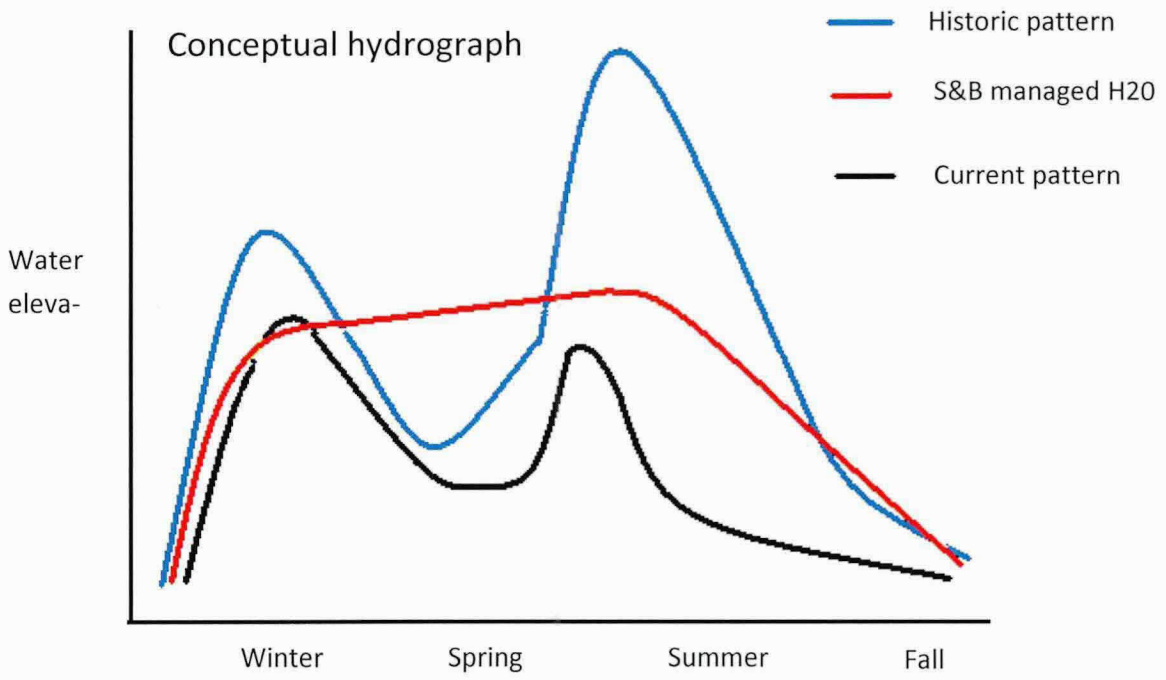
Smith and Bybee Wetlands Water Management Solutions

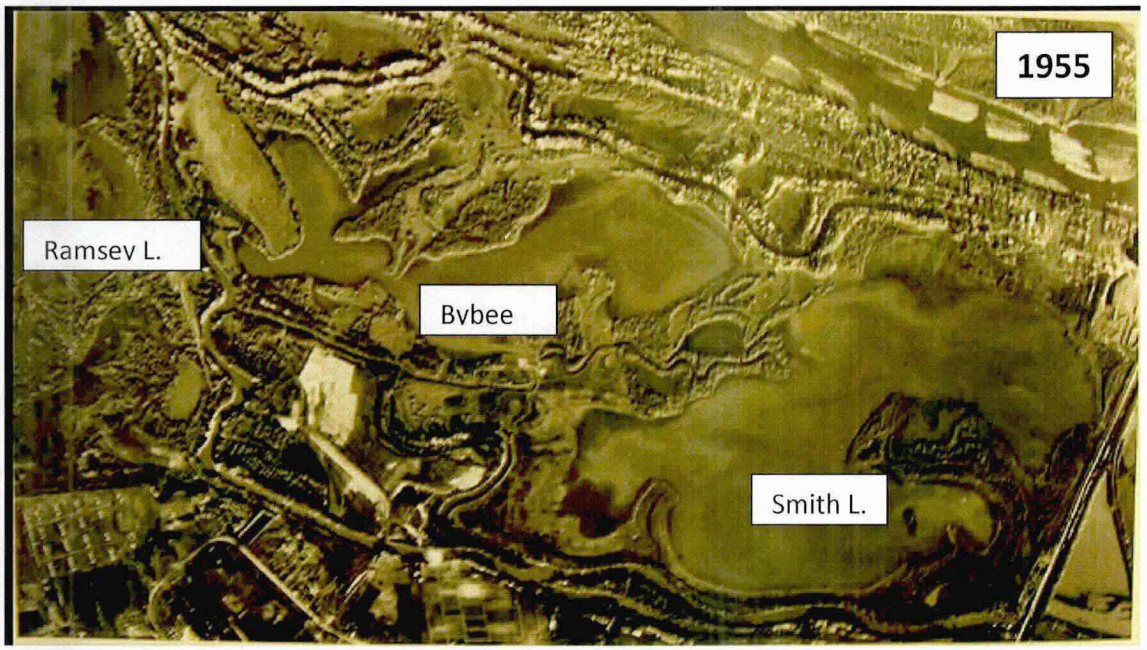
Background – Project Start, 2013

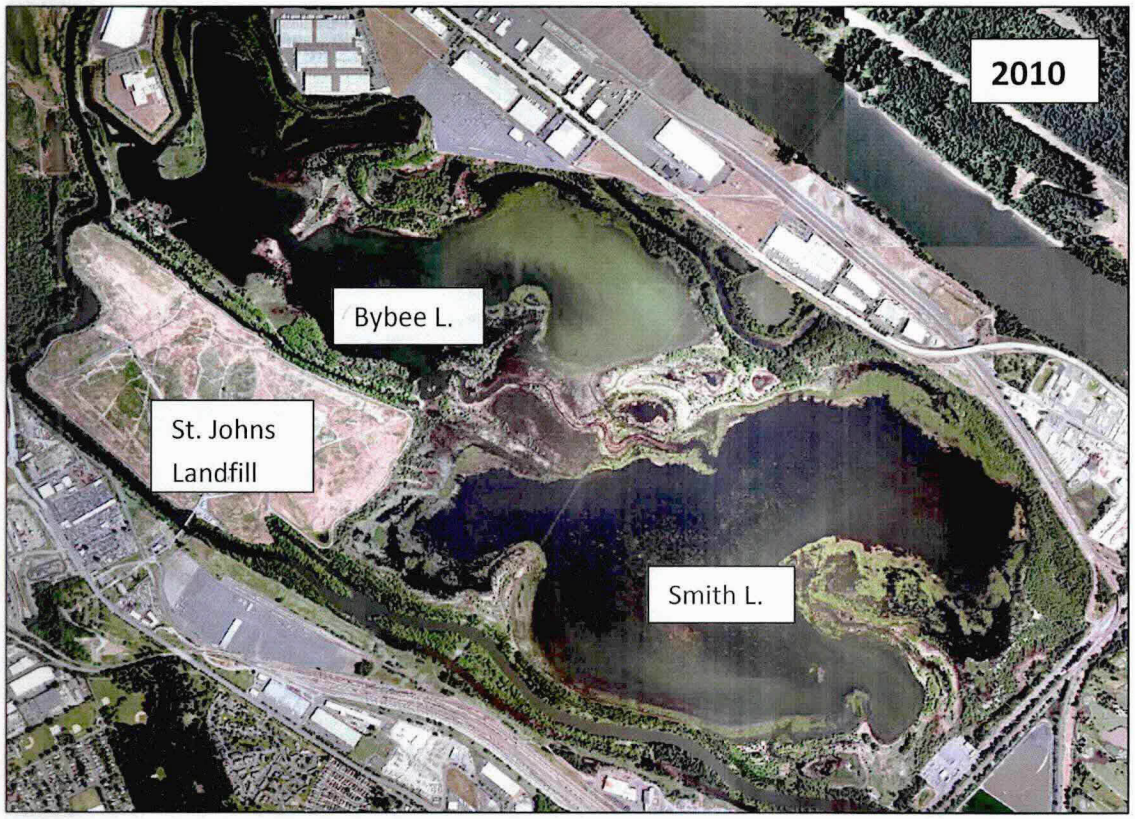
Smith and Bybee lakes and their associated sloughs and wetlands are remnants of formerly extensive river bottomlands located near the confluence of the Willamette and Columbia rivers. Considerable changes have occurred in the lakes' watershed and have had significant impacts on the lakes' system: construction of dams and dikes, filling with dredge spoils and introduction of exotic plants and animals. The first significant alteration to this site was the construction of major dams on the Columbia River. The use of these dams to produce hydroelectric power, store water and reduce flooding drastically altered the natural hydrological cycles in the lower Columbia River ecoregion.



The most recent significant alteration of this system occurred with the construction of the first dam in 1982 that separated the lakes from the North Slough of the Columbia Slough, and thus the Willamette River. It was built in reaction to waterfowl dieoffs in the lakes, presumably from avian botulism; the dam was intended to impound water that would disperse waterfowl and reduce the spread of future outbreaks. The permanently high water levels maintained by the 1983 structure were too much for bottomland willow and ash forest, and hundreds of acres of trees died. In the lakes, the population of non-native carp grew so large that native smartweed beds disappeared and the water became turbid. Impoundment of the lakes also reduced the

availability of mudflats for migrating shorebirds. Reed canarygrass moved into and dominated openings on higher sites where trees had died.





A new water control structure was planned and installed in 2003, one that could allow managers to vary water levels in the wetlands in a pattern more similar to historic conditions. The new water control structure supports restoration of more than half the natural area's acreage. Its original objectives were to:

- control reed canarygrass,
- increase native plant cover in its place,
- provide off-channel habitat for young salmon,
- provide wintering habitat for waterfowl, and
- mudflats for migrating shorebirds.

All of these objectives were realized in the first few years of water management. Native willow regenerated naturally in places where it had died from constant impoundment. Steelhead, Chinook and coho salmon took refuge from high winter flows in the wetlands. Thousands of waterfowl spent the winter on Bybee and Smith lakes, and recent work is documenting the importance of Bybee's late-summer mudflats to shorebirds. In the elevations influenced by water level management, reed canarygrass cover has been reduced by more than 1/3 as of 2009 and has been replaced by native plants.

Since about 2006 or 2007, dam-building by beavers in the channel between Bybee and Smith began inhibiting our ability to fully draw down Smith Lake. The gains of the first few years of water level management have been reversed in the elevation zone below about 7.5 ft (NGVD 29 datum). We have learned that nutria actively supplemented the beavers' dam-building work, adding mud and strengthening the dams. USDA Wildlife Services staff that were on scene for the 2012 avian botulism outbreak reported that Smith-Bybee had the worst nutria population problem they had seen. In a few nights/mornings of work, they dispatched 122 nutria from the site.

The channel was unable to drain due to dams, but also gained at least 12 inches of silt. Preliminary blasting work conducted in fall 2012 allowed some drainage to resume, but the scope of the problem was clearly larger than initially believed. In addition to dams and siltation, the rapid spread of *Ludwigia peploides* ssp *montevidensis* into the upper channel and Smith Lake is impeding water flow out of Smith Lake and further degrading the plant community there.

Although the situation gained attention during the 2012 avian botulism outbreak when we were unable to evacuate tainted water from Smith Lake, this is not a botulism problem or a botulism solution. It is a wetland health problem, and the wetlands will experience botulism outbreaks independent of our water level management. Having the ability to draw down Smith Lake can reduce the extent of outbreak there, but weather conditions may still foster botulism in Smith-Bybee and surrounding sloughs and wetlands.

Update – Phase 1 completion, fall 2015

Metro hired Pacific Habitat Services (PHS) to examine a number of options for regaining the ability to draw down Smith Lake and restore wetland health. The options included:

1) Connection of Smith Lake to the Columbia River
2) Connection of Smith Lake to the Columbia Slough
    a. Pipe Options
    b. Open channel (notch) and Bridge Options
3) Controlling Beaver Dams
4) Dredging Inter-Lake Connector Channel
5) Changes in Water Control Structure Management
6) No Action

PHS described the channel as "...trapezoidal, filled with silty sediment to an elevation of approximately 9.5 feet NAVD (6.1 feet NGVD) at the Smith Lake end. The channel grades slightly toward Bybee Lake with an average grade of approximately 0.00045, although many high spots occur along the channel especially at the east end. A former road crossing near the western end of the channel provides a pinch point. The remnants of a culvert system for the crossing can be seen at low water. A thalweg survey of the channel shows a number of high spots that doubtlessly impede water flow. In recent years, and possibly in earlier times as well, beaver and nutria activity has resulted in reduced flows. The channel was deeper than its present form in the early years of the water control structure, but has silted to a much shallower state in recent years."

The work completed by PHS included surveyed elevations and bathymetry at selected locations, hydrologic modeling to evaluate scenarios, estimated relative costs for the alternatives, and ability of each option to meet six criteria:

1. Provide off-channel habitat for juvenile salmonids
2. Control reed canarygrass via water level management
3. Support re-establishment of willow-dominated shrubland and emergent vegetation
4. Provide mudflats for migrating shorebirds
5. Provide open water habitat for wintering waterfowl
6. Support management of risk of severe avian botulism outbreaks

The only option to meet all six objectives is dredging the channel between Bybee and Smith lakes. Refinements to the water control structure design and operation may help clear sediment from the channel and maintain the cleared area and water flow.

Next Steps – Phase 2, design and construction

Metro is ready to move forward with water control structure refinements and channel clearing. The water control structure refinements are under way; the relevant change for this project is the planned replacement of reverse tidegates with combination tidegates that can move water in either direction.

The above photograph, taken from the Bybee Lake side of the structure, shows the reverse tidegates that allow water to enter Smith and Bybee wetlands and then retains that water. Replacing these tidegates with combination gates will enable Metro to draw down the wetlands more rapidly. This is important in two respects: more rapid flow may enable channel clearing and maintenance after dredging, and rapid drawdown will allow Metro to get tainted water out of Smith Lake should a severe botulism outbreak occur.

The Phase 2 work for this project includes:

- Refine the dredging solution identified by PHS. This includes feasibility, logistics, approximate quantities, cost estimate and location for dredging. It also includes any/all designs required for permitting and going out to bid.
- Permitting – will probably be done by PHS with support from the engineering firm retained for the project.
- Construction – prepare documents and support Metro's bid process, may also require some oversight by engineering firm that develops the design.

The approximate, ideal schedule for the project is:

March: develop preliminary scope of work, identify project team

April: team meets to select on-call engineering firm, refine scope of work with that firm, issue work order for the project, meet on-site with project lead

May and June: field work including any needed surveys, early plans and quantities estimated

July: draft drawings, follow up with agencies regarding possibilities for permit for 2016, site visit with DSL, COE and Portland, submit for permits if feasible, draft RFB for team review

August and September: issue RFB if permits are possible this year, issue contract, conduct dredging.

Project team:

Elaine Stewart	Scientist, project lead	Metro
Katy Weil	Wildlife monitoring/science	Metro
Kristen Acock	Civil Engineer	Portland BES
Jeff Merrill	Scientist	Metro
Chris Hagel	Lead specialist	Metro
Kristina Prosser	Specialist	Metro
Justin Cooley	Technician	Metro

Others that will participate as able and interested include Jonathan Soll and Justin Takkunen. All three members from the land management team (Chris, Kristina and Justin C.) are welcome to participate fully. However, if their time is too limited to review all materials and attend all meetings, perhaps one or two of them could serve.

Time commitment:

Initial and refined scope of work, consultant/engineer selection	0.5 days
On-site meeting	0.5 days
Other meetings with consultants, reviewing work, field/site visits	3 days
Permitting, final report and design/construction document review	1 day
Procurement and construction – Elaine do, minimal help	n/a