TMDL Compliance Monitoring Program Update

December 2, 2015
In-Lake Monitoring Approach

1. Bi-monthly sampling (every other month)
2. Water column vertical profiles (DO, pH, Temp, Cond) - 1 meter intervals
   • 3 sites in Lake Elsinore
   • 4 sites in Canyon Lake
3. Water column chemistry/nutrient sampling (full depth integration)
   • 1 site in Lake Elsinore (LE02)
   • 3 sites in Canyon Lake (CL07, CL08, CL10)
4. Chlorophyll-a
   • Full and 0-2m depth integrated sample (all chem stations)
   • 0-2m depth integrated surface sample only (CL09)
5. Lake-wide satellite imagery
   • Chlorophyll-a
   • Turbidity
6. Plankton sampling – preserved and archived
Station Locations – Lake Elsinore
Station Locations – Canyon Lake
Two Sampling Events Completed
July 31 and October 27, 2015
Lake Elsinore Water Profiles – July 2015

Site LE03

Morning - 0815

- Temperature
- Conductivity

- pH
- Dissolved Oxygen

DO depth mean = 3.6 mg/L

Afternoon - 1830

- Temperature
- Conductivity

- pH
- Dissolved Oxygen

DO depth mean = 4.9 mg/L
Canyon Lake Water Profiles – July/October 2015

Site CL07

July 31 @ 1405

Temperature (°C)

Conductivity (mS/m)

Depth (m)

DO epilimnion mean = 10.0 mg/L

October 27 @ 1405

Temperature (°C)

Conductivity (mS/m)

Depth (m)

DO epilimnion mean = 3.2 mg/L
Lake Elsinore Data Sonde Water Profiles – July 2015

Lakeshore Sonde

Grand Ave. Sonde

LE02 @ 0900 7/31/15
LE02 @ 1800 7/31/15
Sonde 7/31/15
Sonde July 2015

Dissolved Oxygen (mg/L) vs. Depth (m)
Lake Elsinore Data Sonde Water Profiles – July 2015

**Lakeshore Sonde**

**Grand Ave. Sonde**

![Graphs showing dissolved oxygen levels over time for Lakeshore and Grand Ave. sondes.](image-url)
## Analytical Water Chemistry – July 2015

<table>
<thead>
<tr>
<th>Compound</th>
<th>Units</th>
<th>Basin Plan or TMDL Target</th>
<th>Depth Integrated or Surface</th>
<th>CL07</th>
<th>CL08</th>
<th>CL09</th>
<th>CL10</th>
<th>LE02</th>
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</thead>
<tbody>
<tr>
<td><strong>General Chemistry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDS</td>
<td>mg/L</td>
<td>700 (CL), 2000 (LE)(^3)</td>
<td>DI</td>
<td><strong>720</strong></td>
<td><strong>750</strong></td>
<td>--</td>
<td><strong>840</strong></td>
<td><strong>2600</strong></td>
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<td>Sulfide</td>
<td>mg/L</td>
<td>NA</td>
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<tr>
<td>Nitrate as N</td>
<td>mg/L</td>
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<td>DI</td>
<td>ND</td>
<td>ND</td>
<td>--</td>
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<td>DI</td>
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<td>ND</td>
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<td>ND</td>
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<tr>
<td>Kjeldahl Nitrogen</td>
<td>mg/L</td>
<td>NA</td>
<td>DI</td>
<td>2.3</td>
<td>1.0</td>
<td>--</td>
<td>1.1</td>
<td>5</td>
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<tr>
<td>Total Nitrogen(^a)</td>
<td>mg/L</td>
<td>0.75(^b)</td>
<td>DI</td>
<td><strong>2.3</strong></td>
<td><strong>1.0</strong></td>
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<td><strong>1.1</strong></td>
<td><strong>5.0</strong></td>
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<tr>
<td>Ammonia-Nitrogen</td>
<td>mg/L</td>
<td>CMC: 1.56-17.03(^c) CCC: 0.25-2.57(^c)</td>
<td>DI</td>
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<td>Ortho Phosphate</td>
<td>mg/L</td>
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<td>DI</td>
<td>0.16</td>
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<tr>
<td>Total Phosphorus</td>
<td>mg/L</td>
<td>0.1(^b)</td>
<td>DI</td>
<td><strong>0.2</strong></td>
<td>ND</td>
<td>--</td>
<td>ND</td>
<td><strong>0.28</strong></td>
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</tbody>
</table>

### Chlorophyll-a

| Chlorophyll-a | µg/L | 25\(^1\), 40\(^2\) Surf (0-2m) | 4 | 13 | 13 | 17 | **290** |
| Chlorophyll-a | µg/L | 25\(^1\), 40\(^2\) DI      | **67** | **90** | -- | 16 | **326** |

\(^a\) - Total Nitrogen = TKN+NO2+NO3  
\(^b\) - Annual average  
\(^c\) - Values are site specific dependent upon pH and temperature recorded at each location  
\(^1\) – 2020 TMDL Target; \(^2\) – 2015 TMDL Target  
\(^3\) – Santa Ana Region Basin Plan Objective
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<td>mg/L</td>
<td>700 (CL), 2000 (LE)&lt;sup&gt;3&lt;/sup&gt;</td>
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<td>ND</td>
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<td>Kjeldahl Nitrogen</td>
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<tr>
<td>Total Nitrogen&lt;sup&gt;a&lt;/sup&gt;</td>
<td>mg/L</td>
<td>0.75&lt;sup&gt;b&lt;/sup&gt;</td>
<td>DI</td>
<td>1.8</td>
<td>0.86</td>
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<td>DI</td>
<td>1.2</td>
<td>1.0</td>
<td>--</td>
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<tr>
<td>Ortho Phosphate</td>
<td>mg/L</td>
<td>NA</td>
<td>DI</td>
<td>ND</td>
<td>ND</td>
<td>--</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
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<td><strong>Chlorophyll-a</strong></td>
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<td>102</td>
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<td>39.6</td>
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<sup>a</sup> - Total Nitrogen = TKN+NO2+NO3  
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<sup>1</sup> – 2020 TMDL Target,  
<sup>2</sup> – 2015 TMDL Target  
<sup>3</sup> – Santa Ana Region Basin Plan Objective  
<sup>+</sup> - Exceeds CCC for ammonia
Satellite Imagery – Canyon Lake
Chlorophyll-a

Chlorophyll-a Concentrations - Canyon Lake 07/31/15

Relative frequency (percentages)
Next Steps

- Finalize draft of Q1 monitoring report
- Continue multidimensional analysis of data
  - Data variability/ representativeness
  - Support potential revised TMDL targets down the road
- Next sampling date Sunday, December 6 (LandSat8 overpass)