

BURNED-AREA REPORT

(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

- 1. Funding request for estimated emergency stabilization funds
- 2. Accomplishment Report
- 3. No Treatment Recommendation

B. Type of Action

- 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
- 2. Interim Report (####)
 - [] Updating the initial funding request based on more accurate site data or design analysis
 - [] Status of accomplishments to date
- 3. Final Report (following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: **Tank Hollow**

B. Fire Number: **UT-UWF-791**

C. State: **Utah**

D. County: **Utah**

E. Region: **04 - Intermountain**

F. Forest: **19 Uinta Wasatch Cache**

G. District: **Spanish Fork**

H. Fire Incident Job Code: **P4K9H8 (0419)**

I. Date Fire Started: **8/11/17**

J. Date Fire Contained: **10/5/17**

K. Suppression Cost: **\$7,000,000**

L. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline waterbarred (miles): Dozer 4.2; Handline 1.6
2. Fireline seeded (miles): Dozer 0.0; Handline 0.0
3. Other (identify):

M. Watershed Number:

HUC 12 Name	HUC 12 Number	Total Acres	Acres Burned
Indian Creek	140600040104	28,144	51
Willow Creek	140600040301	28,169	7
Tie Fork	160202020103	12,491	6,939
Middle Soldier Creek	160202020105	11,010	1,296
Lower Soldier Creek	160202020107	36,959	2,750

Cottonwood Canyon	160202020302	10,907	24
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N. Total Acres Burned:

NFS (10,811) BLM (0) State (0) Private (256)

O. Vegetation Types: The most dominant vegetation types within the burned areas were pinyon/juniper (P/J) and oak types, (oak, oak-pinyon/juniper, and oak-maple), with some mountain brush, sagebrush, aspen (mostly in the drainages), and scattered native grass/forbs throughout as well as conifers, (Douglas-fir, white-fir and spruce) on the upper elevation north-facing slopes.

P. Dominant Soils: There are 23 soil LSI (Land Systems Inventory) map units within the Tank Hollow Fire perimeter. These LSI units are distinct and are primarily located in the Southeastern Utah Eocene T2, Green River Formation. Soils are primarily loams, silt loams, and clay, with a large component formed from mudstones, siltstones, and lacustrine limestones/dolostones parent materials. Soil taxonomic classifications consist of Mollisols for 15 of the LSI units, Alfisols for 5 of the LSI units, Inceptisols for 2 of the LSI units, and Entisols for 1 LSI unit. Vegetation communities consist of sagebrush, grass-forbs, oak brush, maple, and spruce-fir conifers.

Q. Geologic Types: The Green River Formation formed in intermontane basin / lake environments during the Eocene period and resulted from mountain building and uplift of the Rocky Mountains (late Cretaceous Sevier orogeny and the Paleogene Laramide orogeny). Tectonic highlands supplied the Eocene sedimentary basins with sediment from all directions: the Uinta Mountains in the center; the Wind River Mountains to the north; the Front Range, Park Range and Sawatch Range of the Colorado Rockies to the east; the Uncompahgre Plateau and the San Juan Mountains to the south and finally, the Wasatch Mountains of Utah and the ranges of eastern Idaho to the west.

The lithology of the lake sediments is varied and includes sandstones, mudstones, siltstones, oil shales, coal beds, saline evaporite beds, and a variety of lacustrine limestones and dolostones. Volcanic ash layers within the various sediments from the then active Absaroka Volcanic field to the north in the vicinity of Yellowstone and the San Juan volcanic field to the southeast provide dateable horizons within the sediments.

R. Miles of Stream Channels by Order or Class:

Perennial: 7.5 Intermittent/Ephemeral: 26.3

S. Transportation System (miles)

Roads: 4.8 miles Maintenance Level 2

0.2 miles Maintenance Level 4

0.2 miles Maintenance Level 5

Trails: 2.3 Miles Motorized

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 1,314 low 4,270 moderate 1,351 high 4,132 unburned

B. Water-Repellent Soil (acres): 1,867

C. Soil Erosion Hazard Rating on NFS Lands (acres):

Erosion Hazard Class	Tank Hollow Pre-fire Erosion Hazard
High	6,764
Moderate	2,727
Low	1,575

D. Erosion Potential: Ranges from 1 to 39 tons/acre, 16 tons/acre average within perimeter for High Burn Severity slopes

E. Sediment Potential: 7,585 cubic yards per square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period (years): 3-5 years

B. Design Chance of Success (percent): 80%

C. Equivalent Design Recurrence Interval (years): 10

D. Design Storm Duration (hours): 1 hours

E. Design Storm Magnitude (inches): 0.944 inches

F. Design Flow (cubic feet / second / square mile): 7 cfs/mi² across modeled drainages

G. Estimated Reduction in Infiltration (percent): 51%

H. Adjusted Design Flow (cfs per square mile): 126.9 cfs/mi² across modeled drainages

PART V - SUMMARY OF ANALYSIS

Introduction/Background:

The Tank Hollow Fire started as a lightning caused ignition that was first detected on August 11, 2017. The fire was initially managed for resource benefit, however soil burn severity mapping indicates that significant portions of the fire (51%) burned at moderate and high burn severity and detrimental fire effects are now present on the landscape. The fire began in the Sheep Creek watershed, where it was initially held at approximately 1,100 acres. On August 20th, fire activity increased significantly, resulting in runs to east and southeast, towards the Tie Fork watershed and Highway 6. Once the fire was established in the upper Tie Fork watershed, aerial and ground based burnout operations were initiated on the north and east sides of the watershed.

The burned area is located on the Spanish Fork Ranger District of the Uinta Wasatch Cache National Forest, approximately 21 Miles southeast of Spanish Fork, Utah. The soil burn severity (SBS) map shows that the fire severity varies significantly throughout the fire perimeter. Areas

that burned as a result of natural fire growth experienced mostly moderate and high soil burn severity. Burnout operations ahead of the wildfire resulted in a mosaic burn pattern in the upper reaches of the Tie Fork drainage. Increased post fire soil erosion and runoff are likely to occur within and downstream of the moderate and high soil burn severity areas. This is expected to result in localized flooding, potentially damaging debris flows, scouring and/or deposition of materials.

Short duration (0.5 to 1 hour), high intensity monsoonal thunderstorms are the precipitation events of primary concern. Based on historic precipitation patterns, these types of events are likely to occur in the summer months. The risk of flooding and erosional events has increased significantly as a result of the fire, creating hazardous conditions within and downstream of the burned area.

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

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

A list of values important to the Uinta-Wasatch-Cache National Forest was compiled by the BAER team. The BAER team evaluated values at risk through field assessment and associated analysis to determine the critical BAER values (FSM 2523.1) that may be treated within the BAER program. The risk (FSM 2523.1) to these critical values has been assessed by the BAER team and is described below. A list of treatments has been included below each critical value description to ensure tracking between values and treatments.

1. Human Life and Safety (HLS)

- a. **Very High risk to forest visitors and workers** along roads, trails, at parking areas, including dispersed campsites within and downslope of burned areas on NFS Lands due to hazard trees, rolling debris, localized flash flooding, debris flows, and possibility of entrapment. Probability of damage or loss is likely, magnitude of consequences is major. (*Treatments: T01, T03*)

2. Property (P):

- a. **High risk to road infrastructure** on Tie Fork Road (NFSR 725) due to the increased watershed response to precipitation events on areas of high soil burn severity and the resultant increased runoff. This increased runoff is expected to result in the loss of control of water, overwhelming of road drainage structures and features, and damage to the road prism. Probability of damage or loss is likely, magnitude of consequences is moderate. (*Treatments: T02*)
- b. **Low risk to the Energy Transmission Lines** within and downslope of the burn scars due to the potential for erosion of tower footings resulting in destabilization of the towers. Probability of damage or loss is unlikely, magnitude is moderate. (*No BAER treatments are recommended*)
- c. **Low risk to the Power Line Road (NFSR 606)** due to increased watershed response to precipitation and runoff resulting in the loss of control water, overwhelming of drainage features and damage to road prism. Probability of damage or loss is very likely, magnitude is minor. (*No BAER treatments are recommended*)

- d. **Low risk to the Great Western Trail** due to increased watershed response to precipitation and runoff resulting in damage to trail prism. Probability of damage or loss is possible, magnitude is minor. (*No BAER treatments are recommended*)

3. Natural Resources (NR):

- a. **High risk to soil productivity and hydrologic function** due to the threat of increased erosion and watershed response to precipitation events on areas that experienced moderate and high soil burn severity. The loss of soil organic matter and vegetation ground cover, and presence of hydrophobic soils has increased the threat of soil erosion. The probability of damage or loss is likely, magnitude is moderate. (*No BAER treatments are recommended*)
- b. **Intermediate risk to agricultural supply water** due to increased sedimentation following storm events and potential loss of diversion and conveyance systems. The probability of damage or loss is possible, magnitude is moderate. (*No BAER treatments are recommended*)
- c. **Low risk to native and naturalized plant communities** due to the threat from the spread of noxious weeds and invasive plant species resulting in the loss of Native plants. The wildfire created conditions conducive to noxious weeds spread and establishment by reducing competition, exposing bare mineral soil, and creating an environment where fall nutrient availability (water and soil nutrients) goes to the fall growth period for noxious weeds and not native plants which are mostly dormant at this time. The probability of damage or loss is possible, magnitude is minor. (*No treatment recommended*)

4. Cultural and Heritage Resources (CHR):

- a. None identified.

5. Other non-BAER Values

There are numerous NFS values that are not BAER Critical Values in addition to non-NFS values potentially at risk from post-fire threats originating primarily on NFS lands. Treatments for these other values have not been identified. Activities to address the non-BAER Critical Values on NFS lands can be considered for discretionary program funding. It is recommended the non-NFS values potentially threatened by post-fire conditions be communicated to the appropriate parties through interagency coordination.

B. Emergency Treatment Objectives:

Mitigate, to the extent possible, threats to personal injury or human life of forest visitors and Forest Service employees by raising awareness through implementing administrative closures and posting hazard warning signs on roads, and communicate hazard of flooding, debris flows, and rock fall. Provide safe access to the burned area for personnel implementing authorized BAER response actions and communicate threats to cooperating agencies and community groups.

Protect or minimize damage to NFS investments in roads infrastructure by monitoring drainage features for damage or loss of capacity from potential increased stream flows and/or debris flows. Minimize damage to key NFS travel routes.

Evaluate authorized BAER treatments and existing infrastructure to determine effectiveness in post-fire flow conditions.

Assist cooperators, other local, State, and Federal agencies with the interpretation of the assessment findings to identify and address potential post-fire impacts to communities and residences, domestic water supplies, public utilities (including power lines, roads, and other infrastructure).

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

Land -- % Channel -- % Roads/Trails -- 70% Protection/Safety 90 %

D. Probability of Treatment Success

Treatment	Years after Treatment		
	1	3	5
Land	NA	NA	NA
Channel	NA	NA	NA
Roads/Trails	70	70	70
Protection/Safety	90	80	70

Initially, visitors will heed the warning signs. Complacency is expected after the initial year unless there is a damaging event.

E. Cost of No-Action (Including Loss): \$100,000 for replacement cost of threatened AOP Culvert in Tie Fork.

F. Cost of Selected Alternative (Including Loss): (\$1,750 of storm patrolling) + (Roads loss assumed at 30% due to threat of storm patrolling not being conducted prior to damaging event = \$30,000) + (\$5,000 for protective barrier installation) + (Closure Signs cost of \$1,050) + (Warning Signs costs of \$1,050) = \$38,850

G. Skills Represented on Burned-Area Survey Team:

- | | | | | |
|---|---|--|---|---|
| <input checked="" type="checkbox"/> Hydrology | <input checked="" type="checkbox"/> Soils | <input type="checkbox"/> Geology | <input type="checkbox"/> Range | <input type="checkbox"/> HAZMAT/Mineral |
| <input type="checkbox"/> Forestry | <input type="checkbox"/> Wildlife | <input type="checkbox"/> Fire Mgmt. | <input checked="" type="checkbox"/> Engineering | <input type="checkbox"/> PIO |
| <input type="checkbox"/> Contracting | <input type="checkbox"/> Ecology | <input checked="" type="checkbox"/> Botany | <input type="checkbox"/> Archaeology | <input type="checkbox"/> Liaison |
| <input type="checkbox"/> Fisheries | <input type="checkbox"/> Recreation | <input checked="" type="checkbox"/> GIS | <input type="checkbox"/> Landscape Arch | |

Team Leader: Robert Davidson
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Team Members:

Robert Davidson – Soils
Brendan Waterman – Hydrology
Jana Leinbach– Botany
Matt Lee – GIS

H. Treatment Narrative:

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate

funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

Land Treatments:

None Proposed

Road and Trail Treatments:

T01 – Road Access Barrier

General Description: A gate is needed to restrict vehicle access on the Tie Fork Road during the summer monsoon season when damaging thunderstorms are expected to occur. This full size vehicle route terminates approximately 4 miles up Tie Fork canyon, where it narrows down to a single track motorcycle trail (Great Western Trail) that continues up and out of the canyon.

Suitable Sites: One gate is needed at the bottom of the Tie Fork Road (725), above the intersection with the 117 Road.

Design/Construction Specifications: The gate will be constructed to FS standard and installed at a location that allows for travelers to turn around.

Purpose of Treatment: The purpose of the gate is to restrict vehicle access on the 725 road. This restriction is needed due to the threat of debris flows crossing the road and hitting vehicles parked on tributary alluvial fans or trapping vehicles parked above main stem stream low water crossings in the canyon after significant precipitation events. If such an event were to occur, vehicles would be unable to exit the canyon.

Describe Treatment Effectiveness Monitoring: The effectiveness of the gate would be monitored during storm patrols.

Why is the Treatment /Activity Reasonable, within Policy (identify Agency land management plan), and Cost Effective? A gate is necessary to restrict unauthorized vehicle traffic, while still allowing for administrative access during storm patrol activities. An emergency closure restricting vehicle access would be implemented during the summer monsoon season. This is the most cost effective way to protect human life and safety while still allowing for administrative access.

T02 – Storm Patrols

General Description: The patrols are used to identify debris jam formation and culvert plugging.

Suitable Sites: Forest Service Road 725 – Tie Fork Road

Design/Construction Specifications: Immediately upon receiving heavy rain and during significant spring snowmelt the FS will send out patrols to identify road hazard conditions –

obstructions such as rocks, sediment, washouts, and plugged culverts, so the problems can be corrected before they worsen or jeopardize forest road users. If problems are identified, road patrols shall bring in heavy equipment necessary to mechanically remove any obstructions from the culvert inlet and catch basins where necessary. All excess material and debris removed from the drainage system shall be placed outside of the bank-full stream channel where it cannot re-enter the stream.

Purpose of Treatment:

- i. What value(s) is (are) mitigated by this treatment? Human Life and Safety (Public Safety of Forest Visitors and administrative personnel), Property (Forest Roads and Bridges), Emergency ingress/egress. Indirectly, debris that is not removed immediately could cause more substantial loss of infrastructure and associated sediment/debris that in turn causes an impact to Water Quality and Riparian areas.

There is an immediate and future threat to travelers along these roads within the burned area due to the increased potential for rolling and falling rock from burned slopes and increased potential for falling trees, flash floods and mudflows. The post-fire flooding will threaten to interrupt access to visitors, local residents, and Forest Service personnel who are implementing treatments. With the loss of vegetation, normal storm frequencies and magnitudes can more easily initiate rill and gully erosion on the slopes and it is likely that this runoff will cover the roads or cause washouts. These events make for hazardous access along steep slopes and put the safety of Forest visitors and administrative personnel at risk.

The purpose of the monitoring is to evaluate the condition of roads and culverts for motorized access and to identify and implement additional work needed to maintain and/or repair damage to road surfaces and flow conveyance structures (culverts, bridges) across roads in order to provide safe access across FS lands. Engineering and District personnel will survey the roads within the fire perimeter after high-intensity summer thunderstorms and spring snow-melt. Survey will inspect road surface condition, ditch erosion, and culverts/inlet basins for capacity to accommodate runoff flows.

- ii. How does the treatment relate to damage or changes caused by the fire? Increased runoff resulting from burned slopes and stream channels which are adjacent to roads will likely cause damage to roadway surfaces, drainage structures, or block roads with debris slides. Storm patrol during post fire runoff events provides early discovery of damaging processes and the opportunity to respond with equipment to minimize damage to property and the personnel to secure the scene to protect the public.

Describe Treatment Effectiveness Monitoring: Monitor the storm-patrol response time to ensure objectives are being met. Identify the type of storm event that mobilizes material.

Why is the Treatment /Activity Reasonable, within Policy (identify Agency land management plan), and Cost Effective? Early detection of damaging events reduces monetary loss and the threat to human life and safety. The cost of the treatment is reasonable considering that an average mile of road construction costs \$40,000. In addition, the protection of human life is a critical value and the loss of even one life and/or injury is far more than the cost of the treatment.

Protection/Safety Treatments:

T03 – Closure and Warning Signs

General Description: This treatment is for the installation of burned area closure and warning signs on roads and trail access points. Burned area signs warn the public of the possible dangers associated with a burned area on major entry points into the burned area, trails and developed/dispersed recreation sites. They shall contain language specifying threats to be aware of when entering a burned area such as falling trees and limbs, rolling rocks, and flash floods. In areas that will be administratively closed to the public, the signs will identify the threats to public safety that required the closure.

Description of Suitable Sites: Warning signs will be installed at major entry points in to burned areas and at trail access points.

Design/Construction Specifications:

1. Burned Area warning signs along the roads shall consist of 0.08" aluminum, sheeted in high intensity Orange with black letters. The WARNING lettering shall be a minimum of 5 inches in height and all remaining lettering shall be a minimum of 3.5 inches in height.
2. Burned Area warning signs at trail access points shall consist of 0.08" aluminum, Orange with black letters. The WARNING lettering shall be a minimum of 2 inches in height and all remaining lettering shall be a minimum of 1.5 inches in height.

Purpose of Treatment:

- i. What value(s) is mitigated by this treatment?

Human Life and Safety. The purpose of the Burned Area signs is to inform motorists, trail users and campers of upcoming dangers and/or closures.

- ii. How does the treatment relate to damage or changes caused by the fire?

The risk to human life and safety is increased by post fire hazards such as falling trees, rolling rocks, and flash floods. Burned area sign installation will inform forest visitors and workers of post fire hazards.

Describe Treatment Effectiveness Monitoring: District personnel will monitor sign condition to ensure that they remain effective over time.

Why is the Treatment /Activity Reasonable, within Policy (identify Agency land management plan), and Cost Effective? The treatment is reasonable since protection of human life is a critical value. Signs shall be designed according to agency standards. Material and installation costs were determined to be the most cost effective way to warn forest visitors and workers of burned area hazards.

I. Monitoring Narrative:

Monitoring narrative: Monitoring for individual treatments is described in above treatment narratives.

Part VI – Emergency Stabilization Treatments and Source of Funds

Interim #									
		NFS Lands				Other Lands		All	
Line Items	Unit	# of Units	BAER \$	Other \$	# of units	Fed \$	# of Units	Non Fed \$	Total \$
A. Land Treatments									
None Proposed			\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>			\$0	\$0		\$0		\$0	\$0
Subtotal Land Treatments			\$0	\$0		\$0		\$0	\$0
B. Channel Treatments									
None Proposed			\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>			\$0	\$0		\$0		\$0	\$0
Subtotal Channel Treatments			\$0	\$0		\$0		\$0	\$0
C. Road and Trails									
T01-Road Access Barrier (n) Each	Each	5,000	1	\$5,000	\$0	\$0		\$0	\$5,000
T02-Storm Patrols	Days	350	5	\$1,750	\$0	\$0		\$0	\$1,750
<i>Insert new items above this line!</i>				\$0	\$0	\$0		\$0	\$0
Subtotal Road and Trails				\$6,750	\$0	\$0		\$0	\$6,750
D. Protection/Safety									
T03a-Closure Signs (mater) each	each	350	3	\$1,050	\$0	\$0		\$0	\$1,050
T03b-Warning Signs (mater) each	each	350	3	\$1,050	\$0	\$0		\$0	\$1,050
<i>Insert new items above this line!</i>				\$0	\$0	\$0		\$0	\$0
Subtotal Protection/Safety				\$2,100	\$0	\$0		\$0	\$2,100
E. BAER Evaluation									
Initial Assessment	Team	\$6,500	1	--	\$0	\$0		\$0	\$0
<i>Insert new items above this line!</i>				--	\$0	\$0		\$0	\$0
Subtotal Evaluation				\$0	\$0	\$0		\$0	\$0
F. Monitoring									
<i>Insert new items above this line!</i>				\$0	\$0	\$0		\$0	\$0
Subtotal Monitoring				\$0	\$0	\$0		\$0	\$0
G. Totals									
Previously approved									
Total for this request				\$8,850	\$0	\$0		\$0	\$8,850

PART VII - APPROVALS

1.


 Uinta-Wasatch-Cache Forest Supervisor (signature)
10/18/2017
Date

2.

Regional Forester (signature)

Date

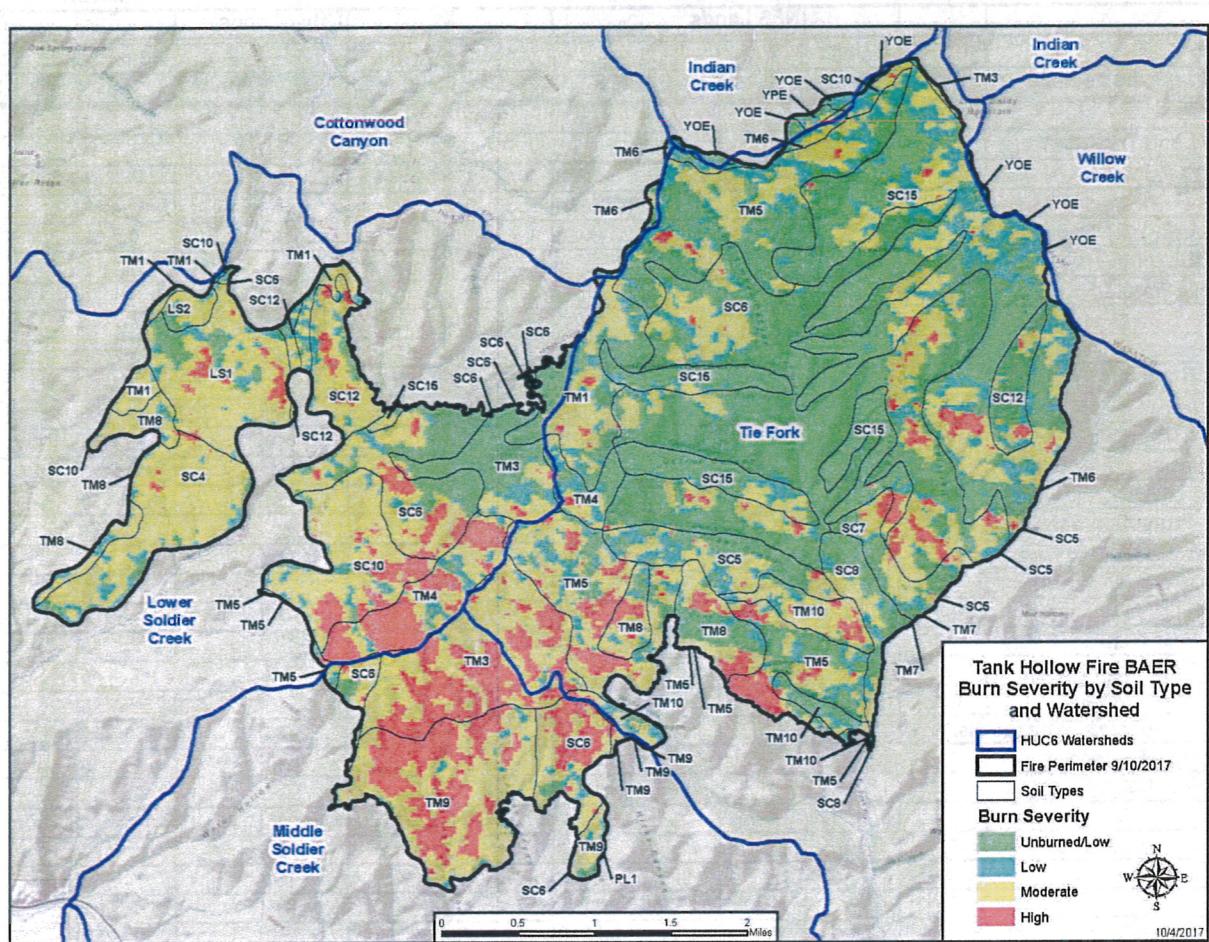


Figure 1: Soil Burn Severity