# Whitewater Baldy Complex

## Burned Area Emergency Response (BAER) Team
## Executive Summary

**Glenwood, Reserve, Black Range, and Wilderness Ranger Districts**
**Gila National Forest**
**Silver City, New Mexico**
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# Executive Summary

## Introduction

In May and June of 2012, the Whitewater Baldy Complex burned approximately 290,000 acres (117,359 hectares) of the Glenwood, Reserve, Wilderness, and Black Range Ranger Districts of the Gila National Forest. The Fire started as two separate lightning strike fires near Mogollon Baldy and in the headwaters of Whitewater Creek in the Gila Wilderness east of Glenwood NM. The two fires joined in extreme fire behavior on 5/23/2012 to form the Whitewater Baldy Complex. The fire severely burned a large tract of land across the Gila National Forest and the Gila Wilderness, including the headwaters of Whitewater Creek, Mineral Creek, and Gilita Creek that drain directly into the communities of Glenwood, Alma, and Willow Creek respectively. All of these population centers are situated in the floodplains of drainages affected by the fire. Much of the vegetation, duff and soil that once served to slow and hold water were eliminated as a result of the fire. Steep slopes further aggravate the situation. In fact, the Whitewater Baldy Complex Fire BAER team has modeled and predicted post-fire peak flows for a 25 year 6 hour precipitation event at 140 times the pre-fire flow in Willow Creek. Post-fire flows from a 25 year precipitation event are expected to increase 2-4 times in most of the affected drainages. Additionally, pre-fire erosion rates commonly less than one ton per acre have been modeled post-fire to range from between 20 to over 100 tons per acre. Changes in runoff response compounded by sediment bulking are issues of serious concern for downstream values of human life and property.

Severe damage to critical natural resources, including soil productivity, water quality, watershed health, threatened and endangered species, and critical habitat has resulted from this fire and irreversible damage is expected if management action is not taken in the three watersheds mentioned above, as well as in the Headwaters of the West Fork Gila River, Canyon Creek-Middle Fork Gila River, and Upper Mogollon Creek, Mineral Creek , and South Fork Negrito sixth code watersheds,. The range of post-fire erosion rates greatly exceeds the dominant tolerable soil loss of 1 to 3 tons per acre. In the wilderness areas proposed for treatment the West Fork and Middle Fork of the Gila, as well as Whitewater Creek and Mogollon Creek, are in nonattainment of state water quality standards (303(d) listed) and are also designated Outstanding National Resource Waters (ONRW) which are subject to higher water quality standards. There are an additional sixteen ONRW streams in these watersheds and approximately ten ONRW wetlands. The burn severity was high throughout most of the mixed conifer vegetation communities at the tops of several drainages.

As of 6/17/2012 the fire was 75% contained and had burned over 290,000 acres. As the fire suppression team worked to contain the fire, a Burned Area Emergency Response (BAER) team was assembled to assess the severity of the Whitewater Baldy Complex to assess threats to life and property due to the fire or post fire consequences, and to determine which emergency treatment would be recommended. The BAER team is an interdisciplinary group of specialists whose job is to identify and assess values at risk from a fire's "after effects," such as erosion or flooding.

The Whitewater Baldy Complex BAER team was composed of specialists in various fields, including hydrologists, soil scientists, wildlife biologists, geologists, ecologists, suppression team liaison, engineers, cultural resources specialists, and geographic information specialists. From June 2nd to June 18th, 2012, the team conducted field surveys, modeling and analysis of data and prepared reports for the emergency assessment of post-fire resource conditions. The purpose of the emergency report was to assess values at risk on the Gila National Forest and surrounding areas from the Whitewater Baldy Complex fire, and to submit a funding request to secure money for implementing treatments that could potentially lessen threats to life, property, and resources from indirect fire effects such as flooding and debris flows.

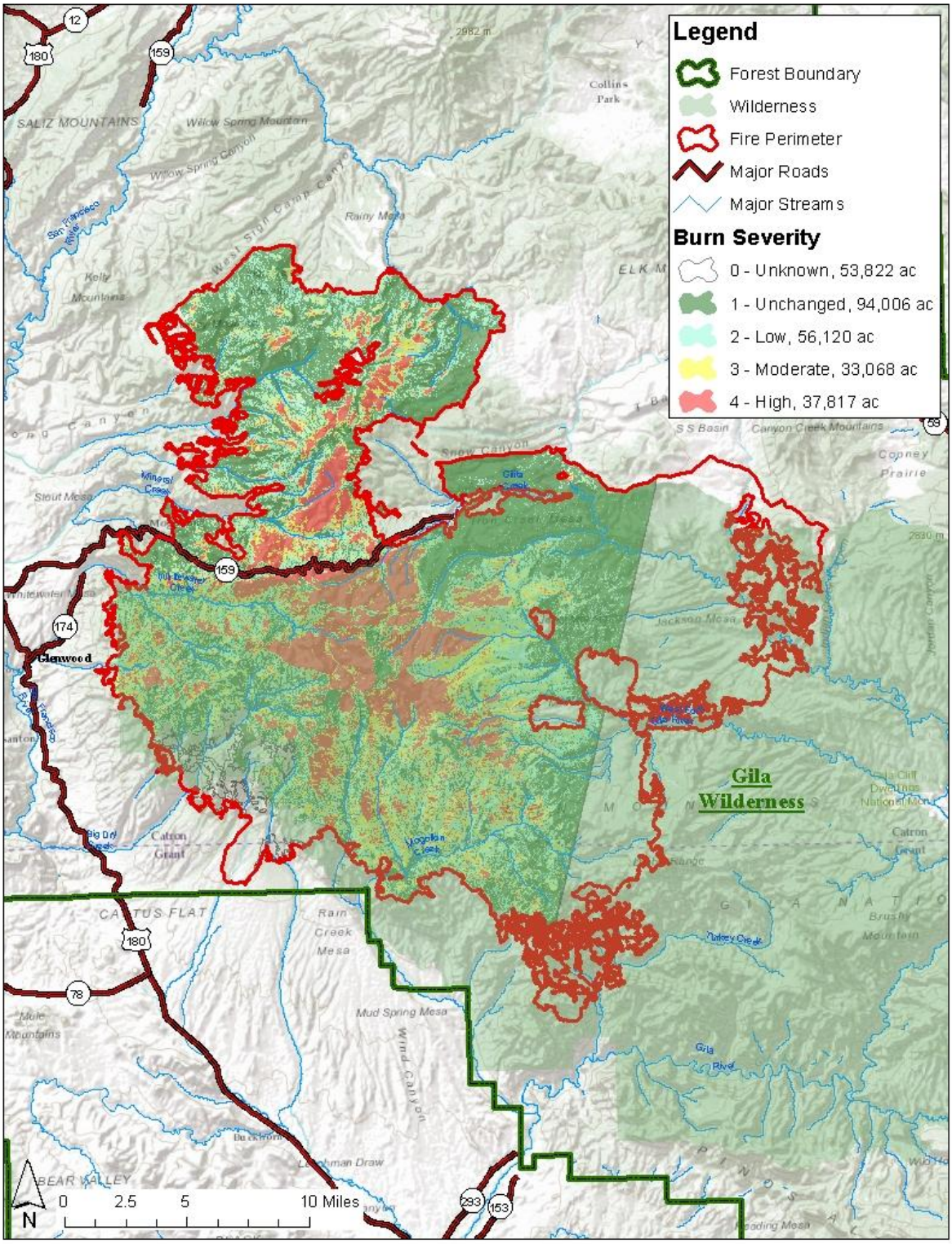
Burn Severity of the Whitewater Baldy Complex

Burn severity measures the effect the fire had on the vegetation and the soil. High severity burns can result in hydrophobicity of the soils, sterilization and consumption of the seedbank, removal of all vegetative ground cover, complete overstory removal and increased water flows in draws and canyons.

The following table indicates the acres of land within each burn severity class within the fire perimeter.

| Burn severity class | Acres burned in each class | Percentage of fire area |
|---|---|---|
| High | 37,817 acres | 14 |
| Moderate | 33,068 acres | 12 |
| Low & Unburned | 150,104 acres | 55 |
| Unknown | 53,795 acres | 20 |
| Total Acres | 274,784 acres | |

(Figure 1. Burn severity by acreage These figures are based on the burn severity map data which was derived from the 6/5/2012 BARC map. It does not cover the entire final burn area or reflect burn severity for internal areas that continued to burn after the BARC map was created. Unknown acres represent areas within the burn perimeter at the time the BARC imagery was collected but did not get picked up by the satelite sensors.)




**Burn Severity map. Burn Severity data is based on 6/5/2012 imagery, fire perimeter is from 6/12/20112**

## Values at Risk

The Whitewater Baldy Complex, located east of Glenwood NM, burned mainly on National Forest land with about 1,000 acres of Private lands burned. The fire burned in Pinon/Juniper woodland, Ponderosa Pine forrest, Mixed Conifer Forest and Alpine Grasslands. The vast majority of high severity burn was as a result of extreme fire behavior in stand replacing burns in mixed confier. The terrain within the burned area is steep to very steep with a very high potential for excessive erosion and loss of control of water. Team hydrologist's models show a high probability for significantly increased runoff flows from storm events.

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

| **Probability of Damage or Loss** | **Magnitude of Consequences** | | |
|---|---|---|---|
| | Major | Moderate | Minor |
| | 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 fire left no vegetative ground cover and hydrophobic soils. The steep slopes and erosive nature of the soils within the burn area combine with the fire effects to result in excessive erosion sedimentation, and loss of control of water. These highly unstable conditions put the following values at risk, and were confirmed through the assessment using the risk matrix:

## Human Health and Safety

There is high risk of loss of life on Forest Service and private land downstream of the burned area. Individuals who may find themselves in portions of the burn area along any of the drainages or roads affected by fire are at risk during storm events. The drainages affected by high burn severity will be subject to higher than usual run-off and debris flows which could cause injury or death. Hazardous materials released from burned homes in the Willow Creek subdivision could be washed downstream towards the Middle Fork Gila River. Bridges, railings and associated infrastructure from the Catwalk Recreation area have the potential to be washed down into the community of Glenwood and the highway 180 Bridge causing damage.

## Property

There is a high risk of public and private property damage due to storm runoff and debris flows. Hydrologic modeling predicts extreme runoff in Willow Creek with post fire flows being generated at **140 times** higher than pre-fire flows from a 6 hour 25-year storm event. Flows were modeled to be 3.2 times higher in Whitewater Creek and 2.7 times higher in Mineral Creek following a 25 year storm event. Peak flows of 2-4 times pre-fire flows can be expected in drainages associated with high burn severity across the burn area. The increase in peak flows resulting from areas of high burn severity, and the loss of channel structure pose a significant threat of flood waters and debris flows that will impact downstream property and infrastructure (e.g. homes, businesses, roads, culverts, bridges and low water crossings). The Willow Creek subdivision will be severely impacted as well as the community of Glenwood and private property adjacent to Alma. Residences on private land as well as commercial properties and agricultural lands are at risk from sediment and debris torrents from increased peak flows. Several bridges along U.S. Highway 180 between Cliff NM and Reserve NM are likely to be damaged. Some downstream effects may be experienced at the outlet of Mogollon Creek and near the confluence of West Fork and Middle Fork Gila River.

## Natural Resources

### Soils

There is a high risk of increased levels of surface soil erosion and sediment delivery predicted to result as an effect of the burn severity within the Whitewater Baldy Complex burned area. Modeling shows that erosion will increase from pre-fire levels just over 0 tons per acre to 20-30 tons per acre average across high and moderate burn areas, with the highest modeled values reaching over 100 tons per acre. The initiation of new surface erosion sources from moderately steep and steep slopes pose an extreme threat to long-term soil productivity, increased risk of water quality impacts, and threats to downstream resources and property from bulking of flood flows.

Several areas of Whitewater Creek were identified as being prone to mass wasting and landslide in a 1995 watershed analysis report. The analysis states that "If there is enough loss of stored channel deposits or down cutting of the channel, it may lead to renewed landslide activity." These findings were based on current conditions and normal stream flows. With the modeled flood increases for post fire storm events, the potential for landslides greatly increases.

### Water Quality

Water quality will be greatly degraded due to ash and sediment deposition post fire in all HUC 6 drainages affected by the burn. Several streams were already in non-attainment of state water quality standards within the burn perimeter prior to the fire.

### Outstanding National Resource Waters

ONRWs are water bodies designated to receive special protection by the Water Quality Control Commission under New Mexico State water quality standards and the federal Clean Water Act. Degradation must be minimized in terms of degree and duration. 18 designated wetlands and 54 streams (294 miles) have been impacted by the fire and will be impacted by ash, sediment, and debris flows in subsequent rain events.

### Hydrologic Function

Hydrologic function will be greatly degraded due to the loss of vegetative ground cover and erosion. Recovery of watershed condition can take up to 25 years to stabilize.

Riparian Habitats

Riparian areas are at high risk on NFS lands due to changes in peak flows, which will result in channel erosion and damage or loss of the riparian vegetation. Riparian habitat within the stream drainages are 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. Loss of streamside shade will result in warming of surface waters which can result in impacts to or loss of aquatic habitat for fish and macro- invertebrates.

Threatened and Endangered Species

Several threatened and endangered species and their habitat have been greatly impacted by this fire including:

- Mexican Spotted Owl
- Mexican Gray Wolf
- Gila Trout
- Gila Chub
- Loach Minnow
- Spikedace
- Headwater Chub
- Chiricahua Leopard Frog
- Narrow-headed Gartersnake
- Gila Springsnail

Recreational Fishing Streams

Both cold and warm water recreational fishing opportunities are somewhat limited on the Gila NF. Higher elevation cold water streams that are not inhabited by native Gila trout are occupied by nonnative brown, rainbow, and brook trout. Use of these streams is variable due to level of access, with those having road access receiving heavier use. Many of these fisheries provide some economic input to local communities such as Glenwood, Gila Hot Springs, and Reserve. Game fish populations in these streams, especially trout, require clean water and sufficient stream cover and pool habitat for survival. Many of these streams will be negatively affected by post fire runoff and angling opportunities will be diminished.

Invasive Plants

An existing bullthistle population located in the 1997 BS Fire poses a high risk to new adjacent fire disturbance areas, as a seed source and specific threat. Generally a 25% increase in non-native invasive plant species is seen after a major wildfire event

## Cultural Resources

The Gila National Forest contains high densities of cultural resources, however, much of the Whitewater-Baldy Complex burn area is in higher elevations (7500 feet and above) which are considered low density. Sites in higher elevation tend to be historic properties. Increased flows of sediments and hazard trees pose a threat to archaeological sites and historic properties.

There are approximately 168 archaeological sites located within the burn perimeter and 15 archaeological sites or historic properties that are eligible or considered eligible for the National Register of Historic Places and have a high risk value associated with them. The types of sites associated with the high risk category include historic cemeteries, historic cabins, prehistoric roomblocks, and cliff dwellings.

## Emergency Treatment Objectives:

- Reduce impacts to soil productivity and hydrologic function
- Reduce the threat of downstream flooding, erosion, and debris.
- Reduce the threat of hazard trees to safety of property owners, roads, and treatment crews
- Reduce the threat to critical aquatic habitats and populations
- Protect National Forest investment in its road infrastructure and minimize impacts to the road and highway infrastructure of other jurisdictions.

## Recommendations/Treatments

The following is a summary of treatments recommended for the immediate emergency. Treatments were prescribed based on the potential for damaging floods, loss of soil productivity; to minimize soil erosion and loss of control of water as well as for the mitigation of and protection against loss of life, property and critical infrastructures.

1. Stabilize soil and provide immediate protection from rainfall by aerial mulching 16,000 acres of high severity burn areas in three watersheds in watersheds draining towards communities and populated areas to mitigate flooding and sedimentation effects to property owners, residences and high value commercial properties, protection of municipal watersheds, and protection of cultural and natural resources. This will assist in reducing erosion and maintaining long term soil productivity.

2. Aerial seed approximately 26,200 acres of high burn severity. A majority of the high to moderate burn severity acres have little to no potential for needle cast to act as protective ground cover and have no remaining seedbank. Application rates will be 15 seeds per square foot where seeding will be combined with mulching (16,000) and 20 seeds per square foot where no mulch is applied (10,200 acres). The seed mix is comprised of annual barley, Arizona fescue, muttongrass, prairie junegrass, and mountain brome. This seed mix has a high percentage of annual barley which is a quick growing non-persistant annual intended to provide protective ground cover in a short period of time. This mix also has native species in to assist in giving the burned area a jump start in native grass recovery.
3. Place high severity burn areas and affected trails in an administrative closure status to prevent injury to the public from hazard trees, flooding, debris flows, and potential entrapment within the burn area.
4. Place closure gates and post warning signs at key access points of the burn area to protect the public from entering the burned area and preventing exposure to the hazards of the burned area.
5. Within the Catwalk Recreation area remove infrastructure (bridges, walkways, handrails and picnic ground structures) that are likely to catch floatable debris. Monitor debris jams that may result in further risk to the downstream community of Glenwood.
6. Mitigate damage to 67 miles Forest System roads within the burn area by installing additional drainage features such as rolling dips, armoring outslopes, and preparing culverts, side ditches and roads to handle increased modeled storm runnoff.
7. Clear and stabilize 3 trails to ensure access to the fire lookout and associated National Forest radio repeater on Mogollon Baldy. This repeater is an essential component to the communication network within the Gila National Forest, providing for the safety of FS employees.
8. Pump 28 vault toilets along streams that will be affected by post fire flows. This is intended to prevent contamination of waterways and prevent risk to public health.
9. Stabilize Heritage sites that consist of archaeological sites, historic buildings, and traditional cultural properties (TCPs) from post fire conditions relating to storm runoff and hazard tree impacts.
10. Maintain FS levies in Mineral Creek and Whitewater Creek in coordination with Catron County.

**Protection and Safety – USGS ALERT precipitation monitoring systems**

Due to the potential threats to human life and safety from post-fire conditions that exist within the Whitewater Baldy Complex, the BAER Team advises that Federal, State, County, and local collaborators seriously consider the installment of ALERT precipitation monitoring systems.

Sites in key watersheds have been identified on National Forest Lands that would be appropriate for the installation of these systems. One site is on Hummingbird Saddle, above the head of Whitewater Creek, Willow Creek, and Iron Creek. A second site is recommended on Bearwallow Mountain to cover headwaters of Mineral Creek and the Northern end of the fire. A third site is recommended for Mogollon Baldy for the southern end of the Whitewater Baldy Complex. The ALERT system can measure rainfall and duration to allow early detection of hazardous conditions. It is also recommended that Whitewater Creek and Mineral Creek have radar flow gauges installed to monitor high runoff events. The National Weather Service is responsible for setting thresholds relative to precipitation, and issuing flashflood warnings. The ALERT communication system can provide local emergency networks with direct contact via phone, cell phone, and satellite to allow for real-time tracking of conditions via internet connections. The NRCS and New Mexico State Department of Homeland Security and Emergency Management (NMDHSEM) would be responsible for placing, maintaining, and operating the equipment. The BAER team bases this recommendation on the high burn severities as a result of the fire, the potential post-fire conditions, and the urban interface values at risk below the burn area.

## Monitoring

Whitewater Baldy Complex B.A.E.R. treatments will be monitored to determine if 1) treatments were implemented to expected standards; 2) treatments were successful (effective ground cover, road damage mitigation, resources mitigation); 3) treatments resulted in undesirable results (noxious weeds).

Monitoring treatment implementation will include verification of proper seeding and mulching rates as it is being applied to the ground. This will allow any adjustments, if necessary to ensure proper and appropriate coverage of the treatment to the affected area. Initial photo points will be established in this monitoring endeavor. In addition, monitoring by aquatic biologists will be done along affected streams to determine if treatments were effective in preventing loss of critical fish populations as well as monitoring general habitat to determine if treatments precluded damage that would render habitat unsuitable.

Monitoring treatment success will entail follow-up monitoring for the seeding and mulching to ensure effectiveness. This will be done post monsoon season and again after snow melt in the spring, as will the post treatment monitoring of the recreation sites, the roads, and the non-native invasive species locations. In addition, storm patrols have been outlined, to have immediate monitoring after significant rain events, reviewing affected roads to ensure those treatments are functioning as planned and identify any debris flows requiring removal to protect FS roads.

## Conclusion

The Whitewater Baldy Complex burned an area of approximately 450 square miles across four Ranger Districts. High and moderate burn severity covers 70,000 acres or 26% of the burn area.

Key canyons and creeks in this burn area drain directly into communities and residential areas. The number of residences, infrastructure and commercial properties below the burn run a very high risk of experiencing effects during the monsoonal season from the burn area

The use of aerial seeding and mulching has been found to be very successful in effectiveness of establishing cover on high to moderate severe burn areas. The other treatments, including roads, trails, cultural heritage sites and channel treatments, can be implemented immediately upon receiving funding.

The BAER team wishes to remind the Gila National Forest that these are mitigation 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, are highly likely. Monitoring of 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 monsoons. In addition, personnel will be needed to patrol portions of the burn area after high intensity rainfalls during the monsoon season.