UDWQ HAB Advisory Process

Monitoring

Routine
- DWQ and partners monitor prioritized lakes on a monthly basis

Response
- DWQ and partners monitor lakes on advisory on a weekly basis

Data Collected
- Microcystin and Anatoxin-a Cell Count (Taxonomy)

Detection
- Inform LHD
  Present data collected along with DWQ recommendation. Assist in answering site specific questions

Communication
- Phone call with all stakeholders (i.e. DNR, USFS, etc.) for site specific context

Advisory

Signs
- Work with LHD and partners to post signs, make sure signs get posted

Communication
- Alert stakeholders to advisory decision. Post information, maps, and narrative about advisory on habs.utah.gov
Software used for initial extraction:

- **Python**
- **PyCharm** (Python IDE)
- **ArcPy** (ArcGIS Python site package)

Basic Steps:
1. Extract and unzip raw Tarball from CyAN directory
2. Extract Utah specific tiles (4 of them for UT)
3. Build tile mosaic for UT
4. Extract pixels that have a hit for cyanobacteria detection
5. Using shapefile of Utah Lakes (contains name, designation, etc.), extract pixel information and merge them into Lakes shapefile
Information output in shapefile and CSV format:

1. Maximum, minimum, mean estimated cell counts for a given lake
2. How many cyan pixels in a lake
3. HAB area in square miles
4. Optional: designated use (high recreation, drinking water, impaired, etc)

<table>
<thead>
<tr>
<th>AU_NAME</th>
<th>MAX_Cyan_A</th>
<th>MEAN_Cyan_</th>
<th>MIN_Cyan_</th>
<th>COUNT_Cyan</th>
<th>HAB_Area</th>
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</thead>
<tbody>
<tr>
<td>Bear Lake</td>
<td>28840.30078</td>
<td>20376.35059</td>
<td>11912.40039</td>
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<td>Bear River-1</td>
<td>2208000</td>
<td>659932.2075</td>
<td>7046.930176</td>
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<td>4.7606401</td>
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<td>Bear River-3</td>
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<td>2092163.333</td>
<td>1870680</td>
<td>3</td>
<td>0.104248</td>
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<td>Bear River Bay</td>
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<td>46</td>
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<td>Beaver River-2</td>
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<td>1089412.9</td>
<td>270396</td>
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<td>Cottonwood Creek Lower</td>
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<td>199526</td>
<td>199526</td>
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<td>0.0347492</td>
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<tr>
<td>Currant Creek Lower</td>
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<td>340542.75</td>
<td>301995</td>
<td>4</td>
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</tr>
</tbody>
</table>
Information emailed out to local health departments and other partners depending on their map preference. Some prefer satellite baselayer, some prefer roads.

- Imagery alone is not used for making recreational health advisory decisions.
- Allows UDWQ staff and partners to target sampling areas and signage and communicate scale of bloom.
Example 1: Yuba Lake Sept. 2019

- High recreation State Park with no history of past HAB advisories
- Week long composite of imagery helped Park managers visually see that there was a significant bloom occurring in the northern end
  - Bloom was prone to dispersing through the water column during the day -- rangers and managers were missing peak bloom and thought advisory was initially not necessary (despite toxins and cell counts)
Example 2: Deer Creek Reservoir, Sept. 2019
- Caught on satellite before in-situ
- Drone flight and field visit confirmed
- Advisory issued quickly

WARNING
Harmful Algae Present

- Do not swim or water ski in this area.
- Avoid areas of algae scum when boating.
- Keep animals away.
- Do not ingest the water.
- Clean fish well and discard guts.

Data Provided:
Contact the Utah Rural Water Coordination Center
If you or your animals have unexplained sickness or algae or poisoning
Visit habs.utah.gov for more info.
Report an algae bloom: (801) 534-4155

(800) 222-1222
Example 3: Pineview Reservoir, October 2019

- 3000 acres
- High recreation in all areas of reservoir
- LHD reported bloom was isolated in specific beach areas
- Imagery helped LHD target sampling and advisory signs as the bloom moved around the reservoir

Cyanobacteria Cells/ml

- 20,000,000
- 7,000
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