USDA-FOREST SERVICE

FS-2500-8
Date of Report: ***July 7, 2011***

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

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

B. Type of Action

[X] 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)

[ ] 2. Interim Report
[ ] Updating the initial funding request based on more accurate site data or design analysis
[ ] Status of accomplishments to date

[ ] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Monument

B. Fire Number: AZ-COP-001102

C. State: AZ

D. County: Cochise

E. Region: 3

F. Forest: Coronado National Forest

G. District: Sierra Vista Ranger District

H. Fire Incident Job Code: PPF4WS

I. Date Fire Started: 6-12-2011

J. Date Fire Contained: 98% as of 07/05/2011

K. Suppression Cost: $20,350,000

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 28 miles dozerline (100%), 10 miles handline (100%)
2. Fireline seeded (miles): None
3. Other (identify): None

M. Watershed Number: HUC 6
- Cave Canyon – 150502020102
- Copper Canyon-Agua Dulce – 150502020104
- Yaqui Canyon – 150502020301
- Montezuma Canyon – 150502020302
- Ash Canyon-San Pedro River – 150502020304
- Spring Creek-San Pedro River – 150502020401
- Miller Canyon – 150502020402
- Hunter Canyon-San Pedro River – 150502020404
- Carr Canyon – 150502020405
- Garden Canyon – 150502020406

- Buena School Area – 150502020603
- Woodcutters Canyon - 150502020604

N. Total Acres Burned: NFS Acres (15675) Other Federal – NPS, DOD (5962) State (480) Private (8211) Mexico (1526)

O. Vegetation Types: The prominent vegetation type within the fire perimeter consisted of broadleaf evergreen woodlands occurring from 5,000 to 7,000 feet within the fire perimeter. To a lesser extent the fire also included desert grasslands (below 5,000 feet), chaparral communities, and riparian vegetation occurring in the major drainages (Ash, Lutz, and Miller Canyon). A limited amount of coniferous forests also occur in within the fire perimeter above 7,000 feet at the top of Miller Canyon and Carr Peak.

P. Dominant Soils:

Soil Map Unit	Slope (%)	Rock Outcrop (%)	Surface Soil Texture	Rock Fragment Volume (%)	Erosion Hazard Rating	Kw-Factor	Hydrologic Group	Acres
BgF - Barkerville-Gaddes association, steep	60	15	Cobbly sandy loam	30	High	0.17	C	**6452.2**
HtF - Hogris-Telephone-Rock outcrop association, very steep	65	20	Very cobbly sandy loam	50	Moderate-High	0.1	B	**4693.7**
71 - Gardencan-Lanque complex, 0 to 5 percent slopes	5	0	Sandy loam	5	Low	0.24	B	**2955.4**
129 - Sasabe complex, 0 to 3 percent slopes	3	0	Sandy loam	3	Low	0.24	C	**2698.9**
Rn - Rock outcrop-Lithic Haplustolls association	0	50	Rock	--	Moderate	--	D	**2403.4**
117 - Oversight-Lanque complex, 1 to 5 percent slopes	5	0	Fine sandy loam	3	Low	0.17	B	**1736.9**
FtF - Faraway-Tortugas-Rock outcrop association, steep	60	25	Very cobbly fine sandy loam	45	High	0.1	D	**1503.9**
HoF - Hogris-Telephone association, steep		0	Very cobbly sandy loam	50	Moderate	0.1	B	**1156.7**
140 - Terrarossa complex, 0 to 45 percent slopes	45	0	Sandy loam	5	Moderate-High	0.24	C	**1068.2**

Q. Geologic Types:
In stratigraphic order, youngest to oldest, the rock types within the wildfire area include the following units:
Paleozoic Limestone and Dolomite
The upper most geologic unit contains rock outcroppings composed of intact blocks of limestone and dolomite in association with a caldera-related breccia. This unit is found discontinuously on ridge crests in the wildfire area.
Cambrian Bolsa Quartzite

Underlying the Paleozoic limestone and dolomite is the Bolsa quartzite of the Cambrian. Bedrock is yellowish- to reddish-brown siliceous sandstone with cemented conglomerate along near its base. This unit is highly resistant to erosion and forms prominent cliffs along the upper reaches of the watersheds.

Precambrian Granite

Yellowish- to pinkish-gray, coarse-grained porphyritic granite underlies the Bolsa quartzite. This granite is deeply weathered and not very resistant to weathering.

R. Miles of Stream Channels by Order or Class: Intermittent and Ephemeral Channels = 54 miles

S. Transportation System
Trails: 17 miles
Roads: 43 miles on forest, 114 miles off forest

PART III - WATERSHED CONDITION

A. Burn Severity by total and FS (acres):

Soil Burn Severity (Acres)	Acres	Percent
High	2318	7.3%
Moderate	12493	39.0%
Low	12946	40.0%
Unburned	4317	13.7%
Total	**32,074**	

B. Hydrophobic Soils: Hydrophobic soil conditions were intermittent within the fire area, and were rarely strongly expressed. Hydrophobic conditions are expected to exist in approximately 15% of the fire area, or ~5,000 acres.

C. Soil Erosion Hazard Rating (acres):

The fire resulted in an increase in acres of soils with a high erosion hazard rating.

	Unburned	**Post-Fire**
Low	9956.6	8856.3
Moderate	12449.2	9076.1
High	8012.5	12485.9

D. Erosion Potential: tons per acre: Average 3 tons per acre. See table below.

E. Sediment Potential:

The Erosion Risk Management Tool (ERMiT), was used to model both pre and post fire sedimentation. In areas with moderate and high burn severity, erosion potential was generally increased above natural conditions. Sedimentation was modeled with a 5 year runoff event.

The first table analyzes the effects the Monument Fire had on the entire HUC6 watershed whereas the second table examines the effect the fire will have on the watershed directly above the pourpoints identified during the assessment process.

Watershed	**Area** (acres)	**Pre Fire Sediment** (tons/acre)	**Post Fire Sediment** (tons/acre)	**Sediment Increase** (%)
Ash Canyon-San Pedro River	27238	0.5	2.5	423
Buena School Area	12036	0.5	0.6	6

Carr Canyon	23216	0.5	1.2	128
Cave Canyon	16441	0.8	1.3	60
Copper Canyon-Agua Dulce	5524	0.8	3.1	314
Garden Canyon	20549	0.5	0.8	48
Hunter Canyon-San Pedro River	32913	1.0	1.5	44
Miller Canyon	7488	0.6	6.2	969
Montezuma Canyon	3146	0.8	8.6	1012
Spring Creek-San Pedro River	20413	0.6	1.7	183
Woodcutters Canyon	9785	0.4	0.6	39
Yaqui Canyon	2546	1.1	3.5	221

Select Pour Point	**Area** (acres)	**Pre Fire Sediment** (tons/acre)	**Post Fire Sediment** (tons/acre)	**Sediment Increase** (%)
Ash Canyon at FS boundary	1139	0.68	11.51	1583
Lutz Canyon at Ash confluence	1133	0.72	14.19	1867
Miller Canyon at Beatty's Ranch	1538	0.80	15.30	1818

F. Debris Flow Potential:
Previous debris flow activities within the wildfire area have been well documented by Wohl and Pearthree (1991). Wohl and Pearthree evaluated debris flow activities in response to the 1977 wildfire in Miller and Stump Creeks, and in response to the 1983 wildfire in Ash Creek. Interviews with local residents, Tom Beatty Jr. and Dan Robinett, included their perspectives of these debris flows. Mr. Beatty is the landowner of the private property within the upper reaches of Miller Creek and he has been living there for a little over forty years. His description was more colorful than Wohl's and Pearthree's and damage to his property (pond and some structures) from the 1977 debris flows is clearly still present in his memory. During the interview Mr. Beatty stated several times that he was in the process of bringing in equipment to help reshape some of his slopes to direct flood waters and debris flows away from his home and other structures. Mr. Robinett is a retired NRCS soil scientist who accompanied the BAER team in these drainages. His observations from his career work in this area were very informative. He reiterated Wohl's and Pearthree's observations that debris flow activities from wildfire areas are more likely to occur during El Nino years.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	understory forbs and grasses 2-3 years overstory oak woodland 7 – 10 years overstory coniferous forest 30 – 40 years
B. Design Chance of Success, (percent):	____
C. Equivalent Design Recurrence Interval, (years):	5 yr
D. Design Storm Duration, (hours):	0.5 hr (30 min)
E. Design Storm Magnitude, (inches):	1.4 in.
F. Design Flow, (cubic feet / second/ square mile):	44
G. Estimated Reduction in Infiltration, (percent):	15%
H. Adjusted Design Flow, (cfs per square mile):	38

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

The Monument Fire started on June 12, 2011 and is approximately 32,074 acres in size. The fire burned areas within the Huachuca Mountains. Carr Canyon, Miller Canyon, Hunter Canyon, Stump Canyon, Lutz Canyon, and Ash Canyon drain from Forest Service lands in the mountains into the developed areas below the burn. Most of the burned area within the mountainous terrain is on National Forest land, with the southern extent on National Park lands in the Montezuma Pass area and down to Mexico. Some private lands (including 62 homes destroyed) were burnt on the toe slopes and flats. The fire burned moderately steep to very steep drainages above fairly densely populated areas at the mouths of drainages and on the alluvial fans developed from the drainages. The watersheds are characterized by moderately steep to very steep rocky slopes with potential for small to moderate debris flows on the tributaries to the main channels that put the roads at risk and could be life threatening if someone is within these areas during storm events. Miller and Ash Canyons could have debris flows possibly affecting home sites near the forest boundary and one in the upper portion of the canyon, but more likely homes would be at risk from flood flows alone. Some unnamed smaller drainages near the forest boundary have debris flow potential and increased runoff potential near homes that are very close to the runoff path. Once out of the canyon areas the increased runoff and sediment load is expected to increase flooding and sediment load potential in and around the stream areas. The streams flow through the developed areas and into the San Pedro River. The magnitude of potential flooding effects will depend on the storm intensity and duration but are likely to affect homes, structures and access roads on private lands.

The climate is arid overall and precipitation in the fire area is low, averaging 14 inches per year. Rainfall occurs mostly during the summer months with the monsoons when the potential for intense and localized rainfall can occur. The fire's soil burn severity was mostly moderate overall, with some areas of high and unburned severity.

Summary of Watershed Response

Hydrologic Response: Watersheds impacted from the Monument Fire are expected to increase from 30% to 2000% of flow rates for the main drainages. Ash, Carr, Hunter, Miller, Stump, Cave, Copper, Unnamed Tributary, and Yaqui Canyons are the main drainages. Pre-fire the cfs ranges from approximately 9 to 150 cfs. Post-fire discharge increases and ranges from approximately 80 to 645 cfs. The west side of the fire has minimal values at risk on or off Forest. The east side of the fire has the most values at risk on and off Forest. Threats to life are primarily for private residences adjacent to the Forest boundary. Few natural and cultural areas could be impacted with the higher flows. Few concerns

for water quality or quantity are present due to dominantly ephemeral and limited intermittent channels; the principal exception is on the intakes and pipeline supplying water from upper Miller Canyon and Clark Springs Canyon to the town of Tombstone (historic Tombstone Aqueduct).

Erosion Response: Pre fire conditions consisted of steep-walled canyons with shallow, coarse-textured, rocky soils surrounding alluvial and colluvial deposition areas. Much of the fire area had moderate and high erosion hazard ratings in the unburned state, and in large storm events erosion rates are very high. The fire resulted in a near complete removal of organic cover material in areas of both high and moderate burn severity. However, surface rock content remains high (though variable) in much of the burn, and many areas have surface rock cover of ~30-60%. The predicted result to erosion is an increase in surface rilling and sheet erosion in most of the moderate and high burn areas. Ash material (0.5 – 3cm thickness) is very likely to erode off the steepest slopes, and be deposited on toe slopes, and in heavy rain events will almost certainly be delivered to streams. Much of the ash in most areas has already been removed by wind events since the fire. The high surface and profile rock content should help prevent scour and gully erosion except in extreme precipitation events.

The fire adapted plant community consists of mixed oak and perennial grasses. The existing grass and tree community will resprout rather quickly, but not until after the monsoon rains, which may very well be the damaging events of concern as well. A return to pre fire vegetated cover could occur within 2-3 years and the oak canopy cover could return within 10 years (see Monument Fire Plant Community Vegetation Recovery Assessment Report). Erosion rates are expected to decrease rapidly after 2-3 years as perennial vegetation recovers.

Geologic Response:

Carr Canyon

Few debris flow activities are predicted to occur within the Carr Canyon area due to predominantly low and limited moderate soil burn severity in most of this watershed. However, there are areas of high soil burn severity within the upper reach of this drainage in the Reef Mine area and it is probable that debris flow initiation may occur from this area. The run-out distance of these potential debris flows, however, is quite long and by the time they may reach values at risk, the deposits will probably be small in size with a resulting magnitude of minor to moderate. The values at risk include the Carr Canyon Admin. Site which has been assigned a risk value of intermediate, and a residential area further downstream which has been assigned a risk value of low.

Miller Canyon

Debris flows have previously occurred in this watershed in 1977 after a wildfire incident. The soil burn severity in the watershed is moderate to high with large areas of high soil burn severity on the upper slopes. Therefore it is likely to very likely that debris flows will occur. Values at risk include the Beatty Ranch (pond with T&E frogs, houses, and other structures) and the residential area near the Broken Arrow Ranch approximately three-quarters of a mile from Highway 90. The magnitude of debris flow activities above the Beatty property is predicted to be moderate to major. Therefore the predicted risk value ranges from high to very high for the Beatty property. The magnitude of the debris flow activities to the residential area is predicted to be minor to moderate due to the longer run-out distance of the debris flows in comparison to the short run-out distances to the Beatty property. Therefore the predicted risk value for the residential area ranges from low to very high.

Hunter Canyon

Most of the Hunter Canyon watershed has moderate to high soil burn severities. Therefore this area is predicted to have probable to likely debris flow events; however, the run-out distances to any values at risk is quite long. Highway 90 is the only value at risk that may be adversely affected with a predicted magnitude of minor; therefore the risk value is predicted to be low.

Stump Canyon

Debris flows have occurred in Stump Canyon in response to the 1977 wildfire. The soil burn severity from the Monument Incident in this drainage is mostly low to moderate with the majority of the high severity being located in the headwaters area. The likelihood for debris flow initiation in this watershed ranges from probable to likely; however, the run-out distances from these initiation sites are long. The values at risk are the residences near the Flying H Ranch. Therefore the risk value assigned to these values at risk is low.

Ash Canyon

The Ash Creek watershed includes Lutz, Ash, Manzanita and Dorothy Ryan Canyons. All of these canyons have moderate to high soil burn severities. Wohl and Pearthree (1991) documented the debris flow activities within the Manzanita and Dorothy Ryan Canyons in response to the 1983 wildfire. The predicted likelihood of debris flow initiation within Ash Creek watershed ranges from probable to likely. The run-out distances for debris flows initiating in the headwaters area are quite long in order to get to any values at risk; therefore the magnitude to these values at risk (residences within the Wintergreen Mink Ranch area) are predicted range from minor to moderate. The risk value then ranges between low to high.

Debris Flow Mitigation Alternatives

There are very few mitigation alternatives for debris flows because of the tremendous energy they have during slope failure and transport. One viable alternative is to establish deflection structures that can redirect debris flow materials away from values at risk. K-rails (also known as Jersey barriers) can be used if debris flows are small. Larger debris flows can be deflected with deflectors designed by professional engineers. These structures are much larger and have a bigger footprint than the K-rails, and require considerable time to properly design and install (months to > 1 year).

Rockfall Potential

During field reconnaissance the BAER Team observed potential areas for rockfall from the fire area. However, during field work it was determined that rockfall will be minor and the likelihood of values at risk being damaged from rockfall is unlikely with a magnitude of minor. Therefore the risk value is given as very low for rockfall.

<u>Values at Risk</u>

- **Life:**
  - In the upper portion of Miller Canyon there is a bed and breakfast type business surrounded by forest service land that has a small and a medium sized drainage that has had debris flows in the past. The watershed area above is mostly burn at high severity and debris flows could occur again and be life threatening for anyone at the site during a storm event.
  - The main drainage of Ash Canyon could experience a debris flow large enough during a large storm event to reach the upper end of a developed area and be a threat to life.
  - Some unnamed smaller drainages near the forest boundary have debris flow potential and increased runoff potential that have homes close to the runoff path; a larger storm event could present enough watershed response to threaten life.
  - Within the forest boundary, many tributary drainages in Ash, Lutz, Stump, Hunter, and Miller Canyons have a high likelihood of debris flows. There are some private land access roads and forest roads within these drainages. Use of these roads during storm events will put life at risk.
  - Rock fall from burnt slopes will be a risk to life in areas on and at the base of these slopes. This risk is most evident within the forest boundary but there is some risk to developed areas just outside the boundary.
- **Property:**
  - Homes/Structures: As described above some homes are threatened by debris flows and many more are threatened by increased flood flows and sedimentation due to the watershed effects of the burned area.
- **Roads:**

  The reconnaissance of the roads during the field investigations found several issues pertaining to emergency stabilization. The issues associated with the findings requiring emergency stabilization included: road drainage problems (i.e. plugged and/or crushed culverts, filled in catchment basins and ditches, low profiled rolling drain dips, etc.), undersized culverts posing a threat of delivering large amount of sediment into adjacent drainages, and burned traffic signs. The result of these field investigations identified threats to public safety and additional sediment delivery to adjacent drainages through possible road failures.

  Most of the issues are typical of what is found on or above roads within burned areas. These issues pertaining to most of the roads are a result of the road location within the drainages or canyons. To further elaborate, sections of the roads are either built next to shallow channels or are built alongside hillslopes whose side drainages cross the road. The location of these roads next to these drainages

and hillslopes are susceptible to receiving highly erosive runoff which can carry large amounts of sediment and debris in a short time span. With the landscape now burned, the runoff flows will be greater in intensity and more debris is available for transport across each of the roads within the burn.

Within the forest boundary, many tributary drainages in Ash, Lutz, Stump, Hunter, and Miller Canyons have a high likelihood of delivering debris flows to main channels. There are many forest service roads crossing these tributaries and the debris flows could deposit material and/or possibly remove portions of the roads where the road intersect these drainages. Many of the roads are at risk of capturing drainage flow and hillslope flow that could seriously erode or destroy the road prism.

To stabilize the issues identified, several treatments are being proposed which include the following: 1) Installing rolling drain dips; 2) removing culverts and building low water crossings; 3) reconditioning the existing drainage features by removing the sediment that lies in the ditches, bottoms of rolling dips, and in catchment basins; 4) upsizing culverts; 5) installing gates and flood warning signs; and 6) armoring road surfaces and shoulders.

- **Non Forest Roads:**
  - Private access roads – Many homes near the drainages on private property have low water crossings that are at risk of being washed out from increased flood flows.
  - Hwy 92 – Flood flows, sand and gravel laden flows, and loose floatable debris could impact State Route 92. Debris, sand and gravel could clog culverts and damage the road.

- **Water Quality and Quantity:**
  – The Tombstone Aqueduct supplies water to the town of Tombstone and has water intakes in Miller and Clark Spring Canyons that are at risk from sediment from burned areas.

- **Threatened & Endangered Species:**
  - <u>Chiricahuona leopard frog</u>
  - <u>Lesser long-nosed bat</u>
  - <u>Mexican spotted owl</u>
  - <u>Ocelot</u>
  - <u>Sonora tiger salamander</u>
  - <u>Springs (water sources)</u>: There were nine springs within the Monument fire perimeter identified as potential wildlife values at risk. These springs are listed in the order of District priority: Old Sawmill, Clark, Kelly, Happy Jack, Bond, Hunter, Comfort, Ramsey/Pat Scott, and Lower Ash Ruins. One of these locations, Clark Springs, is also a water intake for Tombstone.

- **Trails:**
  - Arizona Scenic Trails – Clark Springs Trail, Lutz & Ash Canyon Trails, Perimeter Trail, Miller Canyon Trail, John Cooper Trail are at risk to debris flows and also could capture runoff and wash portions of the trail out. There are also threats to trail users from hazard trees that were damage by the fire.

- **Cultural Resources:**

  Many archaeological sites are located within the perimeter of the Monument Fire. Cultural Resource values are represented by the recovery and/or analysis of artifacts, features, architecture, and cultural landscapes. Displacements, destruction, removal, all cloud the archaeologist's ability to analyze, understand, interpret and explain site function, chronology, and technology. For additional information see the Archaeologist Technical Specialist Report.

- **Botany**

  There are no threatened or endangered plants in the fire area. There is no designated critical habitat for plants in the fire area.

- **Native Vegetation Recovery**:
  - Ecosystem stability of native plant communities in the Coronado NF are at risk.There is a high possibility of damage to the native plant community from noxious weed invasion. If new infestations are established the magnitude of the consequences would be moderate-to-major. The fire created conditions conducive to the spread of the noxious weeds known to be within or near the fire area. The invasion of exotic vegetation, especially grasses and annual forbs as a result of fires reduces or displaces native plant species, thus impacting native vegetative recovery. Suppression activities have likely vectored noxious weed seed from one or more locations. Vehicles and equipment were not washed prior to entering fire area.

- **Soil Productivity:**
  - Most of the fire area consists of shallow soils supporting an evergreen oak woodland community. There are smaller areas of conifer woodland at higher elevations, and shrublands-grasslands extending down the alluvial fans within and outside of the fire boundary. Shallow soils have inherently low productivity. However, these are some of the most productive soils in the area. Because canopy removal was nearly complete in those areas that burned, removal of productive surface soil layers from erosion is expected.

- **Wilderness:**
  - Much of the wilderness was burnt at moderate to high soil burn severity.
  - The trails are at risk for water capture and stream diversion and could erode severely, compromising sections of trail tread and adding additional sediment to the channels.

- **Water Quality and Supply:**
  - There are water source intake locations and delivery pipelines in Miller and Clark Spring Canyons that supply water to the town of Tombstone that are at risk from flood and debris flows. Clogging and burial of inlets has happened in past extreme storm events and fire events of lower intensity.
  - Water tank and pipeline near Cave Canyon: the pipeline is buried in Forest Road 771, which is at risk from the road eroding due to poor drainage control structures. Loss of the road section would mean a breach of the pipeline.

- **Facilities/Recreation:**
  - Campground in top of Carr Canyon
  - Admin site – house, barn, interpretive & well in Carr Canyon

The risk matrix below, Exhibit 2 of Interim Directive No.: **2520-2010-1**, was used to evaluate the Risk Level for each value identified during Assessment:

Probability of Damage or Loss	**Magnitude of Consequences**		
	Major	Moderate	Minor
	RISK		
Very Likely	**Very High**	**Very High**	**Low**
Likely	**Very High**	**High**	**Low**
Possible	**High**	**Intermediate**	**Low**
Unlikely	**Intermediate**	**Low**	**Very Low**

<u>Life Risk Assessment:</u>

Probability of Damage or Loss: Possible due to unpredictable magnitude of monsoon and winter storm events and type of watershed response from the burn.

Magnitude of Consequence: Major

Risk Level: High

Property Risk Assessment:

Probability of Damage or Loss: Possible, commensurate with life probability assessment.

Magnitude of Consequence: Moderate

Risk Level: Intermediate

Forest Roads Risk Assessment:

Probability of Damage or Loss: Very Likely due to drainage control structures that are barely adequate or inadequate for unburned watershed conditions.

Magnitude of Consequence: Moderate

Risk Level: Very High

Water Quality and Quantity Risk Assessment:

Probability of Damage or Loss: Likely, referring to the Tombstone Aqueduct.

Magnitude of Consequence: Moderate

Risk Level: High

Threats to Soil Productivity Risk Assessment:

Probability of Damage or Loss: Very Likely due to natural post-fire erosion processes.

Magnitude of Consequence: Moderate

Risk Level: Very High

Threats to Cultural Resources Risk Assessment:

Probability of Damage or Loss: Likely at 2 specific locations described in the specialist report.

Magnitude of Consequence: Moderate

Risk Level: High

Threats to Wildlife Risk Assessment:

Chiricahua leopard frog:

Resource condition resulting from the fire: The ponds observed on private land just east of the Miller Peak Wilderness Boundary were in good condition and had Chiricahua leopard frogs. The spring source feeding this pond is also located in Marshall Gulch and may be affected by increased sedimentation and ash deposits. The pond is at risk of sediment and deposits from the slopes adjacent to the private land. The water quality in this spring is at risk from sediment and debris flow post fire. The determination is based on the increase in sediment and ash delivery expected to the pond and spring that feeds the pond.

Probability of damage or loss: Likely. This determination is based on the increase in sediment and ash delivery expected to the pond and spring that feeds the pond.

Magnitude of consequence: Moderate. This determination is based on the increase in sediment and ash delivery expected to the pond and spring that feeds the pond.

Risk level: High. Emergency conditions exist for this species. Treatments are being recommended by the soils scientists to reduce sedimentation and ash delivery within Miller Canyon and Miller Gulch. The treatment being recommended is hydromulching on the slopes above the Chiricahua leopard frog pond.

Lesser long-nosed bat:
Resource condition resulting from the fire: Lesser long-nosed bats roost in caves and mines and forage exclusively in agave flower nectar and pollen. The cave was located just outside the fire perimeter and is not at risk from post fire effects. Agave plants were lost throughout the burned area. A reduction in foraging habitat availability (i.e. agave plants) within the burned area is expected for several years. Because foraging habitat was lost, individuals may have to travel farther to find suitable foraging locations. Some agave may survive and others will die as a result of the fire.

Probability of damage or loss: Possible. This determination is based on the decrease in forage (i.e. agave plants) availability.

Magnitude of consequences: Moderate. This determination is based on the decrease in forage (i.e. agave plants) availability.

Risk level: High. I have determined that no emergency conditions exist for this species. No treatments are recommended.

Mexican spotted owl:
Resource condition resulting from the fire: Four PACs were entirely within the fire perimeter, while six others were only partially within the fire. The most significant loss of habitat occurred in Ash Canyon. There was also habitat loss within the designated Critical Habitat area outside occupied PACs.

Loss of important structural elements such as downed woody debris, snags, and canopy cover will reduce suitability in the short and long-term for the individuals within these territories. After the monsoon season, it will be more evident how much of the oak component was lost as a result of the fire. Individual fitness may be compromised as a result of fire effects and habitat loss. The areas that burned at low severity will continue to provide suitable breeding habitat. The majority of drainage bottoms burned at low or moderate severity and may continue to provide adequate breeding habitat. Those areas that burned at high severity are considered unsuitable and not suitable for reproduction. Individuals in PACs 03-001, 03-003, 03-017, & 03-019 are likely the most negatively affected given the amount of moderate and high severity burn that occurred within the PACs. Habitat recovery is expected to be slow in these sky island ecosystems and may affect individual fitness for the long-term.

Probability of damage or loss: Likely. This determination is based on further loss of habitat due to pine beetle infestation.

Magnitude of consequences: Moderate. This determination is based on further loss of habitat due to pine beetle infestation.

Risk level: High. Emergency conditions exist for this species; however, no treatments are recommended.

Ocelot:
No Critical Habitat is designated for this. A reduction in habitat availability within the burned area is expected for several years. Because habitat was lost, individuals may become susceptible to other stressors such as displacement, disturbance, reduced prey abundance, or increased predation.

Probability of damage or loss: Possible. This determination is based on the increased probability of increased stressors such as displacement, disturbance, predation, and reduction in prey abundance.

Magnitude of consequences: Moderate. This determination is based on the increased probability of increased stressors such as displacement, disturbance, predation, and reduction in prey abundance.

Risk level: Intermediate. I have determined that no emergency conditions exist for this species. No treatments are recommended.

Sonora tiger salamander:
Resource condition resulting from the fire: The stock pond surveyed was dry, but in good condition, and had adequate capacity to handle increased flows and sedimentation expected under post fire conditions.

Probability of damage or loss: Unlikely. This determination is based on the limited amount of sedimentation expected into the pond from the small area burned directly above the pond.

Magnitude of consequences: Minor. This determination is based on the limited amount of sedimentation expected into the pond from the small area burned directly above the pond.

Risk level: Very low. I have determined that no emergency conditions exist for this species. No treatments are recommended.

Springs (water sources):
Resource condition resulting from the fire: Four of the identified springs were eliminated as values a risk upon preliminary evaluation. Bond spring is at the top of the watershed on the west side of the fire and is primarily unburned; therefore, it is not considered “at risk” from post fire effects. Comfort spring is outside the burned area and is in a watershed not “at risk” from post fire effects. Happy Jack Spring is located in a watershed that burned at low severity or remains unburned and is not considered “at risk” from post fire effects. Ramsey/Pat Scott spring is outside the burned area and is not “at risk” from post fire effects.

Probability of damage or loss to Clark Spring: Very likely. This determination is based on the sediment movement already witnessed at the site and the predicted erosion potential.

Magnitude of consequences: Moderate. This determination is based on the sediment movement already witnessed at the site and the predicted erosion potential.

Risk level: Very high. I have determined that emergency conditions exist for Clark Spring.

Probability of damage or loss to Old Sawmill Spring: Unlikely. This determination is based on the low severity burned area draining into the spring area.

Magnitude of consequences: Minor. This determination is based on the low severity burned area draining into the spring area.

Risk level: Very low. No emergency conditions exist for Old Sawmill Spring. No treatments are recommended.

Probability of damage or loss to Kelly or Hunter Springs: Likely. This determination is based on the moderate burn severity on the slopes above the springs and the likelihood of increased sediment delivery into the spring areas.

Magnitude of consequences: Moderate. This determination is based on the moderate burn severity on the slopes above the springs and the likelihood of increased sediment delivery into the spring areas.

Risk level: High. I have determined that emergency conditions exist for Kelly and Hunter Spring. Treatments are recommended, see Section III.

Threats to Botany Risk Assessment:

Probability of Damage or Loss: Possible loss of native vegetation community due to invasive species.

Magnitude of Consequence: Moderate

Risk Level: Intermediate

B. Emergency Treatment Objectives:

The objectives of the treatments are to treat the upper watershed area to hold as much soil in place in the debris flow initiation zone to protect soil productivity and reduce the amount and or magnatude of soil erosion contibuting to debris flows. This will also help reduce overall sediment quantity moving downstream into developed areas, and increased infiltration will reduce and attenuate overall flows. Objectives in the lower watershed include maintaining soil productivity, protecting investments in road infrastucture, and keeping as much soil as possible in place and out of the stream system as well as reducing the spread of noxous weed and protecting cultural resources. Treatment objectives include protecting life by contributing to an early warning system on NFS Lands for the homes in Miller Canyon and posting flood and debris flow warning signs at access points.

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

Land **70** % Channel **--** % Roads/Trails **80%** % Protection/Safety **80** %

D. Probability of Treatment Success:

	1	3	5
Land	65	70	75
Channel	n/a	n/a	n/a
Roads/Trails	80	80	90
Protection/Safety	90%	100%	100%

E. Cost of No-Action (Including Loss): See Appendix A: Summary of cost-risk analysis.

F. Cost of Selected Alternative (Including Loss): See Appendix A: Summary of cost-risk analysis.

G. Skills Represented on Burned-Area Survey Team:

[X] Hydrology [X] Soils [X] Geology [X] Range [X] Public Information
[ ] Forestry [X] Wildlife [ ] Fire Mgmt. [X] Engineering [X] BAER coordinator
[X] Contracting [X] Ecology [X] Botany [X] Archaeology [X] NRCS
[ ] Fisheries [ ] Research [ ] Landscape Arch [X] GIS [X} Logistics

Team Leader: Randy Westmoreland
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Core Team Members:

Eric Nicita – Soil Scientist
Curtis Kvamme – Soil Scientist (T)
Josh Caultier – Hydrologist
Jim Schmidt – GIS
Jason Dierberg – GIS (T)
Tom Goheen – Logistics
Tom Koler – Geology
Casey Shanon – Interagency Coordinator
Katie Morison – Administration
Marcie Baumbach – Wildlife
Mike Friend – Botany
Matt Brown – Botany (T)
Shawn Robnett – Road Engineer
Lance Haubrick – Road Engineer (T)
Rebeca Franco – Information
Bob Ramirez – Information
Nolan Smith – Archeology
Dave Young – BAER Coordinator

H. Treatment Narrative:

The proposed treatments on National Forest System lands are designed to protect life by installing flood and debris flow warning signs at forest road and trail access points, and coordinating with USGS and the National Weather Service and local emergency agencies to install an early warning system. Land treatments are proposed on upper, mid, and lower slope positions for slightly different targeted and specific benefits to infiltration and reduction of erosion; these treatments should secondarily help reduce debris flow initiation, overall flow magnitudes, and sediment movement into the developed areas below. Upper slope treatments are targeted to help reduce debris flow initiation by reducing runoff; midslope and lower slope positions are targeted to protect soil productivity and reduce the amount of sediment moving into the drainage system; this will also help reduce flow magnitude and sedimentation downstream. All of these beneficial effects of treatment will help reduce threats to life, and property secondarily, downstream on private lands.

Road treatments are proposed to reduce the stream capture potential, protect the road infrastructure, and reduce overall erosion and sediment movement into the stream system.

Land Treatments

Hillslope Treatment: The Monument fire has the potential for a high degree of soil erosion resulting in loss of soil productivity, as well as significant increases in cubic feet per second flows. Approximately 1502 acres on National Forest across areas that burned with moderate or high severity and varying soil types have been evaluated and determined suitable for treatment to protect reduce the threat of loss of life, and soil productivity. This treatment will also help to reduce sediment movement into the stream system and reduce overall sedimentation and flows into private developed areas below forest service land.

The Miller watershed had approximately 2,787 (73%) acres of high and moderate burn severity, of which approximately 691 (18%) acres were found to be suitable based on evaluation of slope and rock cover. Based on models it is expected that treatment could cause a reduction in flows of approximately 23%. The assessment team determined this treatment coupled with treatments installed with NRCS assisstance to land owners downstream of the Miller Watershed would significanlty reduce the potential for loss of life.

The Ash watershed had approximately 5,088 (70%) acres of high and moderate burn severity, of which approximately 810 (11%) acres were found to be suitable based on evaluation of slope and rock cover. Based on models it is expected that treatment could cause a reduction in flows of approximately 28%. The assessment team determined this treatment coupled with treatments installed with NRCS assisstance to land owners downstream of the Ash Watershed would significanlty reduce the potential for loss of life and property.

Because of the loss of structures during the fire and less potential for impact to State Highway 92 from the Ash Watershed; the team felt that potential NRCS structure protection treatments would have a better chance of success at reducing threats to life than Miller Watershed where residences are still occupied and the threat to State Highway 92 is greater.

While treatments on NFS lands will help to reduce the impacts of the fire following precipitation events, treatments will not completely mitigate the effects of the fire, nor will they be as effective without additional treatments on private lands within and downstream of the fire perimeter. Given the topography of the burned area and lands downstream, the appropriateness and effectiveness of individual treatments varies by location. Cumulatively, the greatest potential to reduce impacts to downstream values would be through a variety of treatments appropriate for the site specific terrain and setting on both NFS lands and private lands.

Alternative 1

Aerial Application of Hydromulch: To help reduce potential threats to human life, property, soil productivity, and watershed degradation, aerial hydromulching with cereal grain seed is proposed on high and moderate severity in Ash and Miller watersheds. Approximately 1502 acres on National Forest across areas that burned with moderate or high severity and varying soil types have been evaluated and determined suitable for hydromulching treatment to reduce the threat of loss of life, and soil productivity. This treatment will also help to reduce sediment movement into the stream system and reduce overall sedimentation and flows into private developed areas below forest service land.

Logistically, hydromulching products are available per conversation with suppliers. There are several airports and private helibases in close proximity to the units which will reduce the cost per acre, and because the proposal would include transporting material internally, equipment can fly over residences, highways and powerlines. Contractors will be responsible for securing all products including water. Additionally aircraft availibility may be limited due to other incidents with other priorities.

Approximate time line for all hydromuching 1502 acres is approximately 21 perfect flying days.

Item	Unit	Unit Cost	# of Units	Cost
Hydromulching with Seed – Miller Watershed	acres		692	
Hydromulching with Seed – Ash Watershed	acres		810	
			Total Cost	

Alternative 2

Wilderness - Hydromulch with Cereal Grain Seed / Non-Wilderness - Agricultural Straw/Cereal Grain Seeding: To help reduce potential threats to human life, property, soil productivity, and watershed degradation, a proposed treatment of aerially applied mixed mulch on 623 acres of high and moderate severity slopes within the wilderness, and aerially applied agricultural straw with a sterile cereal grain seed mix on high and moderate soil burn severity slopes outside of the wilderness has been developed for both Miller and Ash watersheds.

Aerial seeding using fixed winged airplanes will be conducted in areas of moderate to high fire severity to help reduce the potential for loss of soil. Approximately 1502 acres on National Forest across areas that burned with moderate or high severity and varying soil types have been proposed for seeding application with hydromulch and agricultural straw.

Logistically, this treatment will require two different types of aircraft. Aerial hydromulching and seeding requires self contained equipment, while helimulching requires material to be sling loaded and has FAA restrictions that require avoidance of all flights over residences, roads, and power lines. Because of these restrictions there is a potential that a contractor would not concurrently work the same type of aircraft, which could cause an increase in mobilization costs. Potential timeline and procedure could be as follows: Hydromulch/Seed the areas in the wilderness which would take approx 8-14 perfect flying days (not getting shutdown for weather), then the same aircrafts that hydromulched will seed the non-wilderness area. (8-14 perfect flying days). Once the aircraft have finished the seeding then a different set of aircraft will come in and helimulch (8-14 perfect flying days).

A landing zone for agriculture straw application close to Miller Canyon on National Forest lands has been identified, however it may need some improvements to allow for semi-truck ingress and egress, and the amount of aircraft that the site can support is currently unknown. As of date of this request a suitable landing zone for Ash Canyon has not been identified. As such cost per acre may increase due to flight distances once a suitable landing zoned has been identified. It is likely that a 2-3 acre landing

zone would need to be clearcut and constructed on FS lands to comply with FAA regulations; cost for this is not included in estimates.

Finally, there is still a high likelihood that agricultural straw may not stay dispersed across the treatment areas and lose effectiveness, due to the expected wind speeds observed in the Ash and Miller Watershed Areas. While the potential for limited availability of aircraft due to other priorities within the region exists for both alternatives, because of the different types of aircraft needed, and multiple mobilization efforts, Alternative 2 has an increased exposure of hazards to pilots, and increased delays in implementation as a result of existing storm patterns.

Cost estimates below are based on multiple conversations with contractors on July 5, 2011 and from the costs used for the White Fire.

Miller Watershed Treatment Cost

Item	Unit	Unit Cost	# of Units	Cost
Wilderness Hydromulching with Seed	acres		338	
NonWilderness – Ag Straw (2 tons/acre)	acres		354	
NonWilderness – Cereal Grain (53/lbs/acre)	acres		354	
Total			692	

Ash Watershed Treatment Cost

Item	Unit	Unit Cost	# of Units	Cost
Wilderness Hydromulching with Seed	acres		285	
NonWilderness – Ag Straw (2 tons/acre)	acres		525	
NonWilderness – Cereal Grain (53/lbs/acre)	acres		525	
Total	acres		810	

Alternative Total Summary

Item	Unit	Unit Cost	# of Units	Cost
Alternative 1 Total	acres		1502	
Alternative 2 Total	acres		1502	

Areas to be treated will be located on a treatment map and also in a GIS file, which can be given to the contractor. See treatment specification sheet for detailed information.

The assessment team also evaluated the potential for other treatments such as and the following table summarizes feasibility of other treatments considered.

Treatment Type	Feasibility
Construction of Debris Basin	Installation not considered realistic due to length of time to design and construct. Debris flow potential is not as great as flooding response due to slope of channel
Aerial Application of Straw	Considered, but determined to have less likelyhood of effectivenss due to localized wind conditions that would disperse straw into clumps and reduce ground cover. Complexity increased due to FAA regulations that prevent sling loads with cargo nets from flying over residences and associated structures. This would result in longer flight times and increased hazard exposure, and increased costs.

Cultural Resource Site Protection: The treatments proposed are to reduce impact to archaeological sites from increased watershed response, exposure, and theft.

The objective of this treatment is twofold: 1. Construct a series of three Λ shaped log deflection barriers above the area to prevent historic artifacts from being displaced and washed away. Fast moving rain water from the 20% slopes above could also erode and potentially undermine part of the dry laid stone foundation. 2. Chainsaw thin a burned over brushy area above a tent flat that is littered with historic era artifacts. The intent is to drop enough small woody material to deflect and slow down rain water flow from displacing the associated artifacts.

Item	Unit	Unit Cost	# of Units	Cost
Implementation Archaeologist	Days			
Construction of Treatments	Days			
Vehicle	Miles			
Materials and Supplies	EA			

The objective of this treatment is to provide a water deflection barrier to protect two historic sites from further degradation. The sites are adjacent to an unnamed wash which if it floods could severely damage both sites. Installation of the log water deflection barrier will provide an opportunity to preserve these vulnerable and valuable cultural resources.

Item	Unit	Unit Cost	# of Units	Cost
Implementation Archaeologist	Days			
Cut and Install two simple log deflection barrier	Days			
Vehicle	Miles			
Materials and Supplies	EA			

***Channel Treatments*:**

None recommended

Road and Trail Treatments:

Road: *This treatment consists of installing water control features (dips, low water crossings etc) in road where needed to protect the road and reduce stream capture potential and overall erosion, patrolling Forest Roads and clearing rock and debris fall during and after each rainfall event to reduce the potential damage to the road from stream/water capture. These treatments will reduce overall amount of sediment for injury to the public and Forest personnel traveling along the road. Patrols would check the road conditions when safe for travel, and if needed deploy a backhoe to assist in the removal of rock and debris.*

Trail: There are approximately 17 miles of trail in the perimeter in need of tread stabilization followed by administrative closure. Numerous water crossings exist which would intercept water upon the tread and compromise the trail. Treatment consists of installing or improving water control features (dips, low water crossings etc) in the trail where needed to protect the tread and reduce stream capture potential; minor amounts of hazard tree removal exist for safety of crews performing the work. Despite recommendation for administrative closure to alleviate life and safety hazards to the public, trail stabilization is recommended to prevent loss of significant portions of the trail as infrastructure.

Road and Trail Treatment:

Item	Unit	Cost/Unit	Qty.	Total Cost

Construction of Roadway Drainages	Miles			
Road Drainage Maintenance and Reconditioning	Miles			
Trail stabilization and closure	Miles			
TOTAL REHABILITATION COSTS FOR ROADS =				

Protection/Safety Treatments:

Warning Signs: Install warning signs for flood and debris hazards for road crossings and stream access areas, as well as trail closure signs at trailheads.

Early Warning Systems: Installation of early warning sytems for homes along the drainages in Ash and Miller Canyons; cost will be the burden of cooperating agencies, with any permitting requirements facilitated by FS.

Interagency Coordination: Throughout the monsoon season and the following winter, the Forest should continue coordinating with cooperating agencies, relaying the BAER Assessment findings, and providing input as rain events are predicted.

Item	Unit	Unit Cost	# of Units	Cost
Patrols for Storm Induced Road Hazards	Day		6	
Gate Closure	Each		5	
Road and Trail Warning Signs	Each		57	
Interagency Coordination	Total		1	
Total Request				

I. Monitoring Narrative:

Cultural Resources - The Monument Fire, burned approximately 32,000 acres, the resulting loss of vegetative cover exposed at least thirty-five known sites and an un-totaled number of unknown sites to vandalism. Prevention of vandalism is important to archaeologists who are responsible to manage and protect these “non-renewable” resources. Monitoring is seen as important tool to track and reduce vandalism and site destruction.

Cultural Resources Treatment Monitoring Cost:

Item	Unit	Unit Cost	# of Units	Cost
GS-11Archaeologist	Days			
Mileage	Miles			
Total Cost				

Weed Detection Surveys and Treatment Cost:

Detect new infestations while small enough to effectively eradicate and prevent the long-term establishment of new infestations. Eradicate new infestations to prevent the spread of noxious weeds beyond new detection sites. Prevent vectoring of weeds along roads. Protect the native plant community in this relatively weed-free area.

Noxious weed surveys should be focused on the main access routes from State Highway 92 that lead to the fire areas, staging areas, dozer lines, hand lines, riparian areas that intersect roads and trailheads.

Invasive plant coordinator

Biological Technician 1	
Biological Technician 2	
Lodging & Per Diem Tech 1	
Lodging & Per Diem Tech 2	
Mileage:	
Total Cost Estimate =	

This report is an initial funding request based on a rapid assessment. If additonal treatment needs are identified through more site specific on the ground investigation or in cooperation with interested agencies, interim requests for additional funding will be filed. These funding requests will identify the purpose for each treatment, and specific treatment specifications, locations and number of each treatment, and cost.

Part VI – Emergency Stabilization Treatments and Source of Funds

	NFS Lands			
Line Items	**Units**	**Unit Cost**	**# of Units**	**BAER Funds**
A. Lands Treatments				
Weed Detection and Treatment				
Aerial Seeding	Acre			
Mixed mulch – Miller & Ash	Acre			
Archeology site protection	Total			
			Alt 2: Subtotal Land Treatments	
B. Channel Treatments NONE				
			Subtotal Channel Treatments	*$0*
C. Roads and Trails				
Construction of Roadway Drainages	Miles			
Road Drainage Maintenance and Reconditioning	Miles			
Trail stabilization and closure	Miles			
			Subtotal Roads and Trails	
D. Protection and Safety				
Patrols for Storm Induced Road Hazards	Day			
Gate Closure	Each			
Road & trail warning signs	Each			
Interagency Coordination	Total			
			Subtotal Protection and Safety	
E. Monitoring				
Mulch treatment effectiveness				
			Subtotal Monitoring	
F. Totals				
			Previously Approved	n/a
			Alt 2: Totals for this Request	

PART VII - APPROVALS

1. /s/ Jim Upchurch 7/7/2011
   Forest Supervisor (signature) Date

2. /s/ C. L. Newman, Jr. 7/14/2011
   Regional Forester (signature) Date