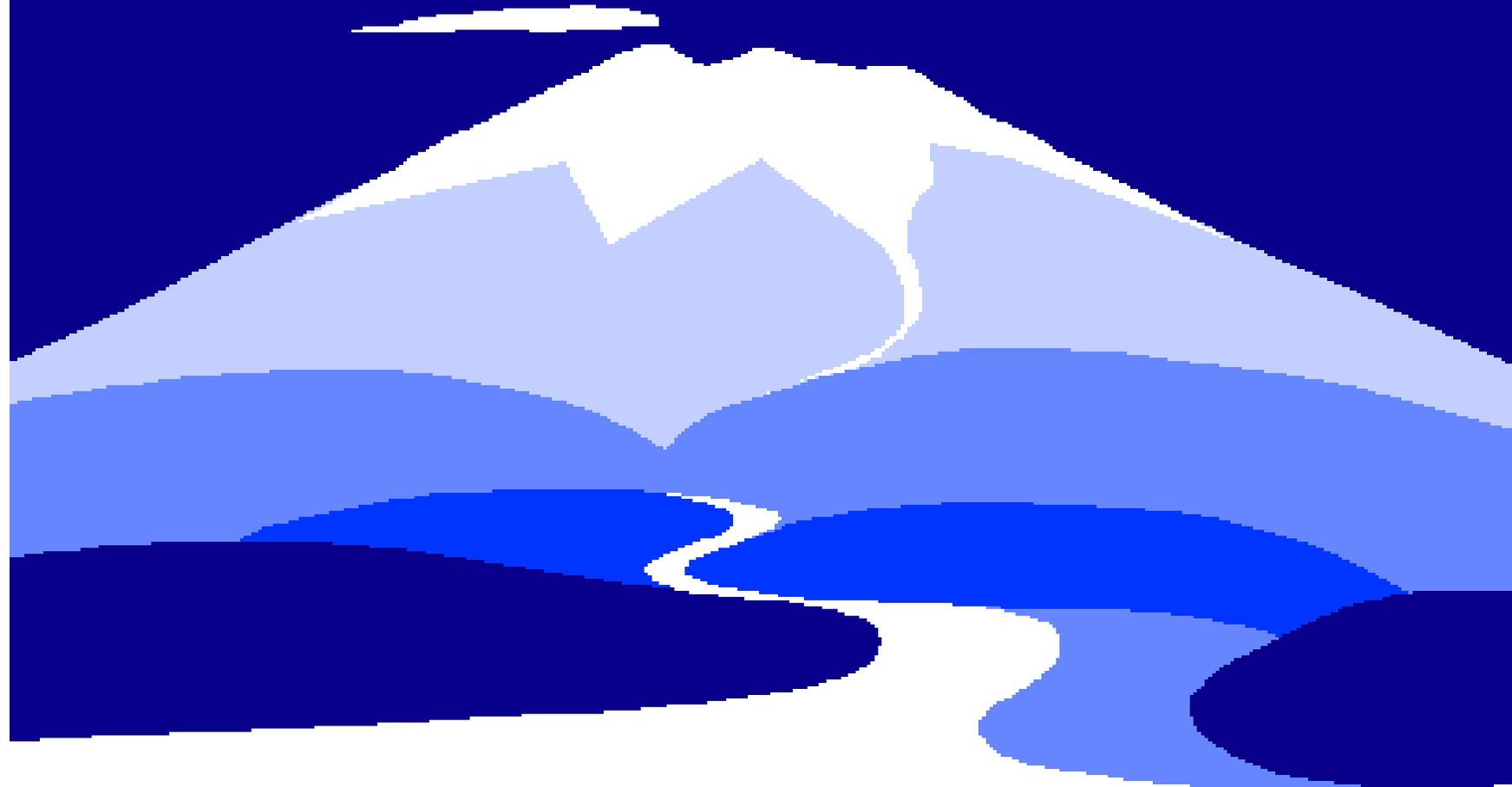


# Nisqually Delta and I-5

Salmon, Orcas, and National  
Security

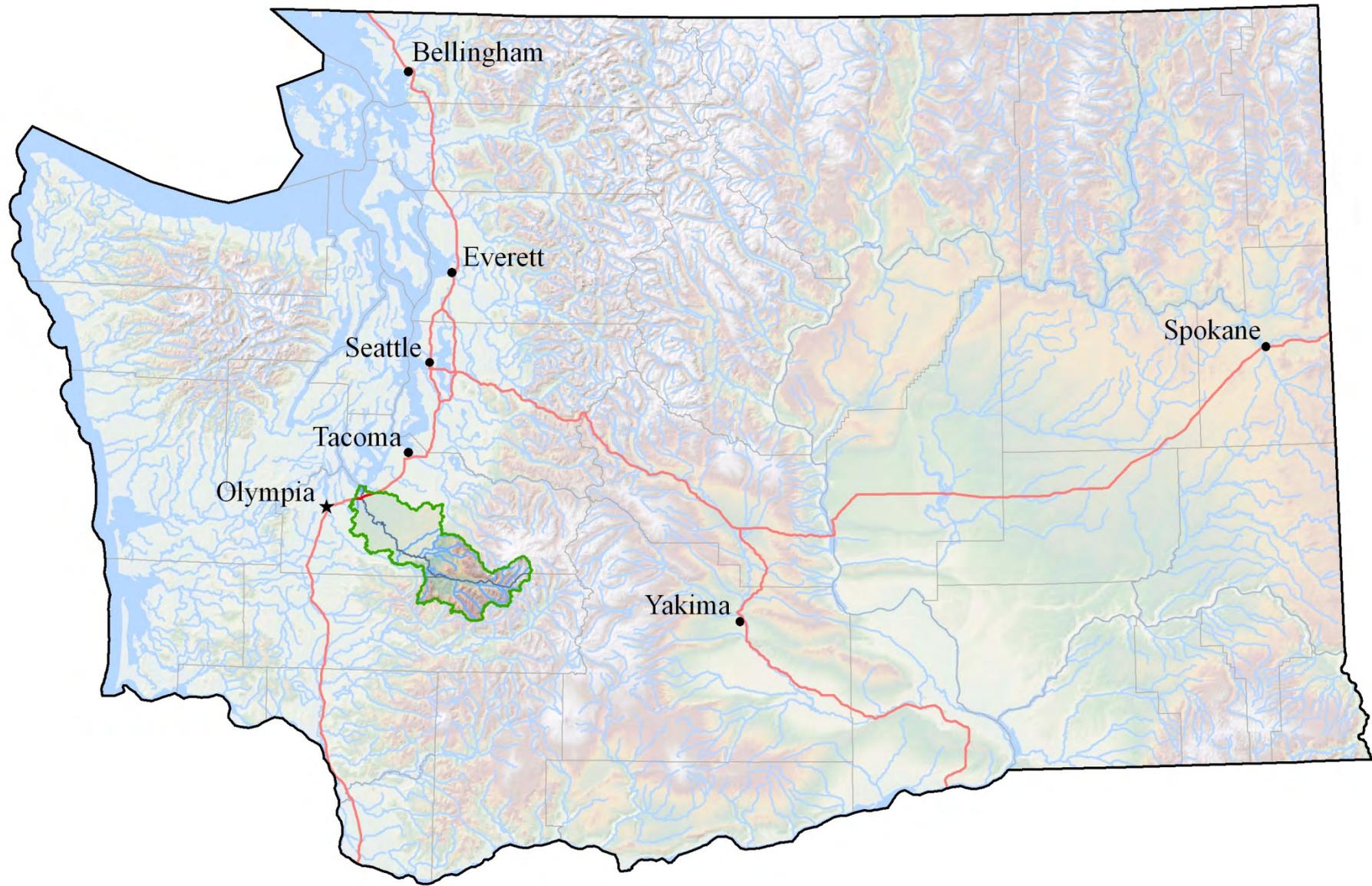


# NISQUALLY RIVER BASIN



**Nisqually  
Watershed**





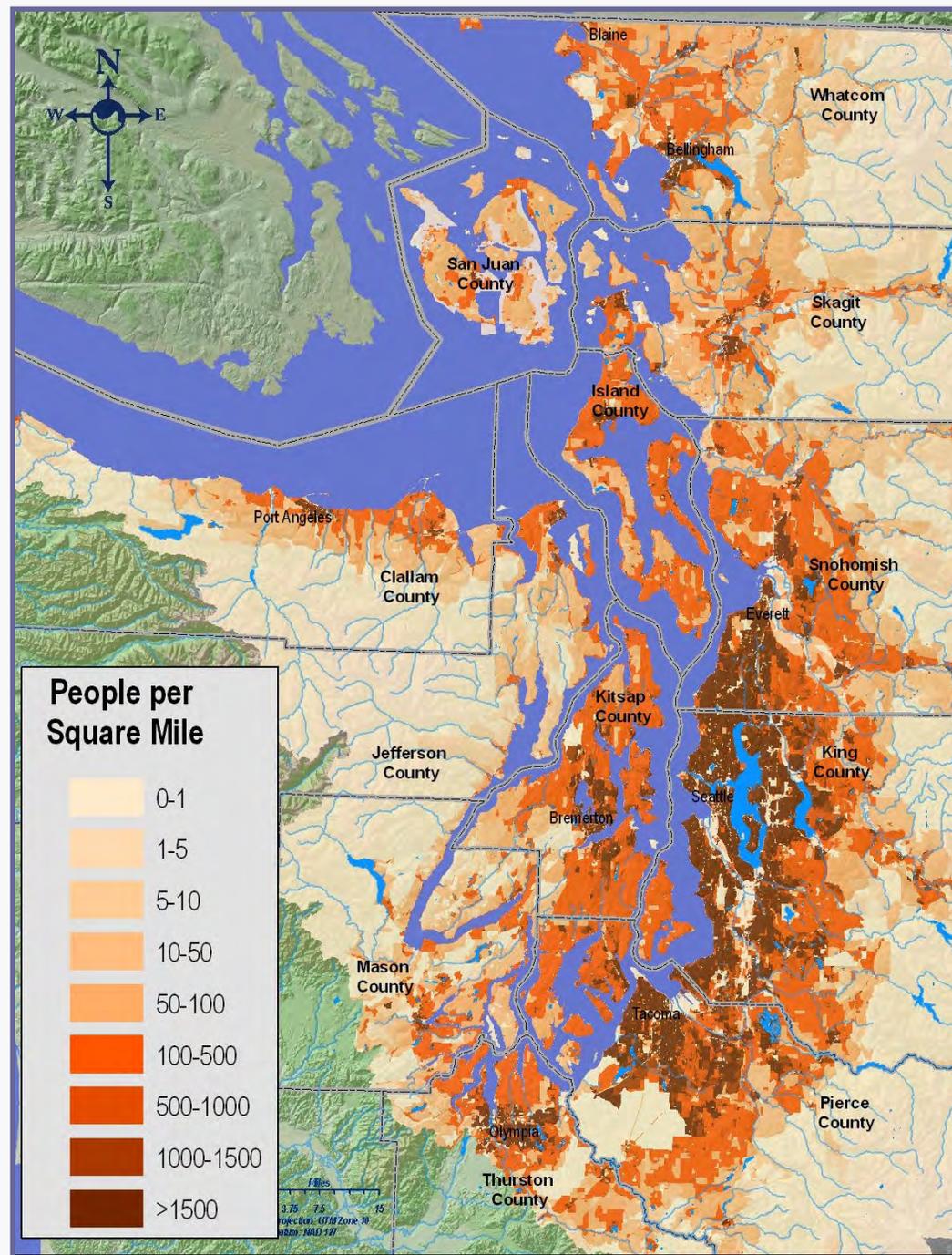
# Nisqually River Watershed



# Historical Habitat, Hatchery, and Harvest impacts take toll on Nisqually Chinook

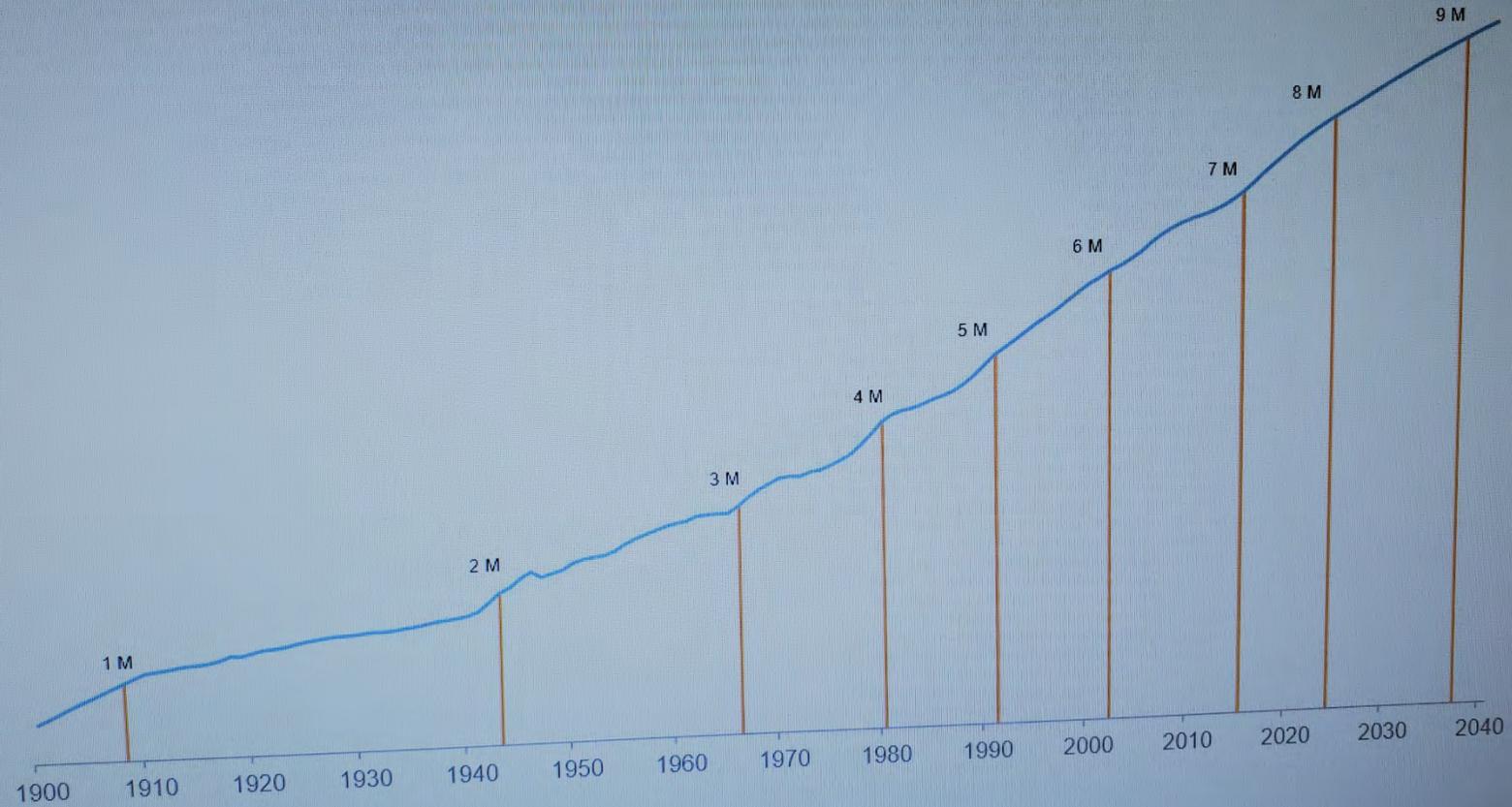


# Puget Sound Population Densities

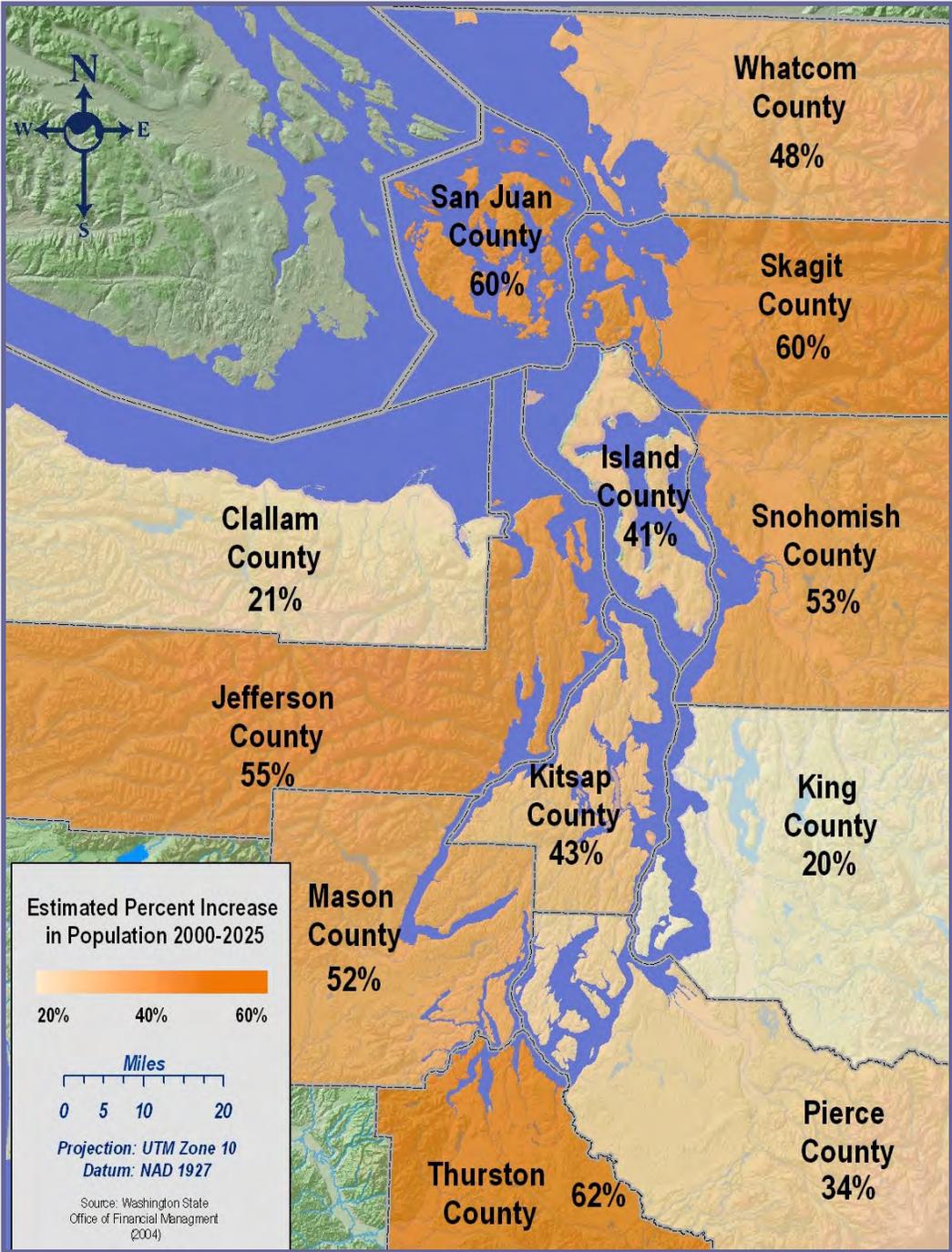


# Population Growth

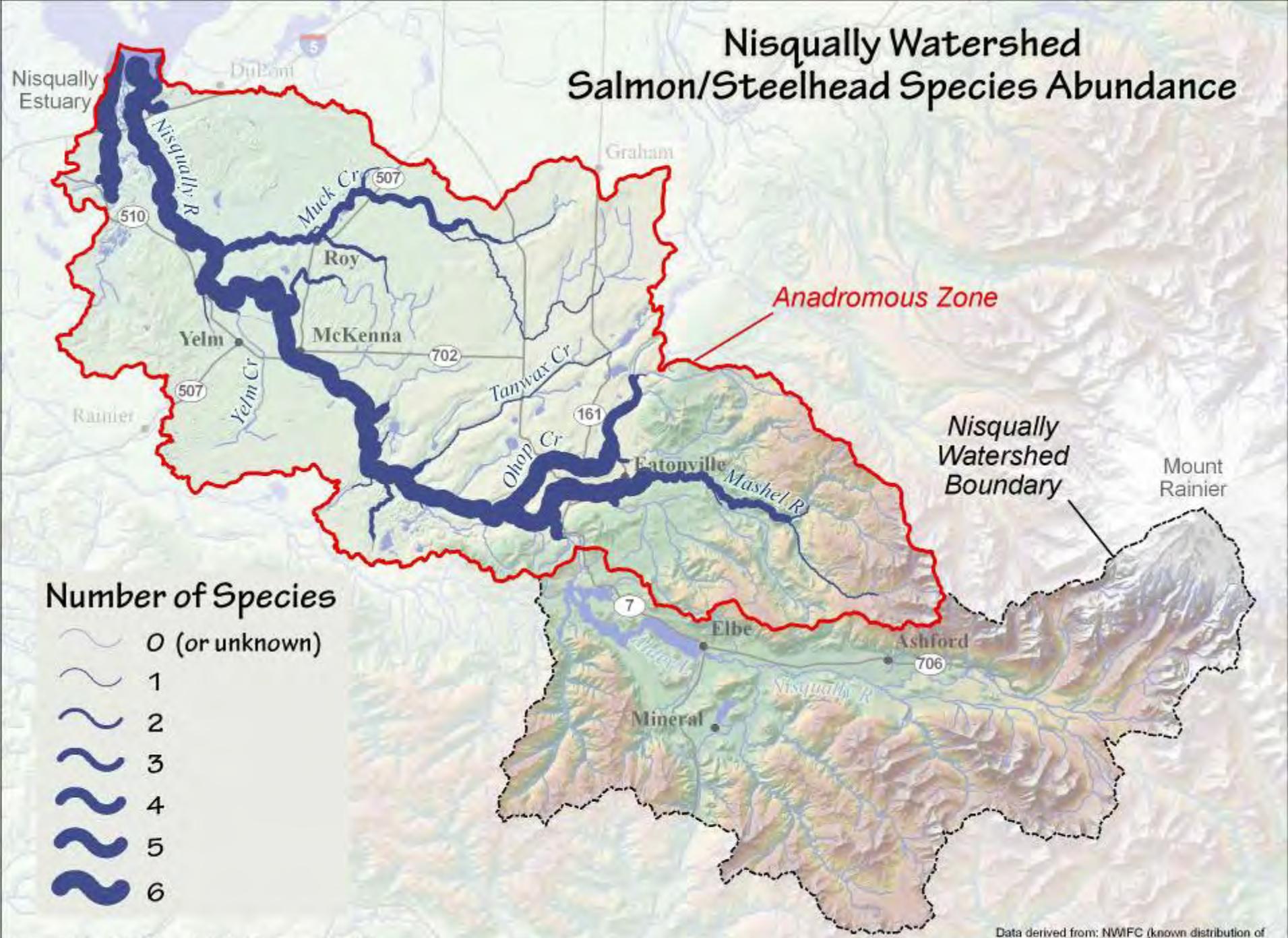
Washington's Population Will Surpass 9 Million by 2037



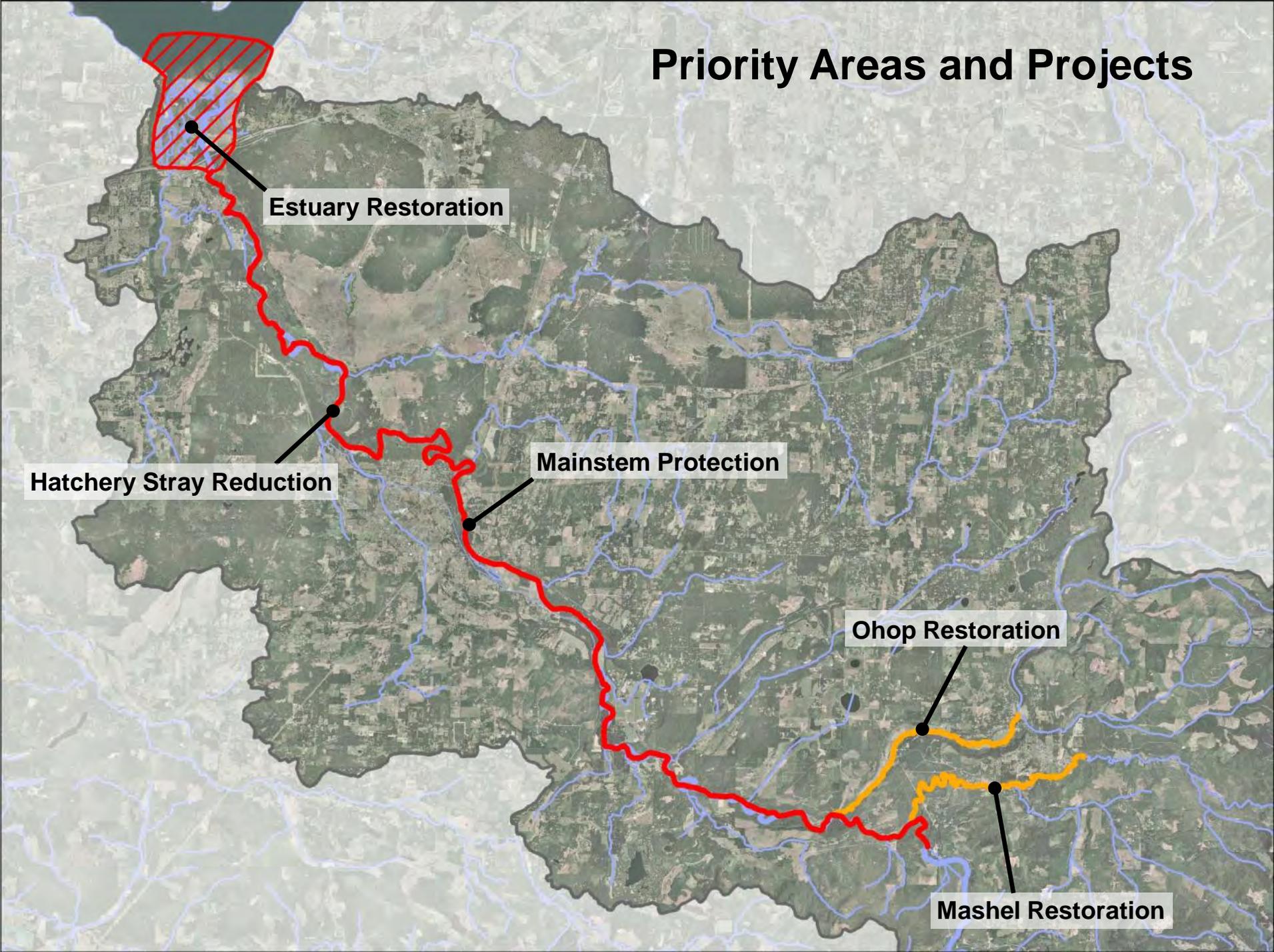
# Puget Sound Population Growth 2000 to 2025



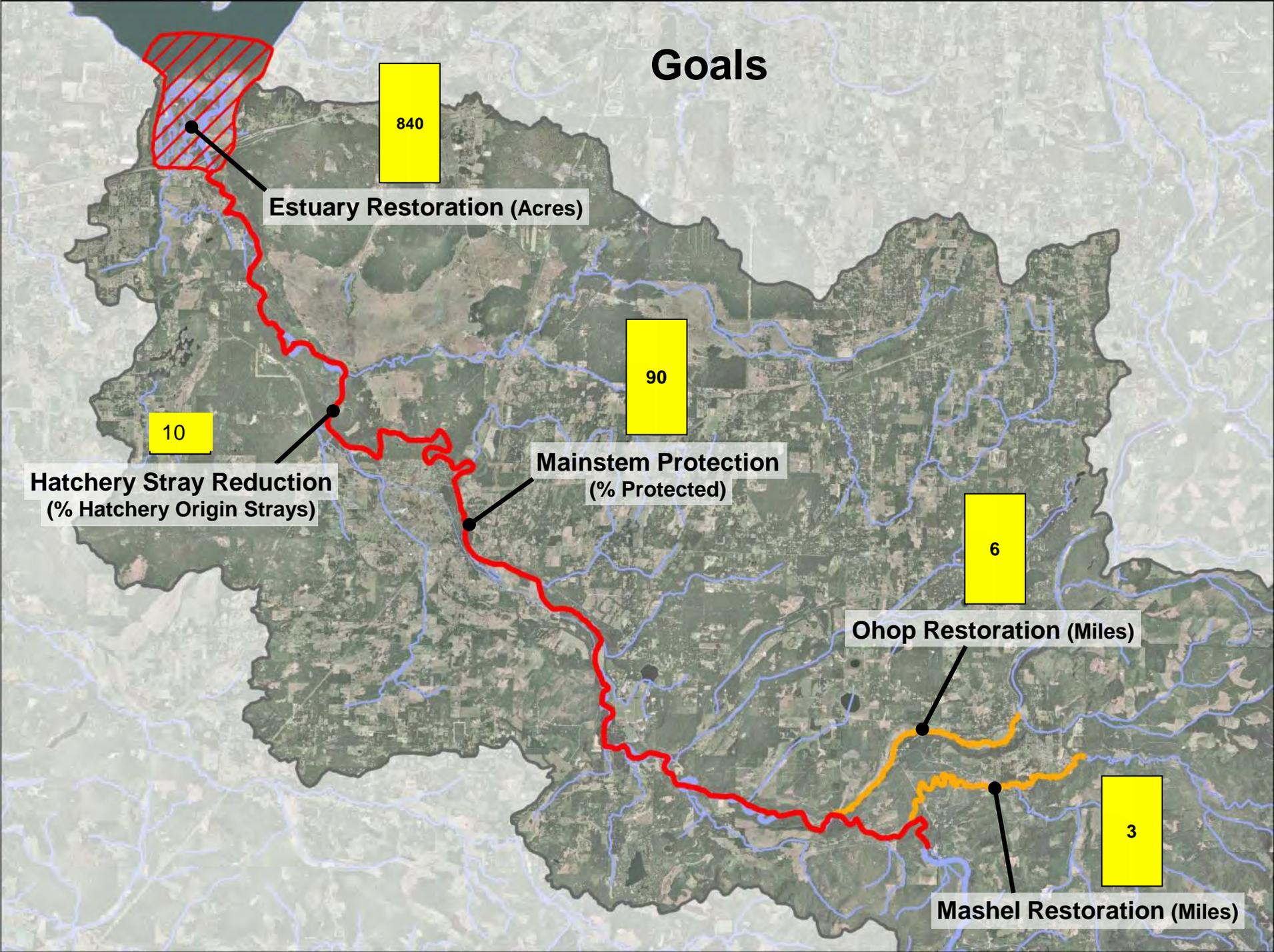
# Nisqually Watershed Salmon/Steelhead Species Abundance



# Priority Areas and Projects



# Goals



840

Estuary Restoration (Acres)

90

Mainstem Protection (% Protected)

10

Hatchery Stray Reduction (% Hatchery Origin Strays)

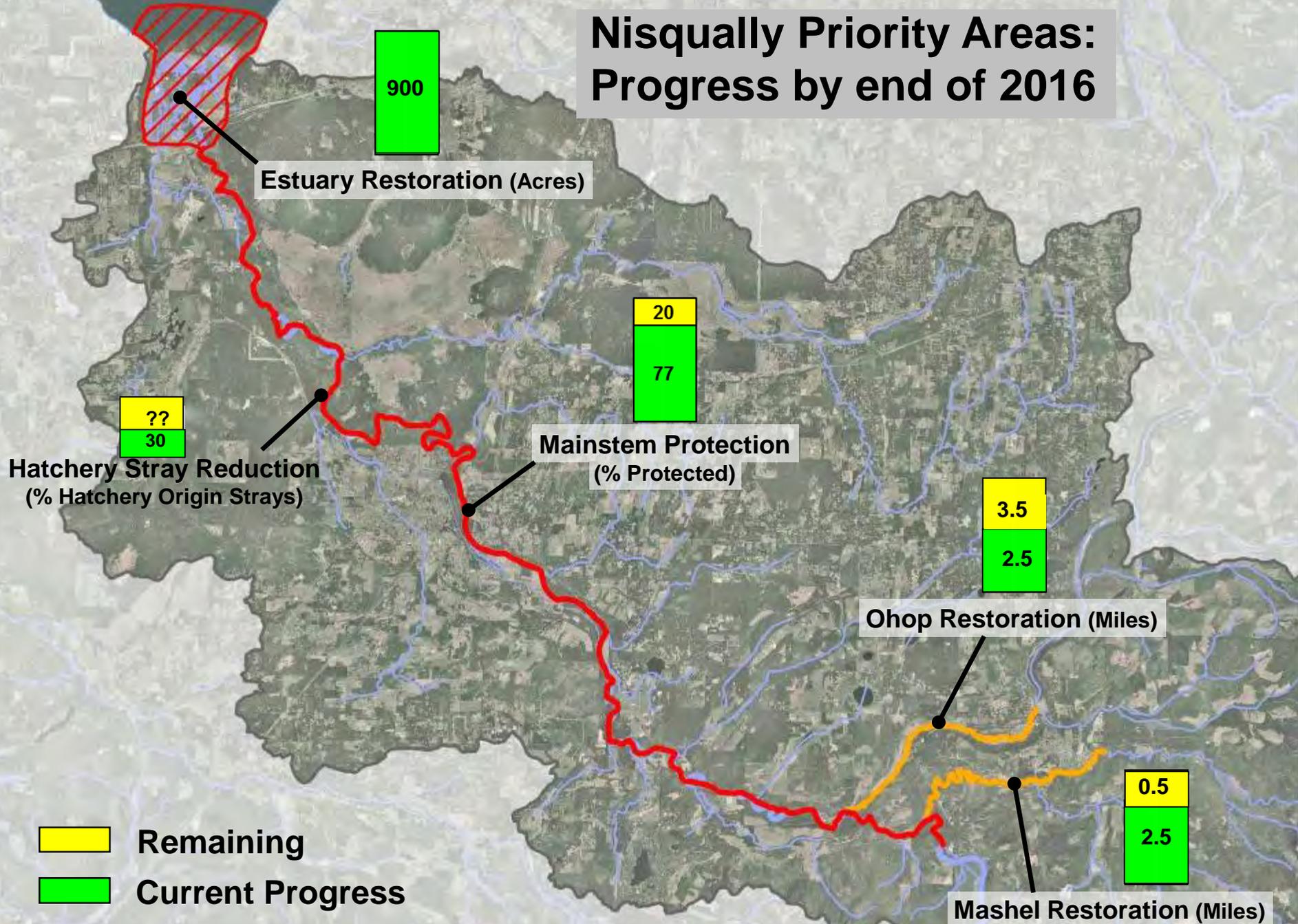
6

Ohop Restoration (Miles)

3

Mashel Restoration (Miles)

# Nisqually Priority Areas: Progress by end of 2016



Nisqually Estuary Restoration:  
Over 900 acres restored since 2002



Nisqually  
Estuary

June  
2009



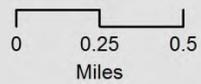
Nisqually  
Estuary

March  
2010



# Nisqually River Historic Flooding

Imagery: WA DOT 1996  
Flood Event  
Aerial Photography



Nisqually Indian Tribe



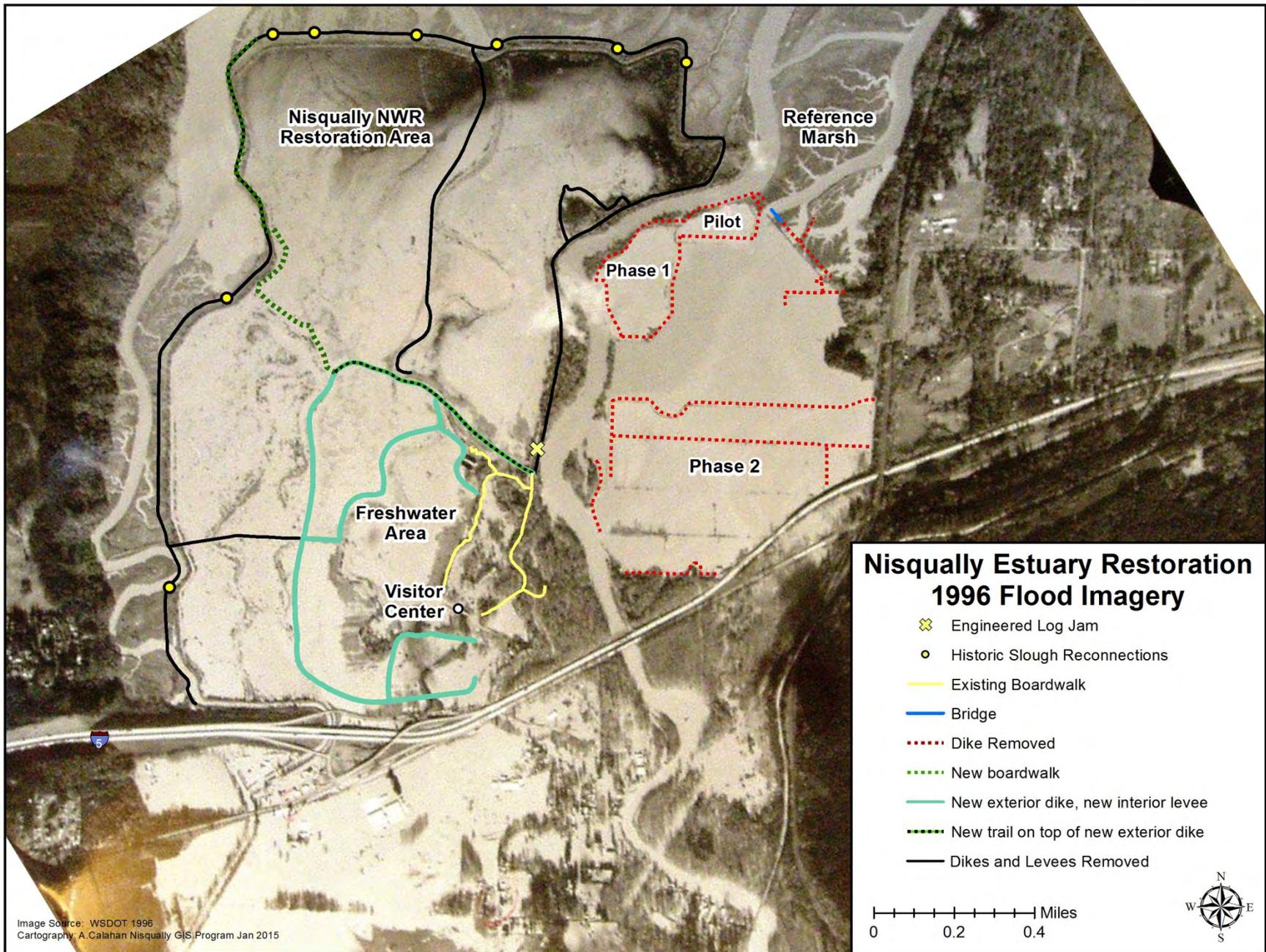


Image Source: WSDOT 1996  
 Cartography: A. Calahan Nisqually GIS Program Jan 2015

### Nisqually Estuary Restoration 1996 Flood Imagery

- Engineered Log Jam
- Historic Slough Reconnections
- Existing Boardwalk
- Bridge
- Dike Removed
- New boardwalk
- New exterior dike, new interior levee
- New trail on top of new exterior dike
- Dikes and Levees Removed

0 0.2 0.4 Miles





Source: US Geological Survey,  
WA Dept. of Natural Resources,  
Univ. of WA River History Project  
Cartography by: C. Sampelle,  
Nisqually Indian Tribe, 11/07/17



Billy Frank Jr.  
Nisqually Nat'l  
Wildlife Refuge  
Visitor Center

Wa He Lut  
Indian  
School

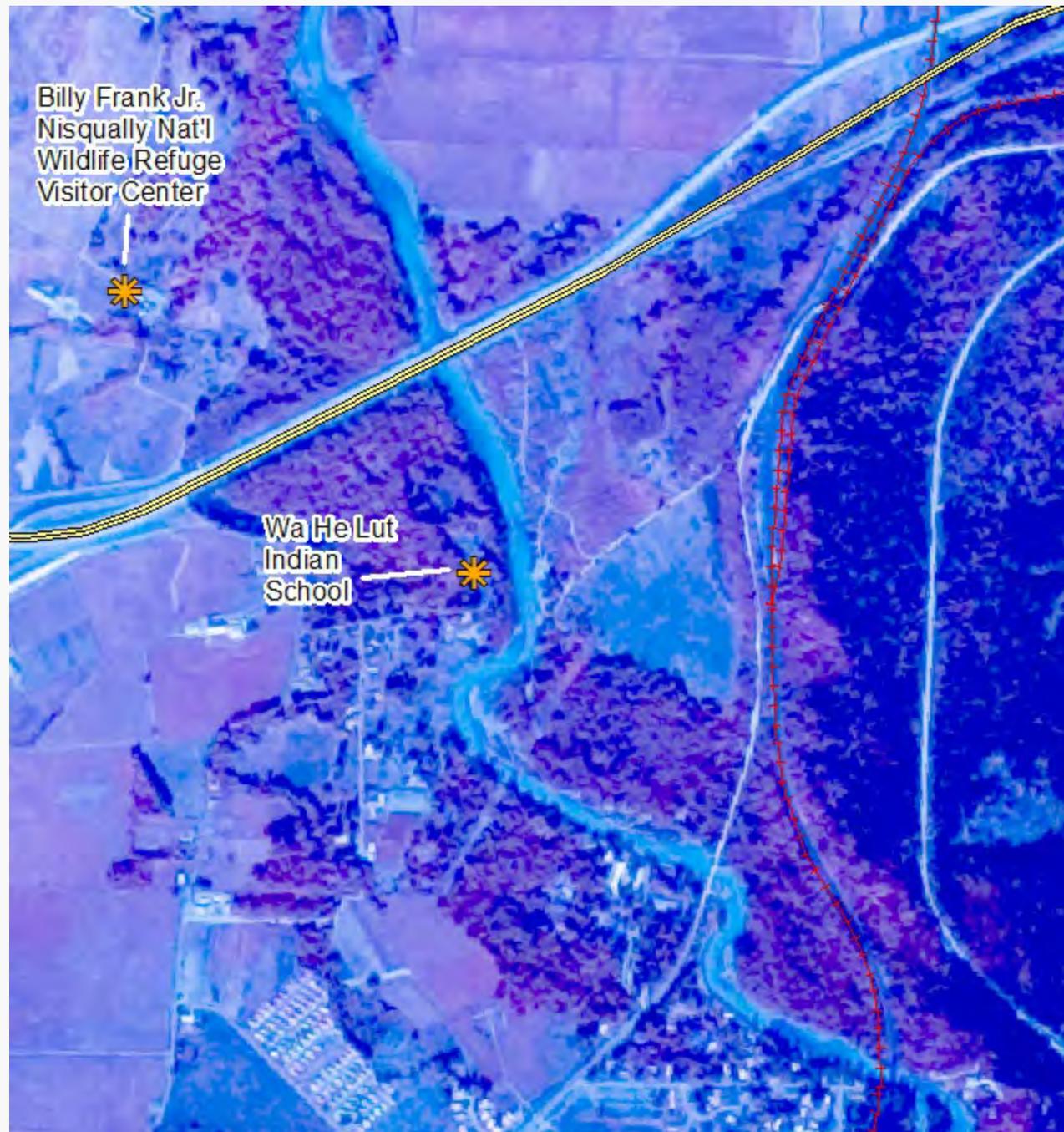
1937



Billy Frank Jr.  
Nisqually Nat'l  
Wildlife Refuge  
Visitor Center

Wa He Lut  
Indian  
School

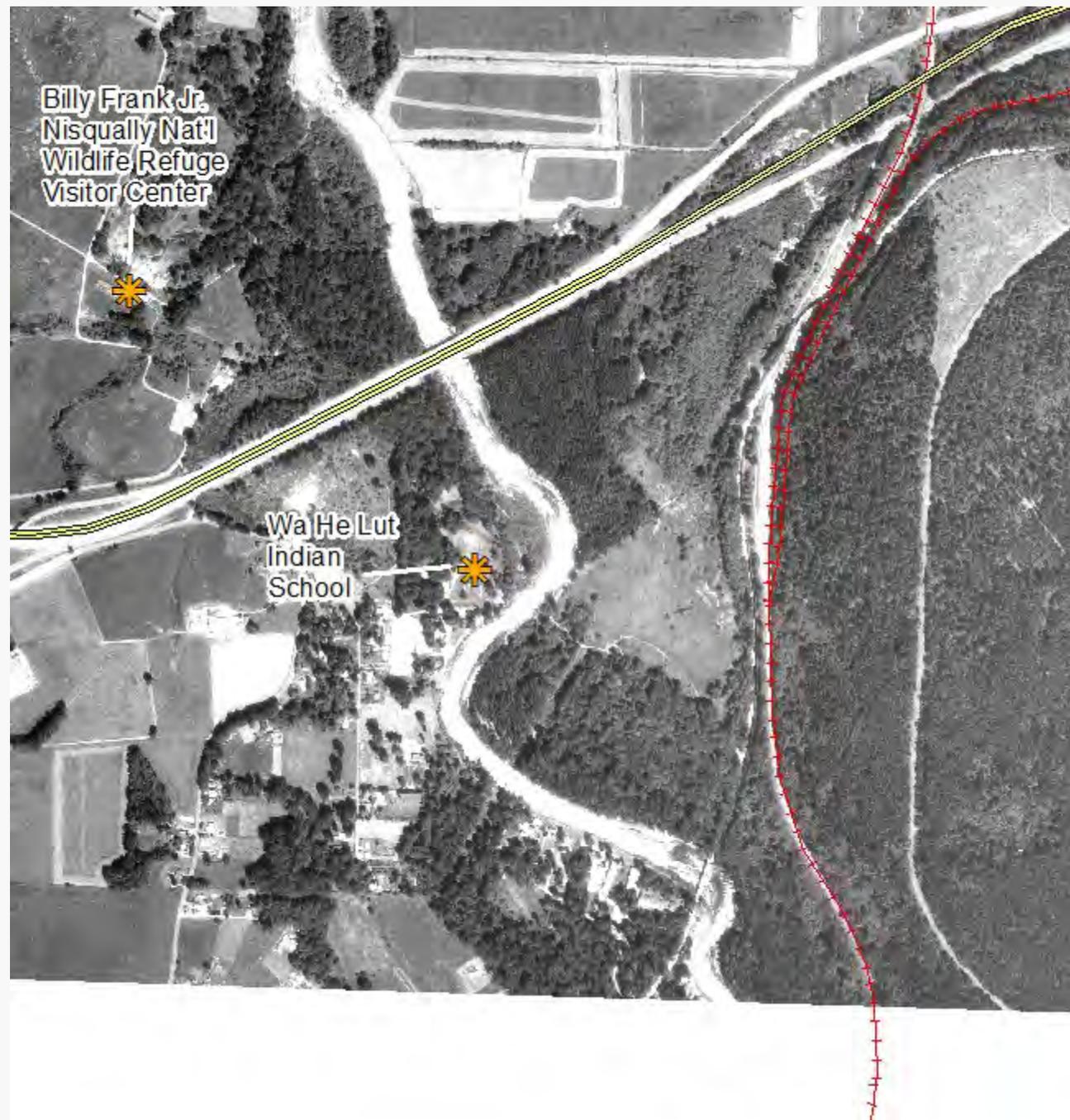
1957



Billy Frank Jr.  
Nisqually Nat'l  
Wildlife Refuge  
Visitor Center

Wa He Lut  
Indian  
School

1971



Source: US Geological Survey 1990  
Cartography by: C. Sampselle,  
Nisqually Indian Tribe, 11/07/17

1990



Source: US Fish & Wildlife Service 1997  
Cartography by: C. Sampselle,  
Nisqually Indian Tribe, 11/07/17

1997



Source: NAIP 2005  
Cartography by: C. Sampelle,  
Nisqually Indian Tribe, 11/07/17

2005



Billy Frank Jr.  
Nisqually Nat'l  
Wildlife Refuge  
Visitor Center

Wa He Lut  
Indian  
School

2011



Billy Frank Jr.  
Nisqually Nat'l  
Wildlife Refuge  
Visitor Center

WaheLut  
Indian  
School

2016

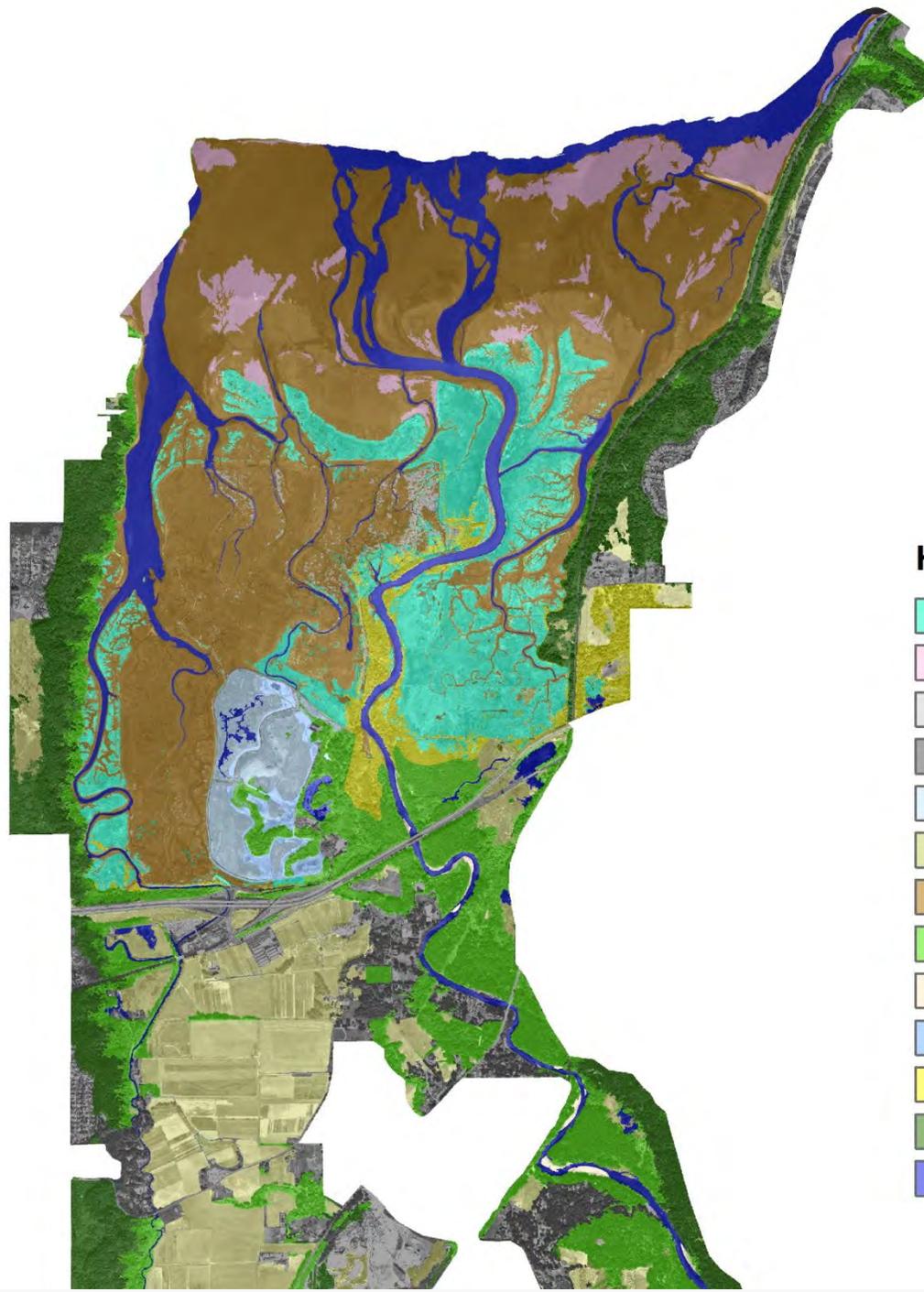
# Nisqually River Riverbend at Wah-He-Lut 1997 & 2013

Imagery: USFWS 1997  
NAIP 2013



Nisqually Indian Tribe

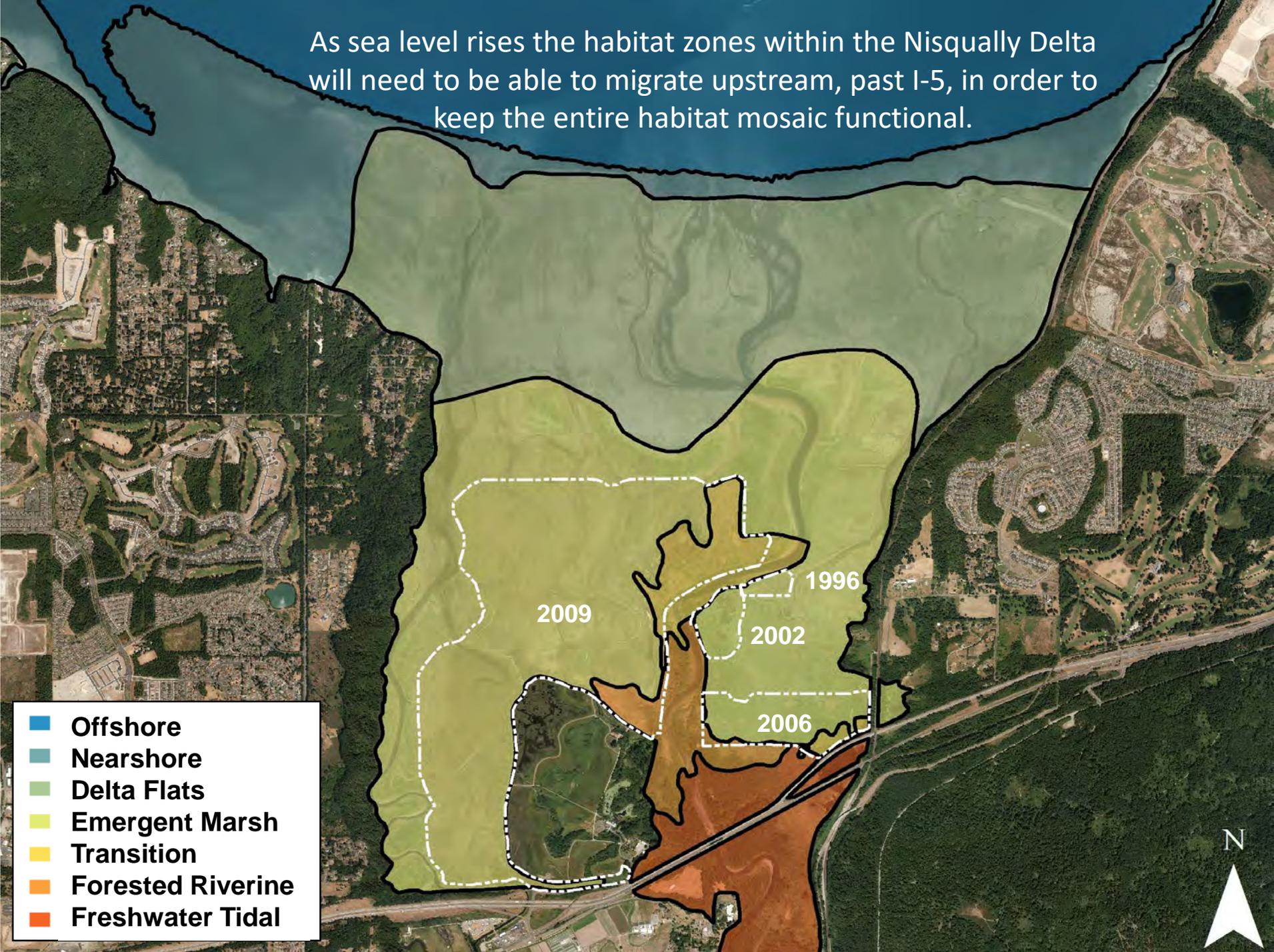




### Habitats

-  Emergent Marsh
-  Aquatic Bed
-  Dead Trees
-  Developed
-  Freshwater Marsh
-  Grassland/Agriculture
-  Mudflat
-  Riparian Forest
-  Riverbank
-  Seasonal Freshwater Marsh
-  Transition marsh
-  Upland Forest
-  Water

As sea level rises the habitat zones within the Nisqually Delta will need to be able to migrate upstream, past I-5, in order to keep the entire habitat mosaic functional.



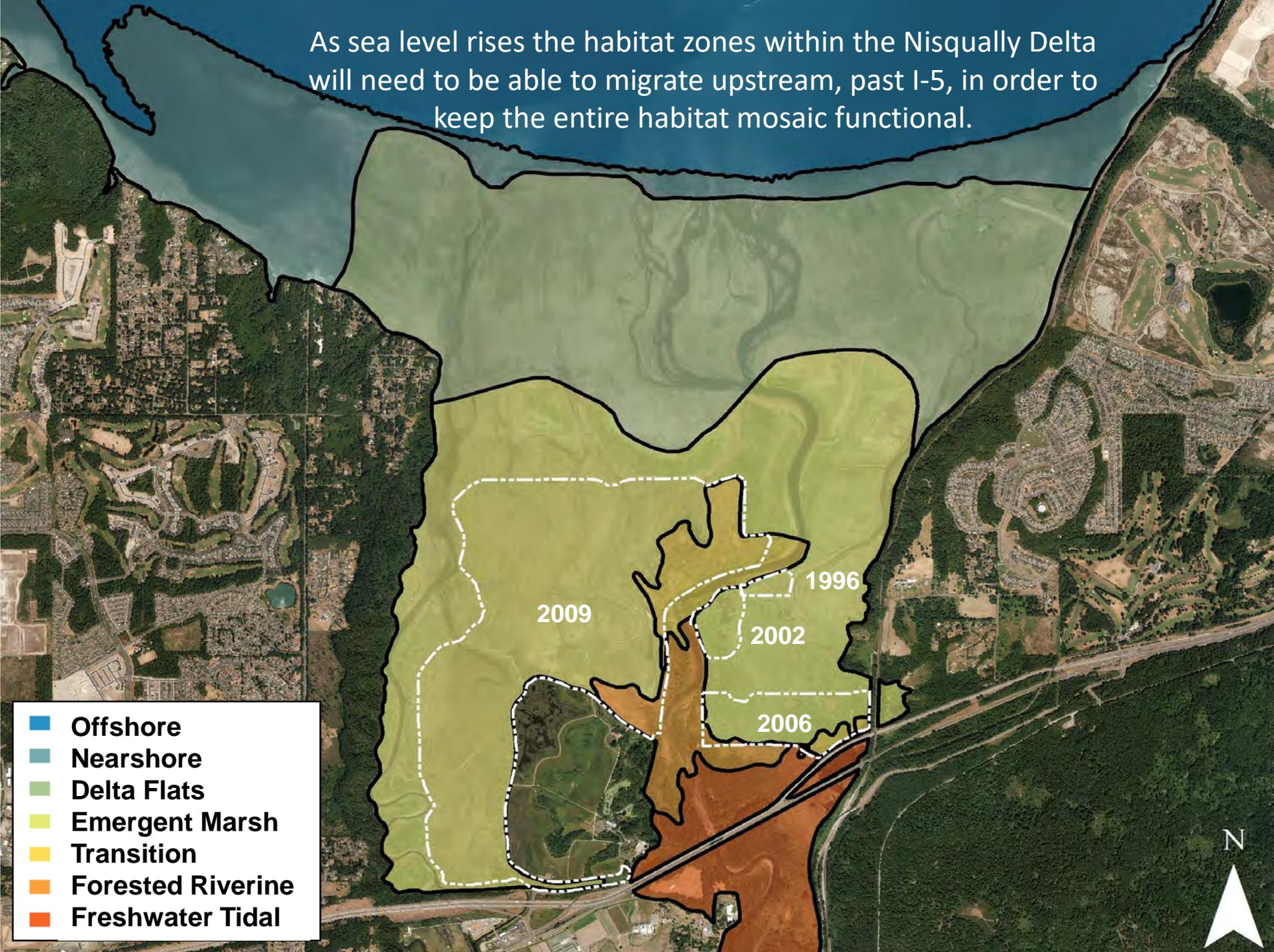
- Offshore
- Nearshore
- Delta Flats
- Emergent Marsh
- Transition
- Forested Riverine
- Freshwater Tidal





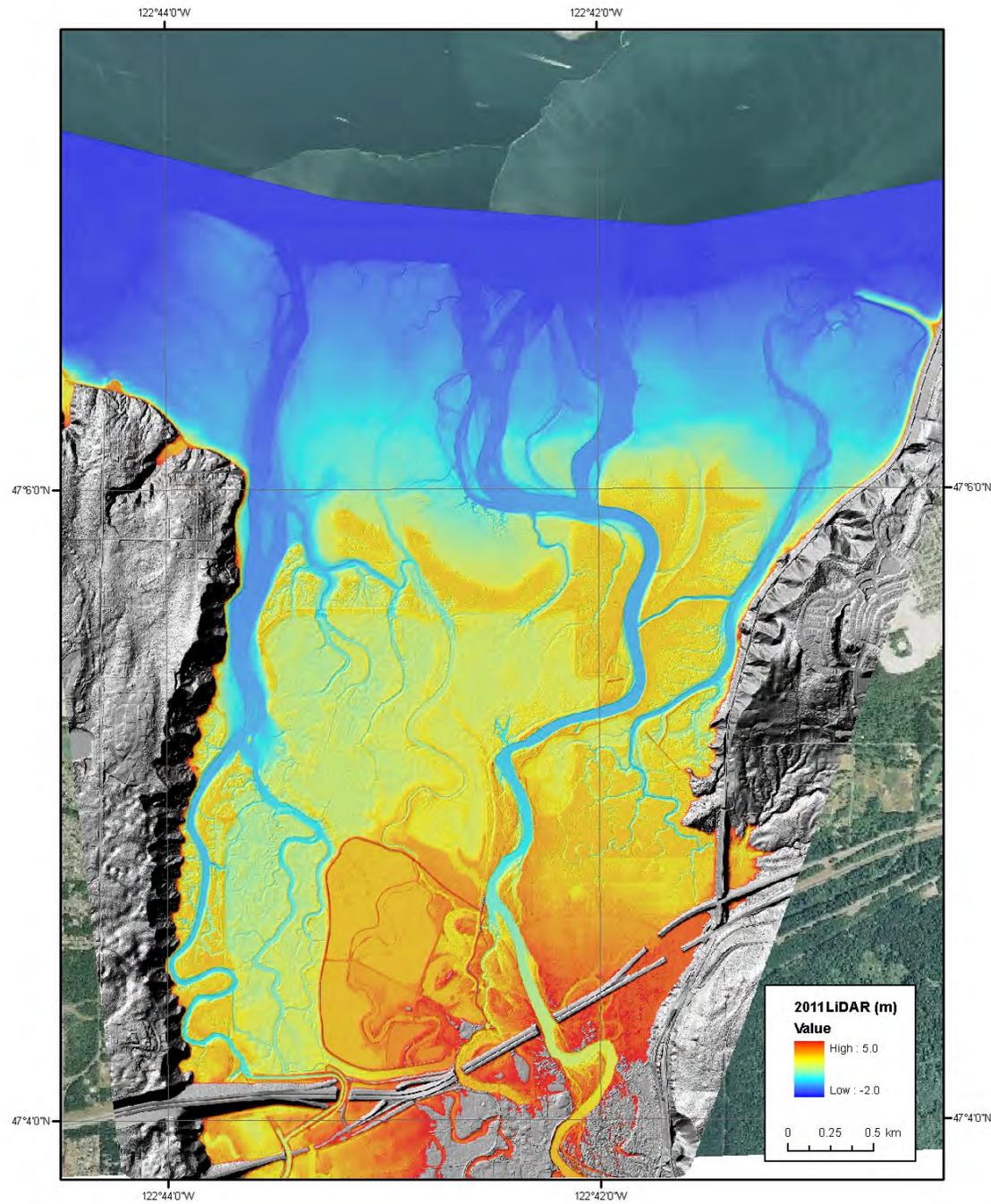


As sea level rises the habitat zones within the Nisqually Delta will need to be able to migrate upstream, past I-5, in order to keep the entire habitat mosaic functional.

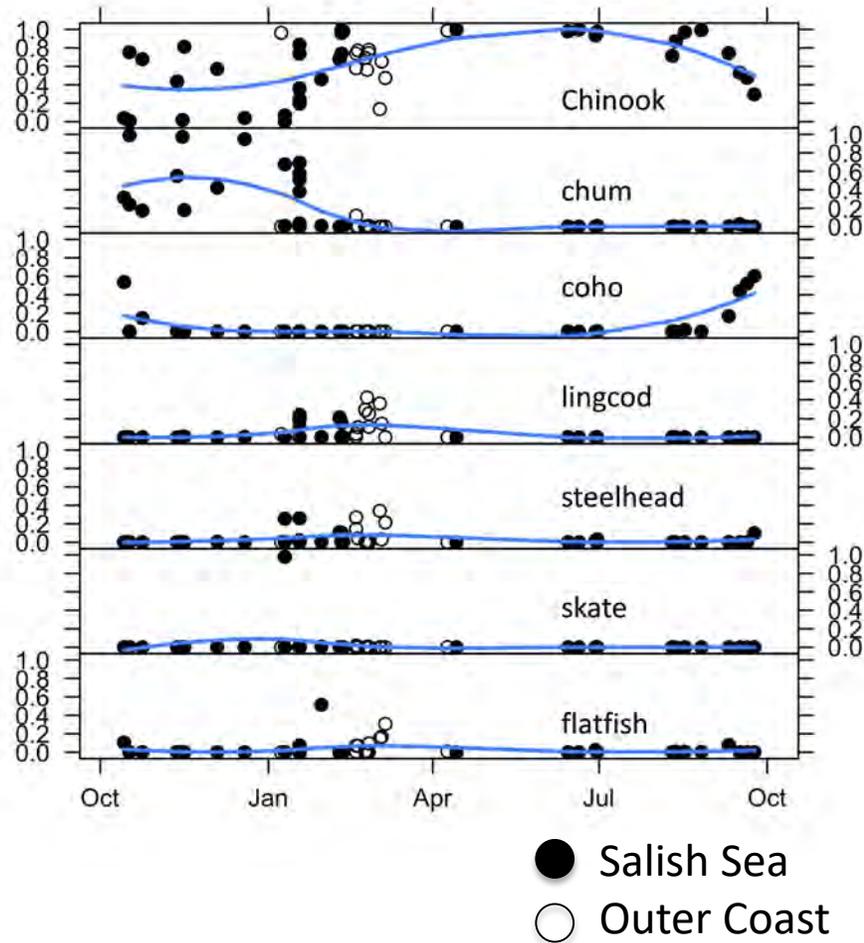


- Offshore
- Nearshore
- Delta Flats
- Emergent Marsh
- Transition
- Forested Riverine
- Freshwater Tidal

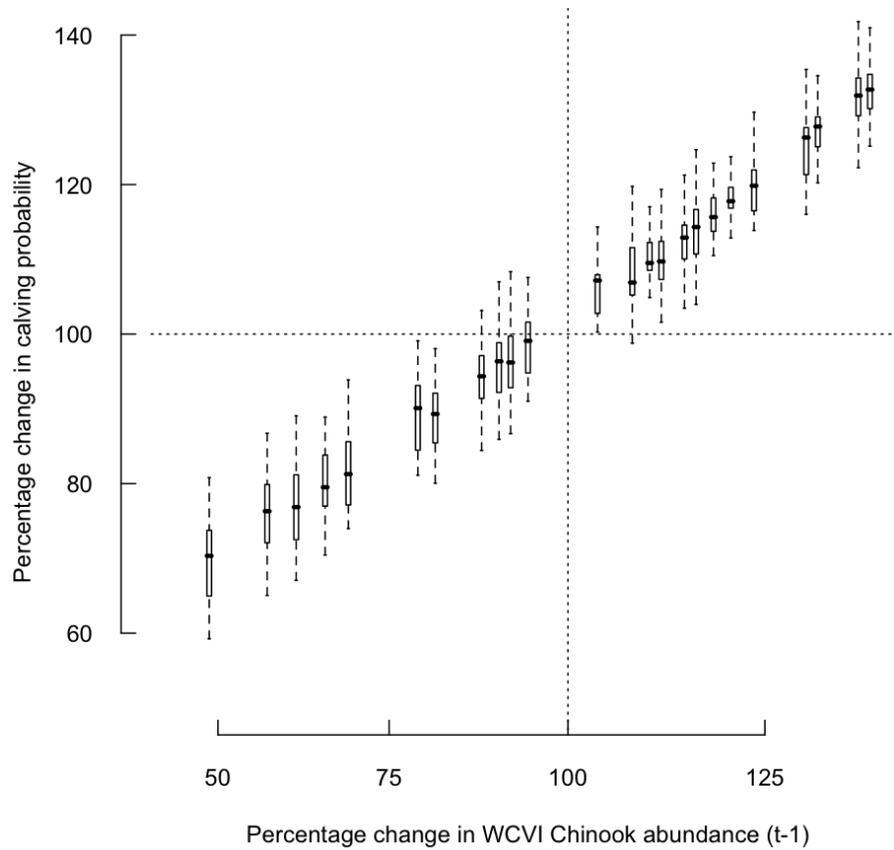




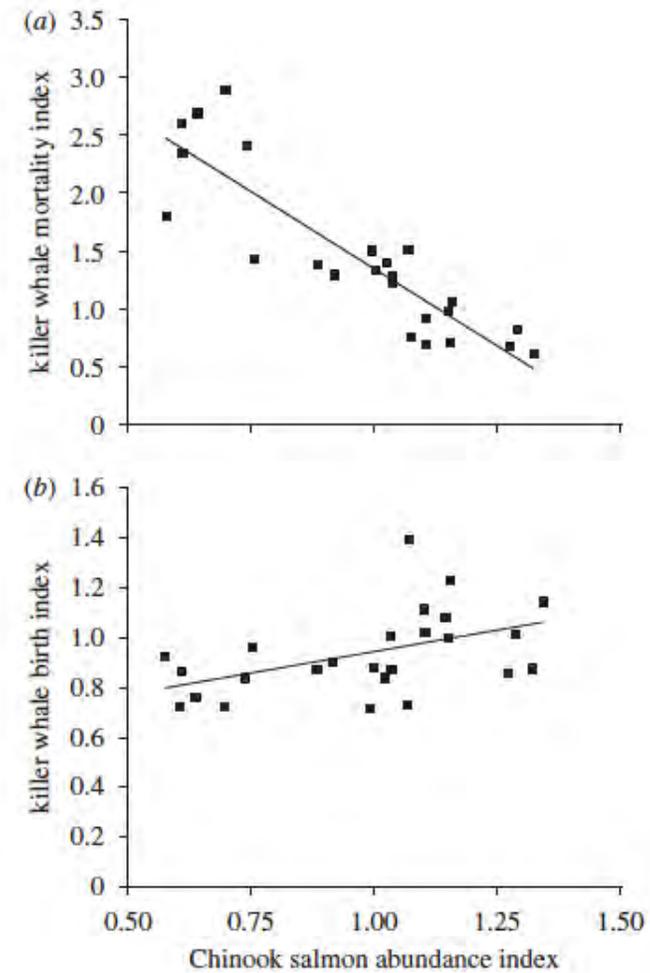
# Resident killer whale diet



# Whale survival and birth rate is correlated with Chinook abundance



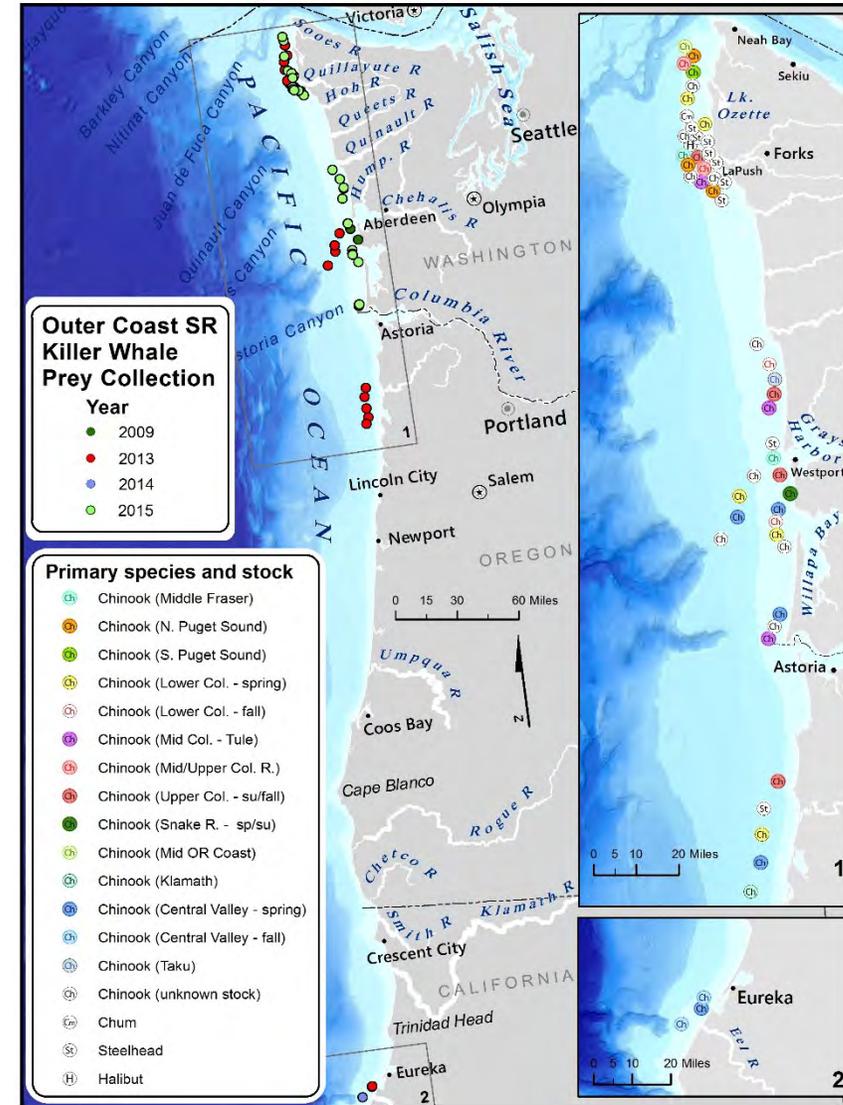
Ward et al. (2009)

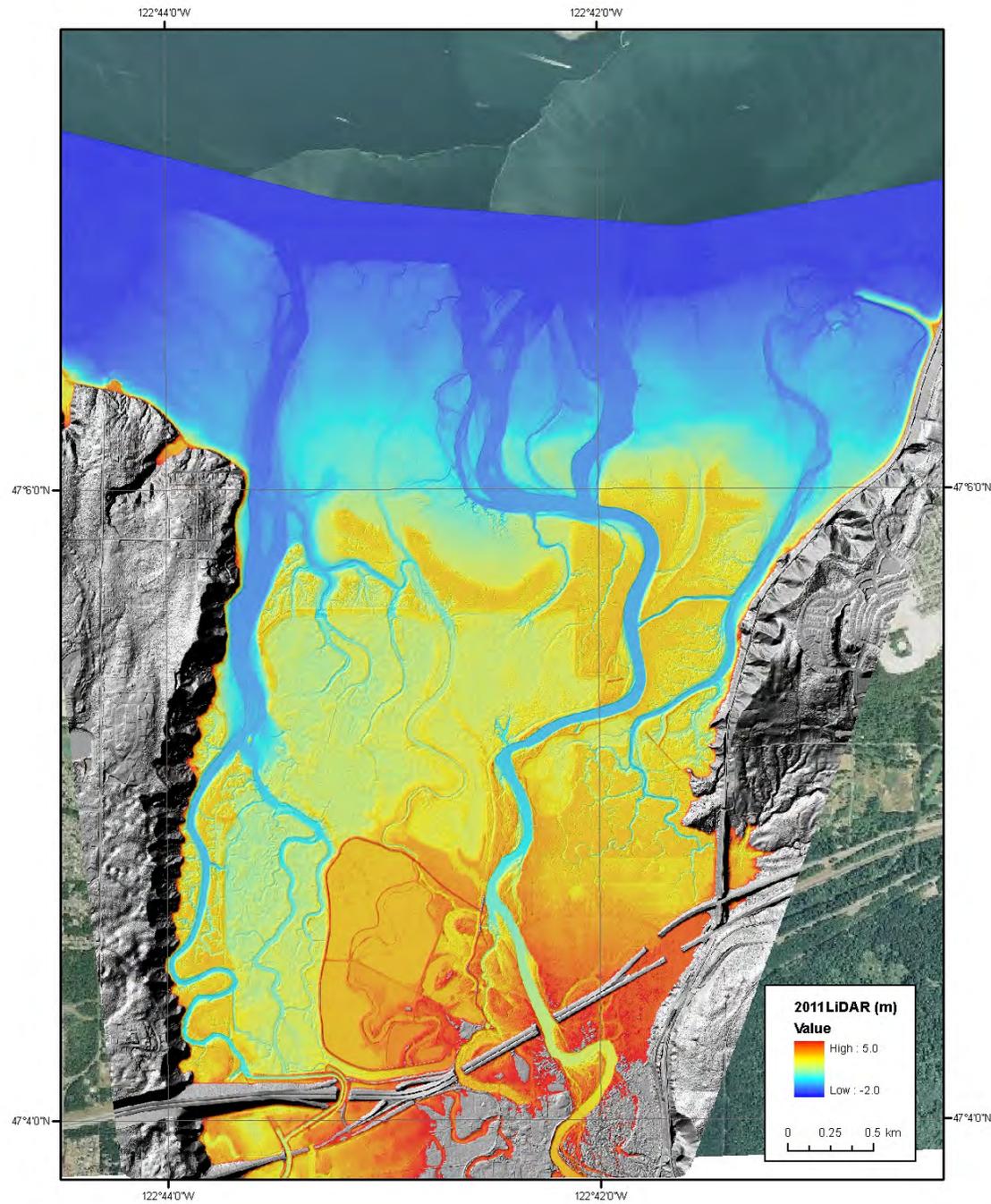


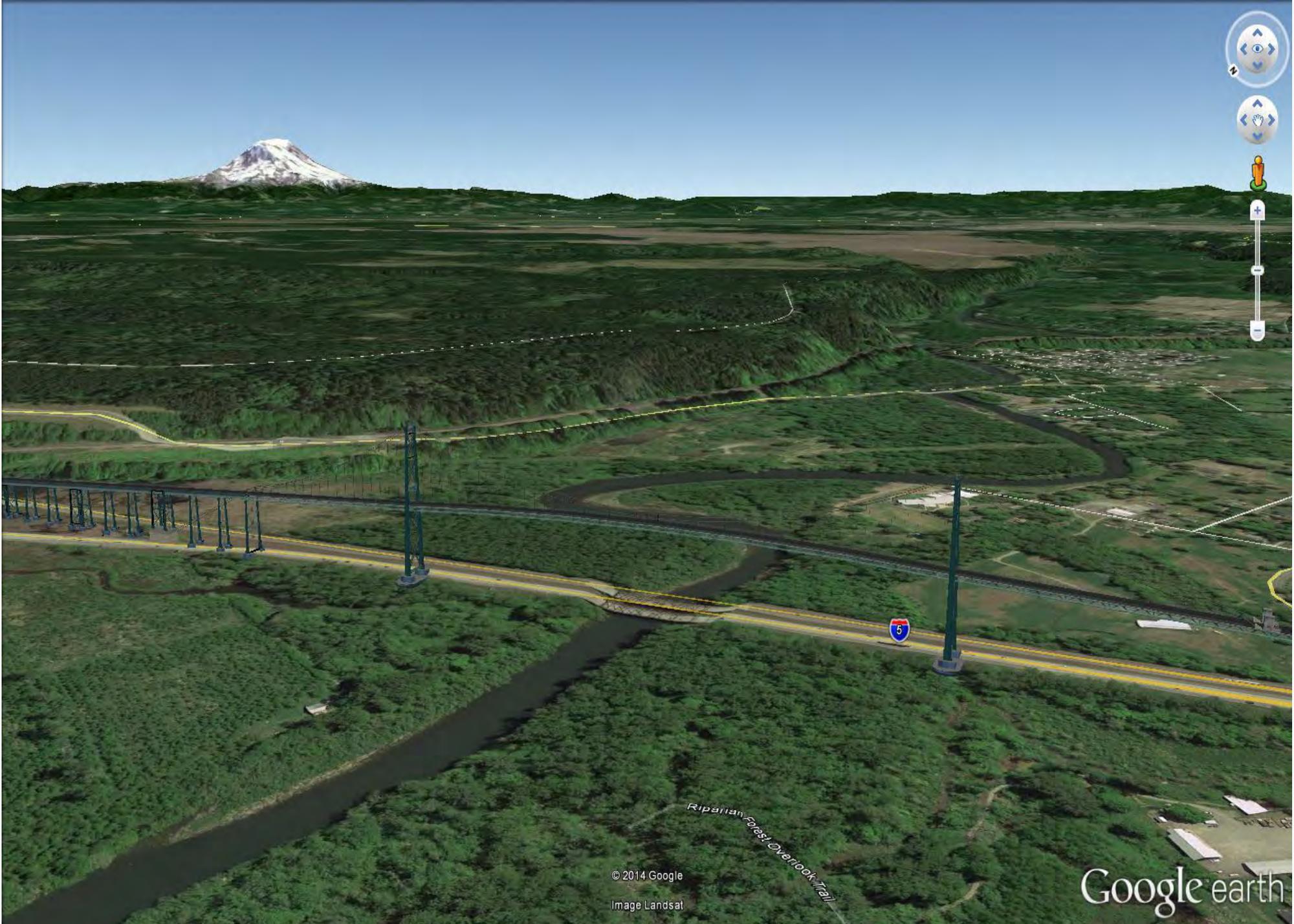
Ford et al. (2009)

# Whale eat a variety of Chinook stocks in the winter

- ~65% Puget Sound while in Puget Sound
- ~50% Columbia River while on coast
- Wide variety of other stocks







© 2014 Google  
Image Landsat

*Riparian Forest Overlook Trail*

Google earth

Sea level rise threatens the newly restored estuary so the Tribe is pushing federal and state agencies to bridge large sections of I-5 so the estuary can migrate inland as sea level rises.

