



## Museum Fire - Flagstaff, Arizona

The **Museum Fire** started in the Dry Lake Hills area just north of Flagstaff on July 21, 2019, with a final update on August 2, 2019 showing 81% containment. Fire investigators determined the cause to be a result of restoration activities related to the Flagstaff Watershed Protection Project. The contractor followed all regulations and the ignition is considered unfortunate, but rare. High severity fire effects specifically within the Spruce Watershed pose significant post-fire flood risk to several neighborhoods in Flagstaff and prevention measures have been taken to protect these areas.

### Flagstaff Watershed Protection Project

After the 2010 Schultz Fire, which resulted in extreme post-fire flooding and one fatality, projections indicated that a similar wildfire event on steep slopes above Flagstaff could cause similar effects to large areas within the City of Flagstaff. Wildfire related erosion on Mormon Mountain could cause debris flows into Lake Mary Reservoir, rendering nearly 50% of the City's water supply unsuitable. To fund treatments within the Flagstaff watershed, the Greater Flagstaff Forest Partnership worked with City government to create a \$10 million bond measure that passed in 2012 with 73% support. It became known as the Flagstaff Watershed Protection Project (FWPP) and is a partnership among the State, City, and Coconino National Forest. Project implementation is approximately 65% complete as of September 2019. The work in progress includes hand-thinning, helicopter logging, steep-slope, and other



FWPP treatment area. Photo courtesy of the City of Flagstaff.

### Museum Fire At-A-Glance:

**Date:** July 21, 2019, reported at 11am

**Suppression cost:** \$9 million

**Cause:** Human activity/restoration equipment

**Total size:** 1961 acres

**Cost of BAER treatments:** \$3.7 million

**Vegetation types:** ponderosa pine, mixed conifer, activity fuels and log decks from the FWPP project

| <b>Burn Severity (BARC*)</b> | <b>Acres</b> | <b>% of Area</b> |
|------------------------------|--------------|------------------|
| High                         | 232          | 12               |
| Moderate                     | 546          | 28               |
| Low                          | 940          | 48               |
| Unburned/Very Low            | 236          | 12               |

*\*Burned Area Reflectance Classification– soil based*

work.

A majority of the fire footprint (62%) was outside any FWPP treatment areas. Of the log decks that had not yet been removed, two burned during the fire and five were unaffected. Remaining low value log decks are approved for on-site chipping and mulching, and high value log decks will be sold. FWPP partners are moving forward with honest communication and a desire to continue work as soon as possible.

### Museum Fire Initial Attack

The Initial attack to the Museum fire was immediate and robust. Aircraft were ordered immediately as well as all available resources on the forest. This included Air Attack, three Heavy Helicopters, two additional helicopters, Multiple air tankers, ten engines, multiple crews, Bulldozers, and Overhead. These resources were on scene very quickly but access to the immediate fire area was difficult for all but the aviation. When the first ground resources arrived on scene the fire was estimated at 3-5 acres with single and group tree torching, and short range spotting. Resources attempted aggressive suppression efforts yet due to fire activity, location, topography and fuel loading, initial attack efforts were unsuccessful and they realized quickly that an Incident Management Team (IMT) was needed.



Aerial image of the variable fire severity within the Museum Fire. Photo courtesy of Coconino National Forest.

### **BAER**

The U.S. Forest Service ordered the BAER team only two days after beginning initial attack. Although unusual, local staff understood the great potential for negative downstream effects to the community and saw the necessity to begin assessments as soon as possible.

According to the final BAER report, approximately 1288 acres were rated at “severe soil erosion hazard” with an estimated 5+ years needed for vegetative recovery. The BAER team modeled various storm events, which indicated existing drainage infrastructure would be inadequate to handle potential stormwater and debris flows, resulting in risk to human life and safety in urban communities due to post-fire flooding. Roads, recreational trails, and natural resources (including Mexican spotted owl habitat) within the fire perimeter are also at risk from post-fire flooding under monsoon rain conditions.

Mulch from on-site low value logs will be spread by helicopter across areas of high and moderate severity fire effects, 507 acres. Current science supports this approach, however it can be a trade-off between reduction of short-term erosion and slowed vegetation recovery ([Bontrager et al. 2019](#)). Due to high risk to the community, opting for reduced erosion in the short-term is the only choice. Drainage expansion and stabilization, closures, and prevention of invasive weed introduction, are among other BAER treatments.

Fortunately, these treatments have not yet been put to a major test due to a dryer than average monsoon season. Although seasonal rains early on reduced fire behavior, they were atypical in their intensity and volume throughout July and August.

### **Communication**

The Public Information shop did an excellent job keeping the community informed during the Museum Fire. Given the location, smoke impacts were constant nighttime reminders of the fire for nearby neighborhoods. There was national priority attached to the fire early, which focused a lot of attention on public information. Public meetings were numerous and integrated due to collaboration among all the agencies and entities affected.

Once the investigation determined that the fire was caused by equipment performing FWPP fuels treatments, FWPP partners came together to discuss the findings with the media at the point of origin. Clear, honest communication is essential and this has been and continues to be the approach taken. FWPP partners hope to begin work again as soon as BAER treatments are complete. The Flagstaff community is relatively savvy when it comes to wildland fire and associated hazard reduction treatments, as evidenced by the FWPP bond. All FWPP partners are committed to complete the treatments and follow up with maintenance treatments in the future. The hope is that the community will continue to support the project into the future.



Approximate point of origin. Fire investigators and the U.S. Forest Service suggest it's likely that equipment approached this steep slope from the top of the ridge where a high elevation meadow leads into it. Photo by B. Satink Wolfson.