Capitol Lake's Protective Effect for Chinook Salmon and Southern Resident Orcas

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Jack Havens DVM

The Southern Resident Orca Task Force report and recommendations of November 16, 2018 strongly recommended new attempts to increase Chinook numbers as prey for these endangered orcas. Two dams around Puget Sound (Nooksack and Pilchuck) were recommended to be razed to help accomplish this. Importantly, the tide lock creating Capitol Lake was **not** recommended for removal. This non-recommendation suggests that tide lock removal would have little, if any, positive effect on quality Chinook salmon. The following report explains why this is likely true when Budd Inlet contaminants are considered. **It appears probable that the 5th Avenue tide lock protects millions of juvenile Chinook from the toxic (often lethal) effects of Budd Inlet contaminants, and by extension reduces ingestion of these toxins by Southern Resident orcas.**

Note: Page notations refer to the Southern Resident orca Task Force report and recommendations of November 16, 2018. Those concerned with protecting the health of Southern Resident orcas, their Chinook prey from the Deschutes River/Capitol Lake and other salmon are encouraged to read the entire "Contaminants" section of this report.

According to the Southern Resident orca Task Force report and recommendation of November 16, 2018, these orcas and their prey are exposed to an **"ever-increasing"** mixture of the following pollutants in the marine environment. (p. 29)

It seems possible, if not likely, that some of the below contaminants play a part in Urban Runoff Mortality Syndrome.

<u>Toxic Industrial Contaminants:</u>

PCB'S – polychlorinated biphenols. (From toxics clean-up sites, potential for small amounts in wastewater treatment) "PCB's are also elevated in juvenile Chinook salmon collected from urbanized river-estuaries in Puget Sound and approximately one third of salmon collected in Puget Sound have PCB concentrations above an adverse-effects threshold for

salmon health. **Moreover, the survival of juvenile Chinook salmon from these urbanized estuaries was 45% lower than Chinook collected from uncontaminated estuaries."** (p.31)

PBDE's – polybrominated diphenyl ether. Created primarily as flame retardants for industrial and domestic uses. They travel to Puget Sound through wastewater and are associated with adverse health effects which include "endocrine disruptions, liver and thyroid function impairment, autoimmunity induction, immunosuppression, and impacts on lung and neural development. In the Southern Resident orca community, PBDE's have been shown to be highest in J pod, attributed to time spent in Puget Sound and closer proximity to urban environments relative to other pods."(p.32)

DDT's – dichloro- diphenyl-trichloroethane. These contaminants are **not** elevated in juvenile or adult Chinook salmon from Puget Sound.(p.32)

PAH's – polycyclic aromatic hydrocarbons:

"Class of compounds derived primarily from petroleum products or the combustion of these products and can enter the aquatic environments directly (for example an oil spill) or indirectly (for example, through stormwater runoff or atmospheric deposition). PAH's are commonly found in creosote wood (marine pilings, utility poses, etc.) vehicle emissions/exhaust and leaks, marine vessel leaks and spills, wood smoke and industrial emissions…... PAH's are toxic to Chinook salmon upon which the Southern Resident orcas feed, altering their growth or making them more susceptible to disease."(pp.32,33)

CEC"S – "contaminants of emerging concern.

Pharmaceuticals, and personal care products (soap, lotion, cosmetics), detergents, plastics, water resistant clothing and some pesticides. They also include toxic flame retardants (including new variants of PBDE's), phthalates, bisphenols, alkylphenols and polyfluoralkyl substances. Cec exposure can result in a variety of adverse effects, but data is limited on where they occur in the environment, where they ultimately end up and how toxic they are to orcas and their prey." (p.33)

CEC's "enter rivers, estuaries, and marine habitats from discharges of wastewater treatment plants, stormwater outfalls, and surface stormwater runoff from impervious surfaces…." (p.33) Under current law, many CEC's are not regulated or assessed for toxic effects. Many CEC's are suspected endocrine (or hormone) disrupters, which can have developmental, neurological, reproductive and immune effects. Recent studies have detected CEC's in wastewater effluent, estuaries, in juvenile Chinook salmon and in bottom dwelling fish in Puget Sound." (p.34)

Health warning signs at Budd Bay adjacent to Mission Creek

At least four sources continuously supply contaminants to Budd Inlet.

1. Urban stormwater runoff, (PAH's, PCB's, CEC's)
2. Effluent from LOTT Cleanwater Alliance, (PBDE's, PCB's –low concentrations, CEC's)
3. Southern Puget Sound marine flows flowing south,
4. Legacy industrial pollutants from toxics clean-up sites. (Listed below from Washington Department of Ecology Website.)

Reliable Steel Site: Gasoline-diesel or oil range petroleum hydrocarbons in soil or Budd Inlet sediments.

Toxic metals – arsenic, cadmium, copper, lead, mercury or zinc in soil groundwater, stormwater runoff or sediments.

PAHs or Carcinogenic PAHs – in soil, stormwater runoff or sediments.

PCBs – in soil.

Pthalates – in stormwater run-off and sediments.

Industrial Petroleum Distributors site (Westbay Drive, formerly ARCO):

Petroleum hydrocarbons from petroleum leaks and spills.

Solid Wood, Inc. site (West Bay Drive just north of 4th Ave., owned by city of Olympia):

Total petroleum hydrocarbons.

PAHs.

Metals – exceeding standards for soil and groundwater.

Cascade Pole (north end of Port peninsula):

Creosote contaminants – soil and groundwater.

Isolation Benefits of Capitol Lake

Capitol Lake (and its juvenile Chinook population) is almost totally protected from most of these pollution sources by the tide lock at 5th Avenue. Mixing of marine and freshwater is the most commonly mentioned characteristic of an estuary. Thus, because of the tide lock, the millions of physiologically sensitive juvenile Chinook salmon which inhabit Capitol Lake from early April through July are virtually spared the severe effects of these toxins for approximately four months before they enter the more contaminated marine waters of Budd Inlet and Puget Sound. This isolation may well produce 1) a higher rate of survival than that of a terminal urban estuary and thus, more orca food (p.30) and 2) a lesser likelihood that these disease inducing toxins will find their way into the tissues of Southern Resident orcas via the food web (p. 30). **These Chinook are also consumed by humans.** (According to Nate Tyler, Amy Grondin, and Chris Wilke, "tribal communities consume fish at a higher than average rate.")[1]

Contaminants in Percival Creek, the major collector of west Olympia runoff, currently travel via the northernmost portion of Capitol Lake relatively quickly, finding their way out of the Lake and into Budd Inlet. Obviously, these Percival Creek toxins do not experience the substantial tidal spreading and contamination into the entirety of Capitol Lake basin which would be associated with estuary mixing.

It is important to recognize that these findings of the imminent contamination to the Capitol Lake basin, should the tide lock be removed, were not mentioned in any depth in the Capitol Lake Alternatives Analysis Public Review Draft of 2009 or the Final Report of the Capitol Lake/Deschutes Estuary Analysis of 2016.

Quotes from Southern Resident Orca Task Force Report and Recommendations

Adult Chinook salmon are a major source of persistent toxic chemicals to Southern Resident Orcas. (p.30)

Additionally, the health and survival of juvenile Chinook salmon from Puget Sound and the Columbia River may be reduced by their exposure to toxic contaminants. In particular, toxics can reduce juvenile Chinook salmon survival by reducing their growth and making them more susceptible to disease. (p.30)

High levels of persistent toxic contaminants including PCB's, PBDE's, and DDT's are present in the blubber of Southern Resident Orcas potentially resulting in harmful health effects including alterations in hormone levels, reproductive disruption or miscarriages, reduced immunity to diseases, neurotoxicity, neurobehavioral disruptions and cancer. (p.31)

1. *Seattle Times,* June 16, 2019 Nate Tyler – council member Makah Indian Tribe, Amy Grondin – commercial fisherman and co-owner , Duna Fisheries, Chris Wilke-executive director, Puget Soudkeeper Alliance