

WILLARD SPUR SCIENCE PANEL MEETING OCTOBER 23, 2012

NAME/AFFILIATION

Chris Cline*	USFWS
Jim Hagy**	U.S. EPA, Office of Research & Development
John Luft*	Utah Division of Wildlife Resources
Theron Miller*	Farmington Bay/Jordan River Water Quality Council
Jeff Ostermiller*	Utah Division of Water Quality
David Tarboton**	Utah State University
Suzan Tahir	Utah Division of Water Quality
Toby Hooker	Utah Division of Water Quality
Jodi Gardberg	Utah Division of Water Quality
Chris Bittner	Utah Division of Water Quality
Mike Shupryt	Utah Division of Water Quality
Calah Seese	Utah Division of Water Quality
Chris Penne	Utah Division of Wildlife Resources
Pam Kramer	Utah Division of Wildlife Resources
Bill Johnson	University of Utah
Ramesh Goel	University of Utah
Joel Pierson	University of Utah
John Cavitt	Weber State University
Heidi Hoven	Institute for Watershed Sciences
Lindsay Cole	Institute for Watershed Sciences
Eric McCulley	ENVIRON
Howard Brower	USFWS
Jeff DenBleyker	CH2M HILL

* Indicates Science Panel member
 ** Indicates Science Panel member joined by telephone

The following represents a summary of discussion. It is not intended to represent meeting minutes. An audio recording of the meeting may be found at <http://www.willardspur.utah.gov/panel/meetings.htm>.

INTRODUCTION

Meeting attendees were introduced and Jeff DenBleyker reviewed the meeting’s agenda. See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/Agenda&Intro.pdf>.

The objective of the Science Panel meeting was to assess whether the project is still on track to meet program objectives and provide the information needed to make recommendations in January 2013 to complete research for this project. The goals of the meeting were to 1) review progress to date and 2) discuss recommendations for analyses to be completed in November-December 2012.

HYDROLOGY & NUTRIENT LOADS

See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/Hydrology&Loads.pdf>

Jeff DenBleyker/CH2M HILL provided an overview of progress in evaluating available hydrologic data and developing estimates of nutrient loads to Willard Spur. Jeff summarized efforts to characterize the dynamics of water levels in Willard Spur for both 2011 and 2012. Survey work funded by Division of Water Quality (DWQ) in 2012 helped correlate water

elevations at three open water gauges with the USGS water level gauge near Unit 5C of the Bear River Migratory Bird Refuge (BRMBR). Historic satellite and aerial photography are being used in concert with the water elevation data to estimate water surface areas and volumes for different flow scenarios. This information will be important in interpreting water chemistry data and understanding nutrient fluxes in the open water. Jeff also summarized the methods used to estimate inflows to Willard Spur for 2011. Estimates of water inflows will be used to complete a water and nutrient mass balance for Willard Spur. This information will help address the question of how nutrients are cycled within Willard Spur.

Jeff reviewed methods used to estimate nutrient loads from the various inflow sites around Willard Spur and initial estimated values. Results illustrate the various forms of nutrients that enter Willard Spur and the timing and relative significance of each source/form. The two inflow sources that requires further evaluation are a ditch located between BRMBR and the Perry Willard Regional Wastewater Treatment Plant (Plant) and from the Harold Crane Wildlife Management Area (WMA). Nutrient removal rates were used for the WMA based upon one sampling event in 2011. These rates need to be updated to include the two sampling events in 2012.

WATER CHEMISTRY

See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/waterchem1.pdf>

Mike Shupryt/DWQ described experiments completed in 2012 to determine which nutrients were limiting in Willard Spur; i.e., identifying which nutrient has the greatest effect on algal growth. DWQ completed benthic nutrient limitation experiments using nutrient diffusing substrates. Results from these experiments showed that there was some increased levels of algal growth on nitrogen sources but the results were inconclusive. DWQ also complete pelagic nutrient limitation experiments that had much more distinctive results. Results from these experiments indicated a strong response in chlorophyll-a (chl-a) for nitrogen treatments, similar response for combined nitrogen and phosphorus treatments, and little response to phosphorus treatments. Results also seemed to indicate that there may be a threshold of nitrogen that triggers a significant chl-a response. These results indicate that Willard Spur was nitrogen limited at the time the experiments were completed and that further experimentation may help identify a threshold value useful for monitoring. Ramesh Goel pointed out that the system could also be carbon limited. Further experiments will be required in 2013 to confirm. It was also suggested that we should look carefully at the types of N and P that are used in the experiments.

Mike described his evaluation of metabolism in Willard Spur, i.e., daily production and consumption of oxygen in the water column. Mike observed warmer water temperatures, higher salinity, and shallower depths in 2012 vs 2011. While Mike observed heterotrophic conditions in the 2011 data, he observed almost autotrophic conditions in the 2012 data. He saw greater gross primary production (GPP) in 2012 vs 2011 but saw it drop off from July to August 2012 perhaps coincidental with shift from macrophytes to algae. GPP increased again from August to September 2012. Ecosystem respiration (ER) was greater in 2012 than in 2011 with a similar drop from July to August and increase again into September 2012. Mike also illustrated changes in dissolved oxygen (DO) in 2012. While DO did not hit zero in July it did in August and September. Peak DO was also higher in July.

Mike illustrated observed trends for seston in Willard Spur, specifically by comparing results for total suspended solids (TSS), total volatile solids (TVS), the ration of TVS/TSS and chl-a. It was suggested that although there seems to be a lot of variability in chl-a data, Mike should look at the correlation of chl-a with TVS. Generally higher TSS is observed in April and May, it decreases in June through September, and then increases again in October. TVS/TSS ratios were low in the spring, increased in June-September, and then decreased again in October. Chl-a was generally higher in the spring, lower in June and July, and higher again in August – October. Western sites generally had similar trends as eastern sites but values were dampened. This may represent the influence of incoming flows and natural filtering processes in the wetlands. It was suggested that Mike look at this again but for both 2011 and 2012.

See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/waterchem2.pdf>

Toby Hooker/DWQ described his initial evaluation of water chemistry, SAV, and chl-a data from 2011 and 2012. Generally total nitrogen (TN) and total phosphorus (TP) concentrations were higher in 2011 than in 2012 with concentrations generally increasing during the summer of 2011 and holding steady during the summer of 2012. It was suggested that Toby should look at the total nutrient pool in the water column, i.e., what is the total mass of TN and TP in the water column by month for each year? Toby also described his evaluation of SAV data. Toby observed that there was generally more SAV

(more vigorous growth and higher percent cover) over a longer period in 2011 vs 2012, the SAV declined earlier in 2012 vs 2012 (i.e., peak percent cover occurred earlier in 2012), and there was perhaps an SAV rebound in August/September 2012. Toby observed that generally as SAV percent cover decreased, the chl-a concentration increased.

VEGETATION LITERATURE REVIEW

See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/Vegetation.pdf>

Karin Kettenring/Utah State University was unable to attend the meeting, however Jeff DenBleyker gave a brief summary of her progress. Karin has finished an initial draft of her literature review and has established a website documenting a study she is completing to map Great Salt Lake wetland vegetation in 2011 (see <http://maps.gis.usu.edu/gslw/index.html>). She is currently working on a comparison of 2007 and 2011 datasets as well as identifying possible links between nutrients and invasive species.

FISH LITERATURE REVIEW

See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/Fish.pdf>

Chris Penne/Division of Wildlife Resources (DWR) provided an overview of fish sampling DWR completed in 2012 and the results of the review of fish literature he completed for Willard Spur. DWR sampled fish in Willard Spur at four locations in August 2012 with the objective of comparing results with work completed by Moore et al in 2011. Seven fish species were collected with only the Utah Chub being a species native to Utah. There were no threatened and endangered species collected. Most fish were small and in the deepest water. Only carp and Utah Chub were collected in the open water of Willard Spur with carp dominating the count and biomass.

Chris confirmed that he was unable to find any literature documenting fishery surveys prior to that completed by Moore et al in 2011. DWR biologists and anglers confirm that the fishery is comprised predominantly of carp. All of the fish species are likely closely linked to both the Bear River and Willard Bay, are generalists in what they consume, can live in a wide range of DO and temperature conditions, and those who are not sterile can find habitat for reproduction in Willard Spur. Chris pointed out that there is some recreational use for fish in Willard Spur but the most important use of the fish is likely as food for bird populations who use this area. The largest threat to the fish population in Willard Spur has likely historically been lack of water. Fish likely repopulate Willard Spur after such events from Bear River and Willard Bay.

NUTRIENT CYCLING STUDY

See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/NutrientCycling.pdf>

Heidi Hoven with The Institute for Watershed Sciences (IWS) began the discussion with a review of project milestones that have been achieved in 2011. Joel Pierson/University of Utah (UofU) then provided a summary of observations from their experiments to date:

- They saw increases in phosphate and nitrate in plots over the months of July – Augusts
- Although they did not reach the target concentrations, they saw higher nutrient concentrations in test plots than in control plots
- Bucket tests were completed to determine nutrient release rates. They discovered that the release rate for Osmocote[®] is indeed temperature dependent. They observed an initial spike with release rates slowing over time. Fertilizer bags removed from the field experiment were compared with bags filled with new fertilizer. The field bags had significantly lower release rates than the new bags. Thus, the team concluded that the time the fertilizer is deployed and the residence time of the water are both critical in determining if they can reach a given target concentration. The budget did not allow for replenishing the fertilizer bags in 2012 thus we likely incurred a consistently decreasing release of nutrients to the test plots.

Heidi provided a summary of her observations:

- Lots of SAV in mid-May with generally more epiphytes observed on macrophytes in treated plots than control plots

- Observed senescence starting in June with many dead by the end of July; this was observed to be the case for all treatments. Heidi postulated – was this due to the floating debris they had to deal with in May/June? It was pointed out that this timeframe is consistent with DWQ's data.
- Heidi made measurements outside of the test plots to test the possible influence of floating debris. These areas outside of the test plots had greater measurements than the test plots in July and similar measurements in September.
- Heidi observed lots of epiphytic cover in July, the sediment test plots had algal mats in August.
- Heidi observed a slight rebound in SAV in September both inside and outside of the test plots. An interesting observation is that a new SAV species, coontail, is taking root and appears to be spreading throughout Willard Spur.

David Richards/EcoAnalysts, Inc. summarized his observations of the macroinvertebrate data:

- Data indicates that there are 15 different taxa with different responses
- Responses are consistent with what would be expected with changes in season, e.g., mayflies were high in July and snails were high in August
- Most taxa were collector/gatherer, only one scraper, midges were the most abundant, chironomids had the highest biomass
- There was no difference observed among the sediment treatment plots, however the low water treatment test plot had a different assemblage than the other test plots.
- Data indicate that this is a very dynamic system, function changes constantly

Joel summarized the isotopic data reviewed to date. They have observed no changes in isotopic data for seeds and tubers of SAV among the plots but they are observing differences in the plant leaves and sediment that are consistent with the plants deriving their nutrients from the fertilizer in the sediment.

Ramesh Goel/UofU summarized initial results from nutrient flux experiments. The objective of these experiments was to evaluate whether biological activity is contributing to the fate of nutrients. Ramesh noted that phosphorus appears to be taken up by the plants; most nutrients seem to be consumed in the water column.

Bill Johnson/UofU concluded the discussion with a review of key observations and thoughts regarding next steps. Bill asked for specific direction on how to proceed with sampling in 2012. Should field sampling stop now or should the team complete one more sampling event in October? Given the fact that plants have senesced and temperatures have decreased significantly, is it worth the expense of sampling again? Is the propagation of coontail a response to nutrients in the system? Why are the coontail propagating this year? Is it worth sampling one more time to capture this event? The Science Panel and team discussed various options and reasons for stopping or continuing sampling. The final direction provided to the UofU team was to complete the final sampling event.

BIRD LITERATURE REVIEW

See presentation slides at: http://www.willardspur.utah.gov/documents/SPSC102312/Bird_Diet.pdf

John Cavitt/Weber State University (WSU) presented the results of the waterfowl diet study he completed for Willard Spur and a progress report for his literature review.

MACROINVERTEBRATE LITERATURE REVIEW

See presentation slides at: <http://www.willardspur.utah.gov/documents/SPSC102312/macroinvertebrates.pdf>

Larry Gray/Utah Valley University (UVU) provided a summary of macroinvertebrate data from samples collected from Willard Spur in 2011 and 2012. Generally, the year 2012 was a much more productive year with much higher numbers than found in 2011. This is likely because the macroinvertebrates started much earlier in the season due to earlier and warmer temperatures. This allowed for the production of more generations and thus more numbers. The taxa observed were similar in both years, however there was a higher percentage of mayflies in 2011 vs 2012 and higher percentage of snails and chironomids in 2012 vs 2011. Macroinvertebrate taxa that Larry has found to correlate with the presence of SAV matched very well with the observed senescence of SAV in Willard Spur in 2012. Further, zooplankton taxa shifts also

corresponded to SAV senescence timing in 2012. Larry also presented initial results from his isotopic analysis of various trophic levels in Willard Spur.

MISCELLANEOUS DISCUSSION

At the conclusion of the presentation of results, Jeff facilitated a discussion of progress to date and whether the work was on track to meet project objectives. Further, was there any further analyses the Science Panel needs to be able to make recommendations for final research in 2013?

The consensus of the Science Panel was that the work is progressing well and is on track to meet project objectives. Theron Miller suggested that we should make a priority in 2013 to determine the actual impact of the Plant's discharge. The Plant moved its outfall point to the Willard Bay outlet channel but has since begun to discharge into a wetland prior to reaching the channel. Thus, it may be challenging to directly tie the Plant's impact to conditions near sampling points. Jeff DenBleyker suggested that the nutrient uptake study planned for 2012 but deferred to 2013 will help address this question. DWQ should also work with the Plant to define various operating scenarios to determine what scenarios result in Plant effluent entering Willard Spur.

The question of whether the ditch located between BRMBR and the Plant contributes significant flow and nutrient loads. Suzan Tahir/DWQ indicated that they have been sampling this ditch. CH2M HILL will attempt to estimate nutrient loads from this source.

NEXT MEETING

The Science Panel agreed that the next meeting would be scheduled for a two day period, January 28 and 29, 2013. The objective of the first day will be to discuss results from studies completed in 2011 and 2012 and discussion on the second day will focus upon framing studies and objectives for 2013. It will be critical that all principal investigators complete their reports by the end of the year for the Science Panel to have a minimum of two weeks to review the reports.