August 20, 2008 Meeting Summary

The twenty fifth meeting of the Vancouver Lake Watershed Partnership was held on Wednesday, August 20th, 2008 from 4:00-6:00pm at the Port of Vancouver Administrative Offices.

Attendance:

Member Present	Member Seat
Patty Boyden	Port of Vancouver
Brian Carlson	City of Vancouver Department of Public Works
Tom Gonzales	Clark County Public Health
Chris Hathaway	Lower Columbia River Estuary Partnership (alternate for Deb Marriott)
Iloba Odum	WA Department of Ecology
Steve Prather	Clark Public Utilities
Ron Wierenga	Clark County Department of Public Works (alternate for Pete Capell)
Bruce Wiseman	Port of Ridgefield
Nancy Ellifritt	Citizen
Thom McConathy	Citizen
Don Jacobs	Citizen
David Page	Citizen
Jane Van Dyke	Citizen

Public in attendance:

Dvija M. Bertish	Citizen (Riverkeeper)
Dick Chandlee	Citizen
Vinton Erickson	Citizen
Merril Firestone	Citizen
Traci Nolan	Citizen (GeoDesign)
Margaret Oscilia	Citizen (PBS Engineering)
Andy Warner	Citizen

Other Agency Members Present:

Gary Bach	City of Vancouver
Jessi Belston	Port of Vancouver
Steve Bollens	Washington State University - Vancouver
Katy Brooks	Port of Vancouver
Loretta Callahan	City of Vancouver Public Works
Amanda Dotson	Congressman Baird's Office
Victor Ehrlich	City of Vancouver
Annette Griffy	City of Vancouver
George Medina	US Army Corps of Engineers
Chris Nygaard	US Army Corps of Engineers
Dennis Schwartz	US Army Corps of Engineers
Sharon Shulz	US Army Corps of Engineers
Dorie Sutton	City of Vancouver
Ron Wierenga	Clark County Public Works

Project Management Team:

Phil Trask	PC Trask & Associates, Inc.
Sabrina Litton	PC Trask & Associates, Inc.

Introductions

The project manager welcomed the group and attendees were asked to introduce themselves. Introductions were made around the room.

Agenda/Discussion Topics

The project manager introduced the agenda and told the group that today's main agenda item was a presentation by the Corps of Engineers.

General Partnership Announcements

Don Jacobs passed around a historical photograph depicting a view of Vancouver Lake from the south east shore. Tom Gonzales announced that the lake is still below threshold levels for Mycrocistin and Anatoxin-a. From a Health Department perspective the Lake is having a good year.

USACE Presentation

George Medina opened the presentation by providing an outline of the presentation objectives. He said that he would begin by presenting background on the Section 536 Program and Feasibility Study, Dennis Schwartz will review the biologic synthesis report, Sharon Shulz will review the 1-D model results, and Chris Nygaard will present findings from the 2-D hydrodynamic model.

George described how two years ago the Corps became involved with the Vancouver Lake Watershed Partnership because they had similar objectives and goals: environmental restoration as it pertains to aquatic habitat. Initially the Corps looked into the possibility of a comprehensive General Investigation (GI) study. However Congress has not authorized new GI Studies making study under a GI authorization unlikely.

The Corps then began to look at other potential funding sources for conducting a Feasibility Study at Vancouver Lake. They were able to move forward under the Section 536 Program where the mission is to improve salmonid habitat. Preliminary investigations for the Feasibility Study included a site survey for habitat potential and a Preliminary Restoration Plan. Findings from these steps determined that there was enough salmonid habitat potential to continue the study. This allowed the Corps to take the next step to produce a historical literature review in the form of a Biological Synthesis.

Dennis Schwartz, the fish biologist on the Corps team, explained that last year he reviewed existing data and past fish reports to complete a fish abundance synthesis for Vancouver Lake. It summarized known biological research on juvenile and adult salmonids at Vancouver Lake. He reminded the Partnership that the Corps' main interest under the Section 536 program is improving salmonid habitat and this literature review was prepared to assess the biological feasibility of a potential project from a salmonid perspective. Dennis reported that there was little contemporary fish data available for Vancouver Lake, and even less for salmonids specifically.

After completing the synthesis with the data that was available, the Corps team again tried to answer their driving question, *Do salmonids rear and use Vancouver Lake as off channel habitat?* It was determined that preliminary hydraulic modeling was required to help answer that question. The Corps then conducted a one dimentional (1-D) Hydraulic Study.

Sharon Schultz, a hydraulic modeler for the Corps, provided an overview of the results from their 1D hydraulic model HEC-RAS. She said that HEC-RAS is the Corps' Lower Columbia River hydraulic model which includes Vancouver Lake. In runs of the model, the Corps studied the flushing channel and Lake River by populating the model with 2006 and 2007 flow data. The scenarios investigated included leaving the system as-is, increasing the diameter of the flushing channel culverts from 7 to 11 feet, modifying Lake River to a uniform 150 foot wide channel, and

the combination of the latter two. These coarse scenarios would help answer the larger scale questions about the hydraulic system and help determine the benefits of further hydraulic investigation. For this model, the Corps did not look specifically at dynamics within the lake.

The key question from that initial modeling effort was: can flow and circulation be increased to improve habitat for salmonids? To evaluate this they looked at the average time required to renew water volume in the lake, also called the Hydraulic Residence Time (HRT). A high HRT indicates increased potential for degraded water quality.

Results of the 1-D modeling effort found that increasing the size of the flushing channel culverts made the greatest change in lowering the HRT in Vancouver Lake. It was also determined that further investigation of circulation patterns within the lake and accounting for the connection to the Columbia River was necessary and two dimentional (2-D) modeling was required to answer the questions.

Chris Nygaard, the hydraulics lead for the 2-D model, presented his approach, results and conclusions from the bathymetry survey and 2-D hydraulics model. His main objective for the effort was to establish flow patterns within the lake as-is, but also to model the effects on flows with various modifications to the lake. In his approach he built a model mesh (a mesh is how the model interprets the survey data) of the existing lake condition. He used outputs from the 1-D model as boundary conditions (inputs) for the 2-D model.

Chris reviewed the assumptions and limitations for the Vancouver Lake 2-D model. He said that no water quality aspects or wind effects were considered, boundary conditions of the model were limited to Lake River and the flushing channel, and short representative time frames were modeled due to long computation times (complicated simulations took days to compute).

A bathymetric survey was conducted by the Corps from January to March of 2008. A single beam transducer was used to collect data every 5 feet . Accuracy of the survey is to within 0.5 feet. This data was used to inform the 2-D models. The 2-D model used was RMA2, a depth averaged, unsteady state hydrodynamic model. One of the assumptions of this model is that water at the top of the lake moves at the same speed as water on the bottom.

Three short representative time frames using 2007 Lake stage data were modeled to represent high, medium and low Lake stages. The high Lake stage was May 15-16th, the medium Lake stage was June 4th and the Low was June 28th. One longer time frame was modeled for demonstration purposes, from June 1-7, a medium lake stage. Chris showed 2-D Velocity vector and contour plots, and a simulation of typical tidal flooding and ebbing that demonstrated both existing conditions at Vancouver Lake, and those with modified culverts.

He then ran the model to the existing condition at the lake, a modified culvert scenario with the diameter increased from 7 to 11 feet, and lastly an enlarged culvert with the gates removed.

To help illustrate the time scale a particle of water in Vancouver Lake is moving, Chris showed something called a drogue plot, a simulation that depicts a particle of water moving under the simulated conditions for 7 days. He used the analogy of throwing confetti into water. From this simulation, it was clear that water is not moving very fast in Vancouver Lake under existing conditions, or with enlarged culverts.

Conclusions from the 2-D Hydraulic Study were:

- Velocities in the Lake were low in all conditions modeled with relatively higher velocities near connection to Lake River and the Flushing Channel;
- Lake dynamics remain tidally dominated in all conditions modeled;
- Enlarging the flushing channel culverts increases velocities in the lake, specifically along the western and northern shores and adjacent to dredge disposal island;
- Removing the tide gates has a negligible effect on hydrodynamics in most hydrologic conditions; and

- Dredging generally decreases Lake dynamics due to increasing the volume of water in the lake.

The presentation was then opened up for audience questions.

Is Lake River a greater influencer of lake hydraulics than the flushing channel?
Yes, even by increasing flushing channel culvert sizes to 11ft, the tidal action of Lake River plays a larger role in Lake hydraulics than the flushing channel.

Did you look at shifting the orientation of the flushing channel?
No we did not look at that at this time. However, from what the model results tell us, the energy component of the water does not extend far into the lake after exiting the culvert. It is not likely that changing the orientation of the flushing channel would have an influence on flows.

What would happen if the flushing channel was closed off?
If the flushing channel was closed, Vancouver Lake would be a tidally driven system influenced only by Lake River. Elevation of the Lake would likely drop. Doing so would not improve conditions because currently 200 cfs passes through the channel, which is significant.

Is it possible to modify Lake River so that it has an effect on Lake hydraulics?
Sharon told the group that in the 1-D model, she modeled a deeper and wider Lake River. Even with this modification, the change in hydraulic movement within the lake was less than if the flushing channel was modified.

Were Felida and the confluence of Lake River and the Columbia modeled?
They were included in the 1-D model, but not in the 2-D.

Was the 1984 dredging operation apparent in the bathymetry survey?
Yes it seemed to be visible. Depths were deeper around the perimeter of the Lake where dredging occurred and there were some very linear depth contour lines close to the island that were likely caused by a dredge.

What would happen over time if the flushing channel and Lake River were left alone?
This was not modeled by either the 1-D or 2-D model.

Based on the drogue plots depicted earlier, dredging would actually decrease water movement?
Yes, because the cross-section gets larger and more water volume would have to be moved to recharge the lake.

Could we dredge and build islands in combination to decrease residence time?
This was outside of the scope for this modeling effort.

Did the model incorporate Burnt Bridge Creek or other tributaries?
No, the model inputs were water level and flows of Lake River and the Columbia River.

Can you explain why the water level was higher this spring and why the water was clearer?
Higher Columbia River stages like experienced this year will move water through the lake quicker and lower the residence time. This year's spring freshet was late and steadier leading to cooler and clearer water.

Can you explain what is going on at the interface of Lake River and flushing channel flows.
A good way to think of this interaction is in terms of energy and in those terms not much is happening at that interface. Think back to the drogue plots and how slowly the particles were moving.

Why was water quality not looked at?
It was beyond our scope of work at this time.

Would increasing the culvert size in the flushing channel be a recommendation? If not, what's next?
No, the corps is not recommending any actions. Today is only a presentation of data and findings. The next step is for the Corps to assess their findings, conduct cost/benefit analyses, and determine if further investigation may lead to improved fish habitat and survival in a cost effective way.

What is the volume of Vancouver Lake and Lake River?
The engineers were unable to state this data off hand but said that it had been determined in order to conduct the model runs.

Why were larger culverts not modeled? And isn't the increase in flows significant?
The choice to model an increased culvert size was to determine its level of impact on lake hydraulics from an input/output standpoint. The specific size of the increase was arbitrary and from the model, the increased diameter did not play significant role on residence time in the Lake. Yes it did increase flows through the culvert dramatically, however in comparison with the size of the Lake as a whole, it is minor.

The time spans modeled were very short and within several weeks of each other. Can you speak to how residence time will vary seasonally? The spatial variability for lake biology was very little and for certain organisms, the difference between 20 and 40 days residence time is important.
Yes, residence time will vary with season and river stage; it's a complex system. Each model run took a great deal of time to complete and it was not possible to model other times. The Corps model did not speak to how much residence time will vary throughout the seasons. The 1-D model averaged residence times across the Lake.

To summarize what we have been hearing; the Corps looked to see if there was a way to reduce Lake residence time from weeks to days, and basically what we are hearing is no? This is an important concept to have clear because with low residence times, biological interactions are likely more important than a physical fix.
Yes, from the Corps modeling standpoint, that is what they have observed in terms of residence times. However, with this complex system a true residence time will never be pinned down. How this plays out in terms of biological interactions is beyond their scope.

When will the report be ready?
Not until late fall.

When thinking about salmonids, how important are flow rates and residence times versus temperature and refuge from predation?
Little is known about how salmonids respond to the complex Lake environment at Vancouver Lake because there is little fish data available. Temperature is a big concern and that is part of the motivation for investigating residence time. Decreasing the residence time (more flushing) could potentially reduce temperatures in the Lake.

Wouldn't dredging increase deepwater habitat and cooler temperatures in certain areas?
Yes that might be true, but dredging is expensive, especially if deepwater habitats are to be created.

Do we know if salmonids in the lake are coming through Lake River or the flushing channel?
It is more likely that salmonids are being pulled through the flushing channel than with the tides up and down Lake River. Egress from the lake could be occurring through either.

Wrap-up
Phil and the Partnership thanked the Corps for their presentation and significant data contribution. This information will be very useful as the Partnership moves forward.

Partnership Business
Phil provided a quick overview of the most current Partnership Business. He told the Partnership that their Project Management team is working on multiple projects at the moment:

- The Partnership will be submitting two grant requests this fall: the Centennial Clean Water Grant and the Freshwater Algae Grant.
- The PIO Group and the Steering Group are working on a scaled up request to the legislature for the 2009-2011 biennium.
- The Technical Foundation document will be ready next month for Steering Group review and once that is complete, it will be ready for the Partnership. Expect to see it early this fall.

Public Comment
There was no additional public comment.

Next Steps/Close
The project manager thanked everyone for coming and closed the meeting.

Next Meetings:
Steering Group Meeting on September 17th, 2008
Full Partnership Meeting on October 15th, 2008 (note: this meeting may be rescheduled due to several conflicts – stay tuned for a potential reschedule date).