

Date of Report: 09/24/2021

BURNED-AREA REPORT**PART I - TYPE OF REQUEST****A. Type of Report**

- ☒ 1. Funding request for estimated emergency stabilization funds
☐ 2. No Treatment Recommendation

B. Type of Action

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)
☐ 2. Interim Request #_____
☐ Updating the initial funding request based on more accurate site data or design analysis

PART II - BURNED-AREA DESCRIPTION**A. Fire Name:** Luna**B. Fire Number:** NM-CAF-000631**C. State:** New Mexico**D. County:** Mora**E. Region:** Southwestern**F. Forest:** Carson NF**G. District:** Camino Real RD**H. Fire Incident Job Code:** P3NN8421 (0302)**I. Date Fire Started:** 10/17/2020**J. Date Fire Contained:** 07/06/2021**K. Suppression Cost:** \$6,120,000**L. Fire Suppression Damages Repaired with Suppression Funds (estimates):**

1. Fireline repaired (miles):
2. Other (identify):

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

HUC #	Watershed Name	Total Acres	Acres Burned	% of Watershed Burned
110800040302	Quemado Canyon-Mora River	21,801	1,920	9
110800040301	Luna Creek	12,336	7,304	59
130201010503	Rio Chiquito	25,029	21	<1
130201010501	Rito de la Olla	21,235	180	5
Total			10,245	

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

OWNERSHIP	ACRES
NFS	7,815

OWNERSHIP	ACRES
OTHER FEDERAL (LIST AGENCY AND ACRES)	
STATE	
PRIVATE	2,430
TOTAL	10,245

O. Vegetation Types: Spruce-Fir, Mixed Conifer w/ Aspen, Bristlecone Pine

P. Dominant Soils: Typic Cryoboralfs loamy-skeletal, mixed (Spruce-Fir); Eutric Glossoboralfs, loamy-skeletal, mixed (Mixed conifer w/ Aspen)

Q. Geologic Types: residual and colluvial sources derived from Pennsylvanian sediments

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	24.5
INTERMITTENT	
EPHEMERAL	
OTHER (DEFINE)	

S. Transportation System:

Trails: National Forest (miles): 0

Other (miles):

Roads: National Forest (miles): 12

Other (miles):

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Table 4: Burn Severity Acres by Ownership

Soil Burn Severity	NFS	Other Federal (List Agency)	State	Private	Total	% within the Fire Perimeter
Unburned	1,101			228	1,329	13
Low	3,017			1,082	4,099	40
Moderate	3,034			914	3,948	39
High	663			206	869	8
Total	7,815			2,430	10,245	100

B. Water-Repellent Soil (acres): 2500 (estimated)

C. Soil Erosion Hazard Rating: **Low:** 0 acres **Moderate:** 4,379 acres **High:** 3,436 acres

D. Erosion Potential: approx. 10 to 12 tons/acre

E. Sediment Potential: approx. 400 cubic yards/sq. mile

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

G. Estimated Hydrologic Response (brief description): In summary, all acres of Moderate and High burn severity are "responsive" to precipitation events (see discussion below).

PART V - SUMMARY OF ANALYSIS

Introduction/Background

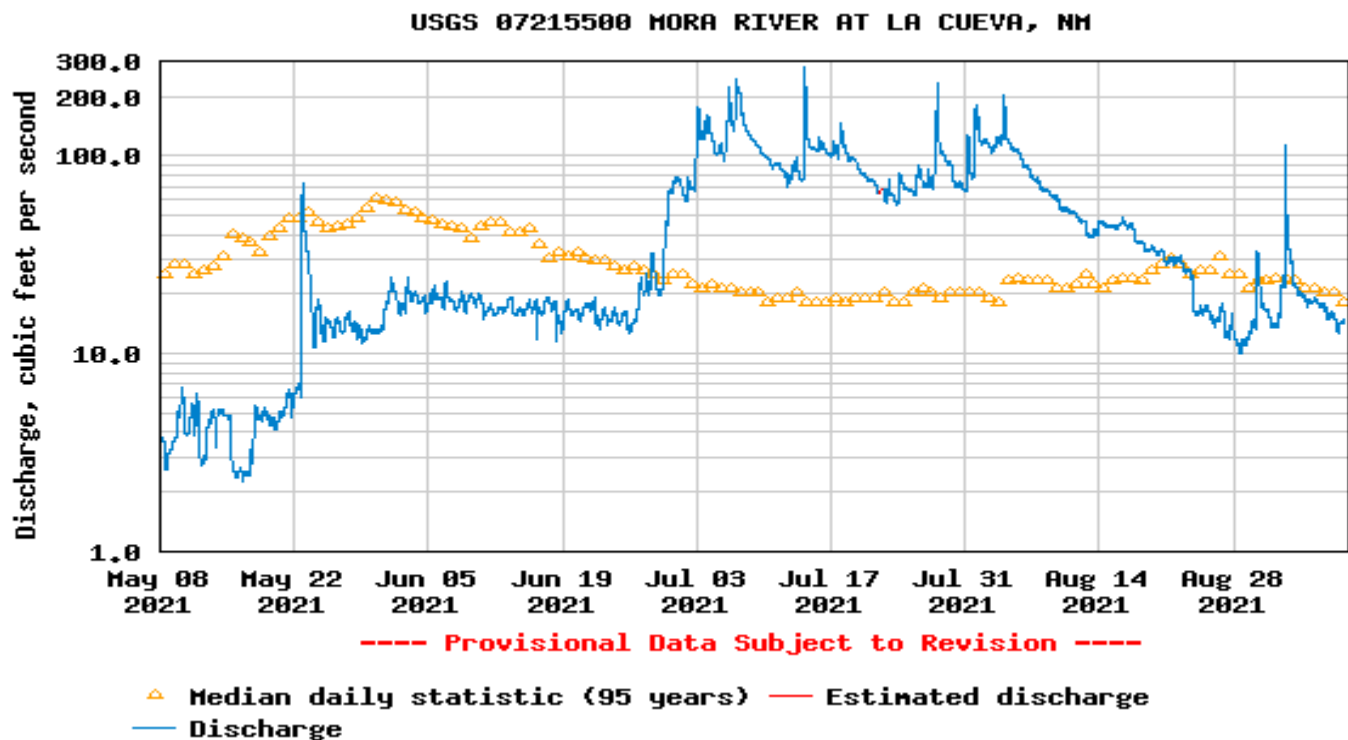
The Luna fire started on October 17, 2020 as the result of an unknown ignition source. Fire suppression continued until early November when winter weather and snow accumulation secured the fire within containment lines. Total size of the Luna fire is 10,142 acres. Elevation of the fire ranges from 8500 feet on private land along Luna Creek to 11,200 feet near Cuchillo de Fernando. Vegetation types are predominately Spruce-Fir and Mixed Conifer w/ Aspen forest types with high levels of standing and downed fuels. Persistent snowpack prevented suppression repair activities from being completed until June 2021. Early monsoonal precipitation (first damaging storm May 28, 2021) also made it difficult to access the burned area to conduct a damage assessment.

The fire persisted within the Luna Creek watershed and most fire related damage occurred along the East Fork and West Fork of Luna Creek. Other watershed areas were only affected to a minor extent on NFS lands, with only small discontinuous areas of high and moderate burn severity.

The Luna burned area has been subjected to repeated monsoonal storms that have resulted in flood events that have affected the watershed of Luna Creek and downstream areas. Monitoring the CoCoRAHS weather network <https://www.cocorahs.org/state.aspx?state=nm>, reporting station near Chacon, NM (Chacon 2.3 ENE/NM-MR-13), located near the confluence of Luna Creek and the Mora River, indicates there have been three (3) rain events recorded that are almost equal to the design storm (1.65 inches/hour) assigned. Given the elevational difference between this weather recording station and the upper elevation of the Luna burned area, it is not unreasonable to estimate rainfall in the upper watershed may have been in the range of 3 to 4 inches/hour. Notes associated with daily precipitation reports at this recording station also have attributed flooding in Luna Creek to precipitation amounts ranging from 0.24 inches to 0.88 inches. Several reports of large sized hail or hail accumulations of 2 to 5 inches in the watershed may have also been contributing factors.

The USGS real time stream gage Mora River at La Cueva, NM (07215500) https://nwis.waterdata.usgs.gov/nm/nwis/uv/?cb_00060=on&format=gif_default&site_no=07215500&period=&begin_date=2021-05-08&end_date=2021-09-08 has also been monitored during the monsoon season this summer. Typical storm related spikes in streamflow discharge follow reported flooding in Luna Canyon, but also indicate runoff from the burned area is not the sole source of those increased discharges. The watershed drainage area of this stream gage is 174 square miles and the gage is located approximately 18 miles downstream of the confluence of Luna Creek and the Mora River. The Luna Creek subwatershed (110800040301) is 12,346 acres (approximately 19.3 square miles) in size.

Median daily statistics for the Mora River at La Cueva stream gage were reviewed for this analysis and averaged for the months of May (36.2 cfs), June (44.9 cfs), July (23.5 cfs) and August (28.8 cfs) over the period of record (Oct. 1, 2009 to Sept. 30, 2020). These months are reflective of median discharge at this gage location during spring snowmelt and early/mid monsoon season. The graph below depicts the median statistic flow versus measured discharge for the period May 8 to September 8, 2021.



Of particular interest is the relationship of measured discharge to the daily median statistic prior to May 22 with discharge significantly below the median daily statistic value. The May 22 increase in discharge is reflective of the 1.27 inch precipitation event measured at the Chacon, NM (Chacon 2.3 ENE/NM-MR-13) site. Measured discharge between May 23 to June 28 was still below the daily statistic for that time period but substantially higher overall. Since June 29 measured discharge has been at or significantly above the daily statistic with peak discharge often exceeding the median daily statistic by an order of magnitude, or more. This is indicative of both the increased discharge from the Luna fire scar as well as above average storm intensity and precipitation amounts across the larger watershed area above the Mora River at La Cueva, NM gaging station.

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

- Human Life and Safety (HLS): High.** Risk to HLS from continued flooding, debris flows, and falling trees within the burned area, especially forest users who venture into the East and West Forks of Luna Creek.
- Property (P): Very High.** Risk to FS infrastructure such as FR 17 in East Fork Luna Creek in form of additional washouts at low water crossing and debris deposits along road prism from adjacent burned slopes.
- Natural Resources (NR): High.** Continued erosion of burned slopes within East and West Forks of Luna Creek will continue to degrade soil condition and sediment delivery will degrade water quality and aquatic habitat and increase risk of spread of invasive plants.

- 4. Cultural and Heritage Resources: Intermediate.** Low occurrence of these resources within the fire perimeter limits risk to this value.

B. Emergency Treatment Objectives: Protect Human Life and Safety and minimize damage to FS Property (FR 17).

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

Land: Likely.

Channel: N/A

Roads/Trails: Possible.

Protection/Safety: Likely.

D. Probability of Treatment Success

Table 6: Probability of Treatment Success

	1 year after treatment	3 years after treatment	5 years after treatment
Land	50	50	70
Channel			
Roads/Trails	50	75	70
Protection/Safety	70	80	80

E. Cost of No-Action (Including Loss): \$6,885,000

F. Cost of Selected Alternative (Including Loss): \$6,420,000

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Greg Miller

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Forest BAER Coordinator: Greg Miller

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Team Members: *Table 7: BAER Team Members by Skill*

Skill	Team Member Name
Team Lead(s)	Greg Miller
Soils	
Hydrology	John Littlefield
Engineering	
GIS	
Archaeology	Heath Bailey
Weeds	Melvin Herrera
Recreation	
Other	

H. Treatment Narrative:

Land Treatments: The occurrence of multiple damaging storm events limits possibility of wide-spread land treatments to be effective in moderating hydrologic response. Natural recovery of shallower slopes is occurring and is expected on steeper slopes within the next 3-5 years.

Monitoring/detection/treatment of invasive plants (musk thistle) is recommended to minimize spread to nearby burned slopes and the riparian area in East Fork of Luna Creek where an established population exists. Treatment would likely be a contract herbicide treatment to maximize effectiveness.

Channel Treatments: None recommended. The occurrence of multiple damaging storm events limits possibility of channel treatments to be effective in moderating hydrologic response. Transport of sediment and debris will continue during flooding events with effects to downstream private lands.

Roads and Trail Treatments: Outslope and waterbar FR 17 (4 miles) is recommended to protect and minimize further impacts to infrastructure from damaging storm events. A low water crossing of FR 17 at East Fork Luna Creek needs to be repaired – likely thru a Pilot Infrastructure request, but it is unclear whether this could be a productive use of those funds given the expectation of continued flooding in this drainage.

Protection/Safety Treatments: Install locking road gates on each end (intersection with FR 76 and at Forest/Private boundary) of FR 17 in East Fork Luna Creek to minimize exposure of public and FS personnel to entrapment due to flooding, debris flows, and falling trees. Other gate locations will be determined by District Roads Manager as needed. **Post Warning Signs** at/near burn perimeter along FR 76 and FR 17 to advise road users of post fire hazards (flooding, fallen trees, etc.). Warning signs would be placed in tandem and meet standards outlined in FW8-14c and FW8-14d.

I. Monitoring Narrative: Monitoring plan for early detection/response to invasive plant spread will be developed as 1st season inventory begins.

PART VI – EMERGENCY STABILIZATION TREATMENTS AND SOURCE OF FUNDS

Line Items	Units	Unit Cost	# of Units	BAER \$	Other \$	# of units	Fed \$	# of Units	Non Fed \$	Total \$
A. Land Treatments										
monitor/detect/treat	ac	5,000	4	\$20,000	\$0		\$0		\$0	\$20,000
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Land Treatments</i>				\$20,000	\$0		\$0		\$0	\$20,000
B. Channel Treatments										
				\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Channel Treatments</i>				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
Outslope/waterbar FR 17	mi	5,000	4	\$20,000	\$0		\$0		\$0	\$20,000
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Road and Trails</i>				\$20,000	\$0		\$0		\$0	\$20,000
D. Protection/Safety										
Road Closure gates	ea	5,000	6	\$30,000	\$0		\$0		\$0	\$30,000
Warning Signs	ea	400	12	\$4,800	\$0		\$0		\$0	\$4,800
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Protection/Safety</i>				\$34,800	\$0		\$0		\$0	\$34,800
E. BAER Evaluation										
Initial Assessment	Report	\$4,000	1	---	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				---	\$0		\$0		\$0	\$0
<i>Subtotal Evaluation</i>				\$0	\$0		\$0		\$0	\$0
F. Monitoring										
monitor invasive treatment	day	\$500	3	\$1,500	\$0		\$0		\$0	\$1,500
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0		\$0		\$0	\$0
<i>Subtotal Monitoring</i>				\$1,500	\$0		\$0		\$0	\$1,500
G. Totals				\$76,300	\$0		\$0		\$0	\$76,300
Previously approved										
Total for this request				\$76,300						

PART VII - APPROVALS

1. _____
 Forest Supervisor Date