

Date of Report: 10/01/2018

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 # 1v2
 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)



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PART II - BURNED-AREA DESCRIPTION

- A. Fire Name: South Sugarloaf B. Fire Number: ECFX-10299
- C. State: Nevada D. County: Elko
- E. Region: 04 F. Forest: 17
- G. District: 06 H. Fire Incident Job Code: PN L3NM
- I. Date Fire Started: 8/17/2018 J. Date Fire Contained: NA
- K. Suppression Cost: \$12,800,000
- L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline rehabilitated (miles): 123
2. Fireline seeded (miles): none
3. Other (identify): Removed hazmat materials, removed berms, cleaned out material pushed in creeks, repaired cut fence lines.

M. Watershed Number:

HUC12	Acres	NAME
170501040301	180.8	California Creek
170501040203	16526.6	Cold Springs Creek-Owyhee River
170501020205	2600.0	Tennessee Creek-Meadow Creek
170501020201	145.5	Copper Creek-Bruneau River
170501040304	2435.9	Fawn Creek-Owyhee River
160401010402	2.8	Chimney Creek-Marys River
170501050506	3808.4	Mitchell Creek
170501040202	25792.8	Trail Creek
170501040105	13060.5	Hendricks Creek
170501020206	1579.8	Telephone Creek
170501050601	43.9	Upper Sheep Creek
170501040102	10482.3	Deep Creek
170501040101	546.1	Delaware Creek-Owyhee River
170501040106	7296.9	Wild Horse Reservoir-Owyhee River
170501040104	5251.2	Martin Creek
170501050504	485.0	Frost Creek
		Headwaters North Fork Humboldt River
160401020101	3177.6	
170501050201	1.8	Upper Harrington Creek
170501040302	7954.9	Mill Creek-Owyhee River
170501050508	1484.9	Spring Creek-Bull Run Creek
170501050503	2146.5	Columbia Creek
170501040201	23500.8	Badger Creek-Owyhee River
170501050505	5740.1	Breakneck Creek
170501050502	10607.4	Cap Winn Creek

N. Total Acres Burned:
NFS Acres(144,868) Other Federal (9596) State (414) Private (78,583)

O. Vegetation Types: grass, brush, timber

P. Dominant Soils: Sumine, Cleavage, Hapgood, McIvey, Chen, Onkeyo, Hackwood, Cotant

Q. Geologic Types: Mostly composed of Rhyolite, various ash flow tuffs, and andesite. Lesser amounts of alluvium, intrusive igneous, metamorphic, and other sedimentary deposits are also present.

R. Miles of Stream Channels by Order or Class:

Perennial: 98.83 miles

Intermittent: 520.26 miles

Ephemeral: 11.59 miles

S. Transportation System

Trails: 186.17 miles

Roads: 169.14 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 153,286 (low) 49,844 (moderate) 2,379 (high) 27,953 (unburned)

B. Water-Repellent Soil (acres): Average increase in water repellency on NFS lands (144868) is 20%. That equates to approximately 28,973 acres.

C. Soil Erosion Hazard Rating (acres): 107,861 (low) 88,709 (moderate) 35,290 (high)

D. Erosion Potential: Range – 0.01 to 7 tons/acre. Average: 0.15 tons/acre (WEPP-PEP and ERMiT)

E. Sediment Potential: Range: 4000-16000 cubic yards / square mile (USGS Debris Flow Model. WEPP-PEP Module).

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 3

B. Design Chance of Success, (percent): 90

C. Equivalent Design Recurrence Interval, (years): 5

D. Design Storm Duration, (hours): .25

E. Design Storm Magnitude, (inches): 1.26

F. Design Flow, (cubic feet / second/ square mile): 1.2

G. Estimated Reduction in Infiltration, (percent): 20%

H. Adjusted Design Flow, (cfs per square mile): 2.5

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

The lightning caused South Sugarloaf fire started August 17th and eventually became the largest fire recorded on the Humboldt-Toiyabe National Forest. The fire burned numerous watersheds that are tributary to Wildhorse Reservoir, the Owyhee River and the North Fork of the Humboldt River including its tributary Cole Canyon Creek. North Fork of the Humboldt is occupied habitat for Lahontan Cutthroat Trout (LCT) a listed species. The fire also burned through high quality native vegetation communities which had minimal background weed populations (less than 3% in the pre-existing monitoring plots). Included in the native plant community are several of the largest leks on the district and brood rearing habitat for sage grouse.

Wildhorse reservoir is a state park frequented for fishing and boating. The reservoir is also the primary source of irrigation water for the entire Duck Valley Reservation. From the reservoir the water travels down the Owyhee River, through the fire area, past Mountain City to the tribe's irrigation ditch system. The tribe was contacted several times to see if they had desired treatments or wanted to partner. To date they have not responded.

Cole Canyon Creek was identified as an area of concern by Nevada Department of Wildlife due to it being a tributary to the North Fork Humboldt River which is occupied LCT habitat (a TES species). Wepp Pep modeling was performed on the watershed and showed a minor increase in pounds of sediment per acre per year from less than 60 to less than 400lbs/yr/acre. The burn severity in the watershed was field verified. Despite the low hill slope sediment yields in the watershed the pre-existing incised nature of the channel will likely be exacerbated by post fire flows which will likely cause a degradation of fish habitat for this population. In addition to Cole canyon, Beaver, Bader and Gravel Creek were identified as having a high risk of hydrologic adjustment that would likely lead to a downward condition trend post fire.

The Mountain City Highway corridor was identified as an area concern due to rock roll out, hazard trees and the potential for flooding. The BAER team and BLM partnered with the National Weather Service to have two radio activated weather stations located within the fire area in order to provide better flood and debris flow alerts as well as better identify when weather events that may trigger rock roll out have occurred. The weather stations are on order and are anticipated to be delivered the last week of September. Hazard tree falling has been coordinated along the highway corridor with the fire suppression rehab group and NDOT. NDOT is also installing additional hazard signs such as rolling rocks and dust hazard.

A large portion of the Forest roads were assessed and multiple locations are in need of culvert upgrades for under sized pipes based on post fire runoff modeling. Other crossings that could be mitigated with relief dips or other lesser treatments were identified. A subset of the roads were also identified as needing basic drainage upkeep in order to not experience unacceptable damage through the coming winter. This minimal treatment is indicated as storm proofing and includes freshening the crown of the road and making sure the ditches and cross drainages are cleaned and ready for potential fire area runoff events.

The native plant communities were assessed to determine their risk of loss as they provide for soil productivity and wildlife habitat and livestock forage. The 144,852 acres within the fire perimeter consisted of native upland and riparian native plant communities that exhibited a minimal amount of weeds and invasive species acreage at 1.29 percent of the total acres (FACTS). Eco-plot data (refer to Cheri Howell's dataset) for the HT NF was also analyzed, and results showed a total frequency of 0.2 percent weeds and invasive species on NF lands inside the fire perimeter. Several portions of the fire area amounting to just under 7% of the total forest service owned fire area were determined to need seeding. Early Detection Rapid Response (EDRR) weed monitoring was identified as a need for the entire fire area.

Based on the Risk assessment exhibit 2 in FSM 2500-2017-1 the following Value at risk table was developed. More in depth specialty area tables follow.

A. Color Scheme Legend	
	Risk Level
	Very High
	High
	Intermediate (Where Treatments Are Recommended)

Value At Risk	Value Life (L), Property, (P), Resources (R)	Probability of Damage or Loss	Magnitude of Consequences	Risk	Discussion
Human Life and safety	L	Possible	Major	High	The BAER team worked with partners National Weather Service, Nevada Department of Transportation (NDOT), and BLM on the largest area of concern the highway 225 corridor (known locally as Mountain City Highway) north of the reservoir. Two early alert weather stations are being installed on Forest Service, additional signage concerning rolling rocks and dust are being installed along the highway and the fire has ordered several saw modules and is clearing hazard trees from the road side and the felled trees are being hauled off with assistance from NDOT and FS heavy equipment.
Roads	P, L	Rock rollout-likely Stream capture in road-Likely Fill and bank failures-Possible Drainage structure failures-likely	Major (P&L) Major (P&L) Moderate Moderate	Very High Very High Intermediate High	See road by road discussion below
Invasive species displacing the Native Plant Community	R	Likely	Moderate	High	Weed populations surrounding and isolated within the fire area offer seed source to expanding populations in light of the fire caused disturbance.
LCT in Cole Canyon and North Fork Humboldt sediment	R	Possible	Minor	Low	WEPP modeling showed a 300lb/acre increase in sediment per year but the maximum sediment per year being modeled does not exceed 400lbs/acre/year from the hill slopes.

Value At Risk	Value Life (L), Property, (P), Resources (R)	Probability of Damage or Loss	Magnitude of Consequences	Risk	Discussion
LCT in Cole Canyon and North Fork Humboldt Habitat alteration due to flood flows	R	Likely	Moderate	High	Due to the pre-existing incision the flood flows will not be able to access the flood plain and additional incision and in channel erosion is likely to occur degrading the in channel habitat for this listed species.
Native vegetation community	R	Likely	Moderate	High	See allotment by allotment discussion
Mountain City and Gold Creek Admin sites	P	Possible	Moderate	Intermediate	Buildings were lost at both of these locations during the fire. The safety hazards presented by the burned buildings were mitigated during suppression repair. Additional concerns included flooding to the sites: where they are aren't regularly occupied and the majority of the structures at Mountain City are being removed this fall these concerns rated less than action level.
Wildhorse Crossing CG	P, L	Likely	Major	Very High	The campground is located on a debris fan caused by the confluence of the stream that comes into the back of the campground and goes through the middle of it to the river. Due to potential for the prolonged occupancy of the site by forest visitors the risk is greater.
Wildhorse Crossing bridge	P, L	Unlikely	Major	Intermediate	The singe to the bridge was assessed by the forest bridge inspector and the bridge was found to be safe.
AML	L, R	Possible	Major	High	Due to the fire removing brush and wooden debris from sites the open underground features are now attractive nuisances that present a high risk factor to personal safety of forest visitors should they investigate the newly exposed sites.
Wood gulch access	P	Unlikely	Major	Intermediate	See road by road discussion.
Soil Productivity	R	Possible	Moderate	Intermediate	Risk due to cheatgrass taking over and reducing the productivity long term.
Water Quality	R	Possible	Moderate	Intermediate	Local seeding as proposed for limiting invasive plant management

Value At Risk	Value Life (L), Property, (P), Resources (R)	Probability of Damage or Loss	Magnitude of Consequences	Risk	Discussion
Hydrologic Function	R	Likely	Moderate	High	Relevant to Cole Canyon, Badger Creek, Beaver Creek and Gravel Creek
Wildhorse Reservoir	L	Unlikely	Major	Intermediate	The dam and a small portion of the reservoir occur on forest service administered property. The dam itself is administered by BIA and the Tribe. The dam structure received no damage during the fire.
Wildhorse Reservoir	P	Unlikely	Major	Intermediate	The dam and a small portion of the reservoir occur on forest service administered property. The dam itself is administered by BIA and the Tribe. The dam structure received no damage during the fire. The workings of the dam experienced a failure during the fire. The tribe is actively working to get the repairs made. The dam could over top via the spill way if the mechanism isn't repaired.
Wildhorse Reservoir	R	Possible	Moderate	Intermediate	Sedimentation and turbidity in the reservoir were identified as concerns by partners and the public. The turbidity would be temporary and transient during high flow events. Sedimentation to the reservoir could reduce the near shore shallows and the overall holding capacity of the reservoir near the tributaries that experience high sediment loads and debris flows. Due to the overall unburned area in the tributary watershed this was not elevated. The BAER team made several attempts to meet and communicate with the partners who manage this feature including Nevada State Parks and the Tribe to facilitate treatments on Forest Administered portions of the watershed. No treatments were requested to date.

Value At Risk	Value Life (L), Property, (P), Resources (R)	Probability of Damage or Loss	Magnitude of Consequences	Risk	Discussion
Cultural resources	R	Likely	Moderate	High	Many known and previously unknown cultural resource sites, both Historic and prehistoric, were burned over during the fire exposing the artifacts to new observation and potential irreversible disturbance by fire area visitors.

Native Plant and Range Values at Risk:

Value At Risk	Relevant Allotments	Value Life (L), Property, (P), Resources (R)	Probability of Damage or Loss	Magnitude of Consequences	Risk	Discussion
A. Native plant community where invasive species or noxious weeds are absent or present in only minor amounts	Chicken Cr C&H Riffe Cr C&H Van Duzer C&H Wood Gulch C&H	R	Very Likely	Major	Very High	<p>ICP was located in an area infested with spotted knapweed, medusahead, scotch thistle, and bull thistle; the weed wash station was only utilized as part of demobilization efforts (BLM Weed Management Specialist). No other mitigation measures were pursued by fire suppression personnel. All vehicles used during fire suppression activities passed through ICP and very likely carried weed seed across all FS roads that were utilized.</p> <p>On the eastern sides of the Chicken Creek and Van Duzer allotments, slopes were identified at 0-45% (Appendix C), increasing access to the area. Heavy fire suppression activity created over 6 miles of dozer line. In addition, Maggie Summit Road (FS & County Road 729) has documented infestations of canada thistle, black henbane, scotch thistle and other state listed noxious weeds. Large portions of these two allotments experienced moderate soil burn severities as well as moderate to high vegetative burn severities (Appendix N-O) making these areas vulnerable to weed invasion.</p> <p>During fall of 1972, prescribed burns were conducted in the Chicken Cr. C&H allotment; vegetation re-established predominately as invasive annuals.</p> <p>Lower portions of Riffe Creek C&H allotment experienced 2,461 acres of moderate severity and 93 acres of high severity burns (Appendix S). The native plant community will likely struggle to re-establish due to a lack of unburned islands and the extent of moderately burned portions.</p> <p>The Wood Gulch C&H allotment is divided by Maggie Summit Road, which is infested with Canada thistle, black henbane, scotch thistle and other state-listed noxious weeds. This major access road was heavily used for fire suppression activities and dozer line was built within the allotment. Prevention of the spread of weeds into this previously undisturbed native plant community is of high priority. Large portions of the allotment suffered from moderate to high</p>

						vegetative burn severity and moderate soil burn severities (Appendix Q-R).
B. Native plant community where invasive species or noxious weeds are absent or present in only minor amounts	Allied C&H Badger CU Beadles S&G Beaver Cr CU Bl. Jacket S&G Clear Cr C&H Cobb Cr S&G Columbia B. S&G Deep Cr C&H E. Bl. Jacket S&G Haystack C&H Pixley Cr C&H Tennessee S&G Timber Gulch C&H W. Bruneau S&G Whiterock C&H Whiterock S&G Wildhorse C&H	R	Likely	Moderate	High	Allotments in this category were determined not to require reseeding due to their low pre-fire vulnerability. These allotments previously exhibited low to no disturbance and had diverse, well established native plant communities. The majority of these allotments consist of slopes greater than 50% (Appendix C) where reseeding has often proved inefficient. Nine of these allotments had 41% to 99% of their total acreage unburned. Many had few vectors pre-fire, and few to none created for fire suppression. However, ICP was located in an area infested with spotted knapweed, medusahead, scotch thistle, and bull thistle. The weed wash station was only used as part of demobilization efforts (BLM Weed Management Specialist). Therefore, all of these allotments were determined to be at high risk of weed and invasive plant spread through fire suppression activities spreading seed.
C. Spread of noxious weeds and invasive annuals	Mountain City C&H Slaughterhouse C&H Haystack C&H Wildhorse C&H Telephone C&H Sunflower Fl. C&H	R	Likely	Moderate	High	FS Roads 930, 931 and 226 run through the Haystack, Wildhorse, Sunflower Flat, and Telephone C&H allotments. These roads are identified as major access roads and were heavily utilized by fire suppression activities. ICP was located in an area infested with spotted knapweed, medusahead, scotch thistle, and bull thistle—of which the first three are Nevada State listed noxious weeds category A, B, and C respectively. The weed wash station was only used as part of demobilization efforts (BLM Weed Management Specialist). Therefore, all of these allotments were determined to be at high risk of weed and invasive plant spread through fire suppression activities and the spread of seed. These allotments show a majority of 0-45% slope (Appendix C) and low to moderate severity (Appendix B). They were predominantly perennial grasslands

							before the fire and will be at risk to invasive annual expansion.
D. Spread of weeds and invasive species from adjacent private, BLM, and state owned lands	Non FS Land	R	Likely	Moderate	High		The Mountain City C&H allotment has a ten acre infestation of medusahead in Unit 7 that burned. Reseeding is proposed at this location in addition to the adjacent Slaughterhouse C&H allotment in order to prevent expansion of this highly competitive annual grass.

Roads Values at Risk:

Value At Risk	"Value: (Life (L), property (P), or Resource (R))"	Probability of Damage or Loss	Magnitude of Consequences	Risk Rating	Justification for Risk Rating
Spring Ck and Road 56729 34"x22" CMP, 18" CMP 41.6872, - 116.0362 Site 148	P	Likely	Moderate	High	This stream crossing is undersized to receive post fire flows by approximately 15%. This corridor serves a community of year round residents. Soil burn severity shows moderate to high burn for this drainage basin.
Hutch Ck and Road 56729 54"x34" CMP 41.7068, - 116.0118 Site 158	P	Likely	Moderate	High	This stream crossing is undersized to receive post fire flows by approximately 60%. This corridor serves a community of year round residents. Soil burn severity shows moderate to high burn for this drainage basin.

Deer Ck and Road 56729 30" CMP 41.7289, - 115.9746 Site 160	P	Possible	Major	High	The inlet has a high probability of plugging and diverting flows. The stream crossing seems appropriately sized and structurally sound. This corridor serves a community of year round residents. Soil burn severity shows moderate burn for this drainage basin.
Van Duzer Ck and Road 56729 84x60" CMP 41.7425, - 115.9746 Site 92	P	Likely	Moderate	High	This stream crossing has high sediment buildup, plugged barrel, and current signs of overtopping. Soil burn severity shows moderate burn for this drainage basin.
Road 56178 12" CMP 41.7975, - 116.1018 Site 97	P	Likely	Moderate	High	This stream crossing has high diversion potential and evidence of rerouting the stream down the travelway. Soil burn severity shows high to moderate burn for this drainage basin.
Road 56951 12" Iron pipe 41.7686, - 116.1249 Site 146	P	Likely	Moderate	High	The culvert is currently working at reduced capacity due to manmade modification. A homemade head gate has been installed on the inlet control for personal use. This corridor serves a community of year round residents. Soil burn severity shows moderate burn for this drainage basin.
Timber Gulch Ck and Road 56729 53x34" CMP, 15" CMP 41.7027, - 116.0159 Site 174	P	Likely	Moderate	High	This stream crossing is undersized to receive post fire flows by approximately 15%. This corridor serves a community of year round residents. Soil burn severity shows moderate to low burn for this drainage basin.

Little Chicken Ck and Road 56729 44x28" CMP 41.7658, -115.9521 Site 68	P	Very Likely	Moderate	Very High	This stream crossing is undersized to receive post fire flows by approximately 50%. Soil burn severity shows high to moderate burn for this drainage basin.
Wall Ck and Road 56951 36" CMP 41.7668, -116.1264 Site 94	P	Likely	Moderate	High	This stream crossing has high sediment buildup, plugged barrel, and current signs of overtopping. Soil burn severity shows high to moderate burn for this drainage basin.
Road 56178 12" CMP 41.7941, -116.1001 Site 265	P	Likely	Moderate	High	Severe damage prevents the structure from functioning properly. Flow will channel downslope and across the native surfaced road. Soil burn severity shows moderate to low burn for this drainage basin.
Site 267 Vault toilet Wildhorse Crossing Campground 41.7199, -115.8949	L	Possible	Major	High	Two structures have burned to the foundation on the upper loop. Exposed rebar, sharp objects, and the vault pose a danger to people.

B. Emergency Treatment Objectives:

Native plant community: monitor and rapidly treat new and expanding infestations. Preventatively seed areas where there is an unacceptable risk of undesired species seed spread and plant establishment due to adjacent populations and the ICP being in a weed infestation in order to keep the weed populations to less than 20%. Protect the 144,852 acres within the fire perimeter consisting of native upland and riparian native plant communities that exhibited a minimal amount of weeds and invasive species acreage at 1.29 percent of the total acres (FACTS). Eco-plot data (refer to Cheri Howell's dataset) for the HT NF was also analyzed, and results showed a total frequency of 0.2 percent weeds and invasive species on NF lands inside the fire perimeter. The objective is to keep the invasive annual grasses and weeds to less than 20% of the area in order to maintain a resilient native plant community that wildlife and the economy of the area depends on. Current resistance and resilience models for sagebrush ecosystems indicate that weed populations of more than 20% are associated with reduced resiliency of the native plant community.

Instream Structures: reduce channel incision and sediment through put by slowing the flood flows by installing beaver dam analogs to mimic inset flood plain characteristics in at risk stream systems.

Roads: prevent the loss of important access routes including access to year round occupied residences.

Closures: close the Wildhorse Campground until the unacceptable risk of debris flows has attenuated. Fence off the burned structures in the upper loop to protect forest visitors investigating the fire area. Gate or otherwise close to easy access mining features that present an attractive neusance and physical hazard to the public.

Heritage: instal infomational signs to increase awareness about not disturbing sites.

Monitoring: monitor the effectiveness of the beaver dam analogs to achieve the desired results.

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

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

D. Probability of Treatment Success

		Years after Treatment		
		1	3	5
Land		90	85	85
Channel		90	90	90
Roads/Trails		90	90	90
Protection/Safety		90	90	90

E. Cost of No-Action (Including Loss):

Native Plant Community and Range:

It is difficult to place monitary value on the loss of 144,853 acres of high value mule deer, pronghorn, elk, sage grouse, and pygmy rabbit habitat, in addition to valuable rangelands. If the proposed BAER treatment is not funded, it is expected that non-native invasive annual grasses and noxious weeds will spread through the burned area. The expected consequences include: diminishing the quality of wildlife habitat and decreasing the value of forage production.

In order to estimate costs to treat infested NF lands affected by the Sugarloaf Fire with pre-emergent and post-emergent herbicide applications, without BAER funds, a series of calculations were performed. These calculations were based off of the conservative prediction that one third of the areas highlighted in risk categories "A" and "C" (that had been recommended to reseed) would become infested if left to recover completely naturally: one third of the specified areas is calculated at 22,784 acres. In order to treat this large of an infestation, it was determined that a minimum of two weed crews, two members each, be assigned to the task. Estimated days for the implementation and oversight of the project for the other personnel involved was doubled to accommodate the two teams. The two herbicides chosen in this estimate were Glyphosate—documented as efficient in eliminating annual grasses—and Tordon—documented as efficient in eliminating perennial forbs with rhizomotous or tap root systems. The rates of application shown in the table and the documentation leading to the selection of these two herbicides is found on Table 5 of the "Gallatin Nation Forest Noxious and Invasive Weed Control EIS." The determination to repeat herbicide treatments for ten years was influenced by a Project Report written by the USDA. It explains that not every infestation will be reached each year, and so seed production of invasive species, although it will decrease from year to year, will persist. It states "Repeated treatments over the course of many years are required to eradicate weed populations," ("Noxious Weed Treatment Project" USDA). A document published by the Oregon Department

of Agriculture supports this determination and even states that some weed treatments take up to 20 years to be effective and successful ("Economic Impact From Selected Noxious Weeds in Oregon"). Ten years was determined to be conservative in the years it would take to reduce the invasive species populations in this large of an area back to pre-fire levels of 1.29 percent. Prices for the two herbicides were taken from *Agri Supply*'s online website.

Re-seeding the treated area, to bolster the herbicide efforts, would be implemented in years 2, 5, and 8 after initial herbicide treatment had begun. The cost for the treatment was determined using Seed Mix 2. Each re-seeding event goes down in acreage by one third to reflect a success rate of 66 percent in the seeding each time.

Line Item	Unit Cost	Total
Salaries four GS 4	\$135 per day x 4 x 132 days	\$71,280
District plant specialist	\$364.32 per day x 20 days	\$7,286
Salary two GS 9	\$241.85 per day x2 x 40 days	\$19,348
GIS/FACTS specialist	\$442.63 per day x 20 days	\$8,853
Vehicle mileage	\$0.60 per mile x 79200 miles	\$47,520
Implementation team leader	\$410 per day x 2 day	\$820
Supplies	\$5,000 for supplies (such as utvs or vehicles needed to support 2 crews over the years, trainings, ect.) \$4.63 per acre for Tordon x 15,946 acres \$0.62 per acre for Glyphosate x 31,855 acres	\$5,000 \$73,830 \$19,750
	Total Cost	\$253,687
	Total Cost x 10 years	\$2,536,870
Aerial seeding contract	40-67\$/acre for 47,801 acres year 2, for 15,918 acres year 5, and 5,300 acres year 8	\$4,624,273
Seed mix 2 is \$78.5 per acre	For 22,784 acres year 2, 7,587 acres year 5, and 2,526 acres year 8	\$2,582,415
COTR	\$410 per day x 15 days x 3 (for 3 years implemented)	\$18,450
Inspectors	(2) \$241.85 & (1) \$364.32 x 10 days x3 "	\$25,440
Vehicle mileage	\$0.60 per mile x 12,000 miles x 3	\$43,200
Implementation team leader	\$410 per day x 1 day x 3 "	\$1,230
	Total Cost	\$9,809,168

Unmeasurable items: soil productivity, forage production due to lost soil productivity for wildlife and livestock.
Other loss costs:

Loss	Estimated Value
road damaged	\$10,000 to repair potential failures/ failure
Flood rescue	Loss varies from several thousand dollars to recover a vehicle (\$500 dollar base response fee plus hourly rates apply to off road wrecker) to the potential loss of life.
AML	Loss varies from several thousand dollars to recover a trapped person to the potential loss of life.
Access Loss	Depending on the direness of the need to travel- the loss can be up to and including loss of life if it is for emergency medical transport.

F. Cost of Selected Alternative (Including Loss): \$498,355

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Robin Wignall

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Phone: 775-778-6122

FAX: NA

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:

Noxious Weed Early Detection Rapid Response (EDRR)

Noxious weed and invasive annual grass species early detection surveys and monitoring, with the potential for rapid response herbicidal treatments, are necessary in year one post-fire. Treatment objectives are to reduce and manage unacceptable risk of invasive weed invasion and establishment with early detection and rapid response surveys and monitoring methods to avoid or minimize threats to the re-establishment of the native plant community. *Including, but not limited to, conducting spot treatments in the seeding units for any cheatgrass and medusa head that germinates in the 2019 growing season during both germination windows (spring and fall). Through targeted treatment of all known species and follow up treatment of the landscape scale treatment units it is hoped that success for the seeding efforts will be ensured.*

EDRR will concentrate on determining if weed sites throughout the fire area are expanding and determine if extra treatments, such as ground-based herbicide application, are necessary. The data gathered from EDRR will be used to determine if and what treatment will be needed. Treatments will occur concurrently to detection surveys as phenology dictates.

Post-burn weed treatment plan year 1: Fund a two person weed crew to survey and monitor the burn area for the presence of invasive weeds along roads, trails, dozer lines, staging, riparian and rangeland areas; rapid response treatment with herbicide may be warranted. Due to the size of the EDRR area, multiple trips to the field will be required totaling 132 days. Mileage includes a UTV and a vehicle to travel to and from treatment areas. Round trip travel from the District office in Elko to the treatment area is 200 miles with an additional 100 miles of off road travel per day.

Line Item	Unit Cost	Total
Salaries two GS 4	\$135 per day x 2 x 132 days	\$35,640
District plant specialist	\$364.32 per day x 10 days	\$3,643
Salary one GS 9	\$241.85 per day x 20 days	\$4,837
GIS/FACTS specialist	\$442.63 per day x 10 days	\$4,426
Vehicle mileage	\$0.60 per mile x 39,600 miles	\$23,760

Implementation team leader	\$410 per day x 1 day	\$410
Supplies (including repair and maintenance on weed sprayer equipped utvs)	\$12,000	\$12,000
	Total Cost	\$84,716

Reseeding of the Native Plant Community

The objective of the proposed reseeding treatment is to provide for erosion control and soil productivity retention on slopes and riparian areas within the burn; encourage native plant community re-establishment against the potential invasion of annual grasses and noxious weed species. The local native plant communities provide necessary habitat for high profile wildlife species such as sage grouse and pygmy rabbits. The Humboldt Forest Land and Resource Management Plan (IV-47), Fire Rehabilitation-Standards and Guidelines states:

"Site-Specific resource objectives will be identified as part of the analysis and rehabilitation plan. Every effort should be made to reseed areas which are prone to cheatgrass invasion as soon as possible after fire burn".

Under program funding, fence replacement and repair will be necessary to exclude livestock from affected areas. As identified in the Forest Plan, a minimum two growing season rest or recovery period will be enacted in order to allow native plant communities the opportunity to re-establish.

It is proposed that 8,801 acres be reseeded with Seed Mix 1 and that 1,160 acres be reseeded with Seed Mix 2, for a total of 9,961 total proposed acreage for reseeding (Appendix D). This amounts to treating only 7.8 percent of the total acres that burned on FS land within the fire perimeter, and only 6.4 percent of the total FS land acres within the fire perimeter, the difference being unburned islands.

Due to the size of the seeding area, multiple trips to the field will be required totaling 40 days. Mileage includes a two UTVs and up to four vehicles to travel to and from treatment areas. Round trip travel from the District office in Elko to the treatment area is 200 miles with an additional 100 miles of off road travel per day. These round trips would be performed with two vehicles.

Line Item	Unit Cost	Total
Aerial seeding contract	40-67\$/acre for 9,961 acres	\$667,387
<i>Seed mix 1</i>	<i>\$1,175,418</i>	<i>\$1,175,418</i>
<i>Seed mix 2</i>	<i>\$128,064</i>	<i>\$128,064</i>
COTR	\$410 per day x 15 days	\$6,150
Inspectors	(2) \$241.85 & (1) \$364.32 x 10 days	\$8,480
Vehicle mileage	.60 per mile x 12,000 miles	\$7,200
Implementation team leader	\$410 per day x 1 day	\$410
	Total Cost	\$1,993,109

1. **Recommendations/Discussion:** There are three recommended reseeding treatments for areas on NFS land, identified within the South Sugarloaf Fire perimeter. The following seed mixes were chosen because the included species occurred on the site prior to the fire and because they possess the following attributes: drought tolerance, extensive root systems, early colonizers, rapid growth, high seedling vigor, and competitive advantages that make them an important component of post-fire restoration activities. The number of species included in the mix will also encourage the native plant

community to re-establish with sufficient diversity, compared to pre-fire composition, to offer quality habitat to wildlife species, while maintaining its ecological resilience.

Both Great Basin Seeds and Granite Seed costs were included to demonstrate the variability in seed prices. It is recommended that flexibility be built into the funding in order to obtain the cleanest lot possible, not simply the least expensive, in order to conform to agency policy of using weed free seed.

Seed Mix 1: Open Market Estimate

Species	PLS lbs./ Acre	Bulk lbs./ Acre **	Acres	Total lbs. needed	Granite Seed Co. (estimated price/bulk#)	Granite Seed Co. Seed Cost	Granite Seed Co. Cost/acre	Great Basin Seed (estimate price/bul k#)	Great Basin Seed Cost	Great Basin Seed cost/acre
Bluebunch Wheatgrass <i>(Pseudoroegneria spicata)</i>	2.5	3.25	8,801	28,603	\$9.00	\$257,429	\$29.25	\$8.95	\$255,999	\$29.09
Great Basin Wildrye <i>(Leymus cinereus)</i> v. Magnar	1	1.3	8,801	11,441	\$9.00	\$102,972	\$11.70	\$16.95	\$193,930	\$22.04
Sandberg Bluegrass <i>(Poa Secunda spp. Sandbergii)vns</i>	2	2.8	8,801	24,643	\$9.00	\$221,785	\$25.20	\$6.50	\$160,178	\$18.20
Western Wheatgrass <i>(Pascopyrum smithii)</i>	2	2.6	8,801	22,883	\$5.00	\$114,413	\$13.00	\$5.95	\$136,151	\$15.47
Idaho Fescue <i>(Festuca idahoensis)</i>	0.8	1	8,801	8,801	\$12.00	\$105,612	\$12.00	\$8.95	\$78,769	\$8.95
Indian Ricegrass <i>(Achnatherum hymenoides)</i>	1.2	1.7	8,801	14,961	\$8.00	\$119,694	\$13.60	\$7.50	\$112,213	\$12.75
Bottlebrush Squirreltail <i>(Elymus elymoides)</i>	0.5	0.75	8,801	6,601	\$18.00	\$118,814	\$13.50	\$18.95	\$125,084	\$14.21
Western Yarrow <i>(Achillea millefolium var. occidentalis)*</i>	0.08	0.1	8,801	880	\$40.00	\$35,204	\$4.00	\$40.00	\$35,204	\$4.00
Desert Globemallow <i>(Sphaeralcea ambigua)</i>	0.1	0.15	8,801	1,320	\$45.00	\$59,407	\$6.75	\$59.00	\$77,889	\$8.85
Total	10.2	13.7	8,801	120,134	N/A	\$1,135,329	\$129.00	N/A	\$1,175,418	\$133.56

*Western yarrow seed is not available through Great Basin Seed; for comparison purposes, Granite Seed Company bulk price for Western yarrow was used.

Seed Mix 1: Government Provided Property Estimate

Species	PLS lbs./ Acre	Bulk lbs./ Acre**	Acres	Total lbs. needed	BLM Seed Warehouse (est. price/bulk#)	BLM Seed W. Cost	BLM Seed W. cost/acre
Bluebunch Wheatgrass (<i>Pseudoroegneria spicata</i>)	2.5	3.25	8,801	28,603	\$12.18	\$348,388	\$39.59
Great Basin Wildrye (<i>Leymus cinereus</i>) v. Magnar	1	1.3	8,801	11,441	\$11.63	\$133,062	\$15.12
Sandberg Bluegrass (<i>Poa Secunda spp.</i> <i>Sandbergii</i>)vns	2	2.8	8,801	24,643	\$4.41	\$108,675	\$12.35
Western Wheatgrass (<i>Pascopyrum smithii</i>)	2	2.6	8,801	22,883	\$2.94	\$67,275	\$7.64
Idaho Fescue (<i>Festuca idahoensis</i>)	0.8	1	8,801	8,801	\$14.09	\$124,007	\$14.09
Indian Ricegrass (<i>Achnatherum hymenoides</i>)	1.2	1.7	8,801	14,961	\$13.36	\$199,888	\$22.71
Bottlebrush Squirreltail (<i>Elymus elymoides</i>)	0.5	0.75	8,801	6,601	\$9.64	\$63,631	\$7.23
Western Yarrow (<i>Achillea millefolium</i> var. <i>occidentalis</i>)*	0.1	.1	8,801	880	\$24.33	\$21,413	\$2.43
Desert Globemallow (<i>Sphaeralcea ambigua</i>)	0.1	.15	8,801	1,320	\$19.62	\$25,901	\$2.94
Total	10	13.65	8,801	120,134	N/A	\$1,092,239	\$124.10

Seed Mix 1 is recommended for use on the Chicken Creek C&H, Van Duzer C&H, Riffe Creek C&H, and Wood Gulch C&H because these species occurred naturally on the site pre-fire and will help to re-establish the native plant community (Exhibit P & T). The average precipitation levels in these allotments is 18-30 inches, therefore the reseeding treatments will have sufficient moisture in an average year to provide for successful germination rates (Appendix E). Each species in the mix was chosen for its ability to re-establish in the first year after seeding under a variety of climatic conditions, in order to ensure that even if there were a drought in year one, there will be species from the seeding that can establish.

The recommended area for the Chicken Creek/Van Duzer and the Wood Gulch reseeding was determined through a suite of factors: bordering the Chicken Creek/Van Duzer and Wood Gulch reseeding area to the east and to the north respectively, moderate to high annual grass cover has been documented (Appendix F), while to the west and to the south respectively, the map shows 0-low percent cover of annual grasses. The un-infested areas are portions where the vegetation burned at a moderate to high intensity, while the annual grass infested portions adjacent to the reseeding sites show low to no vegetative burn intensity (Appendix G-H). Consequently, it is very likely that the seed source of the invasive annual grasses remained largely unburned and intact. This seed source is opportunistic and will spread into the burned area early in the spring before the native plants have the opportunity to regenerate. Reseeding the proposed areas will act as a buffer against the spread of invasive annual grasses, by helping native vegetation to establish and compete against the encroachment. Containing the current population of annual grasses is more cost effective than reclaiming newly infested acres.

The recommended area for the Riffe Creek reseeding was determined due to the extent and the severity of the burn. The BARC map (Appendix B) shows the majority of soil burn severity in the proposed seeding unit (Appendix D) as moderate. Furthermore, the dNBR map shows that the greater part of the area experienced moderate to high vegetative burn severities (Appendix I). When native plant communities experience high burn severities, not only are they more susceptible to invasive species infestation, but they also potentially have lost the seed source within the burned area to re-establish naturally. In addition, the larger the extent of the burned area, the more difficult it is for the unburned, adjacent native seed source to propagate into the fire area and become established (Exhibit B).

Seed Mix 2: Open Market Estimates

Species	PLS lbs./ acre	Bulk lbs./ Acre**	Acres	Total lbs. needed	Granite Seed Co (estimated price/bulk #)	Granite Seed Company seed cost	Granite Seed Co seed cost/acre	Great Basin Seed (estimated price/bulk #)	Great Basin seed cost	Great Basin seed cost/acre
Bluebunch Wheatgrass (<i>Pseudoroegneria spicata</i>)	4.5	5.8	1,160	6,728	\$9.00	\$60,552	\$52.20	\$8.95	\$60,216	\$51.91
Sandberg bluegrass (<i>Poa secunda ssp. Sandbergii</i>) vns	2.0	2.8	1,160	3,248	\$9.00	\$29,232	\$25.20	\$6.50	\$21,112	\$18.20
Western wheatgrass (<i>Pascopyrum smithii</i>)	3.0	3.9	1,160	4,524	\$5.00	\$22,620	\$19.50	\$5.95	\$26,918	\$23.21
<i>Bottlebrush Squirretail (Elymus elymoides)</i>	0.5	0.75	1,160	870	\$18.00	\$15,660	\$13.50	*\$18.95	\$16,487	\$14.21
Total	10.0	13.25	1,160	15,370	N/A	\$128,064	\$110.40	N/A	\$124,733	\$107.53

Seed Mix 2: Government Estimate

Species	PLS lbs./ acre	Bulk lbs./ Acre **	Acres	Total lbs. needed	BLM Seed Warehouse (estimated price/bulk #)	BLM Seed W. seed cost	BLM Seed W. seed cost/acre
Bluebunch Wheatgrass (<i>Pseudoroegneria spicata</i>)	4.5	5.8	1,160	6,728	\$12.18	\$81,947	\$70.64
Sandberg bluegrass (<i>Poa secunda ssp. Sandbergii</i>) vns	2.0	2.8	1,160	3,248	\$4.41	\$14,324	\$12.35
Western wheatgrass (<i>Pascopyrum smithii</i>)	3.0	3.9	1,160	4,524	\$2.94	\$13,301	\$14.47
<i>Bottlebrush Squirretail (Elymus elymoides)</i>	.5	0.75	1,160	870	\$9.64	\$8,387	\$7.23
Total	10.0	13.25	1,160	15,370	N/A	\$117,959	104.69

**The number of bulk lbs. needed per acre was determined by dividing the number of Pure Live Seed (PLS) lbs. per acre by the percent PLS of each species in the seed in order to insure the correct number of live seeds is seeded per acre.

Seed Mix 2 was developed to address areas where the major concern is the spread of invasive annual grasses such as medusahead and cheatgrass. Each species is native to the area and exhibit competitive characteristics to prevent the spread of invasive annuals. For descriptions of each species used in Seed Mix 1 and 2 refer to the descriptions derived from the USDA plant database listed below:

Seed mix 2 is proposed for use along major access roads in the Haystack C&H, Wildhorse C&H, Telephone C&H, and Sunflower Flat C&H allotments. A 40 foot strip or the width of the aircraft pass—whichever is smaller—on each side of the identified roads (Exhibit D) is proposed to be reseeded to

help prevent the spread of invasive annual seeds brought in by fire suppression activities. Areas adjacent to these roads, in the interior of the allotments, experienced moderate to high vegetative burn severities and consequently will be vulnerable to the spread of invasive species (Exhibit K). The average precipitation levels in these allotments is 18-24 inches, therefore the reseeding treatment will have sufficient moisture to provide for successful germination rates (Appendix E).

Seed Mix 2 is also proposed to reseed the Slaughterhouse reseeding area as there is a known 10 acre infestation of medusahead within the area. From the change in the normalized burn ratio on this allotment, we know that the invasive vegetation within the reseeding polygon experienced low severity burns, while the surrounding area within the fire perimeter experienced moderate to high vegetative burns. This means that the monoculture of medusahead was minimally affected, while the surrounding native plant community experienced a more severe burn leaving the native communities vulnerable to infestation. It would be more cost effective to prevent the spread of this invasive annual than to reclaim land lost to its spread. The average precipitation levels in these allotments is 18-24 inches, therefore the reseeding treatment will have sufficient moisture to provide for successful germination rates (Appendix E).

The price estimates for each seed mix has changed due to an error that was caught; the new estimates represent the correct price and amount for the number of bulk lbs. needed in order to seed the area at the recommended rate of 70-80 seeds per square foot (Forest Botanist).

A Seed Request Form has been submitted to the BLM Seed Warehouse; the projected response date is 11-16, at which point it will be confirmed if they have the available seed to complete both Seed Mix 1 and 2. The quarterly “National Seed Warehouse System Inventory” spreadsheet from the BLM Sharepoint website was referenced, and according to numbers provided there is enough seed to fill both orders.

Lewis Flax was removed from both Seed Mix 1 and 2 due to unavailability both through government vendors as well as on the open market. Attempts were made to substitute with other native forbs, such as Canadian milkvetch, which has been successful in past fire seedings on the HT, however only non-native species of milkvetch were available. Then it was substituted with Rocky Mountain Bee Plant, another native forb that has germinated successfully in post-fire seedings on the Forest, however, this substitution increased the total cost of the Seed Mix by approximately \$120,000. It was determined that the benefits of planting Rocky Mountain Bee Plant in comparison with the increased cost was not the most cost effective alternative and was consequently eliminated. The preferred alternative is to substitute with Bottlebrush squirreltail, a native, perennial grass, known to be competitive against annual grasses. This grass will fulfill a similar role to Lewis Flax in the seed mix as it is resistant to fire. A full description of this grass is found below and was derived from the USDA Plant Database.

Bluebunch Wheatgrass ***Pseudoroegneria spicata* ssp. *Spicata*** – Bluebunch wheatgrass is very drought resistant, persistent, and adapted to the stabilization of disturbed soils. It does not out-compete slower developing native species, such as thickspike wheatgrass. Its drought tolerance, combined with extensive root systems and good seedling vigor, make this species ideal for reclamation in areas receiving 10 to 20 inches annual precipitation. ‘Secar’ competes well in areas as low as 8 inches annual rainfall. It is very fire tolerant and establishes quickly for a native grass.

Great Basin Wildrye ***Leymus cinereus*** – Basin wildrye is well adapted to stabilizing disturbed soils and has been used for disturbed area stabilization, mine reclamation, and fire rehabilitation. It has a deep fibrous root system extending to depths of 200 cm (63 in) in undisturbed soils with a lateral root spread of up to 100 cm.

The drought tolerance of basin wildrye, combined with a fibrous root system and fair seedling vigor, make it desirable for reclamation in areas receiving 8 to 20 inches annual precipitation.

Sandberg bluegrass ***Poa secunda* (syn. *P. sandbergii*)** – Sandberg bluegrass is a pioneer species, one of the first grasses to colonize on disturbed sites. It is small in stature, early to establish, and quick to mature. It is also a “self-seeder” and often produces viable seeds within the first growing season.

Western wheatgrass ***Pascopyrum smithii***- Western wheatgrass is a long-lived, cool season species that has coarse blue-green leaves with prominent veins. Western is a sod former with strong, spreading rhizomes making it an excellent erosion control plant. It also has the ability to adapt for a variety of soils and is widely used in seed mixtures for range seedings and reclamation projects.

Idaho fescue ***Festuca idahoensis***- Idaho fescue is a native, perennial, cool-season, drought tolerant grass that produces an extensive, deep root system making it an excellent erosion control grass. Idaho fescue stands are persistent with good seedling vigor and is adapted to stabilization of disturbed soils.

Indian ricegrass ***Achnatherum hymenoides***- Indian ricegrass is a cool season, native bunchgrass. It is drought tolerant and has a fibrous root system, which makes it desirable for erosion control and reclamation. It is one of the first species to establish on cut-and-fill slopes.

*Bottlebrush squirreltail ***Elymus elymoides***- Bottlebrush squirreltail is a native, perennial, and cool-season grass that has been cited as an excellent erosion control grass due to its strong seedling vigor and quick establishment. It has a proficient seed dispersal mechanism, is resistant to fire damage as it burns at low temperatures and remains green into the winter, and has shown that it can compete well with undesirable annual weed species. Bottlebrush squirreltail is valuable winter forage to many domestic and wildlife species as it remains green and palatable throughout the winter.*

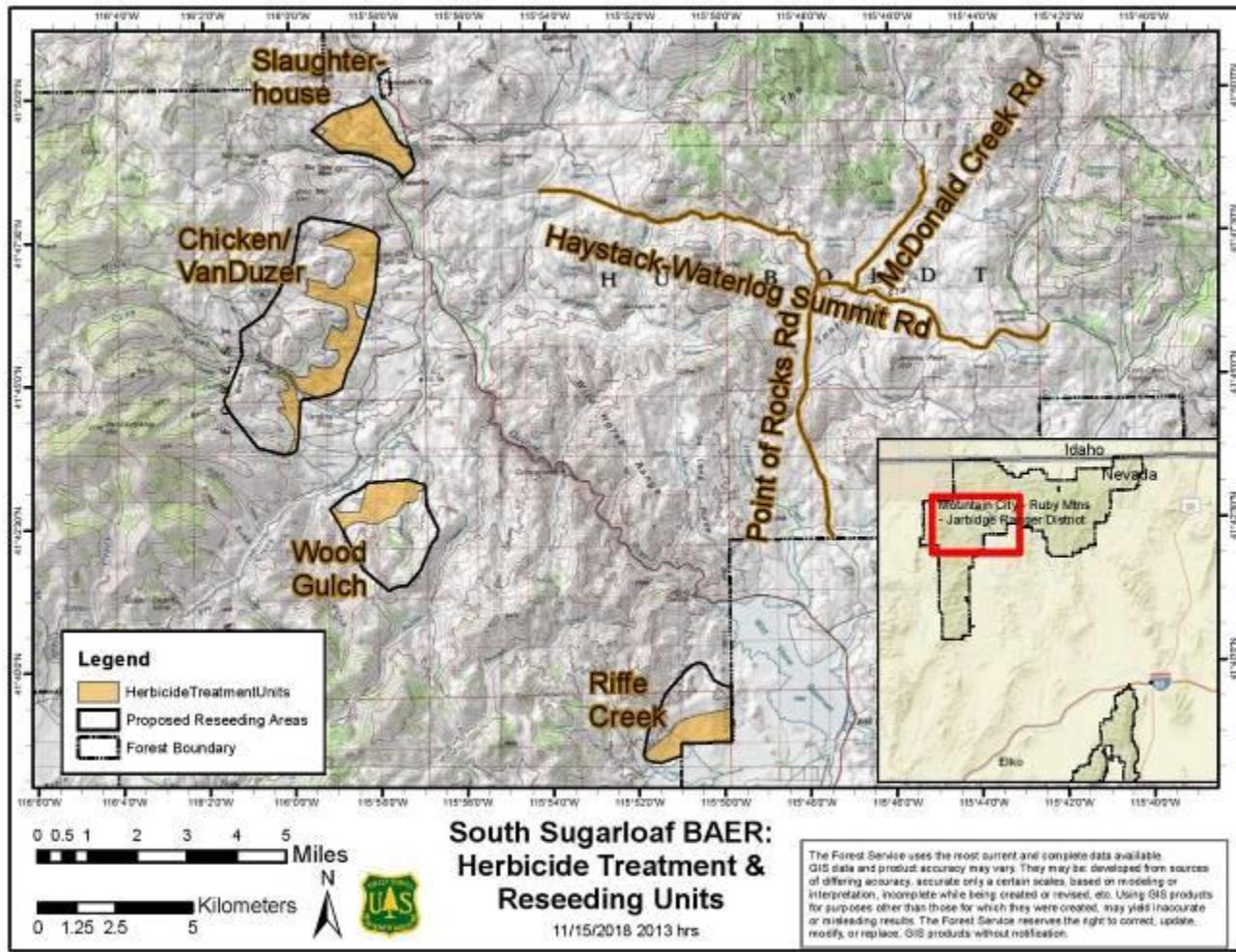
Western Yarrow ***Achillea millefolium var. occidentalis*** – Western yarrow is highly adaptable and displays wide ecological amplitude to diurnal temperature, altitude, latitude, and climatic conditions. Western yarrow initiates growth in early spring and is an early successional species that readily establishes on disturbed sites, and thrives in drought conditions. These characteristics often allow it to compete well against invasive species.

Desert globemallow ***Sphaeralcea ambigua***- Desert globemallow is a drought tolerant native perennial. It can grow in restricted water conditions and has a rapid growth rate with prolific seed production. Desert globemallow is an early colonizing species used for erosion control and can suppress invasive weed species establishment in areas affected by fires and other disturbances.

C) Herbicide Treatment on Seeding Units

Research has shown that pre-treating areas that are to be seeded with herbicide can increase the efficacy of weed control and the chances of seeding success (DiTomaso, 2000 and Jacobs et. Al.). It is not, however, necessary to pre-treat every site that is reseeded, rather a targeted herbicide treatment approach should be utilized to ensure efficiency of both the resource and funding. A study in northern Utah found that where fires have occurred at higher elevations, bunchgrasses have recovered vigorously and there has been little cheatgrass invasion and that cheatgrass is most invasive on mid-elevation sagebrush sites (Sparks et al. 1990). Another study, conducted by the Rocky Mountain National Park, sought to understand the scale and patterns of cheatgrass invasion within their park, and found that aspect influenced percentage cover, with south-facing slopes having higher cover than slopes facing north or northeast,” (Banks and Baker, 2011). Therefore, in accordance with current available research, it is proposed to treat with herbicide all of the mid-elevation areas

and south, southwest, and southeastern facing slopes in each proposed seeding unit, totaling 3,944 acres prior to seeding. The areas proposed for this targeted herbicide treatment were determined to be those most susceptible to the encroachment of invasive annual grasses, with mid-elevations being defined in the area as elevations falling between 5593 feet (the lowest elevation within the seeding areas) and 6300 feet (District Weeds Specialist and Ecologist). All seeding units along roadsides were included for targeted herbicide treatments, due to the high amount of fire suppression and recreational traffic that these areas have and continue to experience, putting them at higher risk of invasive weed seed introduction. Treatments would consist of ground application of Plateau at a rate of 5 oz. per acre, coupled with a non-ionic surfactant at a rate of 20 oz. per 100 gallons (derived from information on Plateau's label coupled with recommendations from the District Weeds Specialist). Non-ionic surfactants have been linked to estrogenic effects in aquatic species, such as fish and amphibians (Bakke 2007). In order to mitigate any potential negative effects to wildlife, it is proposed that application within riparian areas and near perennial streams will be consistent with PACFISH/INFISH, Human Health and Ecological Risk Assessments (HERAs), and product labels, and that application within these areas will be limited to wick/wipe methods (HT Forest Botanist and Invasive Plant Program Coordinator). EDRR efforts will also be utilized the following spring and fall to conduct herbicide spot treatments for any cheatgrass and medusahead that germinates after seeding. These measures will help to ensure the continued success of the seeding efforts.



Herbicide Treatment Unit	Acres
Wood Gulch	570
Riffe Creek	586
Slaughterhouse	907
Chicken/Van Duzer	1680
Haystack-Waterlog Summit Rd	120
Point of the Rocks Rd	51
McDonald Creek Road	30
Total Acres:	3,944

Imazapic (Plateau) has been shown to have high success in reducing annual grass populations across multiple studies, particularly after fire has removed the thatch layer that can otherwise intercept the spray (USDA Plant Database). Various studies have observed exceptional control of cheatgrass (Davison and Smith 2007; Morris et al. 2009; Wilson et al. 2010) and medusahead (Shinn and Thill 2002; Monaco et al. 2005; Kyser et al. 2007) within one year of imazapic treatment. In a three-year study of invasive annual grass control in a sage-steppe ecosystem in the western Great Basin, Kyser et al. (2013) compared the effectiveness of imazapic, glyphosate, rimsulfuron, and sulfometuron + chlorsulfuron and observed the most consistent control of cheatgrass and medusahead with imazapic. Not only has imazapic been shown to effectively control annual grass populations, but it is safe on sagebrush (Morris et al. 2009) and many perennial grass species (Shinn and Thill 2004) at rates lower than 6 oz/ac (BASF, 2008), and has been associated with an increased presence of native forbs following treatment (Kyser et al. 2007; Kyser et al. 2013). The local BLM and NDOW offices have both confirmed successful treatments similar to the one proposed above (Personal Conversation Record).

The official label for Plateau recommends one fallow year before seeding after treating with this herbicide to ensure optimum success. A full year's fallow before seeding would fall in December of 2019, however, due to time constraints for implementing treatments through the BAER process within one year this alternative is not realizable. Rangeland seeding efforts in the Intermountain West have seen the most success when either seeded in the fall or when seeded during the winter over snow (Hudson 2014). Consequently, it is proposed that herbicide be applied fall of 2018 in the months of November and December, with seeding occurring just afterwards in January-February of 2019 or in October of 2019 contingent on seed availability. Seeding before the completion of one fallow year post-herbicide treatment can still increase the success of seeding operations, and has had local success in post-fire treatments for the Murphy Fire in 2007 that occurred on the same District (Brett Glover, FS Weeds Specialist).

Cost Table:

Line Item	Unit Cost	Total
<i>Herbicide Application Contract Mobilization Costs</i>	\$35,000	\$35,000
<i>Herbicide Application Contract Price to treat all Acres</i>	\$137.67 per acre x 3,944 acres	\$542,970
<i>COTR</i>	\$410 per day x 15 days	\$6,150
<i>Inspectors</i>	(2) \$242 x 10 days	\$4,840
<i>Vehicle mileage</i>	.60 per mile x 6,000 miles	\$3,600
<i>Implementation team leader</i>	\$410 per day x 1 day	\$410
	Total Cost	<i>\$282,324 from a women owned small business or \$592,970 from the GSA contract</i>

This estimate was derived by receiving five quotes from different herbicide application companies and using price estimates from a company in the mid-range of prices, in order to maintain some flexibility in contracting.

Due to the size of the seeding area, multiple trips to the field will be required totaling 10 days. Mileage includes a two UTVs and up to two vehicles to travel to and from treatment areas. Round trip travel from the District office in Elko to the treatment area is 200 miles with an additional 100 miles of off road travel per day.

The assessment team considered several alternatives to the proposed action including:

- A reseeding alternative in the Whiterock C&H allotment totaling 3,272 acres was considered but ultimately eliminated. Reseeding was considered along the western boundary of the allotment due to known medusahead infestations on private land to the west. This alternative was dismissed due to information received from the FS grazing permittee that minimal fire suppression activity occurred on the western forest-private land boundary, indicating the spread of medusahead would occur in low amounts. It was also determined that the native plant community has sufficient potential to naturally recover and re-establish.
- A second reseeding location on the allotment of 1345 acres was considered south of the Duck Valley Indian Reservation boundary line; this area is known to have a large medusahead infestation. This location was eliminated due to the low severity of the burn, steep, rugged terrain, and a sizeable unburned area along the Forest-Reservation boundary.
- A reseeding alternative in the Sunflower Flat C&H allotment totaling 8,320 acres was considered but ultimately eliminated. This alternative was eliminated due to the potential of the native plant community to re-establish naturally if the spread of noxious weeds and invasive species is curbed along the high traffic vectors in the area. It is presumed that reseeding adjacent to major access roads will be sufficient to prevent the spread of annual invasive grasses and weeds.
- A riparian seed mix was considered, but eliminated due to field assessments leading to the conclusion that affected riparian areas have the potential to re-establish naturally. The majority of the burned riparian areas exhibited mosaic burn patterns (Appendix B), and consequently should have unaffected seed-sources to re-establish.
- Mulch was considered as a possibility to couple with re-seeding efforts. However, it was not pursued due to a large increase in cost and a low potential increase in effectiveness. The areas proposed for reseeding do not have slope classes that would warrant the assistance of mulch to be effective (Appendix C).
- Seeding with ground based equipment was determined likely to be ineffective due to the steep, rocky terrain. Furthermore, ground based equipment that disturb soil surfaces require archeological surveys, which would increase the time taken to apply the treatment.
- A sterile cereal grain seeding was considered, however, the district has had limited experience with seeding these species and thus has no grounds to prove effectiveness. The neighboring District, Santa Rosa, has had low success with sterile cereal grain seed germination. Due to the uncertain success of sterile cereal grain seeding, and the potential economic loss with an ineffective reseeding, this alternative was not carried forward.

- A No Action alternative was considered for all of the allotments affected by the fire. It was determined that allotments in the *Critical Value Matrix Table* listed as risk “B” have the potential to re-establish naturally. However, for risks “A” and “C” it was determined that post-fire treatment is warranted due to burn severity and the threat of noxious weed and invasive annual grass invasion.
- Aerial herbicide applications were considered as a component of the EDRR proposal, however there is not currently an EIS for this treatment on the Forest and consequently this alternative is not currently an option. An aerial herbicide application EIS would cost approximately \$ 500,000 to prepare, and would take a minimum of 6 months.

Proposed Action: Aerial seeding utilizing the regional IDIQ contract is the preferred alternative for allotments in risk “A” and “C” for the following reasons: it is more expedient and more effective at covering large amounts of acres. Noxious weed and invasive annual grass species early detection, surveys, monitoring and potential rapid response ground based herbicidal treatment are the preferred alternatives to address weed invasion on all allotments burned in the fire, because early treatment of smaller acreages prove to be more economically efficient.

Nevada Department of Forestry is doing this on the Forest Service Lines--Fire-line Seeding Proposal: It is also recommended that Seed Mix 2 be used to reseed along all dozer lines within the fire perimeter, which totals 41 miles (Appendix L). All of the dozer lines constructed on FS lands were constructed with a single pass of the dozer, which measures 10 feet wide. Therefore, the proposal for reseeding dozer lines on FS lands totals 50 acres. Of the 144,852 acres within the fire only 1.29 percent of the total acres had recorded weed infestations (FACTS). Reseeding the dozer lines should prevent the spread of weeds and invasive species into the surrounding native plant communities by introducing perennial grasses that can outcompete the undesirable species seed brought in by fire suppression activity. This indirect response through preventative seeding with least cost, aggressive native species that will compete with invasive species in the first growing season, should allow natural recovery of the native vegetation (“BAER Guidance Paper: Invasive Plant Threats” 2018). The cost to preventatively reseed 50 acres is relatively low (refer to the cost table below), while the cost to reclaim infested FS lands with herbicide treatments or re-seeding after invasive plants have spread is significantly higher (refer to the cost table for the “No Action” alternative).

Line Item	Unit Cost	Total
Aerial seeding contract	\$40.67\$/acre for 50 acres	\$3,350
Seed mix 2	\$3,925	\$3,925
COTR	\$410 per day x 1 days	\$410
Inspectors	(2) \$241.85 & (1) \$364.32 x 1 days	\$848
Vehicle mileage	\$.60 per mile x 700 miles (2 vehicles round trip)	\$420
Implementation team leader	\$410 per day x 1 day	\$410
	Total Cost	\$9,363

Seed Mix 2 for Fire-line Seeding:

Species	lbs./aere	Aeres	Total lbs. needed	Granite Seed Co (estimated price/bulk #)	Granite Seed Company seed cost	Granite Seed Co seed cost/aere	Great Basin Seed (estimated price/bulk #)	Great Basin seed cost	Great Basin seed cost/aere
Bluebunch Wheatgrass (<i>Pseudoroegneria spicata</i>)	4.5	50	225	9.00	2,025	40.5	8.95	2,014	40
Sandberg bluegrass (<i>Poa secunda</i> ssp. <i>Sandbergii</i>) vns	2.0	50	100	9.00	900	18	6.50	650	13
Western wheatgrass (<i>Pascopyrum smithii</i>)	3.0	50	150	5.00	750	15	5.95	892.5	18
Lewis Flax (<i>Linum lewisii</i>)	.5	50	25	10.00	250	5	*10.00	*250	*5
Total	10.0	50	500	N/A	3925	78.5	N/A	3807	76

Channel Treatments:

Instal beaver dam analogs in 4 stream channels (approximatly 4km of stream length) in order to protect them from anticipated post fire flow impacts including additional incision and loss of habitat quality. One channel is occupied LCT habitat. Gravel, Beaver and Badger Creek were all determined through field assessment to be at high risk of additional incision due to post fire flows. Cole Canyon Creek, occupied lct habitat was also determined to be at high risk of incision and also sensitive to sediment introduction.

Line Item	Unit Cost	Total
Posts (2100) including delivery	\$6x2100=	\$12,600
Hand held hydraulic post pounder including delivery	11,000x2=	\$22,000
Implementation team (20 person crew)	11,000/day*14=	\$154,000
Blue rooms	4*\$75/day*14 days=	\$4,200
Hand wash station	1@\$60/day*14 days=	\$840
Team leader	450*20 days=	\$9000
Per diem	21ppl*93+51=	\$42,336
Supplies (saw gas, ice, incidentals)	3000	\$3,000
Mileage (2 crew buggies, chase rig, run about- 4 total)	\$.50*1000*4=	\$2,000
	Total Cost	\$249,976

Revised initial request is to include 1 stream channel (Cole Canyon Creek) for protection of LCT. The revised request is below. This treatment is to be tested as to it's effectivness as a post fire channel treatment. Monitoirng of the channel treatments will need to occur.

Posts including delivery	\$6x200=	\$1,200
Hand held hydraulic post pounder including delivery	11,000x1=	\$11,000

Implementation team (20 person crew)	District and FWS match	
Blue rooms	2*\$75/day*7 days=	\$1,050
Hand wash station	1@\$60/day*7 days=	\$420
Team leader	450*10 days=	\$4,500
Per diem	District match	
Supplies (saw gas, ice, incidentals)	1000	\$1,000
Mileage (4 total vehicles)	\$.50*500*4=	\$1,000
topographic survey for design (partner wants a formal design) (same price to use forest surveyor as contract through USU)	\$3,000	\$3,000
	Total Cost	\$23,170

Roads and Trail Treatments:

Roadbed and embankments of Maintenance Level 3 Roads within the burn area

Road	Length in miles
56729 Trail Creek	11.6
56930 Haystack-Waterlog Summit	13.3
56931 McDonald Creek	3.4
Total	28.2

These roads currently have marginal drainage, and are at risk of further damage from increased runoff. While the drainage issues preexist the fire, the higher runoff will accelerate road damage. These roads are important for accessing the area, and are maintained for passenger vehicles.

Our recommendation for these roads is as follows:

- Reshape (grade) the road using a motorgrader to reestablish the crown, and repair the existing rutting. Additional surfacing material may need to be brought in to repair some local sites with more severe rutting damage.
- Clean out the basins of drainage structures (culverts) of built up sediments and other debris. Repair damaged culvert inlets.
- Install rolling dips at locations of undersized or marginally functioning culverts, and where the rutting is more severe.
- Storm inspection and response is recommended to monitor these roads.

Estimated costs:

Grading the road

Estimate average of 3 miles of road to be graded per day

	Cost per day	Number of days	Total Cost
Motor grader operator	\$320	10	\$3,200
water truck driver	\$340	10	\$3,400
compactor operator	\$224	10	\$2,240
	\$216	10	\$2,160
compactor operator	\$432	10	\$4,320
	\$216	10	\$2,160

Forman	\$397	2	\$794
pickup	\$34	2	\$69
Total			\$18,343

Cleaning inlet basins

Estimating 3 per mile, and average 15 per day

	Cost per day	Number of days	Total Cost
Backhoe	\$174	6	\$1,042
operator	\$490	6	\$2,940
Dump Truck	\$92	6	\$552
Forman	\$550	2	\$1,100
Pickup	\$34	2	\$68
Total			\$5,702

Constructing drain dips and drivable water-bars

estimating a need of 1 per mile, and average 5 per day

	Cost per day	Number of days	Total Cost
Backhoe	\$174	6	\$1,042
operator	\$490	6	\$2,940
Forman	\$550	2	\$1,100
Pickup	\$34	2	\$68
Total			\$5,150

spot rocking - placing aggregate in ruts and other needed places

estimating an average need of 2 cubic yards per mile

	Cost per day	Number of days	Total Cost
Motor grader	\$320	6	\$1,920
operator	\$340	6	\$2,040
Forman	\$550	1	\$550
Pickup	\$34	1	\$34
water truck	\$224	2	\$448
driver	\$370	2	\$740
compactor	\$432	2	\$864
operator	\$370	2	\$740

Materials: 60 cubic yards of aggregate @ \$110 per cubic yard, delivered

\$960	\$7,560
Total	\$14,899

Total cost of proposed work: \$44,094

Specific Maintenance on Level 2 roads within the burn area that provide important access for range allotments, and are mostly usable by low clearance vehicles

Road	Length in miles
56178 Indian Creek	3.1
56181 Mountain City Drive	3.6
56226 Point of the Rocks	5.3
56245 Warm Creek	2.1
56928 Belcher	2.8
56950 Chicken Creek	4.5
59651 Wall Creek (until junction with Road 178)	10.9
Total	32.1

These roads currently have marginal drainage, and are at risk of further damage from increased runoff. While the drainage issues preexist the fire, the higher runoff will accelerate road damage. These roads are important for accessing the area, and for the most part, have been maintained for passenger vehicles.

Our recommendation for these roads is mainly stormproofing:

- Clean out the basins of drainage structures (culverts) of built up sediments and other debris. Repair damaged culvert inlets.
- Install rolling dips or drivable waterbars at locations of undersized or marginally functioning culverts, where the rutting is more severe, and other places where there are drainage problems. Because these roads generally have more severe rutting, they will need to be installed at a higher frequency than the Maintenance Level 3 roads.
- Storm patrols are recommended to monitor these roads.

Cleaning inlet basins

Estimating 3 per mile, and average 15 per day

	Cost per day	Number of days	Total Cost
Backhoe operator	\$174	7	\$1,215
Dump Truck (50 miles per day)	\$390	7	\$2,730
Forman	\$92	7	\$644
Pickup	\$550	2	\$1,100
Total	\$34	2	\$68
			\$5,758

Constructing drain dips and drivable water-bars

estimating a need of 3 per mile, and average 10 per day

	Cost per day	Number of days	Total Cost
Backhoe	\$174	10	\$1,736

operator	\$490	10	\$4,900
Forman	\$550	3	\$1,650
Pickup	\$34	3	\$102
Total			\$8,388

Storm patrol and response estimate is included separately.

Total cost for work on select maintenance level 2 roads: \$14,146

Maintenance Level 2 roads within the burn area not mentioned above

The remaining ML2 roads in the burned area have been largely unmaintained for some time. On these roads, severe rutting is common and they are usually very rough, and do require high clearance vehicles, often 4wd. For the most part, it will require substantial investment in money and time for improving these roads so they drain properly and avoid the accelerated damage from increased runoff resulting from the fire.

For those reasons, and because the drainage problems with these roads is preexisting, our recommendations for these roads are conducting storm patrols, and for installing flash flood warning signs in and around the burn area. We expect users would be familiar with driving these types of roads and would be prepared. However, we feel it is prudent to provide warning signs to remind the public that conditions have changed, and that the risk of flash flooding has increased in the burn area. These roads appear to receive mainly recreational use.

There are a total of 125 miles of these roads in the burn area.

We propose posting warning signs at the more traveled Maintenance Levels 2 and 3 roads that access the burn area, at practical locations. 18 locations for the signs are proposed.

Warning signs

Total of 18 signs

	Cost per day	Number of days	Total Cost
18 signs with posts delivered @ \$20 each	---	---	\$400
Installation crew (2 people) pickup	\$500	4	\$2,000
	\$110	4	\$440
Total			\$2,840

Storm patrol and response estimate is included separately.

Total cost for work on maintenance level 2 roads: \$2,840

Site # 3, Road/Stream crossing of Road 56930 and Chicken Creek, 41.7746, -115.7781

This road/stream crossing is undersized, and unable to handle the post-fire runoff. It consists of three 54 in. diameter corrugated metal pipes, placed side by side. A failure at this site would very likely result in a washout of the road.

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)				Post-Fire (cfs)			
5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
12	29	64	162	87	156	287	558

We believe that the above peak flow estimates for this site are very low. Based on our visual inspection of this site, we believe that it regularly handles much more water than is shown in the table above. There are scour holes under the outlets, and the rust on the inside of the pipe shows they have been flowing near their capacity. The peak flow estimates do show a 625% post-fire increase in a 5-year flow.



For this site, two alternatives were considered:

- A. Removing one or two of the 54" culverts, and installing a larger structure capable of handling the post-fire flows. This option is the more expensive and not carried forward.
- B. (Recommended due to cost) Installing a large, armored rolling dip. Due to the low cover over the culverts, the dip would not be able to be installed at them. It would need to be constructed adjacent to the stream, with an armored channel redirecting the water back into the natural channel. Rock for armoring is not available in the area, so its haul would require a large expense. Further survey of the site is also needed to determine how viable it will be to physically construct the rolling dip.

Costs for installing larger culvert

	Cost per day	Number of days	Total Cost
design work	\$500	2	\$1,000
excavator (rented)	\$1,000	5	\$5,000
operator	\$490	5	\$2,450
water truck	\$224	3	\$672
driver	\$370	3	\$1,110
compactor	\$432	3	\$1,296
operator	\$370	3	\$1,110
Forman	\$550	3	\$1,650
pickup	\$34	3	\$103
Dump Truck (20 miles)	\$48	2	\$95

Materials: culvert, delivered: \$9000	\$9,000
Total	\$23,486

Costs for constructing large armored drain dip

	Cost per day	Number of days	Total Cost
design work	\$500	2	\$1,000
excavator (rented)	\$1,000	3	\$3,000
operator	\$490	3	\$1,470
water truck	\$224	1	\$224
driver	\$370	1	\$370
compactor	\$432	1	\$432
operator	\$370	1	\$370
Forman	\$550	1	\$550
pickup	\$34	1	\$34
Dump Truck (20 miles)	\$48	1	\$48
Materials: 80 cubic yards of riprap, delivered, @ \$110/cubic yard+160delivery/10ynds			\$10,080
Materials: 20 cubic yards of aggregate surfacing @ \$110/cubic yard+160delivery/10ynds			\$ 2,520
Total			\$20,098

Site # 4, Road/Stream crossing of Road 56930 and a tributary to Chicken Creek, **41.7760, -115.7842**

We are concerned with this site washing out with the increased flows resulting from the burned watershed. The existing 36" culvert and road embankment are beginning to fail. The culvert is separating in the middle, and at the inlet treatment. Scour on the road indicates the site has overtopped recently. The invert of the culvert has places where it has rusted through.

The embankment at the inlet was eroding, and required temporary repairs to make it safe for the public. It did not receive adequate compaction however (due to lack of time and proper equipment,) and is anticipated to again erode and fail.

While these deficiencies preexist the fire, we feel that the site is now much more likely to fail again under the increased runoff flows resulting from the burned watershed.

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)				Post-Fire (cfs)			
5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
6	15	33	90	35	66	136	295

This culvert is slightly undersized for the estimated 5-year peak flow. However, based on our inspection of the site, we suspect that the pre-fire estimates are low, and the culvert is actually significantly undersized for the increased runoff. The road itself may be channeling more water to the pipe than would otherwise occur.



Our recommendation for this site is replacing the culvert with a properly sized one. Installing a rolling dip would not address the failing embankment around the culvert. With the increased flows, we believe the embankment has a high chance of washing out, even if a rolling dip were put in.

Costs for installing larger culvert

	Cost per day	Number of days	Total Cost
excavator (rented)	\$1,000	3	\$3,000
operator	\$490	3	\$1,470
water truck	\$224	2	\$448
driver	\$370	2	\$740
compactor	\$432	2	\$864
operator	\$370	2	\$740
Forman	\$550	1	\$550
pickup	\$34	1	\$34
Dump Truck	\$92	1	\$92
Materials: culvert, delivered:	\$3000		\$3,000
Total			\$10,938

Site #6 Road/Stream crossing of Road 56930 and Jenkins Spring, 41.7738, -115.8006

This stream crossing is a 36" diameter culvert that is suspected of being undersized for anticipated increased runoff of the burned watershed. The road and downstream embankment show signs of scour, indicating that water has already been overtopping the road at this location prior to the fire. The downstream fill slope of the road embankment has been eroding, but there is still enough usable road width left for safe use.

Peak flow estimates have not yet been made for this location, but those made for similar sized watersheds in the burn area have had significant increases between pre-fire and post-fire flows.



For this site we recommend installing an armored drain dip adjacent to the culvert, repairing the eroding embankment, and installing a riprap splash apron at the outlet.

Construct armored drain dip, repair embankment, and install splash apron

	Cost per day	Number of days	Total Cost
Backhoe operator	\$174	2	\$347
Forman	\$490	2	\$980
Pickup	\$550	2	\$1,100
	\$34	2	\$68
materials: 10 cubic yards of riprap @ \$110/cy +160 delivery			\$1,260
Total			\$3,755

Road/Stream crossing of Road 56729 and Spring Creek,

41.6872, -116.0362

Site #64. This road stream crossing is undersized, and unable to handle the post-fire runoff. It consists of one 34"x22" CMP and one 18" CMP, placed side by side. The secondary drainage is completely buried in the fill slope. A failure at this site would very likely result in a washout of the road.

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)				Post-Fire (cfs)			
5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
1	3	8	23	81	115	166	255



For this site, we have recommended to upsize the primary drainage structure and replace the secondary drainage structure.

Costs for installing two culverts

	Cost per day	Number of days	Total Cost
design work	\$500	2	\$1,000
excavator (rented)	\$1,000	2	\$2,000
operator	\$484	2	\$968
water truck	\$224	2	\$448
driver	\$360	2	\$720
compactor	\$432	2	\$864
operator	\$360	2	\$720
Forman	\$541	2	\$1,082
pickup	\$34	2	\$68
Dump Truck	\$92	2	\$184

Materials: 42"x29" CMP, 18" CMP, delivered:

\$5,575

mobilization; 174 miles, 1 day			
transport for excavator	\$647	1	\$647
Transport for compactor	\$192	1	\$192
Total			\$14,468

Road/Stream crossing of Road 56951 and Wall Creek, 41.7668, -116.1264

Site #68. This road stream crossing is undersized, and unable to handle the post-fire runoff. It consists of one 36" CMP. A failure at this site would very likely result in a washout of the road and deposition of sediment downstream. There is diversion potential and possibility of stream capture within the road.



For this site, we have recommended installing an armored rolling dip adjacent to the culvert.

Construct armored rolling dip

Cost	Number of	Total Cost
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	per day	days	
Backhoe	\$17 4	2	\$348
operator	\$48 4	2	\$968
materials: 20 cubic yards of riprap delivered (160/10=320) @ \$110/cy			\$2,520
mobilization: 184 miles			
Dump Truck	\$27 2	2	\$545
trailer	\$10	2	\$20
Total			\$4,401

Road/Stream crossing of Road 56178

41.7975, -116.1018

Site #92. This stream crossing is a 12" corrugated metal pipe that is severely plugged, not functioning and displays current signs of overtopping. The soil burn severity for this watershed shows moderate to high burn. Peak flow estimates have not yet been made for this location, but the adjacent, similar sized watershed in the burn area had significant increases between pre-fire and post-fire flows. The site is located adjacent to the low spot in the road.





For this site we recommend pulling the pipe and installing an armored low water ford.

Costs for installing an armored low water ford

	Cost per day	Number of days	Total Cost
design work	\$500	2	\$1,000
excavator (rented)	\$1,000	2	\$2,000
operator	\$484	2	\$968
water truck	\$224	2	\$448
driver	\$360	2	\$720
compactor	\$432	2	\$864
operator	\$484	2	\$968
Forman	\$541	2	\$1,082
pickup	\$34	2	\$68
Dump Truck	\$92	2	\$184

Materials: 20cy riprap @ \$75, 20 cy base rock @ \$75,
delivered(4*160=640): \$3,640

mobilization; 210 miles			
transport for excavator	\$782	1	\$782
Transport for compactor	\$192	1	\$192
Total			\$12,915

Road/Stream crossing of Road 56178

41.7941, -116.1001

Site #94. This stream crossing is a 12" corrugated metal pipe that is severely plugged, not functioning and displays current signs of overtopping. The soil burn severity for this watershed shows moderate to high burn. Peak flow estimates have not yet been made for this location, but the adjacent, similar sized watershed in the burn area had significant increases between pre-fire and post-fire flows. The site is located adjacent to the low spot in the road.





For this site we recommend pulling the pipe and installing an armored low water ford.

Costs for installing an armored low water ford

	Cost per day	Number of days	Total Cost
design work	\$500	2	\$1,000
excavator (rented)	\$1,000	2	\$2,000
operator	\$484	2	\$968
water truck	\$224	2	\$448
driver	\$360	2	\$720
compactor	\$432	2	\$864
operator	\$484	2	\$968
Forman	\$541	2	\$1,082
pickup	\$34	2	\$68
Dump Truck	\$92	2	\$184

Materials: 20cy riprap @ \$75, 20 cy base rock @ \$75, delivered (640): \$3,640

mobilization; 210 miles			
transport for excavator	\$782	1	\$782
Transport for compactor	\$192	1	\$192
Total			\$12,915

Road/Stream crossing of Road 56951 and Wall Creek, 41.7686, -116.1249

Site #97. This road stream crossing has very high plugging and diversion potential. It consists of one 12" iron pipe. A failure at this site would very likely result in diverting and capturing the stream in the roadbed.





For this site, we have recommended installing an armored rolling dip adjacent to the culvert.

Construct armored rolling dip

	Cost per day	Number of days	Total Cost
Backhoe operator	\$174	2	\$348
	\$484	2	\$968
materials: 20 cubic yards of riprap delivered @ \$110/cy+320			\$2,520
mobilization; one way: 184 miles, 1 day			
Dump Truck trailer	\$272	2	\$545
	\$10	2	\$20
Total			\$4,401

**Sites # 108 & 110, Road/Stream crossings in Wild Horse Crossing Campground,
41.724, -115.894 COMPLETED 10/11/2018**

Two stream crossings within the campground are at risk of washing out. The upstream culvert may divert water down the road to elsewhere in the campground, putting additional assets at risk. The watershed upstream is modeled to show a high risk of debris flow. The road through the campground is maintenance level 4

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)	Post-Fire (cfs)
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5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
3	8	18	57	78	136	231	408

The estimated peak flows show a very high increase in 5-year flows, of post-fire over pre-fire. These culverts do not have the capacity to handle the estimated 5-year post-fire flow.

Our first recommendation is closing the campground. The hazard of debris flows is an unacceptable risk to the public health and safety. In addition, the campground and facilities within have been severely damaged, rendering the campground unusable. The campground should remain closed until this stream's watershed has revegetated.

For the stream crossings, Rolling dips were considered for keeping the water in the stream channel. They were eliminated because dolly dips of adequate size would be difficult given the low cover over the culverts.

The culverts should be pulled temporarily, to give the channel much greater capacity to handle the increased flows, and possible debris flows.



remove culverts and excavate stream crossing

	Cost per day	Number of days	Total Cost
Backhoe operator	\$174	2	\$347
	\$490	2	\$980
Forman	\$550	1	\$550
Pickup	\$34	1	\$34
Total			\$1,327

Sites # 116 & 117 Road/Stream crossing of road 56226, just downstream of (or at) confluence of Chicken

and Warm Creeks. 41.7496, -115.8001

This site appears undersized, and is at risk of diverting water down the road for 300 to 400 ft. This crossing consists of two drainage structures, a round culvert with 60" diameter, and a larger, 114" span by 84" rise pipe arch culvert.

There is scour at the outlets of both culverts, and some erosion of the road at a nearby low point, about 300' north of the stream crossing.

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)				Post-Fire (cfs)			
5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
24	61	133	321	196	336	580	1071

The culverts should be able to handle the predicted post-fire 5-year flow, but the observations at the site indicate that the stream is at risk of diverting in part down the road. Beaver activity noted in the area increases the chances of the culverts plugging. It also appears that the water would divert before reaching the top of the culvert. More accurate measurements will be needed to verify though.



Our recommendation for this site are to remove vegetation from the inlets and outlets of both culverts, to increase their capacity, and to install a large armored rolling dip at the low point in the road where the stream would divert.

Costs for constructing large armored drain dip

	Cost per day	Number of days	Total Cost
design work	\$500	2	\$1,000
excavator (rented)	\$1,000	3	\$3,000
operator	\$490	3	\$1,470

water truck	\$224	1	\$224
driver	\$370	1	\$370
compactor	\$432	1	\$432
operator	\$370	1	\$370
Forman	\$550	1	\$550
pickup	\$34	1	\$34
Dump Truck (20 miles)	\$48	1	\$48
Materials: 40 cubic yards of riprap, delivered, @ \$110/cubic yard			\$4,400
Materials: 20 cubic yards of aggregate surfacing @ \$110/cubic yard			\$2,200
Total			\$ 960
			\$15058

Road/Stream crossing on Road 56729 at Timber Gulch Ck, 41.7027, -116.0159

Site #146. This site 53"x34" corrugated metal pipe with a 15" round relief pipe. This crossing seems to be appropriately sized in relation to the post fire flows for its watershed. The primary concern is greatly reduced capacity of the culvert due an unauthorized installation of a head gate placed on the inlet of the primary culvert. The adjacent private land owner was notified and offered to remove the head gate. Our recommendation for this site is to remove the head gate from the culvert's inlet prior to any anticipated storm events. Cleaning the channel would significantly improve its capacity.





Removing head gate from inlet

	Cos t per day	Numb er of days	Tot al Cos t
Backhoe	\$17 4	1	\$17 4
operator	\$48 4	1	\$48 4

mobilization: 210 miles

Dump Truck	\$27 2	1	\$27 2
trailer	\$10	1	\$10
Total			\$94 0

Site #148 Road/Stream crossing of Road 56729 and Hutch Creek, 41.7068, -116.0118

This stream crossing is a 54"x34" culvert that is suspected of being undersized for anticipated increased runoff of the burned watershed. The culvert barrel is plugged approximately 25%.

Peak flow estimates have not yet been made for this location, but the adjacent, similar sized watershed in the burn area had significant increases between pre-fire and post-fire flows.



For this site we recommend installing an armored drivable drain dip adjacent to the culvert.

Construct armored drain dip

	Cost per day	Number of days	Total Cost
Backhoe	\$17 4	1	\$174
operator	\$48 4	1	\$484
materials: 10 cubic yards of riprap delivered @ \$110/cy			\$1,260
mobilization: 174 miles			
Dump Truck	\$25 8	1	\$258
trailer	\$10	1	\$10
Total			\$2,321

Site #158: Road/Stream crossing of Road 56729 and Deer Creek,**41.7289, -115.9746**

This road stream crossing is undersized, and unable to handle the post-fire runoff. It consists of one 30" CMP. A failure at this site would very likely result in a washout of the road. There is slight diversion potential and possible scour degradation to the adjacent cattle guard.

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)				Post-Fire (cfs)			
5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
3	8	18	57	78	136	231	408



For this site, we have recommended to upsize the drainage structure.

Costs for installing one culvert

	Cost per day	Number of days	Total Cost
design work	\$500	1	\$500
excavator (rented)	\$1,000	1	\$1,000
operator	\$484	1	\$484
water truck	\$224	1	\$224
driver	\$360	1	\$360
compactor	\$432	1	\$432

operator	\$484	1	\$484
Forman	\$541	1	\$541
pickup	\$34	1	\$34
Dump Truck	\$92	1	\$92
Materials: 48"x30' culvert, delivered: \$5575			\$5,575
mobilization: 174 miles			
transport for excavator	\$647	1	\$647.28
Transport for compactor	\$192	1	\$192
Total			\$10,565

Site #160: Road/Stream crossing of Road 56729 and Van Duzer Creek, 41.7425, -115.9746

This stream crossing is an 84"x60" culvert that seems to be appropriately sized in relation to the post fire flows. The soil burn severity shows low to no burn to the watershed that is serviced by this crossing. This site will see some increase in post fire flows. There is plugging potential at this crossing and the risk of losing this road with year round residents would be high.

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)				Post-Fire (cfs)			
5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
16	40	88	249	225	411	731	1349





For this site we recommend installing an armored drivable drain dip adjacent to the culvert and storm inspection.

Construct armored drivable drain dip

	Cost per day	Number of days	Total Cost
Backhoe operator	\$174	1	\$174
	\$484	1	\$484
materials: 20 cubic yards of riprap delivered (320) @ \$110/cy			\$2,520
mobilization: 174 miles			
Dump Truck trailer	\$258	1	\$258
	\$10	1	\$10
Total			\$3446

Site # 164: Road/Stream crossing on Road 56950, 41.7774, -115.9870

This location is a 36" diameter culvert that is anticipated to overtop, and this road is at risk for washing out. There is a lot of vegetation at the outlet, significantly reducing the capacity of the site to handle water. In addition, downstream of the outlet has had a lot of erosion from this crossing, which is expected to accelerate now that the vegetation has burned away, and the runoff from the burned watershed will be a lot higher. This road is a maintenance level 2, but provides important access to the area for both range permittees and recreational users.

Estimated peak flows using Runoff Curve Number Method

Pre-Fire (cfs)				Post-Fire (cfs)			
5-yr	10-yr	25-yr	100-yr	5-yr	10-yr	25-yr	100-yr
3	7	14	43	91	142	221	362

The predicted 5-year peak flow post-fire is a very significant increase over pre-fire. The culvert will not handle this volume of water, and a pipe that is large enough will not fit in this location without lots of design and reconstruction.



Our recommendation for this site is to remove the culvert and some of the vegetation in the upstream channel, install a larger armored drain dip, and armor the slope downstream with riprap

Costs for pulling culvert and constructing large armored drain dip

	Cost per day	Number of days	Total Cost
excavator (rented)	\$1,000	3	\$3,000
operator	\$370	3	\$1,110
Forman	\$550	1	\$550
pickup	\$34	1	\$34
Dump Truck (20 miles)	\$48	1	\$48
Materials: 40 cubic yards of riprap, delivered, @ \$110/cubic yard (640)			\$5040
mobilization; 350 miles, 1 day, one way			
transport for excavator	\$1,326	1	\$1,326

Total

\$11,108

Site #174: Road/Stream crossing of Road 56729 and Little Chicken Creek, 41.7658, -115.9521

This stream crossing is a 44"x28" corrugated metal pipe that seems to be undersized to receive post fire flows by approximately 15%. The soil burn severity shows low to moderate burn to the watershed that is serviced by this crossing. The culvert has a mortared headwall. There is minor diversion potential at this crossing.





For this site we recommend installing an armored drivable drain dip adjacent to the culvert and storm inspection.

Construct armored drivable drain dip

	Cost per day	Number of days	Total Cost
Archaeologist	\$410	2	\$820
Backhoe	\$174	1	\$174
Operator	\$484	1	\$484
materials: 10 cubic yards of riprap delivered @ \$110/cy +160			\$1,260
mobilization: 174 miles			
Dump Truck	\$258	1	\$2582
trailer	\$10	1	\$10
Total			\$3006

Site # 217 Road 56928 erosion to embankment

Additional runoff caused by the burn will accelerate ongoing erosion to road's fill slope, leading to an unsafe narrow road. The road is already somewhat compromised at this location. The downhill slope is burned, removing the erosion protection provided by the vegetation.

The gully is being caused by water intercepted by the road about 200' uphill.



Our recommendations are:

- Repair the embankment
- Construct 1 or more drain dips or drivable water-bars.
- Install rock armoring at the drain dips.

repair embankment and install armored rolling dips

	Cost per day	Number of days	Total Cost
Backhoe operator	\$174	1	\$174
	\$490	1	\$490
Materials: 10 CY Riprap delivered @ \$110/CY +160			\$1,260
Total			\$1,924

Site #265: Road/Stream crossing of Road 56172

41.8667, -116.1536

This stream crossing is an 18" corrugated plastic pipe that is severely mangled and not functioning. The soil burn severity for this watershed shows moderate to low burn. Peak flow estimates have not yet been made for this location, but the adjacent, similar sized watershed in the burn area had significant increases between pre-fire and post-fire flows. The site is located adjacent to the low spot in the road.





For this site we recommend pulling the pipe and installing an armored low water ford.

Costs for installing an armored low water ford

	Cost per day	Number of days	Total Cost
design work	\$500	2	\$1,000
excavator (rented)	\$1,000	2	\$2,000
operator	\$484	2	\$968
water truck	\$224	2	\$448
Driver	\$360	2	\$720
compactor	\$432	2	\$864
operator	\$484	2	\$968
Forman	\$541	2	\$1,082
Pickup	\$34	2	\$68
Dump Truck	\$92	2	\$184

Materials: 20cy riprap @ \$75, 20 cy base rock @ \$75, delivered +320: \$3,320

mobilization: 174 miles

transport for excavator	\$647	1	\$647
Transport for compactor	\$192	1	\$192
Total			\$12,461

Site #267: Vault toilet at Wildhorse Crossing CG

41.7199, -115.8949

Two vault toilet structures have burned to the foundation on the upper loop of Wild Horse Crossing Campground. Exposed rebar, other sharp objects and the vaults present a hazard.



For this site we recommend installing safety barrier fencing.

Costs for installing safety barrier fencing

	Cost per day	Number of days	Total Cost
Helper	\$360	2	\$720
Operator	\$484	2	\$968
Foreman	\$541	2	\$1,082
Pickup	\$34	2	\$68
Dump Truck	\$92	2	\$184

Materials: (4) rolls 4'x100' composite mesh fencing @ \$30 each, (40) 1.75"x3.5"x5' steel T-posts @ \$8 each available at local Home Depot: \$440

mobilization: 174 miles

Pickup	\$92	1	\$92
Total			\$3,555

Mobilization

Mobilization is anticipated to proceed in this manner:

- Heavy equipment and operators are stationed in Sparks, NV. Equipment will be transported from Sparks to a staging area at the fire. The distance is approx. 350 miles, and is anticipated to take 1 day for each piece of equipment
 - From the staging area, the equipment will move to individual sites. These transportation costs are included in the estimates for the individual sites.
 - At the end of the project, equipment will return to Spark, again 350 miles and 1 day.
- mobilization; one way is 350 miles, 1 day

Dump Truck	\$536	4	\$2,144
Driver	\$370	4	\$1,480
Transport for Backhoe	\$536	2	\$1,072
Driver	\$370	2	\$740
Transport for Grader	\$1,000	2	\$2,000
Driver	\$490	2	\$980
transport for excavator	\$1,326	2	\$2,652
Excavator (rented)	\$1,000	2	\$2,000
Driver	\$490	2	\$980
Transport for compactor	\$192	2	\$384
Driver	\$370	2	\$740
water truck	\$216	2	\$432
Driver	\$370	2	\$740
Total			\$16,344

Storm inspection and response

Storm inspection and response

patrol crew (4 people)	\$1,000	5	\$5,000
pickup (4)	\$334	5	\$1,672
backhoe	\$174	2	\$348
operator	\$490	2	\$980
mobilization; one way: 350 miles, 1 day			
Dump Truck	\$536	2	\$1,072
trailer	\$10	2	\$20
driver	\$370	2	\$740
Total			\$9,832

In addition, an archeologist is needed for emergency surveys and consultation, 3 days at \$410 per day for a total cost of \$1,230

Two water bars in the proximity of Cole Canyon Creek to divert increased post fire flows from a dispersed camping area access road across the flood plain instead of into the creek that contains listed Lahontan Cutthroat trout. Total cost \$1000

Protection/Safety Treatments:

Though fire intensity varied throughout the burn area and many sites within the perimeter did not burn,

most sites are believed to have been affected by the fire to some degree, including destruction by fire, charring, and breakage. However, emergency protection measures connected to runoff, erosion, flooding, or debris flows are currently not appropriate or feasible for the cultural resources within the fire area.

The Heritage Resource Specialist recommends posting educational/warning signs that inform the public about the importance of cultural resources and the laws protecting them. Informational signs increase the viability of criminal prosecution through the Archaeological Resource Protection Act of 1979 (ARPA). The signs will be located at several access points within the fire area near highly visible historic sites, as well as at several primary access points along the fire perimeter. BAER treatments are subject to Section 106 of the National Historic Preservation Act and 36 CFR 800.2. Treatments will need to be assessed or surveyed by an archaeologist prior to implementation. If cultural resources are present within the area of potential effect of any proposed BAER emergency treatments, protective measures may be necessary before implementation.

Line Item	Unit Cost	Total
One GS-11	\$328.60 per day x 2 days	\$657.2
Signs, posts, and bolts/screws	3 signs @ \$20, 3 posts @ \$10, screws @ \$5	\$95
5767 – PICKUP	FOR rate of \$265/month. Use rate @ \$0.44/mile @ 400 miles	\$176

Total Archeologic Protection Cost: **\$928.20**

Abandoned mine features, Cornwall Mountain, Rio Tinto area, NV

The S. Sugarloaf fire exposed multiple hazardous abandoned mine features in discrete locations at Cornwall Mountain and west of the Rio Tinto Mine along Mill Creek. Three adits and at least one shaft were found that require mitigation. A second shaft was not examined because of a suspected marijuana grow in the vicinity that prevented Forest personnel from competing this activity. The features on Cornwall Mountain are located in T45N R56E, sections 33 and 34, and T44N R55E sec 3, MDM. This proposal addresses the rationale and costs associated with mitigating these dangerous features.

Of these features, two of the adits and one shaft are located in the Cornwall Mountain area. Of these, one is wide open having no protective measures in place, while the other has a steel frame and wire-mesh door (not bat compatible) in place, but is unsecured allowing future access. The shaft is located in a concentrated area of historic mining area but is the only feature still open. The others have all caved in by natural means. The shaft is quite large with a dilapidated barbed wire and t-post exclusion fence falling down around the collar. All three of these openings are adjacent to unimproved gravel roads. The S. Sugarloaf fire consumed all the vegetation surrounding these three workings increasing their visibility from the road system and degree of attractive nuisance to the recreating public. A search of BLM mining records revealed an active mining claimant with claims containing these features, so future mitigation efforts will have to be cleared with that entity. There was an additional shaft present in this vicinity that was not evaluated due to extenuating circumstances. This feature will be looked at as soon as it is practical and safe to do so.

The mine feature along Mill Creek is an adit that is partially caved and water-filled. Water is ponded to a depth of two feet behind an earthen plug at the adit portal that has formed from natural erosion of dirt and debris from the hillside above. The access road from Highway 225 to this feature is in good shape and there were signs of recent visitation. There is no claimant associated with this working, therefore an easy target for mitigation.

Recommendation: The adits and shaft proposed for closure are identified by the following ID numbers: EL 13, EL 298, EL 301, and EL 474. Specific dimensions of the features are as follows:

EL 13 (A): 4 ft wide x 3 ft tall x 100+ ft long. Portal is partially caved with debris

EL 298 (A): 5 ft wide x 7 ft tall x 125 ft long. Steel, wire mesh door attached to steel frame.

EL 301 (A): 4.5 ft wide x 6.5 ft tall x 150 ft long, multiple drifts, wide open.

EL 474 (S): 15 x 18 ft collar, 100+ ft deep

Adit EL 13 will be closed with polyurethane foam plug encapsulating a 6-inch plastic tube to maintain water equilibrium and not build up significant pressure behind the plug. The plug will then be covered with a 12-18 inch thick layer of earth. Adits EL 298 and 301 will be secured with bat compatible steel gates with removable bars to allow future access for the mining claimant. Shaft EL 474 will be secured with a steel grate measuring 15 x 18 ft, attached to the bedrock collar with rebar pins. This closure will require extensive steel product including 15 ft long 4 x 4 steel girders to provide needed strength across the width of the shaft. There will be no adverse visual affect from these closure technique. These features can be accessed from the current road system with few challenges to hinder supply logistics.

Work will commence once funding and approvals are obtained and logistics can be scheduled.

AML Preferred alternative. See table below

Table 1. Preferred Alternative costs (steel, polyurethane foam, labor and travel)

Item	Units	Cost per Unit	Cost Total
Personnel Time (2 personnel)	7	800	5,600
Supplies: steel, misc equip	3	850	2,550
Polyurethane foam, hog panel	1	350	350
Locks, other hardware	2	100	200
Travel and Per diem	6	144	864
Total Cost			9,564

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.)

Part VI – Emergency Stabilization Treatments and Source of Funds

Interim

1v2

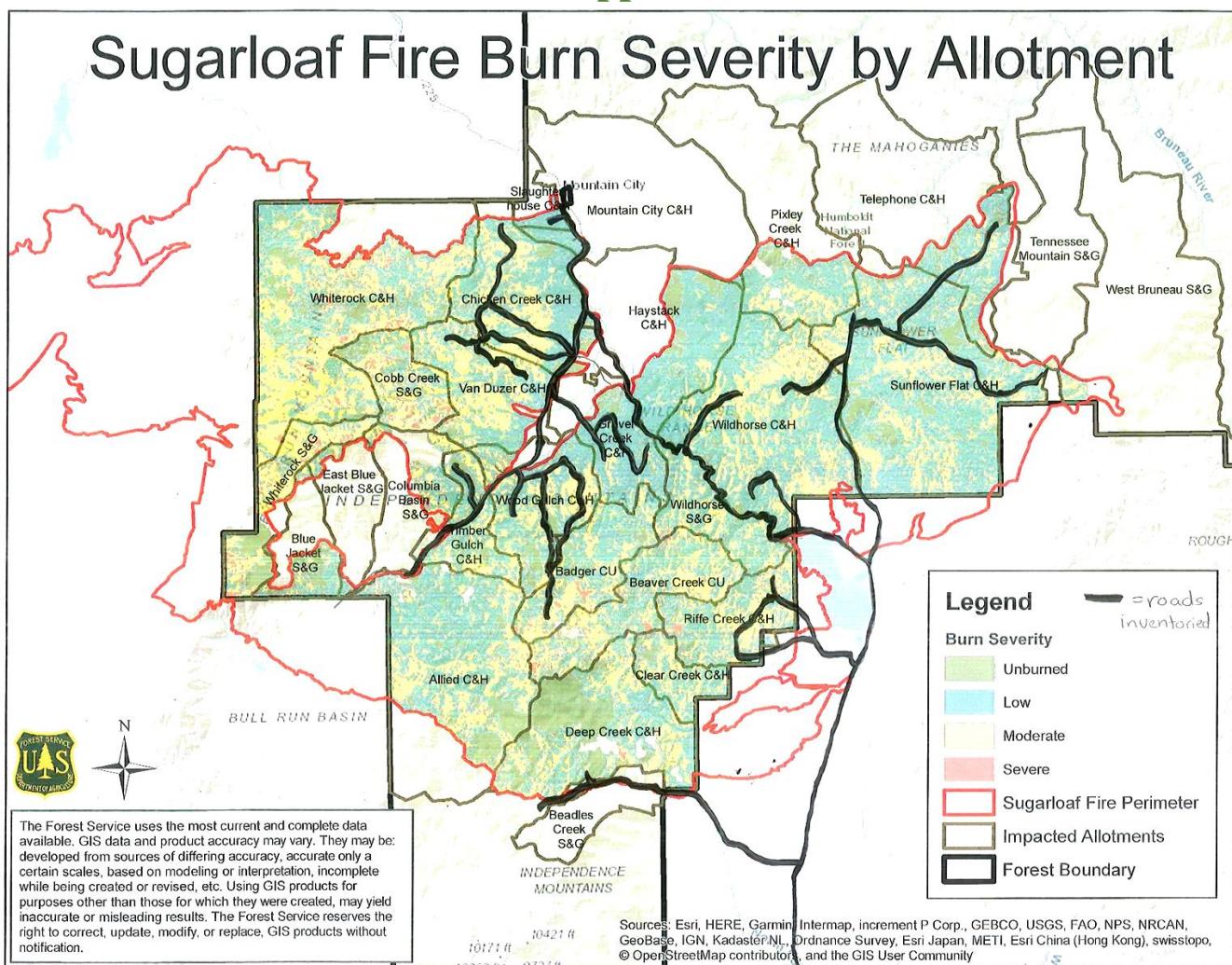
Line Items	Units	Cost	NFS Lands			# of units	Other Lands			All Total
			# of Units	BAER \$	Other \$		Fed \$	# of Units	Non Fed \$	
A. Land Treatments										
EDRR	each	#####	0	\$0	\$0		\$0		\$0	\$0
Fire Line seeding	each	9363	0	\$0	\$0		\$0		\$0	\$0
Preventative Seeding	each	2E+06	1	\$1,993,109						
herbicide	each	#####	1	\$592,970			\$0		\$0	\$1,993,109
							\$0		\$0	\$0
<i>Insert new items above this line!</i>										
<i>Subtotal Land Treatments</i>				\$2,586,079	\$0		\$0		\$0	\$1,993,109
B. Channel Treatments										
BDAs	each	23170	0	\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>										
<i>Subtotal Channel Treat.</i>				\$0	\$0		\$0		\$0	\$0
C. Road and Trails										
road work	each	238088	0	\$0	\$0		\$0		\$0	\$0
Cole Canyon ck watert	job	1000	0	\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>										
<i>Subtotal Road & Trails</i>				\$0	\$0		\$0		\$0	\$0
D. Protection/Safety										
ARPA	each	928.2	0	\$0	\$0		\$0		\$0	\$0
AML	job	9564	0	\$0	\$0		\$0		\$0	\$0
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>										
<i>Subtotal Structures</i>				\$0	\$0		\$0		\$0	\$0
E. BAER Evaluation										
				---			\$0		\$0	\$0
<i>Insert new items above this line!</i>										
<i>Subtotal Evaluation</i>				---	\$0		\$0		\$0	\$0
F. Monitoring										
				\$0	\$0		\$0		\$0	\$0
<i>Insert new items above this line!</i>										
<i>Subtotal Monitoring</i>				\$0	\$0		\$0		\$0	\$0
G. Totals										
				\$2,586,079	\$0		\$0		\$0	\$1,993,109

PART VII - APPROVALS

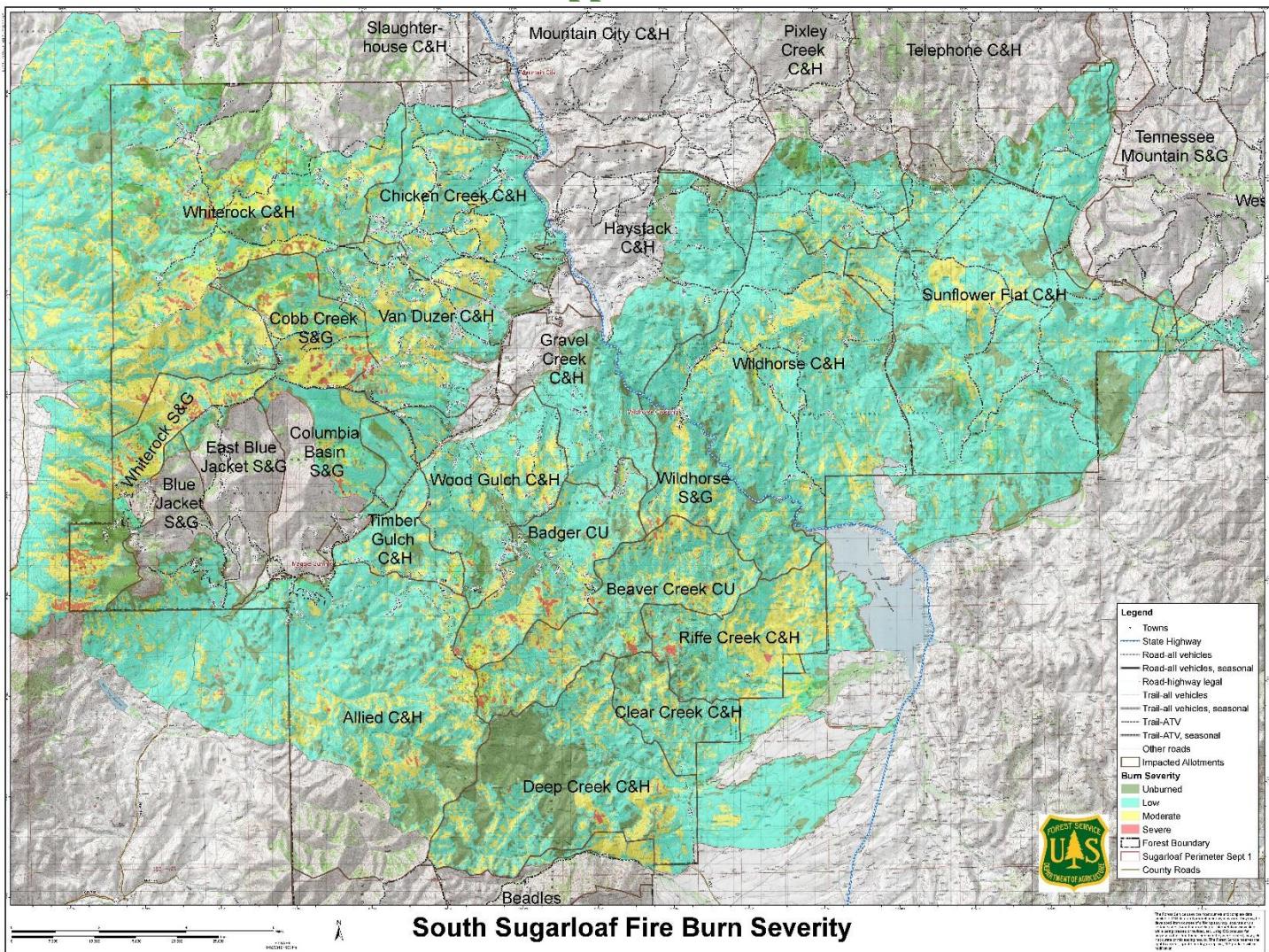
1. /s/WILLIAM A. DUNKELBERGER
Forest Supervisor (signature) Oct 3, 2018_
Date
2. _____
Regional Forester (signature) Date

Appendix A

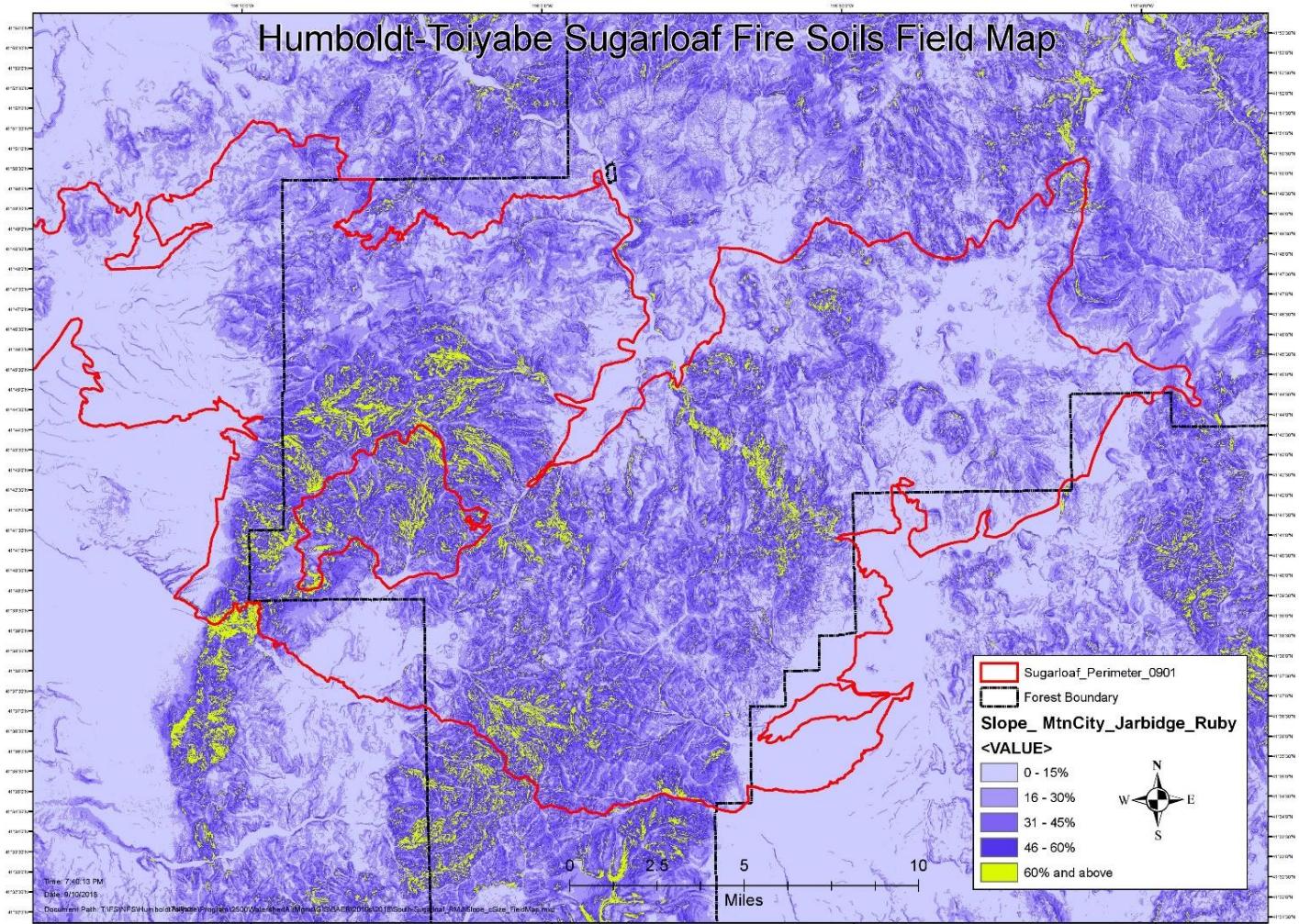
Sugarloaf Fire Burn Severity by Allotment



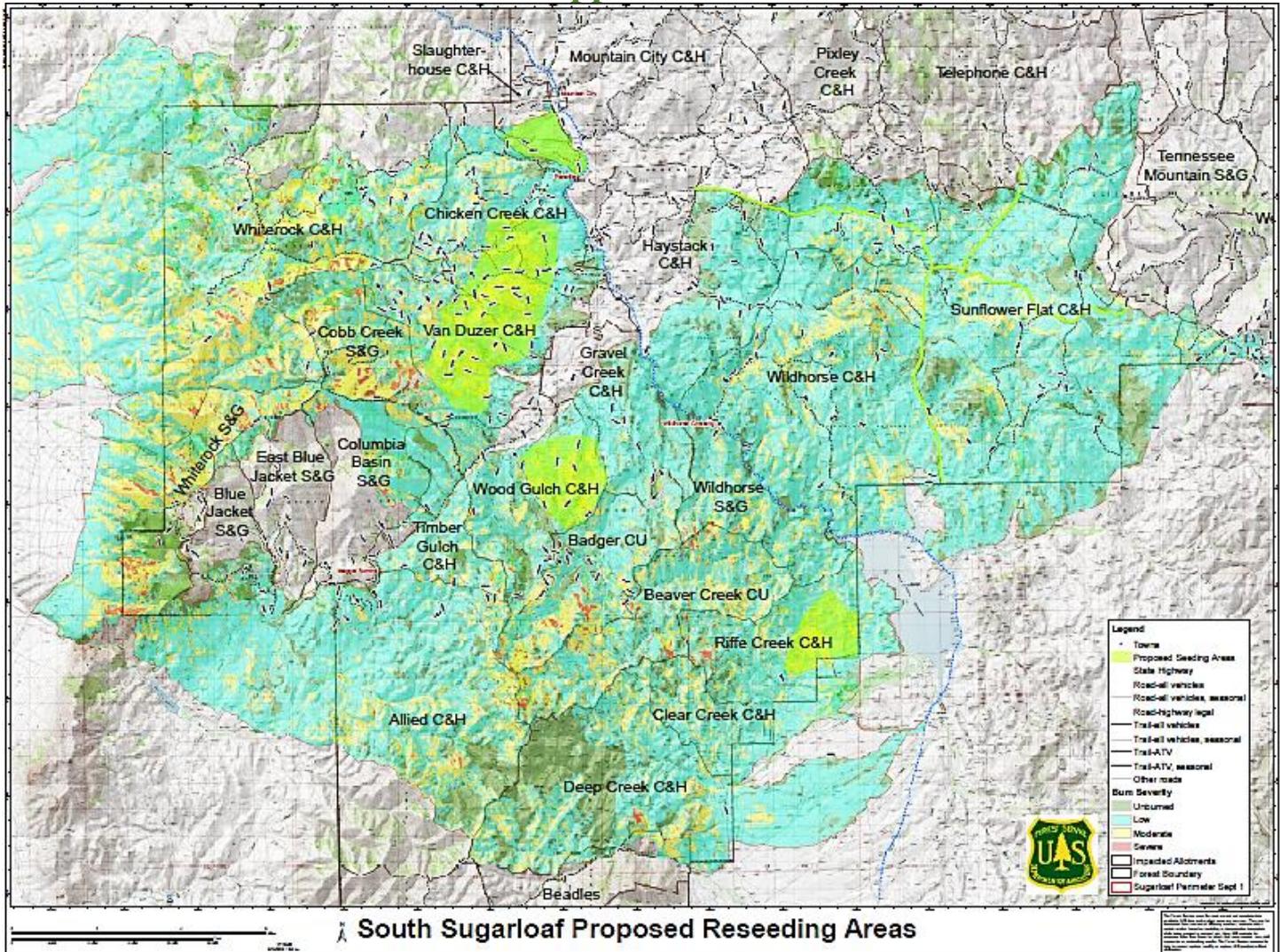
Appendix B



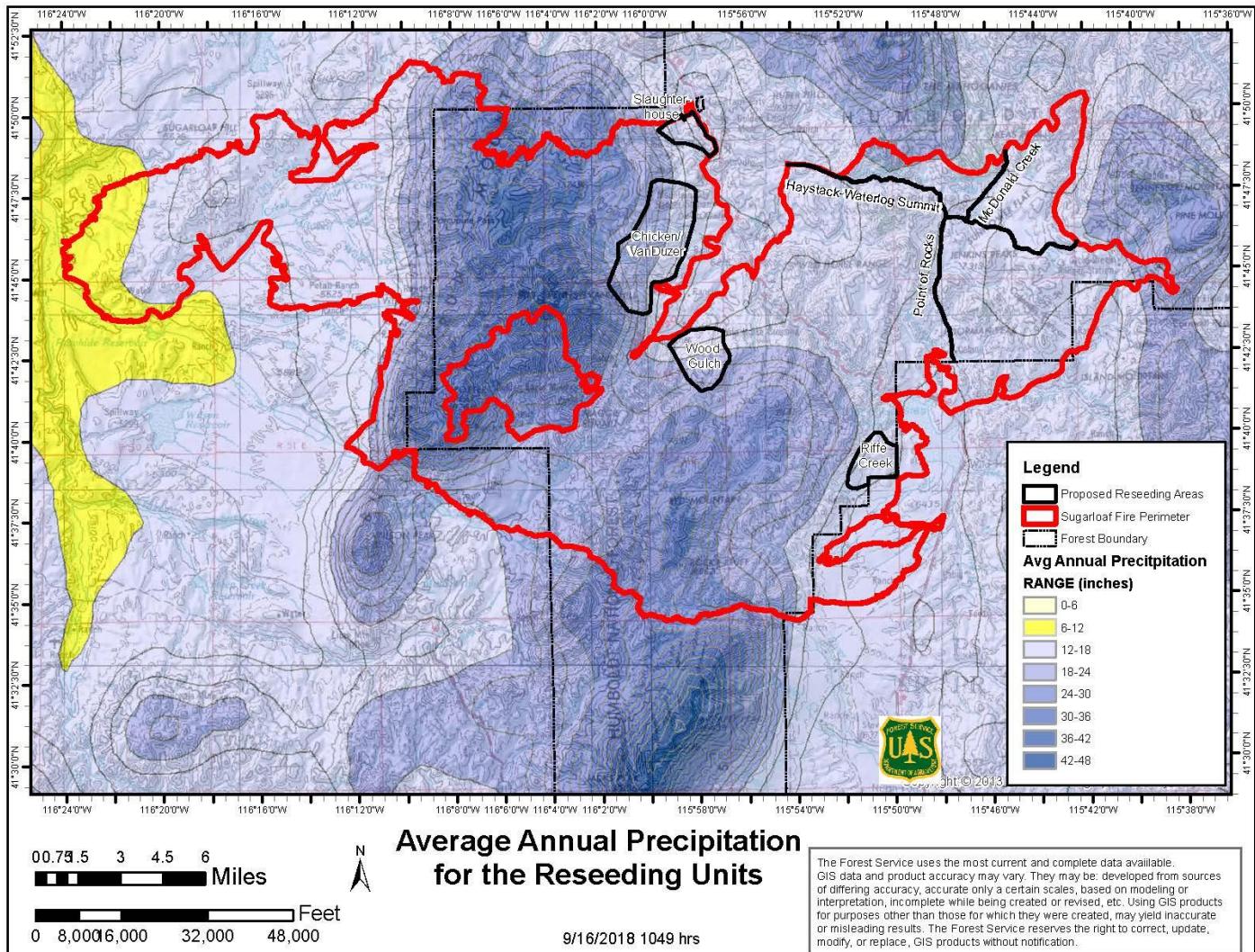
Appendix C



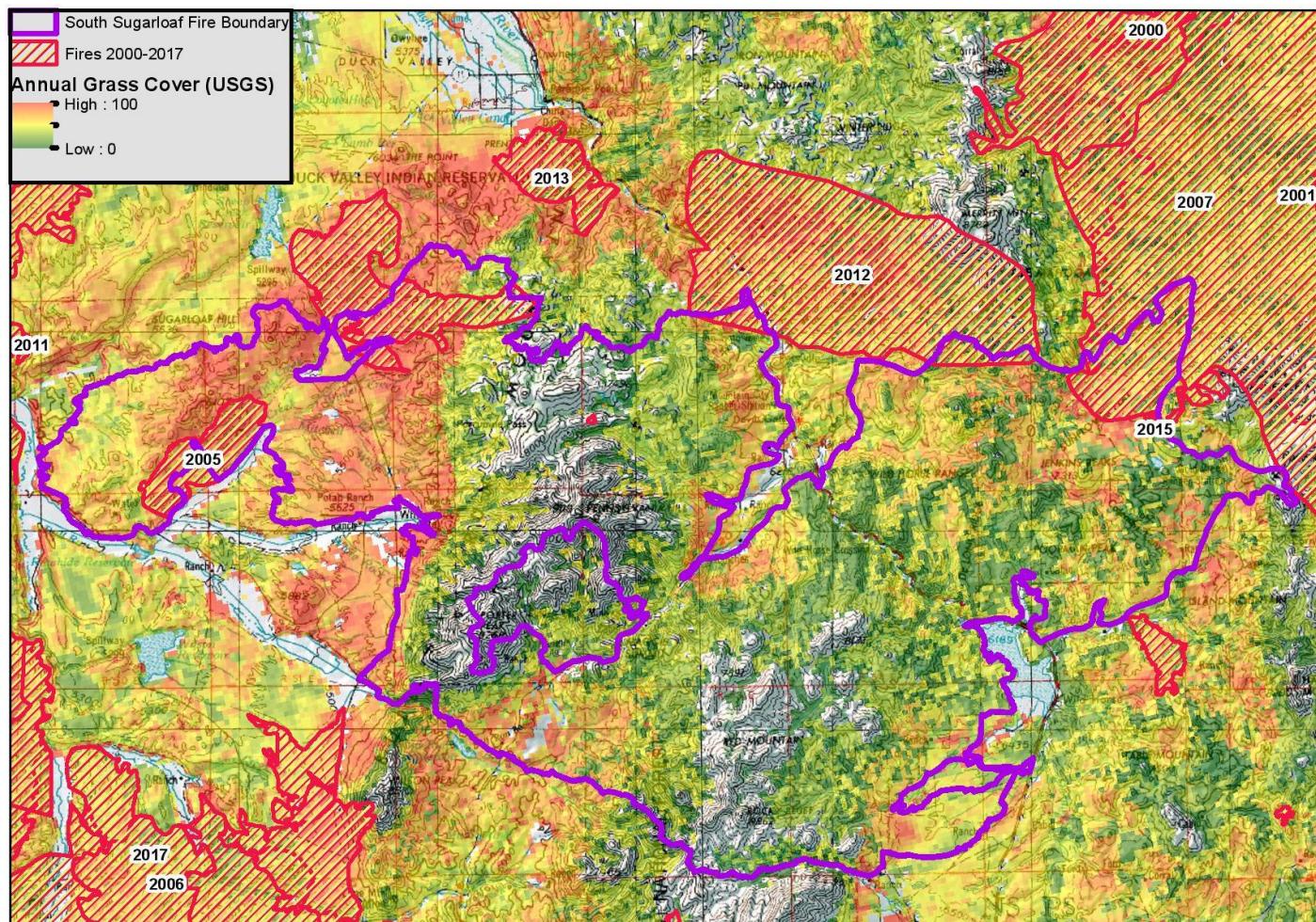
Appendix D



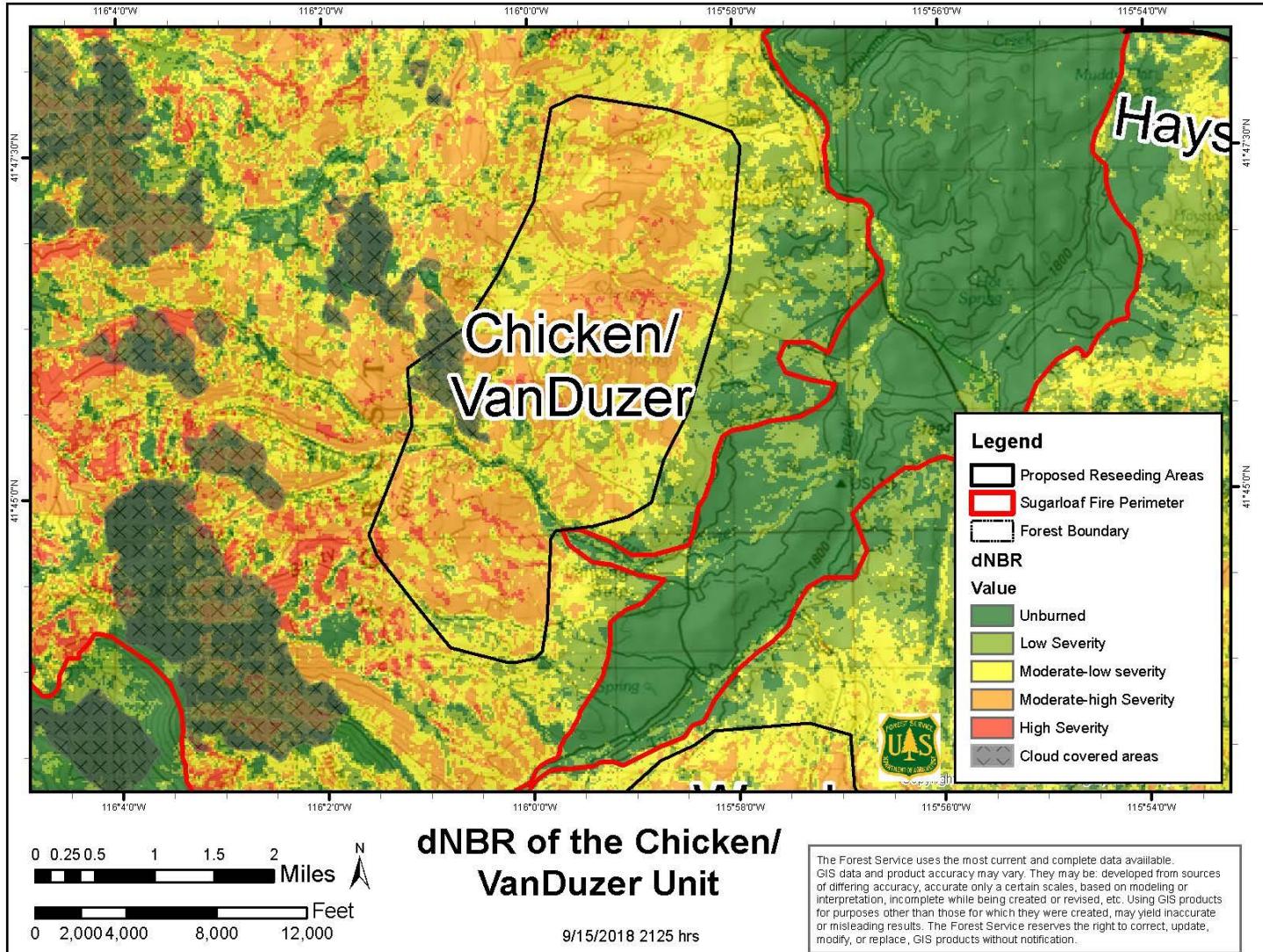
Appendix E



Appendix F

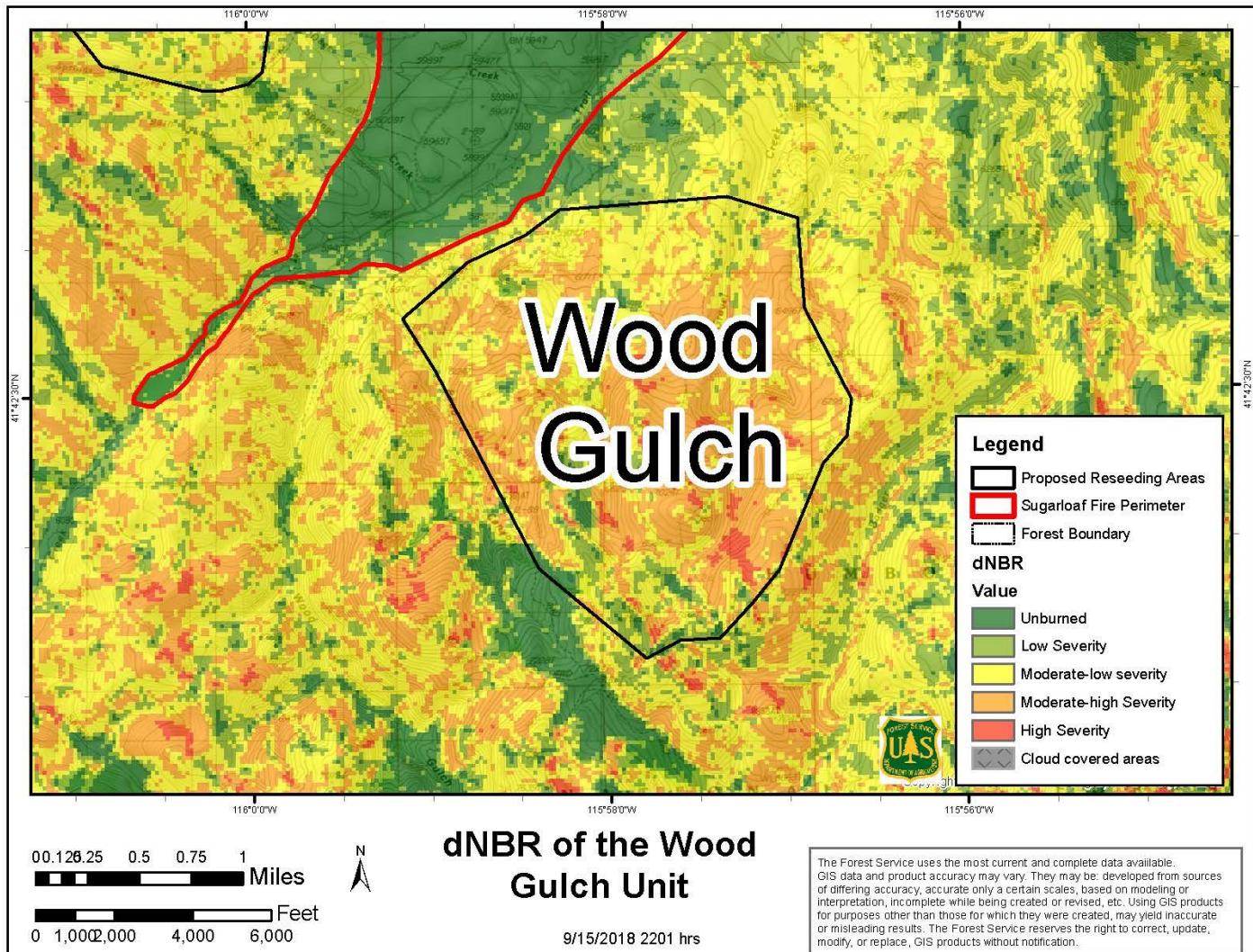


Appendix G

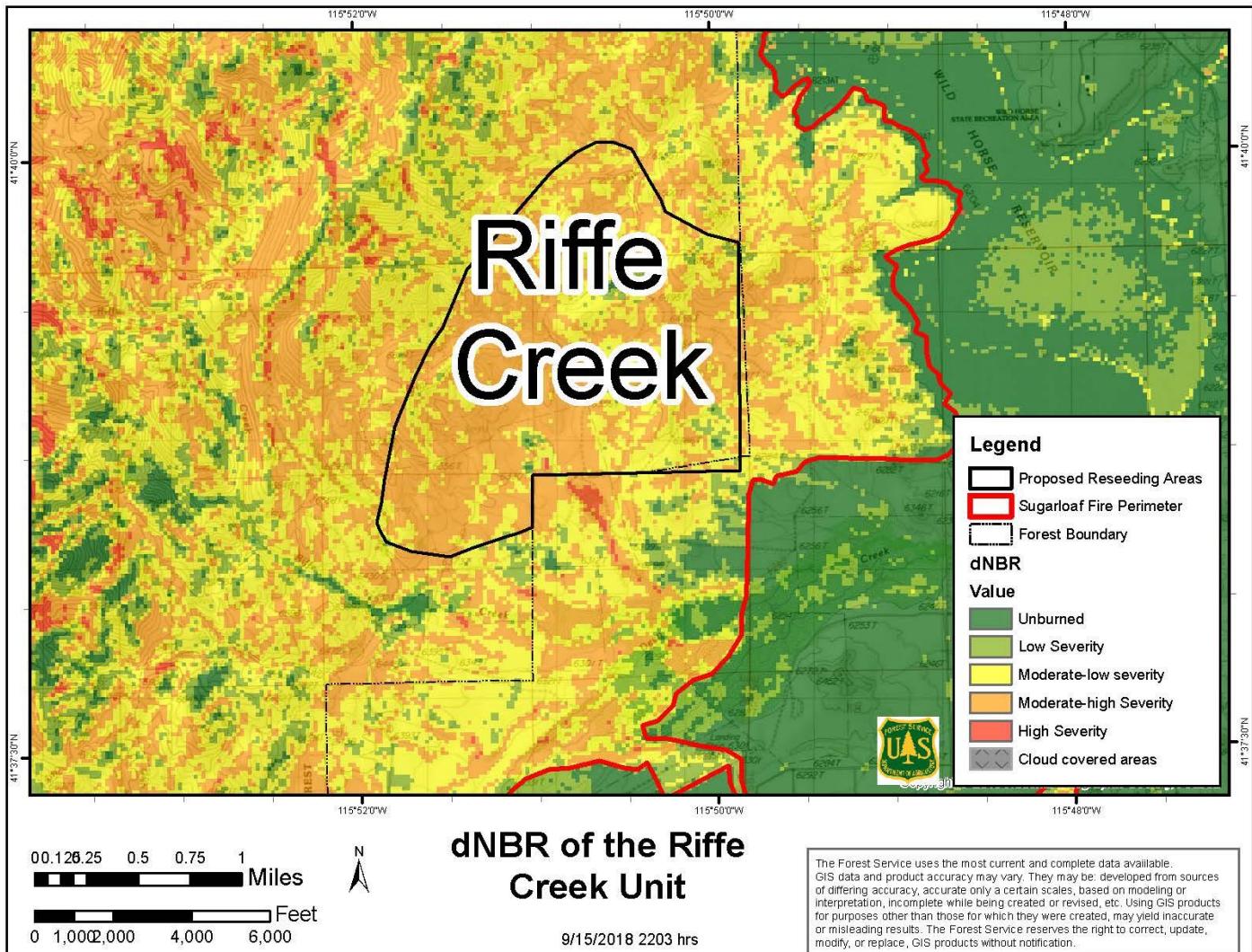


*The change in the Normalized Burn Ratio (dNBR) breakpoints on this map, and following dNBR maps, were determined using methodology from USGS ("FIREMON BR Cheat Sheet V4" 2004). This methodology was determined to best reflect the observed vegetative changes post-fire during field assessments.

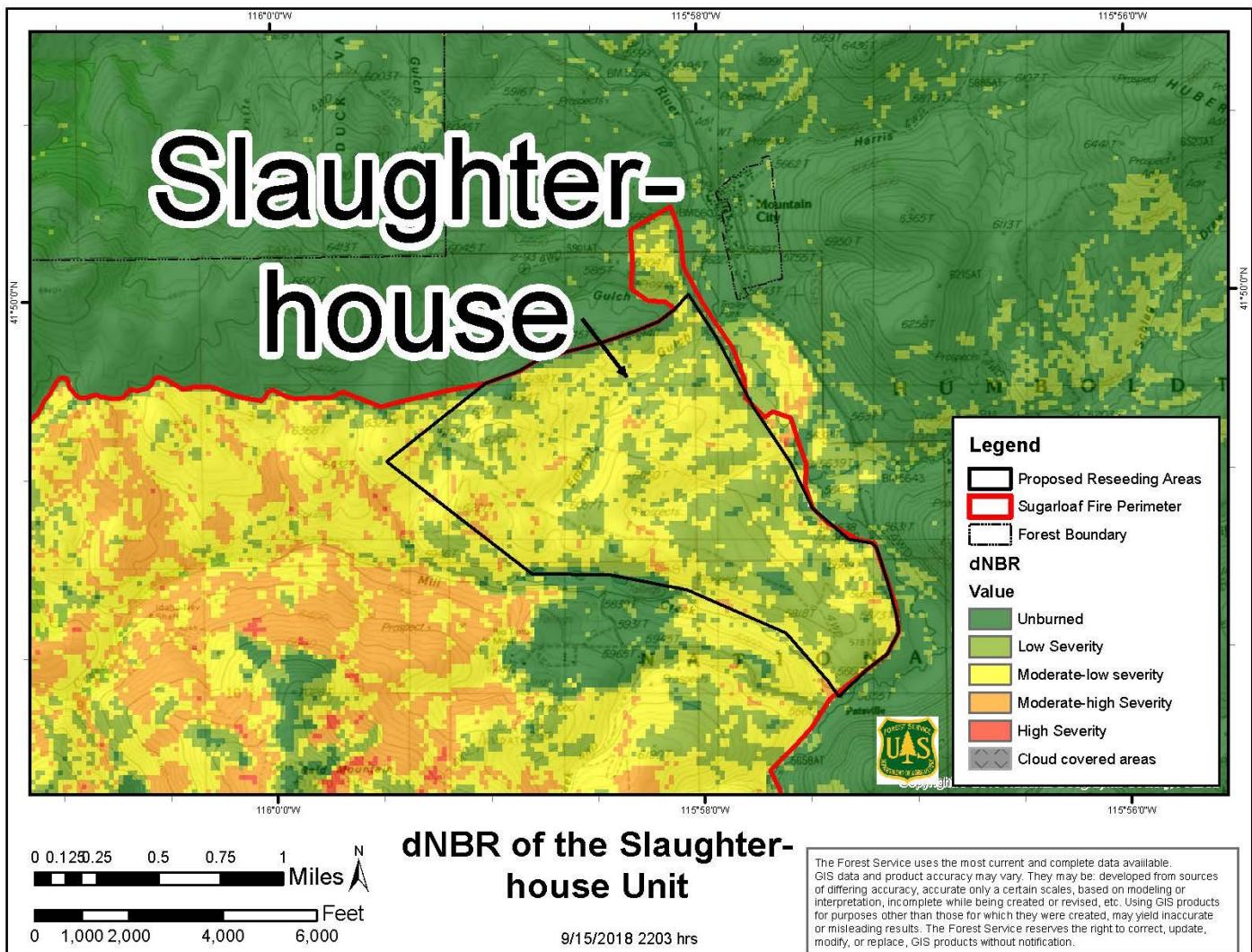
Appendix H



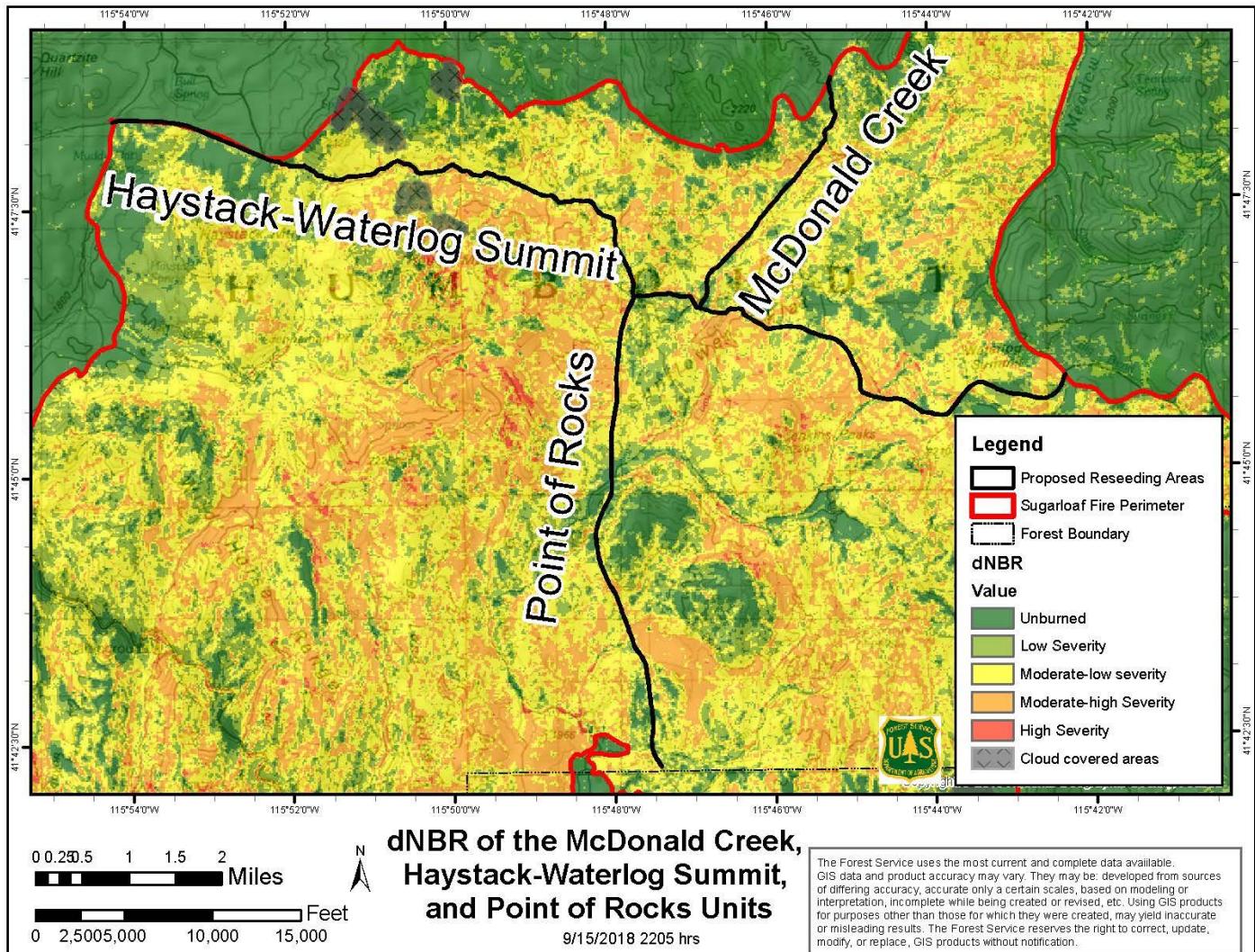
Appendix I



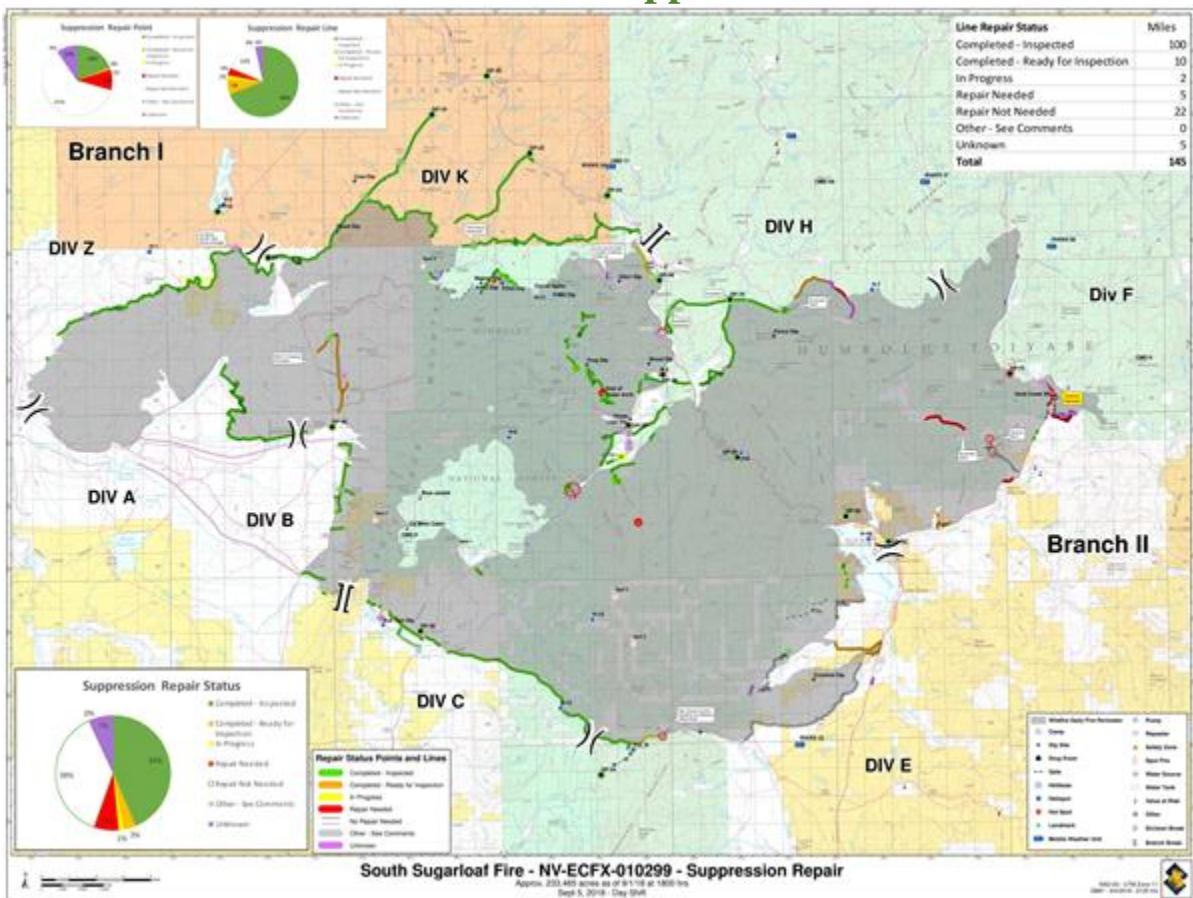
Appendix J



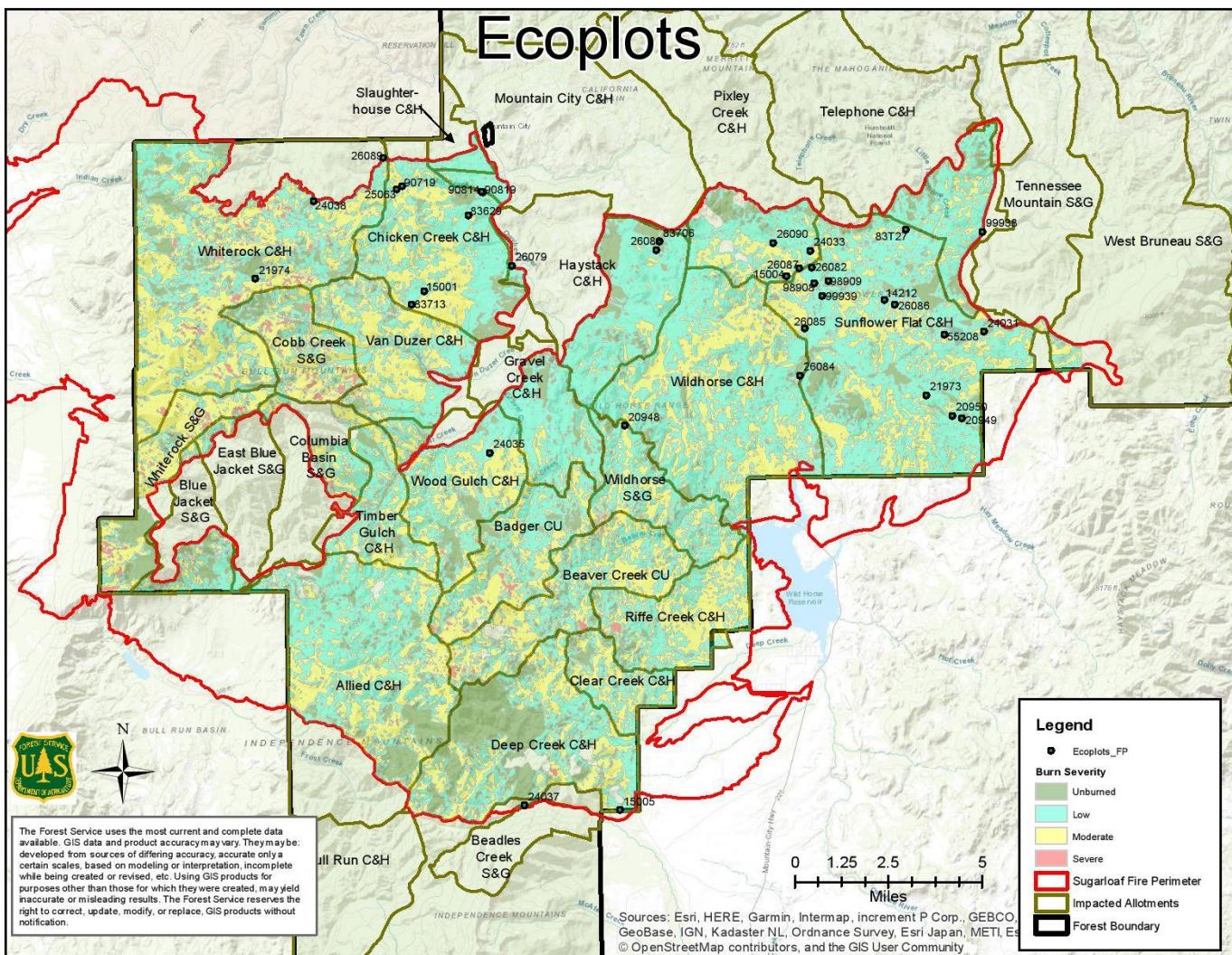
Appendix K



Appendix L



Appendix M



Appendix N

Chicken Creek C&H
Little Chicken Creek Unit
Date: 9-9-18
Observers: C. Fitch & A. Dixon
UTM: 0585080, 4624199



This photo depicts the mix of low-moderate soil burn severity seen on the Chicken Creek allotment.

Appendix O

Van Duzer C&H
Little Chicken Creek Unit
Date: 9-9-18
Observers: C. Fitch & A. Dixon
UTM: 0583669, 4623271



This photo shows low soil burn severity, with moderate to high vegetative burn severity—note the white ash in the mid-ground—coupled with fire suppression activity disturbance in the allotment.

Appendix P

Van Duzer C&H

Dry Creek Unit

Date: 9-9-18

Observers: C. Fitch & A. Dixon

UTM: 0581951, 4625098



This photo shows an unburned island in the Van Duzer C&H as a reference for the pre-fire native plant community composition. Due to locational proximity, this photo can be used additionally as a reference for the Chicken Creek C&H and Wood Gulch C&H.

Appendix Q

Wood Gulch C&H

Lower Road Canyon Unit

Date: 9-9-18

Observers: C. Fitch & A. Dixon

UTM: 0586345, 4618456



This photo depicts the mix of low-moderate soil burn severity seen on the Wood Gulch allotment. It also shows the moderate to high vegetative burn severity in the area.

Appendix R

**Wood Gulch C&H
Upper Road Canyon Unit**

Date: 9-9-18

Observers: C. Fitch & A. Dixon

UTM: 0586779, 4617116



This photo depicts the range of low, moderate, to high soil and vegetative burn severities observed on the Wood Gulch C&H allotment.

Appendix S

Riffe Creek C&H

Wildhorse Unit

Date: 9-5-18

Observers: C. Fitch & A. Dixon

UTM: 0595858, 4611721



This photo represents the majority of the lower portions of the Riffe Creek and Wildhorse units in the Riffe Creek C&H allotment. It shows moderate soil burn severity with a high vegetative burn severity.

Appendix T

Riffe Creek C&H
8-8-97
2210 folder



This photo, from the 2210 files, was taken in 1997 and is used for a reference to the native plant community composition pre-fire. This photo was used due to the fact that no unburned islands were left in the lower portions of the Riffe Creek C&H allotment.