What Should the Water Quality Goals for Great Salt Lake Wetlands Be?

November 15, 2018 – Watershed Symposium
Wetlands
Wetlands
Great Salt Lake Wetlands
Great Salt Lake Wetlands

<table>
<thead>
<tr>
<th>Impounded Wetlands</th>
<th>Fringe Wetlands</th>
<th>Playas &amp; Mudflats</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Impounded Wetlands" /></td>
<td><img src="image2" alt="Fringe Wetlands" /></td>
<td><img src="image3" alt="Playas &amp; Mudflats" /></td>
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</tbody>
</table>
Water Quality Standards (WQS)

Designated Beneficial Uses

- Drinking Water
- Recreation
- Aquatic Life
- Agriculture
- Great Salt Lake
# Water Quality Standards (WQS)

## Designated Beneficial Uses
- Drinking Water
- Recreation
- Aquatic Life
- Agriculture
- Great Salt Lake

## Criteria
### Numeric:
- Toxic substances
- Salinity
- pH
- Oxygen
Water Quality Standards (WQS)

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<tr>
<th>Designated Beneficial Uses</th>
<th>Criteria</th>
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<tr>
<td>Drinking Water</td>
<td>Numeric:</td>
</tr>
<tr>
<td>Recreation</td>
<td>• Toxic substances</td>
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<tr>
<td>Aquatic Life</td>
<td>• Salinity</td>
</tr>
<tr>
<td>Agriculture</td>
<td>• pH</td>
</tr>
<tr>
<td>Great Salt Lake</td>
<td>• Oxygen</td>
</tr>
</tbody>
</table>

**Narrative Criteria**
Narrative Standards

• General Statements of water quality goals
  • “There SHALL’s”

• Describe things not well captured by numeric standards

• Starting point for numeric standards & biological assessment methods
# Wetland Challenges

<table>
<thead>
<tr>
<th>August 2014</th>
<th>September 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="August2014Image.png" alt="Image of wetland in August 2014" /></td>
<td><img src="September2015Image.png" alt="Image of wetland in September 2015" /></td>
</tr>
</tbody>
</table>
GSL Wetland

Designated Uses

5E Transitional Lands
- Waterfowl, shorebirds, food web, recreation

Wetlands within wildlife management areas
- Waterfowl, shorebirds & food web
- Fish & other aquatic life
- Recreation

Other wetlands that are waters of the state
- Recreation
- Aquatic life
Wetland Narrative Criteria

- Colors, odors, & tastes
- Floating & settleable material
- Oil & grease
- Nuisance aquatic life
- Biological community
- Toxicity

Hydrology

Biostimulatory substances

pH

Junk & refuse
DWQ Wetland Monitoring

Impounded Wetlands  Fringe Wetlands  Willard Spur
DWQ Wetland Monitoring

Stressors
- Water Availability
- Legacy Nutrients (esp. Phosphorus)
- Invasive Species

Water Chemistry
- pH – dynamic – frequently >9.0
- Dissolved oxygen – 3-20 mg/L (6)
How to bring it all together?

✓ Utah’s existing uses & criteria
✓ Examples of other states
✓ Wetland condition & stressors
✓ Uncertainty ✓ Great Salt Lake
  ✓ Dynamic hydrology
  ✓ Classification
Conservation Action Planning (CAP)

1. Identify Conservation Targets (ecological systems & species)
2. Assess Targets’ Health (based on key ecological attributes)
3. Assess Stresses & Sources (determine critical threats)
4. Develop Conservation Strategies (objectives & strategic actions)
5. Measure Success
Targets – What WQS Should Protect

- Impounded Wetlands
- Fringe Wetlands
- Playas & Mudflats

Legend:
- Impounded Wetlands
- Open Water
- GSL Meander Line (4,208 ft) MSL
- Fringe Wetlands
- Evaporation Ponds
- Management Area
- Playa/Mudflats
- Rivers

Nested Targets – What WQS Should Protect

- Playas & Mudflats
- Fringe Marsh
- Impounded Wetland
- Shorebirds
- Waterfowl
- Waterbirds
# Key Ecological Attributes – How to Measure Wetland Health

<table>
<thead>
<tr>
<th>Key Ecological Attributes</th>
<th>Impounded Wetland Indicator</th>
<th>Fringe Wetland Indicator</th>
<th>Playa/Mudflat Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydrologic Regime</strong></td>
<td>Water to meet management objectives &amp; maintain connectivity</td>
<td>Flood timing &amp; depth adequate to maintain multiple habitat types</td>
<td>Patterns of flooding &amp; drying supportive of nested target needs</td>
</tr>
<tr>
<td><strong>Chemical Regime</strong></td>
<td>Toxic substances remain below harmful concentrations</td>
<td>Toxic substances remain below harmful concentrations</td>
<td>Toxic substances remain below harmful concentrations + Soil &amp; water salinity</td>
</tr>
<tr>
<td><strong>Nutrient Regime</strong></td>
<td>Algae does not adversely affect uses</td>
<td>Soil &amp; water nutrient bioavailability favor native plant community</td>
<td>Nutrients cycle between soil, water, plants, &amp; birds</td>
</tr>
<tr>
<td><strong>Invasive species</strong></td>
<td>Invasive species abundance has no adverse effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Macro-invertebrates</strong></td>
<td>Macroinvertebrate diversity &amp; biomass</td>
<td>Healthy macroinvertebrate community</td>
<td>Adequate macroinvertebrate biomass</td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td>Dominance of native plant species + Healthy plant community (submerged &amp; emergent)</td>
<td>Dominance of native plant species</td>
<td>Vegetated area dominated by native halophytes + Bare ground &amp; vegetated areas present</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>Adequate wetland area below 4,218 feet</td>
<td>Adequate mudflat habitat area near water &amp; playa refugia</td>
<td></td>
</tr>
</tbody>
</table>
## Indicators – How Healthy the Wetlands Are

<table>
<thead>
<tr>
<th>Key Ecological Attributes</th>
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<th>Fringe Wetland Indicator</th>
<th>Playa/Mudflat Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrologic Regime</td>
<td>Fair</td>
<td>Poor/Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Chemical Regime – Toxic Substances</td>
<td>Good/Fair</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Chemical Regime – Salinity</td>
<td>NA</td>
<td>NA</td>
<td>Unknown</td>
</tr>
<tr>
<td>Nutrient Regime</td>
<td>Fair</td>
<td>Fair</td>
<td>Unknown</td>
</tr>
<tr>
<td>Invasive species</td>
<td>Fair</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Macroinvertebrates</td>
<td>Good</td>
<td>Unknown</td>
<td>Good</td>
</tr>
<tr>
<td>Plants – Native Species</td>
<td>Fair/Good</td>
<td>Poor/Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Plants – Structure</td>
<td>Good</td>
<td>NA</td>
<td>Good</td>
</tr>
<tr>
<td>Size</td>
<td>NA</td>
<td>Good</td>
<td>Good</td>
</tr>
</tbody>
</table>
## Threats – What Stresses Wetlands

<table>
<thead>
<tr>
<th>Stresses</th>
<th>Point Source Discharges</th>
<th>Upstream Water Withdrawal</th>
<th>Management of Dams &amp; Diversions</th>
<th>Invasive species</th>
<th>Land Use Conversion</th>
<th>Other Nonpoint Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered hydrologic regime</td>
<td>7</td>
<td>52</td>
<td>15</td>
<td>7</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>Excessive toxicity</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Excessive nutrients</td>
<td>17</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Reduced macro-invertebrates</td>
<td>0</td>
<td>9</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Altered plant composition</td>
<td>0</td>
<td>12</td>
<td>1</td>
<td>33</td>
<td>0</td>
<td>4</td>
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<tr>
<td>Altered SAV</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Reduced Size</td>
<td>0</td>
<td>12</td>
<td>1</td>
<td>2</td>
<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>
Strategies – How to Protect Wetlands

• Water availability - Maintain sufficient water flow (acre/feet) and a “minimum dynamic area” (acres) of GSL wetlands and bays so that they are in “Good” condition.

• Invasive species - Decrease Phragmites cover around GSL by 50% (~13,000 acres) by 2028.
What will become of it all?

Wetland definition
• CAP targets
GSL Wetland Beneficial Use(s)
• Nested targets
• Key Ecological Attributes
Narrative Criteria
• Indicators
• Stresses & Sources
### GSL Wetland Water Quality Goals

**Protect the water quality for all wetland-dependent birds and their food web**

- Hydrologic, chemical, & nutrient regimes
- Plant and macroinvertebrate community and size

<table>
<thead>
<tr>
<th>Waterbird</th>
<th>Feeding Needs</th>
<th>Nesting Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diving Waterfowl</td>
<td>Macroinvertebrates, Tubers</td>
<td>Emergent Vegetation</td>
</tr>
<tr>
<td>Dabbling Waterfowl</td>
<td>Macroinvertebrates, Leaves, Seeds</td>
<td>Meadow Vegetation</td>
</tr>
<tr>
<td>Large Shorebirds</td>
<td>Macroinvertebrates</td>
<td>Playa/Mudflat</td>
</tr>
<tr>
<td>Small Shorebirds</td>
<td>Macroinvertebrates</td>
<td>Playa/Mudflat</td>
</tr>
<tr>
<td>Piscivorous Birds</td>
<td>Fish</td>
<td>Islands</td>
</tr>
<tr>
<td>Colonial Birds</td>
<td>Macroinvertebrates</td>
<td>Meadow Vegetation</td>
</tr>
</tbody>
</table>

**Feeding Needs**

- Macroinvertebrates
- Tubers
- Leaves, Seeds
- Fish
- Macroinvertebrates

**Nesting Needs**

- Emergent Vegetation
- Meadow Vegetation
- Playa/Mudflat
- Islands
Wetland Designated Uses

- No wetland uses
- Wetlands support any existing uses of associated waterbodies
- Wetlands support specified existing uses
- Wetland-specific designated use
- Wetland-specific and existing uses apply
## Wetland Water Quality Criteria

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Biological community</td>
<td>44</td>
</tr>
<tr>
<td>Nuisance aquatic life</td>
<td>61</td>
</tr>
<tr>
<td>Bio-stimulatory substances</td>
<td>45</td>
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<tr>
<td>pH</td>
<td>42</td>
</tr>
<tr>
<td>Oxygen</td>
<td>42</td>
</tr>
<tr>
<td>Salinity</td>
<td>32</td>
</tr>
<tr>
<td>Hydrology</td>
<td>17</td>
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<tr>
<td>Physical Habitat</td>
<td>19</td>
</tr>
</tbody>
</table>
Thanks to

Greg Low – Applied Ecology
CAP Meeting Participants
Environmental Protection Agency
For more info

rdownard@utah.gov
(801) 536-4340

Wetlands Program

The Utah Division of Water Quality’s (DWQ) mission is to protect, maintain and enhance the quality of Utah’s surface and underground waters for appropriate beneficial uses; and protect the public health through eliminating and preventing water-related health hazards which can occur as a result of improper disposal of human, animal or industrial wastes while giving reasonable consideration to the economic impact.

To support our mission, the Wetlands Program is currently focused on evaluating whether wetlands associated with the Great Salt Lake (GSL) are fully supporting their broadly defined beneficial use: habitat support for waterfowl and shorebirds, including the necessary aquatic life in their food chain.

Utah is not only the second driest state in the United States, it is also home to the Great Salt Lake ecosystem, a large inland basin that serves as a desert oasis for millions of migratory birds and other water-dependent wildlife. Integrated within the Great Salt Lake ecosystem are extensive wetlands that span the transition between the lake and a mosaic of cold desert, rugged mountains, and rapidly growing urban areas. These wetlands provide essential ecosystem services that moderate surface water and ground water flows, and protect downstream aquatic systems by removing excess nutrients and other pollutants. There is an essential need to maintain the health and extent of these valuable ecosystems for future generations.