

US EPA ARCHIVE DOCUMENT

# Utah's Efforts to Address Harmful Algal Blooms



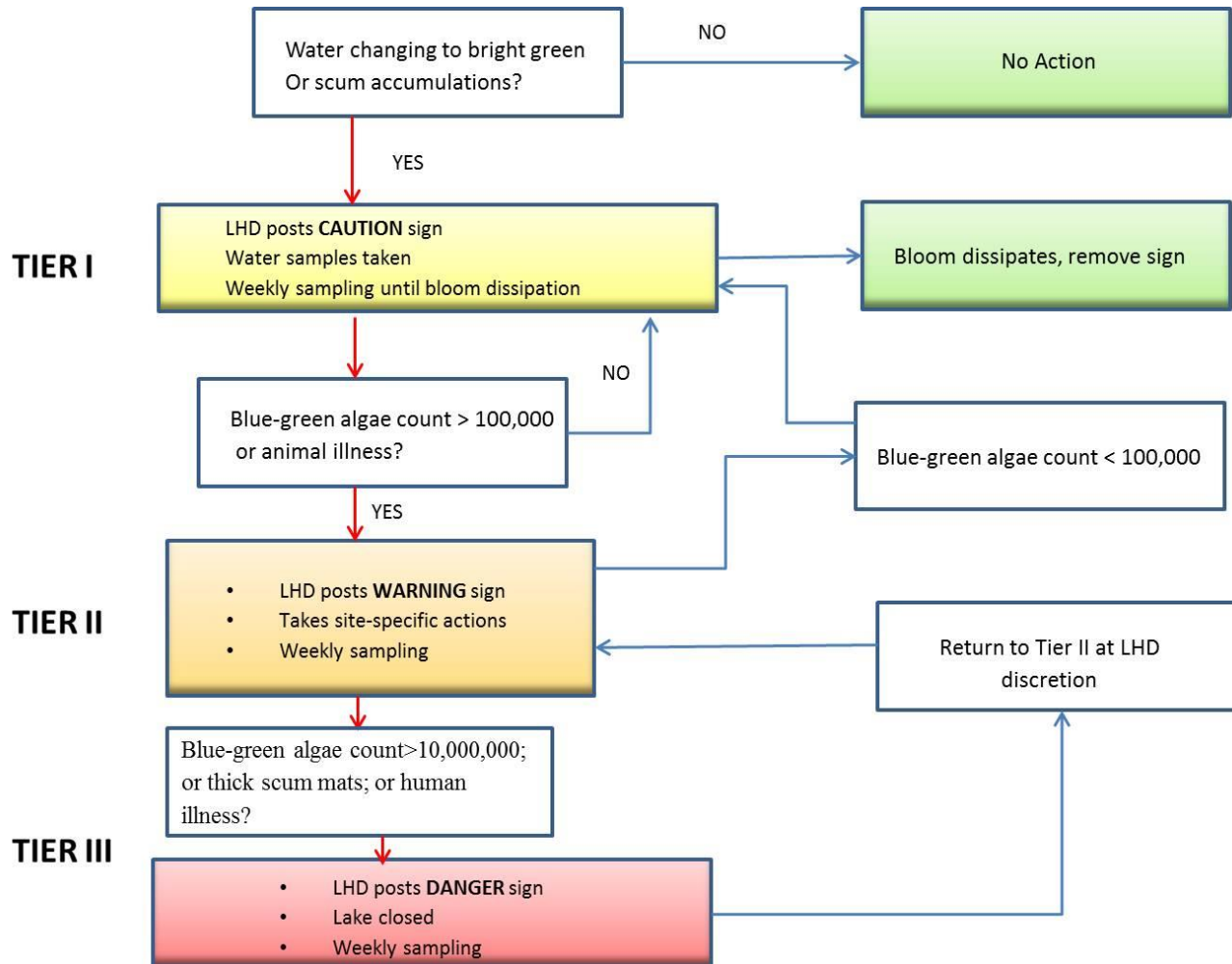
EPA Inland HABS Webinar  
October 20, 2016

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*Division of Water Quality*  
*Utah Department of Environmental Quality*

# UDEQ/UDOH Guidelines for HABs

Toxin Producing Blue-green algae Cell Density (cells/mL)	Health Risks	Action Recommended	Microcystin Concentrations (µg/L)	Relative Probability of Acute Health Risk
<20,000	Negligible	None	<4	Low
20,000-100,000	Short-term effects e.g. skin irritation, gastrointestinal illness	Issue caution advisory; Post <b>CAUTION</b> sign;  Weekly sampling recommended	4-20	Low to Moderate
100,000 – 10,000,00 or reports of animal illnesses or death	As above for low risk, and potential for long-term illness	Issue warning advisory; Post <b>WARNING</b> sign;  Weekly sampling recommended	20-20,000	Moderate to High
>10,000,000 or large scum mat layer or reports of human illness;	As above for moderate risk, and potential for acute poisoning	Issue Danger Advisory; Post <b>DANGER</b> sign;  Weekly sampling recommended  Consider <b>Closure</b>	>2,000	Very High

# HAB Decision-making Algorithm



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# Types of Analysis

- Species Identification and cyanobacteria cell count concentrations – Rushforth Phycology
  - 24 to 48 hour turn around time
- Cyanotoxin pre-screening test strips –
  - Day of sampling
  - Limited to cylindrospermopsins, microcystins and anatoxin-a (not saxitoxins)
  - Limited to various screening levels– recreation values set at >10 ug/L
- Cyanotoxin analysis – GreenWater Lab and EPA R8
  - 48 to 96 hour turn around time at best; 1 week is more likely
  - ELISA and LC/MS/MS results and costs vary
  - Differences in capacity, result ranges, and sample submission
  - Fundamental response that States require from this level of analysis– Is the sample 11 ug/L or 60,000 ug/L microcystin?

# Coordination

## Partners\*:

- Monitor waterbodies
- Take photos and samples
- Analyze for species/toxins
- Post and unpost advisory signs
- Consult with LHD

Communicate  
water quality  
results

## LHD:

- Consult with partners
- Evaluate water quality results
- Issue and lift advisories
- Provide public health information
- Investigate illness reports

Communicate  
health risks

## Potential exposure groups:

Pets/pet owners, Property owners  
Recreational Users, Water systems  
customers

## Interested groups:

Advocacy groups Business owners Interested citizens  
Legislatures Local governments Medical providers  
Regulatory agencies Researchers Veterinarians

# Coordination

## \*Partners:

UDEQ: DWQ/DDW, UDNr, Local Health Departments, UT Poison Control, UDAF, UDEM, Water Conservancy Districts, US EPA and NOAA, USFWS, Rushforth Phycology, Universities, volunteer monitors and more to come...

## Develop inter-agency coordination process

- Local Health Departments are the lead
- All relevant agencies should be notified
- Public Notification Process



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# Outreach: Contact and Websites

DEQ 24-hour Spill Line: 801.536.4123

Utah Poison Control Center: 1.800.222.1222

DEQ website:

[HABS.UTAH.GOV](http://HABS.UTAH.GOV)

UT Department of Health:

<http://health.utah.gov/enviroepi/appletree/HAB>







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## HAB Links

[2016 Blooms Info](#)

[CDC: Health Information](#)

[Basics](#)

[Contact Information](#)

[Drinking Water](#)

[Guidance for Cyanobacteria](#)

[Health Effects](#)

[Protect Yourself](#)

[DEQ Home](#) > [Pollutants](#) > [Harmful Algal Blooms](#) > [Algal Bloom 2016](#)

## Algal Blooms 2016

Harmful algal blooms (HABs) occur when cyanobacteria multiply quickly to form visible colonies or blooms. These blooms sometimes produce potent [cyanotoxins](#) that pose serious health risks to humans and animals.

Conditions during the summer of 2016, including low water levels, abundant sunlight, high nutrient levels, warm water temperatures, and calm waters, have led to numerous algal blooms in Utah waterbodies. These blooms have been unprecedented in their size, scope, and severity.

The Division of Water Quality (DWQ) will continue to conduct extensive sampling of these blooms to track their progress, identify the cyanobacteria species responsible for individual blooms, analyze cyanobacteria cell concentrations, test for cyanotoxins, and chart trends. DWQ provides state and local agencies, particularly local health departments, with sampling test results to assist these agencies in making determinations about lake closures, secondary water usage, and allowable recreational uses of affected waterbodies.

- [Farmington Bay](#)

### Report a Bloom

If you suspect that you have seen a harmful algal bloom, **please call the 24-hour DEQ Spill Line: (801) 536-4123.**

### Exposure

Individuals who believe they may be experiencing [symptoms from exposure](#) should contact the the [Utah Poison Control Center](#) at **(800) 222-1222** immediately. Pet owners concerned about their animals should contact their veterinarian. Veterinarians or members of the public who would like to know more about symptoms or appropriate tests for animals who may have been exposed to harmful algae or cyanotoxins can consult [these CDC materials](#) for

# 2016 cHABs in Utah Waters



Ksl.com

- ❑ Blackridge Reservoir
- ❑ Mantua Reservoir
- ❑ Payson Lakes (n=4)
- ❑ Scofield Reservoir
- ❑ Utah Lake
- ❑ Farmington Bay
- ❑ Upper Box Cr. Reservoir



Justun Edwards

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# Utah Lake

- 24 miles long, 12 miles wide (150 square miles surface area)
  - ~ 4 largest natural freshwater lake in the West; slightly smaller than Pyramid Lake
- Average depth is 3 meters; maximum depth ~4.5 meters
  - 2016 depth is about half these numbers
- Secondary water uses— such as agriculture, livestock, and residential
- Recreational uses— such as swimming, water skiing/tubing, fishing; State Park
  - Home to ESA-listed June Sucker



July 2, 2016

July 11, 2016

# Utah Lake 2016





# Utah Lake 2016



# Utah Lake 2016



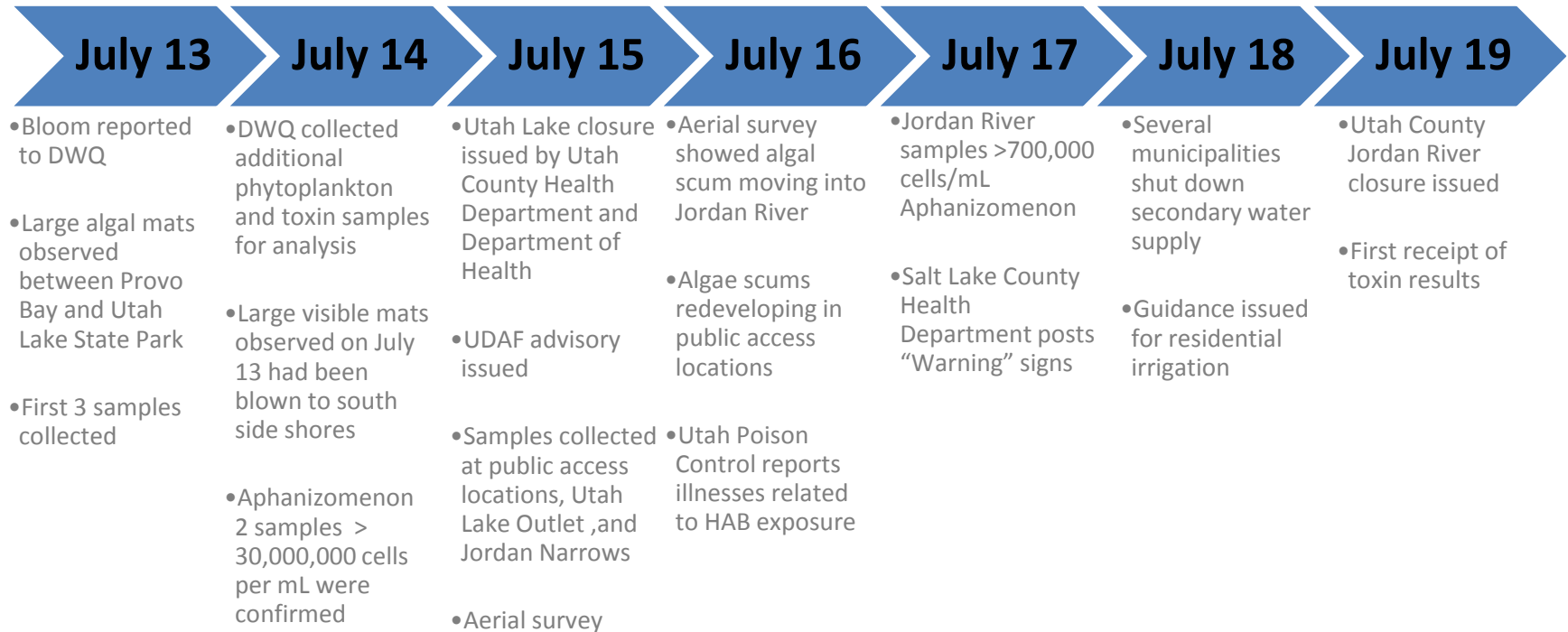


# Utah Lake 2016

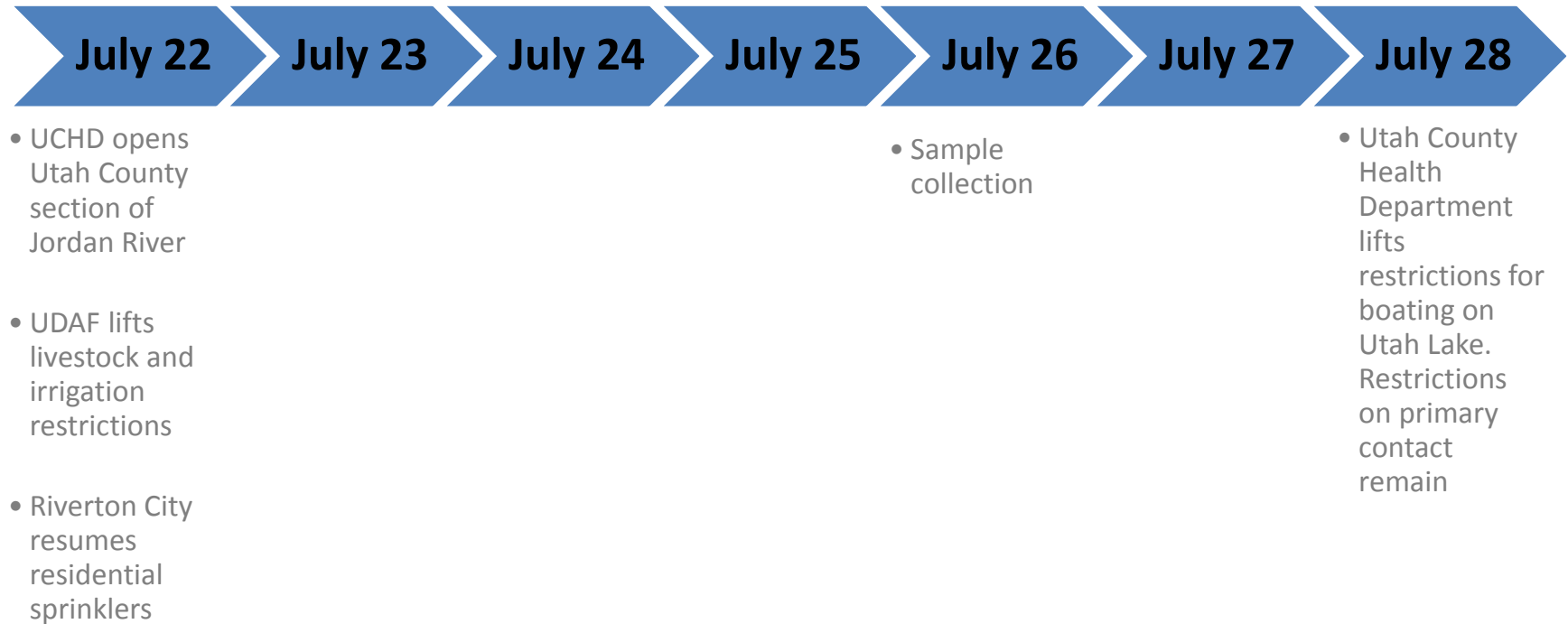




# Timeline



# Timeline



# Utah Lake Closure



State of Utah

GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

Department of  
Environmental Quality

Alan Matheson  
Executive Director

Brad T Johnson  
Deputy Director

Utah County  
HEALTH DEPARTMENT



## NEWS RELEASE

July 15, 2016

### CONTACT

Donna Kemp Spangler  
Communications Director

Office: 801-536-4484

Cell: 801-554-4944

[dspangler@utah.gov](mailto:dspangler@utah.gov)

# DANGER

## LAKE CLOSED

due to toxic algae

## KEEP OUT OF LAKE

**Call your doctor or veterinarian if you or your animals have sudden or unexplained sickness or signs of poisoning.**

Report new algae blooms to the Department of Environmental Quality:

Call your local health department:



UTAH DEPARTMENT OF  
ENVIRONMENTAL QUALITY



UTAH DEPARTMENT OF  
HEALTH

### Potential Health Risks Force Closure of Utah Lake from Harmful Algal Bloom

Lab tests confirms a high probability of health risks

SALT LAKE CITY - Public health officials have decided to close Utah Lake, effective immediately, due to a large, harmful algal bloom that may pose a serious health risk to the public and animals. The Utah Department of Health (UDOH) and Utah County Health Department (UCHD) say lab results for samples collected by the Utah Department of Environmental Quality (DEQ) show the concentration of algal cells in the water are three times the threshold for closing a body of water.



Division of Water Quality

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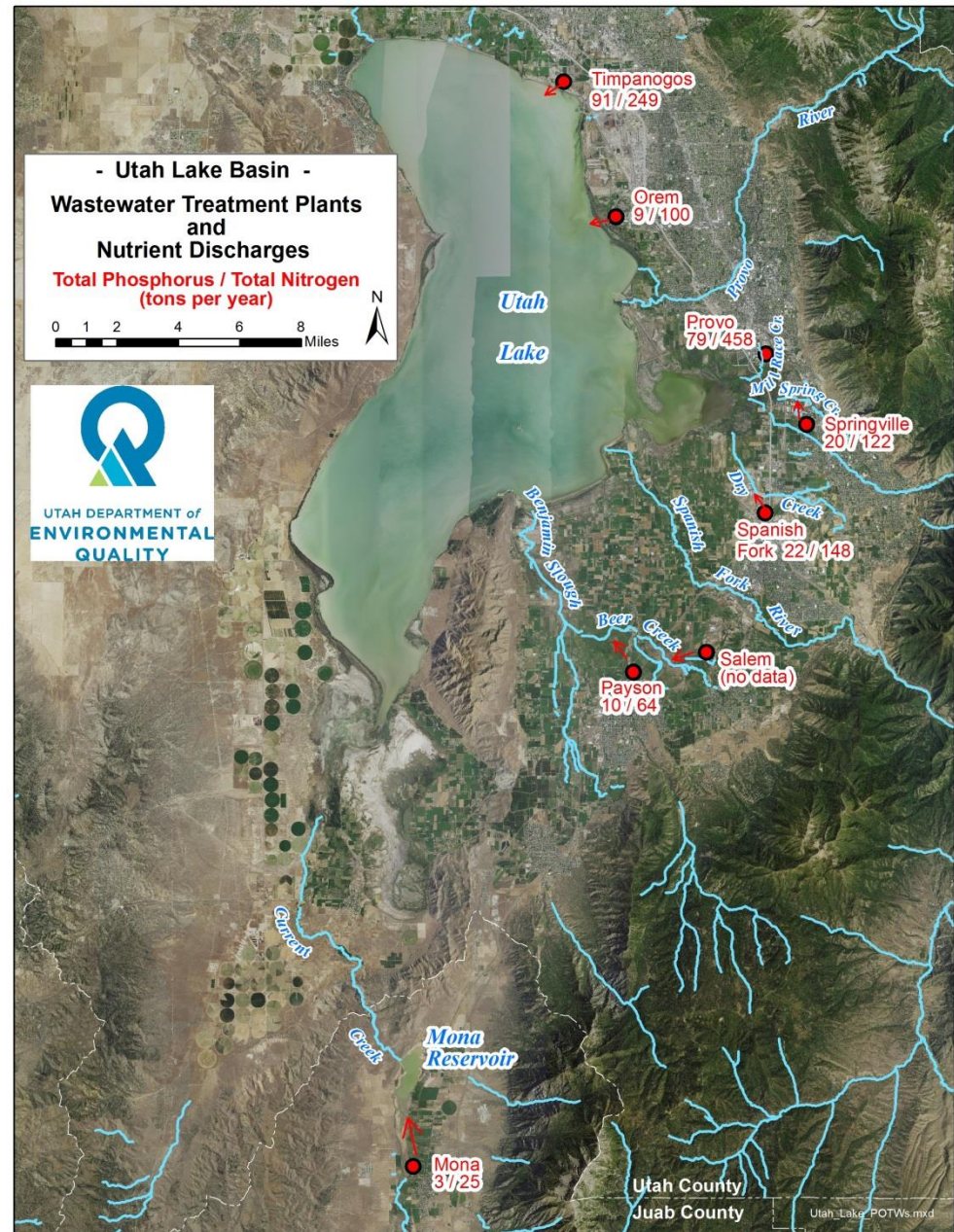
# Utah Lake 2016

- Nutrient concentration during bloom:
- TP concentration (0.18 mg/L) was triple the average (0.06 mg/L) concentration
- TN concentration: 1.2 mg/L

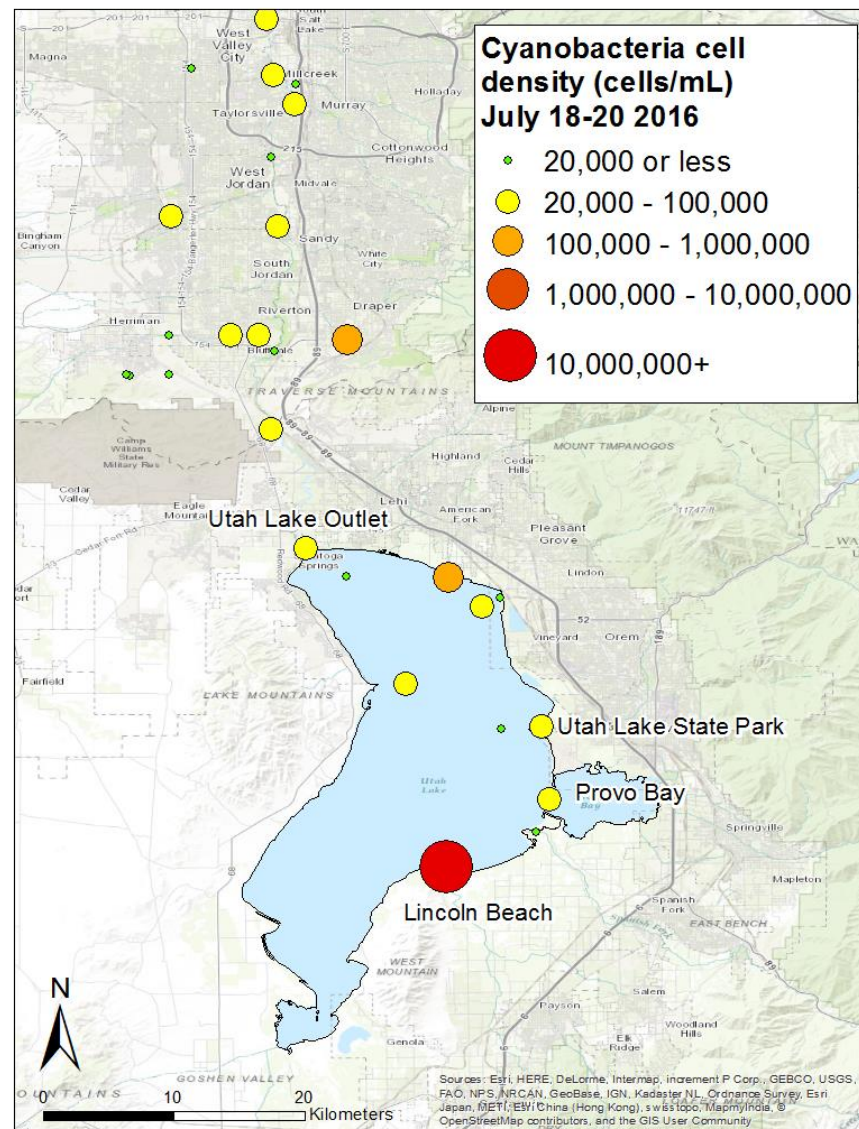
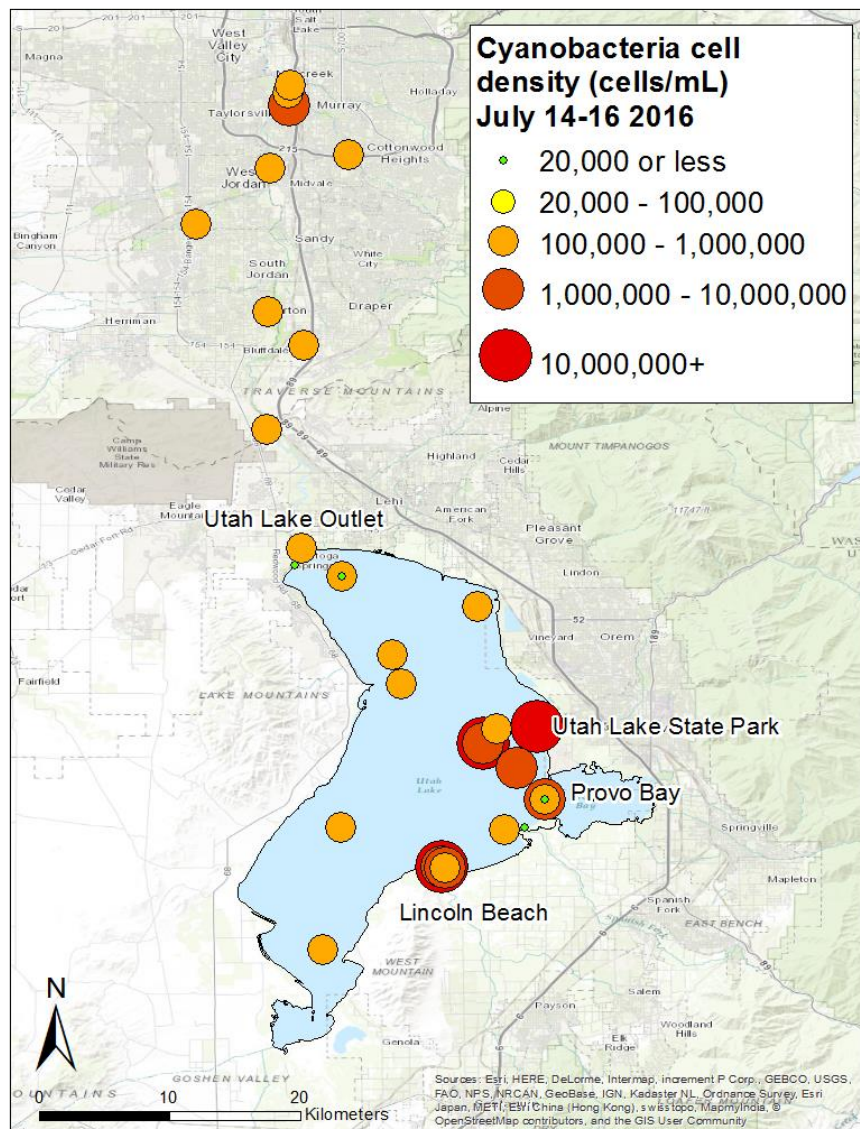


# Nutrient Sources

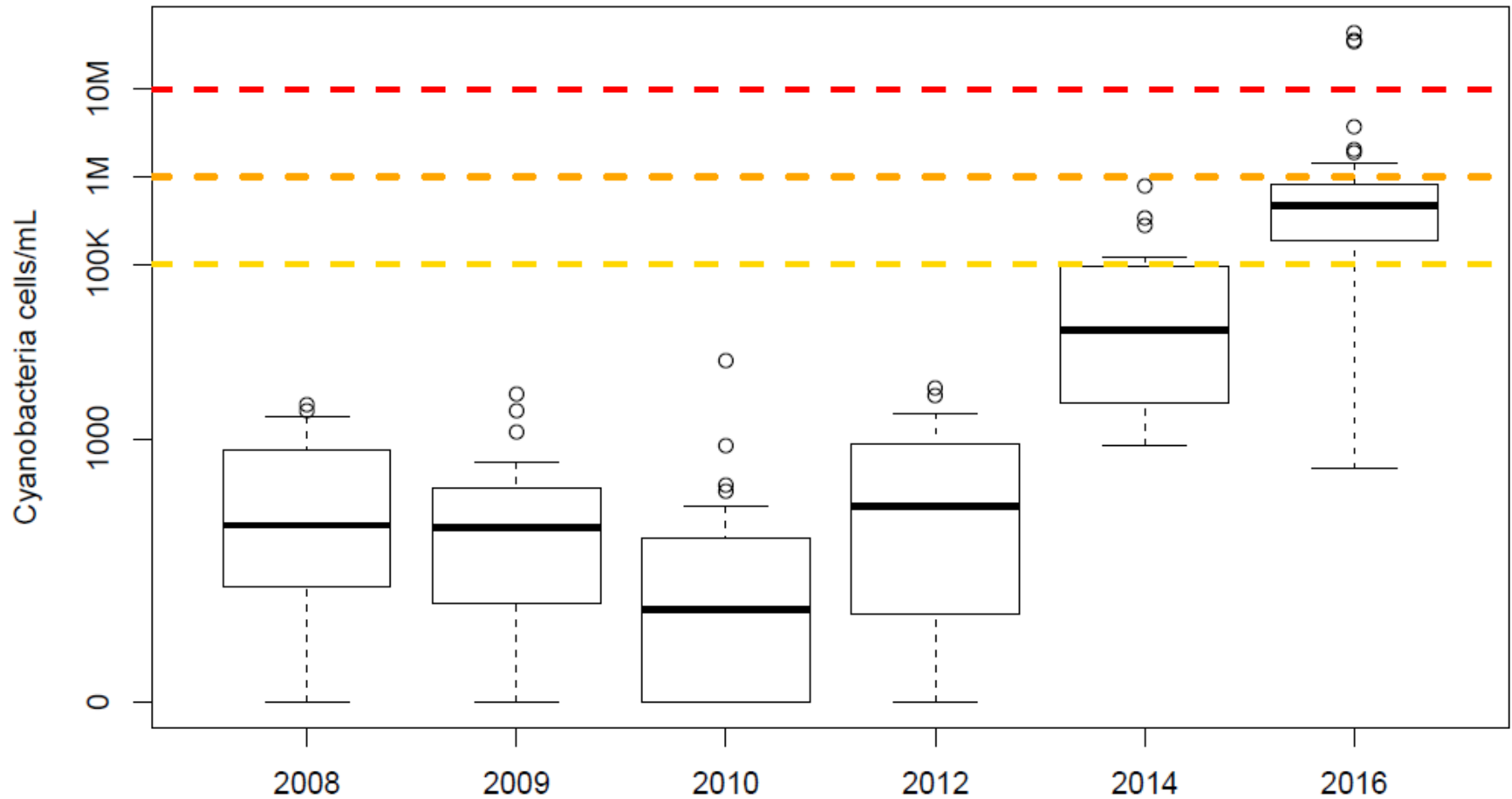
- Publically owned treatment works (POTWs) (largest)
- Stormwater
- Agricultural runoff
- Natural background





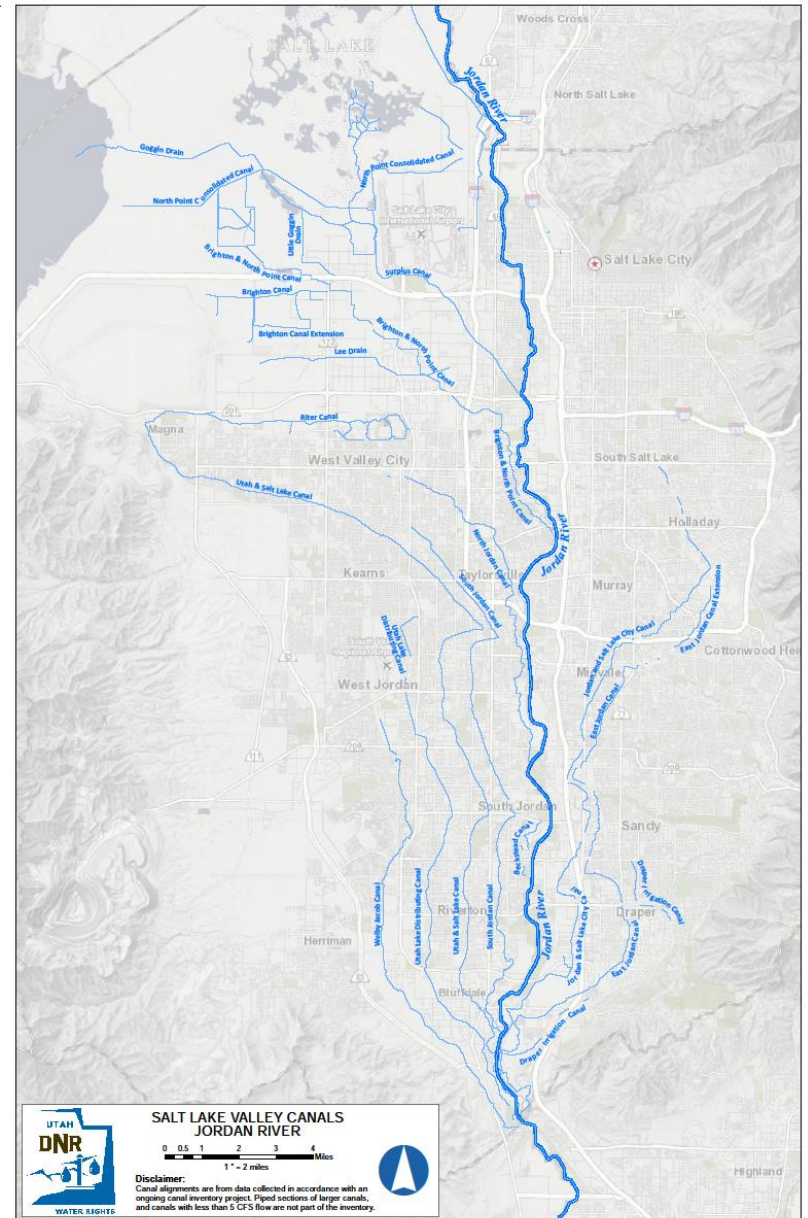


# How does it compare?





# What about irrigation use?





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# Utah Lake 2016

- Overall, essentially a “non-toxic” bloom---  
Toxin results obtained 1 week after collection:
- Surface scum sample 1 ug/L microcystin via ELISA
- Surface scum 177 ug/L microcystin-LR found in a marina

# Utah Poison Control Center



## 636 Reported Cases (As of August 1)

Human Exposure (504)	81%	Recreated in or exposed to Utah Lake Water
Animal Exposure (27)	4%	14 dogs (8 UT Co., 5 SL Co., 1 WY)
Information only (86)	14%	

**31% of cases are symptomatic**

## Symptoms Reported:

GI: diarrhea, nausea, vomiting, and  
abdominal pain

Skin: rash and irritation

Neuro: headache, dizziness, drowsiness

Ocular: irritation

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# Scofield Reservoir

- 2800 acres surface area
- 7600' elevation location
- Source water for potable water– located ~20 miles downstream-- ~10,000 residents
- Secondary water uses– such as agriculture, livestock, and residential
- Recreational uses– such as swimming, water skiing/tubing, fishing; State Park
- Residential- permanent and temporary

# Scofield 2016





# Scofield 2016



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# Scofield Reservoir 2016

- Primary cyano composition:

- *Aphanizomenon flos-aquae*
- *Dolichospermum crassum*
- *Dolichospermum flosaquae*

~700,000 cells/ml;

~200 ug/L microcystin-LR in select locations;

~5 ug/L microcystin exiting reservoir

# Scofield 2016



Photo by Utah DEQ



# Scofield 2016



Photo by Utah DEQ



# Scofield 2016



Photo by Utah DEQ

# Scofield 2016

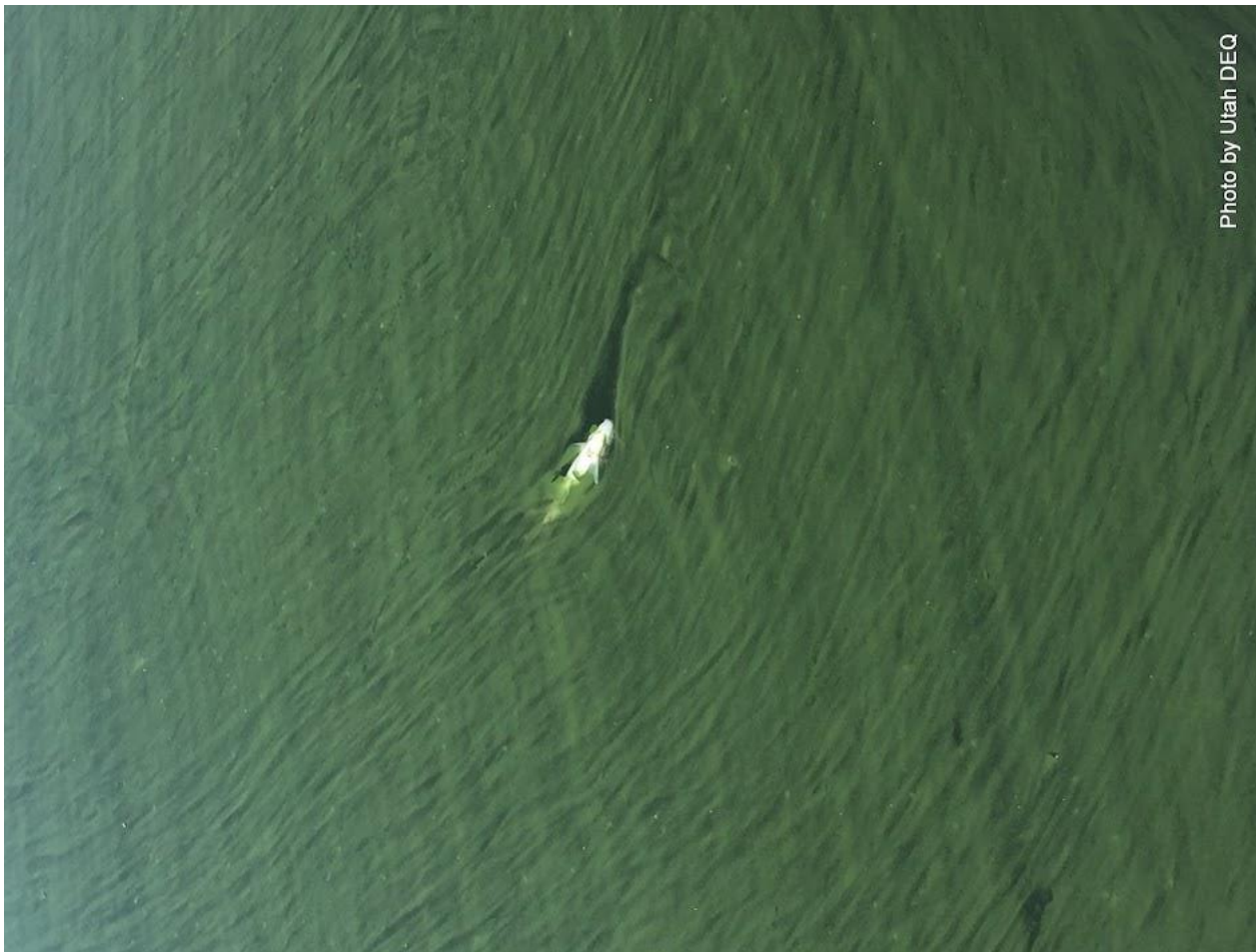


Photo by Utah DEQ





Photo by Utah DEQ



# Scofield 2016



Photo by Utah DEQ



# Scofield 2016



Photo by Utah DEQ

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# Scofield Reservoir 2016

- Primary cyano composition:

- *Aphanizomenon flos-aquae*
- *Dolichospermum flosaquae*

~5M cells/ml;

~60,000 ug/L microcystin from select location

>10 ug/L microcystin below intakes

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# Payson Lakes- Big East Lake

- 23 acres surface area
- 8000' elevation location
- Secondary water uses– such as agriculture, livestock, and residential
- Recreational uses– such as swimming, fishing; National Forest campground



# Payson Lakes 2016





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# Payson Lakes 2016

- Primary cyano composition:

August 2, 2016

- *Gloeotrichia echinulata*

~45.6M cells/ml

~430 ug/L microcystin

September 14, 2016

- *Dolichospermum crassum*

~11M cells/ml

# WQ Recreational Use Assessment?



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# Lake Assessment Guidance

## Recreational Use Support

### Beneficial Use Supported:

- The beneficial use is supported if cyanobacteria cell counts <20,000 cells/mL.

### Beneficial Use Not Supported:

- The beneficial use is not supported if the cyanobacteria cell count exceeds 100,000 cells/mL for more than one sampling event or other narrative indicators (e.g., phycocyanin, chlorophyll-a, HAB beach warnings, suggest recreational uses are not being attained).

### Insufficient Data and Information

- The waterbody will be categorized 3A if there is one exceedance >20,000 cells/mL. These waterbodies will be prioritized for further evaluation with respective public health managing partners such as the State Health Department and State Parks Departments.

## •Examples from other States?





# **Taking Action**

What can we do?

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# Monitoring: Utah's Vulnerable Waters

## Increase monitoring of most vulnerable waters

- Coordination with Division of Drinking Water, State Parks, Water Conservancy Districts, District Engineers, Dept. Agriculture, and Local Health Departments.
- DWQ and partners have scopes and trained staff to provide initial screen at select locations (via NOAA pilot program)
- Targeted core areas to receive more frequent monitoring: Utah Lake, Pineview/East Canyon, Scofield Reservoirs



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# Monitoring: Utah's Vulnerable Waters

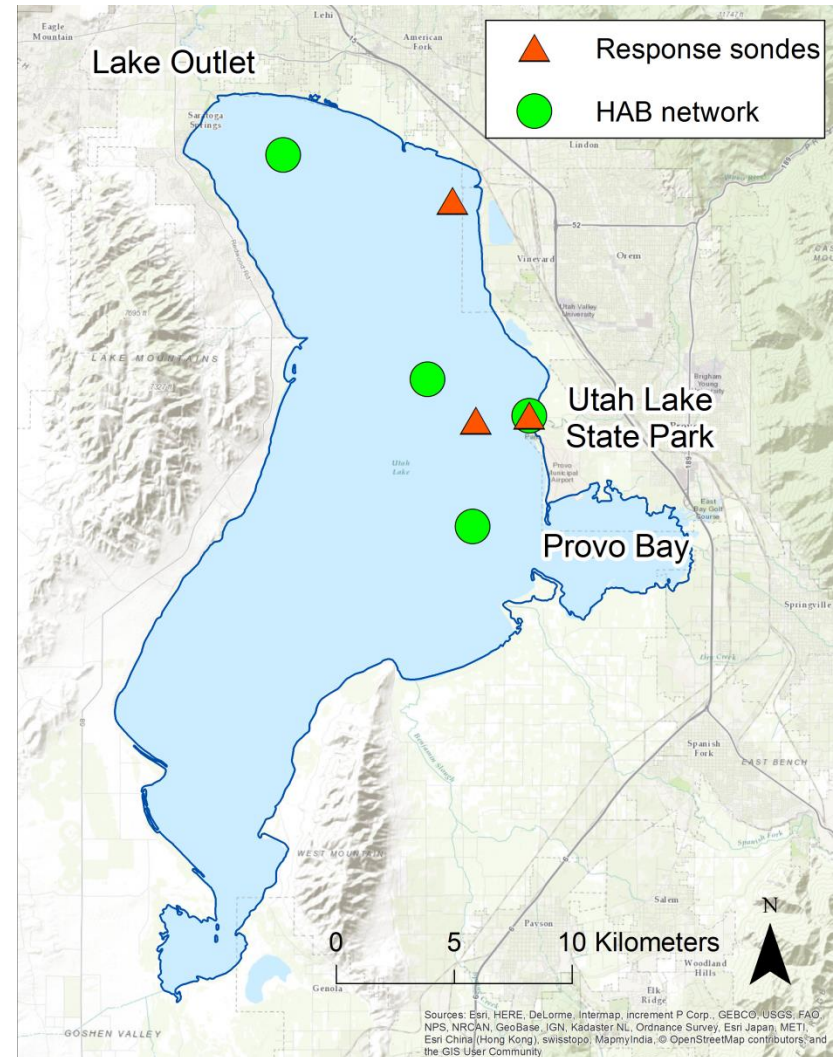
## Target Drinking Water and High Recreational Use Waterbodies

- EPA Region 8 providing monthly cyanotoxin testing at Utah Lake
- EPA and NOAA providing bloom-event toxin testing as needed
- Prioritizing high-frequency data collection at Utah Lake, Scofield, & Farmington Bay

# HAB Monitoring Network

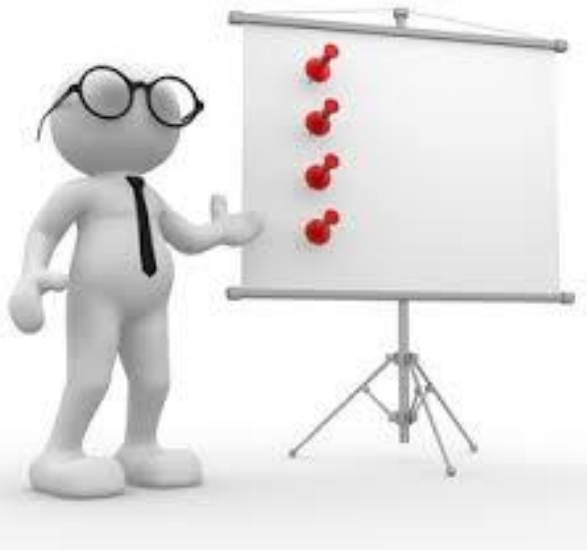
- Utah Water Quality Board Funding - \$100,000
  - 3 Open water buoys
  - YSI sondes (dissolved oxygen, pH, temperature, specific conductivity, chlorophyll a, phycocyanin)
  - Cellular real-time data linked to publicly available iUtah network.
  - Water chemistry and phytoplankton sampling

<https://wqdatalive.com/public/669>

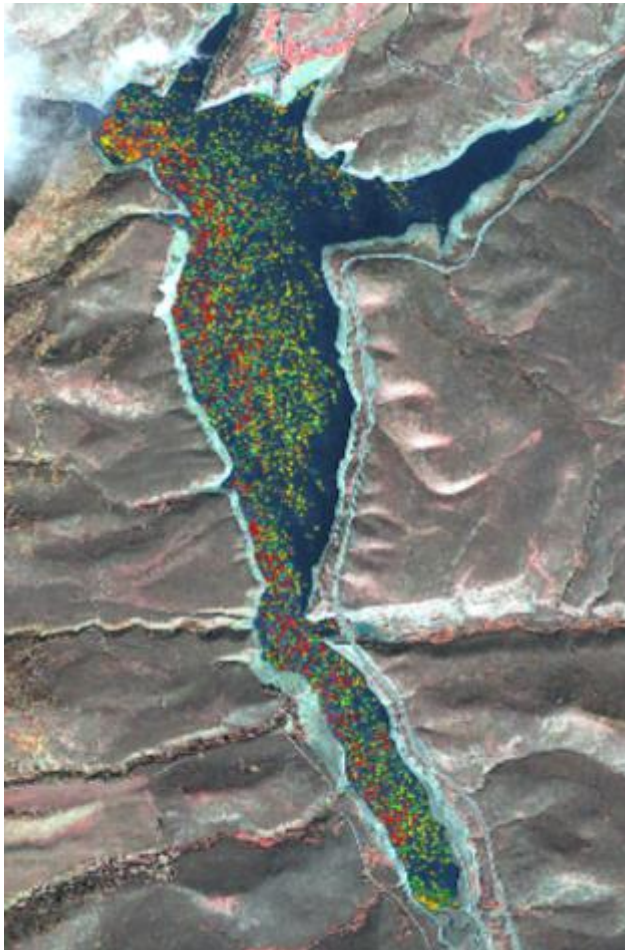


# Developing Numeric Nutrient Criteria

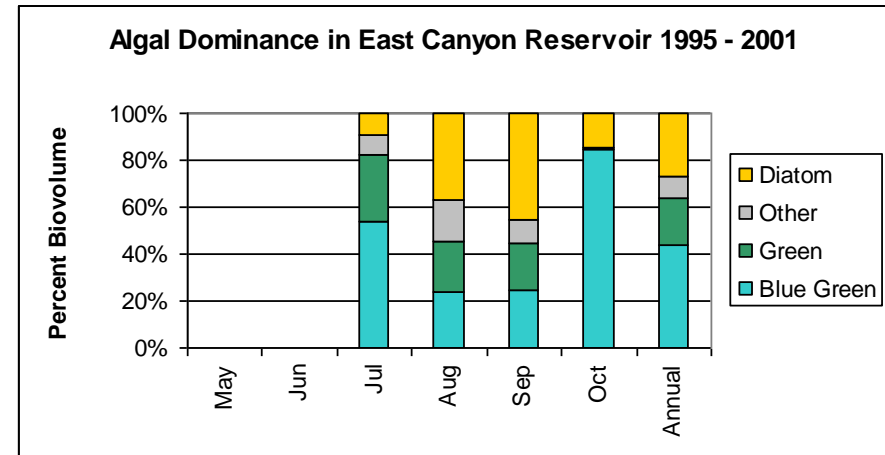
Prioritize development of statewide standards and/or site-specific standards



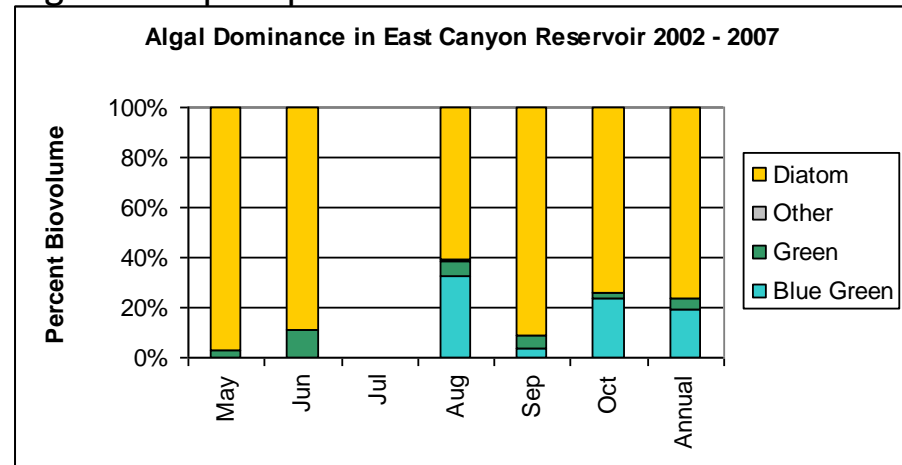
# Algal shift in East Canyon Reservoir



IKONOS Multispectral Imagery of East Canyon Reservoir  
Collected October 11, 2000



2003: Major upgrade of East Canyon WWTP including significant phosphorus reduction





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# Treatment Options?

- Inundated with ‘magic’, silver-bulleted, potions:
  - How do agencies respond?
  - Can EPA provide assistance?
  - What screens could be implemented?
  - How are they communicated appropriately?

# QUESTIONS

