

Meeting Summary
Snohomish Basin Salmon Recovery Technical Committee
Web Conference
9am – 12pm, February 2, 2021

In attendance:

1. Adrian Spidle – NWIFC
2. Andrea Mojzak – King County
3. Andrew - ?
4. Ariana Winkler - ?
5. Brett Shattuck – Tulalip Tribes
6. Carson Moscoso – Snohomish Conservation District
7. Colin Wahl – Tulalip Tribes
8. Cory Zyla – Snoqualmie Watershed Forum
9. Daniel Howe – Snohomish County
10. Denise Di Santo – King County
11. Denise Krownbell – Seattle City Light
12. Doug Hennick – Wild Fish Conservancy
13. Elissa Ostergaard – Snoqualmie Watershed Forum
14. Emily Davis – Snoqualmie Watershed Forum
15. Erin Ericson – Snoqualmie Valley Watershed Improvement District
16. Gretchen Glaub – Snohomish County
17. Jamie Glasgow – Wild Fish Conservancy
18. Jim Shannon – Hart Crowser
19. Josh Kubo – King County
20. Keith Binkley – Snohomish County PUD
21. Kevin Lee – WDFW
22. Kirk Lakey – WDFW
23. Kollin Higgins – King County
24. Larry Lowe – Snohomish County PUD
25. Lindsey Desmul – WDFW
26. Lisa Tario – Snohomish County
27. Marty Jacobson – Department of Ecology
28. Mary Lou White – Wild Fish Conservancy
29. Matt Baerwalde – Snoqualmie Tribe
30. Micah Wait – Wild Fish Conservancy
31. Michael Crewson – Tulalip Tribes
32. Mike Rustay – Snohomish County
33. Mindy Rowse - ?
34. Nicholas Chambers - ?
35. Pete Verhey – WDFW
36. Ryan Bartelheimer – Snohomish Conservation District
37. Ryan Lewis – Snoqualmie Tribe
38. Susan O’Neil – Environmental Science Associates

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Meeting Summary:

Introductions

Colin opened the meeting and led introductions for the meeting. A short break out was held for colleagues to connect with one another.

Colin then turned the agenda over to Gretchen to discuss Basin Updates.

Basin updates

Colin Wahl, Emily Davis, Gretchen Glaub

Gretchen noted that they are missing several SRFB reviewers this grant round due to people departing their positions. She estimates it is about 20 hours of volunteer labor. If you have an idea of anyone who might be interested, please let Gretchen know (Gretchen.glaub@snoco.org).

Gretchen also shared the Notice of Intent to Apply submissions. She noted that they received \$2.1 M in requests, with about \$500k available to allocate. She will communicate with project sponsors soon on which projects are moving forward. There are 7 projects in the queue. She also noted that the Lower Frew project is closing as incomplete. This project was funded in 2017 PSAR dollars, which means the project is able to be reallocated for other projects. They plan to fully fund the Woods Creek Railroad project, which needs about \$12k to be fully funded. She noted that think they can fully fund the design of the Woods Creek project.

Gretchen also noted that, for many years, the basin has talked about the need to develop a strategy to address invasive species. Snohomish County has some funding in Floodplains by Design dollars to create a strategy. She noted she is coordinating with Cory Zyla, who is leading a basin-wide Knotweed Working Group. The group is looking at the Hood Canal Knotweed Control Strategy as an example. Gretchen noted that they want to build on these efforts to develop a Riparian Forest Health Strategy, which will be achieved through the support of a consultant. A participant raised the concern that the original intent of the knotweed strategy development was to have knotweed projects funded by SRFB, so the strategy include a nexus with fish habitat and recovery so that those projects are eligible to compete for funding. Cory noted that the group is looking closely at the basin's Salmon Plan and considering salmon

recovery priorities, but that a key challenge is that the Salmon Plan prioritizes funding for actions in the anadromous zone, whereas knotweed treatment is typically prioritized from a top-down approach, which includes zones above the anadromous zone. Colin also noted that noxious weeds treatment typically require a programmatic approach to actually address them, so leadership from local government is likely needed as a long-term funding solution.

Puget Sound Salmon Recovery Council reviewed a new White Paper developed by Puget Sound Salmon Science Advisory Group. The paper looked at limiting factors for salmon recovery across Puget Sound and suggested that we distribute it and discuss it at the next Technical Meeting, so that Gretchen, Elissa Ostergaard, and Keith Binkley can carry forward any input to a late-March retreat being held by the Salmon Recovery Council.

Technical Committee Workplan

Emily Davis walked the group through the 2021 workplan. She noted that the draft workplan was built based on the survey that Emily sent out at end of 2020. Emily noted that they received a lot of ideas. Emily noted that if you didn't get a chance to submit your ideas for agenda topics, please send those to her and Colin.

Emily also shared progress on their 2020 objectives. She then shared an overview of 2021 Objectives and Deliverables. She noted that they are similar to past deliverables (e.g. provide guidance to the Snohomish Forum, address technical issues, etc.). Emily noted that one new addition is that they want to be sure they are tracking technical issues reported around the region and share those when the time is right. Emily invited anyone who attends regional and/or relevant technical meetings and wants to be a conduit for relevant info to please contact her. She noted that being a conduit isn't meant to be a big time demand, just a periodic transfer of knowledge and updates.

Salmon genetics and hatcheries: common myths and misconceptions

Adrian Spidle, Northwest Indian Fish Commission

Adrian began with an overview of his presentation, which included discussion of population structure of salmonids (metapopulation structure, natural gene flow), genetics of complex traits (heritability, gene expression/phenotypic plasticity), hatchery reform review, and an example (from outside WRIA 7).

Adrian provided his thoughts on the population structure of salmonids, including a definition of a metapopulation, salmon colonizing life history, role of migrants, and gene flows. He also described the hierarchical levels of gene diversity. For instance, gene diversity of a unit can be divided among hierarchical levels, such as diversity of individuals relative to subpopulation, individuals relative to total population, and subpopulation relative to total population (i.e. the metapopulation).

He provided an overview of F-Statistics, specifically "Fst", which is a measure of gene diversity of subpopulations relative to total population. For instance, Fst measurements for Puget Sound ESU of Chinook salmon $F_{st} \sim 0.06$ (GAPS 2007) and Puget Sound DPS of steelhead $F_{st} \sim 0.03$ (Warheit 2014). Adrian also provided a comparison of Chinook and steelhead to other salmonids: bull trout and Maryland Brook trout (Skagit River bull trout $F_{st} \sim 0.15$ (Smith 2010), and Maryland Brook trout stream 20 km^2 $F_{st} \sim 0.17$ (Kazyak *et al.* 2015)). In the case of bull trout, he noted this means that 15% of bull trout diversity within the Skagit is at the level of the identified sub-population, with the entire Skagit being treated as the total population. Adrian noted this would mean that there is nearly 3 to 5 times the

diversity within bull trout populations in the Skagit as there are for Chinook and steelhead across all of Puget Sound (6%, and 3% diversity, respectively).

Adrian proceeded to provide an overview of the genetics of complex traits. He noted that the same genetic background is expressed differently in one environment vs. another (i.e. phenotypic plasticity). For instance, the same fish reared in a hatchery that returns back to the river will have some different phenotypical traits than a peer that is reared naturally in the river.

Adrian described the concept of domestication. He noted that the concept generally means the owner is trying to maximize production/output (“grow the most fish”). Adrian noted that is *not* how hatcheries in the Pacific Northwest operate. Specifically, he noted that PNW hatchery selection is inadvertent, such as the relaxation of selection on natural incubation and rearing fitness traits, relaxation of selection on mate choice, and so on. He noted that we need to be diligent about proper selection (i.e. are we picking big fish or small fish at a given facility?).

Adrian provided insights from research into Wenatchee River Spring Chinook. This research found several divergent results, including: (1) hatchery fish have a lower reproductive success than natural fish (Ford *et al.* 2012), (2) hatchery fish stray and naturally-spawned progeny of hatchery fish also stray (Ford *et al.* 2015a), and (3) natural progeny of hatchery fish have the same reproductive success as natural progeny of natural fish (Ford *et al.* 2015b). Adrian noted the divergent results are likely because when hatchery fish don't return to the hatchery, they tend to not pick high-quality habitat and therefore have lower reproductive success; however, when the natural spawners of those hatchery fish return, they go where natural fish are going and ultimately hold the same reproductive success as natural spawners. So we're seeing a 2-step straying process: first a decrease in fitness, followed by an increase, with an end result of no heritable change to the fish. Adrian noted that what this means is that looking at the reproductive success of 1st generation fish is a red herring because we don't know what their progeny will do, or where they will do it.

He then described hatchery reform. Adrian described how fish hatchery practices used to focus on measurable deliverables (e.g. fish spawned, juveniles reared and released), however, spawning practices were revised through the 1990s to ensure hatchery brood is representative of entire natural run. He noted that genetics began to be incorporated during the 1990s. He also shared a short glossary for Hatchery Reform terminology (e.g. pHOS – proportion of hatchery-origin spawners in nature) and added context to each of the terms. Adrian also described key ideas in spawning plans.

He then provided an overview of a recovery program example from the SF Nooksack. He noted locations of hatcheries within the basin. He noted that SF Spring Chinook were reduced to just dozens of returns per year, so hatchery programs were needed to bring those numbers back. He described the two goals of the rearing program: (1) maintain population structure in the system and (2) minimize loss of genetic diversity (maintain N_e). He also described the concept of the Ryman-Laikre effect. He noted they collected about 4,000 individuals as juvenile and bred them to maturity over 5 years. Adrian emphasized that the project has been a huge success in supporting the population in the Nooksack and that they met their genetic goals. He then invited the group to ask questions.

Discussion

Colin asked about the effective population size. Adrian noted that the smaller a population is, the more susceptible it is to genetic drift. (10:25). He noted that what they showed in the Nooksack is no change (i.e. more fish, but they have the same allele frequencies). Adrian noted that overall, each population is sending more fish to other populations over time (with their nearest neighbor).

Matt Baerwalde asked to clarify the percentage of variation among the Puget Sound metapopulation for Chinook and Steelhead, of all the Chinook in Puget Sound, they are only showing 6% genetic variation, and for Steelhead it is 3%. Adrian noted that the vast majority of diversity is just differences between individuals (e.g. Fall vs. Spring Chinook, Puget Sound Spring runs vs. Columbia Spring runs, etc.).

There was also discussion of controls, scope of the example of project in the SF Nooksack, and if antibiotics are used in hatchery operations.

Cherry Creek Avulsion Repair

Erin Erickson, Snoqualmie Valley Watershed Improvement District

Colin introduced Erin, who began her presentation. Erin noted the Snoqualmie Valley Watershed Improvement District (SVWID) was originally connected to this project due to drainage concerns raised by local residents. She noted that since that time, they've been working towards a vision for a multi-benefit project. Erin shared that it became clear over time that there was a fish passage issue at this site.

Erin then shared a short video about the site. The video demonstrated the temporary fix, as part of Phase 1, with a longer-term solution to be developed under Phase 2. She noted that a planting is being coordinated by King County Stormwater Services within weeks. She also provided a trip report on Cherry Creek Phase 1 from October 2020. Erin noted they started the project on Oct 7th and that they knew a large weather event was coming that weekend. In response, Erin shared how they rescued thousands of coho and returned them to Cherry Creek. She also shared that they dealt with COVID-19 issues on their crew, resulting in shutting down the project site. Erin also noted that flows went from 10 cfs to >100 cfs in one weekend. They used net methods to move the fish (the least impactful method). Erin also noted that large wood was placed on the downstream end of the project. She shared images of the upstream and downstream site post-project. She noted how winter floods during 2019-2020 punched a hole in the levee. Erin shared an anecdote about how large wood is helping to keep the channel deeper.

Erin then described Cherry Creek Phase 2 – Floodplain Reconnection. She noted that this was originally part of Phase 1 plans – to reconnect the floodplain by setting back the existing berm – because not only is there is a willing landowner, but this is the right type of tool for this particular problem. She noted there is a high salmonid use in the area.

Erin shared a schematic of the design plans for Phase 2, noting that they've taken the 75% plan and cut it back to a 60% design. The elements that have been completed are the instream gravel removal upstream of the site and the temporary breach repair. She noted that as part of Phase 2, the items that are still being proposed are the bank opening (at the breach repair: removing the riprap and re-establishing the side-channel), adding a swale, removing a berm downstream of the project site to encourage more connection with the floodplain. Additional planting is also planned.

Erin noted they want to engage partners as they move towards 90% Design. They are aiming to submit Final Designs by January 2022. She noted that they are currently seeking funding for final design and construction, including funding from the King County Cooperative Watershed Management program, King County Fish, Farm, Flood potential pilot funding, and King County's Flood Risk Reduction funding may also be sought. She noted that large wood would primarily be used as a habitat feature in future efforts.

She also shared that landowners noted that they noticed a change pretty quickly following the plugging of the avulsion. She noted that all landowners were very thankful and relieved to be going into winter with some form of security. Some local landowners noted the presence of salmon, and that they hadn't seen their presence in several years. Erin emphasized that the project team was very diligent about salvaging fish and monitoring any straying. Erin concluded by noting that their mentality is forward-thinking: another breach could happen, so resilient solutions are needed and compromise between security and restoring habitat are important.

Erin invited anyone who wants to make comments on the plan for Cherry Creek Phase 2, please be proactive and reach out to Erin directly.

Plan Update Update and Floodplain Targets

Gretchen Glaub, Mike Rustay

Colin noted that the Core Team is getting momentum again, including updates to the Water Quality Paper and hope to be positioned to provide an update at the next Snohomish Forum meeting. Elissa Ostergaard has been working on the Monitoring chapter alongside Colin and Mike Rustay. He noted that the synthesis contract is moving forward, so we will have funding soon that can be transferred to Josh Chamberlain and present results to the Technical Committee. Gretchen is also leading a Nearshore Working Group.

Mike Rustay provided an update on Floodplain Restoration Targets, putting it in the context of the Salmon Plan and Plan Update. He noted that the Snohomish Acquisition Strategy was a key tool they had in their back pocket to inform this effort, and invited Brett Shattuck to share more background.

Brett noted that the strategy started with an extent of 18,806 acres, mostly within the Snohomish County side of the basin and a focus on natural process function (it excludes some areas behind infrastructure; includes Skykomish watershed; does not include the Snoqualmie watershed). He described how the team broke the strategy up into quantiles (Floodplain units, or FPU's). Out of the 5 quantiles, Brett noted that they deleted the 2 lowest scoring quantiles, and took the top 3 to inform a proposed restoration area, totaling 10,512 acres (or 56% of total acreage in the strategy). He shared their rationale for 10-year targets for this spatial extent and that they estimate it would take ~150 years for this ~10,512 acres to be fully restored (i.e. assuming 70 acres per year). Brett noted they then extrapolated that work to the rest of the basin, for instance including marshlands and the Snoqualmie watershed, resulting in 48,428 acres. Using similar logic (top quantiles, 56%), Brett noted we would need to restore 181 acres per year over the same timeframe (150 years) to fully restore the larger extent.

Given this is an extremely large area, Brett posed the question if it's okay to have a target that is large/difficult to achieve (e.g. does that mean we need to frontload floodplain restoration efforts?) and proposed some options to reduce this number, including reducing the proposed restoration area below

56% (i.e. further prioritization), reducing target area (total floodplain acres), or lengthening full restoration target to more than 150 years.

Brett also shared examples that could be counted towards the target. These included Haffner-Barfuse (134 acres) and the Haskel-Slough project (71 acres), areas where natural processes are being restored, side-channels are reconnected, and so on. Mike shared one idea to breakdown this large amount of work is that we could have different restoration types (e.g. full floodplain restoration, partial restoration, enhancement, etc.).

Brett invited comment on the process they went through to arrive at these targets and any comments on the targets themselves.

Discussion

Denise Krownbell noted that she agrees that frontloading is needed (i.e. putting more floodplain projects upfront, to the benefit of people, salmon, and ecosystems), especially in the context of anticipated climate change impacts.

Micah Wait asked about how biological data was used to set targets and/or how they might be used in the future, such as the life-cycle model. Brett noted that they totally agree with that insight and that the challenge is that the data are not yet available. Mike also agreed, noting that this should be framed as an interim target that will be adapted as data are collected. Brett added that the target is based on best available data, but also includes professional judgement and assumptions. He noted that the hope would be to determine how much floodplain restoration is needed to achieve recovery goals as data becomes available.

Susan O'Neil also directed the group's attention to the Status and Trends report and remembering what was flagged in that report and what we are tracking. She noted this interim target is a good way to communicate with partners, even if it is only interim.

Roundtable Updates

Colin invited participants to provide roundtable updates.

Brett noted that they are beginning to engage folks who are active in the Snoqualmie watershed to expand the Acquisition Strategy efforts.

Elissa shared an update on coho pre-spawn mortality. She noted they did not find any evidence of pre-spawn mortality during their surveys, but in the Middle Fork Quilceda, they did. She noted that they will be doing 1 more year of surveys.

Lindsey Desmul shared a reminder that they are putting together a Nearshore Restoration Summit, starting on the 10th (Wed, Thurs, for 3 weeks). She noted that it'll be a smaller discussion by invitation only. Once they have a registration link they'll send to Emily and Colin for distribution.

Kollin Higgins also asked if there has been discussion of Fish Barrier Removal Board draft SRKW Chinook barrier list, as he think their methodology has some gaps and he believes they want feedback by March 1st. Gretchen noted that she sent the SRKW Chinook Barrier list out yesterday to a number of sponsors in the basin who work on barriers and asked for their input. Kollin noted that the list is missing barriers right on the mainstem. It also includes sites that are unlikely to be used by Chinook. He noted that it was

a desktop exercise, so not surprising that it has errors, but it could use a good QA/QC by those who know the basin. Brett noted that he took a look at the barrier list that Kollin was mentioning and agreed that it looked to have a lot of gaps/inaccuracies, encouraging folks to look at it.

Jim Shannon shared an update from the Port of Everett. He also noted that that Jim Miller is retiring from the City of Everett, and that Heather Griffin is taking on his responsibility as liaison with the technical committee. He noted that City of Everett is working on their stream crossing inventory and was wondering if anyone had any info to share. Please contact Jim if you have any info to share.

Meeting adjourned at 12:00 PM.