

# Juvenile salmon ecology and restoration on the delta of the Fraser River estuary

**Misty MacDuffee**

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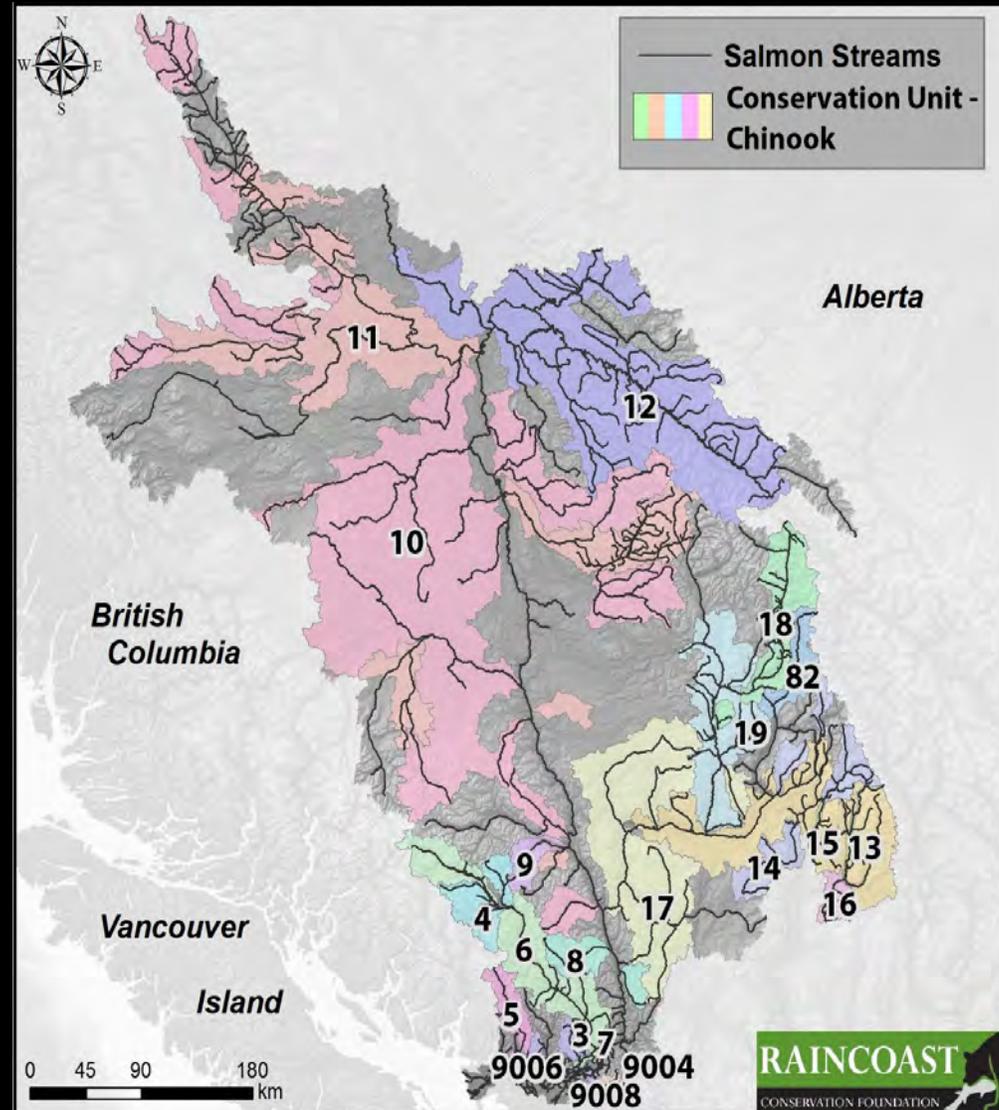


# The Fraser River estuary



# Chinook Salmon of the Fraser River

- 4 run timing groups
- 19 CUs
  - 13 stream-type
  - 6 ocean-type
- Ocean-type Chinook considered more estuary reliant



# The status of Fraser River Chinook salmon

| Species | COSEWIC Status  | CU #   | Fraser sub Group | Conservation Unit (CU)                 | Run timing Aggregate  |
|---------|-----------------|--------|------------------|--|-----------------------|
| Chinook | Endangered      | CK-16  | Thompson         | South Thompson -Bessette Cr Summer 1.2 | Spring 4 <sub>2</sub> |
| Chinook | Endangered      | CK -12 | Upper Fraser     | Upper Fraser River spring 1.3          | Spring 5 <sub>2</sub> |
| Chinook | Endangered      | CK-18  | Thompson         | North Thompson Spring 1.3              | Spring 5 <sub>2</sub> |
| Chinook | Endangered      | CK-19  | Thompson         | North Thompson Summer 1.3              | Summer 5 <sub>2</sub> |
| Chinook | Endangered      | CK-05  | Lower Fraser     | Lower Fraser Upper Pitt Summer 1.3     | Summer 5 <sub>2</sub> |
| Chinook | Endangered      | CK-14  | Thompson         | South Thompson Summer 1.3              | Summer 5 <sub>2</sub> |
| Chinook | Endangered      | CK-09  | Middle Fraser    | Middle Fraser -Portage Fall 1.3        | Fall 5 <sub>2</sub>   |
| Chinook | Threatened      | CK-10  | Middle Fraser    | Middle Fraser - spring 1.3             | Spring 5 <sub>2</sub> |
| Chinook | Threatened      | CK-08  | Middle Fraser    | Middle Fraser -Fraser Canyon           | Spring 5 <sub>2</sub> |
| Chinook | Threatened      | CK-11  | Middle Fraser    | Middle Fraser Summer 1.3               | Summer 5 <sub>2</sub> |
| Chinook | Threatened      | CK-03  | Lower Fraser     | Lower Fraser Fall                      | Fall 4 <sub>1</sub>   |
| Chinook | Special Concern | CK-04  | Lower Fraser     | Lower Fraser spring 1.3                | Spring 5 <sub>2</sub> |
| Chinook | Not at Risk     | CK-13  | Thompson         | South Thompson Summer 0.3              | Summer 4 <sub>1</sub> |
| Chinook | Not Assessed    | CK-06  | Lower Fraser     | Lower Fraser summer 1.3                | Summer 5 <sub>2</sub> |
| Chinook | Not assessed    | CK-17  | Thompson         | Lower Thompson Spring 1.2              | Spring 4 <sub>2</sub> |

19 Cus, 13 assessed: 7 endangered, 4 threatened, 1 concern, 1 stable

# Transformation of the Lower Fraser

- >70% of estuary and floodplain habitats lost or disconnected



# Transformation of the Lower Fraser

- Estuary migration routes for juvenile salmon altered by multiple causeways and jetties

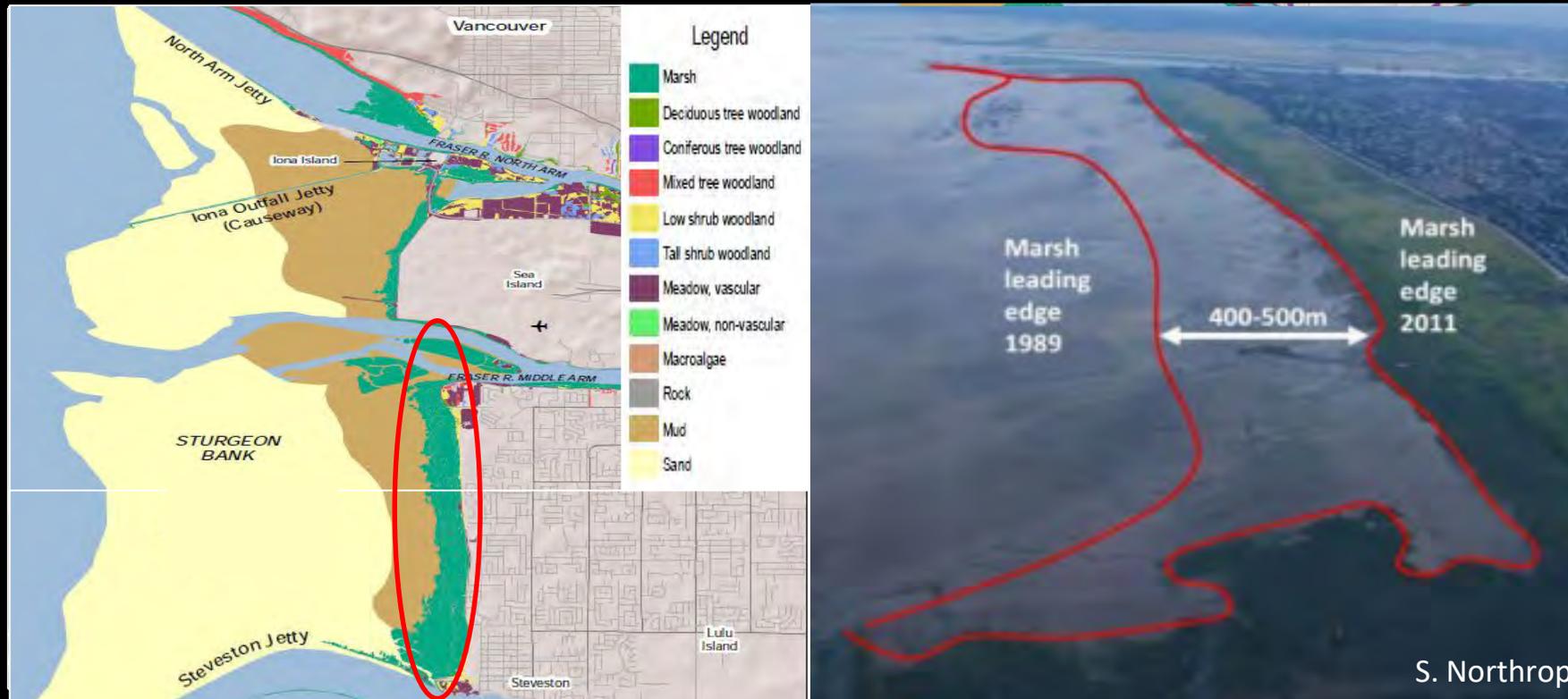


# Barriers to fish movements in the Fraser estuary



# Sturgeon Bank Marsh Recession

- leading edge significant recession (>160 ha) btwn 1989 - 2011
- Hypotheses include reduced sediment supply, increased salinity, herbivory, erosion, etc







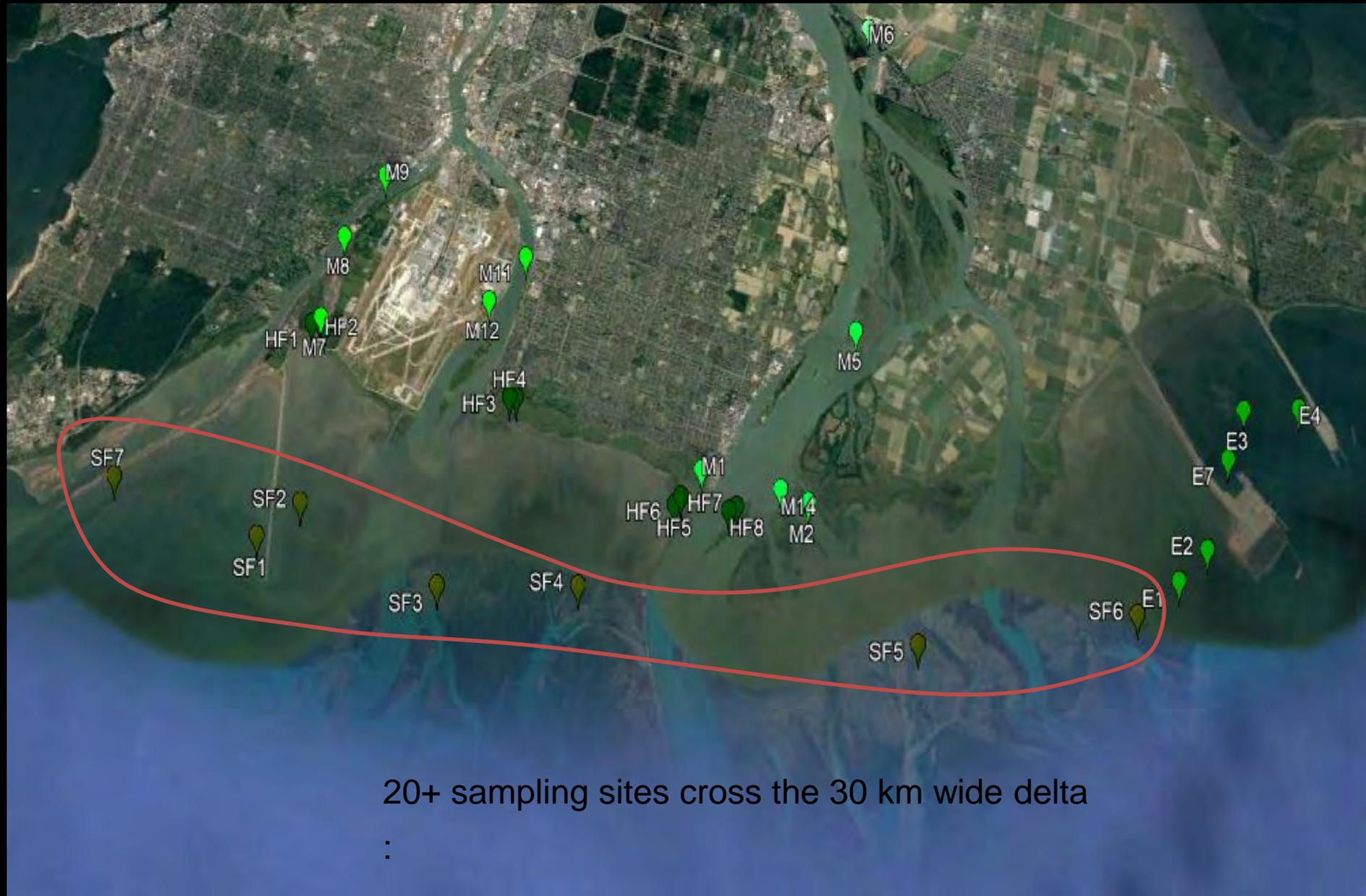
# Raincoast's Fraser Estuary study



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# Beach seine, purse seine and fyke nets



# Fraser estuary study 2016-2019



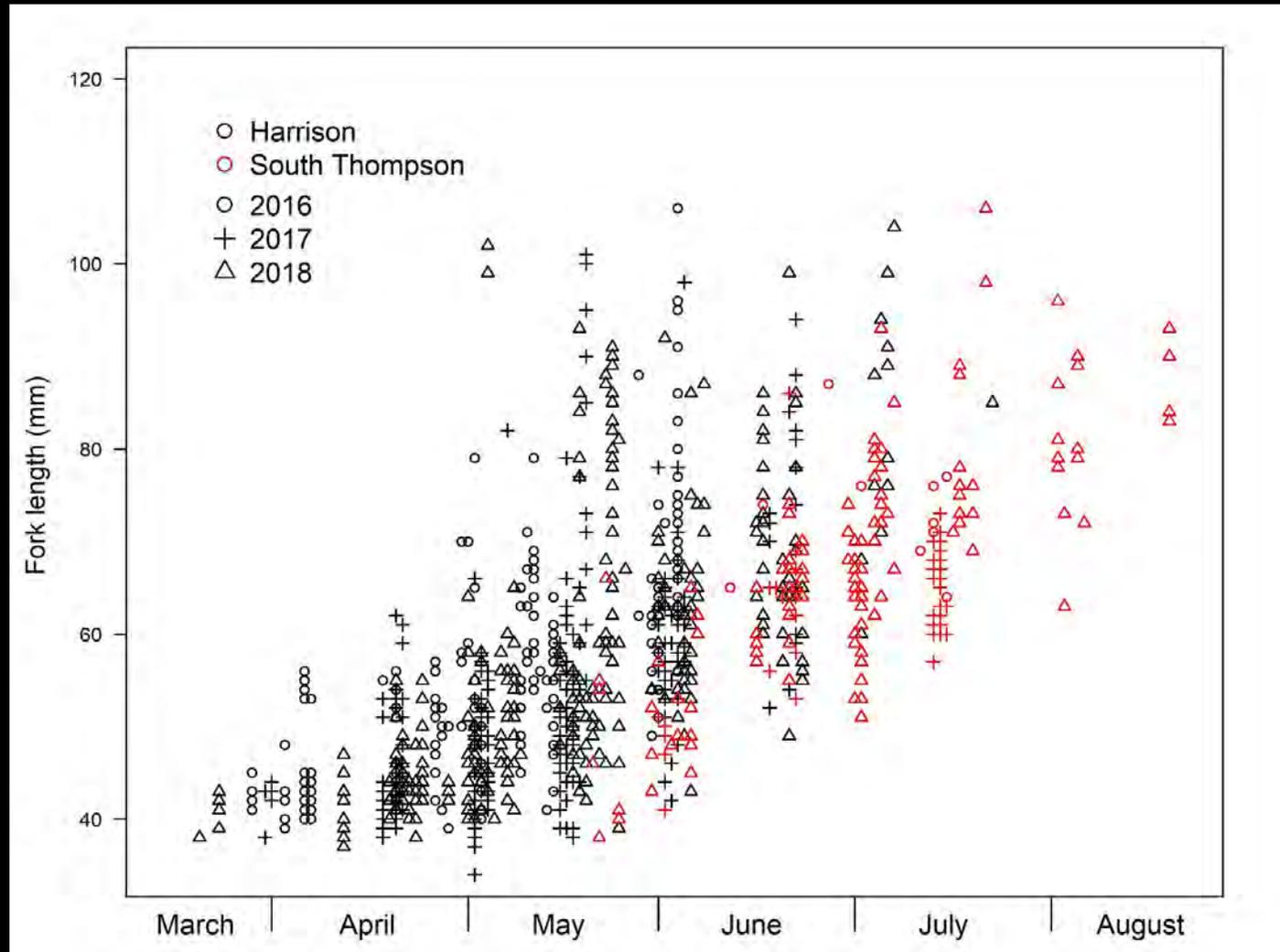
- 20+ sampling sites in 3 habitats
- Presence/ absence/ relative abundance
- Habitat preference
- GSI & outmigration timing of Chinook CUs
- Otolith for growth & residency times
- Abiotic data loggers
- Biomarkers (2019)
- Contaminants (2019)

# Key juvenile Chinook findings 2016-2018



- Total fish: 90k+ Salmon: 15k+ Chinook: 4500+
- Most juvenile salmon /Chinook caught in the marsh
- Harrison Chinook start arriving in March
- Immediate & delayed migration strategies in Harrison
- Stream type (yearlings) arrive early May
- South Thompson (sub yearling) arrive late May can stay to August

# Key juvenile Chinook findings 2016-2018



# Barriers to fish movements in the Fraser estuary

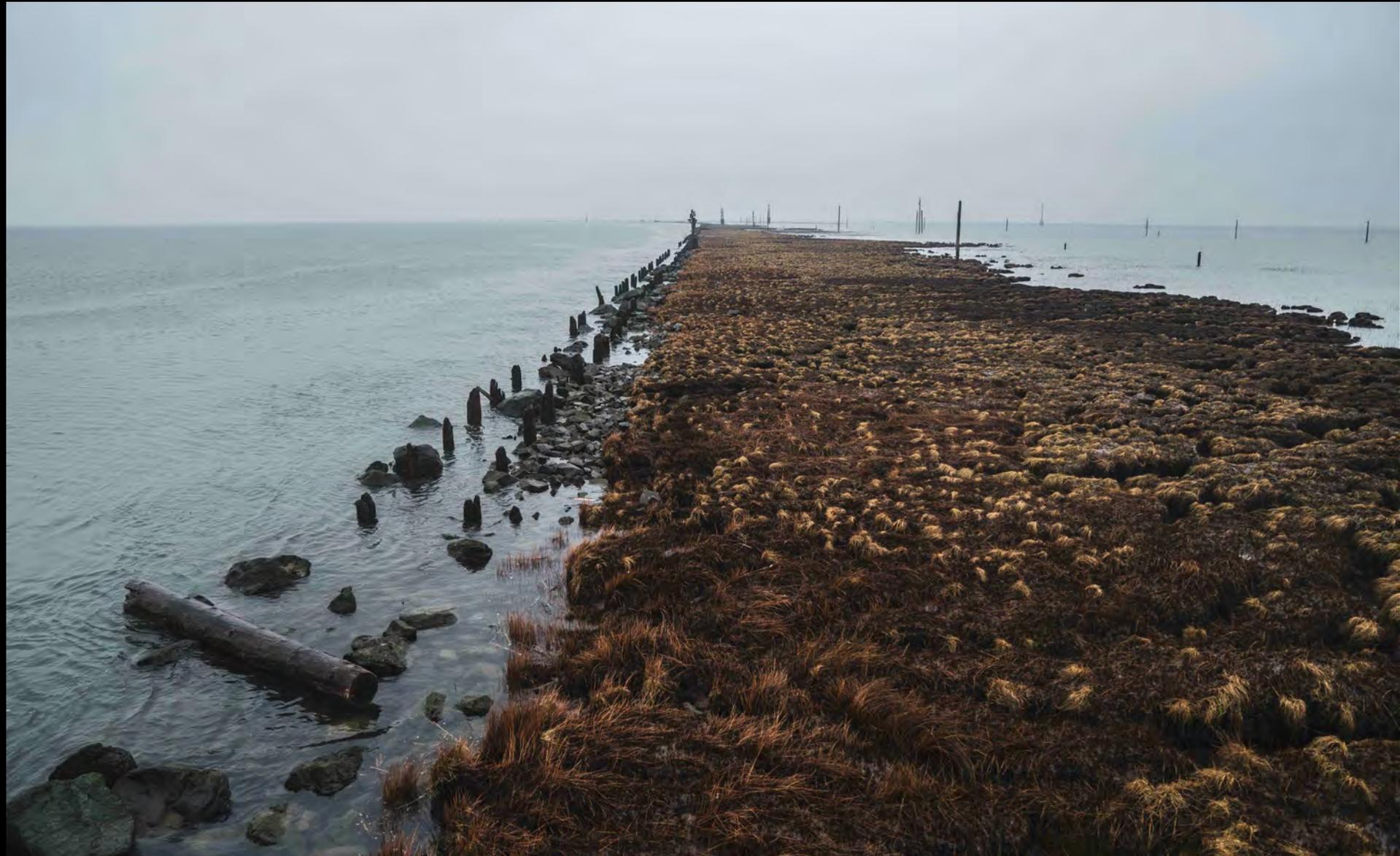


# Fraser Estuary Connectivity Project

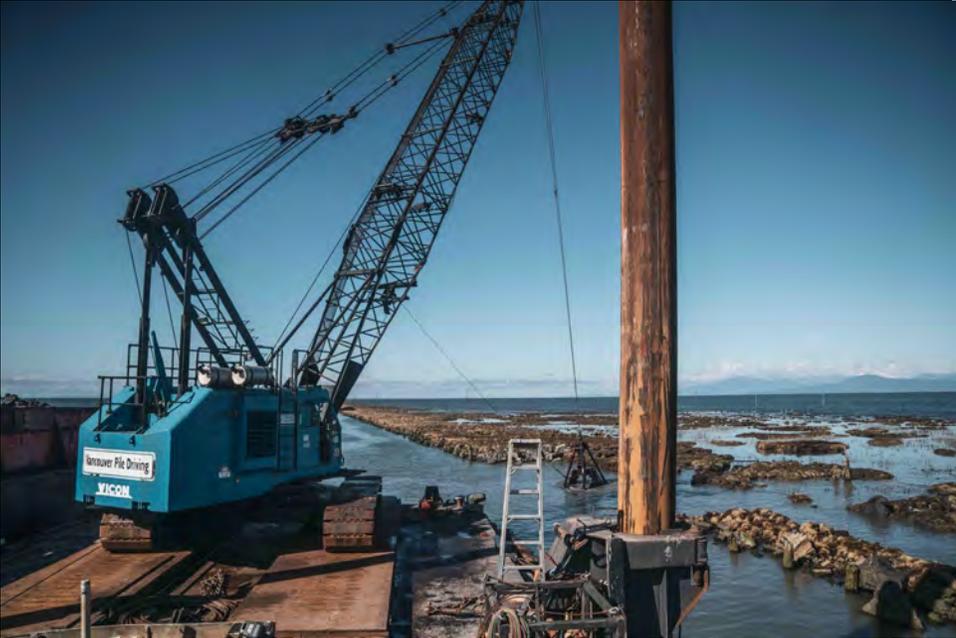
Steveston jetty



# Fraser Estuary Connectivity Project



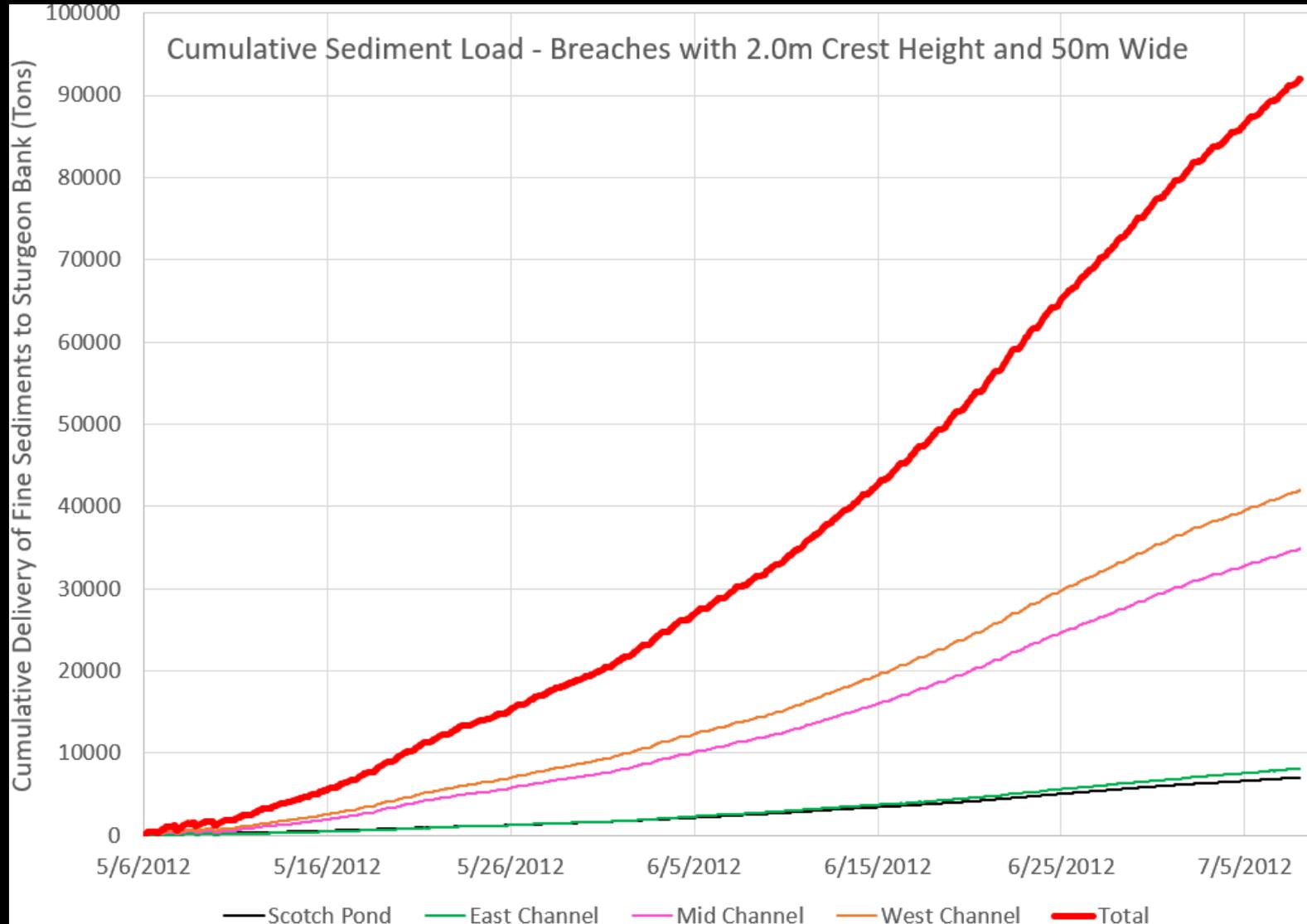
# Steveston Jetty de-construction Feb 2019







# Anticipated delivery of sediment through breaches to Sturgeon Bank



- Restoring Lower Fraser and estuary marsh habitats important to the recovery of Fraser Chinook salmon populations
- Multiple benefits to restoration including providing prey for the endangered Southern Resident killer whales

