

RESTORATION IN THE NISQUALLY WATERSHED

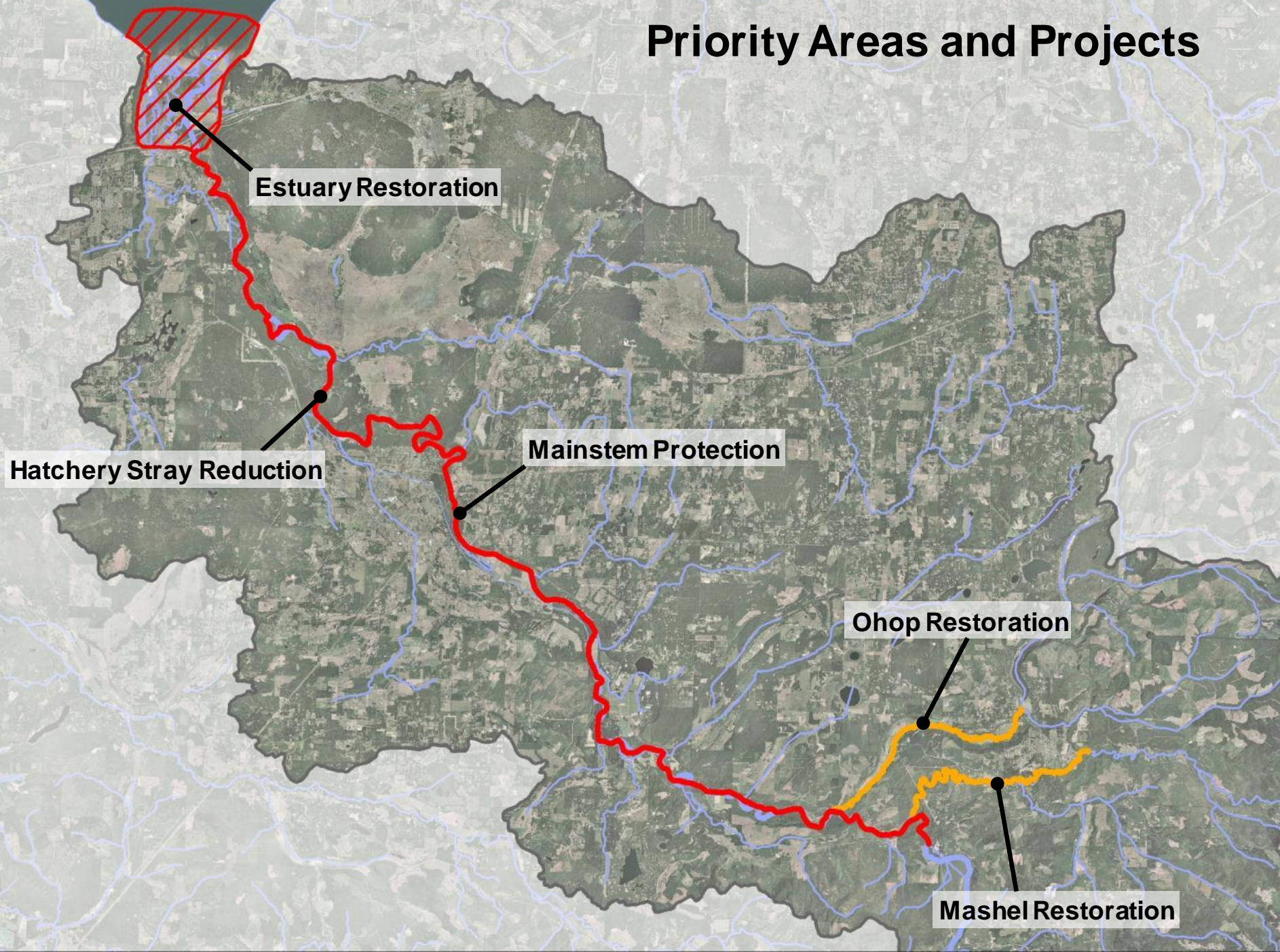
Chris Ellings

Salmon Recovery Program Manager

Nisqually Indian Tribe

January 2015

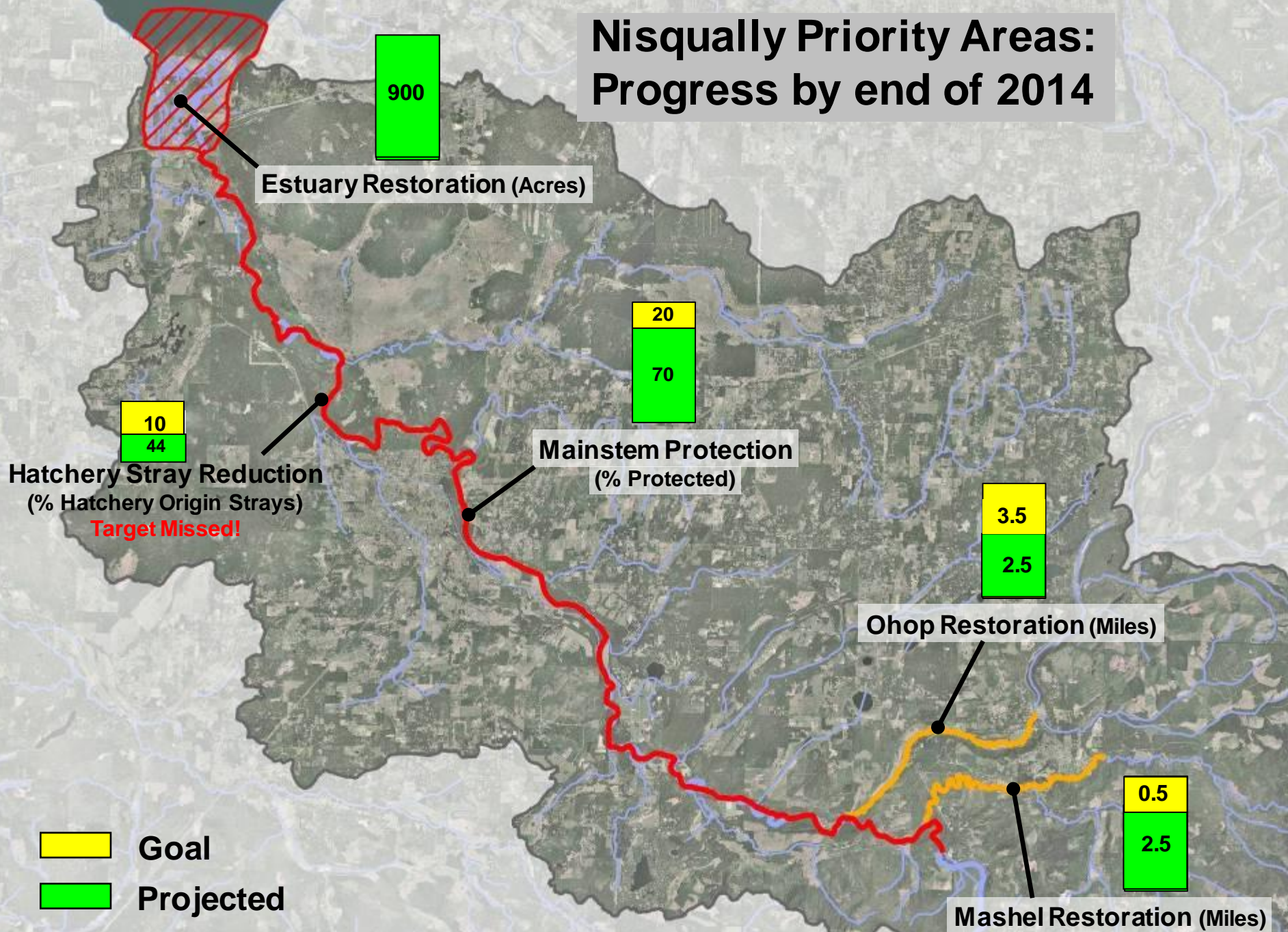
Priority Areas and Projects



Goals



Nisqually Priority Areas: Progress by end of 2014















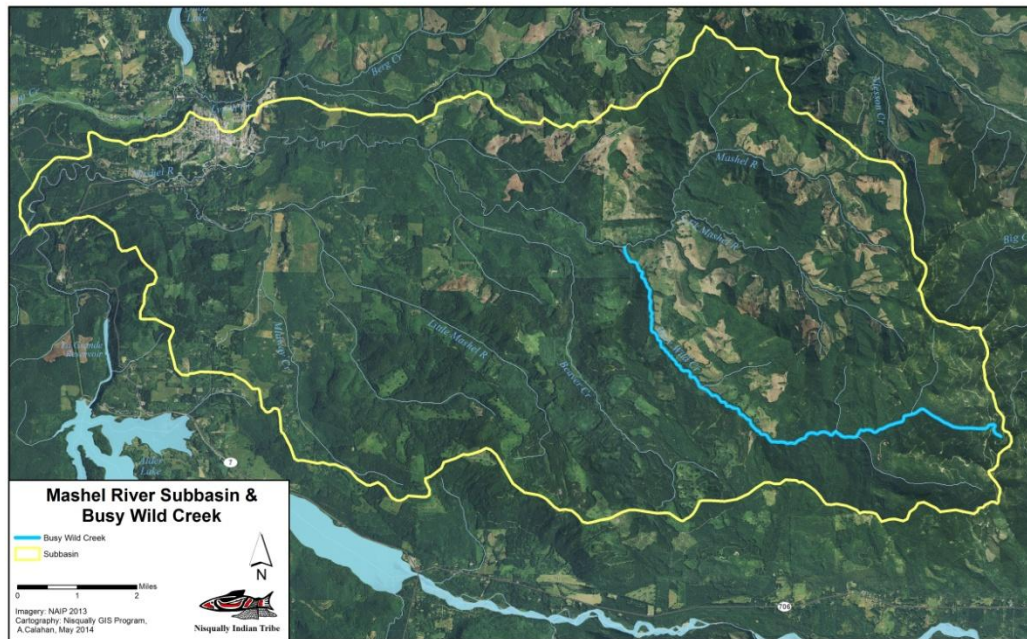
Lower Site — Before

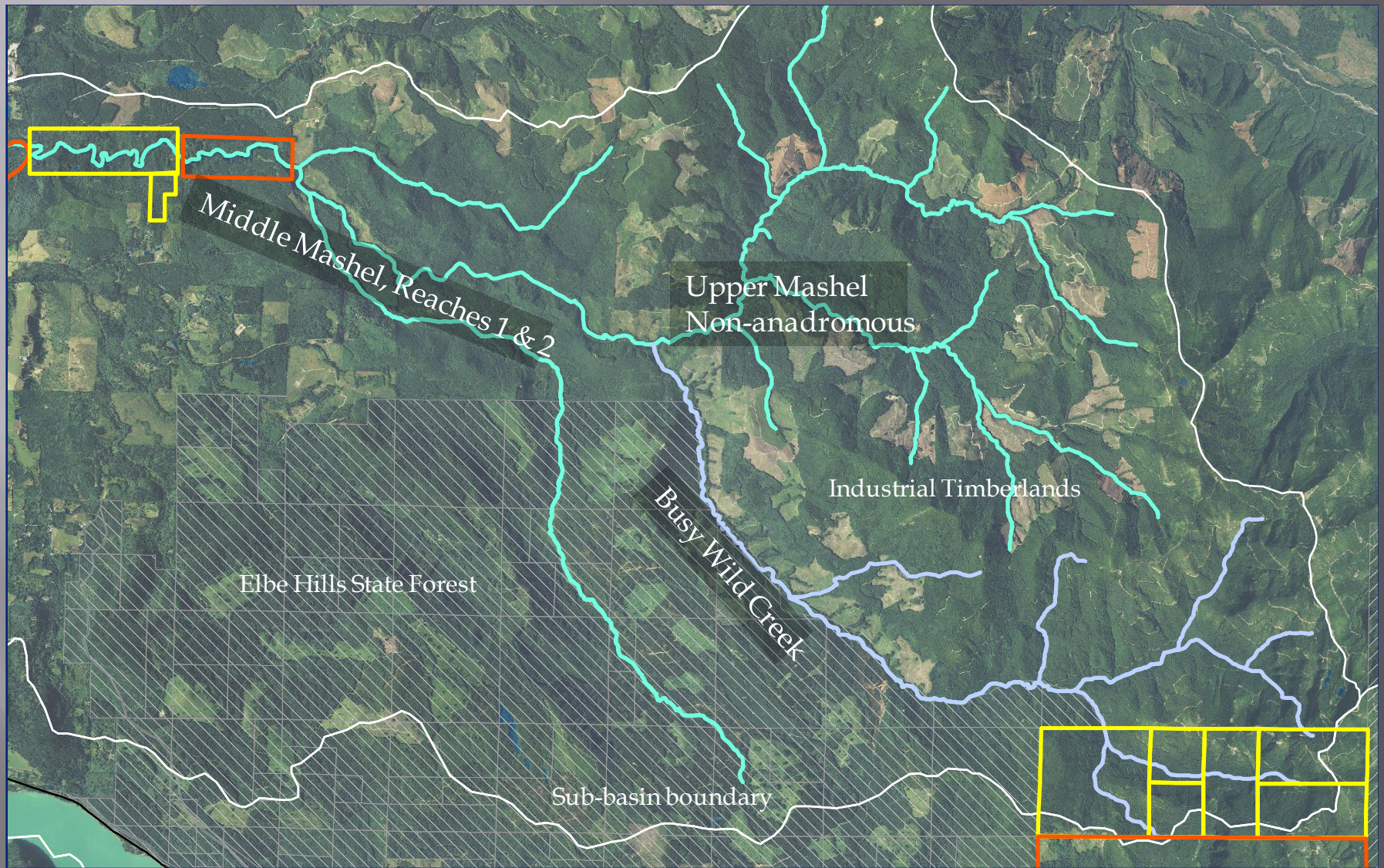












Nisqually Estuary Restoration

Status as of February 2011

Nisqually NWR

- Historic Sloughs Reconnected
- ✕ Log Jam Constructed
- Dikes and Levees Removed
- New Dike Constructed
- New Estuary Trail Completed
- - - Boardwalk Under Construction
- Twin Barns Loop Trail
- Freshwater Wetlands Enhanced
- Surge Plain Restoration Active

Nisqually Indian Tribe

- - - Dikes Removed
- Dike Removal Planned
- Surge Plain Restored

Estuary Channels

- Existing
- Restored 1996-2009

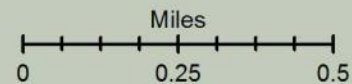
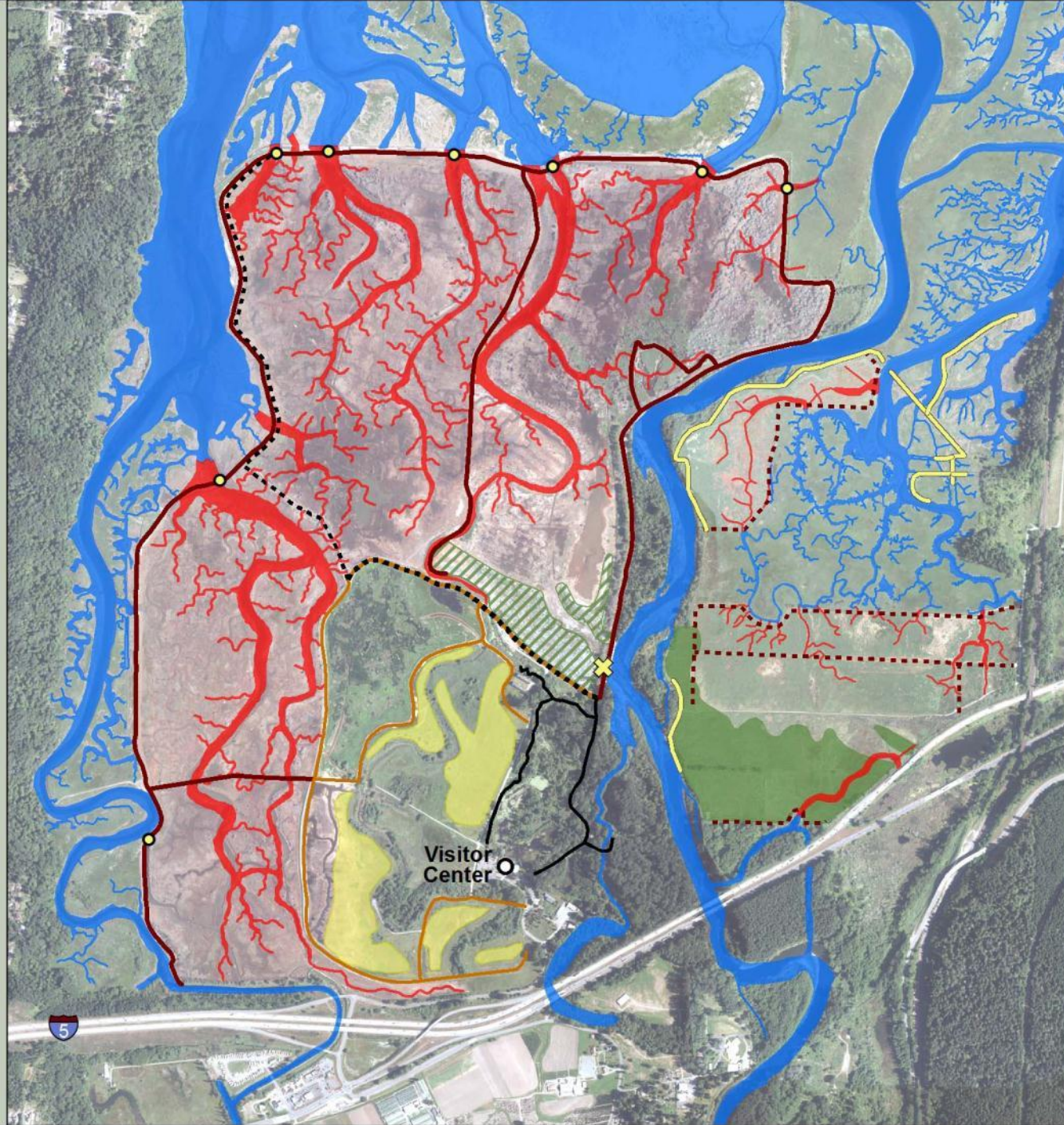


Image Source: USGS, July 2010



Cartography by: J. Cutler, Nisqually Indian Tribe



Nisqually Estuary Restoration: Over 900 acres restored since 2002



Nisqually
Estuary

June
2009

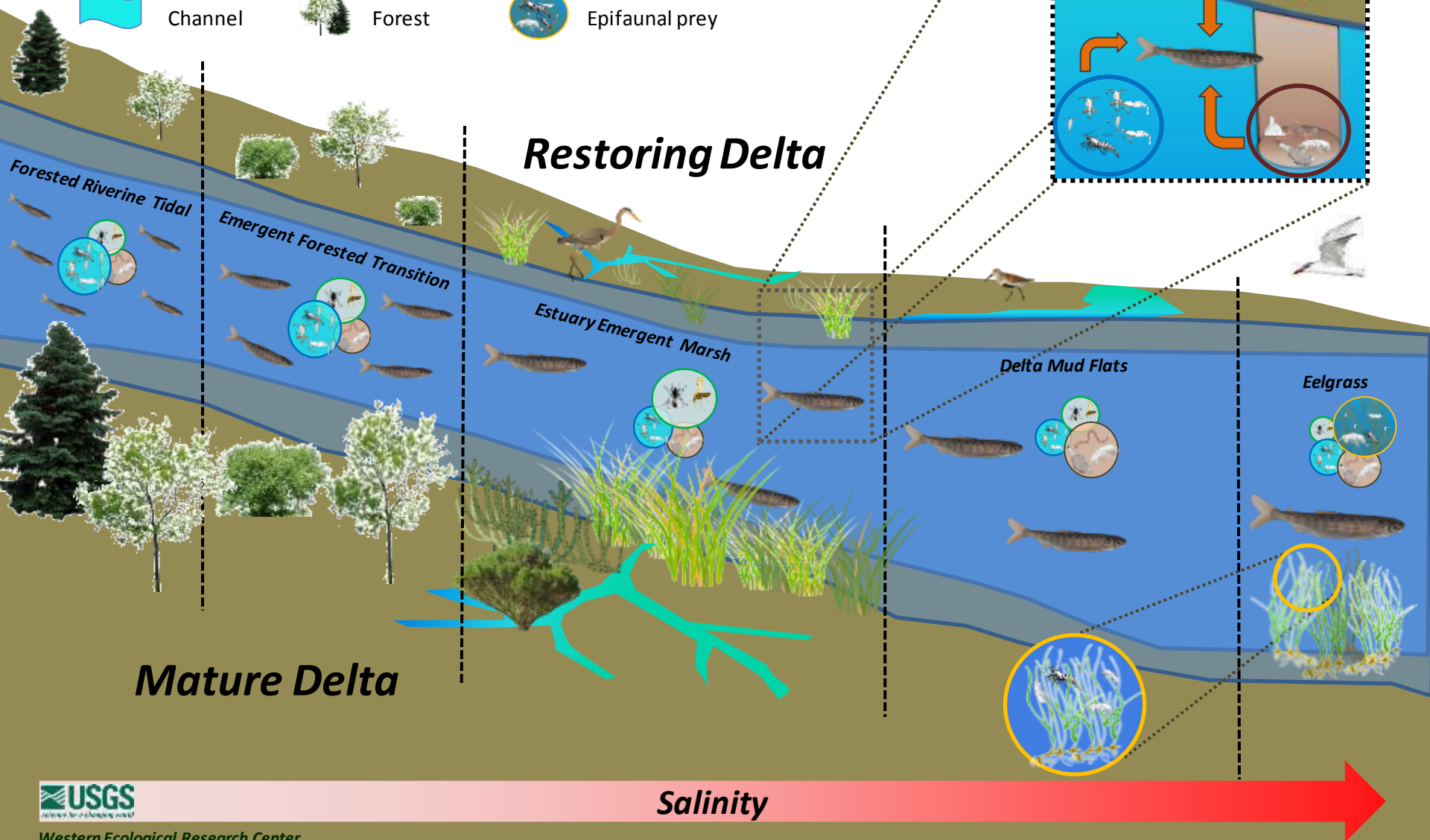
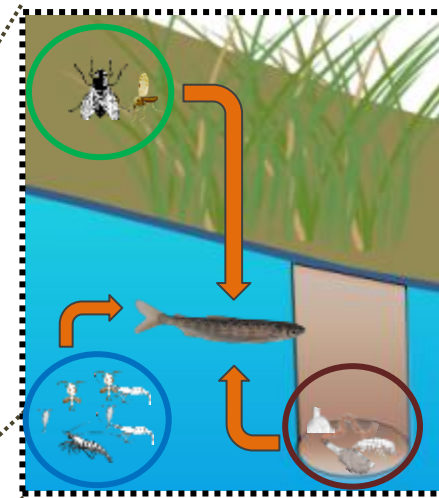
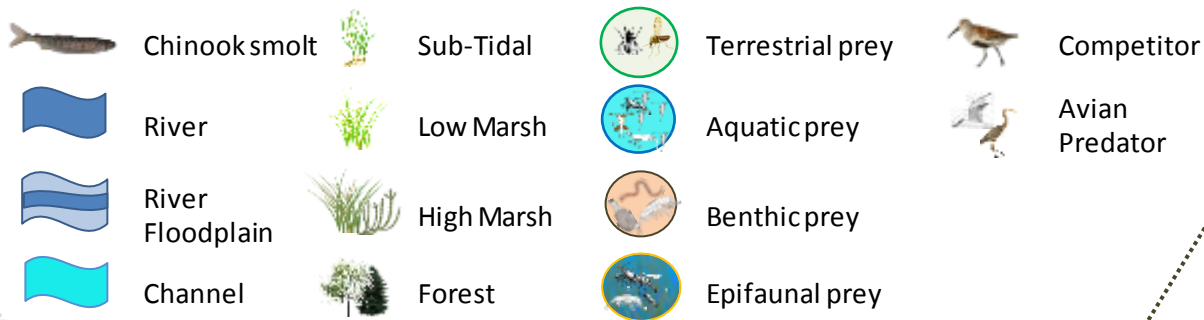


Nisqually
Estuary

March
2010





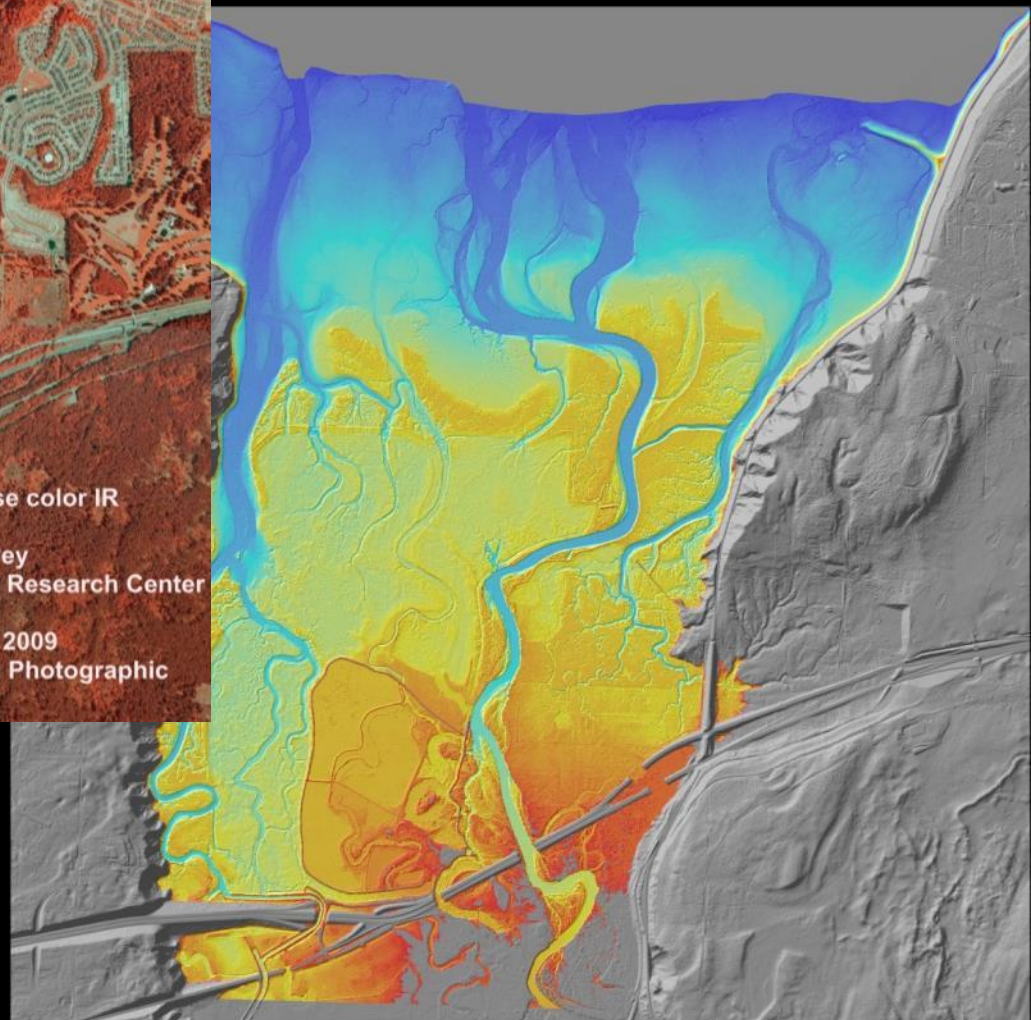




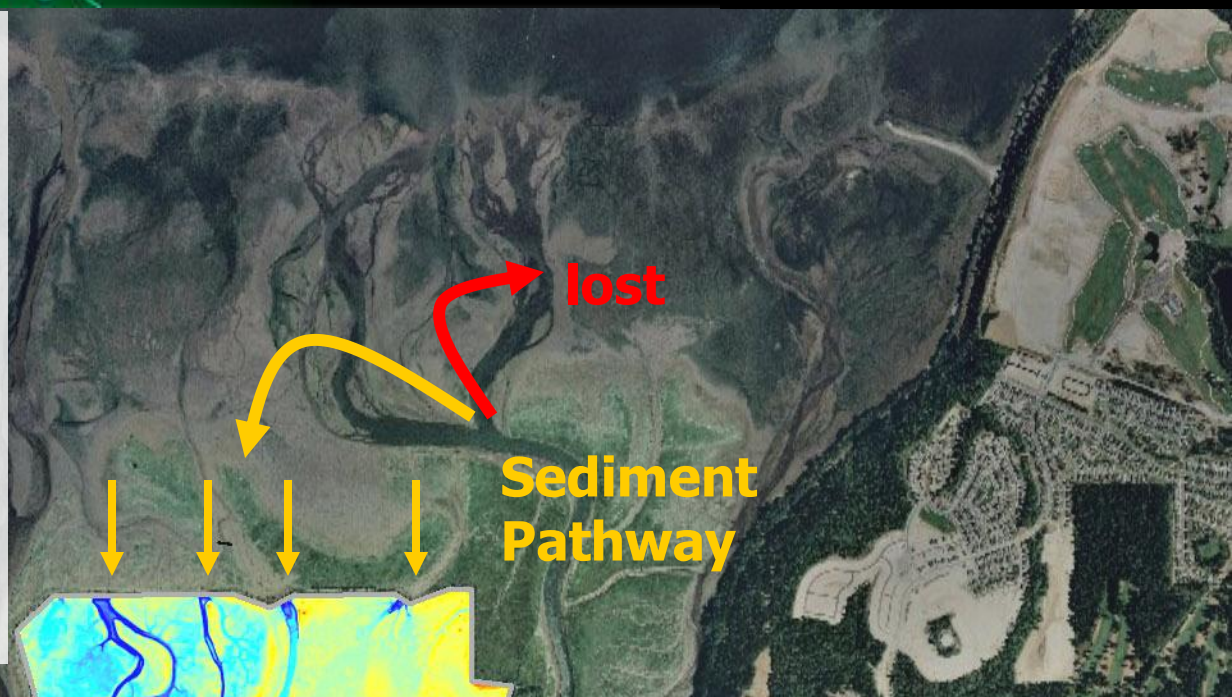
2009 Infrared



2011 Lidar



Floodplain development limits distribution of sediment, resulting in >50% of the available sediment being lost offshore.

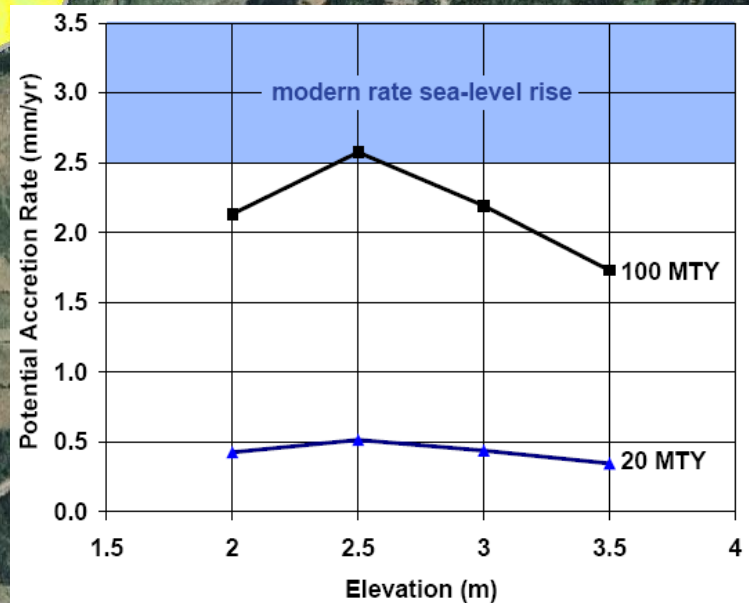
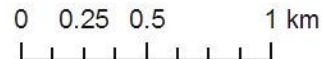
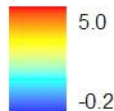


Legend

 Restoration2009

Elevation

(m, NAVD88)



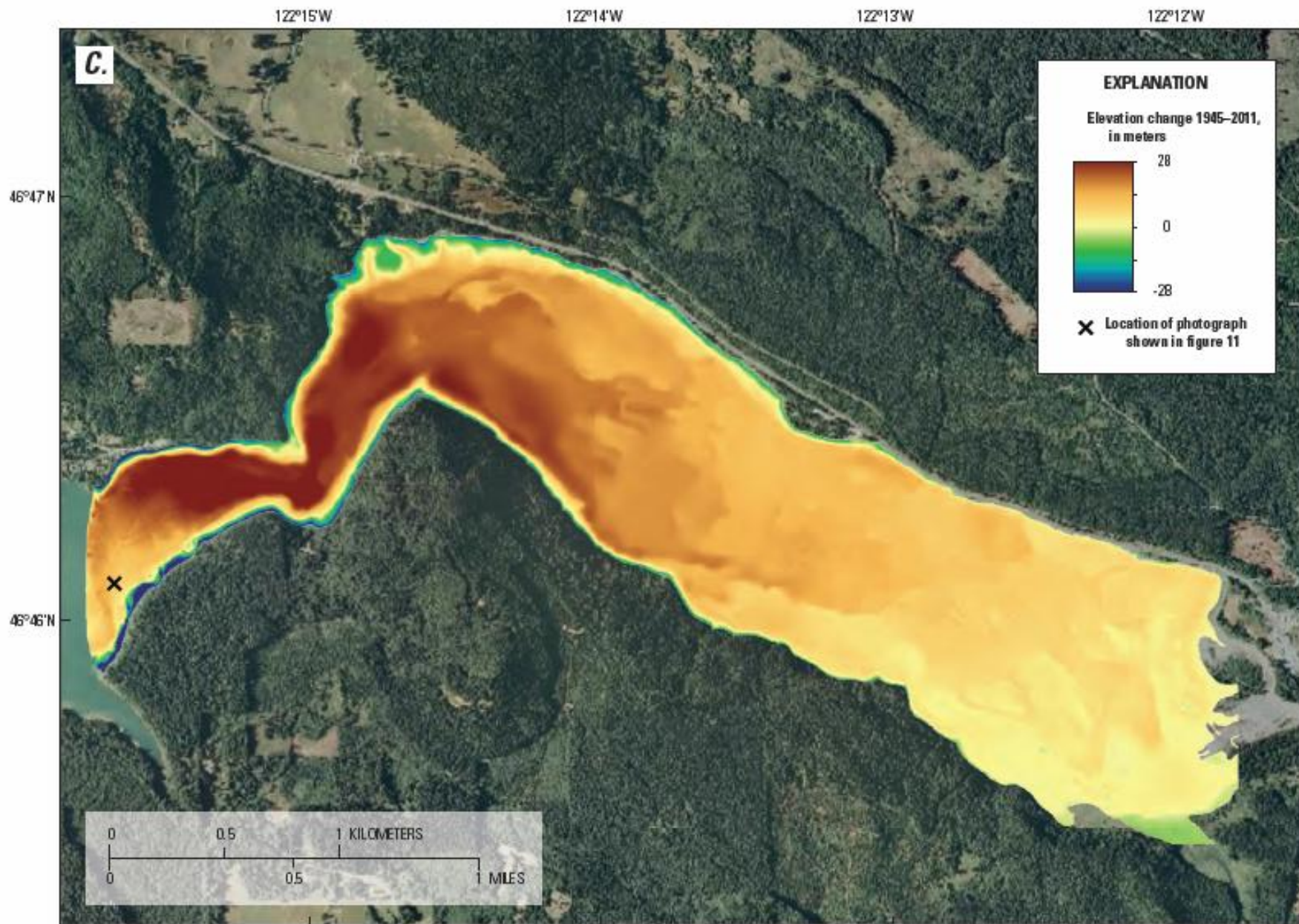
Alder Reservoir

USGS study
estimates that
Alder Reservoir
Traps approx.
92% of
sediment.





Figure 8. Sediment deposited in Alder Lake near Elbe, Washington, March 28, 1956. The probable location of the photograph is indicated in [figure 7B](#); view is looking southeast. (Courtesy of Tacoma Public Utilities, Tacoma Power.)



National Agricultural Imagery Program 2009, UTM zone 10, NAD83, 1 meter resolution.

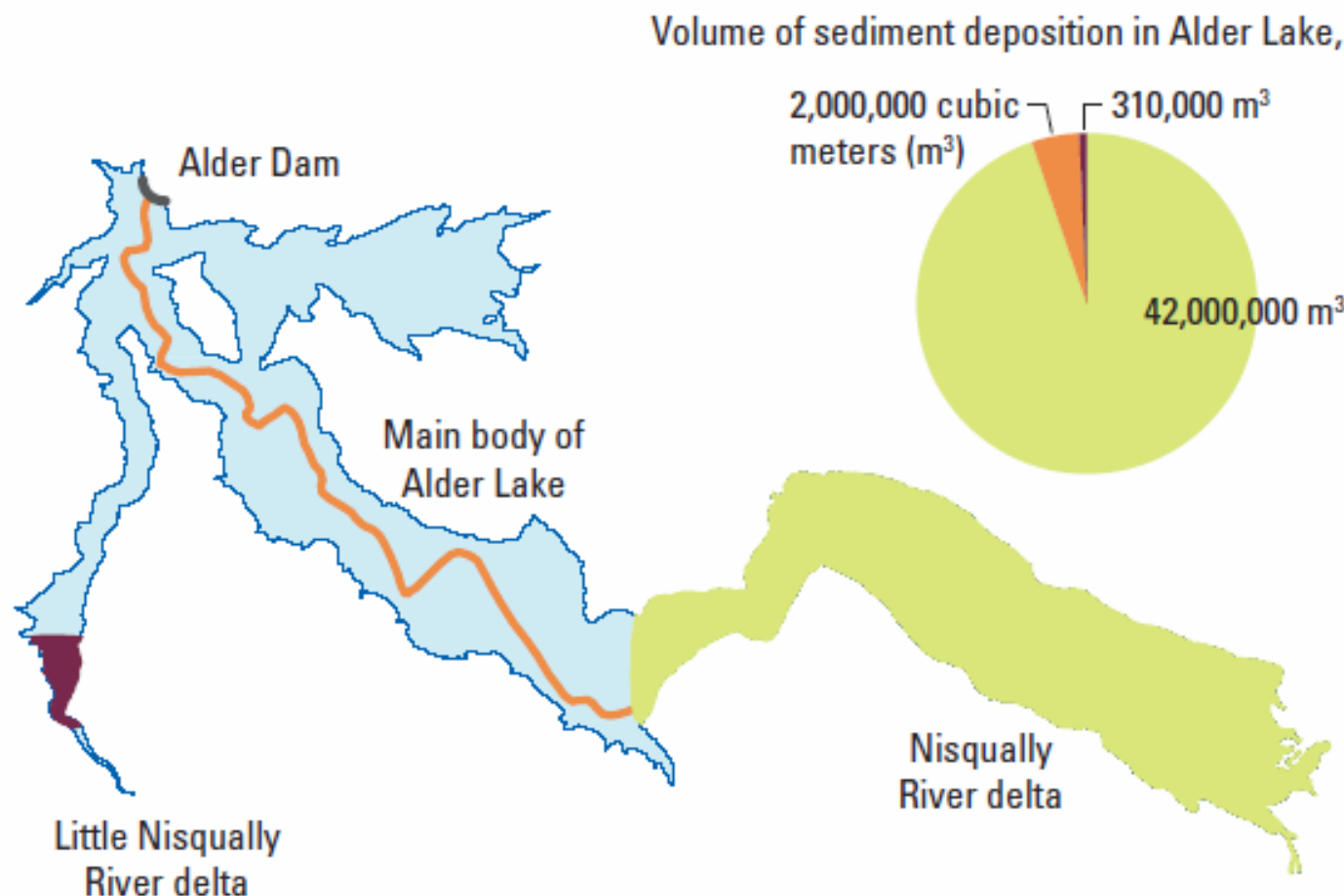


Figure 15. Volume of sediment deposition between 1945 and 2011 at three areas of Alder Lake, Washington: the Nisqually River delta; the main body of Alder Lake, along a 40-meter wide corridor of the pre-dam Nisqually River; and the Little Nisqually River delta.



© 2014 Google
Image Landsat

Google earth

2000

Imagery Date: 5/5/2013 47°04'09.45" N 122°41'56.65" W elev 13 ft eye alt 922 ft

Nisqually Aquatic Reserve Fish Monitoring Sites

Nearshore Sites

- New Seine 2012
- Existing Seine 2012
- New Lampara 2012
- Existing Lampara 2012

Nisqually Aquatic Reserve

Aquatic Land Steward Agent

WADNR

Other State (Non-WADNR)

Other Government/Private/Unknown

Estuary Sites

- Seine
- Lampara

Miles 1 0.5 0 1 2 3



Nisqually Indian Tribe

Cartography by J. Culver, Mar. 2012

Data derived from: Nisqually Aquatic Reserve, Aquatic Lands - WADNR, Fish Monitoring Sites - Nisqually Natural Resources



Beach Seine



Lampara Net



Anderson Island

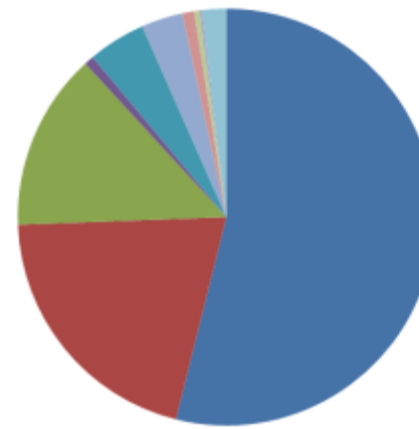


- Pink Salmon
- Chum Salmon
- Shiner Perch
- Hatchery Chinook
- Sculpin
- Pacific Herring
- Saddleback Gunnels
- Hatchery Coho
- Sand Lance
- Starry Flounder
- Other

Monitoring Sites (2011-2013)

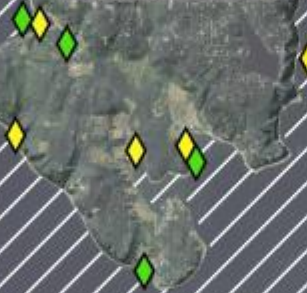


McNeil Island



- Pink Salmon
- Chum Salmon
- Shiner Perch
- Hatchery Chinook
- Sculpin
- Pacific Herring
- Saddleback Gunnels
- Hatchery Coho
- Sand Lance
- Starry Flounder
- Other

Anderson Is



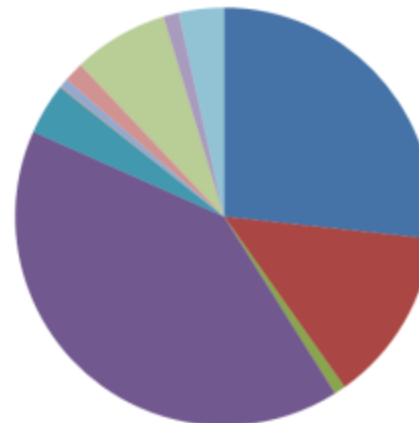
Solo Point Boat Launch

Thurston County Shoreline

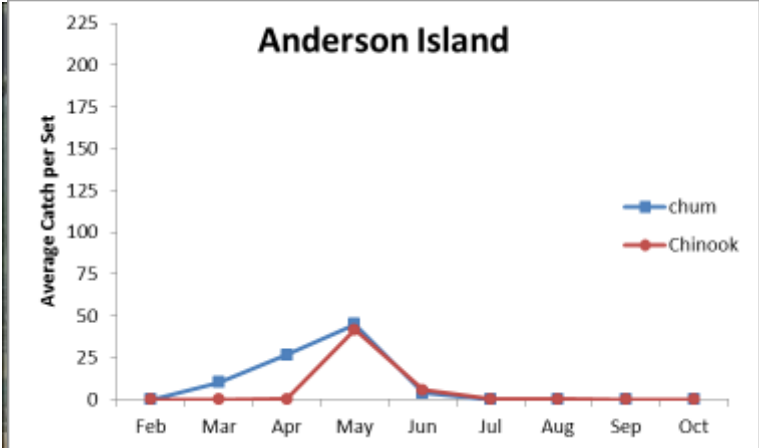


- Pink Salmon
- Chum Salmon
- Shiner Perch
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- Pacific Herring
- Saddleback Gunnels
- Hatchery Coho
- Sand Lance
- Starry Flounder
- Other

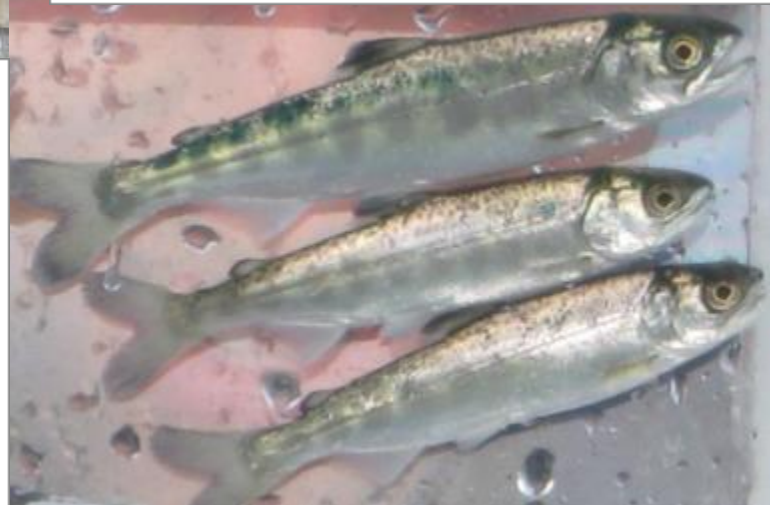
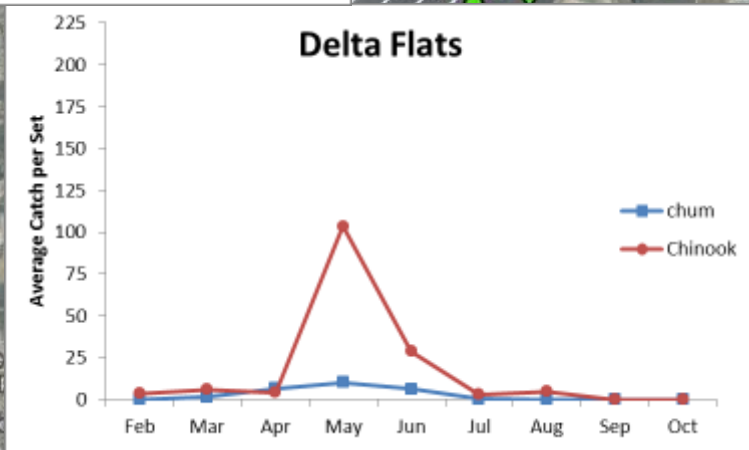
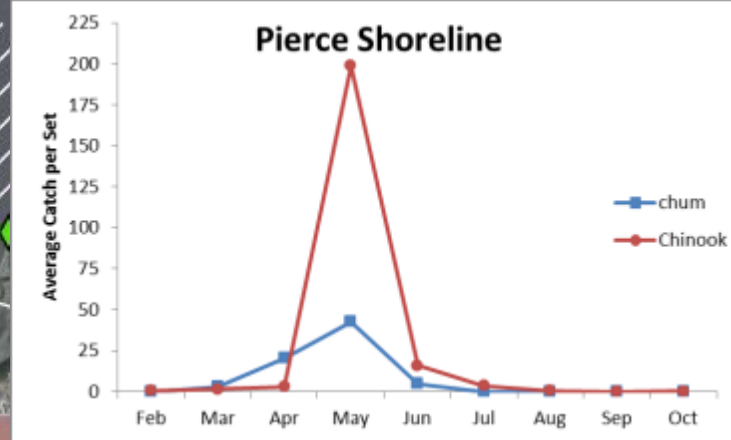
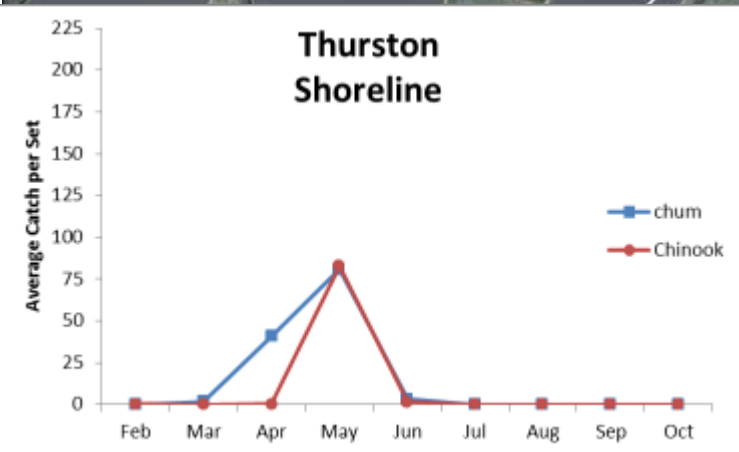
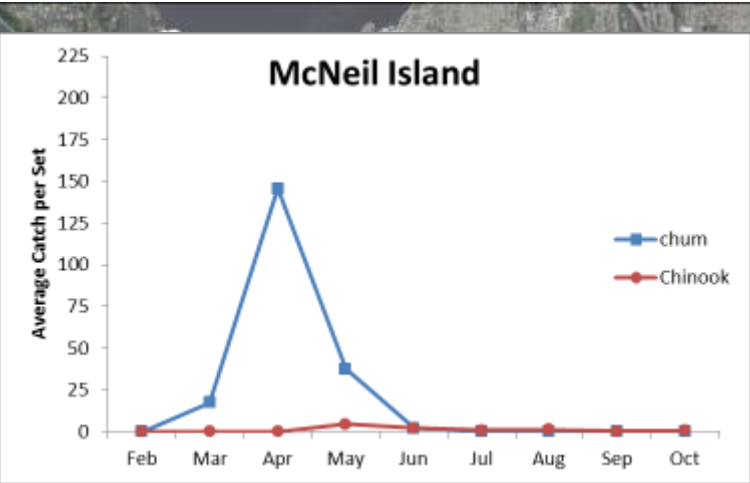
Pierce County Shoreline



- Pink Salmon
- Chum Salmon
- Shiner Perch
- Hatchery Chinook
- Sculpin
- Pacific Herring
- Saddleback Gunnels
- Hatchery Coho
- Sand Lance
- Starry Flounder
- Other



Monitoring Sites (2011)



Nearshore Assessment

Extensive assessment identified over 20 nearshore habitat restoration and enhancement options for a heavily impaired stretch of South Puget Sound shoreline.

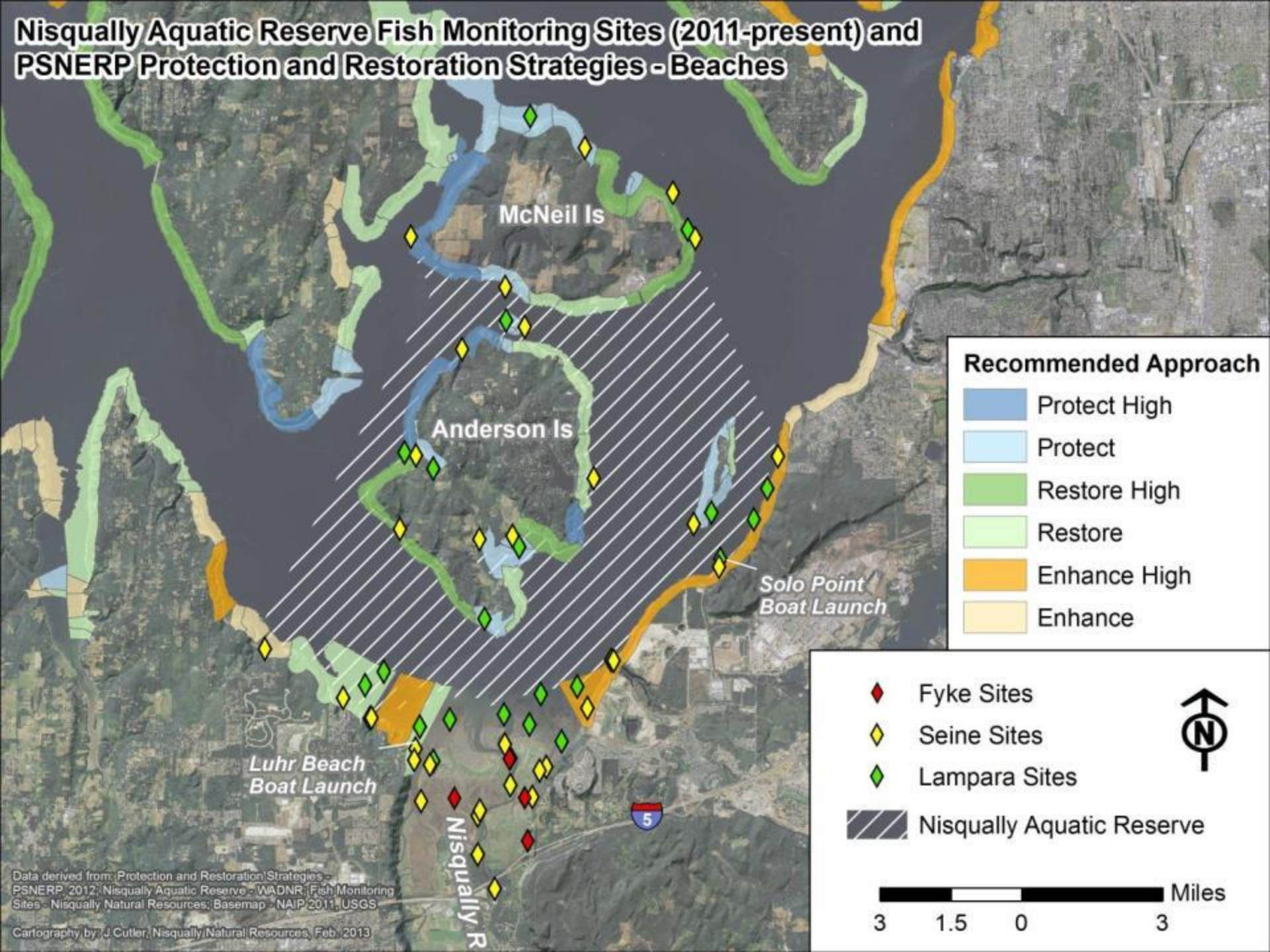
Project Ranking

- ★ Tier 1
- ★ Tier 2
- ★ Tier 3
- ~ Tier 1



12	Sequimichew Feeder Bluff Reconnection
13	Salmon Beach Feeder Bluff Reconnection
14	Sequimichew Drift Cell Nourishment
15	Chambers Drift Cell Nourishment
16	5th Street Waterway Fish Passage Restoration
17	Solo Point Drift Cell Nourishment
18	Tacoma Narrows Drift Cell Nourishment
19	Stellacoom Marina Demolition and Riparian Restoration
20	TOA Beach/Estuarine Restoration
21	Solo Point Estuarine Restoration
22	Day Island Beach and Lagoon Restoration
23	Sunset Beach Restoration

Nisqually Aquatic Reserve Fish Monitoring Sites (2011-present) and PSNERP Protection and Restoration Strategies - Beaches



Data derived from: Protection and Restoration Strategies - PSNERP, 2012; Nisqually Aquatic Reserve - WADNR; Fish Monitoring Sites - Nisqually Natural Resources; Basemap - NAIP 2011; USGS

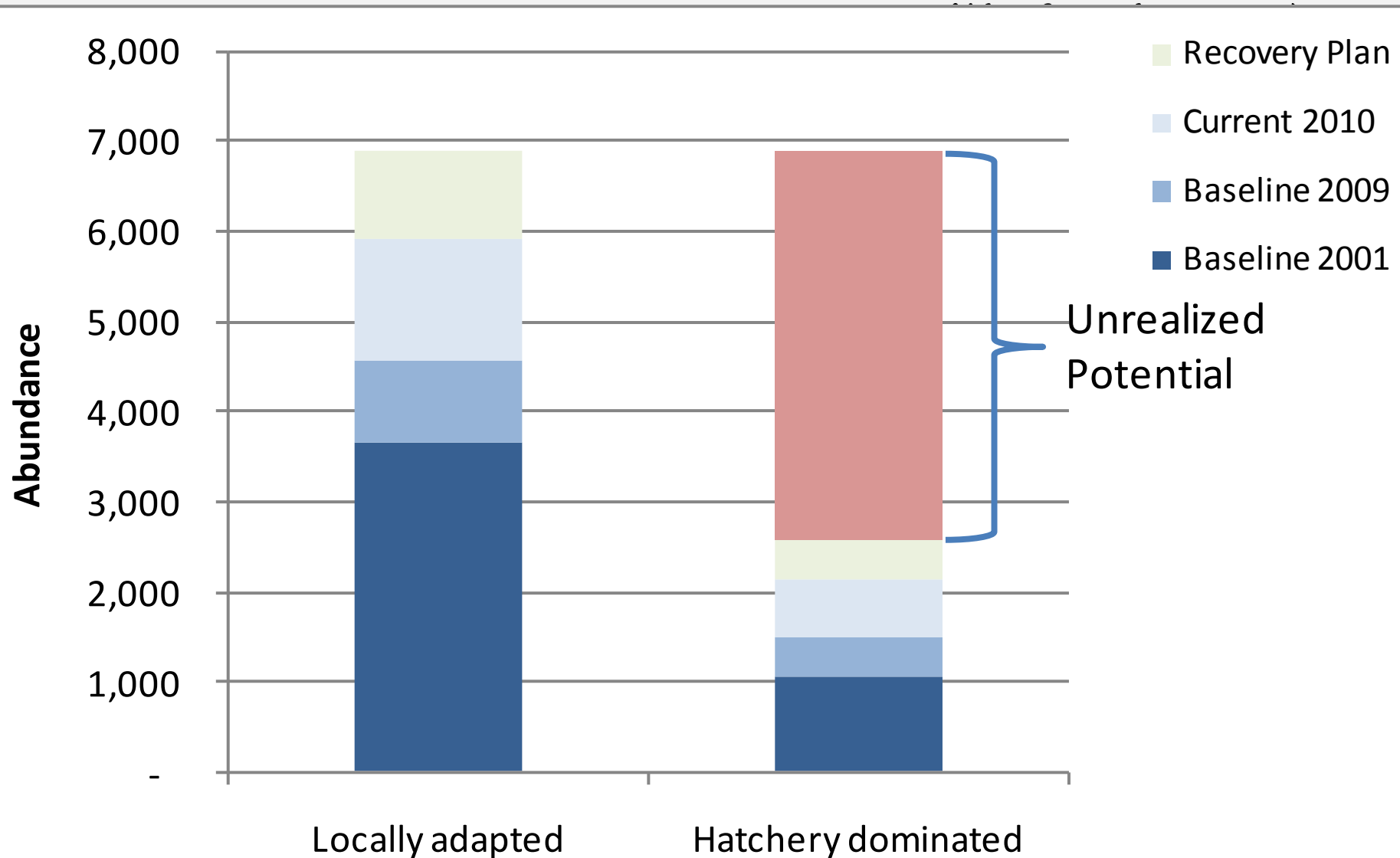
Cartography by: J. Cutler, Nisqually Natural Resources, Feb. 2013







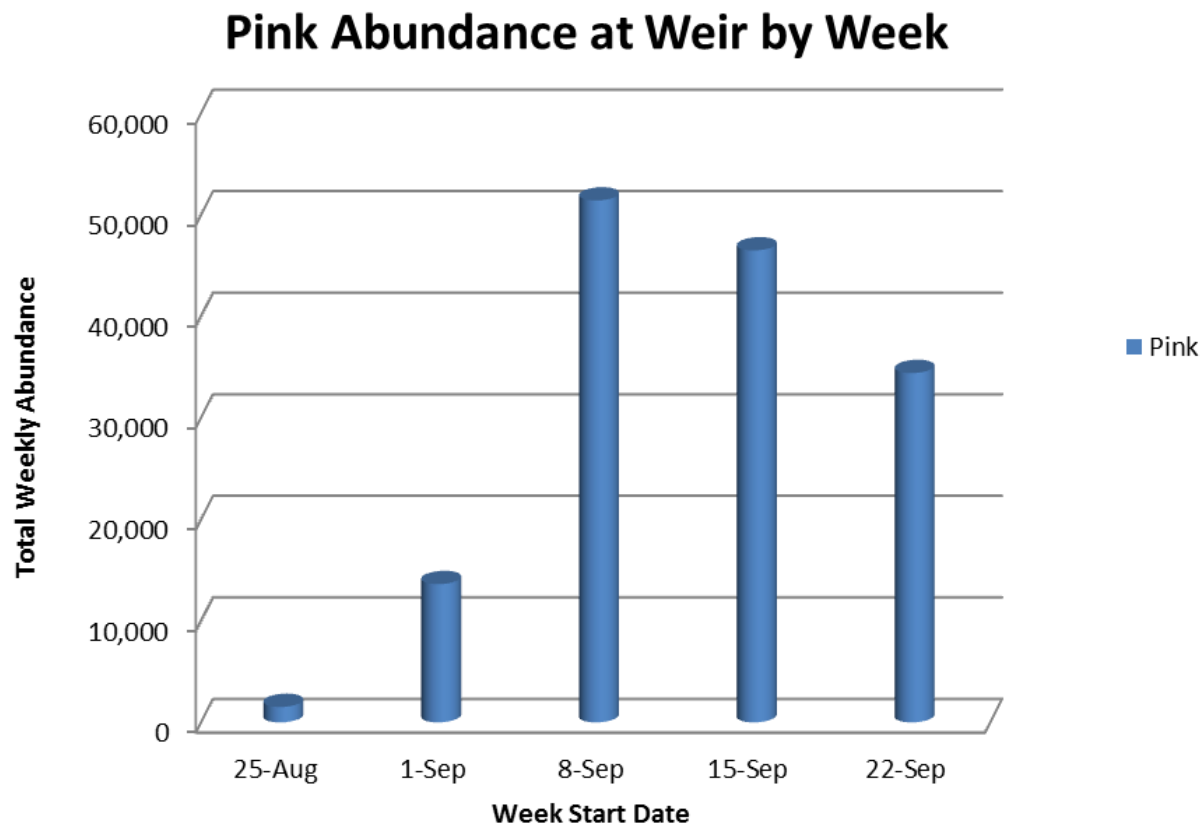
Hatchery dominated Chinook abundance







“Don't cry because it's over, smile because it happened.”
— Dr. Seuss



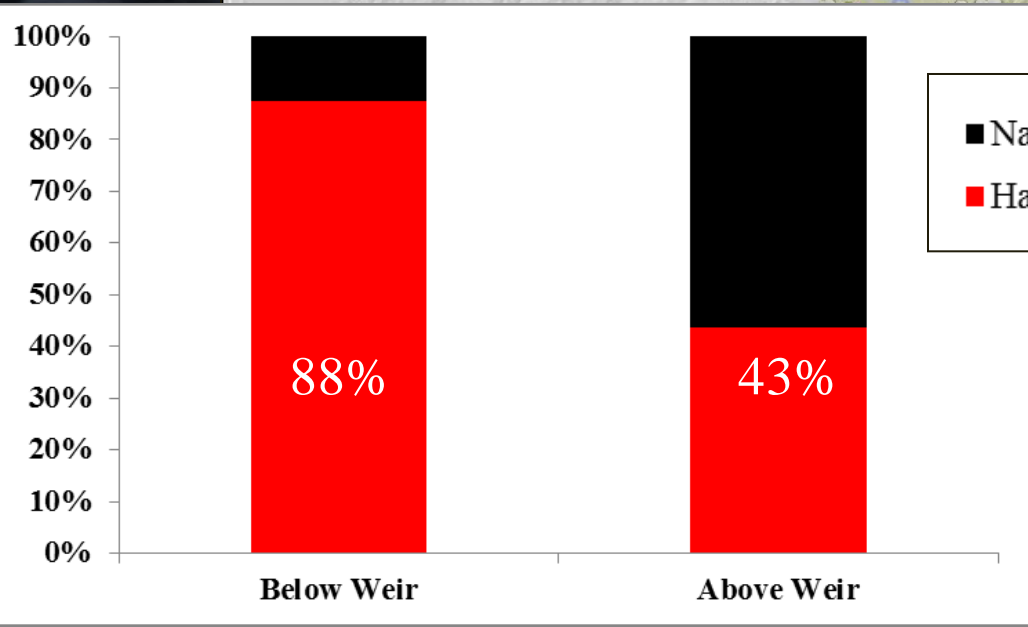
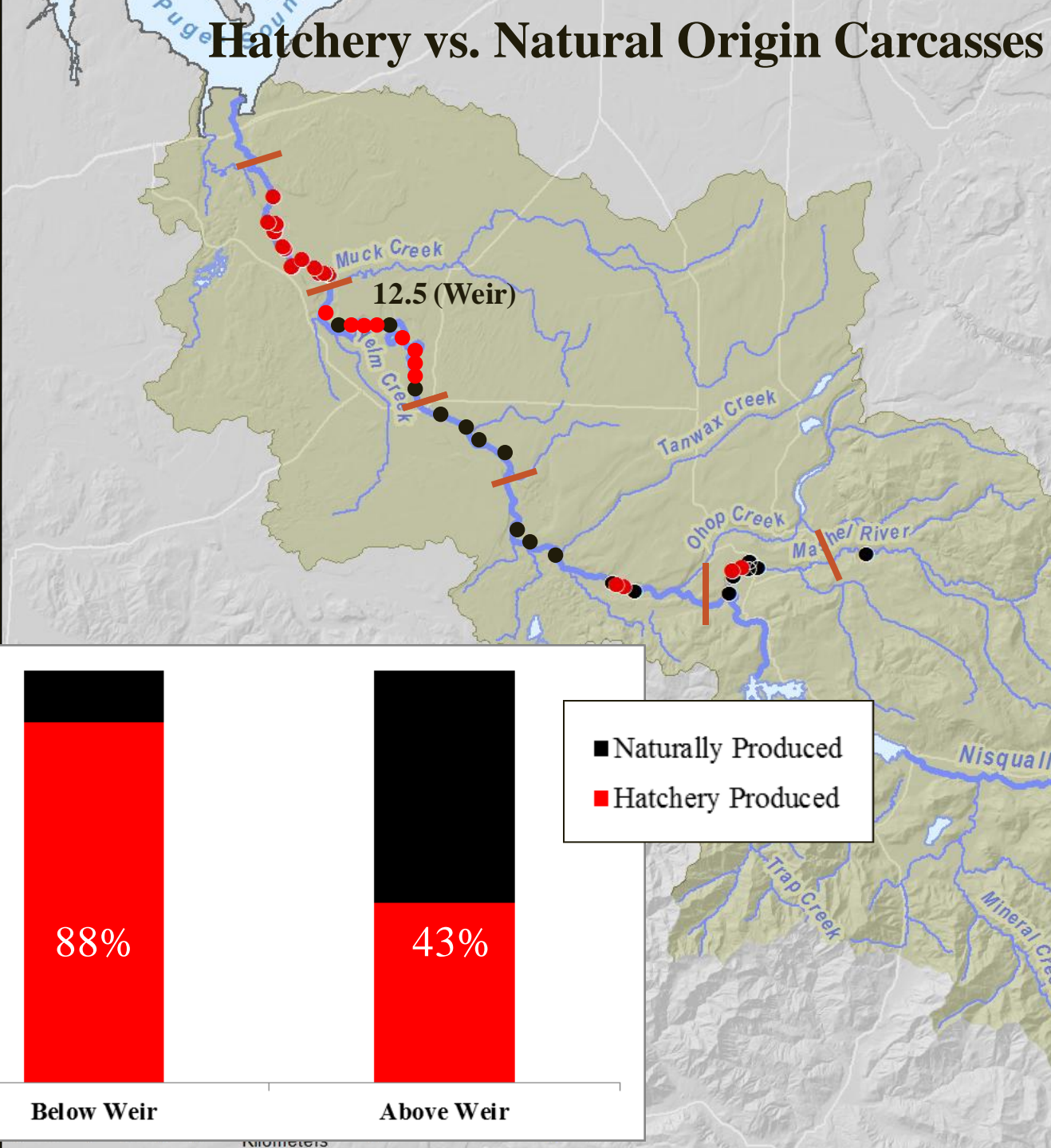
Pinks



**Jaw tag indicates
that this fish was
handled at weir
and spawned
successfully in
Mashel River**

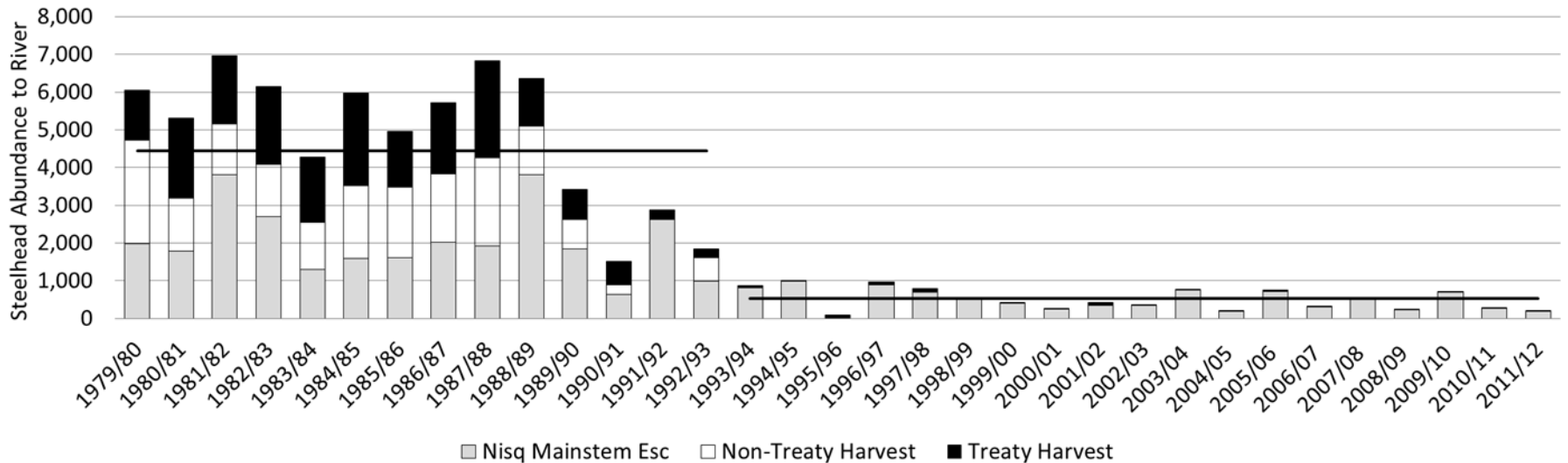


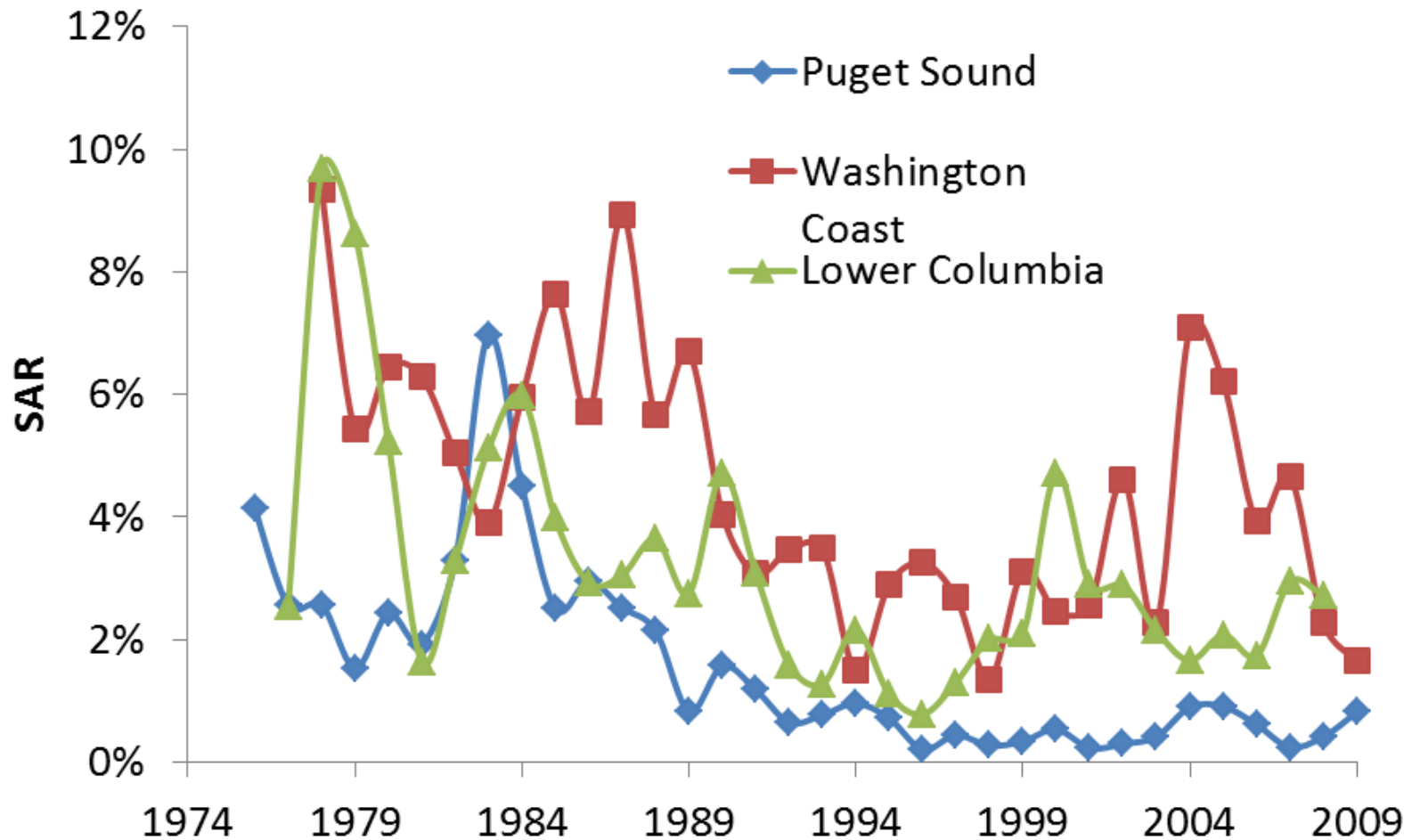
Hatchery vs. Natural Origin Carcasses



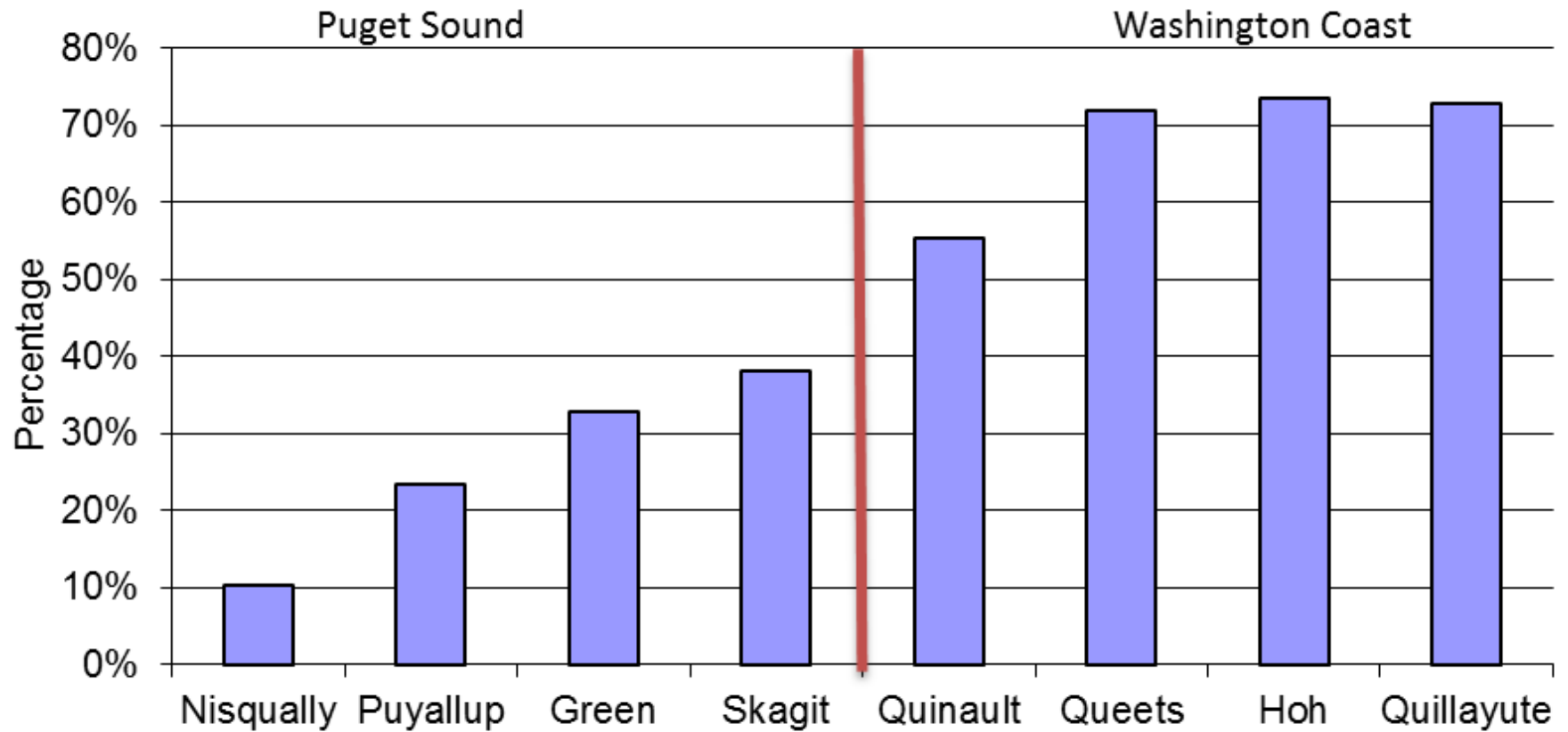
The Problem: Nisqually Steelhead abundance plummets in early 90's

Nisqually River Wild Winter Steelhead Run-Reconstruction (1979-2012).





Smolt-to-adult survival rates for three Puget Sound populations (Elwha, Skagit, Puyallup), three coastal Washington populations (Quillayute, Quinault, Humptulips, Chehalis), and Lower Columbia River (Kalama and Washougal; summer and winter-run). Averages for some years do not include all populations within a region because of the lack of SAR estimates in some populations in some years. Data were compiled by Iris Kemp (LLTK).



Average adult abundance for the most recent six run years (2005-2010) divided by the average adult abundance for run years 1984-1989. Populations are listed from south to north within Puget Sound and the Washington Coast. Data provided by Bob Leland (WDFW) via Ken Warheit (WDFW), and are currently housed on the Salish Sea Marine Survival Project website.



Nisqually Steelhead Early-Marine Survival



Day 13

Strait of Juan de Fuca

**4-18% Steelhead that were
detected in estuary also
detected at Pillar Point**

WASHINGTON STATE

Day 9

Day 5

Seattle

Day 3

Day 2

Day 1.5

Day 0

Nisqually Delta



Simplified Outmigration Path and Average Timing
(line thickness represents number of smolts)



Smolts Detected - 2006



Smolts Detected - 2007



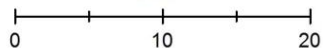
Smolts Detected - 2009

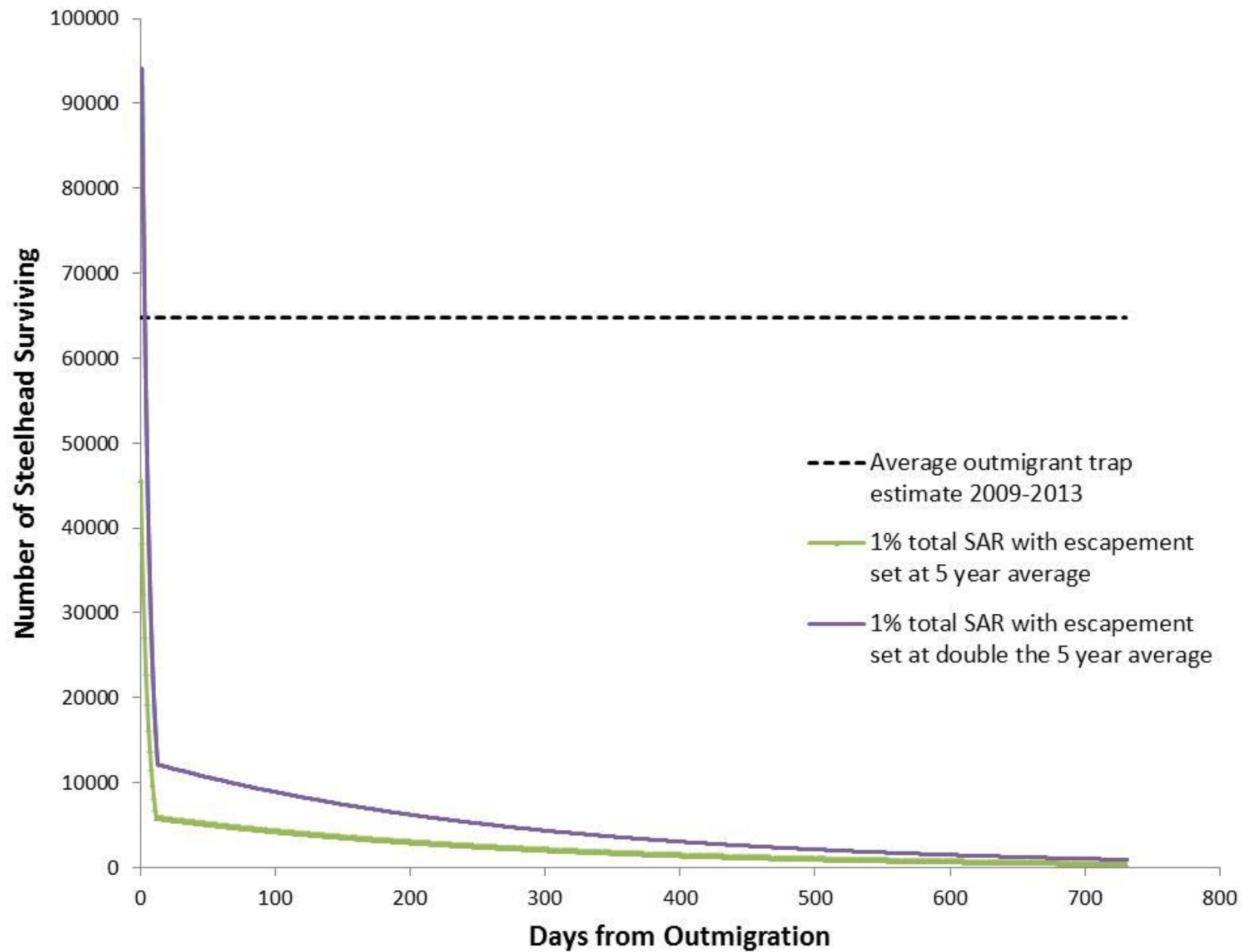


Smolts Undetected



Miles



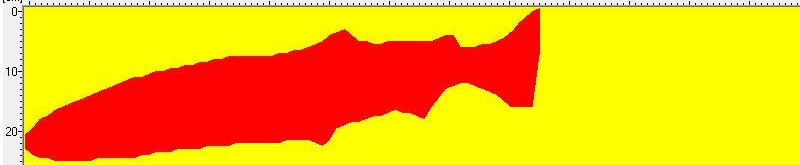




17360

Counter File Images About

Test Add/Remove Files Connect Settings Filter Create Report Close

1/9/2015 1:11:00 PM Depth [mm]: Length [cm]: Speed [m/s]:
Generic Up 145 87 0.61
[cm] 0 10 20 30 40 50 60 70 80 90 100 110 120

Silhouette 2

Tables Charts

Insert fish Delete fish Go to date

Size/Time Temperature File records Visibility

Category	Date/Time	Depth [mm]	Length [cm]	Category	Direction	Speed [m/s]	Frame pos [cm]	storeindex
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	1/8/2015 2:04:00 PM	92	95	Generic	Down	2.85	19	2
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	1/8/2015 2:12:00 PM	102	61	Generic	Down	1.99	10	2
	1/8/2015 2:28:00 PM	85	51	Generic	Down	4.28	7	2
	1/8/2015 2:29:00 PM	90	54	Generic	Down	1.42	11	2
	1/8/2015 2:36:00 PM	115	69	Generic	Up	0.97	38	2
	1/8/2015 2:36:00 PM	105	63	Generic	Down	0.97	7	2
	1/8/2015 2:54:00 PM	95	57	Generic	Up	1.42	4	2
Not fish	1/8/2015 3:34:00 PM	125	75	Generic	Up	0.23	6	2
	1/8/2015 3:51:00 PM	110	66	Generic	Up	0.44	5	2
	1/9/2015 10:37:00 AM	91	54	Generic	Up	0.85	5	2
	1/9/2015 12:31:00 PM	115	69	Generic	Up	1.42	8	2
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	1/9/2015 2:48:00 PM	90	54	Generic	Up	1.36	4	2
	1/9/2015 3:00:00 PM	127	76	Generic	Up	1.52	11	2
	1/9/2015 3:07:00 PM	95	57	Generic	Up	3.57	5	2
	1/9/2015 3:39:00 PM	115	69	Generic	Up	0.7	6	2
	1/9/2015 4:40:00 PM	85	51	Generic	Up	0.55	6	2
Steelhead	1/10/2015 8:42:00 AM	81	48	Generic	Up	0.99	29	2
	1/10/2015 11:15:00 AM	102	61	Generic	Up	1.66	16	2
	1/10/2015 12:38:00 PM	105	63	Generic	Up	1.28	5	2
	1/10/2015 12:48:00 PM	110	66	Generic	Up	1.66	5	2
	1/10/2015 1:46:00 PM	120	72	Generic	Up	1.68	6	2
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	1/10/2015 8:26:00 PM	140	84	Generic	Up	1.15	7	2
	1/10/2015 11:06:00 PM	124	74	Generic	Up	1.08	8	2
	1/10/2015 11:27:00 PM	102	61	Generic	Down	0.72	9	2
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Chinook	1/11/2015 12:48:00 PM	90	54	Generic	Up	1.9	16	2
	1/11/2015 1:29:00 PM	117	70	Generic	Up	0.95	7	2
	1/11/2015 2:16:00 PM	87	52	Generic	Up	1.9	14	2

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