



UTAH LAKE WATER QUALITY WORK PLAN 2015-2019

Utah Lake Water Quality Subgroup

November 10, 2015

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Background on Utah Lake

- Highly productive lake
- Hypereutrophic (nutrient rich)
- Listed on Utah 2004 303(d) for exceedances for Total Dissolved Solids (TDS) and pollutant indicator value for Total Phosphorus
- **2007: Pollutant Loading and Impairment Assessment Reports completed**
- TMDL actions suspended to assess invasive carp removal on water quality

Objectives of 2015-2019 Workplan

- Phase 1:

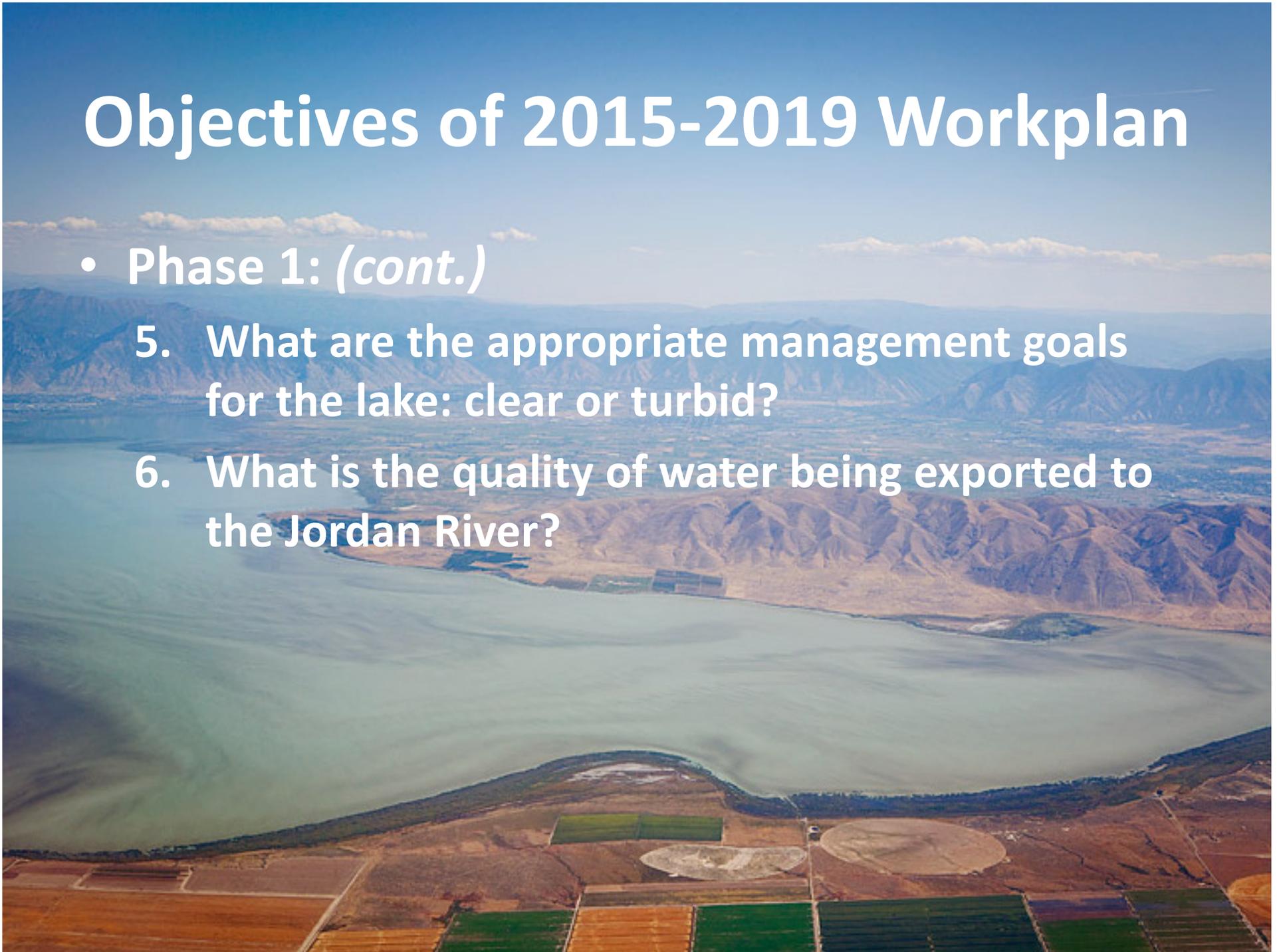
1. What are the current water quality concerns in Utah Lake? Should it be delisted, and/or are there new impairments?
2. What are the connections amongst water quality parameters and effects on aquatic life? Have fish populations, macroinvertebrates, phytoplankton and zooplankton abundances changed?

Objectives of 2015-2019 Workplan

- Phase 1: *(cont.)*
 3. Are the current uses of the lake reflected in the 2B, secondary contact, beneficial use? Should an upgrade to a 2A, primary contact, be made?
 4. What is the influence of nutrient loading, from both point and non point sources, in driving the productivity from Utah Lake? How does nutrient loading vary by season and hydrological condition?

Objectives of 2015-2019 Workplan

- Phase 1: *(cont.)*
 5. What are the appropriate management goals for the lake: clear or turbid?
 6. What is the quality of water being exported to the Jordan River?



Objectives of 2015-2019 Workplan

- Phase 2: Informed by Phase 1

Potential Alternatives

- A) a TMDL for Utah Lake based on current impairments,
- B) Site Specific Standards for impairments that are the result of natural, un-alterable conditions that preclude attainment of state criteria, and/or
- C) Use Attainability Analysis of Utah Lake's designated beneficial uses.

Phase 1: 2015-2016 **Utah Lake Work Plan 2015-2019**

Task 2: Data Information and Management:

- Water chemistry
 - Hydrology
 - Biological data (Phytoplankton, zooplankton, fish)
 - Continuous data
- Informs: 1, 2, 4, 5, 6

Task 4: Source & Nutrient Loading Analysis

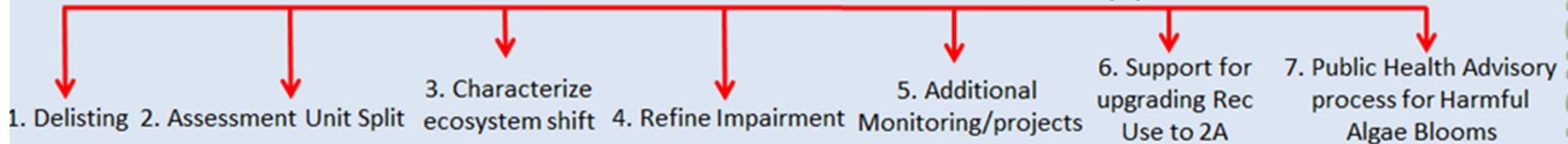
- Updated water budget
 - Calculate pollutant loads
 - Loading by season and hydrologic condition
- Informs: 4, 5, evaluation of 'g' factors

Task 3: Beneficial Use Assessment:

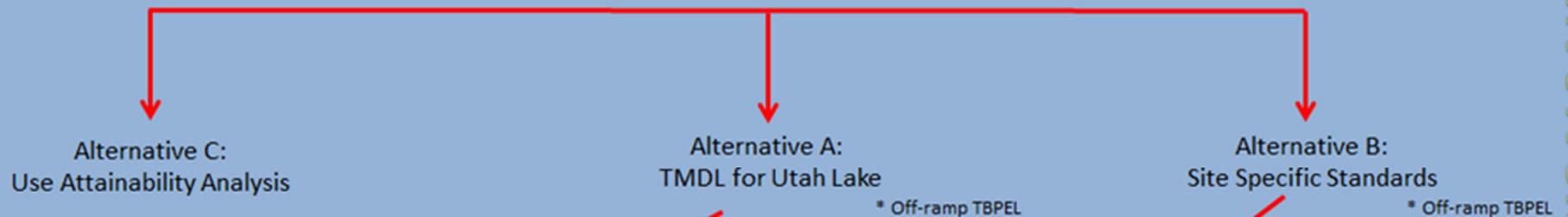
- Aquatic Life (Biology, fish data)
 - Recreation use survey data (Utah Lake Commission)
 - Secondary Water Uses (TDS, algal, cyanotoxins)
- Informs: 2, 4, 7

Task 5: Model Development

- Model selection
 - Calibration and Validation Report
 - Nutrient Scenarios
- Informs: 3, 5, JR TMDL Phase 3



Phase 2: 2017-2018



Phase 3: 2018-2019



Task 1: Stakeholder Involvement

Roles

Task	Lead	Partner(s)
Task 1: Stakeholder Outreach and Public Involvement	DWQ: Hilary Arens (hilaryarens@utah.gov)	Utah Lake Commission (Eric Ellis; eric@utahlakecommission.org)
Task 2: Data and Information Management	DWQ: Suzan Tahir (stahir@utah.gov)	DWQ: Lenora Sullivan (lenoras@utah.gov), Suzan Tahir (stahir@utah.gov); Central Utah Water Conservancy District; Payson, Salem, Spanish Fork, Springville and Provo Waste Water Treatment Plants; Utah Valley University: Eddy Cadet (cadeted@uvu.edu), Weihong Wang (Weihong.Wang@uvu.edu); USGS; Utah Division of Water Rights: Ben Anderson (benanderson@utah.gov); Utah State University: Jereme Gaeta (jereme.gaeta@usu.edu); Rushforth Phycology: Sarah Rushforth (Sarah@rushforthphycology.com); June Sucker Recovery Implementation Program: Mike Mills (mikem@cuwcd.com)
Task 3: Beneficial Use Assessment	DWQ: Jake Vanderlaan (jvander@utah.gov)	Contractor (TDB)
Task 4: Source and Nutrient Loading Analysis	DWQ: Scott Daly (sdaly@utah.gov)	Jordan River/Farmington Bay Water Quality Council: Theron Miller (theron.miller12@gmail.com), Contractor
Task 5: Model Development	DWQ: Nick VonStackelberg (Nvonstackelberg@utah.gov)	Jordan River/Farmington Bay Water Quality Council: Theron Miller (theron.miller12@gmail.com); LaVere Merritt (merrittlb@gmail.com); Contractor (TBD)

Stakeholder Outreach and Public Involvement

1. Technical Advisory Committee

- Review and comment on all documents
- Review analytical methods and findings
- Conduct independent studies

2. Utah Lake Workshop: November 10, 2015

- “Kick off” next phase of workplan

Stakeholder Outreach and Public Involvement

3. Stakeholder consultation
4. Utah Lake Coordinator
5. Public Meetings
 - 2 times/year

Data and Information Management

1. Data acquisition

- **Water Chemistry Database**
 - Water chemistry
 - Sediment core data
- **Hydrology Database**
 - Hydrology
 - Lake Level
- **High Frequency Database**
- **Biology Database**
 - Phytoplankton
 - Zooplankton
 - Fish data
 - Carp removal

Data and Information Management

2. Data Analysis

- DWQ will identify, compile, review and analyze data for Utah Lake from 1990 to present
- Statistical analysis on changes and interactions amongst different ecosystem components
- Water quality parameter trends
- Spatial or temporal gaps identified

Data and Information Management

3. Database development

- DWQ to work with stakeholders to store all data at a centralized location within DWQ

4. Online database

- <http://www.deq.utah.gov/locations/U/utahlake/utahlake.htm>

5. Literature Review

- Reports, studies and investigations

Beneficial Use Assessment

- Utah Lake is protected for the following uses:

- 2B Protected for infrequent contact recreation such as boating, wading, or similar uses.
- 3B Protected for warm water species of game fish, including the necessary aquatic organisms in their food chain.
- 3D Protected for other aquatic wildlife.
- 4 Protected for agricultural uses including irrigation of crops and stock watering.

Beneficial Use Assessment

- **Aquatic Life:**
 - Will evaluate if requirements for warm water species are currently being supported
- **Recreation:**
 - Will evaluate if the 2B beneficial use classification is accurate or if there needs to be a use class change to a 2A
- **Secondary Water Uses**
 - Evaluate water quality associated with irrigation and stock watering

Source and Nutrient Load Analysis

- Update nutrient loading analysis with more recent data of hydrologic conditions, point and nonpoint sources
 - Spring melt and runoff
 - Storm events (summer and fall)
 - Rain on snow events
 - Base flow

Model Development

- **Develop water quality model for Utah Lake**
 - Evaluate driving processes linking nutrients to their impacts on beneficial uses
 - Work with stakeholders to select the most appropriate model to stimulate nutrient dynamics in the lake
 - Mixing
 - Nutrient Cycle
 - Phosphorus internal loading dynamics
 - DO, pH
 - Harmful Algal Blooms (HABs)
 - Turbid to clear state dynamics
 - Food web dynamics

Alternative A: A TMDL for Utah Lake

- Upon confirmation of impairments:
 - Could be cause to initiate a TMDL (Total Maximum Daily Load)
 - Determination of the pollutant(s) of concern.
 - Calculation of the lake's assimilative capacity.
 - Quantification of the pollutant sources to the lake.
 - Predictive analysis of pollution in the lake and determination of total allowable pollutant load.
 - Allocation (with a margin of safety) of the allowable pollutant load among the different sources in a manner that water quality standards and beneficial uses are supported.
 - Possible Off-ramp to Technology Based Phosphorus Effluent Limits (TBPEL)

Alternative B: Site Specific Standards

- In some locations, the nationally recommended aquatic life criteria may be considered under- or overprotective if the species in a waterbody have different sensitivities than those reflected in the national criteria data set.
 - Define the site boundaries.
 - Determine the effect of biological, physical, or chemical characteristics on sensitivity or bioavailability and toxicity.
 - Calculate numerical criteria by applying the recalculation procedure, the water-effect ratio procedure, or the resident species procedure.
 - Possible Off-ramp to Technology Based Phosphorus Effluent Limits (TBPEL)

Alternative C: Use Attainability Analysis

- Process to review and potentially modify a waterbody's designated uses, when the uses are not existing or attainable.
- It is a structured scientific assessment of the beneficial uses a water body could support, given application of required effluent limits and implementation of cost-effective and reasonable best management practices.
 - A UAA considers the physical, chemical, biological, and economic use removal criteria described in EPA's water quality standards regulation
 - Possible Off-ramp to Technology Based Phosphorus Effluent Limits (TBPEL)

