

CCE Awards 2023

Maplewood Marine Restoration Project



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Table of Contents

Project Summary	.1
Project Highlights	.2
1. Innovation	.3
2. Complexity	.4
3. Social and/or Economic Benefits	.5
4. Environmental Benefits	.6
5. Meeting Client's Needs	.7

Cover image: Maplewood Marine Restoration Project during construction

Photo credit: Vancouver Fraser Port Authority

Project Summary

The Maplewood Marine Restoration Project restored over 4.5 hectares of marine habitat at a site which holds cultural significance and was identified as a restoration priority by the Tsleil-Waututh Nation. The Vancouver Fraser Port Authority engaged AECOM to create subtidal and intertidal habitats, which involved beneficial reuse of ~230,000 cubic metres of Fraser River sand and transplanting ~125,000 eelgrass shoots, to create a 1.5-hectare eelgrass bed to increase fish and wildlife diversity in the basin.



1. Innovation

The Maplewood Marine Restoration Project (MMRP) restored over 4.5 hectares of marine habitat in a previously degraded site that was identified as a restoration priority by the Tsleil-Waututh Nation (TWN).

The site, located on the north shore of Burrard Inlet, is in alignment with the TWN's Burrard Inlet Action Plan, which sets out the priority to restore critical nearshore habitat. The Maplewood mudflats hold a cultural significance and continue to be used for traditional practices such as harvesting for a variety of marine species. The project includes something that has never been done before in Burrard Inlet: the transplanting of approximately 125,000 eelgrass shoots by hand from locally sourced beds to create a 1.5-hectare eelgrass bed - about the size of one and a half football fields. Eelgrass provides important refuge and nursery habitat for juvenile fish. It also supports other ecological functions such as nutrient cycling, carbon storage and protection of shorelines. The project team collaborated with Indigenous groups to assess and select eelgrass harvesting sites, which included Bedwell Bay near Belcarra and Roberts Bank near Delta. Eelgrass regrows quickly after harvesting, so impacts to harvested areas are not expected but continue to be monitored.

During marine works construction, 230,000 cubic metres, approximately 300 barges, of dredged Fraser River sand was beneficially reused – rather than being 'disposed at sea' – to restore and raise the Maplewood basin floor so seagrasses like eelgrass can establish. In deeper areas, over 13,000 tonnes of rock were placed to create a ~1-hectare rock reef which will support various kelp species and other aquatic species.

The project team collaborated with Indigenous groups on the planning and implementation of this eelgrass transplanting work, increasing the overall understanding of future restoration and offsetting opportunities in the Pacific Northwest. Altogether, the nearly 5 hectares of restored marine habitat will provide higher-diversity marine habitat for fish, birds and other wildlife compared to pre-restoration conditions, and supports TWN's goal of increasing the health of Burrard Inlet. It will provide long-term benefits for fish and invertebrates that depend on marine vegetation for rearing habitat, along with other fish and wildlife species such as waterfowl and wading birds.



230,000 cubic metres, or about 300 barges, of dredged Fraser River sand was beneficially reused to restore and raise the Maplewood basin floor so seagrasses like eelgrass can establish. Over 13,000 tonnes of rock was also placed to create a rock reef.



Photo credit: Vancouver Fraser Port Authority

2. Complexity

The project site is located within a deep basin - up to nine metres deep - on the foreshore of Burrard Inlet, that was dredged in the 1940s to support a gravel extraction business and was later used as a log storage area. Furthermore, the site is surrounded by mud flats forming a shallow perimeter to the site, limiting access to the site via a single shallow channel during low tide. These physical constraints made barge access to the site difficult and required extensive staging considerations in order to safely overcome the scheduling and logistical challenges. The surficial soils were inferred to be very soft and they comprised a poor foundation, susceptible to settlement and potential mud waves. To address this risk, the sand was placed in seven stages, with each stage having two separate 500mm material lifts. The placement methodology anticipated primary consolidation of the underlying soils and placed material, with lengthy hold periods established between placement stages to allow consolidation and settlement to occur. The infilling forming the subtidal and intertidal habitats are held in place by a two-meter-high rock dyke extending across the entire Northeast Basin from the western foreshore to the existing eastern slope of basin.



The final as-built bathymetry present at the site



Photo credit: Vancouver Fraser Port Authority

3. Social and/or Economic Benefits

The tidal flats at Maplewood are coastal wetlands found near the shoreline in areas protected from waves. They are a key part of the ecosystem because they attract shorebirds and are home to crabs, fish and other marine life and are important in preventing coastal erosion. The Maplewood flats also hold cultural significance and continue to be used for traditional practices such as harvesting for a variety of marine species. The MMRP site lies within a large marine tidal area immediately south of a wildlife conservation area. The upland Maplewood Flats Conservation Area is managed and administered by Environment and Climate Change Canada and operated by the Wild Bird Trust of British Columbia. The TWN's Burrard Inlet Action Plan set out the priority to restore critical nearshore habitat. This project restored more than 4.5 hectares of habitat within this basin by creating a tidal flat, an eelgrass bed and a rock reef. This restoration provides higher diversity marine habitat for fish, birds and other wildlife compared to pre-restoration conditions and support TWN's goal of increasing the health of the inlet. This project is part of the Vancouver Fraser Port Authority's Habitat Enhancement Program, which focuses on creating, restoring and enhancing fish and wildlife habitat to help maintain a balance between a healthy environment and future infrastructure development and aligns to the vision of being the world's most sustainable port.



4. Environmental Benefits

The project site is located within a deep waterlot basin - up to nine metres deep - that was dredged in the 1940s to support a gravel extraction business and was later used as a log storage area. Nearly 230,000 cubic metres of dredged Fraser River sand was beneficially reused to restore and raise the Maplewood basin floor, which will support a variety of shellfish and crab and allow marine plants like eelgrass to establish. Eelgrass, or "cəíləm" in the həńdəminəm language, which is the traditional language of TWN, is a type of seagrass that forms part of the most diverse and productive ecosystems in the world. Eelgrass provides food, shelter and protection from predators for many juvenile fish and shellfish of ecological, cultural and recreational importance. It also plays a vital role in capturing carbon, which helps mitigate climate change impacts. Over 13,000 tonnes of rock were also placed to create a rock reef and other features at deeper locations which will support various kelp species and contribute to an increase in the diversity of fish and wildlife in the basin.



Photo credit: Vancouver Fraser Port Authority



Photo credit: Photo credit: Core6



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5. Meeting Client's Needs

A major portion of the marine habitat created at the MMRP site is being used to fulfill the fish habitat offsetting requirements for the Centerm Expansion Project (CEP), as determined by Fisheries and Oceans Canada. The remaining portion, part of the rock reef habitat in the southwestern corner of the MMRP site is being administered under Vancouver Fraser Port Authority's (VFPA) habitat bank. All project works for the MMRP were completed in August 2021 and met the conditions in the Fisheries Act Authorization. Post- construction effectiveness monitoring commenced in 2022 and is occurring over a five-year period, with the first year of results indicating that the site is establishing within expectations. The MMRP, and its habitat creation and establishment have been critical to the success of CEP meeting its habitat offsetting obligations.



The port authority acknowledges with gratitude AECOM's leading role and exceptional engineering services provided through the design and construction elements of the project completed over the period from fall 2017 to summer 2021. As described in AECOM's submission, the Maplewood Marine Restoration Project has restored ~5 hectares of critical nearshore habitat in a location identified as a restoration priority by the Tsleil-Waututh Nation. The project involved creation of a tidal flat, an eelgrass bed, and a rock reef and provides higher-diversity marine habitat for fish, birds and other wildlife compared to pre-restoration conditions. AECOM played a critical role as Owner's Engineer in the successful design development, procurement and construction delivery of this unique project.

Charlotte Olson

Vancouver Fraser Port Authority Director, Infrastructure Delivery



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Photo credit: Vancouver Fraser Port Authority

About AECOM

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