General Watershed Approach to Chinook Salmon Habitat Restoration

Chapter 8 SRP

Mike LeMoine

SKAGIT RIVER SYSTEM COOPERATIVE

Chinook Life Cycle

- Chinook productivity is dependent on migratory pathways and the habitats used
- Recovery must consider the **Whole life cycle** from spawning grounds to the ocean

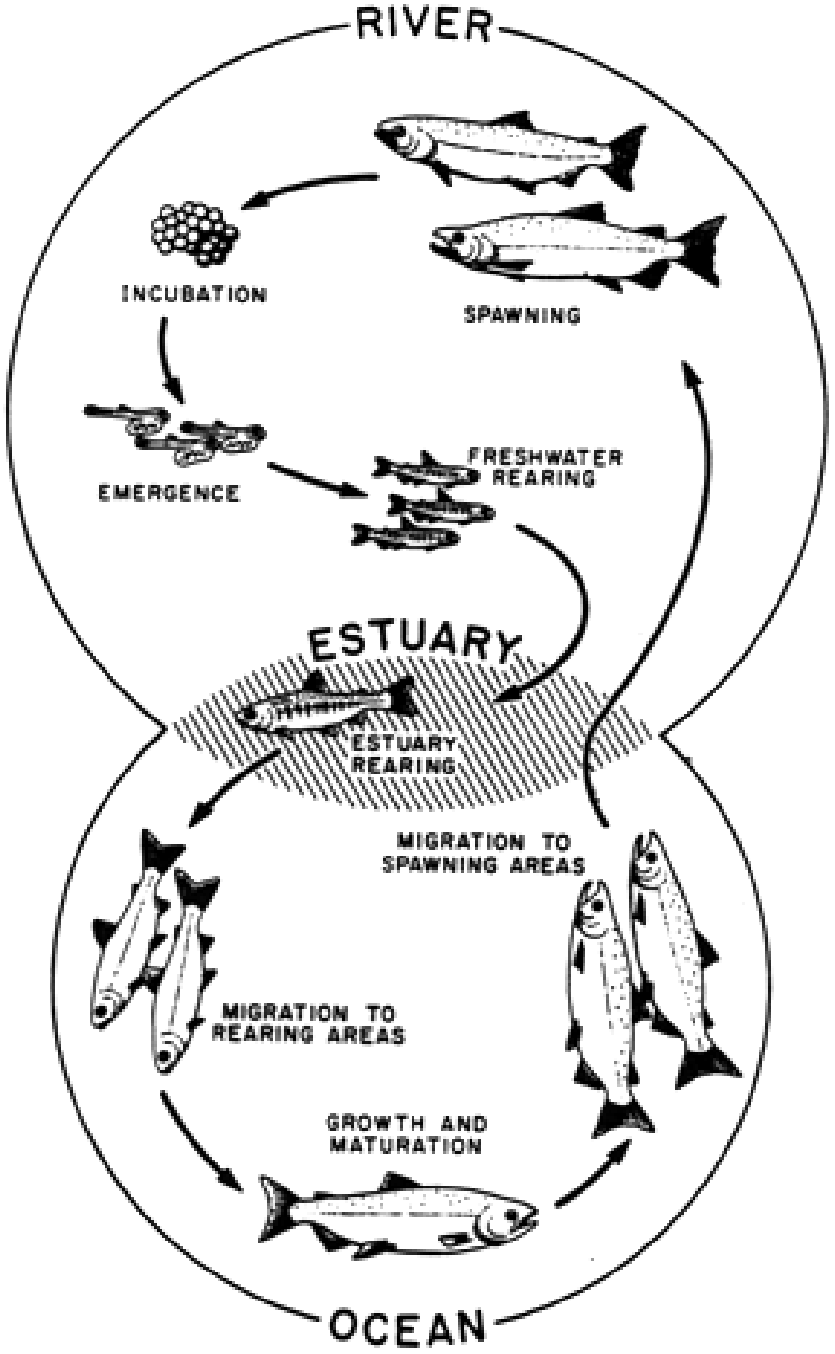
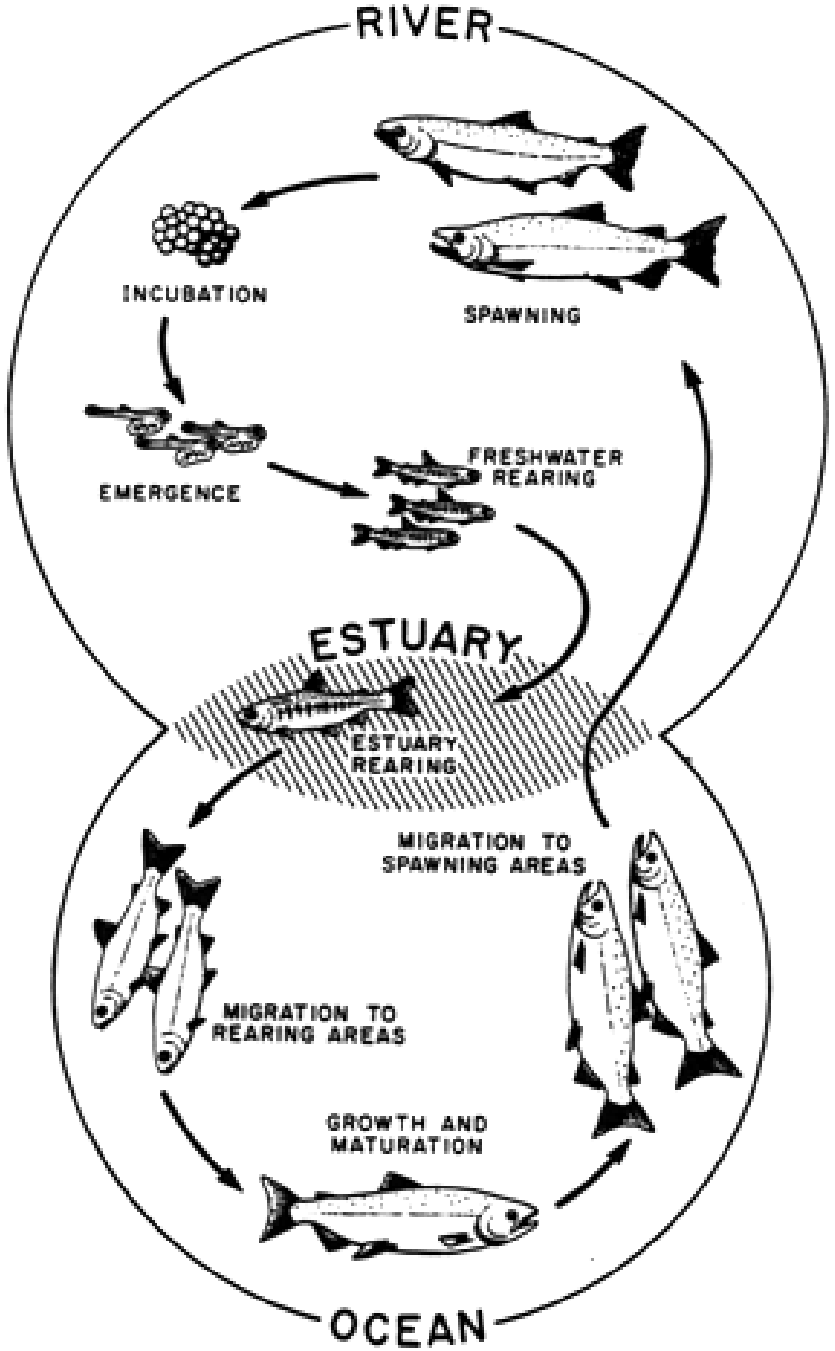
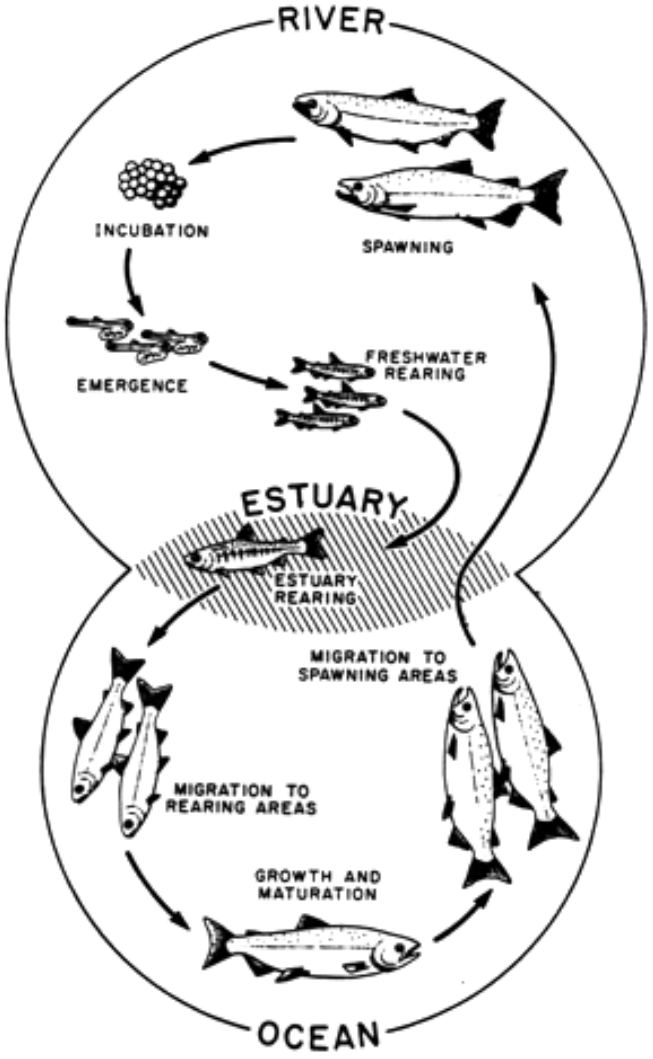



Photo source: oceanexplorer.noaa.gov


RIVER
INCUBATION
SPAWNING
EMERGENCE
FRESHWATER REARING
ESTUARY
ESTUARY REARING
MIGRATION TO SPAWNING AREAS
MIGRATION TO REARING AREAS
GROWTH AND MATURATION
OCEAN

Recovery Planning within the Life Cycle

- Spawning and incubation
- Freshwater rearing
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean Survival*



Recovery Planning within the Life Cycle

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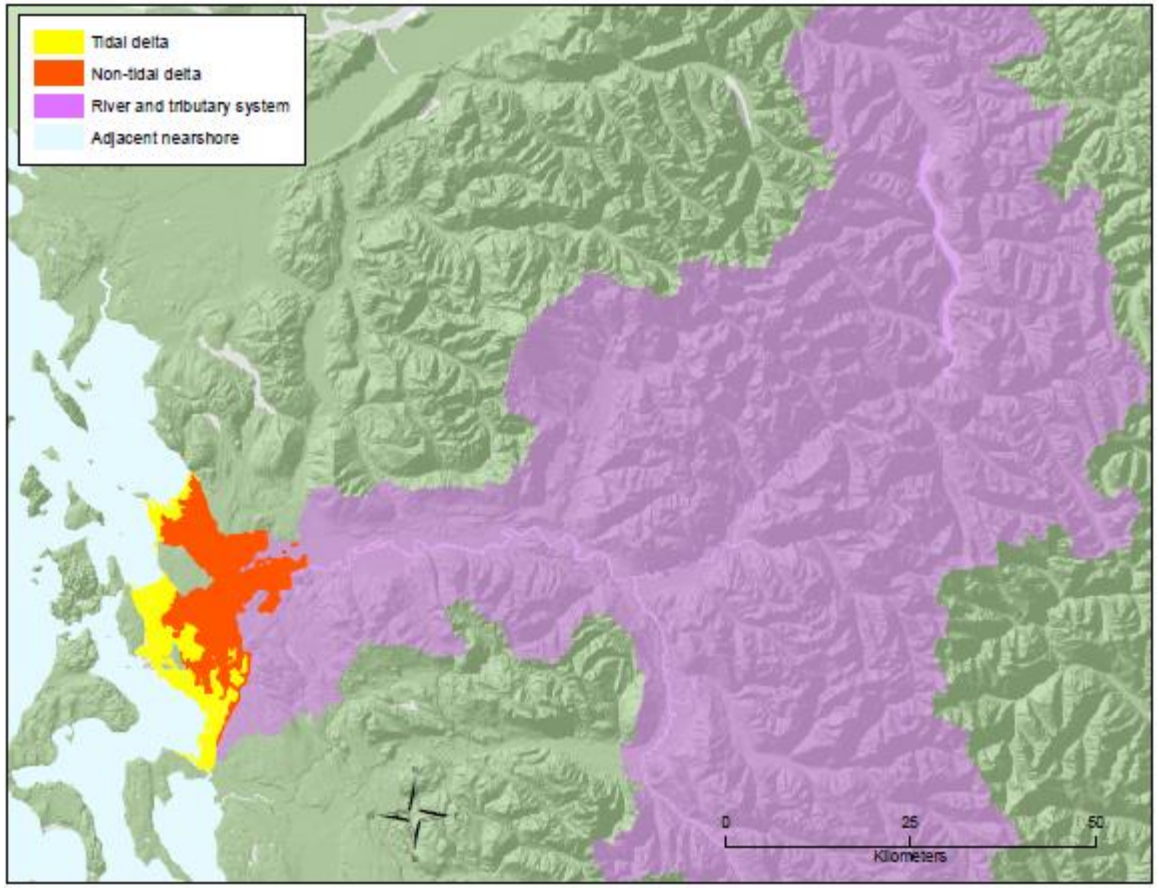
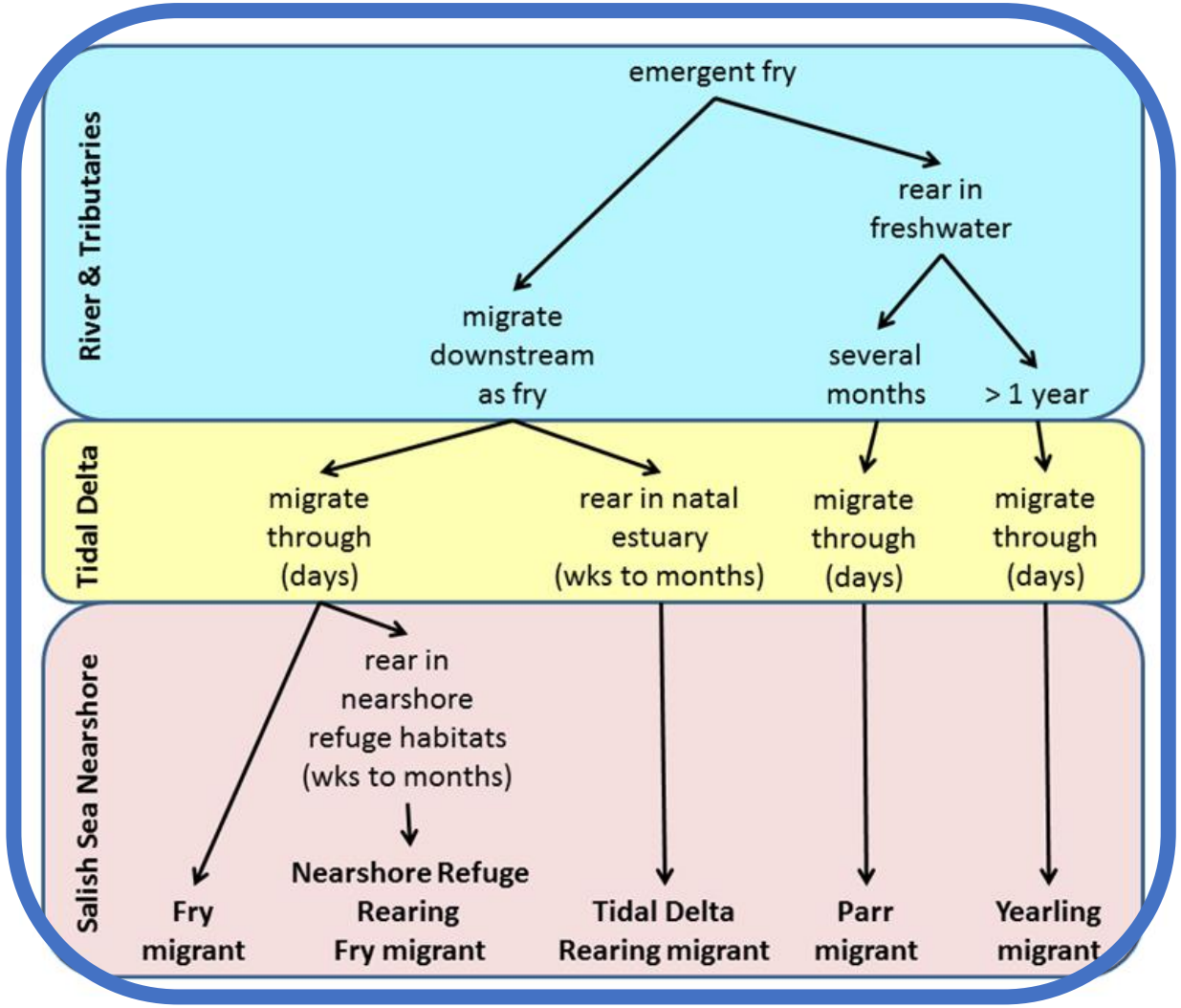
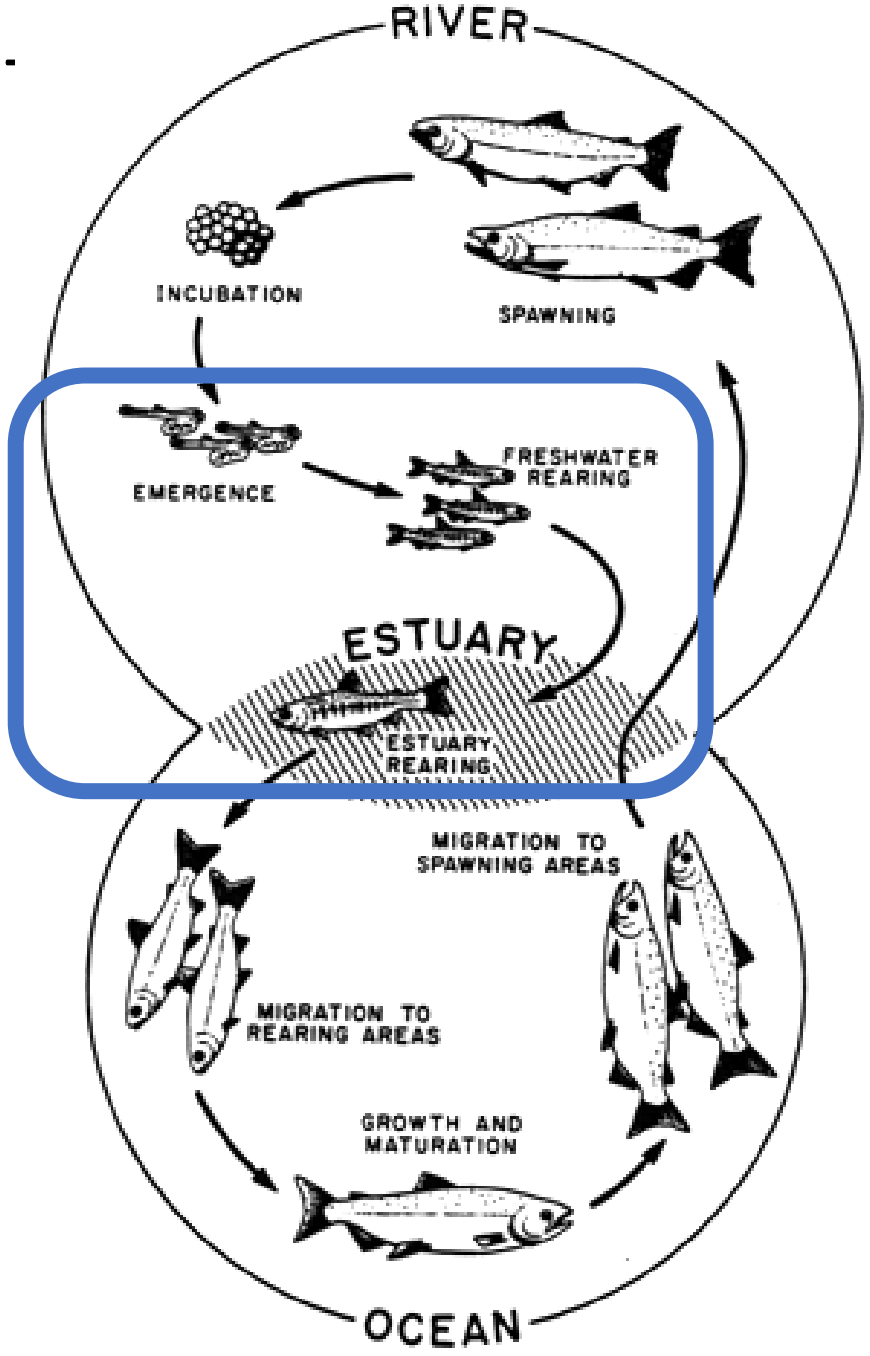


Page 97 Skagit Recovery Plan

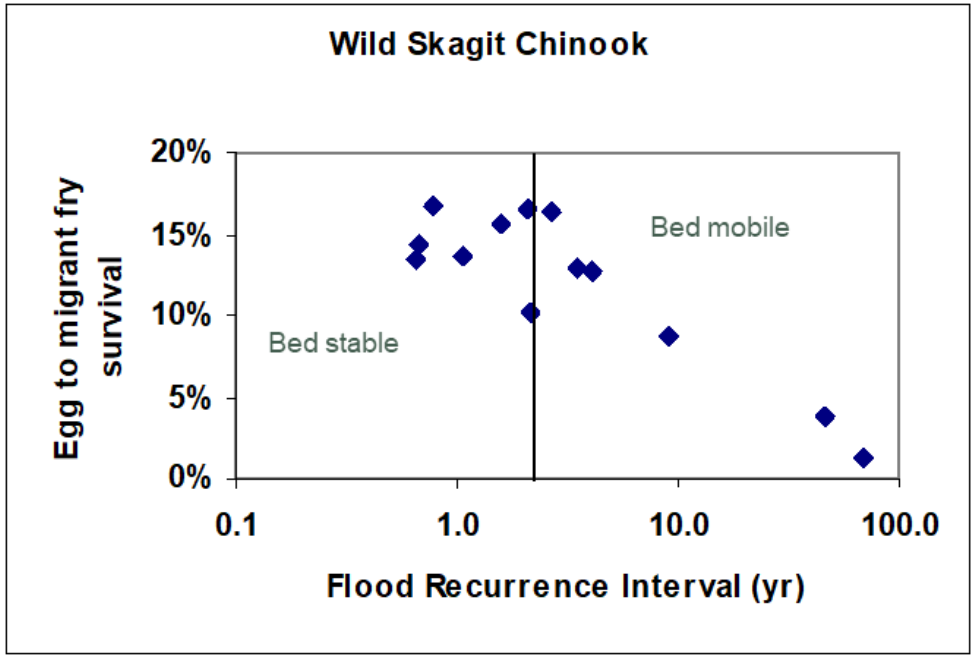
Multiple Pathways to Complete the Cycle





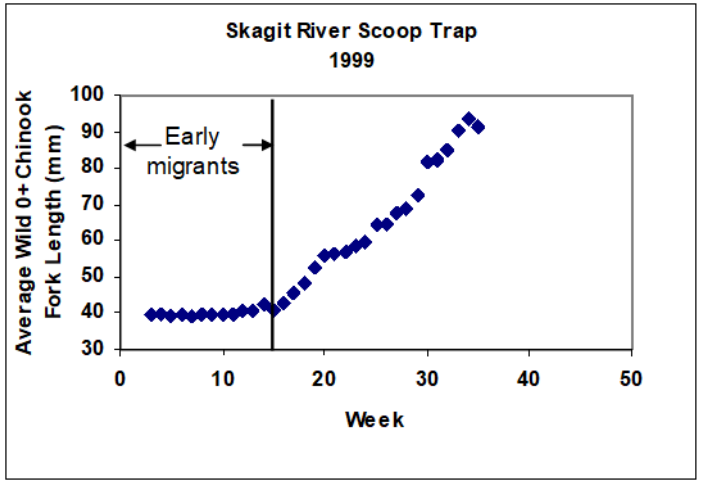
Recovery Planning within the Life Cycle

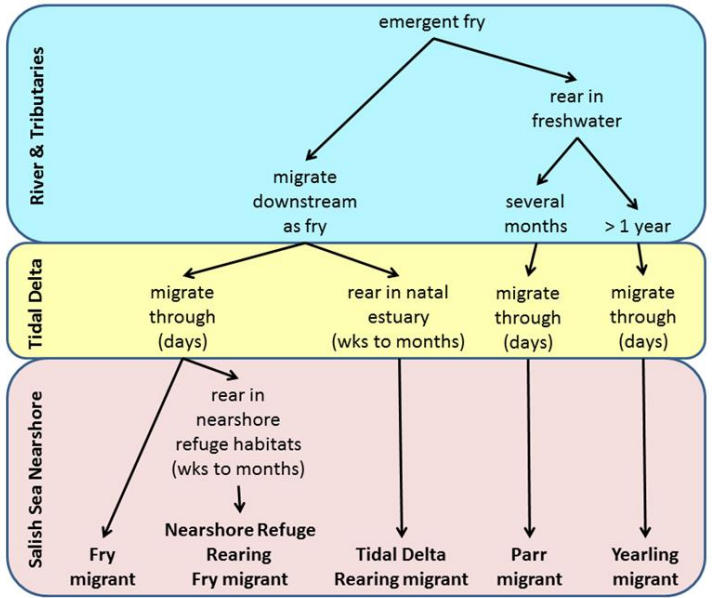
- Spawning and incubation Ch 9
- Freshwater rearing
  - Floodplains
  - Nontidal delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival*



Recovery Planning within the Life Cycle

- Spawning and incubation
- Freshwater rearing Ch 10
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival*





Recovery Planning within the Life Cycle

- Spawning and incubation
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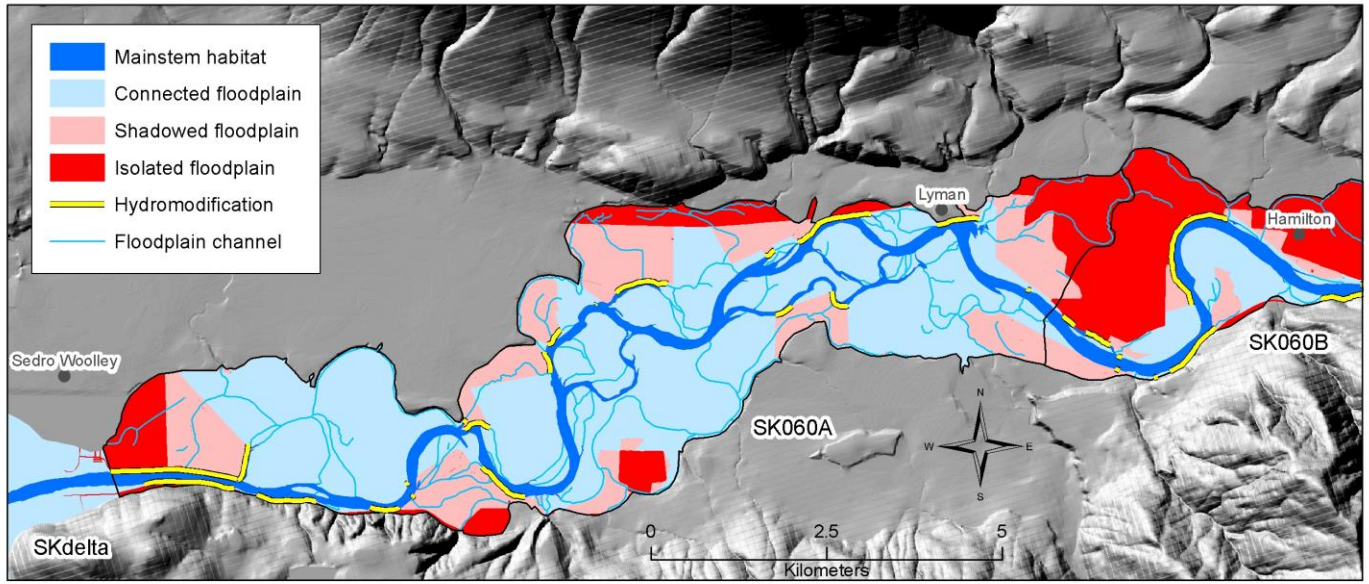
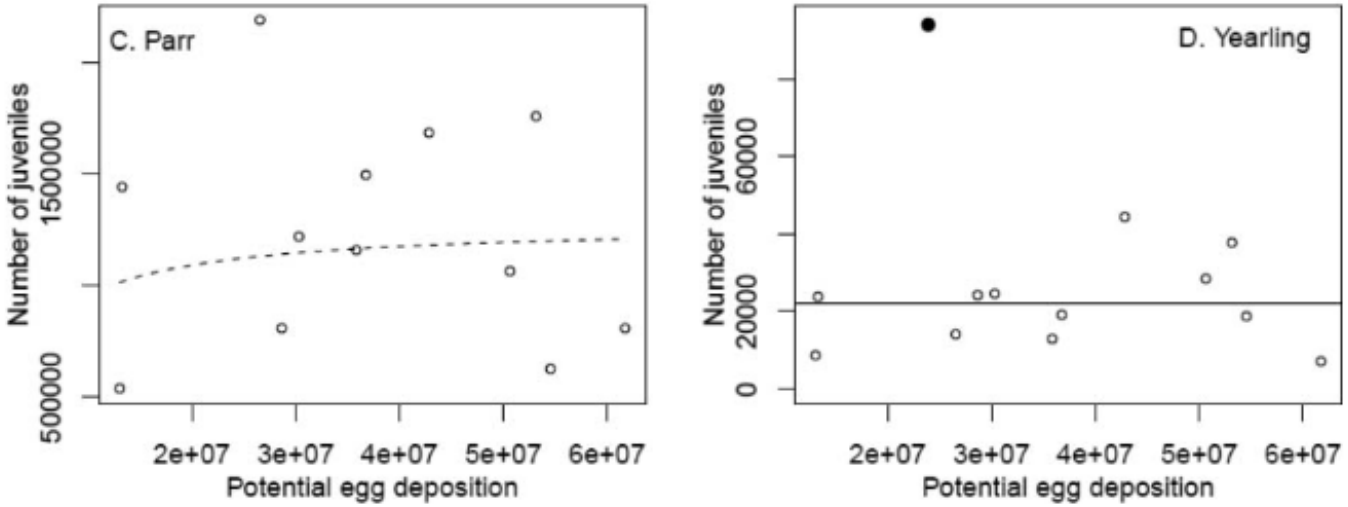


-31% loss of floodplain isolated or shadowed from river hydrology
-17% of large river edge is hardened (riprap)
-loss of off channel length, backwater area, and natural bank habitat

Recovery Planning within the Life Cycle

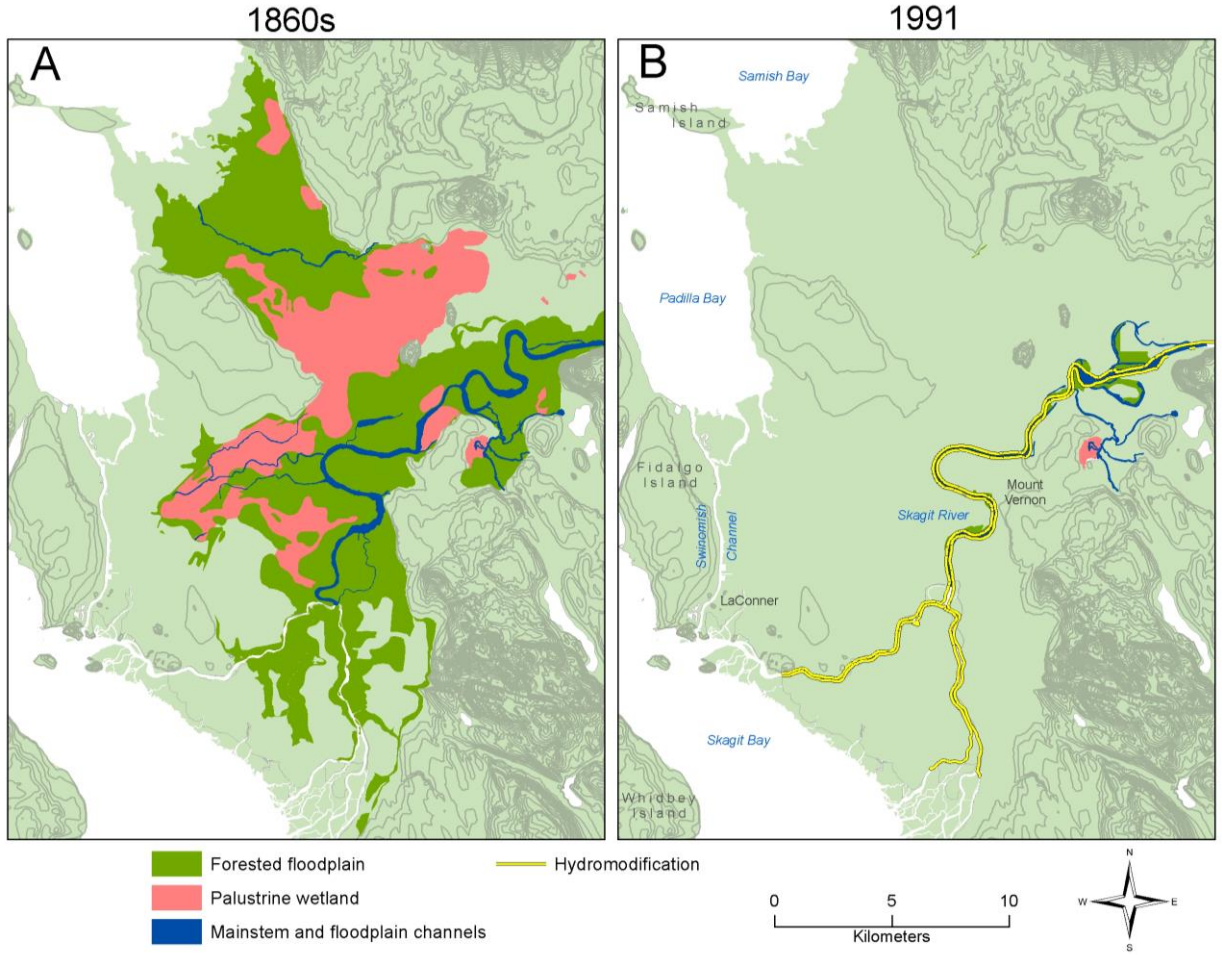
- Spawning and incubation
- Freshwater rearing Ch 10
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival*



Zimmerman et al. 2015

Recovery Planning within the Life Cycle

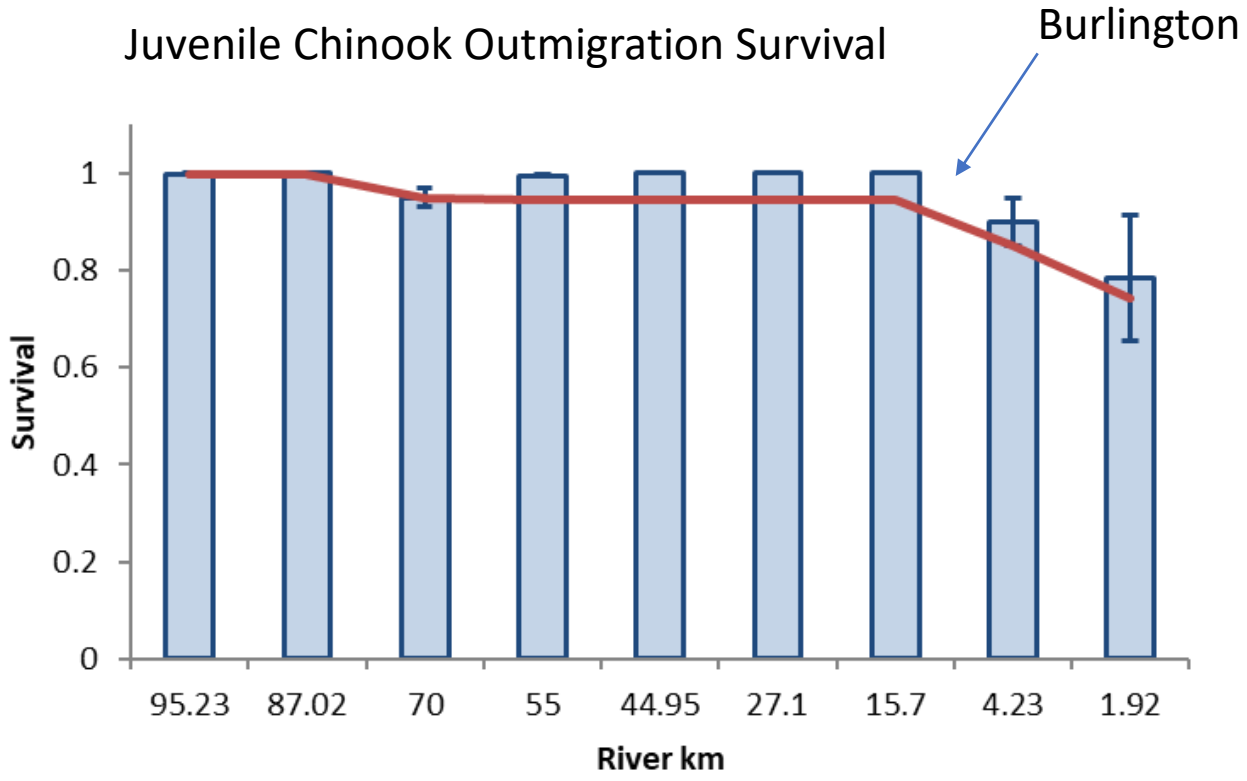
- Spawning and incubation
- Freshwater rearing Ch 10
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival*



~ 98% loss of nontidal delta area

Recovery Planning within the Life Cycle

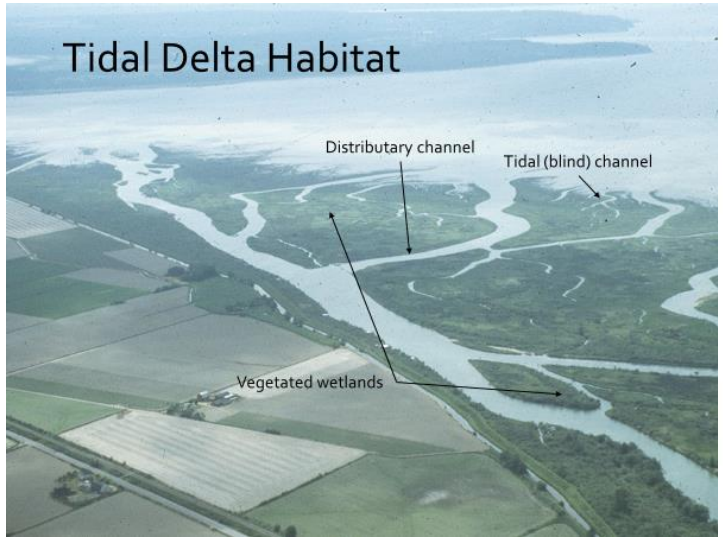
- Spawning and incubation
- Freshwater rearing Ch 10
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival*



Presented to NCC in 2019

Recovery Planning within the Life Cycle

- Spawning and incubation
- Freshwater rearing
  - Floodplains
  - Nontidal Delta
- **Tidal delta rearing Ch 11**
- Nearshore rearing
- Ocean survival*



~73% loss of historical tidal delta footprint

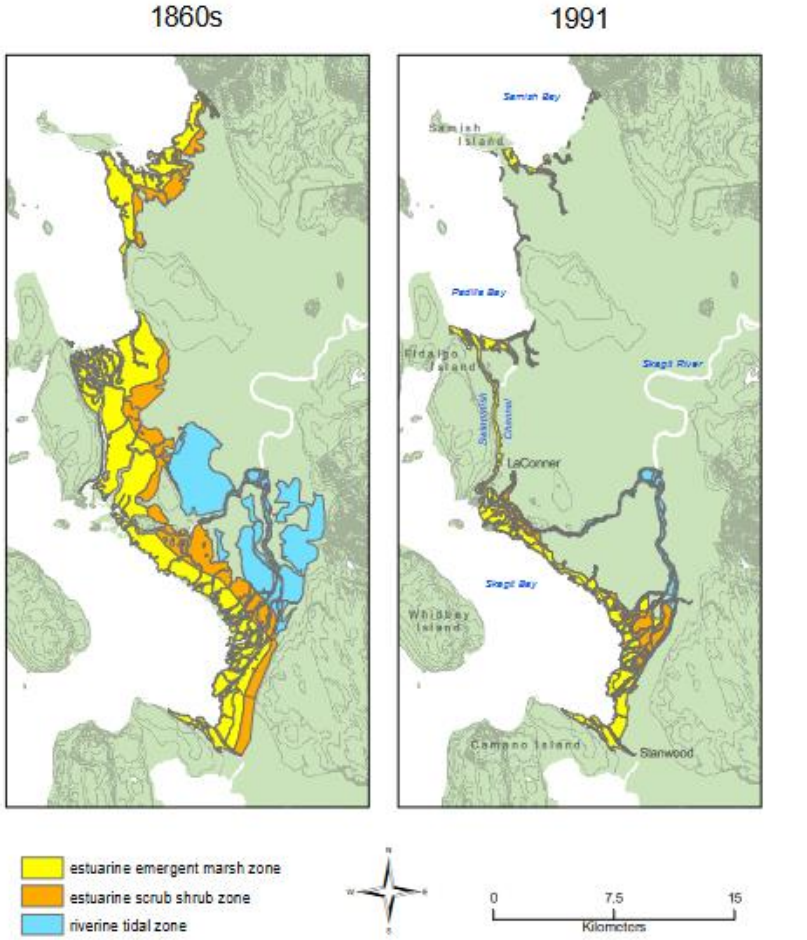
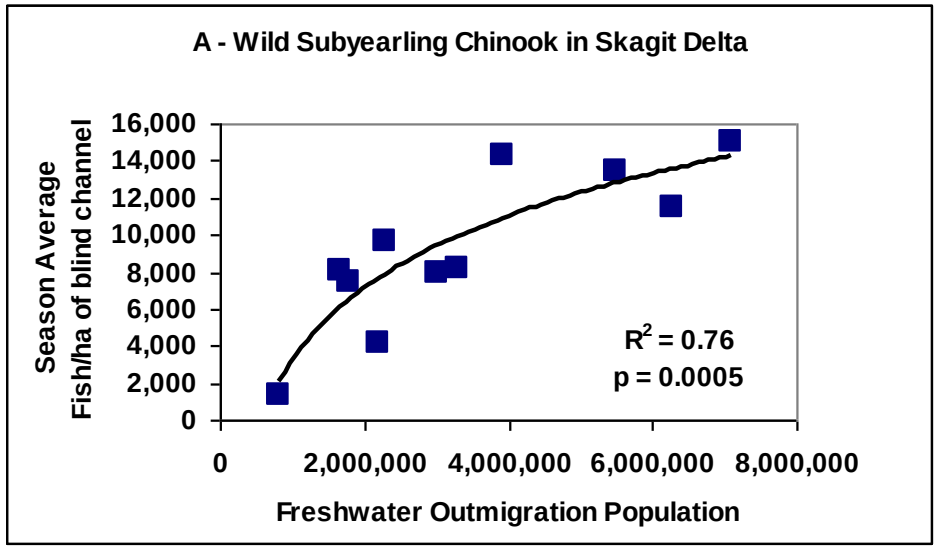
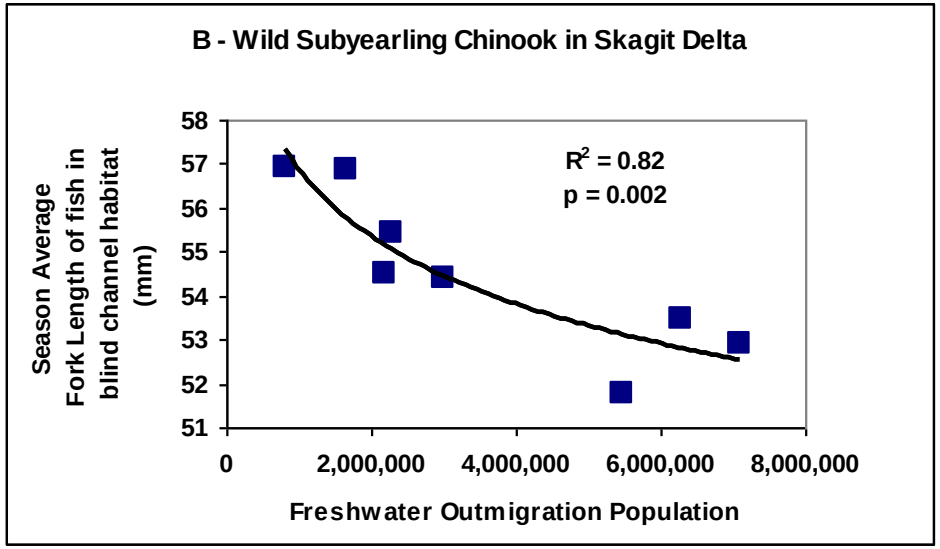


Figure 3.1. *Changes to the estuarine habitat zones within the geomorphic Skagit delta.* Historic (circa. 1860s) conditions were reconstructed by Collins (2000) using archival maps and survey notes. Current habitat zones were mapped by Beamer et al. (2000b) using 1991 orthophotos.

Recovery Planning within the Life Cycle

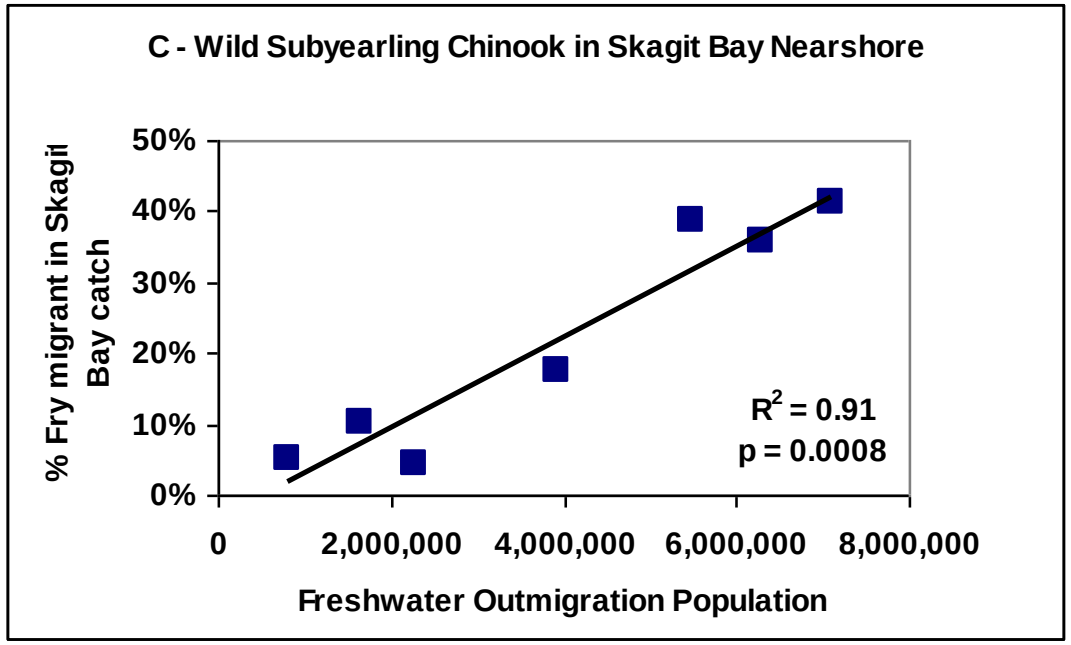
- Spawning and incubation
- Freshwater rearing
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing Ch 11
- Nearshore rearing
- Ocean survival*





Recovery Planning within the Life Cycle

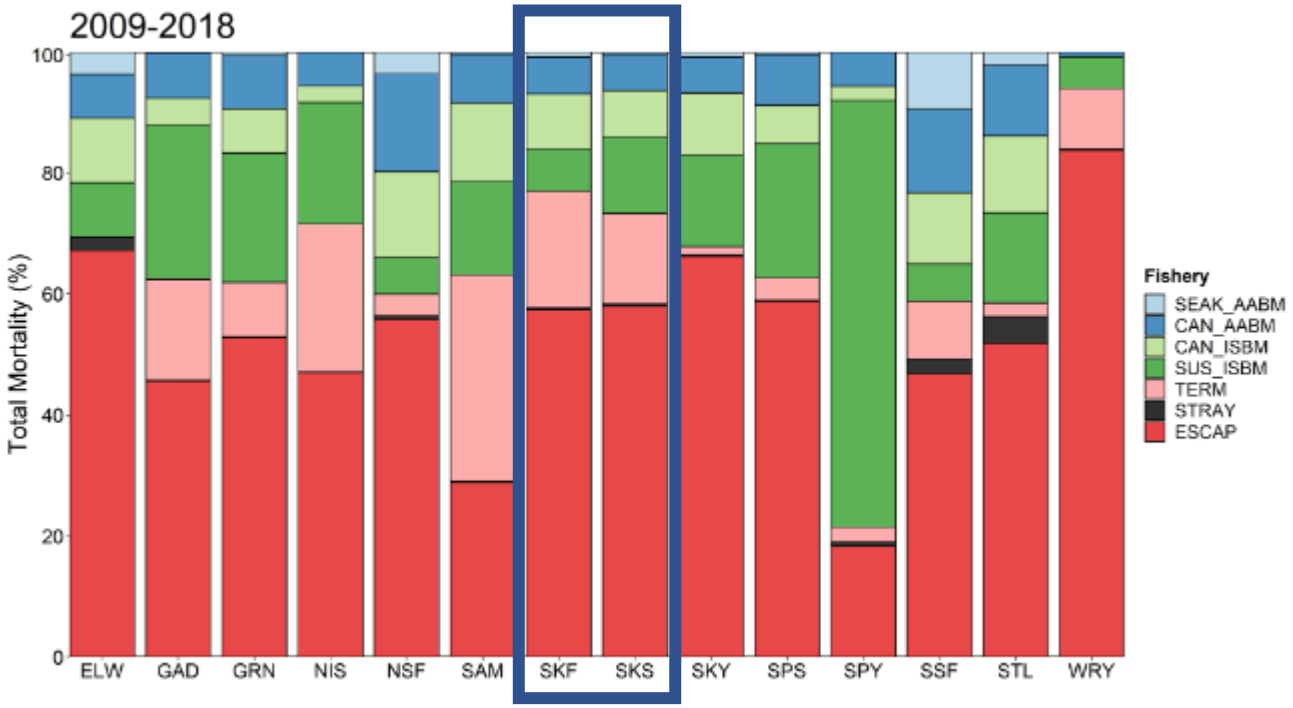
- Spawning and incubation
- Freshwater rearing
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing Ch 12
- Ocean survival*



Recovery Planning within the Life Cycle

- Spawning and incubation
- Freshwater rearing
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival* Ch 4 & 6

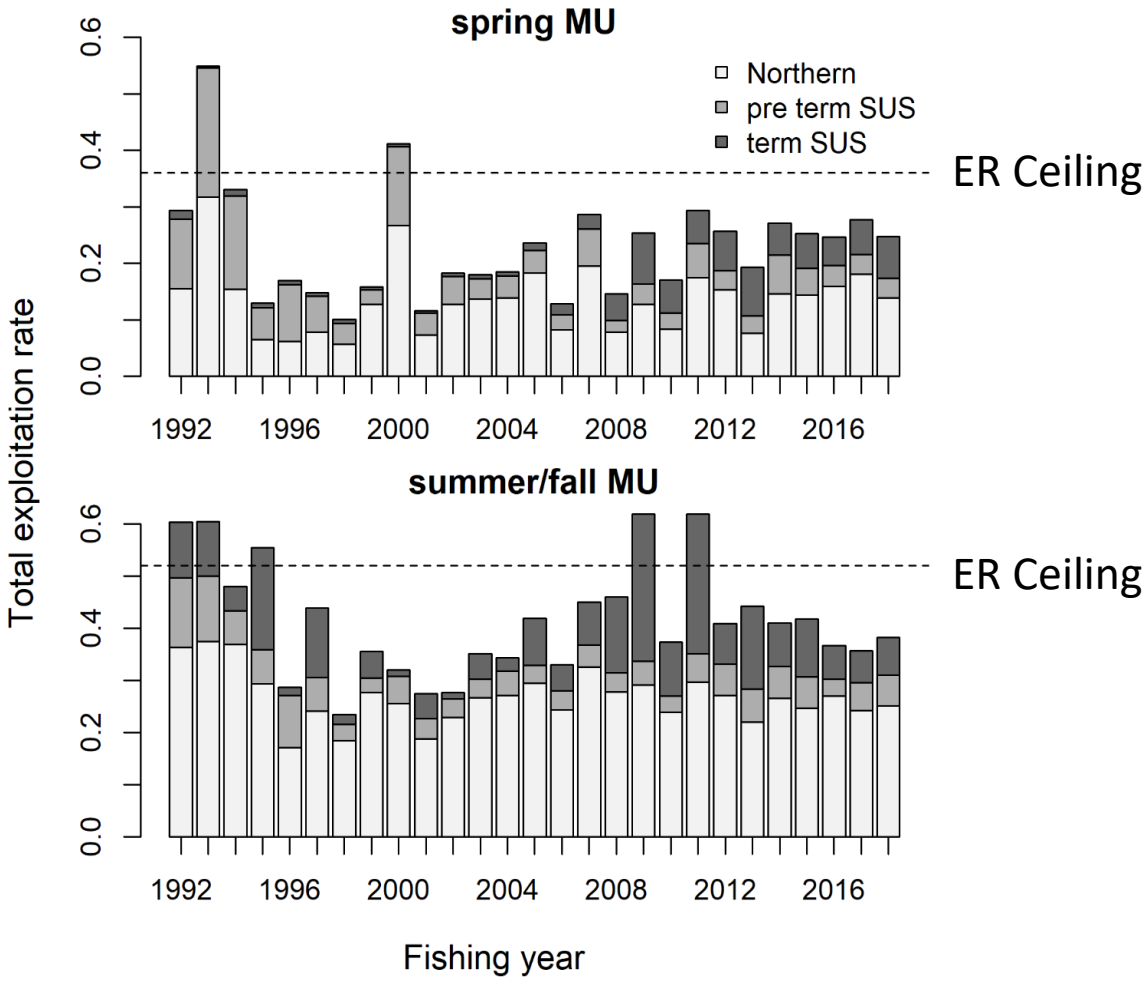
From Pacific Salmon Commission



Skagit

Recovery Planning within the Life Cycle

- Spawning and incubation
- Freshwater rearing
  - Floodplains
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival* Ch 4 & 6



Recovery Planning within the Life Cycle

- Spawning and incubation
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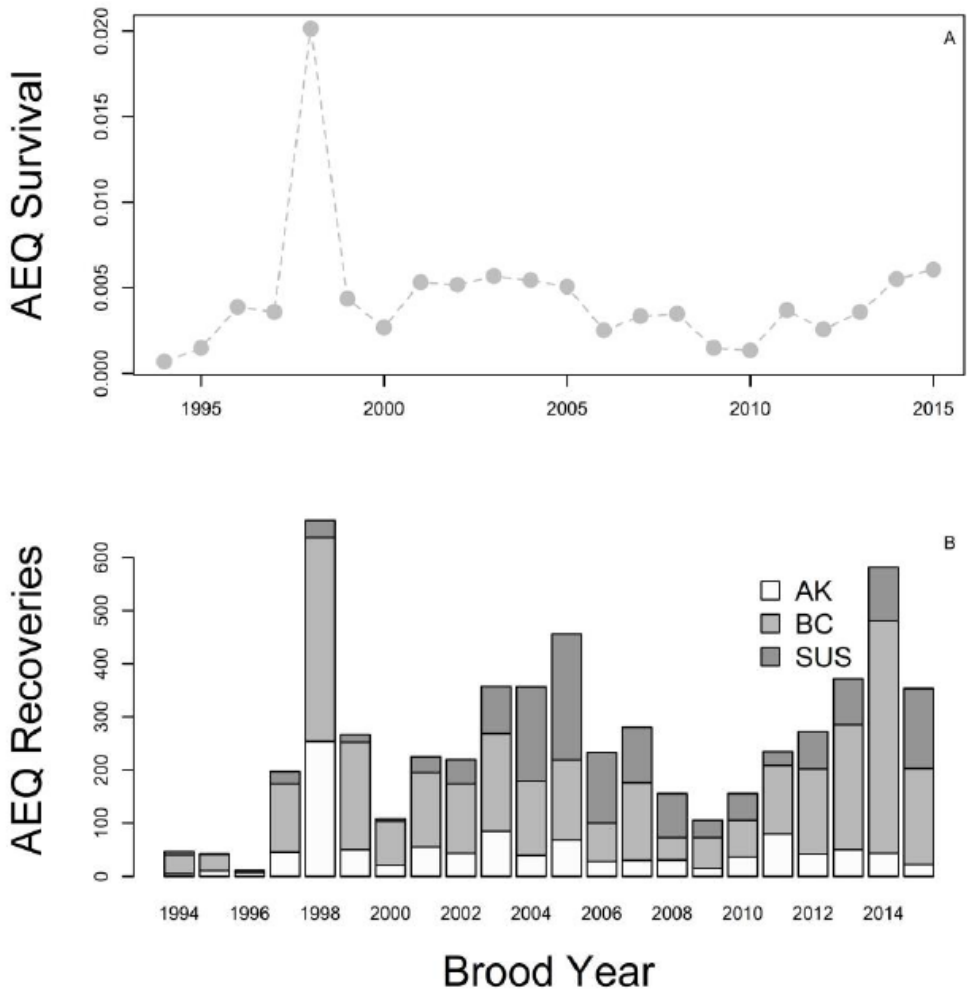
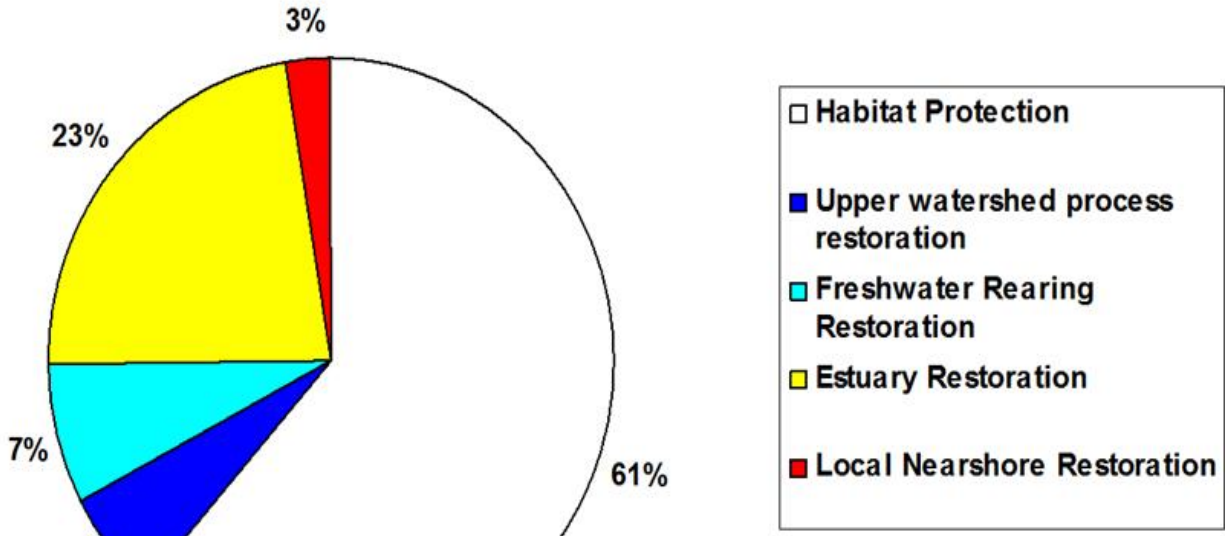
  - Nontidal Delta
- Tidal delta rearing
- Nearshore rearing
- Ocean survival* Ch 4 & 6

From Skagit Co-managers



Contributions to Recovery Goals

- Habitat
  - Habitat Protection
  - Habitat Restoration*
    - Upper watershed spawning and incubation
    - Freshwater (flood plains)
    - Tidal Delta
    - Nearby Nearshore
- Harvest
- Hatcheries
- Hydropower

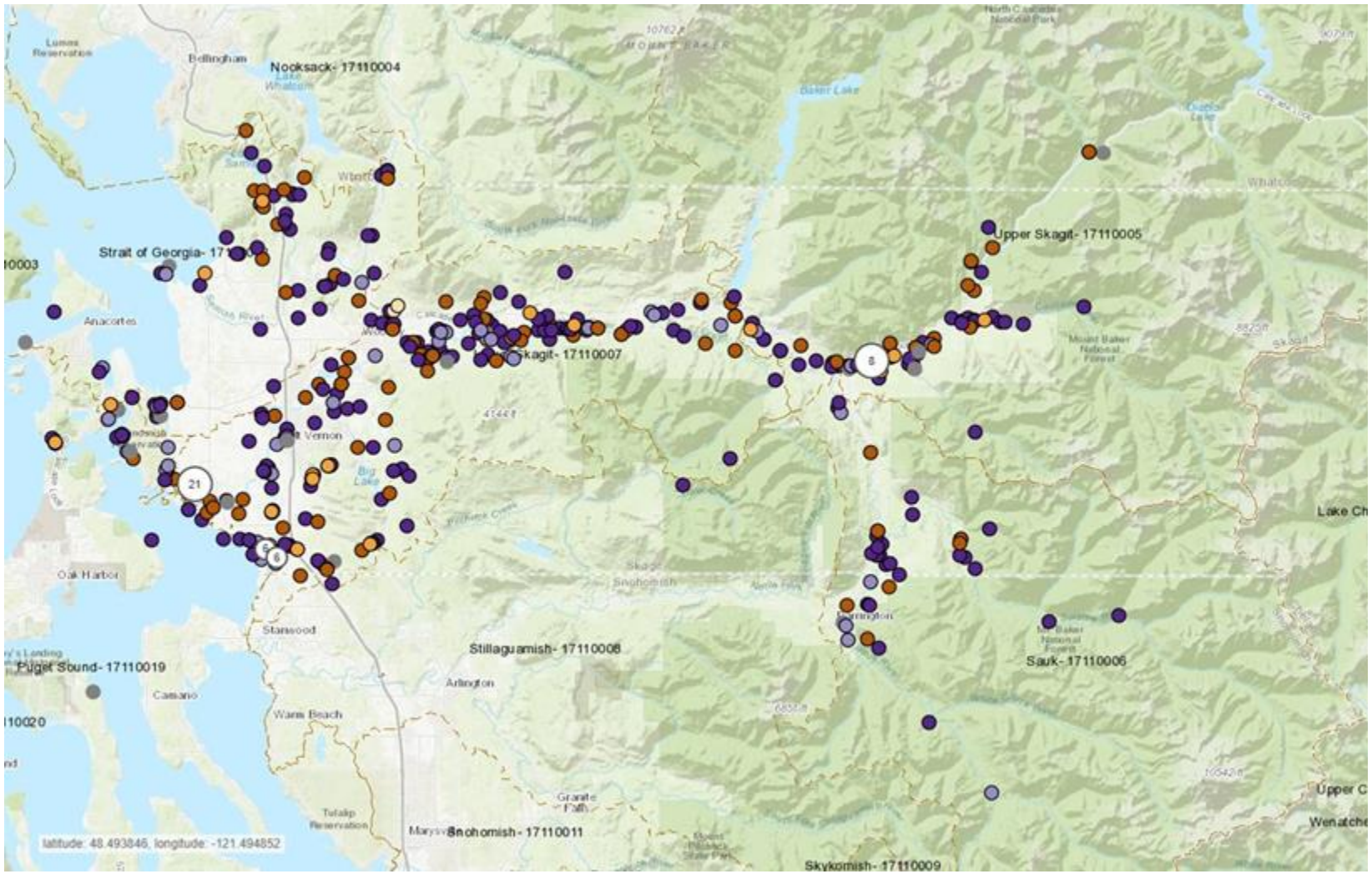


*Focus of Lead Entities - Skagit Watershed Council

Human Dimension of Recovery

- Section 8.5 Identifying Restoration Opportunities
  - Restoration should be applied across the life history strategies
  - And not to solely burden one land use or jurisdiction
- Restoration identified in the Recovery Plan
  - Fit with Chinook biology and system ecology
  - Technically feasible
  - Landowner willingness

A whole life cycle approach



https://srp.rco.wa.gov/projectmap?mlayer=projects