



Lake Elsinore and Canyon Lake TMDL Water Quality

Pre-Post Holy Fire Runoff In-lake Monitoring
Watershed Monitoring Summary

woodplc.com

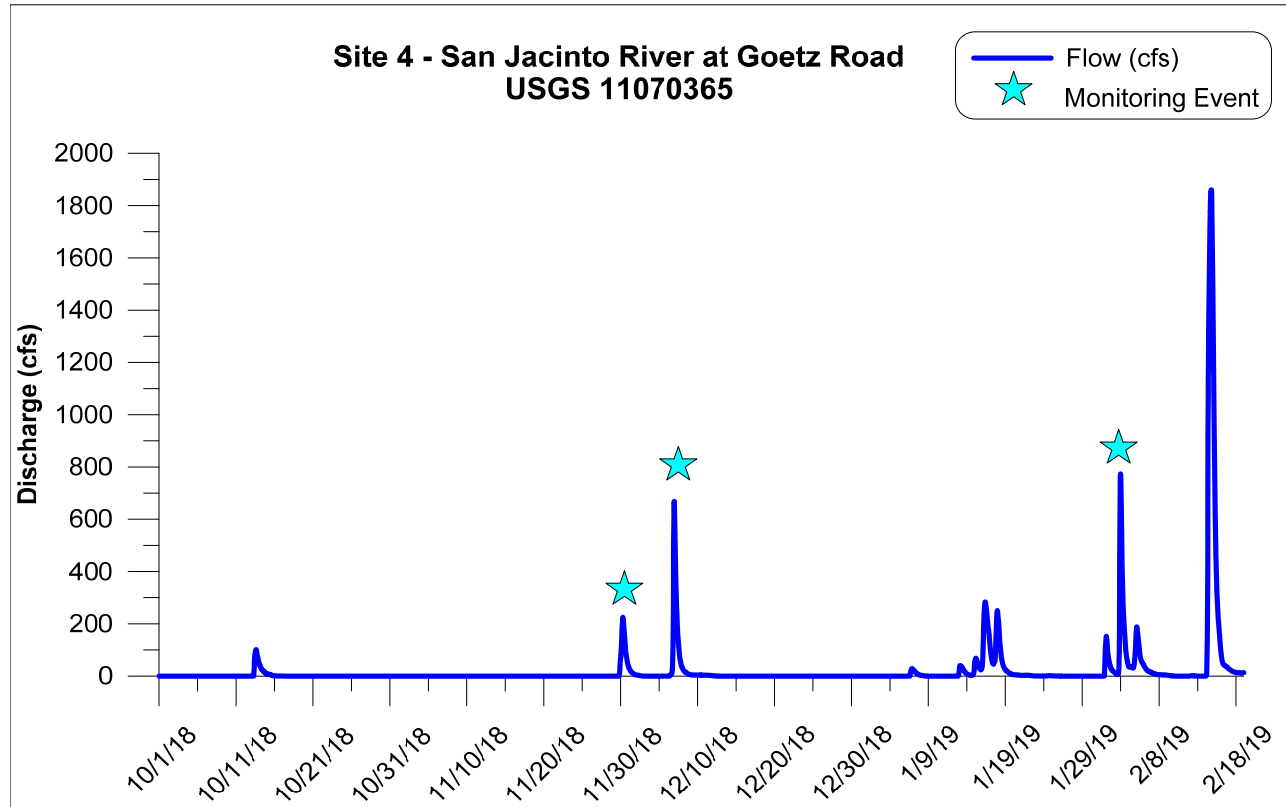


Wood & Alta Monitoring Events

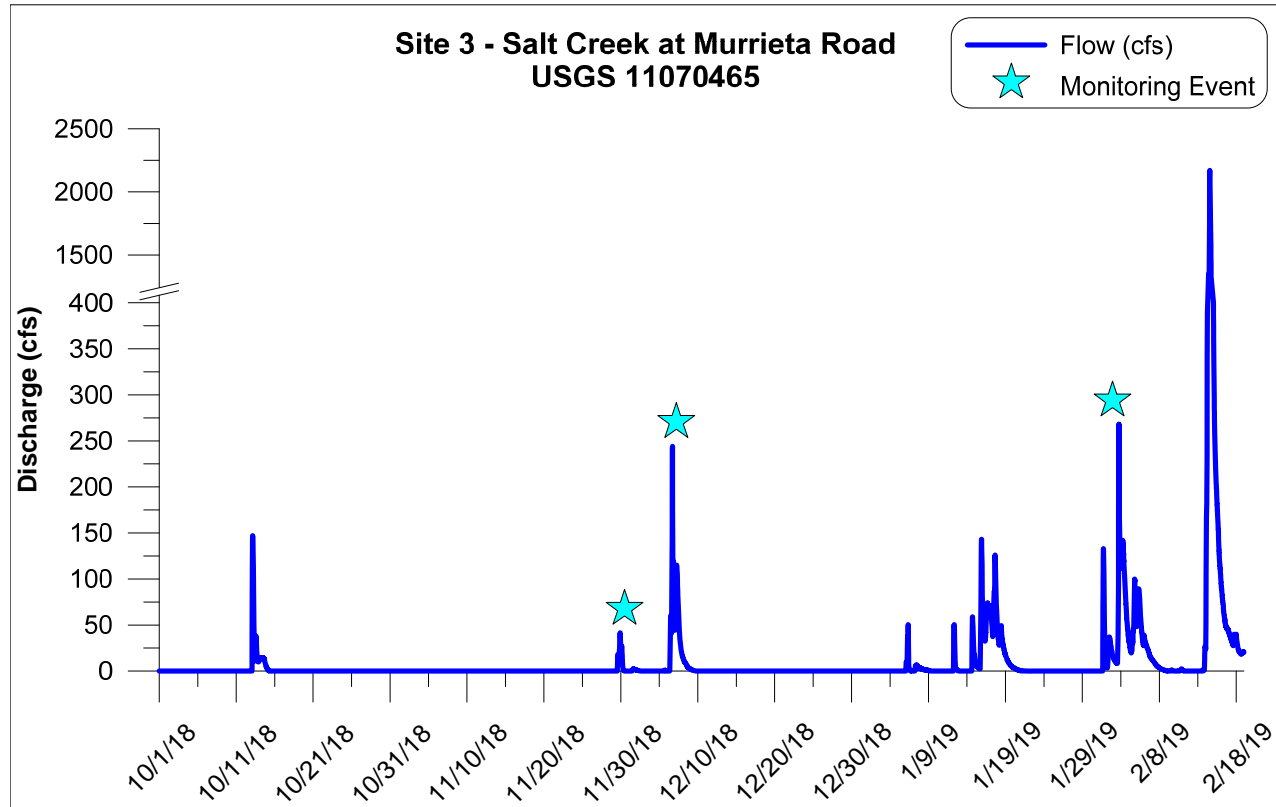
- TMDL watershed storm sampling
 - Three storms sampled at all three locations
 - San Jacinto - 11/29, 12/6, 1/31
 - Salt Creek - 11/29, 12/6, 1/31
 - Canyon Lake Spillway – 1/16, 2/1, 2/14
- TMDL in-lake sampling events 9/11, 10/16, 12/20, 2/19
- TNTP offset sampling 1/24



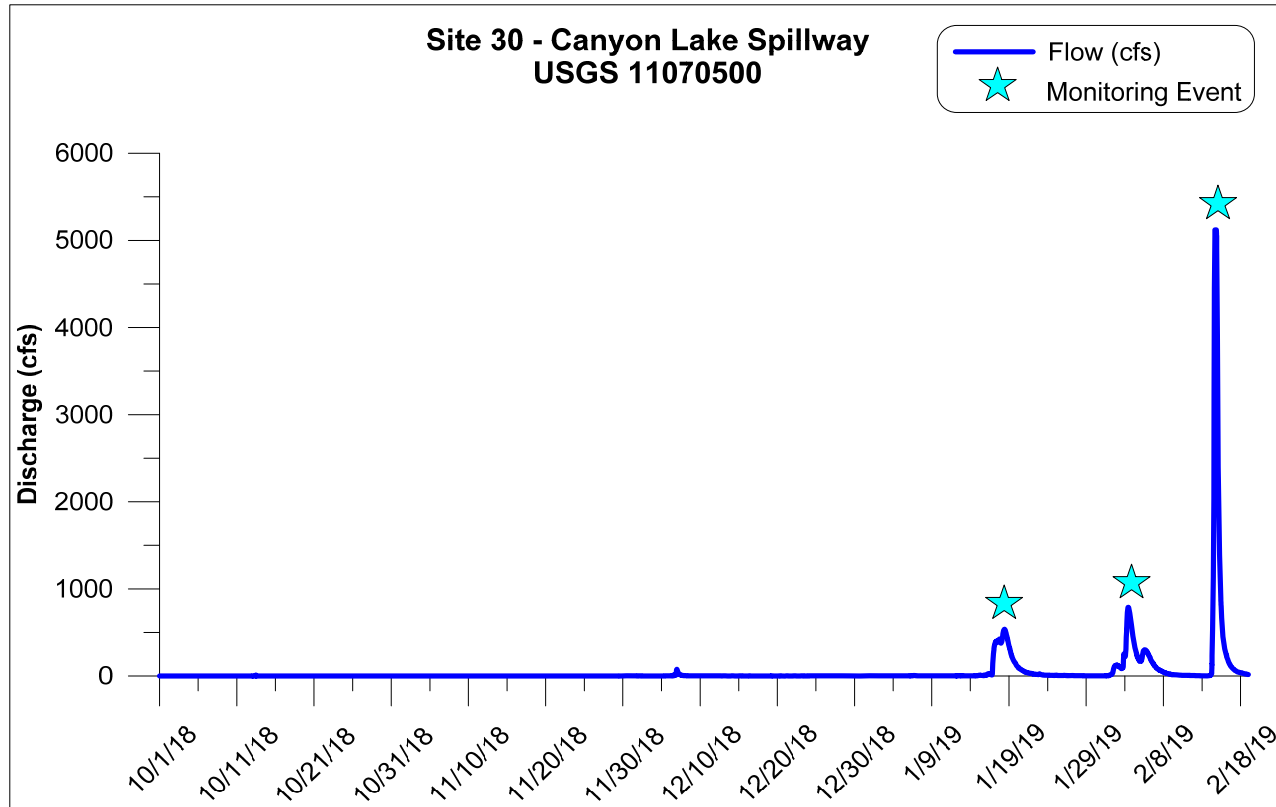
Alta Watershed Monitoring Events



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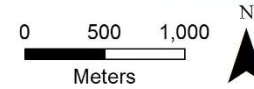
Satellite Imagery



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wood.

Satellite Imagery
Lake Elsinore
September 11, 2018 Satellite Flyover Event



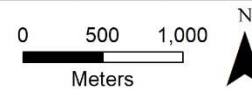
Satellite Imagery



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Satellite Imagery
Lake Elsinore
October 16, 2018 Satellite Flyover Event



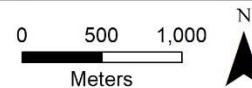
Satellite Imagery



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Satellite Imagery
Lake Elsinore
December 20, 2018 Satellite Flyover Event



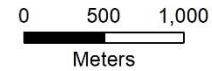
Satellite Imagery



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Satellite Imagery
Lake Elsinore
February 19, 2019 Satellite Flyover Event



In-lake Sampling Pre-Post Holy Fire Runoff



In-lake Sampling Pre-Post Holy Fire Runoff

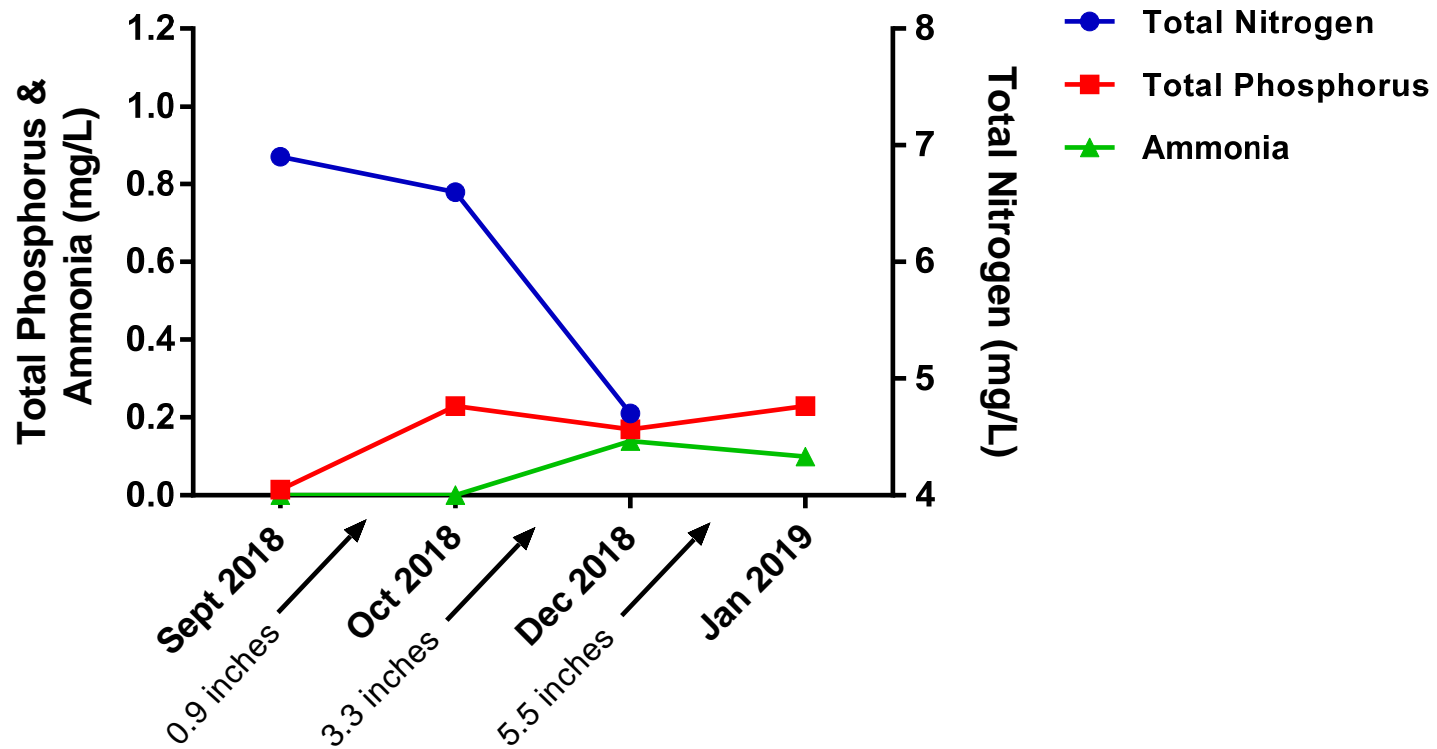


In-lake Sampling Pre-Post Holy Fire Runoff

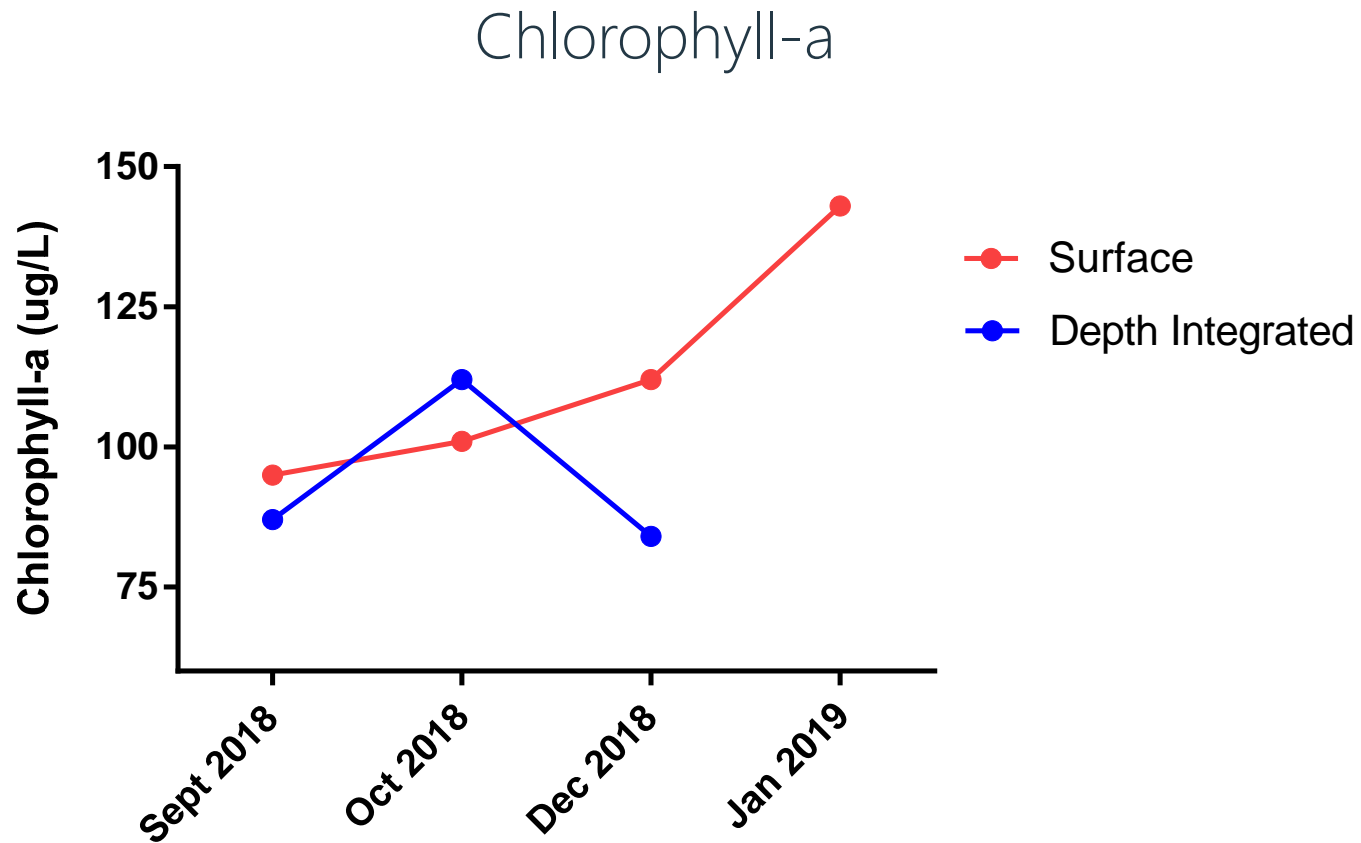


In-lake Sampling Pre-Post Holy Fire Runoff

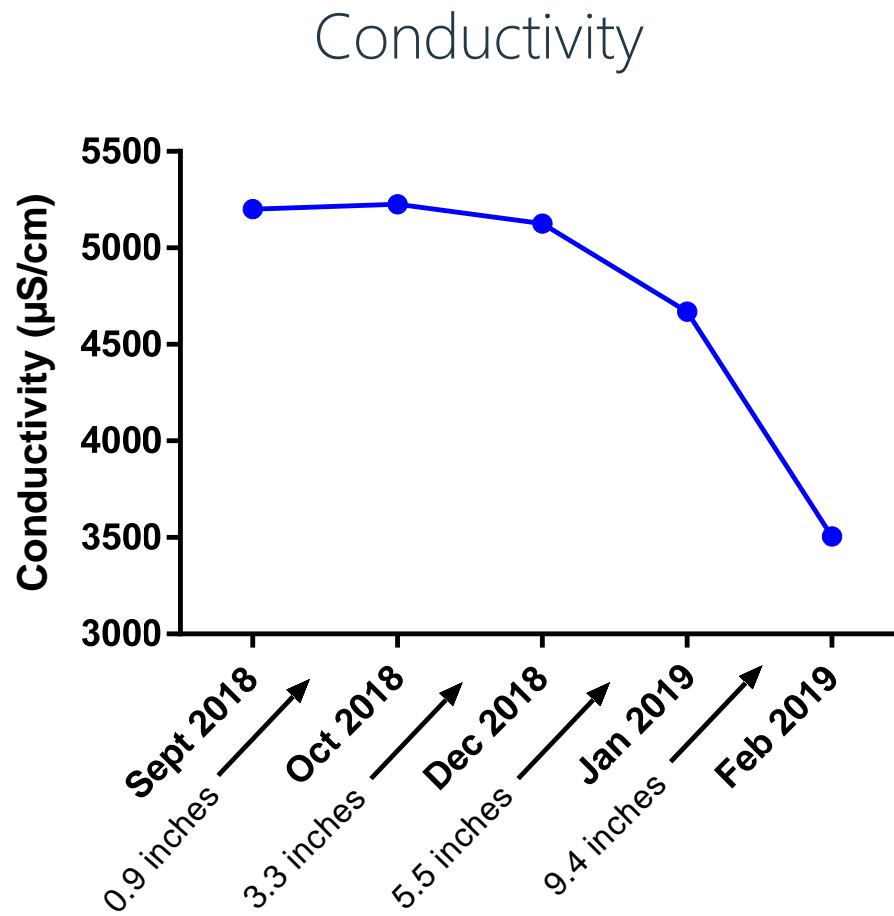
Nutrients



In-lake Sampling Pre-Post Holy Fire Runoff

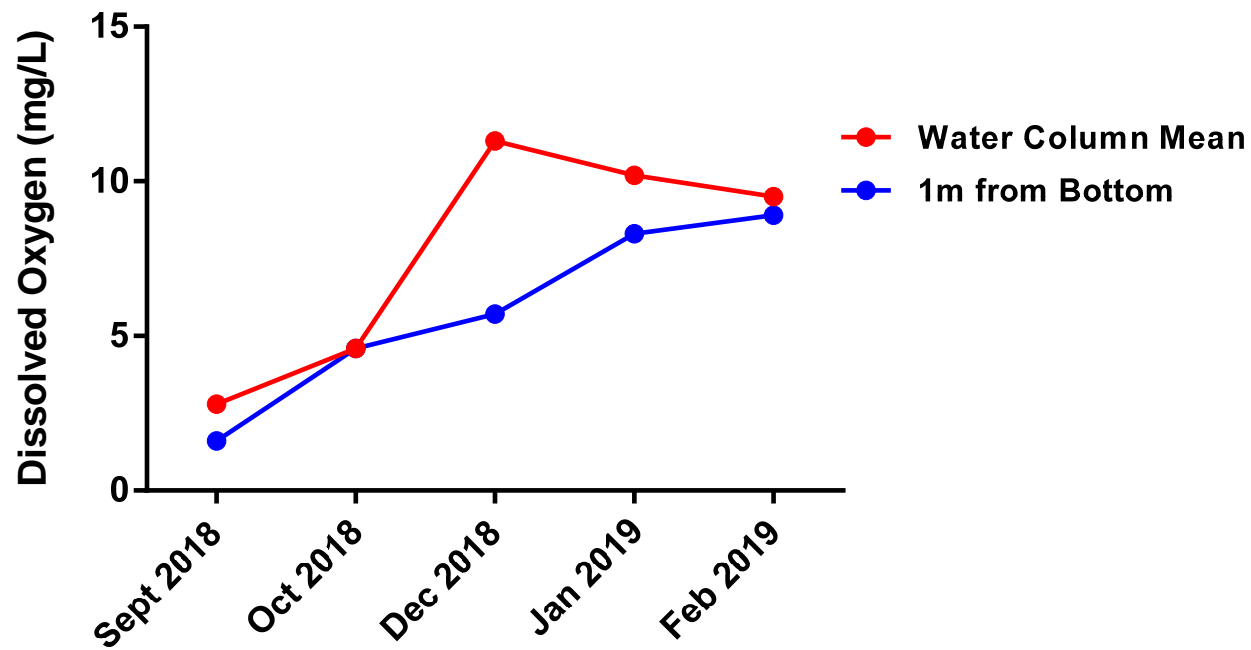


In-lake Sampling Pre-Post Holy Fire Runoff



In-lake Sampling Pre-Post Holy Fire Runoff

Dissolved Oxygen



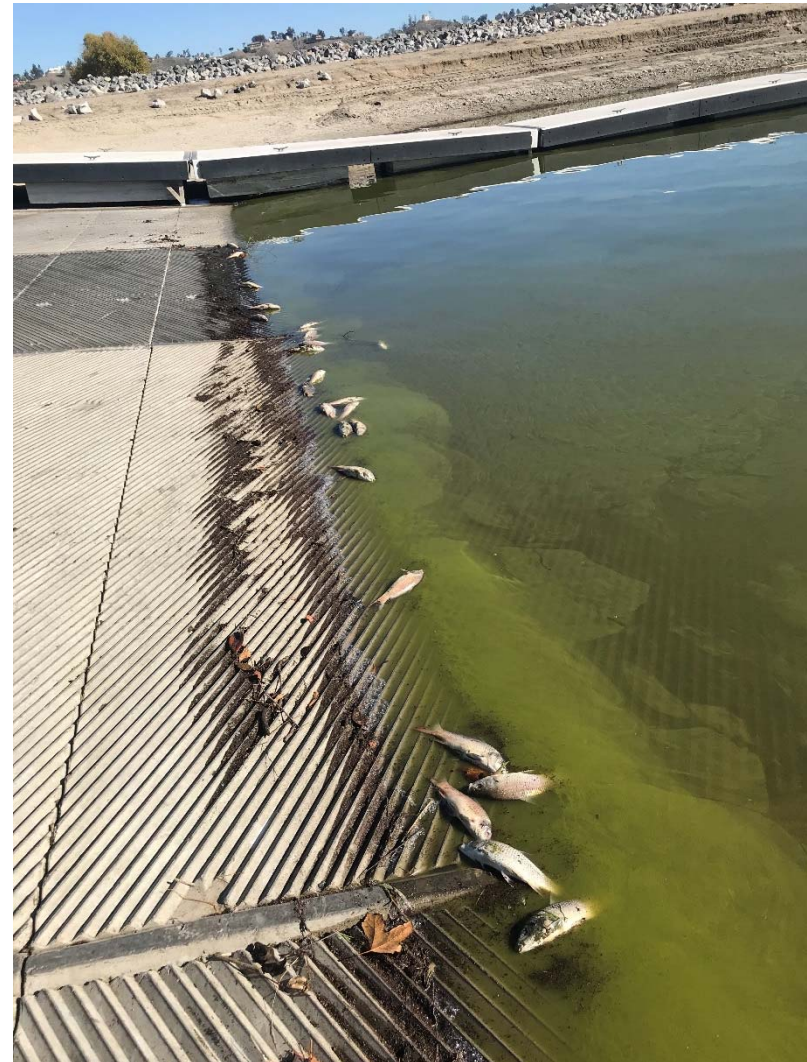
Lake Elsinore Fish Die-off

- December 20 TMDL event observed numerous dead shad



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- Around December 25 lake staff observed many dead carp on the lake
- Golden Algae was discussed as a possible culprit
- January 9 Wood sampled 5 points around the lake for metals, toxicity, and phytoplankton
 - Metal results were low
 - Fathead minnow acute toxicity was observed
 - Golden Algae, *Prymnesium parvum*, was observed at high concentrations in all samples



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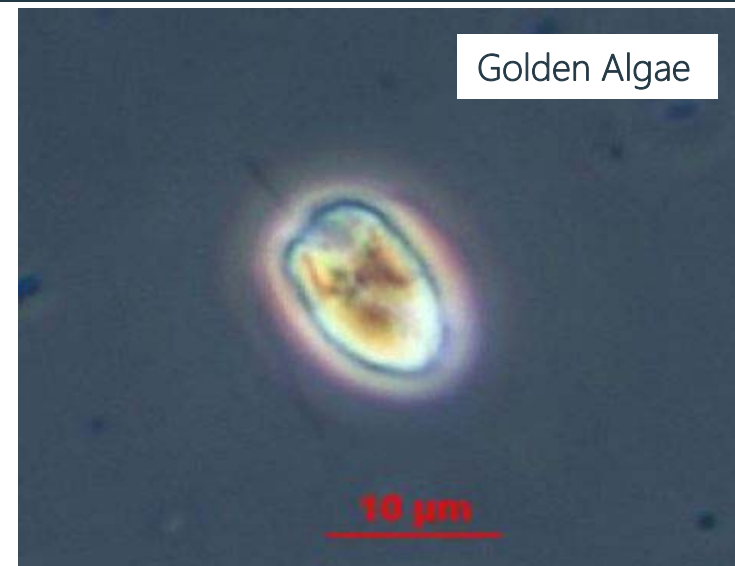


Hyper-red gills of carp, with fin hemorrhaging



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Lake Elsinore Fish Die-off

January 16 - Carp swimming up the EVMWD recycled water input to Lake Elsinore (see video)

Golden Algae likely cause of die off based on multiple lines of evidence

- High levels of *Prymnesium parvum*
- Fish behaviour – gasping, swimming in circles
- Hyper-red gills
- Fin hemorrhaging
- Actively moving towards toxin-free water



In-lake & Leach Canyon Channel Sampling

- January 24 TNTP offset monitoring and Leach Canyon Channel sampling
- Overall less dead carp observed on the lake
- Very few carp seen in EVMWD recycled water channel
- Four sample types collected
 - Algal sample from mid-lake for phytoplankton ID
 - Water sample at La Laguna Boat Ramp: cyanotoxin and toxicity analysis
 - In-lake sediment from the new delta formed by the Holy Fire runoff: chemistry and toxicity
 - Two water samples on and near the sediment delta: chemistry



Jan 24th In-lake & Leach Canyon Channel Sampling

- Decreased densities of Golden Algae (12th most abundant) mid-lake
- La Laguna Boat Ramp Water
 - Low cyanotoxin concentration
 - Acutely toxic (Minnow 12% survival)
- Water from Holy Fire Delta
 - Not toxic (Minnow 100% survival)
 - Nutrients
 - TN = 14 mg/L
 - TP = 7.4 mg/L
 - PAHs – ND
 - Metals (ug/L)
 - Arsenic 87 (T), 3.4 (D)
 - Cadmium 28 (T), ND (D)
 - Copper 520 (T), 1.7 (D)
 - Lead 190 (T), ND (D)
 - Zinc 2300 (T), ND (D)



Jan 24th In-lake & Leach Canyon Channel Sampling

- Water from beach just west of La Laguna Boat Ramp
 - Nutrients
 - TN = 4.2 mg/L
 - TP = 0.62 mg/L
 - PAHs – ND
 - Metals (ug/L)
 - Arsenic 23 (T), 15 (D)
 - Cadmium ND (T), ND (D)
 - Copper 3.0 (T), 1.6 (D)
 - Lead ND (T), ND (D)
 - Zinc 6.8 (T), 2.0 (D)
- Sediment from Holy Fire Delta
 - Not toxic to (*Hyaella* 91% survival)
 - Grain size = 93% silt/clay
 - Waiting on other chemistry results



Looking Ahead

- Wood provided a scope of work for Holy Fire sediment plume monitoring
- SA Regional Board and City of Lake Elsinore working on CAA application for additional funding
- TMDL and TNTP Offset monitoring in place to monitoring lake impacts

