Whitewater Baldy Fire - by Jose Iniguez

If you attended the AFE conference last March and went on the Los Conchas field trip you may remember hearing that managers in the Jemez Mountains were actually expecting another big fire year in 2012. This was because the fire-scar fire history records contained a number of occasions of back-to-back fire years associated with back-to-back drought years. Although this pattern never materialized in the Jemez, it did in the Gila where the 2011 Miller fire, which burned 88,000+ acres, was followed by the 2012 Whitewater-Baldy (WWB) fire. It became the largest fire in New Mexico history at nearly 300,000 acres.

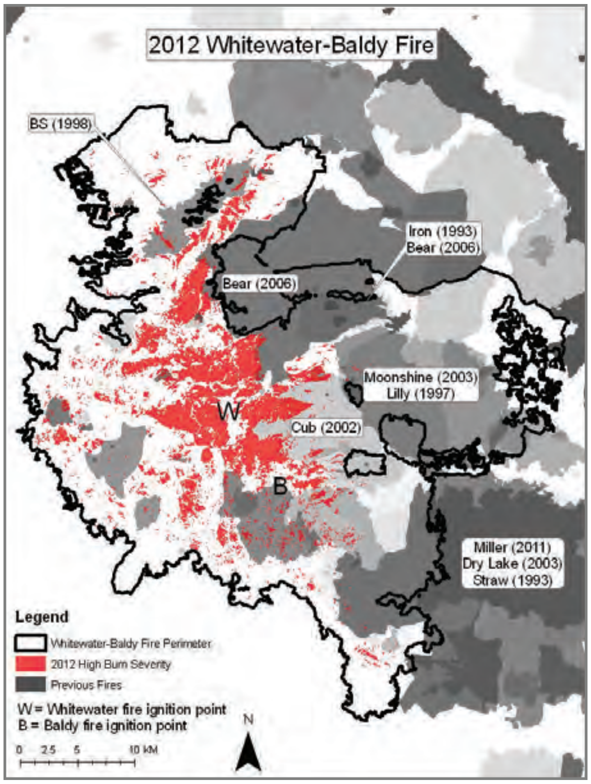
My first experience in the Gila was in the summer of 2003. As a graduate student at the University of Arizona Tree-Ring Lab, I joined Ellis Margolis in the field as part of an effort to reconstruct upper elevation fire regimes in the Mogollon Mountains of the Gila Wilderness. We began our backpacking trip from the Little Dry Creek trailhead on the southwest side of the Gila. We climbed all day and as we reached our destination, Black Mountain, we got caught in a cold, heavy rainstorm at 10,000 ft. The plan was to camp for 4-5 days and collect quaking aspen and spruce-fir age samples, but I was dreading the task given the conditions. As we climbed over a small ridge, we saw this old cabin in the distance. We were in the middle of the Gila Wilderness and given the conditions the cabin seemed like a mirage. It turns out that this was one of a series of historic cabins in the Gila high country that we knew nothing about but were sure glad to find it. The cabin was pretty basic but had a roof, wood burning stove, and nearby spring. Needless to say it was a lifesaver at that point. For the next week, we hiked the trails along the highest ridges in the Mogollon range coring aspen and spruce stands (picture 1). On one of those days we went to visit the Mogollon Baldy Lookout from which we could see this vast road-less landscape. It was there that I fell in love with wilderness and, in particular with the Gila. After that trip, I became more interested in the Gila and realized it was a great location to study the impacts of fire at landscape levels due to its management history. Since the 1970s, the Gila NF has been part of a restoration effort focused on restoring fire as a process. In many ways the WWB fire was a good test to assess the benefits and limitation of a managed fire program such as the one in the Gila.

Picture 1. Ari Fitzwater coring an aspen tree in the Gila wilderness. Notice the dead Douglas-fir tree which represent one of the remaining trees of the stand that was "replaced" by aspen after a high severity pre-settlement wildfire. Photo courtesy of Ellis Margolis.

Picture 2. Mogollon Baldy looking west. The Baldy fire started just south of the lookout and was initially burning within an area that had burned in 1996 and is now dominated by aspen and scattered pines. Photo courtesy of the Gila National Forest.

The Play-By-Play

The WWB was of course initially two separate fires (map 1). The Baldy fire was discovered first burning among previously burned patches in steep terrain within the Wilderness district (picture 2). The Whitewater fire was discovered a few days later, although it was probably started by the same weather system. Both fires were managed under full suppression, but the Whitewater fire clearly had the most potential given



Map 1. Whitewater-Baldy fire high severity patches overlaid on top of past fires in the Gila National Forest. High severity patches are based on the BAER burn severity map which was derived from two BARC datasets from June 05 and June 18 2012.

that it was burning in an area that had not burned for more than a century. Eventually the Whitewater fire which started near the bottom of the drainage, made it to the top of the ridge just in time for two of the windiest days of the late spring. On May 23 2012, the Whitewater fire was pushed east by strong winds and heavy fuels, just as the Baldy fire also made a push north. As a result the two fires merged and burned 48,000 acres in that one day including several structures in Willow Creek (picture 3). Although the Gila NF has been managing fires for decades, much of the upper elevation mixed conifer, aspen, and spruce-fir forest in the Mogollon range had not burned for a century. According to Albert Flores, fuels specialist on the Glenwood District, fires in the monsoon season had been allowed to burn there in the past, but they would burn for weeks and only get a couple hundred acres. Both of these fires, however, were now burning six weeks prior to monsoon season. After back-to-back below average precipitation winters, these were optimal conditions for fire spread in high elevation forests.

As the WWB spread, it encountered a number of old burn scars (perimeter of prior fires). For example, as the two fires merged and spread north and east, the WWB burned towards the 2002 Cub fire and the 2006 Bear fire. As the WWB burned through the 2002 burn scar, severity decreased from high to low and moderate. As the WWB fire moved northeast, it headed for the forest burned in the 2006 Bear fire. Local Reserve FMO Shilow Norton predicted the 2006 burn scar would not burn again, and his prediction got tested. As it happened, the 2006 Bear fire had large patches of stand-replacing fire with most of the dead trees still standing; therefore the WWB fire did not have enough fine fuels to carry and "dropped on its face," according to Shilow.

Unfortunately, the WWB "bounced off" the 2006 burn scar and made a significant run north towards Bearwallow Mountain leaving patches of high severity in mixed conifer dominated forests. Beyond Bearwallow Mountain, the WWB burned into the 1998 BS burn scar, although the fire was spotty within the 1998 fire perimeter (picture 4). Eventually fire spread towards the north was halted with help from the Eckleberger prescribed fire which had been conducted a couple of years earlier by Pete Delgado, Toby Richards, and company from the Reserve District.

Picture 3. High burn severity patch in Willow Creek close to where several structures were also burned. Photo courtesy of Craig Allen.

As the fire spread eastward, it eventually crossed the west fork of the Gila River and into Iron Creek Mesa, Jerky Moun-

tain, and Lilly Mountain where the WWB fire was more of a maintenance burn. For most of these stands, the 2012 fire was the third or fourth fire in the last three decades. Therefore, these areas contain some of the most resilient ponderosa pine forests in the Southwest (picture 5). As a result, the soil burn severity map shows these areas as low to very low burn severity, meaning minimal change in the overstory. This general area is also the site for a series of fuel, stand structure, and age structure studies that my colleagues and I had recently initiated. We had collected data prior to the 2012 wildfire and are now pursuing funding to collect post-fire data given that pre and post wildfire data is not readily available. Eventually, the southeast end of the WWB fire burned into the fresh burn scar from the 2011 Miller fire. These two fires combined to burn nearly 400,000 acres in back-to-back years.

Picture 4. This area was burned high severity by the 1998 BS fire and then re-burned in the 2012 Whitewater-Baldy fire, although the latter was very patchy. Photo courtesy of Craig Allen.

Picture 5. Ponderosa pine forest in Iron Creek Mesa after the 2012 WWB fire. This fire was the third surface fire to burn these stands since 1970. The lack of accumulated latter fuels makes these forests resilient for stand-replacing fires, therefore these forests function very similar to historical conditions. Photo courtesy of Craig Allen.

The Analysis

As a fire ecologist it annoys me when people generalize wildfire as bad or worse when mass media portray wildfires as devastating or destructive. As many of us have seen, even the most severe wildfires create a mosaic of burn severities. As fire professionals we all tend to evaluate a fire using our own criteria. Having a fire history background, I tend to use historical fire regimes and vegetation as my main criteria. In mid-July I planned a field trip to the WWB fire and was joined by Craig Allen (USGS), Jorge Castro (Spanish visiting scholar), Collin Haffey (Bandelier NP), Park Williams (LANL), Neil LaRubbio (High Country News), Albert Flores (Gila NF), Pete Delgado (Gila NF), Toby Richards (Gila NF), and Shilow Norton (Gila NF). Many of the Gila fire folks were actually very pleased with the fire in general and believed that it would have been much larger if not for the old burn scars that either slowed or stopped the fire's spread.

The WWB was a complex fire in many ways. For example, most of the large high severity patches were concentrated at elevations above 8500 ft. (picture 6). Historically high elevation such as spruce-fir, experienced infrequent stand-replacing fires. From the data we collected on my first trip into the Gila, Margolis and others published a paper in 2011 documenting past high severity fires in

Picture 6. Upper elevations of Willow Creek where most of the large high severity patches were concentrated. This area burned on May 23 which was one of the windiest days of the Spring. Photo courtesy of Craig Allen.

some of the areas burned in the WWB fire. Using post-fire aspen stands at the mixed-conifer/spruce-fir ecotone, they estimated historical stand-replacing patches of up to 700 acres (285 hectares) (picture 7). They found that the highest elevation spruce-fir hadn't burned for over 300 years, but potentially represents older, and even larger (>2700 acres or 1100 ha) stand-replacing fire patches. For comparison, some of the high severity patches in the WWB fire were as large as 5,000 acres (2,000 ha); larger than the historical estimate. One potential reason for this apparent increase in high severity patch size likely relates to fire exclusion and increased density in the drier mixed conifer forests. That is, dry mixed conifer forests generally had a mixed fire regime composed of both surface and small (<500 acres) stand-replacing fire patches. Although the Gila NF has had the most actively managed wildfire program in the Southwest, there are still many areas that have not burned in the last century, particularly mixed-conifer forests. This has led to more homogeneous landscape fuel conditions that can now support much larger high severity patches that historically occurred. That is, the high severity patches in the WWB fire may have been larger than historical patches because they burned not only spruce-fir and mesic mixed conifer-aspen types but also included drier mixed-conifer forests (picture 8). It is important to note that most of the larger high severity patches in the WWB were assisted by strong winds. The WWB fire also burned as a backing fire as it spread southwest against the prevailing winds. Here the WWB created a burn mosaic among mixed-conifer forests, with smaller high severity patches much like the historical patterns.

Picture 7. This area was burned high severity by the 1998 BS fire and then re-burned in the 2012 Whitewater-Baldy fire, although the latter was very patchy. Photo courtesy of Craig Allen.

Picture 8. Landscape view of Willow Creek. Historically only the higher elevation spruce-fir experienced stand-replacing fire however the high severity patches associated with the WWB also included many of the mixed-conifer forest and were therefore much larger that historically occurred. Photo courtesy of Craig Allen.

Once the WWB fire reached the lower elevation pine country it became more of a maintenance burn. That is, within the Gila Wilderness much of the ponderosa pine forests have burned two to three times since 1970. In the last couple of year, I was also part of a project looking at the impact of managed fires in the Gila in areas within and outside the WWB fire perimeter. Those findings where published In 2011, and concluded that in ponderosa pine forests the most beneficial aspects of fires resulted from moderate burn severity or multiple low severity fires. The WWB fire should therefore help maintain the open nature of pine forest and increase their resilience for stand replacing fires and other disturbances. Moreover, because many of the areas within the Gila wilderness were never harvested, they represent one of the last remaining reference sites both in terms of forest structure and functioning fire regimes for ponderosa pine in the Southwest. Despite the relatively restored fire regime in these lower elevations, the WWB fire did create some small (<100 acres) stand-replacing pockets in drainages and north facing slopes (picture 9).

Picture 9. Looking south from Iron Creek Mesa towards the Jerky Mountains. Although burn severity was mainly low in this pine dominated landscape there were isolated torching along drainages and north slopes. Photo courtesy of Craig Allen.

The Aftermath

According to inciweb.org, post-wildfire BAER treatments associated with the WWB fire included 26,200 acres of seeding, 15,000 acres of which were also mulched. It was estimated that this effort would take 780 semi-trailers to transport the straw to the aerial mulching operation. In addition, flooding in Whitewater Canyon was expected to be so great that parts of the Catwalk (suspended trail system) was removed to avoid blocking the expected floodwaters. Fortunately, flooding this summer has been minimal on Whitewater creek. There are still concerns associated with possible spring runoff that could potentially impact downstream communities like Glenwood, NM.

As with many of these recent large fires, the long term impacts are largely unknown. For example, according to Research Wildlife Biologist Joe Ganey, Whitewater canyon had one of the highest densities of Mexican Spotted Owls in the Southwest. Existing evidence suggests that Mexican Spotted Owls may continue to occupy and reproduce in areas subject to large wildfires, but this evidence stems from a few studies of short duration. Long-term impacts are unknown but are likely to vary depending on burn severity and patch size.

Overall, it is important to examine the WWB fire as a whole. According to the BAER burn severity map, high burn severity accounted for 38,570 acres or 13% of the total area within the WWB fire. This is a lot of land by any standards, but we have to keep in mind that some of these areas were high elevation forest such as spruce-fir, that will likely respond quickly and regenerate in the form of aspen and spruce given that these forests are adapted to a stand-replacing fire regime. Similarly, we have to acknowledge other positive aspects of this fire. For example, according to the BAER burn severity map 87% of the area burned as moderate to very low severity. Together the Miller and WWB fires treated more than 330,000 acres of mainly ponderosa pine and mixed-conifer forests with moderate to low severity fire, meaning that these trees have survived another surface fire much like they did historically and are now more resilient to other disturbances. This landscape level treatment is greater than what the Four Forest Restoration Initiative (http://www.fs.usda.gov/4fri) is planning to treat over ten years. The WWB fire, however, required less planning and will likely include less monitoring as well.

Picture 10. Areas of high severity along the north edge of the 1998 BS had recently regenerated and were re-burned by the 2012 WWB fire, but most of the regeneration pulse survived their first fire. Photo courtesy of Craig Allen.

In terms of vegetation, the most negative impact of the WWB fire was in dry mixed-conifer stands that experienced high burn severity which likely take longer to recover depending on the patch size. Given that this forest type did not evolve with large high severity patches, recovery in these large barren patches will likely take longer and may even take an unknown successional trajectory. When we visited this summer, some mixed-conifer stands that experienced high severity fire were already re-sprouting with aspen. We also visited mixed-conifer forests that had burned in the 1998 BS fire and were dominated by shrubs, particularly in the interior of the larger patches. Furthermore, we did observe dense pine regeneration along the northern edge of the 1998 fire. The WWB fire burned these young trees, but it appeared that most would survive (picture 10). In general, the long-term post fire impacts will likely depend on severity and patch size, although climate change (drought and temperature) and subsequent fires may also play an important role.

Jose Iniguez is a Landscape Fire Ecologist with the Rocky Mountain Research Station in Flagstaff, Arizona. Most recently he has been working on a series of studies in the Gila National Forest studying the impact of prescribed, fire-use and wildfires on tree spatial patterns and forest structure. Previous work has included classification of vegetation types in the Sky Islands of Southeastern Arizona, as well as studying landscape fire history patterns in the Santa Catalina and Rincon Peak.