

North Santiam Native Fish Species

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My Background (disclaimers)

- Father, Landowner, Fly Angler, Orvis Endorsed Fly Fishing Guide, NFS River Steward
- I am NOT a Fish Biologist
- The following is NOT a scientific study of any sort, simply personal observations made and research done over the past 25 years of living, working, fishing and guiding in the Watershed.

My narrow view of the North Santiam Watershed Council

- **The Oregon Plan for Salmon and Watersheds**
 - Mission: Restoring our **native fish populations** and the aquatic systems that support them to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits.
 - Strategic Directive #2 (of 4): Local community-sponsored action. The most effective conservators are the private citizens and users of land and water who share the landscape with salmon and whose activities have a direct impact on salmon. For that reason, **local watershed councils**, soil and water conservation districts, and other groups are to take the lead in implementing watershed improvement projects.
 - Primary Funding Source: OWEB

Fish Species of the North Santiam

- Native to North Santiam/Upper Willamette (UWR)
 - Spring Chinook Salmon (ESA Threatened)
 - Winter Run Steelhead (ESA Threatened)
 - Rainbow Trout
 - Coastal Cutthroat Trout (Species of Concern)
 - **Bull Trout (Extripated in the 1970's)**
 - Lamprey Eel (Species of Concern)
 - Oregon Chub (Recently de-listed from ESA)
 - Mountain Whitefish
 - Northern Pikeminnow*
 - Largescale Sucker*

Fish Species of the North Santiam

- Introduced/Invasive
 - Spring Chinook Salmon
 - North Santiam Hatchery Stock/Carson Hatchery Stock (Wind River, WA 1970's & 80's)
 - Approximately 670,000 juveniles released each year
 - Summer Run Steelhead
 - Skamania Hatchery Stock (Washougal River, WA)
 - Approximately 120,000 juveniles released each year
 - Rainbow Trout
 - Descendants of various stocks over the years
 - **Skamania Summer Steelhead remaining resident**

Fish Species of the North Santiam

- Introduced/Invasive
 - Coho Salmon
 - Descendants of various stocks over the years
 - Fall Run Chinook Salmon
 - Descendants of various stocks over the years
 - Carson Hatchery Stock 1970-80's
 - Brook Trout (above Detroit)
 - Descendants of various stocks over the years
 - Various Warm-water Species (Lower Basin)
 - Bass, Walleye, Perch, Carp, other

Fish Species of the North Santiam

- Something to think about from a different perspective...
 - In the North Santiam (and UWR) – Skamania Summer Steelhead, Coho Salmon, and Carson Spring & Fall Chinook Salmon are the fish equivalent to Scotch Broom, Armenian Blackberry and English Ivy in the plant world.
 - Worse yet, we continue to pay millions of dollars a year to continue propagation of some of those species and stock Oregon rivers with them, to the detriment of our native species.

Problems facing Native Species

- The 4 H's
 - Hydropower
 - Harvest
 - Hatcheries
 - Habitat

Issues related to Hydropower

- **Detroit/Big Cliff Complex**
 - **Barrier to Fish Passage**
 - Upstream and Downstream
 - Approx. 65 Miles of Spawning Habitat inaccessible to Anadromous Species
 - **Water Quality**
 - Temperature
 - Chemical Balance
 - Toxins
 - **Habitat degradation**
 - Sediment/Gravel Displacement & Distribution
 - **Invasive/Introduced Predatory Species**

Issues related to Harvest

- Off Shore & Inland Commercial
 - Non-Selective Harvest Methods
 - State, Tribal, NMFS & International Quotas
 - Columbia & Willamette Sourced fish make up **60%** of Alaska's Commercial Harvest of some species.
- Sport
 - Inland and Offshore
 - Antiquated Rules Regulations
 - Methods, Gear, Seasons
 - Recently “Simplified” Regulations are misinterpreted by general public.

ODFW Fish Division

The mission of the Oregon Department of Fish and Wildlife (ODFW) is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. The Department is charged by statute (ORS 506.036) to protect and propagate fish in the state. This includes direct responsibility for regulating harvest of fish, protection of fish, enhancement of fish populations through habitat improvement, and the rearing and release of fish into public waters. ODFW maintains hatcheries throughout the state to provide fish for program needs. Operation of these facilities is governed by the following:

- **The Oregon Plan for Salmon and Watersheds, a comprehensive plan for the conservation of salmon and the protection of their habitat which coordinates the actions of all state agencies that affect aquatic resources.**
- **The Native Fish Conservation Policy, which provides a basis for managing hatcheries in balance with sustainable production of naturally produced native fish.**
- The Fish Hatchery Management Policy, which provides general fish culture and facility guidelines and measures to maintain genetic resources of native fish populations spawned or reared in captivity.
- The Fish Health Management Policy, which describes measures that minimize the impact of fish diseases on the state's fish resources.

ODFW Regulations - 2016

- Zone-Wide (Willamette Zone)
 - Trout
 - Catch and Release in Streams
 - Artificial Flies and lures only
 - 8 inch minimum length
 - Lakes Open year round, Streams Open May 22 – October 31
 - Salmon & Steelhead
 - 2 Adult Salmon/ 3 Steelhead per day, 5 Jacks per day
 - Artificial Flies and Lures in Streams
 - No Harvest of Wild Salmon/Steelhead

ODFW Regulations -2016

- North Santiam Specific – Mouth to Big Cliff
 - 5 Hatchery Trout per day, no minimum size (?)
 - 2 Salmon/3 Steelhead per day
 - Open for Hatchery Steelhead all year
 - Open for **Wild** Steelhead Jul 1 – Aug 31 (?)
 - Open for Coho all year from mouth to Stayton-Scio Bridge (?)
 - Open for Coho Salmon Jan 1 – Aug 31 and Oct 15 – Dec 31 from Stayton-Scio Bridge to Big Cliff (?)
 - Use of Bait allowed (year round) from mouth to Packsaddle. (?)
 - No bait allowed in approx. 3.2 miles of the entire system

ODFW Regulations - 2016

- Upstream of Big Cliff
 - Open All Year
 - 5 Trout per Day, 8 inch minimum
 - Use of Bait allowed
- Little North Santiam Specific
 - Open for Steelhead all year
 - Artificial flies and lures only
 - Open for **Wild** Steelhead Jul 1 – Aug 31 (?)

About Hatcheries

- Hatcheries were built and operate today as mitigation for loss of habitat due to dam construction.
- Primarily funded with Federal \$'s
- Managed by ODFW here in Oregon
 - 2 Hatcheries in Oregon managed by USFWS
- Must get approval of operating plan from NMFS (NOAA) every 4 years. Last HGMPs approved were in 2004!

Excerpt from 2004 Steelhead HGMP

- Natural production of summer steelhead associated with the hatchery program may adversely affect listed winter steelhead populations. Chilcote (1998) conducted an analysis of the effects of naturally produced summer steelhead on native Clackamas River winter steelhead. The analysis showed a 27% decrease in wild winter steelhead productivity associated with the occurrence of naturally spawning summer steelhead.
- Believe it or not – this is actually one of the “positive” justifications for a summer steelhead program under the Management Plan. The 27% reduction in wild winter steelhead productivity was acceptable!!!!

Issues Related to Hatchery Operations

- Waste Materials / Disease
- Chemicals/Toxins
- Operating Cost
 - Roughly \$1 per released fish
- Handling of Native Species
- No variation in release strategies to account for environmental conditions:
 - Inland Drought
 - Ocean - Blob, El Nino, etc.

Hatchery connections - North Santiam

- Marion Forks (source of Spring Chinook)
- South Santiam (source of Skamania Summer Steelhead)
- Minto Facility (collection/acclimation/release)
 - Rebuild in 2012 - \$28-\$32 million
 - Release 704,000 Chinook Smolts (2016)
 - Release 121,000 Summer Steelhead Smolts (2016)
 - Collect both Hatchery and Wild Spring Chinook Adults for Broodstock
 - Recycle Summer Steelhead Adults to Lyons-Mehama
 - Euthanize Adult Coho
 - Pass resident Wild species upstream of barrier (Trout, Whitefish, Lamprey)
 - Trap & Haul Wild Adult Chinook and Steelhead above dams

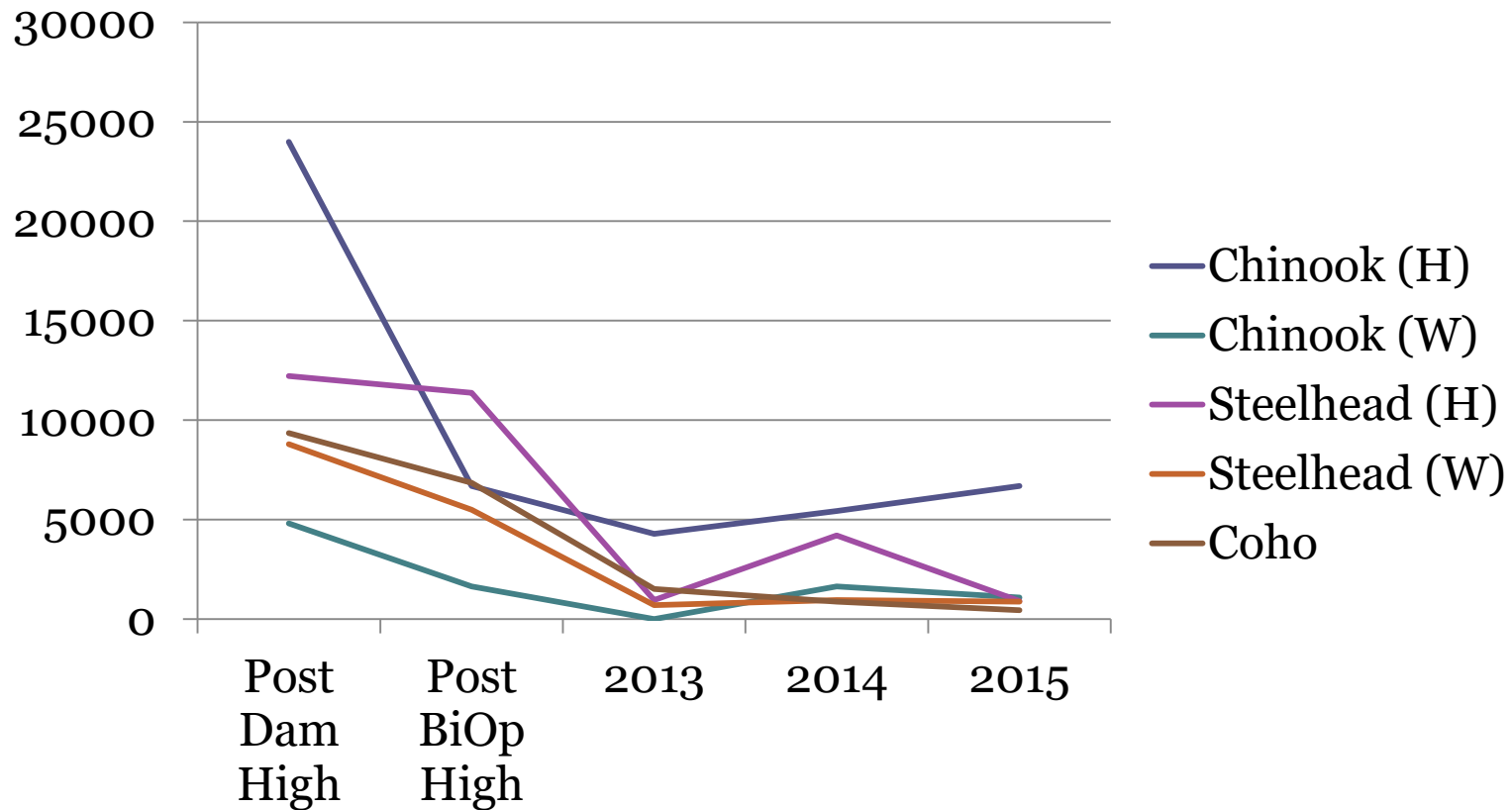
Adult Return vs. Releases (2012-2015)

- **Spring Chinook**
 - Average Release – 675,000
 - Average Return – 5,800
 - Percentage - .8%
 - 2013 & 2014 - .4%
- **Summer Steelhead**
 - Average Release – 120,000
 - Average Return – 2,017
 - Percentage – 1.7%
 - 2013 & 2015 - .7%

Historical Hatchery Stocking North Santiam River

- Includes Trout, Fall Chinook, Spring Chinook, Coho, Summer Steelhead and Winter Steelhead
 - 1951-1960: 1.8 million fish per year
 - 1961-1970: 2.5 million fish per year
 - 1971-1980: 3.2 million fish per year
 - 1981 – 1990: 1.5 million fish per year
 - 1991-2000: 1 million fish per year
 - 2001-present: 854,000 fish per year
- 2.3 Million more fish were stocked in the Little North Santiam from 1952-1993 in total

Adult Returns - Bennett Dams



Steelhead Specifics

- Steelhead are not Salmon and do not follow the Salmon hatchery model for life cycle. “Square Peg in a Round Hole”
- How so?
 - 20% + of juvenile steelhead remain resident and become trout
 - 20%+ Adult Steelhead kelt - return to ocean multiple times
 - Skamania Steelhead are notorious for straying outside their home waters
 - Little North Santiam interbreeding
 - 80% + of wild juvenile steelhead are parented by 20% of the wild adult population.
 - Resident Trout (sneaker) Males commonly fertilize Female Steelhead eggs

Hatchery vs. Wild Genetics (*O. mykiss*)

University of Oregon - Mark R. Christie, Melanie L. Marine, Samuel E. Fox, Rod A. French & Michael S. Blouin

- A **single generation** of domestication heritably alters the expression of hundreds of genes.
- Here, to test this hypothesis, we measured differential gene expression in the offspring of wild and **first-generation** hatchery steelhead trout (*Oncorhynchus mykiss*) reared in a common environment. Remarkably, we find that there were **723 genes differentially expressed** between the two groups of offspring.
- Reciprocal crosses reveal that the differentially expressed genes could not be explained by maternal effects or by chance differences in the background levels of gene expression among unrelated families.
- Gene-enrichment analyses reveal that adaptation to the novel hatchery environment involved responses in wound healing, immunity and metabolism.

What other States are doing

- Montana
 - Eliminated hatchery releases in ALL streams containing wild fish stocks – 1974.
 - Wild fish populations increased in all instances, some by as much as 400% within 2 years
- Washington
 - Began designating specific river systems as “Wild Gene Banks” in 2014
 - No Hatchery Stocking now in 9 rivers

Northern Pacific Aquaculture

- **Floating Net Pen Salmon Farms**
 - British Columbia
 - Puget Sound Washington
 - Banned in Alaska
- **Issues**
 - Atlantic Salmon stocks
 - Escapement from pens: 10-15%
 - Disease/Waste/Excrement/Water Chemistry
 - Location of Pens
 - Parasite congregation
 - Foreign ownership (Primarily Norwegian)

The Final “H” - Habitat

- Habitat Issues
 - Historical
 - Forestry Practices
 - Dams/Diversions/Intakes
 - Mining Practices
 - Industrial Use/Discharge
 - Municipal Use/Sewage/Stormwater
 - Hatchery Practices
 - Agriculture Practices
 - Current
 - See all of the above

We've come a long way.....

- Bureau of Fisheries Stream Habitat Survey – Willamette River Basin 1934-1942 (492 pgs.) Excerpts
 - North Santiam River – 1940 (51 pgs.)

“None of the spawning area is actually unavailable, although the Stayton power ditch and the Salem ditch take most of the water available during low water periods.”

“As soon as the racks are put in at Detroit by the Oregon State Fish Comm. the river is blocked to passage of fish (salmon and steelhead) above that point, and remains totally blocked until the spawning season is over in the fall.”

“There is a large amount of garbage and refuse all along river, with heaviest concentrations below the towns of Stayton and Mill City.”

1940 BFS Survey

- **Pollution Sources:**
 - Town of Stayton (sewage)
 - Paris woolen mill at Stayton
 - Mill City (sewage and saw mill waste)
 - Detroit (sewage)
- **Type of Pollution:**
 - Sewage (towns along river edge)
 - Dye stuff (from Paris woolen mill)
 - Saw mill waste (Mill City)
 - Garbage (towns and farms along river banks)

1940 BFS Survey

Large amounts of garbage and refuse in river at and just below Stayton.

Paris woolen mill observed discharging dye stuffs into waste canal, one discharge of sufficient amount to dye approximately 100 yds of drainage canal (approximately 10' wide, 1-4' deep) a bright red, to such an extent that visibility possible only to 2" depth where ditch joins pools formed by Mountain States Power Co. plant discharge. Temperature of discharge more than our thermometers could record (**well over 150 degrees F**). Group of chinook salmon in pool behind power plant (unable to ascend due to dry fish ladder) observed to retreat back out of sight when dye stuff reached pool in which they lay. At time of observation, no waste materials were being put into the canal by the batt factory or the flour mill in Stayton.

Water was discolored for more than 1 mile below Mill City, apparently from a saw mill operated in that town.

Swimming was reported banned at Mill City because of pollution from Detroit sewage.

1940 BFS Survey

The Mill Dam above Mill City is a barrier at low water when logs are chained across the top of the dam to divert nearly all the water down the sawmill power canal. The dam is approximately 300' long and is of rock-weighted log and wood construction. It has a 21 1/2' wide wooden downstream apron across its entire length. There is a very poor wooden fish ladder with 4 jumps at the left. The amount of water flowing through the ladder at low water is not sufficient to attract fish. There are no protective devices on the sawmill diversion.

1940 BFS Survey

Salmon and other fish can ascend the North Santiam as far as Stayton without much difficulty, but to get through the maze of canals, dams and by passes in that vicinity may be a problem.

A fish ladder was installed this year at the Mountain States Power Co. plant in Stayton in order to pass the fish upstream through the diversions to the river above. This ladder was late in being installed, and a great many of the early - chinooks were forced to drop back downstream before the ladder was finally opened. Hundreds of chinooks, although in poor condition, were taken illegally by local residents.

From all reports, the run of salmon and steelhead into the North Santiam has fallen off considerably, and at present constitutes only a small fraction of the runs reported by early settlers. Cause of the depletion is partly due to the cumulative effects of the various barriers and hindrances encountered by the fish on their spawning migration and the indiscriminate diversion of water and consequent destruction of large numbers of downstream migrants.

Coastal Zone Management Plan

- Coastal Zone Management Act – US Congress 1972
- Oregon Joined in 1977
- Management Measures by NOAA & EPA
 - Erosion
 - Sediments
 - Nutrients
 - Pesticides/Herbicides
 - Grazing
 - Animal Waste
- 1998 Warning from EPA of Non-Compliance
- Oregon is the only state to have lost funding for non-compliance – primarily due to Forest Practices.

Board of Forestry Stream Buffers

- Decision – November 2015
 - Applies to West of Cascade Crest Only
 - Siskiyou region excluded
 - Small & Medium Fish Bearing Streams
 - If containing Salmon, Steelhead, Bull Trout
 - Increase Buffer by 10 feet, double the number of trees that must be left.
 - No change to large fish bearing streams
 - Small Acreages excluded
 - Effective in 2019
 - End Result – Still the most lenient stream buffer regulations in the US

Suction Dredge Mining

- Banned permanently in California and Washington in recent years.
- 5 Year Oregon Moratorium expires 2019
- Permanent Ban proposal died in committee this year.
- Impacts
 - Gravel/Substrate displacement
 - Mercury and other heavy metals/toxins released downstream
 - Fish Redds damaged/destroyed
 - Incubating Eggs damaged/destroyed
 - Noise pollution
 - Chemical pollution (petroleum products)
 - Fish Passage

Miner's Perspective

- They clean the river of old fishing gear (lead)
- The little fish like it – stirs up food (and mercury, arsenic, copper, etc.)
- Willing to cease for a few weeks during spawning
 - Jan-March?
 - Steelhead and Trout Spawning
 - Chinook Eggs Incubating
 - Apr – May?
 - Some Steelhead and Trout Spawning
 - Steelhead and Trout Eggs Incubating
 - Jun – Aug?
 - Some Steelhead and Trout Eggs Incubating
 - Some Salmon Spawning
 - All species at various life-cycle stages highly dependent on Cold Water Refuses & Passage
 - Sep-Dec?
 - Salmon Spawning and Eggs Incubating
 - Some Steelhead beginning to Spawn

Local Issues - This Fish Person's Perspective

- #1 - Water Quality/Temperature
 - Restoration - Stream Buffers/Riparian Areas/Culverts
 - Dams, Diversions, Impoundments, Discharge
 - Climate Change/Drought considerations
 - Higher water temperatures are detrimental to native resident and anadromous populations AND allow predatory species (native and invasive) to flourish – a “double whamy”.
 - Middle & Upper Reach Focus – spawning/rearing habitat
 - Be careful how we (NSWC) promote our successes!

Local Issues - Fish Person Perspective

- #2 – Hatchery Management Plans
 - Major reductions/eliminations of Hatchery Releases
 - Especially in forecasted drought years!
 - Aquarium Effect
 - Hatchery fish pre-disposed with weakened immunity/fitness
 - Eliminate Summer Steelhead program
 - Marc Johnson – ODFW sterilization study has potential
- #3 – Sport Fishing Regulation Changes
 - Public Education
 - More selective gear
 - Barbless / Single Hooks
 - Bait Use Limitations or Elimination
 - Catch and Release for Trout & Steelhead

Questions & Comments?

