Introduction to Jordan River Learning Lab Reports

This serves as a general introduction to a series of Lab Reports produced by River Network staff to document progress and lessons learned during the Jordan River Learning Lab. Rather than repeating the same introductory information in each Lab Report, we've summarized some basic information here and will link to Lab Reports as they are developed over the years of the project.

Statement of the problem

The Jordan River is located in northern Utah, where it flows approximately 51 miles north from Utah Lake to Great Salt Lake. The Jordan River is identified as impaired for a variety of parameters along its entire length. This Lab focuses on the lower Jordan. The lower Jordan is made up of reaches 1-3, which include the river from 2100 South north to the river's discharge to Great Salt Lake. The three reaches of the lower Jordan are listed as impaired due to insufficient dissolved oxygen (along with benthic macroinvertebrate problems and *E. coli*). The dissolved oxygen impairment harms the river's designated use for warmwater fisheries (Class 3B).

> We are investigating how changes to flow management might enhance efforts to achieve water quality criteria for dissolved oxygen, while also improving ecosystem function in the lower Jordan.

A Total Maximum Daily Load (TMDL) has been developed for the relevant reaches (i.e., reaches 1-3). The TMDL establishes loading limitations for Total Organic Matter (OM) in order to reach the target endpoint for dissolved oxygen.

In this project, we proposed to investigate how changes to flow management might enhance efforts to achieve water quality criteria for dissolved oxygen, while also improving ecosystem function in the lower Jordan.

The entire Jordan River is heavily flow-managed, and the lower Jordan is particularly impacted. At the upstream boundary of the lower Jordan, the average annual flow of the river between 1980 and 2003 was 573,900 acre-feet, but was only 106,145 acre-feet at the next major road crossing (1700 South) just five blocks downstream.[1] This change reflects the impact of a large diversion just downstream of 2100 South – the Surplus Canal – which leaves as little as 10 or 20 percent of the natural flows in the Jordan River channel. The draft TMDL for the Jordan notes that flows on the lower Jordan are relatively static stating: "…monthly means flows to the lower Jordan River [are] relatively constant at 190 to 320 cfs."[2]

The Surplus Canal diversion is managed by Salt Lake City. The City uses the diversion to meet the objectives of county and municipal flood control programs, minimizing risks to landowners along the

[1] Utah Division of Water Quality, Draft Jordan River TMDL Water Quality Study, page 23.
[2] Ibid.

lower Jordan. However, the City has indicated openness to the idea of modifying their management to improve use support on the lower Jordan.

Hypotheses

We began this Lab with several questions or hypotheses in need of testing, and we the list of questions will only grow as we proceed. We are currently working through the following hypotheses:

- **Hypothesis 1:** Increased flows (with specific volume, timing, and duration) could move OM off the river bed, moving the OM downstream and depositing it in areas where it could be relatively easily removed. Removing at least some of the OM would reduce its ability to lower dissolved oxygen in the Jordan River's water column, moving the river closer to compliance with water quality standards. To summarize in an if/then statement: If we increase flows in the lower Jordan, then organic matter will be removed from the system and we will see associated improvements in dissolved oxygen. For short-hand, we call this our "scour hypothesis." *See Lab Report 1 for the results of our investigation into this hypothesis.*

- **Hypothesis 2:** Increased flows during critical summer conditions could directly improve the dissolved oxygen levels in the stream (while leaving the OM in place). In this scenario, simply providing a larger volume of water (and hence of dissolved oxygen) at the beginning of the impaired reaches would allow the entire stretch of river to comply with water quality criteria. We call this the "direct dissolved oxygen effects hypothesis." *For more on some exciting findings related to this hypothesis, see Jordan River Lab Report 2.*

- **Hypothesis 3:** Increased flows, while assisting with compliance with dissolved oxygen criteria, could also improve designated use support by improving in-stream habitat, riparian habitat and/or other pollutant parameters (e.g., temperature). *This hypothesis has not yet been tested.*

If you have questions about the Jordan Lab, please feel free to contact Merritt Frey at mfrey@rivernetwork.org or 801-486-1224.

Current Lab Reports

Lab Reports are designed to provide quick summaries of a lesson or lessons learned at key points in the Lab process. Check back regularly for Lab Reports.

Lab Report 1: summarizes our findings related to the "direct scour" hypothesis. For the Jordan, this does not appear to be a good hypothesis to pursue. However, this Lab Report may help you decide if you'd like to investigate the idea in your watershed.

Lab Report 2: summarizes findings related to the "direct effects" hypothesis. This idea turned out to be a very good prospect for restoring the lower Jordan. Read this Lab Report to learn more.

Future Lab Reports will address outreach challenges, water rights implications, technical issues, monitoring, and more.