USDA-FOREST SERVICE FS-2500-8 (6/06)

Date of Report: 5/02/2018

BURNED-AREA REPORT

(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

[X] 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: Bluewater

B. Fire Number: NM-CIF-000108

C. State: NM

D. Counties: Cibola County

E. Region: 03

F. Forest: Cibola NF

G. Districts: Mount Taylor

H. Fire Incident Job Code: P3LN0718

I. Date Fire Started: 04/12/2018

J. Date Fire Contained: 90% as of 4/28/2016

K. Suppression Cost: $1.2M as of 04/22/2018

L. Fire Suppression Damages Repaired with Suppression Funds
1. Road as Fire line rehabed: 0.5mi
2. Completed line rehabed: 21.3mi

M. Watersheds – Affected 6th Codes

6th Code Watershed		NFS Acres Burned*	Percent Burned
Bluewater Lake / Creek	**130202070206**	**5205**	**26%**
Prop Canyon / Rio San Jose	**130202070402**	**853**	**3%**
Reynolds Draw / Bluewater Creek	**130202070207**	**1983**	**14%**

*total acres burned in both Bluewater and Diener Canyon fires

N. Total Acres Burned: 3,472 (USFS: 3,422; Navajo Nation: 50)

O. Vegetation Types: Pinon Juniper, Ponderosa Pine, Deciduous/Evergreen Mix

P. Dominant Soils: Haplustalfs, calciustolls

Q. Geologic Types: Permian Glorietta sandstone and San Andres limestone.

R. Miles of Stream Channels by Order or Class:
Perennial: 0.9 miles
Ephemeral: 10 miles
Intermittent: 0.5 miles

S. Transportation System
ATV Trails: 3.36 miles
Roads: 11.8 total miles: ML-1 3.3mi; ML 2 – 7.5mi; ML 3 – .9mi; ML 4 – 0mi; ML 5 - 0mi

PART III - WATERSHED CONDITION

A. Burn Severity acres: 2,076(low/unburned); 849(moderate); 496(high)

B. Water-Repellent Soil (acres): 810 ac

C. Soil Erosion Hazard Rating (acres): 708 slight (low); 6,553 moderate; 2,080 severe (high)

D. Erosion Potential: 1 ton/ac

E. Sediment Potential: 393 cubic yards / square mile (avg across mod and high severity)

PART IV - HYDROLOGIC DESIGN FACTORS (Bluewater 5th code watershed HEC model)

A. Estimated Vegetative Recovery Period, (years):	3-5
B. Design Chance of Success, (percent):	80%
C. Equivalent Design Recurrence Interval, (years):	25, 100
D. Design Storm Duration, (hours):	6, 6
E. Design Storm Magnitude, (inches):	1.96", 2.5"
F. Design Flow, Pre Fire (cubic feet / second):	1003cfs, 2109cfs
G. Estimated Reduction in Infiltration, (percent):	10
H. Adjusted Design Flow, Post Fire (cubic feet / second):	1034cfs, 2216cfs

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

The Bluewater fire BAER Assesment was restricted to NFS Lands. Assessment of the Navajo Nation lands are to be performed by Tribal authorities.

The Bluewater fire started on April 12th 2018 from an unattended campfire along Bluewater Creek and spread rapidly in fierce winds with gusts up to 50mph.. The fire quickly climbed out of the canyon along a steep side tributary and up onto Salitre Mesa. Once on top of the mesa the fire burned straight to the northeast across the relatively flat mesa top as a classic example of a wind driven fire with sharp straight edges. Near the forest

boundary the fire ran into old clear cut vegetation treaments stopping its progress. However the burn did cross a short way onto Navajo Nation lands to the north of the forest boundary as a creeping ground fire. The final acreage of the Bluewater fire was 3,422ac.

The soil burn severity map for the Diener Canyon & Bluewater Fires was created as a collaborative effort by the BAER team. The remotely-sensed Burned Area Reflectance Classification (BARC) data provided by the Geospatial Technology and Applications Center (GTAC) was the kernel for this analysis. The BARC data were derived from multi-band imagery collected by the Sentinel 2 sensor in two phases: pre-fire imagery was collected on April 22, 2017 and post-fire imagery was collected on April 17, 2018. Errors in these data are attributed to a number of persistent hot spots within the fire perimeters during the post-fire acquisition. These data were used to create a differenced Normalized Burn Ratio (dNBR) image and were further classified into four severity ratings: unburned, low, moderate and high. As stated in the BARC metadata: "The severity ratings are influenced by the effects to the canopy. The severity rating is based upon a composite of the severity to the understory (grass, shrub layers), midstory trees and overstory trees. Because there is often a strong correlation between canopy consumption and soil effects, this algorithm works in many cases for BAER teams whose objective is a soil burn severity assessment. It is not, however, appropriate in all ecosystems or fires. It is expected that BAER teams will adjust the thresholds to match field observations to produce a soil burn severity." The team processed these data based on aerial and ground observations. Each fire was assessed and corrections to the severity thresholds were adjusted independently in order to match the observations and take account for differences in ground cover and vegetation. The high and low severity classes were underestimated on both fires and the adjustments made reduced the moderate severity class. The Bluewater data required a greater degree of adjustment to the high severity threshold due to differences in stand characteristics. The areas of persistent heat had to be manually revised on an individual basis. These values were interpolated based on pre-fire vegetation composition and nearest neighbor burn severity values.

Hydrologic Modeling:

Peak flows have been estimated for eights small watersheds and the entire Bluewater Creek watershed above the bridge on road 178. The purposed of these calculations for these watersheds is to assess post fire effects to the values at- risk identified within and below the burned area. These watersheds include the areas draining to Bluewater Creek on the west side of the fires and areas to the north and east as shown on the map. The Water Erosion Prediction Project (WEPP) Post Fire Erosion Predictor (PEP) was used to evaluate the peak flood flows for the 2, 5, and 10 year recurrence intervals for pre- and post-fire peak flows for representative storms. The results are presented in the table below. The value of modeling peak flows is not to arrive at an absolute number. The value in this modeling effort is the relative difference between pre- and post-fire flows.

Diener Canyon and Bluewater fires WEP-Pep Summary for individual drainages

Name	Acres	Severity - Percent			Peak Flow - 2 year, cfs	Peak Flow – 5 year, cfs	Peak Flow – 10 year, cfs	Fire
#1 - notch trib	623	Unburned	2.8	Pre-fire	17	23	26	Bluewater
		Low	33.2					
				Post-fire	57	101	131	
		Moderate	47.6					
		High	16.4					
#2 - north end - west	1230	Unburned	38.5	Pre-fire	18	24	28	Bluewater
		Low	28.4					
		Moderate	13.8	Post-fire	91	155	198	
		High	19.3					
#3 north end - east	607	Unburned	26.2	Pre-fire	12	15	18	Bluewater
		Low	41.6					
				Post-fire	45	102	140	
		Moderate	23.9					
		High	8.2					
#5-all - north end	2960	Unburned	45.4	Pre-fire	40	48	54	Bluewater
		Low	32.9					
				Post-fire	152	249	313	
		Moderate	12					
		High	9.7					
#6-Diener	4930	Unburned	47.7	Pre-fire	72	111	137	Diener
		Low	35					
		Moderate	11.8					
				Post-fire	219	377	482	
		High	5.5					
#7- Trib to Bluewater, SW of Saltire Mesa	2080	Unburned	76.4	Pre-fire	53	85	106	Diener
		Low	20.2					
				Post-fire	70	112	139	
		Moderate	3.4					
		High	0					
#8- east side/private/tank	2350	Unburned	45.6	Pre-fire	28	38	45	Diener
		Low	35.6					
		Moderate	18.3	Post-fire	87	148	188	
		High	0.6					
Road Bend 480	889	Unburned	51.9	Pre-fire	18	25	29	Diener

Post-fire response from the smaller watersheds draining the high intensity areas within the Bluewater Fire on Salitre Mesa have a higher potential hydrologic responses due to the high percentage burned at high and moderate severity. Watersheds were impacted by the Diener Fire are larger with less high intensity fire percentages. As a result, the hydrologic response is expected to be buffered by unburned and low intensity areas, but flows will

still be higher than pre-fire conditions. This is also true for Bluewater Creek at the bridge on road 178. Less than 10% of this larger watershed was burned by the Bluewater and Diener Fires. Given the post-fire flood potential, heavy rainfall events could result in high flows that access the floodplains of these streams. As the flow continue downstream, they will lose energy as the floodplain and overflow channels are accessed, the floodplain widens and gradients decrease. As a result, post-fire high flows are likely to access areas in the valley bottom that they may not have in many years.

Critical Values Identified

Critical Values identified on NFS Lands (FSM 2523.1 Exhibit 01) during the BAER assessment are: Human life and safety, property, natural resources and cultural/heritage resources. The BAER team evaluated the risk to those critical values using the BAER Risk Assessment (FSM 23235.1 Exhibit 02).

The following risk matrix shown below, Exhibit 2 of Interim Directive No.: **2520-2017-1**, was used to evaluate the Risk Level for each value at risk identified during Assessment:

Probability of Damage or Loss	**Magnitude of Consequences**		
	Major	Moderate	Minor
	Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources.	Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects.	Property damage is limited in economic value and/or to few investments; damage to natural or cultural resources resulting in minimal, recoverable or localized effects.
	RISK		
Very Likely (>90%)	**Very High**	**Very High**	**Low**
Likely (>50% to <90%)	**Very High**	**High**	**Low**
Possible (>10% to <50%	**High**	**Intermediate**	**Low**
Unlikely (<10%)	**Intermediate**	**Low**	**Very Low**

The Very High and High Risk are unacceptable risk levels due to threats to human life, property, infrastructure and resources. Theses unacceptable risk levels trigger discussions on potential response actions taking into account proven treatments, treatments that substantially reduce risk, are economically justified, and the probability of success. An Intermediate Risk could be unacceptable if human life or safety is the critical value at risk. The above matrix only applies to values on National Forest System (NFS) lands. Contact was made with the BIA BAER team which evaluated Navajo Nation lands affected by fire. Information was shared with the understanding that the BIA would assess values on non-Forest Service lands.

Human Life and Safety

There is high risk of loss of life on NFS land within and downstream of the burned area. Individuals who may find themselves in drainages within or below the burned area or on roads affected by fire upstream are at very high risk during storm events. The drainages affected by high burn severity will be subject to higher than usual run off and debris flows which could cause injury or death. Hazard trees throughout the burn pose a very high risk to anyone entering the area.

There is a high probability that life and safety would be threatened by post-fire storm events on non-Forest Service in drainages north east of Salitre Mesa downstream from the burn area.

Property

Forest Service transportation infrastructure within and downstream from high and moderate burn severity are at risk of damage. There are no developed recreation sites or trails within the burn area. Stock tanks and sediment catchments within the affedcted drainages are likely to fill with ash, sediment, and debris and may be overtoped or breached. The increase in peak flows predicted (shown in the hydrologic modeling table above) pose a significant threat of flood waters and debris flows that have the potential to impact downstream transportation and drainage infrastructure. Affected roads include NFSR 178, 575, and several 2-track spur roads on top of Salitre Mesa.

Natural Resources

Wildlife

Two Mexican Spotted Owl Protected Activity Centers (PACs) were affected by the Diener Canyon Fire. Approximately 50% of the Diener Canyon PAC was severely burned with the remaining portion moderately to lightly burned. The Pole Canyon PAC

which had burned previously in the 2004 Sedgwick fire, sustained minor damage in the new fire. 100% of the Diener Canyon fire is MSO Critical Habitat, while roughly 60% of the Bluewater fire is MSO Critical Habitat. Emergency consultation with the USFWS has been initiated over the impact to this federally listed species.
There are many areas that burned in habitats that support the Regional Forester's sensitive species, Management Indicator Species and Migratory Bird habitats. However, this fire did not reduce the viability of the populations of these species nor is it likely to lead to the federal listing of any of these species. There are many species of common wildlife (that are not federally listed or sensitive species) that have been displaced on FS lands and private lands due to the fire.

Invasive Plants

Invasive weed species are a major concern following wildfire. Removal of the extant vegetation by fire, and disturbances from suppression efforts such as bulldozer lines and staging areas, create openings for invasive plants to invade, and impede or prevent recovery of desirable vegetation. Areas within the Diener Canyon and Bluewater fires that have the greatest potential for noxious weed invasion are burned areas of moderate or high severity and/or disturbed areas adjacent to or downstream of existing weed infestations. Disturbed areas should be monitored to catch new infestations and treat immediately through Early Detection/Rapid Response protocols to prevent spreading.

Soil Productivity

Soil loss tolerance is the threshold rate of soil loss. Soil loss rates that exceed this threshold indicate loss is greater than the rate of formation, and thus soil productivity is reduced. Prior to the fires, modeled soil loss exceeded tolerance on 2% of the area burned in the Bluewater Fire and 3% of the area burned in the Diener Canyon Fire. The area burned in the Bluewater had modeled soil loss greater than tolerance (Cibola TES 2005). Post-fire, 13% of the Bluewater Fire area and 20% of the Diener Canyon Fire area now have modeled soil loss rates that exceed tolerance. The Diener Canyon catchment within the Diener Canyon Fire is at very high risk of increased erosion and sediment delivery and therefore a loss of soil productivity. Erosion potential and sediment delivery are estimated to be an order of magnitude higher than what is reported for the entire burned area (see items D and E). Diener Canyon is comprised in part of TEU map units 302, 303, and 312 which have moderate to high erosion ratings. The burn on Salitre Mesa is comprised in part of TEU map units 158, 250, 274, 275 which have moderate to high erosion ratings.

Soil loss that exceeds tolerance has implications for values at risk other than soil productivity, including hydrologic function and infrastructure. It is of particular concern given the 5 sediment retention structures located along NFSR 504. These structures were

installed in the 1990's because of the degree of gullying the system was experiencing, without fire disturbance. Although most of them are near capacity, these structures have been effective over the year given that active gully erosion in the drainage bottom was not observed during field work.

Hydrologic Function

Vegetative cover is critical to reducing erosion rates, improving hydrologic function and maintaining site productivity. Natural re-establishment of cover is the preferred BAER recommendation. While re-sprouting species such as oak and New Mexico locust are part of some of vegetation communities that burned, they are not abundant. Fire-induced soil hydrophobicity can negatively impacts hydrologic function, however these soil conditions are likely to dissipate within the first year. If wide-spread heavy rainfall events occur within the recovery period, erosion and sedimentation above pre-fire rates will occur. Accelerated erosion has the potential to delay vegetative cover re-establishment if it exceeds soil loss tolerance. While natural recovery is generally preferred, the loss of vegetative cover and the erosion potential in the Diener Canyon catchment poses risk to hydrologic function.

Cultural Resources

Prior to the beginning of the Bluewater Fire, approximately 1150 acres (465.4 hectares) (33.6%) had been previously inventoried for historic properties (archaeological sites, historic structures, and traditional cultural properties) within the area of the Bluewater fire perimeter (3,422 acres on the National Forest lands). These inventories documented (12) sites within the fire perimeter on National Forest lands. Sites in the vicinity of the Bluewater Fire, primarily historic sites and artifact scatters associated with railroad logging and mining activities within the Zuni Mountains along with Native American artifact scatters representative of temporary campsites, dating to the Archaic and Ancestral Pueblo eras. After field assessments and analysis none of the NRHP eligible sites were identified as having high risk for damage from post-fire effects and are not recommended for additional preservation measures or treatments.

B. Emergency Response Action Objectives:

Recommended emergency treatments are designed to prepare roads and existing drainage structures to handle increased modeled storm runoff, reduce the spread of noxious and invasive weeds within the burn area, and warn the public of hazardous postfire conditions. Treatments also aim to mitigate soil productivity and hydrologic function loss within the High burn severity of Diener Canyon.

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

Roads/Trails 95 % Protection/Safety 95 %
Probablilities assume onset of monsoonal storms on July 9th, 2018

D. Probability of Response Action Success

	Years after Response Action		
	1	3	5
Protection and Safety	90	95	95
Roads	85	90	95
Weed monitoring and treatment	90	95	95

E. Cost of No-Action (Including Loss): $157,575

Critical values would be lost. See critical values described above, and in the Values At Risk table. The total cost for values at risk if no action were taken is estimated at $157,575, although this does not relfect the cost to potential injury or loss of life to hazards in the burn area and the risks posed by having a faulty guardrail on NFSR 178

Although the cost of losing soil productivity to post fire erosion is relatively high, no proven effective treatments were determined to have a high probability of success on the Bluewater fire. Probability of success was determined to be marginal at best due to the relatively low elevation, site soil composition, and vegetation communities across the burn area.
The total value of potential soil lost was estimated at $157,575.

F. Cost of Recommended Responses (including loss): $234,221

G. Skills Represented on Burned-Area Survey Team:

[x] **Hydrology**	[x] **Soils**	[ ] Geology	[ ] Range
[ ] Forestry	[ ] Wildlife	[ ] Fire Mgmt.	[x] **Engineering**
[ ] Contracting	[ ] Ecology	[ ] Botany	[x] **Archaeology**
[ ] Fisheries	[ ] Research	[ ] Landscape Arch	[x] **GIS**

Team Leaders: Rob Arlowe

Email: rarlowe@fs.fed.us

Cibola NF: 505-346-3900 Fax: 505-346-3901

Addititional Team Members: Livia Crowley – Hydro, Lavonna Begay – Hydro Trainee, Nessa Natharius – Soils, Daniel LeVrier – GIS, Peggy O'keefe – Engineering, Doug Kosik - Arch

H. Response Action Narrative:

Protection/Safety Response Actions:
Recommend the implementation of administrative closure orders for the entire burn area through the 2018 monsoon season and the 2019 spring winds. Signs should be installed at key access points, due to safety concerns within the burn area and in downstream channels especially during the monsoonal season and spring wind season. Install 3 hazard warning signs on roads at key entry points around the burn area and at the Bluewater creek parking area to inform the public of the dangers inherent in entering the burn scar.

Land Response Actions:
Recommend Early Detection/Rapid Response (EDRR) protocol. Mitigate the spread of noxious and invasive weeds within the burn area by conducting field visits (early detection) and immediately treating (rapid response) infestations along roads, dozer line, and staging areas.

Roads Response Actions:
Storm patrols targeting affected sections of NFSR 178 and NFSR 180, and the bridge near the Bluewater picnic site will be performed in advance of predicted storms, during or immediately after storms to clear debris and assess scouring. Storm patrol for debris jams: 1 day for 2 employees times 7 storm events plus equipment.

I. Monitoring Narrative:

No formal monitoring will be performed on the Bluewater fire.

Part VI – Emergency Stabilization Response Actions and Source of Funds **Interim #**

			NFS Lands				Other Lands			All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
	acres				$0		$0		$0	$0
	acres			$0	$0		$0		$0	$0
Invasive Plant EDRR	acres	65.65	160	$10,504						
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$10,504	$0		$0		$0	$10,504
B. Channel Treatments										
	miles			$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
Guardrail Replacement	per	49,342	1	$49,342	$0		$0		$0	$49,342
Storm Patrol	event	2,200	7	$15,400						
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$64,742	$0		$0		$0	$49,342
D. Protection/Safety										
Hazard Signs	per	700	3	$2,100	$0		$0		$0	$2,100
										$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Safety				$2,100	$0		$0		$0	$2,100
E. BAER Evaluation										
assessment	per	19,110	1		$19,110		$0		$0	$19,110
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				$0			$0		$0	$19,110
F. Monitoring										
										$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				$77,346			**$0**		**$0**	**$81,056**
Previously approved										
Total for this request				**$77,346**						

PART VII - APPROVALS

1. _/s/_____ 05/4/2018
   Matthew Rau acting
   Forest Supervisor (signature)

2. /s/_____ _____
   Regional Forester (signature) Date