MEETING AGENDA

WILLARD SPUR STEERING COMMITTEE MEETING

Date: **February 17, 2011**
Time **1:00 – 3:00pm**
Location **GSL Conference Room, 3rd Floor, UDEQ Building, 195 N. 1950 West**

MEETING AGENDA

1. Review meeting summary (January 20, 2011)
2. Update on ongoing coordination with Perry and Willard cities
3. Update on sampling program
4. Discuss Science Panel nominations
    a. Review nomination/selection process
    b. Confirm guidance on disciplines, compensation, conflicts of interest
    c. Steering Committee members briefly summarize why they nominated individuals
    d. Discussion and vote
5. Review action items

ATTACHMENTS

Summary of January 20, 2011 Steering Committee meeting

Draft data quality objectives for 2011 Sampling/Monitoring Program

Draft Research Questions

Updated Science Panel Nomination list

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Summary of the Willard Spur Steering Committee Meeting
January 20, 2011

Refer to meeting recording at:
http://www.willardspur.utah.gov/committee/meetings.htm

Committee Members Present

Name	Representing
Walt Baker	Div. of Water Quality
Karen Hamilton	U.S. EPA
Bob Barrett	U.S. Fish and Wildlife Service
Thomas Bosteels (Alternate)	GSL Brine Shrimp Cooperative
Rob Dubuc	FRIENDS of Great Salt Lake
Pam Kramer	Div. of Wildlife Resources
Hal Lee	Great Salt Lake Minerals
Ryan Nesbitt	Div. of Forestry, Fire & State Land
Mayor Jerry Nelson	Perry & Willard Cities
Commissioner Ryan Tingey	Great Salt Lake Advisory Council
Dal Wayment	South Davis Sewer District
Dick West	Duck Clubs
Chris Montague	The Nature Conservancy

Others Present

Name	Representing
Lareina Guenzel	U.S. EPA
Jeff DenBleyker	CH2M HILL
Leah Ann Lamb	Div. of Water Quality
Bruce R Howard	Perry/ Willard
Howard W Browers	USFWS
Stan F. Pettingill	Perry/Willard
Theron Miller	JR/FBWAC
Lynn de Freitas	Friends of Great Salt Lake
R. Jefre Hicks	Friends of Great Salt Lake
Bruce Waddell	Duck Clubs
Joan Degiorgio	The Nature Conservancy
John Isanhart	USFWS
Jay Agular	Willard City
Kimber Hall	Div. of Water Quality
Jodi Gardberg	Div. of Water Quality

1. **Roll Call, Committee Introductions, Audience Introductions**:

Walt Baker of the DEQ Division of Water Quality and the Steering Committee Chairman welcomed all in attendance. Introductions of the Steering Committee and the Audience followed.

2. **Review Agenda and Meeting Objectives:** (Refer to recording at time 7:15)

3. **Review Project Background:** (Refer to recording at time 10:48)

Walt Baker presented the project background.
See map reference at:
http://www.willardspur.utah.gov/documents/SCHandouts1_20_11.pdf

4. **Review Proposed Approach and Schedule:**
(Refer to recording at time 19:33)

Jeff DenBleyker reviewed the proposed approach and schedule at:
http://www.willardspur.utah.gov/documents/SC012011/Approach&Schedule_ppt.pdf

Questions/Comments (Refer to recording at time 44:56):

- Concern was raised that DEQ's proposal in front of the WQ Board to move the Willard Spur study to a 4 year process and release funds for monitoring was circumventing the Steering Committee process.
- Concern was also raised with the prospect of DEQ contracting with USGS for flow gages. The pros and cons of using USGS were discussed as well as contracting limitations and cost share benefits.

5. **Draft Steering Committee Charter:** (Refer to recording at time 53:09)

See the presentation by Jeff DenBleyker at:
http://www.willardspur.utah.gov/documents/SC012011/SteeringCommitteeCharter_ppt.pdf

Questions/Comments (Refer to recording at time 113:56):

- A suggestion was made that we need to have better definitions, up-front, on words such as “protective” and ”sustain” and other key words. A

discussion of science and policy followed. Better clarity of the final goal was urged.

- An alternate Steering Committee member expressed concern with having time to consult with the Primary Steering Committee member before voting. It was indicated that there are usually not surprises and that committee members have materials before every meeting so there should be ample time to consult with the alternate prior to any voting.

6. **Draft Science Panel Charter:** (Refer to recording at time 116:50)

See the presentation by Jeff DenBleyker at:
http://www.willardspur.utah.gov/documents/SC012011/SciencePanelCharter_ppt.pdf

7. **Science Panel Nominations and Membership:**
(Refer to recording at time 122:24)
Discussion was led by Jeff Ostermiller.

- It was suggested and agreed that the disciplines considered when seating the Science Panel include an avian ecologist, toxicologist and/or wildlife biologist.

- EPA has a scientist in mind but needed assurances that the time commitment would be no longer than 200 hrs./yr and that we could pay for travel and per diem.

8. **Next Meeting Schedule and Topics:**
(Refer to recording at time 148:24)

- The next meeting is scheduled for February 17, 2011 and will be held at DEQ, (room to be determined) from 1:00 pm to 3:00 pm.

- **Homework for SC members:**
  - Science panel nominations by January 31 to Jeff D to include a write-up of why nominated along with a resume or CV.
  - Review of SC and SP charters with comments to Jeff D before next meeting

The United States Environmental Protection Agency's (EPA's) seven-step Data Quality Objective (DQO) process (EPA, 2006) is being used to guide the requirements and design rationale for Willard Spur sampling in 2011. The DQO's define the type, quantity, and quality of data and establish performance and acceptance criteria to ensure that data collected support the goals of the study. It is assumed that these DQOs will be reviewed, revised as required, and accepted by the Science Panel by July 1, 2011. Sampling will need to begin prior to acceptance by the Science Panel to meet study objectives but methods will be adaptively managed/revised per input received.

DATA QUALITY OBJECTIVES FOR WILLARD SPUR SAMPLING IN 2011

1. PROBLEM STATEMENT

PROBLEM

There is very little existing environmental data that describe the water quality and environmental condition of Willard Spur. The only known samples of water and macro-invertebrates from Willard Spur were collected by the Utah Division of Water Quality (DWQ) in August 2010. The Perry/Willard Regional Wastewater Treatment Plant (Plant) anticipates that it will begin discharging from its new facilities on or around February 21, 2011. This creates a critical need to collect data that could help describe the condition of Willard Spur before the proposed discharge begins. This information is important to inform discussions regarding the presence and significance of impacts to Willard Spur from the proposed discharge.

Further, the proposed approach for the Willard Spur research program entails collecting and providing the yet-to-be-formed Science Panel with background data from Willard Spur. This information will help the Science Panel define final research objectives and work plans and prioritize efforts. This dataset will ideally define conditions through the 2011 hydrologic cycle and will serve as the foundation for data to be collected by the research program in future years.

PROJECT TEAM

- DWQ (collection of water, sediment, and macro-invertebrate samples)
- United States Geological Survey (USGS) (flow, water level, and meteorological monitoring)

AVAILABLE RESOURCES

DWQ will utilize existing staff and resources to collect samples in February 2011 and continue at an anticipated monthly interval. Sampling and analytical efforts will be re-evaluated in March with the Science Panel. DWQ will contract with USGS (up to $100,000) to complete flow, water level, and meteorological monitoring of a period of at least one year.

RELEVANT DEADLINES

The Plant anticipates beginning its discharge on or around February 21, 2011. It is critical that the first round of sampling begin before the Plant begins to discharge. DWQ's strategy (i.e., methods, frequency, locations, etc.) for subsequent sampling events will be evaluated by the Science Panel and adjusted as recommended. Spring runoff typically begins in force in April. It is critical that flow monitoring equipment be installed prior to the end of March 2011.

The proposed approach includes a mid-year report of analytical results to the Science Panel in August 2011.

2. GOAL OF THE STUDY/DECISION STATEMENTS

KEY QUESTIONS

Flow monitoring and sampling efforts will work toward answering the following questions.

What is the current condition of Willard Spur?

1. What are the hydraulic/hydrologic characteristics of Willard Spur?
   1.1. Where are the inputs/outputs and what is their timing?
   1.2. What is the annual hydrograph (mass balance) for water entering/leaving Willard Spur?

1.3. How does the water surface elevation change in relation to inputs/outputs?
1.4. How does the volume and residence time of water change in relation to inputs/outputs?

2. What are the sources of waterborne contaminants entering Willard Spur, and what is the relative significance of the various sources?
   2.1. What are contaminant concentrations and loads in water entering Willard Spur? In water leaving Willard Spur to Bear River Bay?
      2.1.1. What is mass balance of contaminants in Willard Spur?
      2.1.2. What are the sources for nutrients entering Willard Spur (isotope analysis)?
3. What are the relative concentrations of potential contaminants in water, sediment, and macro-invertebrates throughout Willard Spur?
   3.1. What potential contaminants are of concern for Willard Spur (i.e., nutrients, selenium, mercury, etc.)?
   3.2. What are concentrations now, pre-Plant discharge? How do they change after Plant begins operation in February 2011?
   3.3. How do they vary spatially in comparison to sources of water?
   3.4. How do concentrations vary throughout the year for different seasons/hydroperiods?
   3.5. How do they vary per other co-located variables sampled?

It is assumed that results will only be reflective of conditions in 2011.

Possible Outcomes

1. Successfully collect all required samples and monitor flow at all locations and measure water level and meteorological changes at one location.
2. Initial reconnaissance and sampling results result in modification to the sampling/monitoring plan.
3. Weather conditions (i.e., ice, electrical storms) or property access limitations preclude or limit the ability to collect samples.
4. Resources (i.e., boats, equipment, staff, contracts, funding, etc.) are not available or in place to complete required sampling, monitoring, and analysis.
5. Information is adequate to quantify the condition of Willard Spur and to conclude that current contaminant loadings to Willard Spur have a measurable adverse effect on beneficial uses of Willard Spur. The Science Panel will evaluate results and provide recommendations for the Willard Spur Research Program.
6. Information is adequate to quantify the condition of Willard Spur and to conclude that current contaminant loadings to Willard Spur have no measurable adverse effect on beneficial uses of Willard Spur. The Science Panel will evaluate results and provide a recommendation as to whether the Willard Spur Research Program should continue.
7. Information is not adequate to quantify the condition of Willard Spur or to determine whether current contaminant loadings to Willard Spur have a measurable adverse effect on beneficial uses of Willard Spur. The Science Panel will evaluate results and provide recommendations for the Willard Spur Research Program.

3. Inputs to the Decision

Informational Inputs

Reconnaissance will be completed to identify potential inflow points to Willard Spur and confirm sampling and flow monitoring points. Figure 1 provides a preliminary assessment of sampling and flow monitoring points.

Pre-Discharge Condition

This is a one-time sampling event, collected in February 2011.

1. Flow rates will be characterized and water samples will be collected from inflow points to Willard Spur and ditches contributing to the Plant outfall channel (assumed that there are up to 50 points).

2. Water, sediment, and macro-invertebrates samples will be collected along the existing Plant outfall channel and mixing zone (up to 7 locations to define gradient and conditions in mixing zone).
3. Water, sediment, and macro-invertebrate samples will be collected along a transect extending the length of Willard Spur (up to 10 points).

SEASONAL CONDITIONS

Samples will be collected at monthly intervals from March – December.

1. Flow rates will be characterized and water samples will be collected from inflow points to Willard Spur and ditches contributing to the Plant outfall channel (assumed that there are up to 50 points).
2. Water, sediment, and macro-invertebrates samples will be collected along the existing Plant outfall channel and mixing zone (assumed seven locations to define gradient and conditions in mixing zone).
3. Water, sediment, and macro-invertebrate samples will be collected along a transect extending the length of Willard Spur (assumed that there are 10 points).

HYDRAULIC CHARACTERISTICS

Five continuous flow gages will be installed and operated for a period of at least one year. The water surface elevation and local meteorological conditions will be monitored. A one-time measurement of residence time will be completed by DWQ.

VARIABLES/CHARACTERISTICS TO BE MEASURED

Flow rates (cubic feet per second [cfs]) at inflow points.

Water surface elevation (feet [ft]) of Willard Spur pool.

Meteorological conditions at Willard Spur (short and long-wave radiation, temperature, humidity, wind, precipitation, barometric pressure)

Residence time (hours) of flow in Willard Spur.

Water and sediment chemistry.

Diversity, numbers, and contaminant concentrations of macro-invertebrates.

Moisture content of sediment and biological samples; report dry-weight concentrations and moisture percentage of biota samples.

4. STUDY BOUNDARIES

As shown in Figure 1 including the wetlands, open waters, and drainage of Willard Spur as bounded by dikes/berms of the Bear River National Wildlife Refuge, Harold S. Crane Wildlife Management Area, Willard Bay Reservoir, and Great Salt Lake Minerals, the natural "weir" separating Willard Spur from Bear River Bay on the west and Interstate 15 on the east.

TEMPORAL

Samples will be collected on a monthly basis from March – December in 2011.

PRACTICAL CONSTRAINTS ON DATA COLLECTION

1. Property access will need to be negotiated and confirmed.
2. Availability of boats and other field equipment, as well as equipment functionality, may limit some activities.
3. Staff and funding availability will need to be confirmed.
4. Weather is a major constraint for all sampling and monitoring activities, because storms can limit our ability to safely conduct sampling and measurement activities at the study area.
5. The presence of ice and/or lack of water could limit the ability to collect samples.

5. Decision Rules

1. If information is adequate to quantify the condition of Willard Spur and to conclude that current contaminant loadings to Willard Spur have a measurable adverse effect on beneficial uses of Willard Spur, then the Science Panel will provide recommendations for the Willard Spur Research Program.
2. If information is adequate to quantify the condition of Willard Spur and to conclude that current contaminant loadings to Willard Spur have no measurable adverse effect on beneficial uses of Willard Spur, then the Science Panel will evaluate results and provide a recommendation as to whether the Willard Spur Research Program should continue.
3. If information is not adequate to quantify the condition of Willard Spur or to determine whether current contaminant loadings to Willard Spur have a measurable adverse effect on beneficial uses of Willard Spur, then the Science Panel will evaluate results and provide recommendations for the Willard Spur Research Program.

6. Tolerable Limits on Decision Rules

Tolerance limits for laboratory analysis data quality will be defined in conjunction with the Science Panel, in terms of acceptability criteria. Quality Control procedures will be developed that specify all quality assurance (QA)/QC objectives for sample measurement based on each matrix.

The Science Panel will provide the Steering Committee and DWQ its recommendation regarding the suitability and adequacy of the available information with regard to the decision rules. The Water Quality Board will make the final decision of if and how the Willard Spur Research Program should continue.

7. Optimization of the Sampling Design

After detailed consideration of reasonable alternatives and given current scheduling constraints, the following design is the most resource effective:

1. Utilize available and Wetrained DWQ sampling personnel to collect water, sediment, and macro-invertebrate samples.
2. Utilize established, existing and local sampling infrastructure (sampling equipment, sampling protocol, vehicles, and laboratories) to execute the sampling plan.
3. Utilize U.S. Fish & Wildlife Service boats and personnel to access sampling locations at open water sites. DWQ to purchase an airboat to facilitate long term collection of samples at Great Salt Lake wetlands.
4. Utilize trained USGS stream gaging technicians that are locally available for gage installation and gage servicing.
5. Utilize established USGS methods, discharge equipment, and software for gage operation, data transmission, and data archiving.
6. Utilize existing technical, database, and publication resources for data QA/QC, data archiving, and publication and distribution of results to interested parties.

It is assumed that these DQOs and all sampling/gaging, analytical, and QA/QC methods will be reviewed, revised as required, and accepted by the Science Panel prior to data being used for decision rules or publication.

References

EPA, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process. EPA Office of Environmental Information. Report No. EPA/240/B-06/001. Washington D.C.

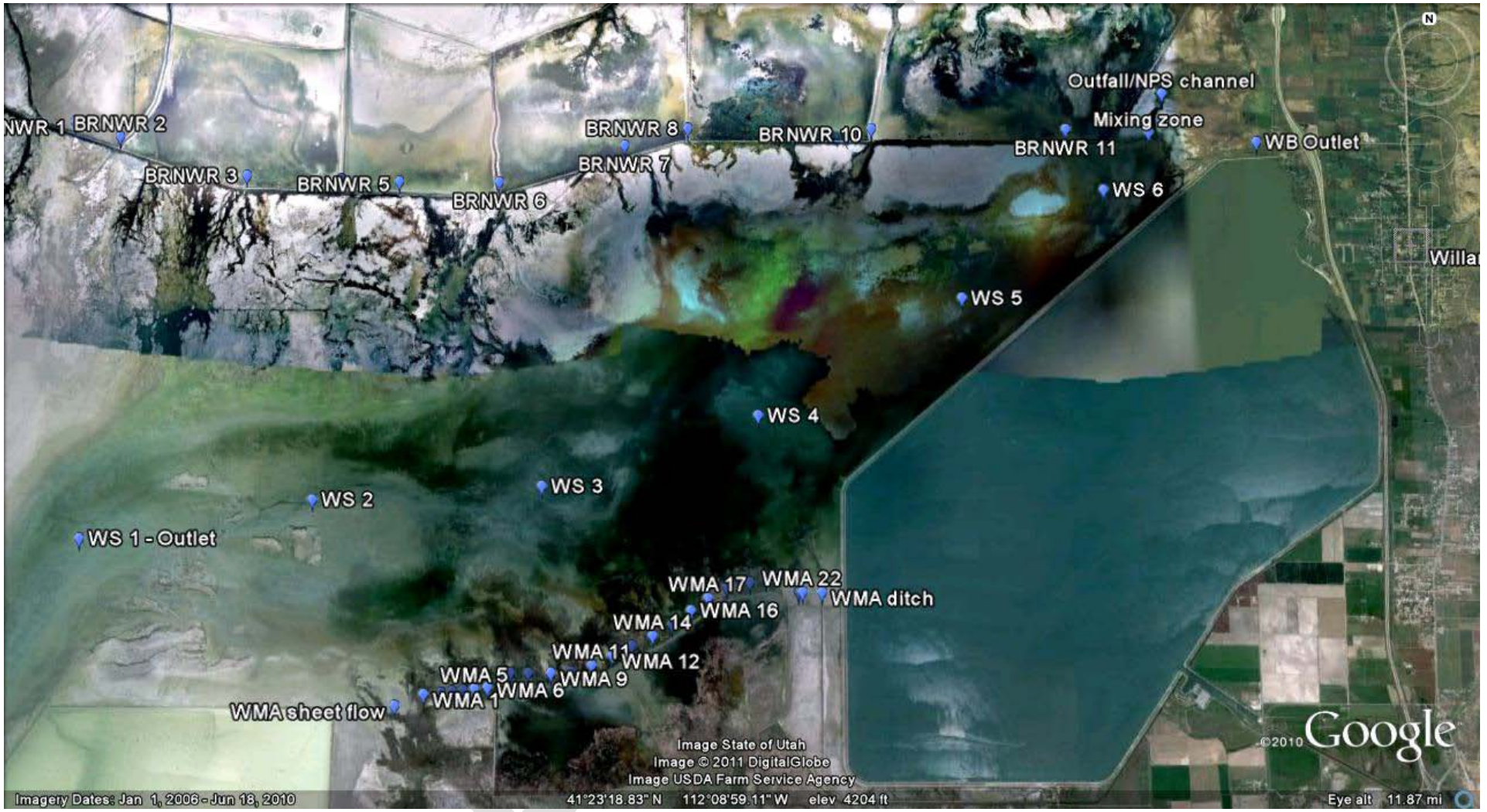

FIGURE 1
Willard Spur Study Area and Possible Sampling Points

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Research Questions

The questions below represent a summary of the issues that may be relevant to the proposed study of Willard Spur. It is not intended to be a comprehensive list but is intended to stimulate discussion, prioritization, and identification of questions to be addressed by the Willard Spur Steering Committee and Science Panel. It is assumed that this list of questions will be part of initial discussions by the Science Panel and will help frame overall program Data Quality Objectives.

The questions highlighted in italics are questions that the 2011 flow monitoring and sampling program will help to start to address.

Program Objective

What water quality standards are appropriately protective of beneficial uses of Willard Spur waters as they relate to the proposed POTW discharge?

Research Questions

1. What is the current condition of Willard Spur?

1.1. Develop a conceptual model of ecosystem

1.1.1. What are the assessment endpoints, i.e., valued ecosystem characteristics, that are desired to be protected?

1.1.1.1. What are the key driver, stressor, non-stressor variables and linkages in this ecosystem?

1.1.1.2. What are the indicator variables, both causal and response, specific to the classification of waters in Willard Spur?

1.1.1.3. What are the linkages and functional relationships between these indicator variables?

1.1.2. What are the biological endpoints most sensitive to nutrient inputs?

1.1.2.1. Do we have sufficient data to describe these endpoints through stressor-response relationships or a water quality model? Are these data sensitive to environmental changes? What are some other covariates that may affect the stressor-response relationships?

1.1.2.2. If data gaps exist, what steps are necessary to procure the data?

1.2. What are the hydraulic/hydrologic characteristics of Willard Spur?

1.2.1. Where are the inputs/outputs and what is their timing?

1.2.2. What is the annual hydrograph (mass balance) for water entering/leaving Willard Spur?

1.2.3. How does the water surface elevation change in relation to inputs/outputs?

1.2.4. How does the volume and residence time of water change in relation to inputs/outputs?

1.3. What are the sources of waterborne contaminants entering Willard Spur, and what is the relative significance of the various sources?

1.3.1. What are contaminant concentrations and loads in water entering Willard Spur? In water leaving Willard Spur to Bear River Bay?

1.3.1.1. What is mass balance of contaminants in Willard Spur?

1.3.1.2. What are the sources for nutrients entering Willard Spur (isotope analysis)?

1.3.1.3. What processes could potentially explain any differences observed in contaminants entering and leaving Willard Spur?

1.3.2. How does interaction with Bear River Bay/GSL affect conditions in Willard Spur?

1.3.2.1. What are effects of high lake levels and salinity?

1.3.3. Develop a hydrodynamic model to represent current condition

1.4. What are the most important processes that affect the partitioning, cycling, and release of potential contaminants in Willard Spur?

1.4.1. What are the relative concentrations of potential contaminants in water, sediment, and macro-invertebrates throughout Willard Spur?

1.4.1.1. What potential contaminants are of concern for Willard Spur (i.e., nutrients, selenium, mercury, etc.)?

1.4.1.2. What are concentrations now, pre-POTW discharge? How do they change after POTW begins operation in February 2011?

1.4.1.3. What biogeochemical processes determine the relative water and sediment concentrations of these potential contaminants?

1.4.1.4. How do they vary spatially in comparison to sources of water?

1.4.1.5. How do concentrations vary throughout the year for different seasons/hydroperiods?

1.4.1.6. How do they vary per other co-located variables sampled?

1.4.2. How do sediment/water column interact?

1.4.3. What is the potential of increased nutrients, also increasing methylation of mercury?

1.4.4. Couple water quality model with hydrodynamic model to represent current condition

1.5. What are the current vegetation, macroinvertebrate, phytoplankton compositions in Willard Spur?

1.5.1. Classify wetland types and aerial extent of types in Willard Spur

1.5.1.1. How does hydrology affect wetland types? Invasive species?

1.5.2. What are current concentrations of contaminants in wetlands biota?

1.5.2.1. How do they vary per water/moisture condition?

1.5.2.2. How do they vary per trophic position of the biota?

1.5.2.3. How do they vary per month during growing season?

1.5.2.4. How do they vary per other co-located variables sampled?

1.5.3. How do nutrient concentrations affect algal mat, SAV, and macroinvertebrate population characteristics?

1.5.3.1. Develop MMI for Willard Spur wetlands

1.5.3.2. How does the Willard Spur MMI compare to current MMI for other GSL wetlands?

1.6. What are the bird use patterns in Willard Spur?

1.6.1. What bird species currently use Willard Spur for feeding, nesting, and rearing their broods? What are their numbers?

1.6.2. What are current concentrations of contaminants in bird eggs laid along Willard Spur?

1.6.3. What are birds eating and where? What are concentrations of contaminants in food items?

1.6.4. What is the hatching success of birds nesting at Willard Spur?

1.7. What are the fish use patterns in Willard Spur?

1.7.1. What fish species currently use Willard Spur and what are their numbers?

1.7.2. What are current concentrations of contaminants in fish?

2. Does Willard Spur currently support its beneficial uses?

2.1. What are the current beneficial uses?

2.2. How do Willard Spur wetlands compare to reference condition?

2.2.1. What wetlands characteristics would determine a reference condition for Willard Spur? What sites could serve as reference wetlands?

2.2.2. Collect information to complete MMI to determine Willard Spur condition

2.2.3. How does MMI for Willard Spur compare to other GSL wetlands?

2.2.4. Is Willard Spur currently at risk? What characteristics are at risk?

2.3. Do stressor response relationships in Willard Spur indicate impairment?

2.4. How do characteristics of Willard Spur compare to established nutrient/algal thresholds for similar wetlands (published literature)?

2.5. How does the current condition represented in the hydrodynamic/water quality model translate to the current narrative standard?

3. Will the proposed Willard-Perry discharge degrade the Willard Spur ecosystem?

3.1. What are historical nutrient inputs?

3.1.1. Paleo-limnology study to evaluate historical nutrient deposition and condition of Willard Spur using biological endpoints (diatoms?)

3.1.2. What was the pre-settlement condition of Willard Spur?

3.1.3. Utilize hydrodynamic model coupled with water quality model to look at water quality conditions in Willard Spur without Willard-Perry discharge

3.1.3.1. What is sensitivity of Willard Spur to Willard-Perry as compared to other nutrient inputs?

3.1.4. Is there evidence of a trend?

3.2. How will proposed and future Willard-Perry discharges change condition in Willard Spur?

3.2.1. What is the relative significance of the proposed discharge for various hydrologic conditions?

3.2.2. Define scenarios for future POTW operation and effluent quality

3.2.3. Utilize hydrodynamic model coupled with water quality model to look at water quality conditions in Willard Spur with Willard-Perry discharge at various effluent concentrations

3.2.3.1. Compare anticipated water quality from model to other GSL wetlands and their MMI

3.2.3.2. Evaluate stressor response relationships

3.3. Are current water quality standards protective of beneficial uses of Willard Spur for current condition and proposed discharge?

4. **What changes, if any, are required to ensure the protection of beneficial uses in Willard Spur?**

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SCIENCE PANEL NOMINATIONS

Name	Nominated by	Affiliation	Key Discipline	Specialty	Notes
			Wetlands Ecologist		
Bonnie Baxter, PhD	Ryan Nesbitt, Division of Forestry, Fire & State Lands	Westminster College, Great Salt Lake Institute	Wetlands ecology/microbiology	Director of Great Salt Lake Institute, photo-biology of salt tolerant bacteria	Currently conducting research on bacteria in North Arm of GSL http://people.westminstercollege.edu/faculty/bbaxter/
~~Edward H. Dettman, PhD~~	~~Karen Hamilton, USEPA~~	~~ORD, USEPA Atlantic Division~~	~~Estuarine Ecologist – eutrophication~~	~~Eutrophication in estuaries and coastal waters, Served on technical advisory groups to establish national guidance for nutrient criteria in estuaries~~	**UNABLE TO SERVE DUE TO PENDING RETIREMENT AND COMMITMENTS IN FLORIDA**
Karin Kettinring, PhD	Bob Barrett, US Fish & Wildlife Service	Utah State University, Department of Watershed Sciences	Wetlands Ecologist - plants	Wetlands ecologist, ecology of phragmites, experience on GSL and Bear River National Wildlife Refuge	Ongoing work for USFWS http://www.cnr.usu.edu/htm/facstaff/memberID=1840
Theron Miller, PhD	Dal Wayment, South Davis Sewer District	Jordan River/Farmington Bay Water Quality Council	Wetlands Ecologist – physical, chemical, biological processes	Led research into impacts of nutrients on GSL wetlands since 2004, Development of metrics that identify threshold concentrations of nutrients linked to adverse effects	Jordan River/Farmington Bay Water Quality Council is funded by POTWs
Benjamim R. Parkhurst, PhD	Dal Wayment, South Davis Sewer District	Consultant, HAF, Inc.	Wetlands ecologist/toxicologist	Ecological risk assessments of nutrients, toxic chemicals, metals, sediment on aquatic life, Development of methods to derive nutrient criteria for WERF and FWQC	Worked with WERF and Salt Lake City DPU to develop risk-based approaches for water quality regulation on Jordan River, will require compensation
~~Joan S. (Thullen) Daniels~~	~~Bob Barrett, US Fish & Wildlife Service~~	~~U.S. Geological Survey~~	~~Wetlands ecologist/botanist~~	~~Wetlands processes and removal of nutrients/trace elements, evaluation of ecosystem conditions/interactions in constructed wetlands~~	**UNABLE TO SERVE DUE TO OTHER COMMITMENTS**

Name	Nominated by	Affiliation	Key Discipline	Specialty	Notes
Wildlife Biologist					
John Cavitt, PhD	Bob Barrett, US Fish & Wildlife Service	Weber State University, Department of Zoology	Wildlife Biologist	Birds of Great Salt Lake, experience on GSL and Bear River National Wildlife Refuge	Ongoing work for USFWS, Division of Wildlife Resources, and Jordan River Farmington Bay Water Quality Council http://faculty.weber.edu/jcavitt/about.htm
Chris Cline	Pam Kramer, Division of Wildlife Resources	U.S. Fish & Wildlife Service, Ecological Services	Wildlife Biologist	Great Salt Lake birds, habitat, and contaminants	Ongoing work for USFWS on Great Salt Lake
~~Nathan Darnall~~	~~Dick West, West Side Associated Duck Clubs~~	~~U.S. Fish & Wildlife Service, Migratory Bird Coordinator~~	~~Wildlife Biologist~~	~~Great Salt Lake birds, habitat, and contaminants~~	**UNABLE TO SERVE DUE TO OTHER COMMITMENTS**
John Luft	Pam Kramer, Division of Wildlife Resources	Utah Division of Wildlife Resources	Wildlife Biologist	Program Manager of UDNR's Great Salt Lake Ecosystem Project, oversight of research into artemia, bird use, and contaminants in GSL	Ongoing work for Division of Forestry, Fire & State Lands and Division of Wildlife Resources
Bioassessment Methods					
Charles P. Hawkins, PhD	Walt Baker, Division of Water Quality	Utah State University, Department of Watershed Sciences	Aquatic Ecology/Statistics	Extensive publications on bioassessment methods, Served on numerous EPA and state advisory panels for development/application of indicators/bioassessment methods for freshwater systems	Will require compensation http://www.cnr.usu.edu/wats/htm/directory-plugin/memberID=792
Ryan S. King, PhD	Walt Baker, Division of Water Quality	Baylor University, Department of Biology	Aquatic Ecology	Focus on the development of ecological indicators and thresholds using aquatic biota, implications of nutrient imbalances on aquatic ecosystems	Ability to contribute to scholarship (research & publications) will dictate whether he can serve on Science Panel or, instead serve as PI http://www.baylor.edu/aquaticlab/

Name	Nominated by	Affiliation	Key Discipline	Specialty	Notes
Hydrology/Water Quality Modeling					
David Tarboton, PhD	Walt Baker, Division of Water Quality	Utah State University, Civil and Environmental Engineering Department	Hydrologic modeling	Surface water hydrology, water budget for Great Salt Lake, hydrologic modeling, climate effects on Great Salt Lake, internet based Great Salt Lake information system	Ongoing work for Division of Water Resources http://www.neng.usu.edu/cee/faculty/dtarb/
Great Salt Lake Ecosystem					
J. Wallace Gwynn, PhD, PG	Ryan Nesbitt, Division of Forestry, Fire & State Lands	Utah Geological Survey - retired	Geochemistry	Conducted Great Salt Lake research since 1975, specializes in salinity and minerals of Great Salt Lake	
Possible Independent Reviewers (nominated but unable to commit to be on Science Panel)					
Robert H. Kadlec, PhD	Dal Wayment, South Davis Sewer District	Consultant, Wetland Management Services	Wetlands Ecologist – physical, chemical, biological processes	Wetlands treatment systems, Assimilation and removal of nutrients, solids, metals in wetlands systems, Phosphorus cycling in Everglades, Author of the book Treatment Wetlands	Confirmed that Dr. Kadlec cannot commit the time required for Science Panel but would like to be considered for independent review tasks, will require compensation
Don Paul, PhD	Pam Kramer, Division of Wildlife Resources	Avian West, Inc.	Wildlife Biologist	Specializes in avian and habitat conservation, studied bird diversity/use/populations on GSL extensively with a focus on Willard Spur	Confirmed that he cannot commit the time required for the Science Panel but would like to be considered for independent review tasks

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