

VEGETATION MAPPING

BACKGROUND

The Utah Department of Environmental Quality, Division of Water Quality (DWQ), the Willard Spur Steering Committee (SC), and the Willard Spur Science Panel (SP) have been working throughout 2011 to develop a research program to answer the question: *What water quality standards are fully protective of the beneficial uses of Willard Spur as they relate to the proposed publically owned treatment works (POTW) discharge?* These groups have worked throughout 2011 to prepare and execute a baseline sampling plan and discuss and define research objectives for subsequent years. The baseline sampling plan, sampling operating procedures (SOPs), meeting summaries, and proposed research plan can be found at the project website, www.willardspur.utah.gov. The proposed research program includes three different research areas to be phased over a three year period (see Proposed Research Plan document dated October 27, 2011). This study is to be completed as a first phase of Research Area No. 1.

SCOPE OF WORK

TASK 1 – LITERATURE REVIEW

The objective of the literature review is to provide an overview of significant literature published on the habitat/vegetation of Willard Spur, Great Salt Lake, Utah. The focus of this review is to address the following five questions:

1. What species of emergent and submerged aquatic vegetation are of interest in terms of habitat and impacts from nutrients in Willard Spur? What water depths/conditions are characteristic of their preferred habitat? What work has been done in the past to study this in the Willard Spur area (including Bear River Migratory Bird Refuge, Harold Crane Wildlife Management Area, and Bear River Bay)?
2. What factors might affect vegetation species/cover in wetlands habitats similar to Willard Spur, e.g., water level, season?
3. What invasive plant species are of concern in the Willard Spur area? What are the possible effects of invasive plant species upon habitat values and use by wildlife in Willard Spur?
4. What does the literature describe in terms of the existing distribution of vegetation, including percent cover for emergent vegetation, submerged aquatic vegetation, invasive species, phytoplankton, and biomass of algae in Willard Spur? It is assumed that Dr. Kettenring's current work to map invasive vegetation in eastern GSL will provide this information.
5. What datasets or mapping are available that document the habitat and/or vegetation of Willard Spur in past years? Identify researchers and the date of work, summarize available information and methods used, and identify tasks needed to process data as required to compare datasets.
6. What does the literature reveal regarding the effects of nutrients on the distribution, abundance, and reproduction of invasive plant species found in the Willard Spur area?

The literature review should be completed using typical methods of chain-of-citation and electronic database searches and consultation with leading researchers. The Principal Investigator (PI) will use the Zotero interface (www.zotero.org) to collect, organize, cite and share the identified literature. Electronic or hard copies of the original documents will be provided to DWQ. Annotations will be captured as notes within Zotero to describe how each piece of literature addresses the questions above.

Field work is possible but not envisioned to be part of this scope of work.

DELIVERABLES

1. An electronic or hard copy of the original documents included in the literature review

TASK 2 – EVALUATION

The objective of this task is to utilize GIS, or other tool, to compare available datasets to evaluate how the vegetative characteristics of Willard Spur have changed over time. It is assumed that three datasets will be available and used in this evaluation including the existing condition (2011). It is assumed that the existing condition (2011) is being mapped by an independent research effort. Other possible datasets include an effort completed in 1992, an effort completed by DWQ and Frontier Geosciences in 2004-2005, an effort completed by Ducks Unlimited in 2006, and LiDAR mapping project completed in 2011 by the Utah Geological Survey. It is assumed that available datasets will need only very minimal processing for use in this study.

Datasets should be discussed in terms of possible factors that may have influenced observed changes (see question No. 2 in Task 1). At a minimum, hydrology should be discussed in terms of the annual flow hydrograph at the USGS gage station at Bear River @ Corinne (obtained from USGS website), outflows from Willard Bay (obtained from US Bureau of Reclamation website), and the available satellite imagery (to be provided by DWQ).

Methods used, observations, and identified data gaps will be documented in Task 3.

DELIVERABLES

1. Available datasets
2. GIS mapping used to perform evaluation

TASK 3 – REPORT

The objective of this task is to document the findings of this study and make recommendations to the Science Panel, Steering Committee, and DWQ for further research.

A report will be prepared that includes a summary of methods, an annotated bibliography from Zotero, key observations and conclusions, identification of data gaps, and recommendations for follow-up research. Recommendations for follow-up research should be prioritized and work to understand how increased nutrients could change the vegetation and habitat characteristics and component of the food web, identify possible indicators of adverse nutrient impacts upon vegetation, and the role of vegetation in the food web of Willard Spur. See also questions identified in the Proposed Research Plan for Willard Spur, dated October 27, 2011. A draft report will be submitted to DWQ for review by DWQ and the SP. Comments will be discussed with the PI and incorporated by the PI into the final document.

DELIVERABLES

1. Presentation of draft results and recommendations at a Science Panel meeting
2. Draft and final report (pdf and three hard copies)

SCHEDULE

Draft report should be submitted by June 30, 2012. Final report by September 30, 2012.