



Decision Support for the Arizona Sunflower Wildfire Burn Area

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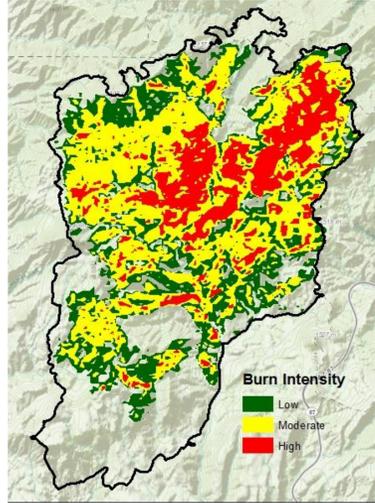


INTRODUCTION

The Sunflower Wildfire initiated on May 12th, 2012 in the Tonto National Forest, located in east-central Arizona. Before the fire was contained on July 5th it had burned 17,446 acres. The fire occurred primarily over steep terrain in the headwaters of the Upper Sycamore Creek and Sheep Creek watersheds. Over 50 percent of the area affected burned at moderate or high intensity (see figures below).



Topographic map of Arizona. Red star shows the location of the Sunflower Wildfire within the Tonto National Forest.



Map showing Sunflower Wildfire perimeter and burn intensities. Wildfire location is depicted by red star on area map (above left).



Sunflower Wildfire smoke plume and pyrocumulus on May 15, 2012. Photo: Melissa Hinch-Ownby



Severely burned areas in the upper Sycamore Creek basin. The unburned area in the photo at left is representative of the vegetation present before the fire. Photos: Flood Control District of Maricopa County.

Post fire assessment by a National Forest Service Burned Area Emergency Response (BAER) Team¹ concluded there was an increased threat to life and property, water quality, and cultural and historic resources from debris flows and flooding due increased soil erosion and sediment delivery to streamcourses.¹ Occupied homes, outbuildings, and National Forest Service facilities are all located in close proximity to Sycamore Creek, downstream of the burn area, and were determined to be at high risk due to subsequent flooding.

This poster summarizes National Weather Service Phoenix Forecast Office actions that were taken. These actions included briefing the operational staff to provide enhanced support for the Sunflower burn area, leading coordination efforts with customers and partners, and reviewing the Decision Support Services that were developed.

INTERNAL TRAINING & SUPPORT TOOLS

The National Weather Service Phoenix Forecast Office developed or enhanced several tools to help forecaster staff maintain situational awareness during hydrometeorological events. These tools enabled the timely detection of heavy rainfall and the efficient issuance of flash flood warnings.

Flash Flood Threshold Guidance Adjustments

The Flash Flood Monitoring and Prediction (FFMP) system² is an integrated suite of multi-sensor applications used for detecting, analyzing, and monitoring precipitation. This tool enables forecasters to compare basin rainfall estimates with Flash Flood Guidance (FFG) thresholds developed by NWS River Forecast Centers to determine the likelihood of flash flooding. FFG values were lowered in FFMP for basins impacted by the Sunflower Wildfire to account for increased runoff expected from moderate and high intensity burned areas (see figures below).

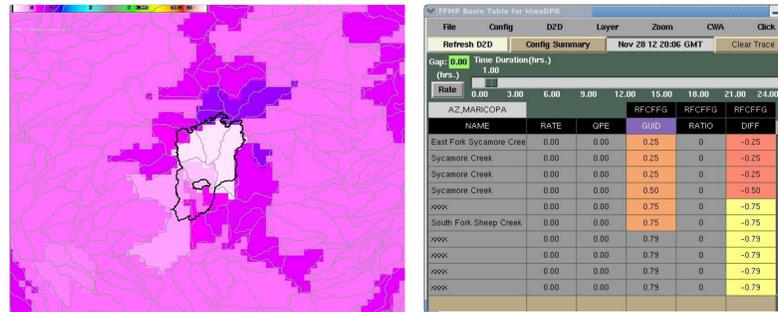
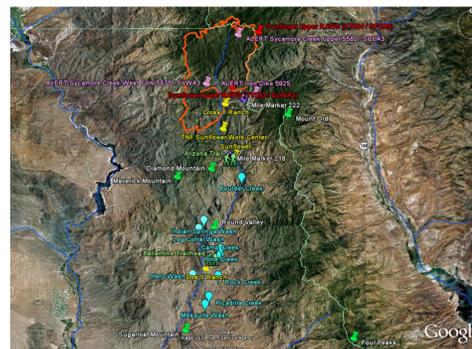


Figure on left above shows FFMP 1-hour FFG values. The perimeter of the Sunflower Wildfire is shown by the black outline. Guidance values for basins in the burn area were reduced below the values of surrounding basins to account for increased runoff and flash flooding threats. The figure on the right shows the modified guidance values, as they appear in the FFMP Basin Table.

Using Google Earth to Maintain Situational Awareness



A Google Earth Placemark (KMZ) file was created containing an overlay of the Sunflower burn perimeter, locations of precipitation and stream gauges, washes, forest roads and trails, properties and structures, and other key points in the Sycamore Creek basin.

Tailored Warning Templates

Flash Flood Warning templates used in the NWS AWIPS Warning Generation software were tailored specifically for the Sunflower Wildfire. As a result, little to no editing of the warnings was necessary. This resulted in timely issuance of the warnings and earlier notification of flood threats.

BULLETIN - EAR ACTIVATION REQUESTED
FLASH FLOOD WARNING
NATIONAL WEATHER SERVICE PHOENIX AZ
1242 PM MST FRI JUN 22 2012

THE NATIONAL WEATHER SERVICE IN PHOENIX HAS ISSUED A

- * FLASH FLOOD WARNING FOR... EXTREME NORTHEASTERN MARICOPA COUNTY IN SOUTH CENTRAL ARIZONA... THIS INCLUDES SYCAMORE CREEK...SUNFLOWER...
- * UNTIL 245 PM MST
- * AT 1240 PM MST...NATIONAL WEATHER SERVICE METEOROLOGISTS DETECTED HEAVY RAIN OVER THE SUNFLOWER BURN AREA. THE RAIN WILL PRODUCE SIGNIFICANT FLOW IN CREEKS AND WASHES ACCOMPANIED BY MUD... ROCKS...AND DEBRIS.
- * FLASH FLOODING OF THE SYCAMORE CREEK DRAINAGE IS IMMINENT AND WILL IMPACT THE COMMUNITY OF SUNFLOWER...AS WELL AS LOW WATER CROSSINGS OF FOREST ROADS AND TRAILS. THIS INCLUDES FOREST ROAD 22 SOUTH OF HIGHWAY 87...THE ARIZONA TRAIL...AND BOLLIER CREEK.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

IF YOU ARE NEAR THE BANKS OF SYCAMORE CREEK OR OTHER NEARBY DRAINAGE AREAS MOVE IMMEDIATELY TO HIGHER GROUND. DO NOT DRIVE YOUR VEHICLE INTO AREAS WHERE WATER COVERS THE ROAD. TURN AROUND DON'T DROWN.

LIFE-THREATENING FLOODING OF CREEKS...ROADS AND NORMALLY DRY WASHES IS LIKELY. THE HEAVY RAINS WILL TRIGGER MUD AND DEBRIS FLOWS...AND ROCKSLIDES IN STEEP TERRAIN...ESPECIALLY NEAR THE BURN AREA.

TO REPORT FLOODING...HAVE THE NEAREST LAW ENFORCEMENT AGENCY RELAY YOUR REPORT.



EXTERNAL COORDINATION & SUPPORT

In the weeks following initiation of the Sunflower Wildfire, National Weather Service staff met on numerous occasions with other local, county, state, and Federal agencies to discuss post-fire support. NWS staff provided historical and climatological outlook data used in determining flood mitigation efforts that would be employed. NWS staff provided recommendations for siting of supplemental precipitation and stream gauges to the Flood Control District of Maricopa County. This was important since, before the fire, no such remote monitoring systems were in place



Photo taken at Sunflower, AZ public meeting.

NWS Staff attended a public meeting with the residents of the Sunflower, Arizona community, and discussed our planned support for the approaching monsoon season. Collaboration was also done with the Maricopa County Division of Emergency Management on the distribution of NOAA Weather Radios to residents in the burn area.



A Decision Support page was created on the National Weather Service Phoenix website for the Sunflower Wildfire. This page enabled NWS staff and partners to quickly access radar, rainfall, and watch/warning data along with flash flood safety information.

CONCLUSIONS

The 2012 monsoon season brought many days of heavy precipitation across portions of the Sunflower burn area. A total of 8 flash flood warnings were issued during the monsoon season for the burn area. The most significant events resulted in water rises of 6 to 12 feet on Sycamore Creek downstream of the burn area.

Despite the number of storms affecting the Sunflower Wildfire burn area, no casualties or significant property damage were reported. Emergency Management partners and community residents expressed gratitude regarding the services that were provided.

National Weather Service Phoenix will continue to refine the warning criteria and enhance decision support services for the Sunflower burn area. The unique nature of this area will afford opportunities for further research regarding post-burn flood response.

REFERENCES

- ¹Laford, R. (2012). Sunflower Fire Burned Area Emergency Response Report. United States Department of Agriculture, Forest Service Report 2500-8.
- ²Filiaggi, T. (2008). Flash Flood Monitor and Prediction: Advanced, Graphical User Interface, Guide for Users. Retrieved from: <http://www.nws.noaa.gov/mdl/ffmp>