



Western Washington University
Western CEDAR

Salish Sea Ecosystem Conference

2018 Salish Sea Ecosystem Conference
(Seattle, Wash.)

Apr 5th, 10:30 AM - 10:45 AM

Marine shoreline armor in King County, 2005-2015

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Henry, Alexis and Higgins, Kollin, "Marine shoreline armor in King County, 2005-2015" (2018). *Salish Sea Ecosystem Conference*. 142.

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Marine Shoreline Armor in King County, 2005-2015

Alexis Henry and Kollin Higgins

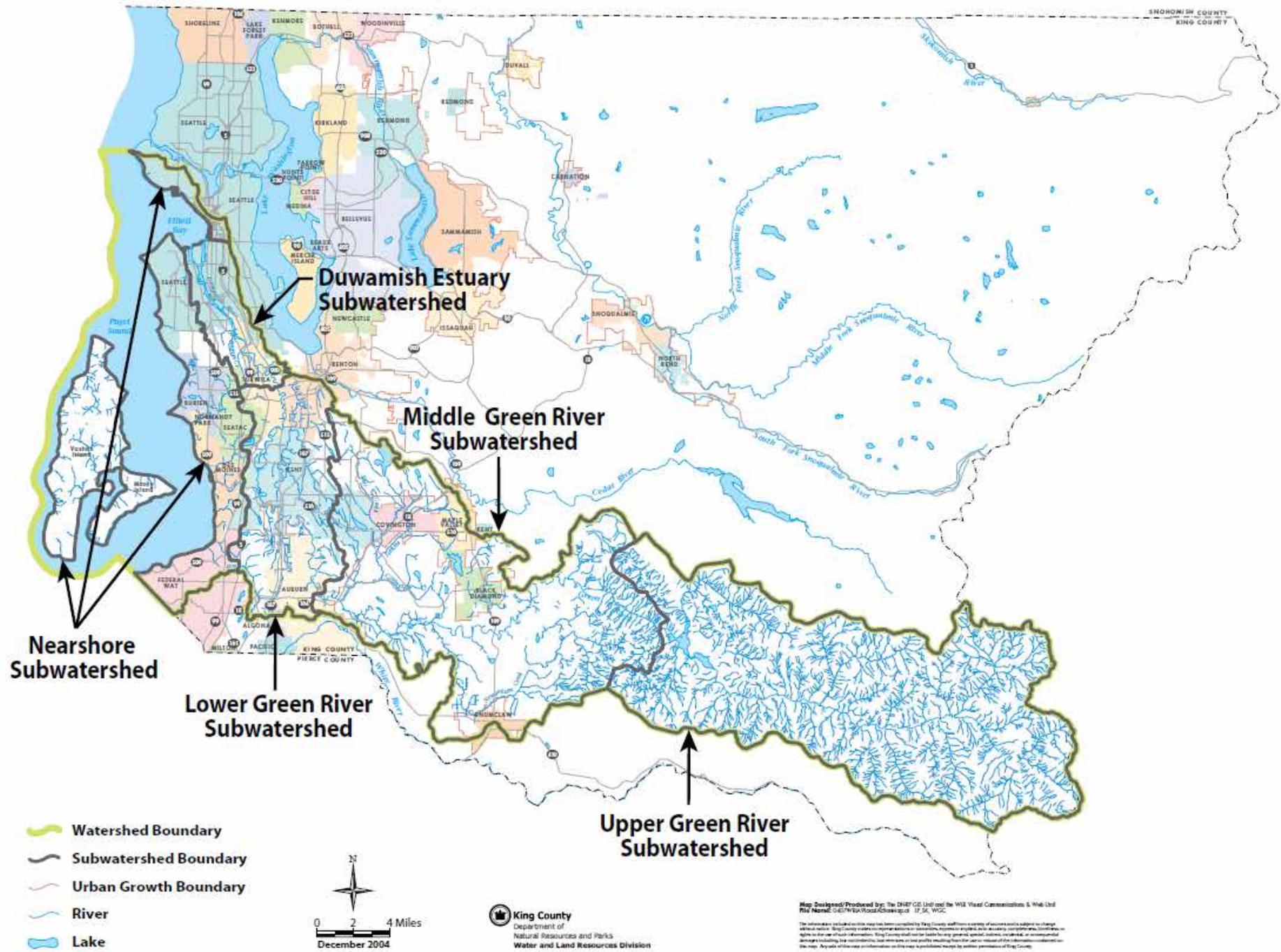
King County Department of Natural Resources and Parks



King County

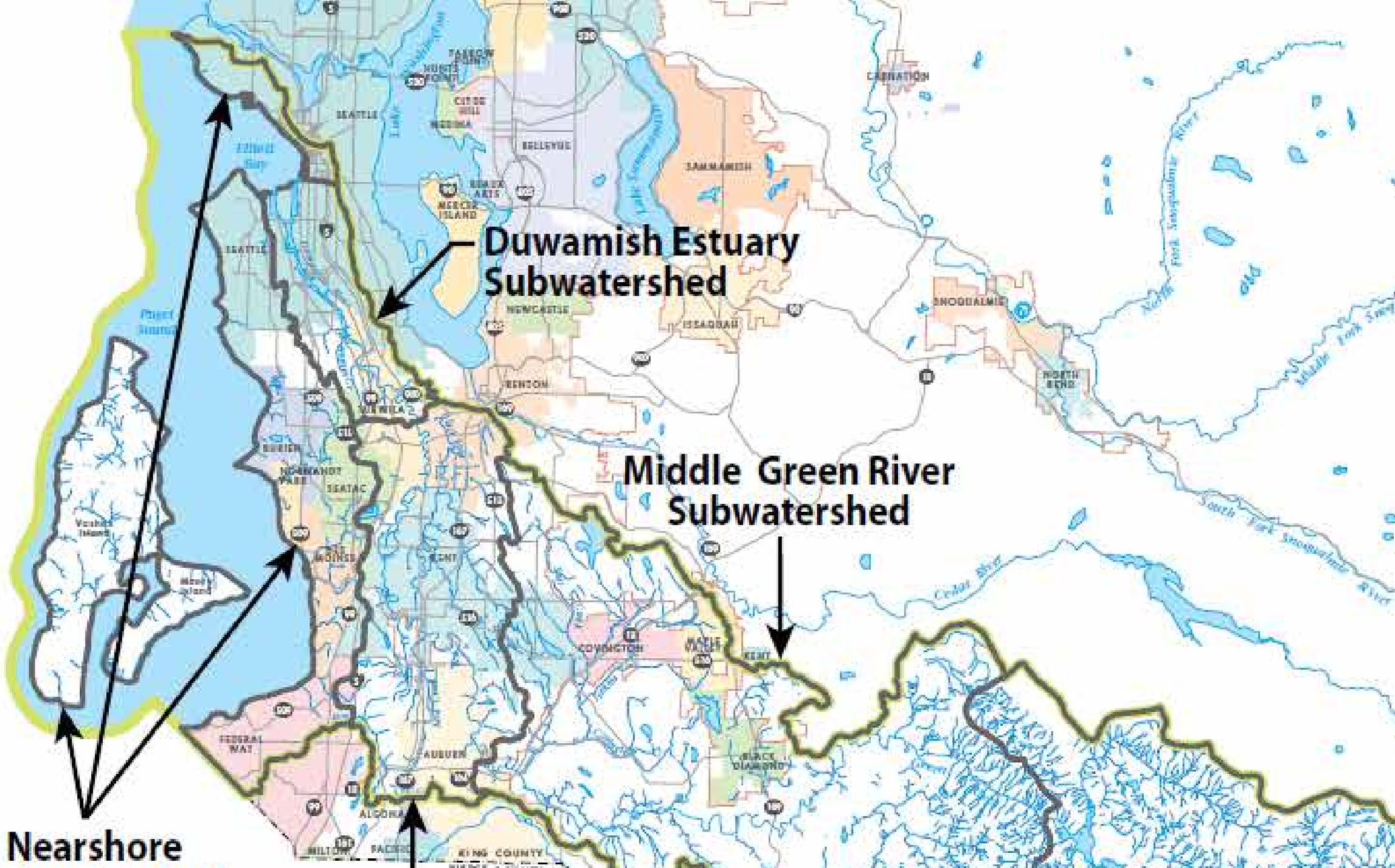
Salish Sea Ecosystem Conference

April 5, 2018



King County
 Department of
 Natural Resources and Parks
 Water and Land Resources Division

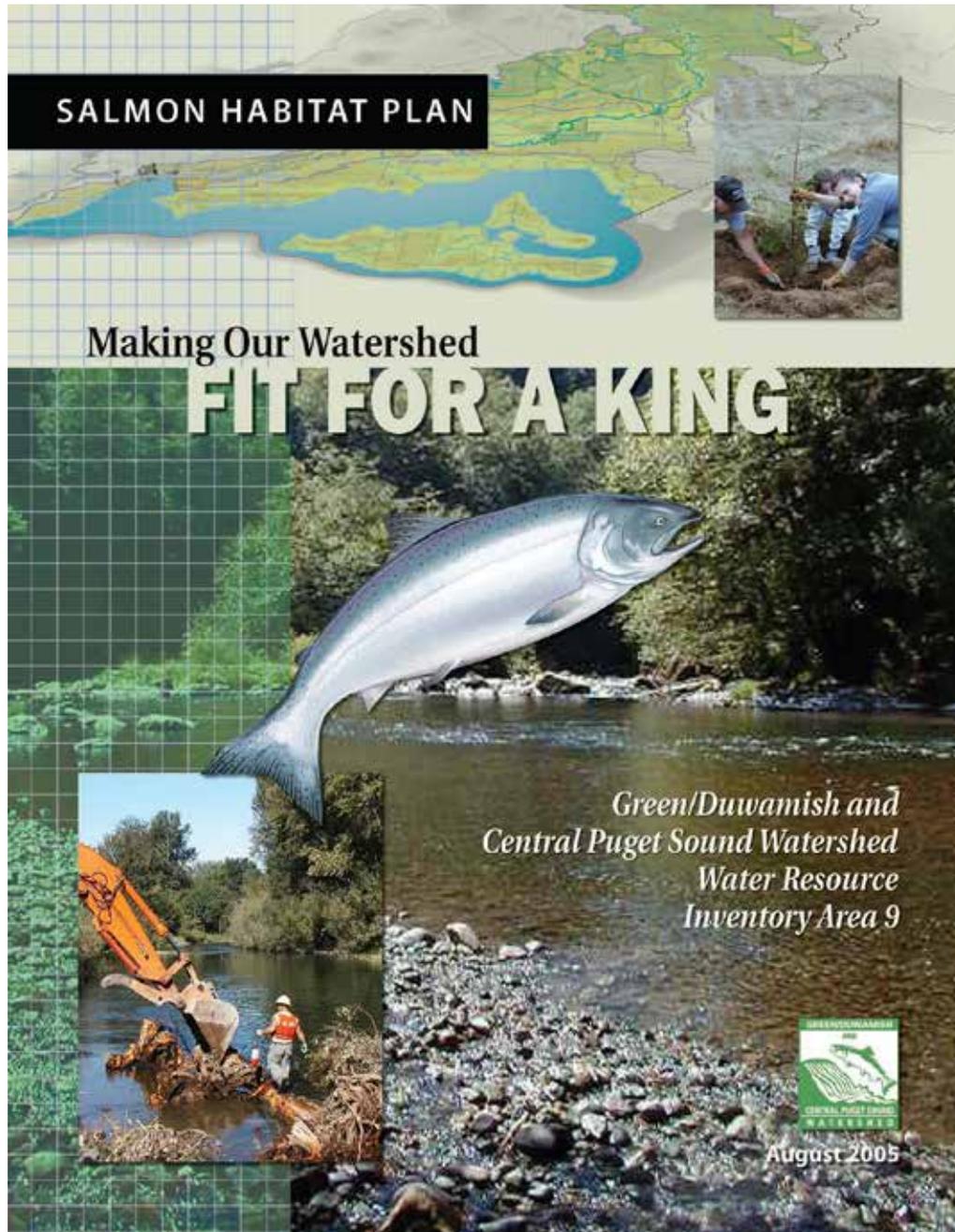
Map Designed/Produced by: The DNR/CDD Unit and the WLR Visual Communications & Web Unit
 File Name: 016/1910/Flood/Showmap_17_54_WG2
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**Duwamish Estuary
Subwatershed**

**Middle Green River
Subwatershed**

Nearshore



Conservation Hypothesis (Nearshore 2)

Protecting and increasing the availability of vegetated shallow nearshore and marsh habitats will enhance habitat quantity and quality and lead to greater juvenile salmon residence time, greater growth, and higher survival.

WRIA 9 Status and
Trends Monitoring
Report: 2005-2010

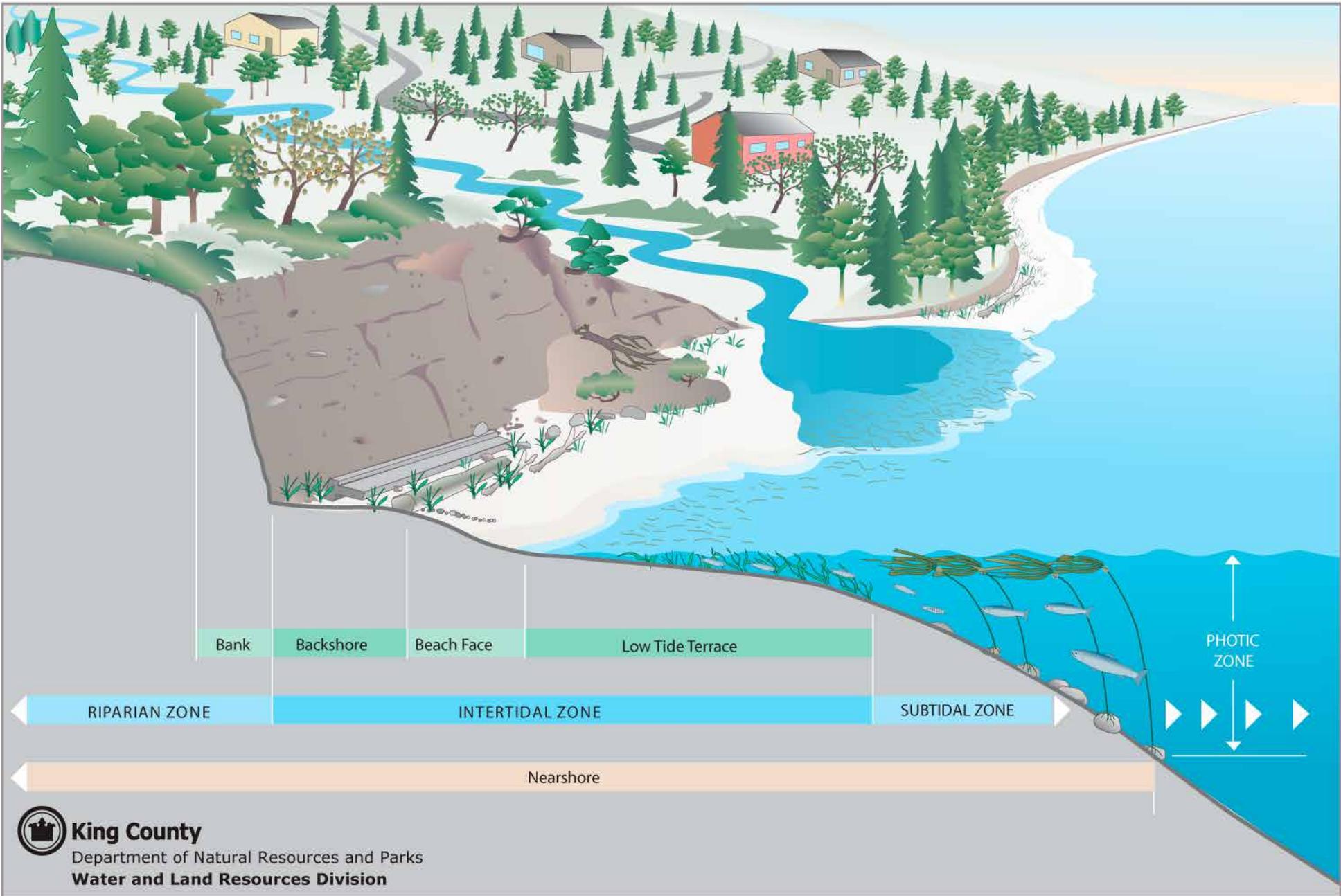
Prepared by the
WRIA 9 Implementation
Technical Committee

Prepared for the WRIA 9
Watershed Ecosystem Forum

February 2012

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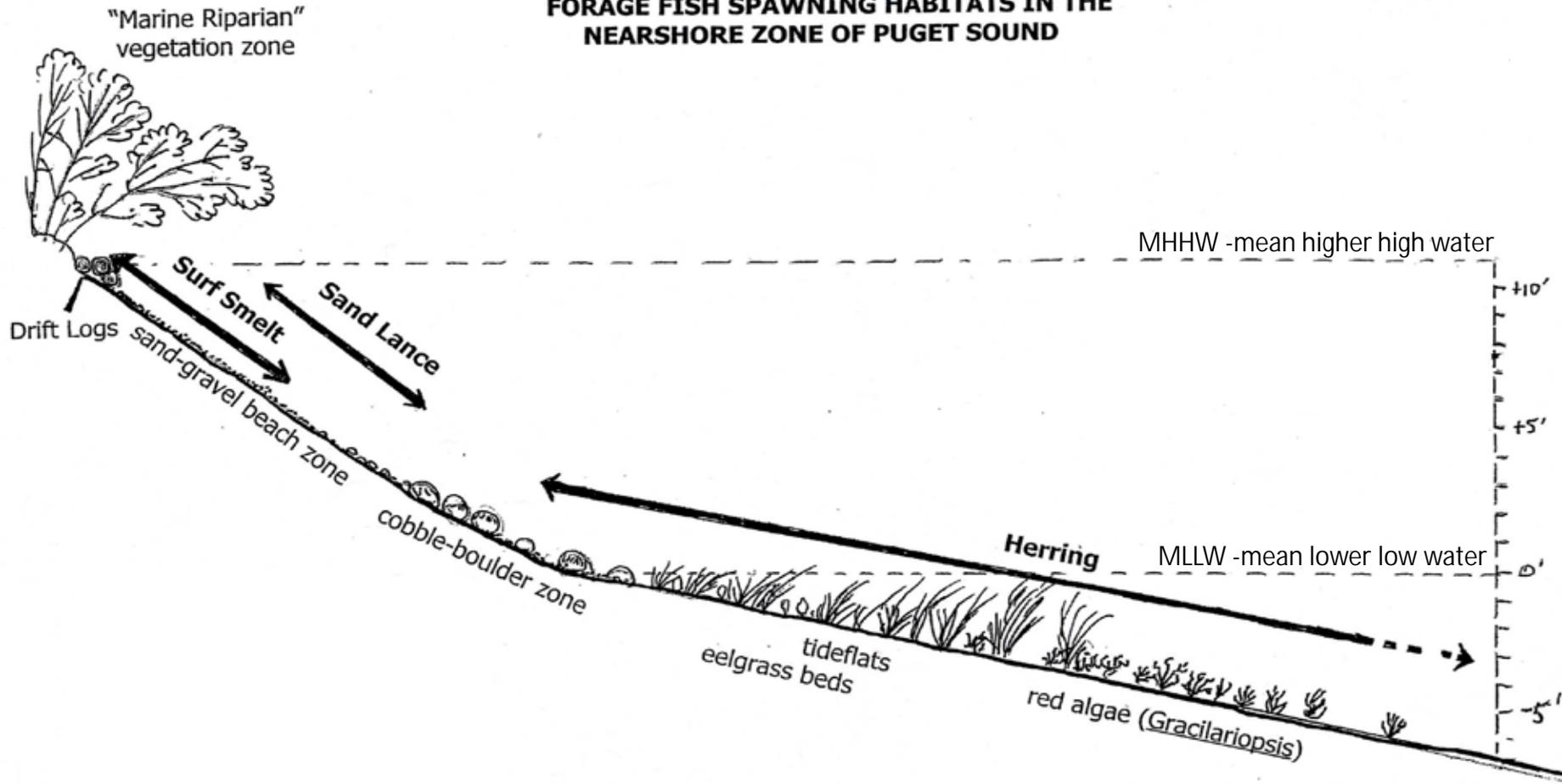


King County

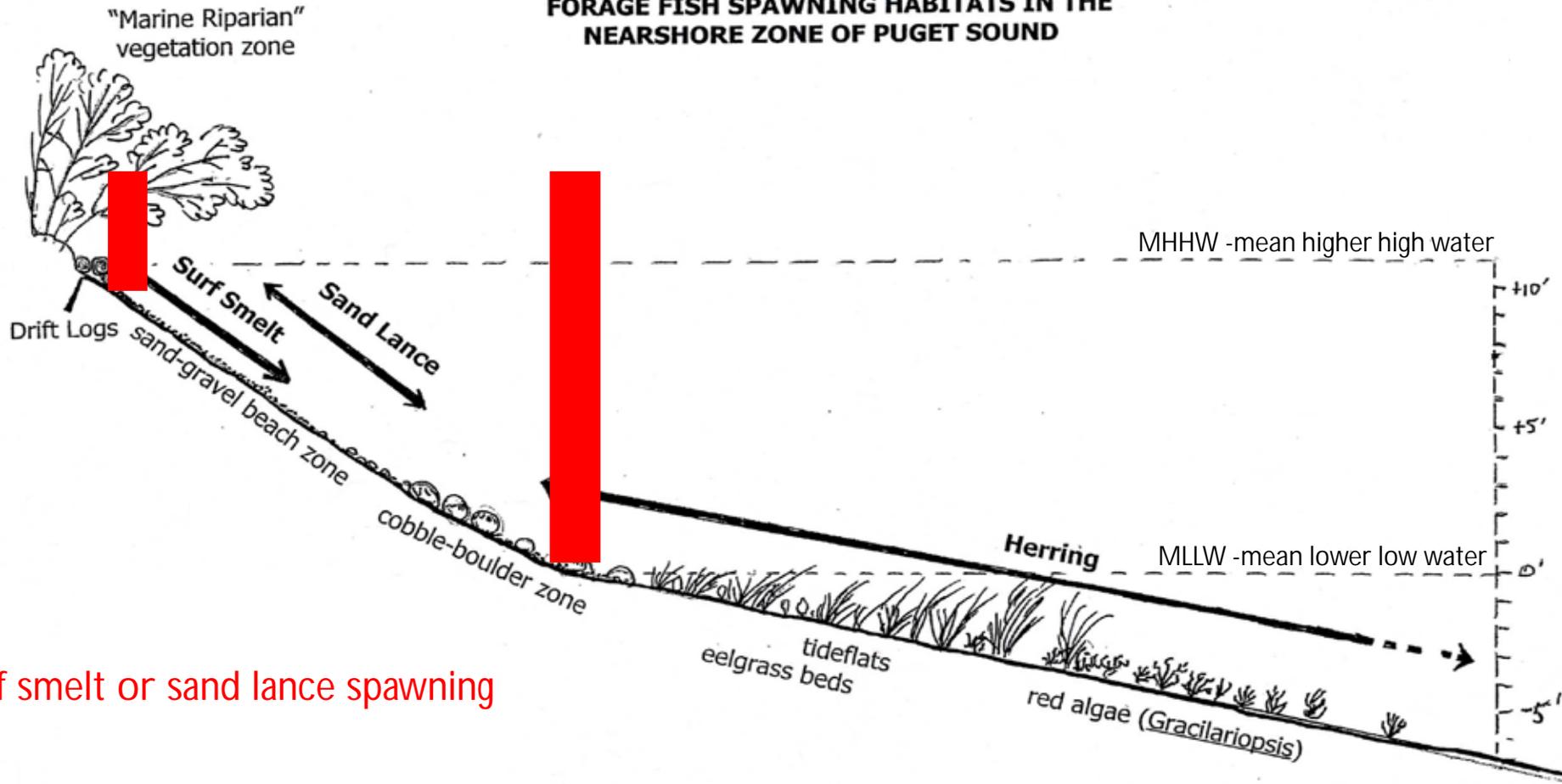
Department of Natural Resources and Parks

Water and Land Resources Division

FORAGE FISH SPAWNING HABITATS IN THE NEARSHORE ZONE OF PUGET SOUND



FORAGE FISH SPAWNING HABITATS IN THE NEARSHORE ZONE OF PUGET SOUND



No surf smelt or sand lance spawning



Washington Department of Fish and Wildlife
Marine Resources Division
LaConner, Washington 98257

**Armoring below High Water Line
reduces LWD and drift logs**





1977

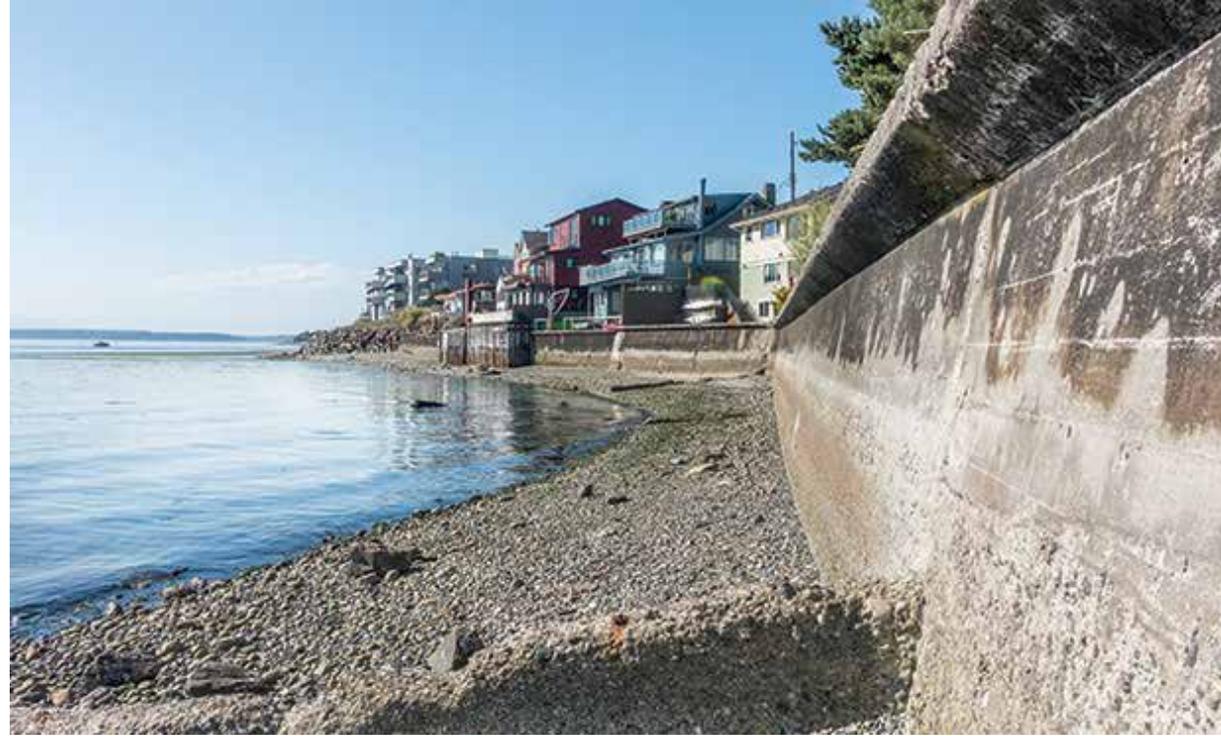


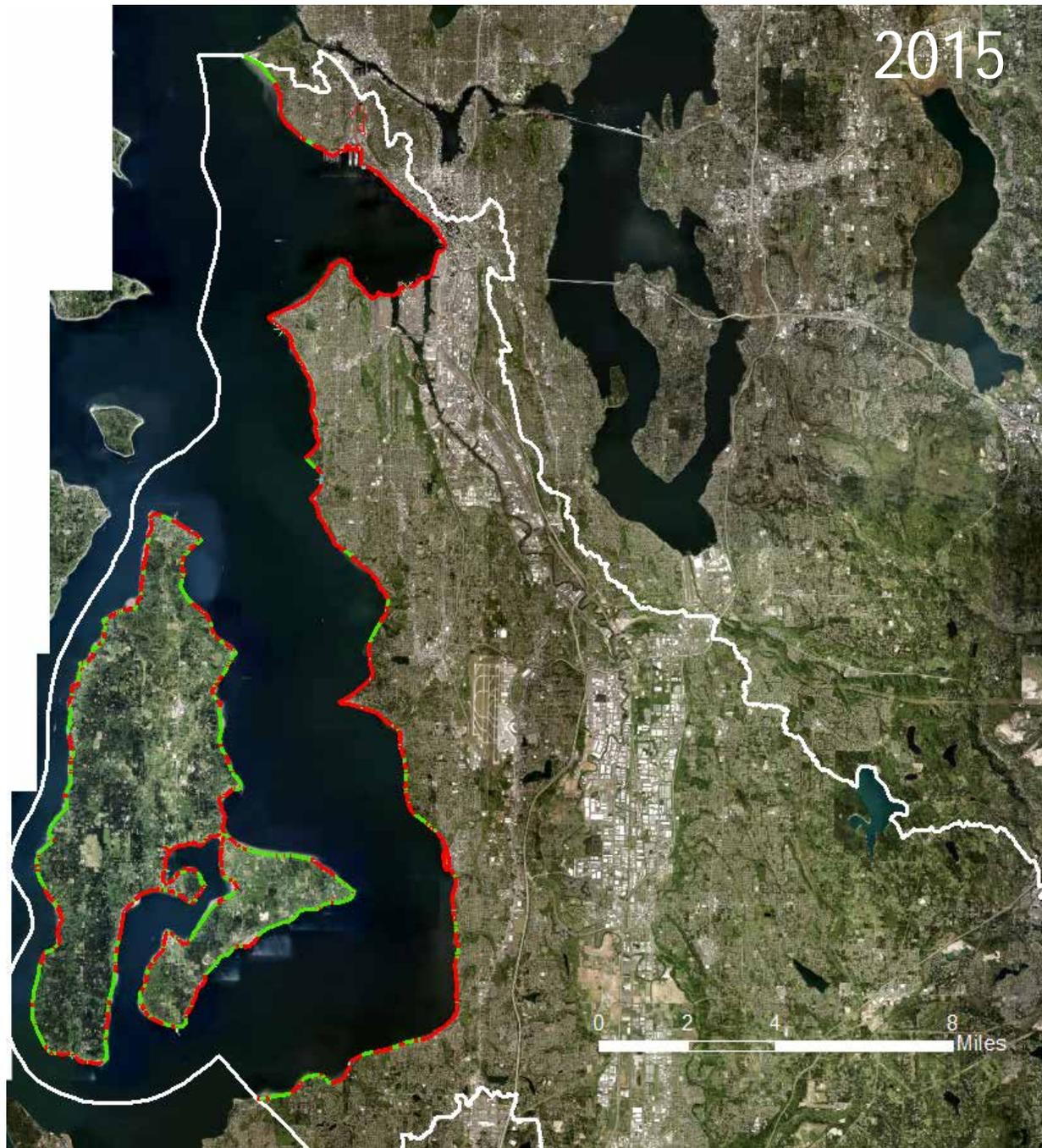
2000

Filling/Armoring

- Loss of shallow water
(wood)
- Loss of riparian
functions
(vegetation)
- Changes in hydrology
(sediment)

à Elimination of
spawning, rearing and
refuge habitat





2015

92 miles shoreline
68% armored







2005

Seahurst Park



+ 21,914 ft²

2015

Olympic Sculpture Park

- Increase larval fish
- Increase juvenile salmon
- Increase juvenile feeding
- Higher invertebrate taxa

(Toft et al. 2013)



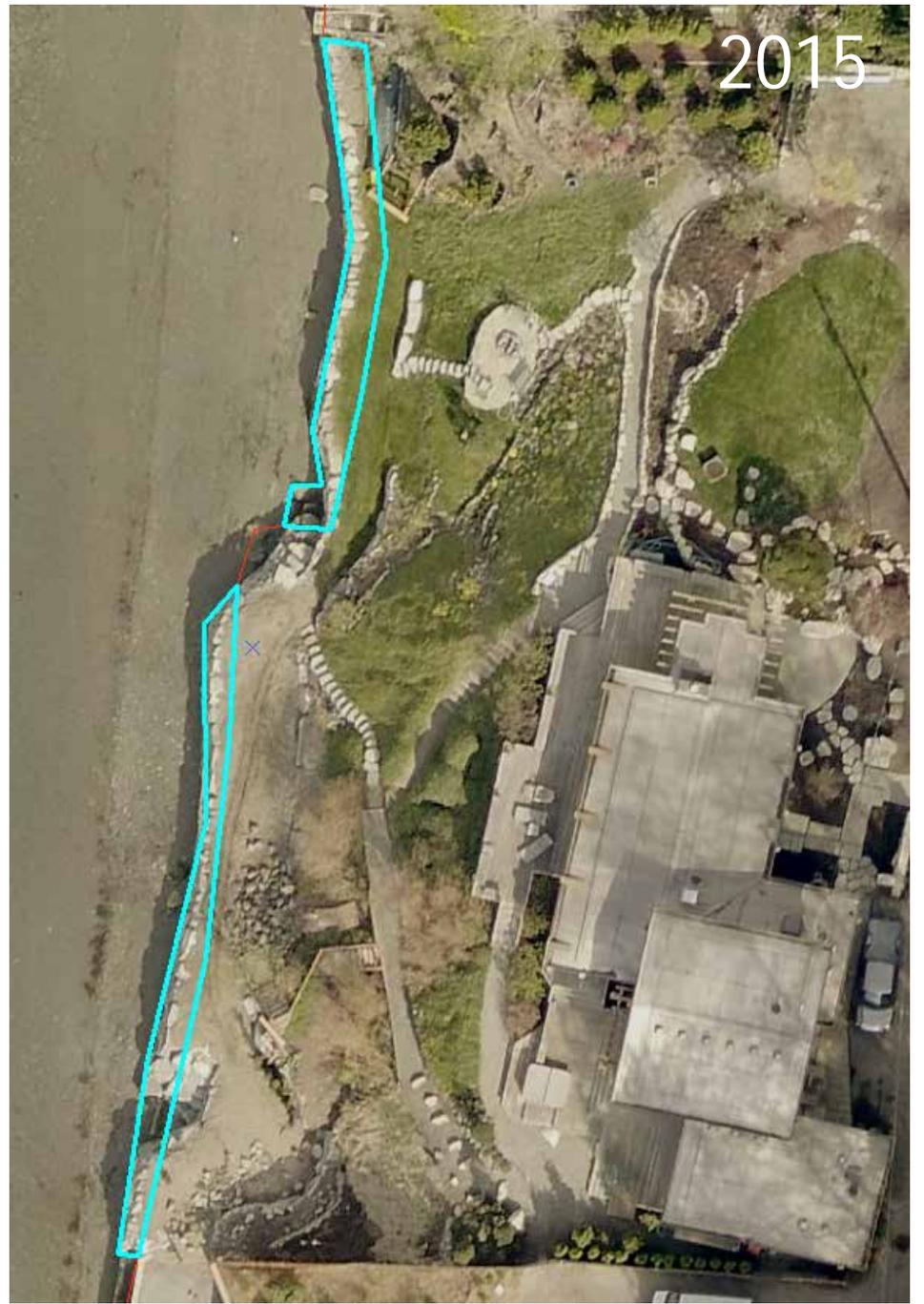
Landslide North of Saltwater Park



Fill



Fill



Fill



Fill



Fill

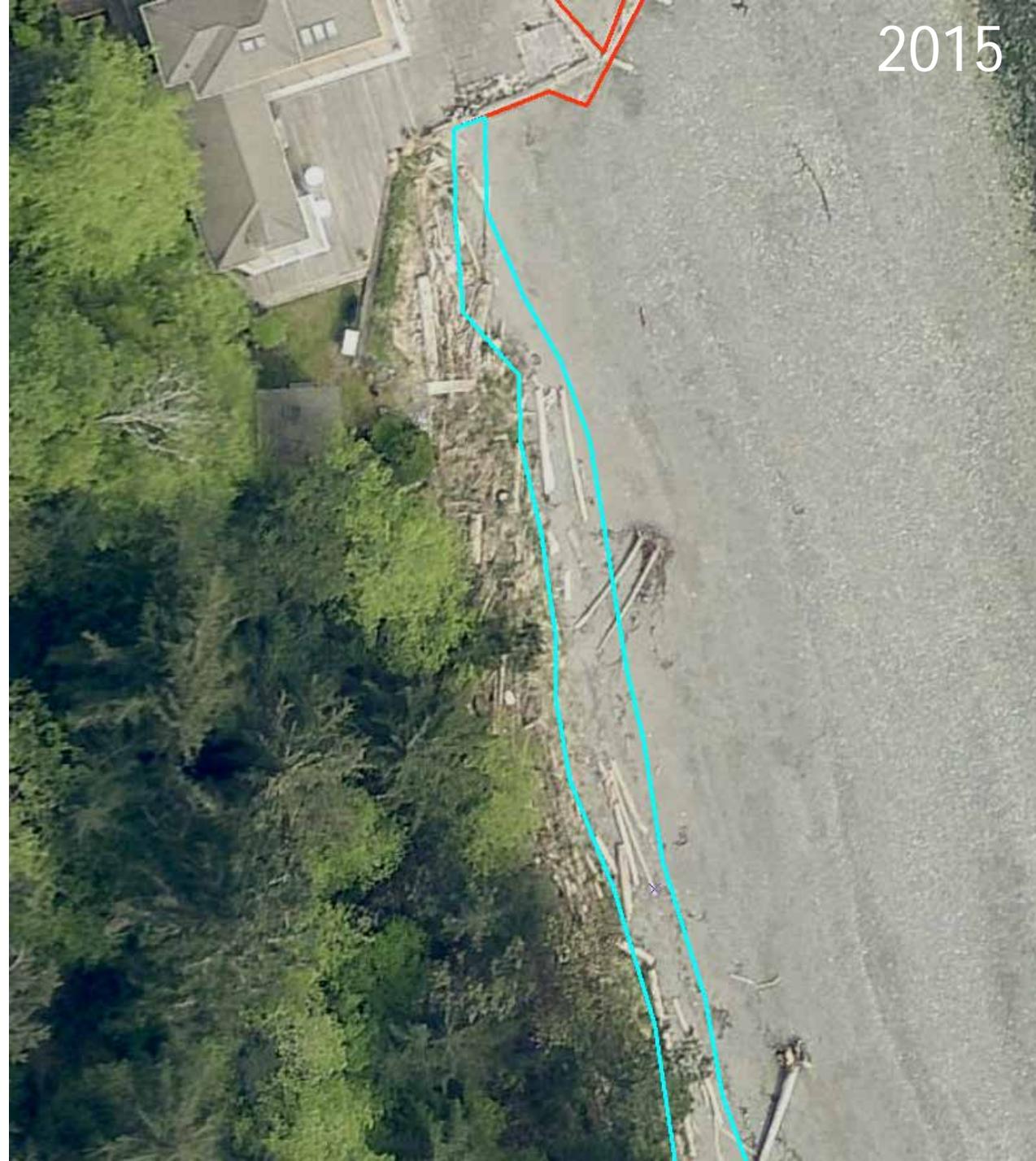


Erosion

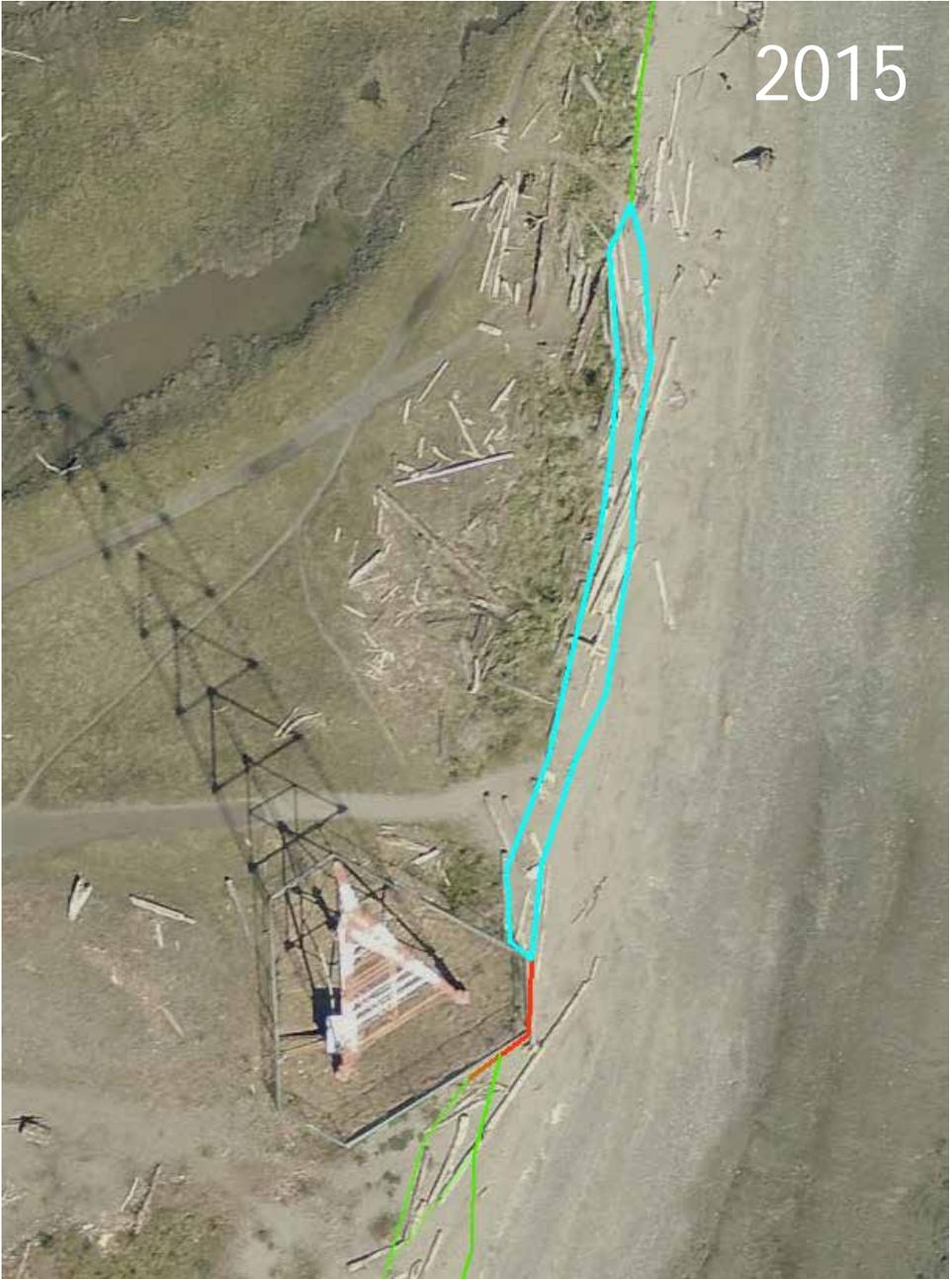
2005



2015



Erosion



Erosion of landslide



Accretion



Removed Armor/Fill

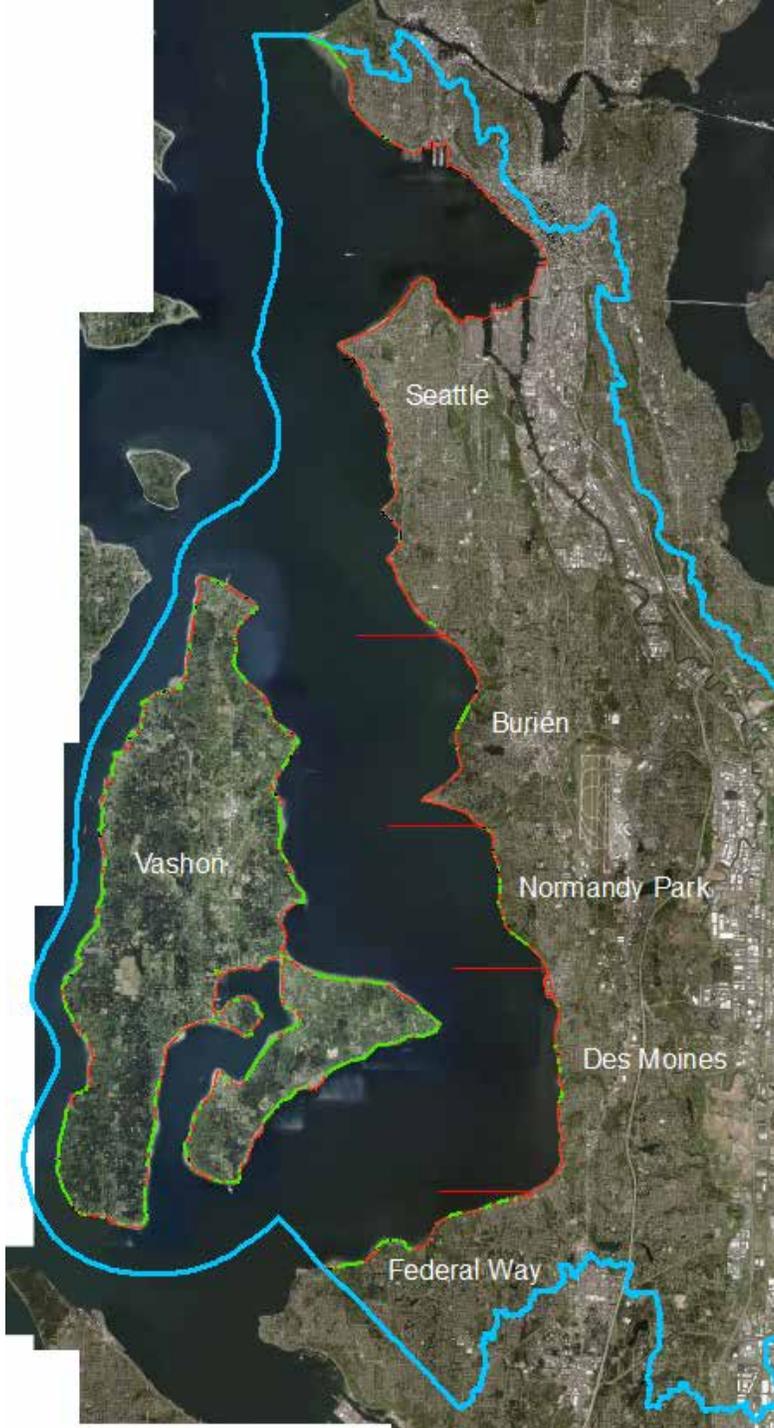


Restoration



Results

Anthropogenic Total (ft ²)	
Nearshore Gain	116,864
Removal of armor/fill	7,859
Restoration	109,005
Nearshore Loss	-17,247
Fill	-7,403
Rock fill	-9,660
Dredging	-184
Net Gain	99,617 ft²



Jurisdiction	Area Removed Armor/Fill (ft ²)	Number Removed Armor/Fill Sites	Area Added Armor/Fill (ft ²)	Number Added Armor/Fill Sites	Net Total (ft ²)	Shoreline Length (ft)
Burien	83,328	6	927	7	80,317	30,799
Seattle	18,717	4	9,018	28	15,094	118,000
Federal Way	3,098	1	-	-	3,982	26,718
Vashon	11,721	3	6,009	24	2,939	291,728
Des Moines	-	-	629	8	-629	20,698
Normandy Park	-	-	664	1	-664	32,211
WRIA 9	116,864	14	17,247	68	99,617	520,154

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Seahurst Park, Burien



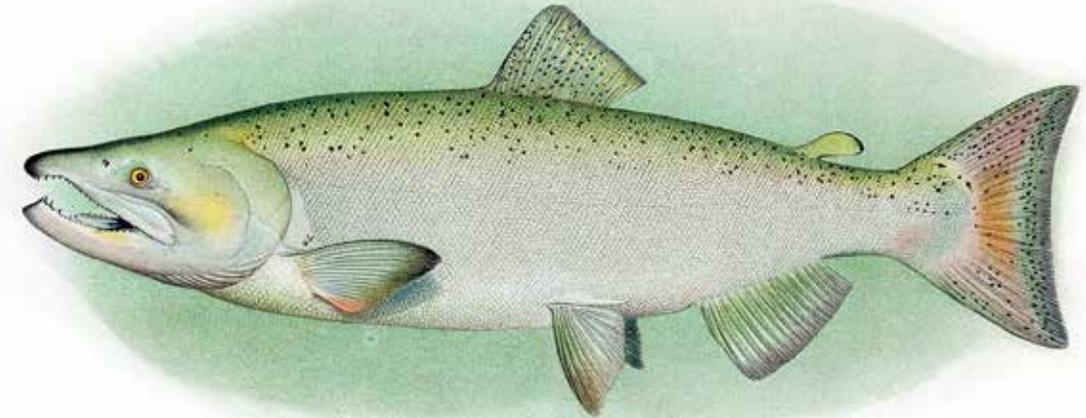
Olympic Sculpture Park, Seattle

Integrating Results in Salmon Habitat Plan Update

q Track shoreline and nearshore habitat changes

q Shoreline features

- 1) Relative tidal elevation of the armor
- 2) Armor condition
- 3) Armor materials
- 4) Overhanging vegetation
- 5) Woody debris
- 6) Houses (septic systems, distance to OHW, etc.)

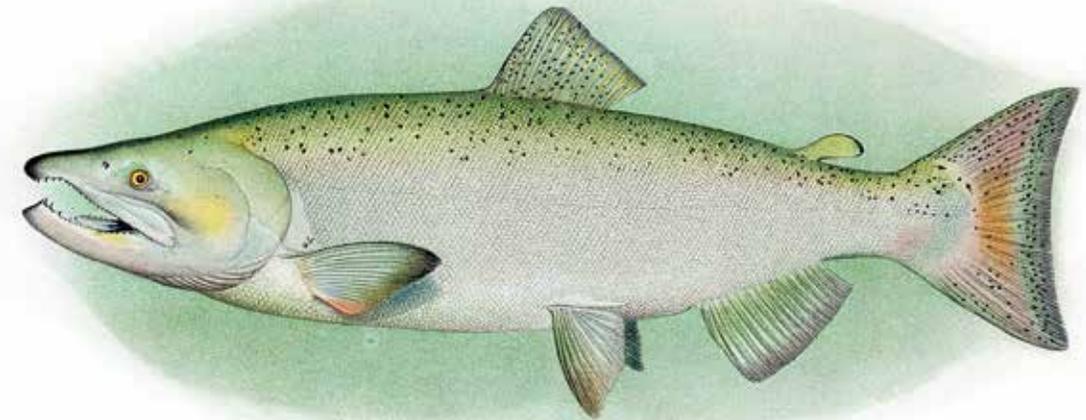


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- Are we meeting our restoration goals?
- Do we want to change strategies and policies?

Questions?

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