PACIFIC SALMON FOUNDATION

EELGRASS SYMPOSIUM REPORT

A summary of proceedings from the 2024 Eelgrass Symposium

Part of the Greening the Salish Sea: Decision Support Tools for Successful Pacific Salmon Habitat Recovery Project

ACKNOWLEDGMENT

Deep gratitude is given to the Wei Wai Kum First Nations, upon whose land we were welcomed. We would also like to thank the Department of Fisheries and Oceans for their funding support, and all that contributed to making the symposium successful. Namely, all of the presenters, especially Dr. Isobel Pearsall, who delivered the plenary and was instrumental in the conception of the project, our nimble facilitator, Maya Guttmann, the PSF staff, who worked tirelessly to make this event a success, Mitch Miller for flawless videotaping of the presentations, to Delaney Cox for her extraordinary artistic rendition of the event, and to all participants. Without this collective effort, we would not be moving as quickly as we need to do with the challenges presenting themselves at an alarming rate.

Thank you,

Nikki Wright
PSF Eelgrass Habitat Coordinator

Photo: Eiko Jones

Cover: Graphic recording by Delaney Cox of Draw it Out captured in real time the themes and discussions of the Eelgrass Symposium.

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INTRODUCTION

This report summarizes the 2024 Eelgrass Symposium convened October 15th-17th in Campbell River. The Eelgrass Symposium was the first of three (others are focused on Marsh and Kelp) that are part of the Pacific Salmon Foundation (PSF)-led project 'Greening the Salish Sea, Decision Support Tools for Successful Pacific Salmon Habitat Restoration' (hereafter called 'Greening the Salish Sea Project'), which is funded by the Aquatic Ecosystem Restoration Fund.

The transboundary Salish Sea Marine Survival Project (SSMSP 2014-2020) findings emphasized the importance of healthy intact nearshore and estuarine environments to Pacific salmon survival. To enable more successful and strategic restoration of key habitats, the Greening the Salish Sea Project is developing a 'Restoration Knowledge Hub' of accessible tools, documents, and other resources to support the recovery of nearshore marine and estuarine ecosystems. The first step towards shaping the resources that will form the Hub was to convene experts in these knowledge-sharing symposia.

The Eelgrass Symposium gathered 66 attendees including representatives from First Nations, academic researchers, consultants, regional stewards, and restoration practitioners who have a range of experience and perspectives (see Appendix 1 for a list of attendees). Together attendees engaged in listening and discussions over two days focusing on the challenges facing eelgrass conservation and solutions for successful eelgrass recovery in the Salish Sea and the West Coast of Vancouver Island. The agenda, including 14 presentations, was broken down into four themes: "What We are Learning about Eelgrass Habitats", "What We Need to Know", "Actions being Taken to Restore and Protect Eelgrass Habitats" and "What the Future may Hold" (see Appendix 2 for the full agenda). The presentation video recordings are available online and summaries are provided in this document.

The key objectives and desired outcomes of the symposium were to:

- Expand foundational knowledge for three documents: *the State of Knowledge of Eelgrass in the Salish Sea and Western Vancouver Island*, *Eelgrass Restoration Methods Practitioner Handbook, and Mapping and Monitoring Eelgrass Practitioner Handbook*, available in the spring of 2026.
- Support Actions for the Restoration of Eelgrass Habitats: Describe advances in science contributing to the understanding of anthropogenic stressors on eelgrass habitats, and promote eelgrass restoration tools and climate change adaptation strategies.
- Build relationships for improved eelgrass habitat protection and increase opportunities for networking and knowledge sharing.

In addition to the formal symposium, attendees were invited to a field trip to Mill Pond, led by the Wei Wai Kum Guardian and Greenways Land Trust. The site, which is adjacent to Baikie Slough in the Campbell River, is a successful example of collaborative ecological and cultural restoration of an industrialized site impacted by log storage since the early 1900s (Appendix 3). Also organized was an evening screening of three videos: "Deep Trouble" by Jamie Smith of Coastal Photography Studio on the invisible and devastating effects of marine underwater debris, "Eelgrass and Estuaries" by the Pacific Salmon Foundation, and "Broken Links" a series of short interviews with researchers and field practitioners working in Puget Sound on the subject of climate impacts on eelgrass and nearshore marine life, and what we might be experiencing in the future. These activities served to provoke thought and enhance discussions.

Summaries of the Symposium proceedings are described following the themed structure of the agenda. We provide summaries of each presentation including author-shared abstracts and questions, answers, and discussions associated with each presentation. Notes from the group discussions, a summary of themes and concerns, and a list of recommendations follow.

OPENING REMARKS

Presentation summaries follow the sequence of talks during the symposium.
For the full agenda please see Appendix 2.

WELCOMING

Jordon Labbe, Wei Wai Kum Guardians

Jordon offered welcoming words to the Symposium participants. He has been restoring eelgrass in Baikie Slough with the Greenways Land Trust as a commercially certified SCUBA diver, and is also engaged in the riparian recovery of the lands surrounding the Slough.

GREENING THE SALISH SEA PROJECT INTRODUCTION

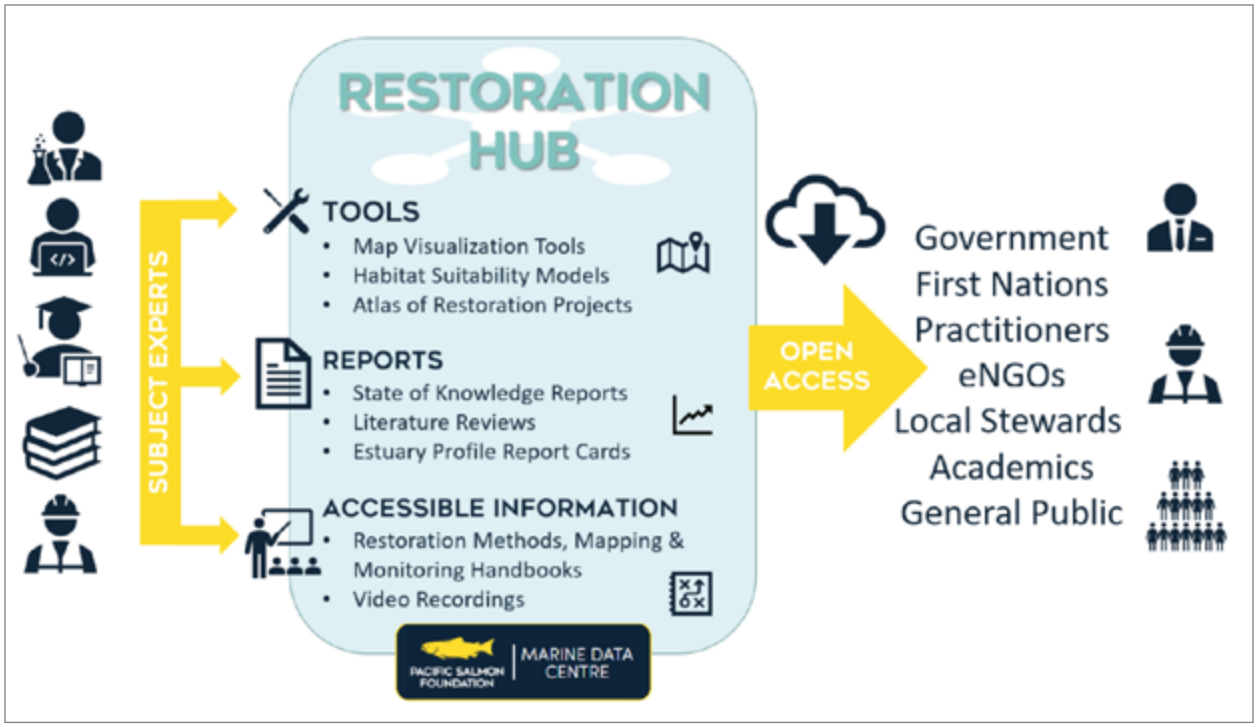
Nicole Christiansen, Project Manager, Pacific Salmon Foundation

Nicole described the three-year project, *Greening the Salish Sea: Decision Support Tools for Successful Pacific Salmon Habitat Recovery*. The project will develop decision support tools and collate state-of-knowledge documents to support marine nearshore ecosystem restoration. The purpose of the project is to fill knowledge gaps and improve the success of restoration in the Salish Sea and beyond, which has been hampered by a lack of accessible information and guidance.

The project is a collective effort made up of PSF staff and several partnerships. It will take a year and a half before the Restoration Hub of information is fully populated based on data from the last ten years. Outcomes include:

- A digitized interactive GIS map product highlighting all salmon habitat restoration projects within the Salish Sea to promote awareness and encourage regular collaboration among the different working groups.
- A Habitat Suitability Model to support habitat restoration by identifying likely sites for restoration success.
- State of Knowledge reports will be one of the outcomes for each habitat (kelp, saltmarsh and eelgrass).
- Practitioner Handbooks for saltmarsh and eelgrass mapping, monitoring and restoration.
- Estuary Report Cards will focus upon salmon bearing estuaries — their status and steps to improve their state of health.

She expressed optimism about the rich discussions to come and thanked everyone for their contributions.

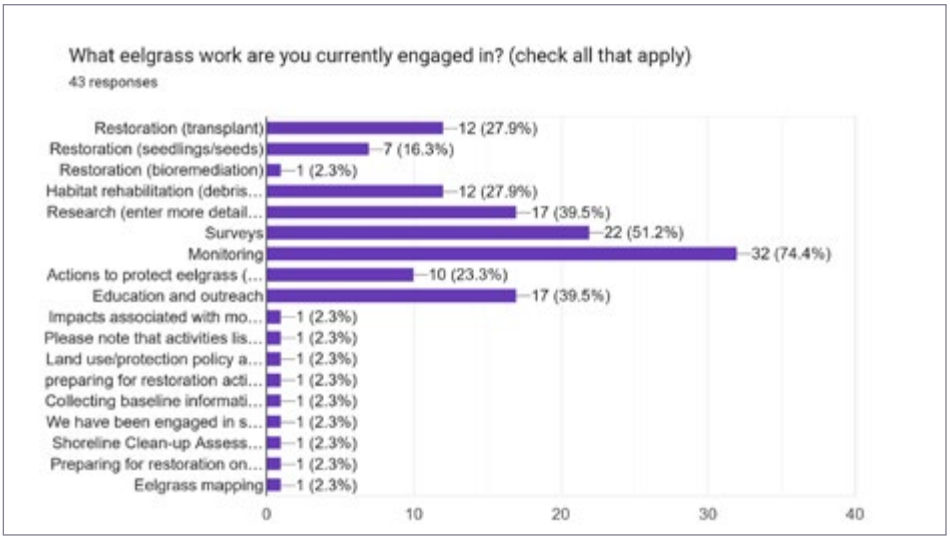


Schematic of the Restoration Hub which will house products resulting from the Greening the Salish Sea project in a centralized and open access location on the PSF Marine Data Centre website.

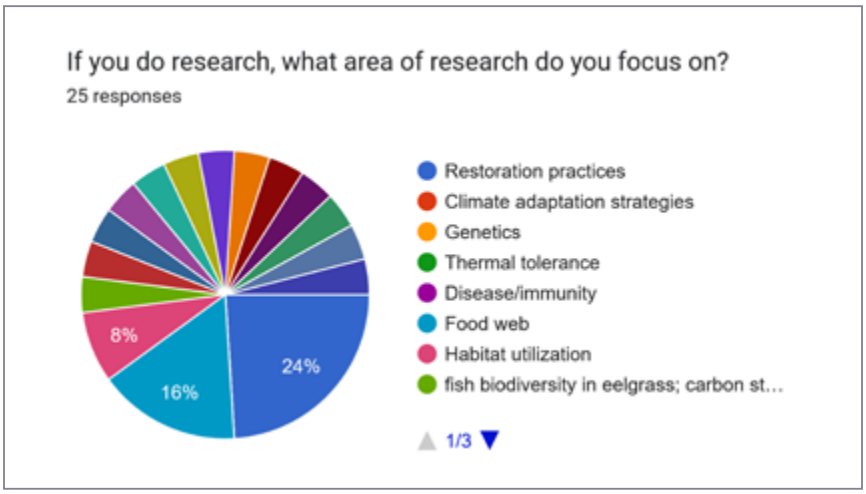
SYMPOSIUM REMARKS

Nikki Wright, Eelgrass Habitat Coordinator, Pacific Salmon Foundation

Nikki discussed the results of a pre-symposium survey, highlighting that most respondents were concerned with monitoring and surveying, with restoration methodologies being a close second. She also mentioned the upcoming discussion groups on restoration and the guidebooks, which she and Cynthia Durance (Consultant, Precision Identification) are working on. According to the survey, the topmost priorities of eelgrass research topics are restoration practices and thermal tolerance. The biggest obstacles to adapting to climate change, according to the survey, are estuary and habitat disruption. Lastly, she discussed the impact of climate change on various factors, identifying heat waves and rising sea surface temperatures as the most significant concern.



Attendees' Current Engagement with Eelgrass Conservation/Research



These pre-symposium survey results show the majority of participants are engaged in eelgrass monitoring

Nikki commented that seagrasses have lived for millennia and are resilient to many changes. She stated "We need to adapt to the plant's resiliency by developing our own. One way is to create an Eelgrass Transboundary Network, with Hakai Institute taking the lead". Lastly, she expressed gratitude to the Pacific Salmon Foundation for bringing everyone together and fostering diverse responses.

KEYNOTE PRESENTATIONS

EVALUATING CLIMATE CHANGE EFFECTS ON EELGRASS – DATA AND FRAMEWORK

Dr. Ron Thom

Dr. Ron Thom is retired from the Pacific Northwest National Lab in Sequim, Washington, which is one of the 17 national labs run by the Department of Energy in the US, and is the only marine science lab in that group. Dr. Thom is also a part-time science advisor for the Puget Sound Partnership, and a member of the Science Advisory Committee for the Northwest Straits Commission.

Dr. Thom's presentation addressed some of the impacts of sea level rise and temperature on *Zostera marina* in our region using a framework that was developed in the Columbia River Estuary, which has been active for about 20 years.

Key concepts:

Website: Climate Reanalyzer (https://climatereanalyzer.org) from the University of Maine: Sea surface temperatures: 2023 was the warmest year on record since ~1981.

- Vulnerability to sea level rise in Puget Sound is widely distributed, but the overall distribution of scores is heavily skewed, suggesting that adaptation actions directed at a relatively small number of parcels could yield significant reductions in vulnerability.
- Observations from 1998-2021 showed that eelgrass was very resilient, if the habitat was submerged, despite impacts from El Niño, and to other changes such as wasting disease (*Labyrinthula zostera*).
- Reduce local and regional stressors to enhance carrying capacity and promote resilience to climate change.

Questions & Comments

Q: Are there population genetic factors influencing eelgrass resilience to climate change?
A: I suspect that there are more tolerant populations and others that are less so. [It is] a good science question to evaluate, but was not really a part of his research background.

Q: Where can we obtain information about tanks that could serve as eelgrass banks?
A: Pacific Northwest National Marine Science Lab (Kate is the contact person)

Q: What is the capital cost to set this up?
A: Eight metre diameter are about $5k each installed. Circulating water system is critical and is a separate cost.

Q: How long did you keep plants when growing them?
A: Two years. We obtained some plants from salvage where they were otherwise going to be destroyed — this worked well. Good opportunity and success holding those plants for a year.

Q: Are climate changes presenting challenges for suitable eelgrass habitats?
A: Yes, coastal squeeze — challenge from both ends due to sea level rise and not enough space for the habitat to migrate due to the natural shoreline features or human infrastructure.

THE SALISH SEA MARINE SURVIVAL PROGRAM

Dr. Isobel Pearsall

Dr. Isobel Pearsall worked for the Pacific Salmon Foundation from 2012 to 2024. She is the former Director of PSF's Marine Science Program, which encompasses a broad range of programs including Nearshore and Estuary Research and Restoration and many programs related to salmon survival in the Salish Sea. She coordinated the Pacific Salmon Foundation's Salish Sea Marine Survival Project 2014–2020. Isobel continues to consult for environmental and marine projects and is an Adjunct Professor at UBC.

Key concepts:

- Coho, Chinook, and steelhead populations throughout the Salish Sea have suffered major declines starting in the '70s.
- The Salish Sea Marine Survival Project (SSMSP), initiated in 2014, set out to investigate the primary factors leading to these declines on both sides of the border, with many partners from both Washington State and British Columbia.
- Key questions posed related to nearshore habitats were: How do juvenile salmon use kelp, eelgrass, and other estuarine habitats? What is the importance of intact estuarine habitat for juvenile Chinook, in terms of their life history and diversity? What are the environmental factors most important for the re–establishment and restoration of these important habitats?
- Climate change impacts include reduced river flows, higher acidification, and increased harmful algal blooms, which lead to physiological impacts on salmon, lessen their resistance to disease, and result in changes to food webs and food quality.
- Interconnectedness of brackish and salt marshes, eelgrass and kelp habitats is crucial for the survival, abundance and biodiversity of salmon; herring and forage fish use of eelgrass habitats is especially important for Chinook salmon.

Questions & Comments

Q: How do we increase herring populations without reducing the fishery?

A: We are doing a lot in our herring program, looking at where spawning is occurring and why or why not in certain areas. Size is related to timing and diversity. We are trying to understand the factors that are affecting patterns for spawning. Fishing practices need to change. There is a narrowing of herring's ability to reproduce, which may be related to contaminants.

Q: Log booming — how do we move forward to transition away from log booms?

Comment: Some bad decisions around renewing leases were made in the Cowichan Estuary, and that it is an issue that needs awareness raised and working with entities as licences come up for renewal. Cheri emphasized the need for more up-to-date LIDAR data and automated tools for habitat suitability modeling, she suggested that the government and Province of BC should take a more active role in providing these resources.

Comment: Hakai has been in contact with the province regarding LIDAR, as the province is mapping kelp beds and could possibly use LIDAR for estuaries.

A: PSF now has a government relations position to work more closely with government on these issues. One solution is to prioritize removing them at peak migration periods to reduce impacts.

Comment: Wood waste from logs are floating around/clogging beaches causing disruption, erosion, etc., and awareness on this issue needs to be raised. Log booms are also a barrier to restoration.

Comment: The Nanaimo River Estuary Committee was able to reduce the number of log booms stored in the estuary by half.

Comment: Seals are escaping on log boom platforms from orca predation so there is less prey for orcas; we have created an imbalance between predator and prey ratios.

Comment: Seal predation and low river flows have large impacts on juvenile salmon survival.

Comment: There are other approaches that can be taken — start by removing booms when fish are returning to or leaving the rivers.

Comment: A biology consultant assesses log boom sites along the coast; there is movement with the provincial government: (BC Timber Sales: https://www2.gov.bc.ca/gov/content/industry/forestry/bc-timber-sales) to change these practices to direct barge dropped off on land on the receiving end. Good to keep pushing for these ideas.

Comment: Wood waste on beaches is also an issue, such as for forage fish spawning.

Comment: We need a systems thinking approach, not just about eelgrass, but we need to include upland watersheds, water temperature and flow rates — include a holistic approach when addressing restoration sites.

PRESENTATIONS THEME 1: WHAT ARE WE LEARNING ABOUT EELGRASS HABITATS?

AN ACCESSIBLE UNIQUE BASELINE RECORD OF THE MARINE LIFE FROM WASHINGTON STATE TO ALASKA

Andy Lamb, Marine Biologist

Abstract: An overview of marine life surveys dive log data base was generated from over 5,000 dives, dates from 1967 to the present, and spans from southeast Alaska to southern Oregon. Research of species identification via limited guidebooks and other resources expanded as observations increased. In the 1980's the data base transformed from individual dive log entries to a modern electronic system developed by computer programmer Charlie Gibbs. DFO is in the process of setting up the database on a website with no firm date for completion.

Key concepts:

- Data base included ~6500 dives to 40 m; 100 spp. of marine life identified each dive.
- "Oriental" shrimp; arrived in SF Bay in last century; Thetis Island trapped some while looking for European green crabs (no EGC found on Thetis), but this shrimp is considered an invasive.
- *Lacuna* snails eat the diatoms that grow on eelgrass, which might increase the plant's ability to photosynthesize.
- Divers don't often tend to see adult salmon while diving.

Questions & Comments

Q: Can communities contribute to the database?
A: No, as we need consistency in IDs; if you are interested, go with Project REEF (Reef Environmental and Education Foundation: https://www.reef.org/reefs-invertebrate-and-algae-monitoring-program)

Q: What dive are you at Andy?
A: 4,168 (90-95% cold water)

Q: In your database, are you able to query habitat type?
A: You can search by species. There are plans to make it more quantitative.

Please send me underwater photos, even if poor quality, can send them along to others for IDs. (andylamb@telus.net).

EELGRASS MONITORING PROGRAM IN THE PACIFIC RIM NATIONAL PARK RESERVE

Jennifer Yakimishyn, Marine Ecologist, Pacific Rim National Park Reserve Pacific Rim National Parks Reserve

Abstract: Jennifer has been leading the Park Reserve's marine monitoring program, which includes over 20 years of monitoring and research in eelgrass meadows including sites in Gwaii Haanas NMCAR & Haida Heritage Site (12+ sites), Gulf Islands NPR (~6 sites), Pacific Rim NPR, Clayoquot Sound (12 sites) and Barkley Sound (10 sites). Working collaboratively with governments, local non-profits and academics, the program measures change in eelgrass health, including change in size over time. Monitoring provides snapshots and time series of eelgrass fish diversity and settlement of young fish. Methods include beach seining, drone surveys and underwater cameras for subtidal areas. Specific conditions are needed to use SPECTRAL Remote Sensing.

Key concepts:

- Eelgrass monitoring program started in 2004 in four geographical areas, which occur in three different National Parks (Gwaii Haanas National Marine Conservation Area, Haida Heritage Site, Gulf Islands National Park Reserve and Pacific Rim National Park Reserve (Clayoquot Sound and Barclay Sound)).
- Monitoring measures eelgrass health over time as well as fish size and diversity within eelgrass beds and settlement of young fish.
- Different methods of mapping these monitoring sites can be found in our reports (https://parks.canada.ca/pn-np/bc/pacificrim/nature/recherche-research/herbe-grass, https://parks.canada.ca/pn-np/bc/gulf/nature/recherche-research/herbieres-de-zostere-eelgrass.
- Over time, eelgrass fish assemblages are relatively stable because different types of habitats around eelgrass meadows increase resilience; heterogeneity along the edges of an eelgrass meadow enhances fish diversity.

Questions & Comments

Q: Fish ID Guide that Parks has is not supposed to be shared?

A: Haven't had a plan for it, but I possibly could share it as a PDF (will be made available within the Knowledge Report).

Comment: Sediments can shift from earthquakes.

TEN YEARS OF SEAGRASS MONITORING BY THE HAKAI INSTITUTE

Margot Hessing-Lewis, Researcher with the Hakai Institute

Abstract: Over ten years of seagrass monitoring program has encompassed long-term collaborative research, knowledge exchanges, and training workshops.[1] Seagrass on the Central Coast and off Quadra Island are the two bases of operation, which includes a genomics lab for "ancient" DNA and geospatial capabilities. Monitoring includes three habitats: rocky intertidal; seagrass meadows; and kelp forests. The six annual seagrass sites are monitored three times/year.

Key concepts:

- Most of Hakai's seagrass monitoring is on the Central Coast and Quadra Island within three habitats: rocky, intertidal, and subtidal (eelgrass and kelp).
- Seagrass bed monitoring: Datasets are stored on MarineGEO (https://marinegeo.si.edu/network/british-columbia).

1. The Hakai team includes Zach Montieth, Angeleen Olson, Carolyn Prentice, Krystal Bachen, Derek VanMaanen, Tyrel Froese, Gillian Sadlier-Brown, Rumer Opie, Ameila Nimmon, Ondine Pontier, Alex Schmill, Danja Currie-Olsen, Alyssa Gehman, Iria Gimenez and Luba Reshitnyk.

- Pacific eDNA Coastal Observatory or PECO is a partnership with the Tula Foundation and McGill University. This collaboration monitors trends and shifts in seagrass and fish assemblages, with sampling of eDNA and fish communities, from the north (Alaska) to the south (San Diego).
- Seagrass-kelp connectivity: Hakai research is giving evidence of the importance of kelp forests in the dietary contributions to some of the major seagrass–associated organisms like isopods and kelp crabs.
- Transboundary habitat node networks share research findings and standardize data on local, national and international levels — the Marine Geo Initiative is an example of an international global network.

UNDERSTANDING EELGRASS DISTRIBUTION AND PROJECTING RANGE SHIFTS AMIDST CLIMATE CHANGE, SEA LEVEL RISE AND ANTHROPOGENIC DEVELOPMENT IN BRITISH COLUMBIA

Ashley Park, PhD student at the University of British Columbia supervised by Dr. Mary O'Connor

Abstract: As a graduate student in Mary O'Conner's Lab, Ashely investigated how abiotic features lead to shifts in eelgrass niches. Abiotic drivers include chemistry, depth, light, salinity, wave energy, and are captured at 20m resolution for the BC coast. Regional models are making predictions into the future. Fish species occurrence is created from DFO stock assessments from research dives (350,000 quadrats for the last 30 years).

Key concepts:

- The objective of the Blue Carbon Canada Initiative is to map kelp, eelgrass, and saltmarsh habitats on all three coasts as well as project their distribution into the future with the hope of understanding more about carbon storage and sequestration.
- One research question is: What abiotic conditions influence eelgrass habitat availability using Habitat Suitability Models? Abiotic drivers include: light, tides, temperature, salinity, wave energy, freshwater input, current, substrate, and slope; models also include temperature anomalies, pH, dissolved oxygen, and nutrient availability in these systems.
- NETForce: National Map of Eelgrass Distribution is used for model validation.
- This data set will be useful for identifying the best candidate for conservation and restoration sites under current and future conditions.

Questions & Comments

Q: Where is there a shift in ranges of eelgrass, or are they due to local losses and increases?

A: We are working on long-term mapping from drones: multi-spectral.

Comment: Thank-you for projecting into the future; language is accessible.

Q: The recovery from eelgrass meadows will maybe have something to do with connectivity?

Q: Looking at seed dispersal; but on a coast-wide scale, so will likely not see blips and small gains and losses of eelgrass beds; but can add dispersion limitations to the model.

PRESENTATIONS THEME 2: ACTIONS BEING TAKEN TO RESTORE AND PROTECT EELGRASS HABITATS

EELGRASS RESTORATION IN BROWN'S SLOUGH IN THE GORDON RIVER ESTUARY

Cynthia Durance, Principal, Precision Identification, and
Helen Jones, Pacheedaht First Nations

Abstract: Brown's Slough in the Gordon River Estuary was historically impacted by intensive logging operations for decades. The Slough was modified by the construction of dykes and dredging. The Pacheedaht First Nations are restoring salmon habitat in the Slough by reconnecting side channels and creating salt marsh and eelgrass habitat. This presentation will focus on the challenges associated with creating eelgrass habitat in the Slough over the last three years.

Key concepts:

Brown's Slough was the largest log sort in North America, and in British Columbia, from the turn of the century until the 1970s; the site was dredged, and the sediment was used to build a dyke, closing off channels for fish passage.

- When the dyke was removed, the dredged material was used to create a saltmarsh; the available sediment was coarse, with an absence of fines suitable for eelgrass growth.
- Eelgrass benches built in 2021 were too high, due to confusion about the correct datum to determine tide heights; they were built at night in winter, transplanted slightly higher and lower than the donor bed.
- Helen Jones, the Project Manager, spoke of the challenges that the Pacheedaht Nation had over the ten years of this restoration work: making legal agreements for access and obtaining water licenses due to the restoration occurring on Federal Reserve land.
- Delays were also caused by the discovery of a very, very large ancient village site under the construction of the eelgrass benches.

Questions & Comments

Q: Did the sand go through testing or approval from DFO? Did the engineers give you a rebate when they screwed up?
A: Not sure about the sand, Helen answered that one. No rebate.

Q: Archeology site: did it slow you down?
A: Yes, we had to find an archeologist during 2020 (COVID) and stopped development for one-half of the site; the village site dated back 1100 years.

Comment: Sediment became course as the eelgrass planting was too high and then currents took out the eelgrass. Making legal agreements for access, and obtaining water licenses due to the restoration occuring on Federal Reserve land were challenges for the Pacheedaht Nation. Moving dredgeates is under the jurisdiction of Transport Canada.

EUROPEAN GREEN CRAB: A SUMMARY OF LIFE HISTORY, ONGOING EFFORTS AND IMPACTS OF THIS COASTAL AQUATIC INVADER ON VANCOUVER ISLAND

Tyranna Souque, Data Manager and Training Lead with Coastal Restoration Society

Abstract: Coastal Restoration Society (CRS) is a non-profit focused on a number of marine restoration projects in partnership with local First Nations. CRS has been running projects on European green crab (EGC) since 2021 to investigate effective methods to control and monitor this invasive species with particular focus on important salmon habitat, particularly eelgrass beds. Large scale trapping efforts occur in both Sooke Basin and Clayoquot Sound, where information is collected on trapping effort, EGC numbers and sizes to look at trends from prolonged trapping that are helping to inform a coast wide management plan being developed by DFO. In addition, several First Nation and community groups have been trained in EGC early detection methods to monitor for potential spread to new areas, especially in the Salish Sea. As part of the large-scale trapping project, efforts have been made to look at changes to ecosystem parameters hypothesized to be affected by large numbers of EGC, which include clam surveys, eelgrass mapping and surveys and monitoring of native crab species. Early results from this year indicate an increase in extent of eelgrass at sites with the lowest EGC numbers. However, this cannot be directly attributed to EGC declines as a multitude of factors can influence eelgrass beds.

Key concepts:

- European green crabs (EGC) are an exotic species of shore crab native to Europe and Northern Africa, which arrived in BC in 1999 from San Francisco Bay.
- EGCs live to be approximately four to seven years old and grow up to about a hundred mm in size.
- They can start reproducing in their first year of life; females can reproduce once or twice a year, laying up to 185,000 eggs at one time; they prey upon on shellfish and other small crabs, and the juveniles consume eelgrass.
- Coastal Restoration Society (CRS) has been using commercial prawn traps to trap over 780,000 EGC (dropping 40-100 traps/day) over the last three years, in Clayoquot Sound and the Sooke Basin.
- CRS trained 16 First Nations and four community groups from the Mainland and Vancouver Island to monitor native crab species before EGCs arrive.

Questions & Comments

Q: What is done with all the collected European green crabs?
A: We freeze and then compost them.

Q: What are their natural predators?
A: Birds and otters, potentially other large crabs.

Q: Are you measuring clipping/burrowing effects?
A: We are looking for clipping, but not burrowing.

ACCESSING AND USING THE SHOREZONE IMAGING AND HABITAT MAPPING DATASET FOR EELGRASS IN THE PACIFIC NORTHWEST

Sarah Cook, Executive Director, SeaChange Marine Conservation Society

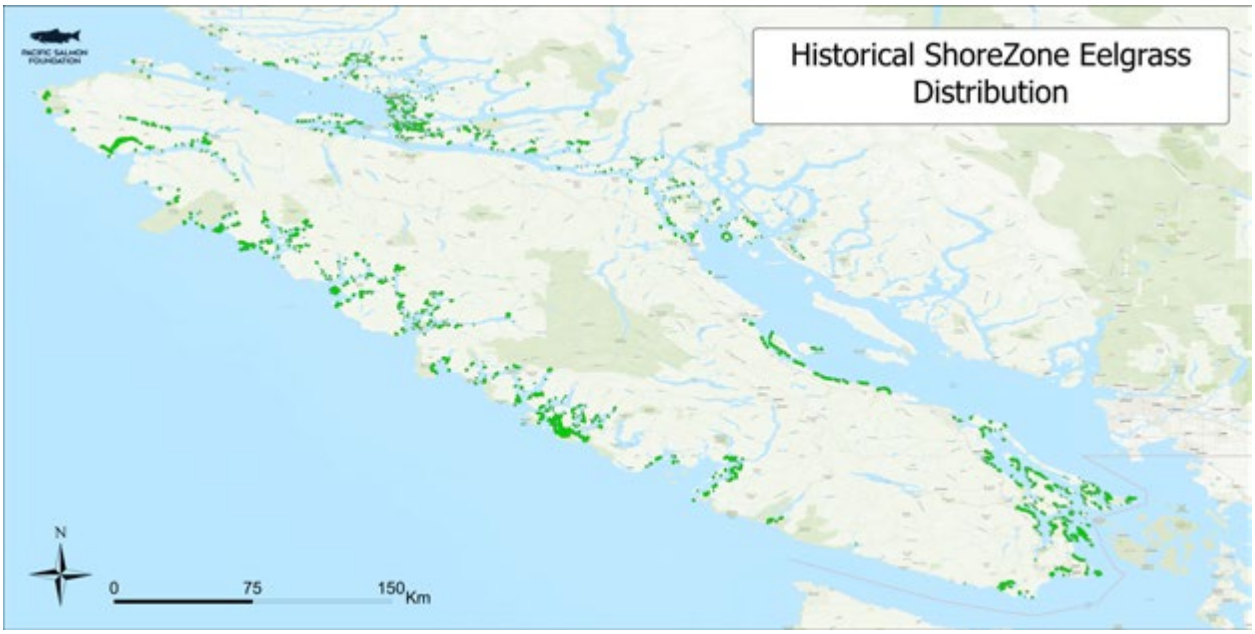
Abstract: ShoreZone is a publicly accessible, cross-border imaging and habitat mapping dataset that exists over the shoreline of the Pacific Northwest from Oregon to Alaska. This dataset includes information of physical and biological attributes, including sensitive habitats like eelgrass. This presentation will go over the basics of ShoreZone as it relates to eelgrass and where and how to access it.

Key concepts:

- ShoreZone is a standardized coastal imaging and habitat mapping system that characterizes shoreline physical and biological attributes; protocols and data are publicly available at ShoreZone.org.
- Physical attributes include substrate, slope, wave exposure, aspect, and geomorphological features.
- ShoreZone has shown that of 37,000 km of British Columbia's coast is 16% eelgrass (over 6,000 km).
- High-resolution satellite data and advances in imaging technology allows for ShoreZone polygon maps of saltmarshes, dune grass, kelp and eelgrass habitats to be created, which is an improvement on linear maps alone.

Questions & Comments

Q: Can you make an overlap with the still images?
A: The variability of height and angle, etc. make it look odd.



ShoreZone Eelgrass Distribution Map (2014)

THE MILL POND RESTORATION PROJECT: A SOCIAL-ECOLOGICAL APPROACH

Katherine (Katie) Lavoie (ED Greenways Land Trust) and Jordon Labbe (Wei Wai Kum Stewardship)

Abstract: This presentation is a brief overview of the Mill Pond Restoration Project in the Campbell River Estuary with a focus on how we have used a social-ecological lens in an attempt to improve restoration success over the long term.

Key concepts:

- The long-term goal of this two-hectare saltmarsh, eelgrass and riparian restoration project, located south of Bakie Slough in the Campbell River Estuary, is the creation of saltmarsh, eelgrass and riparian habitats for salmon, which is essential to the Wei Wai Kum Nation.
- The site is included in the ecological covenant through the Nature Conservancy of Canada and is co-managed through the Campbell River Estuary Committee (including Indigenous local Nations, Ducks Unlimited, the Municipality, recreational users, DFO and others).
- Community volunteers, including former employees of the logging industry, have helped install 40,000 eelgrass shoots thus far.
- Management after the project is done will continue with the perspectives of Traditional Ecological Knowledge (TEK), community science, and academia included in the site management, as well as public perception, community outreach and tourism.
- If you don't build a relationship with the First Nations Guardians, there will not be success.

Questions & Comments

Q: Where is Greenways working?
A: Greenways is based in Campbell River.

Q: Do the washers cause a problem?
A: (Jordan) the metals from the un-galvanized washers oxidize fast and dissolve as they chelate with the hydrogen sulfides in the sediment.

Comment: Thanks to Cynthia for being there to guide the planting.

Photo: Nikki Wright

PRESENTATIONS THEME 3: WHAT WE NEED TO KNOW

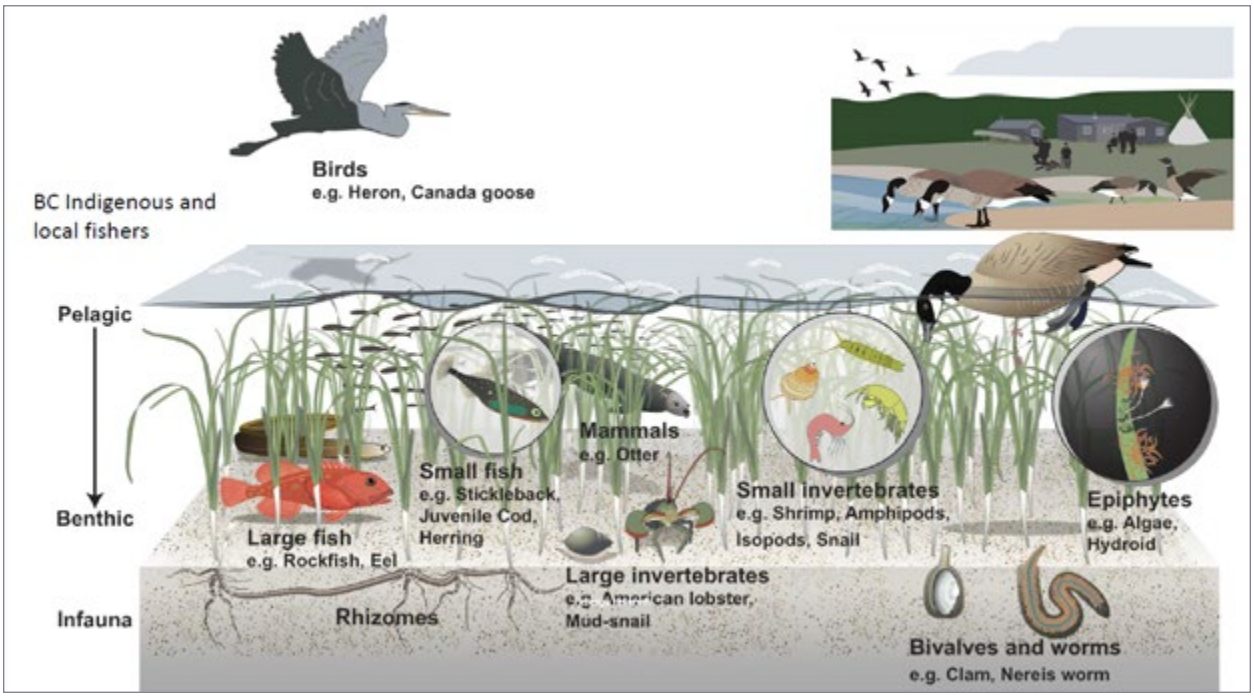
TESTING THE IMPORTANCE OF ROOT AND RHIZOME ASSOCIATED MICROBIOTA FOR EELGRASS GROWTH AND RESTORATION

Dr. Mary O'Conner: Professor in the Zoology Department at the University of British Columbia, and Director of the Biodiversity Research Centre

Abstract: Through work in Desolation Sound and James Bay, we are starting to plan research into eelgrass/sediment/microbe connections as one way to understand eelgrass die-offs and perhaps restoration success. We hope to do some sampling of sediments, eelgrass, and microbes at sites that have different restoration histories: no restoration and healthy eelgrass, restored and healthy eelgrass, no restoration and poor or declining eelgrass, and restoration sites that did not succeed (no eelgrass).[2]

Key concepts:

- Majority of research at the Biodiversity Research Centre at UBC is related to invertebrates that live in seagrass beds; there are 12-15 species in the average seagrass habitat, and 100+ individuals; this presentation is about eelgrass research in James Bay, Quebec, and Desolation Sound, British Columbia.
- James Bay Project: Geese are a centerpiece of Cree culture; their population has crashed; while eelgrass crashed 30 years ago.
- We work with the Cree Nation together with different forms of knowledge to understand what the system used to be like, why it's like it is now, and where it might be going.
- Originally in the 1970s, the eelgrass habitat was 250km^2, which was considered the largest eelgrass bed in North America; and now, because it is a fragment of the original size, the geese do not return.
- How can a sustained monitoring program be developed for long-term data collection by the Nation? There could be a Cultural Knowledge Exchange where we could host the Nation to learn from each other.
- Tla'amin Nation and Desolation Sound Provincial Park Project (research question): What are the effects of intense recreational boat use on eelgrass, and its ability to serve as a foundation species?
- Where there are anchorages in Desolation Sound, there's less eelgrass, and it is shorter, less abundant, and grows less over the growing season; there are fewer species of fish where anchoring concentration is high; after the results were in with this research, Parks closed those anchorages impacting eelgrass beds.



Slide credit: Mary O'Connor, Laura Parfrey, Alex Moore, Miranda MacGillivray and Nicole Knight (all UBC)

Questions & Comments

Q: How do you tag eelgrass?
A: Coloured zip ties.

Q: Can the map of connectivity be applied to other places?
A: The model is only for this area, but we are going to expand it, but it is difficult and requires a person and a couple of years.

HABITAT SUITABILITY MODELS FOR EELGRASS RESTORATION

Miranda Smith, Senior professional biologist, M.C. Wright and Associates Ltd

Abstract: Recent habitat modelling in the Cowichan estuary, on behalf of Cowichan Tribes, was used to generate a suitability model for potential eelgrass transplants in the estuary based on known environmental requirements. Key parameters considered in the model included sediment grain size, wave exposure, water depth, water quality (temperature, pH, salinity, and DO), current velocity, hydrogen sulfide, bed mobility, proximity to active channels, and Crown land tenures. The final suitability model identified areas within the estuary with the highest likelihood of transplant success and were used to inform future eelgrass transplant initiatives.

Key concepts:

- A habitat suitability model was created to determine suitable eelgrass restoration sites in the Cowichan Estuary, an active log storage site.
- Important to investigate environmental parameters, including watershed dynamics such as river flows and sediment loads in a time of climate change; other parameters include turbidity, salinity, DO, and pH, hydrogen sulphide (H_2S) levels in sediments, sediment grain size, water depth and exposure, current velocity, bed mobility, active channels, presence of eelgrass habitats and the status of Crown land tenures held by logging companies.
- The raster layer was created for each of those parameters, and then ranked and multiplied to create maps/layers.
- Test plots tested by planting small areas of eelgrass showed success.
- This model is a tool that can be used to make better-informed decisions and to understand the carrying capacity of nearshore estuarine systems; the strength in the model lies in the strength of the data; the more data there is to create the model, the better.

Questions & Comments

Q: With the modeling, how did the test plots do?
A: They did well.

Q: Is shoreline slope in the model; maybe include it in bed mobility?
A: Bed mobility and slope are not related, but slope can be incorporated in the model.

Q: Tell me about hydrogen sulphides (H_2S)?
A: There were low measurements of hydrogen sulfides, but there is no threshold limit known, so we used the H_2S levels in eelgrass beds and compared other sites to that level; more data are welcome.

Comment: The estuary is bisected by a causeway, so a balance is not easy; the model was excellent; the anthropogenic impacts are overwhelming.

BENEFITS OF SEEDING METHODS IN EELGRASS RESTORATION

Angela Spooner, Senior Coastal Habitat Restoration Biologist in the Operations Coordination and Technical Support team of the Pacific Salmon Strategy Initiative (PSSI) Centre of Expertise (COE) of DFO

Abstract: Eelgrass transplanting is the most common restoration method on the BC coast. Transplanting relies on asexual colonial expansion for success. Studies show eelgrass seeds and seedling establishment is most important for beds that experience seasonal disturbance and thus have a patchy distribution. Despite low germination and survival rates via seeding, genetic diversity of a transplant restoration project can be enhanced providing the potential for resilience to climate change.

Key concepts:

- Seeding restoration has specific benefits that transplanting doesn't provide:
  - > Only the seeding shoots are harvested; vegetative shoots are not removed.
  - > Seeding has a higher genetic diversity, which may increase climate and disease resiliency.
  - > Vegetative shoots are genetically identical to the original; no variability; expand 0.5m/y.
  - > 3-8% of eelgrass seeds germinate; usually where there are openings in disturbed sites in research of these numbers — in nature only up to 2%
  - > Seeding could infill disturbed areas. In archaeologically sensitive areas, seeding is a non-physical method less damaging, and safer in the case of marine conditions.
  - > Small scale, low cost, harvest can be done by community members. So that means that there's not a requirement for large grant funding. Therefore, this is an accessible method for community development, and engagement, school projects, etc.
- Methods: The Buoy-Deployed Seeding System (BuDS) involves buoys being deployed with bags with seeds, which fall out and mature; area and density is site-determined; no overwintering needed.
- Dispenser injection Seeding (DIS) uses a caulking gun; however, the seeds need to be over-wintered.
- Hand broadcast method can also be used but the seeds need to be over-wintered.
- Hessian bag methods require no overwintering; wait until the seeds have fallen out and then put out on lead-lines and the seeds grow through the bags. Yes — one can also put veg shoots in larger bags — no seed separation required.

Questions & Comments

Q: Should population genetics be a factor added to evaluating a site?
A: I do not know the expense of this testing. I think studies to determine the genetic variation of: stable eelgrass beds vs transplanted with vegetative shoots, only; and new beds vs transplanted with seeding; also new beds would be needed first. For low cost and low effort, why not add seeding in the meantime?

Q: Why did you choose to use the BuDS way?
A: It's simple for a first test, and we can always add money to a project method later.

Q: Used to be thought that seeding wouldn't work here (Pacific Coast), why did we think that?
A: The East Coast has larger, flatter conditions with less wave energy so the seeds are not swept away. On the West Coast they can be swept away into dynamic channels or buried by sedimentation. More than 80% of seeds in nature get eaten, buried or are not viable. Seeding likely is a challenge with fringing eelgrass beds, as the energies there are typically higher. Seeds can help restore dynamic patchiness of beds in moderate to protected areas, so why not in vegetative transplanted areas?

Q: There is an idea of bringing school groups to do this. Are there are local partners? We need to "find best locations".
Comment: There is a nursery at the Ucluelet Aquarium that could be used.

Q: The site in Clayoquot Sound; would you want to seed-bank in areas that have been disturbed?
A: Seeds don't last more than 8-10 months, so seeds from that site are not viable; but adding seeds to the area is good. Seeds are sensitive to being buried.

Q: Human interference with the buoys etc.; any tampering?
A: No permits are needed, but you need a buoy array, and therefore Transport Canada (TC) needs to be contacted; TC has not yet figured out where this type of work falls. Buoys are out for 40-60 days and may impede shipping/boating traffic. You would need to submit an Aquatic Plant Approval with the province — they will assess it to see if your plan needs a permit or if they can give an approval without a permit.

Comment: Putting "Research" on a buoy will help avoid tampering. Other methods like Hessian bags can be used, which avoid tampering.

Q: How many reproductive shoots are needed?
A: After four people sampling over two days at low tide only, 4000; shoots were collected, which can have 20-100 seeds.

Q: Why did you try this method first?
A: Logistics and cheapest for first trial.

Q: Are there lessons learned, or any results across literature?
A: Site selection, low energy, water clarity are all really variable.

PRESENTATIONS THEME 4: WHAT COULD THE FUTURE HOLD?

THE FUTURE IS CANDY

Katarina (Kat) Duke-Arquette, Professional Agrologist working as the Manager of Marine Conservation and Fisheries for Ka:yu:'k't'h' / Che:k'tles7et'h' First Nations

Abstract: Eelgrass is the 'Candy of the Sea'. Eelgrass provides a sense of place — identity, dependency, and attachment — which, as a triad, supports well-being. For which well-being is a function of happiness (present feeling) and meaning (integrate past and present, collective). This sense of place and well-being is built upon food, the food directly and indirectly provided by eelgrass, and the experiences with food the meadows provide (e.g., harvest and restoration). By revisiting food and its associated definitions, we can support decolonization and indigenization by striving for food sovereignty. Food sovereignty is the right to define our own healthy and culturally appropriate food systems, leading to food security, not the other way around. Restoring eelgrass meadows is a step toward food sovereignty and all that follows: self-determination and autonomy, healthy ecosystems, cultural revitalization and holistic well-being (well-being of the whole person).

Key concepts:

- Eelgrass is known by many First Nations as the "Candy of the Sea".
- Ka:yu:'k't'h' / Che:k'tles7et'h' First Nations (KCFN) is guided through life by three sacred principles: *7llsak* (utmost respect for), *7uu-7aith-uuk* (take care of), and *hisuk-is ewak* (everything is connected).
- These three sacred principles are a lot like an eelgrass seed. Once planted, they can grow into something phenomenal; abundance that is impossible without them.
- It is with this mindset that we can look to food sovereignty rather than food security
- The distinction between these two concepts is very important; from food sovereignty, we can achieve food security, however, food security does not always guarantee food sovereignty.
- With food sovereignty we then consider the right to define food systems and the right to healthy, ecologically sustainable, and culturally appropriate foods; we distinguish where food comes from and how it is produced, distributed, and consumed. These factors align with the efforts of many First Nations
- The efforts of self-determination, the ability to make choices in accordance with our values, and autonomy, the decision-making structures that actually allow us to make these choices come to fruition. This is especially the case as a conscious choice and decision to harvest and eat traditional foods such as eelgrass.
- Eelgrass meadows provide an act against colonialism itself as it increases cultural and political autonomy by emphasizing traditional ways of being, thinking and doing.
- From the lens of food sovereignty then, eelgrass meadows provide healthy ecosystems, social economic justice, food security, cultural revitalization and more.
- All of the above feeds into that phenomenon mentioned previously, known as holistic well-being (well-being of the whole person, the whole community, mental well-being, spiritual wellbeing, emotional well-being, intellectual well-being, physical well-being, social and cultural well-being, and so forth).
- And well-being is a function of happiness and meaning: happiness is largely present –oriented; it reflects needs and wants.
- Meaning is future-oriented. It seeks to integrate past and present experience with a collective goal, such that the further ahead it lies, the deeper the meaning it can provide.
- Eelgrass meadows are the past, present, and future, through their connections with these places and experiences through the food that they provide.
- This connection eelgrass meadows provides is commonly known as sense of place, which has components, place identity, place dependency, and place attachment.

- Collectively, it all represents the meanings and identities that are developed through experiences with places.
- We are provided with many ways to connect with a place, and many ways to experience them through eelgrass; one of them through the food that they provide.
- Through participating in eelgrass restoration and conservation, through the gathering and preparing of food from eelgrass, or consuming eelgrass itself, through the salmon and herring and cockles, there is a level of support, known as place dependency.
- There is also the spiritual comfort, community building and knowledge sharing that emanates from all of these activities that we can link to place attachment, which is the emotional and symbolic bond that develops with the place.
- The cooperative and pro–social behaviors through our experiences with eelgrass meadows, from the restoration to the harvesting drives these cogs of happiness and meaning that propel well-being continually forward.
- An example for KCFN that best captures the connection between eelgrass meadows, food sovereignty, and well-being is the restoration efforts at 7OTSO:S, also known as Hankin Cove.
- Hankin Cove is a veritable cultural landscape, but to many in the community, it died a long time ago from logging; some people actually don't even know that Hankin Cove existed because their relatives stopped going there for many, many years.
- But through amazing relationships (Cynthia Durance, Corey Myers, Pacheedaht divers, taddy Depp the Casey Fenn Stewardship, known as the Whitwalk, and the DFO Center of Excellence, Angela Spooner), we were able to breathe new life into the Cove through transplanting and seeding.
- But beyond the more obvious benefits of restoring the meadows, this work helped shape the future stewards of the Territory by getting them involved in preparing the shoots for transplanting and these future stewards were actually the youth from the Ka:yu:'k't'h' Elementary Secondary School. We weregetting them on the land, in the water, working alongside, learning alongside, and seeing what it takes to protect their Territory.
- The second was that it provided an opportunity for one of the commercial pageant of Divers who is of Ka:yu:'k't'h' ancestry, to actually return home for the first time and meet relatives. And just hearing how at peace they felt being somewhere they had never physically been, just emphasizes the fact that there's a sense of place, and that spiritual comfort that can come from a place.
- Lastly, another one is that these meadows provide a way to honor ancestors and also those who are no longer with us in the community and for Hankin Cove. The one that comes particularly to mind is the late Wayne Vincent Sr. who provided immense guidance and support to bring life back to Hankin Cove and for that, we will continue to protect Hankin Cove, and we will continue to restore it and monitor and make sure we are successful in honoring him.
- The power behind sense of place, a power that, with patience and continued love for the site, will grow. This is the same power that will allow Hankin Cove to once again support food sovereignty and well-being. The cockles will return, the herring will come back to spawn and the salmon will find refuge once again; the community will be able to find spiritual comfort by being able to reconnect again with the lands and waters of Hankin Cove, which is overflowing with cultural heritage, and is all of this that will allow for the continual improvement in well-being at all scales, from individuals in the community to the community at large, and to the natural relatives of the KCFN peoples.

There were no questions or comments as the Presenter was unable to be present.

A SUMMARY OF SƏLILWƏTAɬ COLLABORATIVE WORK TO MAP AND RESTORE CÁLƏM IN SƏLILWƏT (BURRARD INLET)

Anuradha Ro, Senior Environmental Specialist, Marine Ecosystems on staff with Tsleil-Waututh Nation

Abstract: səlilwətaɬ (Tsleil-Waututh) means "People of the Inlet" in the hən̓q̓əmin̓əm̓ language, referring specifically to səlilwət (Burrard Inlet). Tsleil-Waututh people's creation stories originate from within and around səlilwət where they have been since time out of mind. Approximately 90% of the Tsleil-Waututh diet was derived from səlilwət marine resources and Fraser River salmon. Western archaeology and Indigenous science have demonstrated the abundance and diversity of marine foods within the Tsleil-Waututh diet prior to contact with Europeans, as well as evidence that traditional Tsleil-Waututh practices did not deplete marine resources. The Tsleil-Waututh ancestors established sacred, legal obligations to protect, defend, and steward the territory. Those obligations remain today, but the many changes to — and cumulative effects on — the Inlet following colonial settlement have impeded Tsleil-Waututh's ability to enact their laws and practice their ways of being. səlilwət has been damaged to the point that it is no longer able to sufficiently support Tsleil-Waututh needs. Tsleil-Waututh Nation (TWN) is playing an active role in finding strategic solutions to improve the ecological integrity and health of səlilwət as a whole. Mapping, restoration and protection of cáləm, are among the TWN's numerous projects.

Key concepts:

- A Tsleil-Waututh means People of the Inlet in the Halkomelem language; səlilwət (Burrard Inlet) is the ancestor of the Tsleil-Waututh people; 90% of the Nation's diet came from the Inlet's marine waters as well as from salmon from the Fraser River.
- TWN is a leader of collaboration in the stewardship of səlilwət in their obligations to past, present, and future generations of Tsleil-Waututh people, in accordance with Tsleil-Waututh Soeoteth law.
- TWN created the most comprehensive map of cáləm (eelgrass) in səlilwət (Burrard Inlet) to date in partnership with SeaChange, along with other sources; the first step was bringing 40 people from all the different levels of government, and multiple different organizations, who all had something to do, or some role to play in restoration in the Inlet; we identified existing restoration projects around the Inlet, and where restoration was needed.
- The scope of the restoration was eventually narrowed to marine debris removals, marine riparian restoration sites as well as eelgrass restoration sites.
- TWN and SeaChange have restored cáləm at multiple sites on the north shore of səlilwət, involving Tsleil-Waututh youth, Elders and staff.
- TWN organized a səlilwət cáləm symposium in June 2024, inviting key individuals from multiple jurisdictions. This symposium focused on strategies for protecting cáləm in səlilwət. There was general appetite for collaborating on an eelgrass working group, and establishing an Eelgrass Voluntary No-Anchor Zone, creating protection zones, and having a collaborative governance.
- Tsleil-Waututh's stewardship efforts and collaborations are working: cáləm restoration has been successful: there is a limited food, social and ceremonial clam harvest after >40 years of closure; sɬewət' (herring) have returned to Indian Arm after 140 years of extirpation; and there are increased sightings of q̓əlɬaləməcən (orcas) following a long absence.

Questions & Comments

Q: Where is the historical extent of eelgrass in Indian Arm?
A: I don't know where eelgrass was, but restoration has been on the shore of the reservation. Changes in sedimentation and hydrology have happened because of logging, so where they have been (in the past), might be different than where the eelgrass can grow now. There are some pockets along the Inlet.

Q: Could Eelgrass Voluntary No Anchoring buoys be part of this?
A: SeaChange could provide more information about the buoys.

HOW ENVIRONMENTAL EELGRASS DATA IS USED THROUGH DEVELOPMENT TOOLS AND WHAT CHANGES COULD IMPROVE EELGRASS PROTECTION WITHIN THE ISLANDS TRUST AREA

Chris Hutton, Registered Professional Planner with the Islands Trust

Abstract: The Islands Trust Act is a federated governance system, arms-length from the provincial government. Our mandate is to preserve and protect the lands and waters within the Islands Trust Area, identify the wrongs in building plans and improve relationships. One of the responsibilities of the Islands Trust is to incorporate data into policy. Planners are not environmental specialists. The tool we primarily use to carry out this mandate is through Development Permits.

Key concepts:

- The Islands Trust's mandate is to preserve and protect the culture and identity of the Southern Gulf Islands; it has expanded to include 13 First Nations.
- Environmentally sensitive areas, such as eelgrass, are under Development Permits; if a marine area does not have a DPA designation, Island Trust does not have jurisdiction.
- More staff training has happened with GreenShores and assessments; the hope is that policy develops from this education and training.
- SeaChange mapped eelgrass over three seasons beginning in 2012, and again in 2022, but OCPs have not been updated since 2022, which is where that development permitting comes into play. Our ability to update data is very limited without championship for eelgrass habitats.

Questions & Comments

Q: Do you want to speak to the Map IT tool?

A: The data layer of eelgrass from a 2013 survey; Map IT is ICIS or Provincial Data port; available for all; property lines; only things that go into policy, so not the up to-date data.
Islands Trust funded the 2022 mapping by ShoreZone, but because of the heat dome in 2022, some of that data needs to be redone.

WHAT THE FUTURE COULD HOLD: PROTECTING EELGRASS AND CUTTING THE GREEN TAPE; A DFO PERSPECTIVE

Scott Northrup, Section Head with Fisheries and Oceans Canada's Strategic Initiatives Unit of the Restoration Centre of Expertise

Abstract: The federal Fisheries Act, including supporting policies and regulations, provides tools that can help protect important eelgrass habitats along the BC Coast. Aside from regulatory approaches, DFO is responsible for managing invasive aquatic species, at least one of which, the European green crab, can negatively affect eelgrass beds. In addition, DFO works with partners, including environmental non-government organizations (ENGOs) and Indigenous organizations, to advance eelgrass and other fish habitat restoration through its Restoration Centre of Expertise (RCOE).

Key concepts:

- Restoration Centre of Expertise (RCOE): Strategic, removing barriers to restoration efforts.
- Another team with the RCOE is called the Strategic Initiatives Groups, and that smaller team is doing a lot of planning initiatives; cutting the "green tape" for restoration work.
- We're doing a big engagement process throughout the province and the Yukon Territory, discussing habitat restoration priorities planning for the region.
- Fish and Wildlife Compensation Program, BC Hydro's compensation for some of the watersheds on the coast that have been affected by their energy generation – another avenue to access funds for eelgrass restoration.
- Eelgrass protection levels:
  - **Federal Fisheries Act:** Section 35; fish and fish habitat has no special section for eelgrass, but give it extra consideration, "we would really like" and "discourage people to impact". It is costly to replace eelgrass. Designation of Environmentally Significant Areas (ESAs) is not designated for eelgrass. The mouth of the Fraser or the entire Salish Sea could be declared as an ESA to give extra protection, extra reviews during the development process. It doesn't stop things from happening.
  - **Indigenous Guardians:** Dealing with land and water; shoreline and rivers; becoming increasingly common; have great responsibilities across the landscapes in their traditional territories — uplands, fisheries, wildlife, fisheries and fish habitats, rivers and shorelines.
  - **Provincial:** Mostly related to aquaculture, like shellfish. The Water Sustainability Act (Sec. 11) is related mostly to streams, although Section 11 works in and about a stream. It has however been expanding to the estuaries; regulations have kind of reached out into the estuaries over the last 10 years or so. Application processes for moorage, docks and other developments along shorelines are more stringent than Federal regulations.
  - **Local government:** The Islands Trust and Official Community Plan processes can be quite stringent for allowing development along shorelines affecting sensitive habitats such as eelgrass beds.
- Grants and Contributions Agreements will be the future funding source for eelgrass restoration.
- First Nations and Environmental Non-Governmental Organizations (ENGOs) are taking the leads, therefore, DFO provides support by providing expertise; partnerships and collaborations between ENGOs and First Nations are now part of the restoration process.
- The future: Eelgrass restoration does not lie within the legislated authorization offsetting compensation world; we need to move to a planning process that includes the entirety of eelgrass habitat within the Salish Sea; maps of eelgrass habitats would be available as a regulatory tool to use as a guide for developers. - need someone to take on protection of eelgrass habitats in the Salish Sea as a goal and work to have the Federal government take it on.

Questions & Comments

Q: What about funding after the next Federal election?

A: How they are delivered now, where we have money and people compete for them will stay; but the future is murky.

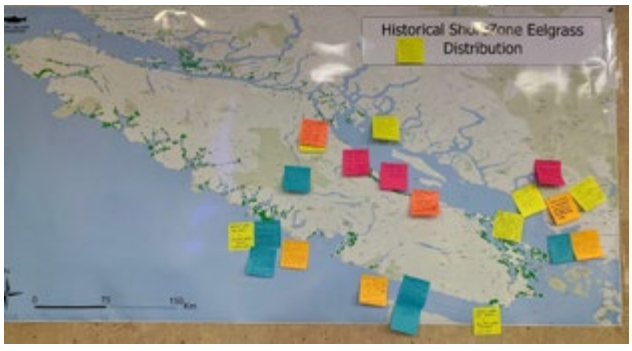
GROUP DISCUSSIONS

KNOWLEDGE SHARING ABOUT EELGRASS DISTRIBUTION AND RESTORATION WITHIN YOUR REGION

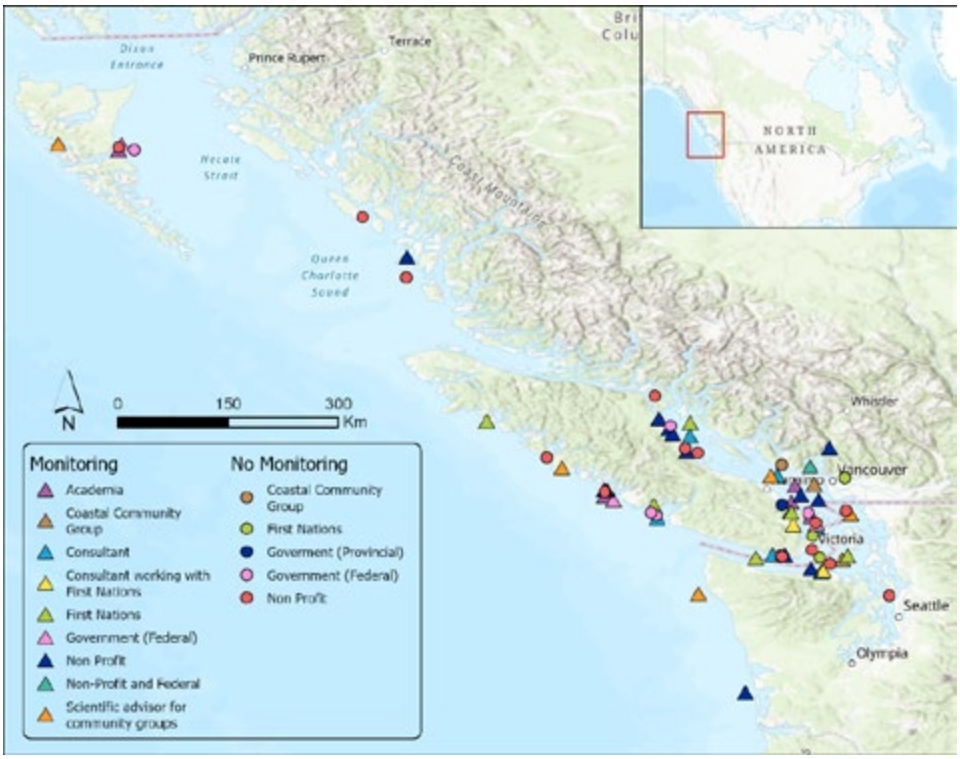
(Comments below are reflective of those of the Symposium participants only, and do not capture the full extent of eelgrass associated activities within the Salish Sea and the West Coast of Vancouver Island)

Facilitator Maya Guttmann revisiting what was learned and discussed.

Symposium participants share ideas related to eelgrass conservation and restoration during break out discussions.



Link to the Interactive Map of Groups Monitoring Eelgrass in the Salish Sea and the West Coast of Vancouver Island: https://psfmarinedata.maps.arcgis.com/apps/instant/interactivelegend/index.html?appid=820b55a339ce4d08adfdb26eab570f42



Static Map of Eelgrass Monitoring Sites by Group

LOCATION AND ORGANIZATION OF EELGRASS RELATED WORK

WEST COAST VANCOUVER ISLAND

Clayoquot Sound (Coastal Restoration Society): European green crab mapping and associated eelgrass monitoring.

Clayoquot Sound (Redd Fish Restoration Society): Planning for eelgrass monitoring and restoration.

Clayoquot and Barkley Sounds (Redd Fish Restoration Society): Assessment of estuarine health, including eelgrass and developing estuary restoration plans.

Ucluelet (Ucluelet Aquarium): Mapping and monitoring eelgrass habitats in Ucluelet Harbour (Healthy Harbour Project). Plan for future eelgrass restoration in Spring Cove if land bridge removed.

Nitinat Lake (Dididaht Stewards and Parks Canada): Eelgrass monitoring throughout the Narrows beginning 2012. Nitinat Lake is a freshwater and saltwater bottleneck fjord. There is marked diversity between different eelgrass beds. The site could be a good study area because of the different water.

Gordon River, Port Renfrew (Pacheedaht First Nations): Mapping, monitoring and restoration of eelgrass habitats including seeding in restored former log use area.

Somass River Estuary (DFO): Eelgrass was mapped by DFO. Past maps are available, including those of fringing eelgrass beds along the Inlet.

Sooke Basin (Coastal Restoration Society): European green crab trapping and associated eelgrass monitoring.

EASTERN VANCOUVER ISLAND

Eelgrass Seeding Trials (2023) occurred **Quadra Island**, **Fanny Bay**, **Maple Bay**; in 2024 seeding trials occurred **Gordon River (Port Renfrew)**, **Kyuquot Sound**; 2025: **Tseil-waututh Nation Territory** and **Juskatla in Haida Gwaii**.

Islands Trust Area (ITA): Maps of the presence of eelgrass in the **Islands Trust Area** (ITA) from 2012 to 2014 (three years inclusive) is a useful tool to identify eelgrass within the Gulf Islands and Howe Sound.

Gulf Islands National Park Reserve (Parks Canada): Monitoring of fish communities and extent of eelgrass habitats.

Valdes to Saturna Islands (select sites in the Southern Gulf Islands) (Mayne Island Conservancy Society): Eelgrass polygon monitoring (video transects and polygon data).

Mayne Island (Mayne Island Conservancy Society): Time series eelgrass monitoring (2009-present).

Cortes Island (Friends of Cortes Island): Mapping of the presence/absence of eelgrass was completed ~2010-15, with detailed site survey of certain sites done over 3-4 bays; we are waiting to re-start this monitoring program.

Thetis Island (Thetis Island Nature Conservancy): Eelgrass mapping, restoration and protection (Voluntary No Anchor Zone buoy).

Fanny Bay (Project Watershed) Restoration project in Ship's Point in Fanny Bay but had limited success because of the heat dome in 2021. The site also had a high accumulation of sedimentation which was discovered in 2023-4, after the restoration took place.

Parksville (Mid-Vancouver Island Habitat Enhancement Society): Need for partnerships to complete subtidal eelgrass mapping.

Campbell River (Greenways Land Trust/Wei Wai Kum Guardians): Eelgrass, saltmarsh and riparian restoration in Baikie Slough and eelgrass mapping/monitoring in Campbell River.

EASTERN SHORES OF THE SALISH SEA

Tla'amin Nation Territory (Powell River/Desolation Sound) (Tla'amin Nation in partnership with UBC and BC Parks): Eelgrass mapping, monitoring, fish diversity monitoring, site identification for eelgrass restoration.

Roberts Creek (Moonstone Enterprises): Stable eelgrass bed monitored but decreasing in area.

Sechelt Inlet (Moonstone Enterprises): ShoreZone map is out of date. Sunshine Coast has been mapped by community members recently.

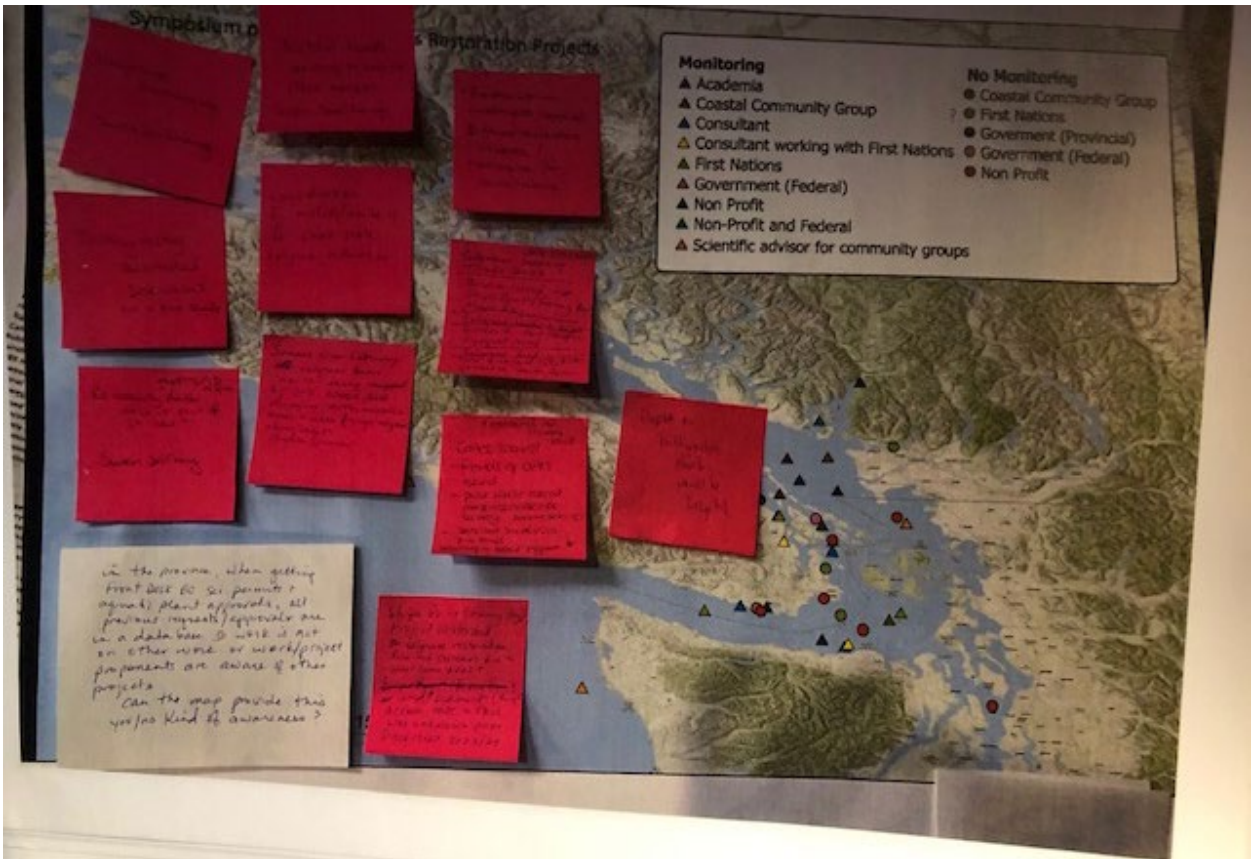
Howe Sound (Marine Stewardship Initiative): Interested in development of a monitoring program; eelgrass restoration Gambier Island.

Lower Mainland and islands: Missing eelgrass information.

False Creek: Eelgrass has been destroyed.

Boundary Bay/Tsawwassen: Observations of decreased eelgrass habitats.

səlilwət (Burrard Inlet) (Tsleil-Waututh Nation — TWN): TWN is integrating the current eelgrass map into an on-line stewardship interactive map; completed three eelgrass restoration projects, worked with Port of Vancouver on habitat banking in Maplewood Flats; presently working on protecting existing eelgrass habitats.



Participant added notes on where eelgrass related work is being carried out.

WHAT DO FAILURES AND SUCCESSES TEACH US ABOUT EELGRASS RESTORATION?

To paraphrase the words spoken by a symposium participant, ecosystem restoration is challenging in itself; recording results and mobilizing knowledge is difficult because often the knowledge is lost when the project ends. Data is forgotten or stored in inaccessible corners. Documents are not updated with links to new knowledge. Success of restoration is sometimes difficult to assess, and causes for failures are sometimes unknown.

Several high-priority actions were identified during break-out group discussions. They included a list of decision-making tools needed to make sound scientifically based recommendations for restoration site selections. The tools identified included an encyclopedia of Resources within the Practitioner Guidebooks, a document including Lessons Learned: Case Studies of Successes and Failures of Eelgrass Restoration Projects, and an avenue for disseminating existing information, such as the Hakai Institute's kelp mapping decision tree (Mapping Canopy-Forming Kelps in the Northeast Pacific: A Guidebook for Decision-Makers and Practitioners).

To address some of these obstacles, small group discussions were scheduled in the time between the presentation themes. Below is a synthesis of these discussions.

Subject	Challenges	Potential Solutions
Data Collection	Centralized accessible databank of past and present eelgrass restoration and conservation projects missing	• Develop a Provincial Seagrass Coordination Framework that has sustained multi-source funding from foundations and government • Create a Framework for Restoration Priority Sites based on large scale eelgrass map of the Salish Sea
Methodology	Restoration/conservation restoration and monitoring projects vary in quality control, methods, and legacy	• Form Regional "Supergroups" of partners for implementing protections, restoration and monitoring • Create a curated hub of information and knowledge, and contact list to have a way to continue sharing information and updated resources • Centralize seagrass data (e.g., environmental data) • Standardize protocols across the sector and create an accessible "Protocol Library"
Planning	Restoration groups need guidance for knowledge transfer	• Form an on-going eelgrass Working Group — a recurring space for connecting and converging; Include an examination of "Who is Not at the Table?" • Create a Framework for setting priorities for eelgrass restoration • Provide comprehensive restoration manual/guide/tools and techniques (written material/step by step procedures, videos, flow charts and check lists • Make available case studies of failures and successes • Facilitate communication between different groups working within the sector (e.g., a Seagrass Slack Network) • Provide funding for scoping/planning and admin

Subject	Challenges	Potential Solutions
Eelgrass conservation	Too little eelgrass habitat protection	• Sustain an on-water and on-shore presence to protect eelgrass through FN Guardian programs, community education, "Eelgrass School" to support municipalities and local governments • Increase capacity for enforcement of regulations/ protection on the ground (e.g., giving more authority to Indigenous Guardians) • Create an eelgrass lobby • Increase focus on special Management Areas, such as Indigenous Protected Conservation Areas (ICPAs) • Distribute information to local governments on how to conserve "proactively" with enforceable conservation actions
Networks	Too little coordination of restoration work between Regions	• Make information accessible of restoration sites listed in the database of the Provincial Front Desk BC that have been issued project permits/approvals • Increase inclusive roundtable events between all levels of FN, government, industry and community members • Continue to share resources (knowledge, equipment, experience, collaborative funding) to enlarge scale and effectiveness of eelgrass restoration • Continue building connections and collaborations, with awareness of the social, ecological and cultural connectivity of this work
Restoration	• Support needed to make sound decisions for restoration site selections • Restoration planning lacks a systemic approach to all stressors impacting eelgrass within specific locations (e.g., Proximity to sawmills may be hazardous to eelgrass beds) • Consider impacts on habitat and tools to measure them • Causes of decline of habitat not always evident • Harvesting of eelgrass seeds and providing nursery tanks to hold eelgrass for restoration purposes still in preliminary stages	• Provide guidance through Practitioner Handbooks, videos and other materials with a Watershed Approach to understand effects of stressors and rank them by severity; increase awareness of how certain factors/ activities affect eelgrass • Provide a Resource List of experienced practitioners to advise on selections of potential eelgrass restoration • Provide accessible Habitat Suitability models with detailed information (sediment grain size, detailed bathymetry, etc.) to guide site selection decisions • Include watershed perspective to restoration of marine nearshore habitats • Observe natural processes within site before restoration begins • Determine restoration metrics before restoration work begins • The Ucluelet Aquarium could provide an eelgrass nursery for future restoration needs

Subject	Challenges	Potential Solutions
Monitoring	Monitoring eelgrass transplants lacking guidance for evaluation of success over time	• Provide Guidelines for predicting success of particular actions • Provide guidance through Monitoring Practitioner Handbook, videos and other materials • Provide information on the best monitoring methods (drones/underwater video/transects on the shore) based on scale of project and capacity of group • Hold meetings by the Eelgrass Transboundary Collective to disseminate information • Provide multi-year secured Legacy Funds to ensure monitoring into the future • Collect eDNA samples in reference and transplant sites to compare biodiversity in each site
Research	Need to identify and communicate knowledge gaps	• Increase networking between academia and restoration practitioners
Communications	Important to communicate the results of restoration projects, including failures, and to facilitate communications to the public	• Increase capacity to do long term monitoring • Increase capacity of groups to do long term outreach • In-person meetings are considered a good start for networking with knowledgeable experts for restoration and monitoring work

CHALLENGES OF PUBLIC PERCEPTION TO RESTORATION EFFORTS: SOME OBSERVATIONS

- Sharing failures as well as successes with eelgrass restoration is very useful, although it can cause backlash in communities that are not on board (e.g., recreational group considered restoration within an estuary limited their use of the site).
- Through discussions and active engagement, the Pacheedaht community is now 100% behind the restoration being accomplished in that community, but that was not always the case (comment by Helen Jones, Pacheedaht Project Manager).
- Good communications and direct engagement by community members reduces backlash to changes made from a restoration project. There is a need to bridge the gap between industries that impact eelgrass. Some individuals want to learn more but are not included in these meetings.
- Volunteers require quality control insurance coverage; volunteer turn-over translates to more frequent training, but there is more buy-in to restoration because of direct involvement. Paid employees reduce training time and increase reliability.
- Site visits with community members and relaying monitoring results of a restoration increases awareness of their contributions (eg. increased biodiversity).

NEEDED RESOURCES

A list of what restoration activities require permits and licenses would be helpful to include in the Practitioner Guidebooks and Knowledge Report; as well an inclusion of literature, and resources and people to contact would be useful in these documents.

A Facebook account was set up immediately after the Symposium to continue the dialogues: https://www.facebook.com/share/g/UpNU9351R354ptrH/?mibextid=K35XfP

Also the Seagrass Conservation Working Group website will be updated over the coming year to revitalize eelgrass networking: https://seagrassconservation.org/

The primary message repeated throughout the Symposium was eelgrass conservation is primary. We need to increase measures to protect this critical habitat. The more effective the message to the public, the higher the level of habitat protection.

The eelgrass work we are collectively undertaking has ripple effects globally. An example is the success of a large eelgrass project in Scotland after the lead Manager visited several projects on this coast.

SUMMARY OF KEY THEMES AND CONCERNS

A summary and key themes from the two days of presentations and discussions can be grouped as follows:

1. CHALLENGES OF CLIMATE CHANGES

- Eelgrass has survived globally for ~50 million years.
- Marine heat waves are increasing in duration and intensity because of climate change and is a major threat to marine life.
- Reduce local and regional stressors to enhance carrying capacity and promote resilience, to climate change.

2. SURVIVAL OF SALMON AND OTHER FISH SPECIES

- Over 30% of small salmon fry that enter the estuary do not return.
- Degraded habitats are likely limiting survival of salmon populations.
- Salmon growth is related to food distribution, quantity, quality, and timing; if Chinook are large enough, they can shift to feeding on herring earlier in the season, in the first summer. Shift to a piscivory diet is crucial for Chinook survival and continued growth.
- 80% of the fish assemblages showed abundance stability over an eight-year period in all monitoring areas within sites of Parks Canada; different types of habitats around eelgrass meadows increase resilience.

3. HABITAT/CULTURAL CONNECTIVITY

- Hakai's research is showing evidence of the importance of kelp forests in the dietary contributions to some of the major seagrass associated organisms (e.g., isopods and kelp crabs), and the importance of kelp in seagrass sediments.
- There are many ways to connect with a place, and many ways to experience those places through eelgrass; one of them is through the food that they provide.
- Through participating in eelgrass restoration and conservation, through the gathering and preparing of food from eelgrass, or consuming eelgrass itself, through the salmon and herring and cockles, there is a level of support, known as place dependency.

4. RESTORATION CONSERVATION

- It is crucial we emphasize conservation; restoration is the second priority.
- Restoration, conservation and management can proceed even in the face of knowledge gaps; a need to know is not an excuse to not do something.
- If more attention is paid for impacts in watersheds, there might be less need for restoration on this coast.
- Habitat Suitability Models are useful tools to make better informed decisions for restoration; the strength in the model lies in the strength of the data; the more data to create the model, the better.
- Method of harvesting eelgrass seeding shoots for restoration increases genetic diversity, which may increase climate and disease resiliency.

5. PLANNING

- We need to move to a planning process that includes the entirety of eelgrass habitats within the Salish Sea; maps of eelgrass habitats would be available as a regulatory tool to use as a guide for developers. We need someone to take on the protection of eelgrass habitats in the Salish Sea as a goal, and work to have the Federal government take it on as well
- First Nations and Environmental Non-government Organizations (NGOs) are taking the leads; Department of Fisheries & Oceans (DFO) is providing support (funding and expertise), but is led by the people doing the work; partnerships and collaborations between ENGOs and First Nations are now part of the restoration process.
- Tsleil-Waututh's stewardship efforts and collaborations are working: cə́ləm (eelgrass) restoration has been successful: there is a limited food, social and ceremonial clam harvest after > 40 years of closure; sɬewət' (herring) have returned to Indian Arm after 140 years of extirpation; and there are increased sightings of q̓əlɬaləməcən (orcas) following a long absence.

6. CULTURAL KNOWLEDGE SHARING

- To many First Nations communities, food sovereignty is the right to define food systems and their sources, and the right to healthy, ecologically sustainable, and culturally appropriate foods, like eelgrass.
- Eelgrass meadows provide an act against colonialism itself as it increases cultural and political autonomy by emphasizing traditional ways of being, thinking and doing.
- This connection that eelgrass meadows provide, is commonly known as a sense of place, which has components, such as place identity, place dependency, and place attachment.
- The cooperative and pro–social behaviors through our experiences with eelgrass meadows, from the restoration to the harvesting, drives these cogs of happiness and meaning that propel well-being continually forward.

7. ACTIONS

- Eelgrass protection includes reducing impacts from boat anchoring, log booms, shellfish operations, and disturbances caused by geese.
- The development of decision support tools is a consequence of these studies enabling actions to conserve nearshore marine habitats (AERF project and ongoing work at PSF).

8. NETWORKS

- It is important for transboundary habitat node networks to share research findings and standardize data on local, national and international levels — Marine Geo Initiative, an international global Network is an example.

9. RESEARCH QUESTIONS

- Data analysis needed to correlate removal of EGCs and densities of eelgrass, clams and other marine nearshore species.
- What are the effects of intense recreational boat use on eelgrass and its ability to serve as a foundation species?
- What is the connectivity between "eelgrass neighbourhoods" and increased biodiversity between meadows in close proximity to each other?
- How important are microbiota in mitigating the effects of hydrogen sulfides and low oxygen in sediments? What are the differences in microbiota between failed and successful transplant sites? Do impacted meadows, or non–thriving meadows, have different microbiota than a healthy thriving meadow?
- Can the health of eelgrass rhizomes in summer indicate the likelihood of survival during the winter months of low light levels?

RECOMMENDATIONS: HOW TO MOVE FROM POLICY TO PROTECTION OF EELGRASS IN BC

GOVERNMENTS

Federal

- Increase capacity for enforcement of regulations/protection on the ground (e.g. more authority for Indigenous Guardian groups).
- Establish eelgrass data on Navionics to delineate No Anchoring in eelgrass Zones by working with Transport Canada.
- The Salish Sea Initiative Map created by DFO (Tamara Fraser) showcases stewardship initiatives by First Nations, but it needs continued funding to be completed.
- Guidance needed for understanding jurisdictional pathways for acquiring permits: Open Access data needs to be more easily accessible.
- Federal legislation is needed to protect the entirety of the Salish Sea.

Provincial

Provincial government improve consultation process for log lease renewals.

- Log dumps need to switch from water to land through barge transport.
- Logs could be moved to allow fish access to and from natal streams/rivers.
- In some estuaries, areas are mapped where logs could be stored with minimal impact to decrease impacts on fish survival and migrations.
- Nanaimo River Estuary, through the collective voices expressed by the Nanaimo Estuary Committee, halved the number of log booms through negotiation with the local logging company.
- Log booms enable increased predation by seals on salmon, may also be decreasing prey for transient orcas. Culls are not endorsed by PSF. Human behavior needs to change.
- PSF now has a Government Relations position that will bring information to different levels of governments.
- Increased communication between local community members and local forestry operations needs to happen to make changes.
- Provincial government needs to take the initiative on LIDAR data collection for restoration within estuaries so that communities have access to current information for modelling and mapping watersheds and estuaries. Some funding is available for LIDAR kelp mapping (Hakai).

STANDARDIZATION OF DATA

- Standardize data outputs when monitoring, such as apps, data sheets, etc.
- Develop data collection tools to support collaboration.
- Determine metrics used for restoration and monitoring.
- Have a centralized respositry of data for open access for eelgrass work.

RESTORATION DESIGNING AND PLANNING

- Make a portal for accessible information for restoration methods, training, site suitability, testing success, and requirements for undertaking restoration projects.
- Increase in-person meetings and symposia to build contacts, so that it is easier to reach out for assistance.
- Increase opportunities to share information on all scales, including internationally, to explore different techniques and to catalogue other restoration accomplished in other countries.
- For monitoring, develop a Decision Tree to choose the optimal method for particular circumstances with a range of options (plus/minus of each and when/where certain methods may be most appropriate).
- Develop a Restoration Hub to address knowledge gaps by providing accessible information, guidance for priority restoration sites, a Habitat Suitability Map to support site decisions and a Community Interactive Map describing specific work in specific areas of the coast.
- A hub would include an Eelgrass Knowledge Report that includes unpublished papers, Practitioner Guidebooks, Estuary Report Cards, and more workshops and training to share information.
- Definition of success/failure of a transplant.
- Create an on-line decision-making tool (including a check list flow chart) that could help make improved decisions for restoration sites.
- One method for determining whether an eelgrass site is fully functioning would be to collect invertebrates from a restoration site and compare with eelgrass nearby.
- There needs to be consistent and flexible funding for planning, experimentation, and longer monitoring schedules.

HIGHLIGHTS FROM GROUP DISCUSSIONS

We need to have a system thinking approach to eelgrass restoration to include upland watershed conditions (temperature, flow rates, etc.), a holistic approach when addressing potential restoration sites. From peak to pelagic: restore the entire watershed e.g., alpine creeks are the "AC units" for the lower river). There can't be logging in the alpine areas without a big impact in the estuary. Water table levels change from upland impacts.

Research

- Research seems to show those sites with higher genetic diversity seem to be colonizing faster.
- Necessary to identify drivers of change and cessation of these before restoration is undertaken
- Important to have good engineering as well as good biological information (fetch, currents, flooding, sediment deposition rates, site relative to stream/river outflows). Recommended that the engineering company's experience and knowledge of nearshore dynamics, such as channel elevation, water volumes and velocities, and metrics, be investigated before project planning begins; elevation ranges can be included in the project design drawings so that decisions can be modified in the field.

Planning

- Expansion of a restoration project to more than one year allows for adaptive changes to take place — this is a major advantage of present DFO funding.
- Baseline data, such as maps, current and sedimentation rates and movement patterns, bathymetry, stressors, and land use, as well as selected reference sites help with site selection.
- Identification of donor beds with similar ecotype to the site being restored is critical.
- Geomorphological and hydrological studies inform location of suitable restoration sites.
- Local knowledge is necessary and invaluable for site locations.
- Site selection: pilot plots are difficult to fund and a lot of ground needed to find the "sweet spot"; failures mixed with successes.

Restoration Methods

- Mapping the outer subtidal edges of eelgrass beds is important.
- Adding to existing eelgrass beds may be less risky than establishing new restoration sites.
- Include Indigenous restoration practices, such as the maintenance of fish weirs in estuaries and eco-cultural goose fencing.
- Methodology of washer attached to shoots seems to be working.

Monitoring

- Baseline monitoring over a year or more prior to restoration can inform what the site conditions in the nearshore system are like.
- Monitoring frequency needs to capture changes over time, and the reasons for them.

Eelgrass Knowledge Report and Guidebooks:

- List of permits/licenses needed for restoration work.
- List of accessible resources (including people attending the Eelgrass Symposium).
- Literature review.
- Include Hakai Institute to help develop monitoring tools (drones, under water cameras, etc.), and include advantages and disadvantages of each method in mapping subtidal edges of eelgrass beds.
- Include the overall theme: Active conservation and protection is the best solution to keep existing eelgrass systems intact.
- Case studies of successes and failures that showcase different levels of capacity (education to high tech monitoring methods).
- Knowledge gaps to highlight the need for further research and collaboration.

Community Engagement

- Avoid thresholds and triggers and areas of higher stress (MHW, industrial use, geese herbivory) for restoration sites. There are stressors we can control through social change.
- Employing community members reduces overall time for training, resulting in possibly higher quality control, and liability issues may be lessened.
- Public backlash to restoration work can be addressed through education and outreach with regard to the goals and restoration processes, community engagement by community members, site visits and regular updates on projects, and how the community is contributing to increased biodiversity.
- Invest time and funds towards training the folks in the field.
- Increase collaborations on all levels.
- Accountability within the government - bring people from different ministries together in the same room (e.g. the TWN Roundtable for stakeholders interested in eelgrass in Burrard Inlet).
- Keep collaborations alive so that when AERF funding is over, the work continues.

APPENDIX 1: PARTICIPANT LIST

Researchers/Government/Consultants		Affiliation
Hessing-Lewis	Margot	Hakai Institute
Prentice	Carolyn	Hakai Institute
Bachen	Krystal	Hakai Institute
Park	Ashley	DFO, UBC PhD O'Connor Lab,
O'Connor	Mary	UBC Biodiversity Lab
Macgillivray	Miranda	UBC Biodiversity Lab
Knight	Nicole	UBC Biodiversity Lab
Spooner	Angela	DFO
Northrup	Scott	DFO
Menning	Patty	DFO
Dunic	Jillian	DFO
Durance	Cynthia	Consultant
Smith	Miranda	Consultant
Helms	Sibylla	Parks Canada
Hutton	Chris	Islands Trust Conservancy
Yakimishyn	Jennifer	Pacific Rim National Park Researcher
Bohlen	Krista	Pacific Rim National Park Researcher
Thomson	Hanna	Parks Canada
Guttmann	Maya	Facilitator
Cox	Delaney	Graphic artist

First Nations		Community
Moskal	Haley	Halalt First Nation
Roemer	Cosmo	Halalt First Nation
Rao	Anuradha	Marine Stewardship TWN|
McGuinness	Jen	Tla'amin Nation
Ouchi	Sachi	Tla'amin Nation
Jones	Helen	Pacheedaht First Nation
Hurry	Daniel	Wei Wai Kum Guardians
Labbe	Jordon	Wei Wai Kum Guardians
Underwood	Lorne	Tseychum Marine Stewardship
Duke	Katarina	Ka:yu:'k't'h' / Che:k'tles7et'h' First Nations

Community Organizations

Wright	Nikki	Pacific Salmon Foundation
Pearsall	Isobel	Pacific Salmon Foundation
Christianson	Nicole	Pacific Salmon Foundation
Clay-Smith	Sarina	Pacific Salmon Foundation
Porter	Marc	Pacific Salmon Foundation
Coleman	Liam	Pacific Salmon Foundation
Ruiz	Paulina	Pacific Salmon Foundation
Smith	Jamie	SeaChange
Anthony	Susan	SeaChange
Cook	Sarah	SeaChange
Brunke	Tiffany	Squamish River Watershed Society/SCWG
Cafarella	Silvi	Squamish River Watershed Society/SCWG
Eriksson	Ann	Biologist/Author
Stubbs	Crysta	Coastal Restoration Society
Twist	Brenton	Coastal Restoration Society
Souque:	Tyranna	Coastal Restoration Society
Fulton	Emily	Redd Fish Restoration Society
Vanderbanck	Sophie	Redd Fish Restoration Society
Pierzchalski	Caitlin	Project Watershed Society
Skinner	Jeff	Project Watershed Society
Zandvliet	Hannah	Raincoast Education Society
Richards	Derek	Raincoast Education Society
Taylor	Gwyn	Marine Stewardship Howe Sound
Lamb	Andy	Marine biologist/SCWG
Riordan	Barbara	Mid-Vancouver Is. Habitat Enhancement Society
Ashton	Pat	Mid-Vancouver Is. Habitat Enhancement Society
Underhill	Rob	Marine biologist/SCWG
Clermont	Tim	Guardians of our Salish Estuaries Society (GooSE)
Hall	Helen	Friends of Cortes Island
Carswell	Alana	Ucluelet Aquarium
Griffith-Cochrane	Laura	Ucluelet Aquarium
Lavoie	Katharine	Greenways Land Trust
Andrews	Camille	Greenways Land Trust
Fish	Marianne	World Wildlife Fund
Ayers	Cheri	Cowichan community

APPENDIX 2: AGENDA

PACIFIC SALMON FOUNDATION

PSF Eelgrass Symposium 2024 Agenda

October 16 & 17, 2024. Coast Discovery Inn, Campbell River BC

Eelgrass Symposium 2024 Objectives

- **Gather and Share Knowledge**: Contribute to the State of the Knowledge Report for Eelgrass Habitats in the Salish Sea and the West Coast of Vancouver Island.
- **Support Actions for the Restoration of Eelgrass Habitats**: Describe advances in science that contribute to the understanding of anthropogenic stressors on eelgrass habitats, and promote eelgrass restoration tools and climate change adaptation strategies.
- **Relationship Building and Storytelling**: Share stories and build relationships for improved eelgrass habitat protection.

Agenda Day 1 Maya Guttmann, Facilitator

Time	Description	
8:00	**Registration, Coffee, and Food**	
	• Name tags, Photo permission forms, Viewing Eelgrass Distribution Map	Eelgrass Distribution map for viewing
9:00	**Welcome and Opening**	Wei Wai Kum Nation
	• Housekeeping/and Agenda Review/ Who is Here? (Survey) • Guidelines for Dialogue • AERF Project	Nikki Wright Nicole Christiansen
10:00	**Keynote Opening**	
	• Evaluating Climate Change Effects on Eelgrass-Data and Framework (digital presentation) • The Salish Sea Marine Survival Project	Dr. Ron Thom Dr. Isobel Pearsall
11:30	Discussions with entire group re topics presented by previous speakers	Maya/Nikki
12:00	**LUNCH**	
1:00	**What we are learning about eelgrass habitats**	
	Andy Lamb: “An Accessible Unique Baseline Record of Marine Life from Washington State to Alaska” Jennifer Yakimishyn: "Eelgrass Monitoring Program in Pacific Rim National Park Reserve" Margot Hessing-Lewis: “10 Years of Seagrass Monitoring by the Hakai Institute”	

Time	Description	
	Ashley Park: “" Understanding eelgrass distribution and projecting range shifts amidst climate change, sea level rise, and anthropogenic development in British Columbia"	
2:15	**Break Out Groups:** Knowledge sharing about Eelgrass Distribution and Restoration within your Region	Facilitated
3:00	**BREAK**	
3:20	**Actions being taken to restore and protect eelgrass habitats**	
	Cynthia Durance: “Eelgrass restoration in Brown’s Slough in the Gordon River Estuary” Tyranna Souque: “European Green Crab: A summary of life history, ongoing efforts, and impacts of this coastal aquatic invader on Vancouver Island” Sarah Cook: “Accessing and using the ShoreZone imaging and habitat mapping dataset for eelgrass in the Pacific Northwest” Katherine Lavoie/Jordan Labbe: “The Mill Pond Restoration Project: A Social-Ecological Approach”	
4:30	**Break Out Groups:** What Do Failures and Successes Teach Us about Eelgrass Restoration	Facilitated
5:00	**Wrap up and agenda for tomorrow**	
	Adjourn 5:15 pm	

6:00 PM Dinner Buffett Texada Room

Speaker and Video Showing

Agenda Day 2

Time	Description	Who
8:30	**Welcome and Opening**	
	• Agenda review & housekeeping • Key takeaways & reflections from yesterday	Maya/Nikki
9:00	**What We Need to Know**	
	Dr. Mary O'Conner: "Testing the Importance of Root and Rhizome Associated Microbiota for Eelgrass Growth and Restoration" Miranda Smith: "Habitat Suitability Models for Eelgrass Restoration" Angela Spooner:" Benefits of Seeding Methods in Eelgrass Restoration"	
10:00	**BREAK**	
10:15	**What could the future hold**	
	Katarina Duke Ka:yu:'k't'h'/Che:k'tles7et'h First Nations: "The Future is Candy: Eelgrass Meadows for Food Sovereignty and Well-being" Anuradha Rao: "A summary of Tsleil-Waututh Nation's collaborative work to map and restore eelgrass in səlilwət (Burrard Inlet)" Chris Hutton: "How environmental eelgrass data is used through development tools and what changes could improve eelgrass protection within the Islands Trust Area" Scott Northrup: "What the Future Could Hold: Protecting Eelgrass and Cutting the Green Tape, a DFO perspective"	
11:30	Whole Group Discussion: Reflections on the Symposium proceedings and actions for the future.	Maya Nikki
12:00	**LUNCH**	
	Adjourn 1:00 PM	

This symposium has been made possible with funding support from the Fisheries and Oceans Canada Aquatic Ecosystem Restoration Fund and contributions by the Hakai Institute and Pacific Salmon Foundation.

APPENDIX 3: FIELD TRIP ANNOUNCEMENT

Fisheries and Oceans Canada
Pêches et Océans Canada
PACIFIC SALMON FOUNDATION
Wei Wai Kum
BRITISH COLUMBIA
NATURE TRUST BRITISH COLUMBIA
GREENWAYS LAND TRUST
CAMPBELL RIVER SALMON FOUNDATION

Field trip to the Mill Pond

Field trip to the Mill Pond led by Jordon Labbe and Katie Lavoie.

APPENDIX 4: GRAPHIC OF SYMPOSIUM PROCEEDINGS

by Delaney Cox

PACIFIC SALMON FOUNDATION

October 16, 2024

Delaney Cox with DRAWING IT OUT

PACIFIC SALMON FOUNDATION

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Fisheries and Oceans Canada | Pêches et Océans Canada