UTAH DEPARTMENT of ENVIRONMENTAL QUALITY

Utah Lake, Jordan River, Canals Algal Bloom 2016

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Data (Expand to view)

[Visit the Photo Gallery (https://deq.utah.gov/water-quality/photo-gallery-and-maps-utah-lake-jordan-river-canals-algal-bloom-2016)]

Update: October 11, 2016

The last few samples taken at Utah Lake showed minimal cyanobacteria cell concentrations. The Division of Water Quality (DWQ) has suspended harmful algal bloom (HAB) data collection until or unless it receives reports of deteriorating conditions from field crews visiting the lake weekly or members of the public.

Three buoys collecting water-quality parameters, including HAB-related data, will remain in the lake until the end of October.

Update: September 19, 2016

Utah County Health Department News Release: Algal Bloom Advisories change both for the better and worse (https://documents.deq.utah.gov/communication-office/press-releases/2016-09-16-Utah-County-Press-Release-Algal-Bloom-Update-2016-09-16.pdf) (pdf)

The Utah County Health Department (UCHD) updated its advisories for Utah Lake today. All marinas and other areas of the lake on now under a CAUTION advisory. In areas with a CAUTION advisory, swimming and other water activities are allowed, but recreators should stay out of areas of scum. Pets and

Report a Bloom

24-Hour DEQ Environment Incidents Line: (801) 536-4123

Call Utah Poison Control Center

(http://poisoncontrol.utah.edu/).

If you believe you or your pet have been exposed to a harmful algal bloom, call **(800) 222-1222**.

activities are allowed, but recreators should stay out of areas of scum. Pets and livestock should not go into the water, drink the water, or venture into areas of scum along the shore.

Sampling Results

Screening-level toxin test strip results from samples taken September 14, 2016, show a significant decrease in cyanotoxins.

Lincoln Beach,which has seen some of the highest toxin levels this summer, tested at 2.5 micrograms per liter (ug/L) for microcystin, well below the >10 ug/L threshold. Lindon Harbor was non-detect for microcystin.

Update: September 15, 2016

Sampled collected at Utah Lake and the Jordan River on September 6, 2016, and September 13, 2016, showed decreasing cell counts and lowered toxin levels.

These data represent the second consecutive week of cell counts <20,000 cells per milliliter (mL) on Utah Lake and Jordan River outlets and non-detect for toxins at Utah Lake.

Utah Lake

September 13, 2016

Cyanobacteria cell counts (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/cyano-hab-tax-dat-utah-lake-9-13-2016.xlsx) from samples collected on September 13, 2016, showed a marked decrease in cyanobacteria in the lake. All samples were <3,000 cells/mL, far below the 20,000 cells/mL threshold..

Screening-level toxin test strip results (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/toxin-strip-test-utah-lake-sept-13-2016.xlsx) at the three Utah Lake sampling locations were non-detect for cyanotoxins.

September 6, 2016

Cyanobacteria cell counts (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/utah-lake-cyano-hab-tax-dat9-6-2016-sum.xlsx) from samples collected on September 6, 2016, showed a marked decrease in cyanobacteria in the lake. All samples were below 10,000 cells/mL, considerably below the 20,000 cells/mL threshold.

Screening-level toxin test strip results (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/utah-lake-toxins-sept-6-2016.xlsx) at the three Utah Lake sampling locations were non-detect for cyanotoxins.

Jordan River and Canals

September 13, 2016

Cyanobacteria cell counts (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/cyano-hab-tax-dat-utah-lake-9-13-2016.xlsx) from samples collected on September 13, 2016, showed a marked decrease in cyanobacteria in the lake. All samples were <3,000 cells/per milliliter (mL), well below the 20,000 cells /mL threshold.

Screening-level toxin test strip results (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/toxin-strip-test-utah-lake-sept-13-2016.xlsx) for samples taken at the Jordan River Narrows Pump Station and Jordan River at Utah Lake Outlet showed low concentrations of anatoxin.

September 6, 2016

Cyanobacteria cell counts (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/utah-lake-cyano-hab-tax-dat9-6-2016-sum.xlsx) from samples collected on September 6, 2016, showed a marked decrease in cyanobacteria levels. Both samples were <5,000 cells/mL, well below the 20,000 cells/mL threshold.

Screening-level toxin test strip results (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/utah-lake-toxins-sept-6-2016.xlsx) at the Jordan River Narrows Pump Station and Jordan River at Utah Lake Outlet were non-detect for cyanotoxins.

Update: September 2, 2016

Samples collected at Utah Lake and the Jordan River between Monday, August 29, 2016, and Wednesday, August 31, 2016, continued to show areas with elevated cell counts

cell counts.

Utah Lake

Cyanobacteria cell counts results from samples collected on August 29, 2106, at Pelican Point (17,000 cells/milliliter (mL) and 1 mile West of Provo Bay (5,500 cells/mL) were in the very low range (< 20,000 cells/mL). However, samples from several Utah Lake marinas on August 31, 2016, showed that these areas still contain very high cyanobacteria concentrations:

- Saratoga Springs Marina (23.2 million cells/mL),
- Lincoln Harbor (4.7 million cells/mL)
- Lindon Marina (570,000 cells/mL)

Screening-level toxin test strips for the August 31, 2016, samples showed non-detect for microcystins at Lindon Marina and Saratoga Springs Marina. However, mycrocystin concentrations remained elevated at Lincoln Beach at >10 micrograms per liter (ug/L).

Jordan River

Cyanobacteria cell counts for samples collected August 29, 2016, were in the very low range (< 20,000 cells/ml) at the Jordan River at Utah Lake outlet (<1000 cells/mL), and in the low to moderate range (20,000 to 100,000 cells/mL) at the Jordan River above the narrows (30,000 cells/mL). All toxin screen tests for samples collected on August 29, 2016, on the Jordan River were non-detect.

Update: August 30, 2016

Utah County Health Department News Release: Algal Bloom Advisories Increased in 3 Water Bodies Algal Bloom Advisories Increased from CAUTION to WARNING (https://documents.deq.utah.gov/communication-office/press-releases/2016-08-30-Utah-County-Press-Release-Algal-Bloom-Update.pdf)

The Utah County Health Department (UCHD) has increased its advisory for the American Fork Marina from a CAUTION to a WARNING based on recent test results and monitoring. The public should not swim in water bodies under a WARNING advisory. While boating activities are allowed under a WARNING advisory, recreators should avoid areas of scum. In areas with a CAUTION advisory, swimming and other water activities are allowed, but recreators should stay out of areas of scum. Pets and livestock should not be allowed in or allowed to drink the water at any advisory level.

Update: August 29, 2016

Cyanobacteria cell count results from the August 23, 2016, sampling were in the moderate to high range (100,000 to 10 million cells/mL) at Lincoln Beach Marina (448,000 cells/milliliter (mL), Saratoga Springs Marina (5 million cells/mL), and

American Fork Marina (1.1 million cells/mL). Cell counts were in the low to moderate range (20,000 to 100,000 cells/mL) in Utah Lake one mile west of Provo and one mile east of Pelican Point.

Screening-level toxin test strips showed the presence of microcystins >10 micrograms per liter (ug/L) from samples collected at Lincoln Beach Marina, 5 ug/L at American Fork Marina and Utah Lake one mile east of Pelican Point, but non-detect at the Saratoga Springs Marina. Samples were sent to EPA for further toxin analysis.

Utah County Health Department (UCHD) posted warning signs at Sandy Beach and Saratoga Springs. Lincoln Beach Marina remains closed to the public on the advice of UCHD. Caution signs remain for the rest of the lake.

Jordan River and Canals

Cyanobacteria cell count results from the August 23, 2016, samples were in the very low range (less than 20,000) at all Jordan River and Canal sites.

Screening level toxin test strips showed the presence of microcystins at 5 ug/L at the Jordan River above the narrows pump station and in the Utah and Salt Lake Canal. Samples were sent to EPA for further toxin analysis.

Caution signs remain posted.

Update: August 26, 2016

Utah Lake

Utah Lake Screening-level toxin test strips for samples collected August 23, 2016, showed the presence of toxins at several sampling sites on Utah Lake.

Microcystin toxin concentrations remain >10 ug/L at Lincoln Marina, and were 5 ug/L at American Fork Marina and one mile east of Pelican Point. Testing detected mycrocystin concentrations of 1 ug/L one mile west of the Provo Boat Harbor.

The Utah County Health Department posted warning signs on August 22, 2016, for Saratoga Springs and Sandy Beach. Lincoln Beach remains closed. CAUTION signs for the rest of the lake remain posted.

Cyanobacteria cell counts and species identification results for the August 16, 2016, and August 23, 2016, samples are expected later today. Toxin test results for the August 23, 2016, samples should be available next week.

Jordan River and Canals

Screening-level toxin test strips for samples collected August 23, 2016, showed microcystin concentrations of 5 ug/L at Jordan River above the Narrows pump station and in the Utah/Salt Lake Canal. CAUTION signs remain posted.

Cyanobacteria cell counts and species identification results for the August 16, 2016, and August 23, 2016, samples are expected later today. Toxin test results for the August 23, 2016, samples should be available next week.

Update: August 22, 2016

Utah County Health Department News Release: Algal Bloom Advisories Increased from CAUTION to WARNING (https://documents.deq.utah.gov/communication-office/press-releases/2016-08-22-Utah-County-Press-Release-Advisories-Increased-2016-08-22.pdf) (pdf)

Utah County Health Department (UCHD) officials issued updated advisories for Utah Lake today. Changes to advisories are based on recent test results and monitoring and include the following areas:

- Sandy Beach: from a CAUTION to a WARNING advisory (based on the presence of toxins)
- Saratoga Springs Marina: from a CAUTION to a WARNING advisory (based on cyanobacteria cell counts)
- Lincoln Beach: remains CLOSED (based on cell counts and the presence of toxins)

All other areas remain at a CAUTION advisory.

The public should not swim in water bodies under a WARNING advisory. While boating activities are allowed under a WARNING advisory, recreators should avoid areas of scum. In areas with a CAUTION advisory, swimming and other water activities are allowed, but recreators should stay out of areas of scum. Pets and livestock should not be allowed in or allowed to drink the water at any advisory level.

Sampling Results

DWQ received the following results from sampling conducted on August 16, 2016. Field staff observed that the Utah Lake bloom appears to be resurfacing.

All cyanobacteria cell counts were in the low to moderate range (20,000 to 100,000 cells/mL) with the exception of two sample sites: Lincoln Beach, which had a cyanobacteria cell count of 7.5 million cells per milliliter (cell/mL), and the

Saratoga Springs Marina, where a new type of filamentous cyanobacteria from the Oscillatoriacea group was detected at 899,000 cells/mL.

Screening level toxin test strips from samples collected at Sandy Beach and Lincoln Beach showed the presence of microcystins at >10 micrograms per liter (ug/L). Microcystins were non-detect at the State Park and American Fork marina. Low levels of microcystin were detected in the Utah and Salt Lake Canal.

The Sandy and Lincoln Beach samples will be sent to a Florida lab for further analysis.

Update: August 15, 2016

Sampling Results

DWQ has received cyanobacteria cell-count results from August 9, 2016, sampling. Toxin results from this sampling should be available later this week. The division will continue to coordinate with the local health departments and other partner agencies as results come in.

DWQ and its partners will continue to sample Utah Lake and the Jordan River and associated canals until cell counts and toxin concentrations are within the low-risk range for two consecutive samples.

Utah Lake

Cyanobacteria cell-count concentrations remain in the low to moderate health-risk range (20,000 to 100,000 cells/milliliter(mL) at Pelican Point, 0.5 miles west of Geneva Harbor, and one mile west of the State Park Boat Harbor. Cyanobacteria cell concentrations were in the very low range (<20,000 cells/mL) at Lindon Marina and Saratoga Springs. Caution signs remain posted.

To date, scientists have identified six species of cyanobacteria at Lincoln Harbor. The mix of species has shifted from Aphanizomenon (131,000 cells/mL) and Dolichospermum (8,500 cells/mL) to Geitlerinema (14 million and 40 million cells/mL), Pseudanabaena (7.7 million cells/mL), Phormidium (3 and 5 million cells/mL), and an unknown cyanobacteria (338,000 and 776,000 cells/mL). The private marina is closed to the public on the advice of the Utah County Health Department, and recreationists should avoid areas of scum.

Jordan River

Jordan River

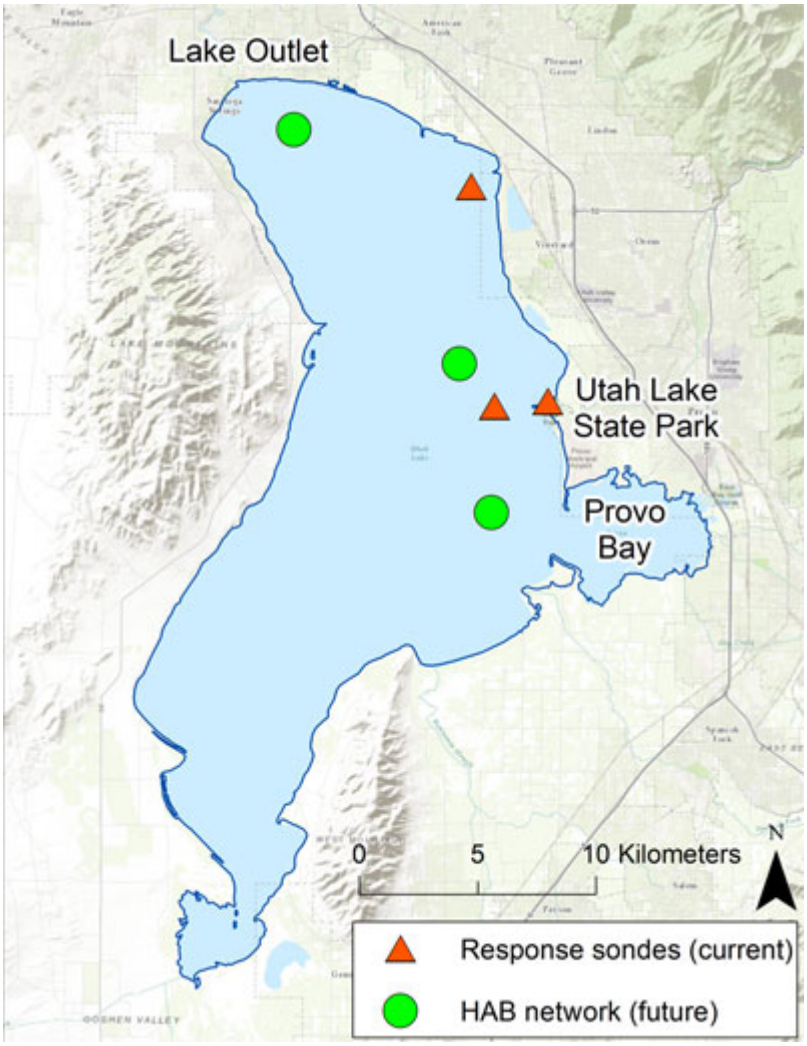
Cyanobacteria cell-count concentrations remain in the low to moderate health-risk range (20,000 to 100,000 cells/mL) at the Utah Lake outlet, in the Jordan River Narrows, and in the Salt Lake Canal at 900 East and Winchester.

Cyanobacteria cell count concentrations were in the very low risk range (< 20,000 cells/mL) for the East Jordan, South Jordan, North Jordan and Ritter East Canals. Caution signs remain posted.

Monitoring

DWQ recently received three high-frequency water-quality sondes (sensors) to track water-quality conditions that indicate the presence or growth of cyanobacteria. DWQ will be deploying these sondes on Utah Lake in the next few weeks.

The following map shows the proposed locations of the new sondes as well as the locations of the three sondes DWQ deployed during the recent bloom.



(https://deq.utah.gov/wp-content/uploads/hab-resultmap-aug15-full.jpg)

Under the monitoring network proposed by DWQ, the new sondes will be deployed on buoys in open water on the lake. These new, high-frequency sensors

(the green circles on the map) will use telemetry to transmit high-frequency (i.e., every 15 minutes), real-time water-quality data directly to DWQ.

The three sondes deployed during the recent bloom event at Utah Lake (the red triangles on the map) also provide DWQ with high-frequency, real-time water quality data from the lake. However, unlike the new sondes, DWQ field crews have to retrieve and manually download the data they collect from these sondes.

Update: August 9, 2016

The Division of Water Quality (DWQ) has received cyanobacteria cell count and toxin results from sampling conducted on August 2, 2016. Cyanobacteria cell counts were low at four of the sampling sites on Utah Lake: Pelican Point, West of Boat Harbor, Saratoga Springs, and the American Fork Boat Harbor.

Cell counts at Lincoln Boat Harbor were still in the millions. The lab identified a new species of cyanobacteria for this bloom, and a different species assemblage than was seen in previous samples. New species and their cell counts include:

- *Geitlerinema species* (7.1 million cells/mL)
- *Geitlerinema species* 2 (5.9 million cells/mL)
- *Oscillatoria princeps (https://en.wikipedia.org/wiki/Oscillatoria)* (9.2 million cells/mL)
- *Pseudanabaena species (https://www.nature.com/articles/ismej200878)* (4.7 million cells/mL)

The Utah County Health Department (UCHD) is performing preliminary screening-level toxin tests, and a local lab is conducting research on the new species to determine whether or not they produce toxins. DWQ should have toxin test results back early this week. The owner of the Lincoln Boat Harbor has chosen to keep the area closed to the public per the recommendation of UCHD.

Cell counts are below the low risk range (below 20,000 cells per milliliter (mL) for the Jordan River and canals, with the exception of the following sites that fell within the low to moderate risk range (20,000 to 100,000 cells/mL):

- North Jordan Canal (34,559 cells/mL)
- South Jordan Canal (50,152 cells/mL)
- Ritter Canal (48,187 cells/mL)

Agricultural concerns

The Utah Department of Agriculture and Food issued the following statement regarding test results on produce irrigated with Utah Lake water during the bloom:

"Tests of vegetables irrigated with Utah Lake water show no traces of toxins suspected of being present in the irrigation water. GreenWater Laboratories of Palatka, Florida, tested eleven samples of corn, zucchini, potatoes, and other vegetables collected from farms in South Salt Lake County on July 21, 2016. The lab was unable to detect any residue of the four toxins (tested)."

Update: August 2, 2016

News Release: Utah Lake Advisory Changed to "CAUTION" (https://documents.deq.utah.gov/communication-office/press-releases/2016-08-02-Algal-Bloom-Utah-Lake-Downgrade-to-Caution.pdf) (pdf)

Utah County health officials have downgraded the restrictions on Utah Lake to a "CAUTION" advisory that allows swimming and other water activities in areas that don't contain algal scum. The change was made in response to the latest round of sampling results that show the bloom is dissipating at most locations on Utah Lake, the Jordan River, and associated canals. Signs will continue to be posted around the lake advising users that toxic algae may still be present.

Under a "CAUTION" advisory, those recreating at Utah Lake should avoid swimming, boating, and water skiing in areas with scum and keep pets and livestock away from the water and any shoreline scums. Anglers should clean their fish thoroughly and discard the guts responsibly.

Harmful algal blooms can reappear quickly under the right conditions. The Division of Water Quality (DWQ) encourages the public to be aware of the continued possibility of algal blooms and report any changes to the color of the water that might indicate the presence of blue-green algae to the DEQ Spill Line at (801) 536-4123.

Update: August 1, 2016

Results from samples collected on July 26, 2016 showed a wide range of cyanobacteria cell counts in Utah Lake, the Jordan River, and associated canals and tributaries.

About half of all samples exceeded the 20,000 cell/milliliter (mL) advisory threshold. No samples exceeded the 100,000 cell/mL human health risk threshold. All other samples were below 20,000 cells/mL

threshold. All other samples were below 20,000 cells/mL.

Concentrations of known cyanotoxins remained low or non-detect throughout Utah Lake, the Jordan River, and associated canals and tributaries. With the exception of two low detections of microcystin (less than 0.5 micrograms per liter

(ug/L) at the Lincoln Beach Harbor and Sandy Beach, all other samples came back as non-detects for toxins.

Update: July 28, 2016

News Release: Utah Lake Reopens After Toxin Results Show Downward Trend (https://documents.deq.utah.gov/communication-office/press-releases/2016-07-28-Algal-Bloom-Utah-Lake-Reopens.pdf) (pdf)

The Utah County Health Department (UCHD) and Utah Department of Health (UDOH) have reopened Utah Lake to boating based on sampling results that show reductions in blue-green algae cell counts at most locations on Utah Lake. However, warning signs remain in place, and people are advised to avoid swimming, water-skiing, jet-skiing, or any direct contact with the water or scums along the shoreline.

UCHD and UDOH will reassess the status of the lake next week when more data are available.

Sampling

DWQ intends to scale down its sampling efforts starting next week, prioritizing waterbodies that show persistent high counts or are important for drinking water supplies.

Samples were taken from Salem Pond and Payson Lake today. Both waterbodies show signs of algal blooms.

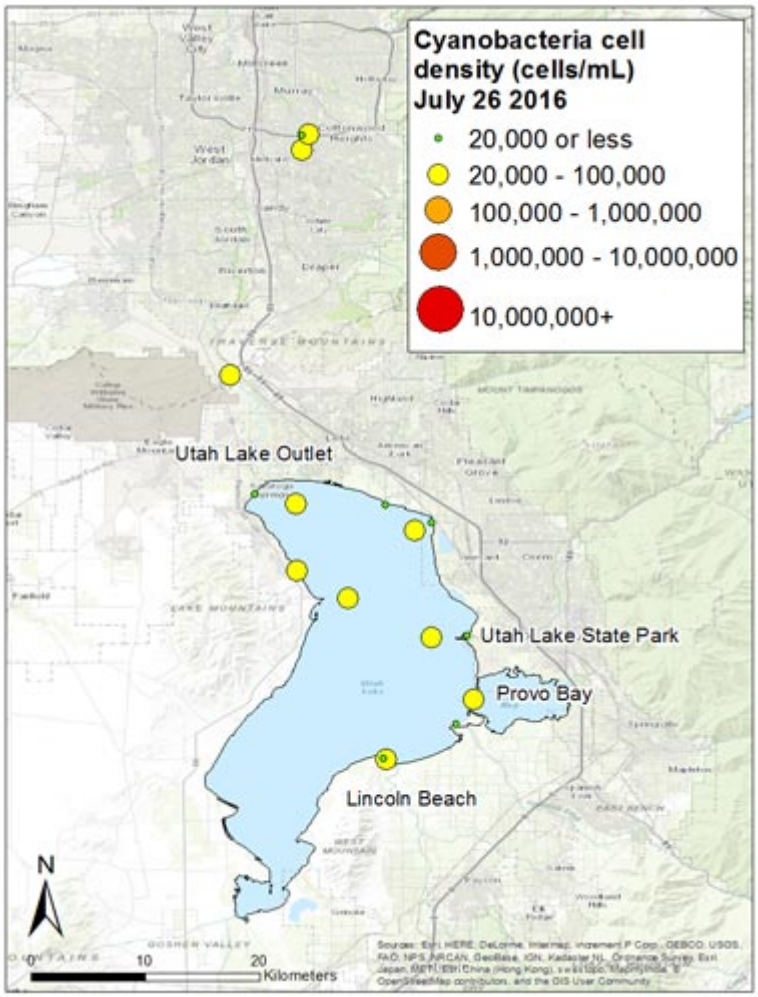
Sampling results

The Division of Water Quality (DWQ) has received cell-count results of samples taken July 26, 2016, from various locations on Utah Lake. All counts were below the 100,000 cells-per-milliliter (mL) human health risk threshold, but some samples still showed levels above the advisory threshold of 20,000 cells/mL. The highest count was recorded approximately one mile east of Pelican Point, with a total cell count in excess of 73,000 cells/mL.

DWQ also received the results of the toxin analyses of the samples taken on July 20, 2016, from numerous locations on Utah Lake and several canals on the west side of Salt Lake County. All samples but one had toxin levels which were either too low to detect or were below 1.0 microgram per liter (ug/L). One of the samples

at Lincoln Beach contained 63 ug/L of the cyanotoxin microcystin. This level is three times the recreational threshold of 20 ug/L for microcystin.

Data from the toxin analysis of the water samples taken on July 26, 2016, are expected sometime early next week.
The latest map for sampling data from July 26, 2016, when compared with sampling data from July 14-16 and July 18-20 (see July 26 update below) illustrate the clear decline in the numbers of cyanobacteria in Utah Lake, the Jordan River, and associated canals.



(https://deq.utah.gov/wp-content/uploads/hap-resultmap-july26-full.jpg)

Potential Health Effects

The Utah Poison Control Center is still receiving a low volume of calls related to the algal bloom. To date, there have been a total of 627 calls, with 511 related to human exposures, 27 related to animal exposures, and 87 for information purposes only. The percentage of callers who report symptoms is approximately 30 percent, with symptoms ranging from gastrointestinal distress to headaches and skin irritation.

Update: July 26, 2016

Update: July 26, 2016

The Division of Water Quality (DWQ) received fewer calls about the algal bloom this week after the Utah Department of Agriculture and Food (UDAF) lifted the advisory on the use of canal water from Utah Lake and the Jordan River.

Sampling

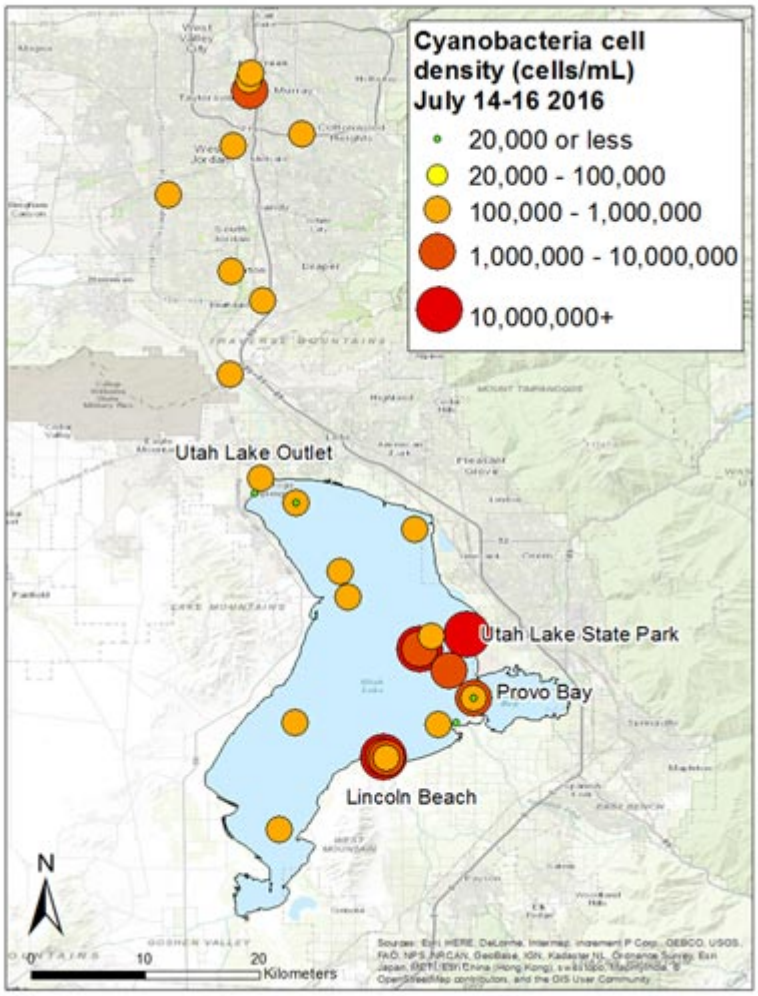
DWQ collected samples today at Utah Lake and the Jordan River to confirm that cell counts are decreasing and the bloom is dissipating. Sample results should be available by July 29, 2016.

Sampling Results

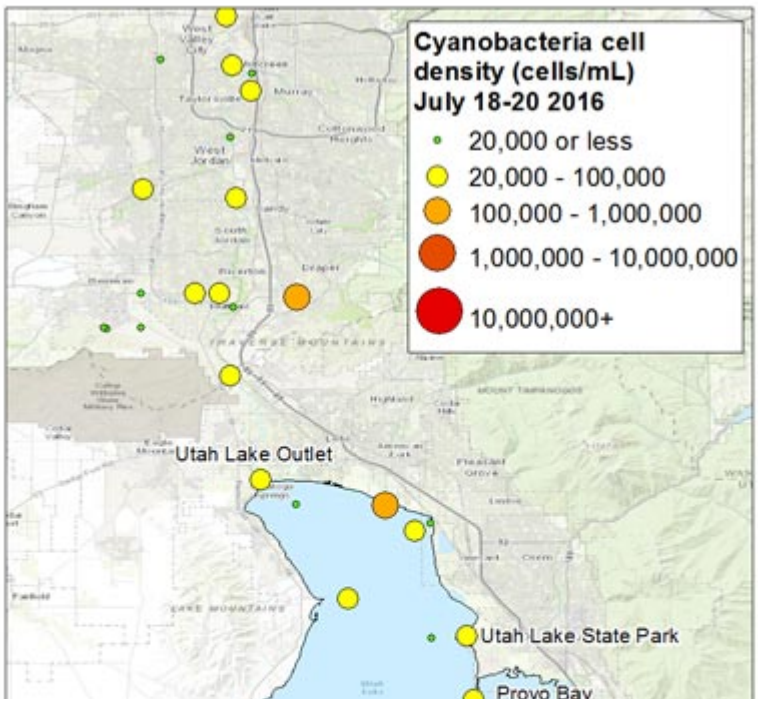
The sampling results received over the weekend confirm the algal bloom is slowly dissipating in the Jordan River and associated canals. All but one of the samples taken from the tributary streams of the Jordan River and several canals contained cyanobacteria cell counts well below the threshold value of 100,000 cells per milliliter.

Analysis of samples taken from July 15 to July 20 for cyanotoxins yielded similar results. Only a handful of samples contained any measurable quantities of the four main cyanotoxins, and none exceeded the EPA recreational water standard. The only toxins that were detected in the samples were the microcystins; all samples for saxitoxin, anatoxin-a, and cylindrospermins were all below the limit of detection.

Maps comparing sampling data from July 14-16 with sampling data from July 18-20 illustrate the clear decline in the numbers of cyanobacteria in Utah Lake, the Jordan River, and associated canals.



(https://deq.utah.gov/wp-content/uploads/hab-resultmap-july14-16-full.jpg)



(https://deq.utah.gov/wp-content/uploads/hab-resultmap-july18-20-ful.jpg)

Potential Health Impacts

The number of calls into the Utah Poison Control Center declined significantly over the holiday weekend, dropping to a low of seveb total calls received on July 25th. Of a total of 617 calls received to date related to the algal bloom, a total of 504 calls involved human exposures, with 27 calls involving animal exposures and 86 calls for general information only. Approximately 30 percent of calls involving human exposures reported symptoms consistent with algal toxin exposure.

Potential Wildlife Impacts

To date, no significant fish kills related to this algal bloom have been reported.

Update: July 22, 2016

News Release: Jordan River and Related Canals Test Results Show Low Levels of Toxins. Irrigation warning lifted; Utah Lake remains closed (https://documents.deq.utah.gov/communication-office/press-releases/2016-07-22-Algal-Bloom-Irrigation-Restrictions-Lifted.pdf) (pdf)

Sampling

Based on the latest algal cell counts and toxin data, the algal bloom on Utah Lake appears to be decreasing, but some samples continue to reveal areas of concern, especially near Lincoln Beach in the southern part of Utah Lake. While the bloom may be dissipating for now, it may return if or when conditions are favorable for growth of cyanobacteria.

In light of these results, Riverton City has again turned on its secondary water system, while the Utah County Health Department is re-opening the previously closed areas of the Jordan River in Utah County and posting “Warning” signs. However, because some of the samples in Utah Lake revealed counts above the high risk threshold, the closure on Utah Lake will remain in effect until new sampling data is available next week. Salt Lake County is maintaining the warning for the Jordan River. The Division of Water Quality (DWQ) plans to repeat sampling on Utah Lake and throughout the Jordan River system on Tuesday July 26, 2016.

The Utah Department of Agriculture and Food has lifted the advisory it issued on July 15, 2016 (https://ag.utah.gov/), warning against the use of Utah Lake water for livestock and irrigation purposes. The Department will continue to work with

the DWQ to monitor for toxin contamination. Results of the samples of produce that were taken earlier in the week should be available sometime next week and will be shared with the public.

Sampling Results

The analysis of all water samples taken between July 14, 2016 and July 19, 2016 for the cyanotoxin saxitoxin failed to detect the toxin in any of the samples.

Today, algal cell concentration (cell count) data were received for samples taken from various locations on Utah Lake and in the Jordan River on July 20, 2016. Of these 24 samples, only two exceeded the threshold value of 100,000 cells per milliliter: a count of 158,566 cells/mL detected at the American Fork Boat Harbor, and a very high count of over 20 million cells/mL detected at the Lincoln Marina.

Results of the toxin analyses for all water samples collected by DWQ and partners on July 20, 2016 are expected sometime this weekend but preliminary discussions with the laboratory suggest that toxins are at low levels.

The dominant species detected in the samples continues to be *Aphamizomenon flos-aquae,* but small numbers of *Dolichospermum crassa* and a new species, *Mycrocystis aeruginosa,* have been detected in some of the samples. The presence of *Dolichospermum* is an additional concern because it tends to produce toxins in larger amounts. As long as the numbers of cells per milliliter remain low, there is no additional health hazard to humans or animals at this time.

Potential Health Impacts

Since July 13, 2016, the Utah Poison Control Center has received 566 calls related to the Utah Lake algal bloom. Of these, 465 were from persons reporting or seeking information about human exposures, 26 were from persons reporting or seeking information about animal exposures, and 75 were for general information only. Of the human exposure calls, approximately 30% of callers reported some adverse effects. These include gastrointestinal symptoms (nausea, vomiting, diarrhea), headache, and eye and skin irritation. The animal exposure calls included dogs, cats, birds and horses. The calls came from a wide range of locations, including Utah, Salt Lake, Davis, Carbon, Millard, Sanpete, Summit, Tooele, and Washington Counties in Utah, as well as from the states of Colorado, Florida, Washington and Wyoming.

Potential Wildlife Impacts

Potential Wildlife Impacts

There have been no reports of dead wildlife or extensive fish kills in the Jordan River or Utah Lake.

Update: July 21, 2016

Sampling

Sampling continues throughout the Utah Lake/Jordan River drainage. Forty one samples were taken yesterday by Division of Water Quality, Salt Lake City, Utah County Health Department and Salt Lake County Health Department from Utah Lake, Jordan River, and most of the major canals. Forty-one samples were taken yesterday by the Division of Water Quality (DWQ), Salt Lake City, the Utah County Health Department, and the Salt Lake County Health Department from Utah Lake, Jordan River, and most of the major canals.

Sampling Results

The Division of Water Quality has received preliminary results of toxin analysis of water samples that were collected last week. Of 42 samples analyzed, over 90 percent had microcystin levels below the EPA drinking water limit of 1.6 microgram/liter (ug/L). Only one sample exceeded the recreational standard of 20 ug/L at 176 ug/L, and that sample was collected directly from an algal mat near Lincoln Beach?. The high concentrations of toxins are suspected to be associated with a second algal species, Dolichospermum crassum, that began showing up in samples on Friday, July 15, 2016.? This species is known to produce microcystin.

The analysis of the samples for anatoxin-a and cylindrospermopsin collected last week either failed to detect the toxin or were very low. While these results are encouraging, the samples had some laboratory flags and toxin result are still pending on saxitoxin samples. Toxin results on samples collected yesterday (July 20, 2016) are also still pending.

Results of water samples taken on the Jordan River on July 20, 2016 were also encouraging. All 8 samples contained less than 100,000 cells per milliliter, with the highest being approximately 86,000 cells/mL at the Utah Lake outlet, and 52,000 at the Narrows portion. While these are below the levels considered to be a high human health risk, they are still high enough to warrant caution signs, and more sampling is needed to verify the numbers. Cyanobacteria cell count data collected in other parts of Utah Lake and the Jordan River system, including major canals, are still pending.

More results for both toxin and cell count analysis are expected by the end of the day tomorrow.

Potential Health Impacts

The Utah Poison Control Center continues to receive a steady volume of calls. To date, the center has received a total of 535 calls related to the algal bloom, with 442 calls related to human exposures, 24 related to animal exposures, and 69 calls for information only. Approximately 28 percent of all human-related calls report adverse symptoms.

Potential Wildlife Impacts

There have been no reports of fish kills at this time. A small number of dead fish can be expected to be seen in Utah Lake and the Jordan River at this time of year. The Division of Wildlife Resources considers a fish kill to be a large number of fish concentrated in one area.

Update: July 20, 2016

Time line provided by Utah Department of Natural Resources (click for large version)

Sampling

Numerous samples were collected today by the Division of Water Quality (DWQ), Salt Lake City, Salt Lake County Health Department and Utah County Health Department. In addition, aerial reconnaissance was used to locate additional bloom areas on Utah Lake and Jordan River. On-ground sampling locations included those on Utah Lake, the Jordan River, and several canals in both counties.

Sampling Results

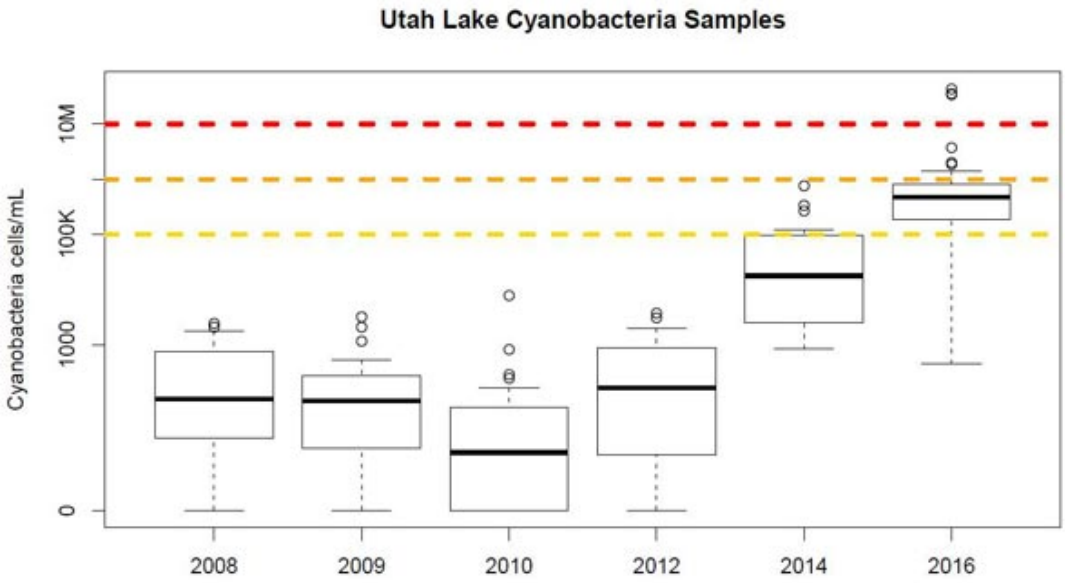
Results of analysis from samples taken July 18, 2016, showed low concentrations of cyanobacteria in the water in the lower portion of the Jordan River and Surplus Canal in Salt Lake and Davis Counties. While these results are encouraging, it should be noted that it can take up to eight days for Jordan River water from Utah Lake to reach the Great Salt Lake. Cyanobacteria counts in the northern portion of the Jordan River could increase in the coming days.

Utah Lake's 2016 Bloom Compared to Blooms in the Past

DWQ compiled historical algal data in Utah Lake to get a sense of the size and scope of this bloom compared to previous years and found that this bloom is much greater than the bloom that occurred in 2014. Median cell counts for the years 2008-2012 were below 1,000 cells/mL, while median counts for the bloom years of 2014 and 2016 were 50,000 and 500,000 cells/mL, respectively. Peak

of 2014 and 2016 were 50,000 and 500,000 cells/mL, respectively. Peak cyanobacteria concentrations in 2014 and 2016 were 750,000 and 36 million cells/mL, respectively. The cyanobacteria concentrations were so great in the

current bloom that to visualize it, the analyst used a log scale to display the graph. No blooms were reported during 2008-2012, and the data was collected as part of DWQ's routine lake monitoring.



Box plots of Utah Lake cyanobacteria concentrations 2008-2016. The 10,000 million cells/mL is shown as a red line and triggers a closure of the water body due to toxic algae. The The 100,000 cell/mL is shown as a yellow line and triggers a warning that toxic algae is present and to avoid contact. (click to zoom)

Potential Health Impacts

Calls to the Utah Poison Control Center (UPCC) from individuals or animals exposed to the bloom continue, with 505 cases reported so far. The breakdown to date:

- Eighty-four percent of the cases are human exposures by individuals who recreated on Utah Lake or were exposed to other water fed from the lake.
- Four percent of the cases are animal exposure, with most cases involving dogs.
- Approximately 12 percent of calls were for information only.

Approximately 29 percent of the cases reported some type of adverse health effect, with the most common complaints involving gastrointestinal distress, followed by headache and skin rash. Most individuals experiencing symptoms of

cyanobacterial exposure have been treated and released and are recovering. Symptoms of algal bloom exposure include nausea, vomiting, diarrhea, headache, and skin rash.

Update: July 19, 2016

- News Release: Utah County Section of Jordan River Closed Due to Harmful Algae (https://documents.deq.utah.gov/communication-office/press-releases/2016-07-19-Algal-Bloom-Jordan-River-Closure.pdf) (pdf)

The Utah County Health Department (UCHD) closed the Utah County section of the Jordan River today. Irrigation companies and some cities have also shut down their secondary water as a precaution. Residents who receive secondary water from the Jordan River are advised against using the water for lawns and gardens.

UCHD has posted danger signs at all major recreational access points to the Jordan River within Utah County. The Jordan River and all canals in both Utah and Salt Lake counties are potentially unsafe for people and animals.

Closures are occurring across the valley:

- Herriman has closed Blackridge Reservoir as a precaution.
- The Daybreak community has shut down secondary water, including streams and water used to irrigate parks and open spaces in Daybreak.
- Oquirrh Lake is currently off-limits to all recreational uses.
- Salt Lake City has closed the Liberty Park pond as a precaution.

Sampling

The Division of Water Quality (DWQ) and Salt Lake and Utah County Health Departments continued sampling today at locations on Utah Lake, the Jordan River, and associated canals. Several impounded wetland ponds north of Salt Lake City were sampled today. Tomorrow, DWQ staff with conduct aerial surveys of Utah Lake and the Jordan River with Civil Air Patrol to evaluate the current extent of the bloom. Sampling crews on the ground will collect samples throughout Utah Lake and the Jordan River system as the first of a standing weekly sampling effort that will continue until the incident is resolved.

Sampling Results

DWQ received toxin results from the Environmental Protection Agency (EPA) Denver laboratory for one of the samples that was collected on July 13, 2016 at Utah Lake. Because the samples were outside of temperature range when they arrived, the EPA lab flagged the data as “estimated”. Subsequent samples have arrived frozen to EPA’s Denver lab, so this will not be an issue for samples

collected since Thursday.

Toxin results (https://deq.utah.gov/legacy/divisions/water-quality/health-advisory/harmful-algal-blooms/bloom-events/bloom-2016/utah-lake-jordan-river/docs/1607029-FINAL-2016-07-19.pdf) for microcystin-YR, cylindrospermopsin, and anatoxin-a were all non-detect, with trace levels of microcystin-LR (0.23 micrograms per liter (ug/L)). The EPA lab does not have the capability to test for saxitoxins, one of four toxins produced by *Aphanizomenon sp*. As a result, DWQ has asked EPA to send a portion of each sample to a private laboratory for saxitoxin testing. EPA will have results for the rest of the toxin samples collected July 14 – July 17, 2016, (Thursday through Sunday) by the evening of July 20, 2016. All samples collected this week are being sent to a private laboratory.

Guidance on Residential Irrigation

Due to concerns about the potential for damage to crops caused by lack of irrigation water, some canal companies have turned on their water again to allow farmers to irrigate their crops while awaiting test results. The advisory against using water from Utah Lake and the Jordan River for livestock watering is still in effect. At least one canal company has been able to substitute water from the Provo River for its customers. Water users are strongly encouraged to contact their irrigation companies or municipalities to verify the source of their irrigation water before using it.

Toxicologists at the Utah Departments of Agriculture and Food and DEQ are currently reviewing scientific literature to determine if food that is potentially contaminated with cyanotoxin can be reliably tested to verify that it can be sold and safely consumed by the public.

Potential Health Impacts

A potential illness related to exposure to cyanotoxin has been reported by a member of a sampling crew who reported dizziness, chest pains, diarrhea and vomiting after exposure to water on Utah Lake. While these symptoms are consistent with toxin exposure, they also might be due to high temperatures. As a precaution, persons who could potentially come into contact with algae-contaminated water or spray from traveling on the algal bloom should use proper personal protective equipment, including respiratory protection.

Utah Poison Control Center (UPCC) has received a total of 463 calls associated with this incident. Of these, 388 were regarding human exposure to the algal bloom and approximately 20 percent of these reported adverse health effects. The most commonly reported symptoms are gastrointestinal illness (vomiting, diarrhea, nausea), headache, skin and eye irritation. UPCC is working with local

health departments to verify whether these reports can be linked to the algal bloom. UPCC has trained pharmacists, nurses, and pharmacy students available 24/7 to consult with callers on possible exposures.

Wildlife Impacts

There have no further reports of bird mortality associated with the algal bloom. One bird has been submitted for testing. No fish kills have been reported.

Update: July 18, 2016

- News Release: Municipalities Warn Against Cross Connecting Between Culinary and Secondary Water Systems Due to Harmful Algae (https://documents.deq.utah.gov/communication-office/press-releases/2016-07-18-Algal-Bloom-Cross-Connection-Warning.pdf) (pdf)
- Read the DEQ Harmful Algal Bloom Blog (https://deq.utah.gov/news/harmful-algal-blooms-isnt-good-green)

Public interest and concern for the algal bloom and its effects on the residents of Salt Lake and Utah counties is high. The Division of Water Quality (DWQ) and the Utah and Salt Lake County Health Departments and other partner agencies report a large volume of calls, with most questions centering on the issue of irrigation water and use of produce from gardens and farms.

Division of Water Quality staff and other lake researchers familiar with previous algal blooms say this algal bloom is unprecedented in scale and size. Division staff are currently compiling previous data to compare the current algal bloom with historic conditions. According to reports from Utah County Health Department employees, the lake is approximately four feet lower this year than last year in August, one of the factors that could contribute to the severity of the bloom.

Secondary Water Systems

Several municipalities have shut down their secondary water in response to the harmful algal bloom and are warning residents to not cross-connect their secondary irrigation lines with their household culinary water systems. Secondary water is commonly used for watering lawns and gardens.

Cross-connections can pull contaminated water into clean water system, contaminating the entire drinking water system. Any attempts to use culinary water systems by cross-connecting for irrigation watering without the proper approval can cause severe health threats to the community and will result in criminal prosecution and civil liability.

The cities of Riverton, South Jordan, West Jordan, and Herriman have shut down

secondary water systems that draw water from Utah Lake for irrigation. Utah Lake is a main source of Riverton City's secondary water supply. West Jordan shut down secondary water to its parks. Canal Companies have also shut down secondary water to West Jordan residents.

Guidance on Residential Irrigation

State agencies and the Utah Poison Control Center (UPCC) have received numerous calls asking about the health impacts of secondary water use. The currently available data show high concentrations of a toxin-producing species of cyanobacteria that could result in unsafe levels of cyanotoxins in the water. Toxin test results take time and won't be available until later in the week. In addition, not all toxins can be measured, and conditions may change from the time samples were collected, analyzed and reported. **To be safe, residents, pets, and animals should avoid any contact with the water.**

Based on the currently available data, the DWQ toxicologist and the Utah Department of Health epidemiologist recommend the following "best practices" guidance for the use of secondary water from Utah Lake and the Jordan River for lawns and produce:

1. Avoid the use of yard sprinklers when people are nearby, as sprinklers can aerosolize toxins and disperse them into the air where they could be inhaled. If residents choose to use lawn sprinklers, please avoid any contact with the water when the sprinklers are running. Night-time watering is unlikely to pose a health risk.
   Avoid direct contact with wet grass after watering lawns. Once lawns are dry, avoid direct skin contact. While skin contact may result in skin irritation or rashes, it is not expected to result in serious health effects.
2. Avoid pools or municipal ponds and lakes that use secondary water unless these waters have been specifically tested and determined to be safe. If residents have filled pools with secondary water, they should not swim or wade in the water and keep children and pets away.
3. Avoid consuming fruits and vegetables that have been watered with secondary water. There is evidence that cyanobacterial toxins can accumulate in plant tissues, but determining the actual level of risk in this situation is difficult due to numerous variables such as concentrations of cyanotoxins in the irrigation water, the specific toxins, how long the crops are irrigated, how long between harvest and consumption, whether crops are flood or spray irrigated, and the type of plant (root, leafy vegetable, or fruit).
   DWQ is investigating if chemical analyses can be used to determine if vegetables and fruits have unsafe levels of cyanotoxins. DWQ concurs with

the Department of Agriculture's recommendations not to irrigate crops using cyanobacteria-contaminated water until the bloom is over. The final decision to eat home-grown produce exposed to cyanotoxins rests with the consumer.

Advisory on Use of Irrigation

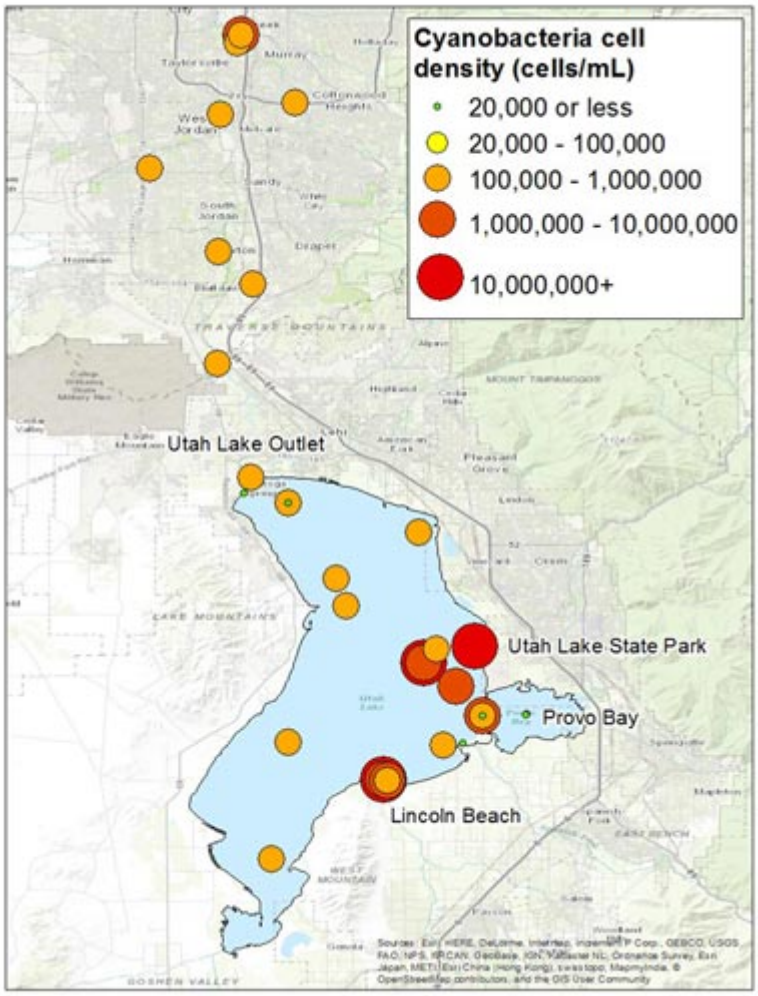
The Utah Department of Agriculture and Food (UDAF) continues to strongly advise farmers and ranchers against using water from Utah Lake for food production and livestock watering (http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/irrigation/blue-green-algae-and-irrigation-water) until lab results are available next week. If farmers and ranchers have access to other water sources, they are advised to use those alternative sources to water crops, livestock, and other animals.

Test kits are available for private citizens and irrigation companies concerned about toxins in their water. Abraxis (http://www.abraxiskits.com/) has ELISA (https://en.wikipedia.org/wiki/ELISA) immunoassay test strip kits available for three cyanotoxins: microcystin, anatoxin-a, and cylindrospermopsin. Unfortunately, test strips are not available for saxitoxins, one of the toxins that can be produced by the algal species identified in Utah Lake and the Jordan River. The Abraxis website (http://www.abraxiskits.com/products/algal-toxins/#anatoxin) has information about how to collect and test (http://www.abraxiskits.com/products/algal-toxins/#dipsticks) samples.

Drinking Water

Officials stress that these warnings do not apply to drinking water, which comes from a separate source and is not impacted by the bloom.

Sampling Results



(https://deq.utah.gov/wp-content/uploads/hab-sampling-result-map-lg.jpg)

Recent sampling data from the weekend shows that the counts of Aphanizomenon flos-aquae continue to be above levels of concern in Utah Lake, Jordan River, and some canals.

DWQ sampled the north end of the Jordan River today and may sample Great Salt Lake's impounded wetlands, and possibly Farmington Bay tomorrow to determine levels of cyanobacteria. Results of analyses for cyanotoxins are still pending at this time.

Salt Lake County Health Department employees have sampled at Daybreak Pond and Blackridge Lake. Preliminary results indicate that the bloom has not affected Blackridge Lake. DWQ is planning to shift its sampling schedule to sample once a week on Wednesdays. This sampling will be held in conjunction with aerial reconnaissance of Utah Lake and the Jordan River to pinpoint concentrations of the algal mats. Division scientists hope that with this new schedule results will be

the algal mats. Division scientists hope that with this new schedule results will be available each Friday, and the labs will be able to better accommodate the extremely high volume of work.

Potential Health Impacts

Calls to the Utah Poison Control Center (UPCC) from individuals or animals exposed to the bloom continue, with over 400 cases reported so far. The breakdown to date:

- Eighty-five percent of the cases are human exposures by individuals who recreated on Utah Lake or were exposed to other water fed from the lake.
- Four percent of the cases are animal exposure, with most cases involving dogs, although UPCC received calls about one horse and a gaggle of geese.
- Approximately 10 percent of calls were for information only.

Fifty-one percent of the exposures were in children and adolescents less than 20 years old.

Approximately 20 percent of the cases reported some type of adverse health effect, with the most common complaints involving gastrointestinal distress, followed by headache and skin rash. Most individuals experiencing symptoms of cyanobacterial exposure have been treated and released and are recovering. Symptoms of algal bloom exposure include nausea, vomiting, diarrhea, headache, and skin rash.

Update: July 17, 2016

- News Release: Don't Use Water from Utah Lake, Jordan River, or Related Canals (https://documents.deq.utah.gov/communication-office/press-releases/2016-07-17-Algal-Bloom-Utah-Lake-Dont-Use-Water.pdf) (pdf)

Elevated levels of a harmful algae in the Jordan River and lower Little Cottonwood Creek have prompted state and local agencies to post warning signs and limit access to the Jordan River system. Utah Lake remains closed.

While the bloom appeared to be dissipating on Thursday, aerial and ground surveys conducted over the past few days show the bloom growing in size. A bloom also appears to have formed in the lower Spanish Fork River and Jordan River.

Jordan River Access and Water Use

According to the Salt Lake County Health Department, the Jordan River and its canals, including all canals in the county, are potentially unsafe for people or

animals.

The Salt Lake County Health Department, in partnership with affected municipalities, has posted "Warning" signs at all major recreational access points along the Jordan River up to 4500 South. Warning signs alert the public that toxic algae is present and that recreating in or drinking the water is unsafe. In addition, pets and animals should not be allowed in or near the water.

The threshold for recommending that local health departments post warning signs in the Department of Environmental Quality/ Utah Department of Health guidance is 100,000 cells/mL, and sample results from the Jordan River are showing concentrations three to ten times that threshold. Local health departments make final decisions on issuing public health advisories.

Residents who receive secondary water from the Jordan River are advised against using the water for lawns and gardens. Although no official notice has been issued to users of secondary water at this time, some municipalities have already shut off their secondary water sources as a precaution.

Since blooms can last for days or weeks, and toxins can last for up to five days following a bloom, response agencies don't expect to know for at least a week when water from Utah Lake and the Jordan River can be used again safely.

Drinking Water

Officials stress that the warning does not apply to drinking water, which comes from a separate source and is not impacted by the bloom.

Advisory on Use of Irrigation

The Utah Department of Agriculture and Food (UDAF) continues to strongly advise farmers and ranchers against using water from Utah Lake for food production and livestock watering (http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/irrigation/blue-green-algae-and-irrigation-water) until lab results are available next week. If farmers and ranchers have access to other water sources, they are advised to use those alternative sources to water crops, livestock, and other animals.

Sampling Results

Utah Lake

Samples collected on July 15, 2016, continue to show elevated cell counts of *Aphanizomenon* in Utah Lake, many of which were at much higher concentrations than the previous day's samples. Samples on July 15 also included a full suite of water quality parameters that will help DWQ better understand the drivers of the

bloom.

Surface scum at Lincoln Harbor registered the highest cell counts to date at approximately 43.5 million cells per milliliter (mL). These concentrations are four and half times greater than the threshold of 10 million cells/mL developed by the World Health Organization (WHO) and adapted by EPA to indicate a high to very high probability of acute risk for adverse health effects.

Other July 15, 2016, sampling sites with highly elevated concentrations included Lincoln Beach at approximately 2 million cells/mL, a sample site one mile west of the airport at approximately 1.9 million cells/mL, and the mouth of Provo Bay at approximately 1.4 million cells/mL.

Jordan River

Preliminary results from samples collected July 16, 2016, at the Jordan River Narrows, Little Cottonwood Creek, Utah Lake Distributing Company, and North Branch all showed elevated levels of *Aphanizomenon* sp., the same species of cyanobacteria found in Utah Lake.

The highest concentration from yesterday's samples was just over 1 million cells/mL at Little Cottonwood Creek near the confluence with the Jordan River. Samplers noted the presence of visible blue-green algal scum at the lower Little Cottonwood Creek site. The lowest concentrations in samples were at the Utah Lake Distributing Company and the Jordan River at 4500 South, with concentrations of over 300,000 cells/mL.

Another cyanobacterium, *Dolichospermum Crassa,* was also detected in some of the samples, but not at levels of concern. It is not considered to be a threat at this time.

Toxin samples will be sent with the rest of the samples to the Environmental Protection Agency (EPA) on Monday. Earliest results are expected Wednesday.

- Read more on the Data page

Potential Health Impact

Calls to the Utah Poison Control Center (UPCC) have decreased after peaking on July 15, 2016. A total of 322 calls have been received so far concerning human and pet health Most individuals experiencing symptoms of cyanobacterial exposure have been treated and released and are recovering. Symptoms of algal bloom exposure include nausea, vomiting, diarrhea, headache, and skin rash.

Wildlife Impacts

One of the canal companies reported finding over 100 dead ducks in a canal after

clearing a downed tree. While a few dead waterfowl are regularly found on the canal weirs, this is an unusual number, and efforts will be made to collect the carcasses for necropsy (animal autopsy) to determine a cause of death.

No significant fish kills in Utah Lake or the Jordan River have been observed to this point. Anglers are currently advised not to fish, or consume fish from Utah Lake and sections of the Jordan River that feed in or out of the lake. Anyone who has caught fish from those areas in or after July 10, 2016, is advised to not consume their catch.

Agency Involvement

State agencies involved in the bloom response include the Department of Agriculture and Food (https://ag.utah.gov/), Department of Environmental Quality, Department of Health (http://health.utah.gov), Department of Natural Resources (http://naturalresources.utah.gov), Department of Public Safety (http://publicsafety.utah.gov), and various divisions within those departments. At the local level, responding agencies include the Utah County (http://www.utahcountyonline.org/dept2/health/Index.asp) and Salt Lake County (http://slcohealth.org) Health and Emergency Management Departments, irrigation companies, water districts, as well as municipalities in the affected counties.

Update: July 16, 2016 (Afternoon)

Aerial views of the bloom showed algal scums moving north from Utah Lake into the Jordan River. Based on these observations, DWQ sampling crews focused today's sampling efforts along the Jordan River.

The Division of Water Quality will continue to sample Utah Lake and the Jordan River for both the algae and toxins. The bloom appears to be more distributed throughout the water column instead of in large surface mats. According to the samplers, some of the samples which had high counts in the 300,000-700,000 cells/mL range did not appear abnormally "green," suggesting that color alone might not be a good indicator of the presence of high counts of cyanobacteria.

Concerns over the safety of irrigation water and recreational use of the Jordan River as well as lakes and ponds fed by the river have led the Salt Lake County Health Department to post caution signs on recreational access points on the river.

Sampling

Samples were taken today at the Jordan River at 4100 South, the mouth of Little

Cottonwood Creek just above the confluence with the Jordan River, and Big Cottonwood Creek. DWQ scientists saw visible scums in lower Little Cottonwood Creek. Salt Lake City and Salt Lake Metro Water also collected samples in several canals that will be analyzed along with the DWQ samples. DWQ has prepared a map of sample sites used during this event for reference.

Sampling Results

DWQ received results today from two samples taken late Friday evening in the Jordan River. A sample taken from the Jordan River just below Utah Lake contained 557,497 cells per milliliter (mL) of water, while a sample taken from the "Narrows" farther downstream contained 718,411 cells/mL. The primary species of cyanobacteria was identified as *Aphanizomenon,* the same species identified in the samples from Utah Lake.

The cyanobacteria concentrations represent a high risk of human health effects for recreational exposures. Salt Lake County Health Department and the Utah County Health Department are reviewing these data. Toxin results will not be available until Wednesday.

Health Impacts

Over the past 24 hours, the Utah Poison Control Center (UPCC) has responded to over 300 requests for assistance regarding the algal bloom in Utah Lake. While the majority of cases involved people recreating at Utah Lake, six involved animals, and 18 were general questions from individuals who had not come in contact with the water.

Exposures were reported in all age groups, with 12 percent of cases in children less than six years of age, 18 percent in children 6-12 years of age, and 25 percent in teenagers.

Approximately 20 percent of the cases reported some type of adverse health effect, with the most common complaints involving gastrointestinal distress, followed by headache and skin rash. The UPCC normally responds to 130-150 requests for assistance daily from the public as well as health professionals. However, after the press release and closure of Utah Lake around noon on July 15, 2016, the UPCC staff managed 32 cases in the first hour, 73 cases the following hour, with the total number of consults approximately three times the normal daily case volume. UPCC will be notifying the Centers for Disease Control (CDC) (http://www.cdc.gov/habs/) about these possible human exposures through the CDC's new HABs reporting system (http://www.cdc.gov/habs/ohhabs.html).

Update: July 16, 2016

- See a Time-lapse video of the Utah Lake State Park Harbor July 13th posted by Scot Chipman, President, Utah Water Ski Club (https://video.nest.com/clip/248c1a77bf844ef98de3a626b84290c5).

Division of Water Quality (DWQ) crews continued sampling various locations on Utah Lake yesterday and used aerial reconnaissance to locate additional bloom areas on the lake's surface. The blooms appear to be dissipating or moving to different areas of lake due to winds and lake currents.

Although results from July 14, 2016, samples indicate that cell counts are dropping, experts caution that this decrease probably indicates that the cells are lysing (dying). When this happens, the cells release more toxins into the water. In fact, toxins can be at their highest after a bloom has subsided. Cyanobacteria can also sink and float in response to changing conditions, so while blooms may not be apparent at the surface, they may still be present in the lake.

Nonetheless, the cell counts continue to be found at moderate to high risk levels.

Sampling

On July 15, DWQ staff sampled Sandy Beach, Lincoln Beach, a private marina near Saratoga Springs, and the Jordan River just below the diversion as well as eight routine monitoring sites on the lake. The crew also deployed three sondes (underwater instrument probes), one at Utah State Park Marina and the others in open water.

Aerial surveys of the lake revealed large concentrations of algae near Pelican Point, scum deposits along Sandy Beach, and algal accumulations on the east shoreline of the lake to the north and south of Utah Lake State Park. Other algal

mats were seen in patches around the lake, mostly in the south. Strong odors associated with the algae have been reported at the park campground.

Samples were taken from the Jordan River at the outlet of Utah Lake due to concerns about the potential for contaminated irrigation water, The organism responsible for the bloom, *Aphanizomenon flos-aquae,* has been detected in the river previous to this incident and could be present in the river.

Samples will be collected today at Lindon Harbor, Utah Lake State Park Harbor, American Fork Boat Launch, Saratoga Springs Marina/Beach, and the Jordan River outflow. Salt Lake Metro Water and Salt Lake City will be collecting samples in the canals in the southern part of the Salt Lake Valley as well.

Sampling Results

Results of the samples collected at various locations on the lake on July 14, 2016, showed cyanobacteria cell counts well below the July 13, 2016 samples (see table). Algal cell concentrations ranged from 11,826 cells/mL two miles east of Saratoga Springs to 673,952 cells/mL one mile east of Pelican Point. The majority of samples exceeded the “medium risk” threshold of 100,000 cells/mL in World Health Organization (WHO) and Utah Department of Health/ DEQ decision guidelines with the highest cell count still almost seven times greater.

Preliminary tests for the cyanotoxin microcystin in the water samples were negative. However, the algal (cyanobacteria) species detected, *Aphanizomenon flos-aquae,* does not typically produce large amounts of this type of toxin. Results of tests for other cyanotoxins are expected early next week.

Advisory on Use of Irrigation Water

The Utah Department of Agriculture and Food (UDAF) issued a strong advisory to farmers and ranchers yesterday, urging them to avoid using water from Utah Lake for crop irrigation and livestock watering until lab results are available early next week. UDAF suggested that farmers and ranchers use alternative water sources for crops, livestock, and other animals. The Salt Lake County Health Department reports that drinking water is not affected by the bloom.

Potential Health Impacts

By early afternoon yesterday, the Utah Poison Control Center had received over 100 calls from individuals exposed to the bloom. A number of callers reported symptoms consistent with cyanotoxin exposure, including vomiting, diarrhea

symptoms consistent with cyanotoxin exposure, including vomiting, diarrhea, fever, skin and eye irritation, and rashes. No definitive link has been made yet between these symptoms and the bloom. Plans are being made to notify the

Centers for Disease Control (CDC) (http://www.cdc.gov/habs/) about possible human exposures to cyanobacteria from the bloom through the CDC's new HABs reporting system (http://www.cdc.gov/habs/ohhabs.html).

Update: July 15, 2016

- News Release: Potential Health Risks Force Closure of Utah Lake from Harmful Algal Bloom (https://documents.deq.utah.gov/communication-office/press-releases/2016-07-15-Algal-Bloom-Utah-Lake-Health-Risks.pdf) (pdf)
- Agriculture and Food News Release: Advisory to Farmers and Ranchers (https://ag.utah.gov)

The Utah Department of Health and Utah County Health Department are closing Utah Lake effective immediately due to a large, harmful algal bloom that poses potential health risks to people and their pets.

Water samples taken at Utah Lake on July 13, 2016, show high cell counts of *Aphanizomenon flos-aquae*, a type of cyanobacteria that can produce cyanotoxins. Results of the toxin analyses are expected early next week.

Sample results are three times greater than the threshold of 10 million cells/mL developed by the World Health Organization (WHO) to indicate a "high probability of acute risk" for adverse health effects. The Utah Department of Health and Utah Department of Environmental Quality have incorporated the WHO thresholds in their Decision Guidelines for Cyanobacteria in Recreational Waters (https://deq.utah.gov/water-quality/recreational-health-advisory-guidance).

The sample taken from the State Park Marina contained approximately 36 million cells per milliliter (mL) of water, and the sample from a "scum" layer on open surface water contained approximately 34 million cells/mL. Another sample taken from below the surface of the lake at the same location contained approximately 1 million cells/mL.

Although *Aphanizomenon flos-aquae* is associated with the production of up to four cyanotoxins (anatoxin-a, cylindrospermopsin, saxitoxin, and microcystin), its presence does not necessarily guarantee the presence of toxins. However, high

cell counts increase the probability that cyanotoxins will be detected in the water.

Monitoring Plan

The Division of Water Quality (DWQ), in partnership with the Utah County Health Department, will be monitoring Utah Lake intensively to determine the extent and severity of the bloom. DWQ sampled five open-water sites and one site in the Jordan River below the Utah Lake outlet for phytoplankton (http://oceanservice.noaa.gov/facts/phyto.html) and toxin analysis on July 14, 2016. On July 15, 2016, DWQ staff will monitor five open water sites, two sites in Provo Bay, one site in Goshen Bay, and one site in the Jordan River directly below the outlet.

The division also plans to collect opportunistic phytoplankton and toxin samples at two to three locations with active algal blooms. DWQ staff will also be documenting the extent of the bloom with GPS-tagged photographs.

In addition to the phyotoplankton and toxin sampling described for July 14, 2016, DWQ will collect a full suite of lake parameters including field sonde depth profiles and water chemistry. The division will coordinate with the Utah Lake State Park and Forestry Fires and State Lands for the deployment of sondes (underwater instrument probes) at representative locations on Utah Lake The Utah County Health Department will be monitoring public access locations around the lake for phytoplankton and toxins, including the American Fork Marina, Saratoga Springs access, Lincoln Beach, and Utah Lake State Park Marina.

Update: July 14, 2016

- News Release: Algal Bloom Detected in Utah Lake Public Warned to Stay Out of Provo Marina (https://documents.deq.utah.gov/communication-office/press-releases/2016-07-14-Algal-Bloom-Utah-Lake.pdf) (pdf)

Utah Lake State Park contacted the Division of Water Quality (DWQ) yesterday morning after a recreational user on Utah Lake reported a large algal bloom extending from Provo Bay to the State Park Harbor.

A sampling crew from DWQ arrived at the lake early yesterday afternoon and confirmed the presence of an extensive bloom on the east side of Utah Lake between Provo Bay and the state park. The crew also identified an algal slick approximately 19 kilometers across and 30-50 meters wide running east-west across the lake.

across the lake.

Analysis of satellite imagery from July 11, 2016, shows bands of algal blooms across approximately 100 square kilometers of Utah Lake. Aerial images of the lake are available on the USGS LandsatLook website

(http://landsatlook.usgs.gov/viewer.html). Zoom to Utah Lake and choose the most recent date to view images.

Samples collected yesterday will be analyzed for phytoplankton species, cell counts, and toxins. Results for species identification and cell counts should be back by the end of today. Toxin sample results may be back as early as close of business tomorrow or early next week, depending on the lab's turnaround time.

DWQ is developing a lake-wide sampling plan and will be conducting more extensive sampling of the lake today.

The Utah County Department of Health and Utah State Parks and Recreation are working with DWQ to monitor and assess the situation. A warning sign advising the public and their pets against recreating in the lake has been posted at the Provo Marina. The Utah County Health Department is waiting for sampling results before posting any additional advisories at the lake. The Utah County Emergency Manager contacted organizers for a triathlon scheduled for this weekend and suggested that they find another venue for their event.

Algal Bloom October 2014

- Read about the 2014 Utah Lake Algal Bloom (https://deq.utah.gov/water-quality/utah-lake-algal-bloom-october-2014)

195 North 1950 West, Salt Lake City, UT 84116

Office: (801) 536-4400
Environmental Incidents (https://deq.utah.gov/general/report-an-incident): (801) 536-4123