Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Santa Fe National Forest | June 2022

Cerro Pelado Burned Area Emergency Response (BAER) Assessment Report

Executive Summary

Figure 1: Cerro Pelado Burned Area

Fire Background

The Cerro Pelado fire started on April 22, 2022, on the Santa Fe National Forest (NF) in Sandoval County, New Mexico. The fire started near Cerros Pelado Peak in the Jemez Mountains located approximately seven miles east of Jemez Springs, south of the Nacimiento Mountains, and west of the Bandelier National Monument areas. The fire burned in mostly mixed conifer and some ponderosa pine, with minor amounts of spruce fir, wet meadows, upland grasslands, and riparian areas. The fire started during a time of extreme winds and record dry conditions. The cause of the fire is not known at this time. Many communities were evacuated and affected by smoke from the fire. Approximately 32% of the fire area had not previously burned, while approximately 68% of the fire was a reburn of the 2011 Las Conchas burn scar.

Many of the Pueblos in the area that have a traditional link to the area, also had lands that were burned in the Cerro Pelado Fire. These include Jemez Pueblo, Santo Domingo Pueblo and Cochiti Pueblo. The Jemez Mountains include the burned area that are utilized by the Pueblo cultures for traditional ceremonies. This includes the utilization of mature Douglas Fir for traditional uses, hunting, and plant collection for traditional medicine and ceremonies. Contemporary uses of the area include recreation, fuel wood, timber, and grazing.

BAER critical values for the Cerro Pelado assessment were identified by using data collected from the incident management team, a listening session with the Pueblo communities, Forest Service (FS) personnel, and communication with the Department of Interior (DOI) BAER team and other cooperating federal, state, and local agencies. BAER critical values identified through this process fall into these broad categories: human life and safety, property and natural resources, and cultural/heritage resources.

BAER Assessment

The USDA Forest Service (FS) established a Burned Area Emergency Response (BAER) team on May 19, 2022, to begin the assessment of National Forest System (NFS) lands impacted by the Cerro Pelado Fire. National Park Service and Pueblo lands burned by the fire were assessed by the Department of Interior (DOI) BAER team. Both teams coordinated and shared their field data gathering and analysis for the Cerro Pelado Fire.

BAER teams focus on emergency actions necessary to protect human life and safety, property, and natural and cultural resources, including affected watersheds. BAER assessments identify unacceptable risks on federal lands from post-fire threats and help land managers prepare burned areas for potential threats from rainstorms. Burned areas often experience increased soil erosion and water runoff during rain events.

The extreme wind events in late April resulted in rapid fire growth. By mid-May, areas of the fire were safe for BAER team's field evaluations

BAER team assessments are emergency rapid evaluations of post-fire conditions of the burned landscape to determine the level of risk from potential flooding and debris-flows to values on NFS lands. The team identifies 'BAER critical values' such as human life and safety, infrastructure, property, and critical natural and cultural resources. BAER teams also share information with local and federal agencies to identify risks to off-Forest resources (such as private property). Risks to BAER critical values are identified with the BAER risk assessment (Table 1), and the BAER team evaluates emergency stabilization treatments to reduce the risk to NFS values. Treatment actions must be evaluated based on: (1) the ability to be implemented in a timely manner, (2) effectiveness in reducing risk, (3) practical and technical feasibility, and (4) cost.

BAER assessments are conducted quickly because BAER treatments (including all phases of bidding, contracting, and implementation) involves time-critical activities to be completed before the first damaging storm event to meet program objectives. In New Mexico (NM) these storms typically will start in early to mid-July and run through mid-September with the monsoon rainstorm cycle. Due to scattered distribution of convective events not all burned areas may experience a damaging storm in the first year.

The soil burn severity (SBS) map was used to model changes in precipitation runoff and debris flow potential

and identify risks to critical NFS values via the BAER risk assessment process (Table 1). This document summarizes formal BAER team assessments found in FS-2500-8, Burned Area Reports.

Table 1: BAER Risk Assessment:[1]

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

Soil Burn Severity Mapping

The BAER assessment focuses on NFS critical values to determine where post-fire precipitation events could increase water runoff, flooding, erosion, and sediment delivery, where post-fire effects could impact critical threatened and endangered wildlife habitat, and where high-risk areas exist for the spread of invasive weeds. Post-fire water runoff changes with the severity of the fire – more severe fire conditions (i.e., hotter fire conditions) will alter the landscape in ways that enable more water runoff (increased flooding) and sediment mobilization (to include potential debris flows).

The BAER team analyzed post-fire satellite reflectance imagery taken on May 14, 2022, and pre-fire imagery from April 20, 2022, which resulted in a Burned Area Reflectance Classification (BARC) map produced by the Forest Service Geospatial Technology and Applications Center (GTAC). The BAER team collected field data from May 21-23, 2022, and helicopter aerial reconnaissance on May 23, to produce a SBS map (Figure 2), which displays SBS categories in the burned area as High, Moderate, Low, or Very Low SBS (Table 2).

The Cerro Pelado SBS map analyzes approximately 45,605 acres of the burned area. Approximately 67% of the acres are either very low or low SBS, while 32% sustained a moderate SBS and only 1% identified as high SBS. The SBS map also shows the burned acreage for land ownership to be:

- 36,981 acres for the Santa Fe National Forest,
- 4,132 acres of Pueblo lands,
- 1,781 acres of National Park Service lands, and
- 2,709 acres of private lands.

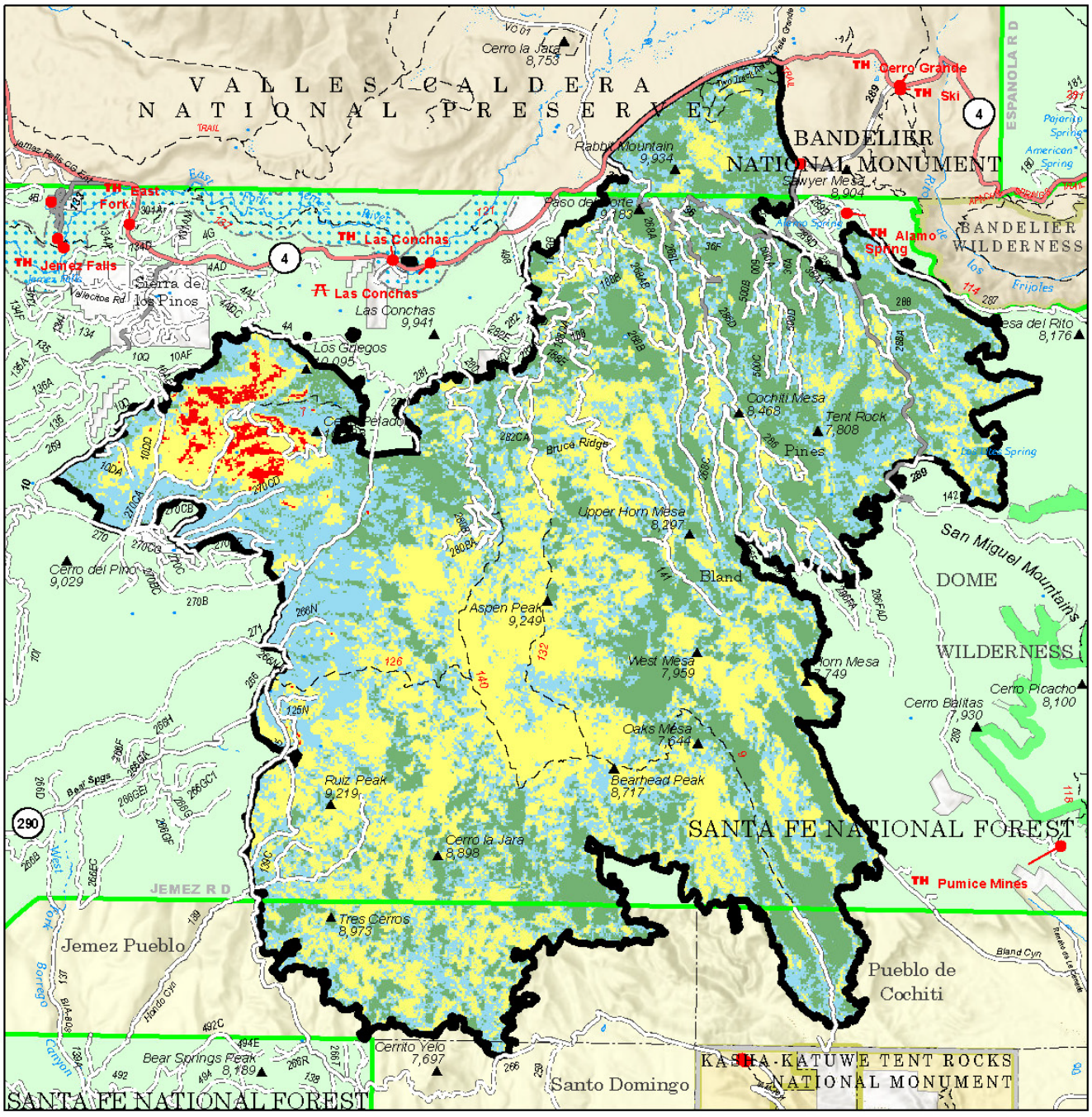
Table 2: Soil burn severity by land ownership

Soil Burn Severity	NFS	Other Federal NPS	Pueblo Reservations	Private	Total	% within the Fire Perimeter
Unburned	10,737	829	1270	1139	13,974	31
Low	13458	661	1534	858	16,512	36
Moderate	12,487	291	1328	630	14,737	32
High	299	0	0	82	382	1
Total	36981	1787	4132	2709	45605	100

[1] Threats to resources are based on the likelihood and consequence of an event. Threats that result in low or intermediate (white and yellow) risks are typically not considered for potential treatments. Treatments may be considered where threats that result in high or very high risks (red) are identified.

Cerro Pelado Fire Soil Burn Severity

Santa Fe National Forest - Jemez Ranger District



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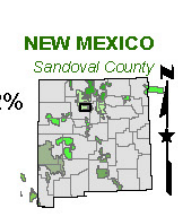
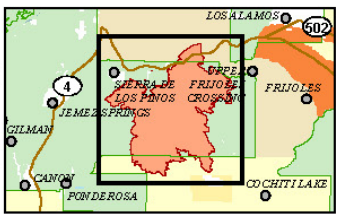
Miles

Soil Burn Severity

- High Severity - 382 acres - 1%
- Moderate Severity - 14,737 - 32%
- Low Severity - 16,512 - 36%
- Unburned - 13,974 - 31%
- Cerro Pelado Fire Perimeter





Disclaimer

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Figure 2: Soil Burn Severity Map for the Cerro Pelado Fire

Figure 3: Examples of low (top left), moderate (top right), and high (lower left) soil burn severity in the burned area. These burn conditions, including remaining ground cover, soil integrity, hydrophobicity, remaining root structure, and surviving vegetation, assist to estimate the likelihood and intensity of future flooding, erosion, and debris- flows.

Watershed Response

Soils

Soil productivity, or how well soil supports plant growth, is a non-renewable resource due to the exceptionally slow soil formation rate in the southwest. Post-fire soil erosion poses a significant threat to soil productivity. Moderate and high soil burn severities increase the potential for erosion and debris flows due to fire induced hydrophobicity (Figure 3), the loss of protective soil cover, the loss of soil porosity, the weakening or loss of soil structure, and the loss of soil stability due to root consumption.

Almost a third (15,119 acres) of the burned area within the Cerro Pelado BAER assessment had high or moderate SBS. The high SBS totaled 382 acres and was on the very western edge of the fire near Cerro Pelado Lookout tower and Los Griegos Mountain. The moderate SBS (14,737 acres) and low SBS (16,512 acres) was considered a mosaic burn across most of the perimeter of the Cerro Pelado Fire overall, but there are larger more extensive areas of moderate SBS in the headwaters of Peralta Canyon with over 40 percent of the moderate SBS in this sub-watershed. Approximately 13,270 acres of water repellent soils occur within the Cerro Pelado burned area.

Figure 4: Strong hydrophobic soil conditions caused by moderate soil burn severity in mixed conifer forest. Note 2 cm diameter water drop that persists on soil surface.

Accelerated water runoff and soil erosion are to be expected from the high and moderate SBS areas of the fire, depending upon burn severity, slope, post-fire soil characteristics, and the intensity and duration of precipitation that occurs within a given watershed. Debris-flows and flooding are strong possibilities. Baseline (pre-fire) erosion rates for soil types in the analysis area average less than one ton per acre per year. Modeling indicates the burned area will now average 8 tons per acre on NFS lands. Average sediment potential across moderate and high SBS areas on NFS lands is approximately 1,459 cubic yards per square mile.

Hydrology

Post-fire watershed conditions such as loss of groundcover and stabilizing vegetation, decreased soil porosity, and fire induced water repellency in soils are all factors that can increase the magnitude, frequency, and volume of stormwater runoff and produce debris-flows. Post-fire water flows have greater energy with which to damage resources within and downstream of the burn area and threaten life and property than do regular rainfall runoff events that occur over unburned areas. Additionally, high flows with increased concentrations of sediment and ash (bulking effect) can result in geomorphic changes such as aggradation, downcutting, and/or widening of stream channels that can significantly alter hydrologic function.

The Cerro Pelado burn scar includes 11 sub-watersheds (12-digit Hydrologic Unit Codes – also called HUCs); however, only 6 sub-watersheds have more than 10% of the watershed area had moderate or high SBS. Sub-watersheds impacted include: Vallecita Creek, Peralta Canyon, Headwaters Borrego Canyon, Rio Chiquito, Canon Santo Domingo, and Church Canyon – Jemez River. All these watersheds, except for Canon Santo Domingo, were modeled as part of this effort. The Canon Santo Domingo sub-watershed was not modeled because there were no FS BAER critical values identified to be at-risk of post-fire storm threats. There was one DOI BAER critical value identified in this sub-watershed, but the DOI BAER team did not request a hydrologic model for the area because of sufficient data already acquired for determining risk.

The modeled sub-watersheds contain relatively equal amounts of soils in hydrologic soil groups A, B, C, and D – with soils in hydrologic soil group B being the most common (30%). Rock outcrops are a major occurrence along the slopes of Cochiti and Peralta and other nearby and tributary canyons. While 67% of the soils in the impacted watersheds were listed as being in fair condition and only 1% in poor condition, 32% of the modeled

sub-watersheds impacted by Cerro Pelado Fire were also within the 2011 Las Conchas burn scar. Based on field reconnaissance and communication with local expertise, 2022 pre-fire vegetation condition was assumed to be poor for areas within the Las Conchas burn scar that had a moderate or high SBS in 2011.

Debris-Flow Hazard Assessment

The US Geological Survey estimated the probability and magnitude of debris flows within and from the burned area. They developed debris flow hazard ratings for both watersheds and stream channels for storms with a peak 15-minute intensity ranging from 12 mm/hour (approximately 1/2 inch per hour) to 40 mm/hour (approximately 1.5 inches per hour). The 40 mm/hour estimates were used for this analysis, as they are most representative of the intensity of southwestern monsoonal storms and provide the most conservative estimate of potential risk for the Cerro Pelado area.

According to a May 26, 2022, communication from USGS Scientist Jaime Kostelnik, their agency models "estimate a low-level debris-flow hazard for most of the area burned by the Cerro Pelado Fire. Most stream reaches and drainage basins have a less than 40% likelihood of debris-flow occurrence at a 15-minute rainfall intensity of 24 mm/hour. A few areas have a moderate to high level of debris-flow hazard, with debris-flow likelihood exceeding 40% and 60%, respectively. These higher hazard areas occur along some sections of Peralta Canyon and in a few small drainages west-northwest of Cerro Pelado near Forest Service Road (FSR) 10AE." While USGS modeled debris-flow hazards are highest for the basins and drainages at the top of Church Canyon and Vallecita Creek sub-watersheds and for multiple basins draining toward Peralta Canyon.

Critical Values

Critical Values identified during the BAER assessment that have potential to be at-risk as defined in Forest Service (FS) Manual 2523.1 include human life and safety of employees and public, FS property (roads, trails, administrative and recreation infrastructure), cultural resources, natural resources including Threatened and Endangered Species (TES) habitat, native plant communities, soil, and water resources. The BAER team evaluated the risk to these critical values in accordance with the critical value matrix table (Table 1) by using the BAER risk assessment. The Cerro Pelado Fire critical value table is in the project record.

Human Life and Safety

There is a very high risk to human life and safety on NFS lands within and immediately downstream of the Cerro Pelado burned area. Threats to human life and safety of forest visitors and employees traveling on NFS roads and trails include falling tees and limbs, falling rocks, flash floods, debris flows and other burned area hazards. Threats downstream of the burned area on NFS lands include flash floods and debris flows. Near the summit of Cerro Pelado Peak is a repeater site that is used for Forest Service comunications and is critical for emergency notifications related to life and safety. There is no risk or damage to the repeater itself; however, access to the site is threatened if FSR 270 becomes unpassable and maintenance and repair cannot be completed.

Specific areas of greatest concern for human life and safety on NFS lands include: Paliza Family Campground; FSR 269 (San Juan), FSR 270 (Cerro Pelado), and portions of FSR 10 (Ponderosa) and FSR 266 (Bear Springs); developed recreation areas above and downstream of the East Fork of the Jemez River Wild & Scenic River including areas around Jemez Falls to Battleship Rock; Soda Dam site; Bearhead Peak, Medio Dia, and Peralta Canyon Trails; and dispersed camping on Rio Chiquito and off of FSR 270. Other areas that are predicted to very likely experience a very significant to extreme change were Borrego Canyon and its tributaries, Peralta Canyon and its tributaries; Cochiti Canyon and its tributaries; Hondo Canyon; Colle Canyon, and Bland Canyon. Areas that should be closed for the onset of the monsoon season and should be monitored but could potentially be reopened after the first few storms, include fishing access and the campground on the Jemez River below Jemez Springs.

Property--Roads and Bridges

The watersheds burned in the Cerro Pelado Fire will experience increased water runoff, sediment/ash laden runoff, and debris-flows creating a future concern for roads, bridges, culverts, and the associated channels

along the drainage paths of the burned watersheds. Increased water flows may cause the capacity of crossings and drainage features (culverts) to be exceeded, and the transported sediment and debris may cause culverts, bridges, and other drainage features to become overwhelmed and ultimately fail (Figure 5). These impacts may cause uncontrolled flow to overtop the road and damage the road prism with potential for structural failure of roads within the affected watersheds.

Figure 5. Burned area above culvert where increased erosion and sedimentation can plug culverts leading to a road being overtopped by flood waters.

The road prism may become impassible to vehicles and in extreme cases may be completely washed out due to fill slope failure. Road prisms may also be damaged due to falling rock and debris making the road impassible. Public safety hazards are significantly increased due to flash flooding, where road segments lie within the floodplain, fallen trees, destabilized rock slopes, damage to traffic safety structures and signs.

Common BAER emergency treatments could include signs warning travelers of the increased danger, closures of some FS roads during monsoon season, storm inspection and response, creating armored dips, clean ditches to handle increased flows, and removing debris from stream channel.

There are approximately 147 miles of Forest Service roads (FSR) within the Cerro Pelado assessment area. Specific roads and bridges that were assessed by BAER engineers:

- **FSR 10 Ponderosa** – A Maintenance Level (ML) 3 gravel road that climbs from the bottom of the drainage outside of the community of Ponderosa, NM and steadily climbs up to State Highway 4. Direct fire impacts on the slopes are directly adjacent to the road, in areas of low and moderate SBS on steep slopes above the road alignment. Select drainages that cross the road suffered moderate SBS with hydrological models predicting substantial increase in water flows during modeled storms.
- **FSR 270 Cerro Pelado** – A ML 2 native surfaced road that climbs from the bottom of the drainage to the ridge with direct fire impacts on the road, in areas of high and moderate SBS on shoulders along the road alignment. This road accesses Cerro Pelado Lookout and Comm Site that is a critical FS infrastructure. The communication site is automated, but access needs to be maintained so that maintenance and refueling can occur. The Cerro Pelado Lookout is staffed by FS personnel.
- **FSR 266 Bear Springs** – A ML 2 native surfaced road that runs from the bottom of the drainage, climbs to the ridge, then descends back into the drainage before entering Jemez Pueblo Reservation lands with direct fire impacts on the road, the slopes, and drainages above the road, in areas of moderate SBS on shoulders along road alignment. This road has berms on the outside of the road for nearly the entire length that are impacting road drainage.

- **Paliza 10B-0.1 Bridge** – This pre-stressed concrete slab bridge located on FSR 10B at MP 0.1 is the sole access to the Paliza Group Campground Site. The bridge is of a low profile. Large debris are unlikely to pass, and higher predicted flows are likely to exceed the hydraulic opening capacity based on water flows provided from hydrological analysis of moderately burned watersheds that drain into Paliza Canyon above this crossing.
- **Paliza 10-3.2 Bridge** – This pre-stressed concrete slab bridge is located on FSR 10 at MP 3.2. The bridge is of a low profile with some bank erosion and minor scour on the upstream End of Bridge (EOB) wingwall where water flow is attacking the substructure. Large debris is unlikely to pass and higher predicted flows likely to exceed the hydraulic opening capacity based on flows provided from hydrological analysis of moderately burned watersheds that drain into Paliza Canyon above the crossing.
- **Paliza 10-3.4 Bridge** – This prefabricated steel bridge is located on FSR 10 at MP 3.4. The bridge superstructure sits more than 10-feet above the observed flow with no bank erosion or scour noted and riprap armoring in place protecting the abutments. Large debris is likely to pass the hydraulic opening, but channel scour is still possible given higher predicted water flows provided from hydrological analysis of moderately burned watersheds that drain into Paliza Canyon above the crossing.

Property--Trails

There are approximately 21 miles of FS trails within the Cerro Pelado assessment area. Trails were evaluated using SBS maps, topographic maps, flight imagery, and in many instances first-hand knowledge of specific trails. The following trail bridge is considered to be at-risk:

- **Trail Bridge in Paliza Campground** – A concrete trail bridge located in Paliza Campground. Hydrological models predict a significant increase in creek flows during modeled storms. High and moderate SBS burned hillslopes in drainage are above the crossing. A bridge footing (near side) is partially exposed during pre-fire conditions.

Natural Resources—Soil Productivity and Hydrologic Function

Many of the sub-watersheds within the Cerro Pelado Fire perimeter have a possible risk to soil productivity since they are areas exceeding soil loss tolerance, but they are of low overall acreage so the magnitude would be minor and risk low.

The Peralta Canyon sub-watershed has a likely probability due to larger more continuous areas (or about half the burn scar) exceeding soil tolerance and these areas account for about a third of the watershed overall. This watershed also burned in the 2011 Las Conchas Fire in a mosaic of moderate and high SBS 10 years ago, and has now reburned. The magnitude of consequences would be moderate due to most of these areas showing modelled soil loss at three times that of tolerance levels and due to the reburn on previous high SBS areas. The risk to this sub-watershed would be high.

Natural Resources—Native or Naturalized Plant Communities

Fire suppression activities may result in the spread of noxious invasive plants. The unknown introduction and dispersal of invasive weeds into areas disturbed by fire suppression and repair activities has the potential to establish large and persistent weed populations. Aggressive invasive plants (i.e., spotted knapweed, field thistle, scotch thistle, bull thistle, cheatgrass, musk thistle, Siberian elm) are present within the assessment area, are primarily along travel routes, trails, and dispersed camping areas. These infestations are within or adjacent to the burned areas. Invasive plants are highly adapted to take advantage of early seral conditions created after fire and can out-compete native plants for resources. There is a risk to native plant populations due to plant species adjacent to previously un-infested areas that have been burned at a moderate to high intensity. Native plants within the Cerro Pelado burned area have been identified as a critical resource for the Pueblo cultures that have an ancestral link to the area. These invasive plant infestations would have considerable long-term effects with eventual displacement of native plants. The risk is a very high for critical values such as native plant communities due to spread of invasive plants into previously un-infested areas.

Natural Resources—Threatened and Endangered (T&E) Species

Rio Grande Cutthroat trout (RGCT): The RGCT is a FS region 3 sensitive species managed under a Species Conservation Agreement. RGCT has been found historically within three creeks found within the Cerro Pelado Fire and its area of influence. These systems include Peralta Creek, Medio Dia Creek, and Capulin Creek. Where Peralta Creek and Medio Dia Creek fall within the fire perimeter, the USGS debris-flow assessment of a 15-minute rainfall intensity of 40mm/hour indicates a potential combined hazard of high and moderate respectively for basins that feed into these systems. Capulin Creek falls within the area of influence but outside of the fire perimeter. Maximum USGS debris-flow combined hazard for a 15-minute rainfall intensity (I_{15}) of 40mm/hour (1.57 inches/hour) for this system is low. The potential for downstream impacts from precipitation and/or flooding carrying sediment loads and ash may be significant for Rio Grande Cutthroat Trout occupied creeks. The probability of loss for Rio Grande Cutthroat Trout habitat is “very likely”, and the magnitude of consequences is determined to be “moderate”.

Mexican spotted owl (MSO) Critical Habitat: MSO habitat is not readily impacted by flooding events. Second order fire effects such as tree regeneration, plant succession, and changes in site productivity can be anticipated primarily for moderate to high SBS. An increase in pest susceptibility may also occur including invasion of noxious and invasive species. Unaffected MSO Protected Activity Centers (PACs) habitat could subsequently be impacted by pest outbreak originating from within the Cerro Pelado Fire. Using the BAER Risk Assessment Matrix (Table 1) for natural resource critical values, we estimate the probability of loss for Mexican spotted owl PACs and Recovery Nest Roost to be “possible” and the magnitude of consequences to be “minor”.

Figure 6. Mexican Spotted Owl

Jemez Mountains salamander (JMS) Critical Habitat: There are 12,137 acres of designated JMS critical habitat within the Cerro Pelado Fire perimeter. In 2011, much of this burned area was within the Las Conchas Fire perimeter and experienced high severity fire effects that reduced habitat suitability. JMS habitat suitability is sensitive to soil and vegetation loss. Second order fire effects such as tree regeneration, plant succession, and changes in site productivity can be anticipated primarily for moderate to high SBS. An increase in pest susceptibility may also occur including an invasion of noxious and invasive species. The analysis of the Cerro Pelado Fire indicates JMS critical habitat was primarily impacted by an unburned or low SBS. The probability of loss for Jemez Mountains salamander critical habitat is “possible” and the magnitude of consequences has been determined to be “moderate”.

Cultural Resources

Cultural resources or historic properties consist of archaeological sites, historic buildings, and traditional cultural properties (TCPs). Significant heritage sites are those listed, or are potentially eligible for listing, on the National Register of Historic Places (NRHP) and are considered nonrenewable and irreplaceable resources. Post-fire erosion threats to cultural resource sites in high to moderate severity burns have been well documented. Sites with surface vegetation removed by wildfire are vulnerable to erosion, slumping, trampling and, with increased ground visibility, artifact looting and theft. Storm runoff, particularly after severe summer monsoons, may wash away significant portions of heritage sites or bury them with mud and debris. Post fire erosion threats include: the development of gullying or riling that can expose and remove subsurface cultural deposits or burials; increased levels of sheet-wash eroding archaeological features and/or removes artifacts from site locations and fire-killed trees that fall, and up-end root systems can result in the destruction of archaeological features/architecture, displace artifacts, and contribute to the exposure of subsurface archaeological deposits including human remains.

The following cultural resources sites were assessed by BAER team archaeologists:

- **FSR 289/Capulin**. There are 59 Native American sites located in this portion of the fire. Most of these sites were evaluated for NRHP eligibility have been determined eligible, although roughly half of sites are unevaluated. The probability of damage to or loss of archeological sites in the FSR 289/Capulin area is unlikely, based on the conditions indicated by the SBS data and observed conditions. Ridgetop sites retain sufficient live vegetation and experienced surface burns and are not susceptible to sheetwash erosion. The risk to cultural resources in this area is low.
- **Cochiti Mesa**. This area encompasses Cochiti Mesa, as well as the other upland areas located in the eastern portion of the burn area. There are eight Native American sites located in this portion of the fire. All have been evaluated for NRHP eligibility, and all but one is eligible under criterion (d). The probability of damage to or loss of archeological sites in the Cochiti Mesa area is unlikely, based on the conditions indicated by the SBS data and are not likely susceptible to sheetwash erosion. The risk to cultural resources in this area is low.
- **West Mesa**. This is a southeast-facing mesa located in the southeastern corner of the fire. There are 56 sites in this portion of the fire. Of these, 51 are located on the lower portion of the mesa. All sites are ancestral Pueblo masonry field house or small pueblo sites. The five sites on the upper end of the mesa are early 20th century log or stone cabins. Based on the information from the post-fire assessments conducted following the 2011 Las Conchas Fire, and the conditions indicated by the SBS data, the risk of significant impacts from sheetwash erosion, pulling of root balls by falling fire-killed trees, and the collapse of burned-out stump holes is low, and the probability of damage to or loss of archeological sites on West Mesa is unlikely. The risk to cultural resources in this area is low.
- **Oaks Mesa**. This is a broad, south-facing mesa located on the southern margin of the fire. There are nine sites in this area. Two are ancestral Pueblo masonry field houses, while the remaining seven are wooden ramadas or log cabins dating to the early 20th century. All nine sites have been determined eligible to the NRHP. The seven sites with wooden features likely burned in the 2011 Las Conchas Fire and have lost the characteristics that once made them eligible for NRHP. Based on the conditions indicated in the SBS data, the risk of significant impacts from sheetwash erosion, pulling of root balls by falling fire-killed trees, and the collapse of burned-out stump holes is low, and the probability of damage to or loss of archeological sites on Oaks Mesa is unlikely. Further, due to the likely loss by many sites of the characteristics that made them eligible to the NRHP, the magnitude of consequence to this loss is minor. The risk to cultural resources in this area is very low.
- **Bland Canyon, Albemarle, and Paliza Canyon**. These three areas comprise the center of the fire area where there has been little or no past archeological investigation. While comprising most of the fire area, only 15 archeological sites have been documented in this area. The Bland Canyon area is in the southeastern portion of the fire. It is a broad, steep-sided canyon located at the southern edge of the fire. The area contains eight sites and two ancestral Pueblo field house sites and a game trap at its lower end, and five sites associated with mining, including the ghost town of Bland, in its upper reaches. The Albemarle area is in the center of the burn area. It contains two sites, the Albemarle town, and mine sites. The Paliza Canyon area is located on the west side of the fire. There are five sites in

this area. Four of these sites are lithic scatters, while one contains a petroglyph and rock alignments. Most of the sites in the Bland and Albemarle area have not been evaluated for eligibility to the NRHP but are of the types that would be eligible. However, all but one of the sites in the Bland and Albemarle areas were impacted by the 2011 Las Conchas Fire, and were damaged or destroyed by burning, flooding, or both. Based on the conditions indicated in the SBS data, the risk of significant impacts from sheetwash and slopewash erosion that likely remain eligible to the NRHP in these areas (the petroglyph and game trap sites) is low, and the probability of damage to or loss of archeological sites in the Bland Canyon, Albemarle, and Paliza Canyon areas is unlikely. Further, due to the likely loss by many of the sites of the characteristics that made them eligible to the NRHP or the likelihood that they would not be eligible, the magnitude of consequence to this loss is minor. The risk to cultural resources in these areas is very low.

- **FSR 270 and FSR 10**. This area encompasses the summit and slopes of Los Griegos and Cerro Pelado, and the portions of the heads of San Juan Canyon and the East Fork of the Jemez River. It is in the northwestern corner of the burn area. The area contains 14 sites. The sites are diverse, and include lithic scatters, the remains of a cabin and sawmill, a historic spring box, a peeled ponderosa pine, a set of New Deal era culverts on FSR 270, and the mid-20th century Cerro Pelado lookout and associated features. The probability of damage to or loss of archeological sites in the FSR 10 and FSR 270 area is unlikely, based on the conditions indicated by the SBS data and observed conditions. Low intensity surface burning or unburned areas at the locations of most sites indicate that significant sheetwash or slopewash erosion is unlikely. Of the two sites where sheetwash and slopewash erosion are likely, the sites are not eligible to the NRHP. A third site is unlikely to be further significantly impacted by slopewash erosion. The risk to cultural resources in this area is low.
- **FSR 10 and FSR 266 Historic Infrastructure**. Two roads along the western perimeter of the fire, FSR 10 and FSR 266, have historic infrastructure that is within or borders the burn area. This infrastructure was constructed by the Civilian Conservation Corps in the New Deal era of the early 20th century and is maintained and currently in use. Both sets of road infrastructure have been determined eligible to the NRHP. FSR 10 infrastructure consists of 18 features, including 11 culverts and 7 retaining walls. All these features are intact, functioning, and are characteristics that qualify the site for the NRHP. FSR 266 infrastructure consists of 32 features, including 31 culverts and 1 retaining wall. Of these, 21 of the culverts and the retaining wall are intact, remain functional, and are site characteristics that qualify the site for the NRHP. Based on the combined hazard debris-flow model, and field observations made by heritage and engineering BAER specialists, the probability of damage or loss to the historic culvert features in the burn area on FSR 10 and FSR 266 is likely. The risk to cultural resources in these two localities is high.
- **Hondo Canyon/Borrego Canyon**. This 1.5-mile (2.42km) section of intermittent drainage contains 8 sites, including a large ancestral Pueblo village site, 4 field houses, the remains of a logging camp, the remains of a sawmill, and a brush corral. Four sites are in Hondo Canyon and three are in Borrego Canyon. The large village site is located at the canyon junction. The large village site is listed on the NRHP and was identified by the Pueblo of Jemez as a critical value at risk. The four field houses and the logging camp have been determined eligible to the NRHP, while the brush corral's eligibility is undetermined, and the sawmill site is unevaluated. Based on the hydrological model, and field assessments and observations, it is likely that the brush corral site could be damaged or destroyed by flooding. However, this site has an undetermined NRHP eligibility and would likely not be eligible if assessed, and as such the consequence of this loss would be minor. It is possible that the large village site could be damaged by flooding. Based on the NRHP listing of this site and its identification as a critical value at risk by the Pueblo of Jemez, the consequence of this loss would be major. As such, the risk to cultural resources at this location is high.
- **San Juan Canyon**. This area consists of three sections of intermittent drainage, as well as the portion of San Juan Canyon within the burn area. There are 33 sites along these reaches of San Juan Canyon. Most of the sites (21) are ancestral Pueblo field houses. Other sites include an ancestral Pueblo small pueblo settlement, Native American artifact scatters (3), boulder shelters (2), a 20th century trash scatter, 2 small 20th century camp sites with various features, the remains of a Civilian Conservation Corps field camp, and an animal pen. Most sites have been determined eligible to the NRHP. Only one site, a Native American artifact scatter, has been determined not eligible. Five sites are unevaluated for

their NRHP eligibility, but three of these are of types that would likely be considered eligible. Based on the hydrological model, and field assessments and observations, it is likely that the brush corral site could be damaged or destroyed by flooding. However, this site has an undetermined NRHP eligibility and would likely be not eligible if assessed, and as such the consequence of this loss would be minor. It is possible that the large village site could be damaged by flooding. Based on the NRHP listing of this site and its identification as a critical value at risk by the Pueblo of Jemez, the consequence of this loss would be major. As such, the risk to cultural resources at this location is high.

- **Paliza Canyon (Vallecitos Creek)**. This 3.37 mile (5.43km) stretch of intermittent drainage extends from just above the Elza Seligman Girl Scout Camp through the Paliza Campground area to the Ponderosa acequia reservoir near the private property boundary. This section contains 13 sites, including ancestral Pueblo field houses (6), medium size ancestral Pueblo villages (2), a small pueblo settlement, Native American artifact scatters (3), and a petroglyph site. Most of the sites have been determined eligible to the NRHP. The remaining sites are unevaluated but belong to site types that are likely to be eligible to the NRHP if evaluated. Based on the assumed location of all archeological sites, it is unlikely there will be any damage or loss at these sites. The risk to cultural resources at this location is low.
- **East Fork of the Jemez River.** This 2.19 mile (3.52km) stretch of perennial stream contains 4 sites: 2 ancestral Pueblo fieldhouses, an ancestral Pueblo residential complex containing 2 small pueblo settlements and agricultural features, and an artifact scatter. The field houses and residential complex have been determined eligible to the NRHP, while the artifact scatter has been determined not eligible. The hydrological model for this drainage estimates the potential for stream flows to be greater than 340 cubic feet per second above Vallecitos de los Indios. In conversations with the BAER hydrologist, it is likely that most debris and some sediment will be removed from floodwaters when it has the chance to spread out in the broad meadows of the Vallecitos de los Indios. However, channel scouring will still occur within the drainage through this section, though the narrowness of the canyon bottom and will likely limit burial by sediment to small floodplain areas.
- **Bland Canyon and Cochiti Canyon (Rio Chiquito)**. While there are known cultural resources in these canyons on NFS lands, it is assumed that they were damaged or destroyed during flooding following the 2011 Las Conchas Fire. Since flooding is predicted for the Cerro Pelado Fire to be less than the flooding that occurred following the Las Conchas Fire, the risk to cultural resources on NFS lands was not assessed. While the hypothetical probability of damage or loss is very likely, due to the prior damage or loss the consequence is minor. This risk to cultural resources in these locations is low.

Partner Efforts

In addition to identifying and recommending treatments to reduce post-wildfire effects to critical values on NFS lands, BAER team members met and communicated with other federal agencies such as US Geological Survey (USGS), Natural Resources Conservation Service (NRCS), and National Weather Service (NWS). Team members also met with non-federal partners such as the State of New Mexico Forestry Department-EMNRD and New Mexico Acequia Association to understand additional post-fire needs that are outside of the scope of the Forest Service BAER program and shared their analysis and data.

Conclusion

The BAER team identified threats to critical values on NFS lands based on a rapid assessment of the area burned by the Cerro Pelado. The team's findings provide the information needed to recommend emergency treatments for managing unacceptable risk to critical values.

BAER treatment recommendations must undergo an internal review at the local Forest Service Supervisor's Office, Regional Office, and Washington Office, depending upon total treatment funding amounts. The BAER team's recommended emergency treatment objectives for its Cerro Pelado assessment include:

- Posting area closure and hazard warning signs to control public access and to inform the public of post-wildfire hazards that exist within the burned area and in watersheds affected by the fire.
- Protecting high value Forest Service roads and bridges through storm inspection and response,

construction and improvement of road dips, berm removal and removal of drainage structures that are expected to fail, to ensure NFS investments are able to function properly during events with increased water flows and sedimentation delivery.

- Implementing Early Detection and Rapid Response (EDRR) of invasive weeds to protect vegetative resources critical to cultural practices of Pueblos that have an ancestral link to the burned area and native plant communities that are critical to natural recovery.
- Placing targeted cultural resource treatments to protect the ancestral Kiabakwa Pueblo located in Hondo Canyon.