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Cedar River Council
DRAFT Meeting Notes

September 28, 2021 – 6:30 pm to 8:30 pm (scheduled)
Meeting/Video Conference Call via Zoom (King County account)

I) Call to Order / Welcome

Nathan Brown called the meeting to order at 6:35 p.m.

II) General CRC Announcements / Information (Open to All)

There were no announcements during this topic.

III) Report: 'Synthesis of Best Available Science: Temperature and Dissolved Oxygen Conditions in the Lake Washington Ship Canal and Impacts on Salmon' – Dr. Lauren Urgenson, WRIA 8

A) Presentation

Dr. Lauren Urgenson is the Technical Coordinator for Water Resource Inventory Area (WRIA) 8, which covers the Lake Washington/Cedar/Sammamish Watershed. This report is a follow-up to Dr. Urgenson's discussion on the draft synthesis of "best available science" on dissolved oxygen levels in the Lake Washington Ship Canal and their impacts on salmon, originally presented at the CRC meeting on January 26, 2021. Along with Dr. Urgenson, the report was co-authored by Josh Kubo and Curtis DeGasperi, both from the Science and Technical Support Section of the King County Department of Natural Resources and Parks (DNRP). The accumulation of dispersed information on such issues has led to the creation of a roundtable to identify alternative actions to migrate towards a feasibility analysis to address said problems.

The Lake Washington Ship Canal (LWSC) is a critical habitat for all anadromous (saltwater to freshwater) salmon in the WRIA 8 Watershed. Juvenile salmon exit the Ship Canal via the Ballard Locks towards saltwater and return through the locks once again to freshwater as adults so they can spawn. The LWSC is also a highly engineered system; prior to both the canal and the Ballard Locks' construction in 1911, the Cedar River flowed into the Black River before subsequently flowing into the Duwamish River. Post-construction, Lake Washington was lowered by 9 feet and the Cedar River now primarily flows into the LWSC and drains through the Ballard Locks. Historical photos between 1885 and 1983 show significant change in the local landscape.

Graphics depicted the changes in depths in the watershed, the LWSC, Salmon Bay, and the connection to Puget Sound both pre- and post-construction. Prior to the creation of the Fremont and Portage/Montlake Cuts, Shilshole Bay and Puget Sound were broad estuaries and mudflats with wetland habitats. There was an abrupt shift that salmon experienced once the LWSC—and particularly, the Ballard Locks—was completed, making it more difficult to move from cool saltwater to warm freshwater. Depth profiles confirm that for the most part, the 8-mile long LWSC is shallow, roughly 9-10 meters (30-33 feet) deep, with Salmon Bay and Lake Union being exceptions (14-16 meters or 45-52 feet deep). Such a shallow depth is significant because it is above the thermocline (thermal layer) of Lake Washington, creating warm surface water and providing fewer areas of deeper, colder water for salmon to access in the LWSC.

As previously mentioned, the Ballard Locks created an abrupt shift in conditions for salmon migration. The only time that saltwater can enter the LWSC is through locks openings. As a result, salmon experience abrupt changes in salinity, temperature, and dissolved oxygen levels as they travel through the locks. Studies performed by Fred Goetz (U.S. Army Corps of Engineers) and the Muckleshoot Tribe have shown that Chinook salmon will exhibit recycling behaviors, going through the locks multiple times to try and mitigate the changes. They will also hold themselves in the saltwater drain intake at the locks for weeks at a time after entering the locks, up to a maximum of 50 days, awaiting temperature changes. The saltwater drain intake is currently the only area for cold-water refuge.

Another issue at the locks is the migration barrier that allows for predation by harbor seals and sea lions (pinnipeds), which generates increased risk and stress for the salmon holding in that area as they try to escape predators. Sockeye do not appear to show these holding behaviors as they tend to move quickly through the locks and reside in the cool, deep waters of Lake Washington up to 2-4 months before they spawn. They are not immune to risk, however, as they are also affected by abrupt temperature changes during locks migration. The Summer 2021 heatwave caused direct mortality among sockeye in the locks' fish ladder in addition to predation and stress.

The Ballard Locks fish ladder is a prime example for the types of extreme changes in water temperature. In the fish ladder, the saltwater drain diffuses cool saline water into the lower levels where saltwater diffusion occurs, keeping the water cooler at the ladder's base. An average summer month measures a water temperature of 15.1ºC (59.2ºF) at the base of the ladder to 21.6ºC (70.9ºF) at the top in the locks' public viewing area. This temperature difference has been an ongoing concern, especially in more recent years as the issue has worsened due to climate change. Based on data from DeGasperi, Goetz, and Quinn (2019), the number of days of water temperature exceeding 20ºC (68ºF) where salmon mortality begins to occur goes from 0 days in 1960 to over 100 days in 2020.

Travel times for salmon migration are also an important factor to consider for temperature difference and dissolved oxygen levels. Chinook salmon will travel quickly through the LWSC before holding in the Ballard Locks for an average of 10-20 days. Juvenile salmon can go from days to weeks in their migration and can spend an additional couple of weeks in Lake Union before journeying out to saltwater.

Both the U.S. Army Corps of Engineers (USACE) and King County have long-term monitoring sensors throughout the LWSC, collecting data on water temperature since 1992 and dissolved oxygen since 2003. Data from Chinook, coho, and sockeye salmon and the thermal, stress, and mortality thresholds were measured from three different depths at both the Large Locks and Gas Works Park areas between each May to September from 2009 to 2019. The three depths vary by temperature impact: normal, sub-lethal (15ºC/59ºF and above), and the migration barrier, or lethal temperatures (21.5ºC/70.7ºF and above). Both locations over the 10-year period found daily average temperatures exceeding the stress threshold most of the time during those months, with surface water temperatures above said threshold roughly 94% of the time.

Area disruption caused by the constant opening and closing of the Ballard Locks and the influence of cooler marine water resulted in better dissolved oxygen conditions, reducing salmon stress. Lake Union also showed potential cold-water refuge around the same time, but the water was found to be anoxic (lacking oxygen) and not ideal for salmon to use during migration. For all locations measured along the LWSC between the 10-year May to September window, salmon stress reached the sub-lethal threshold 87%-92% of the time and the migration barrier/lethal threshold 12%-24% of the time. Some areas showed variability in the opportunity to provide cold-water refuge, but others showed the potential for such refuge 92% of the time.

When these thresholds and conditions are considered as direct effects on salmon, there are also indirect effects. There are both cold and warm water species that can benefit from warmer temperatures such as yellow perch (a warm water species) that can feed on juvenile salmon exiting the watershed as temperatures increase. Data was collected over three different times of release each May in a 4-year period from 2016 to 2019. Results indicated that juvenile Chinook released from the Issaquah Hatchery were detected 2.6-7.3 times greater when released on May 1st compared to those released three weeks later due to temperature and predation rate.

In conclusion, after a decade of synthesis and investigations, the point of WRIA 8's current effort is to bring all of the information into one resource and take the next step towards action. WRIA 8 and their collaboration with Long Live the Kings and other organizations has led to the convening of a LWSC Salmon Roundtable from Summer 2021 to Winter 2022. The purpose of the roundtable is to develop a shared understanding of the problem, followed by pooling expertise to identify and advance solutions, and finally, to advocate for implementation and monitoring. The roundtable is divided into 3 work groups: Technical (those who have direct management over the LWSC or watershed), Steering and Strategy (policymakers, funding, partnerships), and Information, Input, and Advocacy (community feedback). Workshops are also being provided to share ideas and input on how to address these issues. A summary write-up and anticipated approval towards a feasibility analysis are expected to occur in Winter 2022.

B) CRC Member and Public Comment / Q & A

- **Q:** There is a strong sense of urgency on this issue. If there is a consensus that the LWSC is such a problem, how do you see this getting to a solution in time to save salmon such as sockeye to harvestable levels?
  DLU: There is definitely a sense of urgency and this is why we are trying to tackle this; it is not a simple issue, but a critical one, not only to address temperature and dissolved oxygen, but the abrupt change in conditions for salmon. For sockeye, it is the direct temperature impact but also the greater susceptibility to disease and parasites that goes along with the stress from temperature. I know that this issue is on the radar with the sockeye

work group and we have been working closely with them. We have thought a lot about strategies and there have been a lot of ideas suggested over time and it is time to start figuring out which ideas make the most sense and can be implemented. Timeframe is a key criteria we are thinking about in these solutions but also working with policy and funding advocates so that strategies can be implemented immediately. There are challenges in coming up with a solution that will have the right level of biological response and getting it done. Considering all these things simultaneously through this process is the best thing we can do to try and get things moving as fast as possible. At the end of the day, we might have some strategies that are more immediate and short-term and some that will take longer for various reasons and allow us to prioritize.

- **Q:** Our intent as the CRC is to be an energetic advocate and to help you. Is WRIA 8 taking the lead in moving towards a solution at some point? By sharing our knowledge, is there a way to help expedite big projects?
  DLU: Yes! I'm aware of the power of the CRC's advocacy, which is why I'm so pleased to be talking with you all today. USACE is working to move forward strategies and solutions that were recommended years ago and is doing some water quality monitoring next summer. They are also looking at siphoning water from below the thermocline to the cool, deep water in Lake Washington into the LWSC, as well as operational adjustments by changing the interpretation of elevation requirements to see if waterflow during certain times can help the temperature. We are hoping that our current work can help with that.
  Jason Mulvihill-Kuntz (WRIA 8): WRIA 8 is definitely wanting to play a leadership role in convening an assessment on possible solutions in the LWSC, we recognize it as an important bottleneck for salmon recovery in our watershed for various species there. While we have been focused on Chinook, we recognize that sockeye have some challenges in that same space and we want to look at solutions that would help benefit salmon and their survival. We recognize there are decades of data and we have known that this has been an issue for a long time. It has been very hard and been put over to the side and we are finally realizing that we have put a lot of resources into restoring watershed habitat which need to continue, but if we don't start handling these important survival issues, we are going to be less successful in bringing our salmon back and have them access the LWSC habitat. We are trying to play the convener role in bringing parties together and make some headway that we haven't been able to do in the last 20 years. It is going to be a challenge, but we are leaning into it.

Cedar River Councilmember Larry Phillips commented on the years of fish monitoring and urged more action to fish preservation from scientists and staff in addition to studying them. An assessment made in the Cedar River reflected that an estimated $100 million was spent in the last 20 years to reclaim natural habitat and support hatchery work, to great results, most notably in 2006. Now, there is the potential of the largest demise of sockeye run in the country, excluding Alaska and Hawaii. Councilmember Phillips continued to praise WRIA 8's work but expressed CRC members' skepticism due to dwindling fish numbers, demanding short-term solutions that take priority and interim action in increasing spawning numbers while being cost-effective. Adaptive management is more important than ever, and every aspect of trying to preserve sockeye will suffer if adaptability does not occur. Councilmember Phillips also remarked that the CRC, citizens, and activists deserve better in terms of finding immediate solutions, stressing the importance of accountability among policy makers.

- **Q:** There is a long list of partners on this, but which ones will have to do the work? There are multiple interests such as King County and USACE, but who will we need to connect with to advocate our goals?
  JMK: Great question! That is, in fact, one of the biggest challenges with the LWSC. Nobody is willing to take ownership of it or the issue. Organizations will help on other entities' behalf, but there is a lot of "finger pointing" in many directions. What we are trying to do with this process is to bring everyone together and determine collective solutions because it is going to be a multi-faceted approach and pieces of it will need to have ownership. We do not know who that is yet, but I envision it as a selection of the group we have so far, that's why we wanted a management nexus with the LWSC together. We want them all in the same room having a conversation and owning the alternatives. It is not easy, but we are doing our best.
- **Q:** Due to the sockeye run failing so rapidly, what steps can we take quickly to prolong it so there is something to save? There is unused space at the hatchery at Landsburg, why aren't we using it to give us more time?
  DLU: I know that Frank [Urabeck] has more information on that, but with the work that we are doing now, we are hoping it will be complementary to those necessary sockeye preservation efforts. What many said from the initial roundtables is that they wanted a solution that would have a biological benefit in the LWSC for salmon. It would be a water temperature or dissolved oxygen-based solution or some other operational change that would improve conditions. This came out as a priority but that doesn't mean those are the only types of solutions we are examining. There is no strategy that is off the table. Currently, the technical work group is developing a matrix where you can develop a strategy and see what the potential is to have a biological response as well as

feasibility of implementation. Each strategy will be put through this matrix and that is how we will come up with priorities to move into the feasibility analysis.

Chair Max Prinsen: There were roughly 270 sockeye salmon captured and transported to the hatchery tanks. That is an immediate life support measure; if there aren't any sockeye at all, then there won't be any group concept of improving the LWSC. The whole point is we need to at least maintain something to work with as solutions are developed; hopefully, the subsequent work gives it a "springboard" effect for the run. This is why we were so persistent in immediate actions; we want to advocate for those things quickly so we can help you as you create long-term solutions.

- **Q:** Has anyone tried to estimate the historic conditions in the Black River and the feasibility of reconstructing a fish passage along that route?
  DLU: It certainly has been talked about and mentioned in the Lake Washington General Investigation study conducted over a decade ago and will probably be mentioned in this process too. I don't think that is going to be a priority in terms of things happening quickly, but you are not the first one to mention it. It is hard to imagine how it would be done but if it goes through the matrix and the feasibility study, we'll see where it's prioritized.
- **Q:** Has anyone built a computer model of the LWSC water flow to attempt to predict the effects on temperature and oxygen that various changes produce?
  DLU: That is what the USACE is developing for the next stage of models that is supposed to be completed in Summer 2022. It is a sequel two-dimensional model that models the effects of differing actions of water temperature and dissolved oxygen based on previous studies. There are other water quality models for Lake Washington and there are several organizations looking at new technologies to monitor water quality. For now, the USACE plans on using a very common model to model effects in the near-term.

IV) CRC Updates (As Needed)

- **Lakeside Industries Asphalt Plant**
  Chair Prinsen reported that the permit is still under review by King County Department of Local Services (DLS). There has been movement on the land where the proposed plant is to be located, however, it was uncertain if it was permitting related. Cedar River Councilmember Phil Kitzes emailed Project Manager Fereshteh Dehkordi (King County DLS) regarding the activity but did not receive a response.
- **Water Resource Inventory Area (WRIA) 8**
  Chair Prinsen noted the main topics per the latest WRIA 8 meeting notes were discussing the 2022 budget and fund allocation for capital projects. Councilmember Frank Urabeck proposed any CRC representatives that attend WRIA 8 meetings should assert the CRC's constructive advocacy in collaborative salmon recovery efforts. Nathan Brown offered to provide a copy of the WRIA 8 meeting notes and their letter written to Governor Jay Inslee.
- **Fish Habitat Conservation/Restoration (Sockeye)**

  Councilmember Urabeck indicated 279 fish were taken from the Ballard Locks to the Landsburg Hatchery over a 6-day period in late July and early August with only 2 mortalities, a great jumpstart to the salmon run. Parties such as Seattle Public Utilities (SPU), the Muckleshoot Tribe, and Washington Department of Fish and Wildlife (WDFW) were able to construct 20-foot round tubs, plumbing in cold, pathogen-free water from the hatchery. The introduction of fish from the Ballard Locks to the hatchery tubs has become a great success. Councilmember Urabeck also noted 150 more fish trapped near the I-405 Bridge were introduced into the tubs for pre-spawn mortality monitoring after swimming through Lake Washington. Scientific experts studying the difference in water quality from the original rectangular tubs at the hatchery and the new round tubs during salmon maturation found the round tubs to be more effective.

  In total, 1,123 sockeye salmon were counted that made the journey from the LWSC to the Cedar River, mortalities included, with 1,402 salmon collected overall. In 2020, the pre-spawn mortality rate for salmon collected was almost 45%, particularly among those salmon in hatchery rectangular tubs. However, this year, with the use of round tubs and introducing salmon to cold, pathogen-free water, pre-spawn mortality has thus far only been 6%. Salmon exposed to pathogens and warmer temperatures in the Cedar River via concrete raceways have reached a 7.2% pre-spawn mortality rate. Councilmember Urabeck stated the possibility that mortality will continue to increase over time so long as salmon are exposed to the concrete raceways and warmer temperatures.

  Almost 39,000 salmon have been counted at the Ballard Locks in 2021, compared to 23,000 in 2020, however, this is still below the 10-year average of 73,000, but it shows a big improvement. Based on current data from real world actions and WDFW's plans for 2022 such as increasing capacity at the Landsburg Hatchery, Councilmember Urabeck remarked that these factors would allow the CRC to help take more action. However, it begged the question: is the CRC is ready to commit another 2-3 years as these projects occur? With the CRC being an

advocacy group, there is a chance to make a difference, especially now that there has been surprising cooperation among organizations within the past year.

Councilmember Phillips mentioned the accomplishments in the 25-year history of the CRC and praised WRIA 8's Jason Mulvihill-Kuntz and Dr. Lauren Urgenson and their deep respect for the CRC as an advocacy group. Councilmember Phillips acknowledged the great leadership in the years-long campaign to write an action letter to Governor Jay Inslee and other organizations. Such an "action item" was not easy to complete in record time (and in a pandemic) to get necessary data. As a result, it gives the CRC as a citizen's group hope to continue in their work and advocacy.

- **Cedar River Watershed**
  Jamie Thompson, a Fisheries and Aquatic Biologist for Seattle Public Utilities (SPU), said that SPU is currently preparing for the fall rains to return to the reservoirs, otherwise, there has been no other activity. Thompson noted the common annual low water level in the Masonry Pool and Chester Morse Lake. Nathan Brown recounted giving a youth group tour near the Cedar Falls Dam the previous weekend and remarked on the children's enthusiasm for learning about the impact of the landscape around them. Brown also suggested the opportunity for CRC members or volunteers to collaborate with SPU and educate others about the lower portion of the Cedar River Watershed.
- **King County Flood Hazard Management Plan Update**
  Nathan Brown confirmed that Jason Wilkinson from WRIA 8 will be the new Project Manager for the King County Flood Hazard Management Plan starting in 2022. Brown anticipates Wilkinson will attend future CRC meetings to obtain input from CRC members regarding Cedar River flood hazard management issues.
- **CRC Member Updates**
  Councilmember Phillips inquired on the latest counts of both Chinook and sockeye salmon. Councilmember Urabeck confirmed that Chinook and even coho numbers have been coming back better than average. However, there is the current issue of disease impacting the Chinook at both the Issaquah Hatchery and the Cedar River, which is being monitored. Exact numbers and the rate of Chinook pre-spawn mortality should be announced by the October meeting. Councilmember Urabeck stated that arrangements have been prepared with WDFW for an in-person tour of the Landsburg Hatchery in October exclusively for CRC members (due to limited capacity during the COVID-19 pandemic), pandemic severity depending.

  Jamie Thompson (SPU) reported 25,000 coho salmon at the Ballard Locks thus far, above the 10-year average of 12,500, with the locks at 80% of the salmon run curve. Thompson was unable to provide Chinook numbers in the locks but mentioned 47 Chinook redds (salmon egg nests) in the Cedar River, along with 31 Chinook counted above Landsburg Dam. Councilmember Phillips commented that these numbers are encouraging and allows the CRC to focus more on the emergency issue of sockeye salmon. Cedar River Councilmember Tom Allyn added the latest counts at the Ballard Locks were as follows: 26,800 coho (with 700 in the past day), 14,200 for Chinook, and 38,619 for sockeye.

V) Public Comment Period

Chair Prinsen asked Nathan Brown if the King County Sheriff's Department could be contacted for more information regarding some issues that arose during the summer (e.g., vandalism) due to a large influx of visitors along the Cedar River's shores. Brown also noted homeless encampments and squatters in homes purchased for demolition on King County habitat restoration project sites. King County Parks and the King County Sheriff's Department are currently trying to resolve the issue. Brown praised the county's work for habitat restoration, citing the thousands of fish he noticed at the Porter Levee project site along the Green River, and extended an invitation to CRC members to tour the project site for some inspiration.

VI) Closing/Adjourn

Plans to tour the Landsburg Hatchery this fall will continue to be discussed, however, the number of attendees may be limited due to the COVID-19 pandemic. Meeting adjourned at 8:11 p.m.