



PACIFIC SALMON FOUNDATION



RESILIENT COASTS FOR SALMON

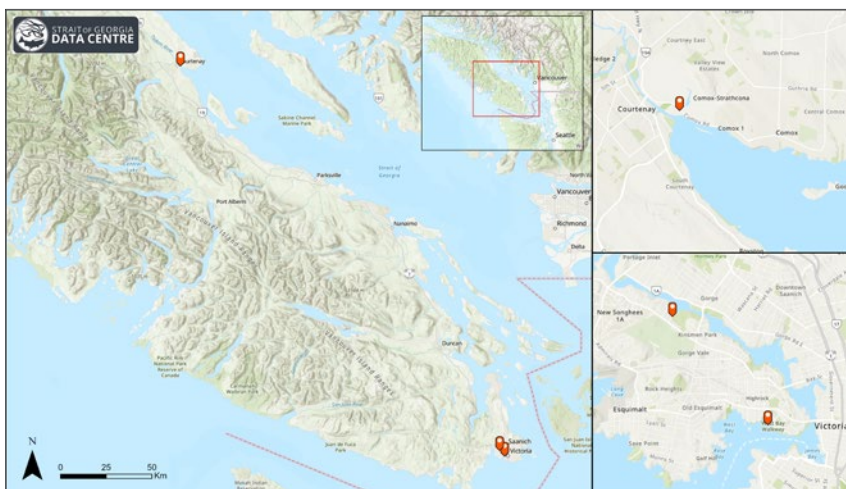
Nature-based solutions for climate change

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Photo by Kyla Sheehan

Resilient Coasts for Salmon is a collaborative initiative led by the Pacific Salmon Foundation (PSF) with partners such as the Stewardship Centre for BC (SCBC), World Wildlife Fund – Canada, Peninsula Streams and Shorelines, and others. Our key aim is to raise public awareness of the impacts of climate change and nature-based adaptation approaches to make our coastlines more resilient by constructing [Green Shores® for Shoreline Development](#) 'Demonstration Sites' at three coastal areas with important ecosystem and recreational values on Vancouver Island. At each site, SCBC is leading Green Shores technical teams and working with local partners to restore ecological values whilst creating climate resilience applying nature-based solutions through the Green Shores framework. This includes removal of traditional hard armour (e.g. seawall) and applying beach nourishment to create forage fish habitat. Each site will feature educational signage about the coastal processes and nature-based techniques used for the restoration for all visitors to learn from and see firsthand.



Map shows the location of the three restoration sites: Songhees Walkway Pocket Beach in Victoria; Esquimalt Gorge Park in Esquimalt; and Dyke Road Park in Comox.

Read on to learn about the progress being made at the sites: Songhees Walkway Pocket Beach and Esquimalt Gorge Park in the Victoria region, and Dyke Road Park in the Comox/ Courtenay area. Each of the three demonstration sites represents high-value salmon habitat on Vancouver Island and the restoration of these sites will be important ecologically while also showcasing nature-based approaches to shoreline management, providing a chance for their communities to observe and understand the benefits they provide, including: resiliency to climate change, enhanced wildlife habitat, cleaner water, increased recreational opportunities, scenic beauty, and more.

Cover photos by Kyla Sheehan (top and right), Eiko Jones (left), and Maria Catanzaro (centre)

WHAT'S GOING ON HERE?

If you visit a completed **Green Shores** project, chances are good you will see a beautiful, natural-looking shoreline with lush native vegetation and plenty of wildlife. However, you might not think about all the steps that went into completing the design or why. Visit any of the three Resilient Coasts Green Shores® demonstration sites and see if you can spot some of the following nature-based techniques in place or in progress there.

- **Removing seawalls, riprap and other hard structures that interfere with natural shoreline processes.**

WHY? Seawalls can increase erosion by reflecting wave energy back into the water, which scours away sediment and destroys sensitive habitats. During powerful storms, waves can crash into and overtop seawalls, increasing the risk of flooding on the backshore. And since they create a barrier between the land and sea, seawalls limit the transfer of nutrients and sediment, the spread of plants, and the free movement of wildlife. This causes an effect known as coastal squeeze, where the habitat itself cannot shift landward with sea level rise.



- **Amending the slope of the shoreline, if necessary, by adding or replacing local sand, stones, and other natural materials.**

WHY? Sloped shorelines and shoreline vegetation buffer the energy of waves as they approach, reducing their speed and impact and enhancing resiliency to the effects of climate change, such as rising sea levels and damage from powerful storms.



- **Adding beach nourishment, like sand and gravel to replace what was lost through erosion.**

WHY? On an eroded shoreline, the specific kinds of substrate required for wildlife, like surf smelt, to spawn and thrive are often washed away due to human-made infrastructure like seawalls. "Nourishing the beach" by adding sand, gravel, or cobble replaces this vital habitat to ensure that forage fish can continue to support the aquatic food web.



- **Placing logs, root wads, and large woody debris on the backshore and foreshore.**

WHY? When strategically placed, this woody debris provides habitat for wildlife, such as insects and birds, enhances biodiversity and, to a certain extent, can help stabilize the shoreline.



- **Planting native grasses, shrubs, and trees in the riparian zone and aquatic plants, like eelgrass, in the foreshore.**

WHY? Establishing native vegetation helps with anchoring sediment and stabilizing the shoreline, thereby preventing erosion. It will also provide critical habitat and nourishment for vulnerable wildlife like migratory birds and forage fish, like Pacific sand lance, an important food source for Pacific salmon. Native vegetation can help with regulating temperature by providing shade and cooling through the natural respiration process of plants and trees, and improve water quality by absorbing and slowing the flow of stormwater runoff from the upland, filtering out pollutants that would otherwise enter the waterway.



For more information about the processes described above, check out the [Climate Change Primer](#) available on our website.



Photo by Kyla Sheehan

SONGHEES WALKWAY POCKET BEACH DEMONSTRATION PROJECT, CITY OF VICTORIA, BC

Located on the north shore of Victoria's Middle Harbour, the Songhees Walkway Pocket Beach has undergone a dramatic transformation over the past two years and is now a beautiful community space that supports the health of Pacific salmon and other wildlife and provides social, recreational, cultural and resiliency benefits to all who visit or live nearby. This heavily modified site is an important place within the Traditional Territories of the ɫəkʷəŋən (Lekwungen) People, known today as the Songhees Nation and Esquimalt Nation. The site also lies within the Victoria Harbour Migratory Bird Sanctuary and the Greater Victoria Naturehood, two federally designated areas. Before restoration, wave energy from storms had left the backshore eroding and the beach was filled with debris and trash.

The initial restoration phase began in 2022 and focused first on removing over 5 tons of cement, asphalt and debris. The shoreline slope was regraded and supplemented by adding sand and gravel nourishment. A testament to the speed with which restoring natural shoreline features can positively affect local ecosystems, surf smelt began spawning in the foreshore area almost immediately after this addition! This is the first spawn event since the complex of bays and shoreline were historically buried during the construction of the park and housing development that now sits there.



Photo by Kyle Armstrong



Photo by Kyle Armstrong

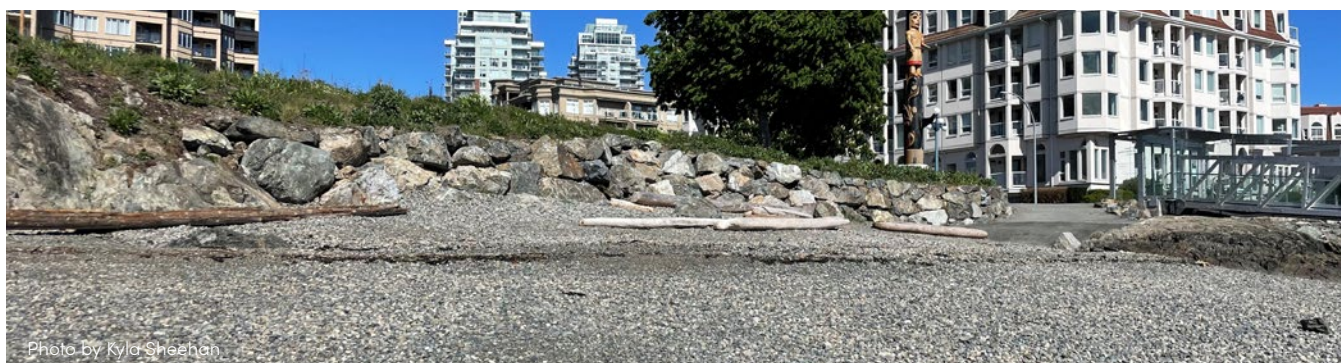


Photo by Kyia Sheehan

Over the past year, in a second phase of restoration, the beach was expanded by extending into the backshore, and adding more sand-gravel beach nourishment. The extent of bedrock was mapped using ground penetrating radar technologies to help inform how far back the beach could be extended into the backshore. By expanding the beach, we have given the shoreline space to adjust the sea level rise without losing habitat. Native plants were established in the riparian zone, including overhanging vegetation, and a path was created to provide access to the beach from the Songhees walkway. The pocket beach restoration is complete; however, further work will be done including monitoring the restored beach, backshore, and riparian areas, replanting or adding sediment where needed. The project team is currently pulling together documentation for a Green Shores verification and rating, and we expect it will receive a Green Shores silver or gold rating!

Commissioned by the Victoria International Marina, a 30-foot welcome pole was carved by renowned artist Tom LaFortune. The pole was erected along the Songhees walkway in front of the restoration site, meant to welcome visitors to the area, and celebrate the culture of the Lekwungen people. Stop by the site today to view the restoration and the First Nation's welcome pole firsthand!

The Songhees Walkway Pocket Beach demonstration site will be promoted and celebrated within the community as an important cultural heritage site for the Songhees and Esquimalt First Nations and an example of how implementing nature-based solutions for shoreline restoration can benefit people, communities, and the environment. The demonstration site was part of a cultural walking tour led by Explore Songhees at the 2023 Coastal Zone Canada Conference, and could become a regular stop for local cultural tours. Already, we are seeing that this site has helped increase visibility of nature-based solutions. Informational signage is currently being developed, and is expected to be installed in 2024. Peninsula Streams and Shorelines will work with the City of Victoria to establish a stewardship agreement so that the riparian plants can be protected and supplemented in the future. To monitor the habitat, Peninsula Streams will continue to sample for forage fish eggs and eDNA (environmental DNA, which can be detected in water samples to determine which species are using the habitat), and may incorporate some parameters like beach slope and sediment size.

Each phase of this project has been completed collaboratively by Resilient Coasts for Salmon partners: Peninsula Streams and Shorelines, the City of Victoria, Songhees Nation, Esquimalt Nation, Pacific Salmon Foundation, the Stewardship Centre for BC, Ralmax Group of Companies, and Salish Sea Industrial Services.

Songhees Walkway Pocket Beach Milestones	2021		2022			2023			2024		
Site Selection and Feasibility Study	✓										
Design		✓									
Permitting and Preparation							✓				
Restoration/Construction								✓			
Design and Install Signage										★	
Green Shores Verification & Rating											★
Ongoing Monitoring											★

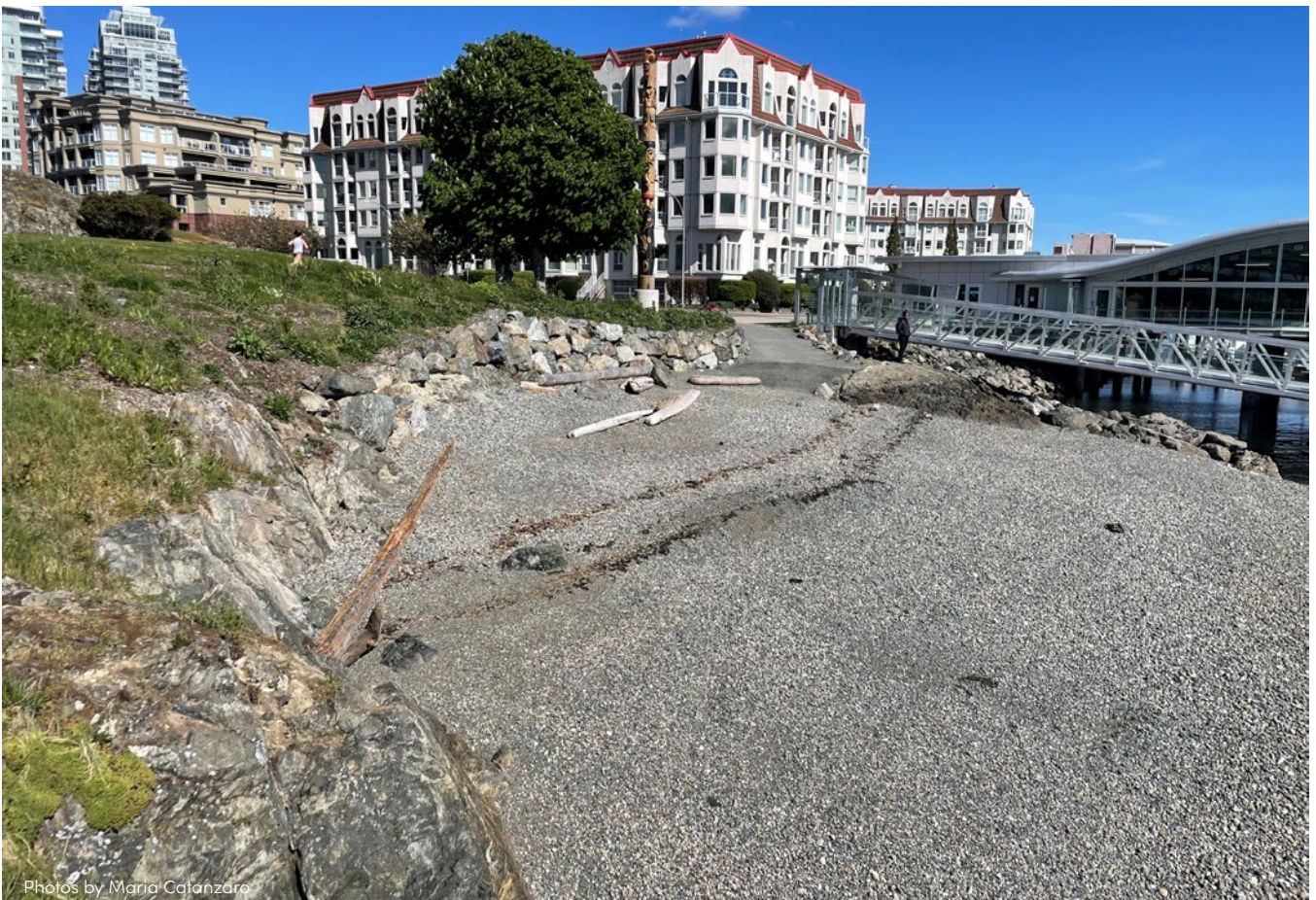
Table 1. Progression of restoration at the Songhees Walkway Pocket Beach demonstration site.

✓ indicates key milestones and when they have been completed.

★ indicates the anticipated completion date



Before restoration (above), the pocket beach was uninviting to people and wildlife as the beach was filled with debris like asphalt and trash, and large jagged boulders rather than soft sediment like it is today (below).



Photos by Maria Catanzaro

During restoration, crew worked to regrade and nourish the beach with a sand-gravel mixture.



Photo by Kyla Sheehan

With restoration now complete, the beach provides access to nature for visitors of the Songhees Walkway, and improved habitat for coastal species like juvenile Pacific salmon.



Photo by Peninsula Streams and Shorelines

Kelly Loch, Green Shores Projects Manager at SCBC, planting Yarrow and other native vegetation on the backshore at the Songhees Walkway Pocket Beach.

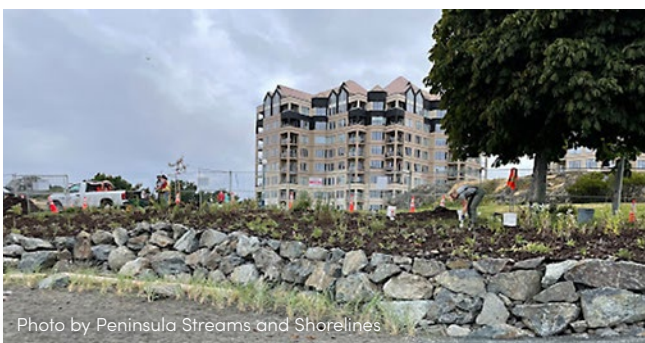


Photo by Peninsula Streams and Shorelines



Photo by Victoria International Marina



Photo by Kyla Sheehan

The welcome pole welcomes visitors to the Lekwungen Territory and overlooks the completed Songhees walkway pocket beach project.



Photo by Kyla Sheehan

ESQUIMALT GORGE PARK GREEN SHORES FOR SHORELINE DEVELOPMENT DEMONSTRATION PROJECT, TOWNSHIP OF ESQUIMALT, BC

The Esquimalt Gorge Park Green Shores Demonstration Project is located on a small portion of the Gorge Waterway, an important ecosystem in Greater Victoria, BC, and the traditional territory of the [ləkʷəŋən \(Lekwungen\) People](#), known today as the Songhees and Esquimalt Nations. It is an important step forward in the ongoing effort to restore and protect the Gorge Waterway. It will help reclaim the site's ecological and cultural values, including restoring vital nutrient and sedimentary processes that support all salmon species in this area.

In the fall of 2021, a Green Shores Feasibility Inventory for the Gorge Waterway and Portage Inlet was produced to evaluate sites for potential shoreline restoration which could benefit salmonids in these areas. Based on this study, Esquimalt Gorge Park in the Township of Esquimalt was selected as an ideal candidate site. In December 2021, a design workshop was held with stakeholders and landscape architects, engineers and biologists. In 2022-2023, community outreach and engagement events and many technical committee meetings took place, resulting in a preliminary restoration design. Based on this design, the project secured additional funding from the Province of BC, the Capital Regional District, and the Township of Esquimalt.

In late 2023, the Green Shores project design was finalized and the focus turned to implementing the project as designed. The final design includes removing hard armouring and regrading the shoreline with sand, gravel, and organic materials to restore a more natural profile. The design also includes native plantings to stabilize the riparian

and backshore zones, and restoring the salt marsh habitat, both of which provide food and breeding grounds important to fish, shorebirds, and other wildlife. A planned gravel walking path will allow park users to view the restored riparian and shoreline areas, while a "mobi-mat" on the recreational beach will enable all park users to access the shoreline.

Construction was originally planned for late summer/early fall 2023 to meet the BC marine/estuarine [Timing Windows](#) for the protection of fish and fish habitat, however, not all permits required to begin construction were received in time. The project will instead begin construction during a two week period in September 2024. In the meantime, other activities moved ahead including planning for educational signage at the project site, updating the Township of Esquimalt's webpage detailing how the Esquimalt Gorge Park Green Shores project demonstrates nature-based solutions through implementing the Green Shore framework. It is anticipated that all signage will be installed and full completion of the site will be in Spring 2025 with accreditation soon to follow. With multiple informational signs in development, this site will provide excellent opportunities for the public to witness nature-based approaches to restoration, and learn about their benefits to salmon, migratory birds, and people. It is hoped that the restoration will encourage juvenile salmon and forage fish to utilize the habitat.



Esquimalt Gorge Park beach. At the far end of the beach, the marsh and backshore habitat is eroding due most likely to herbivory by non-migratory Canada geese and limited sediment supply due to nearby hard armouring.



Pre-restoration conditions, with rip rap lining the salt marsh bench at Esquimalt Gorge Park.

Esquimalt Gorge Park Milestones	2021		2022			2023			2024			2025	
Site Selection and Feasibility Study			✓										
Design						✓							
Permitting and Preparation									✓				
Restoration/Construction									★				
Design and Install Signage												★	
Green Shores Verification & Rating										★			
Ongoing Monitoring												★	

Table 2. Progression of restoration at the Esquimalt Gorge Park Green Shores Demonstration Project.

✓ indicates key milestones and when they have been completed.

★ indicates the anticipated completion date

This project relies upon the collaboration of Resilient Coasts for Salmon partners, [Pacific Salmon Foundation](#), [Stewardship Centre for BC](#), [Capital Regional District \(CRD\)](#), [Esquimalt Parks and Recreation](#), [Gorge Waterway Initiative](#), [World Fisheries Trust](#), [Gorge Waterway Action Society](#), and the [Songhees](#) and [Esquimalt](#) First Nations, with additional support from the Province of BC.



Site Overview Presentation by Sara Stallard of Fish-KW Environmental at the Design Workshop in December 2021.



Finalized design for the Esquimalt Gorge Park Green Shores Demonstration Project, which will include beach nourishment, marsh and riparian plantings, and interpretive signage.



Photos by Nicole Christiansen

DYKE ROAD PARK GREEN SHORES FOR SHORELINE DEVELOPMENT DEMONSTRATION PROJECT

Dyke Road Park, a Comox Valley Regional District Park, is situated on the K'ómoks estuary, with nearby properties managed by Nature Trust and Ducks Unlimited within the traditional territory of the [K'ómoks First Nation](#). The project area is approximately 0.6 hectares of Comox Estuary shoreline within the Class 1 K'ómoks Estuary, which is a Federally recognized Important Bird Area. The park is adjacent to a major roadway, and includes a large open platform and covered bird watching area with a seawall. The areas surrounding this site are a mosaic of incredible restoration efforts by local groups. For example, the [Guardians of Our Salish Estuaries \(GooSE\)](#) society, in partnership with the [K'ómoks Guardian Watchmen](#) led an ecocultural restoration project (shown in the photo above) in the areas directly in front of the site to protect and restore the nearshore marsh from impacts by Canada Geese.

Using a Green Shores nature-based approach, restoration of this shoreline and upland areas will help reclaim the site's cultural and ecological values, including vital nutrient and sedimentary processes that support the five species of Pacific salmon found in the area.

In 2021, a feasibility study of the site was undertaken to determine if Dyke Road Park would be a good candidate site for the application of Green Shores – and specifically for a project that would achieve a gold level certification while supporting salmon habitat and serving as a demonstration site for those wanting to learn about the application of the Green Shores principles. Based on the positive outcome of this study completed in early 2022, a design workshop was held with important stakeholders and landscape architects, engineers and biologists in spring of 2022 to identify objectives for a Green Shores project at the site. Since then, the project objectives and design have been refined through many meetings of the project advisory committee, CVRD staff, and project consultants. With the refined scope of the project, it was clear that a successful restoration of the site would require additional funding, which was acquired

The Comox estuary and shoreline adjacent to Dyke Road park are critical areas for Pacific salmon, raptors species like bald eagles, great blue herons, and more. Once restored, Dyke Road park will provide excellent wildlife viewing opportunities.



A site visit during the design workshop in Spring 2022 to generate ideas about the restoration plan.

through the Union of British Columbia Municipalities' Community Emergency Preparedness Fund (Disaster Risk Reduction stream).

As of spring 2024, with the additional funding in place, most concepts outlined in the design workshop will be incorporated in the final project design. Work is scheduled to commence summer 2024, including:

- ▶ removal of hard armouring and concrete structures to restore natural shoreline processes and ecosystems;
- ▶ creation of permeable pathways and novel boardwalks;
- ▶ installation of split rail fencing to discourage access to sensitive shoreline and marsh habitats;
- ▶ reducing impermeable surfaces on the site to slow runoff and reduce pollutants entering the waterway using a "rain garden";
- ▶ stabilizing the shoreline and increase biodiversity by establishing native vegetation in the riparian zone;
- ▶ restoring habitat – including establishing a new salt marsh tidal inlet to improve carex sp. habitat;
- ▶ removing invasive species like Himalayan Blackberry; improving coastal adaptation to the impacts of climate change;
- ▶ increasing ecosystem connectivity to Kus-Kus-Sum and Hollyhock Flats;
- ▶ and protecting Indigenous cultural archeology.

The project site is expected to be fully restored and Green Shores accredited by summer 2025. Dyke Road Park will be the focus of a short Resilient Coasts for Salmon documentary, showcasing the development of the Green Shores site from site selection to construction to monitoring. It is hoped that the restoration will provide habitat connectivity for Pacific salmon to the other areas of vital habitat within the K'omoks estuary. This site, with its meandering trail, look out points and interpretive signage, will also provide opportunities for the public to engage with nature-based solutions and appreciate the many benefits they provide.



The large viewing platform and concrete base/seawall will be removed to build more backshore habitat and create space for permeable pathways.

The project design graphic features minimized and more efficient parking area to ensure easy accessibility for the public. The site will feature native plants, enhanced marsh area with a tidal channel, and two viewing platform areas connected by meandering boardwalks and a permeable path.

Dyke Road Park Milestones	2021	2022	2023	2024	2025
Site Selection and Feasibility Study	✓				
Design				✓	
Permitting and Preparation				✓	
Construction					★
Restoration					★
Design and Install Signage					★
Green Shores Verification & Rating					★
Ongoing Monitoring					★

Table 3. Progression of restoration at the Dyke Road Park Green Shores Demonstration Project.

✓ indicates key milestones and when they have been completed.

★ indicates the anticipated completion date

The Dyke Road Park Demonstration project relies upon the collaboration of Resilient Coasts for Salmon partners, [Pacific Salmon Foundation](#), [Stewardship Centre for BC](#), [Project Watershed](#), [Comox Valley Regional District](#), [K'omoks First Nation](#), [Guardians of our Salish Estuaries Society \(GooSE\)](#) and the [K'omoks Guardian Watchmen](#), with additional support from the Province of BC.

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