

# Eco-Cultural Restoration of the Campbell River Estuary

FWCP Project No: COA-F20-F-3090



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Prepared by:

**Tim J. Clermont, Executive Director,**

**Guardians of Mid-Island Estuaries Society**

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## Executive Summary

Eco-Cultural Restoration of the Campbell River estuary is a project developed by the Guardians of Mid Island Estuaries Society (GoMIES) in partnership with the Wei Wai Kum Guardian Watchmen. This project transforms future estuary restoration efforts to a more “hands on approach” as the Wei Wai Kum Guardians and partners modify traditional fish weir techniques to restore and protect productive estuary sedge marsh habitats. The long-term goal of this project is to protect and restore *Carex* sedge habitat within suitable brackish high marsh zones of the Campbell River and Nunns Creek estuaries now at risk due to overgrazing by locally overabundant Canada Goose populations. The Eco-Cultural restoration prescriptions implemented by this project address priority actions identified in the 2020 FWCP Campbell River Watershed Action Plan in particular - CBR.RLR.HB.16.01 Conduct habitat restoration activities in the Campbell River estuary-P2.

This project builds on recent restoration efforts in the Campbell River Estuary with a goal to incorporate 100% natural/organic materials to create wooden enclosures that will protect *Carex lyngbyei* channel edge habitat. Enclosures are necessary and designed to stop Canada Goose (CAGO) grazing within them which allows the estuary marsh vegetation to recover. In 2019/20 the Guardians and Wei Wai Kum First Nations transitioned away from enclosure techniques implemented in their 2018 pilot restoration phase (plastic snow fences, fasteners, and metal rebar) using instead, First Nations manufactured alder poles and willow stakes which were re-enforced with hemp, willow branches, and twine to construct natural wooden structures. These wooden enclosures are intended to protect *Carex* channel edge habitat over a longer time frame and provide sites where we can transplant *Carex* plugs from undisturbed donor sites to currently denuded mudflats. *Carex* channel edge communities thrive in brackish tidal channels and are known to be an indicator of estuary productivity and to provide optimal rearing and cover habitat for salmon fry.

GoMIES are following the 2018/19 Campbell River estuary restoration plan a project initiated by the Nanwakolas Tribal Council on behalf of the Wei Wai Kum to help guide their Guardians in restoration activities and overall management of the estuary (Clermont 2019). This project helped the Wei Wai Kum to establish a formal Guardian Watchman program as the work of the estuary stewards was endorsed by the Wei Wai Kum Chief and Council to help them build capacity in long-term fish and wildlife management.

In 2019/20 the Wei Wai Kum and GoMIES constructed wooden enclosures protecting over 12,000 m<sup>2</sup> of sedge marsh habitat in the Nunns Creek and Campbell River estuaries. Just over 8000 *Carex* sedge plants were transplanted into the sediments within the large Nunns Creek enclosure in April of 2019 and 2020. A habitat map was created which provided an update of the habitat enclosures built to date and proposed for 2021-2023. Community outreach has involved the Wei Wai Kum to host and help activate a Campbell River Estuary working group involving the Greenways Land Trust, City of Campbell River, DFO, Ducks Unlimited Canada, and Guardians of Mid Island Estuaries Society. Annual collaborations to tackle invasive plants and Canada Goose management have been planned and implemented alongside this focal project which has attracted more partner support. On-going Indigenous led restoration and management will ensure a healthier estuary.

## TABLE OF CONTENTS

Executive Summary: Eco-Cultural Restoration of the Campbell River Estuary.....	2
Table of Contents.....	3
Background.....	4
Introduction.....	6
Goals and Objectives, Measurables, and Linkage to FWCP Action Plans.....	8
Study Area and Restoration Map.....	9
Methods.....	10
Results and Discussion .....	13
Project Milestones .....	14
Lesson’s Learned and Recommendations .....	15
Acknowledgements.....	16
References .....	16
Project Web Links .....	17

### List of Figures

Figures 1 and 2. Canada Geese grubbing <i>Carex</i> rhizomes which led to marsh platform erosion at the K’omoks Estuary, January 2018. ....	4
Figure 3. Eco-Cultural habitat fencing built by the Wei Wai Kum Guardians protecting channel edge habitat at the Campbell River Estuary, September 2020.....	7
Figure 4. 2021/2022 Campbell River/Nunns Creek estuary restoration map .....	10
Figure 5. Eco-Cultural restoration enclosure with <i>Carex</i> transplants, Nunns Creek estuary	11

## Background

Estuaries are known to be the most productive ecosystems in North America. They provide critical fish and wildlife habitat, and therefore their protection and rehabilitation are of the utmost importance (Gaboury, M. *et al.* 2012). Over 30 Conservation organizations, stewards, and partners have spent over \$20 million to secure, maintain, and restore east coast Vancouver Island estuaries since the 1980's and a significant portion of over \$4 million was invested to secure and restore/enhance the Campbell River estuary.

Since the beginning, the people of the Wei Wai Kum and Wei Wai Kai First Nations have enjoyed and occupied the lands, shoreline, and waters of the Campbell River and Nunns Creek estuaries. Their largest settlement was on lands along the spit adjacent to the estuary and the sea. Oral histories and archaeological evidence show that the estuary and the marine foreshore has long been a place for habitation, hunting and fishing, harvesting of plants and berries, and ways of being. The cultural and spiritual significance of the estuary sustained many generations who were drawn by the rich resources of the estuary. An abundance of salmon, shellfish, and diverse plant and animals sustained these people. Several important artifacts have been discovered and need protection as these First Nations today – study and learn of their ancestry and their connection to the estuary. Estuary restoration to the Wei Wai Kum is more complex. There is a need to protect sensitive estuarine habitats and eroding shorelines for both fish and wildlife habitat values and to protect archaeological sites all of which are important First Nation cultural values. The recent re-finding of stakes forming fish weirs and traps in the estuary emphasizes the longstanding presence of the Wei Wai Kum and Wei Wai Kai in this area.

The Campbell River estuary is a dynamic ecosystem which has received considerable impact from a variety of industrial users over the past 100 years. From the early 1900's to 1977, most of the Campbell River estuary had been modified by industrial activities. Over 80% of the estuary was dominated by forest practices that stored logs for local sawmills. Other impacts to the estuary included the development of marinas, float plane docks, ship repair and barge loading facilities, and gravel removal. The greatest long-term impact has come from 3 hydroelectric dams within its watershed which since the 1950's affects year-round flow and limits sediment inputs. The loss of estuary habitat during this time severely impacted the estuaries ability to support juvenile salmon during critical life-cycle stages and high flows

disrupted salmon spawning gravels. This has had severe consequences for the Wei Wai Kum in terms of their salmon resources for food and ceremonial purposes and to Campbell River's reputation of the salmon capital of the world with 30+ pound Tyee (Chinook salmon) much more common decades ago.

### ***Estuary Restoration and a new Emerging Threat***

However, during the past 30 years efforts to restore the estuary have gained widespread public acceptance. BC Hydro's - Bridge Coastal and Fish and Wildlife Compensation programs along with the City of Campbell River, Habitat Conservation Trust Foundation, DFO, Pacific Salmon Foundation, Nature Conservancy of Canada, Ducks Unlimited Canada, and 20+ community groups/businesses have worked to acquire and restore much of the former industrial lands within the estuary and have invested over \$4 million since 1981.

Over the last two decades most industrial activities had stopped and the focus was habitat restoration. This led to scientific studies from the 1990's to 2013 to evaluate the success of previous habitat compensation and restoration efforts within the Campbell River estuary. These studies revealed an unexpected emerging new threat. Federal and Provincial wildlife agencies authorized the translocation of Canada Geese to several coastal communities in the 1970's and 1980's that became prolific and in some cases resident to urban and semi-rural communities with few predators and limited hunting as residential development grew along coastal Vancouver Island. Data from these estuarine marsh studies have documented 80- 90% loss of *Carex* channel edge communities which are known to be the most important vegetative community for the estuary food web and for salmon fry rearing habitat. Several vegetation studies and publications produced by Dawe et. al (2010-2013) have linked these losses to regionally overabundant Canada Geese and their herbivory. Dawe et al. 2015 reported that by 2012, *Carex lyngbyei* vegetation at the Campbell River estuary had been reduced by over 90% since 1994, and they estimated productivity losses of over 12 tonnes dry mass annually of *Carex* detrital input to the estuary food web. Grout et al in 1997 found *Carex* provided significant detrital inputs over the entire winter to spring cycle which provided food to consumer organisms critical to the juvenile salmon food web. Levings et al. 1986 reported juvenile chinook salmon reared in the Campbell River estuary for 40-60 days in a study comparing wild and hatchery raised chinook smolts.

In the Campbell River estuary Canada Goose populations went from 0 (pre-goose transplants) to over 1400 during the summer molt period (July 2016). In 2018, the Guardians of Mid Island Estuaries Society (GoMIES) partnered with the Wei Wai Kum Guardians to implement a long-

term “Eco-Cultural Estuary Restoration” project for Nunns Creek and Campbell River estuaries. They are now in year 2 of at least a 5-year effort. Additional funding support is required to speed up estuary recovery. GoMIES 2020 winter peak (mid-February) and summer moult counts (June 17<sup>th</sup>) found 500+ Canada Geese in the estuary but none were observed within the habitat exclosures.

## Introduction

In 1981, four marsh islands were established in the estuary at an elevation that would allow for dominant *Carex lyngbyei* sedge growth. *Carex* plugs were transplanted to the constructed islands and along with natural and rhizomal growth, healthy *Carex* channel edge vegetation was found to be dominating the tidal islands (Brownlee et al. 1984; Dawe et al. 2000). *Carex* provides critical food and shelter habitat to salmon fry and helps to build productive marsh platform soils important to estuary primary production benefiting all fish and wildlife species.

Year-round resident CAGO and a variety of “visiting” sub-populations (Clermont, H. 2015), have been directly linked to over-grazing and grubbing of channel edge vegetation dominated by species such as the highly productive Lyngbye’s Sedge (*Carex lyngbyei*), leading to the erosion of productive sediment/soils and the collapse of marsh benches on most estuaries found along the east coast of Vancouver Island. Since 2017, the Guardians of Mid Island Estuaries Society (GoMIES) have worked closely with the Wei Wai Kum First Nation to address a new emerging issue that is severely impacting estuaries within their traditional territories. Overabundant resident Canada Geese (CAGO) have over-grazed estuarine marshes in the Campbell River and Nunns Creek estuaries which has caused erosion of significant marsh and beach structure in the estuary.



Figures 1 and 2. Canada Geese grubbing *Carex* rhizomes causing marsh platform erosion.

According to Dawe et al (2000 and 2015), only one pair of Canada Geese were observed in the Campbell River estuary in 1982 but by 2012, over 1000 geese were observed at the estuary during their June/July molt phase. In 2016, GoMIES conducted a summer molt count along the east coast of Vancouver Island and over 1400 CAGO were observed in the Campbell River estuary in early July which was the highest recorded number of geese found in any Vancouver Island estuary. Research conducted by the Guardians of Mid Island Estuaries Society from 2009 to 2015 at the Little Qualicum and Englishman River estuaries (and more recently by the Greenways Land Trust at the Campbell River estuary) have proven that over-abundant Canada Goose populations target and destroy *Carex* channel edge communities during nesting and summer molt periods ([www.guardiansmie.org](http://www.guardiansmie.org)). GoMIES have developed a *Carex* transplant tool and a restoration system that includes goose exclosure fencing around *Carex* restoration sites that have been remarkably effective at the Little Qualicum, Englishman, and K'omoks estuaries. The Wei Wai Kum Guardians have recently perfected what we have learned from other estuaries to what is our finest example of Eco-Cultural Estuary Restoration setting a higher bar and informing best practices that we now incorporate at five other estuaries.



Figure 3. Eco-Cultural habitat fencing built by the Wei Wai Kum Guardians protecting channel edge habitat at the Campbell River Estuary, September 2020.

## Goals and Objectives, Measurables, and Linkage to FWCP Action Plans

The primary goal of Eco-Cultural estuary restoration is to generate high quality forage and rearing habitat for juvenile salmon and significantly increase the primary productivity of the Campbell River and Nunns Creek estuaries by protecting vulnerable sites and by re-vegetating degraded areas with *Carex* dominated estuarine marshes.

The Nunns islands were created in the 1980's as part of an estuary compensation project to provide critical juvenile salmon habitat. They were deemed a huge success and were dominated by *Carex* into the 1990's but has more recently suffered the greatest degradation by Canada Goose herbivory and has the most potential for immediate protection and enhancement through our proposed habitat-based actions. Creating expanded intact sedge marshes will be critical for juvenile salmonids seeking much needed rearing habitat in the estuary.

Our project helps to implement priority habitat-based actions identified in the 2020 FWCP Campbell River Watershed Action Plan in particular - CBR.RLR.HB.16.01 To conduct habitat restoration activities in the Campbell River estuary-P2.

The following objectives will be achieved through a series of activities and measurables as follows:

1. Develop a comprehensive habitat map that clearly illustrates healthy *Carex* channel edge communities, degraded or at risk *Carex* marsh habitat, and denuded mud flats suitable for restoration.

Measurable: Restoration map completed and updated annually to inform multi-year restoration targets.

2. Construct Eco-Cultural estuary exclosures to protect vulnerable *Carex* channel edge habitat and to facilitate *Carex* restoration success.

Measurables: *Carex* habitat protected and restored in m<sup>2</sup>/hectares, numbers of *Carex* plugs/plants transplanted leading to improved fish use from enhanced habitat structure and resiliency of the estuary.

3. Train First Nation Guardians to become skilled at Eco-Cultural restoration and monitoring.

Measurables: Numbers of Coastal Guardians skilled to carry out all aspects of creating Eco-Cultural habitat exclosures and to conduct project monitoring, data collection, and to sustain restoration sites over the long-term.



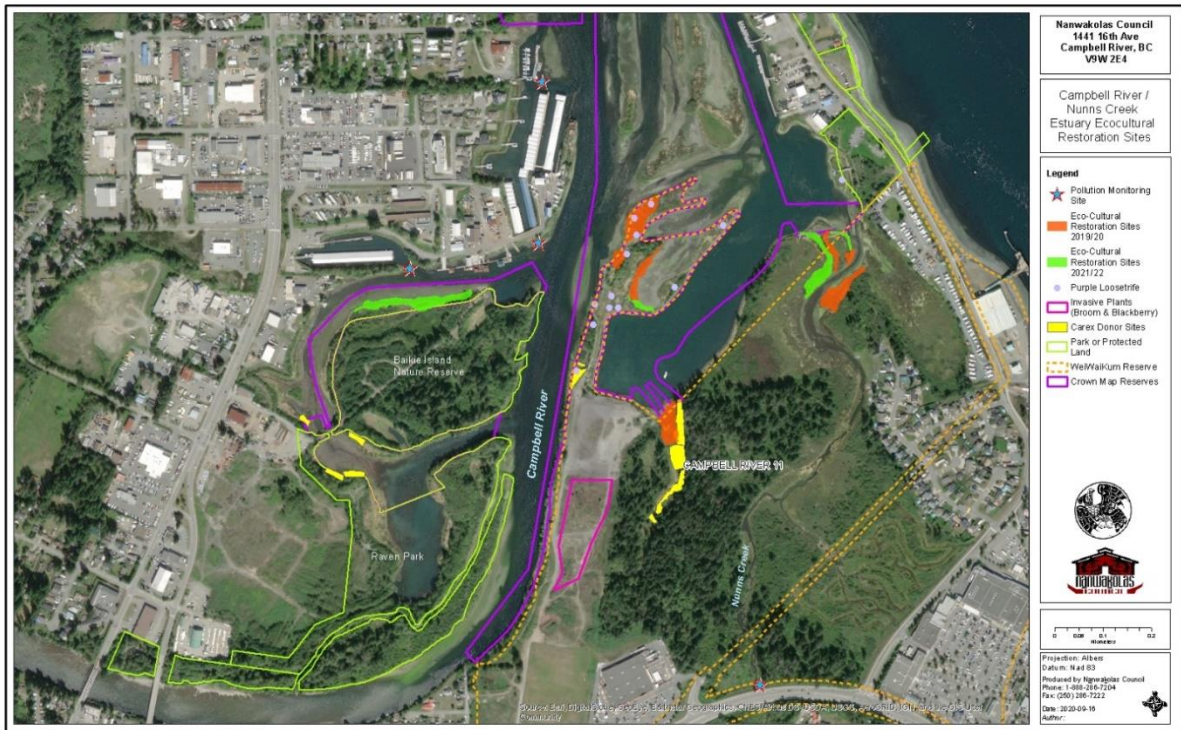
4. Promote research and awareness of Eco-Cultural restoration techniques to improve fish and wildlife habitats in the Campbell River and Nunns Creek estuaries.

Measurables: Quality and numbers of interpretive outreach information documents and signage which highlights the role and contributions of Wei Wai Kum Guardians, community stewards, and funding partners. Local media has taken a keen interest in this project and annual news stories will become a key part of ongoing community outreach avenues.

### **Study Area and Restoration Map**

The Campbell River Estuary drains into the Discovery Passage on the East Coast of Vancouver Island within the City of Campbell River. The estuary is within the core territory of the Wei Wai Kum and Wei Wai Kai First Nations and the Nunns Creek estuary is within the Wei Wai Kum Reserve number 11. The Wei Wai Kum have recently expanded these reserve lands to include the former Timber West dryland log sort adjacent to the Campbell River and estuary (Figure 4). The cultural importance of this estuary to the First Nations is immeasurable as the productivity of the estuary that provided vital habitats for salmon, wildlife, plants, and for ceremonial use provided year-round resources to support their people since the beginning.

The priority habitat representing the project study area involves high marsh, brackish channel edge vegetative communities found in tidal channels of Baikie Slough, along the lower Nunns Creek and constructed Nunns Islands in the heart of the Campbell River estuary. These high value fish and wildlife habitat became a draw to over 1000 moulting (May to August) Canada Geese from 2010-2017 which were by far the highest CAGO densities on Vancouver Island with devastating affects to estuarine vegetation especially *Carex* dominated sedge marshes. CAGO over-grazing within these estuaries completely wiped out the sedge marshes created in the 1980's.



**Figure 4.** 2021/22 Campbell River/Nunns Creek estuary restoration map.

Orange polygons show existing habitat exclosures/restoration sites (2018-2020) and the Green polygons show proposed Eco-Cultural restoration sites to be constructed in 2021/22. Yellow polygons show healthy *Carex* donor sites and Purple dots show Purple Loosestrife hotspots.

### **Eco-Cultural Estuary Restoration Strategy and Methods:**

Eco-Cultural estuary restoration is a modification of traditional fish weir techniques to restore vital estuary habitat to enhance salmon survival. The Guardians of Mid Island Estuaries Society (GoMIES) have pioneered unique and remarkably successful estuary restoration techniques at the Little Qualicum and Englishman River estuaries since 2010. In 2019/20, GoMIES partnered with the Wei Wai Kum First Nation to apply adaptive improvements to earlier restoration efforts to protect at risk *Carex* marshes at the Campbell River and Nunns Creek estuaries.

Eco-Cultural estuary restoration involves the construction of habitat exclosures that incorporate 100% natural/organic materials to create effective protection from Canada Goose herbivory and allows both natural estuarine marsh recovery and enhanced recovery through *Carex* transplants into denuded mudflats. Large 3.5”-5” diameter 2m to 2.4 m high alder poles

were “hand cut and sharpened on one end” and installed in the estuary by using a 6” diameter post pounder. Long slender willow and alder branches (2-3m long) were woven through the larger alder poles to create all wood enclosures stronger and more natural than previously constructed snow fence and rebar structures (pilot 2018 phase) which required regular cleaning/maintenance. The Guardians has a permit from the Ministry of Transportation and Infrastructure (MOTI) that allows our Society with First Nations partners to harvest young alder and willow from highway right of ways from Qualicum Beach to Campbell River. The cost to make the Eco-Cultural restoration wooden structures is lower than purchasing fence posts, rebar, and plastic snow fencing from big box hardware stores which was the case during the pilot phase in 2018. The wood source is donated by MOTI and the cost to manufacture the alder poles and willow stakes is mostly First Nations and GoMIES labour, tools, and transportation costs. This work is best achieved during days where the low tides do not cooperate with 4-6-hour work windows.



Figure 5. Alder and Willow Eco-Cultural restoration enclosure with recent Carex transplants, Nunns Creek estuary, July 2020.

These wooden exclosures are necessary to bring back *Carex* channel edge habitat in the estuaries and to protect existing habitat from further Canada Goose herbivory/degradation. Healthy *Carex* tidal channels are known to be the most important estuarine habitat for salmon fry and smolts, invertebrate production, and to bind carbon and add productive sediments to improve estuarine flood protection and resiliency.

Our Eco-Cultural restoration strategy involves work in two habitat conditions. The first is an area where *Carex* is present but exists in a degraded state. In this instance alder and willow fencing will be used primarily to allow the existing *Carex* to naturally re-establish itself in conditions where it is protected from CAGO grazing. The second restoration type are areas which have seen 100% *Carex*/estuarine marsh vegetative loss and have become denuded mudflats. In this second scenario, *Carex* plugs are brought in from a nearby donor site and planted in the exposed soils with the intent of re-establishing a *Carex* sedge community. This second site type has typically been upstream or adjacent to eroding and widening tidal channel edges easily accessible to molting geese on rising tides. *Carex* plugs are extracted by our crews from “donor sites” where this estuarine plant is abundant. A large custom-made all metal extractor tool designed by GoMIES collects a cone shaped plug from the sedge marsh which contains the roots and rhizomes of 5-15 *Carex* plants. These *Carex* plugs are then carried to the restoration plot and our tool is used to remove a similar sediment plug where we then transplant/insert the *Carex* plug. We have learned that *Carex* can be successfully transplanted in late February to mid-May using this technique. GoMIES staff and volunteer directors trained five new Wei Wai Kum Guardians/participants on the use of these restoration techniques in 2019/2020.

Photo site monitoring and vegetative surveys will be conducted by GoMIES field technicians and Wei Wai Kum Guardians to help measure success of past and proposed restoration efforts. The restoration sites will also provide structure to the estuary to help reduce erosion and provide greater resiliency during peak flows. GoMIES will follow the strategic estuary restoration plans they and their First Nations partners are developing for the Campbell River estuary (in-progress).

In the spring of 2018, GoMIES used GIS software to create georeferenced polygons and photos that identified healthy *Carex* donor sites, priority sites requiring immediate protection from Canada Goose herbivory, and fully denuded sites requiring long-term restoration. The kmz files were sent to the Nanwakolas GIS specialist for mapping to help guide our phased restoration work. This was repeated in September 2020 to help us create the habitat map showing existing restoration sites and those proposed (Figure 4.).

## Results and Discussion

In 2018, approximately 2,100 m<sup>2</sup> of healthy donor *Carex* beds were protected along with heavily degraded sedge marsh within the Campbell River estuary. This pilot phase was funded by the Wei Wai Kum and Nanwakolas Tribal Council through the BC Marine Planning Partnership (MaPP) to start an estuary stewardship role for the Wei Wai Kum. Materials used to build habitat enclosures were comprised of green safety fencing and metal rebar. Nanwakolas provided GIS map support to build a habitat map for the estuaries which could be updated annually to support a multi-year restoration project.

This FWCP project funded work conducted by GoMIES and the newly formed Wei Wai Kum Guardians from mid-2019 to September 2020 involving five new Wei Wai Kum participants by 2020. The planned restoration work was partially delayed with the transition of Wei Wai Kum Estuary Stewards to Guardians and to train the new participants.

The results over the past two field seasons were phenomenal as over 12,000 m<sup>2</sup> of critical sedge marsh habitat has been protected and 6,390 *Carex* sedge plants were transplanted into barren channel edge habitat along the Nunns Creek estuary (Figure 5.). Due to Covid 19 travel restrictions the Wei Wai Kum Guardians utilized additional partner support and spent more time working closer to home to exceed our expectations in completely converting all wood Eco-Cultural habitat goose enclosures within large portions of the Nunns and Campbell River estuaries. GoMIES surveyed all existing enclosures and mapped all potential donor sites and proposed restoration sites in September 2020 that provided the data needed to update our habitat maps. Once again GIS support was provided by Nanwakolas Tribal Council. Next spring, we will focus on accelerating sedge marsh recovery through a more significant effort to transplant over 15,000 *Carex* plants into enclosed (protected) denuded mudflats.

The success of eco-cultural estuary restoration efforts will be measured by the quantity and quality of *Carex* and associated vegetative channel edge community habitat protected and restored at the Campbell River and Nunns Creek estuaries in m<sup>2</sup>. Also, important will be the numbers of First Nations who will be mentored and trained to continue to protect and maintain estuarine habitats vital to salmon and other wildlife. The Guardians feel eco-cultural restoration work could become a significant part of the Vancouver Island Universities – First Nations Fisheries Technician certification program which is expected to evolve into diploma and degree programs in the future. Fish presence and abundance will also be key indicators which will be measured through snorkel surveys and we hope to include underwater video footage.

## Project Milestones

**2018/2019** - Obtained BC Permit from Ministry of Forests, Lands and Natural Resource Operations & Rural Development (FLNRORD) in June 2018 and reviewed with West Coast Conservation Land Management Program and Regional FLNRORD staff in April 2019. A 3-year permit will be obtained in October 2019 for expanded restoration activities and all are supportive of GoMIES and First Nations partners to implement only Eco-Cultural Estuary Restoration techniques.

**2018 (Pilot Phase)** – Tim Clermont worked with two Wei Wai Kum Estuary Stewards to protect vulnerable *Carex* sedge marshes using green fencing and rebar to build goose habitat exclosures. GoMIES used GIS software to map restoration sites in the pilot phase and to inform a long-term restoration plan and strategy which was used for the 2019/20 FWCP proposal.

**2019** - Wei Wai Kum Council formalized a Guardians Program and began the transition of removing rebar and safety fencing from habitat exclosures to all wood Eco-Cultural exclosures. New participants started mid to late 2019 and most of the field work was delayed to 2020.

**May 2019** - BCIT students helped GoMIES build a large habitat exclosure along Nunns Creek.

**April 2020** - GoMIES trained new Guardians on *Carex* transplant techniques which led to over 6000 *Carex* plants transplanted into the Nunns Creek estuary exclosure.

**May to September 2020** - GoMIES worked with the Guardians to build Eco-Cultural (alder and willow exclosures) to protect sedge marsh habitat in the Nunns and Campbell River estuaries. Wei Wai Kum harvested all the exclosure wood products from nearby band lands or the highway corridors near Campbell River and prepared and transported all the wood materials to the restoration sites. Wei Wai Kum Guardians removed all the old rebar and green exclosure fencing material and installed small signs informing the public of the on-going restoration project. GoMIES provided needed tools and supplies (*Carex* extraction tools, chain saw, blue totes for *Carex* transplants, and net floats used to mark exclosures and warn canoe and kayak operators).

**June/July 2020** - GoMIES took site photos as part of on-going photo monitoring.

**September 2020** – GoMIES mapped all *Carex* donor sites and identified priority habitat areas requiring exclosure protection including channel edge habitat along Baikie Slough.

**October 2020** – Nawakolas GIS specialist updated habitat map and Greenways Land Trust hosted a Zoom meeting to review all progress made to improve the estuary in 2020 and we unveiled our restoration plans for 2021 and completed a new FWCP proposal which was

supported by all partners (DFO, Greenways, Wei Wai Kum, and the City of Campbell River). GoMIES submitted the habitat map to Tom Reid and the FWCP proposal at the deadline.

### **Lesson's Learned and Project Recommendations**

This work seems to require more than one calendar year to be fully completed as by the time we receive funding approvals the *Carex* transplant window is short and the work windows for building habitat enclosures rely on low day tides during the late spring to early fall. In 2019, the Wei Wai Kum lost staff and were transitioning into a formal Guardians Program and progress was limited during that field season. Covid 19 travel restrictions in 2020 benefitted this project as the Wei Wai Kum had more members participating with a focus of working close to home and they expended more time than expected by securing additional support as Central Coast habitat monitoring was delayed and Nanwakolas/MaPP funding was directed to this high-profile project.

Work proposed in 2021/22 will focus on the transplanting 15,000 to 20,000 *Carex* extracted from healthy donor sites. During low day tides from late April to September we hope to build additional habitat enclosures (outlined in green polygons on the restoration map below) protecting an additional 8,000 m<sup>2</sup> of *Carex* tidal marshes.

We will want to set up permanent photo-monitoring stations within each enclosure and investigate the incorporation of Large Wood structures into our restoration sites.

Snorkel swims should be conducted in May through June to capture GoPro imagery and video of salmon fry utilizing the restoration sites.

We will need to design and install signage that provides interpretive information to generate greater awareness for the need to restore the estuary and the roles of the Wei Wai Kum and local stewards in working to protect, restore, and manage the estuary. Local media will be extremely interested to report on our progress, and we will work closely with the Wei Wai Kum to ensure the community becomes more aware of this important work and that partners are recognized. A recent story by one of the Wei Wai Kum Estuary Stewards was featured in local media with the message of involving First Nation youth to become more engaged with stewarding the estuary as a key component of their culture and ways of knowing.

The Wei Wai Kum has a strong desire to manage the Crown portions of the estuary adjacent to their IR lands and are working with the project partners to explore the establishment of an Indigenous Protected Conservation Area or IPCA. This should be supported by FWCP through Land Securement or CBR.ALL.LS.05.01 as a cost-effective means for habitat protection.

## **Acknowledgements**

Guardians of Mid Island Estuaries Society gratefully acknowledges the financial support of the Fish and Wildlife Compensation Program for its contribution to Eco-Cultural Restoration of the Campbell River Estuary. [www.fwcp.ca](http://www.fwcp.ca)

We want to thank the Wei Wai Kum Guardian's for their amazing progress over the past two field seasons. Their improvements on our enclosure design have had a positive influence on our work in all estuaries as their modifications have led to a stronger and more effective goose deterrent.

Special thanks to Diana Brown (Nanwakolas GIS Specialist) for her great work preparing and updating our Estuary Restoration maps and to GoMIES field biologist, Garreth Ashley for leading the Carex transplant training this spring. As a result, record numbers of Carex plugs were transplanted by the Wei Wai Kum Guardians and this will continue for years to come.

We also want to acknowledge the support of the Ministry of Highways and Transportation Infrastructure for allowing us a steady nearby wood source for all our Vancouver Island Eco-Cultural Estuary Restoration projects, especially Brendan Kelley and Sean Wong.

And finally, we want to recognize the guidance of the Campbell River Estuary Management Committee led by Chief Chris Roberts (Wei Wai Kum First Nation) with regular contributions and support from Shannon Anderson (DFO Biologist), Cynthia Bendickson (Greenways Land Trust) and Terri Martin (City of Campbell River). We hope to continue to work closely with all partners associated with helping to protect and restore the Campbell River estuary.

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#### Project Web Links

<https://projectwatershed.ca/guardians-building-resiliency-in-the-komoks-estuary/>

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