ADVANCED SIMULATION CAPABILITIES TO ASSESS PRE-AND-POST FIRE WATER QUALITY AND SURFACE WATER-GROUNDWATER INTERACTIONS

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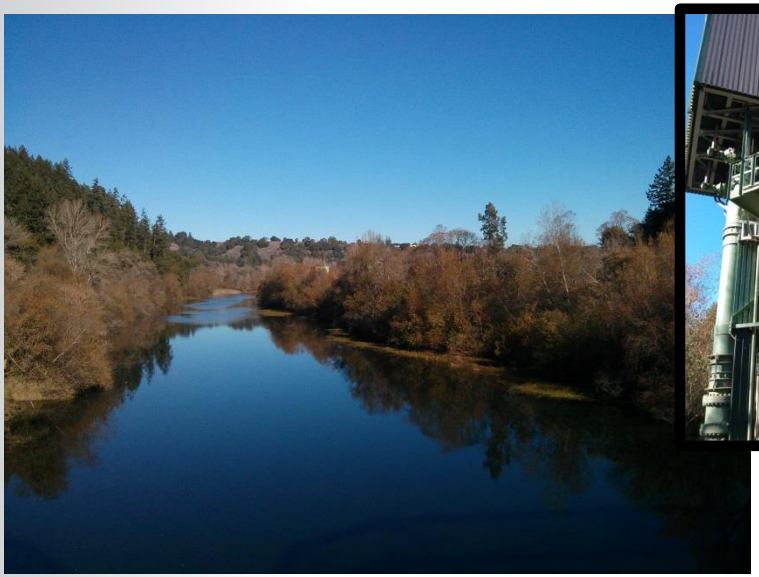
Wine Country Fires, October 2017

Funding provided by Sonoma Water

Ash Leachate Runoff Into the California Russian River, Tributaries, and Groundwater



- Russian River Watershed
- Wohler site on the Russian River, CA
- Riverbank filtration provides drinking water for 600,000 people
- Drainage point from fire perimeters

Oct. 2017: Launched the Pre/Post-Fire Sonoma County Water Quality Monitoring Program

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NEWS CENTER

Research Becomes Reality in Study of Fire Impact on Sonoma Water Resources

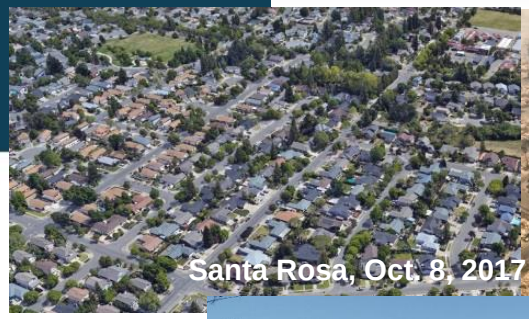
Berkeley Lab analyzes how Sonoma County Water Agency's riverbank filtration system is responding to wildfire

News Release Julie Chao (510) 486-6491 • **NOVEMBER 20, 2017**

239 | 5 | 98 | 342 SHARES

Berkeley Lab researchers, including Michelle Newcomer (right), are collaborating with USGS and the Sonoma County Water Agency to study how the water resources respond to extreme events such as fire. (Photos courtesy Michelle Newcomer)

www.lbl.gov/press/news



Santa Rosa, Oct. 8, 2017

Santa Rosa, Oct. 9, 2017

A burned home

Pepperwood Preserve

Launching the Sonoma County Water Quality Sampling Program

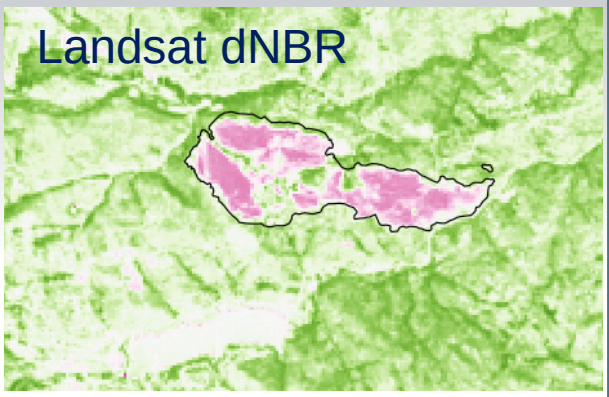
- Measure: Assess potential impacts across the watershed resulting from the recent wildfire activity in Sonoma, Napa, and Marin Counties
- Model: Develop a flow/reactive transport model to assess the impact to surface water and groundwater quality
- Simulate: Site response to fire inputs and future extreme precipitation events

Physical Variables:
Temperature, Infiltration, Sediment GSD, river discharge

Sediment Cryocores
(Pore-Water Chemistry)

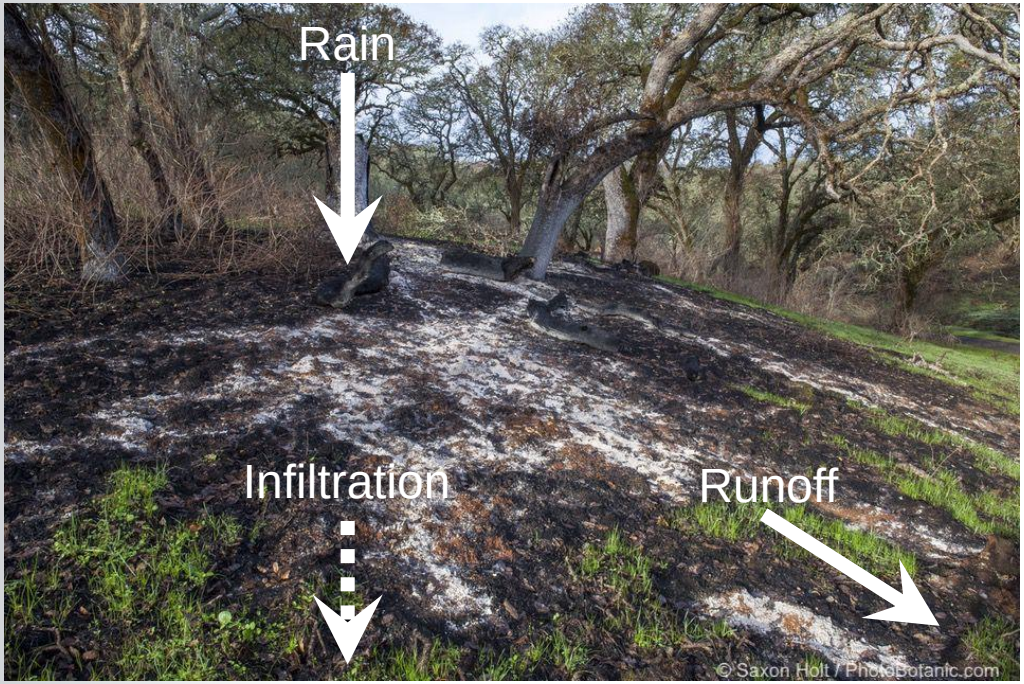
Chemical + Biological Variables: DOC, Fe, metals, Cations, Anions, DTN-Other N, biofilms, DNA, Mercury

Ash Sampling

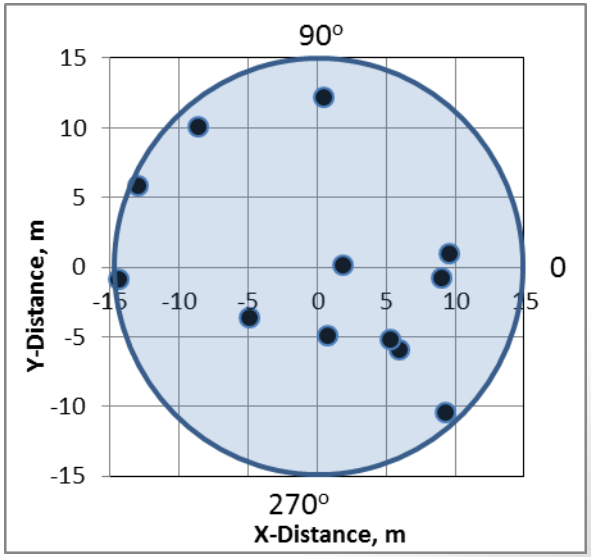


Collect bulk ash samples

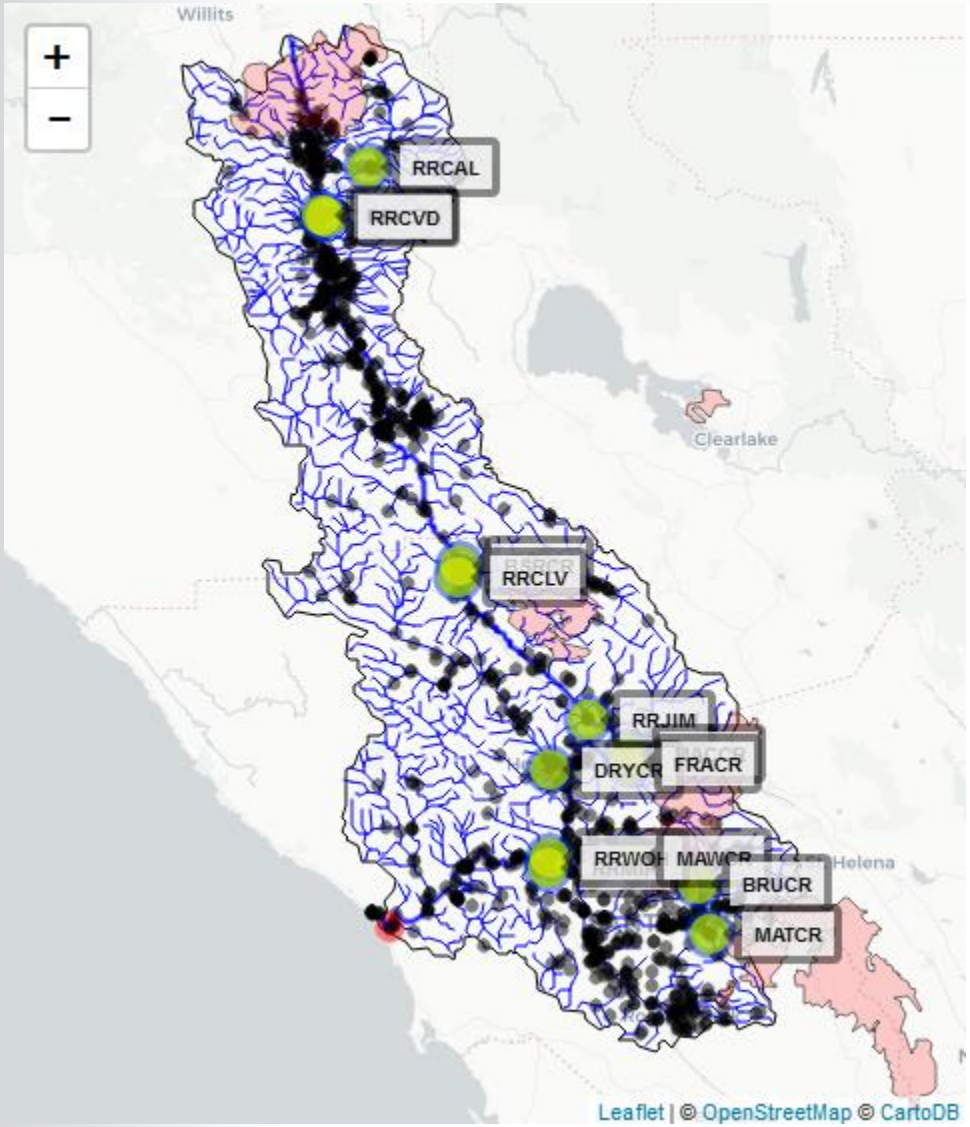
- **Where:** Pepperwood, McCullough Ranch, Shiloh
  - HREC Research Center
- **Purpose**: Ash leachate experiments, column, field
- Collect from low, moderate, and high burn severity
- Classified with Landsat dNBR
- Potential for high DOC and mercury from ash leachate



Random sampling grid

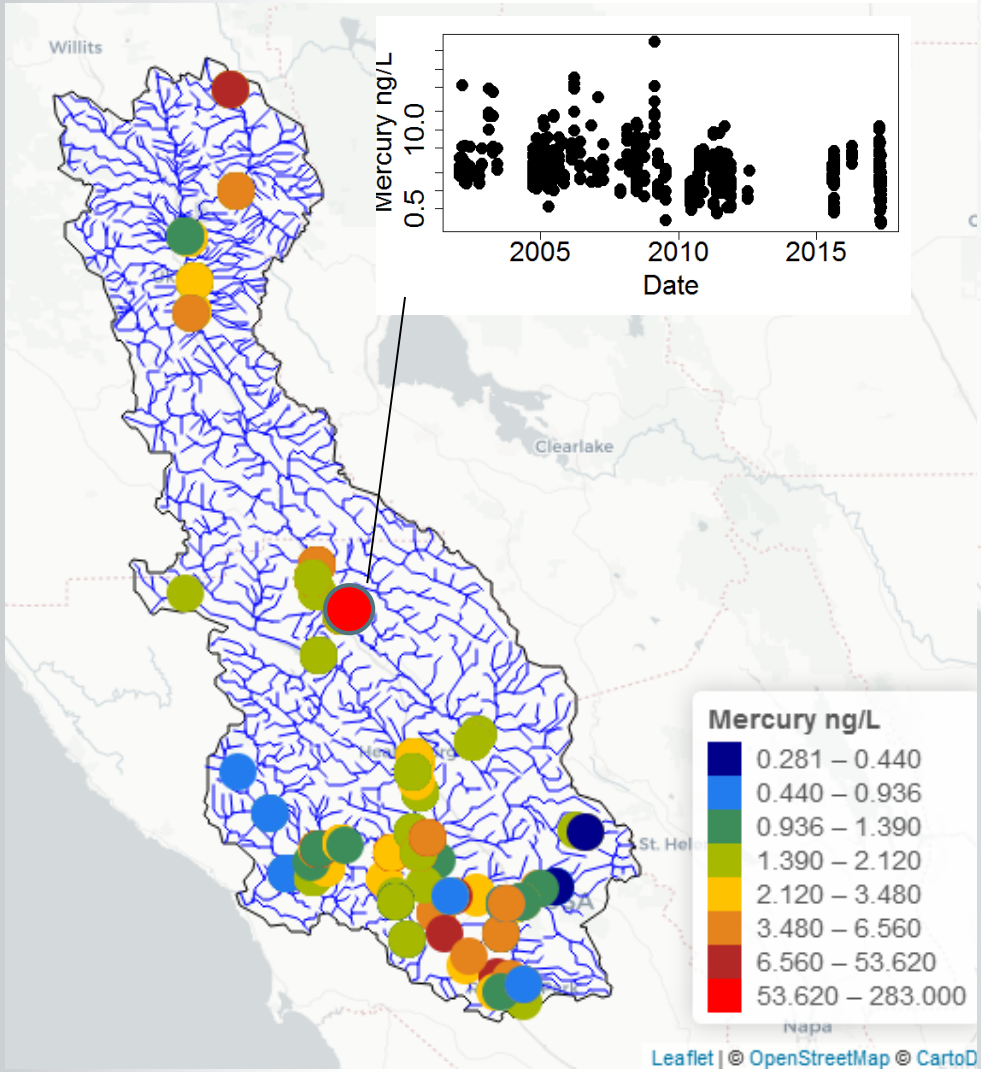


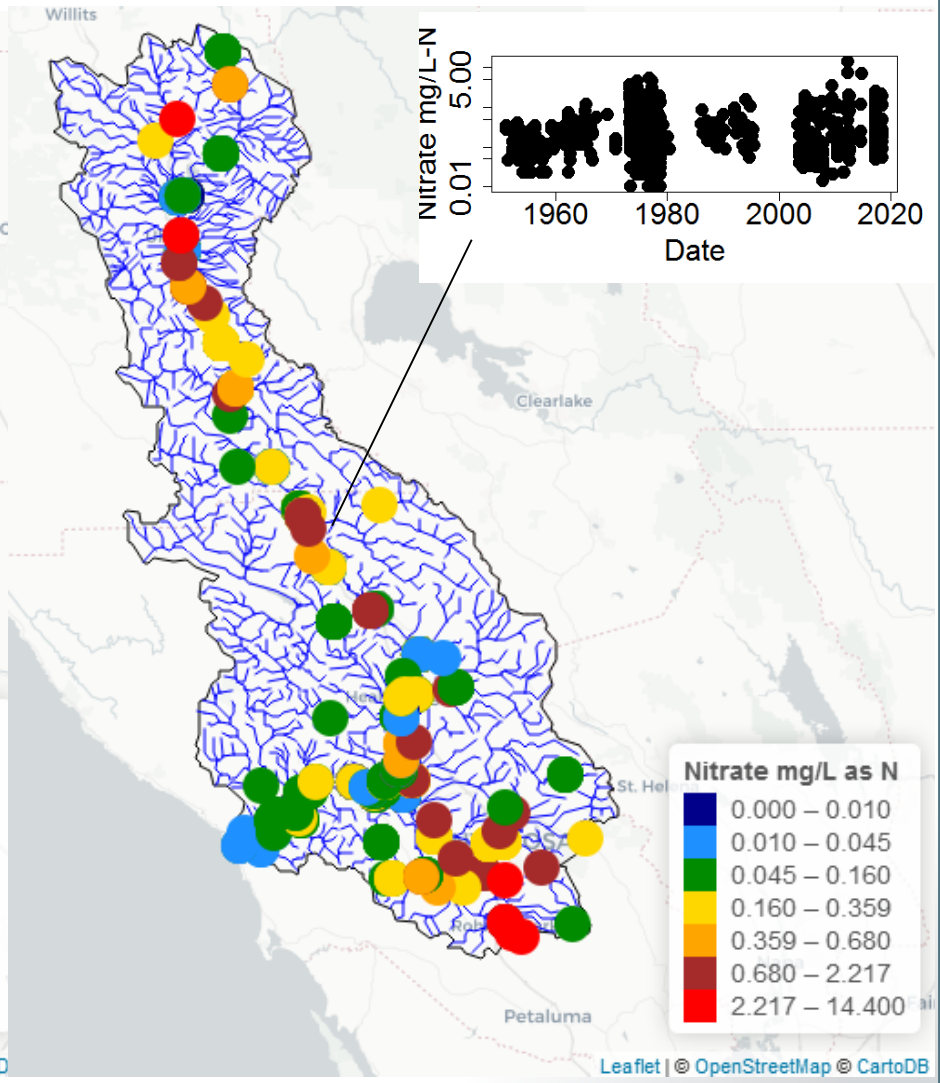
Wet-Season, Dry-Season, and Storm-Based Analysis Across the Russian River Watershed



- Characterize pre-post-fire water quality by the drainage unit of each sample site
- Challenge of how to analyze data relative to the tributaries and creeks draining to that particular site (a function of upstream inputs)
- Need linked network index

Historical Mercury, Nitrate etc. (Spatial and Temporal Time Series)

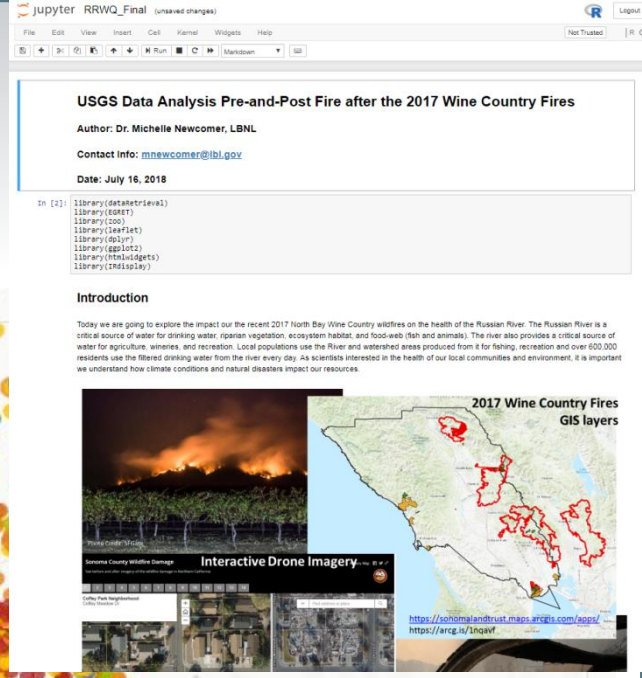




BLEND Workshop #CAWaterDataChallenge

- WQ Analysis, Trends, %Changes Applied on a Local, Watershed, State and National Scale (Newcomer in dev, Nat Geosci, 2018)
- Jupyter Notebook with R Kernel (binder materials https://sites.google.com/lbl.gov/lbnlcawaterdatachallenge)

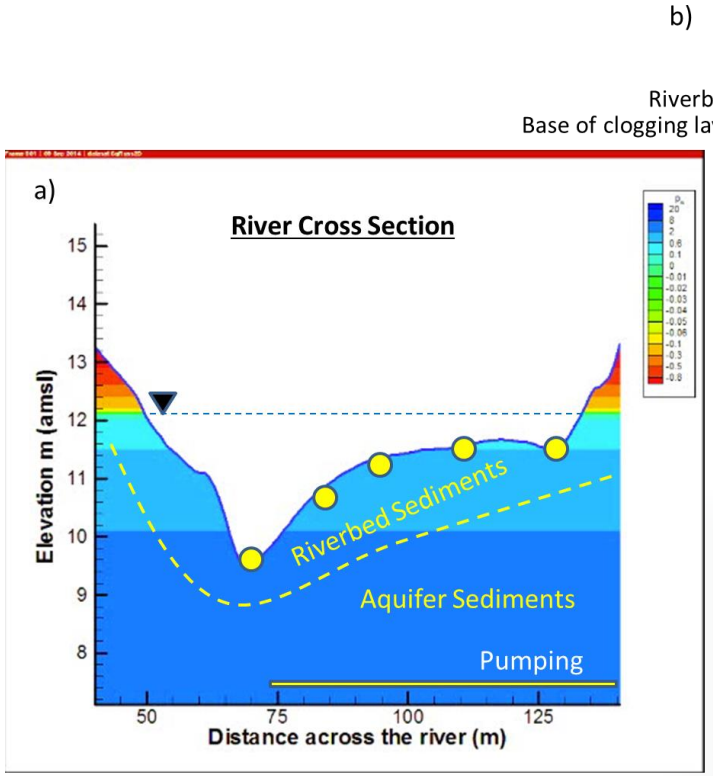
BLEND Workshop (LBNL, Feb. 2018)



Reaction, Mineral, Microbial Network

- Aerobic Respiration
  - Aerobic microbes
- Nitrification
  - Nitrifying microbes
- Denitrification
  - Denitrifying microbes
- Fe(III) Reduction
  - Iron reducing microbes
- Sulfate Reduction
  - Sulfate reducing microbes
- Methanogenesis
  - Metanogenic microbes
- Methyl mercury
  - Methylizing microbes

- 1D, 2D, 3D model for Wohler
- Compare modeled microbes against measured:
  - DNA extracts for QPCR for methyl mercury, iron reducing and sulfate reducing bacteria
- Inclusions of new minerals (Ferrihydrite, Goethite, Alumino-silicates, Manganese-Oxides)
- 2012 ERT inversions for sediment-facies training images



Thank You

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