

October 24, 2018

## EXECUTIVE SUMMARY

Lightning ignited the Silver Creek Fire on July 19, 2018 approximately 16 miles northwest of Kremmling, Colorado. An initial assessment addressing approximately 5,008 acres of National Forest System (NFS) lands was submitted to the regional office on September 18, 2018; the regional office approved \$92,644 for implementation of emergency treatments to address threats to life/safety, roads, and invasion of noxious weeds.

Since the initial assessment, an additional 15,112 acres for a total of 20,120 acres burned in the Silver Creek Fire; this interim request addresses the additional acres. This follow-up BAER assessment is based on available BARC data from September 22, 2018. However fire growth occurred after the September BARC image, and no updated BARC information was available for these additional acres. Consequently these acres were mapped by hand based on field reconnaissance.

Of the total 20,120 acres burned, 3% was mapped as high soil burn severity (SBS), 35% was moderate SBS, 25% was low SBS, and 37% of the area was unburned.

### Total Fire Burn Severity By Ownership

Soil Burn Severity for the Silver Creek Fire			
Soil Burn Severity	Acres by Severity on NFS Lands	Acres of Severity on Private Lands	Acres by Severity State Lands
High	504 (3%)	0 (0%)	0 (0%)
Moderate	6247 (31%)	195 (1%)	544 (3%)
Low	3695 (18%)	213 (1%)	1214 (6%)
Unburned	5197 (26%)	309 (2%)	2002 (10%)
<b>Total</b>	<b>15643 (78%)</b>	<b>717 (3%)</b>	<b>3760 (19%)</b>

The USFS is responsible for addressing risks on NFS lands. This report focuses on risks and proposed treatments to address threats to values at risk on NFS lands, but also provides relevant information to help identify potential threats downstream of the fire. Proposed treatments focus protection of Forest Service property including roads and trails, protection of cultural sites, inter-agency coordination and information sharing to reduce threats to life/safety and property, and minimizing the spread of noxious weeds into burned areas which could detrimentally affect native plant communities.

The BAER team has identified an additional \$ 58,849 in emergency stabilization treatments to address post-fire threats from the Silver Creek Fire.

**BURNED-AREA REPORT**  
(Reference FSH 2509.13)

**PART I - TYPE OF REQUEST**

This report retains information from the initial request. Any additional information or updates for this interim #1 request are reflected in blue font.

**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 # 1
  - 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: <u>Silver Creek</u>   | B. Fire Number: <u>WY-MRF-000312</u>                          |
| C. State: <u>CO</u>   | D. County: <u>Grand, Routt</u>                                |
| E. Region: <u>02</u>  | F. Forest: <u>Medicine Bow-Routt NF</u>                       |
| G. District: <u>Yampa RD</u>  | H. Fire Incident Job Code: <u>P2L023 (0206)</u>               |
| I. Date Fire Started: <u>July 19, 2018</u>  | J. Date Fire Contained: <u>80% contained as of 10/17/2018</u> |
| K. Suppression Cost: <u>\$28 million as of October 17, 2018</u>   |   |
| L. Fire Suppression Damages Repaired with Suppression Funds <ul style="list-style-type: none"> <li>1. Fireline waterbarred (miles): <u>75 miles</u>—rehabilitation in progress</li> <li>2. Fireline seeded (miles): <u>In progress</u></li> <li>3. Other (identify): <u>Safety zones, staging areas, drop points in progress</u></li> </ul> |   |

M. Watershed Number:

**Sixth field sub-watersheds and named streams in the assessed burned area**

6th level sub-watershed	HUC	Major named streams in the sub-watershed	Total acres	Acres burned	% burned
Milk Cr - Muddy	140100010702	Franz Cr, Milk Cr,	26,701	4,737	18

Cr		Muddy Cr			
Upper Muddy Cr	140100010703	Hill Cr, Albert Cr, Muddy Cr	33,444	300	1
Red Dirt Cr	140100010706	Red Dirt Cr, Deer Cr, Elk Cr, Draper Cr	23,554	4,544	19
Silver Cr	140500010108	Silver Cr	15,747	198	1
Sarvis Cr	140500010110	Sarvis Cr	26,029	3,034	12

N. Total Acres Burned:

NFS Acres( 15643) Other Federal (0) State (3760) Private (717)

O. Vegetation Types: The dominate vegetation type is mixed conifer subalpine spruce-fir and lodgepole pine. There are some open grass meadows in the Red Dirt Creek floodplain and some large wetland complexes bordering the northern Red Dirt Creek tributary. Vegetation in the lower elevations on the northeastern portion of the fire are a combination of conifer, aspen, and sage/grass.

P. Dominant Soils: Dominant soil types within the fire perimeter include a very gravelly component of the Granite series and seasonally inundated Mollisols associated with riparian areas and drainages. Smaller components include soils derived from finer grained sedimentary deposits including the loamy soils of the Gateway series. These soils are mostly well-drained and slightly to moderately erosive. They are typically characterized by gravelly loam to sandy loam surface textures and many soils in the area have skeletal properties indicative of large amounts of gravels and rocks. Some fine clay deposits can be distinct and are typically associated with lower elevation sedimentary rocks. Soil structure and fine roots were impacted by fire mostly in high soil burn severity areas. Loss of the litter/duff layer and compromised structural integrity will exacerbate post fire erosion and will inhibit recovery in areas where these effects were most pronounced. Areas that remained unburned and those that experienced low burn severities were found to have a more natural structure (generally granular to subangular) with more organic matter and higher amounts of soil moisture. Recovery of small amount grasses and forbs was observed throughout the burned area and over the range of burn severities. Complete consumption of heavy fuels was far less common than partial consumption of heavy fuels. Consumption of heavy surface fuels will likely detrimentally affect soil productivity over small areas but, overall, it is not believed that long term soil productivity will be an impediment to the continued recovery of plants during successive growing seasons. Debris Flows are possible and high rates of erosion are probable within drainages that experienced moderate to high soil burn severity, especially in steep drainages where ground cover consumption was high.

Q. Geologic Types: The Gore range is south of North Park and is separated from the Park Range by the east-west trending Rabbit Ears range. A faulted anticline with Precambrian rocks at its core, the Colorado River cuts through the northern part of the Gore range just west of Kremmling, Colorado. Much like the Park Range to the north, the Gore Range is generally characterized by highly localized movements of the Earth's crust uplifting the Rocky Mountains. These movements broke the deep massive igneous basement rocks and bent the more flexible Paleozoic and Mesozoic rocks above them, arching them upward. The mountains rose and then were acted on by erosional forces. The local soils today are a reflection of these geologic and geomorphic processes and are generally granitic in areas of higher elevation and sedimentary trending toward lower elevations. The northernmost extent of the Gore range is the location of the Silver creek fire.

R. Approximate Miles of Stream Channels: 36 miles Perennial; 24 miles Intermittent  
 Approximate Miles of Stream Channels (NFS Only): 27 miles Perennial; 19 miles Intermittent

S. Transportation System

Trails: 0.6 miles; 4.3 miles total Roads: 13.4 miles; 26.8 miles total

### PART III - WATERSHED CONDITION

A. Burn Severity (acres): 1630 (33%) (unburned/unmapped) 1144 (23%) (low) 1819 (36%) (moderate)

414 (8%) (high)

B. Burn Severity (acres): 7508 (37%) (unburned/unmapped) 5121 (25%) (low) 6987 (35%) (moderate)  
504 (3%) (high)

B. Water-Repellent Soil (acres): 1,015 acres; 3733 acres

C. Soil Erosion Hazard Rating (acres): 252 (no rating) 682; 4805 (slight) 3,881; 12,207 (moderate)  
188; 2855 (severe)

D. Erosion Potential: 1.19; 3.4 tons/acre

E. Sediment Potential: 906; ~1500 cubic yards / square mile

Supporting information regarding these estimates is available in the soils specialist report. The final soil burn severity map is displayed in Appendix B.

#### PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	<u>3-5 years</u>
B. Design Chance of Success, (percent):	<u>80%</u>
C. Equivalent Design Recurrence Interval, (years):	<u>10 year</u>
D. Design Storm Duration, (hours):	<u>1 hour</u>
E. Design Storm Magnitude, (inches):	<u>0.93 inches</u>
F. Design Flow, (cubic feet / second/ square mile):	<u>50 cfs per sq. mi.</u>
G. Estimated Reduction in Infiltration, (percent):	<u>19% (Table 1)</u>
H. Adjusted Design Flow, (cfs per square mile):	<u>55 cfs per sq. mi (Table 2)</u>

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D. Design Storm Duration, (hours):	<u>1 hour</u>
E. Design Storm Magnitude, (inches):	<u>0.88 inches</u>
F. Design Flow, (cubic feet/ second/ square mile):	<u>19 cfs per sq. mi.</u>
G. Estimated Reduction in Infiltration, (percent):	<u>7% (Table 1)</u>
H. Adjusted Design Flow, (cfs per square mile):	<u>22 cfs per sq. mi. (Table 2)</u>

**Table 1: The soil burn severity acres and percentages by modeled watershed**

#	Modeled Sub-Watershed	Total (ac)	UB (ac)	UB (%)	L (ac)	L (%)	M (ac)	M (%)	H (ac)	H (%)
1	Red Dirt Creek (above Red Dirt Reservoir)	8685	6344	73	731	8	1275	15	335	4
2	Red Dirt Reservoir (western hillslope)	216	4	2	16	5	167	77	29	13
3	Red Dirt Creek Tributary (below Red Dirt Reservoir)	864	712	82	42	7	102	12	8	1

**Table 1: The soil burn severity acres and percentages**

#	Modeled Sub-Watershed	Total (ac)	UB (ac)	UB (%)	L (ac)	L (%)	M (ac)	M (%)	H (ac)	H (%)
1	Muddy-Milk Cr	26700	22045	83	2683	10	1960	7	12	0.1
2	Franz Cr	4258	3076	72	807	19	375	9	0	0
3	Elk Cr	1200	589	49	180	15	423	35	8	1

**Table 2: Pre- and post- fire peak flows (Q) and bulked peak flows (QB)**

#	Modeled Sub-Watershed	Pre Q (cfs)	Post Q (cfs)	Post QB (cfs)	Pre Q (cfs per sq mi)	Post QB (cfs per sq mi)	% Increase
1	Red Dirt Creek (above Red Dirt Reservoir)	180	680	750	13	55	300
2	Red Dirt Reservoir (Western Hillslope)	2	50	65	4	192	4500
3	Red Dirt Creek Tributary (below Red Dirt Reservoir)	30	60	66	22	48	100

**Table 2: Pre- and post- fire peak flows (Q) and bulked peak flows (QB)**

#	Modeled Sub-Watershed	Pre Q (cfs)	Post Q (cfs)	Post QB (cfs)	Pre Q (cfs per sq mi)	Post QB (cfs per sq mi)	% Increase
1	Muddy-Milk Creek	323	831	914	7.7	22	160
2	Franz Creek	81	220	242	12.1	37	170
3	Elk Creek	4	164	205	2.1	109	4000

Selected watersheds most likely to respond to post-fire events or that drain into key areas were modelled (Figure 2, Appendix B). Model results indicate increased runoff during high intensity thunderstorms is likely in the Red Dirt Creek watershed. The design rainfall event (10-year, 1-hour) is 0.93 inches of rain. Above Red Dirt Reservoir, the model indicates peak flows will increase by approximately 300% from pre-fire conditions during the design rainfall event. Within the Red Dirt Reservoir sub-watershed, there will be isolated areas with greater runoff response to a design rainfall event. The peak flows increase by approximately 4500% at one western hillslope of the reservoir. Below Red Dirt Reservoir, the model indicates peak flows will increase by approximately 100% from pre-fire conditions during the design rainfall event. The time to peak flows from the onset of a 10-year, 1-hr rainfall event reduces from approximately 65 minutes to 40 minutes.

Field observations of meadows, floodplains, and riparian areas noted most are unburned and will act as a vegetative buffer to store sediment and dissipate energy during high flow events over the next 3-5 years. Field observations of burned hillslopes indicate roots and seed banks are available for re-vegetation over the next 3-5 years.

Based on the likelihood of increased runoff and erosion for the next 3-5 years, short-term increases of sediment are likely until hillslopes vegetate, soils stabilize, and infiltration rates increase. Full hydrologic recovery of the Red Dirt Creek watershed is expected over an 80 year period. Red Dirt Reservoir (AKA McMahon Reservoir No 2) will receive short term increases in sediment. The short term increases in sediment to Wolford Mountain Reservoir will be less.

The post-fire peak flow estimates are conservative due to factors such as high infiltration rates in wide, unburned meadows, floodplains, and other low gradient areas. The peak flow estimates represent the worst case scenario of rain on snow where there would be limited infiltration in the unburned meadows and floodplains. Red Dirt Reservoir (AKA McMahon Reservoir No 2) receives the majority of runoff below the burned areas. Its capacity is 3400 acre-feet. While the design storm runoff flow is flashy and of high magnitude, the total runoff volume into the reservoir is 45 acre-feet, or less than 2% of the storage capacity of the reservoir. Additional information pertaining to the hydrology modeling is available in the hydrology specialist report.

#### **Milk Creek – Muddy Creek (Tributary to Wolford Mountain Reservoir)**

Model results indicate a 160-200% increase in peak flows during a 10-year 1-hour thunderstorm of 0.88 inches. The time to peak flow is 65 minutes pre- and post-fire. This suggests the valley bottoms from Barber Basin (Franz Creek confluence with Muddy Creek) into the Windy Ridge State Lands (Milk Creek confluence with Muddy Creek) are subject to flooding during heavy rainstorms. The primary contributing factors to the flashy runoff response is a combination of naturally-low infiltration rates (watershed is approximately 60% Hydrologic Soil Groups C and D) and a large burn area of approximately 20% of the watershed. Limiting the runoff response is a long time of concentration (approximately 6 hours), large contributing area (26,700 acres), wide floodplains with adequate riparian vegetation and beaver complexes, and minimal man-made developments.

#### **Elk Creek (Tributary to Deer Creek, Red Dirt Creek, and Wolford Mountain Reservoir)**

Model results indicate a 4000-5000% increase in peak flows during a 10-year 1-hour thunderstorm of 0.85 inches. Note that the large percent increase is due to Elk Creek having a very little pre-fire runoff response of 4 cfs to a large post-fire runoff response of 164 cfs. The time to peak flow reduces from 65 minutes to 35 minutes. This suggests the valley bottoms from the Elk Creek-Deer Creek confluence to the Wolford Reservoir inlet are subject to flooding during heavy rainstorms. The primary contributing factors to the flashy runoff response is a combination of naturally-low infiltration rates (watershed is approximately 90% Hydrologic Soil Groups C and D), a large burn area of approximately 50% of the watershed, a very low time of concentration (1/2 hour), small contributing area (1200 acres), grazing impacts, narrow floodplains with little riparian vegetation, and man-made developments (receives flows from McMahon ditch).

#### **Upper Muddy Creek, Sarvis Creek, and Silver Creek Watersheds**

Field observations of meadows, floodplains, and riparian areas within the watersheds are unburned and will act as a vegetative buffer to store sediment and dissipate energy during high flow events over the next 3-5 years. Burned hillslopes within the watersheds had intact roots and seed banks available for re-vegetation over the next 3-5 years.

In summary, the likelihood of increased runoff and erosion for the next 3-5 years exists in the Milk Creek – Muddy Creek and Red Dirt Creek watersheds. Short-term increases of sediment are likely until hillslopes vegetate, soils stabilize, and infiltration rates increase. The Elk Creek sub-watershed is expected to have the greatest increase in runoff response to a heavy thunderstorm. The Milk Creek and Franz Creek sub-watersheds are expected to have nearly doubled runoff response to heavy thunderstorms, although to a lesser degree due to large floodplains, contributing area, and time of concentration. Full hydrologic recovery of the Muddy-Milk Creek and Red Dirt Creek watersheds is expected over an 80 year period. Wolford Mountain

Reservoir may receive short term increases in sediment and ash. The risk to water quality is low, based on a likelihood of only a short-term loss and a minor magnitude of consequences to property and natural resources.

## **PART V - SUMMARY OF ANALYSIS**

A. **Describe Critical Values/Resources and Threats:** Threats to critical values and determination of risk was based on the following matrix from FSH 2523.

### **BAER Risk Assessment**

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

**Probability of Damage or Loss:** The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within 1 to 3 years (depending on the resource):

- Very likely. Nearly certain occurrence (90% - 100%)
- Likely. Likely occurrence (50% - 89%)
- Possible. Possible occurrence (10% - 49%)
- Unlikely. Unlikely occurrence (0% - 9%)

### **Magnitude of Consequences:**

- Major. Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources.
- Moderate. Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects.
- Minor. Property damage is limited in economic value and/or to few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects.

### **Critical Value: Human life/safety**

**Hazard Trees:** Threats to life and safety, exist within the burned area as Forest users will be exposed to significantly increased risk of hazard trees. The burned area is popular with recreationists, particularly around Red Dirt Reservoir and for big game hunting. NFSR 100 connects US Highway 40 with State Highway 134

and provides two primary access points to the Sarvis Creek Wilderness. The high visitation results in a higher threat to human life and safety from hazard trees.

**Debris Flow Hazard:** The USGS debris flow model was used to estimate debris flow potential. While the debris flow hazard will increase in the years following the fire, the majority of the area has a 0- 20% chance of a debris flow occurring (Figure 3). There is a 40-60% chance of a debris flow occurring in some small basins (Figure 3), several which would affect NFSR 101.0 and the Red Dirt Reservoir recreation area. The location of elevated debris flow potential in concentrated use areas increases the risk of post-fire effects to human life and safety.

**Emergency Determination:** The probability of loss is Possible and the magnitude of consequence is Major for threats to life/safety on Forest Service lands from hazard trees and debris flows; the BAER risk is High. Same determination.

### **Critical Value: Property**

#### **Roads**

There are 13.4 total miles of NFS Roads within the burn perimeter of which 7.1 miles are maintenance level (ML) 3 or 4. NFSR 100.1 is a ML 4 road that connects US Highway 40 and Colorado State Highway 134. NFSR 101.1 and 571.1 are ML 4 roads that provide access to the Latigo Guest Ranch private inholding, and Red Dirt Reservoir. Red Dirt Reservoir is an agricultural reservoir that is popular with recreationists for camping and fishing, and has some developed facilities including a toilet.

All of the roads in the burn area are west of Red Dirt Creek and cross tributaries to Red Dirt Creek or Red Dirt Reservoir. Due to the highly dissected nature of the terrane where these roads traverse, there are numerous drainages on each road that are at risk of failure from increased erosion and flood flows which significantly increases the potential to plug both relief culverts and culverts on active streams. Several of these roads are 'stacked' on each other meaning that if drainage or road failure occurs on an upper road, it is likely to result in a domino effect on the lower road. Road failures could result in loss of emergency egress access from Latigo Guest Ranch as well as significant increased sedimentation to Red Dirt Reservoir which would affect both water quality and potentially dam stability.

The fire burned across and upstream of approximately 5.2 more miles of NFSR 100, a level four road that connects US Highway 40 and State Highway 134. Of these miles, approximately two miles were within or downstream of areas of high or moderate SBS including two major creek crossings. Additionally, NFSR 131.1 and various other ML1 roads were found to be within the fire perimeter.

**Emergency Determination:** An emergency was determined for Property with respect to roads. The probability of loss is Likely and the magnitude of consequence would be Moderate; the BAER risk is Intermediate. Same determination.

#### **Trails**

There are 0.6 miles of the Silver Creek trail within the burn area. Threats to this trail are low due to the flat topography, and generally low soil burn severity adjacent to and upslope of the trail.

The expanded burn area resulted in a total of 4.3 miles of trail within the burn area, of which 1.9 miles are within moderate soil burn severity. There is a risk of loss of trail tread due to increased erosion and flood flows.

**Emergency Determination:** For trails, the probability of loss is Likely and the magnitude of consequence would be Minor; the BAER risk is low.

**Emergency Determination:** For trails, the probability of loss is Likely and the Magnitude of Consequences is Moderate; the BAER risk is High.

#### Forest Service Range Fences

There are approximately 2.5 miles of Forest Service owned fence that was within the perimeter of the fire. These fences are not boundary fences, and are located within the perimeter of the fire for livestock management as noted in the Allotment Management Plans. All fences have been deemed critical to the management of the allotment(s) as they control livestock movement between allotments and/or pastures.

Of these 2.5 miles of fence, approximately one mile of fence was within areas of moderate or high soil burn severity. Areas with high or moderate SBS indicate that the majority of the vegetation has been consumed by the fire; most trees with a dbh of 5" and greater are still standing creating a high risk of snags falling in the near future.

Forest Service Manual 2230, Forest Service Handbook 2209.13 and Term Grazing Permit Parts 1, 2 and 3 mandate that all allotment fences listed on part 3 of the Term Grazing Permit will be maintained by the grazing permittee to a standard of repair on an annual basis. Part 3 of the Term Grazing Permit states "Fences are to be in an upright, vertical position with all broken wires repaired, wires tight and properly spaced, and all corner posts, braces, braces, line posts, steel posts, loops, staples, etc. replaced as needed." Additionally, part 2, section 11(c) of the Term Grazing Permit states "The permanent structural range improvements on the land described in Part 1 of this permit are the property of the United States Government..."

Typically, permittees or their employees would remove any trees threatening the fence through hand felling. However, given that the fire has further weakened trees already affected by the bark beetle infestations it can be anticipated that hand felling would be considered "high risk" to any permittee or employee in these areas. For this reason life/safety concerns exist for traditional fence maintenance methods in areas of high/moderate SBS, and there is a threat to Forest Service property if the fences are not maintained. Rebuilding the fences would require clearing down material, and some snags would still be present creating a high risk environment for anyone working on new fence construction.

**Emergency determination:** The probability of loss is Possible, and the magnitude of consequences Moderate; the risk is Intermediate for both life/safety and property. It was determined that this intermediate rating does not warrant BAER treatment.

#### Critical Value: Natural Resources

**Soil productivity:** While the fire has affected some soil properties, over time it is expected that natural processes will result in the most effective revegetation of these soils. However the burned soils are prone to the spread of noxious weeds which do not provide as effective groundcover as native vegetation for protection from raindrop impact during summer thunderstorms. For this reason threat of loss of native plant communities is also considered a threat to soil productivity.

**Emergency Determination:** The probability of loss is Unlikely, and the magnitude of consequence is minor; the risk is Very Low. With a Very Low risk BAER treatments would not be warranted for soil productivity alone; however treatments to maintain native plant communities would also maintain soil productivity. Same determination.

#### Water Quality:

Soil erosion and subsequent sediment increases are predicted throughout and downstream of the burn area. However wide unburned riparian buffers remain adjacent to Red Dirt Creek within and downstream of the fire. These wide unburned buffers will help to capture some of the increased runoff and sediment thus reducing soil

of the water quality impacts. However some impacts will remain, particularly those from the tributary drainages including those flowing into Red Dirt Reservoir.

The cumulative effect of increased peak flows and sediment laden flows from the burned areas increases the risk of degraded water quality on the Forest and various downstream values at risk. Interagency meetings to inform the local agencies and water users about water quality degradation the following has been initiated. Effects to water quality will be of short term duration, recovering to pre-fire conditions over time with the worst impacts occurring in the first year, and declining over subsequent years. During this time there is likely potential for degradation of water quality downstream of moderate and high soil burn severity areas.

**Emergency Determination:** The probability of some water quality impacts is likely, but the magnitude of consequences with respect to irreversible or considerable long-term loss of water quality is Minor; therefore the BAER risk is Low. Same determination.

#### Native or Naturalized Plant Communities

Oxeye Daisy (*Leucanthemum vulgare*), Canada Thistle (*Cirsium arvense*), Scentless Chamomile (*Matricaria perforata*), Yellow Toadflax (*Linaria vulgaris*), Musk Thistle (*Carduus nutans*) and Bull Thistle (*Cirsium vulgare*) are known to occur within the burn area and along adjacent access routes to the burn. Several plant vectors such as Forest roads, trails, areas impacted by fire suppression, high winds, and waterways occur within the fire area. Even though a weed washing station was utilized, seed could have been transported into the burn on suppression vehicles and equipment that arrived on the fire before the washing station was established. Fire is known to enhance the establishment of all weed species present.

The spread of noxious weeds would adversely affect multiple resources including native plant communities which in turn affects habitat for wildlife and fisheries, as well as soil productivity. Forest Service policy mandates the Forest to minimize the establishment of non-native invasive species to prevent unacceptable degradation of the burned area.

Based off of existing treatment locations and GIS mapping exercises, it is anticipated that approximately 125 acres of noxious weeds could be expected in and around the perimeter of the Silver Creek Fire. Please note this estimate may fluctuate due to the many factors that affect noxious weed distribution such as disturbance level, annual climatic conditions, and previous treatment effectiveness. It is anticipated that the highest concentrations of weeds would be located adjacent to FSR 100 and 101. Other areas where higher concentrations may be observed include Buffalo Park.

**Emergency Determination:** The probability of loss of native plant communities is Likely and the magnitude of consequence is Moderate; the BAER risk is High. Same determination.

#### Wildlife: Critical TES Habitat or Suitable Occupied Habitat

Habitat of one federally listed species exists within the fire perimeter: Canada lynx. Habitat modifications resulting from the fire include 45% of the acreage within the fire perimeter of forested cover types burning at moderate or high severity, thus removing cover and forage. Most cover and forage was removed within low severity burns as well. 32% of the area was unburned, mostly consisting of riparian and wet meadow habitats.

##### Canada lynx:

Most forest cover within the fire perimeter is classified as Canada lynx habitat. The entire burn area is within mapped Canada lynx habitat. In areas of low burn severity some lynx habitat might remain suitable; however, enough of the habitat in the burned area was reduced to stand initiation structural stage by moderate and high severity burn that it is unlikely the area would be used by lynx in the foreseeable future except as linkage habitat along unburned corridors. The habitat will recover over time (20-40 years) as succession plays out across this landscape.

Effects to lynx habitat are similar in this assessment as the previous assessment.

**Emergency Determination** –The probability is Unlikely and the consequences are Minto; the risk is Low; no emergency exists pertaining to federally listed or Forest Service Sensitive wildlife species or their habitats. Same determination.

#### **Fisheries: Critical TES Habitat or Suitable Occupied Habitat**

There are no federally endangered or threatened fish or amphibian species within the fire area. There are also no known R2 sensitive aquatic organisms within the fire area although boreal toad may be present. Post-fire effects are not anticipated to impact the toad if present.

**Emergency Determination:** The probability of damage or loss is Unlikely and the magnitude of consequences is minor; therefore the BAER risk is Very Low. Same determination.

#### **Critical Value: Cultural Resources**

Ten sites are within or potentially affected by the fire. Of the eight prehistoric sites, all were located along the Forest Service Road 100 and not directly impacted by the fire. Two historic sites were directly impacted by the fire, with the Latigo Cabin being completely destroyed. Neither of the historic sites were in areas where high runoff, erosion, flooding or debris flow could pose a potential threat. In addition, the burn intensity was moderate to very low/unburned in the resource locations. Therefore no BAER treatments will be required for any historic properties.

The additional acres burned resulted in two prehistoric sites with lithic scatter and debris being exposed adjacent to open travel routes. The sites were completely burned over leaving bare soil and artifact exposure. This could lead to potential site looting and/or erosion which could potentially cause artifact movement and loss of cultural site integrity. Human disturbance is likely given the location of these sites adjacent to a major travelway.

**Emergency Determination:** The probability of damage is unlikely and the magnitude low; the BAER risk is Very Low.

**Emergency Determination:** The probability of damage is Likely and the Magnitude of Consequences is Major; the BAER risk is Very High.

#### **Summary of the BAER Risk Assessment**

Values at Risk	VAR Category: <i>life-safety, property, natural resource, cultural resource</i>	Probability of Damage or Loss	Magnitude of Consequences	Risk
Life/safety	Life Safety	Possible	Major	High
Native plant communities	Natural Resources	Likely	Moderate	High
Roads	Property, life/safety, resources	Likely	Moderate	Intermediate
Road safety signs	Life/Safety	Unlikely	Major	Intermediate
Red Dirt Reservoir	Life Safety	Unlikely	Major	Intermediate
O&G Trails	Life/Safety	Likely	Minor	Low
Trails	Property, life/safety	Likely	Minor	Low
Water quality	Natural Resources	Likely	Minor	Low
Soil productivity	Natural Resources	Unlikely	Minor	Very low
Lynx habitat	Natural Resources	Unlikely	Minor	Low
Cultural resources	Cultural Resources	Unlikely	Minor	Very low
Range improvements	Property	None	Na	NA

Rare Fen (CNHP designation)	Natural Resources	present No potential effects	NA
TE plants, aquatic species	Natural Resources	None present	NA

Values at Risk	VAR Category: <i>life-safety, property,natural resource,cultural resource</i>	Probability of Damage or Loss	Magnitude of Consequences	Risk
<b>Round 2 VAR--</b>				
10/17/18				
Life/Safety	Life/safety	Possible	Major	High
Trails	Property, life/safety	Likely	Moderate	High
Native plant communities	Natural Resources	Possible	Major	High
Cultural resources	Cultural Resources	Likely	Major	Very High
Roads	Life/safety, property	Likely	Moderate	Intermediate
Range fences	Property, life/safety	Possible	Moderate	Intermediate
Water quality	Natural Resources	Likely	Minor	Low
Soil productivity	Natural Resources	Likely	Minor	Low
Fens	Natural Resources	Unlikely	Minor	Very low
Lynx habitat	Natural Resources	Unlikely	Minor	Very low
TE WL, Plants, Fish	Natural Resources	Unlikely	Minor	Very low

## Other Considerations

### Special Uses:

- The Latigo Guest Ranch maintains a network of trails that are managed through a Special Use Permit. The Permit Administrator will work with the Permit Holder to assess the feasibility of reopening trails on a case by case basis.
- A substantial portion of the Smith Ditch traverses areas of high and moderate soil burn severity. There is an increased risk of falling snags creating debris dams which could cause ditch failures. A ditch failure could result in significant erosion of NFS land, and sedimentation to streams and Red Dirt Reservoir. Forest personnel will work with the permit holder to accommodate maintenance requirements to maintain the integrity of the ditch.
- Failure of Red Dirt Reservoir (aka McMahon #2) due to increased flows or sediment could cause significant damage to downstream users and resources. Review of a 2015 inspection report by the Colorado State dam engineer did not place any limitations on capacity. A review of spillway capacity from the State inspection report indicates that the current spillway should be capable of accommodating increased flood flows indicating that the risk of failure from post-fire effects is low. However, an unusual storm event and/or debris flow could affect the integrity of the reservoir. The Forest Service will work with the reservoir permittee regarding potential impacts.
- Impacts to water quality are likely to occur within and downstream of the fire area. The Forest is holding inter-agency meetings to inform other agencies of potential post-fire effects and modelling results. This information sharing allows different agencies to develop post-fire plans appropriate for their jurisdiction and area(s) of responsibility.

- There is an NRCS Snotel site within the burn perimeter. The site was unburned and appears to have little threat of post-fire effects.

**B. Emergency Treatment Objectives:** The proposed treatments on National Forest System lands can help to reduce the impacts of the fire from storm events, but treatments cannot fully mitigate the post-fire effects of the fire. Detailed information of the treatments summarized below can be found in the specialist reports prepared in support of this funding request. The treatments listed below are those that are considered to be the most effective on National Forest System lands to minimize threats to identified values at risk.

#### Proposed Land Treatments:

The objective of the land treatments are to:

1. Promote and protect native and naturalized vegetative recovery by reducing the spread of noxious weeds; this would also maintain long-term soil productivity.
2. Promote revegetation and control erosion around pre-historic cultural sites adjacent to main travelways to prevent looting and erosion, both which could result in loss of site integrity.

#### Proposed Road and Trail Treatments

The objective of the road treatments are to:

1. Protect road investments from becoming impassable and damaged due to increased post-fire runoff
2. Maintain emergency egress for Forest users, particularly in the Red Dirt Reservoir area, and Latigo Guest Ranch
3. Reduce impacts to water quality and Red Dirt Reservoir from road failures.
4. Protect trail investments from loss due to increased erosion and runoff.

#### Proposed Protection/Safety Treatments:

The objective of the protection/safety treatments are to:

1. Protect human life and safety through an area closure until hazard risk is deemed acceptable
2. Protect human life and safety by raising awareness through posting hazard warning signs at recreation sites, trailheads, and when entering the burn area.
3. Protect life/safety and property through storm patrols where the level of risk does not support more intensive treatments.

**Proposed Channel Treatments:** There are no proposed channel treatments.

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

Land	<u>NA (weeds)</u>	%	Channel	<u>NA- none proposed</u>	%	Roads/Trails	<u>90</u>	%
Protection/Safety	<u>90</u>	%						

#### D. Probability of Treatment Success

Years after Treatment			
	1	3	5
Land	70	75	80
Channel	NA	NA	NA
Roads/Trails	80	90	90
Protection/Safety	90	95	95

E. Cost of No-Action (Including Loss): \$411,400 This cost only reflects monetary loss of roads and trails; it does not reflect loss of life, impacts to cultural sites, loss of native plant communities, or impacts to water quality.

F. Cost of Selected Alternative (Including Loss): \$92,644 plus \$58,849 for a total of \$151,493

- The real property value of the road system within the burn perimeter is over \$2,000,000; this is largely due to 7.1 miles of road being ML 3 and 4. **The real property value of the road system within the burn perimeter is over \$3,000,000; this is due largely to 12.9 miles of road being ML 3 and 4.**
- Extensive repair or reconstruction of roads and at increased risk of post-fire effects is estimated to be over \$200,000 based on cost estimates from the Medicine Bow-Routt Forest Engineer. While realistically only 1/3 of the total would fail in a single event of any size, failure of one road could cause failures of other roads downslope. While not all culverts are likely to fail at once, potential exists for different culverts to fail in different storm events. **Repair or reconstruction costs would be over \$300,000; while not all roads would be likely to fail at once, it is possible that 1/3 could fail within one storm with additional failures from subsequent storms.**
- Estimates do not include loss of emergency access, economic loss to the local economy due to loss of recreation access to Red Dirt Reservoir, or the cost of environmental impacts.
- There **are at least two** fish bearing streams that would require installation of an aquatic organism passage culvert to meet current Forest Plan direction should the existing pipes fail which would be substantially higher cost.

There is a threat to life and safety as well as natural resources including native plant communities and water quality that have non-monetary value. As described in this report, increased risk for impacts to life/safety and non-ecological values exists throughout the burned area. These values were not considered in the benefit/cost ratio.

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Liz Schnackenberg; [lschnackenberg@fs.fed.us](mailto:lschnackenberg@fs.fed.us); 970.819.2900

**Team members:**

Ryan Nupen—Engineering  
Jacob Connors—Engineering  
Tyler Carleton—Hydrology  
Doug Myhre—Weeds/Range  
Melissa Dressen—Wildlife/aquatics  
Marti Aitken—GIS

Ryan Adams—Soils  
John Anarella—Recreation  
Peter Eberstowski—Botany  
Jason Strahl—Archaeology  
Brittany Milway—Archaeology

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:

Invasive Weed Detection and Treatment: Invasive plant detection and treatment along Forest Service roads that were of high to moderate burn severity, and dozerlines where non-native invasive plants are absent or present in small amounts, would be necessary to prevent spread and dispersal of non-native invasive plants into newly burned and disturbed areas. Although moderate burned areas may have some intact vegetation or may experience needle fall, it is not sufficient to prohibit the spread and establishment of invasive plants. The focus will be on locations adjacent to known weed sites, where fire suppression may have introduced invasive plants and road systems that have been previously disturbed and will have a greater potential for invasive plants to establish. The road system is the primary vector for weed spread and Early Detection/Rapid Response (EDRR) will allow treatments to occur before these species are able to spread. An estimated 130 acres will be surveyed and treated as warranted.

Storm Patrol: Storm inspection/response will keep road culverts and drainage features functional by cleaning sediment and debris from in and around features between or during storms. This work will be accomplished through Forest Service Road Crew, equipment rental, and Forest personnel.

#### **Protection/Safety Treatments:**

##### **Road Hazard Warning Signs and Gates**

This treatment will design and install burned area warning signs to support an area closure, and to caution forest visitors recreating and administrative users about the potential hazards that exist within the burned area. treatment will place closure signs, hazard warning signs and information signs at key entry points and concentrated use areas. It will inform users of the dangers associated with entering/recreating within a burned area as well as inform them of closures to help ensure that users are able to access available routes in a safe manner.

The purchase and installation of signs at each of the identified locations consistent would be consistent with Forest Engineering Standards at these locations. A Forest Service employee will inspect the signs for visibility, damage, or loss and replace as needed. This treatment will keep Forest users out of the burn area during major storm events and inform users of the dangers associated with entering/driving within a burned area.

#### **I. Monitoring Narrative:**

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator.)

Storm patrol will monitor the effectiveness of road treatments and identify additional maintenance needs. EDRR will monitor weed establishment and identify if additional treatment is warranted within the first year. Monitoring of cultural site treatment effectiveness would ensure that these irreplaceable resources are not lost.

**Part VI – Emergency Stabilization Treatments and Source of Funds**

**Interim #1**

<b>A. Land Treatments</b>							
EDRR coord-GS-11	day	370	5	\$1,850	\$0	\$0	\$0
2 tech (2 for 10 days)	day	200	20	\$4,000	\$0	\$0	\$4,000
Herbicide	acre	23	62	\$1,426			
Heritage site coord GS	day	335	3	\$1,005			
GS-7 tech seed/mulch	day	213	6	\$1,278			
Seed	lbs	5	45	\$225	\$0	\$0	\$1,426
Wood straw	each	18	50	\$900			
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0
<b>Subtotal Land Treatments</b>				<b>\$10,684</b>	<b>\$0</b>	<b>\$0</b>	<b>\$7,276</b>
<b>B. Channel Treatments</b>							
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0
<b>Subtotal Channel Treat.</b>				<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>C. Road and Trails</b>							
Rd stabilization-see Ap	each	130904	1	\$130,904	\$0	\$0	\$0
Trail stabilization	day	150	30	\$4,500	\$0	\$0	\$4,500
				\$0	\$0	\$0	\$0
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0
<b>Subtotal Road &amp; Trails</b>				<b>\$135,404</b>	<b>\$0</b>	<b>\$0</b>	<b>\$135,404</b>
<b>D. Protection/Safety</b>							
Admin Closure sign	each	300	1	\$300	\$0	\$0	\$300
Warning Signs	each	250	5	\$1,250	\$0	\$0	\$1,250
Gate	each	3000	1	\$3,000	\$0	\$0	\$3,000
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0
<b>Subtotal Structures</b>				<b>\$4,550</b>	<b>\$0</b>	<b>\$0</b>	<b>\$4,550</b>
<b>E. BAER Evaluation</b>							
Assessment Team			—	\$9,405		\$0	\$9,405
<i>Insert new items above this line!</i>			—	\$0		\$0	\$0
<b>Subtotal Evaluation</b>			—	<b>\$9,405</b>	<b>\$0</b>	<b>\$0</b>	<b>\$9,405</b>
<b>F. Monitoring</b>							
GS-9 arch monitor	day	285	3	\$855			
<i>Insert new items above this line!</i>				\$0	\$0	\$0	\$0
<b>Subtotal Monitoring</b>				<b>\$855</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>G. Totals</b>				<b>\$151,493</b>	<b>\$9,405</b>	<b>\$0</b>	<b>\$0</b>
Previously approved				<b>\$92,644</b>			
Total for this request				<b>\$58,849</b>			

**PART VII - APPROVALS**

1. *Karl Dray*  
for Russell Bacon  
Forest Supervisor (signature)

*10/25/18*

Date

2. *J. B.*  
Regional Forester (signature)

*11/16/18*

Date

**Appendix A1: Road Stabilization and Sign Detailed Costs 9/12/18**

Treatment	Unit	Quantity	Unit Cost	Total
<b>Install Roadway Dips</b>				
Driveable Waterbar	Each	29	\$500.00	\$14,500.00
Rolling Dip (ED figured in drainage armor)	Each	9	\$1,200.00	\$10,800.00
<b>Clean Culvert inlets &amp; outlets</b>	Each	41	\$250.00	\$10,250.00
<b>Temporarily Remove Culverts</b>	Each	11	\$1,000.00	\$11,000.00
<b>Clean and Reestablish Ditch Line</b>	Mile	4.69	\$3,100.00	\$14,539.00
<b>Install Culvert Inlet Treatments</b>				
Replace 4 ft. End Section 18"	Each	2	\$780.00	\$1,560.00
Replace 4 ft. End Section 24"	Each	1	\$850.00	\$850.00
<b>Install Aggregate Base Rock</b>	Cubic yard	10	\$50.00	\$500.00
<b>Install Drainage or Slope Armor</b>	Cubic Yard	45	\$200.00	\$9,000.00
<b>Install and Repair Overside Drains</b>	Each	1	\$3,900.00	\$3,900.00
Overside Drain Flume	LF	0	\$25.00	\$0.00
<b>Install Gates</b>	Each	1	\$3,000.00	\$3,000.00
<b>Install Signs</b>				
BAER Warning and Info Signs	Each	5	\$250.00	\$1,250.00
Administrative Closure Signs	Each	1	\$300.00	\$300.00
<b>Monitoring and Storm Patrol</b>	Mile	4.69	\$500.00	\$2,345.00
<b>Mobilization</b>	Job	1	\$3,000.00	\$3,000.00
			<b>Total</b>	<b>\$86,794.00</b>

**Notes and Assumptions:**

Storm Patrol will be for 3 events.

Ditch clearing material will be wasted within a reasonable distance.

Level 1 roads opened for fire access will be closed under suppression rehab.

Unsurveyed spur roads that intersect collector or arterial roads should be waterbared at the approach to prevent captured flow from intersecting the road.

Culverts that are temporarily removed will be reinstalled after two seasons of flow have passed.

Appendix A2: Updated road stabilization and Sign Detailed Costs 10/19/2018

Treatment	Unit	Quantity	Unit Cost	Total
Install Roadway Dips				
Driveable Waterbar	Each	29	\$500.00	\$14,500.00
Rolling Dip (ED figured in drainage armor)	Each	12	\$1,200.00	\$14,400.00
Clean Culvert inlets & outlets	Each	45	\$250.00	\$11,250.00
Temporarily Remove Culverts	Each	11	\$1,000.00	\$11,000.00
Clean and Reestablish Ditch Line	Mile	14.79	\$3,100.00	\$45,849.00
Install Culvert Inlet Treatments				
Replace 4 ft. End Section 18"	Each	2	\$780.00	\$1,560.00
Replace 4 ft. End Section 24"	Each	1	\$850.00	\$850.00
Install Aggregate Base Rock	Cubic yard	10	\$50.00	\$500.00
Install Drainage or Slope Armor	Cubic Yard	60	\$200.00	\$12,000.00
Install and Repair Overside Drains	Each	3	\$3,900.00	\$11,700.00
Overside Drain Flume	LF	0	\$25.00	\$0.00
Install Gates	Each	1	\$3,000.00	\$3,000.00
Install Signs				
BAER Warning and Info Signs	Each	5	\$250.00	\$1,250.00
Administrative Closure Signs	Each	1	\$300.00	\$300.00
Monitoring and Storm Patrol	Mile	8.59	\$500.00	\$4,295.00
Mobilization	Job	1	\$3,000.00	\$3,000.00
			<b>Total</b>	<b>\$135,454.00</b>

**Notes and Assumptions:**

Storm Patrol will be for 3 events.

Ditch clearing material will be wasted within a reasonable distance.

Level 1 roads opened for fire access will be closed under suppression rehab.

Unsurveyed spur roads that intersect collector or arterial roads should be waterbared at the approach to prevent captured flow from intersecting the road.

Culverts that are temporarily removed will be reinstalled after two seasons of flow have passed.

## APPENDIX B: Maps—Final Assessment 10/24/2018

Figure 1: Final Soil Burn Severity

