



Handouts – Great Salt Lake Wetlands CAP Workshop II

- Agenda
- Eastside Wetlands and Management Areas
- Utah's Narrative Standard and Designated Beneficial Uses
- Wetland Targets: Description/Nested Targets/Beneficial Uses
- Key Ecological Attributes and Indicators
- Narrative Ratings Tables for 3 Targets (from 1st workshop)
- Current Health Scores for Targets Across 3 Bays (from 1st workshop)
- Breakout Group Instruction #1: Key Attributes, Indicators & Narrative Ratings
- Breakout Group Instruction #2: Current Health
- Large Group Instruction #3: Threats
- Breakout Group Instruction #4: Strategies

Great Salt Lake Wetlands CAP Workshop II

May 23 & 24, 2018, 9:00am – 5:00pm

Agenda

Meeting Location:

Utah Division of Water Quality, Room 1019, 195 North 1950 West, Salt Lake City

CAP Workshops Objectives:

1. Provide “hands on” advice and assistance to Utah DWQ on developing narrative water quality standards for the Great Salt Lake’s wetlands beneficial uses.
2. Understand DWQ’s regulatory authority for protecting wetland water quality at the Great Salt Lake
3. Explore other conservation action strategies – beyond water quality standards – that might be developed and applied by stakeholders to enhance the Lake’s wetlands health and/or to abate potential future threats to beneficial uses, with a geographic focus on eastside GSL wetlands in Bear River Bay, Ogden Bay and Farmington Bay.

Agenda: Wednesday, May 23

Item No.	Time	Agenda Item
1	9:00 – 9:45	Welcome, Introductions, Expected Outcomes, Ground Rules
2	9:45 – 10:00	Quick Review of Previous GSL Wetlands CAP Workshops and Overview of Where the Process is Heading
3	10:00 – 10:30	Overview of DWQ Regulatory Authority
		<i>Break</i>
4	10:45 – 11:15	Questions & Discussion of DWQ Authority and Process
5	11:15 – 11:30	Quick Overview of CAP

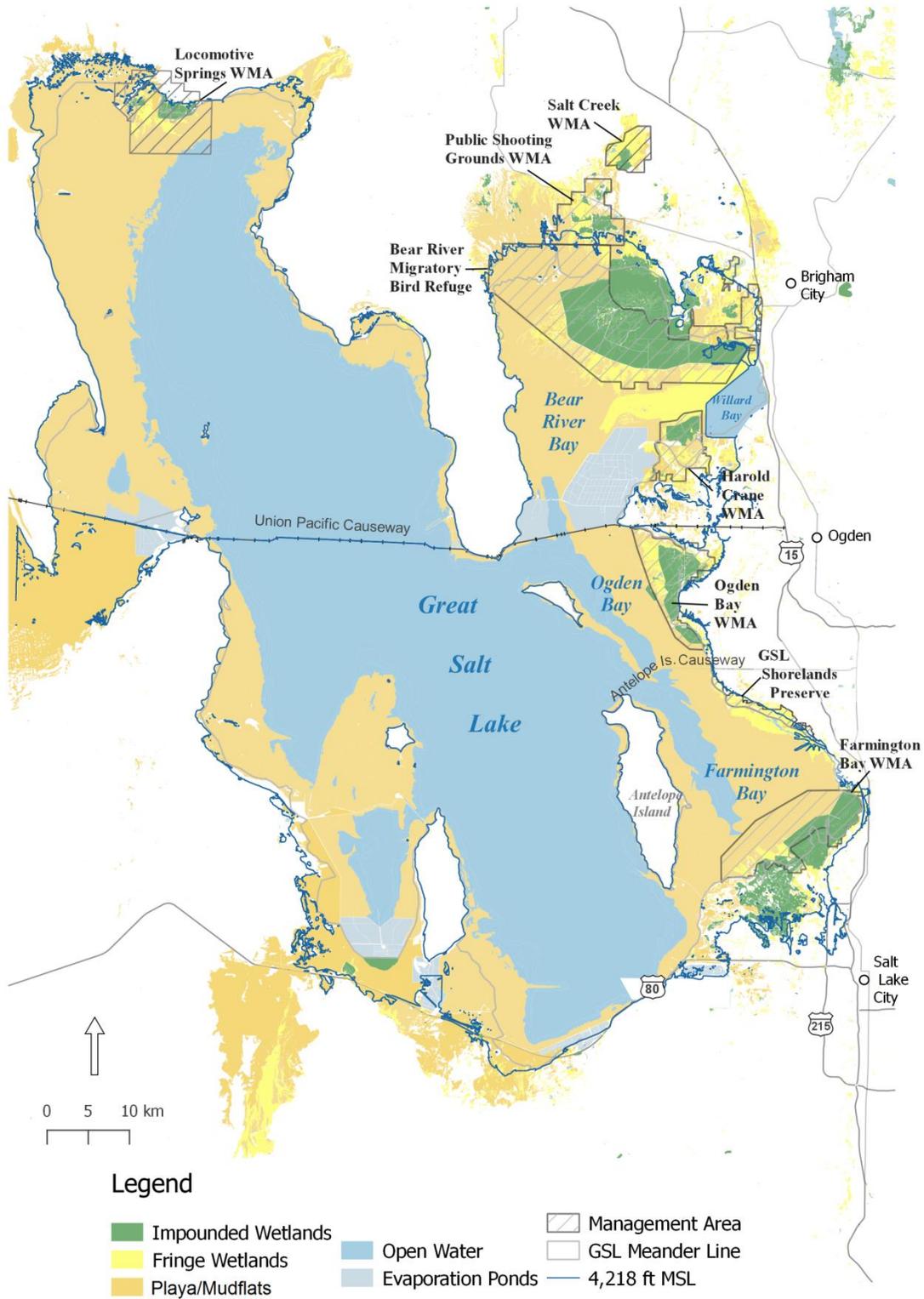
Item No.	Time	Agenda Item
6	11:30 – 12:00	Wetland Targets/Nested Targets/Beneficial Uses – Review Revisions Made from Workshop I - Questions, Discussion & Suggestions
	12:00 – 1:00	<i>Lunch will be provided</i>
7	1:00 – 2:30	Key Ecological Attributes (KEAs), Indicators and Narrative Ratings – Review Revisions Made from Workshop I – Small Working Groups, followed by Large Group Discussion
8	2:30 – 3:30	Current Health: Review Preliminary Current Health Ratings for Wetland Targets in 3 Bays from Workshop I; Revise and/or Score Overall Health for Great Salt Lake Wetlands – Small Working Groups, followed by Large Group Discussion
		<i>Break</i>
9	3:45 – 4:30	Threats (Sources of Stress): Review Threat Rankings from Workshop I; Adjust or Re-Vote if Needed
10	4:30 – 5:00	Recap of Day 1 Findings, Questions & Issues; Preview Day 2 Tasks; Interim “Plus-Delta” Evaluation
11	5:00 pm	Adjourn

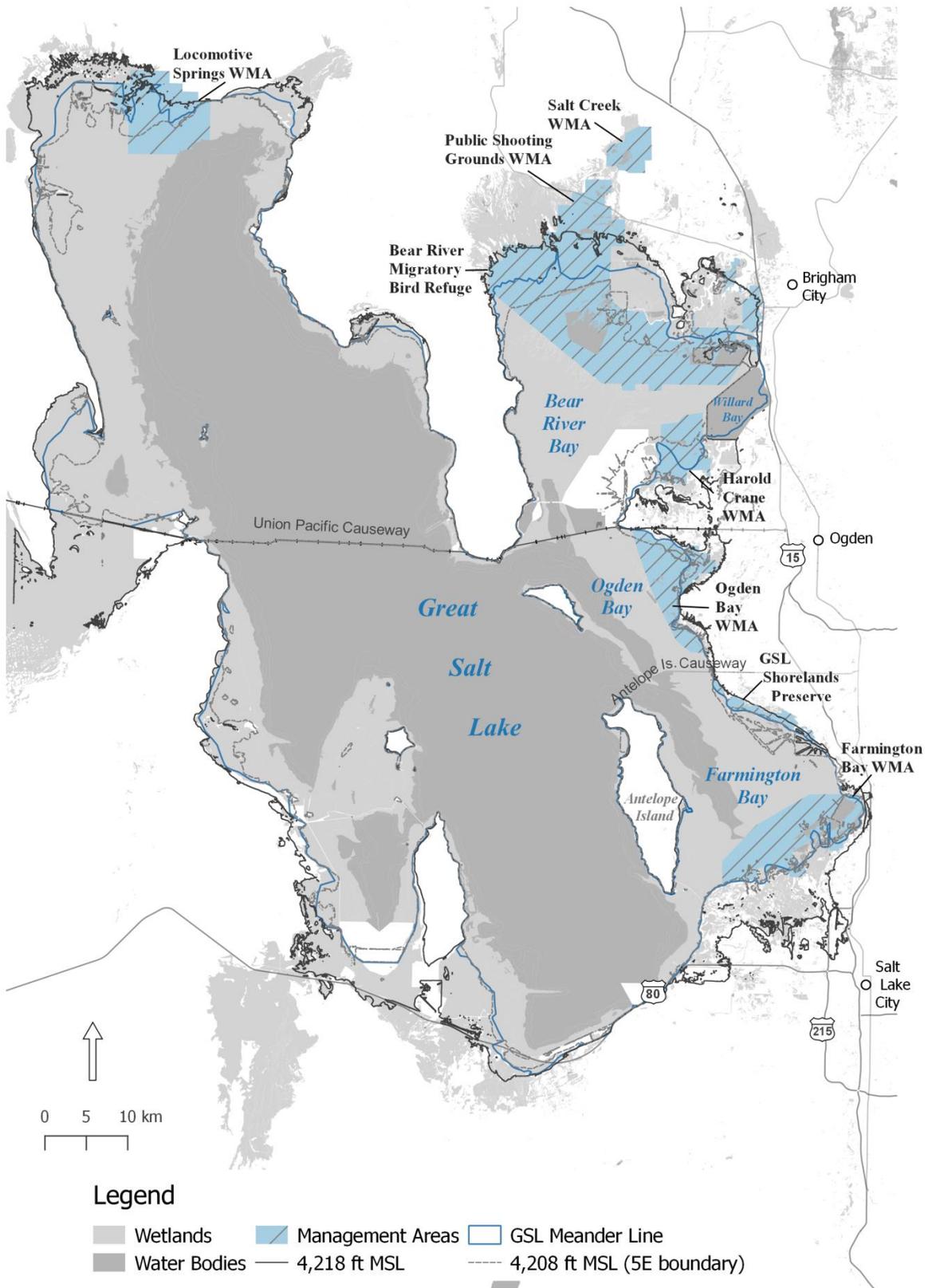
Agenda: Thursday, May 24

Item No.	Time	Agenda Item
1	9:00 – 9:45	Review Day 1 Outcomes; Any Overnight 2 nd Thoughts; Day 2 Tasks
2	9:45 – 10:00	Introduction to Conservation Strategies
3	10:00 – 12:00	Develop Conservation Action Strategies (beyond water quality standards) – Small Working Groups (<i>short break midway</i>)
	12:00 – 1:00	<i>Lunch will be provided</i>
4	1:00 – 2:00	Small Groups Complete Conservation Strategies: Objectives,

Item No.	Time	Agenda Item
		Strategic Actions & Action Steps
5	2:00 – 3:00	Small Group Reports & Large Group Discussion on Strategies
	3:00 – 3:15	<i>Break</i>
6	3:15 – 4:15	Open Time: Ad Hoc Small Groups Refine Strategies and/or Items from Day 1
7	4:15 – 5:00	Recap of Findings, Remaining Questions & Issues, Next Steps, Workshop Evaluation
8	5:00	Adjourn

Maps of Great Salt Lake Eastside Wetlands & Management Areas





Utah's Narrative Standard

Utah Administrative Code (UAC) R317-2-7.2 Narrative Standards

It shall be unlawful, and a violation of these rules, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures; or determined by biological assessments in Subsection R317-2-7.3.

Utah's Beneficial Use Designations - UAC R217-2-6

Class 2 -- Protected for recreational use and aesthetics.

Class 2A -- frequent primary contact recreation (swimming)

Class 2B -- infrequent primary contact recreation, secondary contact recreation (wading)

Class 3 -- Protected for use by aquatic wildlife.

Class 3A -- cold water species of game fish, including their food chain.

Class 3B -- warm water species of game fish, including their food chain.

Class 3C -- nongame fish and other aquatic life, including their food chain.

Class 3D -- waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including their food chain.

Class 3E -- Severely habitat-limited waters

Class 5 -- The Great Salt Lake.

a. Class 5A Gilbert Bay - frequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

b. Class 5B Gunnison Bay (*all bays have the same use*)

c. Class 5C Bear River Bay

d. Class 5D Farmington Bay

e. Class 5E Transitional Waters along the Shoreline of the Great Salt Lake

Geographical Boundary -- All waters below approximately 4,208-foot elevation to the current lake elevation of the open water of the Great Salt Lake; areas of these transitional waters change corresponding to the fluctuation of open water elevation.

Beneficial Uses -- Protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

Wetland Targets: Description/Nested Targets/Beneficial Uses

Target	Description	Nested Targets
Impounded Wetlands	<p>Impounded wetlands are large, primarily open water wetlands that are typically managed to grow submerged aquatic vegetation (SAV), which provides forage and shelter for migratory birds and habitat for macroinvertebrates and fish. These wetlands are diked and equipped with water control structures that alter the inflow and outflow of water to deepen and extend flooding. Elevation and hydrologic gradients within impounded wetlands support multiple wetland types, from deeply flooded submergent wetlands to shallow flooded meadows. Impounded wetlands do not include evaporation ponds.</p>	<p><i>Waterfowl:</i> Dabbling and diving ducks, geese, and swans feed in SAV-dominated wetlands and nest in emergent and meadow wetlands. Species of interest include <i>Cinnamon Teal</i>, <i>Redheads</i>, and <i>Tundra Swans</i>.</p> <p><i>Shorebirds:</i> Shorebirds forage and build floating nests in the shallow waters and nest along dikes. Significant populations of <i>American Avocets</i>, <i>Black-necked Stilts</i>, and <i>Wilson's Phalaropes</i> found in this system.</p> <p><i>Waterbirds:</i> Deeper water is foraging habitat for piscivorous birds, including significant populations of <i>American White Pelicans</i>, <i>Great Blue Herons</i>, and <i>Snowy Egrets</i>. Islands provide protected nesting habitat for colonial birds like <i>Franklin's Gulls</i> and <i>Black and Forster's Terns</i>.</p>
Fringe Wetlands (formerly Un-impounded Marsh Complex)	<p>Fringe wetlands are large, shallow, intermittently to semi-permanently flooded wetlands dominated by a mix of emergent and submerged aquatic vegetation (SAV). Spatial and temporal variation in salinity and hydrology create a mosaic of habitat types in fringe wetlands. Mudflats, playas, meadows, emergent marsh, and submergent wetlands can be found in fringe complexes. Fringe wetlands can also be divided into high and low fringe based on their elevation – high fringe are irregularly inundated by the lake and experience dry conditions when lake levels are low, whereas low fringe may remain inundated for many years.</p>	<p><i>Waterfowl:</i> The mix of emergent and submergent vegetation provides nesting and foraging habitat for large and small waterfowl. Support significant nesting populations of <i>Cinnamon Teal</i>.</p> <p><i>Shorebirds:</i> meadow habitat provides foraging habitat for shorebirds. Large populations of <i>Black-necked Stilts</i> and <i>American Avocets</i> feed here.</p> <p><i>Waterbirds:</i> Fringe wetlands provide breeding and foraging habitat for a portion of the largest global breeding population of <i>White-faced Ibis</i></p>
Playa/ Mudflats	<p>Playas and mudflats are temporarily flooded saline wetlands created by inter-annual or seasonal lake water fluctuations. These flat, depressional wetlands dominate the GSL shoreline and support communities of freshwater and saltwater macroinvertebrates that provide seasonal food for tens of thousands of migratory shorebirds, gulls, and waterfowl. Playa/mudflats, are mostly devoid of vegetation, yet remain important for nesting birds. When vegetated, playa/mudflats are dominated by halophytic ('salt-loving') plant species that vary in composition based on varying freshwater inputs. The specific locations of this habitat changes as GSL expands and contracts.</p>	<p><i>Waterfowl:</i> Short halophyte vegetation provides foraging habitat for migrating waterfowl, including <i>Canada geese</i>.</p> <p><i>Shorebirds:</i> Expansive flat and salty playas and mudflats provide breeding and foraging habitat for many types of shorebirds. Significant populations of <i>Snowy Plovers</i>, <i>Black-necked Stilts</i>, <i>American Avocets</i>, <i>Long-Billed Dowitchers</i>, <i>Marbled Godwits</i>, <i>Western Sandpipers</i>, and <i>Long-billed Curlews</i> feed or nest here.</p>

Key Ecological Attribute and Indicators

Key Ecological Attributes	Impounded Wetland Indicator	Fringe Wetland Indicator	Playa/Mudflat Indicator
Hydrologic Regime	Water available to meet management objectives, including: residence time, pond flushing, habitat size, & habitat diversity	Flood timing & depth adequate to maintain multiple habitat types	Habitat area near fresh or brackish water
Hydrologic Regime			Patterns of flooding & drying supportive of nested target needs
Chemical Regime	Toxic substances remain below concentrations toxic to aquatic life	Toxic substances remain below concentrations toxic to aquatic life	Toxic substances remain below concentrations toxic to aquatic life
Chemical Regime	Tissue concentrations of important bioaccumulation toxics remain below deleterious concentrations		Salinity within a range support of nested target food webs
Nutrient Regime	Algal mats or Harmful Algal Blooms do not adversely affect aquatic life	Soil & water nutrient bioavailability favor native plant community	Nutrient cycling between soil, water, plants, macroinvertebrates & birds
Aquatic Biota	Invasive animal abundance does not adversely affect the populations of native organisms		
Recreational Uses	Algal mats or harmful algal blooms do not impede recreational uses		
Macro-invertebrates	Healthy macroinvertebrate population supportive of nested targets; follows seasonal dynamics & salinity gradients	Healthy macroinvertebrate population supportive of nested targets; follows seasonal dynamics & salinity gradients	
Marco-invertebrates	Adequate macroinvertebrate biomass to support nested targets & management goals		Adequate macroinvertebrate biomass to support nested targets
Plants	Dominance of native species	Dominance of native plant species	Vegetated area dominated by native halophytes

Key Ecological Attributes	Impounded Wetland Indicator	Fringe Wetland Indicator	Playa/Mudflat Indicator
Plants	Healthy plant community (submerged & emergent) that provides adequate habitat structure to support waterfowl & other birds		Bare ground & vegetated areas present
Plants			Phragmites australis cover is a minor component of entire area
Size		Wetland area below 4,218 feet adequate to support nested targets	

Narrative Ratings Tables for 3 Targets
Conservation Target: Impounded Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Comments
Hydrologic Regime	Water available to meet management objectives, including: residence time, pond flushing, habitat size, & habitat diversity	Insufficient water to meet management objectives over most years		Adequate water supply except in a drought year		
Chemical Regime	Toxic substances remain below concentrations toxic to aquatic life	Substances at concentrations that are toxic to people, or aquatic life		Ambient concentrations of toxic substances at or below thresholds toxic to aquatic life		
Chemical Regime	Tissue concentrations of important bioaccumulation toxics remain below deleterious concentrations	Tissue concentration is toxic to people, or aquatic life		Ambient tissue concentration are is at or below thresholds toxic to people or aquatic life		
Nutrient regime	Algal mats or Harmful Algal Blooms do not adversely affect aquatic life	>80% cover during the growing season. Persists greater than a 2 year period		25%		

Conservation Target: Impounded Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Comments
Aquatic Biota	Invasive animal abundance does not adversely affect the populations of native organisms	1 or more invasive species present and pervasive				
Recreational Uses	Algal mats or harmful algal blooms do not impede recreational uses					
Macro-invertebrates	Healthy macroinvertebrate population supportive of nested targets; follows seasonal dynamics & salinity gradients	Plant-associated Macroinvertebrate Index (PMI) score in the bottom 25th percentile		PMI score in the top 50th percentile		
Macro-invertebrates	Adequate macroinvertebrate biomass to support nested targets & management goals	Low biomass(g/m ²) of desirable functional groups		Adequate biomass g/m ² of desirable functional groups		
Plants	Dominance of native plant species	Native cover <50%		Native cover >75%of vegetated area		

Conservation Target: Impounded Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Comments
Plants	Healthy plant community (submerged & emergent) that provides adequate habitat structure to support waterfowl & other birds	Peak SAV cover over very little (e.g. 25%) %		Peak SAV cover over most of spatial extent (e.g. 75%) of open water area%		

Conservation Target: Fringe Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Comments
Hydrologic Regime	Flood timing and depth adequate to maintain multiple habitat types	Brief or absent flooding over multiple years leads to dominance of mudflat or upland types		Annual flooding maintains a balance of five habitat types		
Chemical Regime	Toxic substances remain below concentrations toxic to aquatic life	Substances at concentration that is toxic to people, or aquatic life		Ambient concentrations of toxic substances at or below thresholds toxic to aquatic life		
Nutrient regime	Soil & water nutrient bioavailability favor native plant community	Nitrogen & phosphorus concentrations in the highest 75th percentile for wetland type; large algal mats		Nitrogen & phosphorus concentration in the lowest 50th percentile for that wetland type; no large algal mats		
Macro-invertebrates	Healthy macroinvertebrate population supportive of nested targets; follows seasonal dynamics & salinity gradients	Low biomass(g/m^2) of desirable functional groups		Adequate biomass(g/m^2) of desirable functional groups		

Conservation Target: Fringe Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Comments
Plants	Dominance of native plant species	Native cover <50%		Native cover >75%of vegetated area		
Size	Wetland area below 4,218 feet adequate to support nested targets	Decreased acreage below 4,218 ft MSL		Adequate annually flooded acreage below 4,218 ft. MSL		

Conservation Target: Playa/Mudflats

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Comments
Hydrologic regime	Habitat area near fresh or brackish water	Decreased area inadequate to support GSL shorebird populations		Adequate area to support GSL shorebird populations		
Hydrologic Regime	Patterns of flooding & drying supportive of nested target needs	Multiple years of no flooding or extended deep (>7 inches) flooding		In most years, shallow (<7 inches) early spring ponding or saturation followed by drawdown & period summer inundation		
Chemical Regime	Toxic substances remain below concentrations toxic to aquatic life	Substances at concentration that is toxic to people, or aquatic life		Ambient concentrations of toxic substances at or below thresholds toxic to aquatic life		
Chemical Regime	Salinity within a range support of nested target food webs	Hypersaline conditions caused by drought that are too much for macroinvertebrates		Brackish to saline soil salinity		
Nutrient regime	Nutrient cycling between soil, water, plants, macroinvertebrates & birds	Nitrogen and phosphorus accumulate in soils		Nitrogen and phosphorus regularly cycle from water to soils to plants, macroinvertebrates, and birds		

Conservation Target: Playa/Mudflats

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Comments
Macro-invertebrates	Adequate macroinvertebrate biomass to support nested targets	Low biomass(g/m ²) of desirable functional groups		Adequate biomass (g/m ²) of desirable functional groups		
Plants	Vegetated area dominated by native halophytes	Increased species richness driven by invasive species		A few (≤3) native halophytes dominant, especially <i>Salicornia rubra</i> , <i>Sueada calceoliformis</i> , & <i>Allenrolfia occidentalis</i>		
Plants	Bare ground & vegetated areas present	Loss of dynamic condition, playa/mudflats never vegetated or lost to constantly expanding Phragmites		In most years area is dominated by bare ground with sparse, fringing vegetation; periodic expansion of native halophytes		
Plants	Phragmites australis cover is a minor component of entire area	Large, expanding Phragmites fronts		Manageable (~10% area) Phragmites cover		

Draft Current Health Scores Tables for 3 Targets Across 3 Bays
Conservation Target: Impounded Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Health			
						Bear	Ogden	Farming-ton	GSL Wetlands
Hydrologic Regime	Water available to meet management objectives, including: residence time, pond flushing, habitat size, & habitat diversity	Insufficient water to meet management objectives over most years		Adequate water supply except in a drought year		Fair	Fair	Good	
Chemical Regime	Toxic substances remain below concentrations toxic to aquatic life	Substances at concentrations that are toxic to people, or aquatic life		Ambient concentrations of toxic substances at or below thresholds toxic to aquatic life		Good			
Chemical Regime	Tissue concentrations of important bioaccumulation toxics remain below deleterious concentrations	Tissue concentration is toxic to people, or aquatic life		Ambient tissue concentration are is at or below thresholds toxic to people or aquatic life		Good	Good	Poor	
Nutrient regime	Algal mats or Harmful Algal Blooms do not adversely affect aquatic life	>80% cover during the growing season. Persists greater than a 2 year period		25%		Good	Fair	Fair	

Conservation Target: Impounded Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Health			
						Bear	Ogden	Farming-ton	GSL Wetlands
Aquatic Biota	Invasive animal abundance does not adversely affect the populations of native organisms	1 or more invasive species present and pervasive				Fair	Fair	Fair	
Recreational Uses	Algal mats or harmful algal blooms do not impede uses					Good	Fair	Fair	
Macro-invertebrates	Healthy macro-invertebrate population supportive of nested targets; follows seasonal dynamics & salinity gradients	Plant-associated Macroinvertebrate Index (PMI) score in the bottom 25th percentile		PMI score in the top 50th percentile		Good	Good	Fair-Poor	
Macro-invertebrates	Adequate macroinvertebrate biomass to support nested targets & management goals	Low biomass(g/m ²) of desirable functional groups		Adequate biomass g/m ² of desirable functional groups		Good	Good	Good	
Plants	Dominance of native plant species	Native cover <50%		Native cover >75%of vegetated area		Fair	Fair	Fair	
Plants	Healthy plant community (submerged & emergent) that provides adequate habitat structure to support waterfowl & other birds	Peak SAV cover over very little (e.g. 25%)		Peak SAV cover over most of spatial extent (e.g. 75%) of open water area%		Good	Fair	Poor	

Conservation Target: Fringe Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Health			
						Bear	Ogden	Farming-ton	GSL Wetlands
Hydrologic Regime	Flood timing and depth adequate to maintain multiple habitat types	Brief or absent flooding over multiple years leads to dominance of mudflat or upland types		Annual flooding maintains a balance of five habitat types		Fair	Fair	Fair-Good	
Chemical Regime	Toxic substances remain below concentrations toxic to aquatic life	Substances at concentration that is toxic to people, or aquatic life		Ambient concentrations of toxic substances at or below thresholds toxic to aquatic life		Good	Good	Good	
Nutrient regime	Soil & water nutrient bioavailability favor native plant community	Nitrogen & phosphorus concentrations in the highest 75th percentile for wetland type; large algal mats		Nitrogen & phosphorus concentration in the lowest 50th percentile for that wetland type; no large algal mats		-	-	Fair	
Macro-invertebrates	Healthy macroinvertebrate population supportive of nested targets; follows seasonal dynamics & salinity gradients	Low biomass(g/m ²) of desirable functional groups		Adequate biomass (g/m ²) of desirable functional groups		Good	Good	Good	

Conservation Target: Fringe Wetlands

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Health			
						Bear	Ogden	Farming-ton	GSL Eastside
Plants	Dominance of native plant species	Native cover <50%		Native cover >75%of vegetated area		Good-Fair	Fair	Fair	
Size	Wetland area below 4,218 feet adequate to support nested targets	Decreased acreage below 4,218 ft MSL		Adequate annually flooded acreage below 4,218 ft. MSL		Good	Good	Good	

Conservation Target: Playa/Mudflats

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Health			
						Bear	Ogden	Farming-ton	GSL Eastside
Hydrologic regime	Habitat area near fresh or brackish water	Decreased area inadequate to support GSL shorebird populations		Adequate area to support GSL shorebird populations		Good	Good	Good	
Hydrologic Regime	Patterns of flooding & drying supportive of nested target needs	Multiple years of no flooding or extended deep (>7 inches) flooding		In most years, shallow (<7 inches) early spring ponding or saturation followed by drawdown & period summer inundation		Poor	Good	Poor	
Chemical Regime	Toxic substances remain below concentrations toxic to aquatic life	Substances at concentration that is toxic to people, or aquatic life		Ambient concentrations of toxic substances at or below thresholds toxic to aquatic life		Fair	Fair	Fair	
Chemical Regime	Salinity within a range support of nested target food webs	Hypersaline conditions caused by drought that are too much for macroinvertebrates		Brackish to saline soil salinity		Poor	-	-	
Nutrient regime	Nutrient cycling between soil, water, plants, macroinvertebrates & birds	Nitrogen and phosphorus accumulate in soils		Nitrogen & phosphorus regularly cycle from water to soils to plants, macroinvertebrates & birds		-	-	-	

Conservation Target: Playa/Mudflats

Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Health			
						Bear	Ogden	Farming-ton	GSL Eastside
Macro-invertebrates	Adequate macroinvertebrate biomass to support nested targets	Low biomass(g/m ²) of desirable functional groups		Adequate biomass (g/m ²) of desirable functional groups		Good	Good	Good	
Plants	Vegetated area dominated by native halophytes	Increased species richness driven by invasive species		A few (≤3) native halophytes dominant, especially <i>Salicornia rubra</i> , <i>Sueada calceoliformis</i> , & <i>Allenrolfia occidentalis</i>		Good	Good	Good	
Plants	Bare ground & vegetated areas present	Loss of dynamic condition, playa/mudflats never vegetated or lost to constantly expanding Phragmites		In most years area is dominated by bare ground with sparse, fringing vegetation; periodic expansion of native halophytes		Good	Good	Good	
Plants	Phragmites australis cover is a minor component of entire area	Large, expanding Phragmites fronts		Manageable (~10% area) Phragmites cover		Fair-Poor	Poor	Poor	

Breakout Group Exercise #1: Review KEAs, Indicators, Ratings

Objective: Provide “hands on” advice and assistance to Utah DWQ on developing narrative water quality criteria for GSL wetlands.

Tasks:

1. Review summary matrix of key ecological attributes (KEAs)/indicators for the 3 wetland system targets – recommend any additions, deletions and amendments.
2. Dive deep into 3 to 5 of the “straw dog” KEAs and their narrative ratings – recommend any amendments.

Handouts:

1. Summary matrix of key ecological attributes/indicators for the 3 wetland systems.
2. Detailed “straw” dog of key ecological attributes, indicators & ratings for the two systems.

Hints

- The KEA is what’s important for a target’s long-term health; the Indicator is how you measure that attribute
- Criteria for Attributes and Indicators:
 - ✓ Very important to health of the nested targets
 - ✓ May provide early warning of adverse effects (e.g., conditions to avoid)
 - ✓ Indicators that are feasible to measure
 - ✓ Narrative rating criteria that are feasible to develop
 - ✓ A parsimonious number of KEAs - avoid redundancy & desirable but less critical factors
- Focus on the “Good” & “Poor” narrative ratings (see below); these are the key benchmarks
- Avoid using numbers in the narrative unless they can be scientifically supported; however numbers can be used illustratively – such as “almost all (e.g. ~90%)”
- Rating Scale
 - **Poor - Imminent Loss:** Allowing the factor to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.
 - **Fair – Vulnerable:** The factor lies outside of its range of acceptable variation & requires human intervention. If unchecked, the target will be vulnerable to serious degradation.
 - **Good - Minimum Integrity:** The factor is functioning within its range of acceptable variation; it may require some human intervention
 - **Very Good - Optimal Integrity:** The factor is functioning at an ecologically desirable status, and requires little human intervention – i.e., “Mother Nature’s” condition.

Breakout Group Exercise #2: Current Health Ratings

Objective: Provide “hands on” advice and assistance to Utah DWQ on developing narrative water quality criteria for GSL wetlands.

Tasks:

1. Assign Current Health Ratings for the 3 targets across the eastside wetlands of the Great Salt Lake

Handouts:

- Previous materials and maps
- Current health rankings for targets across 3 bays -- from 1st workshop
- Crib sheet for assessing health over large geographic area

Hints

- Rating Scale
 - **Poor - Imminent Loss:** *Allowing the factor to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.*
 - **Fair – Vulnerable:** *The factor lies outside of its range of acceptable variation & requires human intervention. If unchecked, the target will be vulnerable to serious degradation.*
 - **Good - Minimum Integrity:** *The factor is functioning within its range of acceptable variation; it may require some human intervention*
 - **Very Good - Optimal Integrity:** *The factor is functioning at an ecologically desirable status, and requires little human intervention – i.e., “Mother Nature’s” condition.*

Rating KEAs with Variable Conditions Over a Large Area

% of Area Good	% of Area Fair	% of Area Poor	Overall Rating
80	20	0	Good
80	0	20	Good/Fair
60	40	0	Good/Fair
60	20	20	Fair/Good
60	0	40	Fair
40	60	0	Fair/Good
40	40	20	Fair
40	20	40	Fair/Poor
40	0	60	Poor/Fair
20	60	20	Fair/Poor
20	40	40	Poor/Fair
20	20	60	Poor/Fair
20	0	80	Poor
0	80	20	Fair/Poor
0	60	40	Poor/Fair
0	40	60	Poor
0	20	80	Poor

Group Exercise #3: Stresses & Sources of Stress (aka Threats)

Objective: An assessment of the group's greatest concerns regarding potential sources of stress to GSL wetlands beneficial uses over the next 10 years.

Tasks:

1. Any additions to Sources (group)
2. Each participant check twelve (12) boxes of the Threat Worksheets that you think represent the greatest sources of stress for the 3 targets across the eastside Great Salt Lake over the next 10 years. Focus on key attributes that you think are most likely to be the most stressed. Consider spreading your votes across all 3 targets (e.g., 5 threats to one target, 4 threats to a second target, 3 threats to a third). For any targets, you may check more than one box in a column, or in a row, if you wish, depending on what you consider the greatest sources of stress.

Hints

- “Threats” are the combination of a Sources of Stress
- **Stresses** are the “mirror image” of a Key Ecological Attribute (KEA)
- **Sources** are the human causes of a Stress
- Stresses and Source may be...
 - ✓ Historic - these are already reflected in a degraded KEA, and therefore are not ranked
 - ✓ Current and Ongoing - may stay the same or get worse
 - ✓ Future – focus of the threat assessment
- Stress: How much will the KEA be degraded – e.g., from “Good” to “Poor”
- Assess the projected contribution of the source to a given stress
 - Multiple sources may contribute & more than one source might be “High”
- Consider threats that are “reasonably likely to occur” over the next 10 years
 - If the impact occurs more than 10 years away, but the source is activated within 10 years, then it falls within the 10 year window – e.g., invasive species, policy decision
 - Climate change brings lots of complexity
 - Only consider climate change if there are strategies you might need to deploy now
 - Don't try to distinguish between natural and human-caused climate change
- Challenges
 - How to rank very uncertain threats – e.g., improbable but potentially very harmful
 - “How much sleep do you lose” thinking about this threat:
Nightmare = Very High; Bad Dream = High; Troubled Sleep = Medium

Breakout Group Exercise #4: Strategies

Objective: Explore other conservation action strategies -- beyond water quality standards – that might be developed and applied by stakeholders to enhance the GSL wetlands water quality and/or to abate potential future threats to beneficial uses.

Tasks:

1. Decide on whether you want to address a critical threat or restore the health of a “Fair” or “Poor” rated KEA for a given target or targets
2. Develop a Strategy to this end
 - Objective
 - 3 to 8 Strategic Actions as needed to accomplish the Objective

Handouts:

1. Strategy worksheet
2. Strategy examples

Hints

- A set of **strategic actions** designed to achieve a specific **objective** (outcome) that...
 - Abates a critical threat and/or
 - Enhances the health of a target – i.e., a degraded key attribute
- 3 Parts: Objective; Strategic Actions; Action Steps
- **Objectives**
 - Should always link back to a key ecological attribute or threat
 - Make sure the objective = *success*, not just what’s feasible
 - A specific, measurable, time-based outcome that defines success – NOT how you do it
 - Examples
 - Reduce sediment loading to normal TDML levels on 25 of the 40 Upper River “hot spots” by 20xx
 - No golf resort development in the Valley
- **Strategic Actions**
 - Will the strategic actions, if successful, actually accomplish the objective?
 - *Probe, probe, probe...* the sources of stress, potential underlying causes, key constituencies and possible solutions
 - Who are the key constituencies – that can either STOP or BOOST the strategy?
 - What motivates them?
 - Who’s the actual “decider” (person or body) on any policy?
 - What’s a first approximation of costs to implement – “how many zeros” -- \$10,000, \$100,000 or \$1,000,000? Where will the \$\$\$ come from?
 - Who will provide the strategy leadership and continuity of effort?

Objectives & Strategic Actions Worksheet – Great Salt Lake Wetlands CAP Workshop

	Objective, Strategic Actions, Notes
Objective:	
What Threat is addressed or KEA restored?	
Strategic Actions	
Notes: Constituencies; who decides on policies; motivations; cost	

Strategy Example – Nevada Groundwater Withdrawal

#	Objectives and Strategic Actions
Objective	Ensure that potential large-scale Southern Nevada groundwater withdrawal does not cause “unreasonable adverse effects” to flows and other associated key ecological attributes for groundwater-dependent ecosystems in eastern Nevada.
Strategic action	Secure binding legal agreement between Southern Nevada Water Authority (SNWA) and U.S. Department of Interior (DOI) that incorporates the above objective.
Strategic action	Establish legally-binding Monitoring, Management and Mitigation ("3M") measures intended to achieve the objective.
Strategic action	Use CAP framework to facilitate a Biological Monitoring Plan adopted by SNWA and DOI - including identification of Targets, Key Ecological Attributes and Indicators. Implement Plan to establish baseline conditions.
Strategic action	Secure agreement on and develop a regional groundwater model to account for groundwater data, predict the hydrological impacts of large-scale pumping over time, and allow comparison of pumping scenarios.
Strategic action	Put more "teeth" in the "3M" agreement: Develop and get agencies to adopt: #1 - science-based approach to determine the ecological standard for what constitutes an "unreasonable adverse impact" to the groundwater-dependent ecosystems; #2 - science-based approach, likely including hydrological & ecological models, to establish surface water thresholds required to meet ecological standards above, and linkages to when pumping would cross those thresholds.

Strategy Examples – Lower Bear River CAP



Lower Bear River CAP Implementation Team 2017 Action Plan

OBJECTIVE 1: Enhance wetland, riparian and aquatic targets by achieving water quality goals.

Strategy A: Actively participate with communities in developing and implementing water quality plans, with a view to protecting targets.

Action Steps:

1. Address agricultural impacts to water quality through streambank/riparian restoration and manure management in Cache and Box Elder County. Focus areas are Clarkston Creek, Spring Creek and Mantua reservoir watershed. Identify and work with interested land owners – lead: Margie Borecki.
2. Complete lower Bear TMDL and implementation plan (below Cutler Reservoir to GSL). Anticipated completion is June 2017 – lead: Mike Allred
3. Continue implementing BMP as identified in the Cutler TMDL – lead: Mike Allred

OBJECTIVE 7: Wetlands, riparian and aquatic targets have adequate water to maintain the system in good to fair condition.

Strategy A: For areas identified as high priority riparian, aquatic and wetland sites, determine the amount of water needed to sustain the system into the future and work with the water community to address these needs.

Action Steps:

1. Hold a modeling workshop for the Bear River Water Management Strategies and Allocation Alternatives in the spring with the environmental flows group and other interested persons from the Bear River CAP to present the uncertainty results and solicit feedback.
2. Finalize and implement conservation action plan strategies for the Little Bear and Blacksmith Fork Rivers that focus on providing environmental flows needs – team includes Ann Neville, Bob Fotheringham, Paul Thompson, Jim DeRito, Fred Summers, Tim Hawks and David Rosenberg.