Lake Elsinore and Canyon Lake TMDL Water Quality

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

Site 4 - San Jacinto River at Goetz Road
USGS 11070365

Flow (cfs)

Monitoring Event
Alta Watershed Monitoring Events

Site 3 - Salt Creek at Murrieta Road
USGS 11070465

Flow (cfs)
Monitoring Event
Alta Watershed Monitoring Events

Site 30 - Canyon Lake Spillway
USGS 11070500

- Flow (cfs)
- Monitoring Event
Alta Watershed Monitoring Events
Satellite Imagery

Lake Elsinore
September 11, 2018 Satellite Flyover Event
Satellite Imagery
Satellite Imagery

Lake Elsinore

December 20, 2018 Satellite Flyover Event
Satellite Imagery

Lake Elsinore
February 19, 2019 Satellite Flyover Event
In-lake Sampling Pre-Post Holy Fire Runoff

January 8, 2019
In-lake Sampling Pre-Post Holy Fire Runoff

January 18, 2019
In-lake Sampling Pre-Post Holy Fire Runoff

January 18, 2019
In-lake Sampling Pre-Post Holy Fire Runoff

Nutrients

<table>
<thead>
<tr>
<th>Date</th>
<th>Total Phosphorus</th>
<th>Total Nitrogen</th>
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<tbody>
<tr>
<td>Sept 2018</td>
<td>0.9 inches</td>
<td>0.0</td>
</tr>
<tr>
<td>Oct 2018</td>
<td>3.3 inches</td>
<td>0.8</td>
</tr>
<tr>
<td>Dec 2018</td>
<td>5.5 inches</td>
<td>0.6</td>
</tr>
<tr>
<td>Jan 2019</td>
<td></td>
<td>0.2</td>
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In-lake Sampling Pre-Post Holy Fire Runoff

Chlorophyll-a

![Graph showing Chlorophyll-a levels from September 2018 to January 2019 with data points for Surface and Depth Integrated samples.](image-url)
In-lake Sampling Pre-Post Holy Fire Runoff

Conductivity

<table>
<thead>
<tr>
<th>Month</th>
<th>Conductivity (µS/cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept 2018</td>
<td>5000</td>
</tr>
<tr>
<td>Oct 2018</td>
<td>5000</td>
</tr>
<tr>
<td>Dec 2018</td>
<td>4500</td>
</tr>
<tr>
<td>Jan 2019</td>
<td>4000</td>
</tr>
<tr>
<td>Feb 2019</td>
<td>3500</td>
</tr>
</tbody>
</table>

0.9 inches    3.3 inches  5.5 inches  9.4 inches  16 inches
In-lake Sampling Pre-Post Holy Fire Runoff

Dissolved Oxygen

Dissolved Oxygen (mg/L)

- Water Column Mean
- 1m from Bottom

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 (Hyalella 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