

Resilient Waters Advisory Meeting Report

January 23rd, 2020

1 Overview of the Advisory Report

On Thursday January 23rd, 2020 from 9 AM – 3:30 PM the Resilient Waters team hosted the first meeting of the project advisory members at the Anvil Centre in New Westminster on the unceded traditional territories of the mainland Coast Salish peoples. We had 23 attendees (including our project team) from across disciplines and sectors giving fruitful feedback.

This feedback has given our team a lot to consider and follow up on. In the interests of getting this information back to advisors and others in a timely fashion for their own usage, to encourage better coordination among concurrent overlapping projects, and to capture smaller details to large ideas as they were expressed, this report is in a relatively raw format. It consists primarily of notes taken from the discussions with little refinement. Our team will take this input and incorporate your ideas and feedback into our process. We look forward to our next Advisory meeting in late March or early April 2020. If you have any questions or further feedback please do not hesitate to connect with Dan Straker, Resilient Waters Project Manager at dan@resilientwaters.ca or 604-812-9676.

Table of Contents

1	Overview of the Advisory Report	1
1.1	About the Resilient Waters Project	2
1.2	Project Timeline	2
1.3	Resilient Waters Project Team and Partners	2
1.4	Attendees	3
1.5	Agenda	3
2	Workshop Results	4
2.1	Prioritization Framework - General Discussion	4
2.2	Prioritization Framework Table Discussions	5
2.2.1	Prioritization Framework	5
2.2.2	Map of Flood Control Structures in the Lower Fraser River	7
2.2.3	Relevant data sources, projects, organizations, and gaps	8
2.3	Field Work Plan and Other Technical Considerations	10
2.3.1	Field Work Plan	10
2.3.2	Engineering Considerations	11
2.3.3	Engagement and Collaboration	14
3	Feedback on Advisory and Next Steps	15
3.1	Results from Advisory Feedback Form	15
3.2	Next Steps	16

1.1 About the Resilient Waters Project

The Resilient Waters project of [Tides Canada Initiatives](#) is a two-phased salmon restoration and conservation project that seeks to reintegrate vital wild salmon habitat by modifying and upgrading flood-control infrastructure (FCI) and restoring adjacent habitats in the Lower Fraser Valley region. FCI along the Lower Fraser is vital for the protection of homes, farmland and businesses. Yet, recent mapping shows that over 1,500 kilometers of wild salmon habitat in the Lower Fraser is fully or partially blocked by these floodgates and pumps. Many of these structures and associated dikes must soon be replaced or upgraded due to aging, and/or to accommodate sea level rise and increased seasonal flooding due to climate change. This provides an opportunity to reopen a potentially vast amount of formerly high-value salmon habitat through flood gate replacements, pump retrofitting, associated upstream habitat restoration, and other work.

Phase 1 of this project (October 2019 – March 2021) will identify and prioritize sites for FCI upgrades and restoration by examining these structures and their affected waterways across the Lower Fraser River watershed (Richmond – Chilliwack). This will be followed by analysis and consultation to identify the highest priority sites for infrastructure upgrades and habitat restoration. The results of this analysis will inform the design and implementation of upgrades and habitat restoration in phase 2 (beyond March 2021). Results from Phase 1 of this project will also feed into a larger-scale regional assessment and restoration initiatives being undertaken by Raincoast Conservation Foundation, the Lower Fraser Fisheries Alliance, the Pacific Salmon Foundation, the University of British Columbia, and into fish passage remediation work proposed by the Canadian Wildlife Federation and partners. Our data analysis and outcomes will inform their regional restoration priorities and vice versa. The project is primarily funded by DFO and BC Salmon Restoration and Innovation Fund.

1.2 Project Timeline

Activity	Time Period
Prioritization Framework	Nov 2019 – March 2020
Field Work and Engagement	April – Aug 2020
Analyzing Data and Aligning Priority Sites	Sept – Nov 2020
Recommendation Report	December 2020
Phase 2 Workplan	Jan – Mar 2021

1.3 Resilient Waters Project Team and Partners

The following are project team members and key collaborators on the project that also attended the meeting.

Name	Organization	Role on Project
Dan Straker	Tides Canada	Resilient Waters Project Manager
Bridgitte Taylor	Tides Canada	Internal Steering Committee
Patrick Lilley, Craig Sutherland, and Larissa Lowe	Kerr Wood Leidal (KWL)	Prioritization Study Lead
Mike Pearson	Pearson Ecological	Field Team Lead
Lina Azeez and Aaron Hill	Watershed Watch Salmon Society	Engagement and other support

1.4 Attendees

There was attendance from a cross section of 16 municipal, regional, provincial, and federal government staff, academics, and ENGOs, in addition to our core project team.

Name	Organization	Job Title
Brent Baron	Indigenous Services Canada	Senior Engineer
Katarina Duke	FVRD Engineering & Community Services	Engineering Technologist
Riley Finn	University of British Columbia	M.Sc. Student
Jeanne Hughes	FLNRORD	Surface Water Authorizations Specialist
Millie Kuyer	BCIT Ecological Restoration	Assistant Instructor
Charlene Menezes	Vancouver Fraser Port Authority	Environmental Project Management
Dianne Ramage	Pacific Salmon Foundation	Director Salmon Recovery Programs
Dave Scott	UBC	Student
Sarah Sra	Canadian Wildlife Federation	Conservation Planner
Robyn Worcester	Metro Vancouver Regional Parks	Natural Resource Management Specialist
Alexandre Salvaille	BC Government (MFLNRORD)	Senior Flood Hazard Officer
Forrest Smith	City of Port Coquitlam	Director of Engineering and Public Works
Eric Balke	South Coast Conservation Land Management	Program Coordinator
Suzanne Thorpe	DFO Salmon Restoration and Innovation Fund	Senior Program Officer
Betty Rebellato	Canadian Wildlife Federation	National Fish Passage Program Coordinator
Murray Manson	DFO Restoration Unit	Fisheries Biologist

1.5 Agenda

Start	End	Item
9:00	9:20	Welcome, Purpose, Agenda, and memories of fish
9:20	9:50	Project Background, Scope, and Timeline (Lina Azeez and Dan Straker)
9:50	10:15	Prioritization Framework and Study Overview (Patrick Lilley)
10:15	10:30	<i>Break</i>
10:30	11:30	Prioritization Framework and Study Discussion
11:30	12:00	Advising the Project & Working Together (Dan Straker)
12:00	13:00	<i>Lunch</i>
13:00	14:00	Workplan Overview - (Field Work Plan – Mike Pearson, Engagement – Dan Straker and Gillian Fuss, and Engineering – Craig Sutherland (KWL Engineer))
14:00	14:15	<i>Break</i>
14:15	15:15	Workplan Table Discussions
15:15	15:30	Wrap up, Next Steps, and Feedback Survey

All presentations are available for viewing at this link:

<https://drive.google.com/drive/folders/1bi15BCWi98JiTxRy7F3n9NdaMCEQEgfc?usp=sharing>

This sidebar provides an index of topics for quick scanning

Integrating future infrastructure and growth planning

Species at Risk

Project Goal - Reconnecting streams vs. restoring habitat for salmon

Agriculture and farmers

2 Workshop Results

Below are results of our discussion following presentations from our core project team. Discussions took the form of two x one-hour sessions of table-based discussions, with rotations of table participants at 30-minute intervals. Each discussion session had three distinct topics, one for each of three tables of 5 to 8 advisors. These three topics are reflected in the headings and sub-headings in the notes below, and participants moved tables once per session so that they were involved in at least two table discussions per session. The sidebar text provides a quick index of topics in the notes.

2.1 Prioritization Framework - General Discussion

Following a presentation from Patrick Lilley of Kerr Wood Leidal on the proposed prioritization framework approach, the floor was open to clarifying questions and general comments from participants. Here were questions with responses from the project team:

- How do you integrate future plans for diking and integrate with those activities to reduce flood potential? How are we working with those people to help modify designs they intend to put on the landscape?
 - Response from project team: This is a bit outside the scope of the project and more along advocacy and policy, WWSS is working on with Connected Waters campaign.
- Is prioritization framework looking at species at risk, and what about sturgeon?
 - Response: Yes, it will take into consideration SARA Species in some shape or form
- What salmon are we looking at currently? We will need to know because different criteria for different types of fish.
 - Response: Chinook is likely the number one target at this point, but doesn't limit the project to only Chinook – one of many considerations to weigh

The following are more general comments made by advisors following the presentation:

- Floodbox and tide gates are the same structure – only difference is terminological since tide gates are affected by tides.
- Just reconnecting waters is not going to recover salmon stocks – just be careful in objectives, goals and terminology used. Reconnecting waters is achievable but don't let this limit the target which is really to recover salmon stocks. If objective is to recover flood plain then connectivity to upstream is not going to recover flood plain. Don't focus on individual fish, focus on habitat that may be used at different times of the year. Connectivity is a priority and will improve as flood protection is upgraded, but if we let connectivity be a target we won't do nearly enough to achieve primary goal which is to recover salmon. Eg. Getting access to the flood plain is not going to be fully recovered through connectivity.
- Habitat in lower fraser, it's easy to get hooked on present/historic species in watershed. But floodplains, every km has more thousands passing stocks that use all the side plain and confluences...E.g. don't necessarily just focus on what fish are there, but that habitat might be used by stocks who are not native to that habitat
- We should get the Ministry of Agriculture, agriculture community, and diking authorities involved as soon as possible:
 - Response: we are working on connecting to ministry of agriculture. We do have diking maintenance and authority in FLNRORD flood mgmt. and stream teams represented. WWSS will have a farmer to farmer forum later this summer and we will continue to work

on our engagement plan for working with individuals impacted as we narrow down our site list)

- Canadian Wildlife Federation is doing their own prioritization framework and wants to work closely on this project to share information
 - Response: we have each attended the others workshops now and are aware of each others processes. We will work to ensure that our projects remain informed of each other.
- General tension about what it means to be ‘fish-friendly’ – a spectrum and maybe better to avoid this term.

2.2 Prioritization Framework Table Discussions

The group broke into three table based discussions related to the presentation:

1. Prioritization Framework,
2. Map of flood control structures, and
3. Relevant data sources, projects, initiatives, and gaps

Each table had both a facilitator and note taker from the core project team and were attended by 4-7 participants. The following are results of the table discussions:

2.2.1 Prioritization Framework

Facilitator: Patrick Lilley - PL, Notes: Larissa Lowe

Question: Has anyone done a prioritization framework before and can you provide feedback on how it went.

- Washington State has done some work with culvert replacement and habitat restoration.
- How is the CWF prioritization project similar to our project?
 - CWF mapped areas where salmon are expected and barriers that are there, prioritized which areas had the most habitat and most habitat value then using modelling
 - Different because CWF project includes all of BC. Will narrow down to specific watersheds then take national.
 - There is a potential for data sharing
 - Easy to get low hanging fruit but that’s why modeling so we can get the best out of what we are doing because low hanging fruit not always the best and have the biggest impact
- Discussed Riley Finns work in the lower Fraser and how we are on different timelines
 - Work includes: looking at lower Fraser watersheds and creating a model to help prioritize and optimize restoration efforts (software)
 - Work is being done in great lakes – Check out the Fish works model
- How to better connect existing partners within the watersheds and who’s doing all the pieces and what is the bigger picture
 - Meetings are good but would be better to have a system to do so
- We need to figure out a way to work with stewardship groups. There are a number that don’t have online webpages that have important data collection of places within the lower fraser. Need to build a platform where all stewardship groups can communicate and work together.
- Are there any similar projects outside of BC we could look at?
 - Washington State has done some work with culvert replacement and habitat restoration.

Fish-Friendly ambiguity

Coordinating with other projects doing similar work

Creating a system to coordinate

Incorporating Future Conditions

- How should we incorporate future growth into prioritization (OCP and future impacts)
- PSF and funding projects framework: Can only choose between projects that are presented to them.
- Start broad as possible then break it down, go where the water will be in the future. We can build habitat, but we cannot build water.
- Will habitat restoration be factored into the prioritization? Don't want to forget about areas that have great potential for habitat through restoration work.
- Should think about future habitat. Something that is great now may not be so great in the future. Same with if something is not great now it may be in the future. May want to create a list of projects for future work so potentially other organizations or other funding can help take on.
- Where can we screen out places that will not recover (i.e. glacier fed streams that no longer will no longer be fed).

Technical Analysis vs Expert Opinion

Question: What are your thoughts on how much technical analysis versus expert opinion is being used?

- Challenges: tight timeline and needing to move forward with field work. Don't have time to do modelling. Leaning towards expert opinion including TEK.
- Mike to do field work data collection primarily fish sampling within and outside structures. Mike will complete habitat assessments and look at quality and quantity of habitat.

Age of structure

- Hatzic watershed is a main location CWF wants to fix
 - In 2016 Hatzic infrastructure was replaced but it's a huge ecological area and don't want to screen it out because it was recently done.

Land Uses

- Probably shouldn't look at structures that have been updated within that past 5 years. Age of structure should be included within prioritization

Difficulty of the project

- We shouldn't shy away from developed areas (i.e. diking along agricultural lands)
 - We can get easements, right of ways etc. on lands to build infrastructure
 - We can incorporate habitat works into rezoning applications.
- Is recreation included within the framework?
 - It is a part of the social aspect, but not a key component
- Maybe tackle a couple difficult projects. Can use them as pilot projects to help show communities that difficult partnerships can be done.
 - Would want to look at opposite extremes and work with jurisdictions that may be difficult – show it can be done

Enforcement of regulations

- We must be mindful of the funder (DFO– SRIF) and what their intentions are for the funding
- Discussed the Fisheries Act and how all new structures must be fish friendly
 - The Minister can make it happen. So, if a jurisdiction doesn't want to update their infrastructure the Minister can order them to do it. Not used often as it can be tedious and messy.
- We don't want to choose projects that are a legal obligation of municipalities. For example, culverts.
 - The funding is for supporting fisheries with a focus on innovation
 - Horgan really wanted habitat restoration therefore the fund was split 30% province, 70% DFO in terms of where the money came from

Orphaned dikes

- Will orphan dikes be looked as a possible project?
 - Currently no one wants to take responsibility for the 35 within the lower Fraser
- PSF have had major issues trying to get a project going regarding orphan dikes because no one would sign off on it (no owner).
- How is UNDRIP getting involved?

UNDRIP and First Nation collaboration

- LFFA has designed engagement so it includes FN at all levels. Goal to have collaboration instead of an engagement model
- Likely many tiny projects that will fall off the map because the area that they protect are small. But may be operated in coordinated fashion...perhaps a BMP captures a class of pump stations where 25 small pumps could all change how they work
 - May not fall into top 10 into this process, but collectively important
 - Perhaps look at certain sites like a class/network
 - Could be interesting to put some Feich nets out, could potentially be pulling 3000 coho fry. Don't ultimately know...perhaps keep an eye on this during RW project?
- Want to start with the most data and information as possible then work our way down
 - Discussed the fact: 30-50% streams in BC is cut off by some type of barrier --> so very high number
- Need to also look upstream of structures and see how much available habitat is really there. Need to also think about restoration/recovery potential of watershed. Even though a culvert 100 m upstream is a blockage if that blockage removed then over 2 km of habitat. What other activities in watershed are impacting habitat (eg. land use).
- We never envisioned RW as one-shop deal. This is an ongoing process. Assessment methodology is there, framework is there, data sets are compiled and accessible.
 - As ecological/political shifts happen, we can hopefully get money to redo assessment at a lower cost and time commitment
 - Keep having priorities on table so that this happens over the next couple decades. Enables a ton of restoration in the Lower Fraser a generation from now

2.2.2 Map of Flood Control Structures in the Lower Fraser River

Facilitator: Mike Pearson, Notes: Lina Azeez

Conversations in this group focused on looking at a large map of 156 Flood Control Structures in the Lower Fraser River and asking two questions: what are errors in the map, and what sites would you immediately list in your top 10 sites for modification.

Identifying errors in the map

- Byrne Creek – still a gate there, operational change to keep gate open and upstream – don't focus on this one
- FLNRORD is surveying all flood inventory – will be ready shortly –
- FVRD working on Hatzic Slough – 2 additional new pumps in 2016 – gates are not friendly – old pumps still used in high flow – area of priority
- Mountain Slough – upgraded to screw pumps. Outlet screens a little too small – so that's an issue
- Surrey – sea dam – avoid – not in scope anyway
- Yorkson Creek – gates mostly closed, 1 screw, 1 regular – City inspects everyday – low DO
- Pitt Meadows – no gravity feed
- Nicomen Island – FVRD has all the field data
- Miami Creek – upgraded w/ screw pump
- Ladner – Chilukthan and Crescent Slough – worked on the pump station in 2012
- Bon Accord Creek – upgraded
- Nicomen Slough closed completely
- Dike breach top end of Mariah Slough
- Add Still Creek

Change in operational regime

Prioritizing Projects

Look Upstream

Updating the map of Flood Infrastructure sites

Top priority sites based on opinion

If it was up to you to list top 10, what would they be

- Pitt Addington Marsh Wildlife Area – Prov conservation lands, Ducks
- South Arm Marsh WMA – diked, no plans to upgrade, used for agriculture for migratory water fowl, sea level rise will make it that dikes breach and farming is not feasible. Restore to tidal marsh. Eg: Williamson Island. Gunn, Rose, Kirkland – owned by Duck and TNC, leased to the Province
- Deas Island – old dikes, no real plans to upgrade, no pump stations
- Avoid Nathan Slough, Langley
- Abby – so much
- No flood box on Nathan Slough
- Maple Creek
- Nicomen Slough
- Hope Slough
- Westham Island – breach a flood protection berm that is now protecting land not being farmed any more – Sarah Nathan, Ducks Unlimited (explore)
- Idea to breach North Arm w/ a jetty breach (Raincoast currently assessing)
- Brunette weir
- McLean Creek, Coquitlam – not upgraded because of the orphaned dike – no permission to do this work

Other comments: Orphan dikes should be mapped and identified in a different colour

Data Sources, Projects, and Gaps

2.2.3 Relevant data sources, projects, organizations, and gaps

Facilitator: Dan Straker, Notes: Bridgitte Taylor

This discussion was open to identify any relevant data sources, research, projects, organizations, initiatives and significant gaps in data.

Research

Research:

- BCIT Ecological Restoration and Fish Wildlife Recreation Students (1 yr) Also UBC and SFU (multi-year) - Partner on research and monitoring of projects. Keep in mind advantages of each program in relation to scope of research project. Ongoing annual monitoring could be BCIT / ER program, whereas targeted investigative research question UBC or SFU.
- BCIT Rivers Institute - Connect via Millie or Ken Ashley, doing more research especially around climate adaptation
- In addition to 2009 KWL study and 1999 Johnson study, also look at M. Gaboury/Bussanich 2008 and Gaboury/Rammage/Shinkewski 2011 (Murray Manson DFO has a sheet of projects he's updated based on these reports)
- POLIS project and Enviro Law Centre (Deb Curran) at UVIC – for relevant contextual legal, regulatory, policy, governance research

Funding

Funding opportunities:

- Coastal Restoration Fund - Multiple projects under this, Raincoast, LFFA, DUC south arm marshes
- Fraser Watershed Initiative Rivershed Society - Finn Donnelly's project to help fund these kinds of projects
- NSERC - To fund technological innovation
- Sustainability Innovation Fund Metro Vancouver - To work on technological innovation

- Port of Vancouver Habitat Enhancement Program - Connect on opportunities, potentially alter flood control practices on many structures at once

Overlapping Projects/Strategies to connect with for data/methods/networking:

- Climate Adapt Project LFFA - Looking at pollution and contaminated sites, overlaps with aboriginal knowledge project (not publicly available). LFFA reviewing offset opportunities
- Flood Protection Works for First Nations - Various Communities and Compensation Interests – Connect with Gillian Fuss and Brent Baron
- Province can recommend specific restoration projects for compensation via Water Sustainability Act – connect with Jeanne Hughes at FLNRORD Flood Team
- Province is starting a Fraser River Special Initiative Project (Jeanne Hughes)
- Collaborative Stewardship Project (BC Gov and LFFA) – Grassroots project working at site level. Collecting water quality, state of watershed, and cultural projects
- FBC orphaned dikes project – dikes not “owned” by authority, opportunities for habitat
- Coastal Flood Analysis – NRCAN – not done for Lower Fraser yet, but could be done soon
- City of Vancouver and Park Board - Managing stormwater on land with green infrastructure / nature based solution
- Fraser Basin Council Lower Mainland Flood Management Strategy
- Metro Vancouver Land Acquisition Strategy and Sensitive Ecosystem Inventory maps / Land cover
- Canadian Wildlife Federation BC Fish Passage Restoration Project
- Fraser Valley Watershed Coalition – Natasha Cox
- All munis have fish presence data, and habitat data - the issue is the quality and methods vary
- Port Authority has habitat quality mapping for the Fraser shoreline
- Community Mapping Network has incorporated both municipal data and Port of Vancouver data
- CMN proposed to draw together fish habitat inventory data (via CRF funded LFFA project) called Lower Fraser Habitat Restoration Strategy
- Province developing a tool Stewardship Objective Baseline Tool (SBOT) – will allow user to drop a point and find nearest fish bearing stream
- Pacific Salmon Explorer of PSF mapping fish and fish habitat and lower Fraser threats but too coarse – estimated completion date March 2020

Site Specific Projects / Opportunities:

- Sturgeon Bank Marsh – Recession project and possible pilot project, scoping sediment island deposition project in Lulu Island...opportunities for piloting unique ideas (Eric Balke)
- City of Richmond Sea Island developments for trails / roads
- YVR Strategic Planning
- Richmond River Rd below trestle bridge (pump / gate/ agric)
- Matsqui offset opportunities
- Upper Pitt Restoration
- Lost Lagoon in City of Vancouver – Nick Page working on this
- Bert Brink WMA Floodplain forest restoration project

Overlapping projects / strategies initiatives to connect to

Site specific projects / opportunities

Relevant projects that don't overlap

Gaps in data and projects

Field Work Plan

Report card style presentation

Restoration Potential

Sampling for native species

Sampling methods

Reference sites

Sculpin as connectivity proxy

Projects with relevant methods, but not directly overlapping:

- Living Breakwaters Project (UBC) – modeling sea level rise
- Salmon Pump in Delta on Boundary Bay – reference site
- Living Dike project

Gaps:

- Funding and policy for Nature based solutions
- Future of flood coordination
- Flood infrastructure solutions that are good for fish – Maybe Washington and Europe for examples of this – need partnerships of engineers and biologists
- Climate Change Modelling
- FNs leading projects

2.3 Field Work Plan and Other Technical Considerations

Following presentations from Mike Pearson of Pearson Ecological on the field work plan, Craig Sutherland on Engineering considerations, and Dan Straker & Gillian Fuss on engagement and collaboration (see slides 19-20), we moved to three distinct table discussions, one for each presentation. Here are the results:

2.3.1 Field Work Plan

Facilitator: Mike Pearson, Notes: Larissa Lowe

- Report card model is good because it doesn't automatically brush off habitats that score "low" (and seem not worthy of restoration)
 - Want to keep nuance in the data. Not brush off any habitat
 - We need to assess restoration potential somehow within the data sampling
 - i.e. a wildlife management area will look dif than urban setting.
 - Could have 2 criteria's for the score: current conditions and future potential for restoration. Higher restoration potential would be weighted to bump things up
 - Will the field work include sampling and looking at habitat for other native species (i.e. sturgeon) and not just salmonids?
 - Plan is to incorporate SARA into the field work
 - At locations without staff gauges we can install water level loggers (install inside and outside of structure)
 - How do we determine when flood structures are open and closed? Want to be able to take measurements at different times and to see if flood control actually working as suppose to.
 - Could do photo cameras that do every 30 minutes
 - Can use an accelerator to determine movement
 - Can we use drone for photographs?
 - Will want to use reference sites and may be useful to use Dave Scott's site locations
 - Sculpin can be used to determine connectivity between Fraser and tributaries (flood infrastructure) as they are not known to be big swimmers (can't pass high flows)
 - Depends where the site is located. Hard to use due to the number of small and big airports within the lower Fraser
 - Can get good data for barriers/obstacles using jurisdictions ISMPs
 - Don't rule out a high habitat area if barrier 50 m upstream --> CWF says they can address it by taking the barrier out
 - Temperature loggers should be a focus to get a good understand of the watershed
 - Should put throughout in a gradient to see how it changes throughout the reach

- Baseline data for climate change
- May put up to 50 loggers within one watershed
- Look at which sites are already getting logged for water levels and then install water level monitors at ones that don't have them
- Install will need to be on both sides of infrastructure
- How do we do the monitoring for water levels? When do we need to put them in? Before freshet?
- Get loggers in when water is at the lowest especially at Fraser side
- Looking at doing benthic sampling instead of any water quality analysis
- Lab samples are a big budget item and only a couple samples can be done (grab sample)
 - They are grab samples and don't give you much information about the watershed as a whole
- Consider Groundwater monitoring, can tell you a lot

Data logger on inside of flood control structure --> can put something inside and outside structure that is photosensitive, however, won't work for evenings

- Might be useful to discuss with Marvin from BCIT. He's used 3D sonar before.
- There is a provincial LIDAR data set that covers the whole lower Fraser
- Specific to instream habitat what about vegetative community and composition of invasives
- Can influence restoration and helpful for scoping restoration
- Is there a worry regarding opening up these systems to invasives?
 - Response: Most invasives are concentrated within the dyke system not outside so the issue of introduction is not a big worry.

2.3.2 Engineering Considerations

Facilitator: Craig Sutherland, Notes: Bridgitte Taylor

- What has been effective, what hasn't? lessons and innovations
- Self regulating tide gate installed on Fraser tributary. After, municipality developed area. Curious about this.
 - It's on Fraser Tributary (previously Nelson Creek)
 - Thought it would be very effective, but only meant that it was "better than it was"
 - Was closed more often than PSF thought. Before it got in, levels might not have been monitored well enough beforehand. Could have been data issue upon installation
- Monitoring status of gate continuously could be one solution
 - We did this, but didn't work
- Climate change is a big thing to consider. Water levels are changing, increased rain, snow, longer periods of drought. Can cause data gaps.
- DFO/Diane worked on Lane Creek project. Installed pumps. DFO saw this as chance to put a screen on...knew there was fish there, were thinking that rebuild would include screen on intake. Response was that from an engineering perspective, it's impossible
 - If they can't guarantee water will come through and screen is there, it will get clogged.
 - Couldn't make screens large enough to let through fish
 - Could a screen be developed that addresses this?

Water temperature as proxy for quality

Water Level

Benthic instead of water quality

Engineering Considerations

What has worked vs hasn't

Self-regulating tide gate

Climate Change and increase in water level

Design a new screen to allow fish passage

Fish friendly problematic

Getting fish over a dike - fish ladders problems and solutions (theft, physiology, behaviour)

Scaling up simple solutions

Changing manual regimes

- How can we modify existing equipment that doesn't require a screen?
- Fish Passage Learning Circle – might have some ideas
- Idea: Want to design a screen that could be produced for \$5k...apply to 20x stations. Would make a huge difference.
 - Screening always a challenge with debris. But there is a solution
 - As it gets warmer in summer, more droughts. In winter, ice buildup. Infrastructure isn't used to this. Warm, still water is allowing aquatic invasive plants that never used to be there
 - Hence, challenge of debris free screen is that climate change makes that harder too
 - More stagnant water that never used to be there
 - Also want to be cost effective. How can we build many at the same time?
 - Idea that 'fish friendly' is making it only 'better than it was' (not restoration) is problematic
 - Question: what about getting fish over the dike? Is there enough flow to attract the fish to it to go over?
 - i.e. fish ladder you are pumping up to, that allows fish to come over dike
 - need to have power, would need to be contained. Couldn't have little fountain without it getting plugged or vandalized
 - People steal fish ladders
 - If you had that set up during migration time, the water would be flowing down, but for the fish they would have to climb back up because it's seen as a stream. Would fish even adapt to this? They are looking to just be swept to current. They might not adapt
 - Juveniles that are coming in from down the river are exhausted and starving because of no rest stops, and no food available due to agricultural pesticides. Hence, anywhere they go, they need to just be swept in.
 - What about little attracted flow running via pump (water high on the other side, gates closed) to attract fish to follow it...lungway valve that see's fish is there and spits it out. Becomes 1-way so it can't flood back, but has detected that fish has passed and can automatically squirt them out
 - Would go right through the dike
 - what about an air lock with 2 gates?
 - it's similar to an air lock but with water
 - Could have a bucket on a conveyor belt, similar to a mine belt.
 - but somehow would have to be attracted into where they'd get caught
 - Would need current, or a suction pump 1-way
 - there's no such thing as a pump
 - low tech, simple is better. Something that detects movement and just opens
 - there's diff things going on. Fish who are in area wanting to leave safely. Then fish who are using it as habitat. These solutions only address out migration, not longer open access
 - probably easier to have a solution for the flood box
 - There's a whole class of small, top mounted gates that all protect habitat. Might not look very nice on assessment scores, but as a group/cluster, if there's a solution that can be applied across them you could make a difference.
 - May be worth looking at BMP for this. Timing windows to address the reality that people can't just be going down and opening/closing gates all the time
 - Perhaps 1-2x a year, could change it. But can't be going down every week
 - If that's the though, need to change municipalities you are working with. Ex.) Port Coquitlam has built road that goes up against dike, densifying.

- If we create better engineering, need engineers that say that we can't engineer our ways out of climate change (e.g. start saying no to building near dikes)
- This power that's been given to local government has been difficult to navigate
- In Alouette, pumps are pumping fish out of river by accident. If engineers made it easier to have fish screens that are effective, but still allowed pumps to cycle properly.
 - As sea level rises, elevation of pumps have to change too
 - Is there a way to add tech to the pumps?
- Set up blackout 'low risk' periods. I.e.) if you're going to pump, pump before fish are out.
- One way to co benefit agriculture/fisheries: looked at bringing in water from Coquitlam river to colony farm (this would improve water quality, provide water for irrigation, then specific pump bays that would be built off main ditches that were screened). Allowed big surface areas
 - Con: costs associated
- A lot of stuff went into Colony Farm that could be learned from
- Every time we work with Richmond/Surrey they say they have no fish habitat
- Jewel gate concept is a spring concept. Would hold the gate open until the water flowing around it would overcome that tension, gate would close. Fairly simple, but conditions need to be right.
 - Gates sometimes don't have enough velocity going in so it doesn't close.
- Side mounted gates often don't open because there's no pressure upstream. Not enough flow to get it fully open. Too heavy
 - Could work with lighter material if it would open on a lighter flow. In summer, not enough low
 - Could they be open whole time in Summer?
- Main thing that is sometimes a challenge is learning from past projects of what does and doesn't work.
- Pipe through the dike with 2 valves. Senses fish is there, opens up other valve at higher pressure, and they are pumped through
- Approach needs to be scalable across many different sites
- Top mounted cast iron gates do NOT work
- One site at Pitt Addington has 2 light top mounted gates. No pump, but gate is really light
- Only 3 self regulated tide gates in whole area
- Burn Creek example: side mounted tide gate, modified with weight system. But ultimately chained the gate open majority of the time
- Majority of the year, no flood impact. Could be chained open most of the year. But resources to go and actually open them is challenge
 - How could it be automated? This is what tide regulated does (hydraulic system vs. chain) but still similar.
- Debris always a challenge. Other designs have used floats/levers but debris gets caught, even with booms
- City of Surrey has salt (sea) dams. Not fish passable, but looking to have them replaced and upgraded
- How can you reduce the need to use pumps? Could save the municipality money on electricity, good incentive. BCSRIF feedback: this is innovative!
 - Or, can you reduce the amount of pumping at certain types of year?

Transforming culture of disciplines and authority

Co-benefit of improved water for agriculture

Gate styles and issues

Scaling solution up

Keeping gates open – automating vs manual

Reduce pumping

- Is there certain times of year where the water level is higher on other side so that there's more storage?
- BCSRIF: look at current location of these sorts of infrastructure vs. where they could be. Would limit number of projects you could do, but may be most effective. Rebuild lower portion, etc.

Screen by land use

- KWL is looking at this out near airport
- Can also screen by land use adjacent to dike. Areas with low productivity agricultural land, could be opp. Acquisition cost associated though.
- Not a ton of new technologies coming out of U.S. They have more experience with tide regulated gates, but limited success. It improves conditions, but doesn't restore
- Part of it could be just restoring adjacent land. Is there an interest from agriculture to change their operations?

Restoring adjacent land and dike setbacks

- Metro Van has land acquisition parks budget. Could this be used towards areas that are potentially dike setback areas? Recreation amenity but also potential restoration project
- Meeting seismic criteria for dikes right by river is expensive. But if you set it back, cost reduces. Hence, movement could be co-benefit to both cost and restoration
- Problem is: might have to purchase land in order to reset it

2.3.3 Engagement and Collaboration

Facilitator: Dan Straker and Gillian Fuss, Notes: Lina Azeez

How to Engage?

How to engage

- Important to keep project in scope when presenting to potentially interested parties – do not oversell what the project is offering in terms of opportunity
- Messaging is important when shortlist is created and engaging with citizens
- Balance the outreach with more detailed after short list is identified
- Project will use a survey to municipalities, or series of surveys catered to different audiences
- Pacific Streamkeepers Federation – short questionnaire to their network
- CWF might have also done a similar survey – ask Sarah Sra
- Present project to FBC's LMFMS (Lower Mainland Flood Management Strategy) = instant access to flood risk and engineering professionals from municipalities
- Municipal Environmental Regulatory Managers Committee – region wide
- RP Bios, Enviro Professional and Prof Agrolgists through their Associations via a different survey
- Western Canada Chapter for the Society of Ecological Restoration
- Reach out to local stewards
- Municipal Environmental Planners may be able to advocate from within for projects
- Need to get Ministry of Agriculture involved now
- Agriculture groups: Delta Farmland Wildlife Trust, BC Food and Climate (??), ALC....others

Agriculture groups

- Important to connect with farmer community nearer to end when sites
- Balance the ag interests eg: drainage issue, helps irrigation, FA rules apply even if there's no fish
- WW facilitating a Farmer to Farmer Forum this Summer, it will be an opportunity to engage

Coordinating with other overlapping projects

- How to ensure coordination with parallel and overlapping projects? Eg. CWF
- Utilities might own ROWs over dikes: CN Railway (they also have a new fund), Hydro, MoTI, current and future pipelines – but once we have a shortlist
- Ducks Unlimited as an owner – Sarah Nathan taking over from Dan Buffet

Engaging FNs

- All 30 communities in a workshop as well and non-signatory Nations → Feb 24 session has been earmarked
- Potentially to increase attendance host one meeting up river and one down river
- Highlight opportunity for Phase 2 for FNs to lead their own projects out of this.
- Side bar: IHPP (Indigenous Habitat Participation Program) maybe have funds for FN capacity (FN to lead)
- Once sites are narrowed down, then reach out to specific Nations for much more in depth 1 on 1s

Data sources

- All municipalities have fish presence data, and habitat data - the issue is the quality and methods vary
- VFPA have mapping for the Fraser – habitat quality shoreline
- Community Mapping Network has incorporated both municipal data and Port of Vancouver data
- CMN proposed to draw together fish habitat inventory data (via CRF funded LFFA project) called Lower Fraser Habitat Restoration Strategy
- Province developing a tool Stewardship Objective Baseline Tool (SBOT) – will allow user to drop a point and find nearest fish bearing stream
- Pacific Salmon Explorer of PSF mapping fish and fish habitat and lower Fraser threats but too coarse – estimated completion date March 2020

3 Feedback on Advisory and Next Steps

3.1 Results from Advisory Feedback Form

We received 17 responses from our feedback form which will help us understand how you would like to participate in the advisory going forward. Some clear takeaways from the feedback were:

- Most of you liked the format and balance of presentations and breakout discussions
- The thing many of you liked the most was the gathering of expertise in the room and the format of themed presentations and discussions
- Most of you prefer to get progress updates by email, and secondly at a meeting (whether in person or remote)
- Most of you prefer to give feedback at an in-person meeting, secondly by email
- There is a big range in terms of capacity to contribute to the project from 0.5 hrs to 15 hrs / month (including attendance at advisory meetings). Most of you fall in the range of 2-4 hrs. Most of you also expressed you liked the idea of half day meetings going forward (March, September, and early 2021) and the idea of adding a mid-summer half day meeting was also raised.
- Many of you wanted to see more First Nations and Municipal representation in the advisory

Engaging First Nations

Data sources

Feedback and Next Steps

Next Steps

We really appreciate all of your questions, advice, and feedback and will help improve how we move forward on the project.

3.2 Next Steps

In the next two months the project team will be working hard to:

- prepare a long list of sites (30-40) and make recon visits
- prepare a field work plan and protocol
- continue engagement and collaboration with infrastructure owners, First Nations, and municipalities
- prepare a draft short-list of sites based on recon visits and initial engagement results (15-20 sites)
- set a half-day meeting for late March or early April to present the results of the above and get more of your feedback before a busy field season

If you have any questions, suggestions, or feedback about any of the above, or for the project in general please don't hesitate to contact Dan Straker, project manager at 604-812-9676 or dan@resilientwaters.ca

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