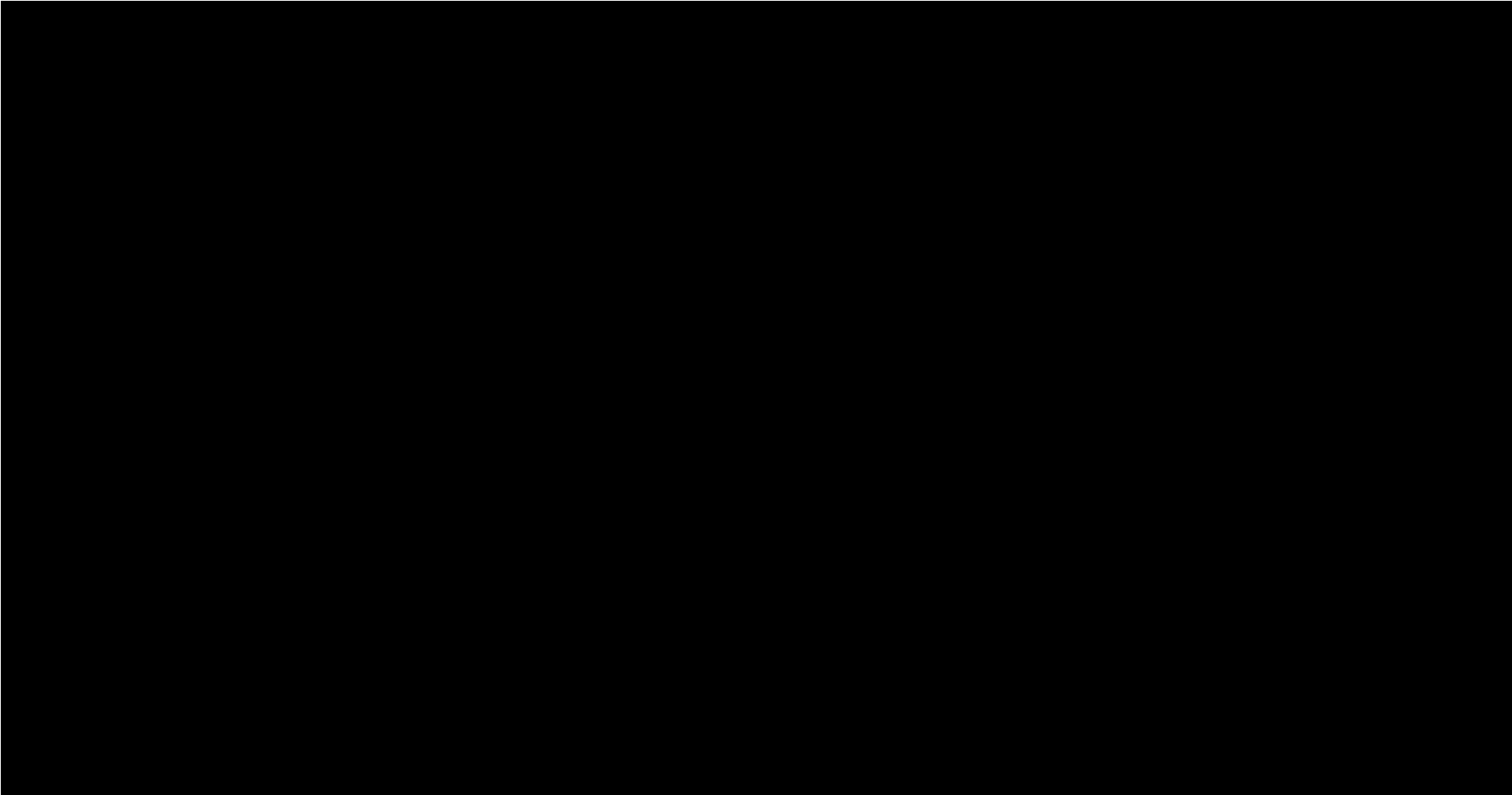
Conclusion and Further Work:

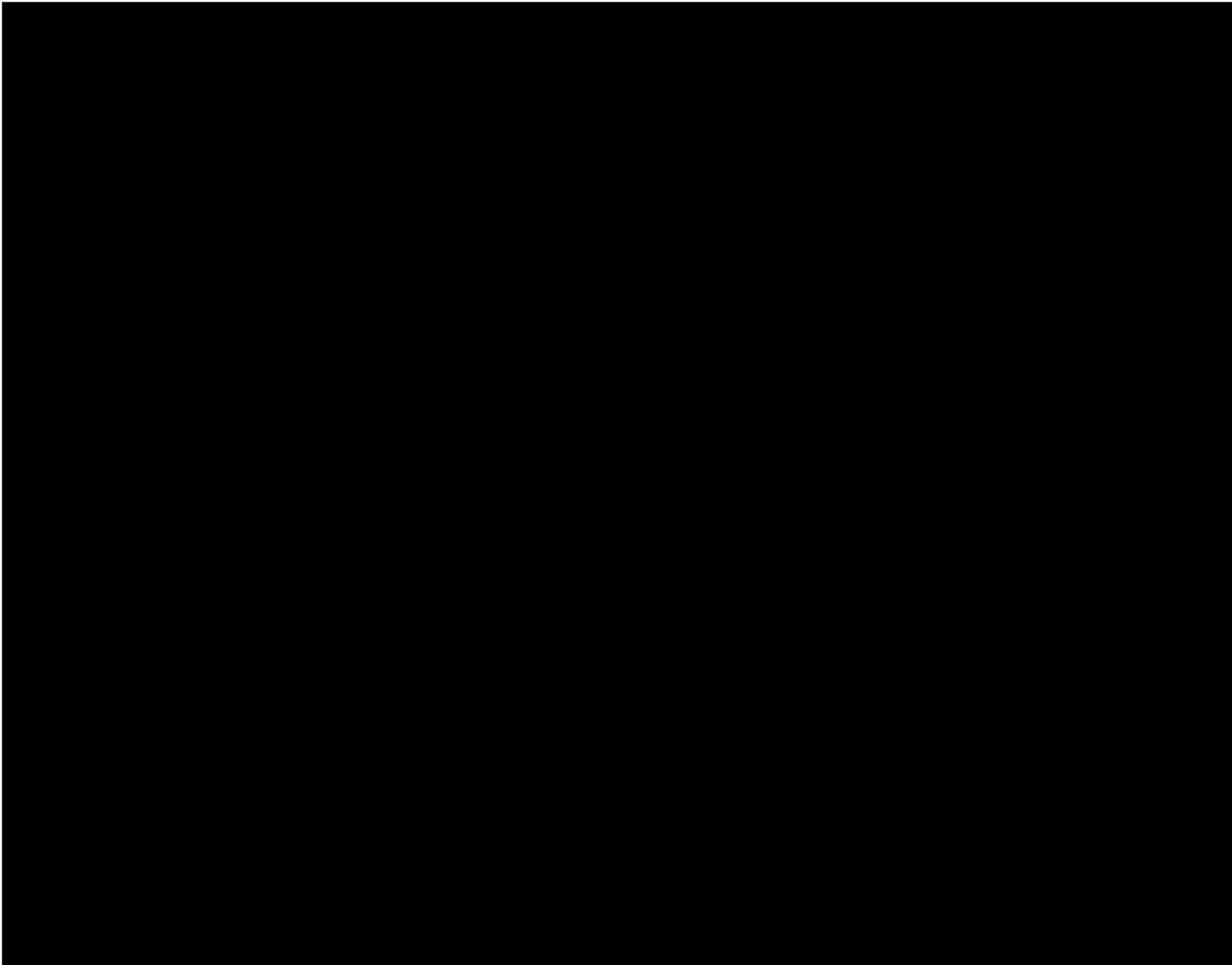
For the future, more post site assessments in the western bajadas will occur later in the Month of July and into August. Once those site assessments are complete, work will begin on the remaining sites that require jute matting and erosional control.











Appendix B: Natural Resources Report

Natural Resources:

By Brett Cockrell, Tonto National Monument Chief of Resources

Saguaro and tree hazard assessment

This is an assessment of fire damaged Saguaros and trees that pose a hazard to individuals or property safety within the confines of Tonto National Monument. These hazard trees and saguaros would be removed and hauled to a landfill.

	PARK Location	Saguaro	Barrel Cactus	Arizona Sycamore	Arizona Walnut	Mesquite	Palo Verde
1	Upper Cliff Dwelling Trail	28	4	10	6	64	7
2	Amphitheater Area	1	0	0	0	6	0
3	Cactus Patch Trail	2	0	0	0	2	3
4	Lower Cliff Dwelling Trail	51	17	0	0	2	4
5	Pump house and Well Area	2	0	0	0	5	0
6	Picnic Area	0	0	0	0	5	2
7	Entrance Turnaround and Road	4	0	0	0	3	4
		88	21	10	6	87	20

A survey was conducted on July 23, 2019, approximately three weeks after wildfire went through the park's boundary. Seven public areas were inspected for possible hazards to staff and visitors. Except the Lower Cliff Dwelling trail, the remaining six were in a moderate to severe burn. Additionally, this survey looked at two types of safety concerns, the first where a saguaro or tree could potentially fall and strike a person or property located on a designated walking trail, road or building/event center. The second, where potential flooding within Cave Canyons

drainage channel could cause collateral damage. The potential for damage is due to smaller diameter trees, like Mesquite and Palo Verde, falling and/or dropping limbs within the channel, which would then become lodged into two 8 foot culverts that run through the only road access for the park. This road also contains the utility corridors for the park; water, electric, sewer and phone.

Erosion control

The park will address erosion concerns, gully and sheet/rill, through the seeding of native grasses and native tree seedlings.

As the non-native species Red Brome were removed due to the fire, an opportunity has presented itself for the re-establishment of native grasses within the park. Prior to the wildfire the non-native species Red Brome dominated the park property. The species Red Brome is an annual cool season grass that when burned off will not grow back till new seed germination takes place in the cool winter months. However, as the wildfire burned a good percentage of the seed source, this species should be limited.

Areas to be seeded will include;

- The hillside above the picnic area extending to the culverts – 8.0 to 10.0 acres
- The area southwest of the Visitor Center – 4.0 to 6.0 acres
- Throughout Cave Canyon including the riparian area – 3.0 to 6.0 acres

A total of approximately 20.0 acres will be reseeded. The three areas selected for emergency stabilization had a fire burn severity from moderate to severe. With the severity of burn to these areas it has created a safety concern for both humans and property.

The human concern is due to these three areas being frequented by both staff and visitors on a daily basis. Two of these areas have slopes of 40% to 60% that have no vegetation holding the soil and rocks in place after the fire. Without this vegetation being present a hard rain storm (monsoon) has the potential to bring this soil and rock down slope. The third area is within the canyon channel and the potential of flash flooding. The seeding will take place along the canyon walls to help slow down runoff and lesson the amount of debris flowing downstream. In reducing the amount of debris washed downstream, we will reduce the chance of plugging up the two culverts through the road.

Appendix C: Initial Assessment Report

Burned Area Emergency Response for Woodbury Fire 2019



Trip Summary Report: July 1, 2019
Tonto National Monument

Personnel:

Salek Shafiqullah, IMRO Hydrologist
Andy Hubbard, SODN Program Manager
Kara Raymond, SOAR Hydrologist

Highlights/notes:

Field visit to assess post fire risk from flooding and erosion due to the Woodbury Fire. This visit follows an initial assessment by A. Hubbard, M. Guebard, and B. Cockrell on June 26, 2019.

Background and existing condition:

Morphology of the property is a south to north flowing creek bisecting the monument with the headwaters of Cave Canyon Creek originating on US Forest Service property to the south. Most of the administration and visitor infrastructure is located within the canyon corridor. The wildfire burned a significant portion of the NPS unit (over 80% of the total acres). The entire watershed upstream of the Monument was also burned in the fire. Observed and interpreted soil burn severity was of low to moderate severity with pockets of unburned. The burn appeared to be a mosaic of patches. Elevated flood flows are predicted with associated debris. Elevated fire severity and continuity in upper Cave Canyon (within Tonto NF south of the monument) - areas burned with the wildfire vs. the lower intensity backburn - suggest that conditions within the monument may not be indicative of those comprising most of the Cave Canyon watershed.

Immediate ES risks and recommendations:

- **Lower Cliff Dwelling trail:** Rock fall, debris and hazard trees and Saguaro Cactus could potentially impact safety. We recommend closure of this trail, during this monsoon season, and placement of hazard signs when the trail does reopen. We also recommend a baseline assessment of scorch height and instability (leaning/exposed roots) for individual saguaros that could fall or roll onto the trail. Hazard tree/cactus removal may be warranted depending on this assessment and observations of deterioration following winds and precipitation events during the summer monsoon. We recommend minimizing staff access and requiring full PPE until the assessments are complete and the slope is deemed safe.



- ***Upper Cliff Dwelling Trail:*** This trail winds through the creek bottom and is susceptible to significant changes from flooding, erosion, debris and hazard trees. Recommend closure of this trail, placement of hazard signs when the trail does reopen, and potentially a complete reroute out of the creek. Conduct a hazard tree assessment with focus on the mature Arizona Sycamore trees. Hazard tree removal may be warranted depending on this assessment and observations of deterioration following winds and precipitation events during the summer monsoon. We recommend minimizing staff access and requiring full PPE until the assessments are complete and the slope and drainage are deemed safe.



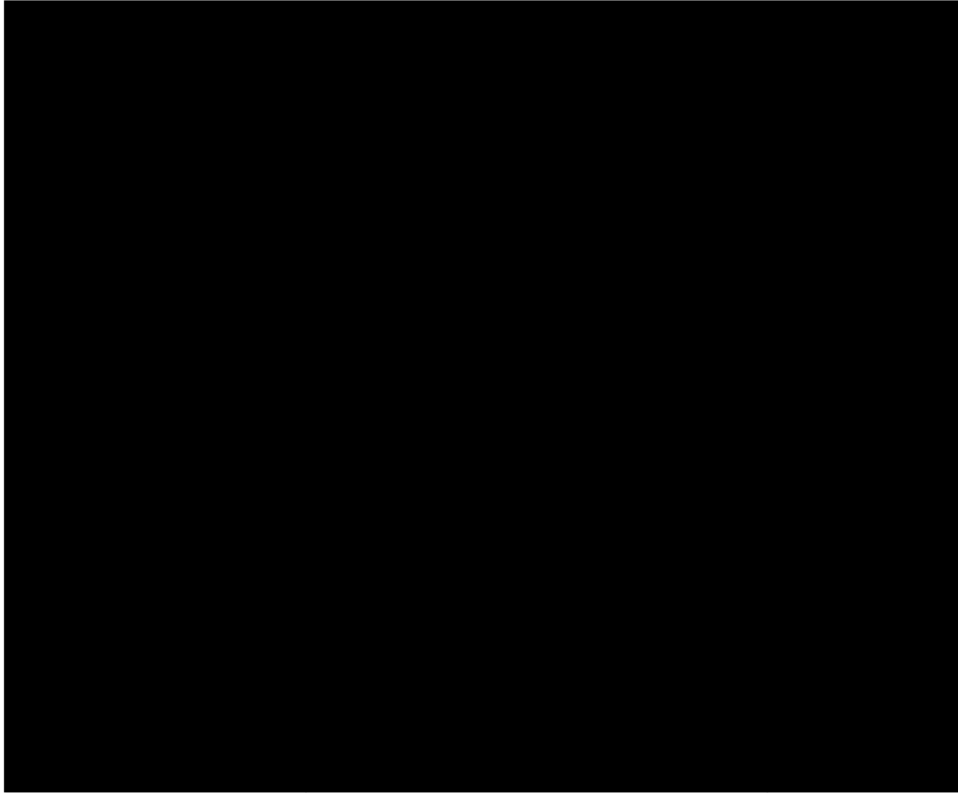
- ***Groundwater well house and partially buried storage tank area:*** Located adjacent to Cave Canyon Creek. Storage tank is well armored with large boulders. The well house is downstream of the storage tank and may be impacted by elevated flood flows. Recommend armoring the well house area on the west, south, and east sides with Concrete Jersey Barriers.
- ***Entrance Road Culvert Crossing:*** at the well house, one CMP 2 foot culvert allows runoff to pass under the road and discharge into Cave Canyon Creek. The culvert outlet is partially compressed and is 1/3 filled with debris. We recommend removing this material prior to likely monsoon activity. Nuisance flooding and debris accumulation is to be expected; it is important to maintain and clear the trash rack between the two culverts, as overflows could impact the well house and water line.

- **Entrance Road Culvert Crossing:** Between the admin. site and the visitor center, 2 CMP culverts (8 foot diameter each) allow Cave Canyon Creek to pass under the road. Numerous utilities are in the road bed above the culverts (power, sewer, potable water). Culverts appear to be in good condition (not compressed or deteriorating). However, one (south side) has a partially clogged inlet. Recommend removing this material with heavy equipment. Also, a large boulder (3-4 foot diameter) is within one culvert (also south side) located near the outlet. Recommend removal of the boulder to allow flood flows to pass. Note: the grade in the creek, both above and below the culverts is fairly steep. However, the culverts themselves are fairly flat. Therefore, future debris removal, during this monsoon season, may be necessary to maintain the function as low gradients can settle debris. Maintaining flow through these primary culverts is critical for avoiding safety and property issues along Cave Canyon.
- **Entrance Road Side slope:** Located between the picnic area and the culvert crossing, on the east side the road passes the toe of a hill with steep slopes. The entire slope is burned and the shoulder is narrow. Dry ravel of slope material was observed on the road. Recommend placement of Concrete Jersey Barriers as a rock fall containment barrier to shield motor vehicles and protect the roadway and buried utilities. Jersey barriers should extend from culvert up canyon to the road crossing (where the double 8' culverts are located). Consider seeding/mulching operations on the segment above the proposed jersey barriers to assist in securing the slope.



- **Picnic area:** Picnic sites at the toe of a hill with steep slopes may be impacted by debris. Recommend closure of these particular sites, for at least the first monsoon season, and placement of hazard signs at the picnic area.
- **Admin Site:** located at the toe of a hill with steep slopes. The entire slope is burned. A diversion ditch collects sheet flow and routes the flow around the admin site. Recommend ditch clean up during this summer monsoon season to remove debris clogging the ditch.





- **Cave Canyon Creek Floodplain:** The risk of flash flooding is elevated. Recommend developing a flash flood evacuation plan and monitoring weather radar for storm-cells in the watershed.



Coordination with other agencies:

- The USFS BAER team is producing a burn severity map for the entire fire including the area burned within the Monument. Also, the USFS team is performing pre and post fire hydrological modeling in important watersheds including Cave Canyon. This effort will greatly inform the down-gradient issues within the monument that are identified above.
- The National Weather Service is proposing to include Tonto NM in its public weather watches and warnings. Also, a forecast update of storm activity, for first responder agencies in and around the burn scar, is being activated and the Monument is being included.

Summary: Emergency stabilization is recommended for Tonto National Monument due to the potential post fire effects from the Woodbury Fire. The stabilization measures are associated with human safety and important infrastructure (property). Closure of some facilities (trails and picnic areas), installation of hazard signs, and mitigation from flooding and debris are the recommendations.

Note: Other areas of the Monument were assessed but no recommendation for emergency stabilization was warranted as they are functioning properly or were not predicted to be at risk of catastrophic failure. Many areas of the Monument will experience nuisance flooding and dirt and debris. Therefore, many of these areas will need an elevated amount of cleanup and potentially some reconstruction and or maintenance (road shoulders, picnic area, trails, etc.).

Additional assessments of erosion potential and resource impacts should be considered to inform burned area recovery plans following the initial emergency stabilization efforts.

Appendix D: Tonto NF Burned Area Report (FS-2500-8)

Date of Report: July 21, 2019

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: Woodbury

B. Fire Number: AZ-TNF-000579

C. State: Arizona

D. County: Maricopa, Pinal, Gila

E. Region: R3

F. Forest: Tonto NF

G. District: 02, 03, 06

H. Fire Incident Job Code: P3I951

I. Date Fire Started: 06/08/2019

J. Date Fire Contained: 7/15/19

K. Suppression Cost: \$25,000,000

L. Fire Suppression Damages Repaired with Suppression Funds (estimates): Click here to enter text.

- 1. Fireline repaired (miles): 14.1
- 2. Other (identify): Road as completed line: 13.7

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

HUC #	Watershed Name	Total Acres	Acres Burned	% Watershed Burned
150601060103	Apache Lake-Salt River	29,477	3,155	11%
150601060102	Buckhorn Creek-Salt River	18,351	663	4%
150601030705	Campaign Creek	21,394	18,634	87%
150601030910	Cottonwood Creek-Salt River	14,766	6,085	41%
150601060105	Fish Creek	25,674	17,915	70%
150501000404	Hewitt Canyon	19,808	2,422	12%
150601060107	La Barge Creek	27,388	8,048	29%
150601060104	Lewis and Pranty Creek	10,309	8,776	85%
150601030706	Lower Pinto Creek	22,943	2,592	11%
150601030704	Middle Pinto Creek	23,090	4,906	21%
150601060101	Pine Creek	23,021	17,552	76%
150601030909	Schell Gulch-Salt River	29,247	4,956	17%
150601060106	Tortilla Creek	20,708	12,120	59%
150601030702	West Fork Pinto Creek	18,143	6,983	45%
150501000801	Whitlow Canyon	23,724	10,598	45%

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

OWNERSHIP	ACRES
NFS	125,329
OTHER FEDERAL (LIST AGENCY AND ACRES)	National Park Service 994 acres
STATE	75 acres
PRIVATE	194 acres
TOTAL	126,591 acres

O. **Vegetation Types:** 32,107 acres grassland, 2,291 acres riparian, 61,078 acres shrubland, 27,701 acres woodland

P. **Dominant Soils:** Lithic Ustic Haplocambids, Ustic Haplocambids, Ustic Haplargids, Aridic Haplustalfs, Lithic Haplustalfs, Aridic lithic Ustorthents, Typic Haplustalfs, and Lithic Argiustolls.

Q. **Geologic Types:** Proterozoic age granite, sandstone, and lime stone, Miocene age Rhyolitic and Dacitic Tuff, and Pleistocene age alluvium

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	7.3 miles
INTERMITTENT	46.6 miles
EPHEMERAL	109.8 miles

OTHER
(DEFINE)

S.

Transportation System:

Trails: National Forest (113 miles):

Other 0 (miles):

Roads: National Forest (53.1 miles):

State Hwy 88 (Apache Trail) (14.85 miles):

PART III - WATERSHED CONDITION**A. Burn Severity (acres):***Table 4: DRAFT Burn Severity Acres by Ownership*

Soil Burn Severity	NFS	Other Federal (NPS)	State	Private	Total	% within the Fire Perimeter
Unburned	30,359	195	21	168	30,743	24
Low	67,799	796	53	25	68,673	54
Moderate	26,605	2			26,608	21
High	566				566	0.5
Total	126,591	993	74	193	126,591	

B. Water-Repellent Soil (acres): 13,868 acres**C. Soil Erosion Hazard Rating:** severe 71,226, moderate 51,267, low 3,562, NA ,**D. Erosion Potential:** 1.8 tons/acre **Sediment Potential:** 643.7 cu yds/sq mi**F. Estimated Vegetative Recovery Period (years):** 5-10 yrs**G. Estimated Hydrologic Response (brief description):**

Most of the area within the fire perimeter burned with low soil burn severity (54%) or lies within the unburned/very low burn severity category (24%). Areas of moderate soil burn severity occupy about 21 percent of the burned area. Areas of high soil burn severity occur in less than one percent of the burned area.

Watersheds with the greatest percentage of moderate burn severity include Campaign Creek (25% moderate severity), West Fork Pinto Creek (34%), Lewis and Pranty Creek (11%) and Pine Creek (20%). Peak flows expected from the 10 yr 1-hr storm will increase by more than 100% from prefire peak flows in these watersheds. The first storm or two following the fire on the burned area can produce even higher peak flows as sediment and fire debris (including ash) is washed from the watersheds.

PART V - SUMMARY OF ANALYSIS**Introduction/Background**

The Woodbury Fire burned approximately 125,000 acres of sonoran desert, semidesert grassland, chaparral, and pinyon-juniper, with smaller inclusions of ponderosa pine, primarily within the Superstition Wilderness. The wilderness is immediately adjacent to the Phoenix metropolitan area and is criss-crossed by many miles of trails. Approximately 110 miles of trails including 26 miles of the Arizona Trail (a National Scenic Trail), are within the burn perimeter. Several of the watersheds within the burned area drain to three major reservoirs that are popular recreation destinations for users from the Phoenix Metropolitan area. A number of dispersed and developed recreation sites are located along these reservoirs at the mouths of washes that drain the burned area. Users of these sites are threatened by flash floods and debris flows from the burned area. Approximately 68 miles of roads lie within the burned area perimeter and a number of additional roads cross streams and washes below the burned area. The Apache Trail lies along the northern boundary of much of the burned area. The road is operated under a road easement issued to the Arizona Department of Transportation but lies on National Forest System (NFS) lands. It is an historic road constructed to facilitate building of Roosevelt Dam in the early 1900's. The road contains a number of cultural resources that are threatened by postfire runoff and erosion.

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. Threats to human life and safety exist where users of National Forest System (NFS) roads are exposed to flash floods, debris flows, rolling rocks, and falling trees or limbs. There are 53 miles of NFS roads within the burned area that are open to the public. An additional 15 miles of administrative roads are accessible to Forest Service employees, contractors and other permitted users. NFS roads with the greatest threat to the life and safety of users include:

FSR 449A that provides access to Reavis Mountain School, the headquarters for the Cross P Ranch, other connecting roads within the burned area, dispersed camping sites, and a Trailhead that provides access into the Superstition Wilderness. This road passes up the main channel of Campaign Creek in one location and crosses the channel at 3 other locations. Campaign Creek. 72 percent of the watershed above Reavis Mountain School burned with moderate to high soil burn severity. The potential for flash flooding and debris flows has increased substantially in this watershed. There is a moderate flash flood hazard from the 1, 2, and 5 year recurrence interval storms and a high hazard from the ten year recurrence interval storm.

FSR 83 provides access to a permitted private residence on NFS lands, to a trailhead into the superstition wilderness, and dispersed campsites on NFS lands. There is a moderate potential for debris flow and low to moderate potential for flash flooding in the washes crossed by this route.

FSR 212 provides access to a popular trailhead for the Superstition Wilderness and access to dispersed camping sites. It is constructed on highly erosive soils and at high risk of damage from storms. It is at moderate risk of debris flows that are a threat to life and safety.

FSR 213 lies entirely within the burned area. This road is a cherry stem that travels approximately three miles into the Superstition wilderness and ends at the Tortilla Trailhead where dispersed camping occurs in close proximity to Tortilla Creek. Increased flash flood hazard occurs in Tortilla Creek.

FSR 650 and 172A are a popular loop drive by OHV users. The routes provide access to a wilderness trailhead and to dispersed camping areas. Debris flow hazard ranges from low to high along this route. Rolling rocks from burned hillsides are also a threat to poorly protected OHV users.

Other roads (both NFS roads state highways) that pass below the burned area also represent threats to life and safety where they cross washes that drain the burned area where the threat of flash flooding has increased.

In addition to users of NFS roads, the burned area is also bordered by State Highway 88, also known as the Apache Trail. This road parallels Fish Creek for approximately one mile, Lewis and Pranty Creek for about 1.5 miles and an area of highly erosive decomposed granite that has been burned for another two miles. Rock fall, and flash floods are a threat to users of this road.

- b. Approximately 113 miles of trails travel through the burned area. These trails pass through drainage bottoms, along steep slopes, and through forested areas. Threats to the life and safety of users of these trails exist from flash floods, debris flows, rolling rocks, and falling limbs and trees. Threats from debris flows are greatest in some of the higher mountainous

country in the headwaters of Fish Creek, Pine Creek, Campaign Creel, and West Fork of Pinto Creek where burn severity is also higher. Smaller areas of high debris flow hazard exist in the headwaters of LaBarge Creek and Lewis and Pranty Creek. Flash flood hazards are also elevated substantially in these watersheds.

- c. Recreation sites. Two developed recreation sites have been developed in washes that drain the burned area where these washes discharge into Apache Lake. Eighty percent of the watershed above the Davis Wash Recreation site was burned in the fire. The recreation site is located where the wash empties into Apache Lake. The threat of flash flooding has increased substantially and ranges from moderate for the one and two year storms to high for the five year and extreme for the ten-year storms.

The Crabtree Wash recreation site is located where Crabtree Wash enters Apache Lake and lies immediately adjacent to the Apache Lake Marina. The site contains recreation residences as well as developed recreation facilities. Forty-two percent of the watershed above the site was burned. Flash flood hazard ranges from high for the one year storm to extreme for the 2-10 year storms.

Other developed recreation sites occur along Roosevelt Lake. These sites are primarily outside the floodplain of washes draining the burned area but recreational use and dispersed camping does occur at the mouths of some of these washes. Boat-in recreational use also occurs at the mouths of washes draining the burned area in Canyon, Apache, and Roosevelt Lakes. Areas of particular concern would include the Boat storage area at the Roosevelt Lake Marina, The mouths of Cottonwood Creek, Cave Creek (which passes through Tonto National Monument), an unnamed tributary to Roosevelt Lake that passes along the east side of the Windy Hill Recreation sites, Schoolhouse Wash, and the unnamed wash that passes through the Schoolhouse Recreation Site.

There are also popular dispersed recreation sites along Fish Creek, Tortilla Creek, Mesquite Wash, Pinto Creek, Miles Ranch, and Boulder recreation site on Canyon Lake at the mouth of LaBarge Canyon. The Apache Lake Vista Recreation site occupies a small area immediately adjacent to the burned area along the Apache Trail at the turnoff to the Apache Lake Marina. Dispersed camping, particularly during hunting season occurs throughout the burned area and on NFS lands below the burned area.

- d. Threats to life and safety also exist for residents on private lands along streams draining the burned area. Private residences exist on Campaign Creek, Pinto Creek, Spring Creek, Lewis and Pranty Creek, Cottonwood Creek, Wildcat Wash, and Whitlow Canyon. Privately owned structures at Tortilla Flat may also be at risk of flash flooding.
 - e. Tonto National Monument is within the burned area and is drained by Cave Canyon. Flash flood risks have increased in Cave Canyon have increased as a result of the fire. Flash flood risks range from moderate from the one to two year storms, high for the five year storm, and extreme for the ten year storm. Travelers on the road into the monument as well as infrastructure at the monument may be at risk from flash floods.
2. **Property (P):** National Forest System property at risk includes the roads listed above as well as lesser used roads not described above and NFS roads that cross washes below the burned area. In total there are approximately 68 miles of NFS roads within the burned area that would be at risk from erosion, overtopping of drainage structures, flash floods, debris flows, rock fall, and hazard trees. National forest system trails within and below the burned area would be subject to the same hazards as the roads threatened by post fire conditions. One hundred thirteen miles of trails lie within the wilderness portion of the burned area and an additional several miles lie outside the wilderness.

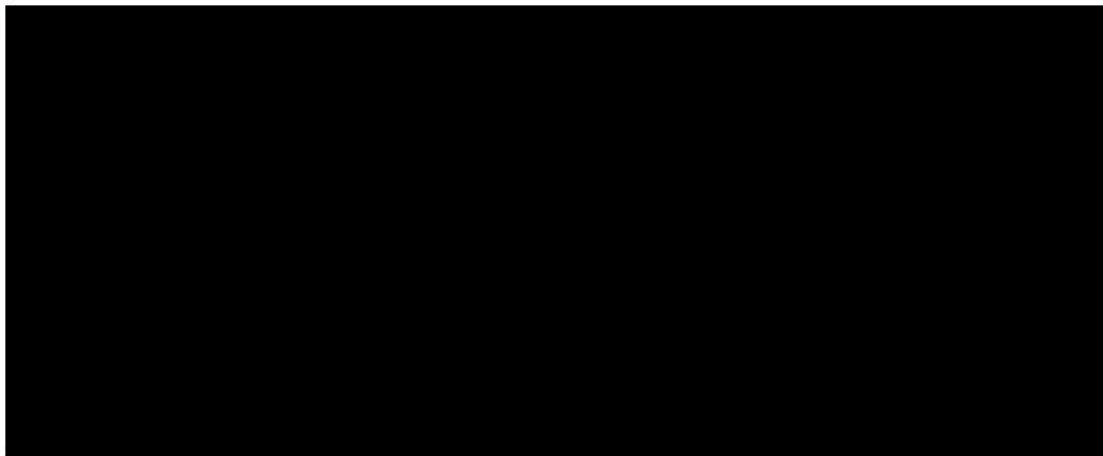
The Woodbury fire heavily impacted Passage 19 of the Arizona National Scenic Trail spanning the Superstition Wilderness from Rogers Trough Trailhead on the east, to Vineyard TH on the north adjacent to Roosevelt Lake. Of the 29.4 total miles of Passage 19, 25.87 miles were within the perimeter of the Woodbury Fire. This portion of the Arizona Trail covers Forest System Trails: Reavis Ranch (109), Reavis Gap (117), Two Bar (119), and Cottonwood (120). These trails were burned at varying degrees of low, moderate, and high severity. Remaining hotspots within the burn perimeter, have limited the information available as to the degree of damage that has occurred.

In addition to the trail infrastructure itself infrastructure at trail heads and signs along the trails may be damaged as well. Developed Recreation sites exist below the burned area In Crabtree and Davis Washes, at the turnoff from the Apache Trail to the Apache Lake Marina, along Roosevelt Lake and Canyon Lake and at Tortilla Flat.

3. **Natural Resources (NR):** In general, fire effects are within natural occurring ranges for the affected vegetation types except for the Sonoran desert portion of the burned area where frequent fire is not a natural component of the ecosystem. Widespread invasion of the desert by red brome (an annual nonnative grass) has increased the frequency of fire in this ecosystem and results in mortality to many native desert trees and cacti. Damage to soil productivity is primarily in isolated areas of high burn severity.

Within this assessment regarding invasive the factors to consider were: importance of the threatened area, proximity to invasive plant and weed source areas and likely transmission vectors; specific plant characteristics, such as method of spread, seed viability, growth rate, response to fire, etc.; severity of fire effects and expected recovery rate/resilience of existing vegetation; state-listed noxious status or category of invasive plant. Within the weeds analysis roadways, hand-lines, dozier-lines, base camps, spike camps, and drainages were observed for noxious weeds as well as the potential for them to have noxious weeds. Upon primary observation the following weeds were observed: fountain grass (*Pennisetum ciliare*), buffle-grass (*Pennisetum setaceum*), malta star thistle (*Centaurea melitensis*) and tree of heaven (*Ailanthus altissima*).

4.



- a. **Emergency Treatment Objectives:** Provide warnings to users of Forest service recreation sites, roads and trails of the hazardous conditions resulting from the burned area. Install gates to close hazardous areas to public entry. Improve drainage on roads and trails. Detect and remove invasive species. Inspect and repair drainage facilities damaged by post fire runoff on roads and trails within and below the burned area.

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

Land N/A	Channel 80%
Roads/Trails Roads 75%, Trails 50%	Protection/Safety Signs 95%, Gates 50%

D. Probability of Treatment Success*Table 6: Probability of Treatment Success*

	<i>1 year after treatment</i>	<i>3 years after treatment</i>	<i>5 years after treatment</i>
<i>Land</i>			
<i>Channel</i>	70%	80%	90%
<i>Roads/Trails</i>	50%	60%	75%
<i>Protection/Safety</i>	70%	80%	100%

E. Cost of No-Action (Including Loss): \$1,615,000**F. Cost of Selected Alternative (Including Loss): \$773,000****G. Skills Represented on Burned-Area Survey Team:**

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

Team Leader: Ryan Nicholas, Grant Loomis, Mike Martinez**Email:**ryan.nicholas@USDA.gov, moalty21@gmail.com, michael.a.martinez@USDA.gov**Phone(s)**Ryan Nicholas-337 255-9568, Grant Loomis 480 406-7352, Mike Martinez 602-499-5818**Forest BAER Coordinator:** Ryan Nicholas, Kelly Mott Lacroix**Email:**kelly.mottlacroix@usda.gov, ryan.nicholas@usda.gov **Phone(s):**602 225-5210, 602 225-5386**Team Members:** *Table 7: BAER Team Members by Skill*

Skill	Team Member Name
<i>Team Lead(s)</i>	Ryan Nicholas, Mike Martinez (trainee) Grant Loomis
<i>Soils</i>	Andy Casillas, David Watson
<i>Hydrology</i>	Kelly Mott Lacroix, Grant Loomis
<i>Engineering</i>	Terrin Lane
<i>GIS</i>	
<i>Archaeology</i>	Kim Stroh, Clint Dalton
<i>Weeds</i>	Ryan Nicholas
<i>Recreation</i>	Sheryl Cormack
<i>Other</i>	Chad Harrold-Geology

H. Treatment Narrative

Land Treatments: Implement an early detection and rapid response effort to detect and remove invasive species. Known noxious weeds including fountain grass, buffle grass, and Malta star thistle were found at fire base camps and spike camps. Tree of Heaven was found at the margins of the burned area. Inspections to detect spread of these species along roadways, dozer lines, hand lines, spike camps, and drainages will be conducted in the spring and fall. If detected they would be grubbed or sprayed with an appropriate herbicide to eliminate or reduce the infestations. The determination and direction towards detection and removal will have to be a large effort for this fire due to its size and landscape status. Therefore the weeds specialist recommends \$30,000 for the detection and removal of invasive species on the Woodberry Fire. The breakdown and justification of funds are as follows: \$10,000 for the detection and removal of weeds for the Globe Ranger District portion of the fire; \$10,000 for the detection and removal of weeds for the Tonto Basin Ranger District portion of the fire; and \$10,000 for the detection and removal of weeds for the Mesa Ranger District portion of the fire. Duties will be carried either by contract or by the Noxious and Invasive Weeds Program Management of the Tonto National Forest.

Channel Treatments: Remove floatable debris from channels that threaten road crossings on Campaign Creek, Lewis and Pranty Creek, Davis Wash, and Pine Creek. Floatable debris would be removed for approximately one quarter mile above the Davis Wash, and Pine Creek road crossings and for approximately one mile along Lewis and Pranty Creek where the road encroaches on the channel. Floatable debris would be removed for approximately 1-200 yards above the low water crossings on Campaign Creek.

Roads and Trail Treatments: Install flood (60) warning signs on roads, trails, and recreation sites threatened by post fire flooding and debris. Construct (23) gates on roads entering the burned area that will be closed until conditions recover sufficiently for safe access. Implement storm inspection and response to ensure road and trail drainage features are functioning properly. Storm inspection request is separated into two categories in this request for the portion of storm inspection to protect cultural resources on Hwy 88 and storm inspection on FS roads.

Trails are located remotely in Wilderness making access challenging and requiring use of primitive tools. Terrain is variable but generally steep and mountainous. Due to the remoteness of trails and miles that must be covered we propose three separate projects consisting of six hitches – 8 day trail crew assignment - totaling \$103,400. There is an immediate need to prevent erosion and reduce impact to hydrologic function on 15.33 miles of the Arizona Trail within the 1st year. This will allow for trails to be reopened and meet FS trail safety standards much sooner.

Protection/Safety Treatments: Hazard signs on roads and trails (previously approved) and gated road closures would provide protection for life and safety.

Monitoring Narrative:

To be determined

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

			NFS Lands				Other Lands			All
		Unit	# of		Other		Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER \$	\$	# of units	\$	Units	\$	\$
A. Land Treatments										
Weeds EDRR	ea	30,000	1	\$30,000	\$0		\$0		\$0	\$30,000
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Land Treatments				\$30,000	\$0		\$0		\$0	\$30,000
B. Channel Treatments										
floatable debris removal	mile	15,000	1	\$15,000	\$0		\$0		\$0	\$15,000
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Channel Treatments				\$15,000	\$0		\$0		\$0	\$15,000
C. Road and Trails										
Substantial closuregates	ea	10,000	7	\$70,000	\$0		\$0		\$0	\$70,000
Simple closure gates	ea	5,600	16	\$89,600	\$0		\$0		\$0	\$89,600
Strm inspcn/rspns NFS	mile	5,750	16	\$92,000						\$92,000
Trail prtctn Az Trail	mile	22,000	5	\$103,400						\$103,400
Strm Proofng Ap Trl	mile	4,000	10	\$38,400						\$38,400
Strm Inspctn/rspns Ap Trl	mile	5,000	8	\$38,000						\$38,000
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Road and Trails				\$431,400	\$0		\$0		\$0	\$431,400
D. Protection/Safety										
Warning Signs (prvlsy aprvd)	ea	225	40	\$9,000	\$0		\$0		\$0	\$9,000
additional signs	ea	125	20	\$2,500	\$0		\$0		\$0	\$2,500
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Protection/Safety				\$11,500	\$0		\$0		\$0	\$11,500
E. BAER Evaluation										
Initial Assessment	Report			--	\$0		\$0		\$0	\$0
to be determined				\$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
Insert new items above this line!				\$0	\$0		\$0		\$0	\$0
Subtotal Monitoring				\$0	\$0		\$0		\$0	\$0
G. Totals										
				\$487,900	\$0		\$0		\$0	\$487,900
Previously approved				\$9,000						

PART VII - APPROVALS

1. _____
Forest Supervisor Date

Appendix E: Tonto NM Post Fire Safety Strategy and Recovery Planning

DO NOT COPY OR DISTRIBUTE
THIS REPORT CONTAINS SENSITIVE CULTURAL AND NATURAL
RESOURCES INFORMATION

National Park Service
U.S. Department of the Interior
Tonto National Monument
Roosevelt, Arizona

2019 Post Woodbury Fire Safety Strategy and Internal Recovery Planning Tonto National Monument



Prepared by:

Duane C. Hubbard, TONT Superintendent
Eric Schreiner, TONT Chief of LVS and CDSO
BAER Team

Summary

<i>Incident</i>	<i>Woodbury Wildfire</i>
Fire Name	Woodbury Fire
Fire Number	L951
Agency Unit	Tonto National Monument
Region	Inter Mountain Region
State	Arizona
County	Gila
Ignition Date/Cause	June 8, 2019/Unknown Cause
Date Contained	July 15, 2019 @ 1900
Date Controlled	
Jurisdiction	Acres
NPS – Tonto National Monument	969

Purpose: The purpose of this document is to outline the strategy for mitigating the risks caused by the impacts from the Woodbury Fire. It will also list short-term actions needed before re-opening to the public and long-term ongoing actions. This will also address ongoing risks associated with working in a reshaped environment. It will outline ongoing monitoring needed to identify risks. This document is a guide for how to recover short and long-term operations from the Woodbury Fire. Finally, future rehabilitation projects that are covered under the BAER report and other non BAER actions are presented.



Timeline of Significant Events

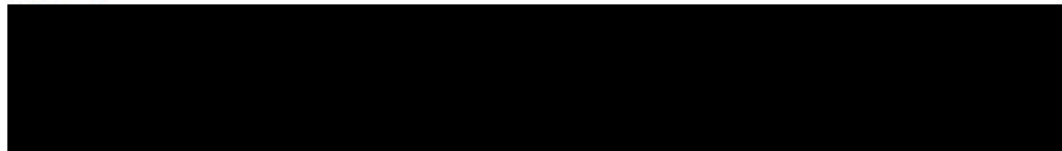
June 8 – Fire Starts

June 14 – 25,716 acres – A dry slot weather event overnight made the fire run approx 5-6 miles to the north and doubled fire size.

June 15 – 36,374 acres - Tonto National Monument signed onto delegation of authority

June 16 – 37,647 acres - Division Tango was created to protect the northeast portion of the fire which included Tonto National Monument.

June 18 – 44,343 acres – Tonto National Monument began preparations for removing archives and the museum collection. Offices were packed and vehicles/equipment moved across the Highway to the Tonto National Forest Work Center.



June 20 – 65,893 acres - Fire made a significant run to northeast approx 5 miles. Highway 188 closed and Lakeview Estates evacuated along with numerous other residents and the employees of the Park. Server and backups removed by SOAR IT specialist. NPS archeologists and firefighters wrap the Lower Cliff Dwelling to protect 700 year-old wood. Remaining park staff evacuated except superintendent. All staff remaining placed on Admin Leave. Superintendent, NPS fire staff and Forest staff monitor fire activity.

June 21 – 79,938 acres - Burnout around Tonto National Monument was conducted from approximately 1700 hrs through 1000 hrs on 6/22/19.

June 24 – 115,750 acres – Facility manager returns to park to evaluate the critical systems and park infrastructure.

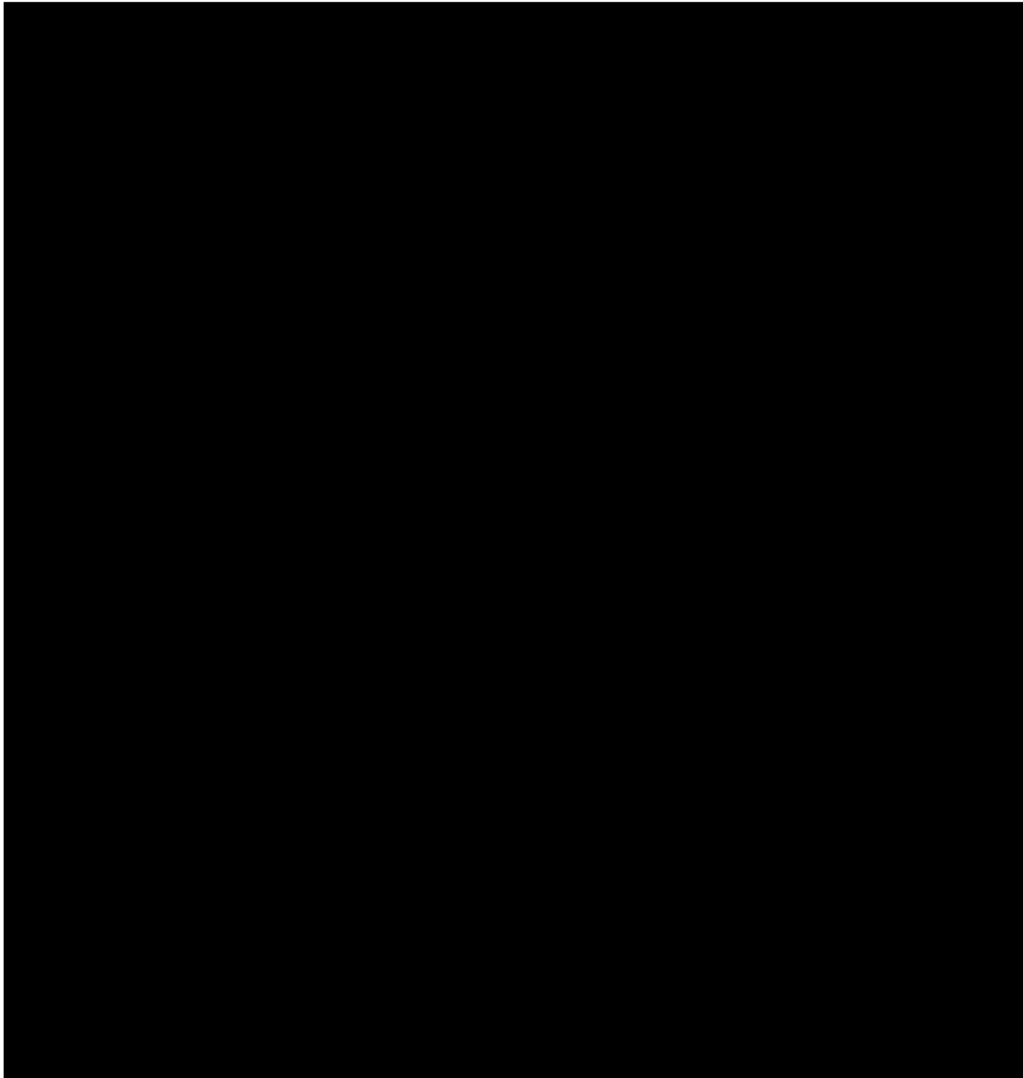
June 25 – Highway 188 closure lifted and Division Chiefs return to park after 11:00am.

June 26 – Remaining staff return to the park and begin moving park equipment from FS to Monument.

June 28 – Transition from Type 1 to Type 3 Team complete. Zone safety officer assessment complete.

July 5 – Transition from Type 3 Team to Tonto National Forest – 90% contained

July 6-15 – BAER plan development and assessments. Implementation of emergency stabilization by adding concrete barriers around pumphouse and Administration building.



Ongoing Hazards and Special Considerations:

- **Working in Burned Areas:** This new environment brings new hazards on top of the previous hazards of working in the backcountry. Rocks may be loose and burn out roots can create tripping hazards. In addition, the local area around burned landscapes will be hotter due to black soils and lack of vegetation.
- **Flooding:** A drastically increased risk of flooding is due to the lack of ground cover. Loose ash and soils will make the first few floods more damaging. Staff need to be aware of potential rainfall at all times, especially while in the backcountry and at the Visitor Center. All employees will follow the "Post Woodbury Fire Flood Evacuation Procedures".
- **New Staff:** All new staff or outside crews coming in to help must be briefed on the continuous and must have proper PPE. All people working at TONT will follow TONT safety procedures; the team leader of the project will be responsible for new staff and crews.
- **Heat Illness:** Heat Illness is a serious concern and staff should take all possible precautions. This means staying hydrated, working in early morning hours, avoiding working in the heat if it is not an operational need. Monitor each other for signs of heat stress and cancel work if need.
- **Overworking and Cumulative Stress:** Supervisors and staff need to be aware of the effect of cumulative stress. Employees should take days off as normal unless there is an operational need. Supervisors should allow employees to take time off when possible. The Employee Assistance Program is a support service available for work and non-work related stress.
- **Empowering Employees:** Employees should feel empowered take action to address safety issues or risk. Supervisors will create a work environment that welcomes employee input on safety and encourages proactive safety choices.
- **Weather Monitoring:** Staff acting as Base for the radios will continually check the radar. They will alert all staff of approaching storms and of flood warning.
- **Backcountry Check-ins:** Since there will be an increased amount of work in backcountry areas during the hotter time of year, staff should take extra precautions. All work planned will be approved by the supervisor and reviewed by the Superintendent. Staff will check in with base before going out, so they know the plan. Crews will also check in every two hours with Base.

Management Recommendations

Flood Control

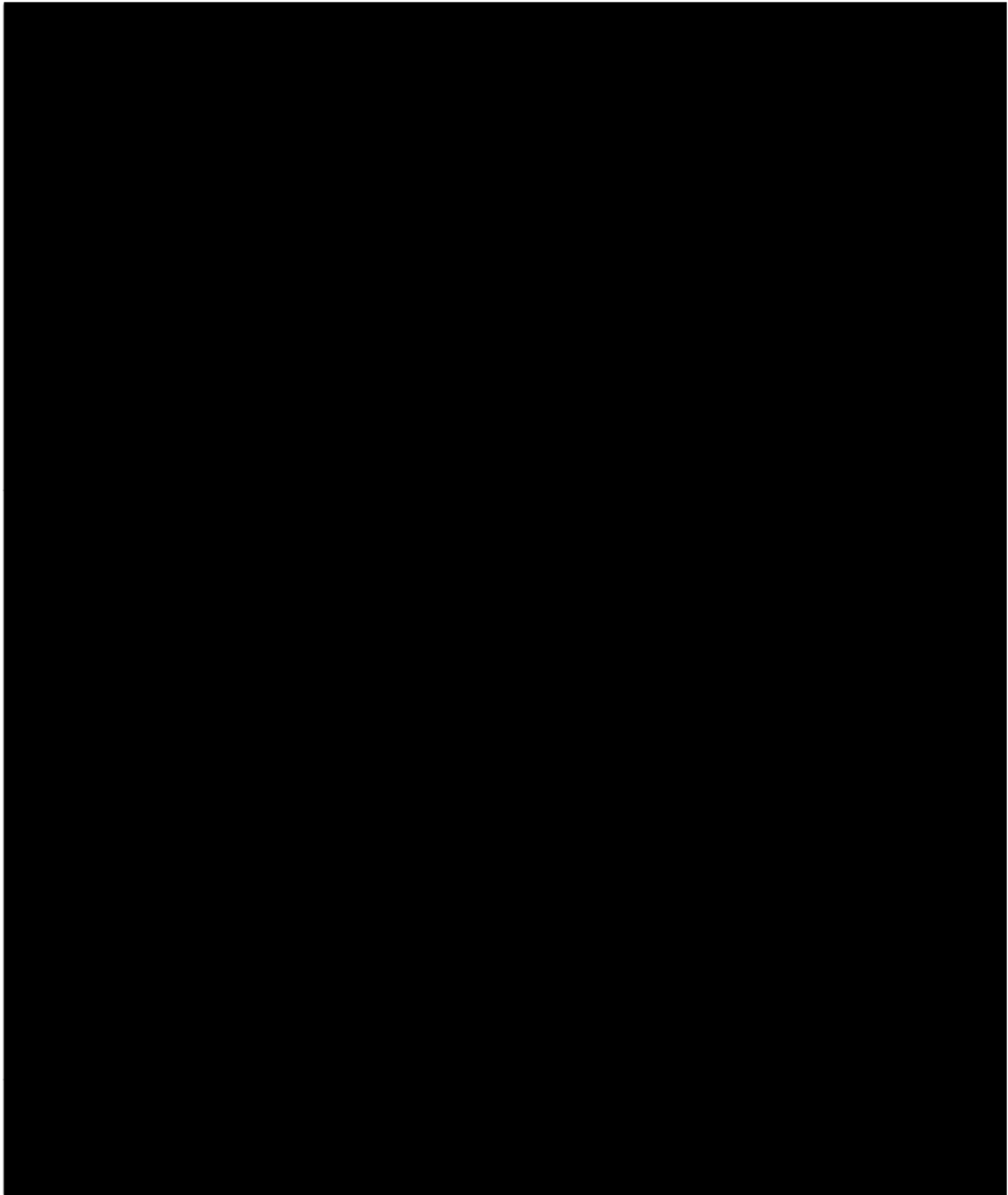
Groundwater well house and partially buried storage tank area (Cinda - Lead): Located adjacent to Cave Canyon Creek. Storage tank is well armored with large boulders. The well house is downstream of the storage tank and would be impacted by elevated flood flows. Armoring of the well house area on the west, south, and east sides with Concrete Jersey Barriers is complete.



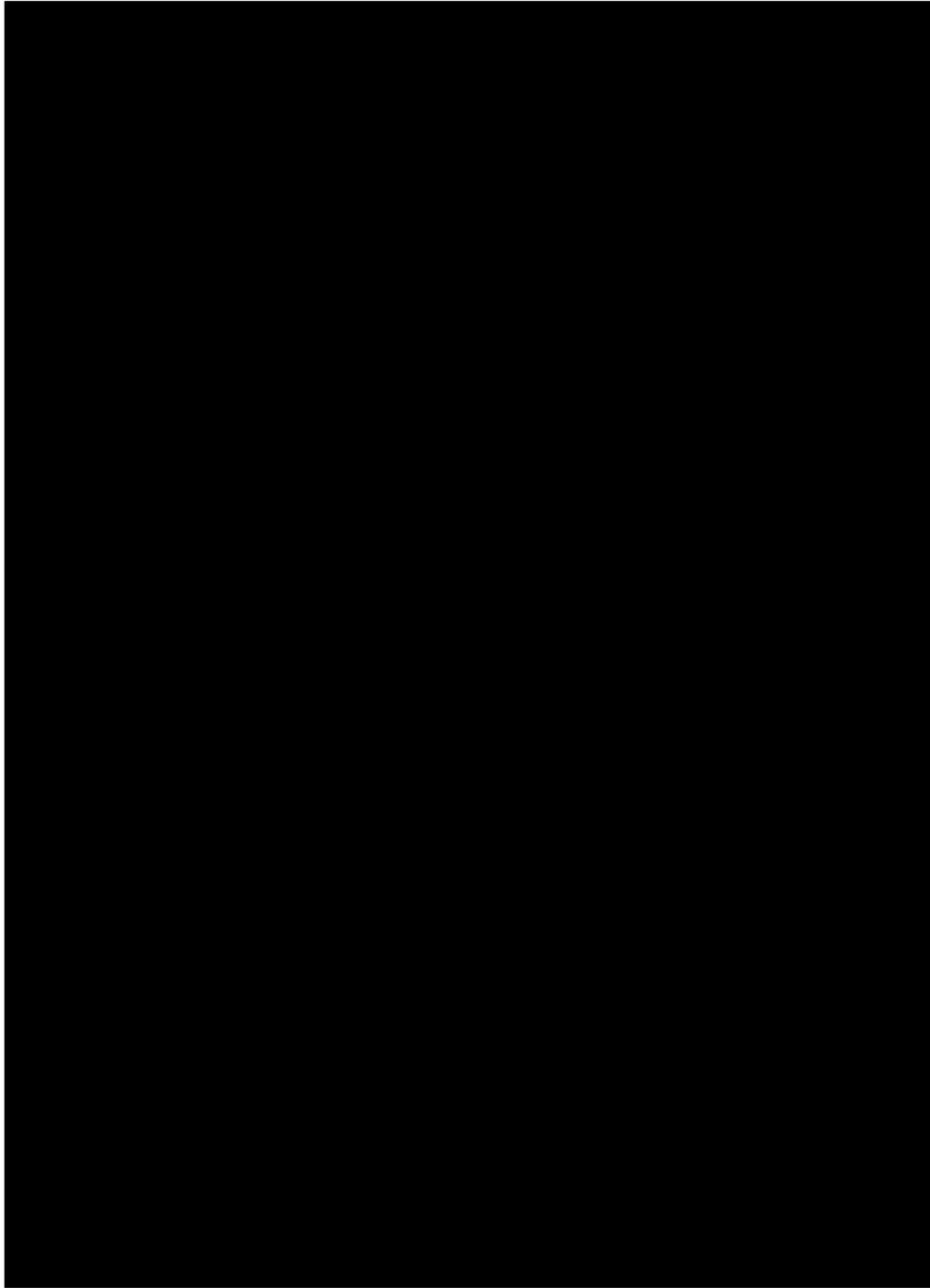


Protect Admin/Maintenance Complex from overland sheetwash and flooding (Cinda - Lead): Located at the northend of the picnic area, several drainages flow directly towards the admin/Maintenance Complex. Armoring of the area above from the comfort station west towards the entrance road will hopefully divert water away from this area during heavy rains. Concrete Jersey Barriers have been installed. Barriers will be moved after monsoons.





8



Hillslope Stabilization

Entrance Road Side Slope (Cinda - Lead): Located between the picnic area and the culvert crossing, on the east side the road passes the toe of a hill with steep slopes. The entire slope is burned and the shoulder is narrow. Recommend placement of Concrete Jersey Barriers as a rock fall containment barrier to shield motor vehicles and protect the roadway and buried utilities. Jersey barriers should extend from culvert up canyon to the road crossing (where the double 8' culverts are located). Daily maintenance and clean up of the road may be required until the slope is stabilized.





Recommendation:

Evaluate impacts to road after the monsoons begin. If significant debris begins to cover the entrance road, consider purchasing the 500' of barriers and placing them along the roadway. Also, a geohazard assessment is needed by a geomorphologist along this slope. Large rocks and boulders are now exposed on the steep hillslope with no vegetation anchoring the slope (*Duane working with IMR to identify a specialist*).

Culvert Cleaning

Culvert cleaning (Cinda - Lead): Fire related flood flows are normally elevated and typically move ash, soil/rock and floatable woody debris. Culverts are usually not designed to accommodate fire effects. Two locations will need culvert cleaning of creek bed load throughout the summer monsoon season and potentially for one year. One is the large 2 culvert crossing of the main park access road to the visitor center and the other is a small culvert near the groundwater well pump house.



Recommendation:

Assess status of culverts along the entrance road and Lower Cliff Dwelling Trail. Complete as much removal of debris with park maintenance staff before the monsoons. Develop a long-term plan and recommendations for a trail crew to remove larger rocks and boulders located within the culverts. Crews will be needed after the monsoon to clean out additional debris deposited. Work with Tonto Basin Fire, the USFS or ADOT on evaluating and flushing the VC parking lot culvert.

(Signs, Benches, Fences)

Signs, Benches, Fences (Cinda – Lead): Placement of new hazard signs at the trailheads, along the entrance road, and picnic areas is needed. A disclosure of entering a recently burned area is warranted as abatement of all risks is not possible. Typically, after 1 or 2 years these can be removed as site conditions stabilize and vegetative groundcover is once again established. Park signs and benches burned by the fire will be replaced along the entrance road, Hwy 188 corridor, and LCD trails before opening the park.





LCD Hazard Trees/Cactus Removal

Lower Cliff Dwelling Trail (Brett - Lead): Rock fall, debris and hazard trees and saguaro/barrel cactus could potentially impact employee and visitor safety. There is a need to conduct an assessment of scorch height and instability (leaning/exposed roots) for individual saguaros and hazard trees that could fall and impact the trail. Hazard tree/cactus removal may be warranted depending on this assessment and observations of deterioration following winds and precipitation events during the summer monsoon.



Recommendation:

Ecologists and saguaro experts will evaluate impacts to cactus and trees along the LCD trail. Hazard vegetation should be marked and then recorded for removal. Fire weakened/killed trees and cactus along the LCD trail corridor will be removed by a Wildland Fire Module or similar module including assistance from an Arborist/Master Faller overseeing the project. Schedule Andy Hubbard and Don Swann for a field consultation regarding hazardous saguaros (*Brett*). Once BAER funding is approved, the module will conduct work prior to opening the LCD trail to visitors.

UCD Hazard Trees/Cactus

Upper Cliff Dwelling Trail (Brett – Lead): This trail winds through the creek bottom and is susceptible to significant changes from flooding, erosion, debris and hazard trees. Conduct a hazard tree assessment with focus on the mature Arizona Sycamore and Black Walnut trees. Hazard tree removal may be necessary depending on this assessment and observations of deterioration following winds and precipitation events during the summer monsoon.



Recommendation:

Fire weakened/killed trees and cactus along the UCD trail corridor and riparian area will be removed by a Wildland Fire Module or similar module including assistance from an Arborist/Master Faller overseeing the project. Schedule Andy Hubbard and Don Swann for a field consultation regarding hazardous saguaros and an arborist for assessment of the riparian area. Once BAER funding is approved, the module will conduct work prior to opening the UCD trail to visitors. Some dead vegetation within the riparian corridor may be removed by park staff with reciprocal saws so that it doesn't plug up downstream culverts.

Finish LCD Trail Resurfacing

The LCD Trail Resurfacing is nearly complete. Trail work can be completed in safe locations along the cactus patch and lower section of LCD Trail.

Restore Entrance Road Shoulder Corridor to 12'

(Cinda/Brett/SODN – Co-Leads): The first phase of this project involves removing dead brush and trees that are not sprouting regrowth up to 12' from the road edge. Brush and trees with new regrowth will have dead/burned parts removed. Brush will be placed in nearby creeks as checkdams or hauled off to the barrow pit. This corridor is from the entrance gate to the visitor center parking lot. Saw work can be done by fire modules or outside trail crews. Jute matting, waddles, and reseedling should occur where needed.



Restore Entrance Road Corridor to 150'

(Cinda/Brett/SODN – Co-Leads): The second phase of this project involves removing dead brush and trees that are not sprouting regrowth up to 150' from the road edge. Brush and trees with new regrowth will have dead/burned parts removed. Brush will be placed in nearby creeks as checkdams or hauled off to the barrow pit. This corridor is from the entrance gate to the visitor center parking lot. This work can be done by fire modules or trail crews with support from TONT staff. Jute matting, waddles, and reseedling should occur where needed.



Restore Entrance Turn-around and Scenic View Area

(Cinda/Brett – Co-Leads): This project involves removing dead brush and trees that are not sprouting regrowth from the turnaround road edge to the fenceline. Brush and trees with new regrowth will have dead/burned parts removed. Brush will be hauled off to the barrow pit. This work can be done by TONT staff. Reseeding should occur where needed. An area to build a park entrance sign should be cleared and prepared as part of this project. Future funding will be procured to build the iconic park sign.



Restore Hwy 188 Corridor

(Cinda/Brett/SODN – Co-Leads): This project involves removing dead brush and trees that are not sprouting regrowth from the 188 road edge to the fenceline. Brush and trees with new regrowth will have dead/burned parts removed. Brush will be hauled off to the barrow pit. This work can be done by fire modules or trail crews with support from TONT staff. Jute matting, waddles, and reseedling should occur where needed. This work will be done in conjunction with ADOT as well.



Restore Hidden Ridge Bosque

(Brett/SODN – Co-Leads): Develop a restoration plan in conjunction with SODN. Assessments of the Hidden Ridge site will be needed after the summer rains. The site will be re-recorded and mapped.



(Monitor and Report on the Effectiveness of Mitigation for Cultural Sites)

(Brett Lead): Cultural sites within the burned area will be visited by Tonto National Monument archeologists and reported on within one year of the fire ignition date. Effectiveness of site resource stabilization will be evaluated, with particular attention paid to continued post-fire erosion and the appropriateness/adequacy of specific landscape treatments.

Other Recommendations

- Contact a noxious weed expert for assessment and recommendations
- Monitor fire severity on I&M long-term monitoring sites (terrestrial and riparian), and capture the immediate effects on the hydrology and aquatic ecology of springs at the parks. Following the onset of the summer rains, SODN will then reread all of the long-term sites and modify long-term sampling strategies to contrast burned with unburned sites.
- Potential impacts and assessments for Threatened and Endangered Species
- Rehabilitate remaining scratch line
- Conduct aerial photogrammetry to map historic and prehistoric structures that have been exposed by the fire
- Create an archeological 100% pedestrian site survey for the park due to the exposure of new archeological sites and feature. As part of this project, perform site mapping and recording.
- Enter new Maintained Archeological Sites (ASMIS) into FMSS as most of these will require work orders for preservation projects after the summer rains
- Incorporate previous fire ecology vegetation plots and photos into SODN long-term monitoring.

Actions Needed Before Opening the Park (Only Visitor Center)

Target Date – August 30, 2019

<u>Priority</u>	<u>Task</u>	<u>Compliance and Date Completed (Y/N)</u>	<u>Date Completed</u>	<u>Notes</u>	<u>Assigned Staff</u>
1	Placement of barricades at pump House and along Road				Cinda
2	Clean out culverts				Cinda
3	Close Picnic Area and Lower Cliff Dwelling trail access points				Cinda
4	Work with NWS to finish set up of weather station and text/email alerts for staff				Duane/Eric
5	Stabilize Cultural sites				Brett/Stephanie
6	Evaluate geohazard risks				Duane/Brett
7	Stabilize slopes and re-seed roadways				Brett
8	Clean up hazard plants along roadways				Brett/Cinda
9	Replace signs, benches, fences damaged by fire. Post BAER signs indicating environment hazards				Cinda
10	Conduct aerial photogrammetry to map historic and prehistoric structures that have been exposed by the fire				Jake
11	Develop talking points about the fire for employees working with the public				Eric

Actions Needed Before Opening the Lower Cliff Dwelling Trail
Target Date – September 28, 2019

<u>Priority</u>	<u>Task</u>	<u>Compliance and Date Completed (Y/N)</u>	<u>Date Completed</u>	<u>Notes</u>	<u>Assigned Staff</u>
1	Complete hazard tree and saguaro analysis along trail, remove identified hazards				Brett
2	Analyze rock fall potential in the Cliff Dwelling and decide if it is low enough to allow employee and visitors into all areas normally open.				Brett/Salek
3	Finish LCD Trail Resurfacing				Cinda
4	Replace bee pheromone traps				Cinda/Northwest
5	Develop new procedures for when to close due to potential impacts from weather. Weather management action points.				Eric
6	Train staff on working in burn out areas and on talking points for when then interact with visitors				Eric

Actions Needed Before Opening the Upper Cliff Dwelling Trail
Target Date – November 1, 2019

<u>Priority</u>	<u>Task</u>	<u>Compliance and Date Completed (Y/N)</u>	<u>Date Completed</u>	<u>Notes</u>	<u>Assigned Staff</u>
1	Complete hazard tree and saguaro analysis along trail, remove identified hazards				Brett
2	Analyze rock fall potential in the Cliff Dwelling and decide if it is low enough to allow employee and visitors into all areas normally open.				Brett/Salek
3	Finish UCD Trail Realignment				Brett
4	Replace bee pheromone traps				Cinda/Northwest
5	Update JHA and develop new procedures for UCD trail on when to cancel tours due to flooding risks or other impacts from weather.				Eric
6	Develop new procedures for when to cancel tours due to potential impacts from weather. Weather management action points along UCD.				Eric
7	Develop new conformation letter and update all information to include new hazards				Eric

Actions Needed Before September 30, 2020

<u>Priority</u>	<u>Task</u>	<u>Compliance and Data Completed (Y/N)</u>	<u>Date Completed</u>	<u>Notes</u>	<u>Assigned Staff</u>
1	Restore Entrance Road Shoulder Corridor to 12'				Brett/Cinda
2	Restore Entrance Road Corridor to 150'				Brett/Cinda/Module
3	Restore Entrance Turn-around and Scenic View Area				Brett
4	Restore Hwy 188 Corridor				Brett/Cinda/Module/ADO T
5	Develop Restoration Plan for Hidden Ridge Bosque				Brett/SODN
6	Monitor and Report on the Effectiveness of Mitigation for Cultural Sites				Brett/Stephanie
7	Contact a noxious weed expert for assessment and recommendations				Brett
8	Monitor fire severity on L&M long-term monitoring sites (terrestrial and riparian), and capture the immediate effects on the hydrology and aquatic ecology of springs at the parks. Following the onset of the summer rains, SODN will then rerun all of the long-term sites and modify long-term sampling strategies to contrast burned with unburned sites.				Brett/SODN
9	Monitor potential impacts and assessments for Threatened and Endangered Species				Brett/SODN
10	Create an archaeological 100% pedestrian site survey for the park due to the exposure of new archaeological sites and features. As part of this project, perform site mapping and recording.				Brett/Stephanie
11	Enter new Maintained Archeological Sites (ASMIS) into FMSS as most of these will require work orders for preservation projects after the summer rains				Brett
12	Incorporate previous fire ecology vegetation plots and photos into SODN long-term monitoring.				Brett/SODN