

SNOHOMISH RIVER BASIN

SALMON CONSERVATION PLAN: STATUS AND TRENDS REPORT

February 6, 2020



Refresher: 2005 Salmon Plan

The 2005 Salmon Plan defines a science-based, strategic approach to recovery of threatened salmon populations over a 50-year period.



10-Year Habitat Gains Needed in Key Sub-Basin Strategy Groups

Sub-Basin Strategy Group and Habitat Condition	Current Intact	Needed Gain in Next 10 Years (Including Current Path Gains)	Total Needed at Year 2015
Nearshore Beaches and Shoreline	8.4 miles	At least 1 mile	At least 9.4 miles
Estuary: Tidal Marsh	1,483 acres	1,237 acres	2,720 acres
Mainstem Primary Restoration:			
Restored Edge Habitat	236 miles	10.4 miles	246.4 miles
Restored Riparian Habitat	5,991 acres	256 acres	6,247 acres
Restored Off-Channel Habitat	350 acres	167 acres	517 acres
Large Woody Debris	N/A	41 new logjams	

Status & Trends Report



- How are we doing on implementing recovery actions to meet our 10 year habitat gain targets?
- What changes are we seeing in the watershed and region since Plan approval?
- What should Forum and restoration partners consider when updating our plan?



Contents

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- **Updating our Salmon Plan**
 - Climate Change
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 - Considerations for updating the Plan

Snohomish Basin Trends



Snohomish Basin Trends

Riparian forest conversion



Loss in riparian forest acreage due to conversion to development, scrub/shrub, cultivation, water

Wood in Rivers



+194 logjams observed since 2002

Bank Armoring

Basin Trends



Chinook Bend levee removal



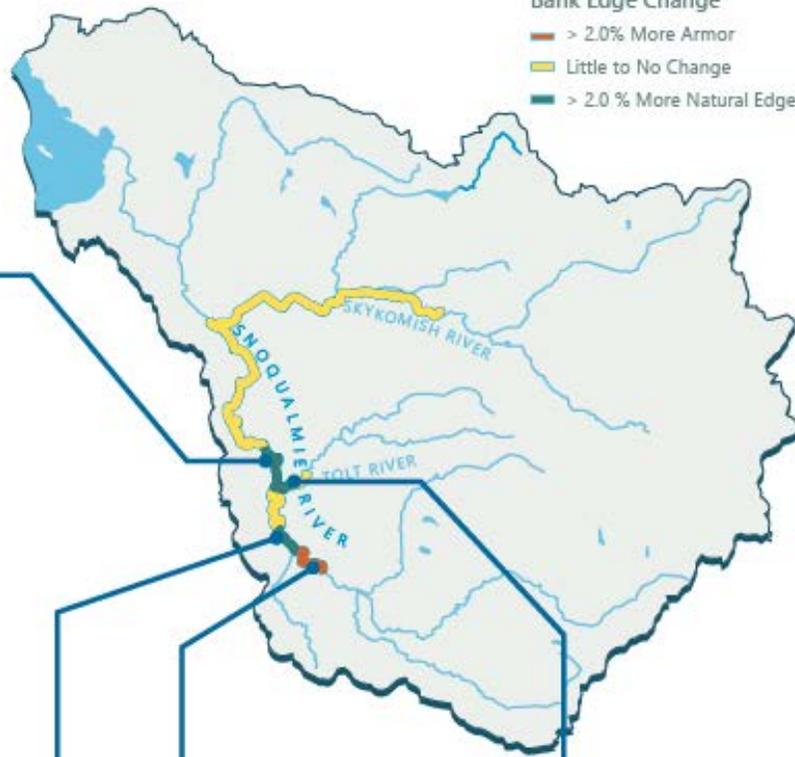
Stillwater Levee removal

▲ 9.1%
more natural edge



Upper Carlson levee removal

▲ 4.63%
more natural edge



New armor observed around
SE David Powell Road

▼ 7%
more armor



Lower Tolt levee setback

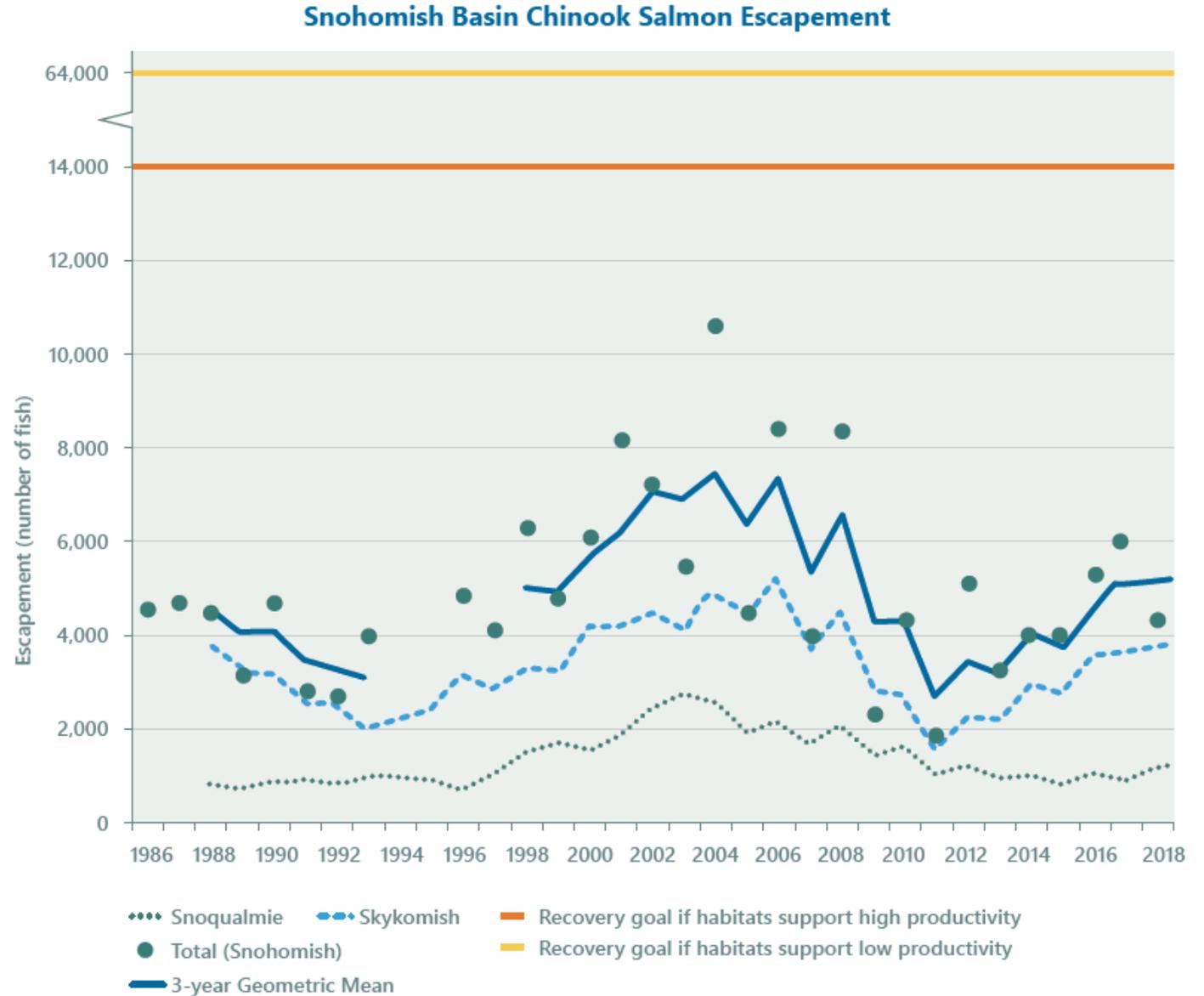
▲ 11.6%
more natural edge



Salmon Trends

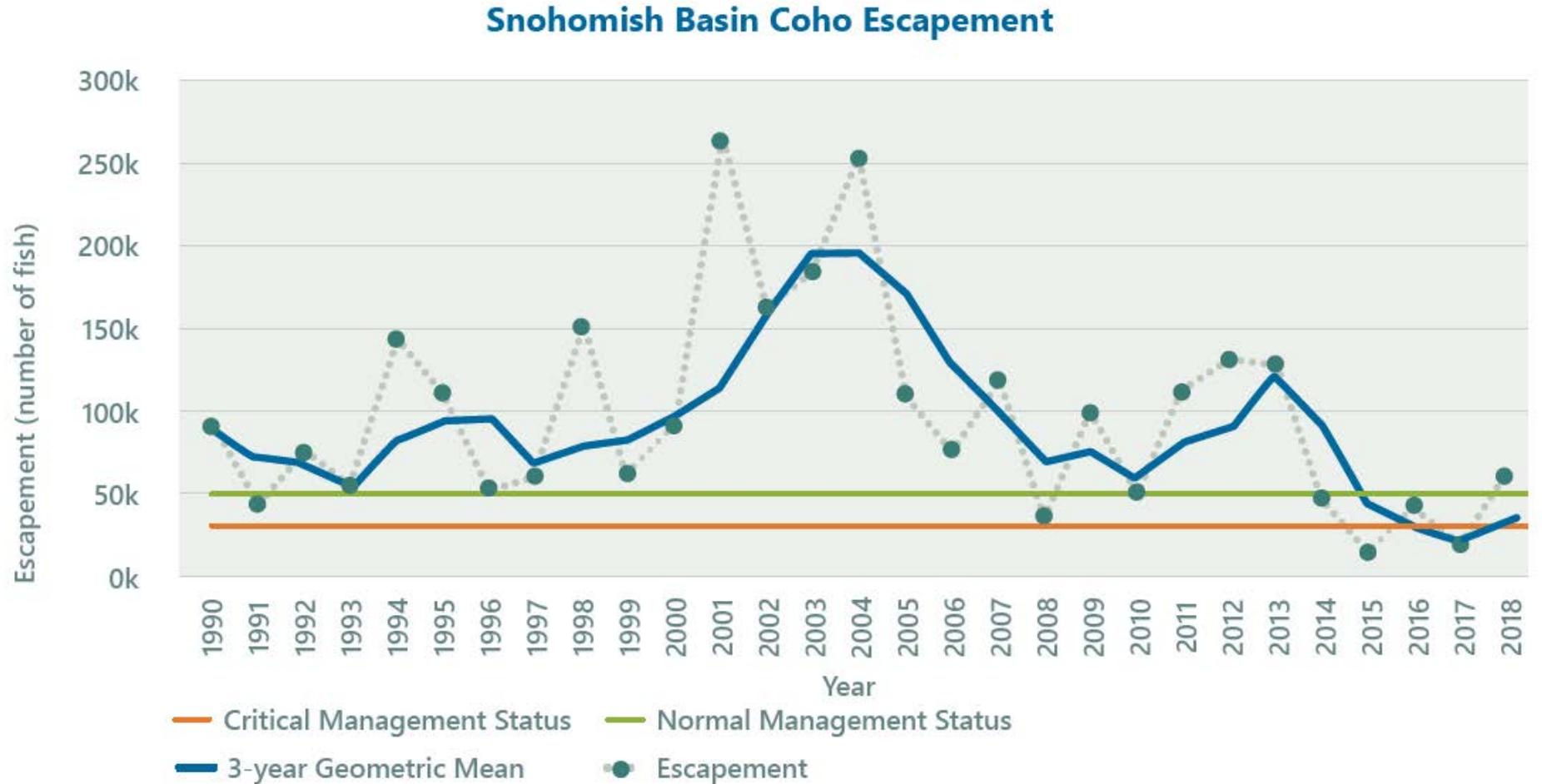
Salmon Trends:

Chinook



Salmon Trends:

Coho



Emerging Species of Concern



In 2015, numbers across Puget Sound were **95% below** the highest recorded escapement (262,000).



After 2006, populations **dropped by 95%**.
After 2015, populations **dropped by 80%**.



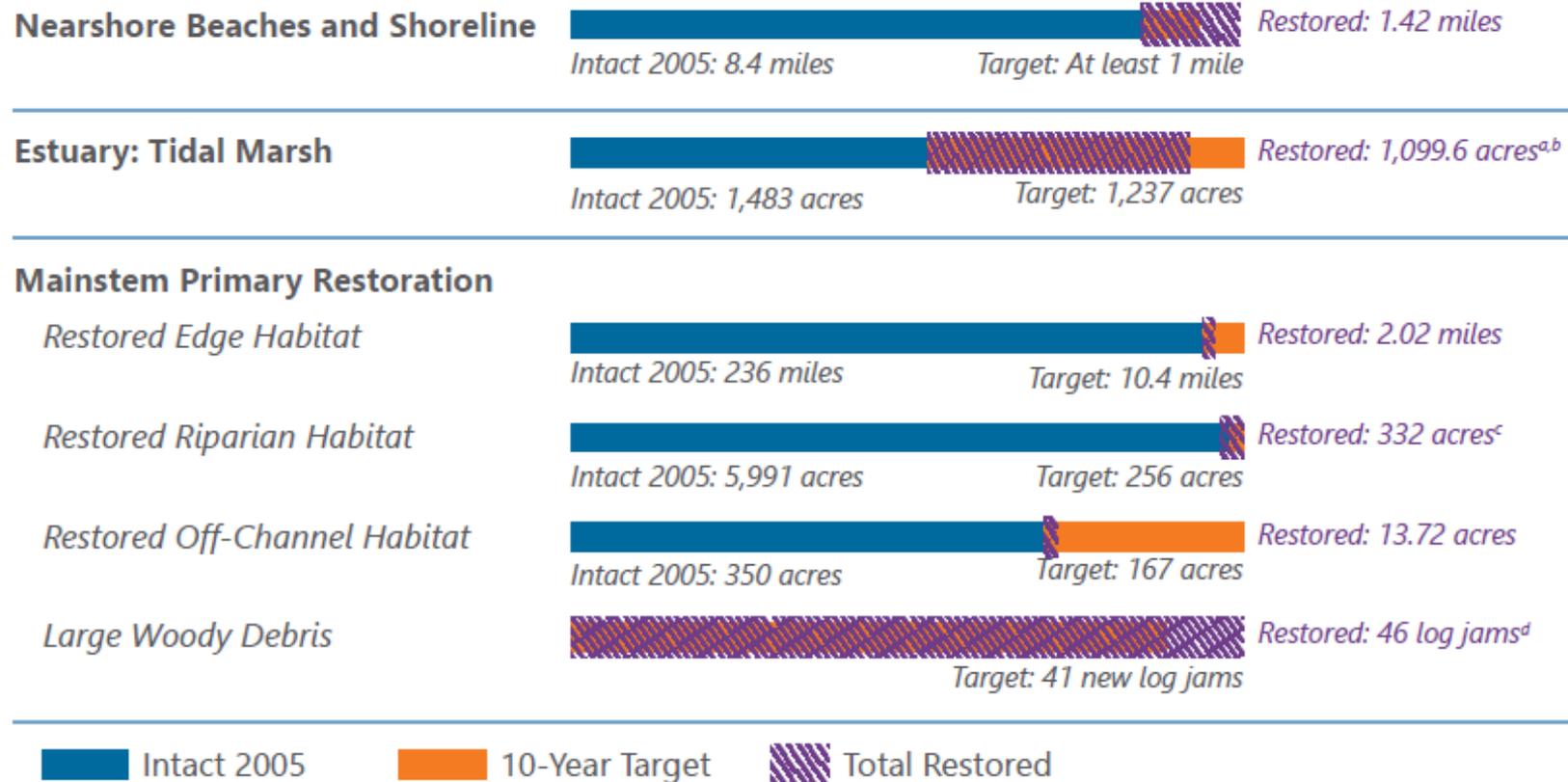
While the 2017 run size was **3% of the 2013 run**, populations can be highly variable. Unclear if a downward trend is occurring.

Implementation Progress



Implementation Progress:

Progress Relative to 10-Year Goals (Set in 2005)



Condition of Watershed Processes:

Moderately degraded

Recovery Need:

Substantial improvement

Nearshore Restoration

Nearshore Beaches and Shoreline



Intact 2005 10-Year Target Total Restored



Nearshore restoration at Howarth Park before (above) and after (below)



Condition of Watershed Processes:
Degraded

Recovery Need:
Substantial improvement



Estuary Restoration

Estuary: Tidal Marsh



Condition of Watershed Processes:

Moderately degraded or degraded

Recovery Need:

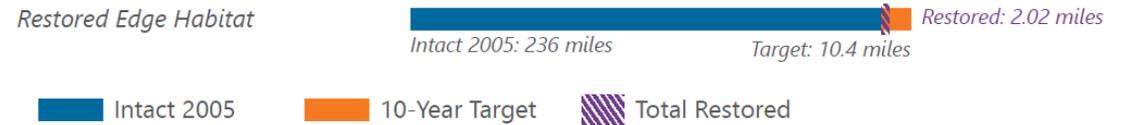
Substantial improvement

Mainstem Primary Restoration



Mainstem Restoration

Restored Edge Habitat



Large Woody Debris



Note:

Total accounts for constructed in-river mainstem log jams. It does not include floodplain log jams or wood structures used as bank stabilization or mitigation. The total does account for change over time (i.e., log jams that did not persist were removed from the total). Additional information on wood in rivers is on page 40.

Restored Off-Channel Habitat



Restored Riparian Habitat



Note:

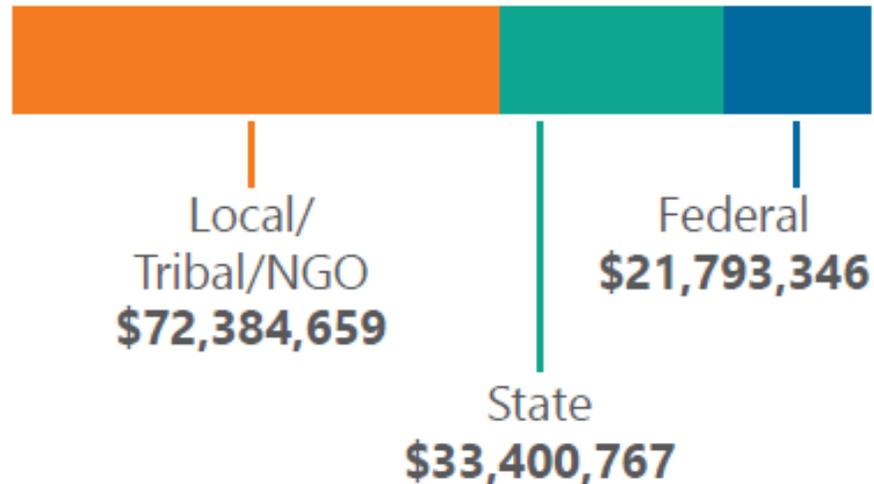
Total shown includes Snohomish County Conservation Reserve Enhancement Program and progress through 2018. Note this progress total does not account for riparian habitat losses (refer to the discussion on page 37).

Habitat Restoration Funding



Funding Restoration

Funding Received by Source



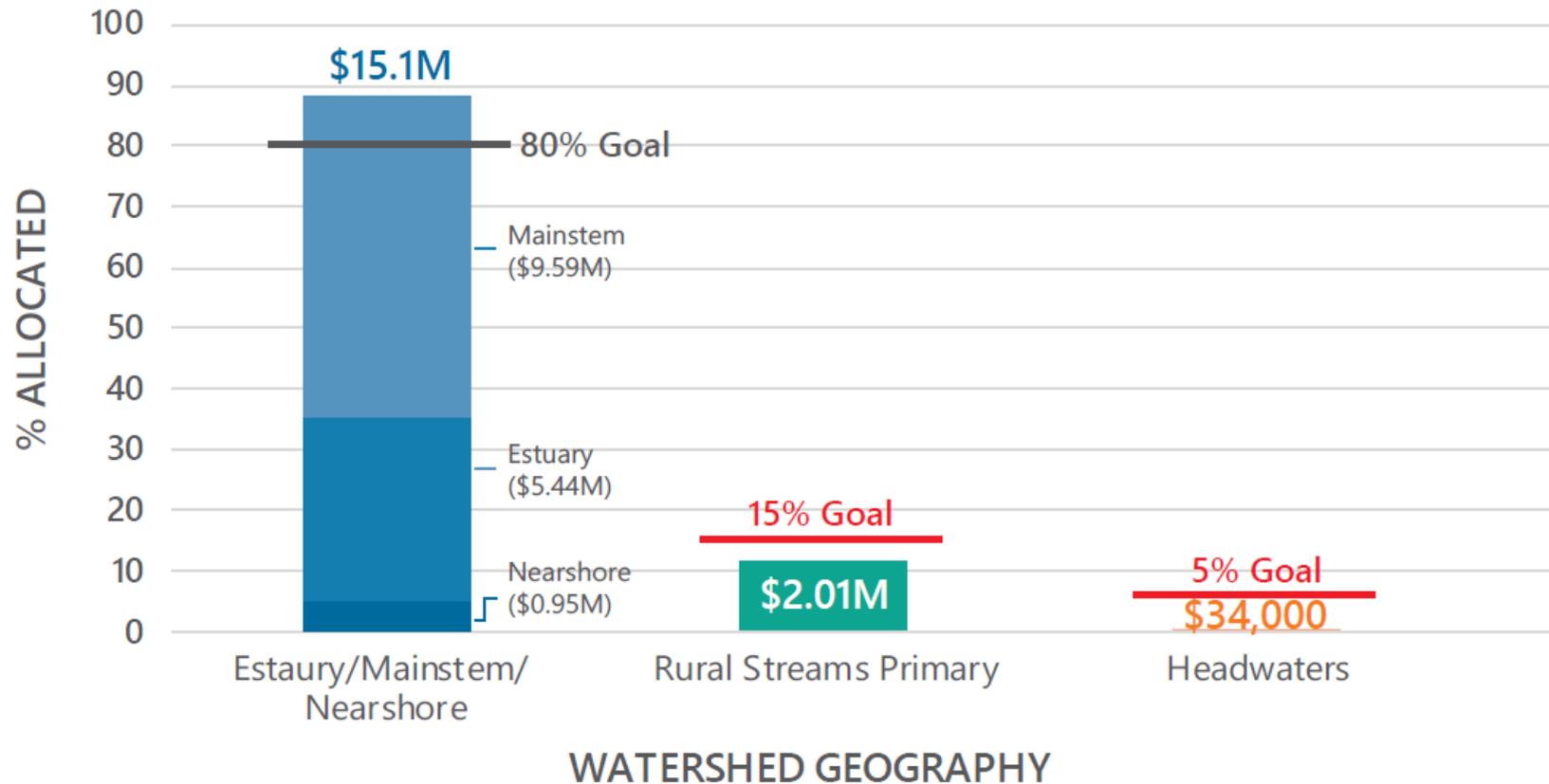
Funding Received Across All Funding Sources

2005	\$24,611,555
2006	\$2,951,017
2007	\$3,782,109
2008	\$5,345,443
2009	\$13,277,087
2010	\$4,114,112
2011	\$6,595,671
2012	\$7,978,991
2013	\$20,182,070
2014	\$9,274,613
2015	\$12,670,002
2016	\$11,168,507
2017	\$5,627,595
Total	\$127,578,772

Total funding target for 14 years of Salmon Plan implementation is \$210,000,000.

Funding Restoration

Snohomish Basin Funding Allocation Summary



Source: Pacific Coastal Salmon Recovery Fund, Salmon Recovery Funding Board, and Puget Sound Acquisition and Restoration

Challenges and Opportunities



Challenges and Opportunities



Updating our Salmon Plan



Updating our Salmon Plan

Among other goals, the Update will aim to:

- Update habitat restoration targets.
- Update recovery strategies to incorporate new science.
- Consider new strategies and actions.



Updating our Salmon Plan

Late 2019 –
Early 2020

- Collect and synthesize new information
- Develop the framework for plan update

Early 2020 –
Early 2021

- Complete new analyses
- Further develop/vet new content

Early to Mid
2021

- Develop draft for review
- Identify future work

Mid 2021 –
Late 2021

- Adoption

An aerial photograph of a lush green valley. A river flows through the center, winding between dense green forests and open green fields. A bridge crosses the river in the lower middle. To the right, there are rows of solar panels. The overall scene is a mix of natural beauty and human development.

Questions?

Report Authors



Special thanks and consideration for the contributing authors of this document, including:

- **Tulalip Tribes Natural Resources Treaty Rights Office:** Morgan Ruff and Colin Wahl
- **Snohomish County Surface Water Management:** Gretchen Glaub and Mike Rustay
- **King County/Snoqualmie Watershed Forum Staff:** Elissa Ostergaard and Beth LeDoux
- **Snohomish Basin Salmon Recovery Forum, Policy Development Committee, and Technical Committee members** who provided review and comment.

Climate Change

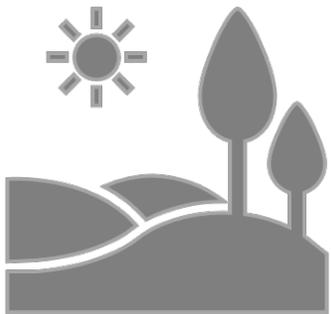
Predicted impacts include...



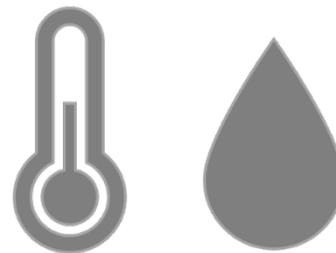
**More intense,
frequent flooding**



**Less snow and earlier
spring snow melt**



**More intense
summer low-flows**



**Increased water
temperature**



**Altered conditions for
nearshore and estuary**

Appendix

Risk	Improvements/Refinements to Management Actions
1 – Migration delay and blocking effects at hatchery weirs	<ul style="list-style-type: none"> • Improved weir management • Implementation of upstream passage and trapping protocols
2 – Removal effects of natural-origin fish	<ul style="list-style-type: none"> • Selective harvest focused on hatchery returns • Strict protocols in the Hatchery and Genetic Management Plans and Terms and Conditions in the NOAA Fisheries' Biological Opinion reduce adverse effects on spatial distribution and population abundance • Refinements to account for the interacting effects of habitat, hatchery, and harvest actions on population status, as expressed by viable salmon population parameters, to determine the phase of recovery and associated management actions
3, 4, and 5 – Amplification and transmittal of infectious pathogens, food resource competition, and predation	<ul style="list-style-type: none"> • Monitored under the Terms and Conditions in the NOAA Fisheries' Biological Opinion; no significant new findings or improvements in monitoring methods
6 – Potential for decreased genetic diversity and fitness through hatchery adult straying and interbreeding with wild fish	<ul style="list-style-type: none"> • Improvements in monitoring infrastructure and capacity, and refinements in monitoring methodology to address genetic risks posed by hatchery-origin Chinook salmon, including: <ul style="list-style-type: none"> - Greatly improved stock assessment through increased marking, sample collections, laboratory sample analysis, quality assurance/quality control, and database management - Development of new stock assessment tools - Refinements to the broodstock collection protocol

Implementation Progress

HATCHERY

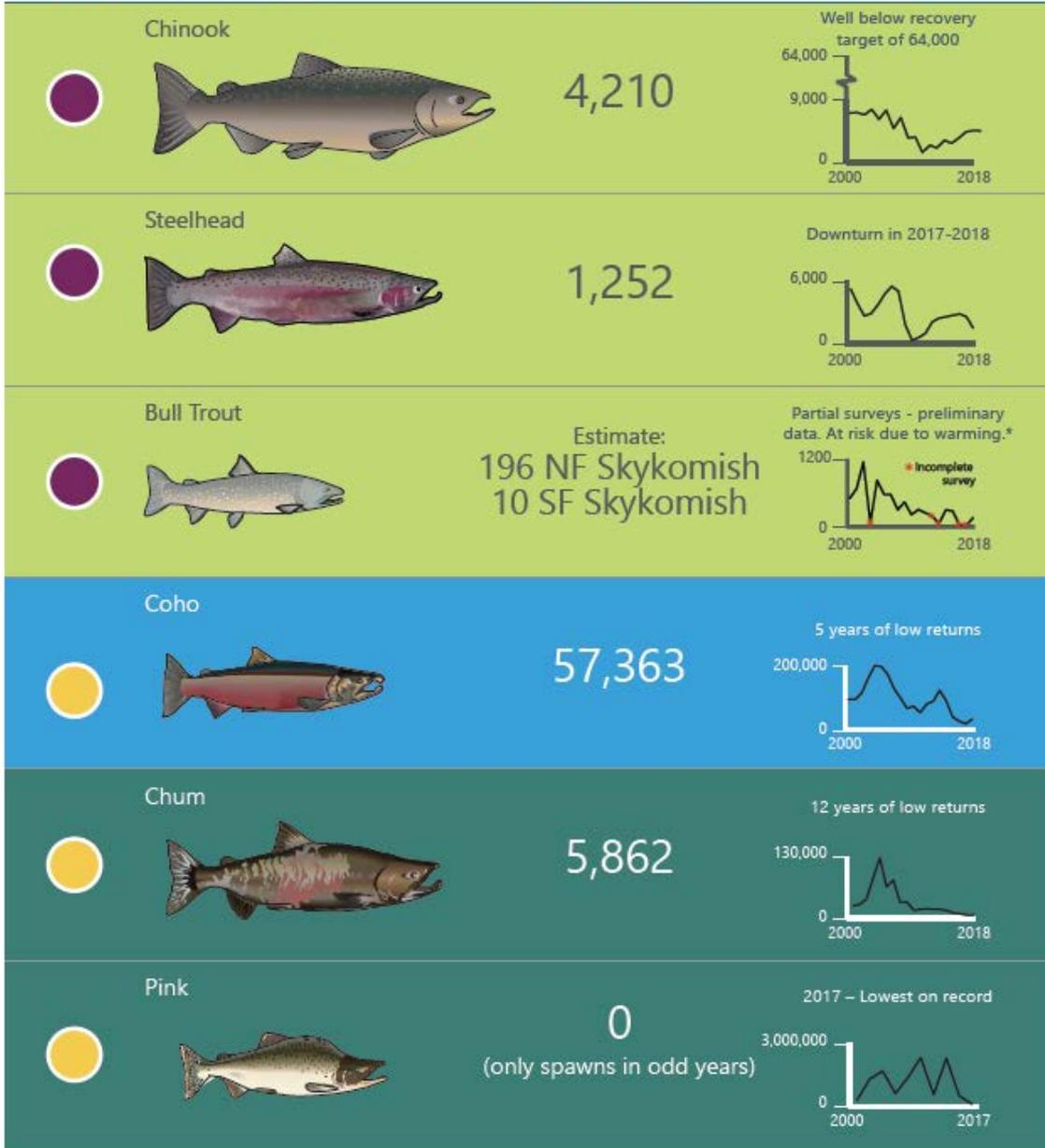
- Knowledge of genetic and ecological risks of hatcheries has greatly improved.
- Hatchery operations have adjusted to limit risks.
- Key management actions to address potential risks have been improved and refined.

ESA Threat Level

Species

2018 Spawners

Status



Threatened Species of Concern

Spawner Estimates

Estimates from Washington Department of Fish and Wildlife and Tulalip Tribes 2018, unpublished data for Snohomish Basin

*This graph does not represent a population estimate; it is an estimate from the WDFW South Fork Skykomish trap and haul facility only.

Basin Trends

Wood in Rivers

A total of 624 in-river wood jams have been observed in the Snohomish Basin since 2002.

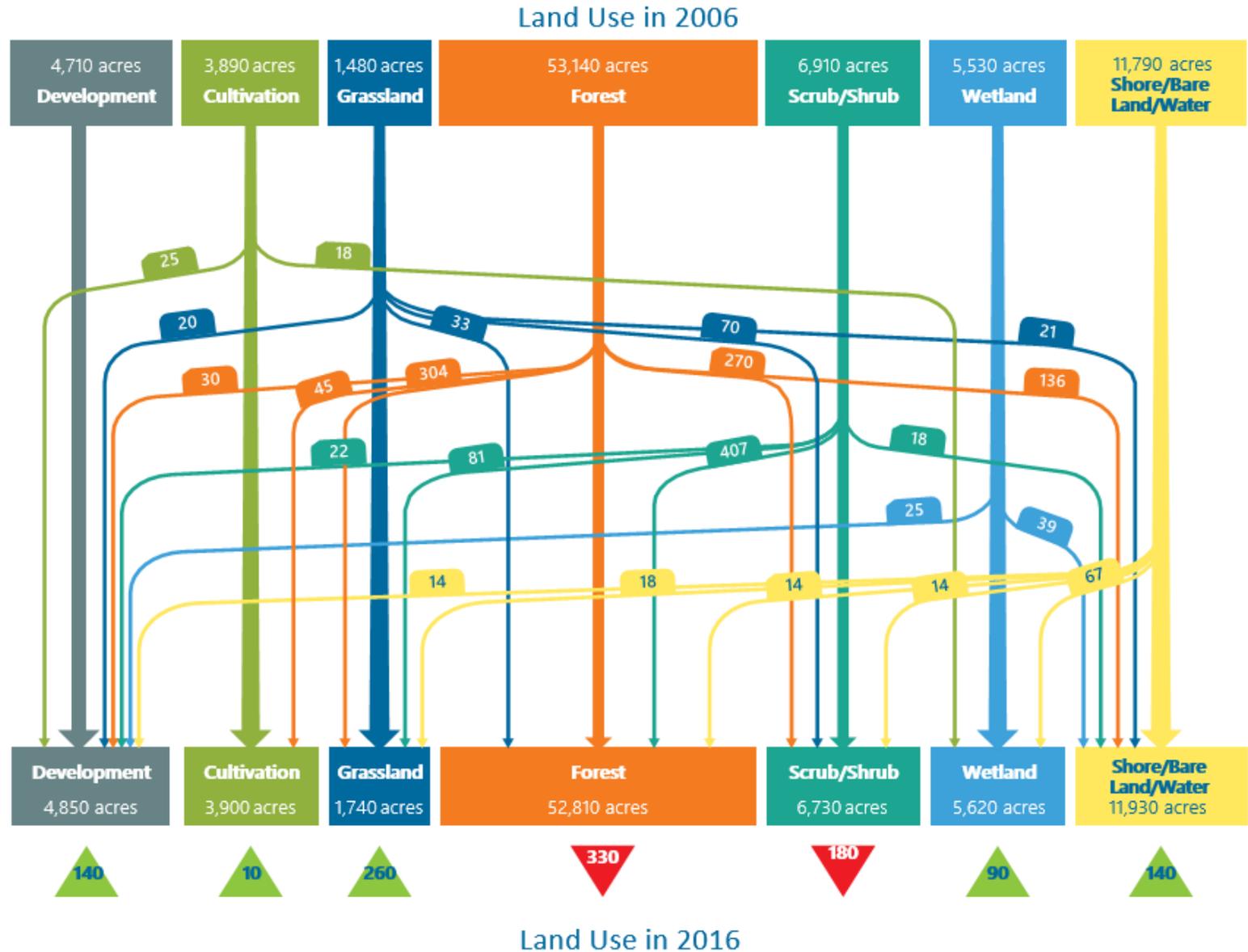
In-River Wood Jam Observations in Selected Mainstem Rivers

Mainstem River Segment	2002	2004	2007	2015	2017	Change
Snohomish		9		27		18
Skykomish	Above Sultan	77		119		42
	Below Sultan	35		40		5
Pilchuck			52	64		12
Sultan			8	21		13
Snoqualmie	Above Tolt	10			31	21
	Below Tolt	11			55	44
Tolt	13				52	39
Total		215		409		194

Riparian & Forest Cover

Basin Trends

Conversions from 2006-2016 of Land Use Types within 150-Foot Riparian Buffers in the Snohomish River Watershed



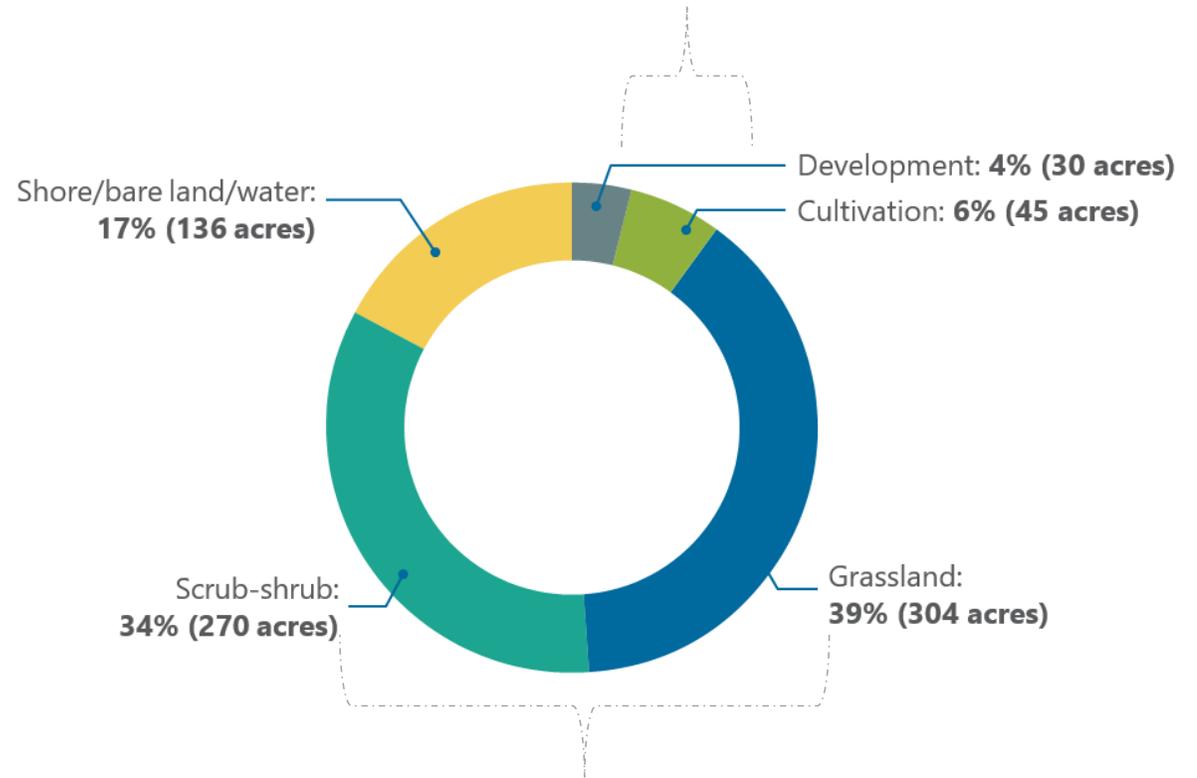
Increase / Decrease? →

Basin Trends: Riparian and Forest Cover

NOAA's Coastal Change Analysis Program (C-CAP) dataset:

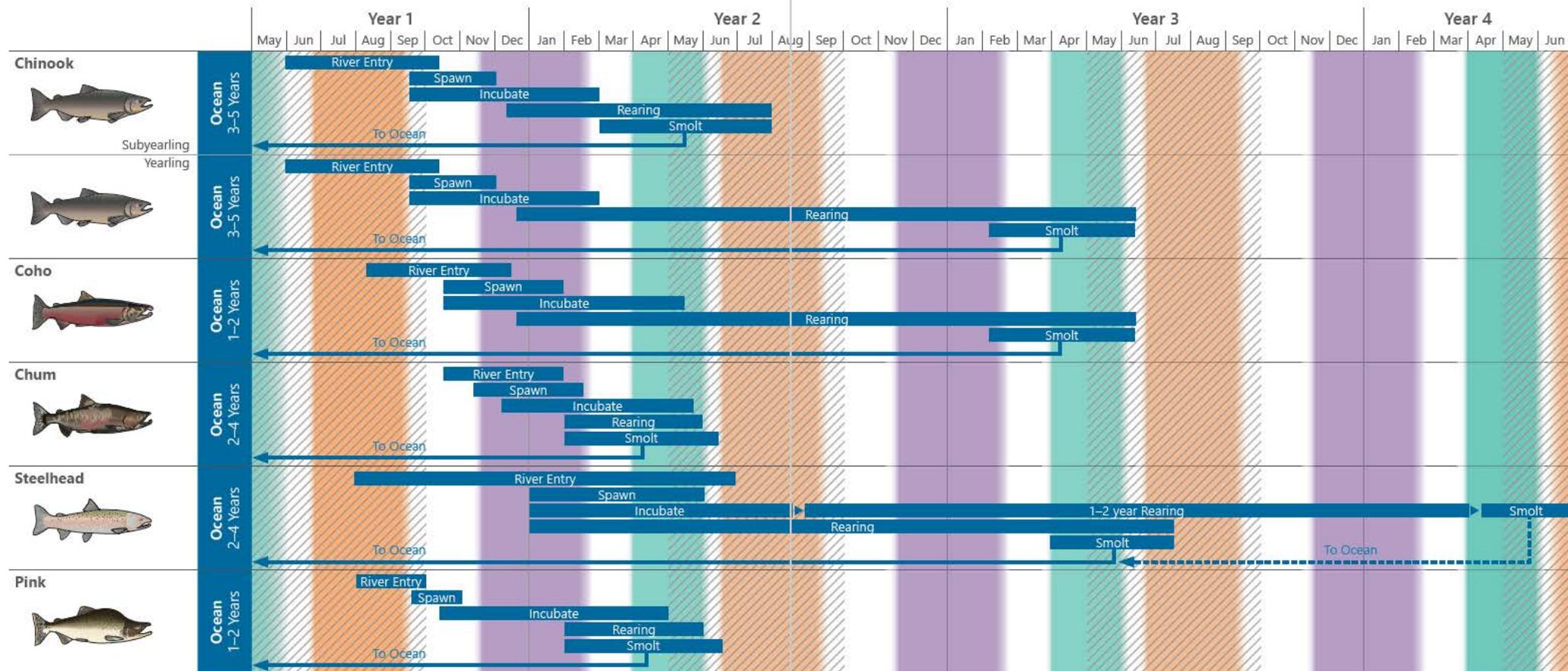
- analyzed data from 2006-2016
- relatively low resolution at 30 square meters
- More investment and improvement in refining high-resolution, remote-sensing data is needed.

~75 acres of forest was lost within 150 foot buffers due to human activity.



~~574 acres of shrub-shrub and grassland were converted to riparian forest.

Basin Trends: Climate Change Impacts



Increased summer temperature may decrease growth or kill juvenile salmon where temperatures are already high and block or delay migration. Increased temperatures may also decrease spawning fecundity (e.g., Chinook) or kill adult fish.

Decreased summer low flow may contribute to increased temperature, decrease rearing habitat capacity for juvenile salmon, and decrease access to or availability of spawning areas.

Increased winter floods may increase scour of eggs, or increase mortality of rearing juveniles where flood refugia are not available, and displace juveniles to less desirable habitats.

Loss of spring snowmelt may decrease or eliminate spawning opportunities for steelhead, may alter survival of eggs or emergent fry for other salmon species, cause early dewatering of off-channel and side-channel habitats, and reduce connectivity to the floodplain.

Funding Restoration: Leveraging \$\$\$

	Basin Watershed Allocation Funding *	Leveraged Funding **	Total	Percent Funded by Non-Forum Controlled Funds	Allocation: Leveraged Funding (in dollars)
Nearshore	\$952,003	\$1,490,000	\$2,442,003	61%	\$1 : \$1.57
Estuary	\$5,443,127	\$35,557,522	\$41,000,649	87%	\$1 : \$6.53
Mainstem	\$9,593,123	\$27,408,035	\$37,001,158	74%	\$1 : \$2.86
Rural Streams/ Tributaries	\$2,089,725	\$10,911,679	\$13,001,404	84%	\$1 : \$5.22
Headwaters	\$33,997	\$31,397,479	\$31,431,476	99.89%	\$1 : \$923.54
Basin-Wide	—	\$2,458,229	\$2,458,229	100%	n/a
Total	\$18,111,975	\$109,222,944	\$127,334,919		

Notes:

* These funds are distributed per decision of the Forum. Source: Pacific Coastal Salmon Recovery Fund, Salmon Recovery Funding Board, and Puget Sound Acquisition and Restoration

** Source: Additional federal, state, and local investments

Protection Strategies

- Habitat and Hydrology Protection
- Urban Protection
- Rural Residential Protection
- Agriculture Protection
- Forestry Protection

Basin-wide Protection Strategy Recommendations

Without protection for Snohomish Basin hydrology, we are likely to see:

- Loss of habitat for salmon and other aquatic species
- Continued degradation of water quality
- Decreased ability to mitigate drought conditions
- Negative impacts on instream flows
- Risk of loss of life and infrastructure during flood events
- Lost opportunity to protect ecosystem function
- High future costs of restoration

Riparian & Forest Cover

Basin Trends

2 remote sensing tools for assessing habitat losses on a large scale:

- (1) NOAA's Coastal Change Analysis Program (Low Resolution)
~75 acres of forest lost to development,
~437 acres converted to forest - 150-ft zone
- (2) WDFW's High Resolution Change Detection program
642 acres of forest lost - 150-ft zone

Key Findings:

- Better, more consistent methods needed
- Salmon Plan assumes that land use regulations would 'hold the line' (not result in net loss)



Basin Trends: Climate Change

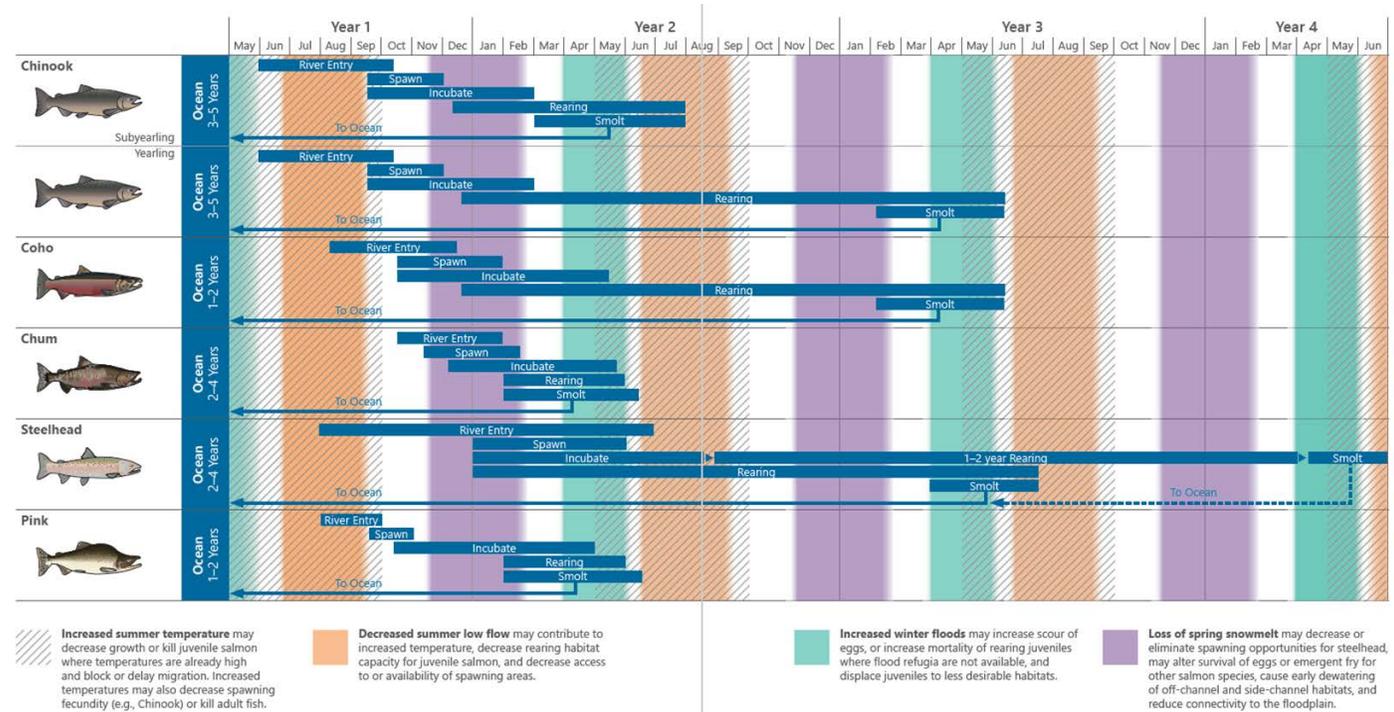
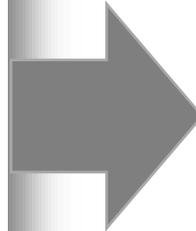
WRIA 7 Climate Change Paper (2017) details anticipated impacts and mitigation strategies.

WRIA 7 Climate Change Impacts to Salmon Issue Paper
March 2017



Prepared for:
Snohomish Basin Salmon Recovery Technical Committee

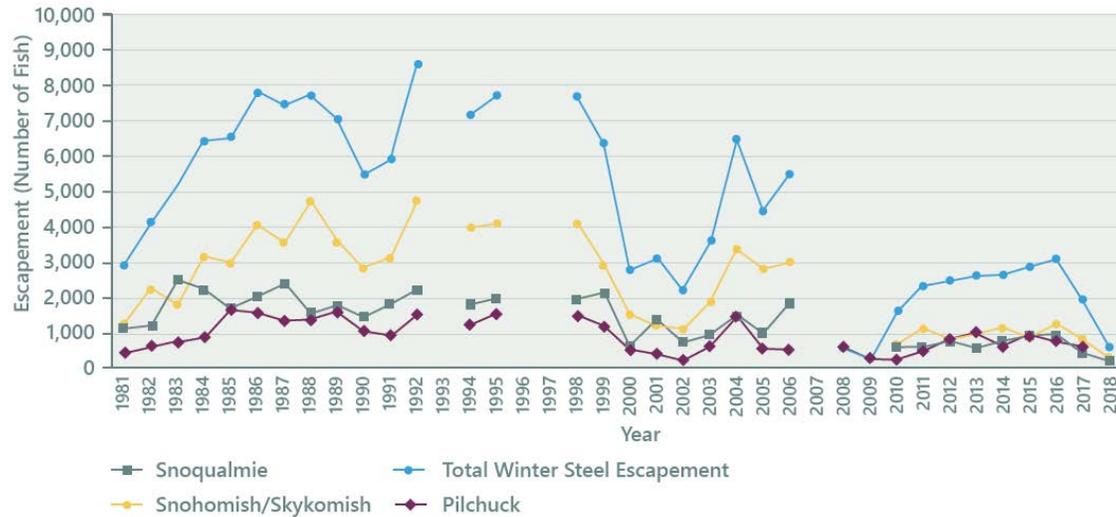
Prepared by:
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Morgan Ruff – Tulalip Tribes Natural Resources Department
Colin Wahl – Tulalip Tribes Natural Resources Department



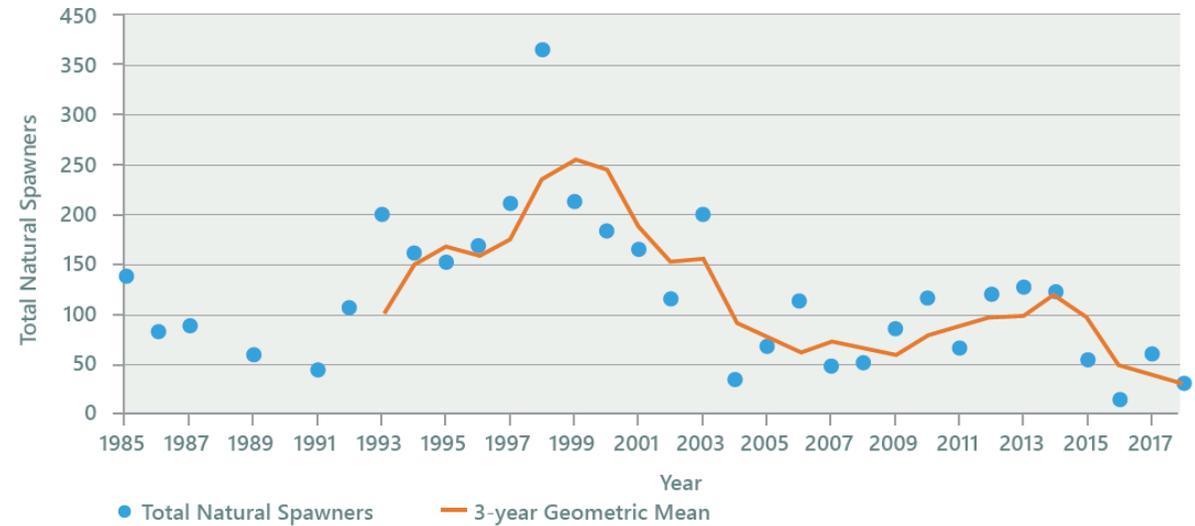
Salmon Trends: Steelhead

Recent downturns in Steelhead returns since they were listed in 2007.

Snohomish Basin Winter-Run Steelhead Escapement



Tolt River Summer-Run Steelhead



Salmon Trends: Bull Trout



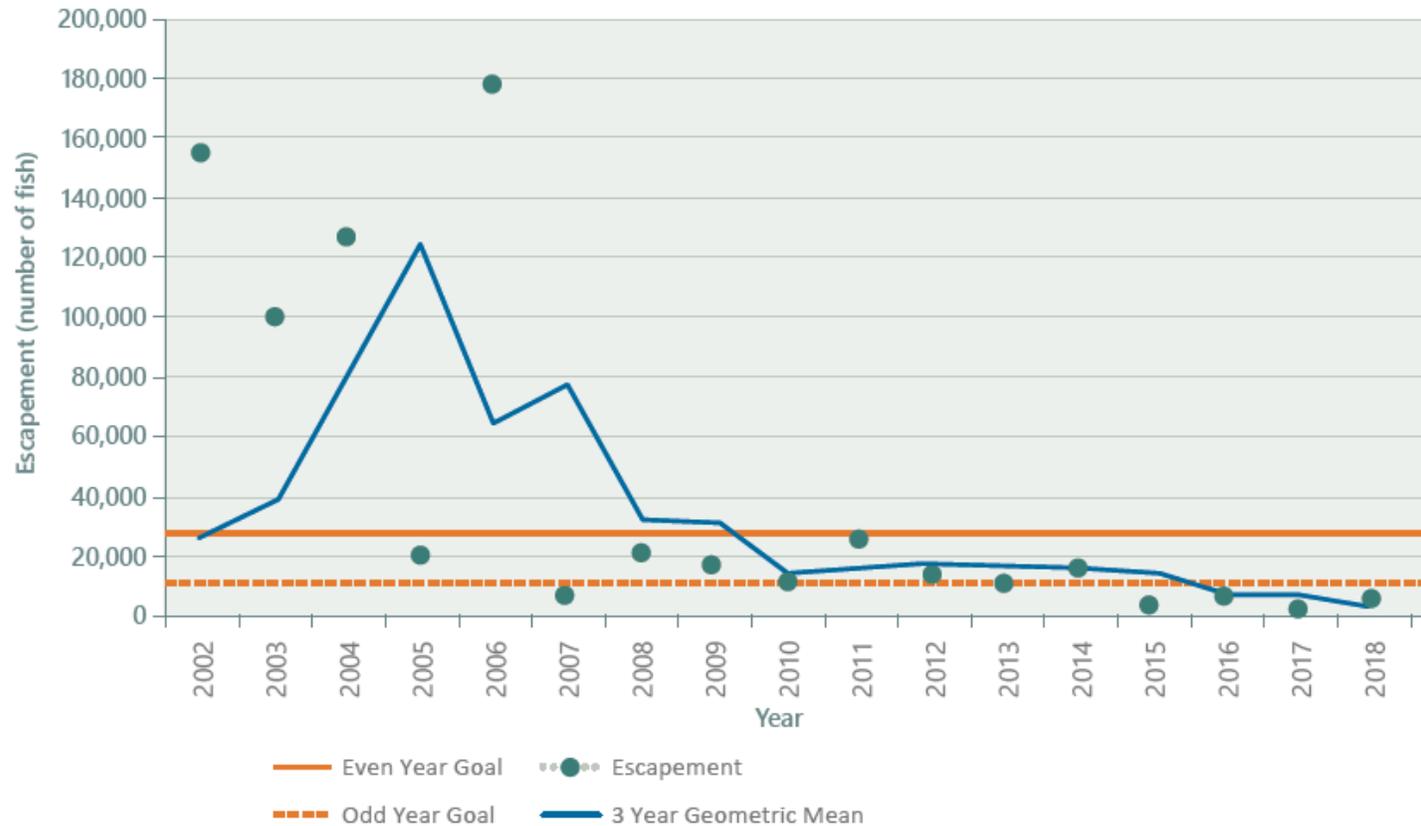
Little is known about Bull Trout:

- Spawn in North Fork and South Fork Skykomish Rivers
- Partial surveys in North Fork Skykomish
- Trap & haul on SF Skykomish
- No surveys above Snoqualmie Falls
- Numbers are low (estimate <300)

Salmon Trends: Chum

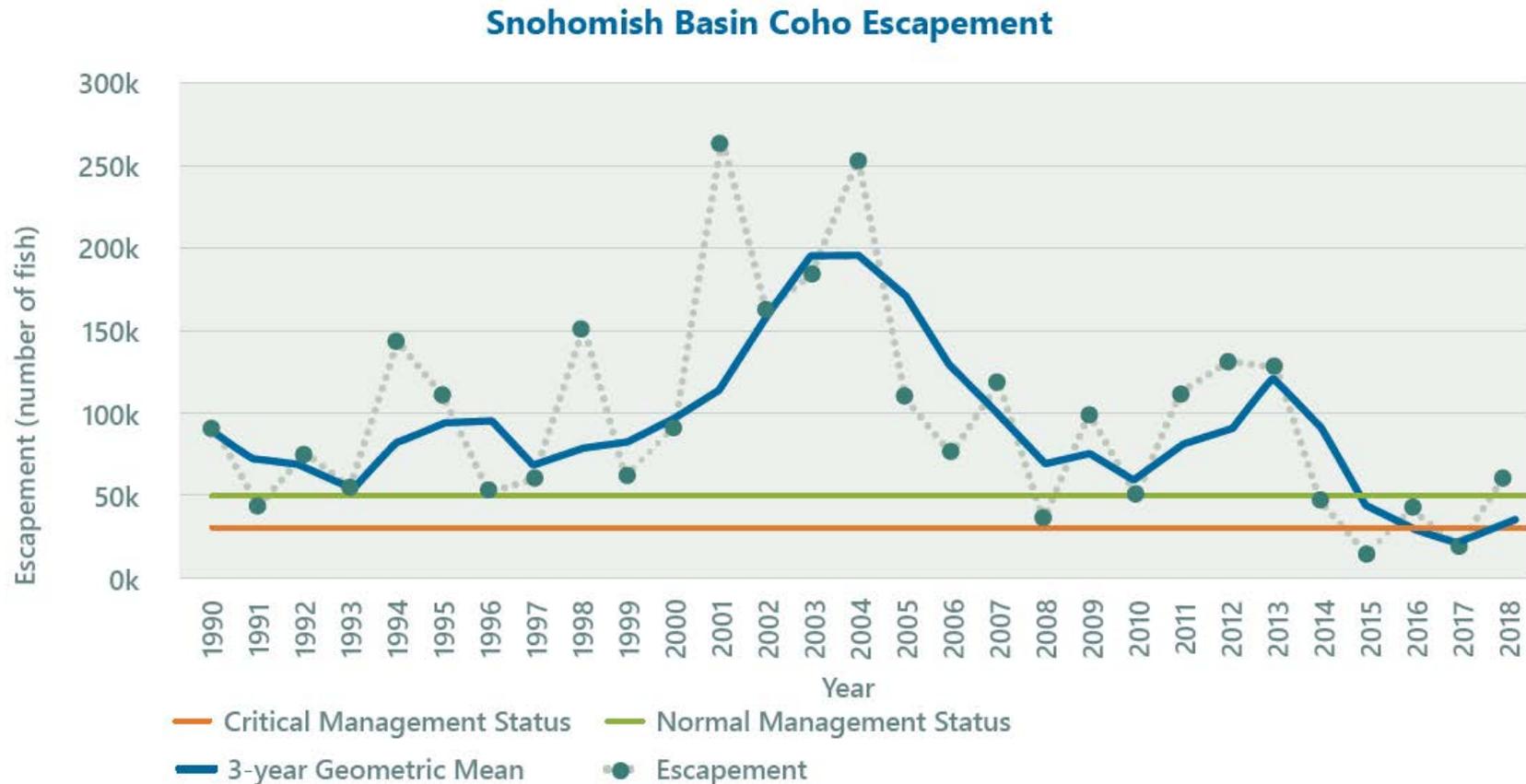
13 years of low chum returns

Snohomish River Chum Escapement

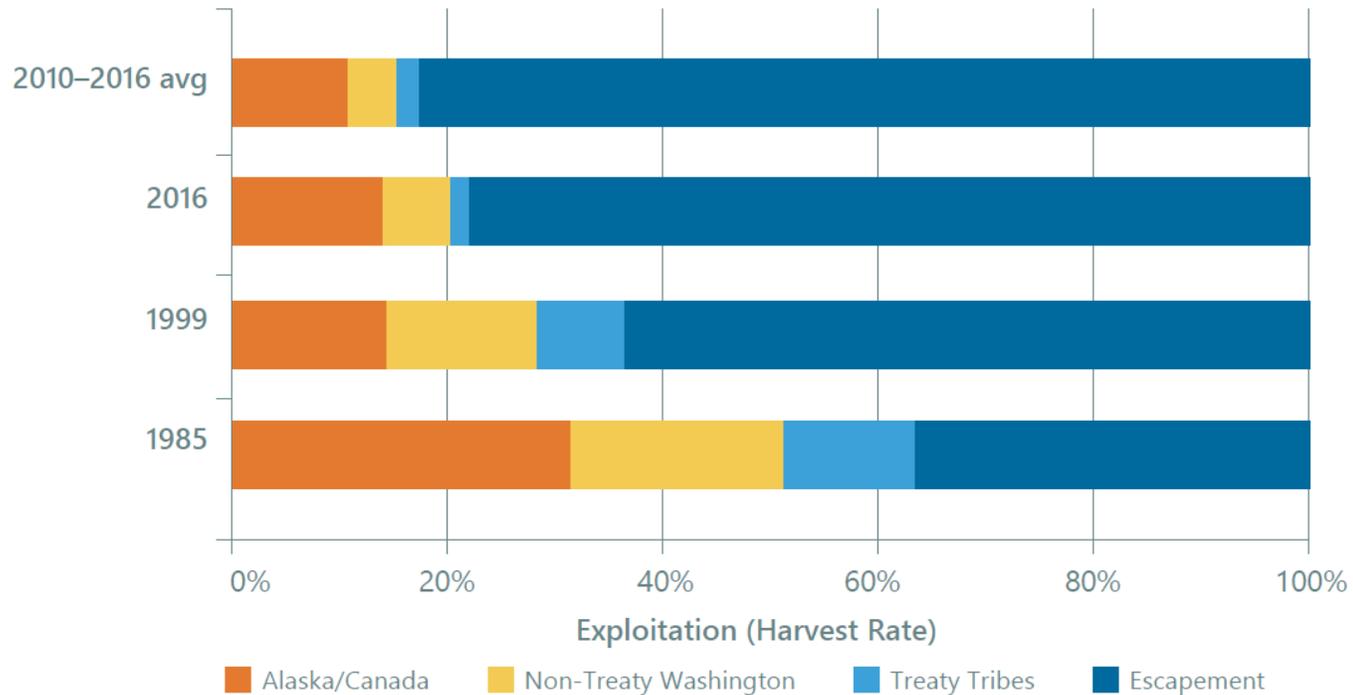


Salmon Trends: Coho

Five years of low returns for coho.



Exploitation Rates of Wild Snohomish Chinook Salmon



Implementation Progress **HARVEST**

Since the ESA listing, fisheries management has generally maintained exploitation rates below the *Rebuilding Exploitation Rates (RERs)* (SB Chinook Salmon RER = 21%)

Implementation Progress

The Salmon Plan emphasizes an approach to recovering salmon populations that balances management actions in the 4 “Hs”.



HARVEST



HATCHERY



HYDROPOWER



HABITAT



Implementation Progress

HATCHERY

- Skykomish Chinook population is supplemented by a hatcheries at Wallace River and Tualip Bay.
- Knowledge of genetic and ecological risks of hatcheries has greatly improved.
- Hatchery operations have adjusted to limit risks.
- Key management actions to address potential risks have been improved and refined.



Implementation Progress **HYDROPOWER**

- 10 Hydroelectric projects in the Snohomish Basin (8 are run-of-river projects)

Since 2005:

- 3 new run-of-river projects (**all designed to pass gravel and support hydro processes*).
- Jackson Hydroelectric Project went through FERC relicensing.
- SF Tolt Hydroelectric Project license expires in July 2029. Relicensing has not begun.