Apr 27th, 1:30 PM - 3:00 PM

# Maplewood Marine Restoration Project - Panel Session

Charlotte Olson

Vanessa Koo

Lindsey Ogston

Hillary Hyland

Cora Den Hartigh

*See next page for additional authors*

## Speaker

Charlotte Olson, Vanessa Koo, Lindsey Ogston, Hillary Hyland, Cora Den Hartigh, Jemma Scoble, Neil Snowball, Ravi Chatterji, and Cynthia Durance

# Maplewood Marine Restoration Project

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# Panelists

| Name | Title | Affiliation |
|---|---|---|
| Hillary Hyland | Senior Environmental Specialist | Tsleil-Waututh Nation |
| Lindsey Ogston | Environmental Program Manager | Tsleil-Waututh Nation |
| Cora denHartigh | Environmental Specialist | Tsleil-Waututh Nation |
| Charlotte Olson | Manager, Habitat Development | VFPA |
| Vanessa Koo | Project Coordinator, Habitat Development | VFPA |
| Jemma Scoble | Indigenous Consultation Advisor | J. Scoble Consulting |
| Neil Snowball | Engineering Manager – Design Lead | AECOM |
| Ravi Chatterji | Senior Ecologist – Biological Design Lead | AECOM |
| Cynthia Durance | Eelgrass Specialist & Principal | Precision Identification |

# Who I am and Where I Come From

I am Coast Salish from Southern BC and come from the Tsleil-Waututh Nation (TWN) and Sto:lo Nation.

I am the Senior Environmental Specialist for TWN, supporting my team in our restoration and data collection projects and providing technical expertise for projects within the Metro Vancouver area.

My passion for environmentalism and conservation were grown on the shores of this inlet and only strengthen with the more I learn of my people and our home.

# History of Tsleil-Waututh Nation

*[Pronounced: SLAY-waa-tooth, 'People of the Inlet']*

Tsleil-Waututh people have lived along the coasts of Burrard Inlet for thousands of years.

We had a population that was around 10, 000 strong, across our traditional territory.

We are one of many Coast Salish groups from the *Downriver Halkomelem* language group həńq̓əmińəm̓, and are a matriarchal society.

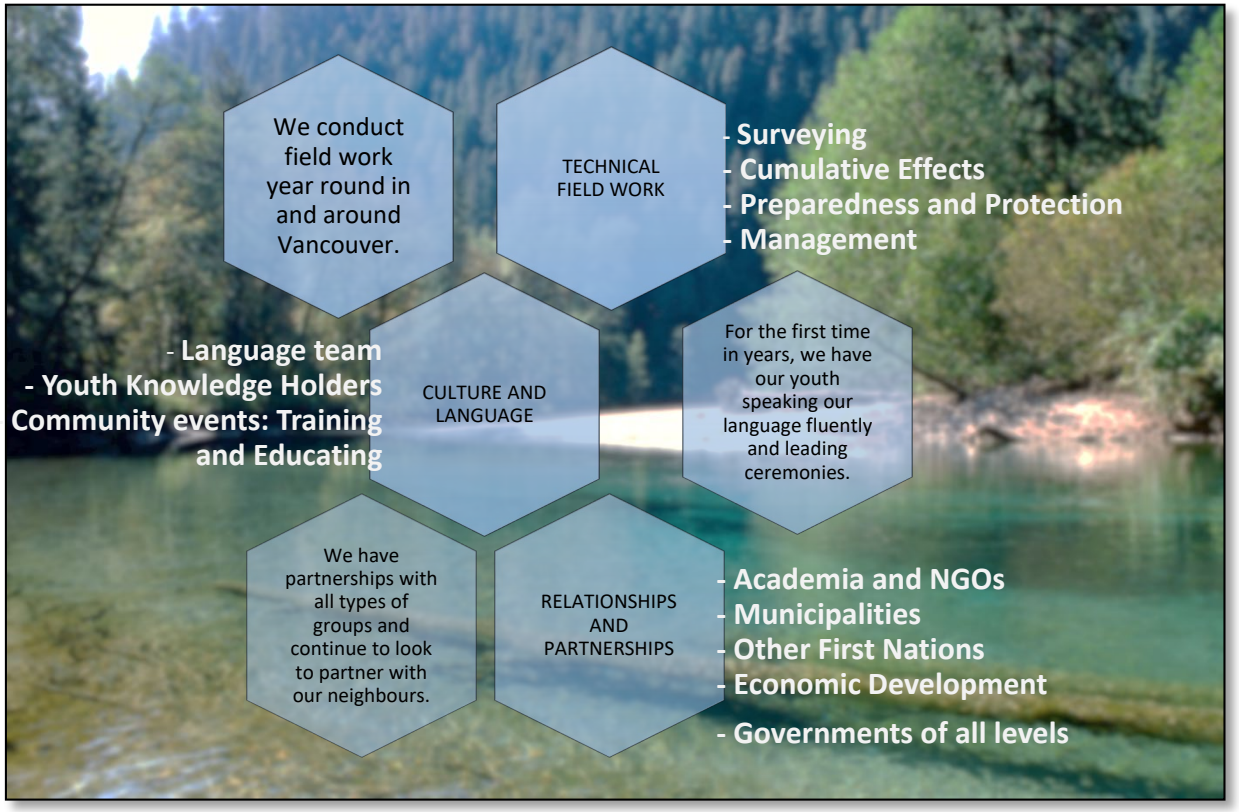
Our main villages are: Whey-Ah-Wichen, Tum-Tumay-Wheuton and Inlailawatash.

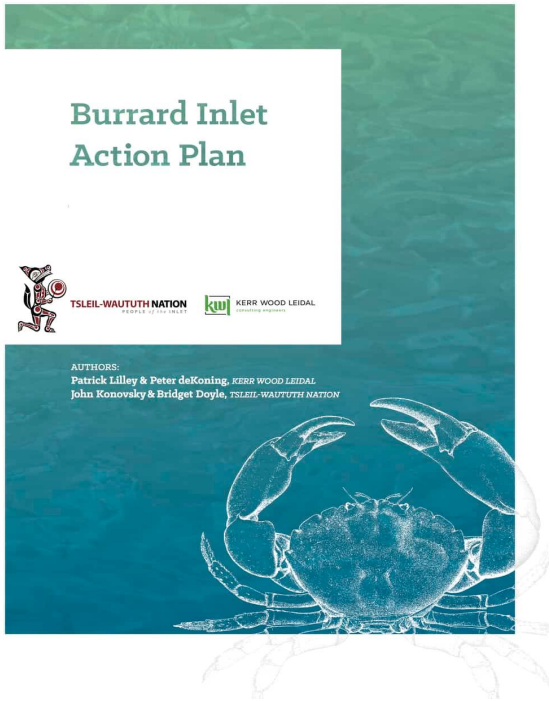
Moving with the seasons and available resources, the villages TWN occupied were all along the shores of the waterways around Burrard Inlet.


We fished, hunted, and gathered all throughout our territory and relied heavily on marine resources for 90% of our diets. We always maintained our stewardship responsibilities to protect the health of our territories, and practice sustainable harvesting.

# Tsleil-Waututh Nation's Government, Present Day

# TWN Highlights




https://twnation.ca/about/our-departments/treaty-lands-resources/

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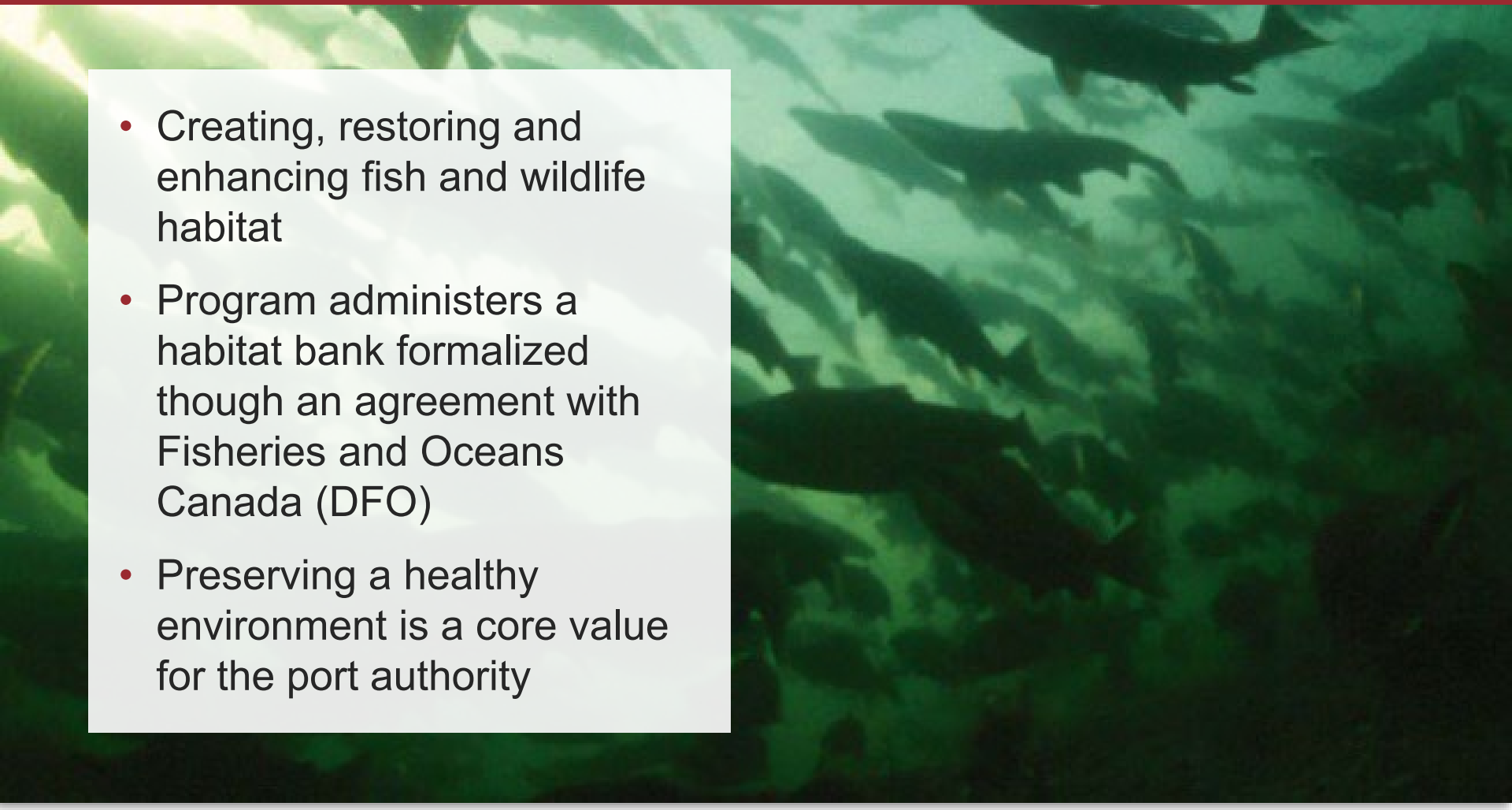
# About the Habitat Enhancement Program



- Creating, restoring and enhancing fish and wildlife habitat
- Program administers a habitat bank formalized though an agreement with Fisheries and Oceans Canada (DFO)
- Preserving a healthy environment is a core value for the port authority

# History of the program and achievements

- The port authority started enhancing habitat in the 1990s
- Since 2012:
  - Enhanced or constructed approximately 15 hectares of functioning habitat
  - Completed feasibility work on over 100 hectares of potential habitat enhancement

# Habitat Enhancement Program overview map

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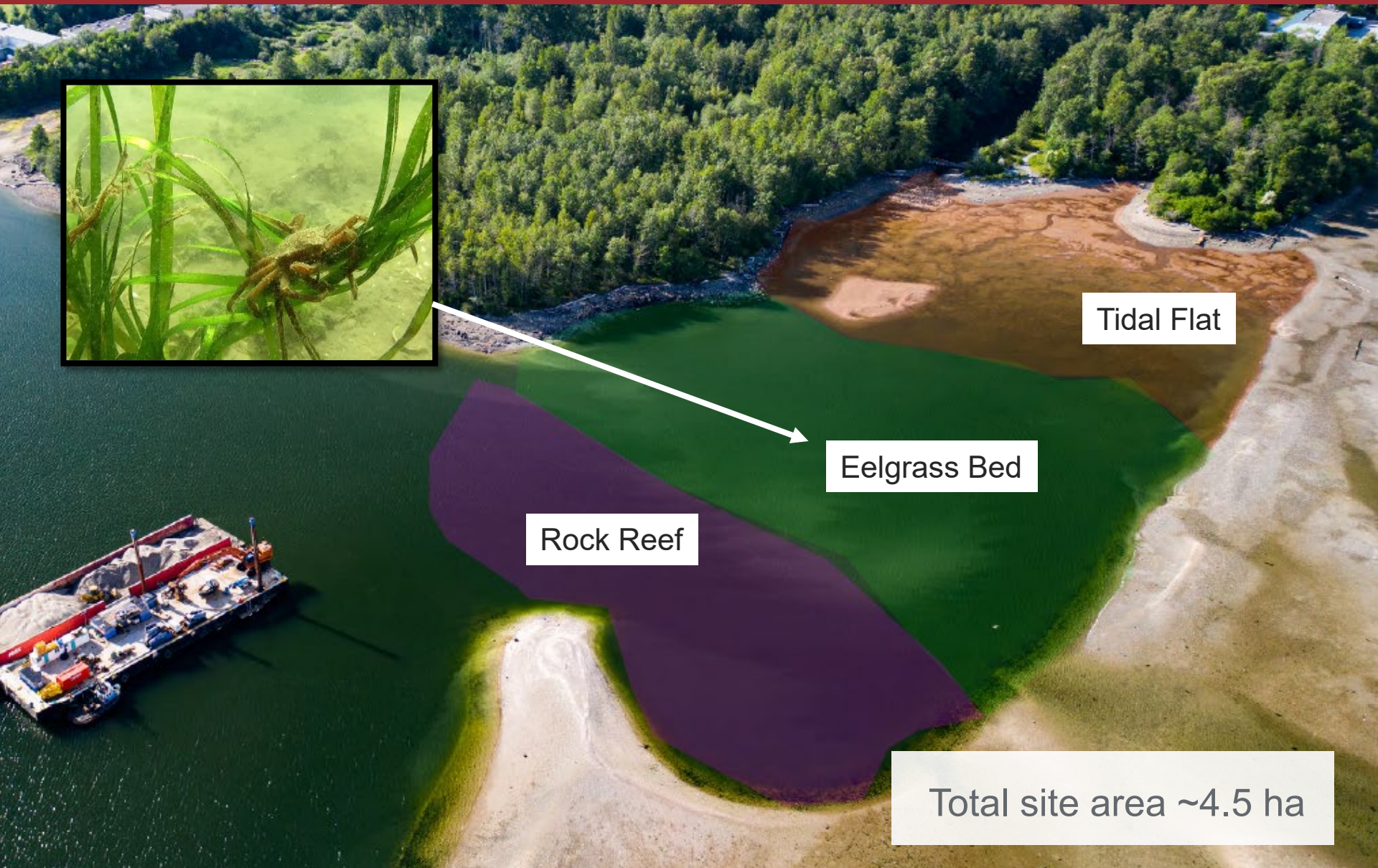
# Marine construction (complete spring 2020)



# Eelgrass transplanting (summer 2021)



Inlailawatash

# Eelgrass transplanting (summer 2021)

~125,000 eelgrass shoots transplanted

# Eelgrass transplanting (complete August 2021)

Largest eelgrass transplant ever performed in Burrard Inlet

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# Biological objectives

- Transform lower-diversity habitat into higher-diversity habitat
- Target species:
  - Bivalve shellfish
  - Pacific salmon (juveniles)
  - Dungeness crab
  - Rockfish
- Increase refuge and rearing habitat, primary production, food web support and other ecosystem benefits

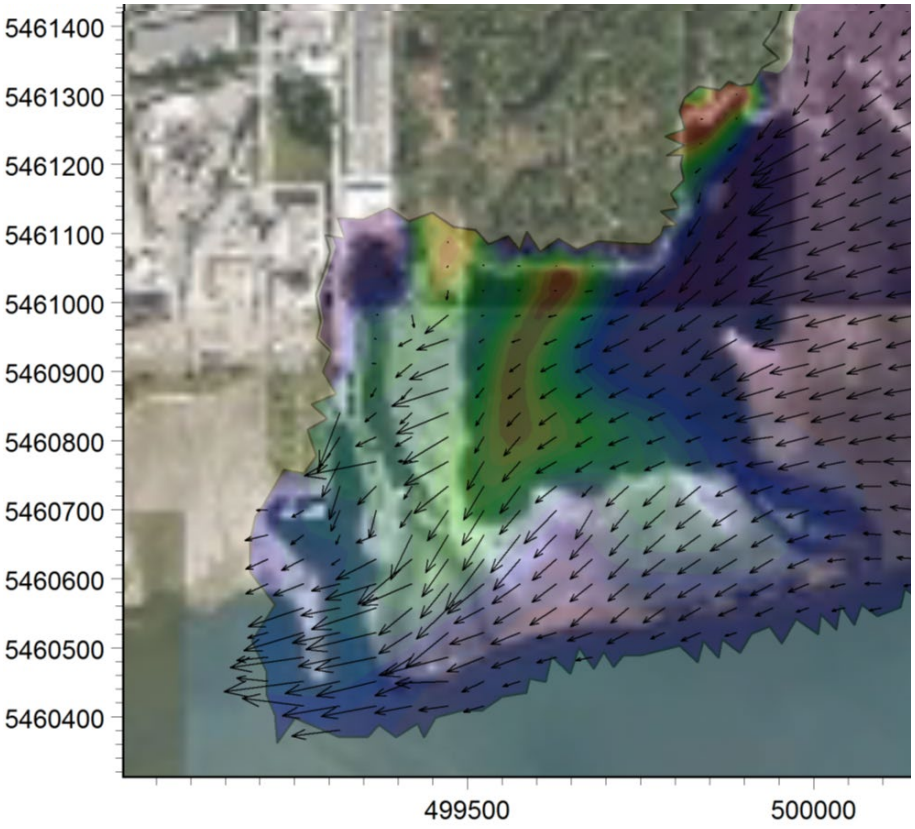




# Tidal analysis

- Relatively sheltered site
  - Slower currents in the basin compared to adjacent Burrard Inlet flow
- Tidal range:
  - -0.40m to +5.6m  CD
- Resident time analysis
  - 60% decrease in residence time in basin

| Pre-project | Post-project |
|---|---|
| 7.4hrs | 3.1hrs |

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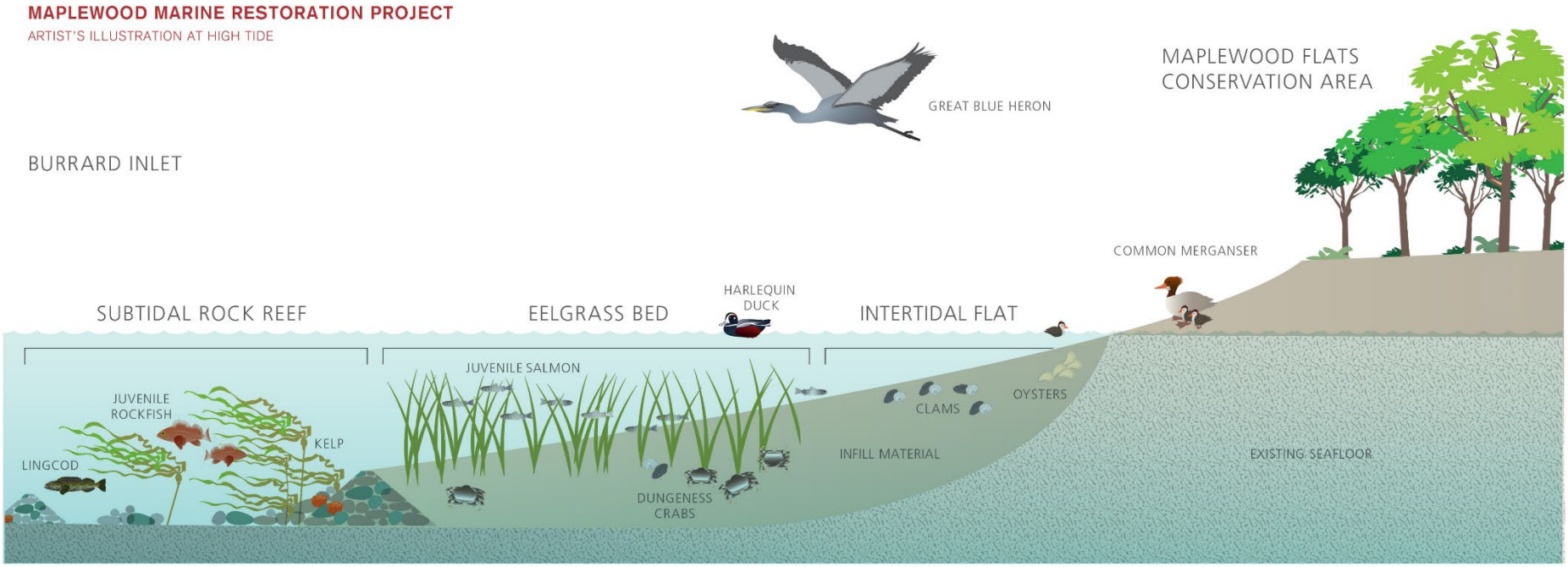
# Project design

- Clean fill placement
- Subtidal rock reef
- 2m high subtidal dyke shoreward of reefs

- Fill placement shoreward of dyke crest to create eelgrass bed and intertidal flat

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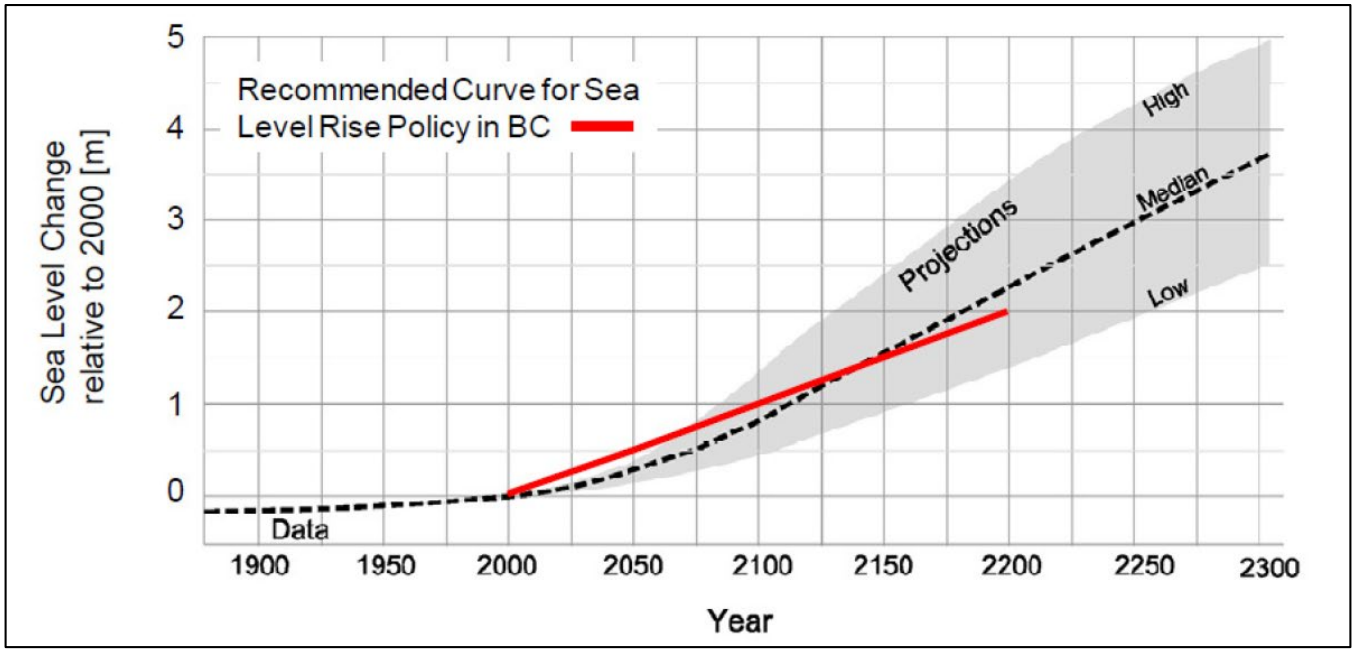
# Sea level rise

- Considered in project design
- Eelgrass bed elevation and slope designed to accommodate natural shoreward migration to adapt to predicted sea level rise

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# Rock reef design

- Maximize rock reef footprint and edge effect benefits
- Placement in deeper waters
- Large average size of rocks placed on a bedding layer

- Design evolution
  - Crenulations to individual islands
  - Improved constructability
  - Additional opportunities for predator avoidance
  - Simpler to monitor, and adaptively manage (if needed)

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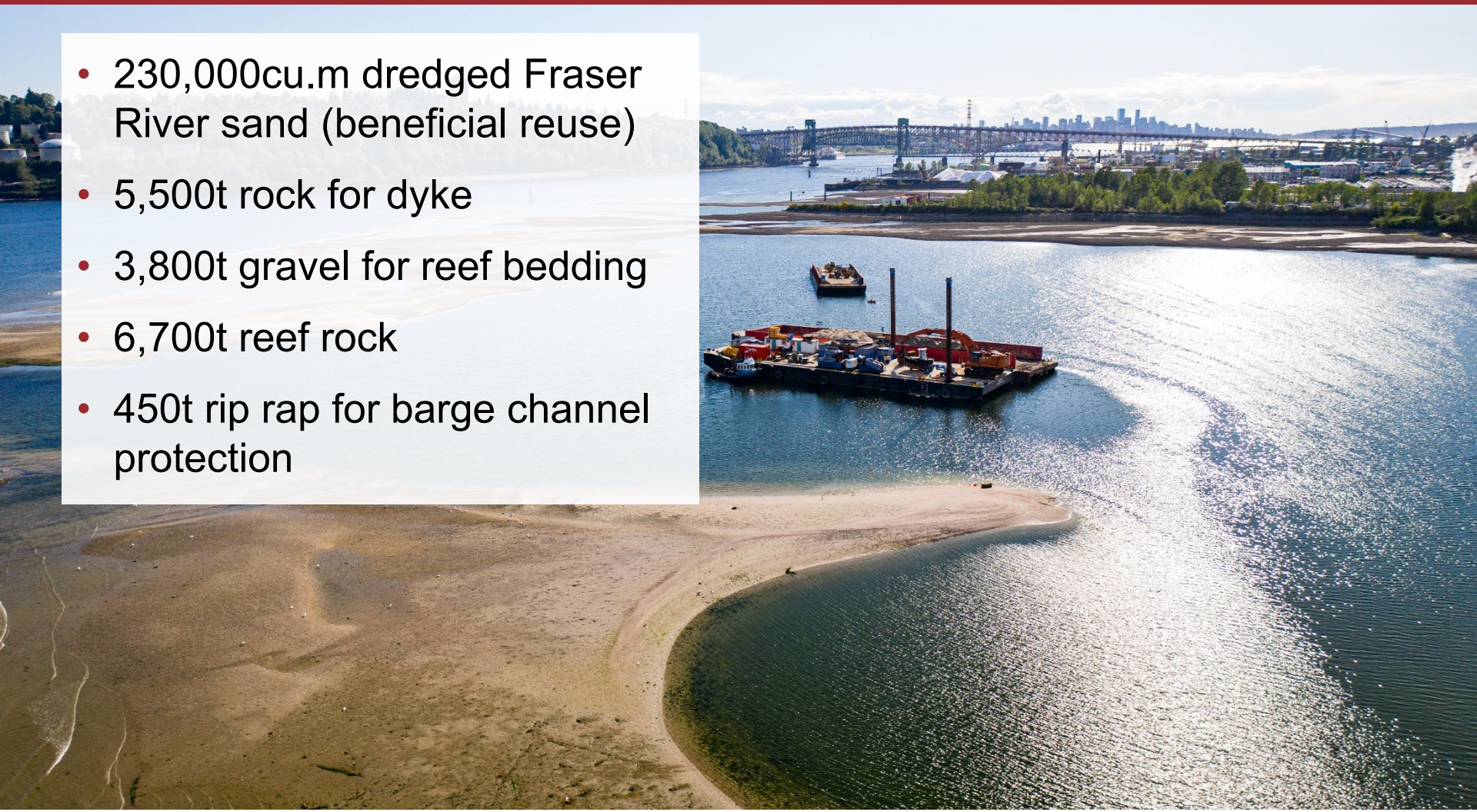
# Marine construction – environmental activities

- Aquatic species salvage
- Material placement plume management with silt curtains
- Regular environmental monitoring:
  - Water quality
  - Fish and bird activity
  - Mitigation measures and effectiveness

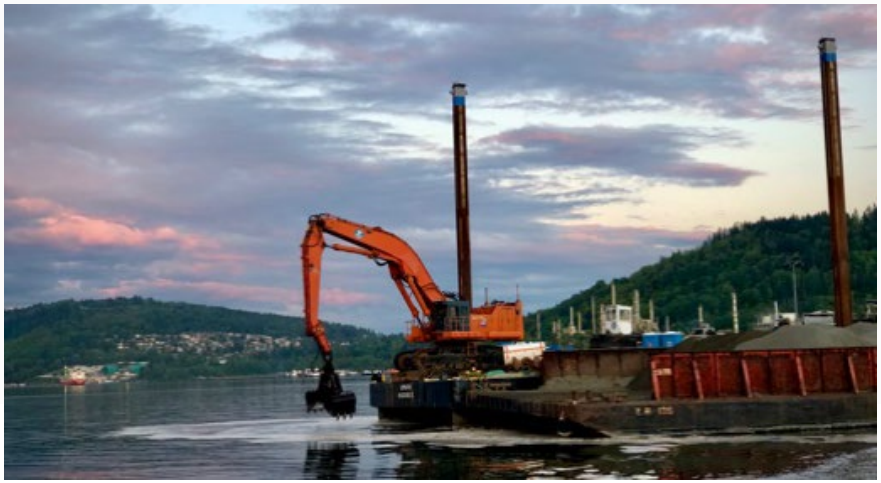
# Marine construction summary

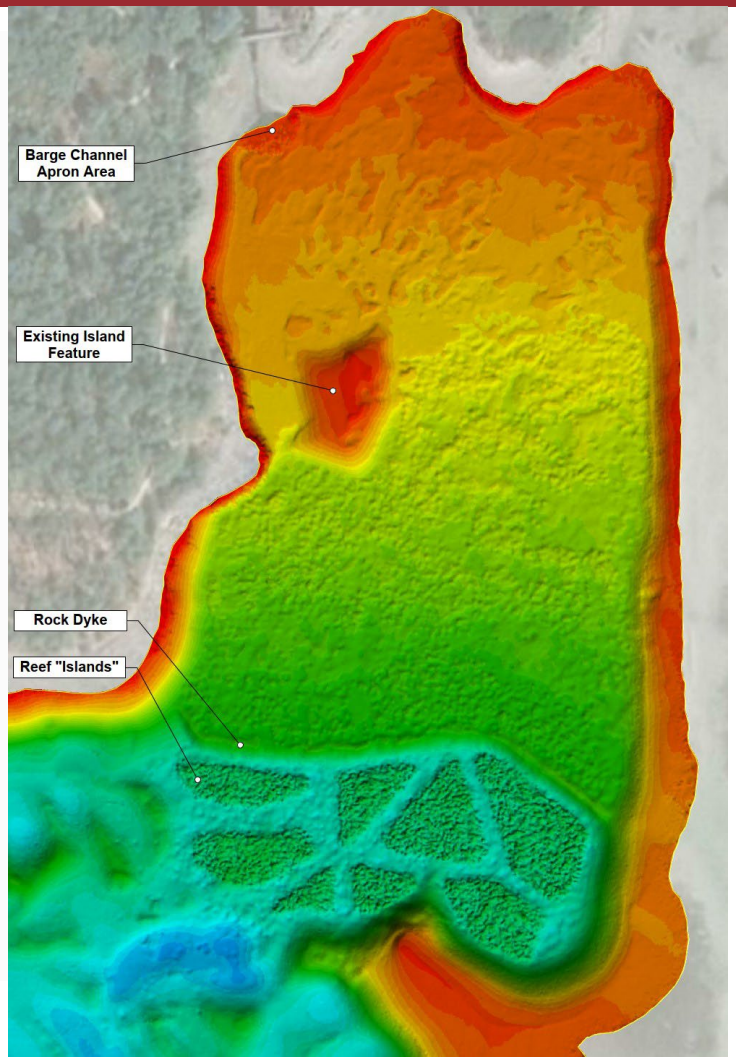


- 230,000cu.m dredged Fraser River sand (beneficial reuse)
- 5,500t rock for dyke
- 3,800t gravel for reef bedding
- 6,700t reef rock
- 450t rip rap for barge channel protection

# Completion surveys

- Bathymetric surveys to confirm material placement
- Completion bathymetry gathered after both marine construction and eelgrass transplantation
  - Comparison to determine stability of placed material



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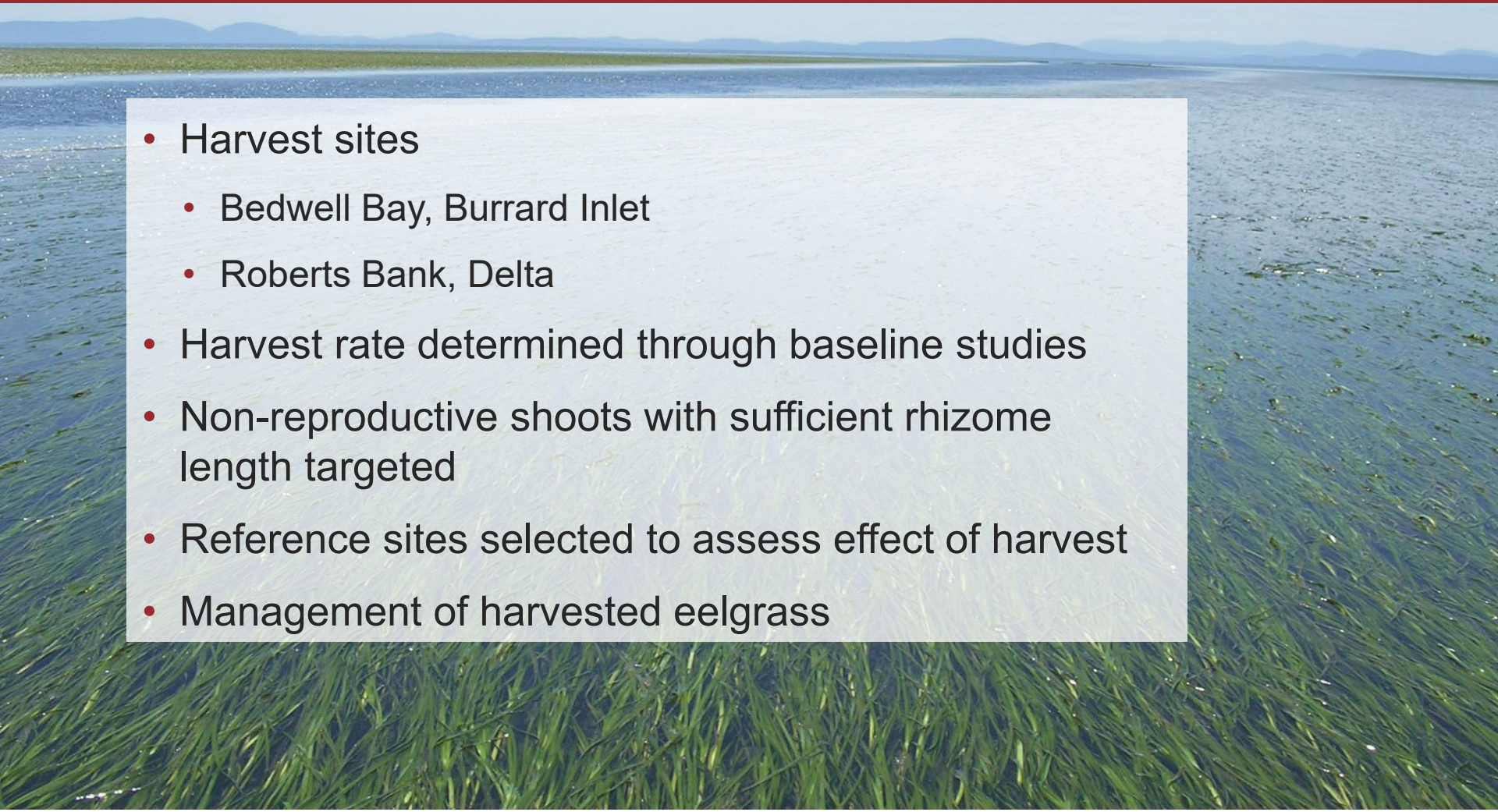
# Biological design

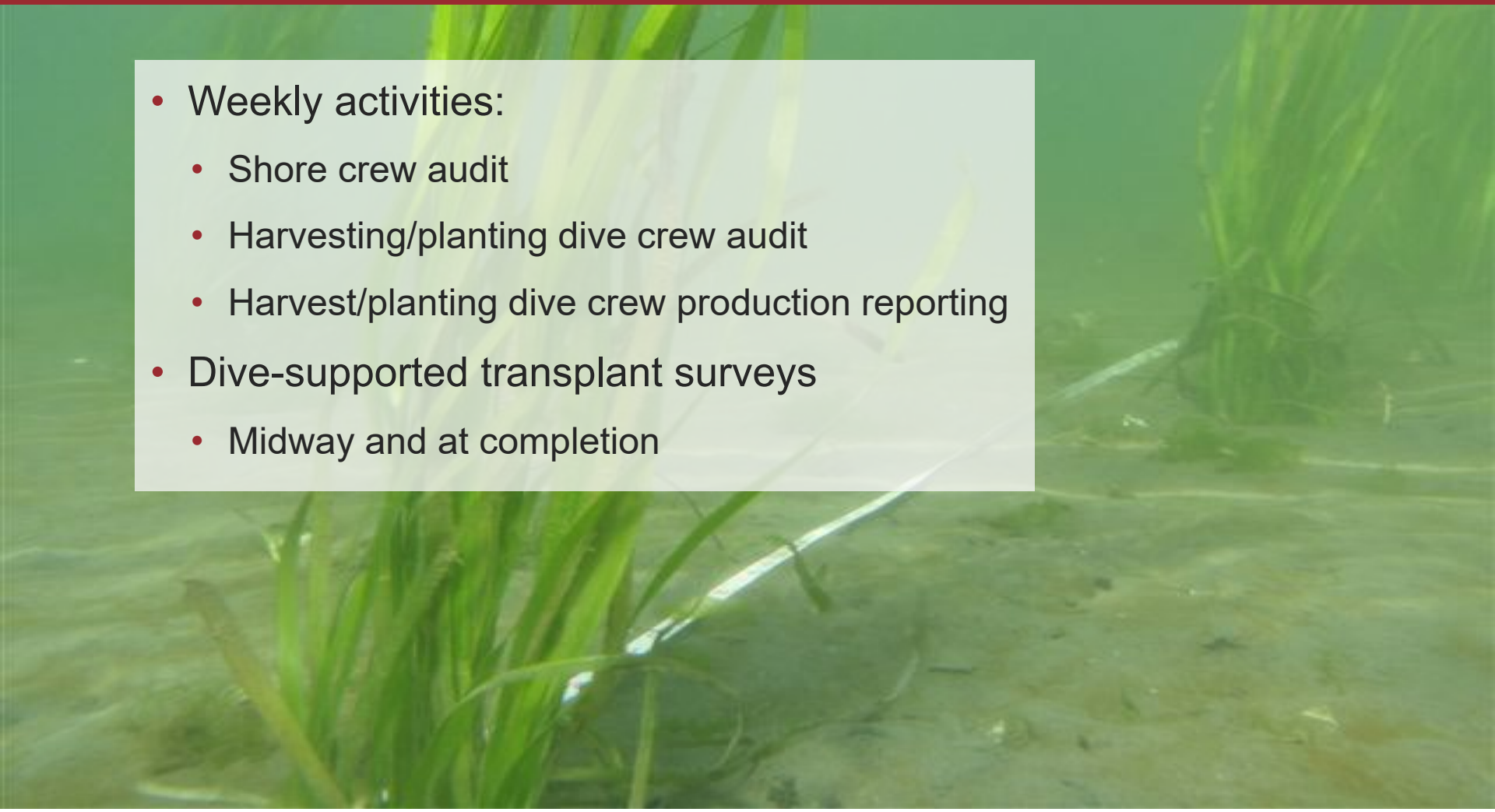
- Intertidal flat designed to blend with the existing Maplewood flats
- Sizing and footprint of reef rock provided a range of interstitial spacing for marine organisms and maximizes edge effect benefits
- Eelgrass elevation (shallow subtidal) selected to optimize eelgrass growth and survival

# Harvesting of eelgrass donor stock



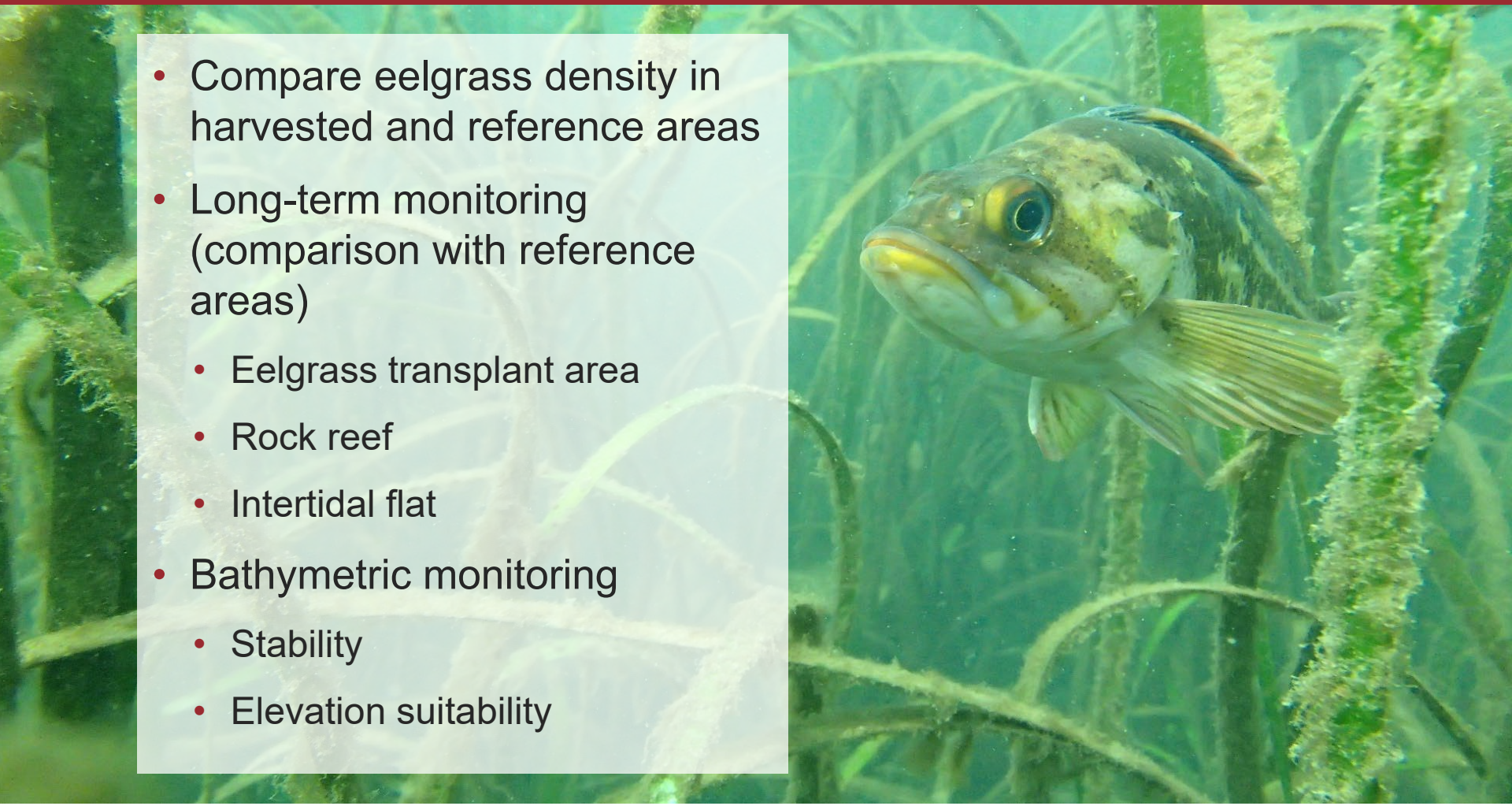
- Harvest sites
  - Bedwell Bay, Burrard Inlet
  - Roberts Bank, Delta
- Harvest rate determined through baseline studies
- Non-reproductive shoots with sufficient rhizome length targeted
- Reference sites selected to assess effect of harvest
- Management of harvested eelgrass

# Regular eelgrass transplant quality assurance activities



- Weekly activities:
  - Shore crew audit
  - Harvesting/planting dive crew audit
  - Harvest/planting dive crew production reporting
- Dive-supported transplant surveys
  - Midway and at completion

# Next steps: monitoring and reporting



- Compare eelgrass density in harvested and reference areas
- Long-term monitoring (comparison with reference areas)
  - Eelgrass transplant area
  - Rock reef
  - Intertidal flat
- Bathymetric monitoring
  - Stability
  - Elevation suitability

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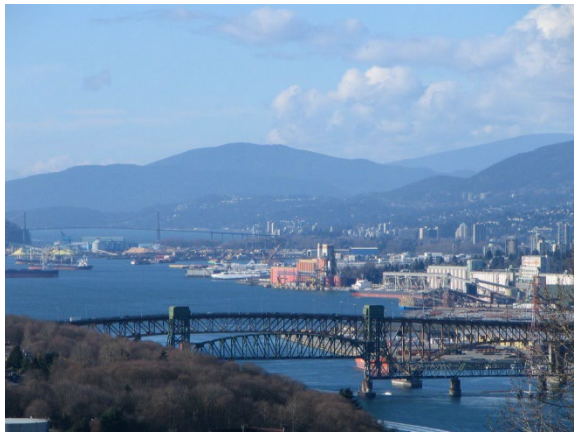
# Tsleil-Waututh Nation Environmental Restoration in Burrard Inlet

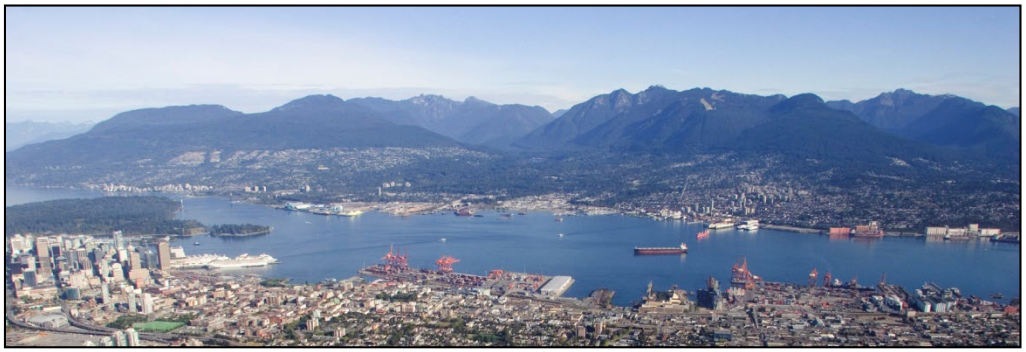

**Cora denHartigh, B.Sc**
Environmental Specialist, Tsleil-Waututh Nation

**Lindsey Ogston, M.Sc**
Environmental Programs Manager, Tsleil-Waututh Nation

TSLEIL-WAUTUTH NATION
PEOPLE OF THE INLET

# Current state of Burrard Inlet

- Burrard Inlet closed to bivalve harvesting since 1972
- Herring extirpated in 1885
- General decline in habitat type, function, connectivity and species populations
- Point and non-point sources of pollution
- Lack of coordinated monitoring or environmental stewardship oversight
- General lack of information and regular data collection



# Tsleil-Waututh Nation Environmental Team

- Works on restoring the health of Burrard Inlet

- Restoration Projects
- Habitat mapping

- Building relationships

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PEOPLE OF THE INLET

# Ecosystem Restoration and Monitoring

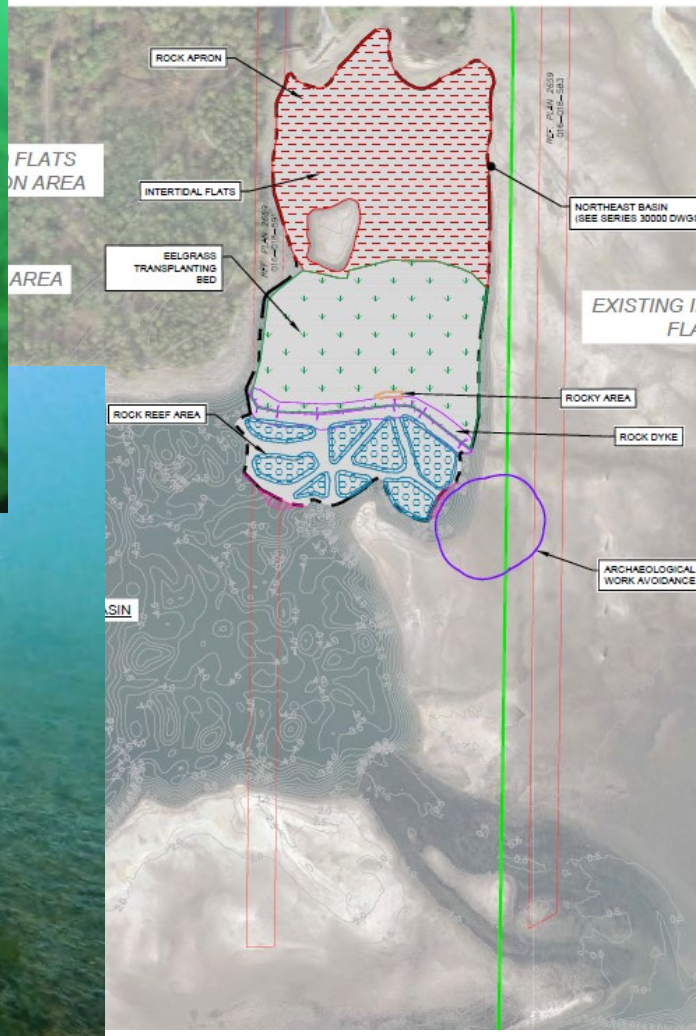
# Habitats of Concern

# Shoreline Change and Importance of Maplewood Mud Flats

# Maplewood Marine Project

- Collaborative with VFPA, co-management
- 3 types of habitat: shellfish beds, kelp bed and eelgrass bed
- Site of former dredged log pond

# Maplewood Marine Project




Thank you!

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