Jaroso Fire

Burned Area Emergency Response (BAER) Team
Executive Summary

Espanola and Pecos/Las Vegas Ranger Districts
Santa Fe National Forest
Santa Fe, New Mexico
July 15, 2013

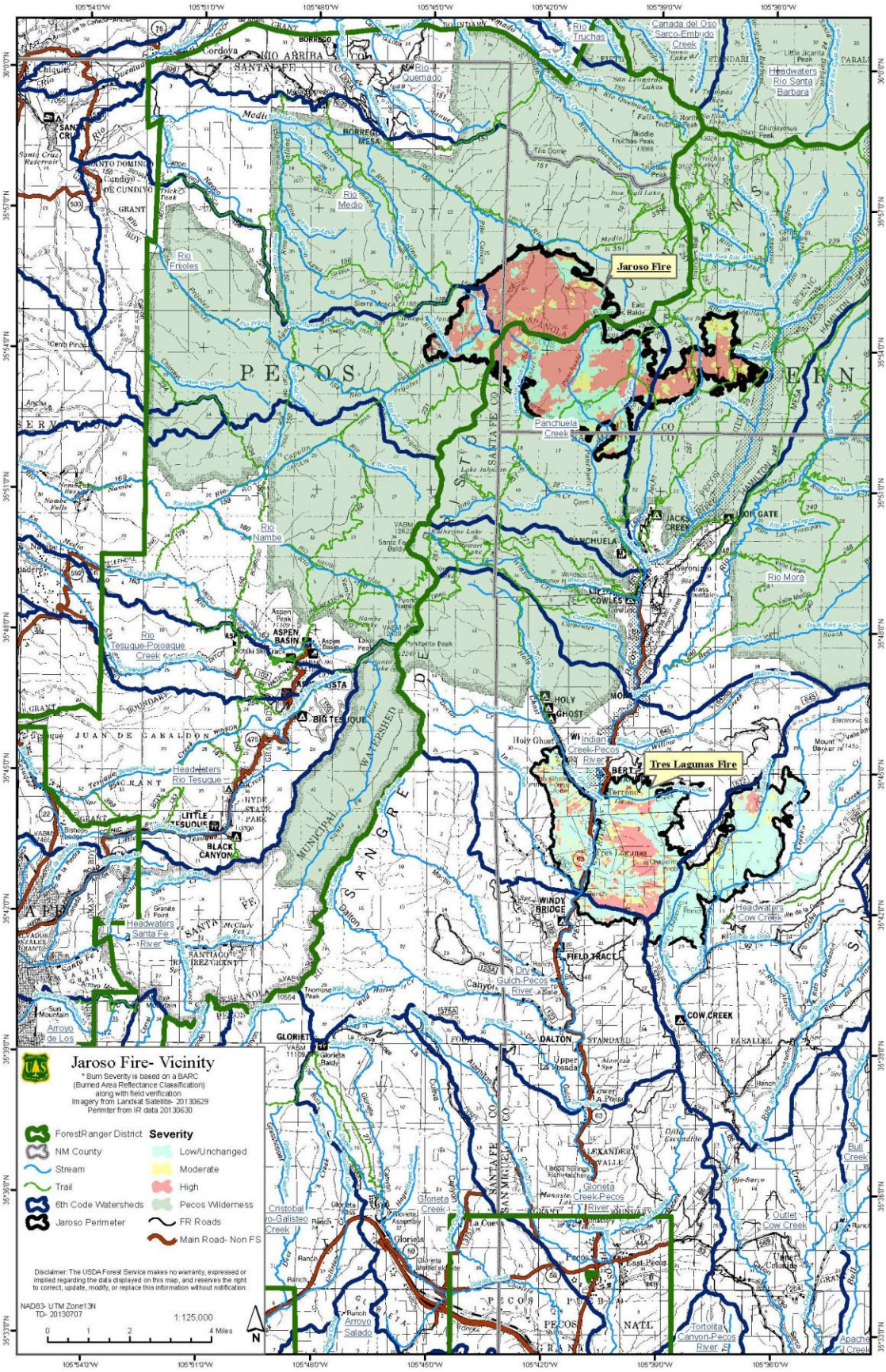
Introduction

From June 10th, 2013 through the time of this report the Jaroso Fire burned approximately 11,149 acres of the Pecos Wilderness on the Espanola and Pecos/Las Vegas Ranger Districts of the Santa Fe National Forest. The fire started from a lightning strike in the Jaroso drainage which was discovered by aircraft working over the Tres Lagunas fire. The nature of the fire became very active at this time displaying extreme fire behavior preventing firefighters to safety enter the fire perimeter. The first four days of the burn showed dramatic growth and the fire burned through an existing 1300 acre area of blow down before conditions slowed the fire's expansion. Then after a number of days of increased temperatures and decreased humidity the fire again became active and made new runs to the east driven by strong winds as well as backing down the blow down area into the Rio Frijoles drainage. Finally a return of higher humidity and lower temperatures resulted in a dramatic drop in fire activity. As of July 15th, 2013 the fire was still reported as 0% contained due

to the fact that no fire containment lines have been dug. However, at this point the fire has received significant precipitation and has not shown significant growth for several days.

The Burned Area Emergency Response (BAER) team was assembled on July 3rd to assess the severity of the Jaroso Fire, including threats to life and property, and to recommend emergency response actions. The BAER team is an interdisciplinary group of specialists, whose work is to identify and assess the values at risk associated with post fire effects such as erosion, flooding, and debris flows.

The Jaroso Fire BAER team was composed of specialists in various fields, including hydrologists, soil scientists, a public information officer and a GIS specialist. Forest and District specialists in wildlife, fisheries, engineering, recreation, archaeology, and cultural heritage were consulted for impacts regarding these resources. From July 3rd to 15th, 2013 the team conducted field surveys, data modeling, and analysis, and then prepared reports for the emergency assessment of post-fire resource conditions. The purpose of the report was to first assess the values at risk on the Espanola and Pecos/Las Vegas Ranger Districts and to submit a funding request to implement response actions intended to reduce threats to life, property and resources.


Jaroso Fire- Vicinity
* Burn Severity is based on a BARC (Burned Area Reflectance Classification) along with field verification.
Imagery from Landsat Satellite- 20130629
Perimter from IR data 20130630
ForestRanger District
NM County
Stream
Trail
6th Code Watersheds
Jaroso Perimeter
Severity
Low/Unchanged
Moderate
High
Pecos Wilderness
FR Roads
Main Road- Non FS
Disclaimer: The USDA Forest Service makes no warranty, expressed or implied regarding the data displayed on this map, and reserves the right to correct, update, modify, or replace this information without notification.
NAD83- UTM Zone13N
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N
Jaroso Fire
Tres Lagunas Fire
PECOS
Rio Truchas
Canada del Oso
Sarco-Embudo Creek
Headwaters Rio Santa Barbara
Rio Quemado
Rio Medio
Rio Frijoles
Rio Nambe
Rio Tesuque-Poiaque Creek
Panchuela Creek
Rio Mora
Indian Creek-Pecos River
Headwaters Rio Tesuque
Headwaters Santa Fe River
Headwaters Cow Creek
Dry Gulch-Pecos River
Gloriota Creek
Gloriota Creek-Pecos River
Tortolita Canyon-Pecos River
Apache Creek
Bull Creek
Outlet Cow Creek
Arroyo Salado
Arroyo de Los
Cristobal Arroyo-Galisteo Creek
Dalton
Cahoon
Sun Mountain
Santa Fe
Cerro Pinos
Cerro Pinon
Santo Domingo
Cundiyo
Cordova
Rio Arriba
Bernalillo
Sandoval
Mora
Las Vegas
Pecos
Rociada
Gloriota
Dalton
Cow Creek
Jacks Creek
Panchuela
Cowles
Holy Ghost
Bert
Terrero
Windy Bridge
Field Tract
Alexander Valley
Pecos National Park
Black Canyon
Little Tesuque
Aspen Basin
Big Tesuque
Hyde State Park
Santa Fe National Forest
Pecos Wilderness
Santa Fe Watershed
Municipal Watershed
Sangre de Cristo
Santa Fe Co
San Miguel Co
Mora Co
Taos Co
Colfax Co
Guadalupe Co
Bernalillo Co
Sandoval Co
Rio Arriba Co
Santa Fe Co
Santa Fe Ski Area
Santa Fe Reservoir
Santa Cruz Reservoir
Cerro Pinon
Sierra Mosca
Tres Lagunas
Upper Lagunas
Lower Lagunas
Gloriota Baldy
Thornton Peak
Middle Truchas Peak
Little Jicarita Peak
Chimayosos Peak
Aspen Peak
Pecos River
Rio Grande
Rio Chama
Rio Santa Barbara
Rio Quemado
Rio Medio
Rio Frijoles
Rio Nambe
Rio Tesuque
Rio Mora
Rio Pecos
Rio Grande
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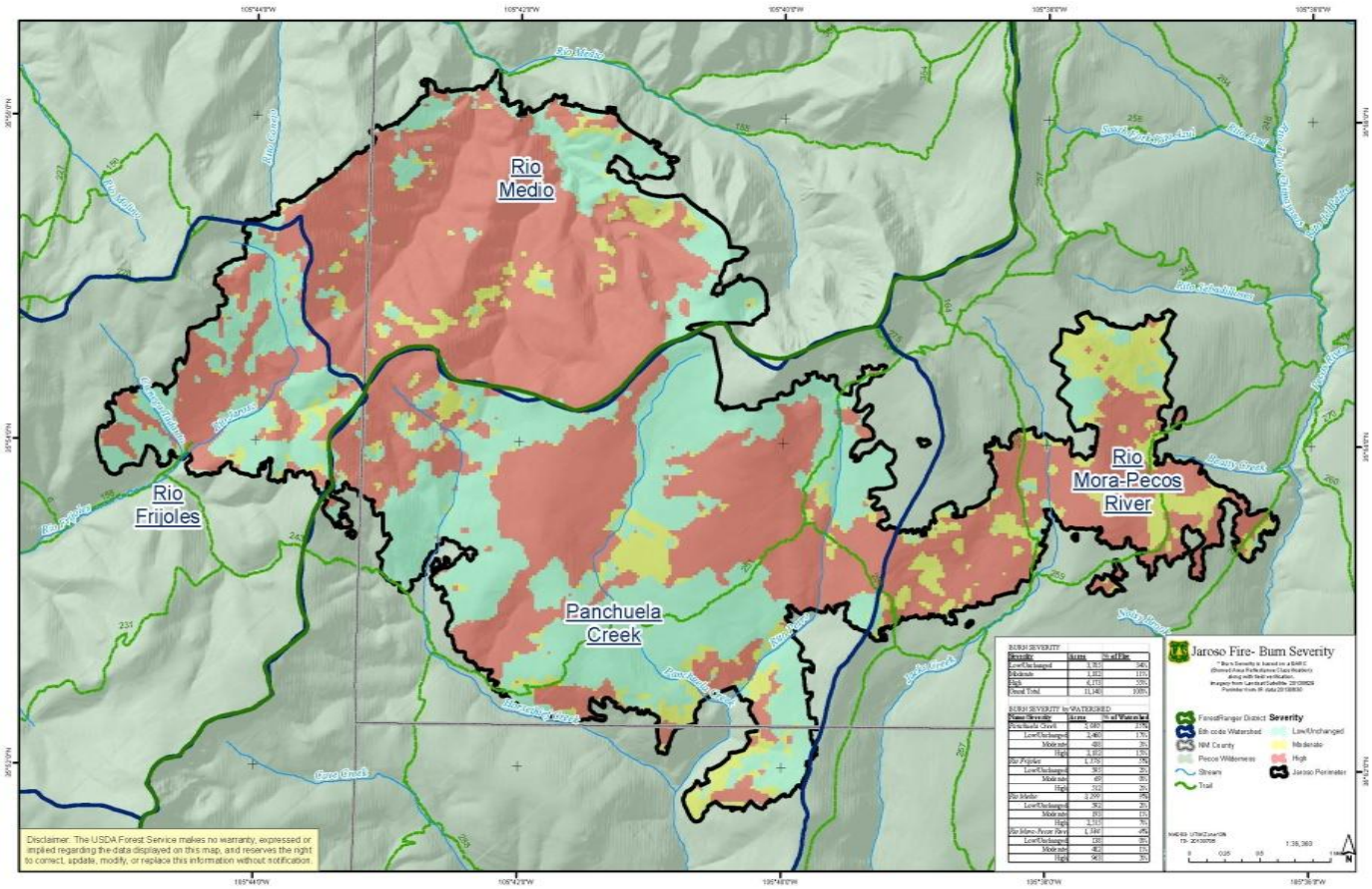
Burn Severity of the Jaroso Fire

Burn severity indicates the effect the fire had on vegetation and soils. High severity burns can result in hydrophobic (water-repellant) condition within the soils, sterilization of the seed bank, removal of effective ground cover, complete over-story removal and increased water flows in draws and canyons. Due to the remoteness of the burn area, extreme fire behavior, and the high level of dead standing trees from bug kill, the risk of sending BAER team specialists into the burned area was deemed too high. Therefore the burn severity mapping was based solely on aerial reconnaissance to validate and adjust the BARC imagery. Due to the proximity and similarity of the Tres Lagunas fire soil types, team specialists were able to predict burn severity from the air with a high degree of confidence. Sixty six percent of the area in this fire received high to moderate severity burn. Within the high severity burned area, dense stands contributed to a total loss of canopy, effective ground cover, and litter. A relatively small area received moderate burn severity common of fire behavior in Engleman Spruce communities where understory fire easily reaches low branches and results in complete torching. For the most part moderate burn tend to exists in a narrow buffers around high burn severity areas where trees were killed by intense heat but did not ignite. This disturbance reflects the natural, long interval, stand replacing fires characteristically seen in sub-alpine spruce/fir – aspen – spruce/fir successional communities.

Burn severity class	Acres burned in each class	Percentage of NFS area
High	6,173 acres	55%
Moderate	1,182 acres	11%
Low/Unburned	3,785 acres	34%
Total Acres	11,141 acres	

(Figure 1. Burn severity by acreage)



Values at Risk

The Jaroso Fire ignited on June 10, 2013 and burned 11,141 acres east of the community of Espanola and North of the village of Pecos. The fire burned entirely on National Forest System (NFS) lands within the Pecos Wilderness. Elevations range from 9200 feet where Rio Frijoles leaves the burned area to almost 12,200 feet on the slopes of Pecos Baldy Mountain. The west side of the burned area drains to the Rio Medio and Rio Frijoles. The Rio Frijoles flows through the community of Cundiyo before these rivers join together just above the Highway 503 Bridge and form the Santa Cruz River. This river flows into Santa Cruz Lake before flowing to the west through the community of Chimayo. The east side of the burned area is drained by Panchuela Creek, Jack's Creek, and the Pecos River. Panchuela and Jack's Creek are tributaries to the Pecos River above the community of Cowles. The Pecos River drains south through a mixture of NFS, state, and private lands before reaching the Village of Pecos. Other communities border the river below Pecos.

The fire burned parts of four 6th-level (HUC12) watersheds through primarily spruce-fir forest. Approximately 1288 acres of the fire burned through an area of spruce-fir blowdown that occurred sometime during 2006-7. This area burned with high intensity. Burn severity and soil erosion hazard ratings are displayed by watershed in the table below.

HUC6 Watershed	Watershed (acres)	Burned Area (acres)	Burn Severity (acres)			Erosion Hazard	
			Low/unchanged	Moderate	High	Moderate (ton/ac)	High (ton/ac)
Panchuela Creek	14,387	5080	2460	438	2182	106	4975
Rio Frijoles	24,047	1176	595	69	512	252	924
Rio Medio	34,952	3300	592	193	2515	265	3034
Rio Mora-Pecos River	37,113	1584	138	482	963	23	1561
Total	110,499	11140	3785	1182	6173		

Total burned area within the Pecos River watershed is 6,664 acres. The Tres Lagunas Fire burned 10,219 acres in the Pecos River watershed just prior to the Jaroso Fire. Runoff, sediment, and debris from the Jaroso Fire compounds the effects of the Tres Lagunas Fire on the Pecos River. The cumulative increase in peak flows from watersheds burned in the Tres Lagunas Fire where they enter the Pecos River range from16 to 25 percent for the 25, 50 and 100 year 6 hour storms. Cumulative increases in peak flows expected from the Jaroso Fire and the Tres Lagunas fire near the Windy Bridge site is approximately 10 percent for these storms.

Human Life and Safety:
There is a very high risk for loss of life on NFS lands within and downstream of the burned area. Threats to human life and safety within the burned area include falling trees and limbs (hazard trees), rolling rocks, flash floods, and debris flows. Threats downstream of the burned area on NFS lands include flash floods and debris flows in stream channels draining from the burned area and flooding along the Pecos River. Roads crossing or passing through the floodplain of streams and rivers affected by increased runoff from upstream burned areas are at risk of flooding or washout during storm events and represent a hazard to users of these roads. Occupants of residences within the floodplain of fire affected streams and rivers are at risk from increased peak flows. Residences at risk on NFS lands include leased cabins near the confluence of Jack's Creek and the Pecos River, and downstream of the Cowles ponds along the Pecos River. The table below displays changes in peak flows expected from the 25 year 1 hour thunderstorm at selected sites in watersheds affected by the Jaroso Fire. These flows have been modeled using the Wildcat 5 Peakflow computer program and should be interpreted as ballpark estimates of changes expected rather than absolute changes in peak flows.

Jaroso Fire Wildcat5 Model Summary for individual drainages

Watershed subHuc6	Acres	Peak CFS			CFS/ Sq.Mi.		
		Pre-Burn	Post	**Percent Increase**	Pre-Burn Flow	Post Burn Flow	**Absolute Flow Increase CFS/Sq.mi.**
Panchuela Creek	7811	2065	4894	**137%**	169	401	**232**
Pecos River below Beatty	3239	1088	2033	**87%**	215	402	**187**
Jack's Creek	2498	934	2028	**117%**	239	520	**280**
Rio Medio Tributary Sec 29	1988	698	3228	**362%**	225	1039	**814**
Rio Medio West Tributary	1328	359	2567	**615%**	173	1237	**1064**
Upper Frijoles	1672	446	1395	**213%**	171	534	**363**
Rio Frijoles SE Tributary	1035	335	361	**8%**	207	223	**16**

Modeled Storm = 25 yr/1 hour; avg 2"

There is also a high probability that life and safety will be threatened by post-fire storm events on private and State lands on the Pecos River downstream from the burned area and on private lands downstream of the burned area on Rio Frijoles and Rio Medio. The probability that streams and rivers downstream of the burned area could be contaminated by hazardous materials and household chemicals from commercial and private properties, and by septic systems and vault toilets during a flood event adds to threats to human life and safety.

Post-fire peak-flows were calculated at Windy Bridge on the Pecos River for both the Tres Lagunas and the Jaroso fires. The Tres Lagunas Fire analysis showed a peak-flow increase of 25%. The Jaroso Fire analysis (which includes both fire scars) showed a peak-flow increase of 8%. The reason for the decrease from 25-to-8% was due monsoonal thunderstorm inputs and the channel lengths. Monsoonal thunderstorms are not likely to simultaneously form & input over both burn areas. Also, time taken for water to travel downslope and down the stream channel (time-of-concentrations) are significantly different which will produce un-synchronized arrival of peak-flows. For the peak-flows to be cumulative, one storm would have to form over the Jaroso fire hours before forming over the Tres Lagunas burn area. Clearly, if the scenario of synchronized arrival was to happen, the peak-flows generated would be nearly the sum of both (Tres Lagunas and Jaroso).

Analysis of the Santa Cruz watershed response (using a 25-year, 6-hour storm) to the Jaroso Fire shows a peak flow of 3926-cfs, 13% peak-flow increase, and delivery of 2633 acre-feet. The Cundiyo bridge on New Mexico State Highway 503 will pass a maximum of approximately 2970-cfs. However, due to the confluence and channel shapes of the Rio Frijoles and Rio Medio, it is likely the bridge will plug with debris and overflow at flows less than the 2970-cfs.

NM Highway 63 is currently the only escape route out of Pecos Canyon. In the event of a catastrophic fire or flood, the highway could be a limiting factor in successfully evacuating this canyon. Consideration of the number of cars that can safely travel and park along NM Highway 63 without causing traffic jams during an emergency evacuation is crucial to the safety of Pecos Canyon residents and visitors. The NM Highway 503 bridge over the Santa Cruz River has been overtopped in the past and is at risk of being overtopped again from potential peak flows and debris from the Rio Medio and and Rio Frijoles watersheds. This bridge provides important access to services in Chimayo for residents of Cundiyo.

The risk matrix below, Exhibit 2 of Interim Directive No.: **2520-2013-1**, was used to evaluate the Risk Level for each value identified during Assessment:

Probability of Damage or Loss	**Magnitude of Consequences**		
	Major	Moderate	Minor
	Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources.	– Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects	Property damage is limited in economic value and/or to few investments; damage to natural or cultural resources resulting in minimal, recoverable or localized effects
	RISK		
Very Likely (>90%)	**Very High**	**Very High**	**Low**
Likely (>50% to <90%)	**Very High**	**High**	**Low**
Possible (>10% to <50%)	**High**	**Intermediate**	**Low**
Unlikely (<10%)	**Intermediate**	**Low**	**Very Low**

The following risks are based on the BAER risk assessment matrix. The Very High and High Risk are unacceptable risk levels due to threats to human life, property, infrastructure and resources, therefore treatments should be applied. For an Intermediate Risk, this could be unacceptable if human life or safety is the critical value, and treatments may be needed. The above matrix only applies to values on NFS lands. Values on other jurisdictions have been assigned a probability of damage or loss but ***not*** a magnitude of risk. Due to the post-fire watershed condition, no vegetative ground cover remains in high to moderate severity burn areas. There is a high presence of hydrophobic soils and steep to very steep slopes, in addition to the erosive nature of the soils within the burn area. These combine to result in excessive erosion, sedimentation, and loss of control of water. These highly unstable conditions put the following values at risk:

Property

Property on NFS lands with high and very high risk ratings include approximately 16 miles of trails within the burned area and an additional 35 miles of trails along channels draining the burned area or downslope of burned areas, a campground and appurtenant facilities (well, toilets) at Panchuela Creek, a footbridge across Panchuela Creek at the Forest Trail 259 trailhead, an inlet control structure, headgate, and beginning of the ditch that irrigates the horse pasture at the Panchuela Creek Administrative site, facilities at the Cowles Pond recreation site including; the parking area, toilets, weather station, pump house, handicap accessible trails, and the lower pond. The Forest Road 555 road crossing of Jack's Creek and the well and pump house down gradient from the road crossing that provide water to the Jack's Creek campground are threatened by flood

flows and debris in Jack's Creek. The concrete box culvert crossing of the Pecos River by FR 555 is also threatened by peak flows and debris.

Hydrologic modeling predicts elevated runoff in Rio Medio, Rio Frijoles, Panchuela Creek, Jack's Creek, and the Pecos River. The increase in peak flows predicted (shown in the hydrologic modeling table above) from areas of high and moderate burn severity, and the loss of channel structure pose a significant threat of flood waters and debris flows that are likely to impact downstream property and infrastructure (e.g. homes, businesses, roads, culverts, bridges and low water crossings.)

Natural Resources

Water

Perennial streams within the Pecos Wilderness have been designated as Outstanding Natural Reource Waters (ONRWs) by the state of New Mexico. Eight miles of streams are identified as ONRWs on the Forests GIS layers within the burn perimeter. Designation as an ONRW triggers the Tier 3 Antidegradation water quality standard (the most stringent of the antidegradation standards). The objective is to maintain the highest water quality possible in these streams. The ONRW's within and below the burned area will experience reduced water quality as a result of the fire.

A 20.5 mile section of the Pecos River, from its headwaters in the Pecos Wilderness to the town site of Terrero, NM, was designated as a Wild and Scenic River (WSR). Maintaining or improving water quality in Wild and Scenic Rivers is a key objective of the Wild and Scenic Rivers Act. A small portion of the far eastern end of the fire burned into the Wild and Scenic corridor and runoff from burned areas within the Panchuela Creek and Rio Mora-Pecos River HUC6 watersheds will degrade water quality in the reach of the wild and scenic river from Beatty Creek to Terrero.

Water draining from the west side of the burned area into the Rio Frijoles and Rio Medio are used for irrigation near the community of Cundiyo and by irrigators in the Santa Cruz Irrigation District who receive water deliveries from Santa Cruz Reservoir. Water draining from the east side of the burned area into the Pecos River is also used for agriculture throughout the Pecos River Basin. Damage to headgates and ditches from floods and debris from the burned area and degraded water quality can be expected.

Soil Productivity and Hydrologic Function

Areas of high and moderate burn severity have impacted soil productivity by removing effective ground cover, organic matter within the topsoil and on the forest floor, and by creating water repellent conditions within the soils themselves. Consumption of the organic layer on the forest floor and severe heating of the upper layer of soil has degraded the seed bank stored in the soil. The most important physical characteristic that affects hydrologic function and stability in the soil is the presence of organic matter, responsible for maintaining soil structure. This loss of structure due to volatilization of organic matter can drastically reduce soil stability. The loss of soil structure increases the bulk density of the soil and reduces its porosity, thereby reducing infiltration and soil

productivity and making the soil more vulnerable to erosion post-fire. Removal of effective ground cover and organic layers combined with loss of soil structure and increased water repellency will further increase erosion. Soil loss occurs through surface, rill, and gully erosion processes. Loss of the soil seed bank, loss of soil structure, and soil loss through erosion processes retards vegetative recovery which, in turn, further impairs soil productivity and watershed conditions.

Hydrologic function within moderately and severely burned areas has also been impacted by loss of the vegetative canopy that intercepts some rainfall, by loss of the organic layer on the forest floor that absorbs some rainfall, by loss of soil structure which reduces infiltration and by development of water repellent soils which also reduces infiltration. Reduced interception and absorption, and reduced infiltration increase runoff from a given rainfall event. Increased runoff increases erosion and the magnitude of peak flows expected from a watershed. The increased magnitude of peak flows increases the threat of flood to downstream life and property.

Increases in erosion can occur on both uplands and in channels. Rills and gullies can form in uplands and channels can scour and downcut. Sediment delivered to channels from rill and gully erosion and eroded from channel banks during scouring and incision processes can deposit in areas of lower energy. Sediment, bedload, and debris deposits can plug culverts and bridges, deposit on floodplains, terraces and other low lying areas such as agricultural fields, clogging ditches, and water supply intakes that can generally adversely affect infrastructure in downstream areas.

Downcutting of stream channels can lower water tables in adjacent floodplain aquifers and result in drying of meadows and mortality of riparian vegetation. Downcutting of stream channels also separates the stream from its floodplain, alters the sediment transport characteristics of the channel, and causes erosion of the channel banks until the channel has widened sufficiently to permit development of a new floodplain at the lowered base level of the channel. Downcutting, widening and deposition processes can destabilize affected channels for many years.

Increases in runoff and erosion, changes in sediment transport characteristics, impacts to channels and floodplains, and impacts to water quality from ash, sediment, and temperature effects, combine to impair hydrologic function.

Impaired soil productivity and hydrologic function affect:

- Human life and safety on or in close proximity to burned NFS lands through increased flood threats,
- Property and infrastructure on or in close proximity to burned NFS lands through increased flooding, erosion, and debris threats,
- Water quality in the Pecos Wild and Scenic River and in Outstanding Natural Resource Waters within the Pecos Wilderness by increasing turbidity and suspended sediment, and by increased water temperature from loss of streamside vegetation due to channel incision and scouring.

Damage to soil productivity and hydrologic function in areas of moderate burn severity with highly erosive soils and areas of high burn severity is very likely to occur, may be irreversible, and is of long term duration.

Critical Habitat or Suitable Occupied Habitat
Federally listed threatened or endangered terrestrial, aquatic, or plant species do not occur within or below the burned area. The Rio Grande Cutthroat Trout, a candidate species for listing, occupies streams within and below the burned area. The populations within and below the burned area are hybridized populations that have interbred with nonnative rainbow trout. A conservation population (greater than 90% genetic purity) exists in Jack's Creek. Water quality impacts from erosion of ash and soil in the burned area and stream channel scouring from increases in peak flows will have adverse impacts on these populations.

Riparian Habitats
While riparian habitat is a vital part of the natural landscape, it is not a BAER critical value. Riparian Habitat restoration post-fire is a long process that the Santa Fe National Forest must undertake and it is not appropriate to address with emergency response actions. These areas will be affected on NFS lands due to changes in peak flows, which will result in channel erosion and damage to, or loss of, the riparian vegetation. Riparian habitat within the stream drainages is expected to be subject to increased channel erosion and scour as well as deposition of ash, sediment and debris from upstream areas of high burn severity. This will cause warming of surface waters due to the loss of streamside shade, resulting in impacts to, or loss of, aquatic habitat for fish and macro- invertebrates.

Cultural Resources
The Santa Fe National Forest contains high densities of cultural resources; however, much of the Jaroso burn is in a lower density area. Five heritage resource sites have been previously documented within or immediately adjacent to the exterior boundary of the 11,141 acre Jaroso Fire. Of the five sites, one site is within the high severity burn areas, four are in the low to unburned severity areas. The fire or suppression related activities may have exposed additional sites that have not been previously documented, a complete survey of the burned area would be necessary to account for all sites on the Jaroso Fire.Invasive Plants
Small infestations of Bull Thistle may exist within the burn area and are likely to expand by 25-30% post fire as they out-compete native regeneration. However as very limited 'on the ground' suppression activities took place new infestations are unlikely. Opportunities for monitoring and treatment of infestations will be very limited due to the ruggedness and remoteness of the area as well as the dangers presented by bug kill and burned hazard trees.

Emergency Response Action Objectives:

The NFS values are at-risk from significant increased peak flows, debris torrents and excessive sedimentation. Peak flows are predicted to increase from two to seven times across the burned area. Soil erosion can increase by over an order of magnitude on the burned area. Residences on private land within the Pecos River, Rio Medio, and Rio Frijoles floodplains have a high probability of being affected by sediment, debris torrents, and flooding from increased peak flows. NM Highway 63 and adjacent private roads, along with associated infrastructure, may be overtopped by flood waters and require maintenance or repair. Culverts may overtop and fail due to increased peak flows and/or from being plugged by floatable debris. Bridges may be weakened or washed out. Public use may be hazardous because of falling trees, flash floods, and falling debris. Infrastructure delivery systems may be damaged by hillslope erosion and/or gullying. Residential wells have a high potential of being inundated with storm runoff, causing health and safety issues.

The objective of recommended response actions is primarily to mitigate the threats to life and safety on NFS lands, NFS infrastructure, and NFS-managed natural and cultural resources. These recommendations are detailed below. The BAER team has shared its analysis and findings regarding the potential of impacts to life and safety, property, and resources on State and private

lands with a wide group of cooperating agencies in order to help these agencies to make their own recommendations for actions. The BAER team has worked with various groups to ensure that these same messages are disseminated to the area residents and general public.

Recommendations/Response Actions (Treatments)

Land Response Actions:
The Jaroso burn scar is the result from a remote, natural ignition which burned entirely in the wilderness. Spruce-Fir forests that have not been subjected to frequent fire, or have not had a fire within the last 100 years, typically burn at high severities that result in stand replacement conditions due to dense forest vegetation, including ladder fuels, and excessive fuel loads of coarse woody debris (Margolis et al. 2007, Fulé 2003). Long interval stand replacement fire is the natural fire regime for spruce-fir communities in the Southern Rockies. If there are not substantial Values at Risk in close proximity identified as a result of this fire, it is very unlikely that emergency response actions would be recommended. In this case the burn scar is buffered by several miles of unburned wilderness. As stated in *the BAER Guidance Paper, Treatments in Wilderness* avaialble in the Fire Management Toolbox on Wilderness.net " when wilderness is involved in burned area emergenecy stabilization assesments , 'no treatment' is always the prefered action. FS policy provides for two situations where furhter investigation may be warrented: 1) unnatural loss of the wilderness resource, or 2) to protect life, property or other resource values outside of the wilderness."

BAER directives for Emergency Response Actions (FSM 2523.2) give guidance to consider emergency response strategies prior to prescribing BAER actions and measures. Emegency response strategies are given in the following preferential order: natural recovery, administrative closures, and other measures. In light of these directives, the following emergency response actions for the Jaroso Fire are recommended: Threats to human life and safety on NFS lands can be mitigated by enacting forest closures. Threats to NFS property can be minimized by implementing point protection response actions outside the wilderness area. Threats to water quality, soil productivity and hydrologic function can be seen as a part of natural recovery.

The Minimum Requirements Decision Guide was used to evaluate the appropriateness of land response actions on the Jaroso fire. The determination of the analysis found no administration action was necessary in the wilderness as a response to the fire.

Channel Response Actions:
Channel response actions are necessary in order to reduce the threat to life and property downstream due to dislodged woody debris that could become projectiles during a flood event. In addition, actions are necessary to reduce the threat to downstream life and property due to breaches of debris jams, and reduce the threat of severe damage to valuable Forest Service resources and infrastructure, floatable woody debris will be removed from 1.5 miles of the Panchuela Creek and Jack's Creek channels.

Protection/Safety Response Actions:
Implementation of administrative closure orders for the entire burn area and trails accessing the burn area are recommended for at least two years depending on conditions. Warning and closure signs should be installed at wilderness trail heads. Closure and warning signs are designed to warn the public of the the dangers of hazard trees, flood, and debris flows. Recreation sites recommended for closure include: Panchuela CG, Cowles Pond and FR 555 entering Jack's Creek CG. These closures should remain in effect for a minimum of the next two monsoon seasons, after which conditions should be reassessed at the discretion of the District Ranger.

Forest infrastructure in within recreation sites must be prepared for elevated flows of ash and debris laden waters. This includes removing floatable objects and providing point protection for permanently installed improvements. Vault toilets in Panchuela CG and Cowles Pond that have the potential to flood should be pumped to prevent human waste from entering the river.

Storm patrols will be scheduled for immediate monitoring after significant rain events targeting the culverts on FSR 555 for debris and sediment removal. Storm patrol for debris jams: 2 teams of 2 employees times 10 storm events.

Jaroso BAER treatments will be monitored to determine:

1) Treatment effectiveness:
Point protection response actions should be monitored on an annual basis.

2) Monitoring undesirable results:
Monitoring for undesirable outcomes (i.e., noxious weed populations) will be limited to aerial surveys during effectiveness monitoring flights due to the remoteness and risk of entry into the area Noxious weeds have been identified by the Chief of the Forest Service as one of the top four threats to National Forest System lands.

Conclusion
The Jaroso Fire burned an area approximately 17 square miles in the headwaters of the Rio Medio, Rio Frijoles, Panchuela Creek, and Jack's Creek. Roughly 66% of this area burned at high and moderate severity. Canyons and draws within the burned area, although remote, drain into populated areas. The residences, infrastructure and commercial properties below the burn run a very high probability of experiencing post-fire effects during the next 2-3 monsoon seasons. Since this area attracts many visitors and summer residents, and the threat to downstream areas in these watersheds is very high.

The treatments, including rec site point protection, channel clearing, closure and hazard warning signing, etc. can be implemented immediately upon receiving funding.

The BAER team wishes to remind the Espanola Ranger District, Pecos/Las Vegas Ranger District, and Santa Fe NF that these are mitigative measures only. Efforts can and will be expended in putting these treatments into place, but both sedimentation and increased flows as a result of the

fire is highly likely. Monitoring the effectiveness of the treatments will be critical, and the Forest will need to be aware of the continued need for specialists and Forest personnel both during implementation and post- monsoon season. In addition, personnel will be needed to patrol portions of the burn area after high intensity rainfalls during the monsoon season. Due to the continuing risks associated with the Jaroso fire, the BAER team has recommended maintaining a public information team for continued outreach. This team should continue public meetings, work with public officials and cooperators, and provide critical updates on emergency response action work.