

### Tubbs and Nuns Fires

In October 2017, the Tubbs and Nuns Fires burned a combined 93,363 acres. This amounted to 8% land coverage of the Russian River watershed and 28.5% of the Laguna-Mark West Creek sub-watershed<sup>1,2</sup>. More than 8,000 structures were damaged or destroyed, elevating the potential for toxics-laden runoff within these watersheds. Surface waters within and downstream of the Tubbs and Nuns Fires include impaired waterbodies, endangered species habitat, and source water for drinking water systems.



Figure 2. BMP controls installed downslope of a burned structure.

### Surface Water Monitoring

Regional Water Board staff assessed potential impacts to surface waters downstream of burned areas by monitoring surface water quality. Samples were collected at four locations within the Mark West Creek watershed (Fig. 1). The first set of samples was collected on November 1<sup>st</sup>, prior to any storm events as a baseline dataset. Three subsequent sampling events were timed to collect samples in conjunction with storm runoff events on Nov. 8, Nov. 15 and March 22 (Fig. 3).

The State Water Board's Division of Drinking water coordinated with drinking water purveyors to ensure that drinking water was safe to drink. Tests conducted by the Sonoma County Water Agency and others reflected no issues with drinking water after the fire.

### Post-Fire Pollutants

During storm events, surface waters may be affected as rain carries pollutants away from burned areas. Research shows that fire affected areas in Southern California contained increased concentrations of contaminants including nutrients (e.g. nitrates and phosphorus), polycyclic aromatic hydrocarbons (PAHs), copper, zinc, mercury, lead, and other metals<sup>3,4</sup>. Several of these pollutants, especially metals, can be detrimental to human health and toxic to aquatic life. Many pollutants often attach to suspended particles and enter the water as runoff. Therefore, high flows can transport sediment bound pollutants to creeks and downstream to the Russian River. To minimize this transport of pollutants, Regional Water Board staff worked with local partners to implement post-fire best management practices (BMPs) in an effort to mitigate pollutants entering surface water during post-fire storm events (Fig. 2).

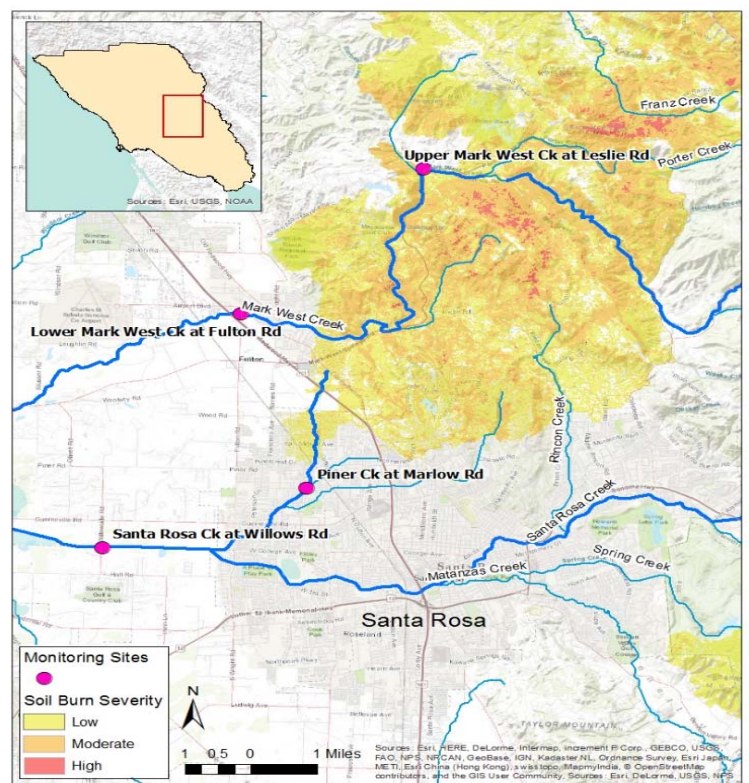


Figure 1. Post-fire water quality monitoring sites on Mark West Creek, Piner Creek, and Santa Rosa Creek.

### Citations

1. Tubbs Fire Watershed Emergency Response Team Final Report. (November, 15 2017). [http://www.fire.ca.gov/communications/downloads/Watershed\\_reports/20171115\\_TubbsWERT.pdf](http://www.fire.ca.gov/communications/downloads/Watershed_reports/20171115_TubbsWERT.pdf)
2. Nuns Fire Watershed Emergency Response Team Final Report. (November, 15 2017). [http://www.fire.ca.gov/communications/downloads/Watershed\\_reports/20171115\\_NunsWERT.pdf](http://www.fire.ca.gov/communications/downloads/Watershed_reports/20171115_NunsWERT.pdf)
3. Stein, E.D., J.S. Brown, T.S. Hogue, M.P. Burke, and A. Kinoshita. 2012. Stormwater contaminant loading following wildfires. *Environmental Toxicology and Chemistry* 31: 2625–2638. doi:10.1002/etc.1994.
4. Burke, M.P., T.S. Hogue, J. Barco, C. Wessel, A.Y. Kinoshita, and E.D. Stein. 2013. Dynamics of pre- and post-fire pollutant loads in an urban fringe watershed. *Environmental Monitoring and Assessment* 185:10131–10145.

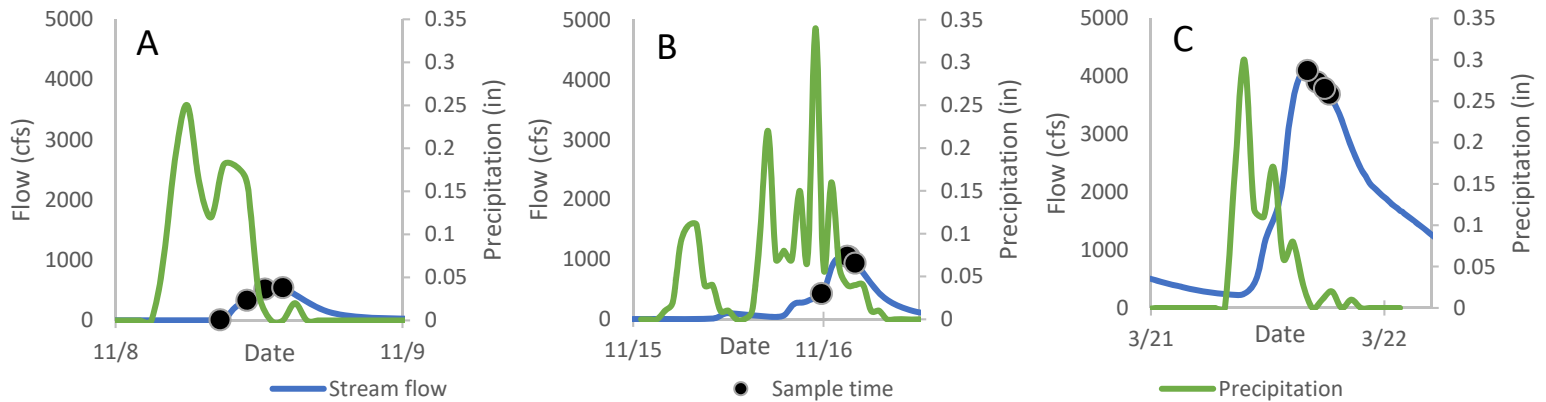


Figure 3. Hydrographs showing stream flow and precipitation vs. sample time for (A), a 1.36" storm on Nov. 8-9, (B), a 1.95" storm on Nov. 15-16, and (C), a 1.21" storm on March 22. Flow data was collected from the USGS flow gauge on Santa Rosa Creek at Willowside Road, USGS Gage #11466320. Precipitation data was collected from the Santa Rosa CalFire weather station.

### Data Evaluation

Evaluation guidelines were developed from the North Coast Regional Water Quality Control Board Basin Plan, U.S. EPA Water Quality Criteria, and Maximum Contaminant Levels published by the State of California. Additionally, monitoring results were compared to baseline samples as well as historical data from Santa Rosa Creek and the greater Russian River watershed.

- Samples were assessed for more than 60 parameters, including nutrients, metals and polycyclic aromatic hydrocarbons (PAHs) and toxicity endpoints.
- Low level concentrations of PAHs were detected during the second and third storm events downstream of the Coffey Park urban area.
- Metal concentrations were documented above baseline concentrations and exceeded evaluation guidelines in some instances, though were within the historic range of concentrations observed during runoff storm events in the Mark West Creek and Russian River watersheds (Fig. 4).
- Toxicity tests were performed on each sample using three different organisms: an amphipod, a water flea, and a fathead minnow. All samples were negative for toxicity.

### Conclusions

- Fire related pollutants (PAHs) were minimally detected at one location below the urban dominated burn area.
- November-February were historically dry months.
  - Following an extensive dry period, the first and second storms may not have been of sufficient magnitude or intensity to mobilize burned material.
  - Sediment runoff related constituents suggest that erosion occurred during the third storm event.
- Immediately following the fires in coordination with local and state agencies, the Regional Water Board enacted best management practices (BMPs), which included sediment and drainage controls.
  - BMPs were implemented close to creeks and in urban areas, where runoff could easily reach the creeks through storm drain systems.
  - BMPs may have been effective at preventing burned materials and pollutants from entering waterways.
  - Hazardous debris removal efforts prior to the third storm may have been effective in lessening the impact of pollutants to water quality.

### Total Aluminum (ug/L)

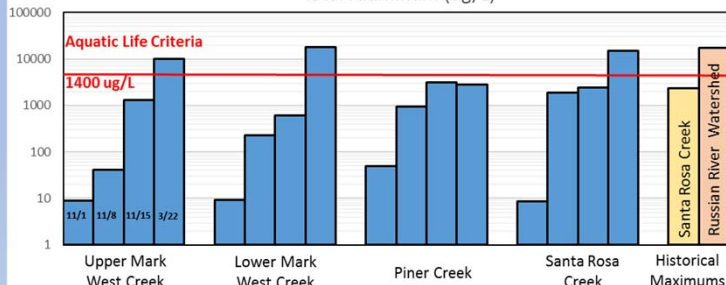


Figure 4. Comparison of post-fire total aluminum concentrations to historical data.

### Next Steps

The Water Board has begun the process of collaborating with state and local partners in developing a longer term monitoring effort to further assess and address any impacts to water quality that may be related to the fires.

#### For more information please contact:

Rich Fadness

(707) 576-6718

[Rich.Fadness@waterboards.ca.gov](mailto:Rich.Fadness@waterboards.ca.gov)