

# Technical and Programmatic Priorities Update

## *Lake Washington Ship Canal Temperature and Dissolved Oxygen Issues*

September 2018

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### **Background**

Temperature is one of the most important environmental influences on salmonid biology. Data collected in the Lake Washington Ship Canal (LWSC) shows periods in most years during late spring and summer when high temperatures affect the behavior and survival of migrating salmon. These high temperatures are caused by solar energy heating the surface of Lake Washington. The heated water forms a layer in the upper part of the water column. The LWSC is only 30' deep in places, and because the thermally stratified layer is often 30' or more in thickness, salmon cannot swim into deeper, cooler waters while migrating to escape the high temperatures.

Because salmon need cold, well-oxygenated water for optimum health, high temperatures in the LWSC during key migration periods can block or delay passage, lead to reduced growth and increased susceptibility to predators, parasites and infectious diseases, affect reproduction, and sometimes directly result in fish kills.

Every salmon in WRIA 8 must pass through the LWSC twice in its life, both as a juvenile migrating out to sea and as an adult returning to spawn, and may encounter lethal or near-lethal temperatures that influence its behavior and reduce its chances of survival. This proposal will directly result in a recommended preferred alternative to reduce effects of high temperatures/low dissolved oxygen concentrations in the LWSC. Stakeholders will understand what technologies and engineering solutions are available to improve conditions during key migratory periods, at what costs.

### **Project outline**

The potential project, executed in three phases, would address elevated water temperatures in the LWSC by seeking and implementing a long-term solution to the problem.

- Phase 1:
  - Synthesize existing temperature and dissolved oxygen data and information;
  - Develop concepts and feasibility-level proposals, in collaboration with key stakeholders, to produce lasting solutions to temperature and dissolved oxygen problems affecting salmon in the Lake Washington Ship Canal.
- Phase 2: Vet proposals, choose a preferred option, and develop funding sources.
- Phase 3: Construct and monitor the preferred option.

Potential stakeholders include the US Army Corps of Engineers (Corps), Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Salmon Recovery Council, City of Seattle, Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe, Washington Department of Ecology, the Puget Sound Partnership, US EPA, US Fish and Wildlife Service, US Geological Survey, University of Washington, local businesses and corporations, and non-profits.

Discussions with the Corps suggest that the project would be most likely to advance if WRIA 8 provided initial funding to secure a consultant team to facilitate the task of convening a stakeholder group and overseeing the development of concepts and feasibility-level proposals. The Corps "Planning Assistance to States" funding program could cost-share development of the feasibility analysis report as a product

of Phase 1 and 2. The Corps' Continuing Authorities Program is another cost-share funding program, among other potential funding sources, that is a likely candidate for implementing Phase 3.

Recommended Action	Estimated Cost
WRIA 8 staff and Implementation and Technical committees recommend Salmon Recovery Council approval to direct a portion of available carry forward funds to enable WRIA 8 to convene a stakeholder process and oversee a consultant team that would organize and facilitate development of concepts and feasibility-level proposals to implement lasting solutions to elevated temperature and low dissolved oxygen affecting salmon in the Ship Canal (facilitate stakeholder process to complete Phase 1 and 2 of the proposed project).	<b>\$27,500</b>

**Funding estimate for recommended action (facilitate stakeholder process to complete Phase 1 and 2)**

Task	Cost
Review and synthesize data and literature (est. 75 hours @ \$100/hour, based on costs for data and information synthesis tasks as part of King County Willowmoor Floodplain Restoration project)	<b>\$7,500</b>

*(NOTE: This work may be able to be accomplished using WRIA 8 technical service funds rather than using carry forward funds to hire a consultant)*

Task	Cost
Host and facilitate up to four stakeholder workshops (est. \$5,000 per workshop, including venue rental, facilitator, and documentation of discussion and actions)	<b>\$20,000</b>

<b>TOTAL PROPOSAL COST</b>	<b>\$27,500</b>
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**Carry Forward Funding Status**

If the Council approves this proposal, approximately \$82,543 in carry forward fund balance would remain.

<b>Beginning balance (as of 1/1/18)</b>	<b>\$184,476</b>
River and stream wood surveys	-\$62,000
Study of predation on juvenile salmon in the Ship Canal	-\$12,433
<i>Convene stakeholder process to identify feasible concepts to address Ship Canal temperature and dissolved oxygen issues</i>	-\$27,500
<b>Remaining balance</b>	<b>\$82,543</b>