



Las Conchas Post-Fire Response Plan

Bandelier National Monument

AUGUST 2, 2011

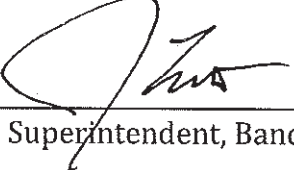


Las Conchas Post-Fire Response Plan | 2011

PARK: Bandelier National Monument

DATE: August 2, 2011

PREPARED BY: National Park Service Las Conchas BAER Team

SUBMITTED BY:  Date: 8/4/11
Jason Lott, Superintendent, Bandelier National Monument

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INTRODUCTION

This document is the post-fire response plan for the Las Conchas Fire at Bandelier National Monument. It consists of assessments and treatment specifications to stabilize and rehabilitate the fire. It has been prepared in accordance with Department of the Interior and National Park Service policy, including DM 620 Part 3: Burned Area Emergency Stabilization and Rehabilitation, the Interagency Burned Area Emergency Response Guidebook, and NPS Reference Manual 18.

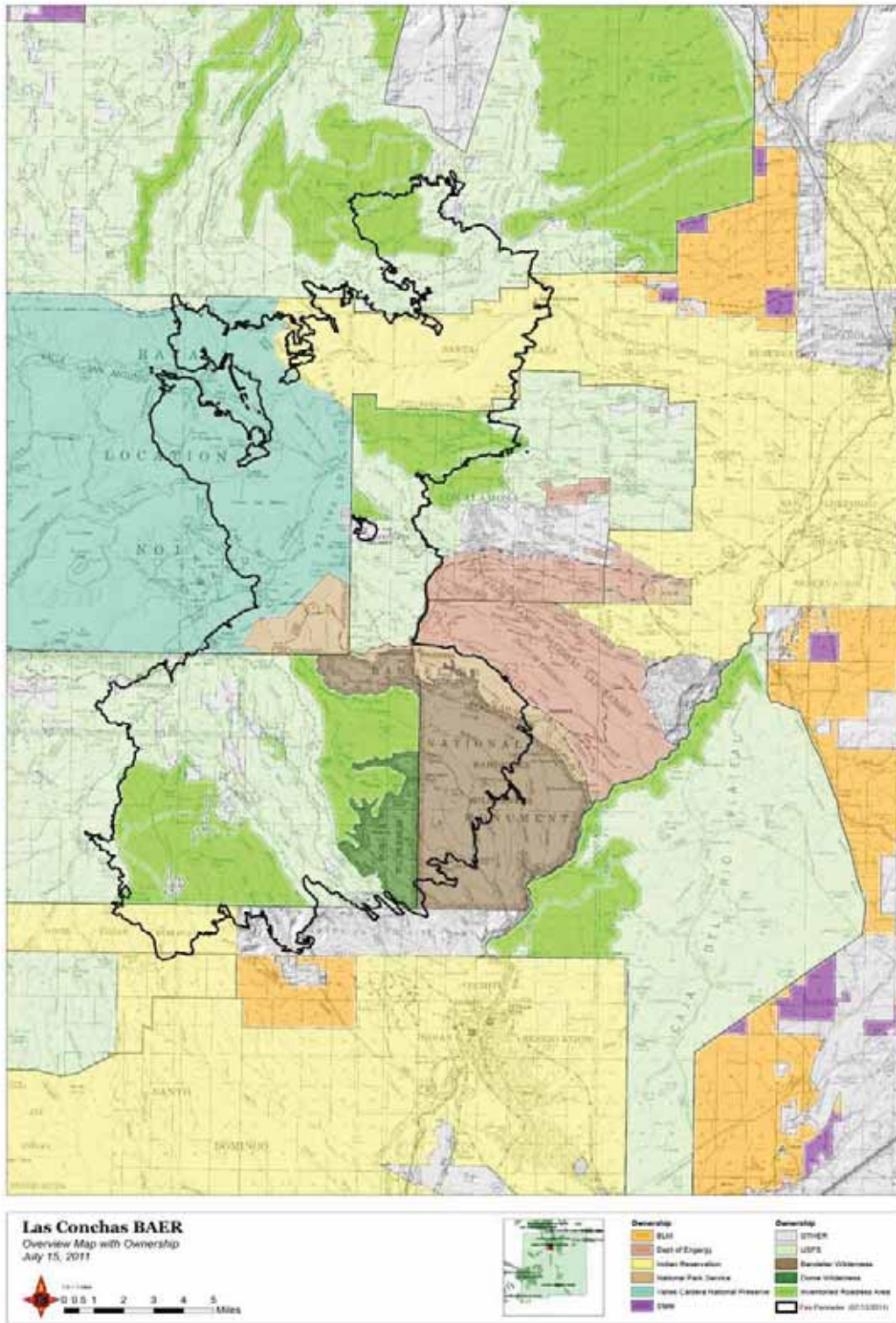
There are three funding sources for post-fire activities; suppression damage repair, emergency stabilization and burned area rehabilitation. Suppression damage repair is performed to rehabilitate suppression damages from activities such as dozer lines, hand lines, and the creation of new fire access routes. Emergency stabilization funds are used to assess and prescribe cost effective post-fire measures necessary to protect human life, property, and critical cultural and natural resources in accordance with approved land management plans and policies, and all relevant federal, state, and local laws, and regulations. Non-emergency burned area rehabilitation treatments to prevent the encroachment of invasive species and to repair minor infrastructure. Any needs and requests outside of these three funding authorities must use park funds or other non-fire program sources.

This plan provides recommendations for all funding sources to stabilize, rehabilitate and restore lands within the jurisdiction of the Bandelier National Monument affected by the Las Conchas Fire. It was prepared by a Burned Area Emergency Response (BAER) team comprised of Bandelier National Monument staff, USGS staff from the Jemez Mountain Field Station, and the United States Forest Service.

The Las Conchas Fire

The Las Conchas fire began on June 26, 2011 when an aspen tree fell and brought down a power line near the Las Conchas Fishing Access Area on the Santa Fe National Forest. The fire ranks as the largest wildfire in New Mexico history. It is the latest and largest in a series of wildfires in the forests and woodlands of the Jemez Mountains in central New Mexico. It destroyed sixty-three residences, impacted cultural and heritage resources, devastated vegetative cover which exposes soil to erosion, and damaged wildlife habitat. The fire burned across almost the entire north-south axis of the mountain range.

During its first burn period, the fire raced across the southern face of the Jemez Mountains, burning 43,000 acres of private land, the Santa Fe National Forest, Bandelier National Monument, and the Valles Caldera National Preserve. The next day, the fire crossed the crest of the Sierra de los Valles, forcing the evacuation of 12,000 residents of Los Alamos. Driven by strong southwest winds, the fire spread to the north and east and entered the head of Santa Clara Canyon. Over the next two weeks, the fire slowed but continued to burn to the north and southwest.



Stand replacement fire occurred in the headwaters of Frijoles Creek, on the sloping mesas of the southern Jemez range, on the east flank of the Valles Caldera, in the headwaters of Santa Clara Creek, and on the slopes of Chicoma Mountain, the highest point in the range.

The Las Conchas Fire has burned more than sixty percent of Bandelier. The possibility of flash flooding in canyons and post-fire dangers such as snags near trails in the park will keep areas of the park closed for the near future. Sections of the park began opening on July 25, 2011, including Juniper Campground, Burnt Mesa Trail, Tyounyi Overlook Trail, and Tsankawi Trail.

Burned Area Emergency Response

It was obvious after the first burning period that a post-fire burned area emergency response was needed. Personnel from the US Forest Service's Santa Fe National Forest, the National Park Service's Bandelier National Monument, and regional and national BAER coordinators exchanged emails to develop a plan. Initially it was decided that the US Forest Service would form a team and the National Park Service would fold into it. After the fire burned north across Santa Clara Pueblo, this triggered a request for the DOI National Burned Area Emergency Response Team. Agency administrators decided that the original US Forest Service – National Park Service configuration would assess the south zone of the fire and the DOI team would assess the north zone. Both of these teams would be coordinated by a National Incident Management Organization.

Park staff and the Burned Area Emergency Response Team have used historical flood data to inform flood mitigation preparations. For example, following the La Mesa Fire of 1977 the Rito de Frijoles flowed thirty-two times its usual rate, and destroyed 23 trail bridges, altered the stream bed, forced evacuations, and deposited 3 feet of silt behind the administrative buildings. Based on this data, NPS crews and contractors removed trail bridges above the visitor center and the auto bridge adjacent to the visitor center to reduce the potential for these structures to act as dams and cause more damage in the canyon. In addition, sandbags and plastic barriers have been installed to protect the CCC historic district. Resource advisors closely monitored these efforts to ensure historic and prehistoric sites weren't adversely impacted.

National Park Service Type II All Risk Team

The National Park Service ordered a NPS Incident Management Team to assist in recovery, restore park operations, and implement emergency stabilization measures. The Intermountain IMT (Incident Commander Rick Mossman) was assigned to the incident. The team is a Type II All Risk Team that responds to a variety of incidents. The objectives for the team were as follows:

1. Protect human life, property and resources through adherence to safety policy and standards and application of risk analysis to all actions
2. Assess immediate, short-term and long-term hazards for re-occupation for agency and public use of the Historic and Visitor Use area of Frijoles Canyon
3. Coordinate and support BAER (Burned Area Emergency Response) team dedicated to BAND Las Conchas Fire response.

4. Implement recommended mitigations for immediate agency and public use of Frijoles Canyon Historic District.
5. Consolidate park administrative functions providing necessary and appropriate office space to reestablish and maintain sustained park operations.
6. Establish interim visitor services program based upon limited or no use of Frijoles Historic District to be initiated as quickly as feasible.
7. Manage park operations to facilitate emergency recovery, on-going operational needs planning and facilitation of park operations as appropriate.
8. Coordinate park operations with existing Las Conchas Fire Operations.
9. Keep costs commensurate with incident requirements.

BAER Team Assessment and Post-Fire Issues and Concerns

The Las Conchas Fire Burned Area Emergency Response (BAER) Team assessed the incident to determine post-fire impacts to life, property, and critical and natural resources. The team conducted field visits to review resource conditions after the fire, completed literature reviews, and consulted resource specialists. The main objectives of the field visits were as follows:

- Identify and inventory values at risk from post-fire flash floods and debris flows
- Identify the physical and biological mechanisms that are creating risks
- Develop soil burn severity maps to identify potential areas of concern
- Review channel morphology and riparian conditions
- Determine needs for emergency stabilization
- Assess other immediate threats to critical cultural and natural resources

Values at risk are properties, capital improvements, and cultural and natural resources located within or downstream of the fire that may be subject to damages from floods, suppression actions, erosion, hazard trees, and invasive species. The following issues were identified during the in-brief and field assessments for the Las Conchas Fire:

- Visitor and employee safety in Frijoles Canyon
- Ancestral sites in Frijoles Canyon especially Tyuonyi Pueblo and Big Kiva
- Over 1,400 dispersed cultural sites throughout the Las Conchas fire footprint
- Civilian Conservation Corps constructed National Historic Landmark district which includes the visitor center, administrative area, maintenance area, and miles of trails that date from 1934 and 1941

Immediate Implementation of Emergency Treatments

During periods of large fire growth, high burn severity is the likely consequence. The Las Conchas Fire burned over 43,000 acres in the first burn period. This was the period that impacted Bandelier National Monument and early reconnaissance verified that there were severe impacts in Frijoles Canyon. Due to these circumstances, the Park Superintendent decided to evacuate the canyon, close the park, remove all moveable objects, and implement point protection measures (See Table 1).



Figure 1. Structure Protection of the Visitors Center Addition

An initial emergency stabilization plan and punch list was developed based on preliminary calculations of flood flows for treatments that needed to be implemented immediately to protect life and property. The National Park Service's Type II All Risk Team was charged to fulfill this mission. A summary of the plan is as follows.

Values at risk from flash flood: Frijoles Canyon infrastructure including sewer, water, electrical and data lines; the Frijoles Canyon Sectional Plate Vehicle Crossing (the motorcar bridge), the sewer lift station, park buildings, including newly-renovated multi-million dollar visitor center, the visitor center comfort station, a maintenance building, foot trails, footbridges, and, if a worst case scenario unfolds (Probable Maximum Flow with 50,000 cubic feet per second), park administration offices and additional maintenance facilities, as well as the Tyuonyi ruins could also be damaged. Bridges in Frijoles Canyon (including the motorcar bridge) will likely be removed in the immediate future to prevent the blockage of debris flows and subsequent floodwaters from accumulating.

Values damaged by wildfire that could be further degraded: All park backcountry trail systems within the fire area, including hazard trees, water bars and masonry; backcountry cabin (burned to ground); Burnt Mesa Trailhead; 1273 archeological sites; Escobas Mesa Ecological Restoration site (600 acres); watersheds in Frijoles, Alamo, Capulin and Sanchez canyons (of the 52.7 combined miles of canyons, 41.2 were burned); wilderness character (retardant drops, 4 helispots) and hand lines and dozer line on Escobas Mesa.

Values to be protected and their location: Frijoles Canyon--personal property, park property, concessionaire property, historical/cultural objects (museum/Visitor Center); park facilities and structures, including sewage lift station.

Punch List of Immediate Emergency Stabilization Actions

The primary objective of the immediate actions that were implemented were for the protection of life and property. This was primarily accomplished by removal of people and property (both personal and public) from Frijoles Canyon Flood Zone and was done as soon as possible.

Table 1. Immediate Emergency Stabilization Actions

#	OBJECTIVE	PRIORITY (H,M,L)	Status
1	Install early warning flood & evacuation system in Frijoles Canyon by July 8.	H	Underway
2	Remove and properly catalogue and store all historical and cultural artifacts from museum/visitor center by July 4.	H	Completed
3	Remove all non-fixtures, supplies and files from buildings within the flood zone by July 4.	H	Completed
4	Clear all sewer lines and vault toilets of contaminants within the flood zone by July 8.	H	Completed
5	Secure organized and readily accessible storage facilities for park and staff possessions by July 8.	H	Completed
6	Remove all chemicals from within the flood zone and place in proper storage (at TA 49?) by July 8.	H	Completed
7	De-energize electrical lines to visitor center and Cottonwood by July 8.	H	Planned
8	Cap severed sewer lines and electrical lines on motorcar bridge.	M	Completed
9	Complete draft burn severity map of Frijoles Canyon by July 4.	H	Completed
10	Remove eight foot-and-motor car bridges in Frijoles Canyon using explosives and backhoes by July 8 to prevent debris dams from forming.	H	Completed
11	Allow Park residents, staff and concessionaire to remove belongings from properties located in the flood zone by July 8.	H	Completed
12	Re-locate admin offices and park residents to temporary quarters by July 30 by acquiring temporary housing and office units and placing	H	Completed

	these at T49 or other suitable location(s).		
13	Monitor historic and modern sections of Visitor Center for structural damage following significant flooding events, using a customized protocol established by a structural engineer (see appendix F)	M	Ongoing
14	Stabilize trails damaged by the fire by removing snags, erosion gullies, debris accumulations, re-installing water bars and rockwork prior to opening trails to visitor use.	M	Planned
15	Develop diversion strategy and implement tactics to channel 3-6,000 cubic feet/second flash flood flows away from structures by July 25.	H	Completed
16	Acquire and distribute sandbags for rapid deployment at vulnerable locations within the flood zone.	M	Completed
17	Develop BAER Plan by August 15 by assembling BAER planning team ASAP.	M	Completed

Verification of Decision to Implement Immediate Emergency Stabilization Actions

US Forest Service hydrologists have developed a rapid method for estimating runoff from burned watersheds (Kuyumjian 2007, as explained in the Watershed Assessment). The method is based on the concept that high magnitude flash flood events in this region are generated by relatively short intense local convective storms and can be used as a rapid predictor of runoff in lieu of necessary information and time to run more sophisticated storm flow runoff models.

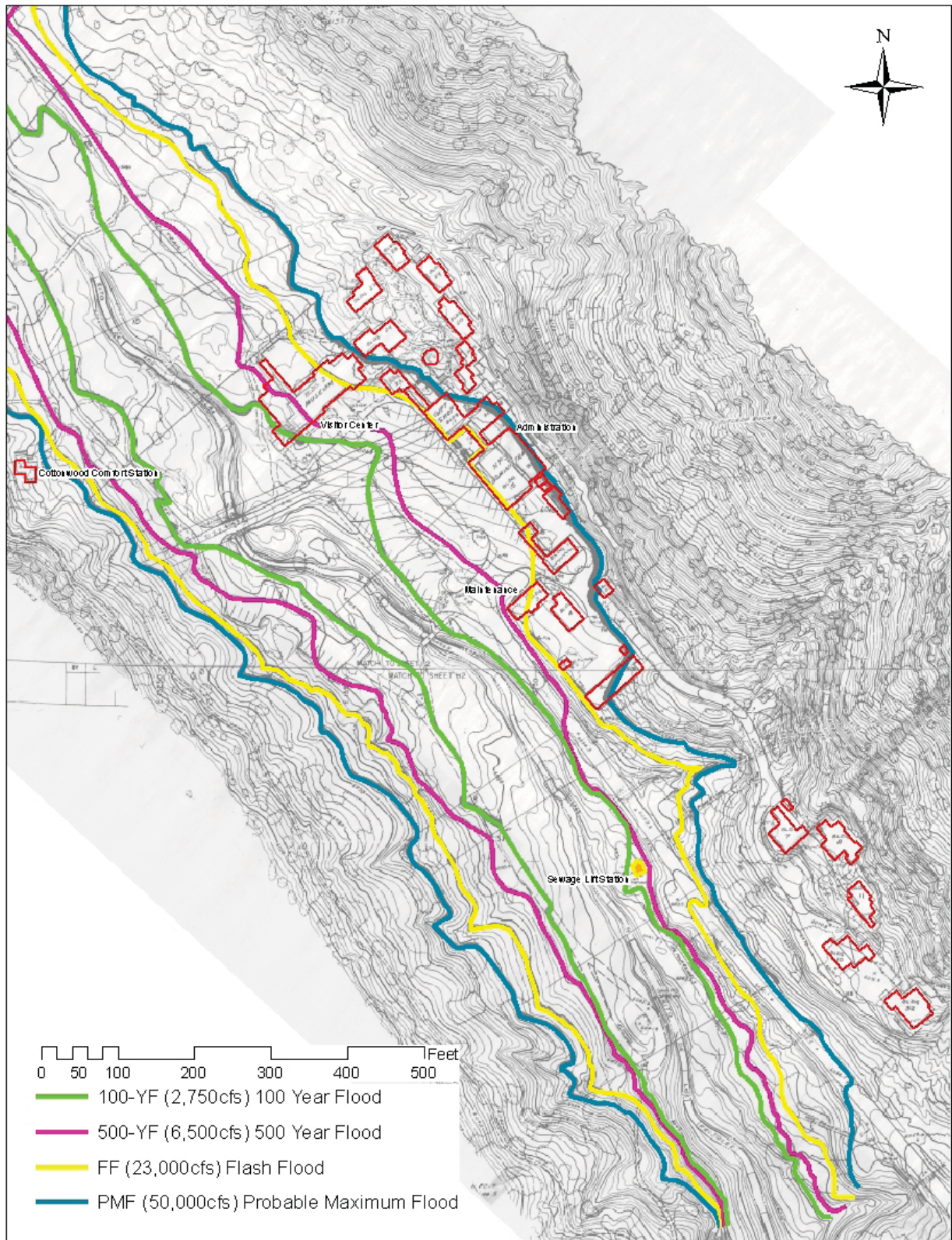
Runoff magnitudes for a 25 year – 1 hour – 5 square mile design storm were estimated using the Rule of Thumb by Kuyumjian. Using this method, a 1.7 inch rain event produces a 3,200 flow event. This data was used to inform the Bandelier Superintendent to support his decision to implement emergency stabilization actions.

Once data became available, Frijoles Canyon at the visitor center was analyzed for pre and post fire stream discharge using the WildCat watershed model (Version 5.0). The 25 year, 1- hour storm was used which produced a rainfall event of 1.8 inches. The pre-fire discharge at the visitor center is 350 cubic feet per second. Post-fire discharge without pre-wetting produced a peak flow of 3,250 cubic feet per second and with pre-wetting, a peak flow of 4,100 cubic feet per second. This data verifies the Kuyumjian method.

The 3,200 flow event has been projected onto the results of discharge recurrence intervals based on estimates produced by the Army Corps of Engineers HEC-2 model as provided in the table below and used to produce the floodplain delineations developed by Reed in 1988. Reed's delineations are used to provide lines of demarcation for predicted flood events as represented in the map below.

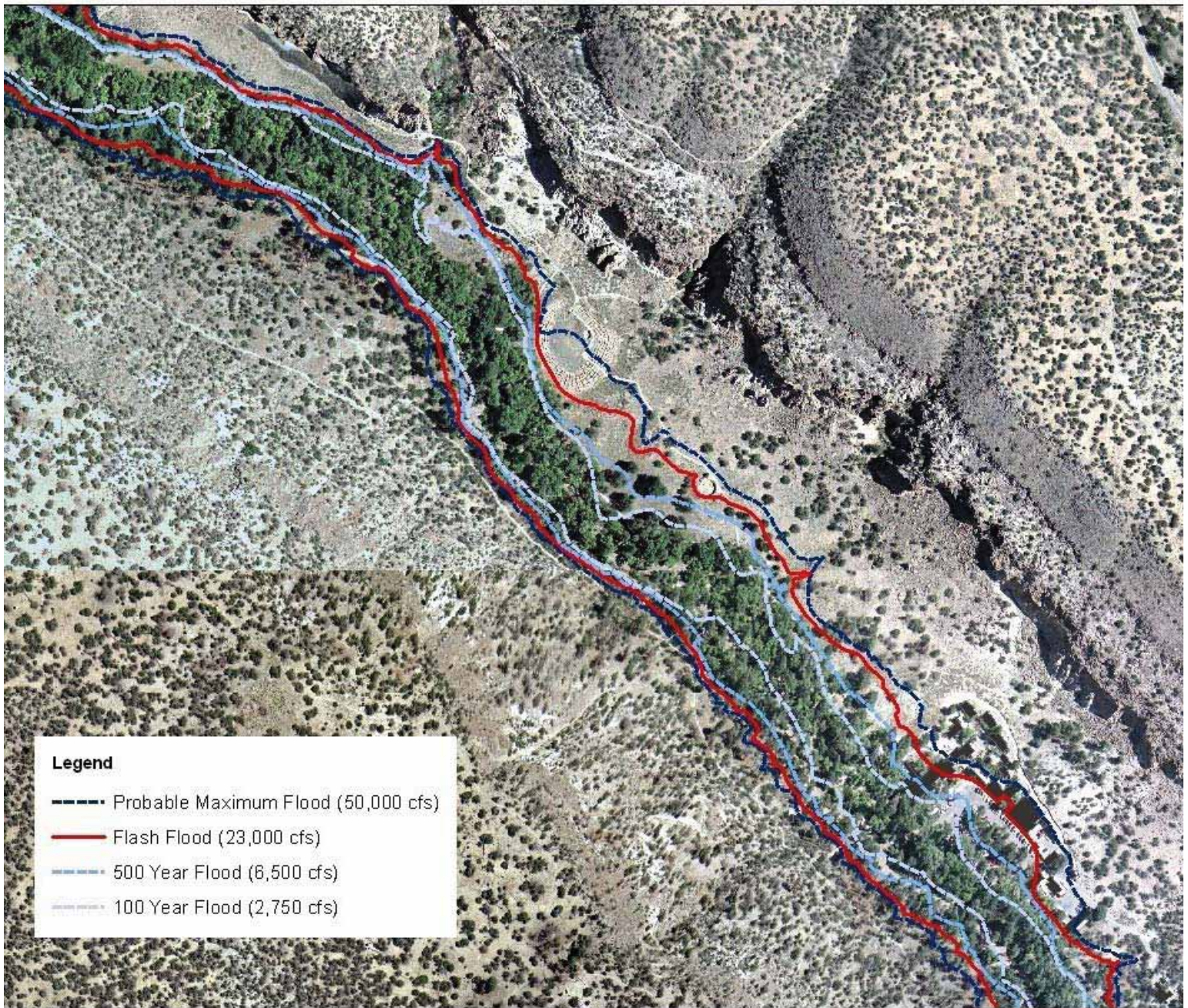
Recurrence Interval (yrs)	10	50	100	500	Flash Flood	Probable Maximum Flood
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Discharge (cfs)	580	1,800	2,750	6,500	23,000	50,000
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For flows to reach the Historic District, they would have to exceed 6,500 cubic feet per second coming within the range of a maximum flashflood event of 23,000 cubic feet per second. This type of event would impact the Visitor Center, lower parking lots, picnic areas and bridges.

For the archeological sites within Frijoles Canyon, similar methodology has been used. The photo below shows the main cultural resource area that is most seen by park visitors. It is protected from flash flood risk by topography and restoration of historic free flows within the Rito de los Frijoles. Flash flood levels would have to rise above 23,000 cubic feet per second to reach the sites and this is considered to be an unlikely scenario.



SUMMARY OF ACTIVITIES AND COSTS

Below is a summary of the treatments activities proposed for funding. Individual treatment specifications are found in the **SPECIFICATIONS** section of this plan.

SUMMARY OF ACTIVITIES AND COSTS

TITLE	UNIT	NUMBER OF UNITS	WORK AGENT	COSTS	2011 EMERGENCY STABILIZATION	2011 BURNED AREA REHAB
Early Warning	Gages	5	C	\$ 147,935	\$ 147,935	\$ -
Water Quality	Samples	12	F	\$ 52,000	\$ -	\$ -
Conduct Archeological Assessments	Sites	1400	F	\$ 162,010	\$ -	\$ -
Archeological Stabilization and Treatment	Sites	50	F	\$ 118,009	\$ -	\$ -
Backcountry Cabin Debris Removal	Sites	1	F	\$ 20,305	\$ 20,305	\$ -
Monitoring Sensitive and Exotic Plants	Each	3	C	\$ 30,000	\$ -	\$ -
Protection of Regenerating Aspen and Shrubs	Acres	60	C	\$ 36,080	\$ -	\$ 36,080
Repair Elk Fences	Exclosures	8	S	\$ 21,740	\$ 21,740	\$ -
Salamander Habitat Stabilization	Acres	50	F	\$ 13,310	\$ -	\$ -
Staffing and Office Space	Unit	1	O	\$ 117,146	\$ 23,429	\$ -
Frijoles Historic Center Protection	Site	1	F	\$ 488,000	\$ 488,000	\$ -
BAER Team Personnel	Plan	1	F	\$ 29,820	\$ 29,820	\$ -
Trails, Trailheads, Signs, Boundary Fence	Each	58	F, C, S, V	\$ 189,062	\$ 45,000	\$ -
				\$ 1,277,481	\$ 628,294	\$ 36,080

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

FIRE INFORMATION

FIRE LOCATION AND BACKGROUND	
FIRE NAME	LAS CONCHAS
FIRE CODE	1249-F5PS-E13
PARK	BANDELIER NATIONAL MONUMENT
STATE	NEW MEXICO
REGION	INTERMOUNTAIN
IGNITION DATE	JUNE 26, 2011
CONTAINMENT DATE	TO BE DETERMINED
ACRES	20,780 ACRES ON BANDELIER; 150,041 TOTAL

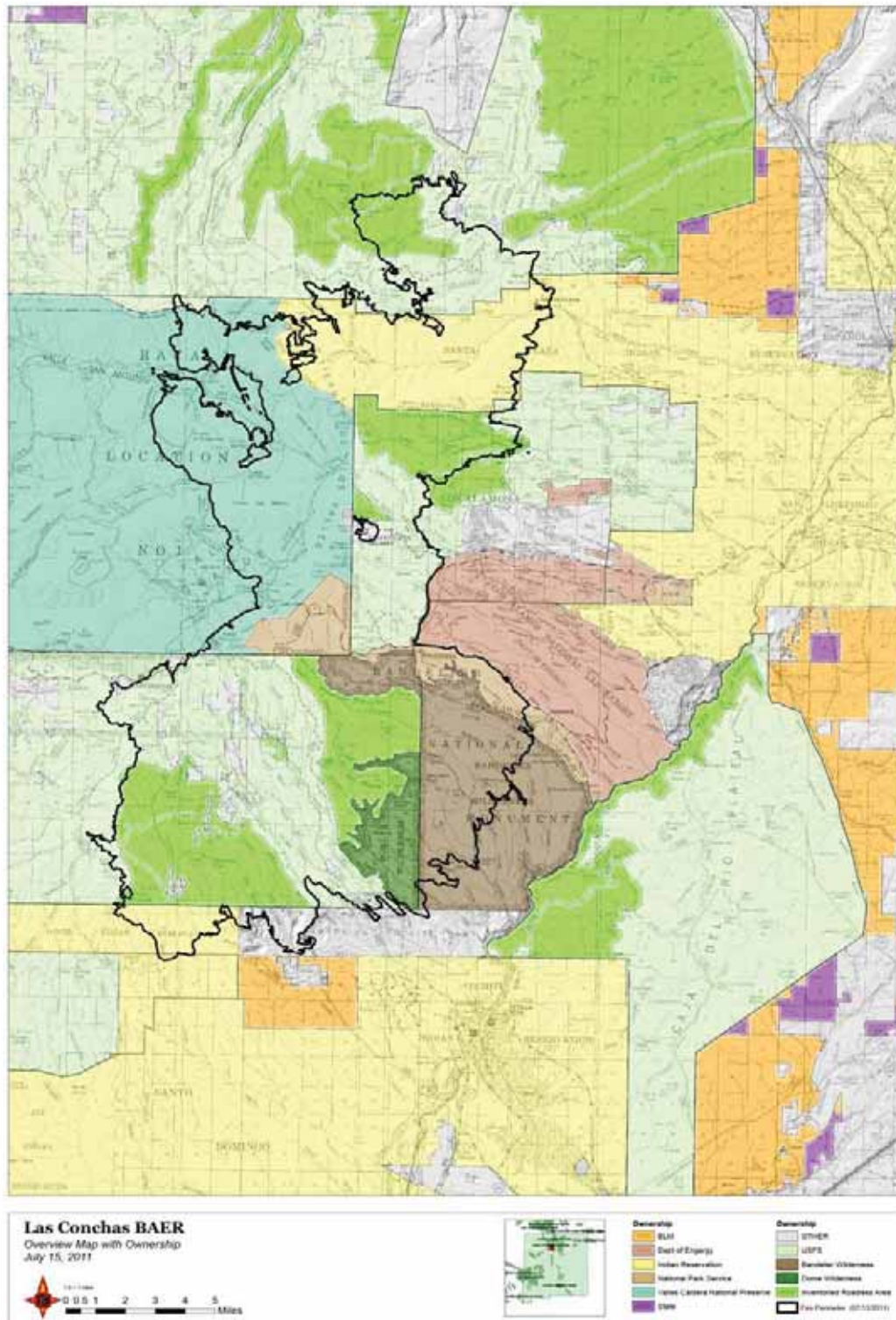
ASSESSMENT TEAM

NPS – USGS TEAM MEMBERS ASSIGNED TO THE SOUTH ZONE BAER TEAM	
CO-TEAM LEADER	RICHARD SCHWAB, FMPC
NPS LIAISON	BARBARA JUDY, BAND
HYDROLOGIST	STEVE MONROE, I & M NETWORK
VEGETATION	BRIAN JACOBS, BAND
WILDLIFE	STEVE FETTIG, BAND
CULTURAL RESOURCES	RORY GAUTHIER, BAND
CULTURAL RESOURCES	HEATH BAILEY, BAND
FIRE ECOLOGIST	COLLIN HAFHEY, BAND
FIRE ECOLOGIST	LAURA TRADER, BAND
FIRE ECOLOGIST	BETH GASTINEAU, BAND
RESEARCH ECOLOGIST	CRAIG ALLEN, USGS
STRUCTURAL ENGINEER	PRESTON FISCHER, MEVE
GIS	KAY BEELEY, BAND

Bandelier National Monument

Bandelier has a long human history and links to the modern Pueblos. Traditions which began in the distant past are still practiced today. At Bandelier, evidence of the Ancestral Pueblo people can be found in the dwellings, artifacts, and continuing culture of the modern pueblos. Early Spanish settlers, the Civilian Conservation Corp (CCC), and the National Park Service also left their mark on the local landscape. About seventy percent of Bandelier National Monument is a designated Wilderness area. Hikers can enjoy viewing remote archeological sites and spotting rare wildlife in this less developed area of the park.

VICINITY MAP



BURNED AREA ASSESSMENTS



WATERSHED RESOURCE ASSESSMENT

Protection of Cultural Sites within the Developed Area of Frijoles Canyon and Hydrologic Resource Assessment

Objectives

- Estimate extent of potential floodplain inundation in lower Frijoles Canyon
- Identify measures required to protect cultural sites in Frijoles Canyon
- Identify future structural protection and data

Observations

Watersheds within Bandelier NM affected by the Las Conchas Fire are shown on Figure 1. Percent burn intensity was high in most of the major watersheds, with the most intensely burned watersheds being Rito de Los Frijoles and Sanchez (Table 1). There are no structures and developed areas in most Bandelier NM's major watersheds, with the exception being Rito de los Frijoles where numerous important cultural sites as well as the park's visitor center and administrative offices are located. The La Mesa Fire in 1977 and the Cerro Grande Fire in 2000 burned portions of the Rito de Los Frijoles watershed. Increases in flood frequency and magnitude were observed after both of these events.

Table 1. Burn severities for major watersheds in Bandelier NM.

Watershed	High (ac)	Moderate (ac)	Unchanged/Low (ac)	No Data	Watershed Area (ac)	Moderate & High (ac)	Moderate & High (%)
Alamo	762	1989	2803	14	7521	2660	35
Capulin	308	3725	3497		12576	4033	32
Frijoles at VC	2359	1903	4661	34	11695	4262	36
Lummis	-	2	1291	-	4958	2	0
Medio	16	511	1622	-	3981	527	13
Sanchez	178	2299	1359	-	4733	2476	52

Comparison of La Mesa Fire to Las Conchas Fire – effects in Frijoles Canyon

Total ac.	Ac. Burned in LMF	LMF Ac. - High	LMF Ac. - Mod	LMF Ac. - Low	Ac. Burned in LCF	LCF Ac. - High	LCF Ac. - Mod	LCF Ac. - Low
11695	6875	1270	1206	4303	10855	2370	1935	4702
Percent	59%	11%	10%	37%	93%	20%	17%	40%

LMF - La Mesa Fire

LCF - Las Conchas Fire

Of note regarding this flood, the 1977 La Mesa Fire burned only **59%** of Frijoles Canyon, while the Las Conchas fire burned **93%**, **20% severely**.

Rito de los Frijoles is a perennial stream with a baseflow of about 0.7cfs. Streamflow was at baseflow at the time of the Las Conchas Fire and has been at this level the entire time since the fire. Hydrology of Rito de los Frijoles was assessed in the field, with the use of burn severity maps, and through evaluation of available hydrologic data.

The Las Conchas Fire burned the most of upper portion of the Rito de los Frijoles watershed, the upper extent of the drainage downstream to near the wilderness boundary. The headwaters of the Rito de los Frijoles have steep slopes with a dense mixed conifer forest. The section of the watershed above Upper Crossing is about one third of the total watershed and experienced lower percentage of moderate to high burn severities than the portion of the watershed immediately downstream. Burn intensities were highest in the section of the canyon known as ‘The Neck’ extending from Upper Crossing to about 3 miles upstream. This part of the watershed has moderately steep slopes in the canyon bottom leading up to vertical rock cliffs in some places. The canyon bottom, slopes and mesa tops were densely forested.

Below The Neck the Rito de los Frijoles enters the ‘Narrows’, a canyon formed by paired strath terraces deeply incised into the Bandelier Tuff. The canyon extends downstream to just above the wilderness boundary and Alcove House. The channel is constricted in many places through the Narrows and the potential exists here for woody debris washed from intensely burned areas upstream to form debris dams exists here. The dams probably would not impound enough water to generate a large flood event downstream under a dam break scenario. Studies of long-term channel incision have identified several places where rockfall dammed the canyon and formed small lakes. Burn intensities decreased downstream and were low or none in the lower reaches of the Narrows. Below the Narrows the valley bottom becomes wider and the channel slope decreases. Significant cultural sites and the park visitor center and administrative buildings are in the section of Frijoles Canyon. Downstream from the developed area the canyon narrows and several larger waterfalls exist. Stream habitat at Rito de los Frijoles has no stream modifications or diversion and is characterized by very little bank erosion, highly stable banks, productive aquatic habitat and a healthy riparian plant community.

The USGS and Los Alamos National Laboratory have collected streamflow data at gaging stations on the Rito de los Frijoles near the park headquarters for most years since 1965. The gage collects and stores data at 5 minute intervals, but the data is not transmitted via satellite or radio.

Flood frequency and magnitude in the Rito de los Frijoles increased following both the La Mesa (1977) and Cerro Grande (2000) fires. The largest flood (3030cfs) occurring after these fires was on July 21, 1978. A chronology of documented floods on the Rito de los Frijoles for the period 1773-2008 was compiled by Judy and is provided in Appendix B. The largest flood estimate during this period was for a 3550cfs event occurring in 1866.

Most flood events in northern New Mexico occur during the summer months and are a result of local high intensity thunderstorms. The existing rain gage network in the Rito de los Frijoles watershed is limited and often does not capture these events.

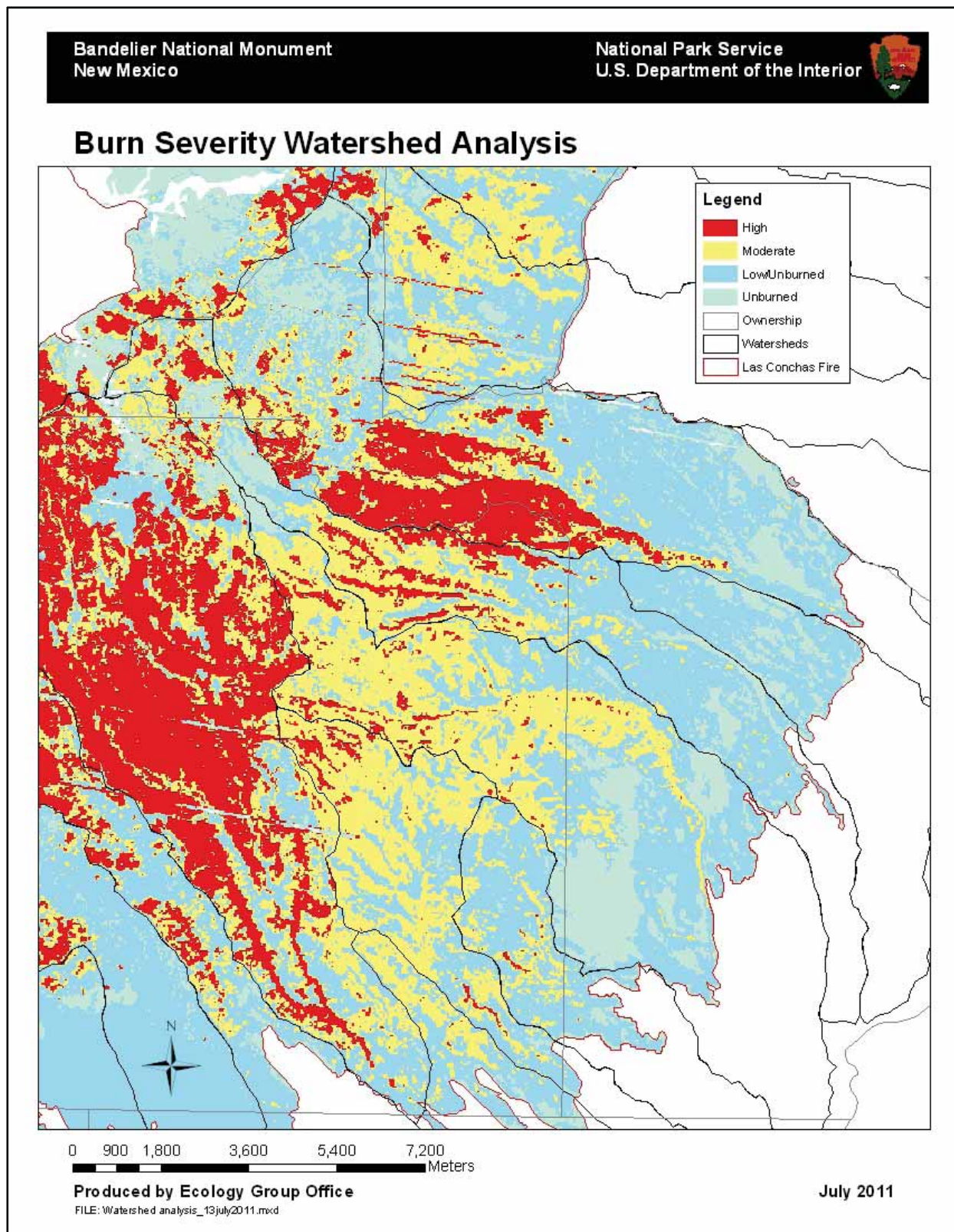


Figure 1. Las Conchas Fire Burn Severity Map

USFS hydrologists have developed a rapid method for estimating runoff from burned watersheds (Kuyumjian 2007, provided as Appendix C). The model is based on the concept that high magnitude flash flood events in this region are generated by relatively short intense local convective storms and can be used as a rapid predictor of runoff in lieu of necessary information and time to run more sophisticated stormflow runoff models.

Rito de Frijoles floodplain inundation for varying discharges was estimated by the Army Corps of Engineers using a HEC-2 model (USACE 1987). The model was based on a stream channel survey of 22 transects encompassing the reach of the Rito de Frijoles between Alcove House and the historic district. Reed (1998) delineated the extent of flooding for the Rito de los Frijoles near cultural sites and developed areas. The flash flood estimate is based on a 8.4 in/hr storm, and the probable maximum flood represents flow resulting from a large extended regional storm.

Findings

Bandelier National Monument managers recognized in the aftermath of the Las Conchas Fire, with 12.3 miles of Frijoles Canyon above the park's primary visitor district impacted by severe-to-moderate fire effects, that flash flooding within the canyon would be inevitable. Fire start was on June 23, 2011, and consideration of resources at risk and protection strategies began on July 3, 2011, immediately after cessation of immediate fire danger.

Concern for flooding in the post fire environment was highlighted and discussed by fire and resource professionals early in the fire incident. As each Type I fire team (Reinarz, Hughes & Turman) took management of their portion of the fire, meetings were held with agency administrators and the public. In each of these meetings, Fire Teams not only discussed operational strategies and tactics to suppress the fire, but spent considerable time explaining and highlighting the exponential risk of flooding that would be present in the post fire environment – specifically flash flooding in and through canyons that would affect not only land owners and managers within the fire perimeter, but also lands and communities downstream of the fire and affected canyons.

Park resource staff brought these same concerns to Superintendent Lott. Chief of Resources, Barbara Judy, communicated her concerns with potential flooding to Mr. Lott, resurrecting a memo she sent to the Bandelier Management Team the preceding fall, September 14, 2010, which outlined potential flood risks in Frijoles Canyon.

The flood map provided in the 1987 Delineation of Floodplains Memo was the preliminary information delineating potential flood risk to NPS infrastructure that managers used to begin understanding and planning for this newly emerging hazard and risk for Frijoles Canyon. It was this benchmark information that managers used for planning parameters for early assessment of risk and operational planning for potential activities for the Canyon.

It is important to note is that these potential flood zones were modeled under pre-fire conditions of the Canyon – the post fire environment will greatly increase flood risks.

This same information and memo was again communicated and shared with parks' Management Team on or about Friday & Saturday, July 1-2, 2011. These early discussions (1-3 July) centered on the flood potential risk along with discussion of what, if anything, could be done to diminish or mitigate potential damages to park facilities, specifically the archeological sites and the Bandelier CCC Historic District.

General recommendations from fire and resource professionals for mitigating flood risks were twofold; first, removal of obstructions within the stream channel in order to allow water to flow freely and swiftly through the stream bed, combined with flood barriers such as dikes and diversion walls in order to divert water from critical infrastructure(s). In addition to in-house flood information, Ms. Judy was communicating with Greg Kuyumjian, USFS Hydrologist – Soil, Water & Air Program Manager for the Okanagan-Wenatchee National Forest in Wenatchee, Washington. Mr. Kuyumjian is a leading expert in post fire emergency response and was the Las Conchas BAER Team Co-Leader.

In an email dated, July 2, 2011, Mr. Kuyumjian attaches a list of items to be considered do “right now.” The check list states:

Non-Negotiable Post Fire Treatments

Water Quality

Pump, sanitize and lock vault toilets in flood prone areas.

Consider filling vault with soil

Infrastructure

Remove culverts/footbridges, etc. that cannot pass high flows or would catch debris

Inlet protection and overflow pathway at critical road crossings

In-channel woody debris removal above critical road locations and threatened facilities

Barrier/levee around facilities

Fences that cross drainages – remove

Water impoundments (ex. stock ponds) – breach those with inadequate emergency spillways

Public/crew safety

Signage

Remove (ie cut down “killer” trees)

Fencing and closure gates

Heritage

Removal if in a known flood pathway

Flush cut trees located within sites, which may topple after ground saturation

Based on the above list, park management identified the following at-risk Frijoles Canyon infrastructure including sewer, water, electrical and data lines; the Frijoles Canyon Sectional Plate Vehicle Crossing (the motorcar bridge), the sewer lift station, park buildings, including a newly-renovated multi-million dollar visitor center, the visitor center comfort station, a maintenance building, foot trails, and footbridges.

Runoff magnitudes for a 25 year – 1 hour – 5 square mile design storm were estimated using the Rule of Thumb by Kuyumjian and are shown with smaller and larger storm events in Table 2. The longest record of rainfall available in the area is from the weather station in Los Alamos (period of record 1910 -2011). The largest 24 hour rainfall event recorded at this station was 3.48 inches in October 1954. Rainfall intensities vary with altitude and it is probable the headwaters of the Rito de Frijoles watershed receive more rainfall than the Los Alamos weather station. Between 1999 and 2010 the largest rainfall event recorded at the Ponderosa Campground weather station in Bandelier National Monument was 1.6 inches/hour in August 2007. This storm produced a 722cfs flood in the Bandelier National Monument historic district.

Table 2. Estimated runoff calculated using the Rule of Thumb by Kuyumjian

Storm area (sq mi)	Rainfall (in/hr)	Discharge (cfs)
5	0.5	900
5	1.7	3200
5	3	5600
5	8.4	16000
8	8.4	25200

Model results of discharge recurrence intervals based on estimates produced by the Army Corps of Engineers HEC-2 model are provided in Table 3 and floodplain delineations (Reed 1988) are shown on maps in Appendix D. The flood in 2007 and a similar size flood in 2008 did not leave the inner channel in the reach near the historic district.

Table 3. Estimated flood recurrence intervals based on ACOE HEC-2 model.

Recurrence Interval (yrs)	10	50	100	500	Flash Flood	Probable Maximum Flood
Discharge (cfs)	580	1,800	2,750	6,500	23,000	50,000

Analysis provided by Reed (1988) establishes that floods with discharges comparable to the estimate 100- and 500-year recurrence intervals have less potential to impact park infrastructure than the maximum flash flood level. Reed's memo contains two conclusions that should be considered when facing flash flood conditions:

- In general, a 100- or 500-year flood will present little, if any, threat to park facilities and resources. However, to provide for visitor safety, structural mitigation from the 500-year flood, or relocation, may be warranted for the lower parking lot (in the primary visitor district.)
- Flash flooding presents considerable risk to park facilities and visitor activities within Frijoles Canyon. The feasibility of establishing a local flood warning system and providing other mitigation (including relocation of the visitor center and administrative areas) should be evaluated.



Flood at streamflow gaging station in 2007.

- The memo by Reed (1988) also clarifies in its narrative and accompanying map that the display archeological site Tyounyi Pueblo and nearby archeological sites are above the maximum flash flood level of 23,000 cubic feet per second (cfs). The memo summarizes the low risk to the archeological sites by noting that the “perseverance of the ruins is, in and of itself, evidence that the likelihood of such an [Probable Maximum Flood] event...occurring is relatively small.”

Agency managers evaluated the potential for existing conditions in the canyon to worsen flash flood events, and concluded that crossing structures over the Rito de Frijoles that constrict flows on the creek had potential to create debris jams that could worsen flash flood events. Debris jams can intensify flash floods by approximately 25%, and were the one possible source of risk to archeological sites in the canyon.



Woody debris dam in channel.

Down tree in channel and concrete debris.

An emergency consultation was initiated with the New Mexico State Historic Preservation Officer on July 3, 2011 requesting concurrence with a proposal to demolish the crossing structures. Concurrence with that proposal was received on July 4, 2011. Within the following week, seven (7) pedestrian bridges and one motor car bridge were demolished (two by park staff and five by a contractor.) Additionally, floatable debris within the Rito de Frijoles vicinity, consisting primarily of dead and down woody material, were removed. Down mature trees in the channel adjacent to the parking lot and a woody debris dam near the streamflow gaging station are still in place and should be removed. Concrete and other deconstruction debris should also be removed from near the channel. With these preparations, agency managers acted to assure that free flows within the creek were restored and flash flood events were unlikely to exceed the highest levels identified in the Delineation of Floodplains memo, and that the exposure of the archeological sites in the canyon to flood damage was at a low level.



Site of removed motor car bridge.

Installation of point protection on the archeological sites was considered; either “K” rail, sandbags and plastic sheeting, or sheet piling. Any of these measures would have entailed driving heavy equipment on the sites and placing heavy objects on them - a process that would inevitably have placed the sites at risk for disturbance and damage. The decision to avoid point protection was made once the high risk of operating heavy equipment in these sites were fully valued, the creek crossing structures were removed and the historic free flow of the creek was restored, and agency managers were updated regarding fire severity and probable high flash flood levels associated with the Las Conchas Fire.

Agency managers were updated on July 6, 2011 with an analysis of probable flash flooding in Frijoles Canyon. Hydrologic analysis indicates that the canyon will have a flash flood between 3,000 and 4,000 cubic feet per second (cfs) under the anticipated range of precipitation events - well below the maximum flash flood of 23,000 cfs described in Reed’s 1988 Delineation of

Floodplains memo, and further confirming that the exposure of the archeological sites in the canyon to flood risk is mitigated through restoration of historic free flows in the creek. Consideration was additionally given to removal of woody debris from the creek channel. This action was undertaken in the vicinity of the archeological sites and near the historic district. Consideration was given to removal of live trees, such as mature cottonwood trees, adjacent to the creek channel. This action was deferred based on the consideration that the root network of live trees contributes to overall stability of the creek channel. Post-flood evaluation of individual trees that may become hazardous will be incorporated into site management, and select removal of standing trees may occur as warranted by flood effects.

Agency managers then turned their attention to point protection of structures at risk from flash floods at the anticipated level of 3,000 to 4,000 cfs. These structures consist of both modern and historic portions of the Visitor Center, the sewer lift station, and other infrastructure such as valve boxes and manhole openings. Following removal of museum objects from the Visitor Center, the building was protected by a plywood/sheet plastic/sandbag protection layer. The lower lying areas along the Rito de Frijoles were armored with diversion structures consisting of “K” rail and sandbag assemblies in two parallel alignments.



Plywood, plastic sheeting, and sandbags protecting Visitor Center.

In conclusion, the archeological sites within the Frijoles Canyon main visitor area are protected from flash flood risk by topography and restoration of historic free flows within the Rito de Frijoles. Flash flood levels would have to rise above 26,000 cfs to reach the sites and this is considered to be an unlikely scenario. The historic and modern structures closest to the creek are reasonably protected from flash floods at the anticipated 3,000 to 4,000 cfs level. However, should a flash flood event of 6,000 cfs or more occur, the capacity of the point protection will be exceeded and damage to these structures will become likely.

Recommendations

1. Clear existing log jam and woody debris from the Rito de los Frijoles stream channel in the reach between Alcove House Rainbow House. Move all woody debris to a location above high flood stage.
2. Clear concrete debris from all bridge removal sites. Move to location above high flood stage.
3. During the first 3 years after the fire the Rito de los Frijoles stream channel in the reach between Alcove House and Rainbow House should be inspected for the presence of woody debris jams after every flood. Woody debris jams should be evaluated on a case-by-case basis to determine whether and how they can be removed. The channel above Alcove House is inaccessible by road and it will be unsafe to remove woody debris mechanically in this reach. This reach should be monitored to assess woody debris jam development and to identify potential dam break risk. Woody debris jams can be unstable and appropriate safety precautions should be followed during removal activities. Use of heavy equipment should be avoided because of the risk of destabilizing the streambanks. Options should be considered for placement of removed large woody debris that may enhance long-term stream health.
4. Inspect cultural resources and structures in the Frijoles Canyon developed area after every flood to determine extent of inundation and assess potential damage.
5. Update floodplain map and flood magnitude estimates for Frijoles Canyon between Alcove House and the park administrative area. The Army Corps of Engineers HEC-2 model used in the current analysis was created in 1987. Data used to develop the model and associated floodplain delineations are not available and will be obsolete following major post-fire flood events. Modern techniques for mapping canyon bottom topography and vegetation should be used to create a new hydraulic model that will be useful for predicting future flood effects.
6. Install an early warning system including rainfall gages in the high/moderate intensity burn area and streamflow gages at points capturing runoff from the burned area sufficiently far enough upstream to provide adequate warning to people in the Historic District.
7. Upgrade the existing streamflow gauge on the Rito de los Frijoles near the park headquarters to enable transmission of real-time streamflow data to remote locations. This will provide park managers with current information about flood conditions in the canyon, supporting decision making regarding safe access to lower Frijoles Canyon by NPS employees, contractors, and park visitors.
8. Install a network of rainfall and crest-stage gauges in Frijoles, Alamo, and Capulin Canyons for the purpose of tracking hydrologic recovery of these systems through time. This information will be important to support decisions about backcountry safety for NPS employees and for recreational users.
9. Permanent Cell Signal Coverage for Lower Frijoles Canyon (Follow-up Project, not BAER)
10. Permanent Barrier Protection for Visitor Center (Follow-up Project)
11. Improve lower wall around Visitor Center Addition (Follow-up Project)
12. Install wall around Lift Station (Follow-up Project)

13. Replacement of creek crossing structures (foot bridges and motor car bridge)

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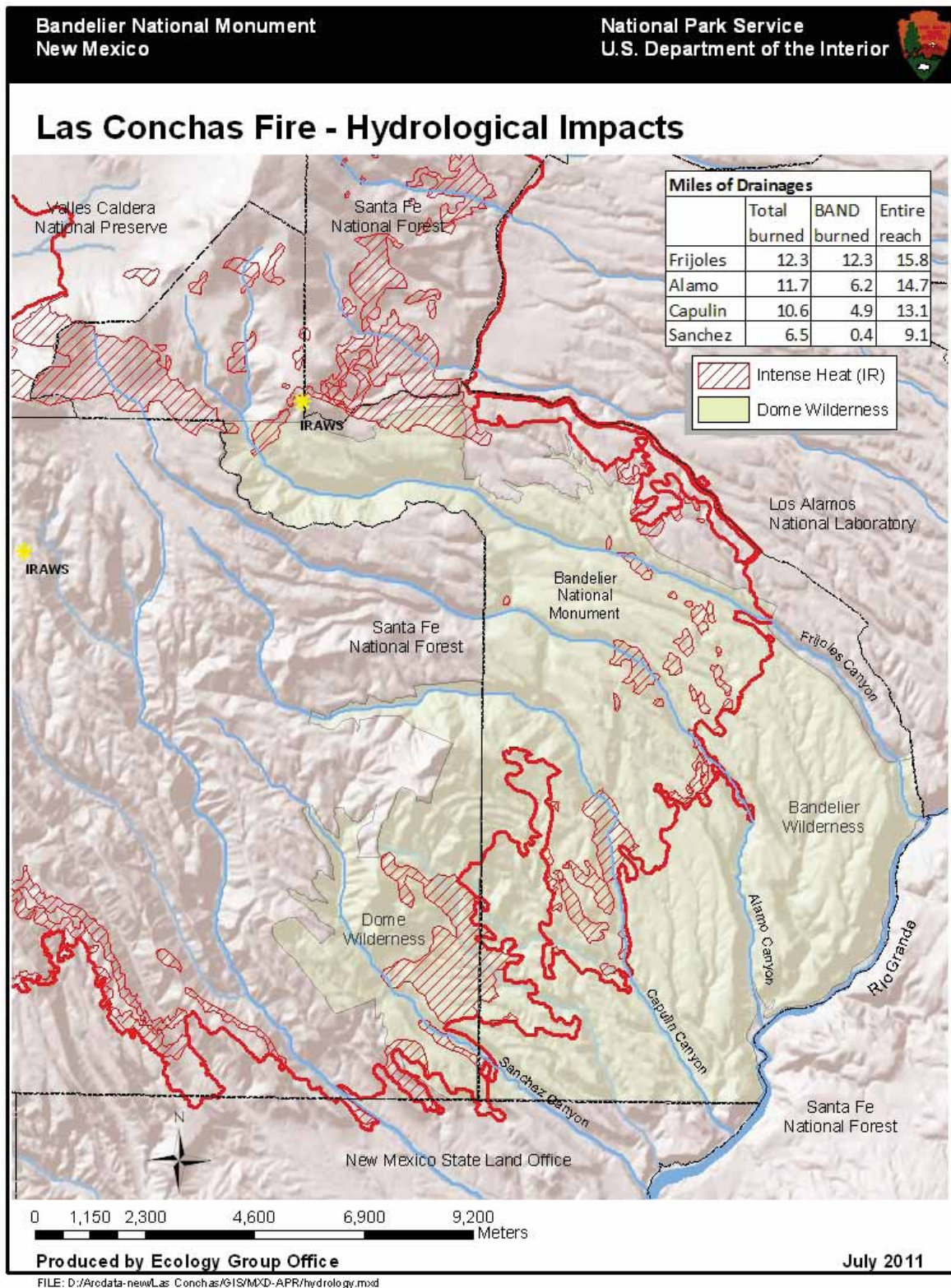
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WATER QUALITY ASSESSMENT

Objectives

- Identify water risks associated with post-fire floods and mobilization of contaminants that may exist or have been introduced to the Rito de Frijoles watershed.
- Coordinate with other agencies to ensure an efficient and comprehensive post-fire water quality monitoring program is in place for streams in Bandelier National Monument.

Observations

- Potential negative water quality risks exist in the Rito de los Frijoles watershed as a result of Los Alamos National Laboratory activities and the application of fire retardant as part of Las Conchas Fire suppression efforts. High magnitude floods may mobilize contaminants in the stream system, presenting a potential hazard within Bandelier and to downstream water users.
- During the 1950s and 1960s NPS applied DDT for the purpose of pest control in the area near the park headquarters. Studies in the 1970s and 1990s documented the presence of DDT in Rito de Frijoles and in fish tissue, leading to a ban on fishing in the stream.

Findings

- Water quality species of concern include but are not limited to radionuclides, nutrients, metals, and fire retardant.
- The Los Alamos National Laboratory and contractors for the Pueblo of Cochiti installed auto-samplers at the Rito de Frijoles near park headquarters. These samplers are part of water quality monitoring networks both agencies are setting up to monitor post-fire water quality in streams throughout the burn area. The two agencies and NPS are coordinating efforts and will be collecting samples for a wide spectrum of analytes.
- The NPS Southern Colorado Plateau Inventory and Monitoring Network has been collecting water quality samples that are analyzed for a broad suite of constituents from two sites on the Rito de Frijoles and one site on Capulin Creek at approximately six week intervals. The network will continue this effort and may add additional analytes.
- It has been more than 10 years since sampling for DDT has been completed at the park and current levels are unknown. In 2011 to help address this question agency staff submitted a proposal to PMIS requesting funds for a DDT sampling program at the Rito de Frijoles.

Recommendations

1. Coordinate with Los Alamos National Laboratory and the Cochiti Baseline Study, a joint undertaking of the Pueblo of Cochiti and the U.S. Army Corps of Engineers to establish water quality monitoring of the Rito de Frijoles. Select monitoring sites, ensure required permits are in place, that auto-sampler installations meet NPS guidelines, and that data is made available to NPS in a timely manner. Bandelier National Monument has not

conducted environmental surveillance to establish the absence or presence of environmental contaminants on park lands, This water quality monitoring is being done because understanding post-fire watershed conditions is an efficient way to rule out the presence of contaminants. Additionally, post-fire monitoring is intended to detect the rate of sediment transfer into the managed Rio Grande waterway and will contribute to an overall understanding of conditions in Cochiti Lake.

2. Add collection of critical water quality constituents including cyanide and possibly other compounds used in fire retardants to the suite of samples collected by the NPS Southern Colorado Plateau Inventory and Monitoring Network at established long-term water quality monitoring sites on the Rito de los Frijoles and Capulin Creek.

ARCHEOLOGICAL BURNED AREA ASSESSMENT

Bandelier National Monument Cultural Resources

The term Cultural Resources is used to describe a number of categories including archeological sites, historic structures, cultural landscapes, ethnographic resources and museum objects. For this portion of the report, Cultural Resources will refer specifically to archeological sites and historic structures.

Objectives:

- Assess and evaluate fire and fire suppression impacts to Cultural Resources
- Identify and develop projects to aid in the protection and preservation of Cultural Resources
- Meet all Federal cultural resource and legal mandates, including consultation with appropriate American Indian Tribes.

Issues:

- There are 1,515 documented archeological sites within the Las Conchas fire perimeter and another 45 archeological sites are located in major drainages downstream from the burned area. Fire maps and GIS data indicate that 1,104 sites have burned and need to be assessed for fire effects and the downstream sites need to be assessed for potential post-fire flooding effects.
- Two-thirds of the archeological sites within the burn perimeter are located on slopes ranging from 0 to 20% and one-third of the archeological sites are located on slopes greater than 20%. Local soils are typically unconsolidated and susceptible to post-fire erosion which will compromise archeological site integrity.
- An estimated 400 archeological sites contain fire-killed trees which are located on site features such as single room structures, mounds and buildings containing up to 100 or more rooms. Falling trees can pull up root balls which will impact surface and subsurface and archeological remains.
- Approximately 30 archeological sites within the fire perimeter are recognized by affiliated pueblo tribes as significant resources and many of these sites are also visited by the 200,000+ visitors to the park. Many of the Pueblos have expressed interest in the protection and preservation of cultural resources.

Background:

The ancestral pueblo archeological sites found in the mesa and canyon country of the southern Pajarito Plateau are the primary reason for the establishment of Bandelier National Monument. The monument's enabling legislation states that these archeological remains are unique and worthy of preservation for the American people. In addition, all of the sites affiliated with ancestral pueblo populations are listed on the National Register of Historic Places and

determined significant at the National Level.

There are currently 2,989 recorded archeological sites within Bandelier National Monument and 1,515 or 53%, are located inside the Las Conchas fire perimeter. Nearly the entire area within the fire perimeter has been inventoried for cultural resources (20,400 acres), although approximately 300 acres remain unsurveyed. An initial assessment of fire impacts has been completed and several projects are proposed to mitigate direct fire impacts and to prevent further, indirect fire impacts to the archeological sites in Bandelier National Monument. (see map of fire perimeter and all archeological sites)

Cultural Context:

The Las Conchas Fire and Bandelier National Monument are located within the Upper Rio Grande Valley Culture area as defined by Stuart and Gauthier (1995). The region is bounded by the Jemez and Sangre de Cristo Mountains on the west and east, Albuquerque to the south and north to the Colorado border. Humans have lived here for at least 12,000 years. The earliest cultures are referred to as Paleo-Indian and Archaic which were characterized by a hunting and gathering-type society. This early period lasted from approximately 10,000 BCE to 900 CE (Irwin-Williams 1973, Vierra and Schmidt 2008, Cordell 1979). Within the fire perimeter there are 158 sites which consist of artifact scatters of lithic debris and many of these sites date to the Archaic period. There are no known Paleo-Indian sites in the park.

The Ancestral Pueblo period at Bandelier National Monument begins at 1175 CE. The initial occupation consists of a number of small farming hamlets found on mesa top settings. This class of archeological site will typically consist of a roomblock containing from ten to thirty rooms and an artifact scatter (Wendorf and Reed 1955, Kohler 2004, Powers and Orcutt 1999). There are 124 of these small pueblos located within the fire perimeter.

The later Pueblo occupation is characterized by the establishment of large villages, some containing up to 400 rooms, and hundreds of small, one to two room structures called field houses (Kohler 2004, Powers 2005). The well-known sites of Yapashi and San Miguel and a several other large villages (8 large villages total), along with 784 field house sites, are located within the fire perimeter. In addition there are a number of other types of sites that are associated with the ancestral pueblo period such as shrines, campsites, rock art panels and farm sites consisting of terraces and a number of other special use type sites that are located within the fire perimeter.

By 1550 CE, most of the inhabitants of the Bandelier region have relocated to areas along the Rio Grande. Sporadic Pueblo use of the region continues in the form of hunting and small scale farming activities. Historic period sites are rare and consist of campsites used mostly by shepherds and hunters. Site features dating to this period consist of the remains of corrals, trash dumps and several historic structures. A total of 37 sites dating to this period are found within the fire perimeter.

Discussion of Fire Impacts:

Burn Severity:

Fire severity maps and Bandelier GIS layers have identified 1,104 archeological sites as burned:

High Severity	11
Moderate	219
Low	874
Unburned	369
Undetermined	42

Assessments for those sites listed as High, Moderate and Low will be prepared for fire impacts. This will include documenting heat related impacts such as sooting or smudging of artifacts, impacts to built features such as rubble mounds or middens in the form of fractured or spalled building stone, and the presence of fire killed trees that need to be removed to prevent damage from uprooting or structural damage from tree fall. (see map of burn severity and archeological sites)

Post-Fire Flooding:

Due to the severity of burning in the headwaters of the major drainages of Frijoles Canyon, Alamo Canyon, Capulin Canyon and Sanchez Canyon sites located within 50 meters of the drainage bottom are selected as needing to be assessed. Assessments will consist of determining flooding potential and erosion potential. A total of 99 sites are located within this zone and also includes sites within the burn area and those downstream and outside of the burn area. Due to burn severity and site location, we assume that many cultural sites are susceptible to flooding impacts. In addition, trees located within floodplain and proximal to archeological sites will need to be assessed for toppling onto archeological sites and determine if removal is necessary. (see map showing drainages and archeological sites)

The major display sites of Tyounyi, Big Kiva and the Unexcavated Pueblo (all located along the primary interpretive trail in Frijoles Canyon) have been assessed for flooding potential and these findings are discussed on pages 6 – 12 of this BAER report. Briefly, the flooding assessment for these sites found that they are above the maximum flash flood level of 26,000 cubic feet per second and the likelihood of a flooding event is relatively small.

Slope and Erosion Potential:

Sites located on slopes of 5% or more are also selected to be assessed. Steep slopes are more susceptible to the effects of post-fire erosion, mass wasting and sedimentation. The Bandelier GIS data base identified 152 sites situated on slopes ranging from 10 to 20% and slopes of more than 20%.

Fire-Killed Trees:

Archeological sites with fire-killed trees located on site features such as roomblocks, within rooms, midden areas, kivas or any other type of site feature will need to be assessed. These trees will eventually fall, further disrupting site features and may pull up root balls that will impact subsurface archeological deposits. An estimated 400 sites will have trees needing removal.

Unique/Special Requirement Sites:

The final class of archeological sites identified for assessments consist of the large, well-known sites that are important to Native American groups and visitors to the park. These include the sites of Yapashi, San Miquel, Shohakka, Potrero de las Casas, Pueblo Chicharra and several other unnamed sites. In addition, 9 sites recorded as shrines within the fire perimeter will be assessed.

All petroglyph sites fall in this category and will be assessed for damage. This class of site is susceptible to spalling, staining and discoloration. There are a total of 3 petroglyph sites within the fire perimeter. (see map of unique and special requirement sites)

Background Information and Recommendations:

Impacts to cultural resources as a result of fire, fire management actions and post-fire conditions can be conveniently divided into three categories: direct, operational and indirect. Direct impacts are those caused by the wildland fire itself or by its byproducts (e.g., smoke); operational impacts are caused by fire management actions made in response to wildland fires (e.g., fireline construction, retardant drops); and indirect impacts occur as a result of fire-induced changes to the context in which cultural resources are found (e.g., erosion due to loss of vegetation cover.)

At this time, no operational impacts have been documented. It is possible that examples may come to light once assessments have been completed, but we are expecting this number to be low. As described above, we expect most impacts to cultural resources will be from direct impacts and the potential for subsequent indirect impacts.

Recommendations:

1. Conduct Site Assessments: (Emergency stabilization, specification related) As mentioned above, over 1,515 archeological sites lie within the Las Conchas Fire perimeter and GIS data and burn severity maps demonstrate that up to 1,104 sites have been burned. Archeological site assessments will collect information on direct fire impacts, indirect impacts and develop recommendations to mitigate fire impacts.

2. Develop and implement treatment plans: (Emergency stabilization, specification related) Once assessments are completed, recommended treatments will be implemented. These will include, but are not limited to the following actions:

- remove fire-killed trees
- construct erosion control features such as log soil dams, log diverters or slash-mulch
- removal of trees in floodplain areas susceptible to falling on archeological sites
- data collection on fire impacts and current site condition

3. Special Considerations: Nearly all of the archeological sites under consideration for assessment and treatment are located in the Bandelier Wilderness. Access and any treatments applied to a site will need to adhere to wilderness guidelines. This may increase time and budget estimates.

In addition, Pueblo consultations on all proposed treatments are necessary. Many of the Pueblos have expressed deep interest in any proposed treatment of their ancestral sites.

4. Monitoring: Where treatments are implemented on archeological sites, monitoring will be necessary to document the effectiveness of treatments. Two years of monitoring on treated sites are proposed.

5. Bandelier National Monument is now the perfect laboratory to study the long-term effects of fire and cultural resources. In 1977 the La Mesa Fire burned through the park and initiated the first studies of fire and archeology (Traylor, et.al. 1990). In 1996 the Dome Fire burned a number of La Mesa archeological sites and initiated another round of fire and archeology studies (Oster n.d.). Perhaps most interesting is that Las Conchas burned many of the same sites that were burned in both La Mesa and Dome. We now have a number of sites that can be investigated to answer questions about the long-term effects of fire on archeological sites that burned in 1977, 1996 and now in 2011.

Proposed Costs:

FY 2012, Archeological Assessments, Site Treatments: \$142,668

FY 2012, 2013, Site Treatments, Treatment Monitoring: \$103,771

Consultations:

Mike Bremer, Santa Fe National Forest Archeologist

William Reed, Program Leader, Intermountain Region, National Forest Archeologist

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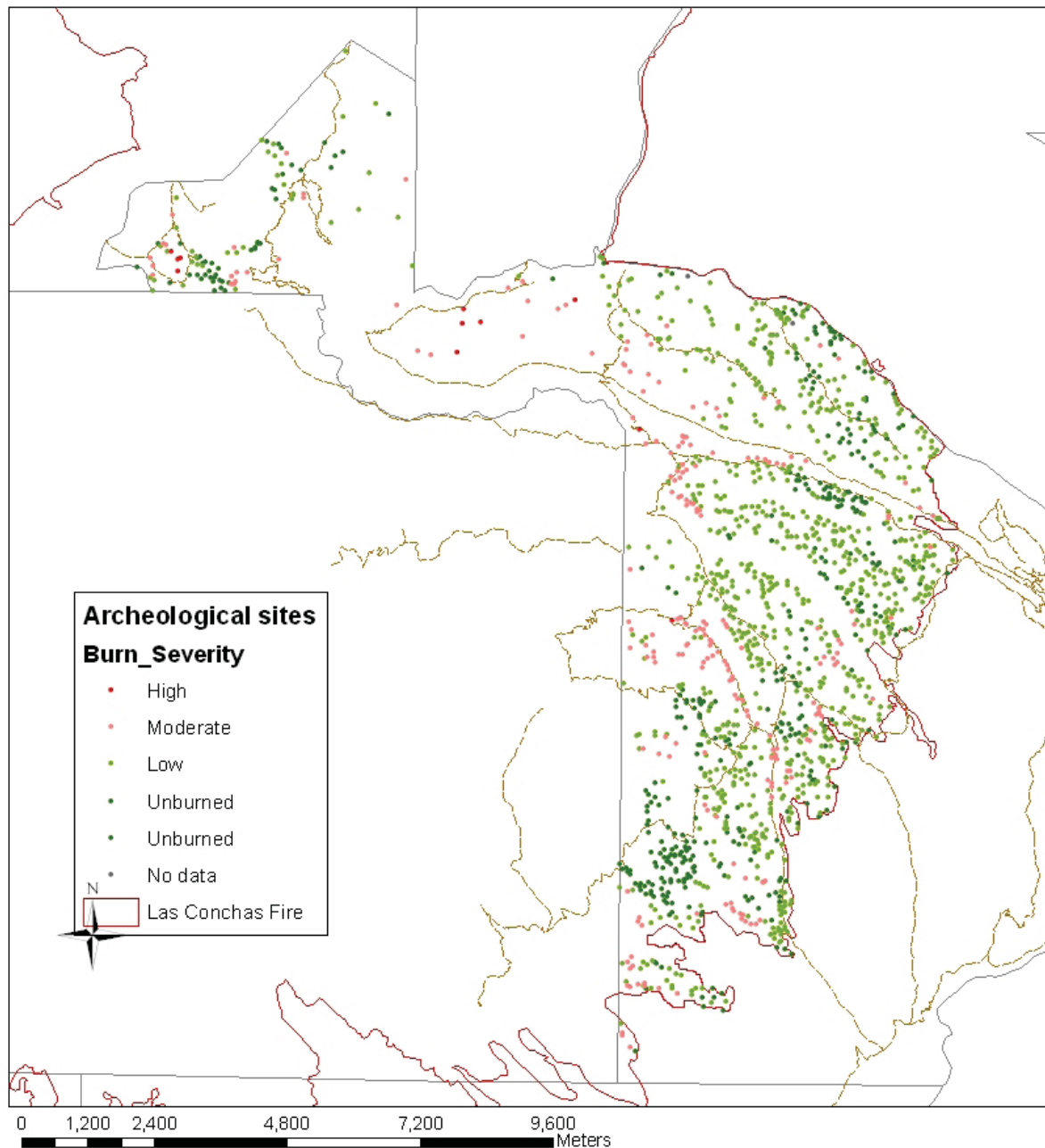
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Bandelier National Monument
New Mexico

National Park Service
U.S. Department of the Interior



Las Conchas Fire - Remote Burn Severity Assessment on Archeological Sites



Produced by Ecology Group Office

July 2011

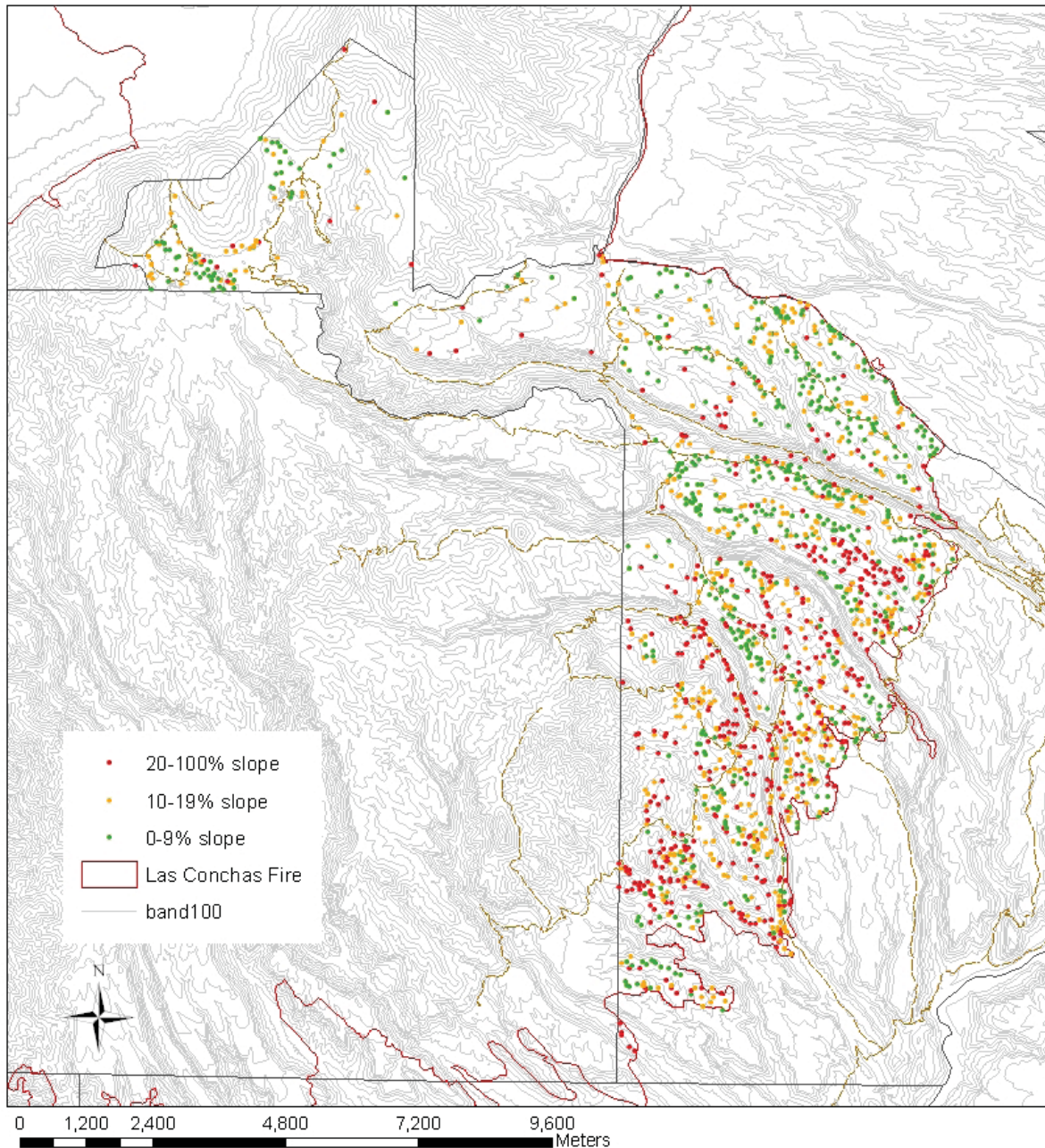
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New Mexico

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Las Conchas Fire - Preliminary Slope Assessment on Archeological Sites



Produced by Ecology Group Office

July 2011

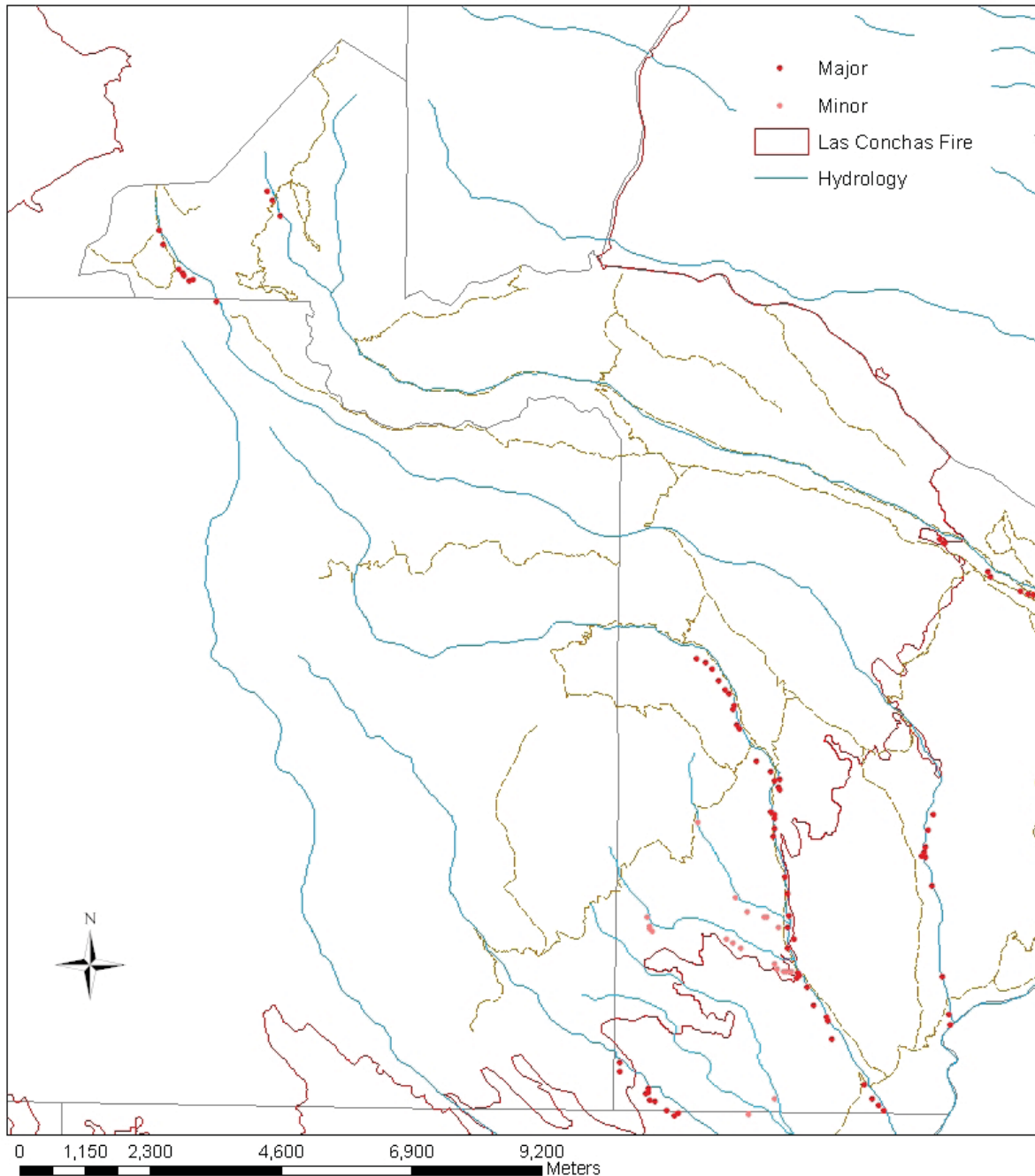
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New Mexico

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Las Conchas Fire - Archeological Sites Prone to Flooding



Produced by Ecology Group Office

July 2011

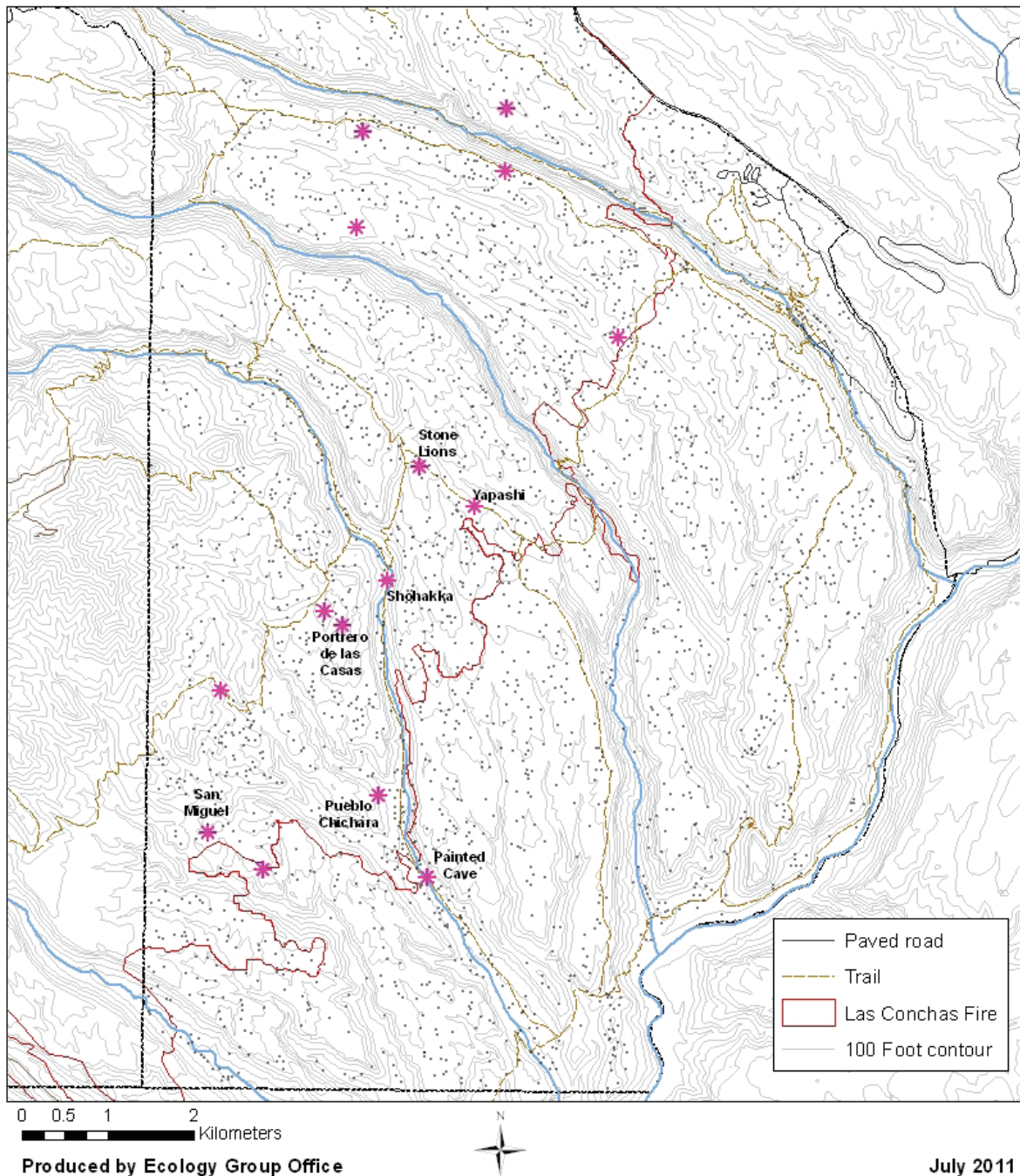
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Las Conchas Fire - Archeological Sites of Special Concern





Pueblo cluster on South Frijoles Rim showing standing dead. LA3769 with LA3753 in background.



Shohakka Pueblo showing standing dead and proximity to Capulin Creek

Shohakka Pueblo views showing high severity to masonry fabric, spalling, cracking, color change



WILDLIFE ASSESSMENT

Resource: Regenerating Aspen and Palatable Shrubs
Fire: Las Conchas
Date: June and July 2011 and continuing
Author: Stephen Fettig, NPS, Bandelier National Monument, New Mexico

General Effects on Biota and Habitat

The horizontal rolling vortex photographed during the first day of the Las Conchas Fire undoubtedly had a devastating impact on above-ground wildlife. Observations a few days after the fire in the Dome Wilderness and the western part of Bandelier National Monument (the park) documented extensive combustion of above ground vegetation. The speed of the rolling vortex, on the order of 1-2 acres (0.4-0.8-hectares) per second, meant that relatively few animals living above ground likely survived. In addition, the mid-elevation areas of all the major canyon systems of the park experienced extensive to near complete mortality of all tree and shrub cover while leaving dead trees standing. In the upper watersheds of Alamo and Frijoles Canyon the fire burned in more of a mosaic leaving many canopy trees live in many places with notable high burn severity areas near Scooter Peak in the upper Alamo Canyon watershed.

The direct impacts of the fire on underground-dwelling wildlife were likely small. Many small mammals such as squirrels (*Spermophilus sp.*) and chipmunks (*Tamias sp.*) likely weathered the fire underground. At lower elevations where dry conditions are preventing any substantial plant regrowth, the indirect impacts of the fire may lead to extreme food shortages for many small mammals who rely on above ground vegetation. In contrast, re-growth of grass observed in the park's higher elevations means the indirect impact of the fire are likely to be of relatively short duration in those areas. This is especially true for the **pika** (*Ochotona princeps*), a resident of highest-elevation rocky grasslands of the park, whose habitat at Bandelier was only burned to a light or moderate degree and in a patchwork nature. Pika populations are likely to experience few if any long term impact from the Las Conchas Fire at Bandelier National Monument.

The **Jemez Mountain salamander** (JMS, *Plethodon neomexicanus*) is another resident of high elevation habitat in the park. The JMS is endemic to the Jemez Mountains of New Mexico. In September 2010, the U.S. Fish and Wildlife Service determined that the Jemez Mountain salamander (JMS) warrants listing under the Endangered Species Act (1973), in part because of significant population declines across its limited range. The species uses habitat with broken rock substrates above elevations of approximately 7,000 feet. These broken rock substrates provide air spaces that the salamander uses during 90-95% of its life. The species only comes to the surface to feed during very moist conditions when temperatures are relative warm. During very wet conditions of late summer, JMSs can be found on the surface above their broken rock subterranean habitats. During these wet conditions, the species uses spaces in and under logs and stumps for cover and foraging habitat. Decomposing Douglas fir (*Pseudotsuga menziesii*) logs and stumps are used more extensively than other species because of their long air spaces which provide for relatively ease of movement by the salamander. A very high percentage of the logs and stumps have been consumed by the Las Conchas Fire within much of Bandelier's high country. Thus, the Las Conchas Fire undoubtedly resulted in no significant direct mortality of JMS because the animals were all underground during the fire. Indirect impacts on the species

are foreseeable because of greatly reduced food availability due to the reduced woody cover on the grounds surface.

During January and February 2011, The Nature Conservancy facilitated discussions on the topic of management options for JMS habitat given the increasing risk of wildfire in the Jemez Mountains anticipated with warmer and drier weather. The discussions involved on-the-ground biologists as well as fire management officials and agency line officers. One point of consensus from the discussions was that any sort of **grass seeding** in JMS habitat should be done with caution. Grasses that produce a dense turf or dense rhizomatous root system can be disastrous for JMSs. Grasses that produce dense root systems inhibit the movement of JMS and can likely make large areas of soil surface unusable for the salamander. The two JMS experts who can be called to verify this information are Charlie Painter (charles.painter@state.nm.us, 505-476-8106) with New Mexico's Department of Game and Fish in Santa Fe, and Michelle Christman (michelle_christman@fws.gov, 505-346-4728) at the Ecological Service, United States Fish and Wild Service in Albuquerque.

The Las Conchas Fire's large impact on canyon systems of the park means most if not all of the park's nesting and roosting habitat for **Mexican Spotted Owls** (*Strix occidentalis lucida*) has been altered beyond suitability for the species. These owls use the coolest recesses produced by trees shading canyon walls as their core habitat. All such cool alcoves are now profoundly altered. Detailed evaluation of the extent of the change will require aerial imagery to be gathered this fall.

In contrast to the impacts on Mexican Spotted Owl habitat, **Peregrine Falcon** nesting habitat is well above the trees on canyon walls. The Las Conchas Fire likely had no direct impact on these falcons. Some indirect impacts are likely from reduced prey (small birds) availability.

For **Rio Grande Cutthroat Trout** (RGCT, *Oncorhynchus clarki virginalis*) introduced into Capulin Canyon in March 2006, the direct impact of the Las Conchas Fire was likely small. Water temperatures likely changed little from the passing of the fire front. Indirect impacts from ash flowing into the creek and flash flooding, however, have a relatively high likelihood of eliminating RGCT from Capulin Canyon. This likelihood is based on observations of all fish being eliminated from Capulin Canyon by flash flooding after the 1996 Dome Fire. On-going monitoring by the Southern Colorado Plateau Inventory and Monitoring Network (SCPN) will be tracking the recovery of aquatic macro-invertebrates, the primary food source of RGCT. This information will provide park management with information on when and if re-introductions of RGCT should be considered in perhaps 4-6 years. The monitoring data and the related decision process will also consider the introduction of other fish of conservation concern such as the Rio Grande Sucker (*Catostomus plebeius*), the Rio Grande Chub (*Gila pandora*), and the Longnose Dace (*Rhinichthys cataractae*). The Longnose Dace is a low priority because it is relatively common in northern New Mexico.

The fire's impact to the perennial streams of the park also alters plans for **removing non-native fish** from Frijoles Canyon. The magnitude of flash flooding may potentially remove non-native fish from Frijoles Creek without further human intervention, as flash flooding did in Capulin Creek after the 1996 Dome Fire. On-going monitoring by the SCPN will be tracking the

recovery of aquatic macro-invertebrates, a key food for fish. Over the next 4-6 years, the SCPN's monitoring efforts will provide management with information on whether active removal of non-native fish is still needed or not.

In 1998, the park established an array of 0.62-acre (0.25-hectare) **elk fences (exclosures)** and unfenced reference areas to provide information needed to make sound inter-agency elk management decision. Within areas of gentle slopes and flat terrain in the upper elevations (8,000 – 10,000 feet) of Bandelier National Monument field crews have observed relatively high levels of browsing by elk on aspen (*Populus tremuloides*) sprouts and woody shrub such as chokecherry (*Prunus virginiana*), service berry (*Amelanchier utahensis*), mountain maple (*Acer glabrum*), and oak (*Quercus* sp.). The browsing is at such intensity that regenerating individuals cannot grow to maturity and reproductive status. Such limitations imposed by browsing prevent the regenerating most woody plants from contributing vertical habitat structure and from contributing fruits or seeds to wildlife food supplies, both of which are important for overall biological diversity. Reconnaissance of the 13 **elk fences (exclosures)** within the Las Conchas fire perimeter has documented burnt fallen trees on the fences at 8 locations.

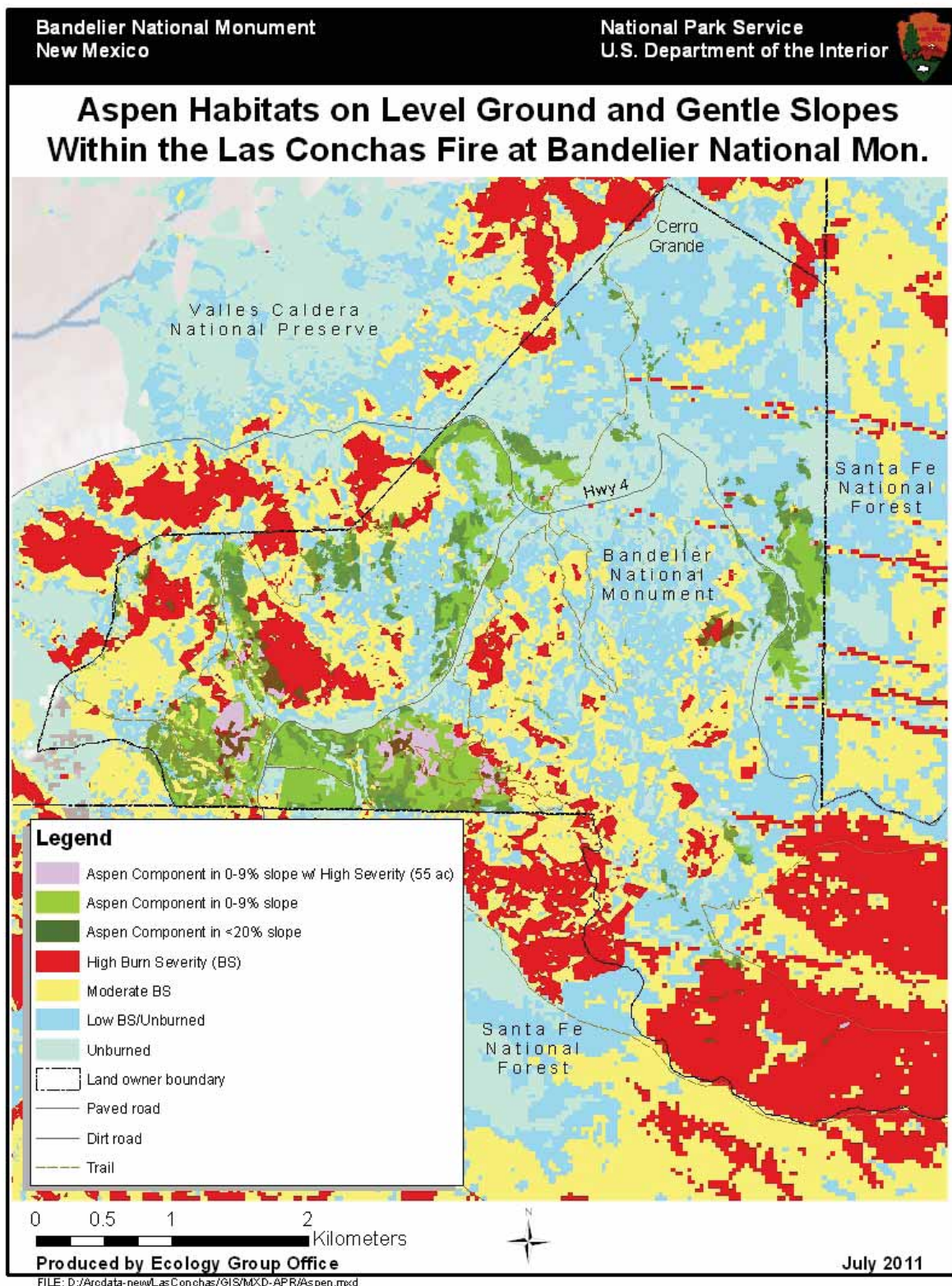
Ecosystem Challenges

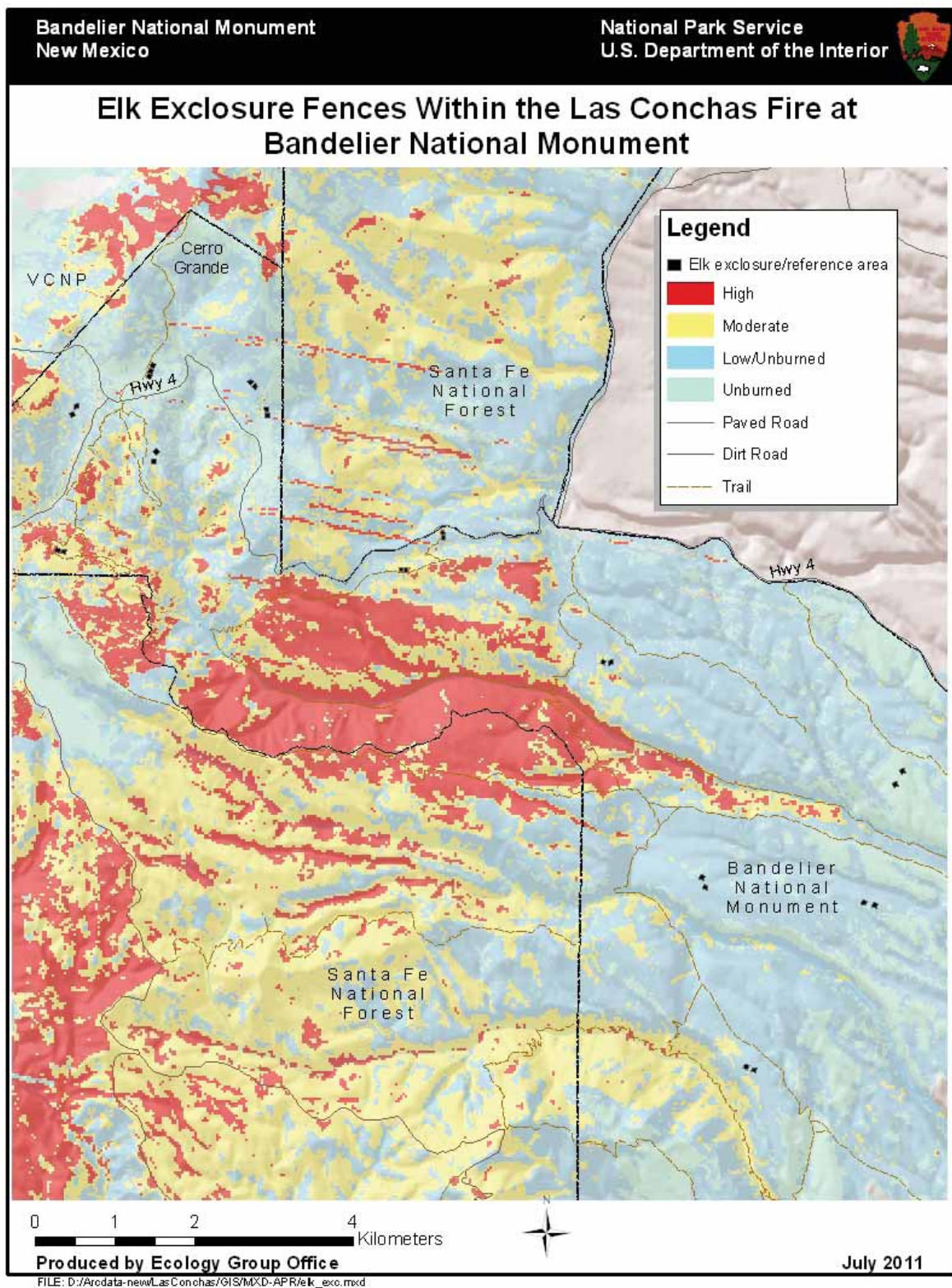
Aspen (*Populus tremuloides*) and palatable shrubs (e.g., chokecherry, service berry, mountain maple) produce food and cover critical to wide range of wildlife from insects and spiders to mammals and birds. Currently, elk browsing completely prevents any aspen regeneration and most shrubs regrowth on level and gentle slopes within Bandelier. The fire has created an critical emergency for aspen and many shrubs by killing the above ground stems. Since regeneration is not possible given the current level of elk browsing, local extirpations loom. Observations within Bandelier after the 2000 Cerro Grande fire documented elimination of aspen root systems over two 4-hectare (10-acre) patches in less than 4 years because of elk browsing. The same elimination of aspen root systems on level and gentle slopes is clearly foreseeable in high burn severity areas of the Las Conchas Fire, specifically in the upper Alamo and Frijoles Canyon watersheds.

Recommendations

1. Related to pika, consider no post-fire actions given the relatively minor direct impacts of the fire on the species and the relatively rapid recovery likely for the species' grassy habitats.
2. Related to Jemez Mountain salamander, consider scattered felling standing dead trees to quickly provide some additional foraging habitat for this candidate species for federal listing. The primary target areas would be within the 500 acres of high burn severity in the uppermost part of the Alamo Canyon watershed on the west and southwest sides of Scooter Peak. This work could be done by NPS employees and would require less than 1 day oversight by the park's wildlife biologist (see specification sheet for JMS). This work would not occur in federally-designated wilderness.
3. Related to Jemez Mountain salamander (JMS), the park should strongly resist any pressure to seed grasses in potential JMS habitat.

4. Related to Mexican Spotted Owl, consider no post-fire actions given that most of the habitat for this species has been severely degraded or eliminated within Bandelier. This judgment will be re-evaluated based on aerial imagery to be acquired in the fall of 2011 with funding from the Southern Colorado Plateau Inventory and Monitoring Network (SCPN), and in consultation with FWS.
5. Related to Peregrine Falcon, consider no action post-fire actions given the rock-cliff nature of this species' nesting habitat.
6. Related to Rio Grande Cutthroat Trout, consider no post-fire actions given that the SCPN will be funding stream invertebrate monitoring and supplying the results for future management decisions and planning efforts.
7. Related to removing non-native fish within perennial stream reaches, consider no post-fire actions given that the SCPN is already planning on conducting appropriate monitoring. The SCPN monitoring results will feed into future management decisions and planning efforts.
8. Related to exclosure, consider actions to repair fences damaged from falling fire-killed trees. Contracting and overseeing this work is likely to require a week of time by the park's wildlife biologist with approximately 3 weeks of work by a contractor (see specification sheet for repair). This work would not occur in federally-designated wilderness.
9. Related to the challenge of preserving aspen and palatable shrubs on gentle slopes, the park's wildlife biologist will need two months of time for surveying, photographing, and mapping the extent of this issue that the park has been tracking since the mid-1990s. A first step would be to undertake aspen condition monitoring on a larger scale than Bandelier; for example setting up a monitoring program between the Valles Caldera National Preserve and Bandelier National Monument. Localized degradation of aspen stands within the monument may not be a concern, but if it is part of a larger trend that shifts vegetation composition, then a response is warranted.
10. Related to the challenge of preserving aspen and palatable shrubs on gentle slopes, consider building temporary protective fences with on-site materials. High altitude areas that burned severely within the mixed conifer forest may become aspen dominated because of removal of overstory trees by fire. However, in gentle terrain there will be overbrowsing. New Mexico Game and Fish management may encourage expansion of the elk herd, potentially increasing browsing pressure. Winter browsing areas tend to be the most heavily impacted. Therefore potential for overbrowsing is a land management concern. Based on conditions monitored after the Cerro Grande Fire, the elimination of regenerating of aspen, mountain maple and other trees and shrubs from easy-to-walk places could happen in about four growing seasons. Installation of fencing to protect degraded aspen is normal practice (Ref ROMO "Elk and Vegetation Management Plan" for a good example of this.) Protection of degraded aspen is identified as a potential rehabilitation need, following a monitoring program. Contracting and overseeing this work is likely to require two weeks of staff time with a month of fence construction by a contractor (see specification sheet for fences). This work would not occur in federally-designated wilderness.



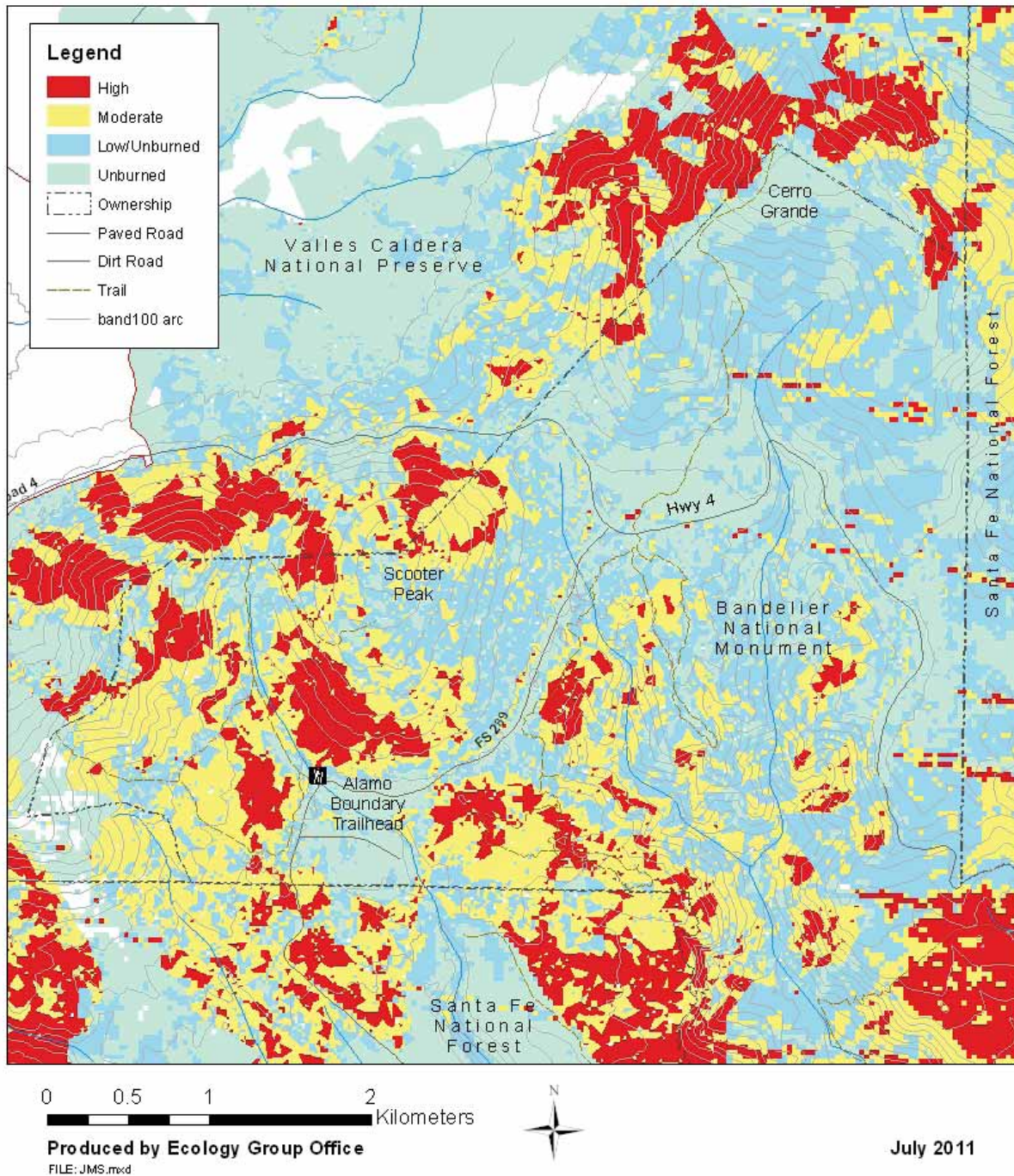


Bandelier National Monument
New Mexico

National Park Service
U.S. Department of the Interior



Las Conchas Fire Severity within Jemez Mountain Salamander Habitat at Bandelier National Monument



VEGETATION BURNED AREA ASSESSMENT



OBJECTIVES

Assess impacts of fire and suppression activities on native flora, plant communities and associated habitat including post-fire recovery of vegetative cover, rehabilitation of suppression impacts, monitoring of known sensitive plant populations, and detection of exotic plant expansion/ establishment that would warrant direct control efforts. Prescribe additional treatments as necessary based on monitoring results.

Issues:

Ensure that post-fire mitigation of suppression activities was completed to standard. Monitor for lagged fire and suppression effects including sensitive and exotic plant response, and adequate vegetative recovery of suppression impacts to document fire effects and system recovery.

Overview:

As of July 15th, the Las Conchas fire has burned over 150,000 acres of vegetation ranging from low elevation juniper savanna to high elevation spruce-fir forests, creating a wide range and spatially mosaic pattern of burn severities. In general the most severely burned areas were consumed during the first day's run (~40,000 acres) when a late afternoon convective thermal updraft created a fire storm vortex capable of burning across nearly any vegetation type or structure within its path. Nearly a third of the Las Conchas fire area was burned at least once during the previous 30-year period by other large wildfires. Introductory text adapted from a recent publication on the flora of the Jemez and Tusas Mountains by Reif et al (2009) is used to provide an overview of the vegetation types within the fire area and readers are referred to that publication for more complete text and citation information as well as to reference the annotated species checklist.

Description of Vegetation Communities:

Forest and Woodland Types

Spruce-fir forest.—These forests occur in subalpine habitats above 9,500 feet or on cooler and moister slopes at somewhat lower elevations. *Picea engelmannii* and *Abies arizonica* are codominants, although *Picea pungens* may occur as a seral species on moist sites. Scattered stands of *Populus tremuloides* may be present in disturbed areas. Conifers of lower elevations, such as *Pseudotsuga menziesii*, *Abies concolor*, and *Pinus flexilis*, may be present in low numbers. The shrub and herb layer can be quite sparse due to the closed canopy. Associated shrubs and subshrubs include *Arctostaphylos uva-ursi*, *Juniperus communis*, *Paxistima myrsinites*, *Ribes wolfii*, *Salix scouleriana*, *Sambucus racemosa*, and *Vaccinium myrtillus*. The herb layer is quite sparse yet may include the forbs *Actaea rubra*, *Castilleja sulphurea*, *Cymopterus lemmonii*, *Ligusticum porteri*, *Pedicularis racemosa*, *Penstemon whippleanus*, *Solidago simplex*, and *Viola canadensis* and such graminoids as *Bromus ciliatus*, *B. richardsonii*, *Luzula parviflora*, *Poa leptocoma*, *Trisetum spicatum* and *T. montanum*.

Mixed conifer forest.—This forest type covers large areas in the Jemez mountains (8,000–10,000 feet). *Pseudotsuga menziesii* and *Abies concolor* are the most widespread and important conifers. They occur with *Pinus strobiformis* in cooler sites while *Pinus flexilis* is found in dry, exposed areas, and *Abies arizonica* in the ecotone with spruce-fir. *Picea pungens* is restricted to locations subject to cold-air inversions including lower slopes and drainages while *Pinus ponderosa* is found in xeric sites and at lower elevations. Aspen (*Populus tremuloides*) is nearly ubiquitous in Jemez mixed conifer forests. The mixed conifer forests are heterogeneous thus reflecting the landscape. Common understory shrubs and subshrubs include *Acer glabrum*, *Arctostaphylos uva-ursi*, *Berberis repens*, *Holodiscus dumosus*, *Jamesia americana*, *Juniperus communis*, *J. scopulorum*, *Paxistima myrsinites*, *Physocarpus monogynus*, *Rosa arkansana*, *R. woodsii*, *Symphoricarpos rotundifolius*, and *Vaccinium myrtillus*. Forbs may be represented by *Artemisia franserioides*, *Castilleja miniata*, *Cymopterus lemmonii*, *Fragaria vesca*, *Lathyrus leucanthus*, *Lithospermum multiflorum*, *Potentilla gracilis*, *Thalictrum fendleri*, and *Thermopsis rhombifolia*, while frequent graminoids include *Agrostis scabra*, *Blepharoneuron tricholepis*, *Carex siccata*, *C. geophila*, *C. occidentalis*, *Elymus trachycaulus*, *Muhlenbergia montana*, and *Achnatherum asperifolia*. Fire has created a natural mosaic within this vegetation type, with burns ranging from

patchy, low intensity to stand replacing fires. Drought, insect outbreaks and dwarf mistletoe infestation also add to the patchwork.

Ponderosa pine forest.—Warmer and drier conditions from 6,700–8,500 feet support this forest type that often forms pure stands and occurs throughout the Jemez mountains. At its upper limit, *Pinus ponderosa* and mixed conifer forests intergrade, while at its lower limit it merges into piñon-juniper woodland.

However, ponderosa pine typically is the sole dominant conifer. Where trees are large and scattered the forests may be open and park-like, with a predominately grassy understory formed under pre-settlement fire conditions. Historic disturbance patterns in ponderosa pine forest were characterized by frequent, low intensity understory fires. Associated deciduous shrubs in the understory include *Berberis repens*, *Ceanothus fendleri*, *Cercocarpus montanus*, *Fallugia paradoxa*, *Juniperus communis*, *Ribes cereum*, *R. inerme*, *R. leptanthus*, *Rosa acicularis*, *R. woodsii*, and *Symphoricarpos rotundifolius*. Relictual individuals of *Juniperus deppeana* are here documented for the Jemez Mountains. These are of Madrean origin with a center of distribution in Mexico. Representative forbs include *Achillea millefolium*, *Amauriopsis dissecta*, *Antennaria parvifolia*, *Cymopterus lemmonii*, *Erigeron divergens*, *E. flagellaris*, *Heterotheca villosa*, *Hymenoxys richardsonii*, *Lithospermum multiflorum*, *Lupinus argenteus*, *Penstemon barbatus*, and *Vicia americana* while common graminoids include *Blepharoneuron tricholepis*, *Carex inops* ssp. *heliophila*, *Elymus elymoides* var. *brevifolius*, *Festuca arizonica*, *Koeleria macrantha*, *Muhlenbergia montana*, and *Poa fendleriana*.

Piñon-juniper woodland.—*Pinus edulis* and *Juniperus monosperma* are dominant in the foothills and form a discontinuous transitional belt (6,000 to 8,500 feet). Piñon-juniper woodlands represent the lowest elevation forest type. Piñon forms closed woodlands at the upper elevational range, whereas juniper occurs in savanna-like communities at the lower elevational range and interface with grasslands. *Juniperus scopulorum* commonly occurs with piñon in mesic settings and has recently encroached into *Pinus ponderosa* understories in absence of fire disturbance. Understory conditions are dynamic and vary with canopy cover, soil conditions, and land use and fire history. Shrub cover is variable and includes *Quercus gambelii* and *Q. undulata*, but also *Artemisia tridentata*, *Cercocarpus montanus*, *Gutierrezia sarothrae*, *Fallugia paradoxa*, *Ribes cereum*, and *Rhus trilobata*. Forbs include *Castilleja integra*, *Chaetopappa ericoides*, *Chamaesyce fendleri*, *Cryptantha cinerea*, *Eriogonum jamesii*, *Gaillardia pinnatifida*, *Hymenoxys richardsonii*, *Lappula occidentalis*, *Oenothera suffrutescens*, *Sphaeralcea coccinea*, and *Tetranneuris argentea* with several succulents including *Cylindropuntia imbricata*, *Opuntia phaeacantha*, *O. polyacantha*, and *Yucca* spp. Common graminoids are *Achnatherum hymenoides*, *Aristida purpurea*, *Bouteloua curtipendula*, *B. gracilis*, *Carex geophila*, *Elymus elymoides*, *Hesperostipa comata*, *Hilaria jamesii*, *Koeleria cristata*, *Muhlenbergia torreyi*, *Piptatherum micranthum*, and *Poa fendleriana*. Historic impacts in woodlands are extensive and include fuel harvest and grazing. Degraded conditions due to historic grazing are often characterized by high densities of *Juniperus monosperma* and intercanopy spaces dominated by *Bouteloua gracilis* and *Gutierrezia sarothrae* with exposed soils and active erosion. Bark beetle outbreaks of *Ips confusus* associated with drought stress can result in high levels of piñon mortality with the most recent events peaking in 2002. From 2007 to 2010 approximately 5000 acres of eroding piñon-juniper in Bandelier National Monument were proactively thinned to

restore understory cover; the slash was broadcast onto exposed soil surfaces to mitigate accelerated runoff and sediment transport and promote recovery of understory vegetation. Approximately 1000 acres of this treatment area was burned over by the Las Conchas fire (Figure 4).

Shrubland Types

Montane Shrubland.—These shrublands are found throughout the Jemez Mountains. They are distributed in a patchy manner throughout mixed conifer, ponderosa pine forest or piñon-juniper woodland. Areas of montane shrubland are often too limited in extent for mapping because they are produced by site-specific factors: past disturbance, local substrate such as felsenmeers, and patterns of moisture. Comparably drier and more rocky sites are typical of montane shrubland, although some associates such as *Prunus virginiana* and *Ptelea trifoliata* are found in areas of increased moisture such as small catchments. Included in this classification of montane shrubland are thick stands of *Quercus gambelii* and *Robinia neomexicana*. These species occur on soils that are poorly developed and xeric and have also been regarded as a seral association produced by past disturbance notably high severity burns which type convert upper elevation forest types. Other shrubs include *Ceanothus fendleri*, *Holodiscus dumosus*, *Jamesia americana*, *Juniperus communis*, *Physocarpus monogynus*, *Ribes cereum*, *R. inerme*, *Rubus parviflorus*, *Sambucus racemosa*, and *Symphoricarpos rotundifolius*.

Grassland Types

Montane grasslands, wet meadows, and other grasslands.—This vegetation type occurs from about 8,500 feet to the highest summits throughout the Jemez mountains. Upper-elevation montane grasslands may be extensive and uninterrupted, whereas lower elevation wet meadow sites are often surround by dense coniferous forests. *Blepharoneuron tricholepis*, *Danthonia parryi*, *Festuca idahoensis*, *F. thurberi*, *Koeleria macrantha*, *Muhlenbergia montana*, and *Poa fendleriana* dominate at higher elevations, while forbs and exotic species may outnumber grasses in lower elevation wet meadows. Wet meadows are associated with landforms which accumulate water especially snow melt and may form soils which inhibit tree establishment. While species composition varies with elevation and moisture levels, montane grasslands are characterized by a diverse array of grasses and forbs. Some frequent representatives of the latter group include *Achillea millefolium*, *Campanula rotundifolia*, *Carex microptera*, *Eremogone fendleri*, *Erigeron flagellaris*, *Erysimum capitatum*, *Frasera speciosa*, *Heterotheca villosa*, *Hymenoxys richardsonii*, *H. hoopesii*, *Ipomopsis aggregata*, *Iris missouriensis*, *Lupinus argenteus*, *Orthocarpus luteus*, *Potentilla hippiana*, *P. gracilis*, and *Thermopsis rhombifolia*. Generally, this vegetation type has experienced a high level of disturbance by grazing. Loss of natural fire disturbance due to grazing effects has promoted forest encroachment in many locations.

Riparian Types

Montane Riparian.—Margins of perennial and intermittent streams support variable species assemblages.

Montane riparian vegetation is found in moist areas within spruce-fir and mixed conifer forests. As with montane meadows, the species composition follows an elevation gradient. Obligate and

facultative riparian species of trees and shrubs can be arranged along a descending gradient: *Picea pungens*, *Salix bebbiana*, *Alnus incana*, *Acer glabrum*, *Cornus sericea*, *Populus angustifolia*, and *Acer negundo*. Additional facultative riparian trees and shrubs include *Populus tremuloides*, *Prunus virginiana*, *Quercus gambelii*, and *Robinia neomexicana*. Among the rich diversity of forbs are *Aconitum columbianum*, *Caltha leptosepala*, *Cardamine cordifolia*, *Equisetum arvense*, *Geum macrophyllum*, *Heracleum maximum*, *Hypericum scouleri*, *Mertensia fransiscana*, *Mimulus guttatus*, *Oxypolis fendleri*, *Pedicularis groenlandica*, *Saxifraga odontoloma*, *Veronica americana*, and species of *Epilobium*, *Potamogeton*, *Ranunculus* and *Salix*. Graminoids include *Alopecurus aequalis*, *Deschampsia cespitosa*, *Elymus canadensis*, *Glyceria grandis*, *G. striata*, *Juncus arcticus*, *Torreyochloa pallida*, and species of *Agrostis*, *Carex*, and *Eleocharis*.

Seral Disturbed Types

Aspen seral forest.—*Populus tremuloides*, an important seral species and post-fire increaser, is widely distributed in the Rocky Mountains. Pure stands of this shade-intolerant species arise through root-sprouting following fire disturbance; however, intense elk browsing of young growth can severely impact and even kill individual clones especially in locations accessible to these large ungulates. Scattered individuals can also be found in late succession or near climax stages in mixed conifer forest and lower subalpine spruce-fir forests. However, like many successional communities, aspen forms a distinct assemblage that may persist for long periods of time. Aspen are found in various coniferous forest types. Forbs include *Campanula rotundifolia*, *Castilleja miniata*, *Chamerion angustifolia*, *Geranium richardsonii*, *Pseudostellaria jamesiana*, and *Thalictrum fendleri* while frequently encountered grasses included *Poa fendleriana*, *P. pratensis*, *Bromus carinatus*, *B. richardsonii*, and *Festuca arizonica*.

Burned Areas.—Natural and anthropogenic fires have been frequent in most of the vegetation types. In this regard the Jemez Mountains has been extensively researched. Over 5,200 fires have been documented between 1906 and 1996, 75 percent of which were initiated by lightning. However, recent large fires in the Jemez Mountains including the 1996 Dome (16,000 acre) and 2000 Cerro Grande (45,000 acres) wildfires were all a result of human ignition. An overlay of large fires since the 1977 La Mesa wildfire (Figure 1) illustrates that approximately one-third of the area within the Las Conchas burn perimeter was previously burned within the last 30-years. Within portions of Bandelier National Monument some areas have been burned 3 times during this time period in areas of overlap between La Mesa, Dome, San Miguel, and Las Conchas wildfires and the 1998 prescribed natural Lummis fire which was lightning ignited. This recent fire history can complicate mapping of fire severity and fire effects on existing vegetation due to the Las Conchas fire because existing vegetation cover data may not fully incorporate recent fire induced vegetation changes.

Roadside-agricultural.—Here, native vegetation may be largely replaced by exotic or agricultural species. Noxious weeds collected along roads include *Aegilops cylindrica*, *Cirsium vulgare*, *Convolvulus arvensis*, *Lepidium latifolium*, *Linaria dalmatica*, and *Ulmus pumila*. Weedy or agricultural plants include *Avena sativa*, *Helianthus annuus*, *Salsola tragus*, *Sisymbrium altissimum*, *Tragopogon dubius*, and species of *Ambrosia*, *Bromus*, *Chamaesyce*, *Chenopodium*, *Elymus*, *Lappula*, *Lepidium*,

Medicago, Melilotus, Plantago, Polygonum, and Trifolium. Roadsides and recently disturbed locations including hand and dozer lines and vehicle tracks can act as corridors for exotics and thus warrant monitoring for noxious weeds.

Exotic Plants

Invasive exotic plants can impact biodiversity and integrity of natural systems, although often increasing total plant species diversity. In natural areas, invasive plants are defined as those which produce significant alterations in plant composition, structure, and ecosystem functions. Invasive plant species that are particularly damaging or prolific are regulated as noxious weeds by New Mexico state. Primarily weeds of concern within the La Conchas burn perimeter based on existing information include: *Acroptilon repens*, *Aegilops cylindrica*, *Bromus tectorum*, *B. japonicus*, *B. inermis*, *Carduus nutans*, *Cirsium arvense*, *C. vulgare*, *Elaeagnus angustifolia*, *Linaria dalmatica*, *Linaria vulgaris*, and *Ulmus pumila*. However, vehicles, heavy equipment and associated fire operations may introduce new weeds not previously reported for our area, as well as move existing weeds into new locations impacted by ground disturbing fire suppression activity. Slurry drops may temporarily promote weed growth at affected locations by enhancing available nutrient and water resources especially where slurry drops are coincident with dozer lines. Distributional data for most of these species is limited to general locations which can be revisited to assess potential effects of the fire and suppression activities. In addition, a GIS layer documenting a range of fire suppression activities including hand lines, dozer lines, vehicle access corridors, camps, helispots, and slurry drops will be used to monitor for both enhancement of existing weed populations as well as new establishment. Based on initial monitoring data, supplemental requests for treatment of weed populations will be developed.

Sensitive Plant Species

Sensitive plant species reported within the general project area include: *Abronia bigelovii*, *Astragalus cyaneus*, *Astragalus iodopetalus*, *Astragalus micromerius*, *Astragalus ripleyi*, *Cornus canadensis*, *Corydalis caseana* ssp. *Brandegeeii*, *Cymopterus sessiliflorus*, *Cypripedium parviflorum* var. *pubescens*, *Epipactis gigantea*, *Eriogonum lachnogynum* var. *colobum*, *Grindelia decumbens* var. *subincisa*, *Hackelia hirsute*, *Lilium philadelphicum*, *Lorandersonia microcephala*, *Mentzelia conspicua*, *Mentzelia springeri*, *Muhlenbergia arsenei*, *Podistera eastwoodiae*, *Ranunculus abortivus*, *Salix arizonica*, and *Spiranthes romanzoffiana*. Many of these species occur in very limited distributions and depending on habitat requirements may be variously impacted or benefited by fire effects. Most direct fire effects would likely be due to habitat alteration, including suppression activity ground disturbance, fire consumption of overstory canopy, flood alteration of stream or floodplain morphology, and accidental introduction of exotic plants. Distributional data for most of these species is limited to point locations and thus monitoring would be limited to revisiting known locations to assess impacts and recovery. Requests for mitigation treatment of sensitive plant populations and habitat would be based on the results of initial monitoring data.

Vegetation Assessments:

All vegetation assessments reported here were conducted using existing literature, local expert knowledge, and remote sensing data including the burn severity map (Figure 3) developed by the BAER team. The vegetation cover base map used for analysis here was developed by the Southwest regional gap analysis project, SWReGAP (Lowry 2005) program using 2001 Landsat data (Figure 2). We overlay existing pre-fire vegetation with burn severity map to visualize relative fire effects relative to vegetation type and burn severity class. It was not possible to account for fire effects imposed by wildfires since existing vegetation map classifies areas burned between 1996 and 2000 as recently burned and does not include more recent events (Figure 1). However, we can assume that areas burned prior to Las Conchas at high severity would likely have been converted woodland and forest to shrub and grass types while moderate and low severity would still likely be classified as forest or woodland. It is possible to overlay existing pre-fire vegetation cover with burn severity map and estimate actual numbers of acres for each vegetation type/ burn severity class while accounting for effects of past burns. However this more refined analysis is only possible using individual burn severity maps from the earlier fires and recent vegetation cover interpreted from imagery; and this level of analysis is beyond the scope of the current report.

Based on a review of the literature (Peppin et al 2010) as well as our recent experience in the local area (i.e. 1977 La Mesa, 1996 Dome, and 2000 Cerro Grande wildfires, Barclay et al. 2004) the BAER team recommends that no seeding occur within the Bandelier portion of the Las Conchas burn area. The rationale for not seeding burned watersheds is supported by an abundance of evidence indicating that post-fire seeding is not effective in reducing erosion (especially in the first season), has many potential side-effects including suppression of the native plants response (including conifer regeneration from seed), introduction of non-local genetics into native plant populations, and inevitably introduces non-local and exotic plant materials to the ecosystem, including noxious invasive plants. For example, after the 2000 Cerro Grande Fire near Los Alamos, NM, it was estimated that contamination of aerial seeding sources inadvertently broadcasted over 1 billion cheat grass seeds on recently burned sites¹. In our experience locally with major wildfires since 1977 the natural vegetative/ watershed recovery trajectory is about 2-3 years regardless of treatment. Seeding treatments are often problematic in terms of the natural response with seeding success and watershed recovery highly dependent on rainfall patterns. While a successful aerial grass seeding can provide short-term erosion control, the treatment generally has a longer-term negative effect in terms of altered native species composition/ exotic plant introduction lasting at least 5-10 years, and in the La Mesa Fire seeding-introduced sheep fescue (*Festuca ovina*) dominated severe burn areas for decades, and in the Dome Fire area an introduced noxious grass (smooth brome, *Bromus inermis*) has greatly increased in cover over the past decade and now absolutely dominates large areas (Oertel et al., unpublished manuscript). Recent data (Charlie Painter, personal communication) suggest seeding may also negatively impact habitat for the endemic Jemez Mountain Salamander.

Neighboring Santa Fe National Forest will employ seeding for select areas of mixed conifer forest. The areas currently proposed for reseeding are not likely to impact the monument through

¹ A 21st Century Perspective on Postfire Seeding, Keeley, Jon E. and others, *Journal of Forestry*, Vol. 104, No. 2, March 2006.

migration of introduced seed, however, BAER stabilization activities on the forest should continue to be monitored for changes in approach that might effect park lands.

Recommendations:

1 - Treatment recommendations for vegetation are currently limited to monitoring fire and suppression activity effects on the sensitive and exotic species noted above, including known populations within fire or suppression activity affected areas as well as monitoring for establishment of new weed populations. In addition the crew will document that all suppression ground disturbance, including hand and dozer lines, were closed out according to established standards and that vegetative recovery on these sites is acceptable. Rehabilitation of suppression impacts is normally a task completed by operational resources assigned to the fire, as is development of a comprehensive GIS layer detailing location of suppression activities. A crew of plant ecology technicians from the New Mexico Natural Heritage Program (NMNHP) would be contracted through an existing Cooperative Agreement to monitor both sensitive and exotic plants using existing population location data and survey sites potentially impacted by extreme fire severity and/ or documented suppression activities. They would also note additional remediation necessary where line closeout did not occur or did not meet standards; as well as edit GIS coverage which is inaccurate or incomplete.

2 - In addition, effects of the fire on the recently completed piñon-juniper ecological restoration treatments within Bandelier National Monument would be documented. Burned restoration areas would be evaluated for adverse soil and vegetation impacts due to heat effects and consumption of the slash mulch relative to adjacent unburned areas using a combination of remote sensing and ground truth to interpret imagery.

3 - Because there is often a significant lag time between fire effects and plant response, and plant response is variable depending on precipitation patterns, we propose three years of monitoring at an annual cost of \$30K to survey the entire scope of the burned area including National Forest Lands, Valles Caldera National Preserve, and Bandelier. This would support a NMNHP field crew of four for a total of one month each year.

4 - Additional funding requests for exotic plant control would be developed as necessary to mitigate documented weed issues resulting from fire and suppression activities.

Total Bandelier National Monument Monitoring Request: $10K \times 3 \text{ years} = \$30K$

Figure 1. Recent Large Wildfires

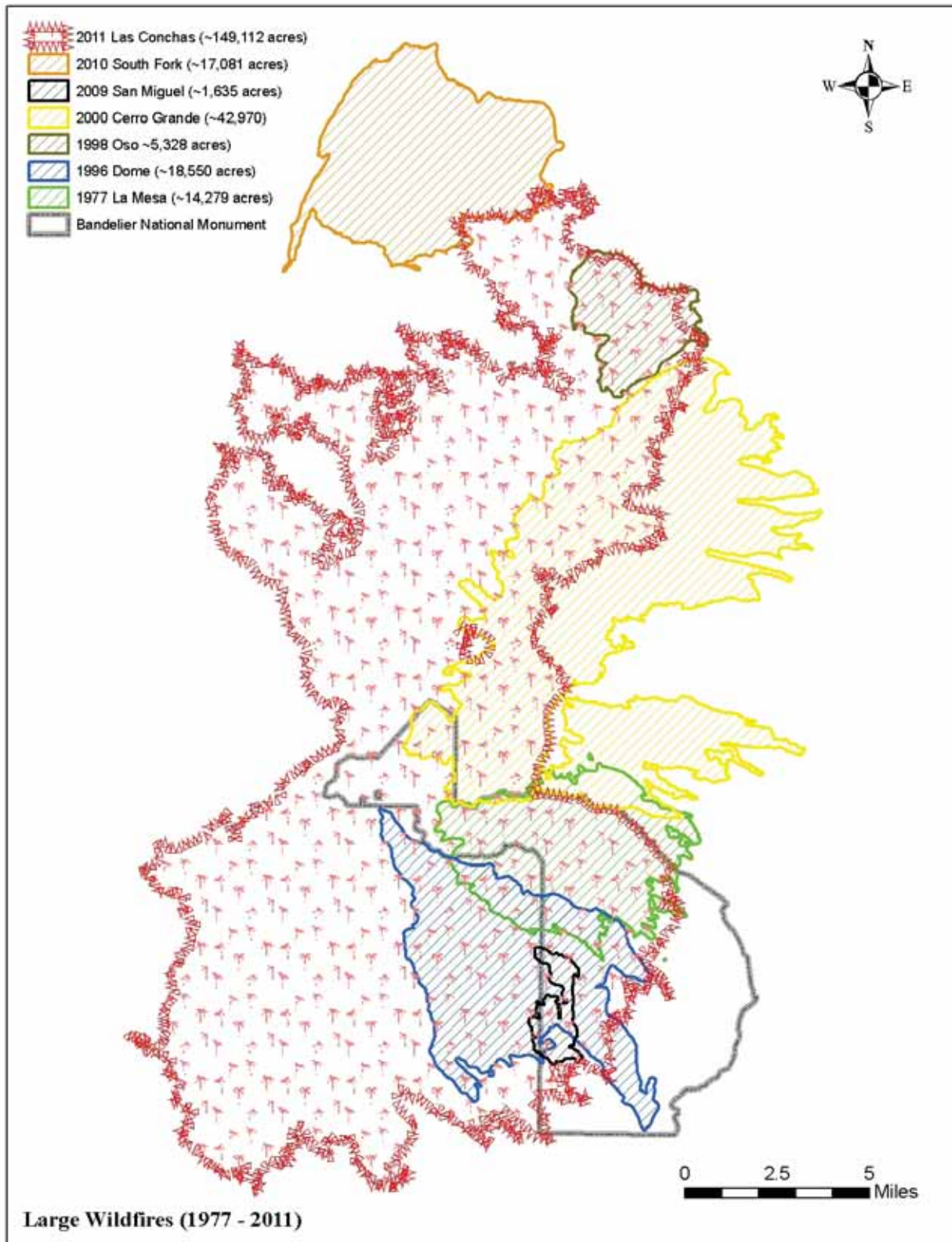


Figure 2. Existing Vegetation

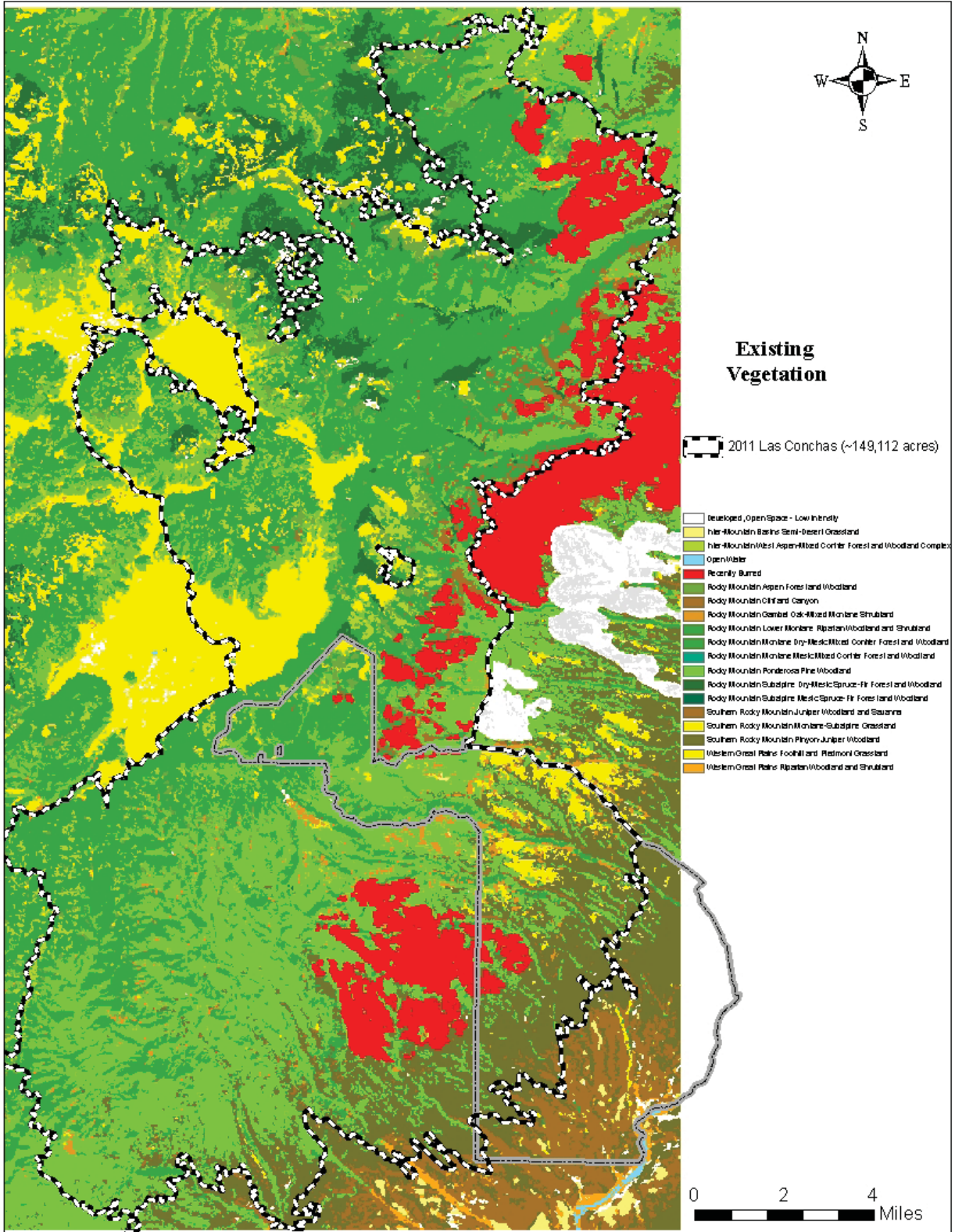


Figure 3. Burn Severity

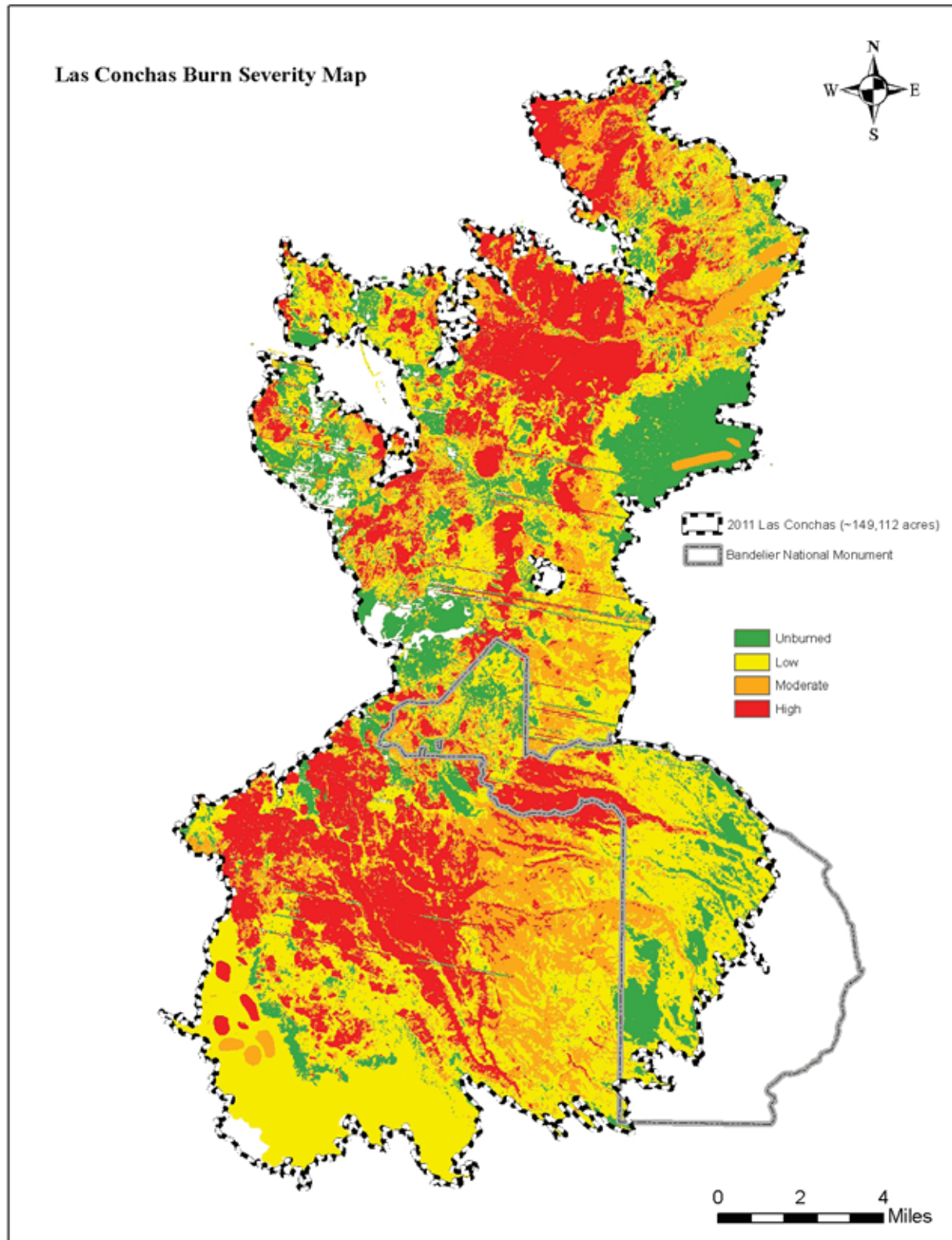
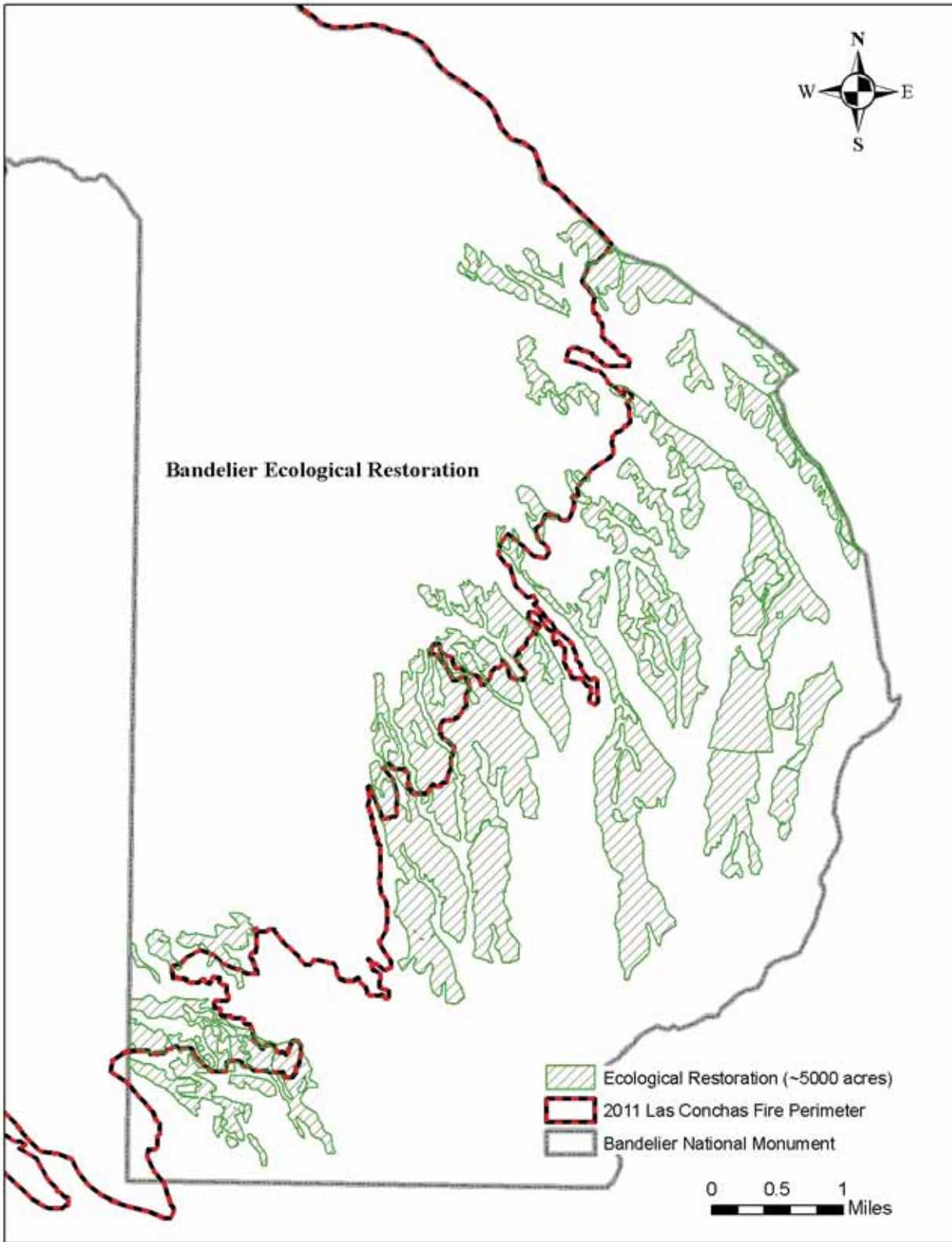


Figure 4. Ecological Restoration



Literature Cited:

Barclay, A.D., J.L. Betancourt, and C.D. Allen. 2004. Effects of seeding with ryegrass (*Lolium multiflorum*) on vegetation recovery following fire in a ponderosa pine (*Pinus ponderosa*) forest. *International Journal of Wildland Fire* 13:1-12.

Lowry, J.H. et al. 2005. Southwest regional gap analysis project (SWReGAP): final report on land cover mapping methods. RS / GIS Laboratory, College of Natural Resources, Utah State University, Logan, UT, USA.

Oertel R.O., et al. Unpublished manuscript. Post-fire invasion and dominance of an introduced grass, *Bromus inermis*, in the Jemez Mountains, New Mexico.

Peppin, D., P.Z. Fule, C.H. Hull Sieg, J.L. Beyers, and M.E. Hunter. 2010. Post-wildfire seeding in forests of the western United States: An evidence-based review. *Forest Ecology and Management* 260:573–586

Reif, B., J. Larson, B.F. Jacobs, B.E. Nelson, and R.L. Hartman. 2009. Floristic Studies in North-Central New Mexico, U.S.A.: The Tusas Mountains and the Jemez Mountains. *J. Bot. Res. Inst. Texas* 3:921-961.

MINOR FACILITIES BURNED AREA ASSESSMENT

Bandelier Backcountry Cabin Debris Removal

Work to be done:

Remove all debris from former backcountry cabin and supporting structures located within upper Capulin Canyon, Bandelier National Monument. Cabin is located within Capulin Creek floodplain, and debris are at imminent risk of being carried down-Canyon by post-Las Conchas Fire flood waters. Debris include roofing tin, a wood stove, wilderness tools, kitchen wares, camping equipment, and structural materials such as nails and wire. Propane tanks also exist on site, and should be considered as hazardous material for aviation transport.

Bandelier staff familiar with aviation sling load operations estimate Bandelier Backcountry Cabin debris removal to take 3 days (2 days of preparation, 1 day of flight). Debris will be manually reduced to fit sling load specifications for weight and size. Number of estimated sling loads equals 10.

Bandelier Backcountry Cabin debris removal is feasible only by way of helicopter sling load as it lies in the Dome Wilderness. Taking into consideration the distance to any navigable road and the rough terrain within the Wilderness area, manual removal of debris is inefficient and unsafe. Helicopter operations also provide the necessary speed required to remove debris before they are dispersed down-Canyon by flash flooding.

Estimated Labor Cost: \$3,000

Estimated Materials Cost: \$3,000

Estimated Helicopter Operating Cost: \$15,000

Estimated Total Cost: \$21,000

Protection of Cultural Sites Within the Developed Area of Frijoles Canyon

Bandelier National Monument managers recognized in the aftermath of the Las Conchas Fire, with 12.3 miles of Frijoles Canyon above the park's primary visitor district impacted by severe-to-moderate fire effects, that flash flooding within the canyon would be inevitable. Fire start was on June 23rd, 2011, and consideration of resources at risk and protection strategies began on July 3rd, 2011, immediately after cessation of immediate fire danger.

Following analysis and consideration of hydrologic data, park managers determined that archeological sites within Frijoles Canyon main visitor area are protected from flash flood risk by topography and restoration of historic free flows within the Rito de Frijoles. Flash flood levels would have to rise above 26,000 cfs to reach the sites and this is considered to be an unlikely

scenario. The historic and modern structures closest to the Rito are reasonably protected from flash floods at the anticipated 3,000 to 4,000 cfs level. However, should a flash flood event of 6,000 cfs or more occur, the capacity of the point protection will be exceeded and damage to these structures will become likely. The extent and cost of damages could range from nuisance clean-up levels to extensive structural damage. The timeframe for flash flood damage is expected to extend for three monsoon seasons. Damage costs are not estimated in the Initial BAER request, but may be requested in subsequent requests as circumstances warrant.

Trails: 53.5 (63%) miles of trails within Bandelier National Monument were directly impacted by various levels of fire efforts. An additional 5 miles of trails lie within canyon bottoms that are highly likely to be impacted by flash flood events. Trails provide critical access to park cultural and natural resources, many trails are prehispanic or historic routes, and additionally trails are a critical visitor experience resource. Most trails lie within Bandelier Wilderness and logistics for trail repair will require a Minimum Requirements Decision process.

Trail Impacts	Distance (miles)	Comment
Trails within the Las Conchas Fire perimeter	53	Trails and adjacent areas are moderately to severely burned; high elevation areas present danger from snags. Of these trails, 20 miles (40%) are on slopes greater than 20% that are expected to require extensive repair following post-fire erosion, and 13 miles lie on canyon bottoms exposed to flash flooding that may cause extensive damage.
Trails on canyon bottoms that are exposed to post-fire flash flooding	5	Trails within the canyon bottoms are exposed to damaging flash flooding.
Total Distance	58 miles	Impacted trails.

Trail Signs:

Wayfinding signs exist along the park trail system that are essential to safe use of the trails by staff and visitors. Signs are metal placards mounted on metal posts.

Trail Signs	Quantity	Comment
Signs within the Las Conchas Fire perimeter	49	Approximately 49 signs lie within the severely burned area of the park. Fifty percent (50%) are expected to require replacement due to direct fire damage or damage due to post-fire erosion.

Trailheads:

Two trailheads were directly affected by burnover, with portions of the trailhead structures consumed by fire. Log structure components of the trailheads that define the allowable footprint

of vehicle parking and driving activities are essential to safe use of the trailheads and protect nearby cultural and natural resources from inadvertent damage.

Parking Area/Trailhead Impacts	Quantity	Comment
Burnt Mesa Trailhead	200 LF	Perimeter Ponderosa Pine log structure confining parking footprint and preventing vehicles from traveling on trail.
Ponderosa CG/Trailhead	300 LF	Roadside Ponderosa Pine log structure confining parking and preventing vehicles from traveling off road.
Total	500 LF	

Moror Car and Foot Bridges:

Five bridges crossing Frijoles Creek in the historic district were identified as choke point for debris during flash flood events and were removed by the Intermountain Incident Management Team.

Motor Car and Foot Bridges	Quantity	Comment
Motor Car Bridge	1	Stone and Concrete two-lane motor car bridge with utility corridor in road prism (electrical, water, wastewater)
Trail Foot Bridges	4	Concrete foot bridges connecting Main Loop trail system
Total	5	

Flash Flood Clean-Up:

While point protection has been installed in areas of the historic district to protect resources and facilities infrastructure, it is anticipated that mud and debris would still be deposited in the visitor parking areas and the Cottonwood Picnic Area. The extent of clean-up efforts will depend on the severity of flash flood events.

Monument Boundary:

Seven (7) miles of the Monument boundary fence on the west side lies within the burn footprint of the Las Conchas Fire; this west boundary fence separates the park from Santa Fe National Forest land that is allocated for cattle grazing allotments. Prevention of cattle trespass onto the Monument is essential to avoid trampling, trailing and bedding of cattle on archeological sites. The fence is a metal stake 3-strand fence that is exposed to damage from severe burning, post-fire erosion, and collapse of snags onto the fence.

Hazard Trees:

Along all affected trails the presence of hazard trees is extensive. These trees present a hazard to all personnel traveling along trails for assessment, stabilization, monitoring, and other recovery activities, as well as the visiting public.

Reinstall Transformer:

Reinstall Visitor Center Transformer that was removed by Incident Management Team = \$2,500

Remove Temporary Point Protection:

Remove and dispose of temporary point protection at Visitor Center and Lift Station including flood diversion wall that was installed by Incident Management Team = \$21,000

RECOMMENDATIONS

Trails:

Trails within the fire perimeter and all canyon trails should remain closed until snags, erosion and other unsafe conditions have stabilized, wayfinding signs are replaced, and trailheads are repaired. Trail closure may be required for a minimum of two monsoon seasons, until flash flood conditions on canyons have stabilized.

Exceptions to the trail closure recommendation apply to Tyounyi Overlook Trail and Burnt Mesa Trail; these trails lie within lightly burned pinon/juniper woodlands, on relatively level terrain. Stabilization of these trails can be accomplished quickly, and they can be returned to service with relatively modest effort. Patrol of conditions along these trails should be intensive during the next two monsoon seasons, as they may be subject to localized erosion conditions that will require speedy remedies to assure their safe use.

In addition, a formal assessment of trail conditions should be performed annually for the next three years following each monsoon season. The assessment should focus on identifying fire impacts and stabilization and rehabilitation needs to return and maintain trails.

Trail Infrastructure:

Rebuild signs and trailheads to pre-fire conditions. Interpretive signs should be strategically placed to inform visitors of the wildfire occurrence, the safety hazards and ecological impacts (up to 20 signs.)

Flash Flood Clean-Up:

Clean-up efforts after flash flooding in the Frijoles Canyon historic district will include mud and debris collection and disposal primarily using park equipment including skidsteer tractors, a backhoe, and the park's dump truck. Clean-up and disposal costs for mud and debris will vary depending on the severity of the flash flood. The park's intent is to minimally clean-up and

debris removal after each flood event during the monsoon season and end of the hurricane season sufficient. This would be followed by extensive annual clean-up and debris removal to address mud and debris stockpiled in the district as a result of only performing minimal clean-up and debris removal after each event during the flash flood season.

Hazard Trees:

Assess hazard trees at trailheads, along trails and boundary fences, and in the vicinity of Ponderosa and Juniper campgrounds semi-annually and remove hazards.

Boundary Lines:

Work with neighboring National Forest districts to rebuild damaged portions of fence, remove debris from backcountry, patrol fenceline for three years to remove snags and continue repair process.

Motor Car and Foot Bridges:

The motor car and foot bridges are locations/assets critical to visitor access to the Main Loop Trail, Alcove House, and the Cottonwood Picnic Area and Restroom. Restoration of these locations/assets should be initiated as soon as it is determined Frijoles Canyon is safe for resumption of visitor services. The foot bridges should be designed to be removable in preparation for future flood events. The motor car bridge and associated creek crossing will need to be analyzed for appropriateness of restoration of bridge to pre-fire configuration. A low-water crossing may be determined as an appropriate alternative. The motor car bridge removed the Incident Management Team included a subsurface utility corridor which included water, electric, and wastewater supporting the Cottonwood Restroom. Re-establishment of these systems will be required to restore visitor services to the Cottonwood Picnic Area.

Frijoles Creek Channel Clearing:

There is still some remaining rubble in the creek channel remaining from the foot bridge removal. This material will contribute to water impoundment and should be removed as soon as possible. Removal will require an excavator and operator. In addition, the Frijoles Creek channel will need to be assessed for fire-related impoundments and such impoundments will need to be promptly removed.

Temporary Point Protection Maintenance:

The temporary property protection measures put in place by the Incident Management Team around the Historic District are largely composed of plastic-lined sand bagging, plastic-covered plywood window and door coverings, concrete landscaping blocks, and concrete “K” barriers. These temporary measures will need both annual maintenance and post-flash flood event maintenance. Maintenance of the systems is critical to protecting property. Maintenance activities should include resetting of displaced concrete landscape blocks and “K” barriers, replacement of sand bags and plastic liner, and the replacement the plastic liner over the plywood protecting the windows and doors of the Visitor Center.

Replacement of Backcountry Cabin:

The Backcountry Cabin was the central point from which all backcountry rangers operations and programs were managed. This building should be restored to pre-fire configuration in order to support backcountry program and backcountry resource-related BAER activities.

Permanent Flood Diversion Wall and Lift Station Protection:

The temporary protections put in place by the Incident Management Team should be replaced with permanent protection measures. This will require design and specification consistent with departmental policies and sympathetic to the character of the historic district. These measure should be implemented as soon as possible.

Tsankawi Unit Trail and Facility Improvements due to Re-Focus of Visitor Services:

The Tsankawi Unit of the monument is now the focus of the delivery of Visitor Services due to the closure of Frijoles Canyon. Because of the increase in visitation caused by the re-direction the capacity of Tsankawi has been exceeded. The visitor contact area consists of a small building with a bathroom for administrative use, and several picnic tables beneath a porch roof. There are two seasonal restrooms available to visitors, the capacity of which is routinely exceeded by the tour buses which are now arriving there instead of Frijoles Canyon. Currently there is no network access or phone service at this location. The park is looking into the feasibility of bringing in DSL or a satellite system to allow the facility to properly function.

The trail system at Tsankawi is constructed through the native stone, a soft Tuff, which erodes quickly from foot traffic. Cyclic maintenance of the trail system there included the installation of sacrificial tread. Due to the increased traffic, the maintenance interval of certain areas of the trail has been shortened to 1-2 years.

SUMMARY OF MINOR FACILITIES PROJECTED COSTS

Trails, Trailheads, Signs, and Boundary Fences Assessment

Year 1	\$17,300
Year 2	\$17,300
Year 3	\$17,300
Total	\$51,900

Trails, Trailheads, Signs, and Boundary Fences Stabilization

Year 1	\$190,000
Year 2	\$175,000
Year 3	\$150,000

Total	\$515,000
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Flash Flood Clean-Up

Year 1	\$50,000
Year 2	\$50,000
Year 3	\$50,000

Total	\$150,000
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Motor Car and Footbridge Replacement

Motor Car Bridge	\$310,000
Foot Bridge Replacement	\$198,000

Total	\$508,000
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Hazard Tree Assessment and Mitigation

Year 1	\$75,000
Year 2	\$55,000
Year 3	\$55,000

Total	\$185,000
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Frijoles Creek Channel Assessment and Clearing

Year 1	\$15,000
Year 2	\$15,000
Year 3	\$15,000

Total	\$45,000
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Temporary Point Protection Maintenance

Year 1	\$21,000
Year 2	\$23,000
Year 3	\$25,000

Total	\$69,000
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Replacement of Backcountry Cabin	\$375,000
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Permanent Flood Diversion Wall and Lift Station Protection

Flood Diversion Wall	\$485,000
Lift Station Protection	\$173,000

Total	\$558,000
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Tsankawi Unit Trail and Facility Improvements due to Re-Focus of Visitor Services

Las Conchas Post-Fire Response Plan | 2011

Trail Repairs	\$75,000
Installation of IT services	\$48,000
Total	\$123,000

Total of Minor Facilities Projected Costs \$2,579,900

PHOTOS



View of Backcountry Cabin debris.



Postfire view of trail at Upper Crossing



View of trail across Sanchez Mes



Vegetation Recovery underway at Sanchez Canyon



Damaged trail sign at Upper Crossing

STAFFING AND OFFICE SPACE NEEDS

STAFF WORKLOAD ASSIGNMENTS AND BAER IMPLEMENTATION OFFICE SPACE BURNED AREA ASSESSMENT

OBSERVATIONS

Successful implementation of the BAER program in Year 1 will place a substantial demand on the permanent Resource Management, Facility Management, Administrative, Interpretive and Protection divisions staff. Enlistment of permanent staff in support of the BAER effort is appropriate because of the time-sensitive nature of recovery efforts, which are an emergency for park resources and require immediate depth of knowledge of the park and its cultural and natural resources. Use of out-of-park resources would not provide the speedy response demanded by the emergency circumstances, and would generate costs associated with travel, per diem and contracting that would result in a less cost-efficient response.

Permanent Staff Workload Impacts	Percent of annual schedule allocated to BAER Emergency Stabilization	Comment
Chief of Resources	25%	Overall integration of the program with parkwide activities, compliance
Park Archeologist	25%	Oversight of BAER cultural resources assessment and treatments, compliance
Archeological Technician	75%	Daily management of BAER cultural resources assessment and treatments, compliance
Park Botanist	25%	Monitoring fire effects, retardant drop locations, impacts on park erosion conditions, compliance
Wildlife Biologist	25%	Monitoring impacts on T&E species, FWS Section 7 consultation, other compliance
Park Cartographer	25%	Data collection and management, compliance
I&M Hydrologist	5%	Coordinating water quality data collection
Chief of Facility Management and Historic Preservation	25%	Integration of program with Facility Maintenance and Operations
Trails Program Coordinator	50%	Oversight of Hazard Tree and Trails Assessment, Stabilization, and Rehabilitation
Trails Foreman	50%	Field Supervision of Trails Recovery Projects
Maintenance Work Supervisor	5%	Supervision of expanded custodial staff
Maintenance Worker	100%	Custodial support for expanded office

		inventory
FMSS Specialist	25%	FMSS support for Facilities recovery efforts
FMSS Clerk	25%	FMSS support for Facilities recovery efforts
Chief Ranger	10%	Oversight and management of expanded patrol needs
LE Ranger	100%	Expanded patrol needs
Chief of Administration	5%	Oversight of BAER-related administrative workload
Budget Analyst	20%	Management of BAER-related accounts at park level (It is understood accounts are regional)
Administrative Assistant	15%	Human Resources services for BAER-related new positions
Budget Technician	20%	Assist management of BAER-related accounts at park level (It is understood accounts are regional)
Contract Specialist	40%	Oversee BAER-related procurement at park level
IT Specialist	30%	Manage BAER related IT needs at park level
Park Program Manager	10%	Oversight of park engagement in BAER-related work
Interpretive Ranger	25%	Expanded interpretive needs at Tsankawi
Total Staff effected	24	

BAER Implementation Office Space:

Successful implementation of the BAER program in Year 1 will require office capacity for temporary staff that will be needed for this effort, and do not currently exist within the position management structure of the park. Office space for these temporary staff does not currently exist within the park inventory of available space. A single-wide office trailer is proposed as a solution to house up to 6 work stations, several of which will be shared. The BAER Implementation Leader will be housed in this location, along with the Trail Crew Leader, the Cultural Assessment/Treatment crew leader, and other temporary hires associated with the BAER effort. Use of a rental trailer is proposed as the most time-and cost-efficient means of addressing this need. Location of the trailer could be either on Frijoles Mesa or at TA-49, subject to evaluation of infrastructure capacity.

RECOMMENDATIONS

1 - Assignment of Permanent Staff for one year:

Enlistment of permanent staff in support of the BAER effort is appropriate because of the time-sensitive nature of recovery efforts, which are an emergency for park resources and require immediate depth of knowledge of the park and its cultural and natural resources.

2 - Provision of an Office Trailer for one year:

Provision of an office trailer, as part of a series of BAER implementation decisions that call for hiring and retaining temporary staff to support implementation of this effort, is recommended as the most time-and cost-efficient means of addressing this need.

Use of out-of-park resources for personal services and office space would not provide the speedy response demanded by the emergency circumstances, and would generate costs associated with travel, per diem and contracting that would result in a less cost-efficient response.

APPENDIX A: ENVIRONMENTAL COMPLIANCE



Las Conchas Post-Fire Response Plan, Bandelier National Monument Environmental Compliance Considerations and Documentation (PEPC 38361 - Las Conchas Post-Fire Response Plan)

A. Federal Environmental Compliance Responsibilities

All projects proposed in the Las Conchas Fire Post-Fire Response Plan, which includes recommendations for Burned Area Emergency Response (BAER) and Burned Area Rehabilitation (BAR) mitigation actions, that are prescribed, funded, or implemented on park lands are subject to compliance with the *National Environmental Policy Act* (NEPA) in accordance with the guidelines provided by the *Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508)*. This Appendix documents the BAER Team considerations of NEPA compliance requirements for prescribed emergency stabilization, rehabilitation and monitoring actions described in this plan for areas affected by the Las Conchas Fire, Bandelier National Monument, New Mexico.

This plan identifies specific emergency stabilization, rehabilitation, and monitoring actions and recommendations designed to mitigate damages to resources as a result of the Las Conchas fire and associated fire suppression activities. The park must complete separate NEPA analyses and compliance for fire response activities not addressed in this plan.

Agency Specific Guidance: This NEPA documentation has been developed in accordance with National Park Service specific guidelines. Emergency stabilization and rehabilitation actions proposed on National Park Service lands, involving the agencies permitting, funding, or implementation, must comply with regulations set forth in the *Department of the Interior Manual Part 516 (DM 12)*.

B. Related Plans and Cumulative Impacts Analysis

The Bandelier National Monument Wildland Fire Management Plan, 2004. The fire management plan provides guidance for “Emergency Rehabilitation and Restoration” actions following wildfires in the Monument. Specific guidance within the monument includes:

Mitigation and restoration activities will be incorporated into stabilization and restoration actions. This includes maximizing the least resource damaging suppression actions (utilization of natural barriers, and existing roads or trails) and utilization of light ground pressure equipment minimizes rehabilitation after a fire. Locating control lines to avoid falling and bucking trees also reduces required rehabilitation. Severely damaged large trees in developed areas (i.e. trails) may be classified as “hazardous” and will be felled to protect the public. Restoration actions begin promptly following suppression of the fire, with flag lines, signs, and trash removed during the mop-up phase. The Fire Management Officer is responsible for insuring that rehabilitation actions are conducted. Plowed firelines within the Monument require considerable rehabilitation efforts. Typically the berms can be ‘rolled’ back into place, if they are not ‘set’ into place by rainfall, foot traffic, or a return trip by heavy

equipment. Handlines generally do not require significant rehabilitation efforts. Contouring of slopes, erosion control, of seeding is not required in the Monument.

Cumulative Impact Analysis: The emergency stabilization and rehabilitation treatments for the Las Conchas fire, as proposed in this plan, do not result in an intensity of impact that would cumulatively constitute a significant impact on the quality of the environment. The treatments are consistent with the above park management plans and associated environmental compliance documents of the NPS, and categorical exclusions presented below.

No direct or indirect unavoidable adverse impacts to the biological or physical environment would result from the implementation of the Las Conchas Fire Burned Area Post-Fire Response Plan.

Summary of Compliance Documentation Relevant to the Las Conchas Post-Fire Response Plan

The following table summarizes the existing NEPA or NHPA compliance in place for the BAER/BAR treatments proposed for the Las Conchas fire. Two treatments may involve ground disturbance and thus would require archeological consultation; one treatment, herbicide application may require completion of an Environmental Assessment before implementation is allowed.

Treatment or Action	NEPA documentation (EIS, EA, or Cat Ex)	Reference to Assessment	Findings of Significance
BAER assessment and planning	DO-12 CE: 3.3.U	N/A	No Significant Impact
Monitoring and treatment of archeological sites, watersheds, vegetation, biota	DO-12 CE: 3.4 G.2	Prehistoric Sites, Vegetation, Biota, Water resources	Categorical Exclusion No Significant Impacts expected
Place woody material (logs and stumps) on the ground in areas of Jemez Mtn Salamander habitat. Complete work in advance of monsoon season, or as rapidly as possible. Use locally available standing dead material. Primarily done in the vicinity of Scooter	DO-12 CE: 3.4 G.2	T & E	Categorical Exclusion No Significant Impacts expected

Peak and Alamo Canyon (Rabbit Ridge). Monitor invertebrate populations within perennial streams (Rito de Frijoles and Capulin Creek.) Indicates presence/absence of fish in creeks.			
Repair of minor facilities, emergency flood protection, site stabilization. Trail repairs, sign replacement, boundary fence repair, trailhead repairs Maintain creek channel clear of debris jams as successive flash floods occur, at the approach to the area of concentrated archeological sites in Frijoles Canyon (from Alcove House to Rainbow House.) Emergency actions in Frijoles Canyon: Five (5) pedestrian bridges and one motor car bridge were demolished. Additionally, floatable debris within the Rito de Frijoles vicinity, consisting primarily of dead and down woody material, were removed. Select structures consisting of both modern and historic portions of the Visitor Center, the sewer lift station, and other infrastructure such as valve boxes and manhole openings	DO-12 CE: 3.4 G.2 Note: Trail repairs and mitigation requirements covered under PEPC 24794 Routine Trail Maintenance (Five Year Plan) for Bandelier NM.	Trails, signs, fences, trailheads, minor structures	No Significant Impact May require archeological consultation

were sandbagged. Following removal of museum objects from the Visitor Center, the building was protected by a plywood/visqueen/sandbag protection layer. The lower lying areas along the Visitor Center were armored with diversion structures consisting of “K” rail and sandbag assemblies in two parallel alignments. Provide and install and office trailer on Frijoles Mesa or TA-49 for 12 months.			
Fire suppression impact repairs, Debris removal at destroyed backcountry cabin and elk exclosure - helicopter sling loads anticipated to be the most effective means of removal.	DO-12 CE: 3.4 G.2;	Viewsheds, cultural landscapes, exotic plant management	No Significant Impact May require archeological consultation
Also add removal of hazard trees, use of LE Remote Sensors, minor repairs to CCC Visitor Center, potential mold mitigation, potential hauntavirus mitigation.	DO-12 CE: 3.4 C.4 DO-12 CE: 3.4 G.2		
Replacement of Tsankawi Restrooms, lengthening of the radio antenna, the pole retaining walls around the parking lots, the COW cell antenna, and the addition of a temporary VC trailer.	DO-12 CE: 3.4 C.4 DO-12 CE: 3.4 C.8		

Support management planning during the upcoming years of flash flood activity by installation of water quality monitoring equipment. Support management planning during the upcoming years of flash flood activity by updating the Rito de Frijoles Delineation of Floodplains. Monitoring for sensitive and exotic plants in the footprint of the fire and suppression disturbance. Monitoring the Ecological Restoration footprint, where effected by fire and suppression disturbance.	DO-12 CE: 3.3	Monitoring of a temporary nature.	Categorical Exclusion No documentation necessary.
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C. DOI EXCEPTIONS TO CATEGORICAL EXCLUSIONS

The CEQ Regulations at 40 CFR 1508.4 require agencies to consider whether fairly routine actions involve extraordinary circumstances that, per NEPA, trigger an agency to prepare additional assessment and consideration. If it is determined that any of the exceptions listed in the table below apply to a proposed action, that action may not be categorically excluded, and an EA or an EIS must be prepared. The list below is a Department of the Interior list that applies to all DOI agencies (516 DM 2, Appendix 2); agencies often have additional items on their own list of Departmental exceptions, appendix 2). All treatments that are proposed as a Categorical Exclusion for the Bandelier National Monument have been compared against the list of Extraordinary Circumstances listed below and were found not to trigger any exceptions.

Yes	No	Extraordinary Circumstance. Would this action...
	X	2.1 Have significant impacts on public health or safety?
	X	2.2 Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); national monuments; migratory birds; and other ecologically significant or critical areas?
	X	2.3 Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources [NEPA Section 102(2)(E)]?
	X	2.4 Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?
	X	2.5 Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?
	X	2.6 Have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects?
	X	2.7 Have significant impacts on properties listed, or eligible for listing, on the National Register of Historic Places as determined by either the bureau or office?
	X	2.8 Have significant impacts on species listed, or proposed to be listed, on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species?
	X	2.9 Violate a Federal law, or a State, local, or tribal law or requirement imposed for the protection of the environment?
	X	2.10 Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898)?
	X	2.11 Limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007)?
	X	2.12 Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112)?

D. Consultations

National Park Service

- Lisa Hanson, Fire Program Compliance Coordinator, Intermountain Regional Office (IMR)
- Linda Kerr, IMR BAER Coordinator

All BAER and BAR treatments will be presented to the Interdisciplinary Team for discussion of the recommended compliance requirements described above prior to initiation of any of the actions.

US Fish and Wildlife Service and National Historic Preservation Act consultations:

The Las Conchas Fire has an open consultation with Fish and Wildlife Service (FWS) (Consultation #22420-2011-TA-0046) which was initiated by the Santa Fe National Forest. While BAND is included in that consultation, the monument may also initiate an informal consultation with FWS on T&E species in the park, in order to generate the information the park needs to support an updated Fire Management Plan.

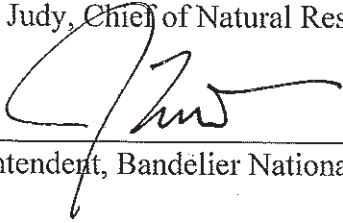
The New Mexico State Historic Preservation Officer will be contacted. Should any BAER or BAR treatments lead to activities that may impact cultural resources, consultation will be initiated before any actions are implemented.

CONCLUSION

I have reviewed the treatments in the 2011 Las Conchas Fire Post-Fire Response Plan in accordance with the criteria above. Those actions which require additional environmental review will be analyzed and appropriate NEPA compliance completed before they can be implemented; those actions with approved existing compliance would not involve any significant environmental effect and are approved for initiation. Refer to PEPC 38361 – Las Conchas Postfire Response Plan – for additional documentation and consultation. Burned area emergency response team technical specialists have completed or will complete necessary coordination and consultation to insure compliance with the National Historic Preservation Act, Endangered Species Act, Clean Water Act and other Federal, State and local environment review requirements

Prepared by: Barbara Judy, Chief of Natural Resources, August 2, 2011

Approved:


Superintendent, Bandelier National Monument

8/4/11
Date

APPENDIX B: EMERGENCY CONSULTATION

"Biella, Jan,
DCA"
<jan.biella@state.nm.us>
07/04/2011
04:56 PM GMT

To "Barbara_Judy@nps.gov" <Barbara_Judy@nps.gov>

cc "Nelson, Norman, DCA" <NormanB.Nelson@state.nm.us>, "
Cannizzaro, Pilar, DCA" <pilar.cannizzaro@state.nm.us>, "
Jason_Lott@nps.gov" <Jason_Lott@nps.gov>, "
Rory_Gauthier@nps.gov" <Rory_Gauthier@nps.gov>

Subject RE: Bandelier NM emergency consultation;
flash flood readiness within Frijoles Canyon developed area

Barbara,

I have reviewed the information provided concerning the urgent need to prepare for potential flooding and the protection of the Frijoles Canyon Cultural Historic District. Could you please resend the attachments? It may be necessary to send them in a couple of emails since larger files can be stripped.

Even without the additional information on the flood conditions and images, you have explained the necessity for the removal of the 1949 bridge. As you recognize this is an adverse effect to the bridge, a structure that appears to be eligible for the National Register. I would like to review the information in the attachments and discuss with Pilar, but given the significant risk the flooding could pose to the historic district, I concur with Bandelier's decision that the removal of the bridge is unavoidable. Whether its demolition constitutes an adverse effect to the structure only and not the historic district, the Level II HABS documentation and narrative for the bridge, as proposed, you have my concurrence that this is an appropriate mitigation measure. Please proceed accordingly.

I assure you that we will expedite any agreement documents or other requirements called for in the PA so that you are not delayed in responding to this emergency.

I will discuss with Pilar first thing tomorrow morning and get back to you immediately with any next steps.

Good luck and please let us know if we can be of any additional assistance.

Jan

Jan V. Biella
Interim NM State Historic Preservation Officer

505-827-4045

From: Barbara_Judy@nps.gov [Barbara_Judy@nps.gov]

Sent: Sunday, July 03, 2011 2:47 PM

To: Biella, Jan, DCA

Cc: Nelson, Norman, DCA; Cannizzaro, Pilar, DCA; Jason_Lott@nps.gov;
Rory_Gauthier@nps.gov

Subject: Bandelier NM emergency consultation; flash flood readiness within
Frijoles Canyon developed area

Jan;

Please accept this message in lieu of a formal written consultation letter, in consideration of the urgent circumstances created by the Las Conchas Fire.

This message updates you on critical readiness actions being taken within the Bandelier CCC National Historic Landmark District in Frijoles Canyon. Flash floods pose considerable risk to park cultural resources within the canyon. Based on the Delineation of Flood Plains for the monument, depth of flash floods and associated debris flows could reach as deep as 8-feet on the lower parking lot nearest Frijoles Creek.

Urgent flash flood preparations are underway to reduce risk of flood damage to cultural resources, including the Visitor Center, which is a contributing structure to the NHL historic district. These measures include removal of all bridges that constrict flows on the creek and may accumulate debris jams that would worsen flash floods.

Approximately eight pedestrian bridges exist on the creek above the historic district. The pedestrian bridges are all modern structures that have been designed for ease of removal. They are located on the sites of CCC-era footbridges, all of which have been lost in previous flash flood events. NPS considers that existing documentation of footbridge

locations is sufficient to ensure the agency's ability to reconstruct compatible replacement bridges in the future.

One motor car bridge exists within the district. The motor car bridge is a period structure, built in 1949 by the National Park Service and post-dating the CCC construction era that extended from 1933 to 1942 ACE. NPS has determined that the motor car bridge appears eligible for the national register as a contributing feature to the Frijoles Canyon Cultural Landscape Historic District, which has a period of significance extending from 1150 to 1972 ACE. The bridge is designed as a large culvert, and has a high likelihood of creating a substantial debris jam that would concentrate flood activity toward the Visitor Center structures, which are anchor structures for the historic district. Due to the risk this bridge poses to cultural resources of greater value, NPS is preparing to demolish it. In mitigation of the action, NPS proposes to prepare a documentation report for the structure referencing HABS Level II standards as closely as possible. The documentation report will include a narrative of bridge construction and its role in the canyon setting, copies of original construction documents, and photographs. The report will become part of the permanent record of the park.

NPS considers that removal of this bridge structure, while an adverse effect on the structure, will not be an adverse effect on the Frijoles Canyon Cultural Landscape Historic District. The cultural landscape incorporates approximately fifty distinct features, the balance of which will be protected during actions to stabilize infrastructure exposed to flash floods.

Attached to this message are photographs of the bridge and a memo summarizing flood potential within the canyon. Please do not hesitate to contact me on my cell phone: 415-308-4408, with any questions regarding the above information. I am available to discuss this action with you at your convenience, and on behalf of the park request your support for this action which is taken in the best interests of overall protection of the district.

Barbara A. Judy
Chief of Resources, Bandelier National Monument
15 Entrance Road
Los Alamos NM 87544-9508

(505) 672-3861 ext 701

Images attached:



View 1 – Motor Car bridge as viewed from Rito de Frijoles; note that the bridge is essentially a large culvert.



View 2 – Motor car bridge as viewed from the roadbed, crossing Rito de Frijoles.

APPENDIX C: LAS CONCHAS FIRE INCIDENT SUMMARY (FINAL DRAFT)

Executive Summary

2 employees lose homes

Kevin Stillman

Rebecca Oertel (who actually worked for the USGS Field Station at BAND; took position with Valles Caldera)

NIMO team dedicated to post fire recovery/response; specifically the flood response, protective measures

Special Note: BAND received huge support of IMR, OSFT staff, other parks and specialists

Total Fire: 155,000

Total BAND Burned: 20798

Total BAND Wilderness Burned: 13929

Total Trails Burned: 53.3 miles of 84.6 miles of trails

Total Canyons Burned: 41.1 miles of 52.7 miles of canyon

The Las Conchas Fire - Overview

The Las Conchas fire began on June 26, 2011 when an aspen tree fell and brought down a power line near the Las Conchas Recreation area on the Santa Fe National Forest. The fire ranks as the largest wildfire in New Mexico history. It is the latest and largest in a series of wildfires in the forests and woodlands of the Jemez Mountains in central New Mexico. It destroyed sixty-three residences, impacted cultural and heritage resources, devastated vegetative cover which exposes soil to erosion, and damaged wildlife habitat. The fire burned across almost the entire north-south axis of the mountain range.

During its first burn period, the fire raced across the southern face of the Jemez Mountains, burning 43,000 acres of private land, the Santa Fe National Forest, Bandelier National Monument, and the Valles Caldera National Preserve. The next day, the fire crossed the crest of the Sierra de los Valles, forcing the evacuation of 12,000 residents of Los Alamos. Driven by strong southwest winds, the fire spread to the north and east and entered the head of Santa Clara Canyon. Over the next two weeks, the fire slowed but continued to burn to the north and southwest.

Stand replacement fire occurred in the headwaters of Frijoles Creek, on the sloping mesas of the southern Jemez range, on the east flank of the Valles Caldera, in the headwaters of Santa Clara Creek, and on the slopes of Chicoma Mountain, the highest point in the range.

The Las Conchas Fire has burned more than sixty percent of Bandelier. The possibility of flash flooding in the park, and especially Frijoles Canyon, will keep most of the park closed for the near future. Plans are underway to open sections of Bandelier as soon as conditions allow for safe visitor access.

The Las Conchas Fire – Bandelier National Monument Impact and Response

Initial Response

Shortly after 1300 hours on Sunday, 26 June, Bandelier fire staff received a report of a fire approximately 12 miles west of the park. BAND initial attack engine staff responded along with USFS to suppress the fire.

The fire, under the management of the USFS, was named Las Conchas and became the largest wildfire in recorded New Mexico history.

Conditions were such that the fire exploded – growing from ignition to 43,000 acres in 14 hours – a growth rate of 1 acre in less than a second.

At 1353 hours BAND Fire Duty Officer, Frank Gonzales, notified BAND Fire Management Officer (FMO) Gary Kemp of the fire, advising the park was west of the park by several miles but headed toward the Monument.

FMO Kemp notified Superintendent Jason Lott of the fire. Shortly thereafter, FMO Kemp drove to the Monument from his home in Whiterock, 9 miles east of the Monument. While enroute he heard the fire was already in Spruce Canyon, 2 miles from the Monument boundary. Kemp and Superintendent Lott both arrived at TA49, the parks fire management office and helibase.

Discussions of possible evacuation of the visitors, staff and NPS residents of the park ensued. Initially, trigger points and time lines for possible evacuations were discussed, but by 1600 hours FMO Kemp, watching and hearing reports of the rapidly expanding fire recommended immediate evacuation of all park visitors, staff and residents.

Shortly thereafter, approximately 100 park visitors were evacuated, both from Frijoles Canyon Historic District and Juniper Campground.

Over the next few hours all residents, both in Frijoles Canyon and on the Mesa, were evacuated. Some moved to family or friends homes in the nearby communities, but most were housed in the Santa Claran hotel in Española, which was paid for by the park.

Additionally, as the fire moved into the northern portions of Frijoles Canyon, park staff removed historic and cultural items from the parks museum/visitor center, critical administrative files, such as personnel and financial documents, computer servers & CPU's along with other vital administrative equipment and documents. These items were eventually moved to the NPS Old Santa Fe Trail's Office located in Santa Fe, New Mexico, and are slated for longer-term storage at WACC.

While this evacuation was underway, Los Alamos Fire Department provided structure protection of NPS Historic District buildings, foaming many of the roofs.

While managers and law enforcement staff evacuated visitors, staff and residences from the park, Bandelier Fire Management staff along with fire resources supplied by the nearby Pacheco Fire began construction of a fire line between the rim of Frijoles Canyon, north of Juniper campground and the mesa housing area, across the Mesa to NM Highway 4. Once this hand line was completed fire management staff coordinated a 4-part backfire operation aimed at protecting both park infrastructure and keeping the fire from crossing Highway 4 - which would directly endangering Los Alamos Laboratory and the town of Los Alamos.

Over the next 14-16 hours BAND fire staff and available fire crews ignited four backburn operations:

- ❖ North from the rim of Frijoles Canyon along the handline across the Mesa to Highway 4, then north west along Highway 4 to BAND's Ponderosa Group Campground;
- ❖ East from BAND Ponderosa Group Campground taking fire east along Highway 4;

- ❖ West from USFS Road 289 (also known as the Dome Rd.) bring fire west along Highway 4; and
- ❖ East from USFS 289 taking fire along 4 to Las Conchas.

Initiated by BAND FMO Kemp and burning through the night, nearly 15 miles of blacklining burnout occurred along New Mexico Highway 4 – providing the critical buffer for Los Alamos National Laboratory and the town of Los Alamos. This line was the first control line of the Las Conchas fire and kept the fire from traversing north of the parks' boundary.

Monday morning, 27 June, day two of the fire, NPS BAND Wildland Fire Module entered Frijoles Canyon and began cutting a rim-to-rim fire line, approximately two tenths of a mile north of Alcove House. Once the line was cut, the crew ignited a backburn north of the line working to create a blackline buffer between the rapidly advancing fire within Frijoles Canyon and the NPS Historic District. Over the next 24-36 hours crews battled to maintain this fire line requiring assistance of air dropped retardant and water drops from air tankers and heavy lift helicopters in order to hold the line.

Eventually holding, this line stopped the rapidly advancing fire from entering the NPS Historic District, thereby saving all of the buildings, infrastructure and cultural resources from being overrun by the running fire.

[\[Pictures of first day\]](#)

Las Conchas Fire Management

Initially, Las Conchas was under the management of a local USFS Type III Fire IMT, Incident Commander Robert Morrales. By the evening of day 2 (27 June), management of the fire was transitioned to a Type I Fire Team (Reinarz), a second Type I team was on order (Hughes), as was Area Command (Oltrogge). Ultimately, the fire was divided into three zones – each managed by a Type I Fire Team – with an Area Command.

This high level of fire management was due both to the complexity of the fire and the political complexity of the geographic location which encompassed private and public lands owned and managed by at least 6 federal agencies (USFS, NPS, Corp Eng, BLM, DOE, BIA), 3 counties (Sandoval, Los Alamos & Rio Arriba), the State of New Mexico and 4 Native American Tribes (Santa Clara, Cochiti, Jemez and San Ildefonso Pueblo's).

Over the next few days Superintendent Lott was both personally immersed in attending and coordinating other BAND representatives' attendance at numerous transition meetings, agency meetings, liaison functions and public meetings. Superintendent Lott signed Delegations of Authority for fire Suppression and management first to Reinarz's Type I Fire Team, Hughes Type I Team and finally with Area Command (Oltrogge)

The park remained closed due to the fire, most employees were on administrative leave. A temporary administrative office was established in the Old Santa Fe Trails Building in Santa Fe New Mexico. This office was staffed with the park's AO, Ken Bigley, and Facility Manager, Glenn Simpson, acting as Finance Section Chief and Planning Section Chief respectively along with other staff members displaced from their offices in the park. This office made contact with each employee, including volunteers and interns, verifying their safety and location and acquiring their personal contact information. A daily conference call was initiated for all employees by Tuesday, 28 June (Day 3). This call was used to verify safety and locations of all employees along with being a primary source of management communication with employees. Additionally, an email list with employees' personal emails was established in order to facilitate

communications with staff.

Meanwhile, key emergency response staff such as fire, law enforcement and resource advisors were actively working the fire through the established fire organization. Additionally, park Public Information Officers were folded into the fires' JIC's (Joint Information Centers) along with setting up information tables at three local community grocery stores; Smiths at White Rock, Smiths at Los Alamos and _____ in Santa Fe.

By day 5-6 of the incident (30 July – 01 June) the risk of fire in the park had greatly diminished. Mop-up and active patrols were maintaining the black-line-fire-perimeter on the parks north and north-western boundary. Additionally, there was still active fire in the backcountry which was being suppressed, but not at great risk of expanding due to the fuel type. The active fire fronts of the Las Conchas Fire were now well outside the park boundary, north and south of the park.

Fire Risk Subsidies

With the threat of fire diminishing within the park, staff began assessing burned areas.

Of primary concern was Frijoles Canyon which: receives 95% of the parks visitation, and contains the parks Historic District that includes the parks only visitor center, a historic guest lodge which now serves as the parks administrative offices - containing 60% of the parks office space, 45% of the parks housing, a gift shop & snackbar, and entry point for the parks' main loop trail which takes visitors along Frijoles Creek and the parks premier cultural sites and trailheads for most of the parks backcountry trails.

Over the next few days (Thursday, 30 June – Saturday, 01 July), park staff physically visited fire affected areas within the park along with an over flight assessing resource conditions and severity of burned areas.

[pictures of the burned areas]

Initial assessments of Frijoles Canyon showed approximately 11,000 acres of the Canyon's total 12,000 acres, were burned.

33% of the Canyon, or 4,000 Acres burned very severely

58% of the Canyon, or 7,000 Acres are burned with mixed severity

8% of the Canyon, or 1,000 Acres is unburned

Concern for flooding in the post fire environment was highlighted and discussed by fire and resource professionals early in the fire incident. As each Type I fire team (Reinarz, Hughes & Turman) took management of their portion of the fire, meetings were held with agency administrators and the public. In each of these meetings, Fire Teams not only discussed operational strategies and tactics to suppress the fire, but spent considerable time explaining and highlighting the exponential risk of flooding that would be present in the post fire environment – specifically flash flooding in and through canyons that would affect not only land owners and managers within the fire perimeter, but also lands and communities downstream of the fire and affected canyons.

Park resource staff brought these same concerns to Superintendent Lott. Chief of Resources, Barbara Judy, communicated her concerns with potential flooding to Mr. Lott, resurrecting a memo she sent to the Bandelier Management Team the preceding fall, 14 September 2010, which outlined potential flood risks in Frijoles Canyon. At the time the memo was sent, its purpose was information to be understood and incorporated into the parks emergency operations plans and procedures. The memo highlighted key points of a 1970's U.S. Corp of Engineers hydrology report and provided a map showing the extent of potential floods within the Canyon. The bulleted points of the memo are:

*Flash flooding presents considerable risk to park facilities
Flash flooding can impact creek levels and the rear of the developed area;
Frijoles Canyon structures at greatest risk include; and
Recommendation to establish a flash flood warning system. [foot note memo in appendix]*

The flood map provided in the 1970's Corp. Engineer report was the preliminary information delineating potential flood risk to NPS infrastructure that managers used to begin understanding and planning for this newly emerging hazard and risk for Frijoles Canyon. It was this benchmark information that managers used for planning parameters for early assessment of risk and operational planning for potential activities for the Canyon.

It is important to note is that these potential flood zones were modeled under pre-fire conditions of the Canyon – the post fire environment will greatly increase flood risks.

[corp flood map]

This same information and memo was again communicated and shared with parks' Management Team on or about Friday & Saturday, 1-2 July. These early discussions (1-3 July) centered on the flood potential risk along with discussion of what, if anything, could be done to diminish or mitigate potential damages to park facilities, specifically the Frijoles Historic District.

General recommendations from fire and resource professionals for mitigating flood risks were twofold; first, removal of obstructions within the stream channel in order to allow water to flow freely and swiftly through the stream bed, combined with flood barriers such as dikes and diversion walls in order to divert water from critical infrastructure(s).

In addition to in-house flood information, Ms. Judy was communicating with Greg Kuyumjian, USFS Hydrologist – Soil, Water & Air Program Manager for the Okanagan-Wenatchee National Forest in Wenatchee, Washington. Mr. Kuyumjian is a leading expert in post fire emergency response and was the Las Conchas BAER Team Co-Leader.

In an email dated, 2 July 2011, Mr. Kuyumjian attaches a list of items to be considered do "right now." The check list states:

Non-Negotiable Post Fire Treatments

Water Quality

Pump, sanitize and lock vault toilets in flood prone areas.

Consider filling vault with soil

Infrastructure

Remove culverts/footbridges, etc. that cannot pass high flows or would catch debris

Inlet protection and overflow pathway at critical road crossings

In-channel woody debris removal above critical road locations and threatened facilities

Barrier/levee around facilities

Fences that cross drainages – remove

Water impoundments (ex. stock ponds) – breach those with inadequate emergency

Spillways

Public/crew safety

Signage

Remove (ie cut down) “killer” trees

Fencing and closure gates

Heritage

Removal if in a known flood pathway

Flush cut trees located within sites, which may topple after ground saturation

Specific to the concerns of flooding was the parks Historic District in Frijoles Canyon. The District contained seven (7) walking or pedestrian bridges along with a motor car bridge spanning Frijoles Creek – all located within the foot print of the Historic District. In a flood event, these bridges would act as dams, backing up water and debris, impeding the downstream flow of water and debris - expanding the flood waters laterally.

A specific example of such flooding is found in the 1978 Superintendents Report and was witnessed firsthand by Park Ranger (I) Chris Judson. The 1977 La Mesa fire burned a similar foot print as Las Conchas. One year following the fire, summer of 1978, a flash flood within Frijoles Canyon witnessed flood waters reach the public restrooms, basement of the visitor center, cover most of the parking lot - reaching the threshold of the administrative offices. Of note regarding this flood, Frijoles Canyon was only 59% burned, while the Las Conchas fire burned 92% - 20% severely.

Recognizing the new hazards and risks facing Bandelier in the post Las Conchas fire environment, the urgent need to take mitigative actions and maintain the closure of all NPS facilities in Frijoles Canyon - keeping employees in limbo both for residences and offices - Superintendent Lott and the Management Team met to discuss the parks status and available options.

From this meeting it was unanimously decided to keep Frijoles Canyon closed to employee access and that immediate emergency actions needed to occur to protect the Historic District from catastrophic flooding.

The urgency of the situation was driven by the imminent start of the regions monsoon season – forecast to begin within a week to 10 days. The official start of the monsoons in this part of northern New Mexico is 10 July.

Upon meeting, it was decided the bridges within Frijoles Historic District would need to be removed and the park would need external assistance to prepare for this newly emerging emergency related to flash flooding. Therefore, the park communicated its intent to remove the bridges to both the Intermountain Regional Office and state SHPO.

Ms. Judy communicated the following to New Mexico SHPO officer Jan Biella. [Complete Email attached in appendix]

Please accept this message in lieu of a formal written consultation letter, in consideration of the urgent circumstances created by the Las Conchas Fire.

This message updates you on critical readiness actions being taken within the Bandelier CCC National Historic Landmark District in Frijoles Canyon. Flash floods pose considerable risk to park cultural resources within the canyon. Based on the Delineation of Flood Plains for the monument, depth of flash floods and associated debris flows could reach as deep as 8-feet on the lower parking lot nearest Frijoles Creek.

Urgent flash flood preparations are underway to reduce risk of flood damage to cultural resources, including the Visitor Center, which is a contributing structure to the NHL historic district. These measures include removal of all bridges that constrict flows on the creek and may accumulate debris jams that would

worsen flash floods. (3July11 email sent to NMSHPO staff,cc Supt. Lott and BAND VT archeologist R.Gauthier))

Additionally, on Sunday, 3 July 2011, Superintendent Lott officially requested deployment of the regions standing Type II Incident Management Team to assist the park with the management of the parks “extreme risk of catastrophic flooding to Bandeliers’s National Landmark District.” [3July11 email from Supt. Lott to IMR Acting Chief Ranger Dave Horne, cc. Deputy Regional Director Laura Joss. Full email attached in appendix]

Tentative Objectives would include:

OBJECTIVE 1: Protect life and property

OBJECTIVE 2: Develop and implement plan to mitigate immediate flood risks to Historic District

OBJECTIVE 3: Relocate and re-establish monument administrative functions

OBJECTIVE 4: Re-establish a visitor services program

OBJECTIVE 5: Evaluate and implement closures

OBJECTIVE 6: Develop tiered response plan to flood events

IIMT, BAND & BAER Response

July 4-5th Intermountain Incident Management Team (IIMT) members traveled to Bandelier. Incident Commander, Rick Mossman, and 3 other command and general staff members arrived at Bandelier late in the evening, July 4th.

At this same time NPS BAER (Burned Area Emergency Recovery) Program Manager and Co-BAER Team Leader for the Los Canchas fire, Rich Schwab, also arrived on the independent yet similar mission of assessing the post fire conditions for the purpose of life, health and property safety, along with initiating an immediate and long term recovery plan for the areas affected by the fire.

Mr. Schwab (NIFC) and his USFS counterpart, Greg Kuyumjian (USFS, WA), had been tracking Las Conchas fire from its first day. Collectively, Schwab and Kuyumjian opted to co-lead the BAER response for the fire. Unlike IIMT, who had the sole responsibility of responding to Bandelier National Monument, Mr. Schwab and Mr. Kuyumjian, were responsible for

managing a BAER response for the entire fire encompassing more than 155,000 acres and 15 different agencies and governments. Mr. Kuyumjian took responsibility for the northern half of the fire, while Mr. Schwab had leadership responsibility for the southern half.

Mr. Schwab led a team of approximately 80 resource professionals; 30 outside resources and 50 local professionals. The team was divided into subgroups, each dedicated to a specific agency or governmental organization. Although leading the entire 80 person team, Mr. Schwab had the additional responsibility of direct oversight and leadership of the NPS BAER subgroup dedicated to Bandelier's assessment & response. As such, even before arriving on site in Los Alamos, as the immediate fire risk was subsiding, Mr. Schwab had been in frequent contact with Chief of Resources Barbara Judy providing counsel to her regarding the BAER process and urgent nature of the flood risk to Frijoles Canyon and the Historic District.

BAER Team Leader Schwab, Incident Commander (IC) Mossman and Superintendent Lott met together and began working collaboratively on Tuesday, 5 July.

It is important to note that these three leaders had independent responsibilities, yet worked collaboratively throughout the entire response to this emergency.

The initial draft Emergency Response document, drafted by Dan Buckley, National Program Leader for Fire Operations, who was already on the ground with the Las Conchase BAER response was forwarded to Mr. Schwab who then shared it with Superintendent Lott and IC Mossman on 4 July. The document stated in part:

This is an initial submission, and it is expected this plan will be combined with other plans from the other entities that have been impacted by the Las Conchas Fire, into a single Burned Area Emergency Response plan. Because of the urgent need facing Bandelier National Monument resources in Frijoles Canyon, this ES plan development started with the initial actions taken by the park to protect life and property at risk from flash floods and debris flows.

Values at risk from flash flood: Frijoles Canyon infrastructure including sewer, water, electrical and data lines; the Frijoles Canyon Sectional Plate Vehicle Crossing (the motorcar bridge), the sewer lift station, park buildings, including newly-renovated multi-million dollar visitor center, the visitor center comfort station, a maintenance building, foot trails, footbridges, and, if a worst case scenario unfolds (Probable Maximum Flow with 50,000 cubic feet per second), park administration offices and additional maintenance facilities, as well as the Tyuonyi ruins could also be damaged. Bridges in Frijoles Canyon (including the motorcar bridge) will likely be removed in the immediate future to prevent the blockage of debris flows and subsequent floodwaters from accumulating. [full document including punch list of items to be completed attached as appendix]

The document then provides a 17 item punch list that includes acquisition and installation of an early warning system, removal of the Historic Districts bridges, relocation of the parks administrative offices, etc. [see full doc attached]

IIMT

IIM Team members arrived 4-5 July. Superintendent Lott delegated responsibility of response to the emergency along with management of the park on 6 July 2011. The objectives were:

1. Protect human life, property and resources through adherence to safety policy and standards and application of risk analysis to all actions;

Specific Deliverables:

- a. Assess current work-rest-ratio of all park employees and ensure staff receive required leave to meet incident work-rest-ratio policy;
- b. Establish modified operational schedule to ensure park staff meet work-rest-ratio policy during extended park recovery operations.

2. Assess immediate, short-term and long-term hazards for re-occupation for agency and public use of the Historic and Visitor Use area of Frijoles Canyon;

Specific Deliverable:

- a. Multi-disciplinary report providing comprehensive analysis of immediate, short-term (1-year) and long term (1-10 years) flood hazard along with recommended mitigations for agency and public use of the Canyon.
3. Coordinate and support BAER (Burned Area Emergency Response) team dedicated to BAND-Las Conchas Fire response.
4. Implement recommended mitigations for immediate agency and public use of Frijoles Canyon Historic District.
5. Consolidate park administrative functions providing necessary and appropriate office space to re-establish and maintain sustained park operations.
6. Establish interim visitor services program based upon limited or no use of Frijoles Historic District to be initiated as quickly as feasible.
7. Manage park operations to facilitate emergency recovery, on-going operational needs, planning and facilitation of park operations as appropriate.
8. Coordinate park operations with existing Las Conchas Fire Operations.
9. Keep costs commensurate with incident requirements.

Wednesday and Thursday, 6-7 July, IIMT members sought and met with subject matter experts in post fire conditions; these included NOAA Meteorologists Kerry Jones and Hydrologist Ed Polasko, Corp of Engineers Hydrologists Ronald Kneebone, Cheryle Buckles and Robert Mussetter (PHD Hydraulic Eng with Tetra-Tech a Contractor with COE), U.S. F.S. Hydrologists, BAER hydrologists and USGS Ecologist Craig Allen. IIMT sought specific information on the food potential and possible emergency mitigations.

Augmenting preliminary potential flood risk data taken from the 1970's Corp. of Engineer report, BAER team members, using Kuyumjian's rule-of-thumb method, calculated likely potential flood flows of Frijoles Creek. This data was communicated to Bandelier's Management Team and IIMT members in a meeting at the park on Thursday, 7 July 2011.

- ❖ Current daily flow of Frijoles Creek is ~6-10 cfs (cubic-feet-per-second)
- ❖ Flows that would fill the existing incised Frijoles Creek channel would be about ~700 cfs
- ❖ A 25-year rain event would likely create flash flood flows of 3,750-7,000cfs

Note: Reference the Corp Flood map that indicates Historic District Infrastructure would be flooded/inundated with water, specifically the new multi-million dollar theater, the western portions of the visitor center – including the basement, and parking lot. These flows would mimic the 1978 flood event detailed in the Superintendents report and witnessed by NPS staff member Chris Judson.

As with early incident information provided to Superintendent Lott, the expertise and counsel all said the same thing:

- ❖ flood risk becomes exponential in a post fire environment, particularly in canyons such as Bandeliers' Frijoles Canyon and is exponentially increased with increased % of terrain severely burned - flooding is likely to be catastrophic;
- ❖ no effective treatments of the burned areas are available to stop or limit the risk (the Cerro Grande Fire which took place in this same area in 2000 was often cited as an example where treatments were tried, but failed to take hold and failed to limit or reduce flood risk or damages);
- ❖ Mitigating emergency responses were mostly limited to
 - removing obstructions within the primary stream bed;
 - installing/constructing emergency diversion/protective measures; and
 - installation of effective early warning system(s).

When provided with information about Frijoles Canyon and its Historic District all experts consistently advised:

- Remove obstructions such as the motor car bridge and (7) pedestrian bridges as they will be damaged/destroyed in the flood and will act as barriers and dams causing flood waters to further deepen and laterally causing peripheral infrastructure such as the Historic District to be flooded;
- Construct/erect flood barriers such as diversion walls and barriers to both protect canyon infrastructure; and
- Purchase and install early warning systems such as rain and flow gauges up canyon from the historic District.

Therefore, on Friday, 8 July, under threat of monsoonal storms forecast to start in 72 hours (Sunday evening 10 July), IIMT commenced removing the stone motor car bridge and seven pedestrian walking bridges spanning the Frijoles Creek.

Initially, there were recommendations and discussion of installing some sort of point protection for the parks primary display archeological sites located within the Canyon, specifically Big Kiva and Tyounyi Pueblo. However, specialists later recommended against such "protection" as the impacts installing such mitigations would likely cause more damage than possible flood damage as these sites are located outside the zone of a 7,000cfs flood. Therefore, no flood control measures were installed on or at these sites.

Under the leadership of IIMT Operation Section, utilizing 3 single resource supervisors, BAND maintenance staff and two Type II hand crews (Navajo Scouts out of Window Rock Arizona - recently released from fire suppression on the Las Conchas) the following was accomplished:

- (1) Steel Plate & Stone auto bridge removed (stone from headwalls salvaged for future use)
- (2) Wood walking/pedestrian bridges removed and salvaged for future use
- (5) Concrete walking/pedestrian bridges removed
- 600 linear feet of wall/door protection for the Visitor Center & Theater
- 300 linear feet of water tight diversion wall in place

- 10,000 sand bags filled and placed along point protection measures

[photo's, photo's, photo's]

Not all of the necessary materials could be obtained on such short notice – specifically, Jersey Barriers, also known as K-Rails, were unavailable in this short of time frame. Additionally, the forecast rains did not materialize as initially predicted, the park receiving only a few light sprinkles of rain, therefore, work on the point protection and barriers continued through and was completed on Thursday, 14 July.

[pictures of jersey barriers being unloaded and final construction pictures]

Final Summary of Point Protection completed and in place:

- (1) Stone auto bridge removed (stone salvaged for future use)
- (2) Wood walking/pedestrian bridges removed and salvaged for future use;
- (5) Concrete walking/pedestrian bridges removed;
- 600 linear feet of wall/door protection for the Visitor Center & Amphitheater
- 700 linear feet of diversion wall (one 300' water tight, one 400' non-water tight) installed and sandbagged;
- 14,000 sand bags filled and placed along point protection measures;
- Floodgate installed to protect maintenance yard
- Sewage lift station sealed and sandbagged
- Manholes and valves sealed
- Secondary protection installed on structures above the flood line

[final pictures]

BAER

During this same period of time the BAER Team NPS subgroup, mostly comprised of BAND resource management staff, were performing ground assessments of effected park resources, additional consultation with subject matter experts regarding immediate risks to park facilities and resources, and hasty analysis and data production for a BAER response report delivered to BAND management staff and IIMT on Monday, 18 July.

BAND

While the IIMT was removing bridges and constructing point protections and the BAER Team was assessing damaged resources and drafting a response plan, the senior management staff of Bandelier tackled immediate management issues facing the park and staff.

First priority was status of funds - specifically project funding that may or may not be able to be expended in the parks post fire recovery and post fire operations - employment of temporary staff, housing for park employees, use and occupancy of Frijoles Canyon for park operations and visitor services.

The entire park remained closed during this period due to the tri-fold hazards and risks of :

- ❖ Park remaining within the overall active Las Conchas fire perimeter;
- ❖ Hazardous post fire resource conditions that had not been assessed nor mitigated; and
- ❖ Potential risk of catastrophic flash floods.

The loss of use of the parks' Historic District and facilities located within Frijoles Canyon translates to the loss of 45% of its housing ability, 60% of its office capability and nearly 100% of its visitor services.

On Thursday, 7 July (12 days into the incident), the management team reviewed the status of park project funds. The review had two objectives:

- Assess the parks ability to continue moving forward on projects – expending the appropriated funding; and
- Status of temporary employees being paid from any project funds that would be in jeopardy of losing their job(s) due to the inability of the park to complete projects in the post fire emergency response.

Findings of this review revealed projects were either mostly completed and/or obligated and that no current employee was in jeopardy of losing his or her job.

Additionally, at this meeting park managers reviewed the status of current housing issues - many staff were still in hotels, staying with friends or had even left the area as their Canyon residences were unavailable to them. The Management Team tasked the parks housing officer with devising a draft plan to accommodate all existing park residences. Priorities were for PFT employees in required occupancy positions, permanent staff beneficially occupying BAND housing and then temporary staff.

Bandelier Today

As of this writing, Friday 22 July, Bandelier remains in a state of emergency and recovery.

Park operations, as they were prior to 26 June 2011, no longer exist and are likely not to return for at least 3 months, possibly upwards of 3 years.

- ❖ The park remains under delegated fire suppression of the greater Las Conchas fire management;
- ❖ has isolated patches of active fire in the wilderness; and
- ❖ remains in a state of active wildland fire patrol.

- ❖ Its primary visitor use district of Frijoles Canyon is under threat of possible catastrophic flash floods and will remain closed for the foreseeable future (2-3 months minimum);
- ❖ Has lost use of 45% of the parks housing capabilities located within Frijoles Canyon;
- ❖ Has lost, at least temporarily, the use of 60% of its primary office space which is located within the historic buildings of the Historic District;
- ❖ Is without a public visitor center; and
- ❖ Has lost use of at least 65% of the parks backcountry trails which are located within the primary fire perimeter and are in jeopardy of being washed-out with monsoonal rains.

Park staff are working on a temporary plan to re-occupy – for administrative use (read office space/use) only – the administrative offices within Frijoles Canyon. But not all park operations will be able to effectively operate under the safety mitigations that will be essential for occupancy of Frijoles Canyon.

The Interpretive Division is re-creating itself without use of a visitor center and the primary visitor use cultural sites located within Frijoles Canyon. The staff is metamorphosing from a single point, almost sedentary program based out of the parks' visitor center, to a mobile staff with its primary visitor use site located at a remote non-contiguous site located 12 miles from the main park. The requirements of staffing this remote site will encompass all of the existing divisional staff. Any additional programs to the parks visitor services, such as the addition of a temporary visitor center or guided hikes/tours into Frijoles Canyon (when conditions permit), will significantly overextend existing staff.

The Resource Division is facing an exponential increase in work load as the BAER program settles on the park for the next 3 years. (The BAER program comes with its own soft money funding, unlike increased/changing workloads that will be experienced in other divisions such as Interpretation.)

The Protection Program faces increased work load and logistical challenges of newly exposed cultural sites within the 50% of the park fire has eliminated most if not all of the vegetative cover camouflaging such sites.

The Maintenance Division faces the additional work load of maintaining historic structures essentially abandoned from everyday use in addition to the increased visitor use program at a remote unit.

Administrative Division has the exponential IT work load of creating and maintaining temporary offices (both data and phone), successful telecommuting opportunities and fluctuating temporary offices. Additionally, the division is facing fiscal year close out without use of its primary office (and files) space and having administrative staff scattered amongst temporary offices.

None of the above challenges are insurmountable, but taken together create challenges for a park just starting to re-tool for a dramatically different park operations.

Verification of Decision to Implement Immediate Emergency Stabilization Actions

US Forest Service hydrologists have developed a rapid method for estimating runoff from burned watersheds (Kuyumjian 2007, as explained in the Watershed Assessment). The method is based on the concept that high magnitude flash flood events in this region are generated by relatively short intense local convective storms and can be used as a rapid predictor of runoff in lieu of necessary information and time to run more sophisticated storm flow runoff models.

Runoff magnitudes for a 25 year – 1 hour – 5 square mile design storm were estimated using the Rule of Thumb by Kuyumjian. Using this method, a 1.7 inch rain event produces a 3,200 flow event. This data was used to inform the Bandelier Superintendent to support his decision to implement emergency stabilization actions.

Once data became available, Frijoles Canyon at the visitor center was analyzed for pre and post fire stream discharge using the WildCat watershed model (Version 5.0). The 25 year, 1- hour storm was used which produced a rainfall event of 1.8 inches. The pre-fire discharge at the visitor center is 350 cubic feet per second. Post-fire discharge without pre-wetting produced a peak flow of 3,250 cubic feet per second and with pre-wetting, a peak flow of 4,100 cubic feet per second. This data verifies the Kuyumjian method.

The 3,200 flow event has been projected onto the results of discharge recurrence intervals based on estimates produced by the Army Corps of Engineers HEC-2 model as provided in the table below and used to produce the floodplain delineations developed by Reed in 1988. Reed's delineations are used to provide lines of demarcation for predicted flood events as represented in the map below.

Recurrence Interval (yrs)	10	50	100	500	Flash Flood	Probable Maximum Flood
Discharge (cfs)	580	1,800	2,750	6,500	23,000	50,000

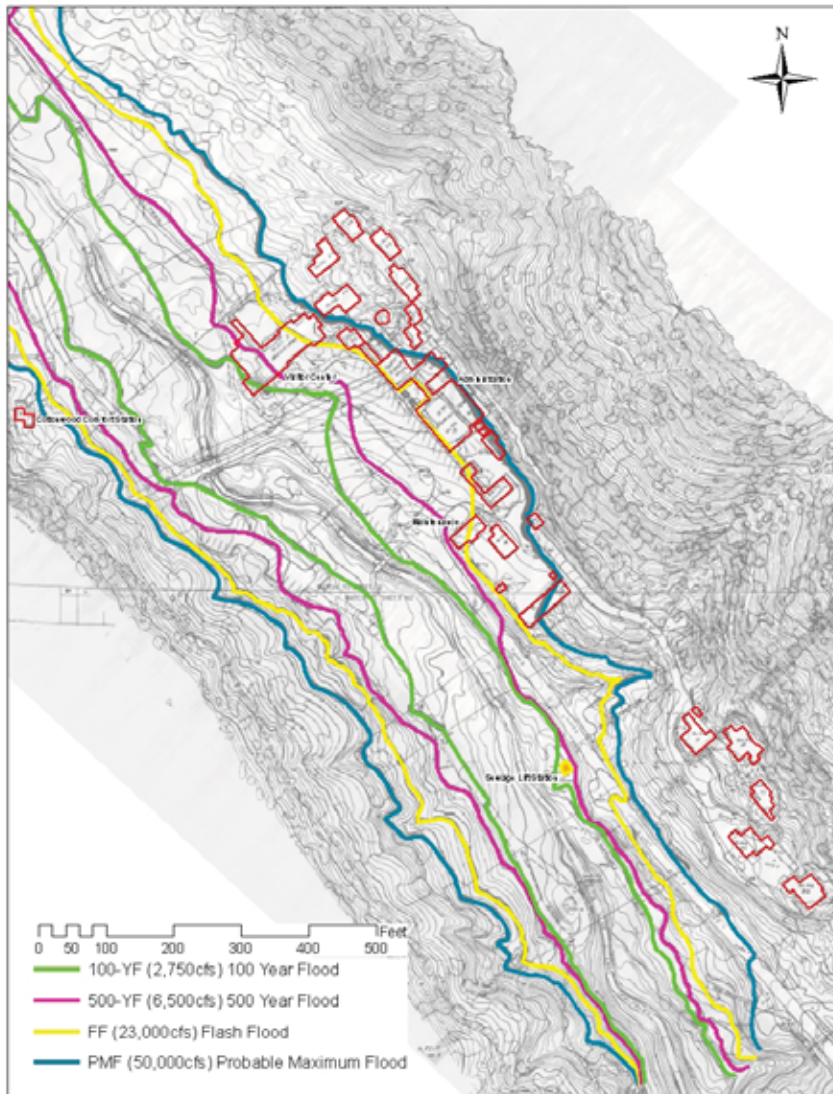
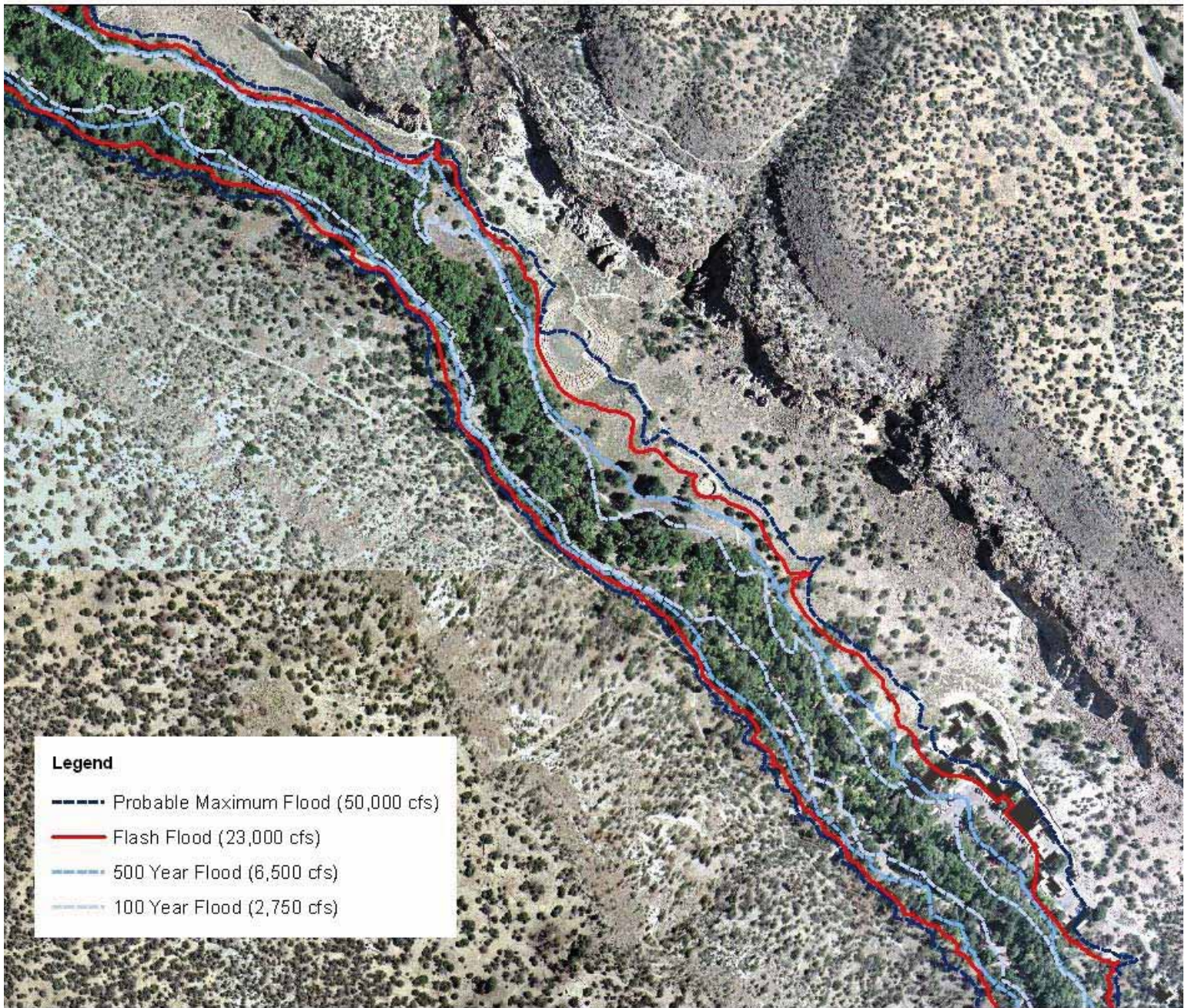


Table 3. Estimated flood recurrence intervals based on ACOE HEC-2 model.

For flows to reach the Historic District, they would have to exceed 6,500 cubic feet per second come within the range of a flashflood event of 23,000 cubic feet per second. This type of event would impact the Visitor Center addition, lower parking lots, picnic areas and bridges.

For the archeological sites within Frijoles Canyon, similar methodology has been used. The photo below shows the main cultural resource area that is most seen by park visitors. It is protected from flash flood risk by topography and restoration of historic free flows within the Rito de los Frijoles. Flash flood levels would have to rise above 26,000 cubic feet per second to reach the sites and this is considered to be an unlikely scenario.



APPENDIX D: CHRONOLOGY OF FLOODING

Chronology of Flooding Activity in Frijoles Canyon ¹

1773	3M above stream bed, reconstructed fire year, estimated 2526 cfs
1866	3.3M above stream bed, estimated 3552 cfs
1905	1.6-to-2.6M above stream bed, estimated 1495 cfs
1951	2.9M above stream bed, estimated 2526 cfs
1972	1.7M above stream bed, estimated 724 cfs
1977	5.02 stage, 653 cfs; post-La Mesa fire flooding: Year 1; 7 events >200 cfs
1978	6.34 stage, 3030 cfs; post-La Mesa fire flooding: Year 2; 1 event >100 cfs, 4 events >200 cfs, and 2>1000 cfs
1979	3.81 stage, 354 cfs; post-La Mesa fire flooding: Year 3; 3 events >100cfs
1981	2.67 stage, 43 cfs
1982	2.93 stage, 83 cfs
1985	2.68 stage, 57 cfs; Visitor Center flooded causing damage to reconstructed cavate floors
1991	4.15 stage, 710 cfs
1992	3.44 stage, 65 cfs
1998	3.12 stage, 125 cfs
2000	2.66 stage, 40 cfs
2006	3.21 stage, 90 cfs
2007	4.68 stge, 722 cfs; took out two pedestrian bridges on Falls Trail
2008	4.34 stage, 513 cfs; took out two pedestrian bridges on Falls Trail

¹ Flood History Reconstruction in Frijoles Canyon Using Flood-Scarred Trees, McCord, 1996 – source for dates 1773 to 1972; Frijoles Gauging Station Records – source for dates 1977-present (note only events >40 cfs included)

APPENDIX E: RUNOFF ESTIMATES USING THE KUYUMJIAN METHOD

Runoff Estimates, Los Conchas Fire
7-11-11 - Bruce Sims, USFS
DRAFT

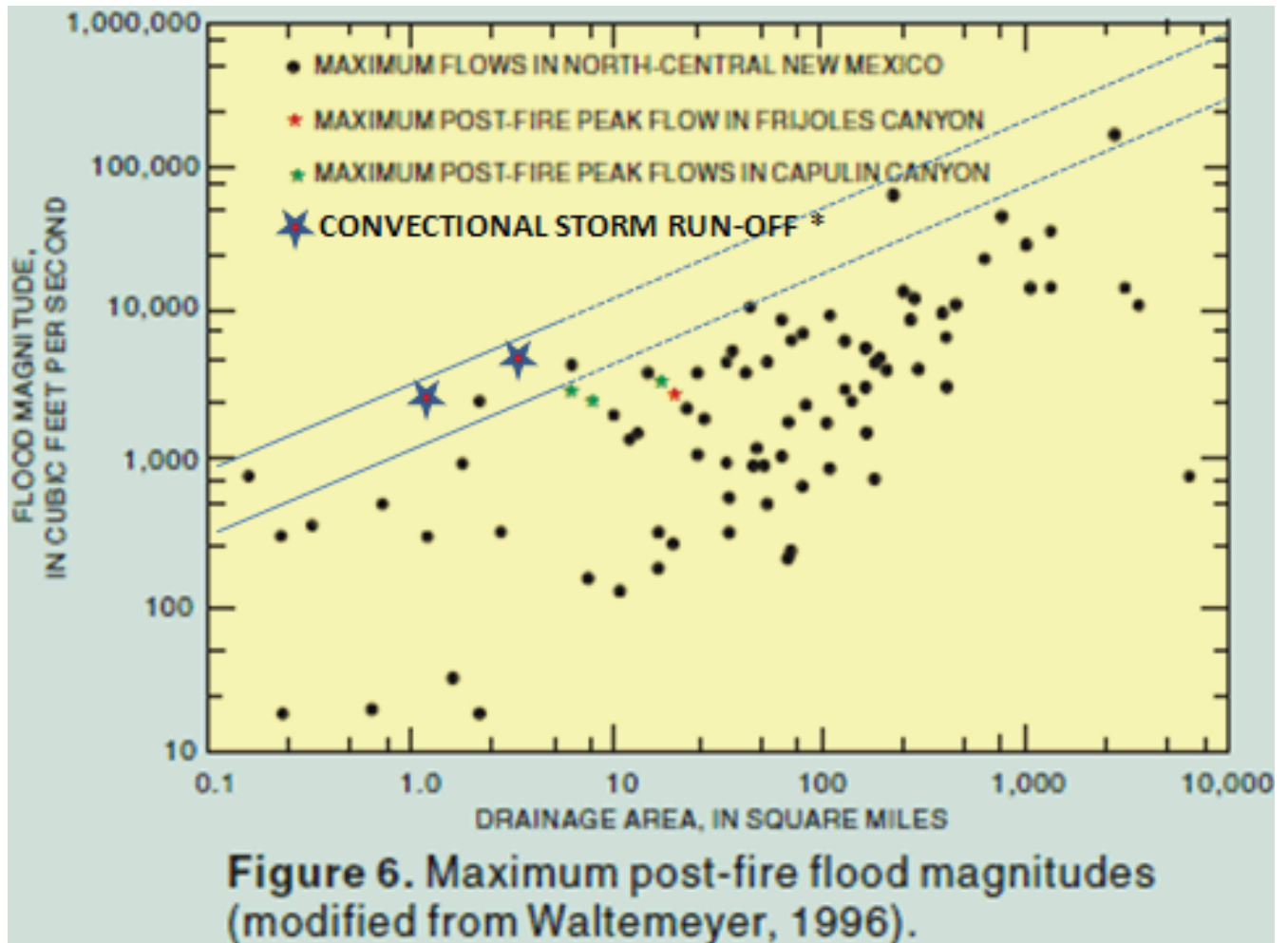
Potential runoff estimates for watersheds affected by the Los Conchas Fire, using rapid calculation methodology developed by Greg Kuyumjian, USDA Forest Service. More than 50% of annual precipitation on the east slopes of the Jemez Mountains falls between late June and September. Summer convectional rainfall events are common and may yield high rainfall intensities. It was anticipated that convectional storms can cover 0.5 to 5 square miles of a given watershed in any one storm event. Where these storms occur on lands with moderate to high burn severity significant runoff can be expected. The 25-year return interval 1-hour rainfall amount is approximately 1.7" for the area burned by the Los Conchas Fire. To estimate runoff volumes generated by a 1.7" per hour storm using the Kuyumjian method, the size of the storm in square miles located over areas of moderate or high burn severity can be multiplied by 1.7" and that quotient is then multiplied by an empirically developed coefficient of 300. This figure is then raised by 25% to account for post fire bulking of the flow with sediment and other debris. Estimated runoff volumes calculated for the 2, 3, 4, and 5 square mile storm events on burned sites are shown below:

2 square mile storm – 1,375 cubic feet per second (cfs)
3 square mile storm – 2,000 cfs
4 square mile storm – 2,500 cfs
5 square mile storm – 3,125 cfs

These estimates would be exceeded if:

- A convectional storm tracks linearly along a stream drainage,
- a higher magnitude storm event occurs,
- multiple storm cells form over the same watershed, or
- high antecedent moisture conditions exist.

These estimates were compared to maximum peak flows measured in North Central New Mexico. These flows included run-off following the 1977 La Mesa wildfire that burned in both Frijoles and Capuline Canyons (USGS Fact Sheet 141-02, Nov. 2002). Interestingly, the Los Conchas Fire estimates using the Kuyumjian calculations for peak flows from convectional storms covering 2 to 5 square miles are similar to the maximum peak flows of record in North Central New Mexico for areas from 2 to 5 square miles (see figure below).



From - USGS Fact Sheet 141-02, Nov. 2002

*The larger stars indicate the maximum run-off from a 1 hour - 25 year rainfall event calculated for 2 and 5 square mile convectional storms covering moderate and high severity burns using the Kuyumjian methodology.

The Los Conchas Fire area has been divided into 29 watersheds. Outlet points were selected to allow understanding of potential flood risk and discharge volumes as a result of the fire. Possible flood ranges are presented for each watershed. The maximum estimate using this (Kuyumjian) methodology is approximately 3,125 cfs.

References

- Veenhuis, Jack E. 2002. Effects of wildfire on the hydrology of Frijoles and Capuline Canyons in and near Bandelier National Monument, New Mexico. USGS Water-Resources Investigations Report 02-4152, 39 p.
- Waltemeyer, S.D. 1996. Analysis of the magnitude and frequency of peak discharge and maximum observed peak discharge in New Mexico: U.S. Geological Survey Water-Resources Investigations Report 96-4112, 79.p.

Burned Area Emergency Response Tools



[BAER Tools](#) -> [Post-Fire Road Treatment Tools](#) -> [Post-Fire Peak Flow and Erosion Estimation](#) -> [Rule of Thumb by Kuyumjian](#)

Rule of Thumb by Kuyumjian

The Rule of Thumb by Greg Kuyumjian has been used by Region 3 BAER team members, which is about 7% of BAER interviewees (Foltz and others 2008).

Experienced BAER team members often use their own rule of thumb, which they developed based on their experience and post-fire monitoring observation and what works well within certain regions. An experienced BAER hydrologist (pers. comm. Kuyumjian 2007) suggested using the following rule of thumb, which requires a minimal amount of input information.

You will need to know the following: **Rule of Thumb by Kuyumjian.**

Input Requirement

To use the Rule of Thumb by Kuyumjian, the following information is required:

- area of high and moderate soil burn severity; and
- anticipated precipitation amount from a damaging storm.

Steps

1. Determine the design/damaging storm, including storm intensity, duration, and recurrence interval.
2. Estimate the post-fire peak flow (Q_p) using the [Rule of Thumb by Kuyumjian](#).

Advantages

The following were advantages to applying the Rule of Thumb by Kuyumjian for post-fire runoff and erosion estimation. The Rule of Thumb by Kuyumjian:

- is applicable for estimating post-fire peak flow;
- is a simple and quick approximation;
- does not need to determine parameter values; and
- considers bulking factor for post-fire debris flow/torrent.

Disadvantages

The following were disadvantages to applying the Rule of Thumb by Kuyumjian for post-fire runoff and erosion estimation. the Rule of Thumb by Kuyumjian:

- does not estimate erosion;
- is only applicable for short-duration (1 hour or less) high intensity (greater than 0.5 inches) storms;
- is not applicable for estimating peak flow from snowmelt or rain-on-snow or frozen ground;
- is currently evaluated only for Region 3; and
- uses only English units.

Example Results

APPENDIX F: DELINEATION OF FLOOD PLAINS IN RITO DE FRIJOLES

DELINEATION OF FLOODPLAINS FOR RITO DE LOS FRIJOLES

BANDELIER NATIONAL MONUMENT, NEW MEXICO

William B. Reed¹

INTRODUCTION

On March 10, 1988, the Associate Regional Director, Park Operations, Southwest Region, National Park Service requested assistance from the National Park Service's Water Resources Division in quantifying flood hazards for Rito de los Frijoles within Bandelier National Monument. This study was required to update a U.S. Army Corps of Engineers report (U.S. Army Corps of Engineers, 1987). At the time the earlier report was completed, existing topographic coverage was inadequate to accurately delineate floodplains in the vicinity of park resources and facilities.

The purpose of this study is to delineate for Rito de los Frijoles the floodplains for the 100-year, 500-year, and probable maximum flood (PMF), and to assess the flood risk to existing facilities, historic structures, and other park resources. Additionally, the area subject to flash flooding was delineated.

PHYSICAL SETTING

Bandelier National Monument is located 6 miles south of Los Alamos, New Mexico (Figure 1). In the monument, Rito de los Frijoles flows within the narrow, deep Frijoles Canyon. On the canyon floor, Tyuonyi ruins, and the visitor center and administration complex are situated near the stream.

The area of the watershed above a point 950 feet downstream of the visitor center and administration complex is 18.1 square miles (Figure 2). The studied reach extends from this point to a point 7,750 feet upstream of the complex. This upper location is 750 feet upstream of the Ceremonial Cave. The total length of the studied reach is 8,700 feet. Average channel slope for this reach is 1.8 percent.

HYDROLOGY

The peak flows for the 100-year and 500-year floods were obtained from the 1987 U.S. Army Corps of Engineers report. The peak flow for the probable maximum flood was calculated using the Soil Conservation Service unit hydrograph method (McCuen, 1982) and the basin-specific 24-hour probable maximum

¹Hydrologic Transition Manager, National Weather Service, Southern Region, Fort Worth, TX (formerly with National Park Service, Water Resources Division, Fort Collins, CO).

precipitation (PMP). The basin-specific 24-hour PMP, 21.8 inches, was calculated using the method developed by Miller, et al. (1984). However, it should be noted that the calculated PMF is not a flash flood. Therefore, an estimate of the "upper limit" (largest peak flow) for flash floods was calculated using the basin-specific 1-hour PMP, 8.4 inches. The peak discharge values in cubic feet per second (cfs) are listed in Table 1, and the resultant storm hydrographs for the 1-hour and 24-hour PMPs are shown on Figures 3 and 4.

Table 1. Peak Discharge Estimates for Rito de los Frijoles

Type of Event	Peak Discharge
100-year	2,750 cfs
500-year	6,500 cfs
flash floods	23,000 cfs
PMF	50,000 cfs

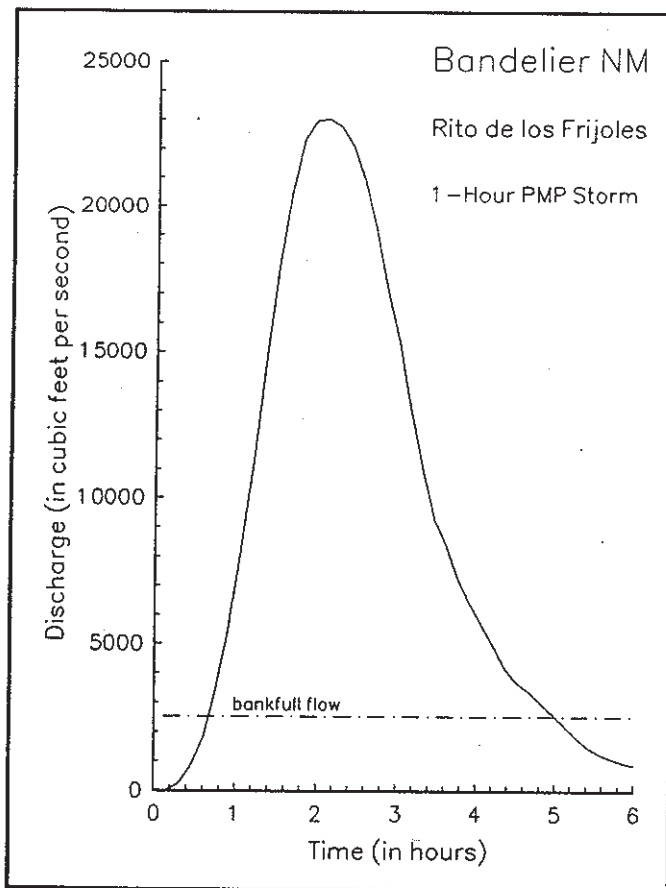


Figure 3. 1-Hour PMP Storm

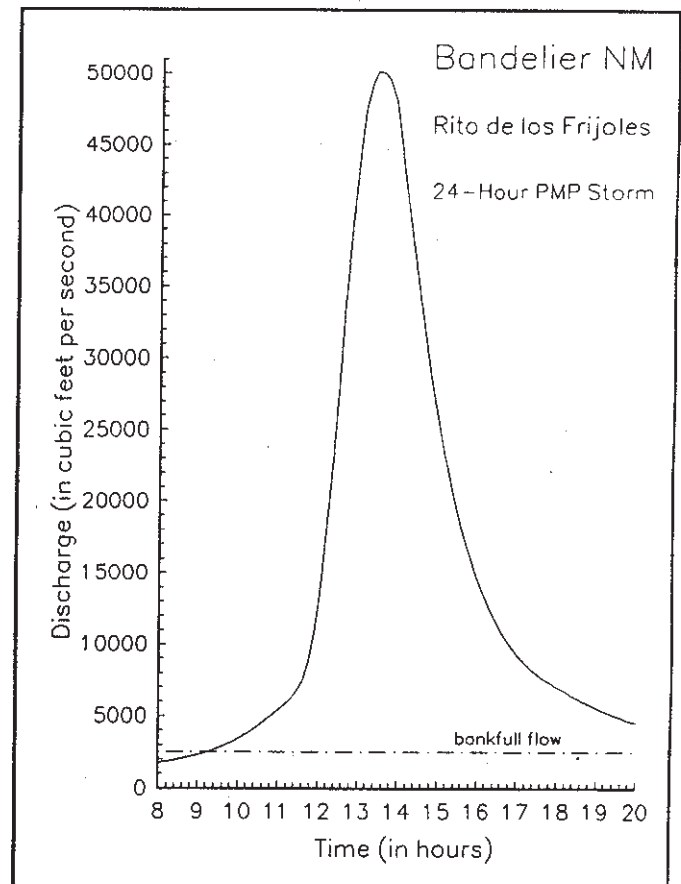


Figure 4. 24-Hour PMP Storm

HYDRAULICS

A hydraulic analysis of Rito de los Frijoles was made using U.S. Army Corps of Engineers' HEC-2 (Water Surface Profiles) computer program (U.S. Army Corps of Engineers, 1982) to calculate peak water surface elevations for the 100-year, 500-year, and PMF. Additionally, HEC-2 was used to calculate peak water surface elevations possible during flash flooding.

Thirty-three cross sections were selected in the field and subsequently obtained from a new (1988) topographic park base map. This map was prepared by the National Park Service's Denver Service Center at the request of the Division of Natural Resources Management, Southwest Region, National Park Service. The lengths between cross sections were measured along the thalweg and from the midpoint of the left and right overbank transect. Thalweg lengths and the dimensions of the bridge opening were measured in the field using a steel tape. Overbank distances were determined directly from the topographic map.

Roughness coefficients (Manning's "n" values) were estimated in the field individually for the main channel and left and right overbank at each cross section. These values were selected based on the experience of the author and by using two references: Barnes (1967), and Benson and Dalrymple (1967). The potential for debris dams upstream of the studied reach (although observed) was not evaluated. However, because the narrow canyon upstream of the studied reach is long and of varying width, debris-release flooding will likely attenuate before reaching the Tyuonyi ruins, and subsequently the visitor center and administration complex.

Subcritical flow, and therefore for most cross sections subcritical depth, was assumed for all discharges. However, when the energy equation could not be balanced between cross sections, critical depth was assumed. The U.S. Army Corps of Engineers also made these assumptions for the preparation of the 1987 report. It is the opinion of the author that for the prevailing natural conditions of the studied reach that supercritical flow will not be sustained for a significant distance during floods. Additionally, the exact location of where a hydraulic jump will occur can not be determined using standard hydraulic modeling methods.

RESULTS

As shown on Figure 5, the comfort station and lower parking lot (at the visitor center and administration complex) are within the 100-year, 500-year, "flash flooding", and PMF floodplains; the museum is within the 500-year, "flash flooding", and PMF floodplains; the entire parking lot is within the "flash flooding", and PMF floodplains; and the Tyuonyi ruins, and entire visitor center and administrative complex (including the parking lot) are within the PMF floodplain. Site-specific, overbank, flood depths are presented in Table 2.

Overbank velocities are generally greater than 15 feet per second for the simulated flash flooding and PMF events. Overbank velocities are generally greater than 10 feet per second for the simulated 500-year flood. Overbank velocities are generally greater than 6 feet per second for the simulated 100-year flood.

An estimate of the warning time for the PMF is 9 hours (time-to-peak is 13.4 hours). An estimate of the warning time for the simulated flash flooding (approximately half the magnitude of the PMF) is 40 minutes (time-to-peak is 2 hours). Figure 6 presents a direct graphical comparison of these two events (as previously

stated: the 24-hour PMP causes the PMF and the 1-hour PMP produces the simulated flash flooding).

Table 2. Flood Depths at Selected Sites.

Facility/Location	100-Year (feet)	500-Year (feet)	Flash Flooding (feet)	PMF (feet)
1. lower parking lot	<1	3	8	12
2. museum	---	<1	5	9
3. comfort station	<1	2	8	11
4. Tyuonyi ruins	---	---	---	4

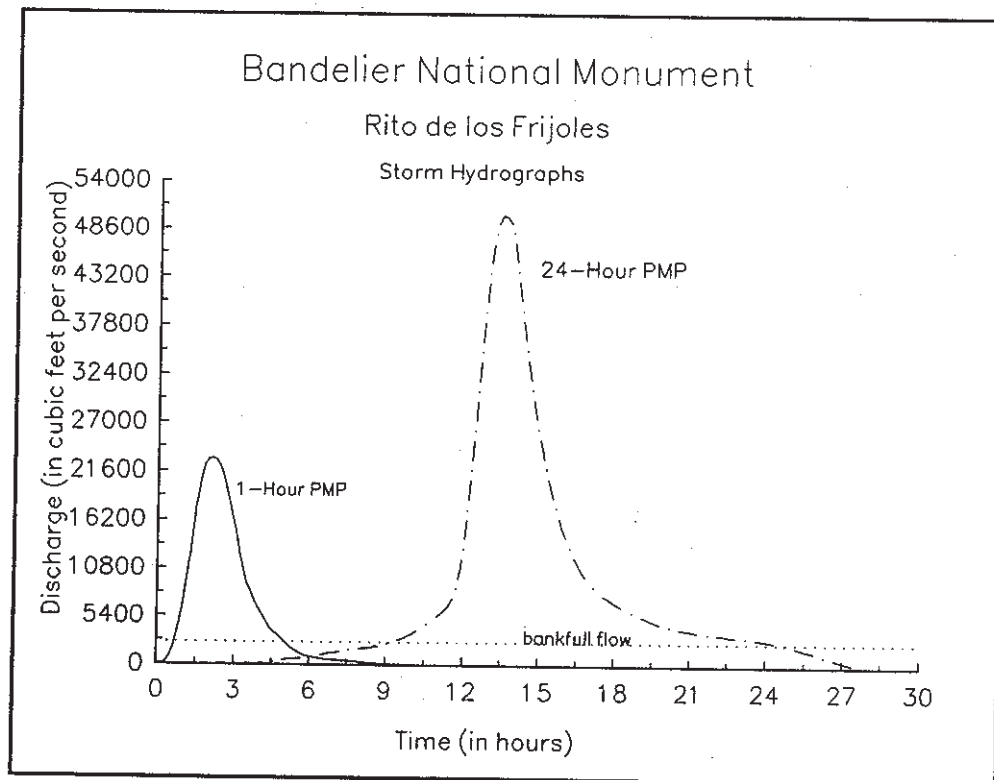


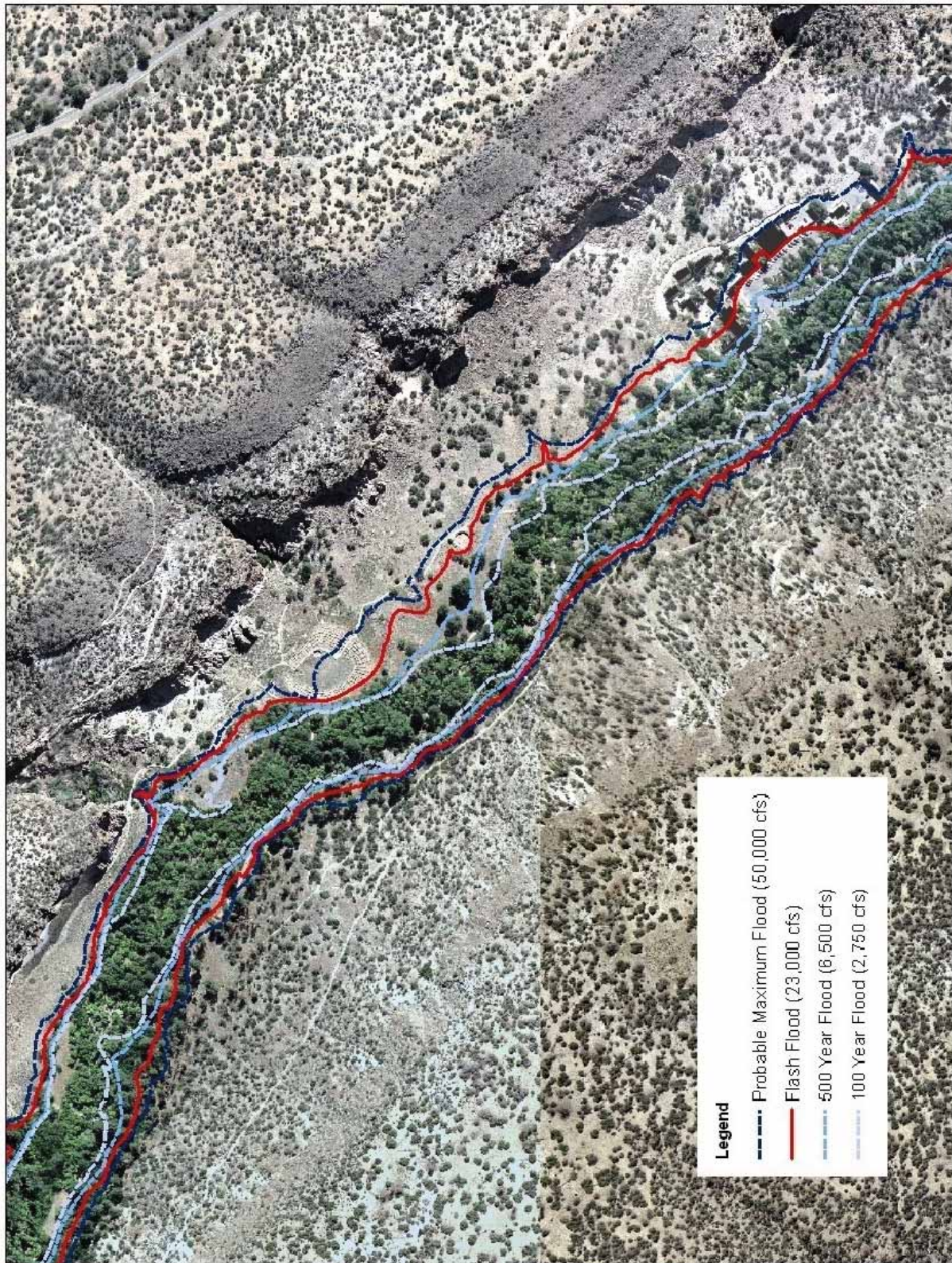
Figure 6. Storm Hydrographs for 1- and 24-Hour PMPs.

CONCLUSIONS

- In general, a 100- or 500-year flood will present little, if any, threat to park facilities and resources. However, to provide for visitor safety, structural mitigation from the 500-year flood, or relocation, may be warranted for the lower parking lot.
- Flash flooding presents considerable risk to park facilities and visitor activities within Frijoles Canyon. The feasibility of establishing a local flood warning system and providing other mitigation (including the relocation of the visitor center and administration complex) should be evaluated.
- A PMF would cause major damage to all structure situated near Rito de los Frijoles, including the Tyuonyi ruins. However, the perseverance of the ruins is, in and of itself, evidence that the likelihood of such an event (PMF) occurring is relatively small.

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APPENDIX G: US FOREST SERVICE WATERSHED REPORT

Watershed Resource Assessment

Las Conchas Fire

July 2011

Kyle Wright Sequoia NF and Eric Moser A&B Ecosystems Enterprise Unit

EXECUTIVE SUMMARY

Critical values of risk were identified and assessed in 6 of 33 watersheds in the fire area. An emergency determination was made that there existed an unacceptable risk in watershed resource, particularly in regards to life and property. An empirical method for rapid calculation of potential runoff was used that used a design storm of 25-year, 1-hour frequency-duration, and an extent of storm coverage between 0.5 and 5 square miles. Discharge calculations were between 280 and 3600 cubic feet per second (cfs), depending on storm size and amount of moderate to high burn severity.

High and moderate burn severity ranged between 0 and 81% in the fire area drainages. The two drainages with the greatest risk to life and property were Bland and Cochiti at 62 and 79, respectively. Bland Canyon contains an historic mining district, in which debris pose a risk of debris jams at road crossings and contamination of flood waters by residue from one-time ore leaching process is very high. Cochiti Canyon threatens state land and lease-holder's facilities and assets, including orchards, by break-out flooding from a narrow constriction in the valley immediately upstream. Risk was assessed at very high. Calculated maximum runoff due to impacts of the fire for these two drainages, Bland and Cochiti, were 1900 and 3200 cfs, respectively.

RESOURCE CONDITION ASSESSMENT

Resource Setting

Stream flow in the fire area of the Jemez mountains is typically intermittent to the fourth order or 6th code HUC. Perennial flow is often spring-like with sustained summer baseflow. The occurrence is a function of geologic stratigraphy or structure, and not necessarily related to drainage area. For example, most of the perennially flowing water in the Valles Caldera: San Antonio Creek and East Fork Jemez River, are from spring issue at the foot of massive fan slopes and lake bed terraces. Rita de los Indios valley, a tributary of San Antonio Creek, is aligned with a large fault. Contact planes of rock types with variable capacity of transmission and storage of percolating groundwater are another source of sustained channel flow, particularly where extrusive igneous lavas such as rhyolites, andesites, dacites and basalts contact underlying pyroclastics or volcanoclastics of some types, which may be relatively impervious. Water percolating down through fractures in the lava rock will spread laterally or atop the clastic rock until daylighting if valley slopes intercept the contact plane.

The climate of the Jemez Mountains is semiarid temperate mountain (Bowen 1990). Precipitation is distributed distinctly bimodal between summer rainfall from convective cells and winter snowfall. This

proportion, about evenly split in the lower elevations changes upslope until in the elevations of the Caldera, between 8,000 and 11,500 feet most of the precipitation is from winter snowpack.

Rainfall intensity is important to understanding runoff response, particularly in the low to mid elevation zones (5,000 to 8,000 feet). One inch per hour is about a 2-year frequency across the fire area, rising but at a declining rate to a 25-year, 1-hour storm of 1.7 inches total (NOAA, 2011). On ground bereft of cover the surface of the mineral soil is exposed to the full impact of a raindrop. Drop size increases with intensity, so that a drop of 3mm diameter, typical for intensities of greater than 1 inch per hour has kinetic energy well in excess to move the median soil grain size. Surface infiltration abruptly decreases as the surface is stirred up and smaller grains plug the interstitial pores. It is also well to note that due to the aridity which inhibits plant growth and soil development, and pervasive bluff-forming rock types, such as the welded tuffs, a significant proportion of the lower half of the 6th code drainages are exposed rock.

There is a dearth of low order channels on hill slopes, particularly in the upper elevations mostly composed of massive, fractured layers of volcanic flow rock. High rates of ground water transmission combined with high evapotranspiration rates and low annual precipitation result in little hill slope valley development. On the gorge bluffs, drainage features are associated with rockfall failures and debris fan runs.

Channels with annual scour usually develop on third order or fourth order stream segments that occupy the bottom of the major canyons (7th and 6th code HUC). The typical profile includes the active channel or most recently scoured portion, in the lower half of a steep V-shape incised into a larger valley floor that is more accurately thought of as a terrace, and a floodplain in only the most extreme events.



Figure 1. Channel in lower Bland Canyon, July 13, 2011

The incised portion will contain most or all large flood events of recent climatic regime. For example; in Frijoles Canyon a rainfall event (1.5 inches) roughly equivalent to area average of a 25-year 1-hour event on Escobas Mesa produced a 637 cfs flow at the visitors center (USGS, unpublished 2007), which is below the top of the flood channel. The runoff stage from the La Mesa Fire area was 1.72 feet higher (Veenhuis, 2002).

Findings

Critical values at risk were largely within a minority of fire area watersheds (6th code HUC). These watersheds were visited and many areas and features listed were found to be in no risk of flooding or sedimentation. Each watershed and resources values of risk contained are listed below.

Cochiti Canyon; Rio Chiquito

Dixon Apple orchards and facilities attached to the University of New Mexico are situated on sediment fans emanating from Cochiti Canyon. The canyon ends in a very narrow slot, 20 to 30 feet in width, and cliffs of 50 feet in height, overtopped by very steep slopes above to the canyon rim. The slot is 200 to 300 yards long. Immediately above the slot the canyon widens to 300 feet or more, occupied by a pine stand burned with high severity. The slot is a point of flow constriction with high potential for debris

dam if sufficient down wood exists. Below the slot the canyon widens immediately to at least 200 feet. During the visit excavators were engaged in deepening and clearing the channel down stream to point past the orchards. Jersey barriers were being set up to protect New Mexico facilities including a well head for agriculture. There was no running water from the canyon at the time of visit. The active scour channel and ditches being constructed were estimated to have conveyance capacity of a few hundred cfs at most.

Bland Canyon

Cochiti subdivision, the Town of Cochiti Lake, and the Cochiti golf course are all within the lower portion of Bland Canyon drainage. Cochiti Subdivision and the Town of Cochiti Lake are at elevations well above potential flooding. A portion of the golf course, including two fairways, a maintenance shed and fueling station, are potentially in the floodplain.

Forest Road 268 runs up Bland Canyon, occupying the canyon bottom most of the way up to private land with mining interests. There are four bridges. The lower two may be inundated by flow that potentially would flow onto the road. Berms and rolling dips would help keep flow within the channel margins or, conversely, divert some portion of it around a bridge. Conveyance under the bridges was calculated as between 275 and 450 cfs. Some culverts draining the road or hill slope swales need to be cleaned out.

The private holdings contained residences, sheds, stamping mills and tanks for holding milled ore and aqueous cyanide for extracting gold from the ore. All of these facilities burned so that the remains are largely a heap of metal including a large amount of corrugated sheet metal used for roofing. The concrete foundations and tanks are intact. There is potential in the event of a maximum runoff that some portion of the debris, most particularly the sheet metal might be mobilized.

Peralto Canyon

The Peralto Canyon channel forms the western and part of the northern boundary to the Pueblo of Cochiti. A berm separating the Pueblo from the channel was in the process of being strengthened (jersey barriers buried along the base), heightened, and gaps filled. A contingency to block flow on Forest Road 266 with jersey barriers and dirt was planned by stockpiling materials near the fee booth to Tent Rocks Monument. A settling pond immediately above the culvert crossing on the road leading south from town was being deepened. Two 10 foot diameter corrugated culverts constituted the crossing. At the angle they were set in each is capable of passing in excess of 1,000 cfs, or more than 2,000 cfs total. Upstream of town the wash is approximately 200 yards across. Depth of alluvium to bedrock (Otowi Member of Bandolier Tuff) probably shallows upstream from the lowermost windmill in section 33 within Tent Rock Monument. At this point the Pueblo is about 5 miles downstream. About a half a mile upstream of the windmill the drainage profile reduces to a slot 20 to 30 feet wide, which is also the site of a ruined masonry dam. Shortly upstream of this point is the confluence of the main stem Peralto and Colle Canyon, still within a highly competent volcanic breccia that forms the slot. Above this member is the tuffaceous Otowi member or alluvium of the Cochiti Formation.

The headwaters of Peralto are composed of andesite flow rock, hard, dense, and highly resistant to weathering. Forest Road 280 and secondary routes are out sloped with virtually no drainage crossings

on very uniform hill slopes. The running surface of the roads is partially to fully bench in parent material. A few culverts should be cleaned out but no other issues were seen.

Guaje Canyon

Five municipal wells and 1 water main boost pump, located in the bottom of Guaje Canyon were visited. Most of the facilities were 20 or more feet in elevation above the channel bed and considered in no risk to flooding. Boost Pump #2 and Water Wells #4A were at the level of Forest Road 57 and might be in some potential risk to nuisance flooding. Conveyance at Boost Pump #2 was calculated at 2400 cfs. The channel was similar at Water Well #4A.

Forest Road 57 and 416 have concreted fords at all channel crossings; all in good condition. A transmission line supported on wooden poles, crisscross the canyon bottom. While the poles themselves may not be in a potential floodplain, some have guy wires that cross the channel at low height and could hang up with debris, or might be undermined.

Frijoles Canyon

The visitor Center and adjacent facility buildings of Bandolier National Monument are located in Frijoles Canyon, about 1.5 miles downstream of the burn perimeter. Bridges (1 auto and several foot) have been pulled, and the visitor center, which is lowest in elevation has been protected with jersey barriers, sandbags and plastic sheeting. Conveyance of the channel at the Tyuonyi ruins was calculated at about 1100 cfs. Downstream of the visitor center flow of approximately 2/3 capacity of the channel was calculated at 637 cfs (USGS, 2007). In 1978, one year after the La Mesa Fire a stage about 1.7 feet higher was recorded that overtopped the channel and flooded the basement of the visitor center (Veenhuis, 2002).

Emergency Determination

There is an unacceptable risk to watershed resources due to the Las Conchas Fire, particularly in regards to life and property. Calculations of runoff from moderate and high burn severity areas were made for all the 6th code watersheds in the fire area. In most cases the calculated runoff will greatly exceed the current capacity of existing channels. Several of these watersheds contain valued resources that are determined to be within or close enough to flow paths to be at risk. A map of all 6th cod HUC watersheds in fire area is in Appendix A. Appendix B contains BAER Risk Assessment Matrix table.

Table 2 Design storm parameters

Estimated Vegetative Recovery Period, (years):	5
Equivalent Design Recurrence Interval, (years):	25
Design Storm Duration, (hours):	1
Design Storm Magnitude, (inches):	1.7"
Design Flow, (cubic feet / second/ square mile):	100
Estimated Reduction in Infiltration, (percent):	20
Adjusted Design Flow, (cfs per square mile):	~700

Landscape treatment justification above Bland Canyon Mining District

Bland Canyon has a risk of contaminating downstream water quality due to known mining history in the area. Treatable acres above the mining district were determined by slopes between 0 and 45 percent and areas of high and moderate burn severity. This exercise shows that 1100 of the 2300 acres of the watershed are treatable. If this amount of the drainage is treated it will show a measurable difference in flows available to transport contaminants downstream.

Runoff Model

Potential runoff values for watersheds affected by the Los Conchas Fire were calculated using a methodology developed by Greg Kuyumjian, USDA Forest Service (personal communication, July 2011). In equational form runoff flow (Q) is determined by:

$$Q = bciA$$

Parameters of the model are discussed below.

More than 50% of annual precipitation on the east slopes of the Jemez Mountains falls during late June and September (Bowen, 1990). Summer convectional rainfall events may yield high rainfall intensities. A 25-year 1-hour rainfall volume for the area of approximately 1.7" was used for this calculation (NOAA, 2011). Rainfall range within the burn perimeter for the 25-year 1-hour storm is 1.5-1.9 inches, table 4 displays this range for peak flows. It is anticipated that convectional storms can cover 0.5 to 5 square miles of a given watershed in any one storm event. Where these storms occur on lands with moderate to high burn severity significant runoff can be expected.

Table 3 Constants in runoff model for Los Conchas Fire

25 year 1 hour Storm Depth (in)	1.5-1.9
Coefficient	300
Bulking Factor	1.25

The method is as follows:

1. Within in each watershed calculate contiguous area of high and moderate burn severity, not to exceed five square miles. (A)
2. Use rainfall depth for the twenty-five year one hour storm from NOAA atlas 14 (i)(NOAA, 2011).
3. Apply an empirically developed coefficient of 300. (c)
4. Multiply by an additional twenty-five percent to account for post fire bulking of sediment and other debris. (b)

Calculation of discharge for contiguous high and moderate burn severity by increments of area is given in Table 4.

Table 4 discharge using minimum and maximum for the 25-year 1-hour event (1.5-1.9")

Contributing Area of High and Moderate Burn Severity	Discharge (cfs)
0.5	280-360
1.0	560-700
1.5	840-1100
2.0	1100-1400
2.5	1400-1800
3.0	1700-2100
3.5	2000-2500
4.0	2300-2900
4.5	2500-3200
5.0	2800-3600

Table 5 Results for various southern watersheds in fire area using runoff model (Using 1.7")

Watershed	Contributing Area High and Moderate (Sq. Mi.)	Discharge (cfs)
Peralta All @ Tent Rock	3	1900
Bland @ Cochiti Pueblo Boundary	3	1900
Cochiti @ Dixon's Orchard	5	3200
Frijoles @ VC	5	3200
Water	2.5	1600
Pajarito	2	1300
Upper Los Alamos Canyon @ Omega Bridge	2.5	1600
East Fork below Las Conchas	2	1300

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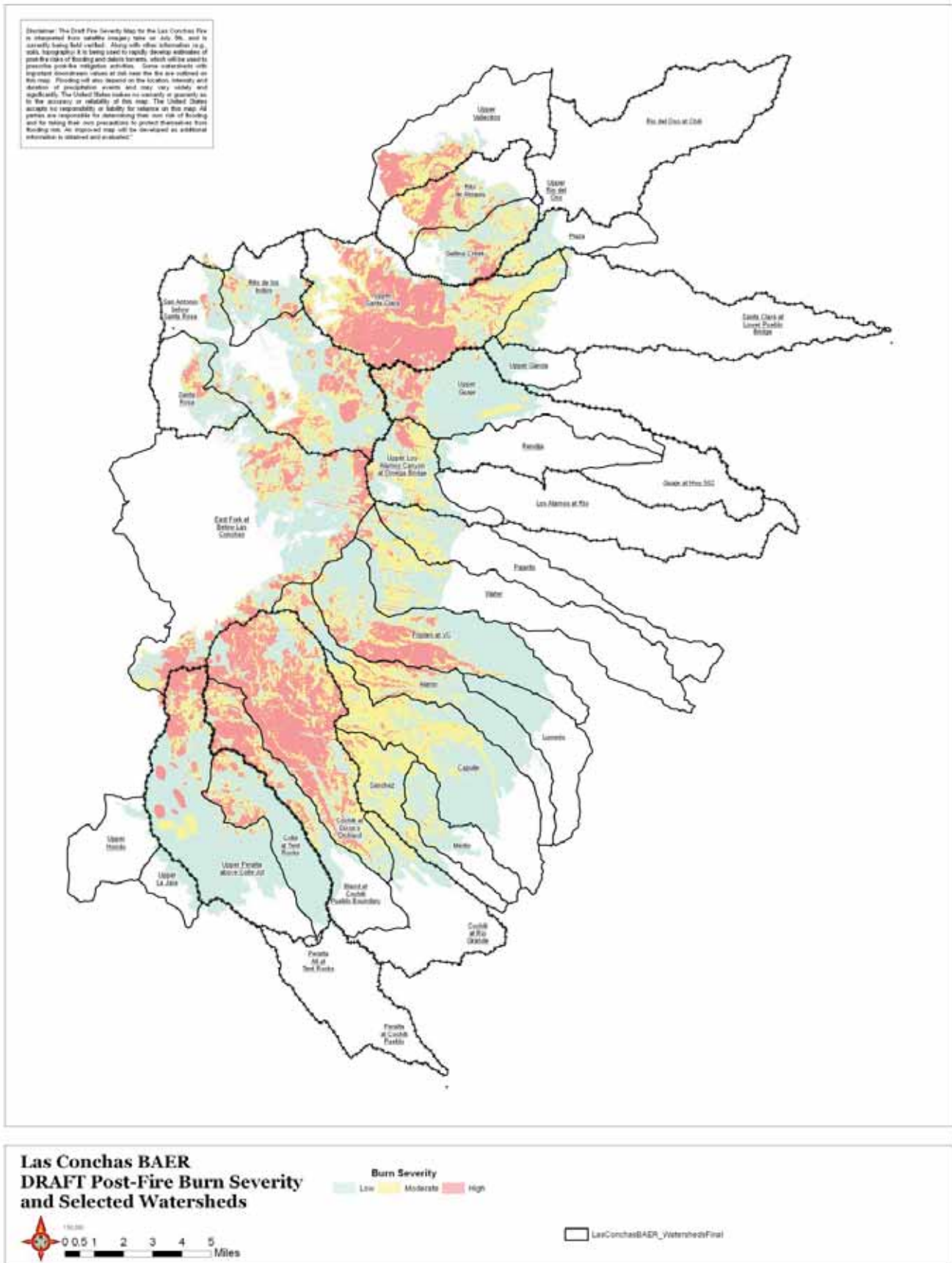
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Watershed Map and Burn Severity acreages



Sub Watershed Name	Burn Severity				Grand Total	High/Mod	%High/Mod
	High	Moderate	Low	Unburned			
Alamo	770	1900	2803	860	6330	2660	42
Bland at Cochiti Pueblo Boundary	1840	1210	1540	150	4940	3050	62
Capulin	310	3730	3430	880	9430	4030	43
Cochiti at Dixon's Orchard	7760	3720	2400	550	14480	11480	79
Cochiti at Rio Grande	9600	5400	4710	770	20860	15010	72
Colle at Tent Rocks	690	690	1850	220	5760	1380	24
East Fork at Below Las Conchas	3220	2870	3190	3250	13740	6090	44
Frijoles at VC	2360	1900	4160	1480	10760	4260	40
Gallina Creek	250	1590	1140	500	3860	1840	48
Guaje at Hwy 502	930	1080	1260	1020	7270	2020	28
Los Alamos at Rio	1430	2520	2830	1450	11200	3940	35
Lummis	0	0	1290	520	1820	0	0
Medio	20	510	1580	140	2300	530	23
Pajarito	110	100	1120	200	2430	1100	45
Peralta All at Tent Rocks	2180	1600	3570	1040	17590	3810	22
Peralta at Cochiti Pueblo	2180	1600	3570	1040	17590	3810	22
Plaza	10	510	570	370	1460	510	35
Rendija	0	20	110	70	440	30	6
Rio del Oso at Chili	730	3480	1880	640	7430	4210	57
Rito de Abiquiu	480	1880	720	130	3520	2360	67
Rito de los Indios	290	480	1070	450	2410	770	32
San Antonio below Santa Rosa	2890	3810	5210	3090	15720	6700	43
Sanchez	180	2300	1330	40	3890	2480	64
Santa Clara at Lower Pueblo Bridge	4310	6880	2330	640	14540	11190	77
Santa Rosa	430	780	540	330	2280	1210	53
Upper Garcia	10	230	210	30	1030	230	23

Sub Watershed Name	Burn Severity				Grand Total	High/Mod	%High/Mod
	High	Moderate	Low	Unburned			
Upper Guaje	930	1060	1150	960	6830	1990	29
Upper Los Alamos Canyon at Omega Bridge	500	1430	1550	400	3880	1930	50
Upper Peralta above Colle Jct	1500	940	1730	820	11820	2430	21
Upper Rio del Oso	730	3470	1860	630	7380	4200	57
Upper Santa Clara	4300	6260	1680	440	13030	10570	81
Upper Vallecitos	300	1530	220	120	2560	1820	71
Water	280	1530	1800	420	4030	1810	45

*Note that acres are subject to change due to the fact that the fire is still burning

BAER Risk Assessment Matrix

Value (life/property/resource)	Value at Risk	Probability of Damage	Magnitude of Consequences	Risk	Treatment	Notes
property	Dixon Apple Orchard/state land	Very likely	Major	Very High	Consult with NRCS and State emergency office	BAER team will help facilitate options like early warning systems. Investigate trash rack at FS boundary.
life/property	Cochiti Pueblo	Possible	Moderate	Intermediate	Consult with Pueblo, BLM	BAER team will help facilitate options like early warning systems
property	Cochiti golf course	Likely	Moderate	High	Consult with Pueblo, BLM, NRCS	
property	Pvt. Land nr. Tent Rocks	Likely	Minor	Low	Consult with Pueblo, BLM, NRCS	
property	Tent Rock facilities	Unlikely	Minor	Very Low	Consult with Pueblo, BLM, NRCS	
property	Pueblo route 85 crossing of Peralto	Possible	Moderate	Intermediate	Consult with Pueblo, BLM, NRCS	
property	Sewage lagoon at Cochiti Pueblo	Possible	Moderate	Intermediate	Consult with Pueblo, BLM, NRCS	
property	Hazardous materials in	Very Likely	Major	Very High	Consult with NRCS and State	

Value (life/property/resource)	Value at Risk	Probability of Damage	Magnitude of Consequences	Risk	Treatment	Notes
	Bland Cyn				emergency office	
property	Bland Cemetery	Possible	Major	High	contour felling and chipping	
property	Los Alamos Water Wells	Possible	Major	High	none	Flows not expected to damage buildings
property	Town of Cochiti Lake	Unlikely	Minor	Very Low	None	
property	San Ildefonso	Possible	Moderate	Intermediate	Consult with Los Alamos County	
property	Los Alamos wastewater	Unlikely	Moderate	Low	None	
resource	Capulin Cyn Cutthroat	Very Likely	Major	Very High	Consult with NPS and USFWS for possible extraction	
property	FR 89 in Cochiti Cyn	Very Likely	Moderate	Very High	Closure and flood proof	
property	FR 268 in Bland Cyn	Very Likely	Moderate	Very High	Closure and channel clearing up and down stream of bridges and flood proof.	Investigate trash rack above CCC bridge
property	Cochiti at Rio Grande	Possible	Minor	Low	Consult with BOR, NRCS	Investigate boom at mouth of Cochiti
property	Bland Historic Structures	Unlikely	Moderate	Low	none	
resource	Cutthroats at	Likely	Major	Very High	Saw no water	

Value (life/property/resource)	Value at Risk	Probability of Damage	Magnitude of Consequences	Risk	Treatment	Notes
	Cochiti on Rio Grande				in stream, little indication of perennial flow out of canyon	
Life/property	Ice Rink in Los Alamos Canyon	Likely	Major	Very High	Los Alamos County is breaching the dam above	
Life/property	Los Alamos Dam	Likely	Major	Very High	Los Alamos County is breaching dam	
property	LANL gas line	Likely	Moderate	High	LANL is taking measures to protect pipe.	
property	NM State Highway 4	Unlikely	Moderate	Low	NMDOT is aware of risks	
property	Pvt. Property on EF Jemez River	Unlikely	Minor	Very Low	none	
Life/property	Visitor Center and historic district at Bandelier	Very Likely	Major	Very High	Consult with Park Superintendent	Park has instituted options such as early warning systems, evacuations of moveable resources, closures, and point protection.
Property	Bandelier ruins (Tuyonyi Pueblo and Big Kiva)	Unlikely	Moderate	Low	Consult with Park Superintendent	
property	West Road Bridge on Los Alamos Canyon	Very Likely	Major	Very High	Closure by NMDOT	

APPENDIX H: STRUCTURAL OBSERVATIONS AND RECOMMENDATIONS

Las Conchas Fire Bandelier National Monument, New Mexico Structural Observations and Recommendations for Bandelier Visitor Center

July 2011



Looking South at Garden area and Portale of Original Visitor Center.

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**National Park Service
Vanishing Treasures Program**

Introduction:

The Los Conchas Fire, which began on June 26, 2011, destroyed much of the vegetation in the upper watershed above the Visitor Center for Bandelier National Monument. Due to concerns from flooding resulting from the lack of vegetation in watershed above the Visitor Center, Park Staff requested an evaluation of the potential impacts to the Visitor Center from anticipated flood events. Of particular concern is the recent theater addition on the western corner of the existing structure. There is a very real possibility that potential flooding in Frijoles Canyon will cause damage to the visitor center, especially the Theater Addition. On July 11, 2011, Preston Fisher, Structural Engineer with the NPS Vanishing Treasures Program, inspected the Visitor Center to identify potential problem areas and identify areas to observe and monitor for potential damage.

Observations and Recommendations

General Conditions:

The NPS All Hazard Incident Management Team has overseen the installation of sandbags and plastic barriers around the west and south ends of the building to protect from flooding and debris that could potentially be washed down Frijoles Canyon and cause damage to the building. The Park has been temporarily closed and the Visitor Center has been armored with plastic and plywood to further protect the structure from water and debris flows.

Due to the fact that the new addition is constructed from different material and the foundations for the addition are different the addition will react differently to changing conditions from flooding than the original visitor center and museum. The expected flood events range from low volume flooding that may only saturate the soil beneath the foundations and walls to extreme flood events that could wash away soil adjacent to the structure, undermine the foundations, and topple portions of the building.

After each flood event a comprehensive inspection of the structure should be conducted. Any areas where the new addition is attached to the historic structures should be inspected, looking for any signs of separation indicating the new addition is moving, which may affect the stability of the historic structures. Any separation greater than ¼ inch visible on the surface may indicate that the new addition is beginning to separate from and damage the original historic structure it is attached to. At that point a determination needs to be made whether to try to repair or sever the connections. Foundations and lower wall areas need to be inspected for erosion and degradation as well.

This report will identify areas to observe and monitor in the event that the addition is spared from catastrophic flooding, but is subjected to lower level flooding that may affect the foundations and other portions of the building.



Figure 1. Looking Northwest showing sandbagging and armoring.

Exterior Observation Points

On the date of this inspection several areas of minor cracking in the theater addition were observed. These could be attributed to differential settlement and thermal expansion/contraction that is fairly common when newer construction materials and techniques are utilized to connect modern structures to historic structures. The more obvious areas were photographed and can be utilized as observation points to determine to settlement is affected by future flood events.



Figure 2. Southeast wall of Theater showing minor cracking.

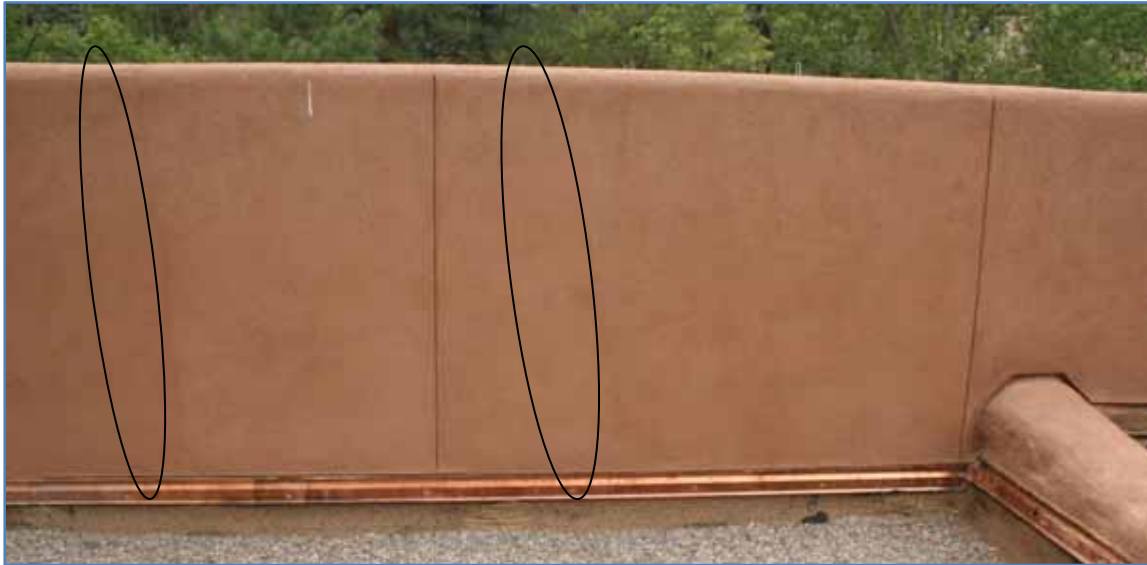


Figure 3. Southeast wall of Theater showing minor cracking.



Figure 4. Southeast wall of Theater showing minor cracking.

A caliper measurement point was etched into the stone on each side of an existing crack at the northwest end of the Portale, directly above the existing light fixture (Figure 5). The initial measurement was 75 mm. This measurement point should be checked after each catastrophic flood event to determine if any movement has occurred. The marks are located on the third course down from the top and look like this
├┤.



Figure 5. Caliper measurement point on Northwest end of Portale.

Interior Observation Points

There is some plaster loss and separation along the northeast wall of the portale that may be associated with settlement from the theater addition roof resting on top of the portale wall (Figure 6). Although it might be likely that this wall was constructed with a slight bulge, establishing a baseline vertical profile of this wall would help determine if any movement of this wall in the future. A plumb bob measurement point should be established on the southwest side of the portale wall (now the interior wall of the theater). A plumb bob can be suspended from a viga near the location of the spalling plaster on the opposite side of the wall and measurements taken from the stringline back to the wall at 1 ft. or 20 cm increments

establish the current vertical profile of the wall at this point. This should be remeasured annually to determine if the wall profile is changing which would indicate settlement of the theater addition.



Figure 6. Plaster loss on northwest wall of Portale.



Figure 7. Northeast interior wall of theater addition showing profile of original exterior portale wall. Note apparent bulging.

Most likely any potential movement due to potential flooding and/or soil moisture changes will be evident at points where the addition adjoins the original structure or on the taller exterior walls of the theater addition. Several photos have been included in this report to establish baseline conditions to compare any potential future movement with.



Figure 8. Northwest end of theater wall adjoining original portale wall.



Figure 9. Southeast corner of addition.



Figure 10. Southeast end of southwest wall of theater addition.



Figure 11. Northwest end of southwest wall of theater addition.



Figure 12. Closeup of wall and the beam closets to the southeast end of the southwest wall of the theater addition.



Figure 13. Closeup of wall and the 2nd beam from the southeast end of the southwest wall of the theater addition.

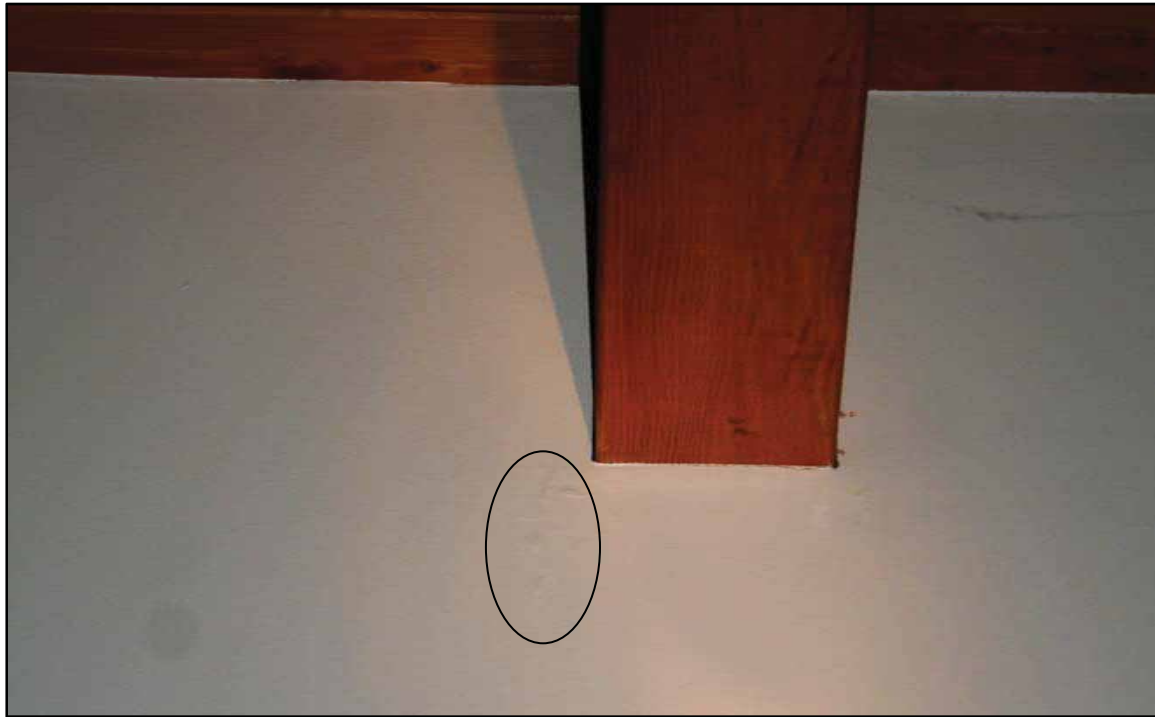


Figure 14. Closeup of wall and the 6th beam from the southeast end of the southwest wall of the theater addition. Note “bubbling” below beam.



Figure 15 Photo of hall (Room 119) wall intersection with Theater (Room 112) showing minor separation at corner.



Figure 16 Locations of interior observation and monitor points.

The locations of the interior photo observation/monitor points, the proposed plumb bob monitor point, and the caliper monitor point are shown in Figure 16. The minor cracking noted on the upper exterior walls in photos 2, 3, and 4 should be visually monitored after catastrophic flood events or annually for any enlargement of the thermal cracking present. The basement and adjacent to the southeast portion of the theater addition and the crawl space beneath the theater should be inspected after each flood event to determine the amount of water that has seeped under the foundations. Structural recommendations are listed in priority order in Table 1.

Table 1. Structural Concerns and Recommendations for Atsinna Ruin

Area	Recommendations
Theater – Southwest wall	Monitor intersections of beams and upper walls for cracking
Theater –Northeast wall	Establish vertical profile – monitor after each flood event or annually
Portale-Northwest exteriorl	Monitor caliper measure point annually
Theater – upper exterior southeast walls	Visually monitor cracking annually
Foundations/basements/crawl spaces	Visually monitor after each flood event

APPENDIX I: EARLY WARNING

Proposed Locations for Early Warning Rainfall and Streamflow Gauges – Rito de los Frijoles

Locations

Rainfall gauges

- On promontory close to Highway 4 and north of Apache Springs
- Near overlook above the part of Frijoles Canyon known as ‘The Forks’ – access via trail from Highway 4.
- On north rim of Mesa del Rito approximately above Upper Crossing – access via trail from FR287.
- On Obsidian Ridge south of Upper Upper Crossing – access via trail from FR287.
- On Burnt Mesa near Burnt Mesa Canyon – access from Burnt Mesa Trailhead on Highway 4.

Streamflow/Rainfall gauges

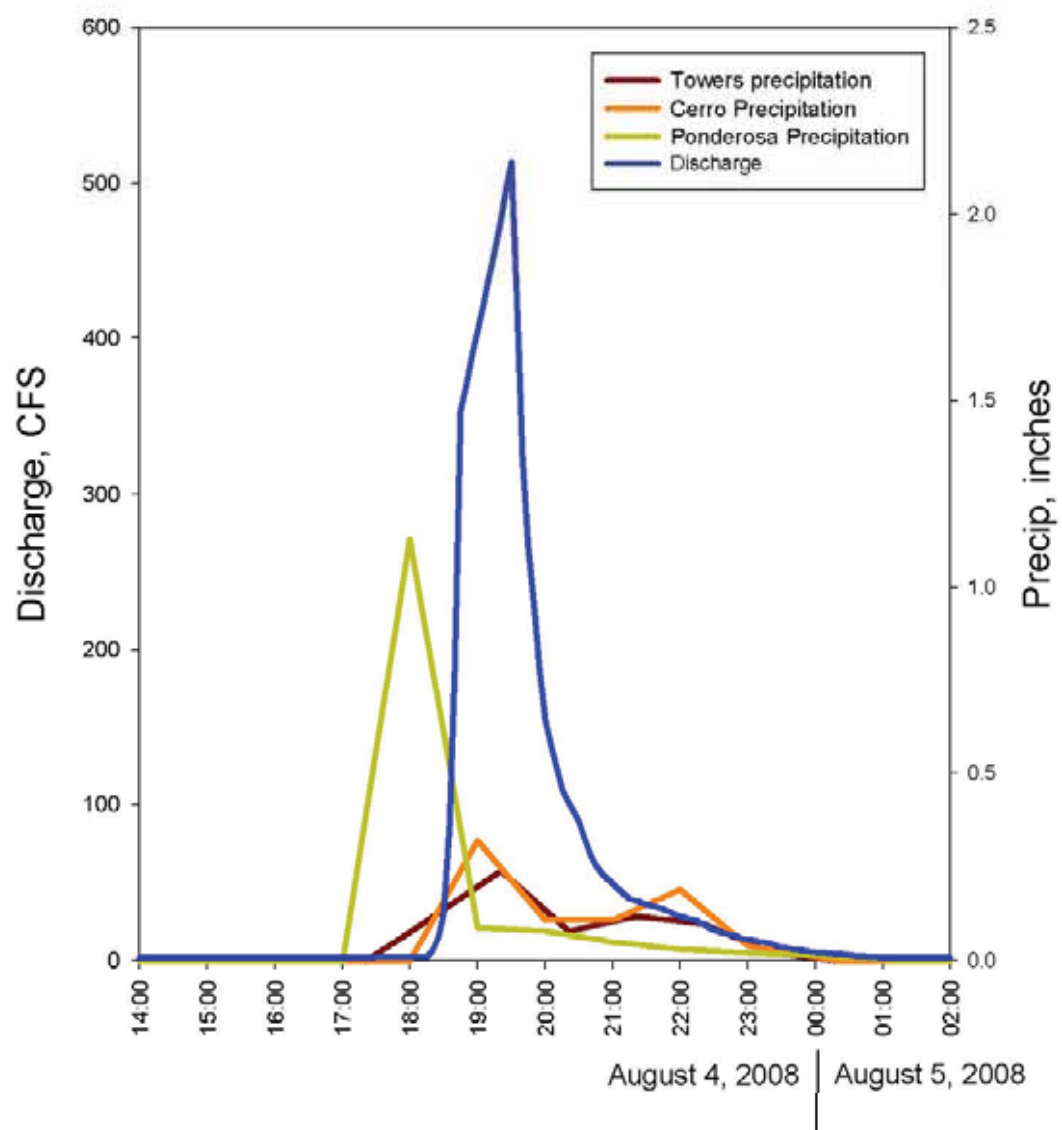
- One quarter mile upstream from Upper Crossing. Access via trail from Ponderosa Campground.
- Approximately one mile upstream from Alcove House – access via trail from Park Headquarters.

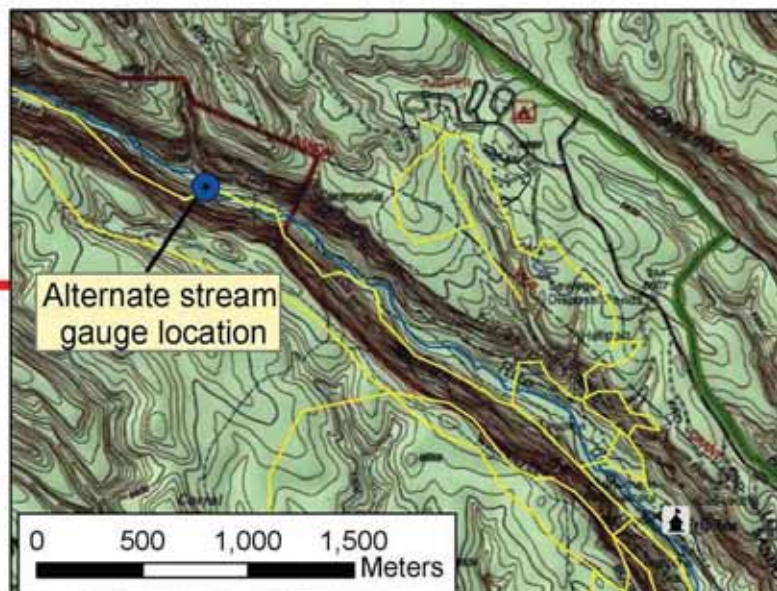
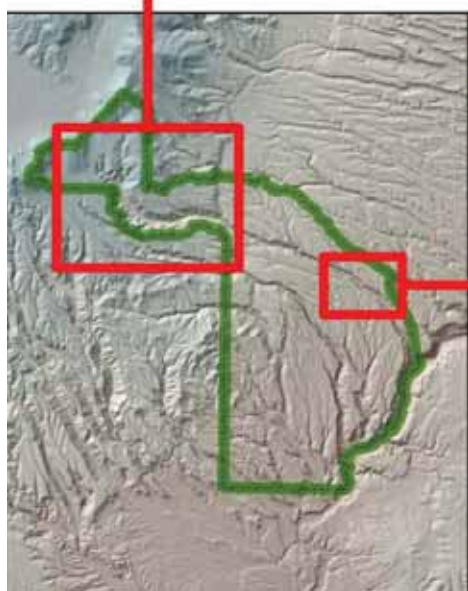
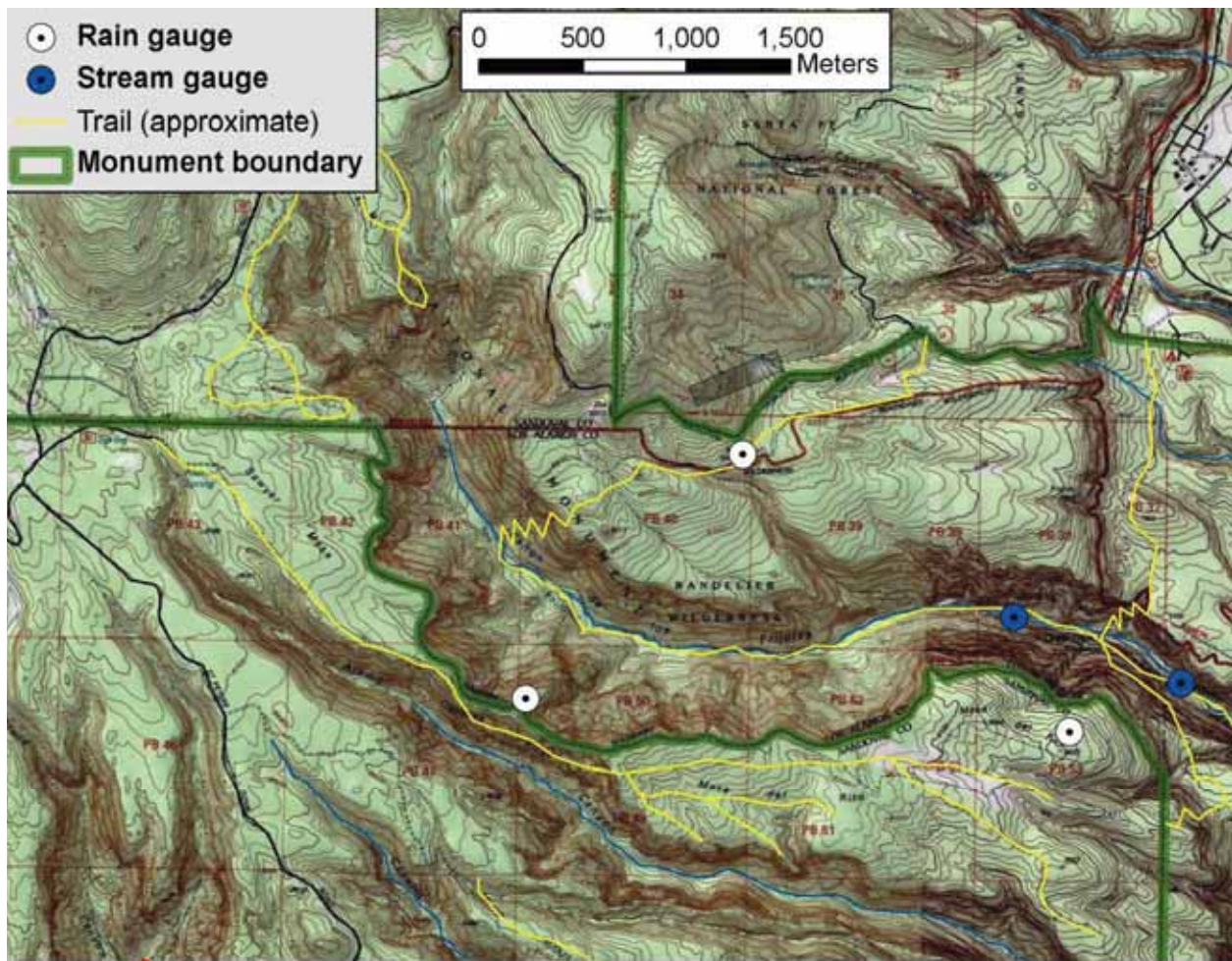
Locations provided are approximate and exact gauge sites should be determined through site reconnaissance.

Site selection criteria

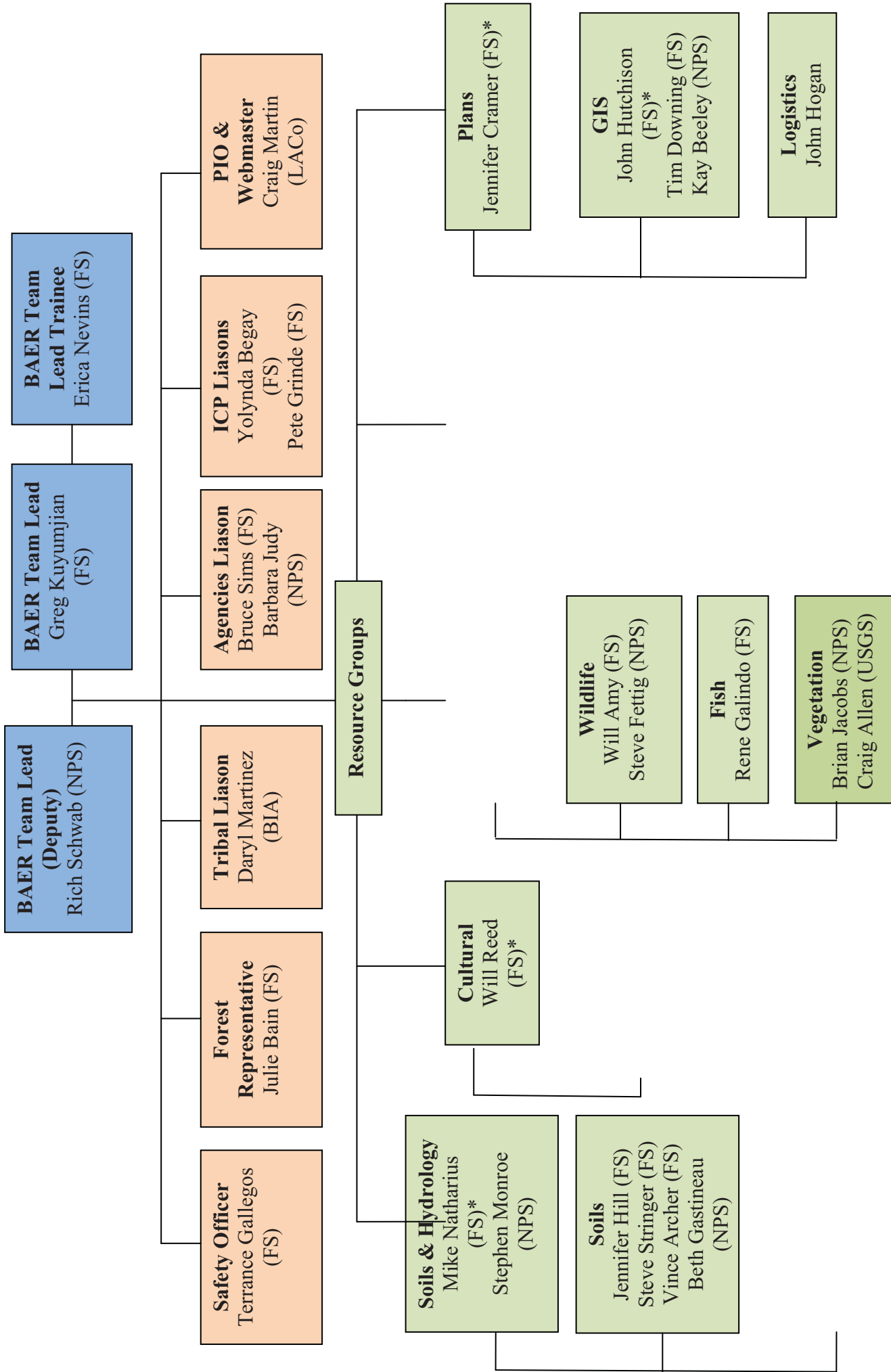
- Coverage
 - The rainfall gauges should thoroughly cover the moderate/high intensity burn area. We show circular coverage polygons for one, three, and five square mile areas around each gauge. Storms one square mile or smaller may occur in gaps between the gages, but unless they are very high intensity they will probably not produce large runoff events.
 - The streamflow gauges should be located near or below the lower end of the moderate/high intensity burn area and near the lower end of the Narrows. These gauges should be far enough upstream to provide sufficient time between when flood surge passes gauge and when it arrives at Park Headquarters. Travel time estimates for a flood surge to move between Upper Crossing and the populated area are 0.5 to 1.0 hour. Flood travel times will vary depending on storm intensity and magnitude.
- Redundancy – It is extremely important a critical warning is not missed due to failure of a rainfall or streamflow gauge.

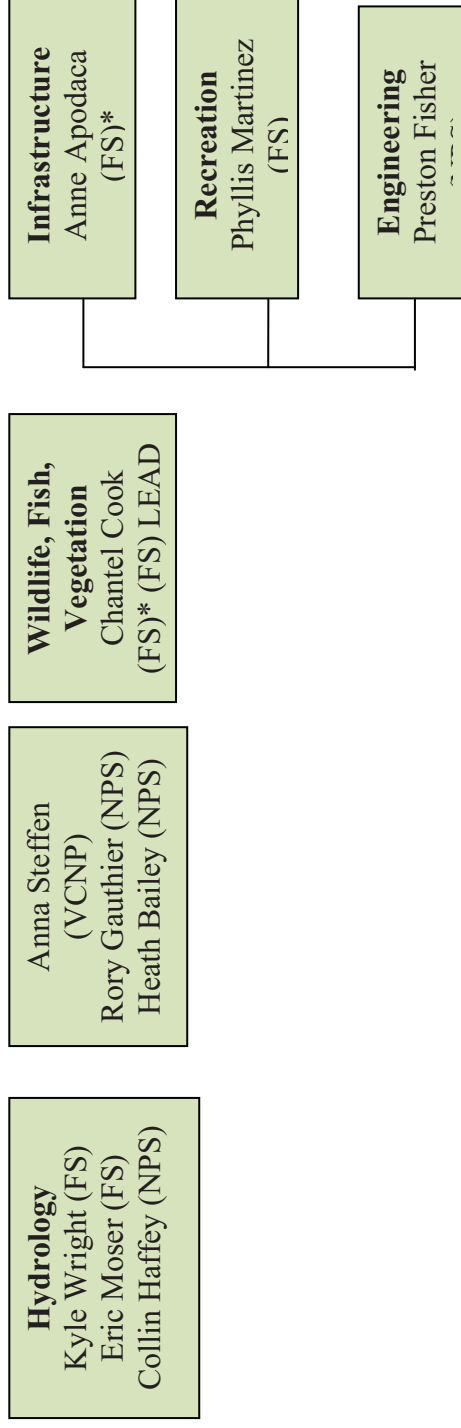
-
- Two streamflow gauges will be located near Upper Crossing, in the lower portion of the moderate/high intensity burn area. One will be about one quarter mile upstream from the trail crossing and the other will be about one quarter mile downstream. There are two gages located in this critical area as a measure of caution providing backup in the case of failure or damage to one of the gauges.
 - The streamflow gauge upstream from Alcove House will provide a back-up in case failure occurs at the Upper Crossing gauges, in the event of a debris flow in the Narrows section of the canyon, or if a flood event is generated by an intense storm on Escobas Mesa.
 - The streamflow gauge downstream from Upper Crossing is co-located with a rainfall gauge. This rainfall gauge will provide canyon bottom rainfall data and redundancy with the rainfall gauge located on Mesa del Rito.
 - Access – For ease of installation and maintenance rainfall and streamflow gauge sites should be close to developed roads or trails.





APPENDIX J: COMBINED US FOREST SERVICE – NPS ORGANIZATION





APPENDIX K: SHORT-TERM RE-ENTRY PLAN FOR FRIJOLES CANYON

Bandelier National Monument

Bandelier-Las Conchas Fire Recovery Administrative Use of the Historic District Safety Plan*



***Interim Operational Plan**

Operational Period: August 8, 2011 – October 31, 2011



PARK: Bandelier National Monument

Date: August 4, 2011

Prepared By: National Park Service Intermountain Incident Management Team

Approved By: _____ **Date:**

Jason Lott, Superintendent, Bandelier National Monument



INTRODUCTION TO INTERIM OPERATIONAL PLAN

On 7/22/2011, the Intermountain Incident Management Team presented a DRAFT Administrative Use of the Historic District Safety Plan to the BAND Management Team, including a detailed assessment of alternatives in the following areas:

- 1.** Core operational hours for employees working administratively in the Historic District.
- 2.** Vehicle parking.
- 3.** Employee accountability.

Based on input from the Management Team, the fiscal requirements associated with implementing other operational alternatives, the desire to field test alternatives and the need to meet the primary objective of implementing a viable employee safety plan, this Interim Operational Plan will be in force through October 31, 2011.

For reference, the assessment of alternatives for Vehicle Parking and Employee Accountability Systems from the DRAFT Administrative Use of the Historic District Safety Plan are referenced as Appendix 3 in this Interim Plan.



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PURPOSE OF THE PLAN

To provide the framework to support the administrative use of the offices within the Historic District of Frijoles Canyon with the primary objectives of providing for employee safety and accountability. Work that might be performed outside the historic district is not addressed in this plan.

Bandelier Management is currently pursuing options to address outside use by staff and researchers. Until appropriate mitigation factors are implemented, Frijoles Canyon is considered a closed area and entry is allowed only with Management Team approval of stated purpose to enter.

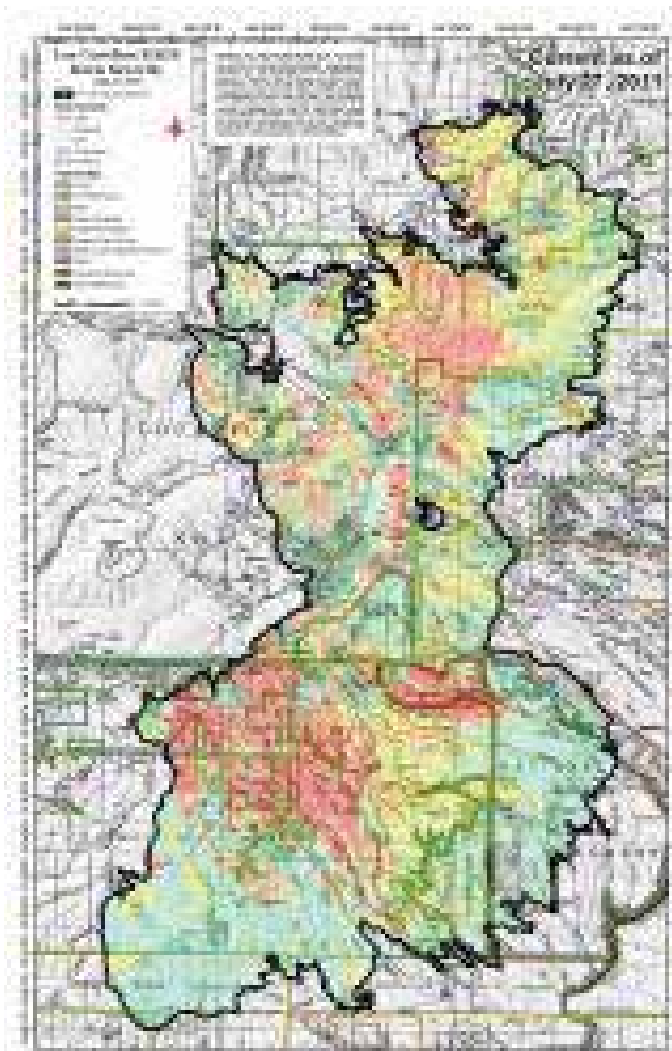
PLAN OBJECTIVES

1. Identify target personnel covered by the plan
2. Establish the functional jurisdiction of the plan
3. Provide an assessment of alternatives framework for employee accountability
4. Identify early warning methodology and precedence
5. Establish thresholds and triggers for emergency actions
6. Develop the Emergency Action Plan, to include:
 - a. Notification procedures, redundancy, and responsibilities
 - b. Emergency parking plan
 - c. Emergency egress procedures
 - d. Staff accountability
 - e. Redundant egress routes and shelter in place contingencies
7. Define post emergency action canyon re-entry criteria and responsibilities
8. Establish pre-planning training and preparedness requirements and metrics



INTRODUCTION AND BACKGROUND

The Las Conchas Fire started on June 26, 2011 quickly becoming the largest wildfire in New Mexico history. In the first burn period alone, the fire burned 43,000 acres along the southern exposure of the Jemez Mountain Range and over the next two weeks significantly reduced and, over large areas, eliminated the vegetative cover over much of the Jemez range and the headwaters of the canyons within Bandelier National Monument, the eastern flanks of the Valles Caldera, and the headwaters of Santa Clara Canyon. In all, sixty percent of Bandelier National Monument burned.



The threat of flash flooding is a recurring seasonal concern during the summer monsoon period. The widespread loss of vegetative cover after the Las Conchas Fire significantly increases the potential for runoff and stream flow to levels that could threaten park structures and related infrastructure within the Frijoles Canyon Historic District, employees whose offices are in the District, and parked vehicles. At some levels of flooding, escape routes would be compromised.

The findings of The Las Conchas Fire Burned Area Emergency Response (BAER) Team



supported the concern that the more immediate impacts of the fire is the flash flood potential. The BAER Las Conchas Post-Fire Response plan cites historical data to support this concern. Following the La Mesa Fire in June 1977, the stream in Frijoles Canyon flowed thirty two times its normal seasonal rate destroying 23 trail bridges, altering the stream course, and depositing three feet of silt behind the administrative buildings.

After being significantly burned during the Las Conchas Fire, Santa Clara Canyon received .3" to .5" of rain precipitating a flash flood. The post flood evaluation discovered 13 mud flows with evidence of 6 – 7 foot flows on standing trees.

During the fire, all personnel were evacuated from Frijoles Canyon, including all employees residing within the Canyon. In addition to park housing, 60% of the Monument's critical office space is located within the Canyon. In the interim, park offices have been moved to other locations. Employees are crowded into mesa top office space and some telecommuting takes the pressure off of what is now very limited space. The ability to meet on-going management responsibilities is compromised. To continue operating without the Frijoles Canyon office space would require a large and, potentially, long term investment in modular offices and IT infrastructure. In addition to these types of investments, there are long term morale concerns associated with displacing employees.

Consequently, the goal of this plan is to facilitate the re-occupation of the Canyon offices for administrative purposes to preclude the need for investment in alternate office infrastructure. However, employee health and safety and operational risk management will drive all decisions.

EXPOSURE

As exposure increases, so does risk. Therefore, it is the intent of this plan to effectively control exposure by limiting the number of people and vehicles within the threat area.



Reviewing the Bandelier organization chart for those that may need to utilize office space in the Historic District, it appears that as many as 30 administrative positions could be working in the Canyon during core hours.

It is possible that each of these individuals could be utilizing their own privately owned vehicle or arriving in government owned vehicles. Considering the number of people with offices in the historic district, the potential for others conducting casual business, and persons requiring parking for work outside the historic district, the potential exists that up to 40-45 cars will have to be accommodated.

Parking

Options for parking take into account that the more that people are physically in the Canyon the higher the level of exposure to an impending emergency situation. The more efficiently the staff is able to evacuate the Canyon quickly, the more the risk exposure decreases.



Assessment of Vehicle Parking Options

Preferred Alternative: POV/GOV's allowed in Canyon

Requirements:

- Employees driving to work and using GOV's at work will exchange their POV for their GOV on the Mesa Top
- Parking on North Side of Admin Lot
- Interim Traffic Pattern will be against regular flow of traffic in canyon
- Drivers will be required to back into parking spaces
- A designated parking area will be established for non-employees conducting casual business at offices located in the Historic District. These individuals will need to check in at the Admin Building and be met by the employee with whom they have business. BAND will develop an emergency situation handout for these individuals describing the flooding risk and evacuation procedures
- A designated parking area will be established for employees parking in Frijoles Canyon but working outside of the Historic District, i.e. backcountry field work. In addition to parking in the designated area, these vehicles will display a BAND placard with the following information:
 - Names of **all** employees associated with the vehicle
 - Dates for entering and exiting the canyon
 - General work location

Advantages	Disadvantages
Employee Acceptance	Increased Exposure to Risk
Increased Flexibility: employees could come and go when needed	Increased Potential to Motor Vehicle Accidents during evacuations
Facilitates Egress: vehicles close at hand	Potential for Loss of Personal Property (requiring vehicles to be unlocked with keys inside)
	Spaces in North Lot about 30



Work Shifts

Since it is most likely that monsoonal flows will occur in the late afternoon to evening hours, the work shift for the administrative staff will be modified to allow for early morning access to the Canyon at 0700. Core work shift hours are established from 0700 to 1730 for employees working in Frijoles Canyon.

Before being granted access to the Canyon, employees must receive training on evacuation signals, notification methods, rally points, and parking procedures. To decrease the level of exposure to non-NPS individuals that may have a need to access the Canyon such as, visiting the Human Resource office, management should consider relocating offices that may create a higher level of risk to those that have not been trained on evacuation processes to the mesa top or other locations.

ACCOUNTABILITY

In the event of the need to either evacuate or to stage to evacuate the Canyon offices, employee accountability is the critical element in providing for safety and is, therefore, the critical component of this plan.

Accountability in any circumstance is a balance between system efficacy and the impacts to employees governed by the system. The need for knowing who is in the Canyon in the event of a rapidly developing threat places a greater emphasis on system efficacy. A system which delays accountability not only places employees working in the Canyon at risk, it places the Visitor and Resource Protection Rangers at greater risk in their efforts to ensure that all employees are accounted for.

Common requirements for any accountability systems are:

1. Obtaining buy in from the staff
2. Consistent and rigorous supervision of the system at all levels
3. Training and monitoring
4. Limiting exposure outside of core hours, weekends, and off season
5. Employee vehicle registration will continue



Employee Accountability System

Preferred Alternative: Manned Contact Point, Monday – Friday, year round¹

Requirements:

- Contact station located at the existing mesa top gate on the Entrance Road
- Station will be manned as long as persons are entering and until the last person exits the Canyon. Core hours established as 0700 – 1730 Monday thru Friday.
- All employees (drivers and all passengers) will be recorded along with their vehicle information and office location
- All employees will be checked both entering and exiting the Canyon
- Random audits will be conducted to ensure compliance and accountability

Advantages	Disadvantages
High accountability	Investment in infrastructure ²
High compliance	Investment in personnel
Positive check in and check out with a written record	Backup plans and contingencies for off hours and weekends
Established clearing point at a controlled access location	Employee dissatisfaction
	Job burnout of a position with high importance and low reward

¹ The BAND Resource Management Staff will consult with hydrology SMEs in an effort to develop some seasonality criteria for this plan.

² Will require some type of facility with HVAC, traffic protection, and protection during lightning



CRITICAL THRESHOLD METHODOLOGY

Next to an effective accountability system, an effective and redundant early flood warning alert system is critical to this safety plan. Three current redundant alert systems and one pre-alert forecasting system will be implemented and maintained. The metric for success target will be to provide the park staff with at least 30 minutes advance warning prior to an event reaching the Historic District.

Plan note: At the time of this writing the park is developing a multi-point stream flow monitoring and alert system for Frijoles Canyon. Once that system is implemented and tested it will become a fourth redundant alert system.

Pre-Alert forecasting: Park staff should routinely monitor the NWS forecast for Los Alamos, NM with special attention to the Hazardous Weather Conditions Forecast. <http://forecast.weather.gov>. Enter Los Alamos, NM. All warnings will be posted in this section. See example.

Flood Advisory

FLOOD ADVISORY

NATIONAL WEATHER SERVICE ALBUQUERQUE NM
242 PM MDT WED JUL 20 2011

NMC028-039-043-202345-
/O.NEW.KABQ.FA.Y.0056.110720T2042Z-110720T2345Z/
/000000.N.ER.000000T0000Z.000000T0000Z.000000T0000Z.OO/
LOS ALAMOS-RIO ARriba-SANDOVAL-
242 PM MDT WED JUL 20 2011

THE NATIONAL WEATHER SERVICE IN ALBUQUERQUE HAS ISSUED AN

* ARROYO AND SMALL STREAM FLOOD ADVISORY FOR...
WESTERN LOS ALAMOS COUNTY IN NORTH CENTRAL NEW MEXICO
SOUTH CENTRAL RIO ARriba COUNTY IN NORTH CENTRAL NEW MEXICO
EAST CENTRAL SANDOVAL COUNTY IN NORTH CENTRAL NEW MEXICO

* UNTIL 545 PM MDT

* AT 241 PM MDT NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED
HEAVY RAIN IN A DEVELOPING THUNDERSTORM NEAR THE LAS CONCHAS BURN
SCAR.



Alert System 1: NOAA/NWS <http://forecast.weather.gov> severe weather alert advisory system. The NWS will issue watch, advisory, and warning notifications (representing increasing levels of severity in that order). The park will implement the following redundant NWS alert measures:

- Park Management will identify critical park staff to subscribe to the Interactive NWS (iNWS) automatic alert system to receive automatic text and email alerts <http://inws.wrh.noaa.gov> . Park Management will identify a polygon for an area with the potential for Frijoles Canyon flooding
- Park Management should explore the possibility of having Los Alamos County Dispatch subscribe to the iNWS alert system and then contact any on duty ranger of an alert affecting Frijoles Canyon
- Park should consider having the VRP Program Assistant as an additional iNWS point of contact

Alert System 2: KOAT TV active radar koat.com. In the event of either a NWS alert or if park staff observe severe weather development, active radar can be monitored for the monument via this website.

Alert System 3: Staffed lookout positions. Park staff will be stationed at strategic locations to be able to observe weather development and rain in the areas with the potential for impacting Frijoles Canyon.

- Monitors will have radio communications with on duty VRP staff
- Monitors will receive training on what to watch for, descriptive terminology to use, and personal safety
- Monitors will record weather information (see attached)

EVACUATION PROCESS

When the need for an emergency action is identified, the VRP Chief Ranger or designee is responsible for determining the appropriate action level.

In order to facilitate a timely evacuation it is critical to understand when to evacuate. There is a 3 staged approach to begin the evacuation process.



BAND personnel are directed to follow the alert guidelines of the National Weather Service in conjunction with maintaining the lookouts that are already in place.

Stage 1:

The 1st stage is notification of a **FLASH FLOOD WATCH** alert from the NWS or a call from the lookouts that light to moderate rain is continuously falling in the Canyon.

A **WATCH** means that hazardous weather is possible.

STAGE 1 Flash Flood WATCH Level Notification. At this level, park staff will be notified via:

- A general radio notification.
 - *"Attention all BAND Staff, stand by for an emergency notification. The park is now under Stage 1 Evacuation Preparedness. All personnel in the Canyon should remain in the Historic District and be prepared to evacuate on further notification." Repeat.*
- A phone paging notification.
- All staff email alerts
- NO siren will be sounded.

Employee Actions:

All personnel in the Canyon should

- Begin to gather what they might need to be able to evacuate if further notification is received
- Be aware that conditions are present that could rapidly change requiring a further course action in a short period of time
- Gate should begin to limit access to the Canyon to non-NPS personnel



- Employees should remain in the Historic District where they can easily hear the Evacuation siren

In Stage 1, the Incident Commander is identified and general staff are stood up.

STAGE 2:

The 2nd stage is notification of a **FLASH FLOOD ADVISORY** alert from the NWS or a call from the lookouts that moderate to heavy rain is continuously falling in the Canyon. An **Advisory** means conditions are less serious than a stage 3 Warning but cause significant inconvenience and could lead to situations that may threaten life or property.

Stage 2 Advisory Level Notification

- Siren will be sounded³
- A general radio notification.
 - *"Attention all BAND Staff, stand by for an emergency notification. The park is now under Stage 2 Mandatory Evacuation. All non-mission critical personnel in the Canyon will proceed immediately to the pre evacuation staging area."*
Repeat.
- A phone paging notification.
- NO email notification.

Employee Actions:

All personnel in the Canyon should:

³ Currently this siren will be a VRP patrol car emergency siren. The monument has ordered a stationary manual siren for the Historic District. Once that is in place, it will serve as the emergency alert siren.



- Gather personal belongings
- Immediately proceed to the staging area in front of the Administrative Building

An **Advisory** means that all non-mission critical staff is required to evacuate the Canyon immediately. Non-mission critical is defined as:

- Anybody in the Canyon performing administrative duties
- Office work
- Research activities
- Resource activities
- Maintenance turning off the lift station and emergency generator

Personnel should assemble by workgroup at the staging point in front of the Administrative building. After verifying everybody in their party is accounted for should proceed to their vehicles and evacuate the area immediately. All evacuated personnel will assemble at the Rally Point at the top of the Mesa Maintenance Building to be accounted for.

At Stage 2 notification, Bandelier staff will implement ICS.

Stage 3:

The 3rd stage is notification of a **FLASH FLOOD WARNING** from the NWS or extremely heavy continuous rain being observed in the Frijoles Canyon by the lookouts. A **Warning** means that weather conditions pose a threat to life or property.

Stage 3 Warning Level Notification

- Siren will be sounded⁴
- A general radio notification.

⁴ Currently this siren will be a VRP patrol car emergency siren. The monument has ordered a stationary manual siren for the Historic District. Once that is in place, it will serve as the emergency alert siren.



- *"Attention all BAND Staff, stand by for an emergency notification. The park is now under Stage 3 Mandatory Evacuation. All personnel in the Canyon will proceed immediately to the Mesa Top Rally Point." Repeat.*
- A phone paging notification.
- NO email notification.

Employee Actions:

All personnel including mission critical need to:

- Assemble at the staging point in front of the Administrative building
- Account for everyone in their party
- Immediately begin the evacuation process

Mission critical are those employees that may be performing essential duties such as:

- Maintenance performing shut down of equipment and final sandbagging efforts
- LE's performing a sweep of the Historic District and Park entrance road

All evacuated personnel need to meet at the Mesa top Rally Point at the Frijoles Canyon Checkpoint Gate for evacuation accountability check in.

At Stage 3 notification, if ICS has not already been completed, implement ICS.

IMPLEMENTING ICS

Upon initiation of evacuation procedures, Bandelier staff will implement the ICS. The ICS positions will be implemented as required.



POST INCIDENT ACTION

Following an evacuation, the Incident Commander will determine if and when to restore administrative operations in the Canyon. During a normal monsoonal period, this determination may have to be made repeatedly. A number of factors will have to be evaluated towards this determination.

1. Did the Canyon flood or not and, if so, was the event significant enough to warrant staying out of the Historic District.
 - a. Even if the water level in the Historic District is not significant, park management will have to evaluate the possibility that a debris dam could exist upstream.
2. Did the rain event contribute to ground saturation which could increase the impacts of subsequent rain event and the potential for flooding.
3. Damage to facilities and infrastructure.
4. Employee morale.

Evaluating the potential for upstream threats without placing staff at risk is a challenge. The two cameras located in Frijoles Canyon, while helpful in remotely evaluating conditions at the Historic District, will not provide information on conditions upstream.

Stream flow monitors in Frijoles are data loggers, but cannot provide information remotely. Placing staff at risk to either download the loggers or to sweep the Canyon for obstructions are not options. Over flights may be the only safe option.

Post evacuation employee notification

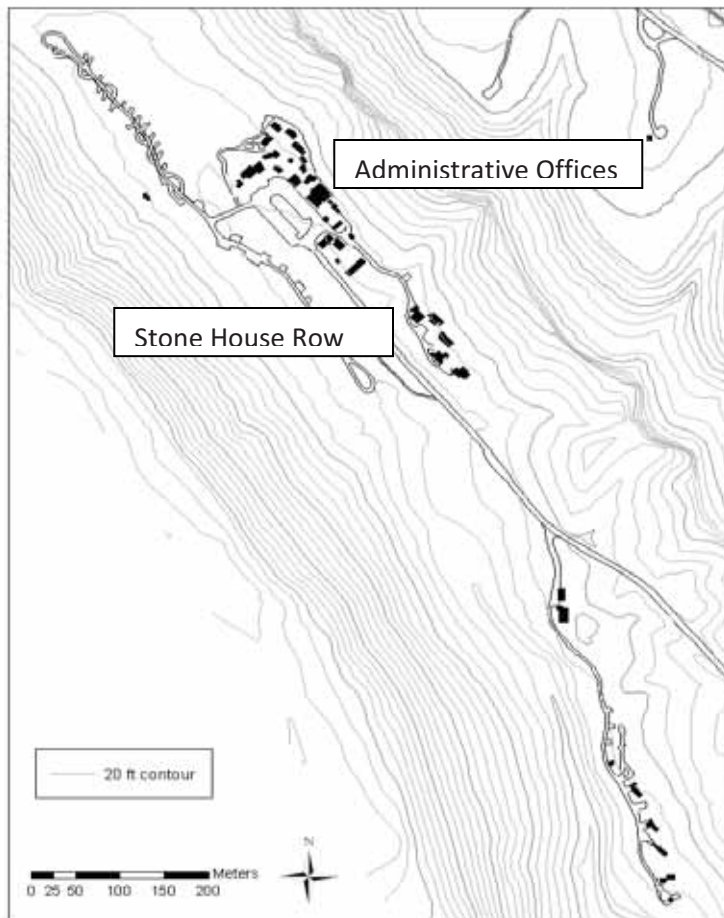
The IC will notify the staff as to whether to return to the Canyon the following workday by posting a notification on the BAND Employee Information Line 505-672-3861 Ext 585.



CONTINGENCY PREPAREDNESS

SHELTER IN PLACE

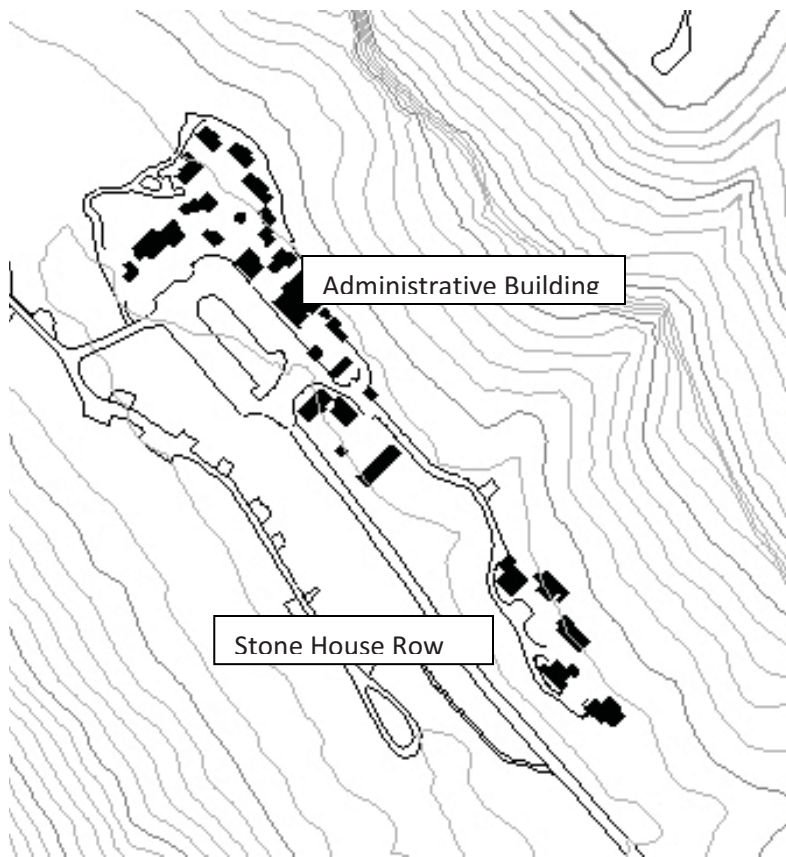
Park Management will establish a shelter in place redundancy in the event that conditions or unforeseen emergencies could preclude a complete evacuation of the Canyon. The designated shelter in place area is the Stonehouse Row Housing area in Frijoles Canyon.





The park will cache appropriate shelter in place emergency provisions and should consider temporary sanitation. Given the point protection at the road leading to the maintenance area, access to the designated shelter in place

area must be through the rear door of the Administration Building.





Emergency Vehicle Shuttle

As an emergency egress redundancy, in the event that vehicles are trapped in the Canyon, the GSA van (or its equivalent) will be parked at the corral area during core hours. The corral can be accessed on foot via the trail leading from the Stonehouse Row Housing to the corral.

EVACUATION PREPAREDNESS METRICS

Staff training and execution drills are the key elements to functional preparedness.

Success Metrics

1. Documented 100% staff attendance at a plan review and table top exercise.
2. Plan execution drills.
 - a. Documented 100% staff attendance and compliance.
 - b. Two successful drills prior to each monsoon season.
 - c. Success is defined as total evacuation (within the parameters of this plan) within twenty minutes of the evacuation alert.

EVACUATION INCIDENT COMMAND

As soon as there are weather observations that reach the critical threshold, the park will initiate an Incident Command System structure. At a minimum, the Evacuation Incident Commander will be identified. The primary responsibilities of the EVAC IC are:

1. Standing up the required command and general staff.
2. Evaluating thresholds and establishing the current stage.
3. Ensuring that current and appropriate stage notifications are issued.
4. Managing the evacuation process.



5. Final release of employees (if appropriate).
6. Evaluating post evacuation conditions and determining the post-incident action relative to returning to operations in the Canyon.



Appendix 1

EVACUATION INCIDENT COMMANDER CHECKLIST

STAGE 1

- ☐ Identify IC and announce to staff
- ☐ Ensure that Stage 1 Alert is issued
- ☐ Stand up General and Command Staff positions and notify

STAGE 2

- ☐ Ensure that Stage 2 Alert is issued
- ☐ Direct Maintenance to initiate critical “buttoning up” of canyon infrastructure.
- ☐ Ensure that all point protection is in place
- ☐ Initiate accountability and begin closing down canyon access
- ☐ Notify Superintendent
- ☐ Manage personnel at Evac Staging Area
- ☐ Assign personnel to manage Mesa Rally Point and record employee status checkout
- ☐ Make post evacuation determination regarding returning to work in the canyon

STAGE 3

- ☐ Ensure that Stage 3 Alert is issued
- ☐ Direct Maintenance to close out final “button up”
- ☐ Finalize canyon evac accountability and finalize a sweep of the Historic District



- ☐ **Manage Mesa Rally Point and complete final employee checkout**
- ☐ **Make post evacuation determination regarding returning to work in the canyon**
- ☐ **Meet public information requirements**
- ☐ **Supervise SAR missions if required**



Appendix 2

ACTION SUMMARY GUIDE

	STAGE 1	STAGE2	STAGE 3
THRESHOLD	- NWS/NOAA Flash Flood WATCH issued - Lookouts report light to moderate rain over Frijoles Canyon	- NWS/NOAA Flash Flood ADVISORY issued - Lookouts report moderate to heavy rain over Frijoles Canyon	- NWS/NOAA Flash Flood WARNING issued - Lookouts support the existence of heavy rain over Frijoles Canyon - Observed signs of increased stream flow
NPS Personnel Actions	- Personnel should remain in the Historic District and make preparations to evacuate - Incident Commander identified, critical general staff stood up	- Audible siren alert - All Non-Mission Critical Staff will proceed to the pre-evacuation staging area. - Maintenance will complete critical “buttoning up” actions. - Point Protection will be reviewed. - VRP will begin sweep in preparation for Stage 3	All Personnel will evacuate Frijoles Canyon to the Mesa Rally Point - VRP will complete sweep and accountability status review - IC will determine evacuation status
Staff Notification	- General radio notification - Interoffice phone paging - All emp email alert	- Audible siren alert - General radio notification - Interoffice phone paging	- Audible siren alert - General radio notification



Appendix 3

Assessment of Vehicle Parking Options

Alternative 1: POV/GOV's allowed in Canyon

Requirements:

- Parking on North Side of Admin Lot
- Traffic Pattern is against regular flow of traffic in canyon
- Drivers will be required to back into parking spaces
- Keys left in Vehicles on front seat

Advantages	Disadvantages
Employee Acceptance	Increased Exposure to Risk
Increased Flexibility: employees could come and go when needed	Increased Potential to Motor Vehicle Accidents during evacuations
Facilitates Egress: vehicles close at hand	Potential for Loss of Personal Property (requiring vehicles to be unlocked with keys inside)
	Spaces in North Lot about 30



Alternative 2: POV/GOV's minimally allowed in Canyon

Requirements:

- Parking on exit lane of entrance road
- Vehicles facing up canyon
- Minimal Parking on North Side of Admin Lot to accommodate specific needs
- Traffic pattern is against regular flow of traffic in canyon
- Vehicles in canyon required to be backed into parking spaces

Advantages	Disadvantages
Flexibility to access vehicles	Increased Risk of MVA ^{5 6}
Facilitates Egress	Increased Exposure to Risk ⁷
Accommodate for Specific Needs	Time involved in getting to vehicle in case of evacuation
Accommodate for GOV's such as Maintenance and LE's	Walking Distance
Vehicles out of immediate threat zone	Requires walking downhill and uphill
	Spacing of vehicles would have to be set to allow vehicles to exit safely
	Parking up to 30 cars in road

⁵ Parking on road creates a one lane road with 2 way traffic

⁶ Potential for MVA is greatly increased

⁷ Potential for Personal Injury with Pedestrian Traffic in roadway



Alternative 3: POV/GOV's park in Corral parking lot

Requirements:

- Parking in Corral lot only
- Vehicles backed in to facilitate egress
- Access and Egress route will be on trail thru Stonehouse Row Housing to the corral (existing point protection will require all employees access Stonehouse Row Housing through the rear doors of administration building)
- Minimal Parking on North Side of Admin Lot to accommodate specific needs
- Traffic pattern is against regular flow of traffic in canyon
- Vehicles in canyon required to be backed into parking spaces

Advantages	Disadvantages
Decreasing flexibility to access vehicles	Requires walking downhill and uphill
Facilitates Egress	Spacing of vehicles would have to be set to allow vehicles to enter/exit
Vehicles are out of immediate threat zone	Longer time to get to vehicle in case of evacuation
Decreased Exposure to MVA's ⁸	Walking Distance
Decreased Exposure to Risk ⁹	Need to spot parking to allow for maximum spacing
Accommodate for Specific Needs	May not fit 30 vehicles
Accommodate for GOV's such as Maintenance and LE's	

⁸ Vehicles are not parked in the egress route

⁹ Eliminates pedestrian traffic in roadway



Alternative 4: Minimal use of POV's

Requirements:

- Parking of POV's on Mesa Top
- Van pickup and delivers employees to canyon
- In case of evacuation signal, requires secondary staging at corral for pickup
- Minimal Parking on North Side of Admin Lot to accommodate specific needs
- Traffic pattern is against regular flow of traffic in canyon
- Vehicles in canyon required to be backed into parking spaces
- Vehicles in canyon leave keys on front seat

Advantages	Disadvantages
Less Vehicles in canyon	Park responsible to pickup and deliver employees to Canyon
Less Exposure to MVA's	Decreased employee acceptance
	Employees needing to leave canyon for personal affairs don't have access to vehicle
	Egress capabilities are decreased
	Decreased parking for Visitors at amphitheater
	Significantly increases time requirements to shuttle employees out of canyon
	Staff could be left waiting at corral for van to drop off and pickup

APPENDIX L: COST SUMMARY SPECIFICATION FORMS

Bandelier National Monument
Las Conchas Post-Fire Response Plan

SUMMARY OF ACTIVITIES AND COSTS

Plan

TITLE	UNIT	NUMBER OF UNITS	WORK AGENT	COSTS	2011 EMERGENCY STABILIZATION	2011 BURNED AREA REHAB
Early Warning	Gages	5	C	\$ 200,000	\$ 200,000	\$ -
Water Quality	Samples	12	F	\$ 52,000	\$ -	\$ -
Floodplain Map	Service	1	C	\$ 30,000		
Streamflow Gauges	Service	1	C	\$ 216,640		
Channel Maintenance	Service		F	\$ 13,122		
Conduct Archeological Assessments and Treatments	Sites	500	F	\$ 142,668	\$ 15,000	\$ -
Archeological Stabilization and Treatment	Sites	50	F	\$ 144,341	\$ -	\$ -
Monitoring Sensitive and Exotic Plants	Each	3	C	\$ 30,000	\$ -	\$ -
Protection of regenerating aspen and shrubs	45 acres	45 acres	C	\$ 36,080	\$ -	\$ 36,040
Repair elk fences	8 fenced areas	8	S	\$ 14,652		\$ -
Salamander Habitat Stabilization	Tree Felling	50 acres	F	\$ 3,725	\$ 3,725	\$ -
Staffing and Office Space	Unit	1	O	\$ 599,330	\$ 23,429	\$ -
Frijoles Historic Center Protection	Site	1	F	\$ 392,000	\$ 392,000	\$ -
BAER Team Personnel	Plan	1	F	\$ 29,820	\$ 29,820	\$ -
Backcountry Cabin Debris Removal	Sites	1	F	\$ 20,305	\$ 20,305	\$ -
Infrastructure: Minor & Restoration				\$ 2,579,900	\$ 45,000	\$ -
				\$ 4,504,583	\$ 729,279	\$ 36,040

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Early Warning	PART E SPECIFICATION #	1
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: To install a flash flood early warning system
B. Location/(Suitable Sites): 5 sites in Frijoles Canyon
C. Design/Construction Specifications: See contract bids
D. Purpose of Treatment Specifications: To warn the public and park employees about impending floods
E. Treatment Effectiveness Monitoring Proposed: A operation and maintenance agreement will be included in the contract.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	\$ -
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
3 rain gages, 2 flow/rain gages, 1 base station	\$ 200,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ 200,000
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 11	07/25/11	09/30/12	C	Gages	\$ 40,000	5	\$ 200,000
FY					#DIV/0!		
FY					#DIV/0!		
FY					#DIV/0!		
TOTAL					\$ 40,000	5	\$ 200,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	E
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
Bandelier National Monument	5	\$ 200,000
TOTAL COST	5	\$ 200,000

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Water Quality	PART E SPECIFICATION #	2
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

- A. General Description: Work with The Los Alamos National Laboratory and contractors for the Pueblo of Cochiti to ensure required permits are in place,
 B. Location/(Suitable Sites): Frioles Canyon
 C. Design/Construction Specifications:
 D. Purpose of Treatment Specifications: Identify water risks associated with post-fire floods and mobilization of contaminants that may exist or have been
 E. Treatment Effectiveness Monitoring Proposed: Monitoring will be conducted by the NPS I&M program

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
	\$ 40,000
TOTAL PERSONNEL SERVICE COST	\$ 40,000
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
Sampling Equipment	\$ 5,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ 5,000
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Water Sampling Supplies	\$ 2,000
TOTAL MATERIALS AND SUPPLY COST	\$ 2,000
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Laboratory analysis	\$ 5,000
TOTAL CONTRACT COST	\$ 5,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 12	10/01/11	09/30/12	F	Samples	\$ 4,333	12	\$ 52,000
FY					#DIV/0!		
FY					#DIV/0!		
FY					#DIV/0!		
TOTAL					\$ 4,333	12	\$ 52,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

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JURISDICTION	UNITS TREATED	COST
Bandelier National Monument	12	\$ 52,000
TOTAL COST		\$ 52,000

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Floodplain map and flow model	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: 5. Update floodplain map and storm flow model. B. Location/(Suitable Sites): Frijoles Canyon between Alcove House and the park administrative area. C. Design/Construction Specifications: 1) High resolution LiDAR data will be obtained and processed by a qualified contractor; 2) A streamflow analysis model will be developed using HEC-GeoRAS or similar software. D. Purpose of Treatment Specifications: 1) Development of an accurate and up to date floodplain map; 2) Construction of an interactive storm flow analysis model that will be used for defining flood lines for various flood magnitudes. The hydraulic model currently available for Frijoles Canyon was created in 1987 is not in a useable format, and will be obsolete after the large floods expected following the Las Conchas Fire. E. Treatment Effectiveness Monitoring Proposed: Groundtruthing to verify accuracy of LiDAR data.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	\$ -
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 11					#DIV/0!		
FY 12					#DIV/0!		
FY 13					#DIV/0!		\$ 30,000
FY 14					#DIV/0!		
TOTAL					#DIV/0!	0	\$ 30,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
	TOTAL COST	\$ -

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Streamflow Gauges	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: 5. 7. Upgrade the existing streamflow gauge and install a network of rainfall and stream gauges. B. Location/(Suitable Sites): Frijoles, Alamo, and Capulin Canyons. C. Design/Construction Specifications: 1) Upgrade the existing streamflow gauge on the Rito de los Frijoles near the park headquarters to enable transmission of real-time streamflow data to remote locations outside of the canyon. Data transfer will be accomplished through either a radio transmitter or satellite telemetry. The streamflow gauge is currently part of a network of gauges maintained by Los Alamos National Laboratory. The upgrade will be completed and maintained by Laboratory staff; 2) The USGS will install a network of rainfall and crest-stage gauges in Alamo and Capulin Canyons for the purpose of tracking hydrologic recovery of these systems through time. The network consists of 2 stream gauges and 2 rainfall gauges in Alamo Canyon, and 2 stream gauges and 3 rainfall gauges in Capulin Canyon. 5. Indirect measurements of flow including survey of high water marks and computations of flow volumes will be completed after extreme flow events. D. Purpose of Treatment Specifications: 1) Streamflow data transmitted from the existing streamflow gauging station will provide park managers with information describing current flow conditions in Frijoles Canyon, supporting decision making regarding safe access to lower Frijoles Canyon by NPS employees, contractors, and park visitors; 2) a crest-stage gauge network will track hydrologic recovery of Bandelier NM's canyon systems through time. This information will be valuable in supporting decisions about backcountry access and safety for NPS employees and for recreational users. E. Treatment Effectiveness Monitoring Proposed: 1) Monitoring will be conducted by Los Alamos National Laboratory; 2) Monitoring will be conducted by the USGS and the NPS I&M program.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	\$ -
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Upgrade the existing streamflow gauge.	\$ 10,000
Install and maintain network of rainfall and stream gauges.	\$ 206,640
TOTAL CONTRACT COST	\$ 216,640

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 11					#DIV/0!		\$ 95,000
FY 12					#DIV/0!		\$ 42,500
FY 13					#DIV/0!		\$ 42,500
FY 14					#DIV/0!		\$ 36,640
TOTAL					#DIV/0!	0	\$ 216,640

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	C
3. Estimate supported by cost guides from independent sources or other federal agencies.	C
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
	TOTAL COST	\$ 216,640

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Channel Maintenance	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: 5. Clear woody debris from stream channel. B. Location/(Suitable Sites): Frijoles Canyon between Alcove House and the park administrative area. C. Design/Construction Specifications: 3. During the first 3 years after the fire inspect the Rito de los Frijoles stream channel in the reach between Alcove House and Rainbow House the channel in the reach near cultural resources and developed area should be inspected for the presence of woody debris jams after every flood. Woody debris jams should be evaluated on a case-by-case basis to determine whether and how they can be removed. The channel above Alcove House is inaccessible by road and it will be unsafe to remove woody debris mechanically in this reach. This reach should be monitored to assess woody debris jam development and to identify potential dam break risk. Woody debris jams can be unstable and appropriate safety precautions should be followed during removal activities. Use of heavy equipment should be avoided because of the risk of destabilizing the streambanks. Options should be considered for placement of removed large woody debris that may enhance long-term stream health. D. Purpose of Treatment Specifications: Reduce potential of woody debris dam formation, thereby encouraging flows to remain in current channel. This reduces the risk of overbank flooding, channel diversion, and possible dambreak scenarios. E. Treatment Effectiveness Monitoring Proposed: Stream channel inspections following every major flood.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
3 - GS05 @ 16.14 x 80 hr x 4	\$ 11,621
TOTAL PERSONNEL SERVICE COST	\$ 11,621
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
Chain saw and other equipment required for removal of woody debris jams.	\$ 1,500
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ 1,500
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 11					#DIV/0!		\$ 4,374
FY 12					#DIV/0!		\$ 4,374
FY 13					#DIV/0!		\$ 4,374
FY 14					#DIV/0!		
TOTAL					#DIV/0!	0	\$ 13,122

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Conduct Archeological Assessments at	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: Archeological assessments will be prepared on a sample of sites burned within the Las Conchas fire. Assessments will consist of documenting fire impacts, post-fire impacts and potential impacts, develop treatment plans if necessary and document current site condition. Where feasible. B. Location/(Suitable Sites): The location of archeological sites are located within Bandelier National Monument, within the Las Conchas fire perimeter. C. Data Collection: Data collection for archeological sites are collected by photograph (digital and film), GPS data sets, digital documents and written documents. Where necessary, existing site forms will be updated. Treatment plans to mitigate adverse fire effects will be developed during the site assessment. Plans may include, but not limited to, designing the placement of log diverters or log sediment traps, quantify fire-killed trees to be removed, and flood protection plans. Treatment plans will be appropriate to the significance of the resource and level of disturbance or damage. If preservation treatments can be implemented during the initial site visit, these will be completed. This activity may include treatment such as hazard fuel removal, fire-killed tree removal, installation of log diverters, soil retainers and mulching. D. Purpose of Treatment Specifications: To meet legislative mandates of the National Historic Preservation Act, as amended and NPS Guidelines for Historic Preservation. E. Treatment Effectiveness Monitoring Proposed: For sites selected for treatment, monitoring will be conducted for two growing seasons. Costs for this

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	COST / ITEM
Do not include contract personnel costs here (see contractor services below).	
GS-09 Archeologist \$32.07/hour (TERM STF) x 1560 hours for 0.75 fiscal years	\$ 50,029
GS-07 Archeologist, \$21.22, two positions (temporary) 1040 hours for 0.5 fiscal year = \$22,068.80 x 2 positions = 44,137.60	\$ 44,138
GS-05 Archeologist, \$16.14, two positions (temporary) 1040 hours for 0.5 fiscal year = \$16,785.60 x 2 positions = \$33,571.20	\$ 33,571
Support for BAER archeology program from Permanent staff is summarized on Table "Personnel and Office" and is not restated here	
TOTAL PERSONNEL SERVICE COST	\$ 127,738
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
Mobilization in federally-designated Bandelier Wilderness, allow:	\$ 24,000
Vehicle rental for 1.0 years @ 450.00/month + .40/mile (4,000 miles) = 7,000	\$ 7,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ 31,000
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Supplies for field camp	
TOTAL MATERIALS AND SUPPLY COST	\$ 2,500
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
backcountry per diem @20.00/day for 5 persons for 60 backcountry days	\$ 6,000
TOTAL TRAVEL COST	\$ 6,000
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 12	10/01/12	09/30/12	F	500	#DIV/0!		\$ 167,238
FY					#DIV/0!		
FY					#DIV/0!		
FY					#DIV/0!		
TOTAL					#DIV/0!	0	\$ 167,238

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P, M, T, E
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
Conduct Archeological Assessments and Treatments	500	\$ 142,668
	TOTAL COST	\$ 142,668

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Archeological Stabilization and Treatment	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	2012, 2013
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: 1,104 archeological sites in Bandelier National Monument were impacted by the Los Conchas Fire. Fire impacts include post-fire B. Location/(Suitable Sites): Specific sites needing treatment have not been identified. Based on previous fire projects, an estimated 50 sites may need C. Design/Construction Specifications: These may include using on-site materials to construct diversion structures and sediment traps. Fire-killed trees will D. Purpose of Treatment Specifications: Purpose is to prevent irreplaceable loss to Bandelier's archeological sites for which the park was established to E. Treatment Effectiveness Monitoring Proposed: Monitor for 2 growing seasons after treatments are installed. Two positions, one month in duration will

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):	COST / ITEM
Do not include contract personnel costs here (see contractor services below).	
GS-09 Archeologist \$32.07/hour (TERM STF) x 1560 hours for 0.75 fiscal years	\$ 50,029
GS-07 Archeologist \$21.22, two positions (temporary) 1040 hours for 0.5 fiscal year = \$22068.80 x 2 positons = \$44,137.60	\$ 44,137
GS-07 Archeologist \$21.22, two positions (temporary) 320 hours = 6790 (monitor efficacy of treatments)	\$ 6,790
GS-05 Archeologist \$16.14, one position (temporary) 1040 hours for 0.5 fiscal year = \$16,785.60	\$ 16,785
Support for BAER archeology program from Permanent staff is summarized on Table "Personnel and Office" and is not restated here.	
TOTAL PERSONNEL SERVICE COST	\$ 117,741
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Vehicle rental for 6 months @450.00/month +.40/mile/2000 miles = \$3,500.00	\$ 3,500
Mobilization in federally-designated Bandelier Wilderness, allow:	\$ 16,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ 19,500
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Field supplies - estimate \$3,500	\$ 3,500
TOTAL MATERIALS AND SUPPLY COST	\$ 3,500
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
Backcountry perdiem @20.00/day for 3 persons for 60 backcountry days	\$ 3,600
TOTAL TRAVEL COST	\$ 3,600
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 12 & 13	10/01/13	06/01/13	F	50	#DIV/0!		\$ 144,341
FY					#DIV/0!		
FY					#DIV/0!		
FY					#DIV/0!		
TOTAL					#DIV/0!	0	\$ 144,341

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P, M, T, E
3. Estimate supported by cost guides from independent sources or other federal agencies.	

4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
Archeological Stabilization and Treatment	50	\$ 144,341
	TOTAL COST	\$ 144,341

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Monitoring Sensitive and Exotic Plants	PART E SPECIFICATION #	6
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	n/a

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: Monitor fire and suppression activity effects on sensitive and exotic species, including known populations within fire or suppression activity affected areas as well as monitoring for establishment of new weed populations. Document that all suppression ground disturbance, including hand and dozer lines, were closed out according to established standards and that vegetative recovery on these sites is acceptable. In addition, effects of the fire on the recently completed piñon-juniper ecological restoration treatments within Bandelier National Monument would be documented. B. Location/(Suitable Sites): 1) known locations of existing sensitive and exotic plant populations affected by fire and/ or suppression activities; 2) sites potentially impacted by extreme fire severity and documented suppression activities to detect new exotic populations C. Design/Construction Specifications: A crew of plant ecology technicians from the New Mexico Natural Heritage Program (NMNHP) would be contracted to monitor both sensitive and exotic plants using existing population location data and survey sites potentially impacted by extreme fire severity and/ or documented suppression activities. They would also note additional remediation necessary where line closeout did not occur or did not meet standards; as well as edit GIS coverage which is inaccurate or incomplete. Burned restoration areas would be evaluated for adverse soil and vegetation impacts due to heat effects and consumption of the slash mulch relative to adjacent unburned areas using a combination of remote sensing and ground truth to interpret imagery. D. Purpose of Treatment Specifications: 1) early detection and documentation of exotic plants including expansion of existing populations and establishment of new populations to inform treatment options; 2) assessment of fire and/ suppression impacts on known sensitive plant populations; 3) assessment of fire and/ or suppression impacts on ecological restoration treatments within Bandelier National Monument E. Treatment Effectiveness Monitoring Proposed: Field data include habitat or site status including impacts and vegetative recovery, species monitored, area coverage, reproductive status, photo documentation, and GPS location

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	\$ -
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
35,000/year x 3 years	\$ 105,000
TOTAL CONTRACT COST	\$ 105,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISH MENTS	PLANNED COST
FY 12	10/01/11	09/30/12	C	Each	\$ 35,000	1	\$ 35,000

FY 13	10/01/12	09/30/13	C	Each	\$ 35,000	1	\$ 35,000
FY14	10/01/13	09/30/14	C	Each	\$ 35,000	1	\$ 35,000
FY							
TOTAL					\$ 105,000	3	\$ 105,000

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	C
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

see vegetation assessment for additional details and rationale

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
VCNP	ea	\$ 15,000
USFS	ea	\$ 60,000
NPS	ea	\$ 30,000
	TOTAL COST	\$ 105,000

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Protection of regenerating aspen and s	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	FY2012
NFPORS TREATMENT TYPE *		WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	None	IMPACTED T&E SPECIES	None

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: Cut trees on site for fences; construct lean-to style fences
B. Location/(Suitable Sites): Upper Alamo Canyon boundary trail area and along Forest Road 289.
C. Design/Construction Specifications: Using existing woody materials killed or dying from the fire temporary wooden fences would be built, to
D. Purpose of Treatment Specifications: 6-foot tall fencing
E. Treatment Effectiveness Monitoring Proposed: Site visits

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	\$ -
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Fence tie wire, 65 rolls * \$150/200 feet	\$ 9,750
Fuel, 80 gallons * \$4.00/gallon= \$320	\$ 320
Oil, 5 gallons *\$12/gallon = \$60	\$ 60
Chain saw chains 10* \$15= \$150	\$ 150
TOTAL MATERIALS AND SUPPLY COST	\$ 10,280
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
50 miles round trip * 2 vehicles * 16 days * \$0.50/mile = \$800.00	\$ 800
TOTAL TRAVEL COST	\$ 800
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Six (4) people with chain saws working 6 weeks (6 people * 4 weeks * 40 hours/week *20/hour * 130% for employee related expenses = \$16,640.00;	\$ 24,960
"130%" = These expenses include, the employer's contribution to Social Security, employer's contribution to health insurance and any employer's contributions to a retirement plan such as Thrift Savings, as well as the employer's payment of Workers' Compensation Insurance.	
TOTAL CONTRACT COST	\$ 24,960

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY2012	10/01/11	11/01/11	Contact	45 acres			\$ 10,280
FY2012	10/01/11	11/01/11	Contact	45 acres			\$ 800
FY2012	10/01/11	11/01/11	Contact	45 acres			\$ 24,960
FY							
TOTAL					\$ 1,802	45 acres	\$ 36,040

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	M
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	T, C

5. No cost estimate required - cost charged to Fire Suppression Account.	
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P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NSP, Bandelier	45 acres	\$ 36,040
	TOTAL COST	\$ 36,040

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Repair elk fences	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	FY2011 or FY2011
NFPORS TREATMENT TYPE *		WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK	None	IMPACTED T&E SPECIES	none

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: Post-fire repair of 8 elk fences.
B. Location/(Suitable Sites): Specific location at elevations above 7,000 feet
C. Design/Construction Specifications: Replace metal poles that cannot be re-used; re-tie fence to poles after raising collapsed fence after removing
D. Purpose of Treatment Specifications: Protect vegetation in side fenced areas.
E. Treatment Effectiveness Monitoring Proposed: Site visits after work has been complete

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
	\$ -
TOTAL PERSONNEL SERVICE COST	\$ -
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
	\$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Fence tie wire, 2 rolls * \$150/200 feet	\$ 300
Metal poles, 30 * \$20/each	\$ 600
Concrete, ready mix, 10 bags * \$4.00/bag	\$ 40
TOTAL MATERIALS AND SUPPLY COST	\$ 940
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
50 miles round trip * 1 vehicle * 16 days * \$0.50/mile = \$400.00	\$ 400
TOTAL TRAVEL COST	\$ 400
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Six (4) people, 8 fenced areas * 2 day/area * 8 hours/day * \$20/day * 130% for employee related expenses = \$13,312.00	\$ 13,312
"130%" = These expenses include, the employer's contribution to Social Security, employer's contribution to health insurance and any employer's contributions to a retirement plan such as Thrift Savings, as well as the employer's payment of Workers' Compensation Insurance.	
TOTAL CONTRACT COST	\$ 13,312

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY2011	09/01/11	09/30/11	S	8 fenced areas	\$ 940		\$ 940
FY2011	09/01/11	09/30/11	S	8 fenced areas	\$ 400		\$ 400
FY2011	09/01/11	09/30/11	S	8 fenced areas	\$ 13,312		\$ 13,312
FY							
TOTAL					\$ 1,832	8 fenced areas	\$ 14,652

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	M
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	T,C
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS, Bandelier	8	\$ 14,652
	TOTAL COST	\$ 14,652

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Salamander Habitat Stabilization	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	FY11 or FY12
NFPORS TREATMENT TYPE *		WUI? Y / N	No
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	Jemez Mountain Salamander

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: fell standing dead trees haphazardly. B. Location/(Suitable Sites): west and southwest sides of Scooter Peak in high burn severity areas C. Design/Construction Specifications: Work must avoid warm wet periods in August, in order to avoid accidental killing of salamanders near the surface; D. Purpose of Treatment Specifications: mitigate fire effects on Jemez Mountain salamander habitat E. Treatment Effectiveness Monitoring Proposed: post-treatment field surveys

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
One crew of 3 people with chain saws working 1 weeks = 3 people * 1 weeks * 40 hours * \$20/hour * 130% for employee related expenses = \$3,120.00	\$ 3,120
TOTAL PERSONNEL SERVICE COST	\$ 3,120
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
	\$ -
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Fuel, 80 gallons * \$4.00/gallon= \$320	\$ 320
Oil, 5 gallons *\$12/gallon = \$60	\$ 60
Chain saw chains 10* \$15= \$150	\$ 150
TOTAL MATERIALS AND SUPPLY COST	\$ 530
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
30 miles round trip * 1 vehicle * 5 days * \$0.50/mile = \$75.00	\$ 75
TOTAL TRAVEL COST	\$ 75
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY2012	10/01/11	10/30/11	NPS crew	50 acres	74.5	Tree felling	\$ 3,120
FY2012	10/01/11	10/30/11	NPS crew	50 acres		Tree felling	\$ 530
FY2012	10/01/11	10/30/11	NPS crew	50 acres		Tree felling	\$ 75
FY							
				TOTAL		50 acres	\$ 3,725

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	M
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P,T
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS, Bandelier	50 acres	\$ 3,725
	TOTAL COST	\$ 3,725

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Staffing and Office Space	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	2011, 2012
NFPORS TREATMENT TYPE *		WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	Bald eagle, peregrine falcon, western willow flycatcher, Jemez Mtn Salamander, Mexican spotted owl

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

A. General Description: Implementation of the BAER program will require the intensive support of permanent staff at Bandelier National Monument during Year 1. Park staff will be enlarged during Year 1 to accommodate the demands of implementing the BAER program; these new temporary staff will need to be provided work space and equipment. Total area in the park effected by the fire is 20,798 acres.

B. Location/(Suitable Sites): throughout the Monument.

C. Design/Construction Specifications: n/a

D. Purpose of Treatment Specifications: to recognize and plan for workload demands on permanent staff associated with the BAER effort and to provide for work space for temporary staff associated with the BAER effort. Note: personal services costs for temporary staff are specified under appropriate subject matter specifications elsewhere in this document.

E. Treatment Effectiveness Monitoring Proposed: both permanent and temporary staff have adequate workspace and workload planning.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
GS-12 PERM Chief of Resources (25% of Year 1 workload)	\$ 31,500
GS-11 PERM Park Archeologist (25% of Year 1 workload)	\$ 25,550
GS-9 PERM Archeologist Technician (50% of Year 1 workload)	\$ 32,000
GS-11 PERM Park Botanist (25% of Year 1 workload)	\$ 23,800
GS-11 PERM Wildlife Biologist (25% of Year 1)	\$ 40,880
GS-9 PERM Park Cartographer (25% of Year 1)	\$ 21,000
GS-12 PERM I&M Hydrologist (5% of Year 1)	\$ 69,300
GS-7 Backcountry Ranger for one year	\$ 45,000
Storm watch lookouts (prior to installation of First Alert System: 3 FTE for 60 days at \$3600 each	\$ 10,800
GS-12 PERM Chief of Facility Mgmnt (25% of Year 1)	\$ 28,200
GS-9 PERM Trails Program Coordinator (50% of Year 1)	\$ 42,700
GS-7 Term Trail Foreman (50% of Year 1)	\$ 26,200
WS-9 Maintenance Work Supervisor (5% of Year 1)	\$ 4,200
WG-5 Maintenance Worker (5% of Year 1)	\$ 2,100
GS-11 TERM FMSS Specialist (25% of Year 1)	\$ 19,400
GS-05 TERM FMSS Clerk (25% of Year 1)	\$ 10,600
GS-12 PERM Chief Ranger (10% of Year 1)	\$ 11,500
GS-12 PERM Chief of Administration (5% of Year 1)	\$ 5,100
GS-9 PERM Budget Analyst (20% of Year 1)	\$ 13,800
GS-7 PERM Budget Technician (20% of Year 1)	\$ 13,100
GS-11 PERM Contract Specialist (40% of Year 1)	\$ 35,100
GS-9 PERM IT Specialist (30% of Year 1)	\$ 23,300
GS-9 PERM Interpretive Ranger (25% of Year 1)	\$ 19,200
GS-14 PERM Park Program Manager (10% of Year 1)	\$ 13,400
TOTAL PERSONNEL SERVICE COST	\$ 567,730

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
GSA Truck Lease @ \$500/month X 12 months X 1 years	\$ 6,000
Single-wide trailer lease at \$750/month x 12 months, sufficient for 6 work stations	\$ 9,000
Single-wide trailer install and remove (1 time each including utility connect/disconnect, allow)	\$ 10,000
Operational cost of utility services to trailer, (electrical service, telephone, data, sewer, domestic water) allow \$300/month	\$ 3,600
Backcountry Ranger vehicle for one year	\$ 4,000
Services to develop a plan to reoccupy Frijoles Canyon for administrative uses	\$ 5,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ 28,600

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Office furnishings sufficient to support basic functionality, allow	\$ 3,000

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
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Services to develop a plan to reoccupy Frijoles Canyon for administrative uses	\$	5,000
TOTAL TRAVEL COST	\$	5,000
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM	
N/A		
TOTAL CONTRACT COST	\$	-

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 11	08/01/11	09/30/11	F	Unit	\$ 99,888	1	\$ 99,888
FY 12	10/01/11	09/30/11	F	Unit	\$ 499,442	1	\$ 499,442
TOTAL					\$ 499,442	1	\$ 599,330

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	E, M
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

n/a

TOTAL COST BY JURISDICTION

BAND	UNITS TREATED	COST
BAND	1	\$ 599,330
	TOTAL COST	\$ 599,330

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Frijoles Historic Center Protection	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: B. Location/(Suitable Sites): C. Design/Construction Specifications: D. Purpose of Treatment Specifications: E. Treatment Effectiveness Monitoring Proposed:

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
	\$ 392,000
TOTAL PERSONNEL SERVICE COST	\$ 392,000
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 12		07/04/11	F	Site	\$ 392,000	1	\$ 392,000
FY					#DIV/0!		
FY					#DIV/0!		
FY					#DIV/0!		
TOTAL					\$ 392,000	1	\$ 392,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
	TOTAL COST	\$ -

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	BAER Team Personnel	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task: A. General Description: B. Location/(Suitable Sites): C. Design/Construction Specifications: D. Purpose of Treatment Specifications: E. Treatment Effectiveness Monitoring Proposed:

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):	COST / ITEM
Do not include contract personnel costs here (see contractor services below).	
	\$ 29,820
TOTAL PERSONNEL SERVICE COST	\$ 29,820
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$ -
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$ -

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY			F	Plan	\$ 29,820	1	\$ 29,820
FY					#DIV/0!		
FY					#DIV/0!		
FY					#DIV/0!		
TOTAL					\$ 29,820	1	\$ 29,820

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
	TOTAL COST	\$ -

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Backcountry Cabin Debris Removal	PART E SPECIFICATION #	5
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	2011
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK	n/a	IMPACTED T&E SPECIES	n/a

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: Remove all debris from burned Bandelier Backcountry Cabin
B. Location/(Suitable Sites): Upper Capulin Canyon
C. Design/Construction Specifications: Remove debris via helicopter sling loads
D. Purpose of Treatment Specifications: Prevent debris from washing down canyon due to flash flooding
E. Treatment Effectiveness Monitoring Proposed: Bandelier Resources Management

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
6 ct. GS05 @ 16.14 x 30 hr x 1	\$ 2,905
TOTAL PERSONNEL SERVICE COST	\$ 2,905
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Jumbo Bags @ 500 x 4	\$ 2,000
Nets @ 1000 x 2	\$ 1,000
TOTAL MATERIALS AND SUPPLY COST	\$ 3,000
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Helicopter and Helitac Crew @ 1800 x 8 x 1	\$ 14,400
TOTAL CONTRACT COST	\$ 14,400

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 11	07/20/11	08/01/11	F	Sites	\$ 20,305	1	\$ 20,305
FY					#DIV/0!		
FY					#DIV/0!		
FY					#DIV/0!		
TOTAL					\$ 20,305	1	\$ 20,305

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	C, M
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account.	

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RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

2) Narrative description. 3) Photos.

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
Bandeir National Monument	1	\$ 20,305
	TOTAL COST	\$ 20,305

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Infrastructure: Minor & Restoration	PART E SPECIFICATION #	2
NFPORS TREATMENT CATEGORY*		FISCAL YEAR(S) (list each year):	
NFPORS TREATMENT TYPE *		WUI? Y / N	
IMPACTED COMMUNITIES AT RISK		IMPACTED T&E SPECIES	

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
A. General Description: Replace Minor Preserve Infrastructure (trails, trailheads, signs, boundary fence) damaged in Las Conchas wildfire. B. Location/(Suitable Sites): See BAER map: Bandelier_Trails_Signs_7-15-2011 C. Design/Construction Specifications: return to pre-fire conditions D. Purpose of Treatment Specifications: To repair damage and open trails and trailheads currently closed to Monument visitors. E. Treatment Effectiveness Monitoring Proposed: An inspection for each of years 1, 2 and 3 will be planned to patrol for hazard trees (snags) and to arrest deterioration due to post-fire erosion.

LABOR, MATERIALS AND OTHER COST:

SUMMARY PROJECT COSTS:	COST / ITEM
Replace burned ground motion sensor	\$6,000
Replace burned trail counter	\$6,000
Reinstall transformer at Visitor Center	\$2,500
Remove and dispose of temporary point protection at Visitor Center	\$21,000
Trails, Trailheads, Signs, and Boundary Fences Assessment	\$51,900
Trails, Trailheads, Signs, and Boundary Fences Stabilization	\$515,000
Flash Flood Clean-Up	\$ 150,000
Hazard Tree Assessment and Mitigation	\$ 185,000
Frijoles Creek Channel Assessment and Clearing	\$ 45,000
Temporary Point Protection Maintenance	\$ 69,000
Replacement of Backcountry Cabin	\$ 375,000
Permanent Flood Diversion Wall and Lift Station Protection	\$ 558,000
Tsankawi Unit Trail and Facility Improvements due to Re-Focus of Visitor Services	\$ 123,000
Motor Car and Footbridge Replacement	\$ 508,000
TOTAL PERSONNEL SERVICE COST	\$2,615,400
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$ -
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
	\$ 33,250
	\$ 83,700
	\$ 76,200
TOTAL MATERIALS AND SUPPLY COST	\$ 193,150
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$ -
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Allow for mobilization in Wilderness (pack operations, etc.), assume 4 pack trips at \$3000 each	\$ 12,000
Cost for flash flood repairs to Visitor Center and other infrastructure in main visitor area	not estimated
TOTAL CONTRACT COST	\$ 12,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY 12	08/01/11	09/30/12	F, C, S, V	Each	\$ 6,350	58	\$ 368,300
FY13							\$ 335,300
FY14							\$ 312,300
Year not specified							\$ 1,564,000
TOTAL					\$ 44,481	58	\$ 2,579,900

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P, M, C

3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account.	

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RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
NPS - Bandelier		\$ 2,579,900
	TOTAL COST	\$ 2,579,900

3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P,E
5. No cost estimate required - cost charged to Fire Suppression Account.	

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RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
	TOTAL COST	\$ 13,122