

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



## WRIA 9 Implementation Technical Committee Meeting February 15, 2023 | 9:30 am – 11:30 am

[Click here to join the meeting](#) or call in (audio only): [+1 425-653-6586,911155469#](tel:+14256536586)

Meeting ID: 291 061 535 541

Passcode: uafR9e

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|-------|---|-------------------------------------|
| 9:30  | <b>Welcome &amp; Agenda Overview</b>  |                                     |
| 9:40  | <b>Vashon Island: Piner Pt &amp; Lost Lake</b><br><i>Presentation followed by Q&amp;A</i><br><br>Highlighting two Vashon Island projects, Greg and Mason will discuss the history of Piner Pt (southeast tip of Maury Island) and Lost Lake (eastern shoreline of Vashon Island at Quartermaster Harbor), project design and permit process, and expected project benefits.   | Greg<br>Rabourn,<br>Mason<br>Bowles |
| 10:05 | <b>Blood-brain barrier disruption in juvenile Chinook exposed to roadway runoff</b><br><i>Presentation followed by Q&amp;A</i><br><br>Recent research shows that the acute mortality of coho salmon exposed to roadway runoff involves disruption of the blood brain barrier. This WRIA 9 CWM-funded project investigated blood-brain barrier disruption in juvenile Chinook as a sublethal mechanism of toxicity for contaminants in roadway runoff.   | Stephanie<br>Blair                  |
| 10:40 | <b>Meet &amp; Greet + Round Robin Updates</b><br><i>Slide deck activity</i><br><br>Welcome new Basin stewards Alicia Kellogg and Kelley Govan and connect with your fellow ITC members!<br><br><b>Pre-meeting prep (5 minutes)</b> – Please find instructions on slide 1 at this link: <a href="https://docs.google.com/presentation/d/1PFUpN4VE9gf6cwOu_rC30Fd9aFJRqP_sQBITS1uukno/edit?usp=sharing">https://docs.google.com/presentation/d/1PFUpN4VE9gf6cwOu_rC30Fd9aFJRqP_sQBITS1uukno/edit?usp=sharing</a> .<br><br>Make your slide your own! We will each lead mini-presentations of our respective slides during the meeting. You can also email updates directly to Iris ( <a href="mailto:ikemp@kingcounty.gov">ikemp@kingcounty.gov</a> ) for inclusion in the slide deck. | All                                 |
| 11:25 | <b>Good of the Order; Adjourn</b>   |                                     |

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

**Participant list:**

Kerry Bauman, Stephanie Blair, Mason Bowles, Sophie Chiang, Julian Douglas, Kelley Govan, Chris Gregersen, Sarah Heerhartz, Kollin Higgins, Josh Hopkins, Josh Kahan, Bridget Kaminski, Alicia Kellogg, Iris Kemp, Matthew Knox, Elizabeth Mackey, Marc Marcantonio, Cleo Neculae, Nikolas Novotny, Mike Perfetti, Greg Rabourn, Rowena Valencia-Gica, Heidi Watters, Zach Wilson

**Round-table Updates and Reminders**

Read through our **WRIA 9 ITC February meet & greet** slides at this link:

[https://docs.google.com/presentation/d/1PFUpN4VE9gf6cwOu\\_rC30Fd9aFJRqP\\_sQBITs1uukno/edit?usp=sharing](https://docs.google.com/presentation/d/1PFUpN4VE9gf6cwOu_rC30Fd9aFJRqP_sQBITs1uukno/edit?usp=sharing).

**Reminder:** Project applications for WRIA 9 Cooperative Watershed Management (CWM) grants are due March 3. Please reach out to Matt with questions about Capital Projects and Regreen the Green programs and to Iris with questions about Monitoring and Research and Stewardship, Education, and Learning (SEaL) programs. <https://govlink.org/watersheds/9/funding/default.aspx>

**Reminder:** Please reserve time on your calendars in early April to review this year's proposed funding package in advance of our April 20 meeting. You will receive materials for review two weeks prior to the meeting.

Please welcome new Duwamish Basin Steward Alicia Kellogg ([alkellogg@kingcounty.gov](mailto:alkellogg@kingcounty.gov)) and new Lower Green Basin Steward Kelley Govan ([kgovan@kingcounty.gov](mailto:kgovan@kingcounty.gov)) to the watershed!

**Vashon Island: Piner Pt & Lost Lake ([slides at this link](#))**

Mason and Greg presented two recently-completed Vashon Island restoration projects. The Piner Point project included removal of a bulkhead, retaining wall, and underground soil storage tank as well as relocation of an underground utility vault. Ongoing work includes invasive plant control and creosote piling removal. The Lost Lake project included bulkhead removal, installation of rock, wood, and beach gravel for soft shoreline restoration and erosion risk reduction for the neighboring property, and native vegetation plantings. Both projects were permitted in one year due to a simplified process that included permit exemption via the WDFW Habitat Recovery Pilot Program targeted towards nearshore restoration and permit exemption from Section 404 and Section 10 via the US Army Corps of Engineers.

Visit the [slide deck at this link](#) for some amazing before/after photos of these projects.

**Q&A:**

- Zach – how long did design take?
  - Eight months. More time was spent in contracting than design. The longest portion of design was deciding how to transport equipment, machinery, etc. to Lost Lake project site (barge vs. road).
- Kollin – you mentioned one design change that was necessary to get the permit exemption from USACE. What was it?

- A minor change – moving the location of the large boulders at Lost Lake about a foot or two away from the initially planned locations to align appropriately with jurisdictional boundaries.
- Mike – how important are herring? Are you seeing sedimentation?
  - Herring use this area and herring habitat recovery is important in Puget Sound. (For those interested, a little more info on Puget Sound herring status & trends is available here: <https://vitalsigns.pugetsoundinfo.wa.gov/VitalSign/Detail/33>)
  - We are already seeing shoreline movement. The neighbor loves the new beach.
- Heidi – how did you address the anticipated change with the neighbors?
  - A lot of conversations. The design for Lost Lake used large boulders with wood pinned between them to create an area of roughness to dissipate waves. There were concerns about adverse impacts to adjacent properties, but at the end of the day the biggest liability turned out to be bringing big equipment down an active hillside. This was also a concern at Piner Point as the neighbors had a springbox well perched on the bluff for drinking water and we worried about destabilizing the hillslope. There was a small slide last winter, but it was in the realm of natural processes and didn't impact the well or the project.

Further questions? Contact Mason Bowles ([mason.bowles@kingcounty.gov](mailto:mason.bowles@kingcounty.gov)) and Greg Rabourn ([greg.rabourn@kingcounty.gov](mailto:greg.rabourn@kingcounty.gov)).

### **Blood-brain barrier disruption in juvenile Chinook exposed to roadway runoff**

Stephanie presented research on the mechanism of toxicity for roadway runoff on juvenile coho and preliminary results of similar investigations on juvenile Chinook. Sensitivity to roadway runoff varies across species; early research suggests that coho are most sensitive and experience acute mortality while steelhead and Chinook are less sensitive and exhibit a slight amount of acute lethality. Sublethal impacts are likely but relatively unknown/unquantified.

The newly discovered contaminant 6PPD-quinone – a transformation product of the chemical 6PPD used in tires – is lethal to coho at concentrations commonly found in urban waterways. What are the underlying mechanisms for how roadway runoff and this contaminant in particular impacts a fish's body?

Stephanie's focus is on the cardiovascular system and particularly the blood-brain barrier. All vertebrates have a blood-brain barrier. It regulates body systems and protects the central nervous system from toxicants in the blood. In fish, similarly to mammals, the blood-brain barrier structure is endothelial cells that make up blood vessel walls of capillaries in the brain firmly joined by tight junctions that seal the space between the cells and regulate localized opening for transmission of things that need to get into the brain. Inflammation can cause blood-brain barrier disruption.

The initial hypothesis that blood-brain barrier disruption was the mechanism leading to mortality of coho exposed to roadway runoff was because of the phenotypical behavior responses observed upon exposure that included strange surfacing behavior, swimming in

circles, gasping for oxygen, and consistent increase in hematocrit (thickness of blood). Tracer tests shows that fish exposed to roadway runoff accumulated tracer in the brain, suggesting that the blood-brain barrier was leaky. The control group of fish not exposed to runoff did not accumulate tracer in the brain because the blood-brain barrier remained intact. Further tracer tests on fish exposed to runoff collected from a Tacoma highway suggested that blood-brain barrier disruption could be triggering the phenotypic surfacing symptom and that even a couple presymptomatic fish had blood-brain barrier disruption. Exposures to the single contaminant 6PPD-quinone produced the same effect.

Expanding this research to Chinook, juvenile Chinook were exposed for 8 and 24-hour periods to 50% roadway runoff (at concentrations that would have been lethal to coho) with no symptom development or mortality. Even in a repeated experiment with very high concentration (2000 ng/L) for 24 hours, no mortality was observed. Fish tissue samples were preserved to investigate with more sensitive tests/methods (e.g., looking at genetic expression of inflammatory and BBB regulatory proteins using RT-qPCR).

Q&A:

- Chris – what about effects on steelhead?
  - They are showing some acute mortality response. Other labs have found rainbow trout sensitivity at a higher lethal concentration than coho, high enough to expect potential blood-brain barrier disruption.
- Heidi – are riparian buffers helpful to reduce contaminant impacts in streams?
  - Yes. Any way that you can sequester contaminants – any organic material that can bind and adsorb chemicals – before they reach the stream is helpful.
- Heidi – how quickly does 6PPD-q break down?
  - It is water soluble and dissolved within stream water when fish encounter it. We don't know much yet about how it moves through soils and how that could be a sink and/or source into streams. Ed Kolodziej's UW team is doing a lot of that work. 6PPD-q is more persistent and water soluble than 6PPD; the previous work done on the parent compound doesn't tell us about the transformation product.
- Nik – were your roadway runoff samples collected during the first flush? Do you concentrate the runoff before exposing fish? Are steelhead next?
  - Yes, for this research we target the first flush to get the most chemicals possible. Timing of collection is very important because there is quite a bit of variability in concentrations. We often encounter complications and unexpected variability when collecting roadway runoff – for example, if a downspout is clogged with soil, sand, that can actually act like a pre-treatment and clean the runoff a little bit.
  - We expose fish to whatever runoff we get in the field – no post-collection concentration.

- Yes, we want to look at steelhead! Animal husbandry is a challenging part of this research. Chinook especially are difficult to keep healthy in the lab. We expect steelhead to be a little easier.
- Kerry – are recycled tires in ball fields a potential source of 6PPD-q?
  - There's a growing list of literature looking at how tires affect public health – crumb rubber, astroturf, etc. – so far we think the contaminant sticks around and is probably in any rubber treated with 6PPD which is pretty much every tire manufactured.
- Mike – from a practitioner's point of view, we are doing projects to open non-natal tributaries to Chinook but those are also coho habitats and I have seen urban runoff mortality syndrome symptoms in one of our creeks. We are eager to reduce the amount of contaminants entering the system – interested in compost treatment and more traditional TAPE approved facilities for roadways. Is UW Tacoma the only lab right now with capability to do 6PPD testing?
  - There is one other lab but yes, testing capability is limited at the moment. WA Dept of Ecology is getting set-up to do a lot of testing once they get their methods standardized and labs up and running, so there should be more testing capability soon.

Further questions? Contact Stephanie Blair at [stephanie.blair@wsu.edu](mailto:stephanie.blair@wsu.edu).