
RESTORING CHUM SALMON
RETURN
OF THE
REDDS
RESTORING WATERSHEDS

INTRODUCING RETURN OF THE REDDS

Introducing **Return of the Redds**, a collaboration between the North Coast Watershed Association, local landowners, the forest products industry, nonprofits and state/federal agencies all united around a common goal:

To revitalize the once-abundant Big Creek and Youngs Bay watersheds and chum salmon populations.

LEAD PARTNER

Lead Partner:
North Coast Watershed Association, a non-profit, non-regulatory organization made up of local watershed councils.

NCWA Mission:
To improve watershed health through community-based efforts.

BASIC PROJECT DETAILS

Goal:
- To restore habitat and increase local chum salmon populations

Timing:
- Began Jan. 1, 2021, habitat restoration work starting in 2022

Project areas:
- The Youngs Bay and Big Creek watersheds

Funded by:
- State, federal and nonprofit partners

Cost to landowners:
- $0

RESTORING CHUM SALMON
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RETURN OF THE REDDS PROJECT AREA

CHUM SALMON: A QUICK OVERVIEW

Oncorhynchus keta is a Pacific salmon, also known as dog, keta and silverbrite salmon. The name chum comes from the Chinook Jargon term tzum, meaning “spotted” or “marked,” while keta (the species name) comes from the Evenki language of Eastern Siberia via Russian.

CHUM SALMON: A QUICK OVERVIEW

Why focus on chum?

- spawning habits, improving habitat, adding nutrients

Are chum in trouble?

- vulnerable habitat, on the decline, threatened species

The chum lifecycle

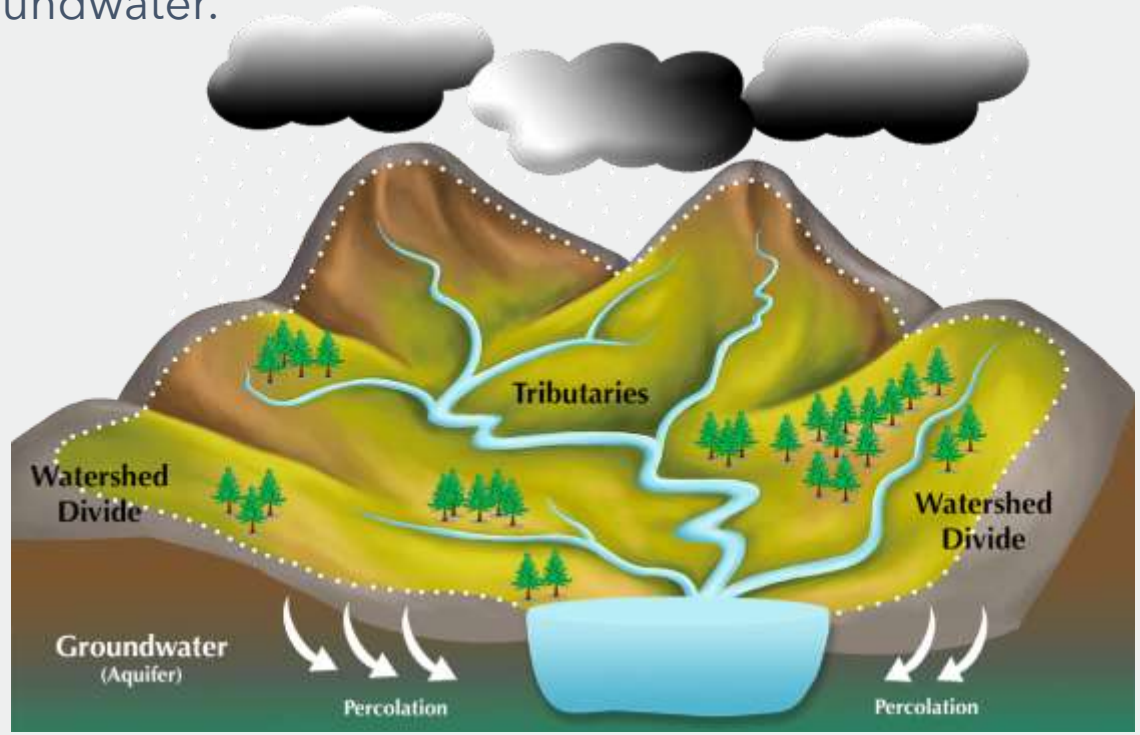
- spawning in lower reaches, peaking in Nov., 3-6 years at sea

Chum and the food web

- providing nutrients for critters, bugs and humans

WHAT IS A WATERSHED?

A **watershed** is the area of land where all of the water that drains off of it goes into the same body of water. These watersheds include streams, rivers, lakes, wetlands and groundwater.



WHAT IS A WATERSHED ASSESSMENT?

A **watershed assessments** is a collection of content that provides baseline information about an area including **previous research, data gaps, and current conditions**. Creating an accurate watershed assessment for Return of the Redds will require:

- Collection of existing data on: stream flows, bank elevations, seasonal trends
- Landowner permission/participation
- Updating outdated watershed assessments
- Species counts

WHAT DOES RESTORATION MEAN?

Habitat Structure Restoration:

- A project-based approach
- Add large wood, increase off-channel wetlands, protect riparian areas/floodplains, remove invasive species, replant native vegetation

Ecological Process Restoration:

- A long-term approach
- Build relationships and trust with new partners, stream surveys, decommission roads no longer in use, identify areas to upgrade

LANDOWNER AND STEWARD PARTNERS

One of the most important aspects of Return of the Redds is landowner and land steward participation. Restoring stream habitat is good for fish **and** good for folks.

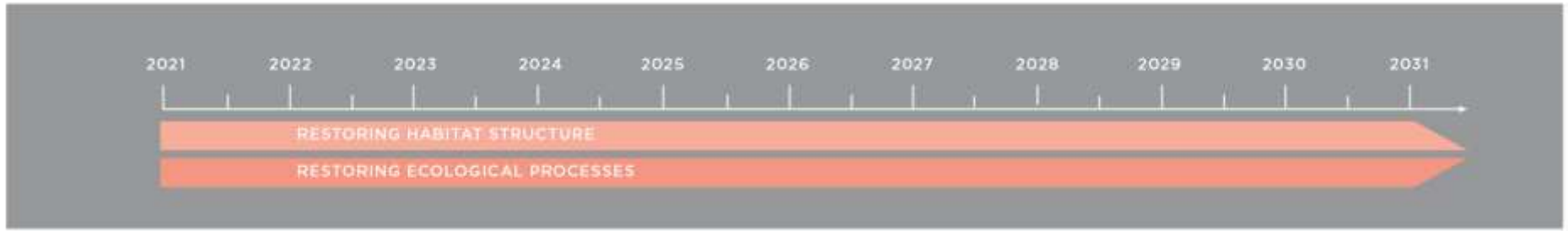
LANDOWNER AND STEWARD PARTNERS

Return of the Redds will be asking landowners and land stewards to be a part of the project in a variety of important ways including:

- Sharing the history of their waterways
- Becoming part of the community of RREDDs partners
- Permitting one-time access for stream assessment
- Considering restoration of waterways on their property
- Participating in informational events and gatherings
- Staying in touch, reporting future waterway changes

2021 – 2022 TIMING

We are currently working on landowner outreach and planning. Stream assessment and restoration will begin in 2022.

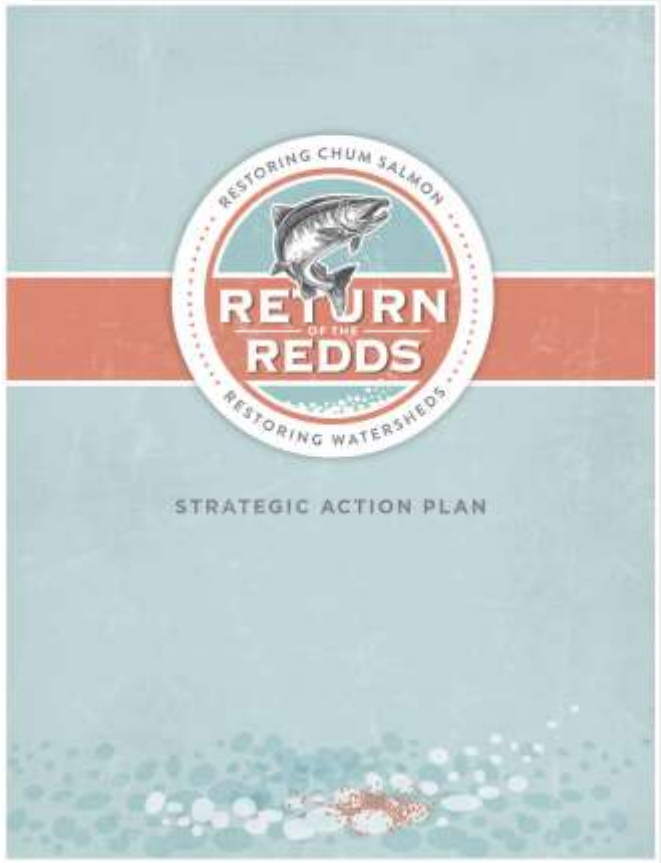


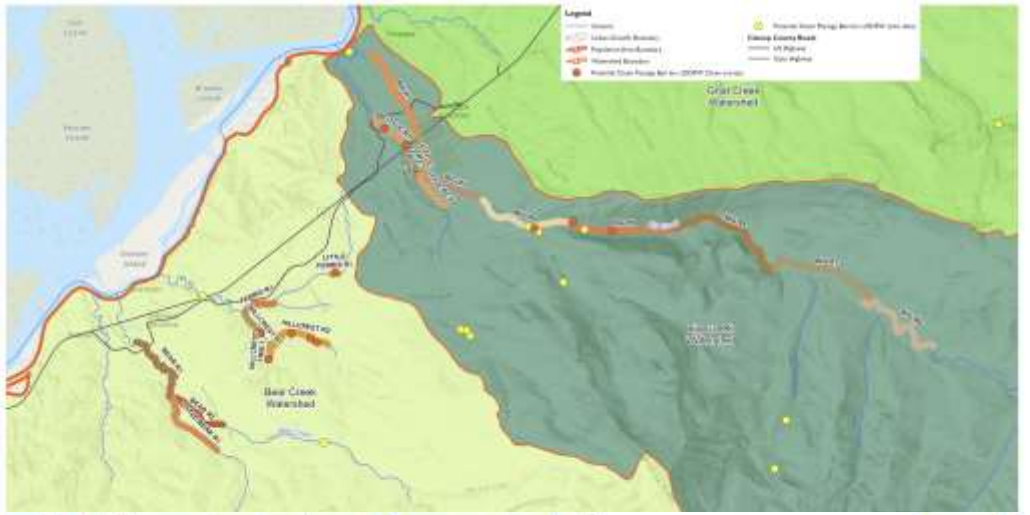
RREDDS STRATEGIC ACTION PLAN

The Return of the Redds Strategic Action Plan (available online) is a detailed roadmap illustrating all the steps needed to reach our goal from beginning to end including:

- Development process with RREDDs partners
- Executive summary and overview
- History and historical context
- Economic importance
- Metrics for measuring success
- Past successful case studies
- Project area and species data
- Priorities, objectives, monitoring and evaluation

A STRATEGIC ACTION PLAN IS FORMED!





LANDOWNERSHIP

LAND USE/ OWNERSHIP (AND MANAGEMENT)	BIG CREEK POPULATION AREA ACRES (%)	YOUNGS BAY POPULATION AREA ACRES (%)	TOTAL
Federal	215 (0.3%)	1,213 (0.9%)	1,428
State Forest (Managed by ODF)	18,415 (24.8%)	11,307 (8.4%)	29,722
State (Other Agencies)	119 (0.2%)	5,205 (3.9%)	5,324
Clatsop County	51 (0.1%)	167 (0.1%)	219
Local Government	4,102 (5.5%)	1,309 (1.0%)	5,411
Private	51,381 (69.2%)	115,155 (85.7%)	166,537
TOTAL	**74,283**	**134,356**	**208,641**

TABLE 1. Land Use/Ownership within the Big Creek and Youngs Bay Chum Salmon Population Areas

HISTORIC HABITAT

Global Chum Habitat - Pacific salmon atlas – The Wild Salmon Center

FIGURE 1. The 17 Historical Chum Populations in Oregon and Washington Comprising the Columbia River Chum Evolutionarily Significant Unit (ESU). Source: Wiley 2021

THE CHUM SALMON COLLAPSE

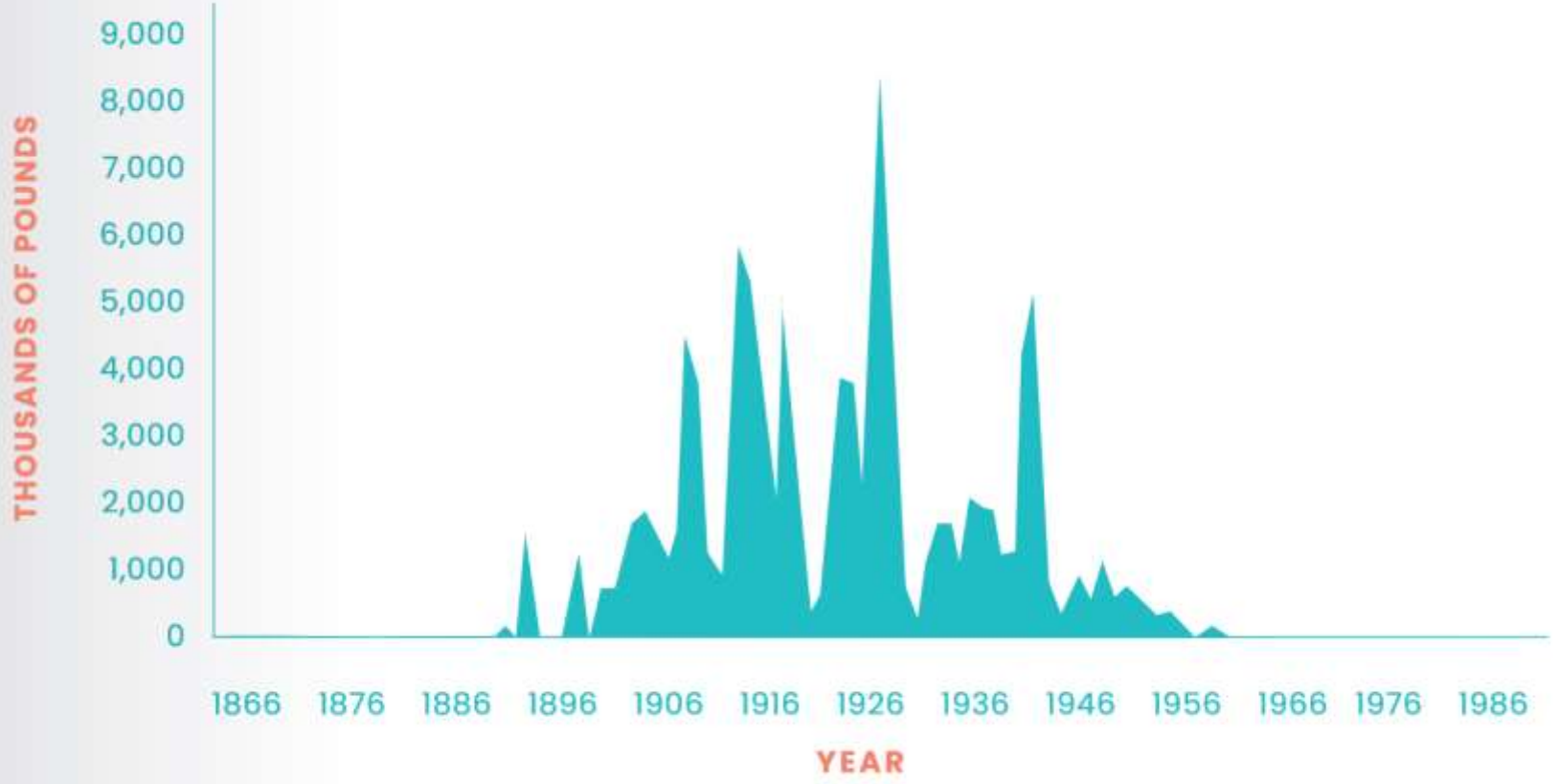


FIGURE 3. Columbia River Chum Processed in Thousands of Pounds, 1866 to 1986. By the 1960s, Very Few Chum Were Present. Source: Johnson et al. 1997

THE CHUM SALMON FISHERY

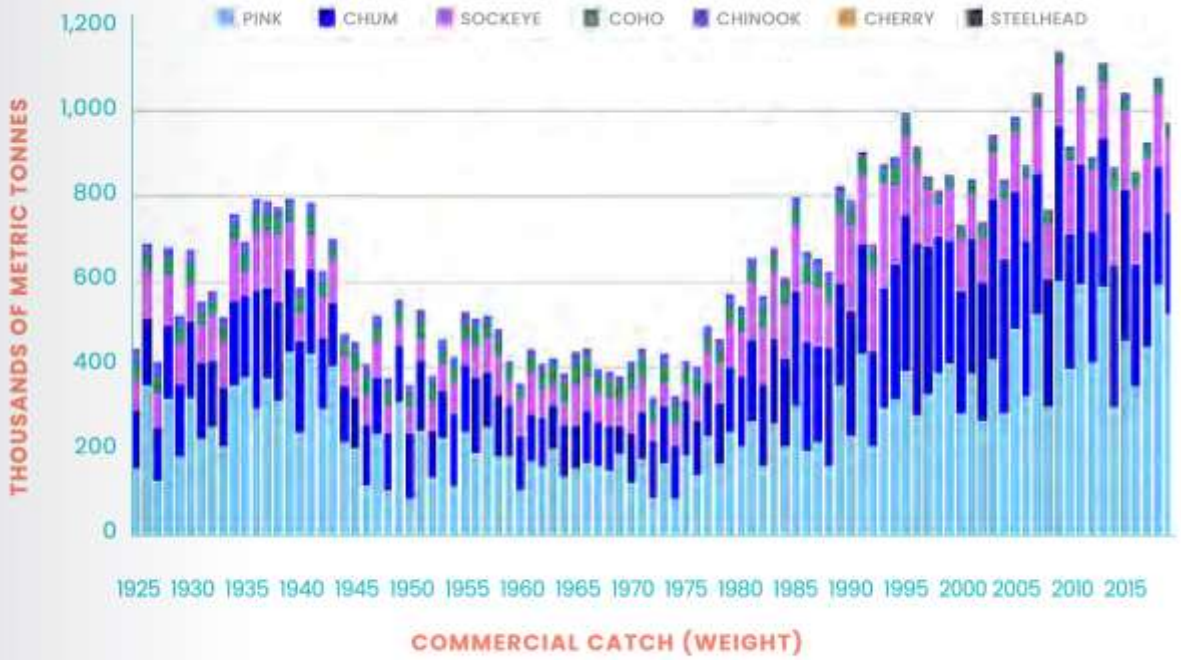


FIGURE 5. Annual Commercial Salmon Catch by Weight (Thousands of Metric Tonnes) 1951-2019. Source: North Pacific Anadromous Fish Commission 2020

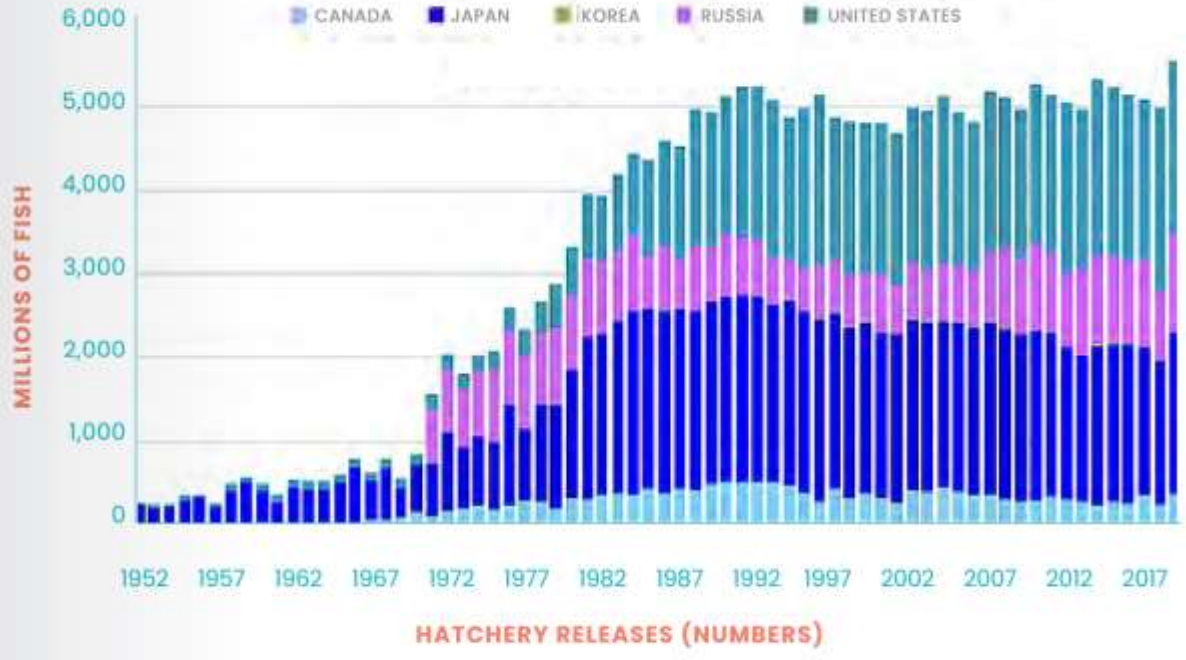
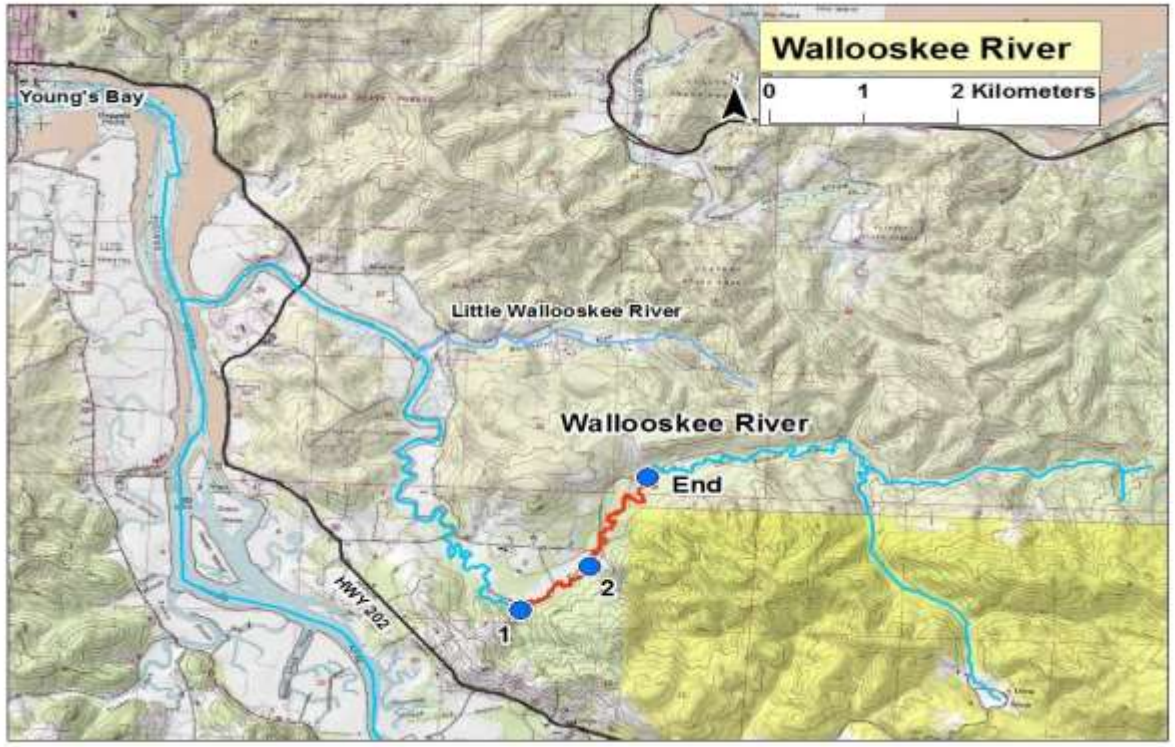


FIGURE 6. Total Hatchery Production (U.S., Canada, Korea, Russia, and Japan) of Pacific salmon, 1951-2019. Source: North Pacific Anadromous Fish Commission 2020

DEFINING HIGH INTRNSIC POTENTIAL HABITAT

In designing the Chum-centric surveys, spatial extent was determined based on **high intrinsic potential habitat** (Hale et al. 1985). Primarily, this relates to stream gradient (targeting contiguous locations with a gradient < 1%), proximity to tidal extent (beginning as close to tidal extent as feasible), and is limited by the maximum gradient in corridors between spawning habitat (gradient < 5%).



SPAWNING HABITAT QUALITY WITHIN HIGH INTRINSIC POTENTIAL HABITAT

Four primary habitat quality attributes examined

1. Spawning gravel patch size >1m2
2. Spawning gravel size (gravel-cobble) 4-128mm diameter
3. Spawning gravel embeddedness <20% fines
4. Presence of cold-water patches during summer surveys

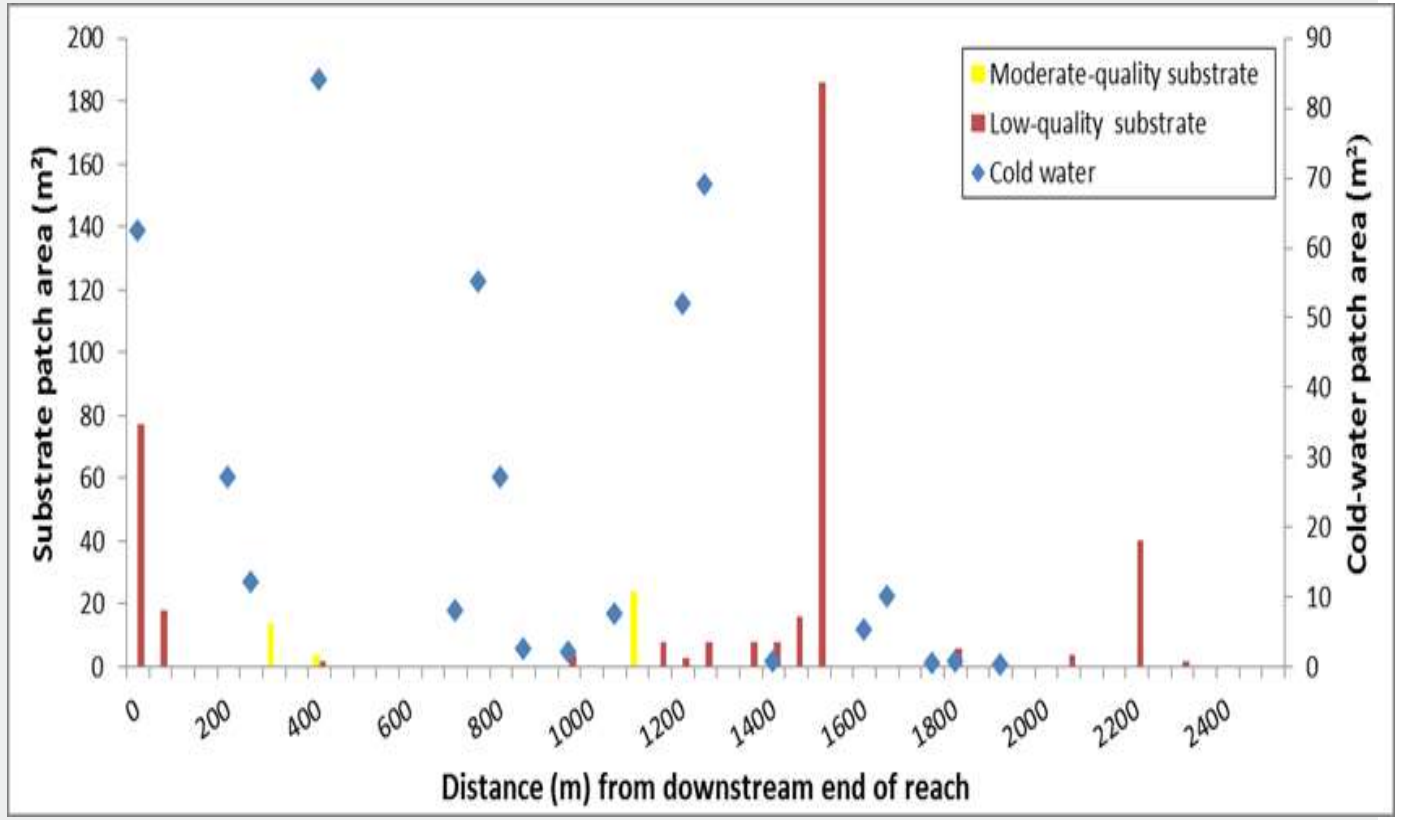
Cold water patches were defined as a patch of any size with a temperature difference from the surrounding area of at least 1º C. These patches could be produced by upwelling groundwater or by seeps or springs entering the active channel

Chum are assumed to select upwelling habitats because of their warmer and stable water temperatures in the winter (Geist et al. 2002). Other reasons cited for spawning chum selecting upwelling areas are increased oxygenation and removal of fine sediments due to the upwelling water (Hale et al. 1985).

RESULTS EXAMPLE

substrate quality	Percent of Substrate Type				Number Patches	Patch Area
	Fines	Small Gravel	Large Gravel	Small Cobble		
high	0-10	100	0	0	0	0
high	0-10	75	25	0	0	0
high	0-10	50	50	0	0	0
high	0-10	25	75	0	0	0
high	0-10	0	100	0	0	0
moderate	0-10	0	75	25	0	0
moderate	0-10	0	50	50	0	0
low	0-10	0	25	75	0	0
low	0-10	0	0	100	0	0
moderate	11-20	100	0	0	0	0
moderate	11-20	75	25	0	0	0
moderate	11-20	50	50	0	1	14
moderate	11-20	25	75	0	2	28
moderate	11-20	0	100	0	0	0
low	11-20	0	75	25	3	7
low	11-20	0	50	50	7	43
low	11-20	0	25	75	7	208
low	11-20	0	0	100	6	132

Table 7. Total number and area (m²) of suitable spawning substrate patches separated into three quality grades (low, medium, and high) classified by the percentage of fines (0—10% and 11—20%) and 25% categories of small gravel (4—11 mm), large gravel (12—45 mm), and small cobble (46—128 mm), observed in reach 4 of the Lewis and Clark River, south of Astoria, OR, in July 2014.



PROPERLY FUNCTION CONDITIONS V. EXISTING

AQUATIC HABITAT BENCHMARK	UNDESIRABLE	DESIRABLE
LARGE WOOD:		
Key pieces (≥60 cm diameter and ≥10m long per 100 m (328 ft.)	≤1	≥3
Number of pieces (per 100 m/328 ft.)	≤10	≥20
POOLS:		
Pool frequency (number channel widths between pools)	≥20	≤5 - 8
RIPARIAN CONIFERS (30 m from both sides):		
Number>50-cm dbh/305m (1000 ft.) stream length	≤150	≥300
Number>90-cm dbh/305 m (1000 ft.) stream length	≤75	≥200
SUBSTRATE:		
% fines in riffles (≤2 mm diameter)	≥15%	≤8%
% gravel in riffles (2-64 mm diameter)	≥54%	≤10%

TABLE 2. ODFW Aquatic Habitat Benchmarks

Chum Population Area	Subwatershed	ODFW Chum Stream & Reach Designation	Stream Survey Year	Length (m)	LW Key Pieces/ 100 m (≥3)	Number of LW Pieces/ 100 m (≥20)	Pool Frequency (Channel Width b/t Pools) (≤5-8)	Number of Conifers/ 1000 ft > 50 cm dbh (≥300)	Substrate Condition (% Fine in Riffles) (≤8%)
Big Creek	Lower Big Creek	Reach 1	2007	1555	- (0)	- (3.1)	- (12.1)	- (0)	- (25)
		Reach 2	2007	759	- (0.2)	- (8.1)	+ (7.6)	- (30)	- (15)
		Reach 3	2007	1200	- (0.1)	- (11)	+ (6.2)	- (30)	- (15)
		Reach 4	2007	1830	- (0.8)	+ (30.6)	+ (3.2)	- (122)	- (15)
	Upper Big Creek	Reach 5	2007	1729	- (0)	- (8.7)	+ (5.4)	- (15)	- (16)
		Reach 6	2007	2478	- (0.2)	- (8.1)	+ (4.6)	- (0)	- (17)
		Reach 7	2007	1950	- (0.1)	- (11)	+ (4.2)	- (12)	- (15)
		Reach 8	2007	2061	n/a	n/a	+ (4.4)	- (20)	n/a
Big Creek	Little Creek	Reach 1	2008	750	- (0.6)	- (7.3)	- (14.4)	- (49)	- (38)
		Reach 2.1	2008	666	- (0)	- (5.3)	- (90.5)	- (0)	n/a
		Reach 2.2	2008	805	n/a	n/a	n/a	n/a	n/a
	Bear Creek	Bear 1	2008	1516	- (0.9)	+ (20.0)	+ (6.3)	- (91)	- (12)
		Bear 2	2008	1112	- (1.7)	- (11.5)	- (20.5)	- (61)	- (13)
		Little Bear 1	2008	1434	- (1.1)	- (12.6)	+ (4.0)	- (0)	- (18)
	Ferris-Hill Crest Creek	Ferris Creek Reach 1	2008	550	- (0.4)	- (6.8)	- (8.8)	- (91)	- (31)
		Hill Crest Creek Reach 1	2008	436	- (0.5)	- (9.4)	- (15.4)	- (41)	- (55)
		Hill Crest Creek Reach 2	2008	1688	- (0.9)	- (5.6)	n/a	n/a	- (48)
		Little Ferris 1	2008	550	- (2.7)	+ (24.6)	- (19.0)	- (30)	- (20)
	Mill Creek	Reach 1	2008	668	- (0.6)	- (6.4)	+ (3.2)	- (61)	- (66)
		Reach 2	2008	496	- (1.0)	- (11.0)	n/a	- (0)	- (46)

TABLE 3. Habitat Benchmarks for ODFW Chum Spawning Habitat Evaluation Reaches within the Big Creek Chum Population Area. Table Header Number in Parenthesis = Benchmark Value. Minus Symbol (-) = Does Not Meet the Benchmark. Plus Symbol (+) = Meets or Exceeds Benchmark. Reach Habitat Numbers in Parentheses = Observed Habitat Value.

LARGE WOOD INSTREAM SOUTH FORK MCKENZIE

Pre-project

Post-project

USFS

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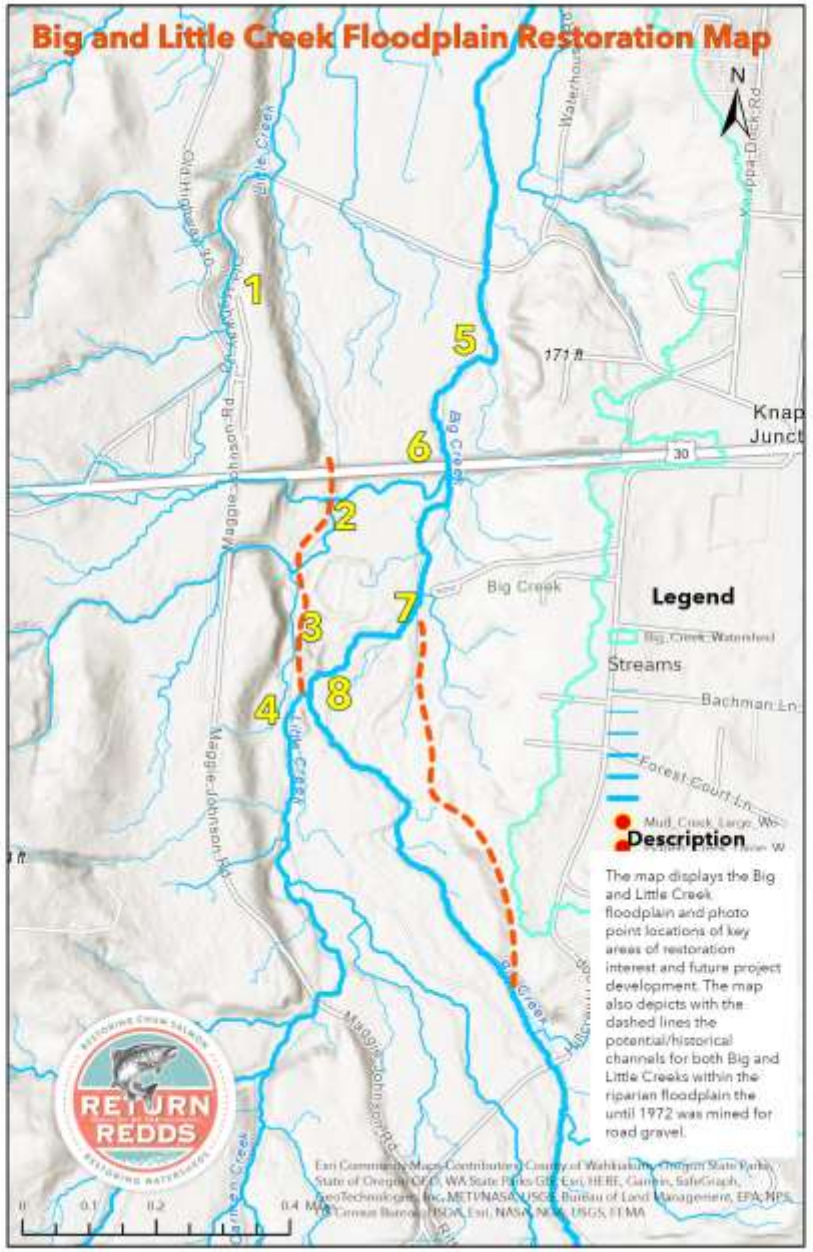


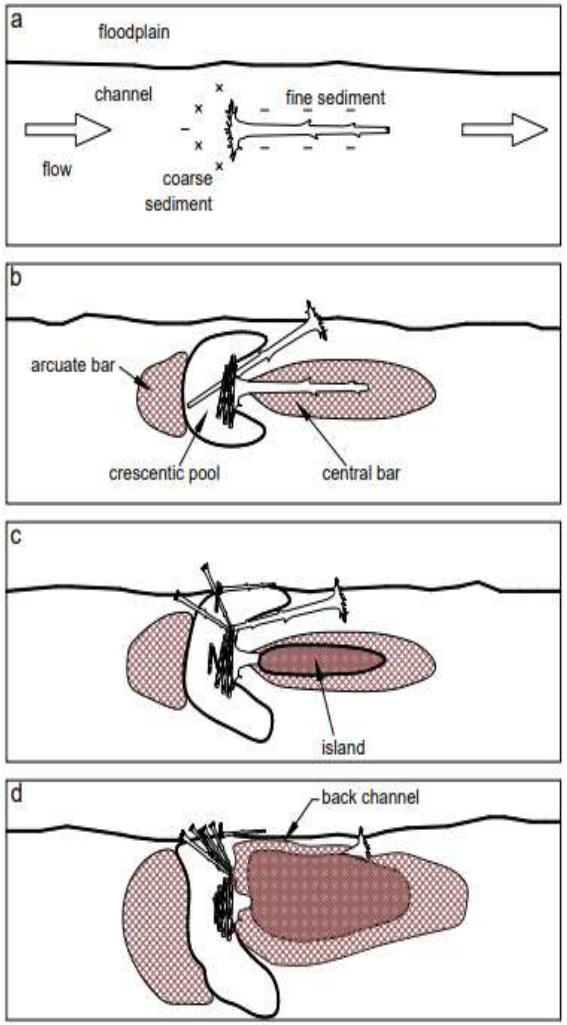
Credits: NCWA GIS - Graham Klag

BIG AND LITTLE CREEK GRAVEL MINE 1971

EVOLUTION OF A GRAVEL BAR

Large Wood and Log Jams Figure 2. Visual and physical isolation provided by a rootwad for juvenile coho salmon. (photo from NF Stillaguamish River, Snohomish County, Washington, Source: Roger Peters, USFWS).

Large Wood and Log Jams Figure 3. LW placed on the floodplain will provide low velocity refuge during high flows. (Finney Creek, Skagit County, Washington).



Large Wood and Log Jams Figure 1. Schematic of side channel formation against the bank at a logjam (courtesy Tim Abbe). Morphological stages in alluvial topography associated with construction of a woody debris (barapex) jam. (a) Deposition of an especially large tree with the root wad intact. (b) Formation of a coarse gravel bar upstream, a crescent-shaped pool immediately upstream of the root wad, and a downstream central bar of finer sediments along the axis of the tree. (c) Island development along the central bar. (d) Integration into the broader floodplain. Modified from Abbe and Montgomery (1996).

COMPLEX HABITAT

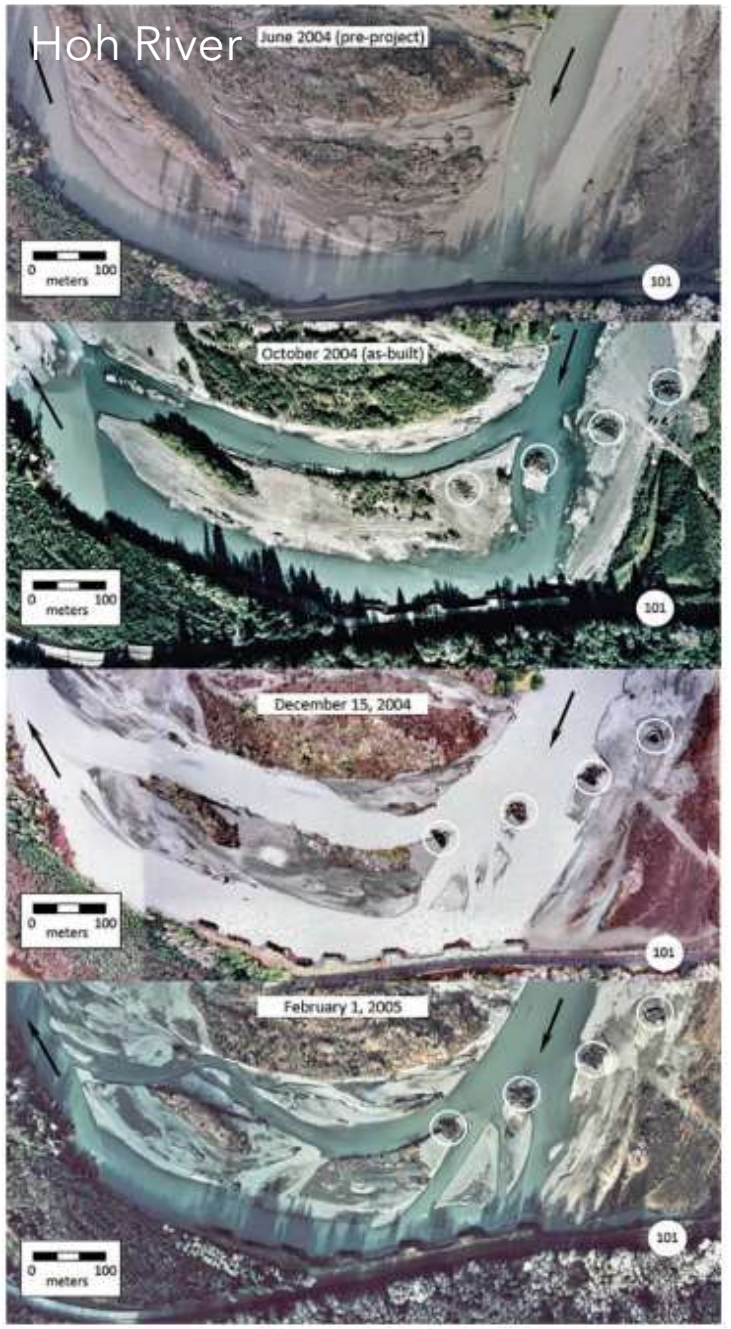


Fig. 2 Time sequence photos of pre-and post-project conditions for ELJs re-directing flows on the Hoh River, Jefferson County, WA.

THE WATERSHED PROCESSES

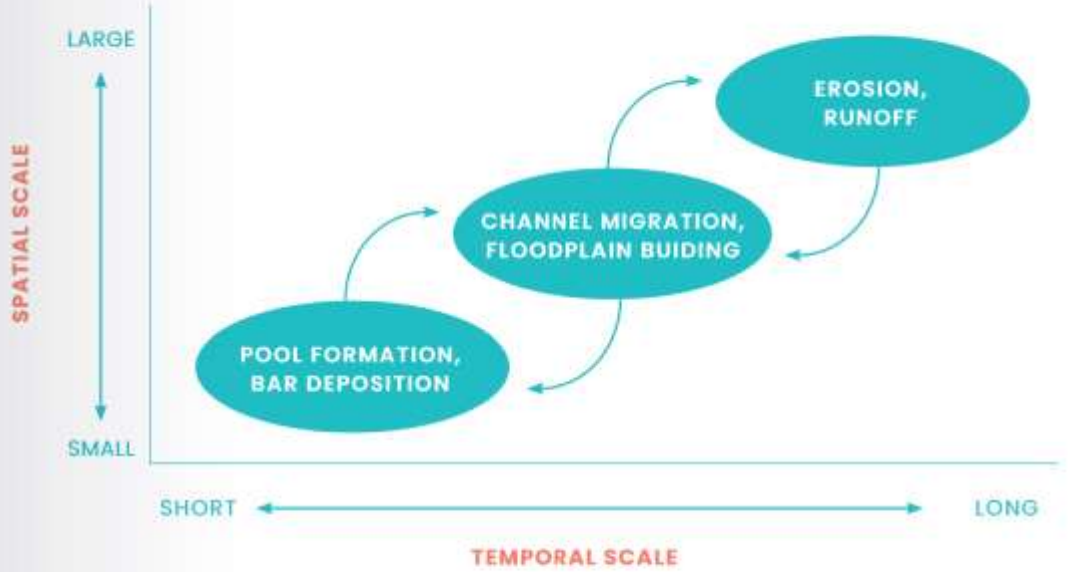


FIGURE 10. Watershed Processes Operate at a Variety of Space and Time Scales, with Processes Operating at Larger Spatial Scales and Influencing Processes Operating at Smaller Scales (Heavy Arrows). In this Case, Large-scale Erosion and Water Runoff Influence Channel Migration and Floodplain Formation at Medium-Spatial Scales, and Pool Formation and Bar Sediment Deposition at Fine-Scales. Source: Beechie et al. 2010

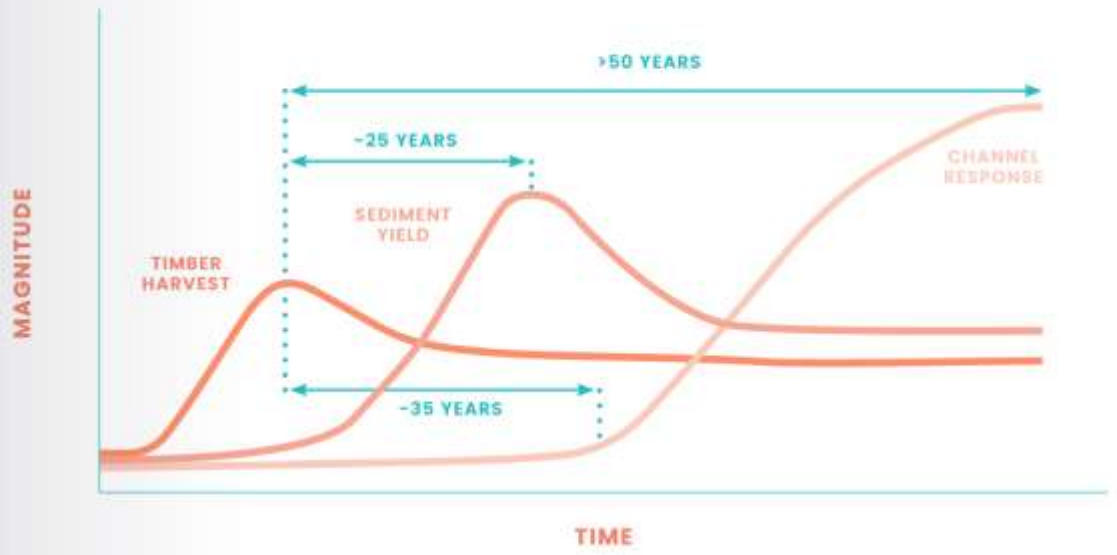


FIGURE 11. Conceptual Model of Trends of Sediment Yield in the Upper Grays River Channel Network and Channel Response over Time from Historical – Before Modern Forest Practices Rules – Timber Harvest and Forest Roads. Source: May and Geist 2006

Rearing Grounds and Riparian Habitat

What Oregon Dept. of Forestry does for RREDDs?

Riparian Buffers

Hydrological connectivity

Wet weather haul restrictions

Transportation system planning

Stream restoration and enhancements

WATERSHED PRIORITIES

POP. AREA	WATERSHED/ PRIORITY	SUBWATERSHED AND REACH	NOTES / RESTORATION APPROACH
Big Creek	Big Creek /1st-Tier Priority (Higher Priority)	Estuary Transition (R1)	Most of the area is protected
		Lower (R2-4)	Key historical chum spawning area and habitat restoration
		Middle	Process-based restoration
		Upper	Process-based restoration
	Little Creek /2nd-Tier Priority		Targeted Opportunities: Process-based and habitat restoration
	Farris Creek /2nd-Tier Priority		Targeted Opportunities: Process-based and habitat restoration
	Bear Creek /2nd-Tier Priority		Targeted Opportunities: Process-based and habitat restoration
	Gnat Creek /3rd-Tier Priority (Lower Priority)		Targeted Opportunities: Process-based and habitat restoration

POP. AREA	WATERSHED/ PRIORITY	SUBWATERSHED AND REACH	NOTES / RESTORATION APPROACH
Youngs Bay	Lewis and Clark River /Highest Priority	Estuary Transition	Key historical spawning area: Habitat restoration in the estuary and lower ends of tributaries
		Lower (R1-5)	Key historical spawning area: Habitat restoration in the river and lower ends of tributaries
		Middle	Process-based restoration
		Upper	Process-based restoration
	Klaskanine River /2nd- Tier Priority		Targeted Opportunities: Process-based and habitat restoration
	Youngs River /2nd-Tier Priority		Targeted Opportunities: Process-based and habitat restoration
	Wallooskee River /3rd-Tier Priority		Targeted Opportunities: Process-based and habitat restoration
	Skipanon River /3rd-Tier Priority (Lower Priority)		Targeted Opportunities: Process-based and habitat restoration

CHUM SALMON RESTORATION

POPULATION	FISH BARRIERS ADDRESSED (#)	LARGE WOOD PLACEMENT (MI)[1]	FLOODPLAIN/ OFF-CHANNEL ENHANCEMENT (ACRES)	SIDE-CHANNEL CREATION (MI)	RIPARIAN PLANTING (MI)[2]
RESTORATION OUTPUTS FOR BROAD SENSE RECOVERY					
Youngs Bay	NA	46	1.3	0	19
Big Creek	NA	58	5.1	5	19
ACCOMPLISHMENTS (THROUGH 2019)					
Youngs Bay	4	3.01	0.1	0.75	2.27
Big Creek	4	0.75	2.1	0.42	2.15

TABLE 8. LCR Plan Restoration Outputs Necessary to Achieve Broad-Sense Recovery and Accomplishments through 2019 for Big Creek and Youngs Bay Salmon Populations
NOTES: 1. Large wood placement volume – 706 ft.3 (20 m3) of large wood per 328 ft. (100 m) of stream channel
2. Riparian Planting 98 ft. (30 m) width on each side of the stream channel

OREGON LOWER COLUMBIA RIVER POPULATION AREA	ABUNDANCE		POTENTIAL RECOVERY GOAL RANGE (CUMULATIVE FOR THE FOUR POPULATION AREAS)		
	RECENT	HISTORICAL	LOW	MEDIUM	HIGH
Youngs Bay	15	9,000	2,500	5,000	7,500
Big Creek	299	5,000			
Clatskanie	3	6,000			
Scappoose	0	500			

TABLE 9. Recent and Historical Abundance and the Potential Cumulative Recovery Goal Range for the Numbers of Chum Adults Returning to the Four Oregon Population Areas (Columbia Basin Partnership Task Force 2020)

RESTORATION AND ENHACEMENT

Upper Big Creek Floodplain Restoration - 2021

https://arcg.is/0SjOO8

RESTORATION AND ENHACEMENT

North North Fork Klaskanine River Fish Passage Project - 2022

https://arcg.is/0ejSOb0

RESTORATION AND ENHACEMENT

Blind Slough Wetland Reconnection - 2022

THANK YOU FOR WATCHING

Questions?

https://www.youtube.com/watch?v=TezU94ptQ9Y

THANK YOU!

Learn more at returnoftheredds.com