



# The Role of Hatcheries in the North Willamette Watershed District

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# ODFW Mission Statement

“Our mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations.”

# Hatchery Policy Goals

1

Foster and sustain opportunities for sport, commercial, and tribal fishers consistent with the conservation of naturally produced native fish.

2

Contribute toward the sustainability of naturally produced native fish populations through the responsible use of hatcheries and hatchery-produced fish.

3

Maintain genetic resources of native fish populations spawned or reared in captivity.

4

Minimize adverse ecological impacts to watersheds caused by hatchery facilities and operations.

# Hatchery Program Management Goals

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The Department shall develop hatchery program management plans for all hatchery programs.

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Program management plans describe the program's objectives, fish culture operations, facilities operations, and monitoring and evaluation.

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Plans use the most up to date and reliable scientific information and seek the input and involvement of appropriate tribal, state and federal management partners, university programs and the public.

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Native Fish Conservation Policy (OAR 635-007-0502 through -0506) provides the primary process for planning and coordinating hatchery programs.

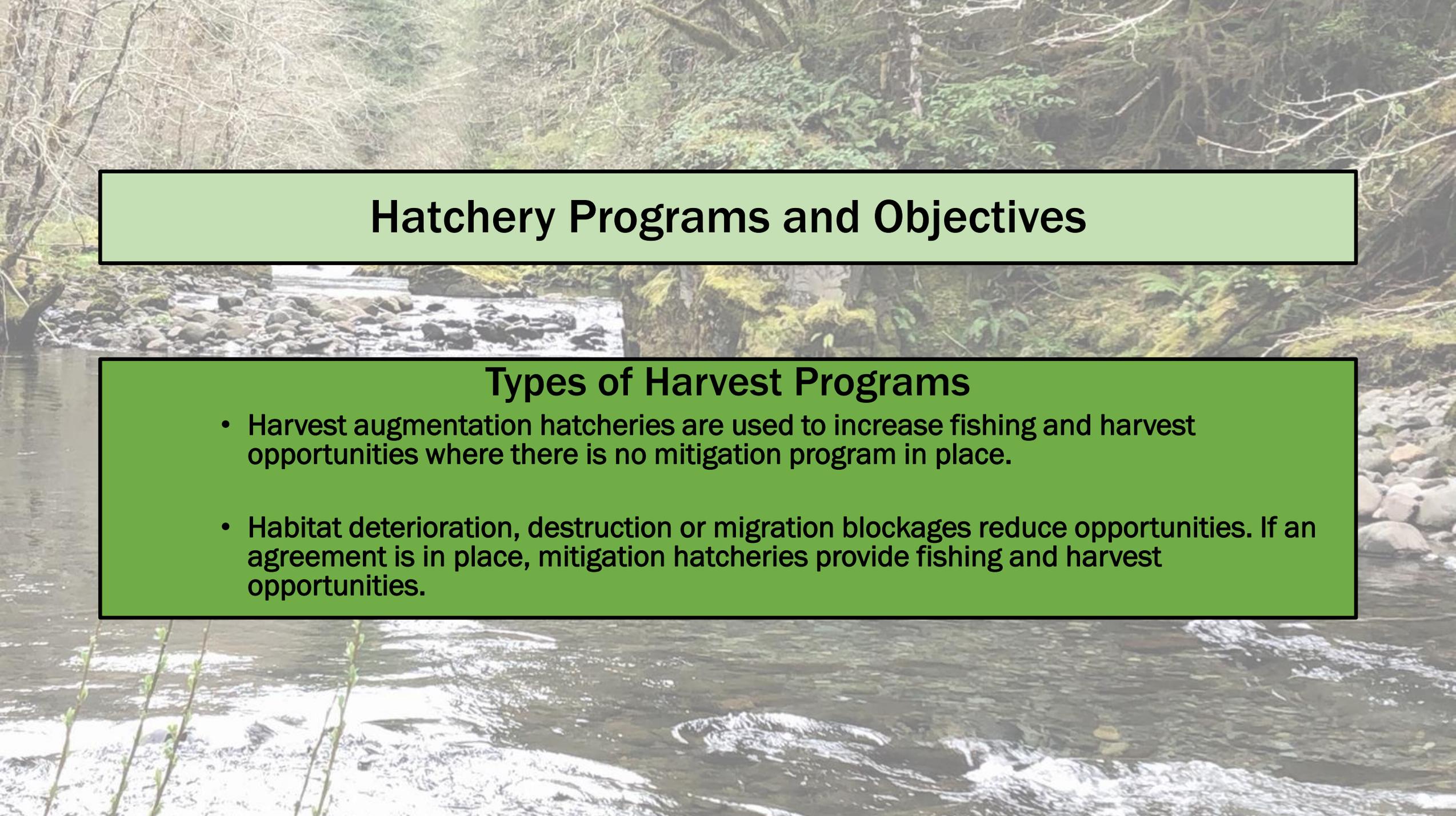


# Hatchery Programs and Objectives

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## Harvest Programs

- Operate to enhance or maintain fisheries without impairing naturally reproducing populations.
- Separate (temporally, spatially, visually) hatchery produced and naturally produced native fish in fisheries and on spawning grounds as necessary for conservation.



## Hatchery Programs and Objectives

### Types of Harvest Programs

- Harvest augmentation hatcheries are used to increase fishing and harvest opportunities where there is no mitigation program in place.
- Habitat deterioration, destruction or migration blockages reduce opportunities. If an agreement is in place, mitigation hatcheries provide fishing and harvest opportunities.

# Hatchery Programs and Objectives

## Conservation Programs

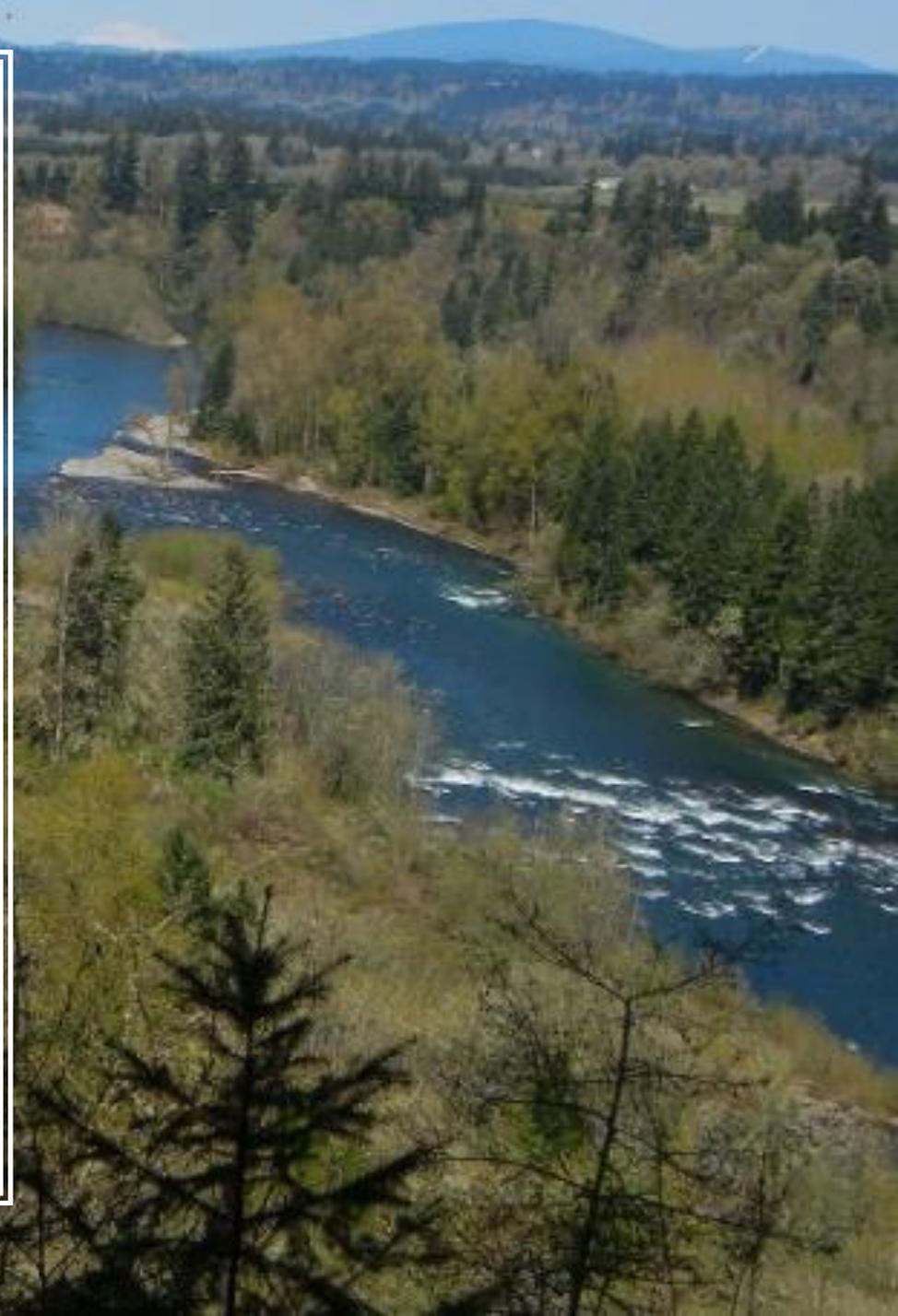
- Maintain or increase the number of naturally produced native fish without reducing the productivity of naturally produced fish populations.
- Provide a survival advantage with minimal impact on genetic, behavioral and ecological characteristics of targeted populations.
- Long-term conservation success is tied to remediating causes of the decline that resulted in the need for hatchery intervention.



# Hatchery Programs and Objectives

## Types of Conservation Programs

- **Supplementation programs** route a portion of an imperiled wild population through a hatchery for part of its life cycle to gain a temporary survival boost or bring in suitable hatchery produced fish or naturally produced native fish from outside a target river basin to supplement the imperiled local population.
- **Restoration programs** outplant suitable non-local hatchery produced or naturally produced native fish to establish a population in habitat currently vacant for that native species using the best available broodstock.
- **Captive brood programs** take a portion or all of an imperiled wild population into a protective hatchery environment for the entire life cycle to maximize survival and the number of progeny produced.
- **Captive rearing programs** take a portion of an imperiled wild population into a protective hatchery environment for only that part of its lifecycle that cannot be sustained in the wild.
- **Egg banking programs** temporarily remove a naturally produced native fish population from habitats that cannot sustain it and relocate the population to another area that can sustain it.
- **Cryopreservation programs** freeze sperm from naturally produced native fish for later use in conservation hatchery programs.
- **Experimental programs** investigate and resolve uncertainties relating to the responsible use of hatcheries as a management tool for fish conservation and use.



# The History of Hatchery Spring Chinook in the Clackamas

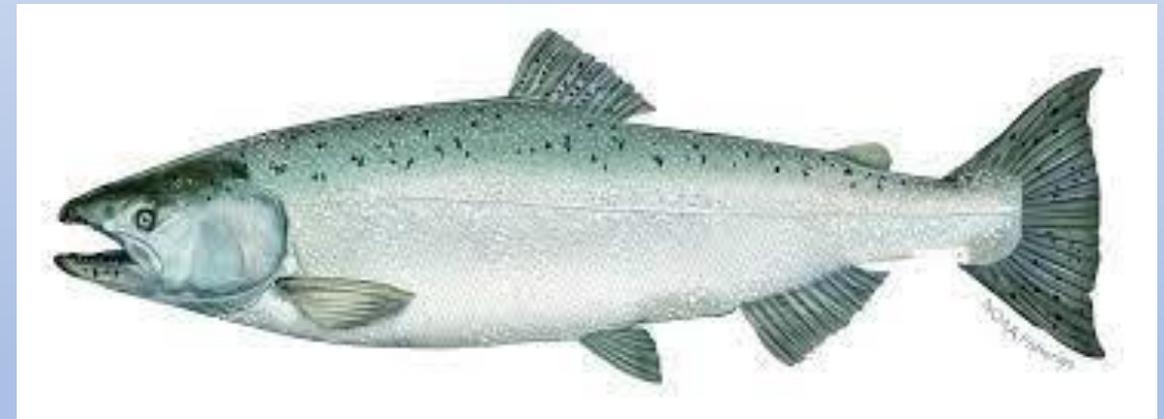
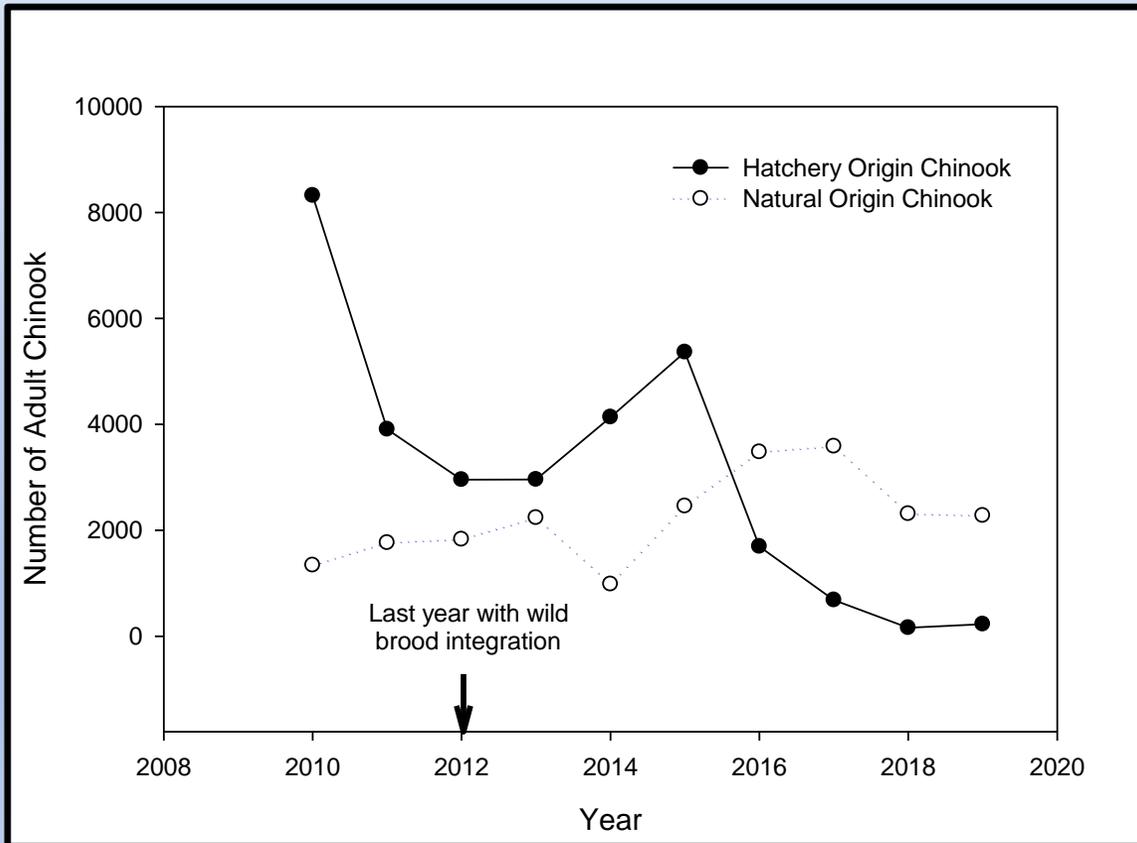
- The history of salmonid production in the Clackamas River dates back as far as 1870's, when cannery personnel formed the Oregon and Washington Fish Propagating Company, which was constructed at the mouth of Clear Creek.
- The current Clackamas Hatchery was developed initially due to an agreement between Portland General Electric and the State of Oregon.
- Spring Chinook salmon production began in 1979 using adult returns from upper Willamette River stock.



# Clackamas River Hatchery Spring Chinook

- The overall program goal is to support Clackamas River wild spring Chinook salmon conservation while enhancing commercial and recreational fisheries in Oregon Rivers and the coastal Pacific Ocean.
- Clackamas Hatchery spring Chinook salmon program mitigates the loss of spring Chinook salmon production caused by the construction and operation of PGE's Clackamas Hydroelectric Project.
- The broodstock used at this facility was founded from upper Willamette River spring Chinook salmon in 1976, and has been managed as a segregated stock since that time.
- In recent years, the number of adult hatchery-origin spring Chinook salmon returning to the Clackamas River (i.e. smolt-to-adult returns; SARs) declined precipitously, despite relatively constant production and release of juveniles.
- The dire situation of the Clackamas Hatchery's spring Chinook salmon program prompted managers to consider a variety of alternative actions, including transition to an integrated broodstock.

# Number of adult hatchery-origin and natural- origin spring Chinook salmon returning to the Clackamas River (2010-2019).



# Clackamas Hatchery Spring Chinook

- The Hatchery and Genetic Management Plan (HGMP) describes management of the Clackamas Hatchery Spring Chinook Program as an integrated program after three “rebuilding” years.
- Under this integrated plan, take of wild Clackamas spring Chinook salmon will occur in accordance with a “sliding scale” that determines the integration rate as a function of the number of wild spring Chinook returning to the Clackamas River.
- Hatchery-origin fish will be crossed with other hatchery-origin spawners and similarly, wild brood will be spawned only with other wild brood. The program will be managed with a target of less than 10% hatchery origin spawners (pHOS) on natural spawning grounds of the Clackamas River.

# Clackamas Hatchery Spring Chinook

## “Rebuilding Years”

- The broodstock goal for Clackamas Hatchery is 600 adult spring Chinook salmon, comprised of 400 females and 200 males (all hatchery origin), whereby each male is spawned with two females.
- For research purposes, we propose to annually collect 120 wild spring Chinook salmon from the Clackamas Hatchery and North Fork Dam traps in 2022, 2023 and 2024. Each year, these wild brood will include 80 females and 40 males, to be spawned in the same 2:1 manner as hatchery-origin brood.
- Half of the wild broodstock (40 females, 20 males) will be collected during the month of July, when most adult returns arrive at North Fork Dam, and the remaining half will be collected after that date.
- If fewer than 1,000 wild spring Chinook arrive at North Fork Dam by July 31<sup>st</sup> (including those collected for brood), no additional wild Chinook will be collected for that year.

# Clackamas Hatchery Spring Chinook

## “Sliding Scale”

- Following the initial broodstock development or “founding” years, integration of wild fish will follow a “sliding scale”.
- Hatchery- and natural-origin adults will be collected at the Clackamas Hatchery trap throughout the duration of the run.
- Hatchery-origin adults will also be collected from the North Fork Dam trap throughout the duration of the run.

NOR Count on July 15th	Estimated NOR run size	% Total NOR	NOR to collect for brood		
			Males	Females	Total
<1000	<1000	0	0	0	0
1000-2000	1000-2500	0.8-2.1	7	14	21
>2000	>2500	2.25	15	30	45
First 3 “building” Years	>1000	Up to 5.0	40	80	120

# Clackamas Hatchery Spring Chinook

## “Collection and Timing”

- Natural-origin adults will be collected from the North Fork Dam trap, in accordance with sliding scale guidelines, only after July 15th. All natural-origin adults will be provided upstream passage above the North Fork Dam prior to this date.
- Delayed collection of natural-origin adults at North Fork Dam reduces the average holding time of natural-origin brood, thereby limiting prespawn mortality and increasing mean fitness of wild fish used as brood.
- Late-summer and fall collection of brood will improve the accuracy of sex determination based on secondary characteristics, which are often undeveloped during the spring and early summer. Accurate sex determination is important, given the 2:1 mating scheme used during hatchery spawning.
- Delayed collection will allow for confident estimation of the wild run size from passage occurring prior to July 31<sup>st</sup>, informing the appropriate collection rate to be used during August-October, per the sliding scale.



## Research, Monitoring and Evaluation

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- Given the history of hatchery production in the Clackamas River and the long-term use of a segregated hatchery-origin broodstock, coupled with the precipitous decline in hatchery-origin returning adults, ODFW affords a unique opportunity to observe and measure the potential “genetic rescue” in the context of the performance of a hatchery program.
- During the “Rebuilding years” a genetics study intends to measure the efficacy of the hatchery program’s “genetic rescue” by way of increasing the allelic richness of the hatchery stock through integrating a locally adapted natural-origin spring Chinook salmon population, and in turn, increase adult production as a measure of increased returns or SARs.
- Parental-based genetic tags (PBT) will be used to track the contribution of hatchery and natural-origin fish spawned to returning adults in subsequent years. In terms of juvenile-to-adult survival, production will be compared with the existing hatchery stock production for three brood years (2022-2024). Over that period, ODFW would track the genetic diversity of hatchery and wild fish that contribute to hatchery production and test for relationships between diversity and productivity of Clackamas spring Chinook salmon.



## Research, Monitoring and Evaluation

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- Hatchery and natural-origin bloodstock, including mortalities, will be sampled to ensure life-history characteristics such as age composition, sex composition, body size (length and weight), run timing, adult/jack ratio, and fecundity does not differ from that of the hatchery and natural-origin adults returning to the Clackamas River basin.
- Punch card information and electronic reporting, creel surveys, and commercial catch data will be evaluated to determine the hatchery program's fishery benefits.
- Other ongoing monitoring and research projects occur through ODFW's Corvallis Research Lab (Environmental Monitoring and Assessment Program [E-MAP], spawning surveys, habitat surveys, focused research, PGE (smolt emigration at North Fork Dam), the USFS (juvenile surveys, smolt trapping), and other entities. These monitoring efforts are not directly related to the spring Chinook salmon program, but ODFW will use information collected by these activities to evaluate and guide the overall hatchery program.

A large, silvery fish, possibly a salmon, is being held in shallow, rippling water. The fish's scales are highly reflective, creating a shimmering effect. A person's hand is visible at the bottom right, supporting the fish. The water is clear, and the background shows the texture of the water's surface.

**Thank you!**

**Ben Walczak**

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