Date of Report: January 5, 2012

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[ ] 1. Funding request for estimated emergency stabilization funds
[X] 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 #____
[ ] Updating the initial funding request based on more accurate site data or design analysis
[ ] Status of accomplishments to date

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

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Fish Trap - Fish Fire Complex

B. Fire Number:KY-DBF-100064

C. State: Kentucky

D. County: Powell

E. Region:08

F. Forest: Daniel Boone National Forest

G. District: Cumberland

H. Fire Incident Job Code: P8FX4G

I. Date Fire Started:10/24/2010

J. Date Fire Contained:11/9/2010

K. Suppression Cost: Estimated as of 11/9/2010 at $500,000

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles):2 miles of hand line
2. Fireline seeded (miles): none
3. Other (identify): none

M. Watershed Number:HUC 6: 051002040209 (Indian Creek - Red River)

N. Total Acres Burned:
NFS Acres(1595) Other Federal (**0**) State (0) Private (70)

O. Vegetation Types: yellow poplar, white oak, northern red oak, chesnut oak, white oak, northern red oak, hickory, pitch pine, virginia pine, white pine, and scarlet oak

P. Dominant Soils:Alticrest-Ramsey(ArF) on the ridges; Helechawa (HeF) midslope; and Bledsoe-Berks (BsF) lower slopes.

Q. Geologic Types: Resistant Pennsylvanian sandstones and conglomerates (Corbin sandstone member of the Lee Formation, form extensive and massive cliffs overlaying erosive Pennsylvanian shales of the Lower Breathit formation. In places small amounts of shale from the upper member of the Breathitt Formation is found on top of the sandstone and conglomerate. Under the Pennsylvanian layers, Mississippian Newman limestone (resistant and often cliff forming) sits atop softer Mississippian shales, siltstones and dolomites of the Renfro, Nada, Borden and Cowbell members of the Borden Formations. Larger river valleys are dominated by Quatenary alluvium.

R. Miles of Stream Channels by Order or Class: Stream Order 4: 0.9 miles, Stream Order 5: 5.7 miles

S. Transportation System

Trails: 6.9 miles Roads: 6.29 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 1,137 (low/unburned) 257 (moderate) 271 (high)

B. Water-Repellent Soil (acres): 0

C. Soil Erosion Hazard Rating (acres):

Number of acres in each NRCS soil erosion class by fire.

	Erosion Rating from NRCS Web Soil Survey				
Fire	**Slight**	**Moderate**	**Severe**	**Very Severe**	**Total Acres**
Fish Trap	11	442	824	349	*1641

*15 acres are in water

D. Erosion Potential: 20.79 tons/acre

E. Sediment Potential: ____ cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 1 – 2

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

C. Equivalent Design Recurrence Interval, (years): 1

D. Design Storm Duration, (hours): 2

E. Design Storm Magnitude, (inches): 0.68

F. Design Flow, (cubic feet / second/ square mile): No change

G. Estimated Reduction in Infiltration, (percent): 0

H. Adjusted Design Flow, (cfs per square mile): No Change

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

The Fish Trap Fire occurred within the Red River Gorge, a landscape of highly dissected uplands and streams of the Red River watershed near the western edge of the Cumberland Plateau in east-central Kentucky. The burned area is roughly bounded on the western edge by Tunnel Ridge Road, the northern edge by the Red River, and the eastern and southern edge by State Highway 77. The Fire burned a total of 1,665 acres. 1,595 acres burned on National Forest System Lands and 70 acres burned on private land. The team assessed the entire burn affected by the fire. Approximately 271 acres (16.3%) of the burn was determined to have high burn severity, 257 acres (15.4%) of moderate burn severity, and 1,137 acres (68.3%) of low burn severity and unburned vegetation.

The Red River Gorge is a national treasure that is sometimes referred to as the "Grand Canyon of the East". This unique and scenic natural area occurs within the boundaries of the Daniel Boone National Forest in eastern Kentucky. The gorge is known for its free-flowing streams, abundant natural stone arches, unusual rock formations, and spectacular sandstone cliffs. State and federal designations within the area include the Red River Gorge Geological Area, National Wild and Scenic River, State Wild River, Outstanding National Resource Water, Clifty Wilderness, National Natural Landmark, National Archaeological District, and a National Scenic Byway. These designations guide the management and protection of watersheds, wildlife, archaeological resources and spectacular geologic features in the gorge. The Red River is also a priority watershed under Kentucky's Watershed Management Framework. The Red River Gorge is visited by an estimated **half million people per year** from around the world.

Summary of Watershed Response

Hydrologic Response: When considering the hydrologic effects from fire in the Eastern United States many studies indicate that the impacts are short in duration and relatively minor (Audin, 2008, Edwards and Troendle, 2008). Low fire intensity may be partially responsible for the lack of hydrologic response (Cushwa and others 1970, Mohering and others 1966, Shahlaee and others 1991). Swift and others (1993) also found that soils did not become hydrophobic following a low intensity fire on a poor quality site in the southern Appalachian Mountains of western North Carolina. Humus and some charred litter were present over much of the area but burning resulted in relatively little exposed mineral soil.

Studies also indicate that regardless of location and seasonality of stream flow increases, most measurable increases in water yields occur during periods of low flow in the Appalachians (Douglass and Swank 1975). In this region increases occur in annual water yields, but they primarily augment low and moderate flows (Edwards and Troendle, 2008). Peak flows are not altered.

On the Fish Trap Fire these conclusions will hold true on the low and moderate burn severity areas. The difference is on the high severity areas. The later portion of 2010 has seen a record setting dry period in the Red River Gorge. Only 2.8 inches of precipitation fell when normally this areas receives over 9 inches. Fire behavior was much more extreme than is usually observed in the eastern United States. Areas that burned hot included the slopes adjacent to Highway 77 near Nada tunnel and on the steep shoulders above the cliffs. Flame lengths near Nada tunnel were reported to be fifteen to twenty feet in length (Figure 1). On the upper shoulders of the cliffs the flame lengths grew to nearly forty feet and scorched much of the vegetation (Figure 2). The result was that most of the duff was consumed on the steep shoulder slopes above the cliff line. In addition, most of the downed fuel was burned and deep stump holes were created. Kolka (2008) found similar results and stated that "The most dramatic impacts have occurred where soils are shallow and fires are severe with some water quality parameters remaining elevated for 3 or more years". Unless treatment measures are taken, it is expected that there will be additional runoff and erosion to occur from the high severity areas. Erosion can already be seen following a low intensity 0.2 inch rainfall.

Figure 1. Fire near Nada Tunnel along Highway 77.

Figure 2. Severely burned area on steep slopes above cliffs showing exposed mineral soil.

Total water yields will most likely increase during the first and second years following the fire, but most of the change will augment low and moderate flows. Runoff in the severely burned areas will result in additional erosion. Due to the proximity of the severely burned areas to the edge of the cliff line, there will be an increase in runoff over the cliff's edge. This may impact archeological and botanical resources. Since the low and moderately burned areas dominate the lower slopes and make up a majority of the fire area (84%) it is unlikely that storm flows at the outlets of the sub-watersheds will be affected.

Erosion Response: The erosion hazard was estimated by using Web Soil Survey (NRCS, 2008). NRCS describes the erosion hazard as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

The erosion rates were modeled using ERMiT WEPP modeling (Elliot, 2006), an internet based model developed by the USDA Forest Service Rocky Mountain Research Station that estimates probable erosion rates using specific factors for climate, soil texture, rock fragment content, vegetative cover, slope, and soil burn severity. Erosion was modeled for representative areas within the fire perimeter. Slopes were determined by GIS modeling with erosion rates being calculated by weighted averages for the soil burn severity rating. The overall average erosion rate was estimated at 20.79 tons of soil per acre for the first year post fire using five-year precipitation. In contrast, the natural background erosion rate is estimated to be 0.24 tons per of soil acre. Background erosion rates should return with the recovery of post fire vegetation and soil cover levels, estimated to be within a 1 to 2 year timeframe.

Geologic Response: The unique geological features of the fire area are primarily due to the resistance of the sandstone to erosion. Rock shelters, lighthouses, and arches boldly illustrate the power of erosional processes in the area. Often the underlying rock is weaker than an erosion-resistant layer above it. Differential weathering washes out the weaker layers. This process has led to the formation of hundreds of rock shelters and other unique rock formations. Where the ridges are narrow, these rock shelters eventually weather through, forming an arch. The area contains the largest concentration of rock shelters and arches east of the Rocky Mountains.

Values at Risk

FISH TRAP WILDFIRE

BAER / CRITICAL VALUES-AT-RISK … SUMMARY TABLE

The following values were identified during the initial phase of the Fish Trap Fire BAER assessment process as "at risk" from the effects of the fire including increased runoff and debris flows, rock and debris fall, hazardous trees, erosion and sedimentation, and disturbance of natural and cultural resources.

HUMAN LIFE AND SAFETY

Human Life and Safety on or in close proximity to burned NFS lands.

Roads & Flooding – After an incident of wildfire, damaged transportation systems often behave as conduits by accelerating the flow of surface water across unprotected landscapes during periods of heavy rain or summer thunderstorm events. In most cases, the drainage design of a given road or trail system will NOT be sufficient to handle the increased magnitude of flows that will be produced as a direct result of the burning disturbance. There is increased potential for public safety problems along State Highway 77 if infrastructure becomes compromised and the road is overtopped. Overtopping would occur as a result of increased runoff, erosion, debris flows, and rock fall from the severely burned area immediately above the road, which is on a steep slope on national forest land. State Highway 77 is a major thoroughfare that serves as one of the three major entrances/exits to the area for mountain residents and the half million annual recreation users.– Likely / Major … **VERY HIGH**

Hazard Trees near roads, trails, trail heads, & parking lots – While 31.7% of the fire was high and moderate severity, threats to public safety exist to the general public along Double Arch Trail (201), Auxier Branch Trail (203), Courthouse Rock Trail (202), Auxier Ridge Trail (204) and State Highway 77 from increased potential for rockfall and hazard trees. Several trees were burnt along the trail system and state highway and identified as eminent hazards. Trail heads and parking lots are also affected. Due to the fire there was a reduction of the duff layer, scorching of the cambium layer, and compromised soil structure weakening the support system for live trees. As a result of the fire, day use hikers and overnight backpackers are at an increased risk to hazardous trees, both fire-killed and green trees. In several sections of these trails the tread was burned right up to and underneath the trail. Additionally, several tree root balls and stumps along the trail were consumed, which created holes as deep as three feet and voids underneath the trail tread. Standing hazardous snags are still within close proximity to the trail. The Red River Gorge is visited by an estimated **half million people per year** from around the world. Trails are very heavily used. Long term closure of these trails is **not** an option. Law Enforcement is currently working 24 hours per day, 7 days a week to keep the area closed.**–** Very Likely / Major … **VERY HIGH**

PROPERTY

Buildings, water systems, utility systems, road and trail prisms, dams, wells or other significant investments on or in close proximity to the burned NFS lands.

Forest Roads – Most National Forest System roads are located on ridge lines and are not in imminent danger from the

the wildfire. – Unlikely / Minor … **VERY LOW**

State Highway – There is increased potential for property damage along State Highway 77 if infrastructure becomes compromised and the road is overtopped. Overtopping would occur as a result of increased runoff, erosion, debris flows, and rock fall from the severely burned area immediately above the road, which is on a steep slope on national forest. State Highway 77 is a major thoroughfare and one of three main entrances/exits to the area for mountain residents and the half million annual recreation users. The slopes adjacent to the road are very steep and the only locations to control upslope fire impacts are within the narrow State right-of-way (the ditchline) and the slope above the road. – Very Likely / Major … **VERY HIGH**

Forest Trails / Trailheads – There are approximately 6.9 miles of NFS Trails within the Fish Trap fire perimeter. Approximately 5.9 miles are located in high burn severity areas or immediately downslope of these areas. These miles are at risk from increased runoff and debris flows. The drainage design of this trail system will NOT be sufficient to handle the increased magnitude of flows that will be produced as a direct result of the burning disturbance. – Likely / Moderate … **HIGH**

Private / State Property – There are several structures around the perimeter of the fire. The hydrologist assessed each property. No emergency threat exists to these structures around the perimeter. Unlikely / Minor … **VERY LOW**

NATURAL RESOURCES

Water used for municipal, domestic, hydropower, or agricultural supply or waters with special state or federal designations on or in close proximity to the burned NFS lands.

Red River Wild and Scenic River – Unlikely / Minor … **VERY LOW**

Water Quality – The most noticeable effects on water quality will be increased sediment from the burned area into Fish Trap and Auxier Branch. During storm events this will increase turbidity and contribute to some pool filling. Natural recovery is the recommended treatment. No emergency threat exists.

The above threats will be the most acute during the first post-fire rain event. Rain storms occur all year round but are strongest in the months of January, March, June, and July with a lower level of hazard following the summer season for areas with low to moderate burn severity. Areas that experienced high burn severity will not have new vegetative growth and will not become stabilized until the summer of 2012. There is a complex and prolific plant community in the area composed of some 1,000 different species representing 100 families and 304 genera. The richness of the vegetation in the Gorge can be related to its diverse topography, proximity to the center of the mixed mesophytic forest, and glacial history. The post-fire watershed threat should be reduced measurably after the first summer in low to moderate burn severities with favorable precipitation. – Possible / Minor … **LOW**

Wildlife – No specific threats to wildlife habitat were identified. No emergency threat exists. - Possible / Minor … **LOW**

Soil productivity – There is no emergency threat to soil productivity. Natural recovery is the recommended treatment. No emergency threat exists. – Possible / Minor … **LOW**

Native vegetation threatened by noxious weeds – An emergency exists with respect to vegetative recovery as a result of the threat of post-fire noxious plant introduction and spread. The introduction and dispersal of invasive weeds into areas disturbed by fire suppression and rehabilitation has the potential to establish large and persistent weed populations. In addition, it is highly likely that existent non-native plant

infestations will increase in the burn area, due to their accelerated growth and reproduction and a release from competition with natives. Birds also are expected to move in the area and bring with them a payload of several invasive weed seeds. These weed populations could affect the structure and habitat function of native plant communities and threatened and endangered species within the burn area. It is expected that most native vegetation will recover if weed invasions are minimized. An emergency threat exists. – Very Likely / Moderate … **VERY HIGH**

Rare Plants – The threatened white haired goldenrod is an herbaceous perennial plant in the sunflower family. The white haired goldenrod's habitat is located in the rock shelters throughout the Red River Gorge. Threats to the white haired goldenrod include: non-native plant invasion in the occupied habitat, recreational impacts of hikers, rock climbers, and campers, archaeological looting of the rock shelters, erosion/disturbance on upper cliffs, and forestry practices near the cliff line. It is highly likely that existing weed populations will increase in the white haired goldenrod occupied habitat. There is potential for day hikers to spread non-native plants in the area that the white haired goldenrods occupy due to new accessibility to these rock shelters. Individuals that recreate in or loot the rock shelters can disturb the occupied habitat. The disturbance to the white haired goldenrod's habitat constitutes an emergency. An emergency threat exists. Additional observations are summarized in the Botany Specialist Report. – Very Likely / Moderate … **VERY HIGH**

CULTURAL AND HERITAGE RESOURCES

Cultural resources on NFS lands which are listed on or potentially eligible for the National Register of Historic Places.

Listed & Currently Unknown Sites – Low levels of archaeological survey have been conducted in the Fish Trap Fire area. Out of 27 sites known to exist within the Fish Trap Fire, 26 fall within areas of high or moderate burn severity. One site, a previously unrecorded rock shelter with historic elements, was found to have been directly impacted by the fire. Loss of sediment on the ridge line could mean the actual loss of sites. Once trees die off or fall down along the cliff line, cracks can occur in the rock above the shelters introducing water, which can alter these sites. While most sites did not receive direct impacts during the fire, the increased water movement modeled in the hydrology report indicates these sites could now be at risk for damage from erosion or flooding. Flooding of these shelters can compromise artifacts remaining in the sites. In addition, the removal of vegetation from these areas increases the potential for inadvertent or intentional impacts from visitor traffic. An emergency threat exists. – Possible / Major … **HIGH**

Summary of the critical values and risk evaluations are in the table below:

Critical Values	Probabilities	Magnitudes	Risk Rating
*** Human Life and Safety ***			
Roads – Flooding	Likely	Major	**Very High**
Hazard Trees near roads, trails, trail heads, & parking lots	Very Likely	Major	**Very High**
*** Property ***			
Forest Roads	Unlikely	Minor	Very Low
State Highway	Likely	Major	**Very High**
Forest Trails	Likely	Moderate	**High**
Private / State Property	Unlikely	Minor	Very Low
*** Natural Resources ***			
Wild & Scenic River	Unlikely	Minor	Very Low
Water Quality	Possible	Minor	Low
Wildlife	Unlikely	Minor	Very Low
Soil Productivity	Possible	Minor	Low
Native Vegetation threatened by Noxious Weeds	Very Likely	Moderate	**Very High**
Rare Plants	Very Likely	Moderate	**Very High**
*** Cultural Resources ***			
Listed & Currently Unknown Sites	Possible	Major	**High**

B. Emergency Treatment Objectives:

As noted above, the greatest threats to life and propertyare from increased runoff, increased fire killed trees, and rock fall. For these reasons the primary treatment objectives are to reduce the risk to human safety, reduce the risk of degradation of significant natural resources including the potential spread of noxious weeds, and protection of cultural resource sites.

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

Land **80** % Channel ___ % Roads/Trails **80** % Protection/Safety **80** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	80	100	100
Channel	n/a	n/a	n/a
Roads/Trails	80	90	100
Protection/Safety	80	90	90

E. Cost of No-Action (Including Loss): $4.7 million

F. Cost of Selected Alternative (Including Loss): $860,000

G. Skills Represented on Burned-Area Survey Team:

[X] Hydrology	[X] Soils	[ ] Geology	[ ] Range	[ ] Public Information
[X] Forestry	[X] Wildlife	[ ] Fire Mgmt.	[ ] Engineering	[ ] Inter-agency coordinator
[ ] Contracting	[ ] Ecology	[X] Botany	[X] Archaeology	
[ ] Fisheries	[ ] Research	[ ] Landscape Arch	[X] GIS	

Team Leader: Mary Moore

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Core Team Members:

- Jeffery Lewis – Forester
- Jon Walker – Hydrologist
- David Taylor – Botanist/Wildlife
- Wayna Adams – Archaeologist
- Rita Wehner – Arch/Rec/Botany Tech

Adjunct Team Members:

- Robert Garrison – Line Safety Officer
- Tim Eling – Red River Gorge Manager
- Eva Challis – GIS

H. **Treatment Narrative & Implementation Accomplishments:**

Treatment Implementation Team Leaders:

- Claudia Cotton – Leader, Soil Scientist
- Tim Eling – Red River Gorge Manager
- David Taylor – Botanist/Wildlife
- Kay Shelnutt – Archaeologist
- Frank Bodkin - Archaeologist
- Charlie Rowe, Aaron Miller, and Carey Loomis – Trail Techs

(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:

Non-Native Invasive Plants Detection and Native Vegetation Recovery

Non-native invasive plant (NNIP) species detection surveys of all road (including dozer lines), trails, hand lines and drop points associated with the Fish Trap fire on NFS lands. These areas will be surveyed for evidence of spread of NNIP species. If new or expanded populations are detected in the surveys, a supplementary request for treatment of the populations will be submitted.

Native vegetation recovery survey directed primarily at high burn intensity areas. Burning was sufficiently severe in these areas to sterilize at least portions of the thin soils. In addition to the concern of non-native invasive plants moving into these areas, there is concern that native plants will not move in quickly. It is anticipated that in these areas, recovery will take at least two years.

Occupied Habitat Surveys to assess damage if any to the nine white-haired goldenrod sites known from within the Fish Trap fire area. It is expected that no serious injury has occurred to the sites, but confirmation is required.

This objective would be accomplished by surveying the 2 miles of hand lines, 11 miles of roads and trails used as control lines and traveled within the burn during suppression activities, 4 of drop point zones, and 9 sites of occupied habitat of white haired goldenrod in 2011. Surveyors should look for all Daniel Boone National Forest Listed Noxious Weeds. Estimated costs are based on the assumptions that two visits would be necessary due to establishment times. If timing is such that all the target species are detected in one visit, the actual costs would be lower than displayed below. If populations are located, an interim report will be completed, requesting funds for treatment/removal of nonnative species.

Item	Unit	# of Units	Unit Cost	Total
GS-12 botanist	Days	3	$496	$1,488.00
(2) GS-5 biological science tech	Days	10	$522	$5,22.00
Vehicle Mileage	Mile	300	$.45	$90.00
Supplies	Each	1		$100.00
Total				**$6,943.00**

Accomplishments for Non-Native Invasive Plants Detection and Native Vegetation Recovery:
David Taylor, GS-12 Botanist, worked 5.5 days on this job code to accomplish his work. Rita Wehner, GS-5 Biological Science Tech, worked 23.5 days on this job code for this treatment. The following report was written by David Taylor. No supplies were bought.

Various parts of the Fish Trap BAER area were surveyed beginning 29 June 2011, using both project dollars and BAER funds. Dates of surveys are 16 August 2011, 2 November 2011 and 8 November 2011. During these surveys two nonnative invasive species were found in large numbers: princesstree (*Paulownia tomentosa*) and coltsfoot (*Tussilago farfara*). About two hundred of each plant were located. Both species were especially dense on the ridge north of Nada Tunnel that was the ignition site for the fire.Using project dollars some of these were removed. Other non-native invasive species that were detected in order of decreasing abundance are common sow-thistle (*Sonchus oleraceus*) ca. 40 plants, common dandelion (*Taraxacum officinale*), ca. 40 plants, Chinese silverplume (*Miscanthus sinensis*), 40 plants, crabgrass patches (*Digitaria sanguinalis* and *D. ischaemum*), ca. 20, Oriental Lady's thumb (*Polygonum cespitosum*), 2 plants, Japanese spiraea (*Spiraea japonica*), and butterflybush (*Buddleja davidii*), 1 plant.

After numerous surveys on the Fish Trap BAER area as well as the Rush Ridge BAER area, and inquiries of a couple of district employees, a few patterns arose related to the non-native invasive species present.

1. **Of the nine species, the crabgrasses and Oriental lady's thumb do not have windblown seed. These species were likely carried in by hikers as all occurrences were along the trail. The butterflybush and spiraea can be spread by wind, but was likely brought in by a hiker. The butterflybush was within 50ft of a trail and the spiraea was on the ignition ridge. Other species carried in soil on shoes, paws, and in water such as Japanese stiltgrass (*Microstegium vimineum*) and miniature Beefsteakplant (*Mosla dianthera*) expected in the burned areas were not detected. These two species like moister conditions than occur immediately along most of the trail. Hikers may have remained on trails because of snag warning signs and therefore seed may not have yet migrated into off trail locations. It is also possible that trail closure until late spring reduced the spread of soil carried seed.**
2. **Existing populations of coltsfoot, common dandelion and Chinese silverplume are in the immediate area and provided a seed source between November 2010 and May 2011. A source princesstree was identified about two air miles to the northwest, the direction from which prevailing winter winds blow. At least a dozen Chinese silverplume plants were established in the southern portion of the Fish Trap BAER area prior to the fire. The source of the other species is unknown.**
3. **Trails and fire lines were largely free of nonnative invasive species. Most (~97%) individual plants were located during cross-country survey. Crabgrasses were the primary trailside weed.**
4. **Soil moisture, especially in areas with shallow soils over bedrock was high throughout the summer and fall. With the tree canopy mostly gone and a limited shrub and herbaceous layer, evapotranspiration is limited and soil moisture is high. In places ridgetop soils were muddy.**
5. **High light levels are present through most of the area. The lack of a tree canopy and limited shrub and herbaceous layer result in limited shade. All of the identified nonnative invasive species found, except Oriental lady's thumb require or fair best in high light conditions.**
6. **A well established cryptogamic crust over 20-30% of the area helps hold moisture in place and provides an ideal seedbed for some of the nonnative invasive species encountered.**
7. **Bare mineral soil or soil with thin (1/4 inch or less) duff provides an ideal seedbed for some of the nonnative invasive species for all the nonnative invasive species encountered.**
8. **In areas of intact or nearly intact canopy such as at lower slopes along creeks, nonnative invasive species were not found. In these areas duff did burn, but heavy shade reduces suitability for establishment of nonnative invasive species. Nonetheless, nonnative invasive species were found in areas of dense, mostly dead mountain laurel and rhododendron thickets where the canopy had been removed.**

It is likely that a typical wildfire for the area would not have resulted in the same level of infestation by nonnative invasive plants. The canopy still would be largely intact resulting in drier soil and lower light levels. Soil would be much less disturbed as well. Because conditions were as dry and warm as they were when the fire was ignited, severe damage was done to duff and the canopy setting the stage for nonnative invasive species infestation establishment. The extent of soil disturbance coupled with high soil moisture and high light conditions have provided ideal conditions for the establishment of the identified nonnative invasive species.

The current situation is problematic. For the next 3-4 years, conditions will continue to allow new populations of nonnative invasive species to become established. Woody plant recovery in particular will be slow and as a result soil moisture is likely to remain high unless the area is subject to drought. Light conditions are expected to remain high as well, although they will slowly decrease as herbaceous plant cover increases. While a large number of nonnative invasive plants have been and will be removed, many are in inaccessible places for hand removal. These plants will produce seed and continue to increase the existing infestation. Offsite populations of nonnative invasive species, many on private lands, will continue to

contribute seed. An increase in trail associated occurrences and soil transported species is expected as more users return to the area. There is an expectation that bird-spread nonnative invasive species will be detected by summer 2012. Existing populations of autumn olive (*Eleagnus umbellata*), wine raspberry (*Rubus phoenicolasius*), Asiatic bittersweet (*Celastrus orbiculatus*), Amur honeysuckle (*Lonicera maackii*), and Japanese honeysuckle (*Lonicera japonica*) are present nearby on National Forest System lands or on private lands. While it is fact existing populations of nonnative invasive species provide the seed source, it is the conditions created by the fire that create the problem for this area.

Of particular concern are princesstree (Fig. 1) and coltsfoot both from the standpoint of sheer numbers of plants and their reproductive potential. These two species are also expected to persist as the forest begins to recover. Princesstree grows quickly (some individuals encountered reached 6ft in less than one full growing season, see Fig. 2) and will maintain itself in the canopy for 20-30 years before it is overtopped. A single tree at 6" inches dbh (about 3-4 years growth) is capable of producing ¼ million seeds. Individual plants pulled indicate a wide variation in growth strategies. Many plants put down large carrot-like taproots (Fig. 4) and produced small stems. These plants will grow rapidly in the next few years and will persist even in drought. Others produced more fibrous roots and grew to 6ft tall (Fig. 3). These also will grow rapidly, but may be more susceptible to drought conditions. Some produced a combination of both types of roots. Based on treatment through November, the chances of removing individuals of this species by hand after mid-summer 2012 are slim. At that point targeted treatment with chemical will be required over a large area for multiple years to control the species. Eradication may not be possible for years if at all.

Fig. 1. Princesstree ca. 3 in tall (September 2011).

Fig. 2. Princesstree ca. 6 ft tall (September 2011).

Fig. 3. Princesstree with fibrous root system (September 2011).

Fig. 4. Princesstree with taproot system (November 2011).

Coltsfoot will maintain itself in moderate shade for years, but with reduced flowering. Buds are already set and may actually open anytime between December and March (Figs. 5 & 6). The plants observed were averaging 25 buds per plant (after one growing season). Each bud produces 100-200 seeds for 2500-5000 seeds per plant. The plants once established form large rosettes that smother vegetation. The plant produces an extensive rhizome system that grows downward and then laterally at multiple levels. Treatment (hand pulling) accomplished so far indicates that complete removal of plants will become difficult at best. Many have already begun to grow vertical rhizomes. It is not known how much of these rhizomes need to be removed to ensure death. Even small plants with 2-3 leaves were producing lateral rhizomes to 12 inches long. At best one more growing season of hand pulling is available to treat plants established in 2011. After that, it will require the use of targeted chemical over a large area for multiple years to control the species. Eradication may not be possible.

Fig. 5. Coltsfoot with rhizomes (September 2011).

Fig. 6. Coltsfoot with flower buds (November 2011).

In this BAER area, Chinese silverplume has the potential to become a problem, especially on the ignition ridge. Numerous seedlings were found in this area along with older established plants. Conditions are excellent for the growth and reproduction of the species and are expected to remain so for 3-4 years at least. Unlike princesstree and coltsfoot, individual plants of this species are effectively removed by hand even after 10-15 years of growth unless they coalesce into larger patches. Careful monitoring and action to remove this species can reduce its problematic potential.

Boot Cleaning Stations

Boot Cleaning Stations at Martin's Fork Trailhead, Auxier Ridge Trailhead, Raven's Rock Trail, and Double Arch Trail should significantly reduce the introduction of invasive species into the burn area. Boot cleaning stations will consist of a three brush system mounted such that a boot or shoe placed in the device and moved back and forth will remove the majority of mud and seed attached to the bottom and sides of the boot before entry onto the trail. The brush system will be mounted on a concrete slab to steady it and make it less mobile. A simple Carsonite sign will explain its purpose and use.

Boot Cleaning Station Cost

Item	Unit	# of Units	Unit Cost	Total
(2) GS-5 Rec Tech	Days	2	$ 522.00	$ 1,044.00
Vehicle Mileage	Miles	150	$ 0.45	$ 67.50
Boot Brush	Each	4	$ 100.00	$ 400.00
Carsonite Signs	Each	4	$ 25.00	$ 100.00
Sticker (Print and Design)*	Each	0	$ 1,000.00	$ -
Total				**$ 1,611.50**

*Sticker Print and Design cost is captured in Rush Ridges Cost

Accomplishments for Boot Cleaning Stations:
Glen Scott, GS-5 Rec Tech, spent 8 days from this job code on this treatment. David Taylor wrote the following report.

The originally planned design for boot brush stations was changed after additional consultation with other National Forest units and venders. The cost increased about $250 per station for design, purchase and installion, but resulted in sturdier, more user friendly, and more easily maintained product. The final design chosen consisted of a small plaque (18" x 24") mounted on two 4" x 4" posts. Near ground level, a boot brush was attached to the posts. Surrounding the posts is a 48" x 48" wooden frame filled with gravel (Fig. 7). As soil and seeds are wiped off boots and shoes, it falls into the gravel and is captured. Once seed sprouts, plants can be pulled and identified to know what was kept off of the trail system. The plaque allowed for an educational message (Fig. 8).

All four planned boot stations were installed. The main Auxier Ridge trail and connecting trails receive heavy recreational use and with that use comes increased likely of the introduction of soil-carried nonnative invasive species. Boot stations are expected to help control soil-carried nonnative invasive species within the Fish Trap BAER area.

Fig. 7. Completed Boot Brush Station.

Fig. 8. Plaque on boot brush station.

Channel Treatments: None Proposed

Roads and Trail Treatments:

State Highway 77 Treatments

Minimize the risk of State Highway 77 if infrastructure becomes compromised and road is overtopped. Protect culverts from debris jams while reducing the potential for erosion from the steep cut slopes along the road.

Treatment Description: Implement BAER treatments along a 1 mile section of Highway 77 on the east side of Nada Tunnel.

Three prescribed treatments include:
- Installing and staking straw bales above the culvert inlets.
- Installing and staking straw bales in the ditch line.
- Hydromulching and/or seeding above State right-of-way where necessary.

BAER treatments will focus on road banks in areas of moderate to high soil burn severity. Monitoring points will be established with GPS and photo points to be used over time to check the progress of the recovery efforts. The slopes adjacent to the road are very steep and the only location to control upslope fire impacts is within the narrow State right-of-way.

A twenty person fire crew will complete the emergency treatments. Work will consist of day work with no overnight stays.

Item	Unit	# of Units	Unit Cost	Total
GS-11 Soils Scientist	Days	1	$500	$500
GS-09 Archeologist	Days	5	$320	$1,600
Vehicle Mileage	Mile	250	$0.45	$113

Supplies	Each	1		$5,000
Contract for Hydromulching	Each	1		$3,000
Total				**$10,213**

Accomplishments for State Hwy 77 Treatments:

Claudia Cotton, GS-11 Soil Scientist, spent 5 days from this job code for this treatment. Kay Shelnutt, GS-09 Archaeologist, spent 4 days. Carey Loomis, GS-09 Trail Tech, spent 2.3 days. Richard Hunter, GS-07 Trail Tech, spent 1 day. The straw bales cost $476.00. The hydromulch treatment cost $14,500. The following report was written by Claudia Cotton.

On May 6, 2011, 80 straw bales were staked along a 1-mile section in the ditch line of Hwy 77 to reduce sedimentation (Figs. 9-11). The hydromulch contract got held up in contracting, and the bare ground above the ditch line (higher up on the slope than what is seen in the picture) was contributing to sediment in the ditch line. The KY Department of Transportation cleaned out the ditch line just prior to the installation of the straw bales. The area was hydromulched just after the installation of the straw bales.

Fig. 9. Staked straw bale in ditch line above Hwy 77.

Fig. 10. Staked straw bales around culvert along Hwy 77.

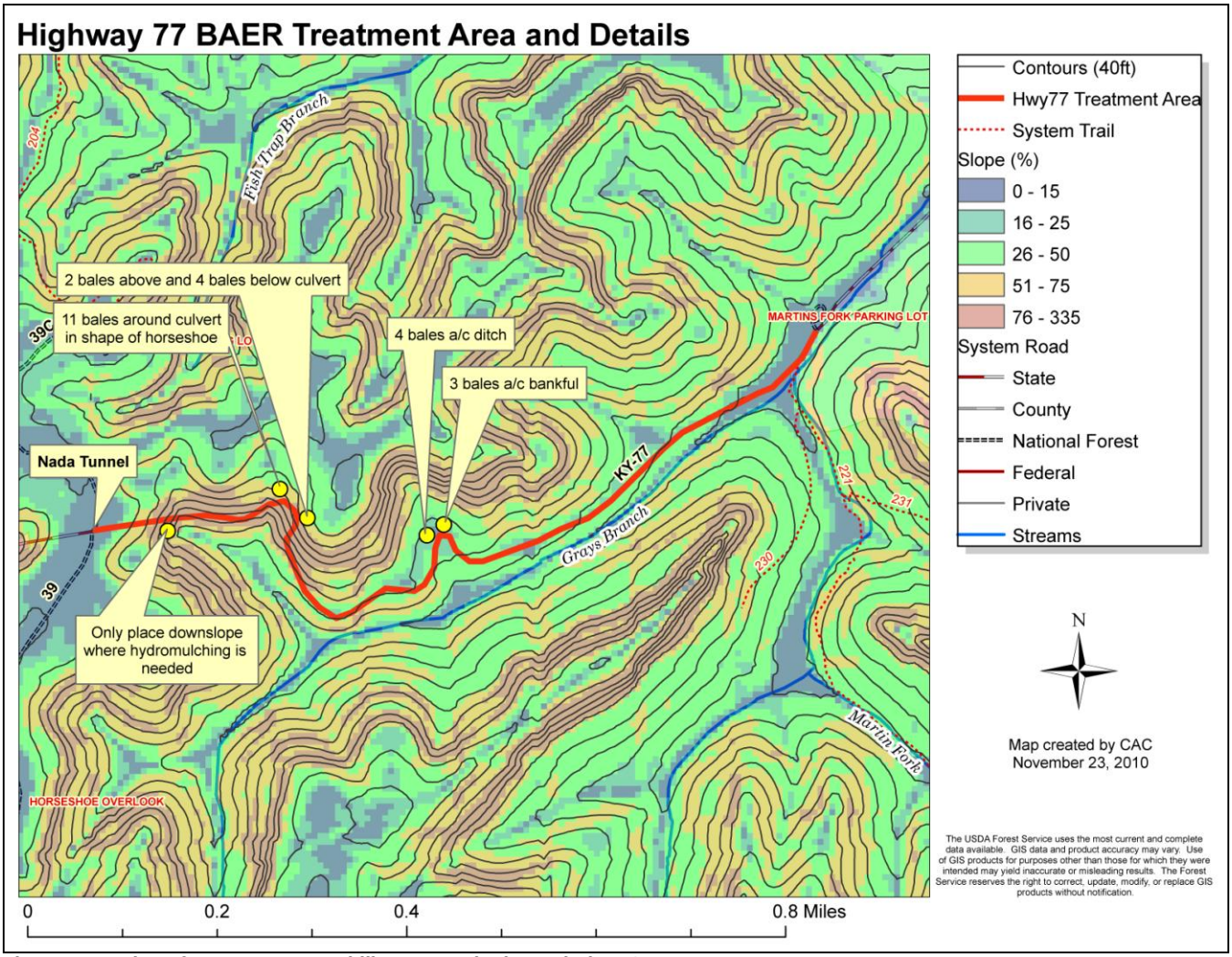

Fig. 11. Location of treatments to stabilize Hwy 77 in the Red River Gorge.

On May 16, 2011, 4 acres along the north slope of Hwy 77 were hydromulched to revegetate and stabilize the slope. Each acre received the following: 1500 lbs. mulch, 250 lbs. fertilizer, 125 lbs. lime, 100 lbs. of mixed annual and winter rye (*Lolium multiflorum* & *Secale cereale*, respectively), 80 lbs. of tackifier, and 3,000 gallons of water. The treatment area extended along a one-mile section of the highway between Nada Tunnel and Martins Fork Trailhead (Fig. 11). This was the ignition slope and the wildfire burned off much of the vegetation (Figs. 12 & 13). After the treatment was installed, the slope was stabilized and bare soil and erosion were reduced (Figs. 14-16).

Fig. 12. Slope above Hwy 77: bare soil, steep slope.

Fig. 13. Slope above Hwy 77: bare soil, steep slope.

Fig. 14. Application of hydromulch.

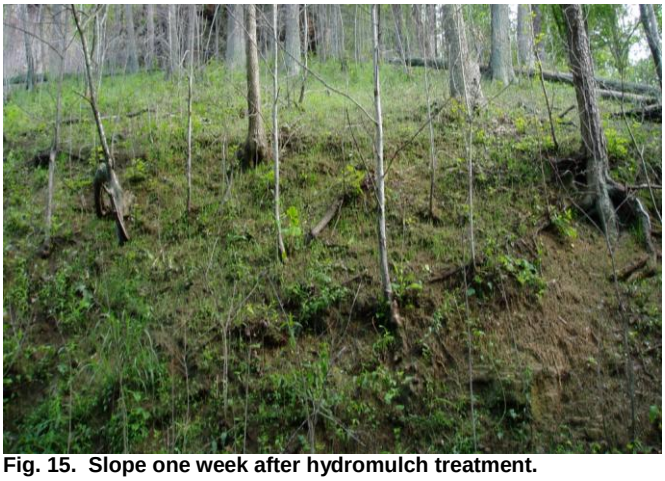

Fig. 15. Slope one week after hydromulch treatment.

Fig. 16. Slope two weeks after hydromulch treatment.

Trails Treatment

Minimize risk of trail failure in the burn area through the placement and maintenance of effective water control measures. Prevent the channeling of water on trails. Ensure the diversion of runoff in controlled intervals to reduce erosion and further watershed degradation. The trail segment selected for emergency BAER treatments have reliable access for trail crews to meet treatment objectives. Improve areas where trail tread was lost to provide for public safety.

Treatment Description: Approximately 5.9 miles are located in high burn severity areas or immediately

downslope of these areas. These miles are at risk from increased runoff and debris flows. BAER treatments will focus on: 1) decreasing sediment flow; and 2) protecttin the trail infrastructure from failure

Four prescribed treatments include:

- Clearing and improving both earthen, log, and rock water bars,
- Trail out-sloping and berm removal (as needed),
- Armor side wall of the trail tread with native materials (where duff layer has burnt to the edge and in places under the trail)
- Filling in of stump holes that are immediately adjacent to trails and pose a hazard to public health and safety

BAER treatments will focus on trails in areas of moderate to high soil burn severity. Monitoring points will be established with GPS and photo points to be used over time to check the progress of the recovery efforts.

Currently, the trails are closed and we have Forest Law Enforcement Officers keeping people out of the area. Due to multiple access points, once the trails are opened, the trailheads will be posted with hazard signs to warn trail users of the increased hazards from rockfall and hazardous trees post-fire.

A twenty person crew will complete the emergency treatments. Work will consist of day work with no overnight stays.

The cost estimate is high due to the severety of the burn which is causing an impact to a heavily used trail system. With an estimated **half million visitors per year,** public health and safety is a serious concern in this area.

Trails Treatment

Item	Unit	# of Units	Unit Cost	Total
GS-11 Soils Scientist	Days	3	$500	$1,500
GS-09 Trails Crew Leader (2 people)	Days	10	$320	$3,200
20 person crew	Days	5	$11,000	$33,000
GS-09 Archeologist	Days	5	$320	$1,600
Vehicle Mileage	Mile	250	$0.45	$113
Supplies	Each	1		$1,000
Total				**$40, 413**

Accomplishments for Trails Treatment:

The following personnel worked on this treatment: Claudia Cotton, GS-11 Soil Scientist, 2.5 days; GS-09 Trails Crew Leaders (rotated) – Aaron Miller, 13.5 days, Carey Loomis, 8.3 days, and Charlie Rowe, 14 days; Kay Shelnutt, GS-09 Archaeologist, 2.5 days; and Jon Walker, GS-12 Hydrologist, 4 days. The following report was written by Claudia Cotton and Charlie Rowe.

We were able to save money by using a trail crew comprised of ten students from the Frenchburg Job Corps to accomplish much of this work. This was a benefit to us and the students, as the JC Facility is located approx. 5 miles from the burned area, and their teachers are always looking for ground experience for their students. Supplies included PPE for the Job Corp kids, trail tools, and rock working tools.

The Fish Trap Fire affected approximately 5.9 miles of system trails. These trails included Double Arch # 201, Courthouse Rock #202, Auxier Branch # 203, and Auxier Ridge #204. These

four trails have a combined trail mileage of 7.4 miles. These trails are all single track trails used primarily by hikers. Much of the fire impacts included burned out standing trees, burned out stump holes, and the loss of soil structure under the trail. The Frenchburg Job Corps and district trail technicians made up the team for treatment work associated with these trails.

The first phase in trail rehab work involved some hazard tree removal and filling in burned out stump holes (Fig. 20). Most of tree removal work was accomplished during mop-up operation after the fire. The primary safety task however was filling in the numerous amount of burned out stump hole along the trails. We targeted holes that were approximately within 6 feet of either side of the trails. After consultation from district archeologist we were able to use on site soil to fill in these holes. Without having an exact count, there may have been approximately 100 holes that were filled in. The holes ranged in size from one foot wide by two foot deep, to 3 feet wide by 3 feet deep. The holes where filled in using five gallon buckets and shovels. In areas where larger holes existed along the outer edge of the trail, we used soil excavated from the inside edge of the trail which helped to widen the trail and allow trail users to travel a safe distance from these filled in holes.

Once the immediate safety issues were mitigated the trails team moved onto bringing various segments of each trail up to a standard that would reduce channeling of water and rutting on the trails. The objective was to reconstruct or relocate trail segments that were directly or indirectly impacted by the fire. Due to the organic materials being burned off on top of the forest floor, the probability of water run-off across on top of the trails had increased significantly until which time vegetation grew back. To mitigate this the several days were devoted to de-berming the outer edge of trails that traveled alongside slopes (Fig. 21). Hand tools were used to accomplish this. In addition, several water dips or water bars were added. This aided in redirecting water off the trail which is a significant reason for causing trails to rut or "cup".

One particular segment of the Auxier Ridge Trail needed to be relocated because of the high potential for continued erosion, poor alignment when the trail was first constructed, and the impacts of the fire (Fig. 19). This segment was relocated on the side hill rather than leaving it aligned along the fall line of the hill it was built on. The new segment will minimize future erosion and create a safe route for trail users. The original section was also closed out by the trail crew. Water dips were constructed with hand tools and brushed in to prevent future use.

Fig. 17. Collapsed trail on Auxier Ridge.

Fig. 18. Repaired trail on Auxier Ridge.

Fig. 19. Trail reroute on Auxier Ridge; old trail is to the right.

Fig. 20. Trailside burned out stump hole repaired.

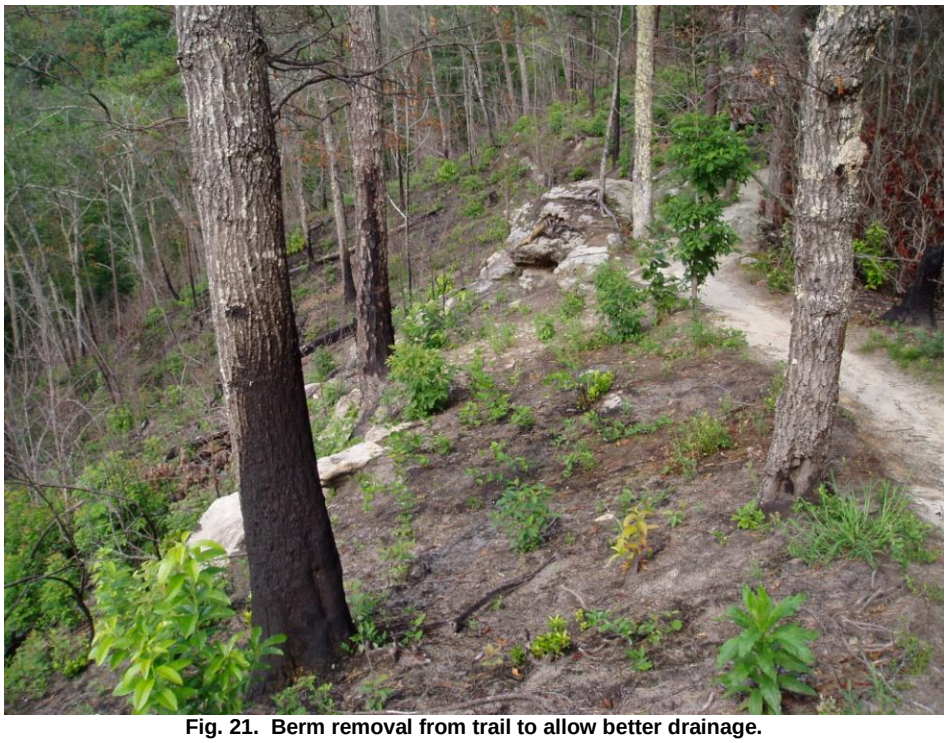

Fig. 21. Berm removal from trail to allow better drainage.

Protection/Safety Treatments:

Heritage Resource Preservation Treatment and Surveys

The main objective of treatment is to stabilize or camouflage cultural resources that are now at risk due to the fire effects. Any sites that are now easily accessible should be camouflaged to help inhibit impacts from deliberate or inadvertent damage, vandalism, and/or looting. In addition, sites that may suffer impacts from changes in water flow should be stabilized to help prevent damage from erosion or flooding. Towards these ends, a three part treatment is proposed for the Fish Trap Fire Area.

First, the direct impacts of the fire to the previously undocumented rock shelters should be dealt with. For this site, the best treatment is camouflaging the site to keep visitors from deliberately or inadvertently damaging the site. Camouflage would be best achieved by placing brush around the front of the rock shelters to shield the cultural materials from view.

The second recommended treatment is stabilization of the recorded sites inside the areas of high and moderate burn severity to protect them from impacts created by erosion or flooding. A total of 26 of the 27 previously recorded sites fall within high or moderate burn areas. This step should be conducted in two episodes; the first stage would be physically visiting these 26 sites after the first significant storm event to check for erosion or flooding. Should evidence of erosion or flooding of sites be observed, actions would be taken to prevent further water flow in these sites. For sites on ridges or slopes, the water should be diverted and the sites protected through the placement of erosion blankets.

If the rock shelter sites are being flooded, the water must be diverted to prevent the loss of irreplaceable cultural resources that persist in these unique, dry environments. If the water is entering from the back of the shelter, then water is flowing down from the top due to the new condition of a lack of vegetation to divert water. To remedy this situation, water flow can be mitigated from the top of the landform through the placement of mulch and seeding of the area. If the water is entering from the front due to increased run off over cliff edges (as is predicted in the hydrologist report) water bars must be put in place to divert the increased water flow away from the rock shelter to protect the fragile dry environment inside the shelter.

Next, educational signs should be posted (if not already present) at the trail heads. Signs should advise visitors of the penalties associated with looting, damaging, and/or vandalizing cultural resources. Signs educate the public and support law enforcement should the need arise to prosecute antiquities violations. Signs can be placed in existing kiosks at trailheads. Since there are already penalties for damaging cultural resources on the Forest, Forest Service law enforcement and Backcountry Rangers will also be informed so they are aware of resources in the area and can look for human impacts.

Treatments proposed include camouflaging one rock shelter, placement of erosion blankets and mulch on open sites to prevent erosion, creation of water bars or placement of mulch above shelters to prevent flooding of rock shelters and installation of educational signage at trail heads.

Heritage Resource Protection Treatment Costs

Item	Unit	# of Units	Unit Cost	Total
FS Arch (GS -9)	Days	16	$ 279.00	$ 4,464.00
FS Trails Person (GS-9)	Days	6	$ 320.00	$ 1,920.00
FS Heritage Tech (GS -5)	Days	10	$ 260.00	$ 2,600.00
FS Forest Arch (GS-12)	Days	3	$ 339.61	$ 1,018.83
Red River Gorge Manager	Days	2	$ 462.20	$ 924.40
Vehicle	Miles	350	$ 0.45	$ 157.50
Supplies and Signs	Each	1	$ 2,000.00	$ 2,191.0
Total				**$ 13,275.73**

Accomplishments for Heritage Resource Protection Treatment:

Kay Shelnutt, GS-09 District Archaeologist, spent 9.5 days on this treatment. Richard Hunter, GS-07 Trail Tech, spent 9 days. Tim Eling, GS-12 Red River Gorge Manager, spent 3 days. No supplies were purchased for this treatment. The following report was written by Kay Shelnutt.

Twenty previously recorded archaeological sites and one newly discovered site (see Fig. 22) were monitored to assess what damage, if any, was caused by the Fish Trap Fire in October 2010. Three previously recorded sites were not relocated, generally due to inadequate or inaccurate location information in the original site record. With one exception, the sites examined suffered no permanent damage from the Fish Trap Fire. In those sites where the fire encroached, the burn was confined to floor debris or the uppermost duff layer. There is also no indication of current or potential damage from fire-related erosion or flooding. The fire did damage wood plank artifacts in the newly discovered site. The damage was slight, however, charring only the end of some of the planks. In order to mitigate this damage, the site was recorded and the data entered into the Forest Service Infra database. Signs advising visitors of the presence of Cultural Resources have been placed at the Martin's Fork, Double Arch, Pinch-Em-Tight, and Auxier Ridge trailheads. The signs were printed and placed in the kiosks at the trail heads.

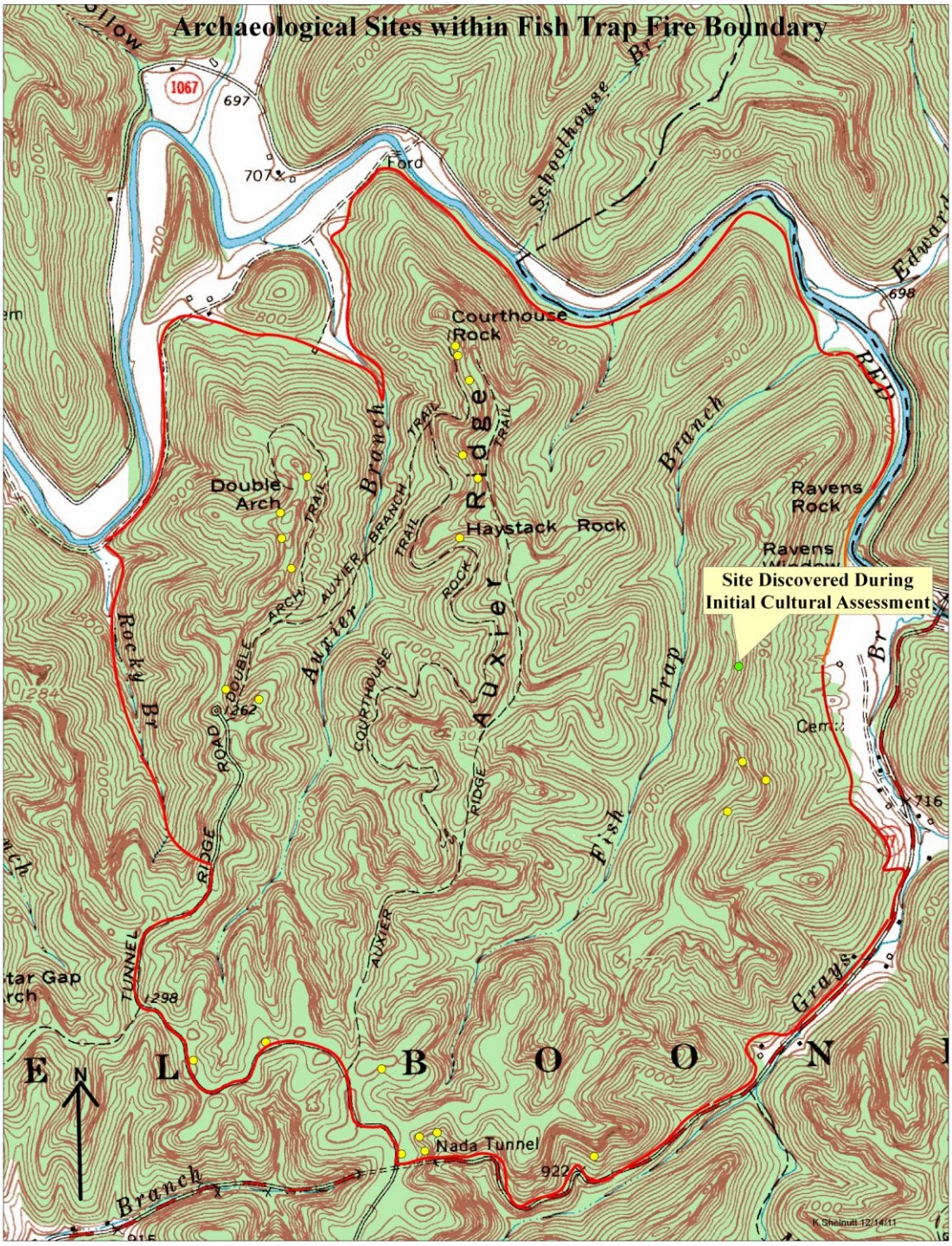

Fig. 22. Location of new heritage site within the Fish Trap Fire perimeter.

Fig. 23. Rockshelter in the burned area.

BAER Warning Signs

BAER warning signs purposed for protection of life and safety and cultural and natural resource sites. Treatment sites include Fish Trap Fire burn area entry points: Martin's Fork Trailhead, Auxier Ridge Trailhead, Raven's Rock Trail, and Double Arch Trail and east and west bound on highway 77. Construct and install signs with text, font, colors, size and shape designated by the Forest Service at locations determined by the Red River Gorge Manager. Warning signs will be to Daniel Boone National Forest and Red River Gorge Scenic Area specifications and will alert walkers and overnight backpackers to hazards along the trail in order to minimize personal injury.

Sign Treatment Cost

Item	Unit	# of Units	Unit Cost	Total
(2) GS-7 Rec Techs	Days	3	$ 567.00	$ 1,701.00
Vehicle Mileage	Miles	250	$ 0.45	$ 112.50
Signs	Each	6	$ 334.00	$ 2,004.00
Total				**$ 3,817.50**

Accomplishments for BAER Warning Signs

Tim Eling, GS-12 Red River Gorge Manager, spent 3.8 days on this treatment using this job code. No supplies were purchased.

Laminated warning signs (Figs. 23 and 24) were posted at Martin's Fork Trailhead, Auxier Ridge Trailhead, Raven's Rock Trail, and Double Arch Trail and east and west bound on Hwy 77. Tim was also instrumental in working with the public to close the area, communicate the situation, and reopen the area.

Fig. 23. BAER warning sign in a kiosk at a trailhead in the burned area.

Fig. 24. BAER warning sign placed at a trail head in the burned area.

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

			NFS Lands				Other Lands			All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
Weed Surveys	each	1	6943	$6,943	$0		$0		$0	$6,943
~~Goldenrod Surveys~~	~~each~~	~~1~~	~~2724~~	~~$0~~	~~$0~~		~~$0~~		~~$0~~	~~$0~~
Boot Cleaning Stations	each	4	402.88	$1,612	$0		$0		$0	$1,612
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$8,555	$0		$0		$0	$8,555
B. Channel Treatments										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
Highway 77	mile	1	10213	$10,213	$0		$0		$0	$10,213
Trails	mile	6	6735	$40,410	$0		$0		$0	$40,410
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$50,623	$0		$0		$0	$50,623
D. Protection/Safety										
~~Hazard Tree Removal~~	~~each~~	~~1~~	~~5373.5~~	$0	$0		$0		$0	$0
~~Hazard Tree Surveys~~	~~each~~	~~1~~	~~6687.5~~	$0	$0		$0		$0	$0
Heritage Surveys	sites	26	510.61	$13,276	$0		$0		$0	$13,276
Warning Signs	each	6	636.25	$3,818	$0		$0		$0	$3,818
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$17,093	$0		$0		$0	$17,093
E. BAER Evaluation										
				---	$45,000		$0		$0	$45,000
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				---	$45,000		$0		$0	$45,000
F. Monitoring										
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				$76,271	$45,000		**$0**		**$0**	**$121,271**