

GREEN/DUWAMISH AND CENTRAL PUGET SOUND (WRIA 9) IMPLEMENTATION TECHNICAL COMMITTEE



WRIA 9 Implementation Technical Committee Meeting February 21, 2024 | 9:30 am – 11:30 am

[Click here to join the meeting](#) or call in (Teams audio only) [+1 425-653-6586](tel:+14256536586), [185643467#](tel:+14256536586)

Meeting ID: 212 285 313 251

Passcode: t9wk6N

9:30 **Welcome & Introductions**

9:45 **Status & Trends Watershed Ecosystem Forum presentation**

Informal update/report-out

Iris Kemp,
Matt Goehring

Based on ITC input at the January 2024 status and trends workshop and post-workshop content and slide review, Iris and Matt presented a high-level overview of status and trends analysis results and Salmon Recovery Manager reflections to the Watershed Ecosystem Forum on February 8. The presentation was well-received and generated lively discussion. We invite any ITC members who attended the Forum meeting to share additional comments/report-outs.

9:55 **Lower Green River Flaggates: an evaluation of function and juvenile Chinook passage**

Presentation followed by Q&A

Chris Gregersen

Flaggates provide protection from river flooding but can create significant barriers for salmon, especially at juvenile life stages since flaggates are often placed on small tributaries which also provide valuable juvenile salmon rearing habitat. This study investigated six flaggates throughout the Lower Green River to determine the duration and extent at which juvenile Chinook salmon could access habitat upstream. This study's purpose was to identify physical characteristics of flaggates that allow juvenile passage to inform improved flaggate designs and identify habitat improvement opportunities.

11:00 **Round Robin Updates**

Slide deck activity

All

Pre-meeting prep: Add your updates to the slide deck! Instructions on slide 1 at this link: <https://docs.google.com/presentation/d/16Z31Totgh9B0-KAKo-6l9ps5PHfxQD2ve46i8eZ8pbU/edit?usp=sharing>. You can also email updates directly to Iris (ikemp@kingcounty.gov) for inclusion in the slide deck.

11:30 **Adjourn**

WRIA 9 ITC web page: <http://www.govlink.org/watersheds/9/committees/ImpleTechCmte.aspx>

Participant list:

Alicia Kellogg, Chapin Pier, Chris Gregersen, Erik Rigaux, Iris Kemp, Jenn Stebbings, Jerrod Davis, Joshua Hopkins, Julian Douglas, Kelley Govan, Kollin Higgins, Marc Marcantonio, Matt Goehring, Matt Knox, Monica Walker, Nikolas Novotny, Rowena Valencia-Gica, Suzanna Smith, Zach Wilson

Round-table Updates and ITC Actions

ITC members discussed a proposed 990-acre mining site and asphalt plant adjacent to Kanaskat Palmer State Park near the Green River. This project is in the SEPA determination phase. ITC members agreed to review available information and draft a technical letter stating interest in more information on potential impacts of the proposed project. The letter will not take a stance on the project itself.

WRIA 9 Grant Round proposals due February 28. ITC members, please mark your calendars to review recommendations from the grant round Review Teams in the week prior to our April 17 ITC meeting. If you would like to join site visits and provide technical feedback, please contact Suzanna (susmith@kingcounty.gov).

New Zealand mud snail alert: Port of Seattle identified a positive hit for New Zealand mud snails during Duwamish River People's Project benthic invertebrate sampling. Please spread the word to be aware and decontaminate gear. There are several ways to decontaminate gear. The protocols that King County Science staff use are copied here for reference:

Level 2 or "high risk situations" decontamination protocols are required when moving across WRIA boundaries, when leaving known infested waters, and before entering protected or highly sensitive sites. Level 2 decontamination is designed to kill/eradicate invasive species, and is done after Level 1 procedures have been completed. Freezing gear and equipment is the preferred Level 2 decontamination procedure used by King County; if that is not possible, Virkon is used as an alternative.

All field equipment and wading gear that has been immersed in a stream or been in contact with the macroinvertebrate sample is placed in a chest freezer at a maximum of 14°F (-10°C) for at least 8 hours. The Washington Invasive Species Council recommends gear be held at -4°C for a minimum of 4 hours to achieve 100% NZMS mortality (time starts once the equipment reaches -4°C) (Ecology 2016b). Freezing has also been shown to be effective against the benthic diatom *Didymo* (*Didymosphenia geminata*), though it may not be effective against chytrid fungus (*Batrachochytrium dendrobatidis*) or the fish pathogen whirling disease (*Myxobolus cerebralis*) (Root and O'Reilly 2012, Kilroy et al. 2006, WDFW 2016).

As of May 2020, NZMSs have been found in many tributaries to Lake Washington, as well as some tributaries to Lake Sammamish. In addition, NZMSs have been found in streams draining directly to Puget Sound as well as the Green and White rivers. These streams include: Thornton, Pipers, McAleer, May, Mapes, Maplewood, Lyon, Sunset, Longfellow, Kelsey, Taylor, High School, Big Soos, North, Country, and Boise creeks. Staff should conduct Level 2 decontamination as standard practice when working in all of these basins.

Read through [WRIA 9 ITC February round robin slides at this link](#). Includes updates from WRIA 9 Team, Duwamish Basin Steward, Lower Green Basin Steward, City of Seattle, King County Science, Covington Water District, City of Kent, Port of Seattle, and Mid Sound Fisheries Enhancement Group.

Lower Green River Flapgates: an evaluation of function and juvenile Chinook passage

[\(link to slides\)](#)

Flapgates are commonly used to prevent high flows from entering the floodplain. There are 19 mapped flapgates in the Lower Green River. All are top-hinged and only one (Johnson Cr) is equipped with a fish passage device. Flapgates can block fish access to upstream habitat and alter downstream confluence habitat. A recent non-natal tributary study by Chris and King County Science team members found that although non-natal tributary habitat is important to juvenile Chinook, there was low-to-no use of upstream habitat on tributaries with flapgates.

This study sampled six streams with flapgates in the Lower Green River: Gilliam Cr, Johnson Cr, NE Auburn Cr, Golf Course tributary, Old Fishing Hole, and North Green River Park.

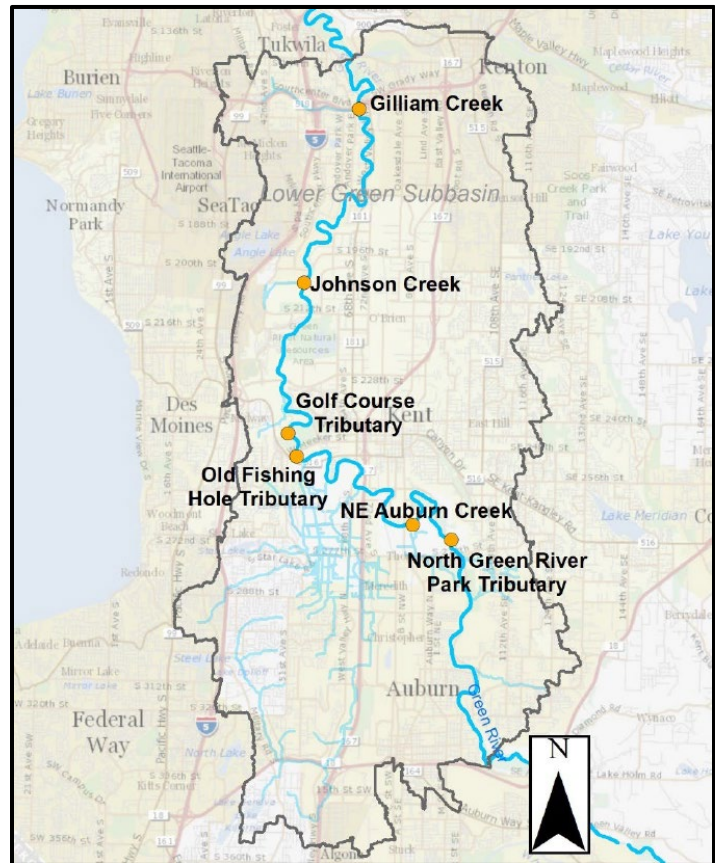
Based on previous research and literature on Chinook fry swimming ability, a flapgate was assumed passable when 1) water level upstream and downstream were equal (i.e., low water velocities), 2) river water backwatered completely through the culvert, and 3) flapgate was not underwater or closed.

Chris and team conducted physical surveys with water levels and installed level loggers, timelapse cameras, and flapgate position sensors. Data from these sources and the observed flow range based on the USGS Auburn gage allowed calculation of site-specific flow range for fish passage at each flapgate.

Results showed highly variable fish passage windows, from 0-36% passability.

Percent passable did not appear to correlate with fish presence. Fish were found upstream of Gilliam, NE Auburn, and N Green River flapgates during one fish survey in February 2020 (additional fish survey efforts were unable to be conducted due to the COVID-19 shutdown), even though the N Green River flapgate only had 0.2% passability. In contrast, although Johnson Cr flapgate had 36% passability, no fish were observed upstream.

Flapgate position sensors validated that flapgates were open during predicted and observed flow range but flapgate opening was minimal except following high flows. Flapgate closures



were variable and often occurred long after the flapgate was submerged. Flapgates regularly captured debris which negatively impacted function.

In February 2020, there was an 11,700 cfs flood event which provided opportunity to evaluate flood protection by these six flapgates. Half of the flapgates provided minimal to no flood protection during this event.

Factors that influenced passability at these flapgates:

- Trash rack debris dammed upstream sides of flapgates which reduced passage opportunities by up to 95%.
- Culvert size: smaller culverts have a smaller range of passable flows since the volume of water coming through a small space leads to faster velocities and longer equilibration.
- Flapgate design and placement along the tributary: Chinook were found in 3 of 4 streams where flapgates were passable at 4,000 cfs regardless of % passability, suggesting Chinook were seeking off-channel habitat at this flow range. Chinook were found at the three flapgates furthest from the mainstem, suggesting that confluence habitat helped fish find the culvert outlet and provided a staging/holding area where fish could wait for optimal passage conditions.
- Pool vs. drop from flapgate: the pool at the outlet of N Green River flapgate provided backwater flow into the culvert and reduced water velocity, which could explain why Chinook were found upstream of this flapgate even though it had the second lowest % passability in the study.
- Culvert gradient: steeper gradients reduce passability window, create velocity barriers.
- Flapgate type: top-hinged flapgates restrict flow through narrow passage and round culverts create higher velocities at lower flows which reduces access.

Actions that could mitigate/eliminate flapgate impacts to juvenile Chinook upstream passage:

- Increase maintenance on trash racks
- Retrofit flapgates (replace lid, remove trash rack)
- Replace flapgates with improved designs (bigger culvert, square culvert, flatter gradient, side-hinged gate, muted tidal regulator)
- Relocate flapgates further away from mainstem to create lower gradient and more habitat below flapgate
- Remove flapgates where they aren't doing much for flood control. This may also allow for faster draining of flooded areas.

Takeaways for salmon recovery:

- Not all flapgates serve their intended purpose.
- Fish passage isn't only when flapgate is open.
- Valuable habitat currently being blocked by outdated flapgates.
- There are options to improve fish passage, habitat, and flood protection.

Takeaways for project managers

- Design is critical.

- Need to allow fish access to floodplain when they want it - open across a range of flows, especially around 4,000 cfs.
- Set back from river.
- Bigger is better.
- Side-hinged/muted tidal regulator is preferable.

Q&A

- Can you speak more to juvenile Chinook inability to access underwater flapgates?
 - Fry have low swimming ability and also are at a vulnerable life stage where they strongly prefer low velocities and shallow areas to avoid predators.
- Are these culverts included in the tribal injunction – i.e., fish passage issues legally required to be fixed?
 - None of these flapgates are included in the injunction. WDFW’s methodology considers flapgates as 100% barriers. A number of these are in local jurisdictions and not on state land, so are out of the injunction area. These types of fish passage barriers have been overlooked in past because the focus has previously been more on adult spawning habitat and less on juvenile rearing habitat.
- What maintenance recommendations do you have?
 - Frequent maintenance. Any event that brings up water level will catch debris on the trash rack. It’s a compounding issue over time, especially for flapgates close to the river. Many flapgates aren’t maintained at all.
 - Maintenance standard should be all debris removed, not just enough debris removed to get flapgate open.
- If a levee is damaged from a flood and has a culvert, the local authority could request assistance from the Corps under PL 84-99 and work to upgrade/improve fish access could be cost shared that way. <https://www.nws.usace.army.mil/Missions/Civil-Works/Programs-and-Projects/>
- These results are currently being used to inform the NE Auburn and Gilliam Cr projects. Please reach out to Chris if you are interested in more data and/or thinking about a flapgate project!

Further questions? Contact Chris Gregersen at chris.gregersen@kingcounty.gov.