



State of Washington  
**DEPARTMENT OF FISH AND WILDLIFE**

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December 30, 2022

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The Honorable Kevin Van De Wege  
Chair, Senate Agriculture, Water,  
Natural Resources and Parks  
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The Honorable Mike Chapman  
Chair, House Rural Development,  
Agriculture, and Natural Resources  
132B Legislative Building  
Post Office Box 40600  
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Dear Chairs,

I am writing to provide you with the Washington Department of Fish and Wildlife's report to the legislature on the work of the Puget Sound Recreational Fisheries Enhancement Fund (PSREF) Oversight Committee.

The PSREF Oversight Committee was established by the legislature in 2003 to advise the department on Puget Sound recreational fisheries. The group has developed goals, objectives, and performance metrics to track the effectiveness of the Puget Sound recreational fisheries enhancement program and has annually reviewed and approved the enhancement fund budget.

Consistent with RCW 77.105.160 and RCW 43.01.036, the Oversight Committee partnered with the agency to develop this status report for the Legislature and Commission on our work to date. The following report outlines the Oversight Committee's progress towards the goals and objectives established by the legislature in our enabling legislation.

If you have any questions or concerns about this report, please feel free to contact Tom McBride, WDFW's Legislative Director, at (360) 480-1472.

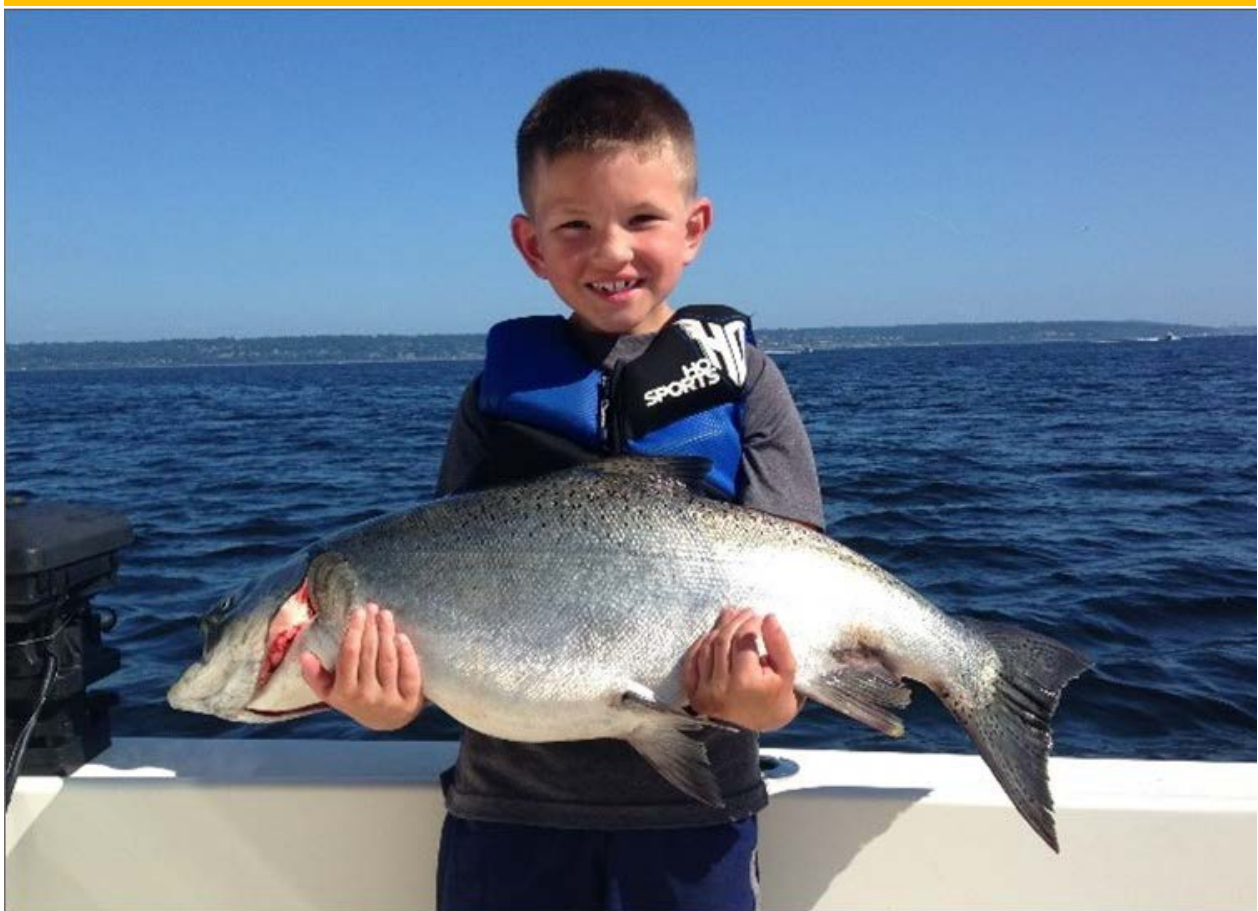
Sincerely,

A handwritten signature in blue ink, appearing to read "Kelly Susewind".

Kelly Susewind  
Director

# Puget Sound Recreational Fisheries Enhancement Fund 2022 Report to the Legislature

Washington Department of Fish and Wildlife



Washington  
Department of  
**FISH and  
WILDLIFE**

December 2022

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# Background

Leading up to the 1990s, recreational fishing opportunities for salmon and marine bottomfish in Puget Sound were on the decline. In 1993, the Washington State Legislature created the Puget Sound Recreational Fisheries Enhancement Program (PSRFE) to improve recreational fishing opportunities and increase the economic benefits from the fishery. To date, the program has worked to conserve, enhance, and improve fishing opportunity through outreach to promote fishing, hatchery fish production for harvest, and bottomfish conservation.

The Washington State Legislature created the PSRFE program in 1993 with a dedicated account called the Puget Sound Recreational Fisheries Enhancement fund. The funding is achieved from a portion of the fees collected from saltwater and combination fishing license sales, based on the proportion of purchasers who fish in Puget Sound which is derived through a survey.



# History

## 2010 Audit of the Puget Sound Recreational Fisheries Enhancement Program (PSRFE)

The primary objective of the 1993 PSRFE program was focused on enhancing the “winter” blackmouth recreational fishery on Puget Sound through the release of 3 million yearling Chinook salmon into Puget Sound annually.

Following a request by the Legislature, the Washington State Auditor’s Office conducted a performance audit of the PSRFE program in 2010. Auditors concluded the following: 1) WDFW was not meeting its statutory goal to release 3 million delayed-release Chinook annually, 2) the statutory goal to release 3 million delayed-release Chinook was not effectively sustaining or restoring the Puget Sound Chinook salmon recreational fishery. The goal to release 3 million delayed release Chinook salmon stems from research dated to the 1970s and 1980s.

Recommendations based off the findings included the revision of the program’s goals to reflect contemporary data. Additionally, recommendations insisted on the use of outcome-oriented goals and regular reporting from the department to the commission and legislature to track the program’s progress.

In 2011, the Legislature repealed several sections of the RCW 75.54, and subsequently reauthorized the PSRFE program under RCW 77.105. The revised legislation includes provisions for marine fish enhancement as well as notable evaluation metrics. Under 77.105.005(3) the legislature has determined that the number of angler trips expended in these waters is the measure of fishing opportunity (WDFW).

## Recreational Fisheries Enhancement Account

Historically, the budget for PRSFE was an annual recreational surcharge of \$10 for each combination and saltwater license sale. Following the 2009 recession, license fees were increased by 10% to backfill general fund cuts. In 2011, Legislature rolled the Puget Sound enhancement surcharge into the base saltwater and combination license fee. The annual budget reflects a portion of license sales of those who intended to fish for salmon or any marine species in Puget Sound (marine catch areas 5 to 13) or in Lake Washington. An annual survey develops these rates by license type from the previous year and is applied to current license sales (Figure 1). The average annual budget depends on license sales, Puget Sound fishing participation, and spending authority.

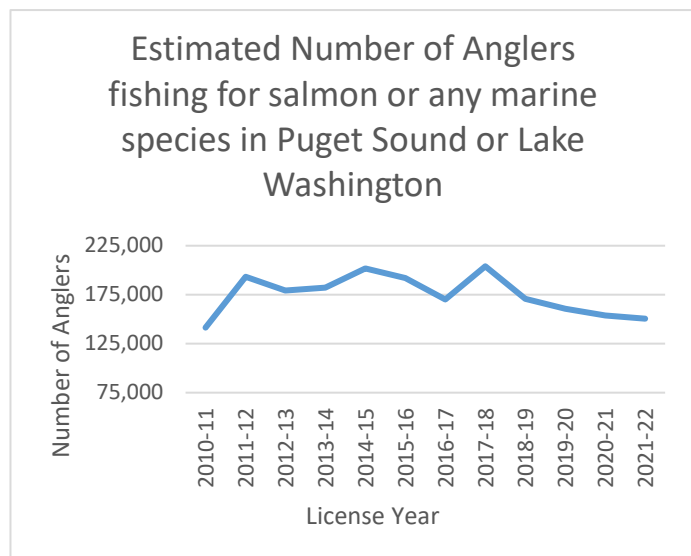


Figure 1. Source: WDFW.





Figure 2 below shows PSRFE budget revenue summary per biennium. Please note Biennium 21-23 does not include spending for the full biennium, only revenue.

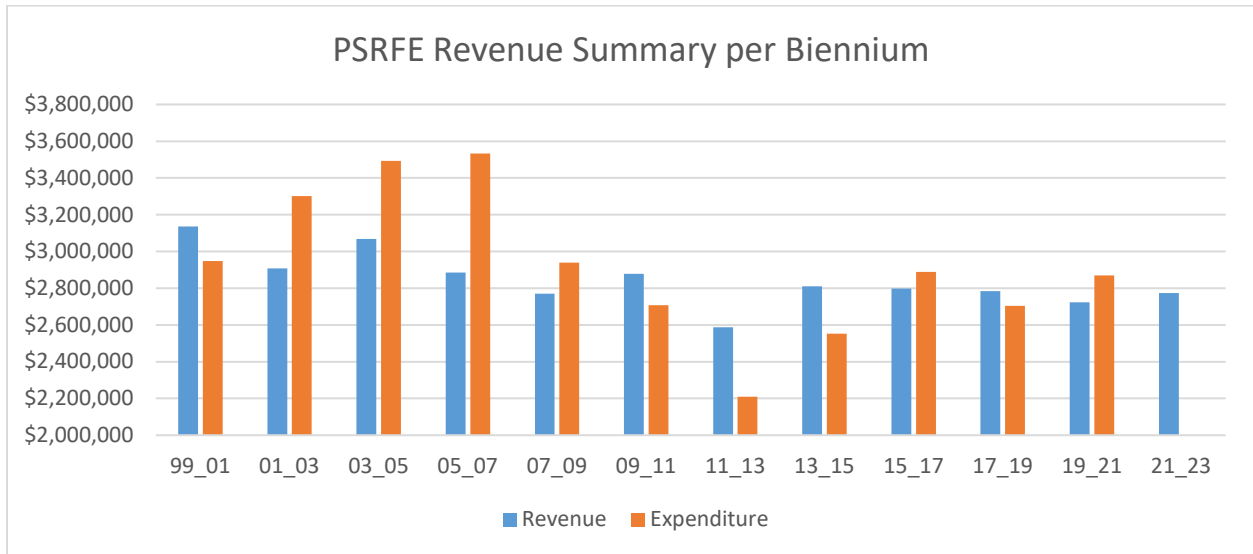


Figure 2. Source: WDFW.

As shown in Figures 3 and 4 below, most of the budget is spent on hatchery production. With legislative changes in 2011 and the development of goals and objectives, additional resources have been allocated to pursue other projects, including outreach and bottomfish conservation. These distribution efforts are further discussed throughout the four strategies below.

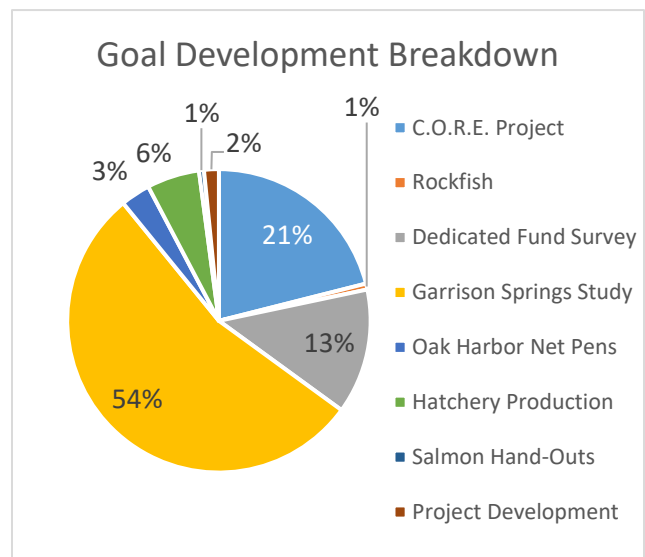
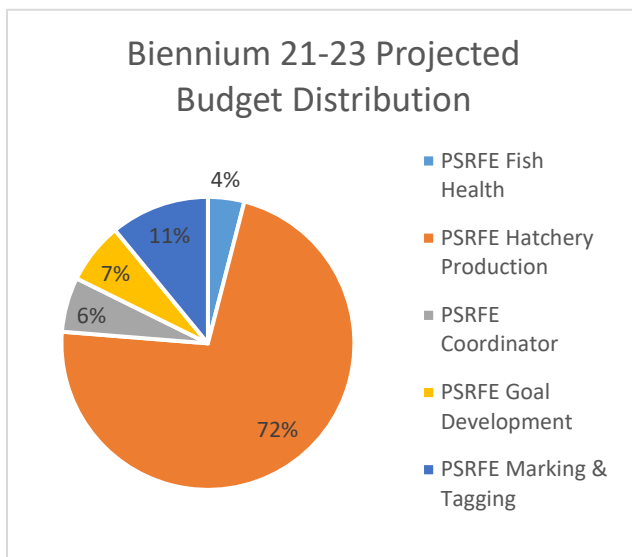


Figure 3 (left) and Figure 4 (right). Source: WDFW.



# Current Goals and Objectives

Following the legislative changes in 2011, the Oversight Committee in conjunction with WDFW developed the following performance-based goals to measure progress and ultimately improve the cost-effectiveness of the program.






The outcome performance measure is an increase in angler trips in Puget Sound and Lake Washington by 5% per biennium. As detailed in later sections, the four strategies work towards this 5% increase.

## Historical Angling Trips

The declining populations of salmon and rockfish species in Puget Sound and Lake Washington continue to impact recreational fishing opportunity. These declines are due to habitat destruction, sea lion and seal predation, changes in ocean productivity, and historical overfishing. The four strategies emphasize outreach, research, hatchery production, resource management and conservation to improve populations in Puget Sound and Lake Washington.

While these strategies work towards the 5% increase per biennium, reduced populations ultimately affect the past and current availability of fishing due to restrictive regulations on these fisheries. Constraints are placed on recreational fisheries in Puget Sound to limit impacts on weak Puget Sound stocks. As shown in Figures 5 and 6, the number of angling trips correlates to the number of open salmon fishing days. The decline in 2016 demonstrates this correlation.

In 2016, recreational fishing opportunity was limited in Puget Sound to reduce mortality of Coho stocks. Low coastal and Puget Sound returns in 2015 and low Coho run size forecasts for 2016 drove restrictive measures on Puget Sound recreational fisheries. The

Goal	Progress
Improve the recreational fishing opportunities in Puget Sound and Lake Washington and Increase the economic benefits from the fishery	
Strategy	
Improve marketing and remove obstacles to build interest and participation in the fishery	
Increase effectiveness of hatcheries providing salmon to PS fisheries	
Develop a long-term strategy for improving recreational <u>bottomfish</u> fisheries in PS	
Stabilize and enhance resources invested in improving PS recreational fisheries	

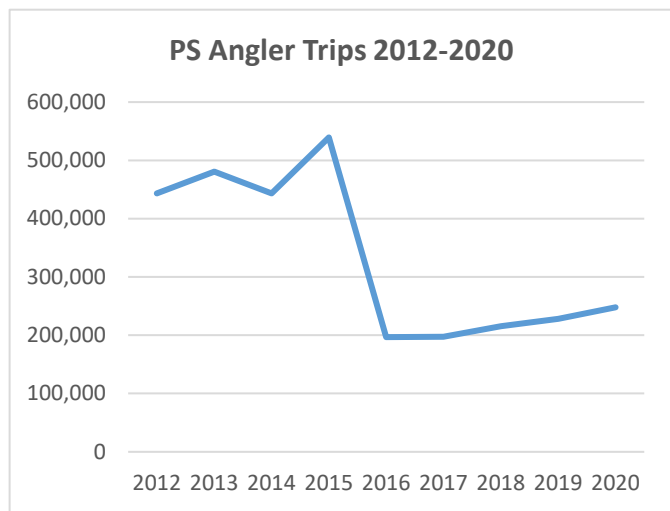
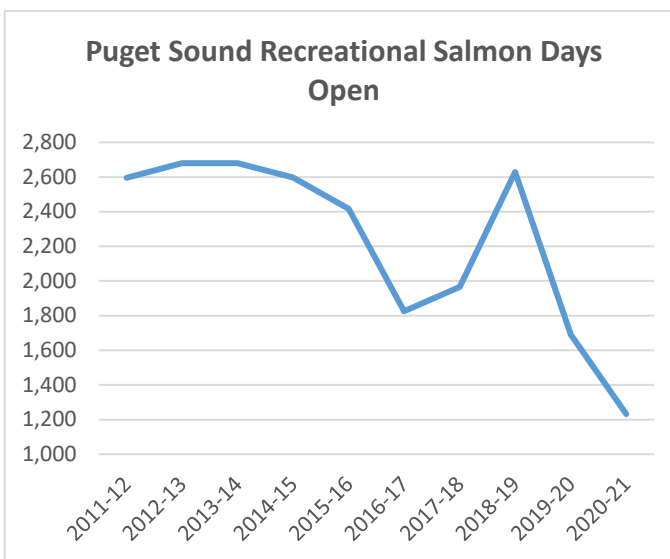


Figure 5 (above) and Figure 6 (below). Source: WDFW.



retention of Coho was prohibited in Puget Sound, and salmon fishing was closed during Coho periods (September to October) for most marine areas (Areas 5-11 and 13).

The closure of Lake Washington sockeye salmon has also significantly influenced fishing effort. Although Lake Washington angling trips are not included in the above graphs, the decline in the sockeye stock plays an important role in the participation of recreational fishing on Lake Washington.

Each year, WDFW and the Muckleshoot Indian tribe conduct fish counts at the Ballard Locks to determine the run size, whether escapement goals will be met, and the opening of the sockeye fishery. Due to insufficient escapement numbers, the Lake Washington Sockeye salmon fishery has been closed since 2006. Although recreational fishing is open for species such as Black crappie, yellow perch, and even Coho for a limited period, effort on Lake Washington has not been the same due to diminished sockeye returns.

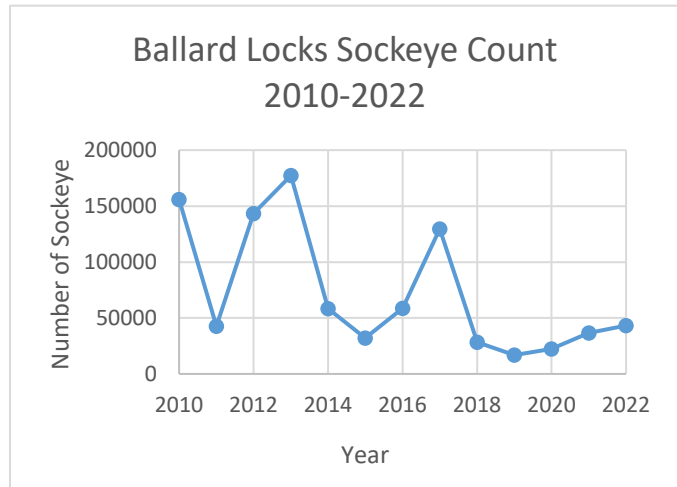


Figure 7. Source (WDFW)

Another factor affecting fishing effort is rockfish availability. Currently, certain populations are in such a decline that only marine area 5 is open for limited rockfish fishing. All other areas must release all rockfish species.





## Strategy 1: Improving marketing and removing obstacles to build interest and participation in the fishery

Previously, the Puget Sound Recreational Fishery Enhancement Program utilized various marketing tactics to educate new and experienced anglers regarding fishing opportunities in Puget Sound and Lake Washington. The program attended the Puyallup Sportsmen's Show, the Seattle Boat Show, and made significant efforts in outreach events and seminars at Joint Base Lewis McChord (JBLM). These events have also given WDFW staff the opportunity to conduct surveys to better understand anglers' awareness of PSRFE. About 1800 surveys have been conducted per year at events as well as online.



Unfortunately, these outreach efforts were paused due to the Covid-19 pandemic. Washington state was put on a mandatory lockdown to limit the spread of the virus in March 2020. Although events were put on hold, the program was able to find innovative ways to educate public and promote fisheries.



The program collaborated with the Friends of Issaquah Hatchery to set up a live salmon camera <sup>1</sup>at Issaquah Hatchery. This allowed the public to watch salmon runs from the comfort of their home. The program also approved funding for two separate net pen projects: the Chinook Orca Recovery Education <sup>2</sup>project (C.O.R.E.) and the Oak Harbor Net Pen <sup>3</sup>project. Both projects aim to bring the local community together and educate youth through school field trips to the net pens. The program also plans to pick up where it left off in 2020 and attend future boat shows and events in 2023.

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<sup>1</sup> [Fish and Wildlife Live Cameras | Washington Department of Fish & Wildlife](#)

<sup>2</sup> <https://nwsalmonresearch.org/chinook-orca-recovery-project/>

<sup>3</sup> [Oak Harbor Net Pens Proposal.docx \(sharepoint.com\)](#)

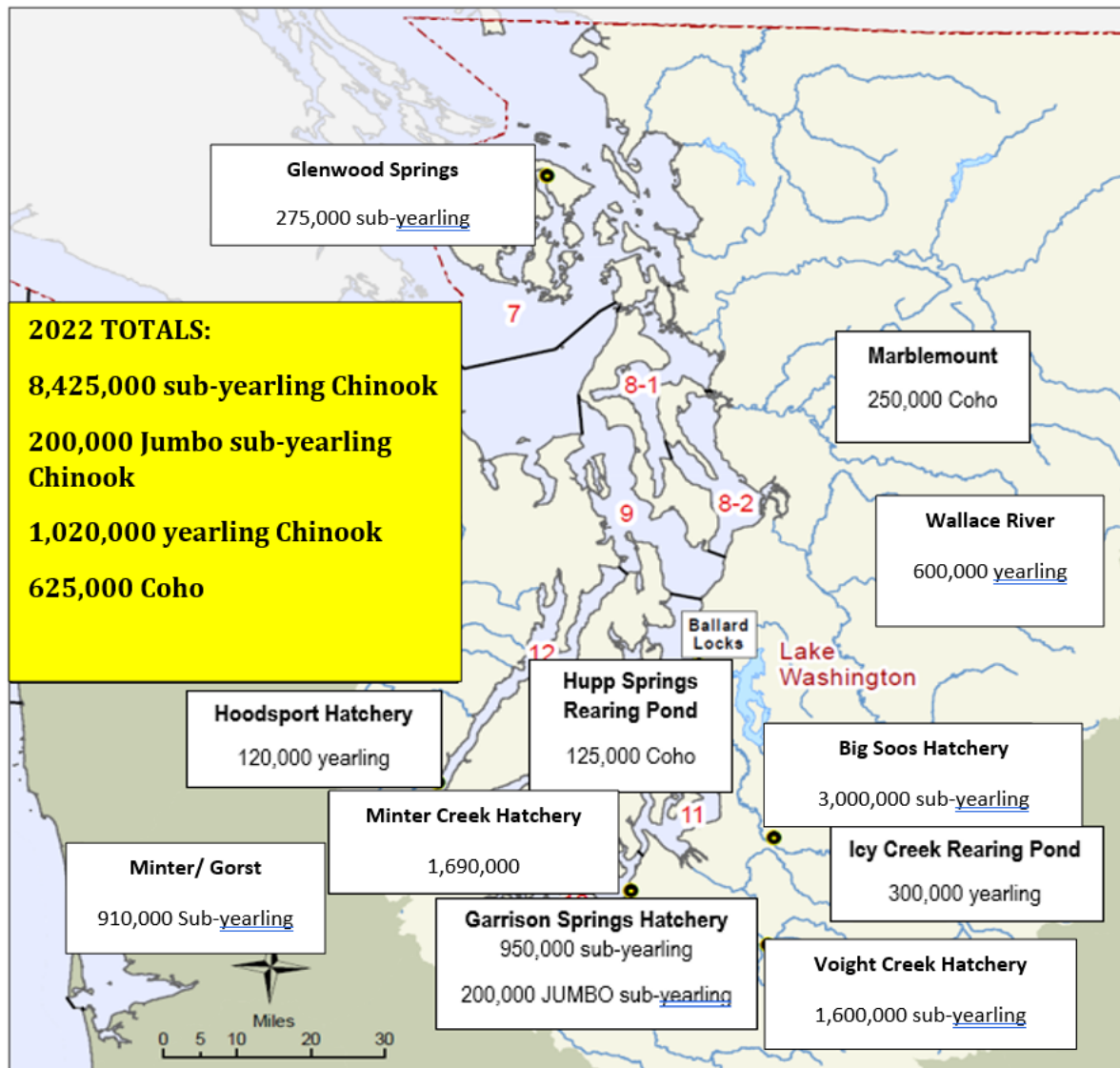


PSRFE will continue to use future events to educate anglers on new rules and regulations, including rockfish conservation practices. The program is also encouraging anglers of underutilized fish stocks in Puget Sound, such as flounder, cutthroat trout, and lingcod fisheries. To further promote these underutilized fisheries, multiple YouTube marketing videos have been developed. To date, the program has developed videos on sea-run cutthroat, flounder/sole, and pink salmon; all of which can be found on the Fish Washington website.



## Strategy 2: Increase effectiveness of hatcheries providing salmon to Puget Sound fisheries

The PSRFEF Oversight Committee has made significant investments in hatchery production, research, and marking and tagging over the years, which have contributed to Puget Sound recreational fisheries. Initially, investments focused on winter blackmouth programs. In recent years, focus has shifted to Coho programs throughout the Puget Sound. Coho programs are more cost effective to run and have resulted in more robust returns and opportunities for Puget Sound anglers. Because hatchery produced fish are the foundation of Puget Sound recreational fisheries, the PSRFE program currently contributes funding to fish rearing efforts at WDFW hatcheries on Puget Sound (map below). PSRFE total production includes over 8 million sub-yearling Chinook salmon, over 1 million yearling Chinook salmon, and 625K yearling Coho salmon.



2022 Map of PSRFE funded salmon hatchery locations on Puget Sound, including total number of salmon species reared. Source: WDFW.



To maximize harvest and fishing opportunity, the program also dedicates funds to hatchery research. A report produced by the Hatchery Scientific Review Group (HSRG) in 2018 to review the 13 salmon production programs and facilities in Puget Sound was supported by PSRFE dollars<sup>4</sup>. The report calculated and summarized Chinook and Coho survival rates, contribution rates, and cost per fish. The following table (Table 1) has been updated since the 2018 report to include recovery data to date of the PSRFE funded salmon hatchery programs.

Hatchery Name	Species	Age at Release	Run	Total Released (Avg.)	Smolt to Adult Return %	Adults Produced	PS Sport fishery*		PS Blackmouth fishery	
							Per 100,000 **	% ***	Per 100,000	%
Wallace River	Chinook	Yearling	Summer	405,614	0.77%	3055	119	15.85%	62	8.28%
Voight Creek	Chinook	Subyearling	Fall	856,592	0.97%	8278	132	13.73%	35	3.65%
Garrison Springs	Chinook	Subyearling Lates	Fall	84,519	0.63%	530	172	27.38%	36	5.71%
Hoodspout	Chinook	Yearling	Fall	122,451	0.52%	642	154	29.49%	52	9.96%
Icy Creek	Chinook	Yearling	Fall	264,406	0.46%	1208	135	29.44%	42	9.15%
Big Soos	Chinook	Subyearling	Fall	2,530,449	0.45%	11,341	48	10.79%	13	2.93%
Minter (Gorst)	Chinook	Subyearling	Fall	783,601	0.50%	3936	376	13.70%	112	12.00%
Glenwood Springs+	Chinook	Subyearling	Fall	594,102	0.36%	2146	42	11.74%	8	2.34%
Garrison Springs	Chinook	Subyearling	Fall	692,688	0.01%	51	3	37.82%	1	11.15%
Minter Creek	Chinook	Subyearling	Fall	976,860	0.44%	4265	109	25.03%	18	4.05%
Marblemount	Coho		Fall	244,899	4.32%	10,574	589	13.64%	NA	NA
Hupp Springs	Coho		Fall	356,561	2.49%	8,892	640	25.67	NA	NA

\*Total fish harvested in Puget Sound summer and winter sport fishery

\*\*Total adult fish harvested per 100,000 released

\*\*\*Percent harvested adult fish per 100,000 released

+PSRFE stopped funding after 2021.

Table 1. Fisheries Contribution Table. Source: PSRFE data.

Additionally, PSRFE has contributed to research to increase efficacy of hatchery production, salmon survival rates, and fishery contribution; most importantly adults returning to Puget Sound sport fisheries. Some of these studies follow the efforts of the Salish Sea Marine Survival Project<sup>5</sup> in understanding factors affecting the survival of marine species, specifically salmon. For a comprehensive list of all PSRFE studies, please see below.

<sup>4</sup>[https://wdfw.wa.gov/sites/default/files/about/advisory/psrfef/docs/Final\\_Report\\_HSRG\\_to\\_PSRFEFOC\\_November\\_2018.pdf](https://wdfw.wa.gov/sites/default/files/about/advisory/psrfef/docs/Final_Report_HSRG_to_PSRFEFOC_November_2018.pdf)

<sup>5</sup> <https://marinesurvivalproject.com/the-project/>



## Past Studies:

1. Cedar River Sockeye Report (2018): The Lake Washington Sockeye salmon fishery is an important recreational fishery for Puget Sound. Unfortunately, due to insufficient escapement numbers, the fishery has been closed since 2006. WDFW and PSRFE has been looking to alternate rearing strategies to improve survival of sockeye salmon. Currently, more than 90% of juvenile sockeye do not survive to smolt stage in Lake Washington. A recent report (2018) was conducted of the Cedar River Sockeye hatchery to estimate abundance and migration timing of natural origin sockeye fry migrating into Lake Washington<sup>6</sup>.

## Ongoing Studies:

1. Chinook Orca Recovery Education (CORE) at Pt. Defiance Study- C.O.R.E. is a public/private partnership project to rear and release surplus Chinook salmon at net pens for public engagement. This is a project focused on outreach specifically to increase awareness of salmon populations and orca survival<sup>7</sup>.
2. South Sound Diet Study- This project is a partnership with anglers to better understand foraging patterns of south sound salmon on an ongoing basis. WDFW have asked anglers to extract stomachs from salmon for research<sup>8</sup>.
3. South Sound Coho Barging Study- This study partners with the Squaxin tribe to barge Coho salmon past known mortality zones to evaluate survival rates<sup>9</sup>. A report summarizing findings will be produced in 2023.
4. Puget Sound Early Marine Survival Study- This study explores release times throughout Puget Sound to determine effects of survival on juveniles, adult returns, and size<sup>10</sup>.
  - a. Garrison Springs Chinook Jumbo Late time (Jumbo) release study- This study evaluates alternate release times of chinook subyearling salmon based on survival rates. A normal subyearling release is compared to a late subyearling release time (a.k.a. Jumbo).
  - b. Gorst Creek Marine Survival Study- This is a newer study introducing two separate release time groups to Gorst creek. This study will observe differences in survival and returns of Chinook salmon.
5. Hatchery feasibility report- The University of Washington's College of the Built Environment (CBE) partnered with WDFW, the Muckleshoot Indian Tribe and Puget Sound Anglers to develop a course focused on hatchery rearing strategies and salmon recovery. The course was designed to identify hatchery production efforts and explore best options for salmon survival. Report to be completed by August 2021<sup>11</sup>.

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<sup>6</sup> <https://wdfw.wa.gov/sites/default/files/publications/02082/wdfw02082.pdf>

<sup>7</sup> <https://nwsalmonresearch.org/chinook-orca-recovery-project/>

<sup>8</sup> Puget Sound Chinook and Coho feeding study Flyer, David Stormer, WDFW

<sup>9</sup> <https://wdfw.wa.gov/sites/default/files/publications/01969/wdfw01969.pdf>

<sup>10</sup> Hatchery Release Timing Studies, Hatchery Evaluation and Assessment Team Powerpoint, Gary Marston, WDFW

<sup>11</sup>WDFW Goods and Services Contract with UW, Statement of Work, David Stormer, WDFW





## Strategy 3: Develop a long-term strategy for improving recreational bottomfish fisheries in Puget Sound

The PSRFE program has supported efforts to improve recreational bottomfish fisheries through research, production, outreach, and education.

Regular fishery and population status assessment is critical to identify groundfish trends. In 2011, PSRFE supported NOAA in ongoing research on lingcod viability in a hatchery setting. Two reports were generated from this research assessing lingcod stocks and harvest management in Puget Sound<sup>12</sup>. PSRFE has discussed potential for collaboration with the WDFW Rockfish Unit in its effort to determine lingcod population abundance in Hood Canal as of 2023.

PSRFE has also contributed funds to the conservation of rockfish species, as certain populations continue to decline. In 2010, the Endangered Species Act (ESA) categorized three rockfish species as endangered and two as threatened. In compliance with the ESA, WDFW prohibited retention of rockfish species in marine areas 6-13, while limiting a black rockfish fishery to marine area 5.

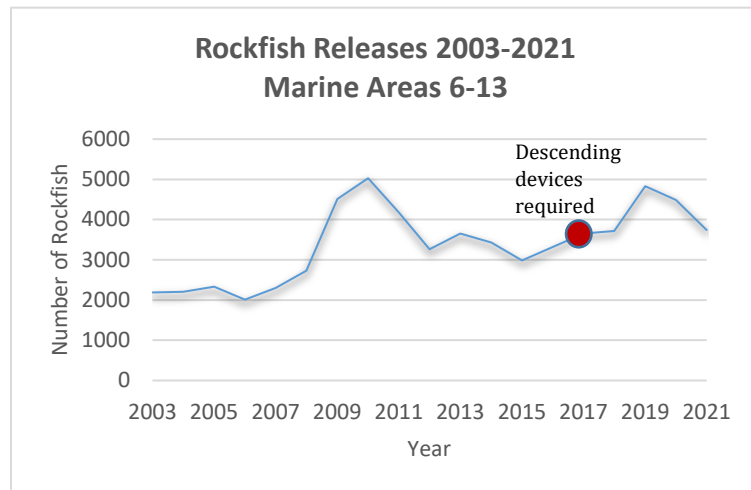


Figure 8. Source: WDFW.

PSRFE has dedicated close to \$55,000 since 2011 to increase angler awareness of rockfish populations through outreach and products, such as rockfish ID guides, and descending devices. Starting in 2017, descending devices were required aboard all vessels. Since 2017, \$17,000 have been allocated to descending devices, which have been continuously distributed at events. Additionally, the WDFW rockfish unit updated the PSRFE-OC on the current status of Puget Sound lingcod bottomfish species for circulation at upcoming events.

<sup>12</sup> (1) <https://doi.org/10.1080/10641262.2013.799391>; (2) <https://pubmed.ncbi.nlm.nih.gov/23731140/>



Figure 8 shows a decrease in rockfish releases starting in 2010 due to a decrease in overall rockfish encounters after the ESA listings. The increase in releases since 2016 demonstrates the increased use of descending devices since they were required in 2017. Additionally, the decrease starting in 2019 corresponds to a decrease in rockfish encounters.



## Strategy 4: Stabilize and enhance resources invested in improving Puget Sound recreational fisheries

As outlined in the three strategies above, the program works towards improving Puget Sound recreational fisheries through outreach, hatchery production, and resource management, i.e., conservation practices. This fourth strategy focuses on resource management through maintaining and improving the fiscal health of the program. PSRFE has supported various attempts by the agency to adjust license fees so they reflect cost of living. Unfortunately, legislative sessions have failed and so this inflationary adjustment has not been implemented, eroding the buying power of the PSRFE over time. Fortunately, the 2022 legislative session passed the implementation of electronic licensing practices, allowing print-from-home options and mobile device based electronic licenses. This rule will facilitate license sales.

Outreach events contribute to the program’s success in resource enhancement. These events raise fishery interest and in turn add to the number of fish license sales. Since 2017, JBLM has increased its percentage of license sales compared to total license sales per year. In 2017, JBLM sales accounted for 0.28% of total licenses sold to anglers. In 2022, JBLM participation increased to 0.35% of total licenses sold of saltwater and combination sales. Figure 9 (right) shows total license quantities sold at JBLM since 2017. The notable increase is seen each odd year due to fishing opportunity for pink salmon.

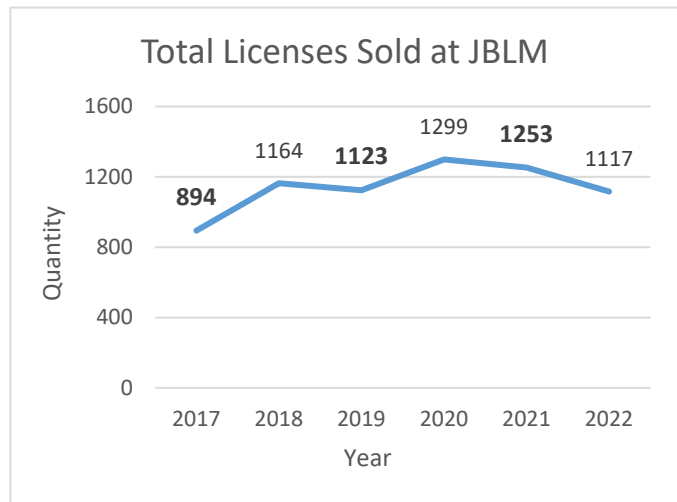


Figure 9. Source: WDFW.

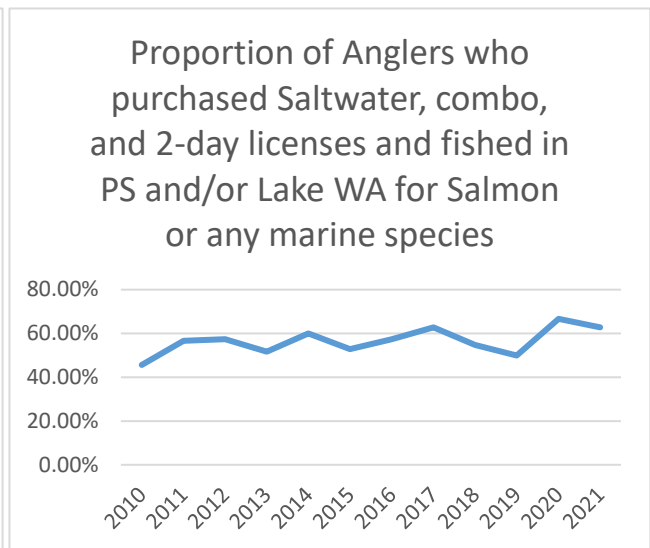
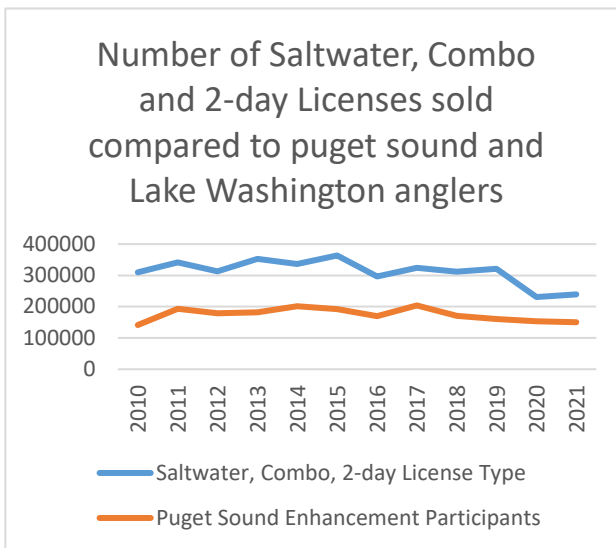


Figure 10 (left) & Figure 11 (right). Source: WDFW



Figure 10 (left) shows the total license quantities of saltwater, combination, and 2-day license sales compared to the total number of participants fishing for salmon or any marine species in Puget Sound or Lake Washington, a.k.a. Puget Sound Enhancement angler (PSE). Figure 11 (right above) shows this percentage of PSE anglers to the number of licenses sold.

PSRFE continues to engage in public outreach to promote fishing and awareness of the program. PSRFE has been pursuing alternate funding sources, such as a cost share program and a match grant program. Currently, the program funds 30% of the Hupp Springs hatchery program. The match grant program is being discussed now. The agency and the PSRFEF Oversight Committee is exploring transitioning to a grant program with a formal project solicitation process to increase the volume and competitiveness of projects we fund and to leverage matching funds from project sponsors. This will ensure that we have robust project lists, a transparent process and don't have unallotted funds at the end of the biennium, which has happened in past years.



# Conclusion

In conclusion, through investments in conservation, hatchery production, outreach, and resource management, the program has diversified the agency's approach to enhancing recreational fisheries throughout Puget Sound. Despite these great strides, it is critical to point out that the rapidly changing climate and eroding habitat conditions in Puget Sound have and will continue to challenge the work and limit achievements of PSRFE in the years to come. The program is developing new ideas in research and outreach to improve and enhance fishing opportunity. Some ideas being discussed are listed below:

- "How-to" videos to encourage anglers to get outside and fish underutilized stocks
  - How to clean, prepare, and cook fish, including Dogfish, Lingcod, Flatfish
- Hatchery production review of limitations affecting survival and contribution rates
- Outreach events targeted at youth specifically
- Lingcod dinglebar surveys in Hood Canal
- Hydroacoustic surveys for sockeye abundance in Lake Washington and the Skagit River basin





# Appendix 1: 2010 Washington State Auditor's Report on the Puget Sound Recreational Fisheries Enhancement Fund



# STATE AUDITOR'S OFFICE PERFORMANCE AUDIT



## Department of Fish and Wildlife Delayed-Release Chinook Salmon

April 9, 2010

Report No. 1003365



WASHINGTON  
**BRIAN SONNTAG**  
STATE AUDITOR

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## About the Department of Fish and Wildlife

The Legislature created the Department in 1993 by combining the Departments of Fisheries and Wildlife. The Department's supervising authority is the Fish and Wildlife Commission, composed of nine citizens, appointed by the Governor, who serve staggered six-year terms. The Commission appoints the Department director; establishes policy; and monitors the Department's implementation of the goals, policies and objectives established by the Commission.

To achieve its mission to protect, restore and enhance fish and wildlife and their habitats while providing sustainable fish and wildlife-related recreational and commercial opportunities, the Commission established the following goals:

- Achieve healthy, diverse and sustainable fish and wildlife populations.
- Ensure sustainable fish and wildlife opportunities for social and economic benefit.
- Ensure effective use of current and future financial resources to meet the need of the state's fish and wildlife resource for the benefit of the public.
- Implement processes that produce sound and professional decisions, cultivate public involvement and build public confidence and agency credibility.
- Promote the development and responsible use of sound, objective science to inform decision-making.

## INTRODUCTION

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**W**e audited the Department of Fish and Wildlife's delayed-release Chinook salmon activity in response to a legislative request. This audit was designed to determine if the Department:

- Achieved the statutory goal to increase the production and planting of delayed-release Chinook salmon to a level of 3 million annually by the year 2000.
- Uses sufficiently reliable and high quality data to monitor the activity and support management decisions.

### What We Found

Key conclusions of this audit:

- The Department does not meet the statutory goal to release 3 million delayed-release Chinook annually. Several factors, including limited hatchery capacity, water quality problems and discontinuation of saltwater net pens, contributed to declining salmon releases during the past decade.
- The statutory goal is not an effective or efficient strategy for restoring the Puget Sound Chinook salmon recreational fishery. Declining survival rates have significantly reduced the number of delayed-released Chinook being caught. In the 1970s, one would have been caught for about every 66 Chinook released; by the 1990s, one would have been caught for about every 904 Chinook released. As a result, the cost for each delayed-release Chinook caught recreationally in Puget Sound increased from \$56 to \$768 during that period.
- The Department has reliable, high-quality data to monitor the program and support management decisions. However, it has not fully used that data to support policy discussions and decision-making by the Program's sport fishing Oversight Committee, the Fish and Wildlife Commission or the Legislature.

### Background

When the Legislature created the Department of Fish and Wildlife in 1993, it also established the Puget Sound Recreational Salmon and Marine Fish Enhancement Program under Chapter 77.105 RCW. The Program is designed to increase the salmon population and the number of salmon available to recreational anglers, individuals who catch fish for their personal use. The Program's Oversight Committee meets quarterly to advise the Department on all aspects of the Program and to review and provide guidance on the Program's annual budget. The Program is funded by a portion of each saltwater and combination fishing license fee, which is deposited into the recreational fisheries enhancement account.

Lawmakers set two goals for the Department:

- To annually produce and release 3 million delayed-release Chinook salmon into Puget Sound by 2000.
- To use at least one freshwater site in each of the four Puget Sound regions to rear delayed-release Chinook.

## Terminology

Chinook salmon are referred to differently depending on their age:

- **Subyearlings** are juvenile Chinook less than 1 year old. They weigh between 3 and 10 grams.
- **Yearlings** are juvenile Chinook about 1 year old. They weigh between 30 and 155 grams. Delayed-release Chinook are yearlings because they are about 15 months old when they are released.
- **Blackmouth**, which refers to the salmon's black gum line, are sexually immature Chinook that have grown to the legal size of at least 22 inches. Subyearlings and yearlings grow into Blackmouth, usually late in their second year or early in their third year of life. Blackmouth technically become Chinook when they sexually mature, which is generally at 3 to 5 years of age.

The legislation focused on delayed-release Chinook because research shows that by releasing a Chinook at 15 months of age, a year after its normal migration time, it is likely to lose its instinct to migrate long distances. At 2 to 3 months old, Chinook would naturally migrate north to Canada or Alaska and be available to anglers outside Puget Sound before returning to spawn. However, Chinook held in hatcheries for one year are more likely to remain in Puget Sound during their three to five-year maturation period.

The Legislature set the goal at 3 million because it represented the number of Chinook the Department released in the late 1970s and early 1980s, when Puget Sound recreational fishing was at its height.

The term "delayed-release Chinook salmon" is unique to Washington and does not have a formal definition. Department documents have described it as a Chinook held in the hatchery for one year beyond its natural migration age of 3 months. The Department manages the Program, including the delayed-release Chinook activity, as part of its overall fish management operation. Chinook are one of five salmon species the Department manages; delayed-release Chinook represent 4.7 percent of the Chinook the Department released into the Puget Sound from 1995 through 2008.

In addition to subyearlings and yearlings, Chinook releases include small numbers of fry, which weigh less than 3 grams, and adult Chinook. Each year, more adult Chinook return to the hatchery than are needed to provide the eggs required to support the subyearling and yearling programs. The Department donates most of the excess adults to food banks or sells them to a contracted buyer.

To help re-establish Chinook populations, the Department has released a very small number of these excess adults to supplement the wild spawning population at alternate sites. It has similarly released very few fry when a hatchery has more fry than it needs for its subyearling or yearling program.

The release of adults and fry is done in coordination with the National Oceanic and Atmospheric Administration (NOAA) and affected tribes. Exhibit 1 on the next page compares the total yearling Chinook and other Chinook releases from 1995 through 2008.

To track the number of hatchery-released Chinook that are eventually caught, the Department uses coded wire tags, which are micro-sized numerical tags that are machine-inserted into Chinook snouts. The tag numbers reference specific Chinook releases from hatcheries. A Department biometrician determines how many hatchery-released Chinook must be tagged so the Department can make reasonably accurate estimates about the effectiveness of its hatchery programs.

The Department sends samplers out to landing docks to identify hatchery-released Chinook that anglers have caught. The sampler runs a wand over the snouts of caught Chinook and removes and sends the heads of tagged Chinook to the Department's lab. The Department removes the tag, reads it through a microscope, and sends the information to the Regional Mark Information System for tracking (see RMIS discussion, below).



## Scope and Methodology

To determine whether the Department met the statutory goal and has high-quality data available to monitor the activity and support management decisions, we reviewed yearling release data from 1995 through 2008 and yearling and subyearling recovery data from the 1970s, 1980s and 1990s. Our audit did not include other activities within the overall Puget Sound Recreational Salmon and Marine Fish Enhancement Program or under the auspices of the Puget Sound Partnership.

To gain an understanding of the activity, we interviewed Program management and staff; reviewed applicable state and federal laws and external reports on hatchery reform and salmon survival in the Pacific Northwest; and reviewed Department reports about salmon contribution and survival rates. We also quantitatively analyzed selected data.

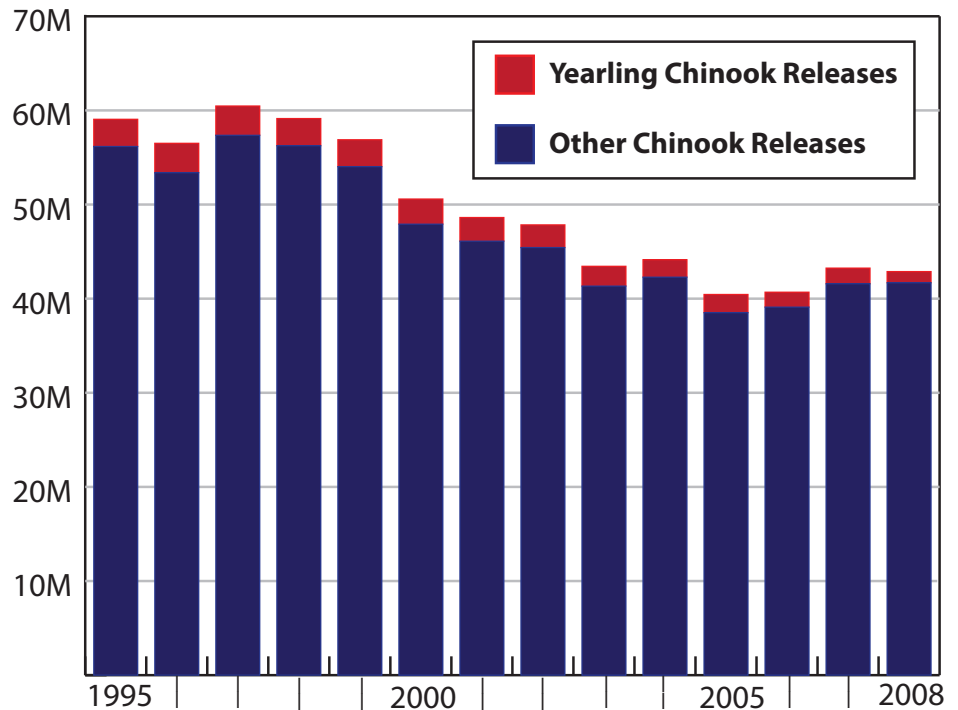
We verified the reliability of the Department’s data regarding the number of hatchery Chinook released and recovered. A recovered hatchery delayed-release Chinook is one that is caught by an angler anywhere. PLANTS<sup>1</sup> is the database the Department maintains to track the release of hatchery fish. We gained an understanding of the Department’s procedures for obtaining and maintaining information in PLANTS regarding the number of Chinook released. We sampled hatchery release records to verify information was accurately recorded in PLANTS. We did not identify any discrepancies and determined we could rely on this data for our audit.

The Regional Mark Information System (RMIS) is operated by the Regional Mark Processing Center, a division of the Pacific States Marine Fisheries Commission. Congress formed the Pacific States Commission more than 50 years ago to help resource agencies and the fishing industry sustainably manage valuable Pacific Ocean resources in Alaska, Oregon, California, Washington and Idaho. It is funded by federal grants, special contracts and dues from its member states.

RMIS collects information about the number of fish recovered and released in all five states. Although

<sup>1</sup> PLANTS is the name of the database; it is not an acronym.

**Exhibit 1**  
**Number of Chinook Released in Puget Sound**  
**1995 - 2008, in millions**



Source: Auditor analysis of Department of Fish and Wildlife data and RMIS data.

Canada is not a member of the Pacific States Commission, it contributes data to RMIS. The participation of several states is critical to the integrity of the data, because RMIS captures information on fish released by hatcheries in one state but caught in another, enabling the participating states to evaluate the effectiveness of their hatchery programs.

We reviewed the Department’s procedures to collect and enter information about recovered fish into RMIS. We sampled Department release information in RMIS to verify its accuracy and did not identify any discrepancies.

Although we contacted the Center to learn about its processes and found they were adequate to ensure the validity of data received from contributing states, sampling data from the other states to verify its validity was outside the scope of this audit. It was also outside the scope of this audit to review the other states’ processes for collecting and contributing data, but the Center provided information about how it verifies the validity of data contributed by the other states.

Based on our work and our understanding of these data entry processes, we determined we could rely on the RMIS data for our audit.

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards, prescribed by the U.S. Government Accountability Office. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

In addition, we considered the nine elements contained in Initiative 900 as displayed in Appendix A.

## Commendations

The Department recognizes that using an adaptive management strategy can provide a greater benefit to the Puget Sound recreational fishery than attempting to achieve a specific production goal for yearling Chinook. Adaptive management strategies are a best practice that include adjusting management actions based on new information. In a 2007 report, NOAA cited use of adaptive management as crucial for salmon recovery programs because of the length and complexity of the salmon cycles and the uncertainties with improving salmon survival.<sup>2</sup>

On occasion, the Department has used an adaptive management strategy to increase the number of fish available to anglers in the Puget Sound recreational fishery. For example, it recently began producing subyearlings instead of yearlings at certain hatcheries. Additionally, the Department is attempting to produce very large subyearlings at one hatchery to determine if older subyearlings lose their instinct to migrate as yearlings do. If so, more Chinook would be available to anglers, at a lower cost, as the subyearlings mature in the Puget Sound Blackmouth fishery.

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<sup>2</sup> "Adaptive Management for ESA-Listed Salmon and Steelhead Recovery: Decision Framework and Monitoring Guidance" ([http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/upload/Adaptive\\_Mngmnt.pdf](http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/upload/Adaptive_Mngmnt.pdf)), May 1, 2007, National Oceanographic and Atmospheric Administration.

## What's next

Initiative 900 requires the legislative bodies for the government agency in this report to hold at least one public hearing to consider the audit findings and to receive comments from the public within 30 days of this report's issue.

The corresponding legislative body must consider this report in connection with its spending practices. A report must be submitted by the legislative body by July 1 each year detailing the status of the legislative implementation of the State Auditor's recommendations. Justification must be provided for recommendations not implemented. Details of other corrective action must be provided as well.

The state Legislature's Joint Legislative Audit and Review Committee (JLARC) will summarize any statewide issues that require action from the Legislature and will notify the appropriate fiscal and policy committees of public hearing agendas.

Initiative 900 provides no penalties for audited entities that do not follow recommendations in performance audit reports.

Follow-up performance audits of any state or local government entity or program may be conducted when determined necessary by the State Auditor.

## Terminology

A **contributed** salmon is a hatchery-released salmon caught in the Puget Sound recreational fishery.

The **contribution rate** represents the number of tagged, hatchery-released salmon caught in the Puget Sound recreational fishery divided by the number of tagged fish released. It measures hatchery program effectiveness, because a higher contribution rate means more hatchery-released salmon are caught in the Puget Sound recreational fishery.

A **survived hatchery-released Chinook** is one that is caught in the Puget Sound recreational fishery or that has migrated and is caught outside of the Puget Sound. The survival rate represents the number of all tagged hatchery-released salmon caught anywhere (e.g., Puget Sound, Alaska, California, or those that return to and are removed at the hatchery) divided by the total number of tagged fish released. The survival rate also measures program effectiveness because a higher survival rate means more hatchery-released salmon are being caught by anglers anywhere.

## AUDIT RESULTS

**Issue: The Department does not meet the statutory goal to release 3 million delayed-release Chinook salmon annually. However, the goal does not align with hatchery management best practice, and the low contribution rate and high cost per contributed fish make it an ineffective and inefficient strategy for restoring the Puget Sound recreational fishery.**

State law (Chapter 77.105.040 RCW) established a goal for the Department to release 3 million delayed-released Chinook salmon annually by the year 2000 and to develop at least one freshwater rearing site in each of the four Puget Sound regions – South Puget Sound, Central Puget Sound, North Puget Sound, and Hood Canal – to produce some of these Chinook. The Department did not meet the salmon-release goal after 1997, primarily due to risks to wild salmon, limited hatchery capacity and water quality issues.

However, we do not recommend the Department simply change its practices to meet the goal, because the goal is outdated and inconsistent with best practice. It is neither an effective nor efficient strategy to restore the recreational fishery because the Department must release more than 900 yearling Chinook, on average, for every one that is eventually caught in the Puget Sound recreational fishery. The cost per yearling caught is about \$768.

### The Department does not meet the statutory goal

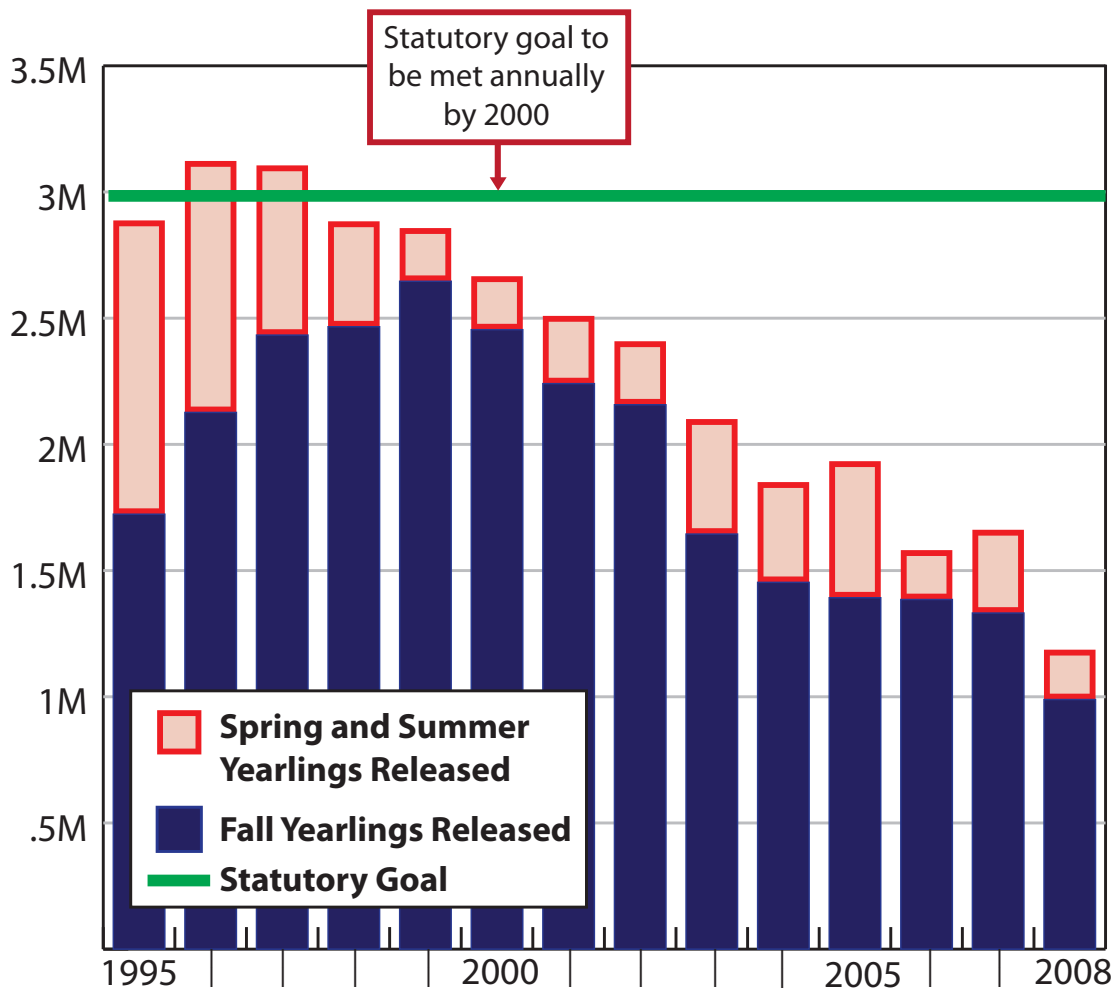
Although the Department has not formally defined what a delayed-release Chinook salmon is or how to count them, Department records show it historically counted only fall delayed-release Chinook. However, some Department staff believe that spring and summer yearlings also should be counted. If fall, spring and summer Chinook are included in the count, the Department has not met the goal to release 3 million delayed-release Chinook annually since 1997. If only fall Chinook are counted, the Department has never met the goal to release 3 million delayed-release Chinook.

Exhibit 2 compares the statutory goal and the number of delayed-release Chinook released from 1995, the first year of releases funded by the recreational fisheries enhancement account, through 2008. The graph shows the number of Chinook released if just fall yearlings are counted and the number if fall, spring and summer yearlings are counted. The graph also shows the Department steadily increased the number of Chinook released in the early years of the program but steadily reduced them after 1999.

The Department has a freshwater rearing site in each region, but determining whether it meets the statutory requirement to raise delayed-release Chinook at each site depends on whether spring and summer yearling releases are counted in addition to fall releases. The Department raises Chinook yearlings at all four sites, but does not produce fall yearlings at the North Puget Sound site.

Appendix B provides additional information on hatchery locations and the type and number of yearling Chinook each hatchery released.

## Exhibit 2 Number of Delayed-release Chinook Released 1995 - 2008, in millions



### Several factors have limited the numbers of fish the Department releases

Risks to wild salmon, limited hatchery capacity, water quality issues and related environmental concerns at certain hatcheries have prevented the Department from producing 3 million delayed-release Chinook annually. Risks to wild salmon became a particular concern when wild Puget Sound Chinook were listed as threatened under the U.S. Endangered Species Act in 1999. The Act imposed additional management conditions on the Department, including a requirement for National Oceanic and Atmospheric Administration (NOAA) to review the Department's plans for hatchery production and releases of listed fish. NOAA did not require the Department to reduce Chinook yearling production, but did express concerns regarding the high number of yearlings produced. The Department significantly reduced its production of Chinook yearlings due to

NOAA's concerns and other factors. Key actions included:

- The Department stopped using saltwater net pens to raise Chinook. Science shows that Chinook reared in net pens have no hatchery to return to, so they are more likely to stray and reproduce with wild Chinook, which can potentially change the genetic makeup of the wild stock. Net pens had accounted for about 600,000 yearling released annually.
- The McAllister hatchery closed in 2002 due to budget cuts. The yearling program was to be terminated to avoid unnecessary risks to wild fish populations and because of the high cost to contribute yearlings to the fishery.
- Percival Cove slowed production in 2004 and stopped production after 2007 due to high phosphorous levels in the water and flooding from the Deschutes

River, which caused early releases of fish, and to avoid unnecessary risks to wild fish populations.

- Wallace cut production in half to avoid unnecessary risks to wild fish populations.
- Hoodsport cut production in 2004 because of limited hatchery capacity, water flow issues and to avoid unnecessary risks to wild fish populations.
- Glenwood and Samish stopped production after 2007 due to low survival rates of released yearlings and to avoid unnecessary risks to wild fish populations.

Department staff reported that all hatcheries currently operate at capacity, so other hatchery programs would need to be scaled back or discontinued to support increased production of delayed-release Chinook to meet the statutory goal.

### Salmon survival rates have declined and vary significantly by hatchery

The statutory goal to release 3 million delayed-release Chinook annually was established based on data from the 1970s and 1980s when the Department released 3 million delayed-release Chinook annually and the survival rates

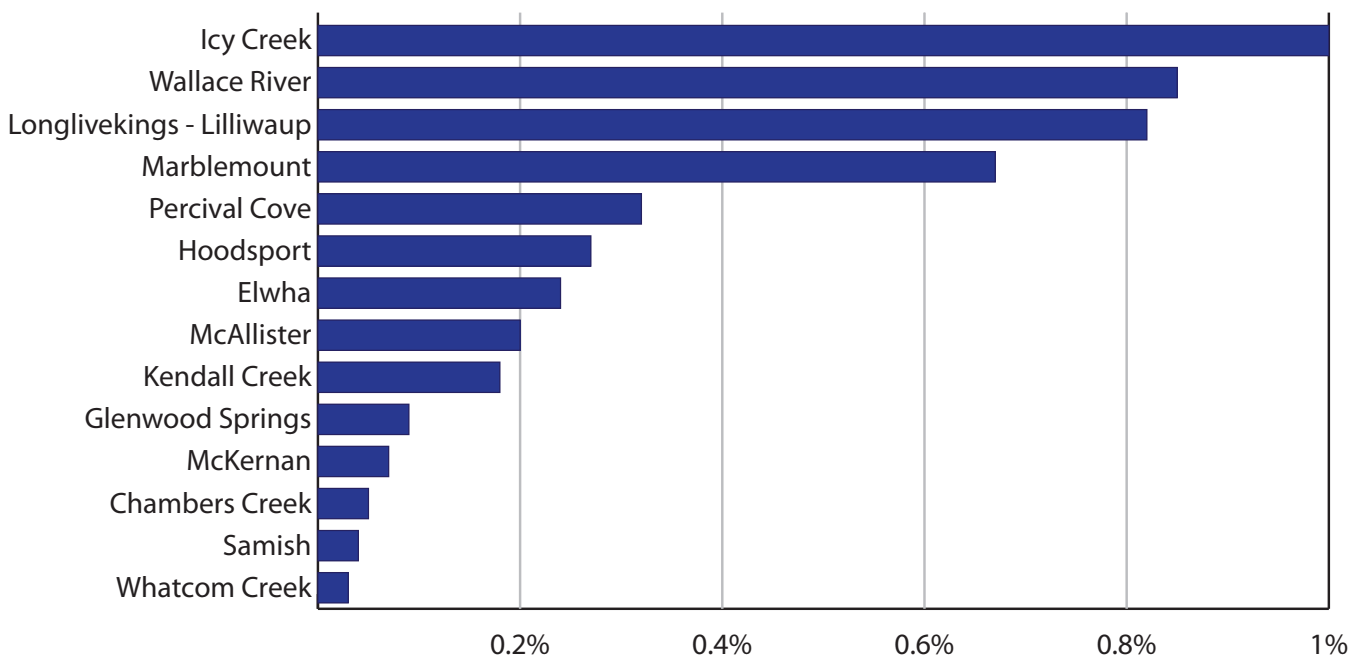
were higher than they are today.

NOAA attributes the decline in survival rates to loss of habitat due to natural and human-induced factors, including increased land use, climate change and events such as floods and droughts.

Survival rates for yearling Chinook vary greatly among hatcheries, making it more cost effective to operate yearling release programs at certain hatcheries. For example, between 1990 and 1999, the yearling survival rate for the Icy Creek Hatchery was 1 percent, meaning one fish was caught for every 100 Chinook released. On the other hand, Whatcom Creek Hatchery’s survival rate was 0.03 percent, meaning one fish was caught for every 3,695 Chinook released. Exhibit 3 shows yearling survival rates by hatchery.

The Department recognized that producing delayed-release Chinook was not effective or efficient at certain hatcheries, given survival rates and production costs. Therefore, it replaced delayed-release Chinook production with subyearlings at certain hatcheries. At the same time, the Department acknowledged it would not meet the statutory goal.

**Exhibit 3**  
**Yearling Chinook Survival Rate by Hatchery in the 1990s**



Note: Rick Endicott’s Pond Hatchery is not included here because the Department did not tag salmon released from this hatchery.

Source: Auditor analysis of RMIS data.



## Low survival rates have reduced the recreational catch of delayed-release Chinook in Puget Sound

The goal to release 3 million Chinook annually focused on yearlings, because the legislation was based on data from the 1970s and 1980s that showed yearlings were more likely than subyearlings to survive and be caught by anglers in the Puget Sound recreational fishery.

However, the difference in survival and contribution rates between yearlings and subyearlings has narrowed since the legislation was enacted in 1993. If 3 million yearling and subyearling Chinook had been released, the survival and contribution rates of the 1970s would have resulted in anglers catching seven times more yearlings (45,200) than subyearlings (6,100). But by the 1990s, the ratio of the number of yearlings caught (3,300) vs. subyearlings (840) would have been reduced to fewer than 4:1. These numbers also show the Department would have to release many more Chinook today than it did in the past for each one eventually caught in the Puget Sound recreational fishery.

Exhibit 4 compares the declining contribution rates of yearlings and subyearlings during the 1970s, 1980s and 1990s. It also shows how the declining contribution rates affect the number of yearling and subyearling Chinook that must be released per fish caught in the Puget Sound recreational fishery.

### Exhibit 4

#### Historical Contribution Rates and Releases Needed for One Chinook to Be Caught in the Puget Sound Recreational Fishery

Decade	Type of Release	Contribution Rate	Number of Chinook to Release to Catch One in Puget Sound
1970s	Yearlings	1.5066%	66
	Subyearlings	0.2050%	488
1980s	Yearlings	0.3157%	317
	Subyearlings	0.0439%	2,280
1990s	Yearlings	0.1106%	904
	Subyearlings	0.0281%	3,562

Note: Releases needed were calculated by dividing 1 by the contribution rate.

Source: Auditor analysis based on data from the RMIS database.

## The cost of hatchery-released Chinook caught by recreational anglers in Puget Sound substantially increased

Due to the low contribution rates, the cost to contribute each Chinook to the Puget Sound recreational fishery by releasing yearlings is significantly more than the cost to contribute one Chinook by releasing subyearlings. We estimated the cost to produce one delayed-release Chinook to be \$0.85, and the Department estimates the cost to produce one subyearling to be \$0.11. Because the Department must release approximately 900 yearlings to contribute one Chinook to the fishery, the cost per contributed yearling is about \$768 (904 yearlings x \$0.85). Exhibit 5, on the next page, compares the input and outcome cost per yearling and subyearling Chinook contributed to the Puget Sound recreational fishery in the 1970s, 1980s and 1990s.

The Department released about 990,000 yearling fall Chinook in calendar year 2008, which will contribute about 1,100 Chinook to the Puget Sound recreational fishery. For the same cost, about 2,146 subyearlings could be contributed to the same fishery. Exhibit 6, on the next page, shows the combined effect of the declining contribution rate and the increasing cost per contributed Chinook over three decades.

Appendix C provides details on our calculations of contribution rates, number of releases required to contribute one Chinook to the Puget Sound recreational fishery, cost to produce a subyearling and yearling Chinook, and cost per Chinook caught in the Puget Sound recreational fishery.

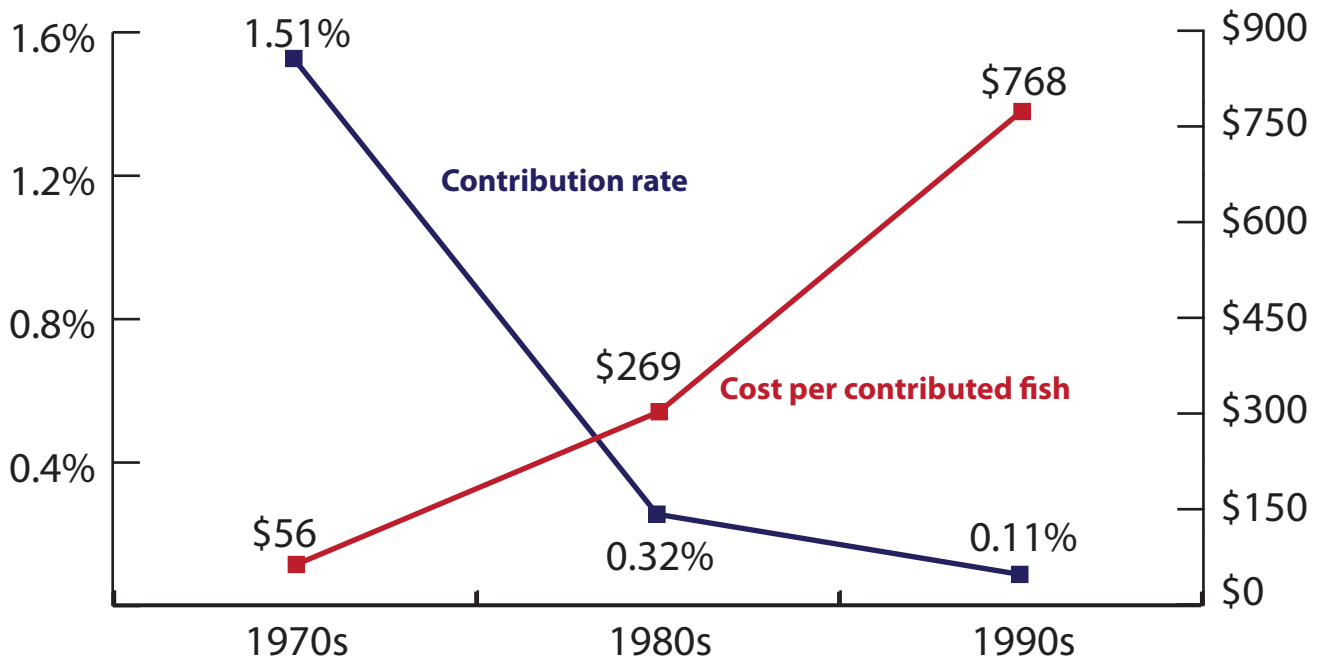
### Exhibit 5 Cost per hatchery-released Chinook caught in the Puget Sound recreational fishery

Decade	Type of Release	Cost to Release One Chinook (Input Cost)	Number of Released Chinook Needed to Catch One in the Puget Sound Recreational Fishery (from Exhibit 4)	Cost Per Chinook Caught in the Puget Sound Recreational Fishery* (Outcome Cost)
1970s	Yearlings	\$0.85	66	\$56
	Subyearlings	\$0.11	488	\$54
1980s	Yearlings	\$0.85	317	\$269
	Subyearlings	\$0.11	2,280	\$251
1990s	Yearlings	\$0.85	904	\$768
	Subyearlings	\$0.11	3,562	\$392

Note: Calculated by multiplying the cost to release one Chinook by the releases needed to catch one. The cost per contributed yearling is based on 2008 costs and contribution rates from the 1970s, 1980s and 1990s and is not adjusted for inflation.

Source: Auditor calculation based on Department, RMIS and Agency Financial Reporting System data.

### Exhibit 6 Puget Sound Recreational Fishery Contribution Rates and Cost Per Yearling Chinook



Note: The cost per contributed yearling is based on 2008 costs and contribution rates from the 1970s, 1980s and 1990s and is not adjusted for inflation.

Source: Auditor analysis of Department release data, RMIS data and Agency Financial Reporting System data.

## Hatchery management best practice recommends outcome goals

Hatchery management goals and practices were addressed several years ago by the Hatchery Scientific Review Group, an authoritative and independent scientific panel established by Congress to oversee the Puget Sound and Coastal Washington Hatchery Reform Project. The Review Group's 2004 report, "Hatchery Reform: Principles and Recommendations," recommended hatchery management goals that emphasize the quality of the fishery rather than the number of fish released.

The report said hatcheries should release the fewest number of high-quality fish that would maximize potential benefits while minimizing risks to wild naturally spawning populations. The report recommended establishing goals that reflect value to the community, such as contribution to the harvest, conservation, education, research, employment and recreation. It also identified specific examples of appropriate measures of success:

- The scale and availability of harvest. Examples would be contribution rates and number of fishing days available.
- The number of returning adult salmon and their ability to reproduce and sustain the stock.

The goal to release 3 million delayed-release Chinook does not align with the Review Group's recommendations because it emphasizes quantity rather than quality or value to the community. Focusing on quality should ultimately increase the number of fish available to anglers. However, discontinuing these releases altogether likely would harm the Blackmouth fishery in the Puget Sound, because fall Chinook released as yearlings tend to remain available for anglers to catch in the Puget Sound for two to three years while they mature.

## The Department's data is reliable, but is not used to report program results

The Review Group's report recommended monitoring and evaluations as basic components of managing streams for hatchery harvest. It recommended that hatchery management decisions be informed and modified by continuous evaluations of existing programs and scientific information. The PLANTS database is a reliable source of information for tracking the Department's hatchery releases and RMIS is a reliable source of information for tracking hatchery-released Chinook that have been caught. The combined information from these systems provides the Department with sufficiently reliable and high-quality data to monitor the program and support decision-making.

Hatchery program data is generally monitored and analyzed at the request of the Oversight Committee rather than as a regular process. The Department recently reported cost and survival rates by hatchery to support discussions with its Oversight Committee about where to reduce delayed-release Chinook activity to achieve budget reduction targets, but it does not regularly monitor, evaluate or report the effectiveness and efficiency of the delayed-release salmon activity by hatchery or as a whole. It does not report its progress toward meeting the statutory goals, nor does it routinely produce outcome and cost information to support policy discussions and decision-making by the Oversight Committee, the Fish and Wildlife Commission, or the Legislature.

Despite the Department's inability to meet the 3 million goal, the Department and the Oversight Committee find the release of some delayed-release Chinook to be productive and the statute useful as a whole. Because of this, the Department has not asked the Legislature to amend RCW 77.105.040 to remove the focus on yearling Chinook. Instead, the Department has adjusted its strategy to produce a mix of yearlings and subyearlings that is more effective for restoring the Puget Sound recreational fishery.

However, regular monitoring and reporting could have alerted the Legislature to the Department's inability to meet the goal and goal's ineffectiveness and inefficiency. Regular monitoring and reporting of program outcomes to the Legislature would support more informed decision-making as lawmakers consider alternative goals.

## RECOMMENDATIONS

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1. **The Legislature should replace the statutory provision requiring the Department to release 3 million delayed-release Chinook annually with outcome-oriented goals that align with the Hatchery Scientific Review Group's recommendations.**

The goals should permit the Department to flexibly manage its hatcheries and funding to most effectively and efficiently maximize recreational fishing opportunities in the Puget Sound.

2. **The Legislature also should require the Department to report regularly on its progress toward meeting the revised goals.**

Progress reports should include measures of success aligned with the Hatchery Scientific Review Group's recommendations and the cost and the impact on the Puget Sound fishery, including the Blackmouth fishery. This would help to ensure the Legislature is adequately informed and that statutory goals remain relevant.

3. **If the Department continues to produce delayed-release Chinook, it should define the term, including which yearlings to count as delayed-release Chinook.**

Establishing and communicating a clear definition will help establish whether the Department is complying with statutory requirements and that its reports include clear, reliable and comparable data.

# APPENDIX

## Department of Fish and Wildlife Delayed-Release Chinook Salmon

- Appendix A: Initiative 900 Elements
- Appendix B: Freshwater Hatchery Locations and Chinook Yearling Releases
- Appendix C: Methodology for Calculations Used in Report
- Appendix D: Response



WASHINGTON  
**BRIAN SONNTAG**  
STATE AUDITOR

## APPENDIX A: INITIATIVE 900 ELEMENTS

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Cross-reference of which I-900 elements are addressed in the report.

I-900 Element	Addressed
1. Identification of cost savings	No
2. Identification of services that can be reduced or eliminated	No
3. Identification of programs or services that can be transferred to the private sector	No
4. Analysis of gaps or overlaps in programs or services and recommendations to correct gaps or overlaps	No
5. Feasibility of pooling information technology systems within the department	No
6. Analysis of the roles and functions of the department, and recommendations to change or eliminate departmental roles or functions	Yes
7. Recommendations for statutory or regulatory changes that may be necessary for the department to properly carry out its functions	Yes
8. Analysis of departmental performance data, performance measures, and self-assessment systems	Yes
9. Identification of best practices	Yes



## APPENDIX B: FRESHWATER HATCHERY LOCATIONS AND CHINOOK YEARLING RELEASES

Freshwater Hatcheries	Region	Location	Chinook Yearlings Released from 1995 through 2008 <sup>2</sup>
<b>Hatcheries Releasing Fall Yearling Chinook</b>			
Chambers Creek	South Puget Sound	Tacoma, Pierce County	910,104
Garrison	South Puget Sound	Tacoma, Pierce County	18,100
McAllister	South Puget Sound	Lacey, Thurston County	1,971,773
Lakewood	South Puget Sound	Tacoma, Pierce County	1,554,599
Percival Cove	South Puget Sound	Olympia, Thurston County	2,064,257
Tumwater Falls	South Puget Sound	Tumwater, Thurston County	404,875
Icy Creek	Central Puget Sound	Palmer, King County	4,040,128
Wallace	Central Puget Sound	Sultan, Snohomish County	5,216,573
Glenwood Springs <sup>1</sup>	North Puget Sound	Orcas Island, San Juan County	1,628,976
Samish	North Puget Sound	Burlington, Skagit County	1,019,797
Hoodsport	Hood Canal	Hoodsport, Mason County	2,437,548
Lilliwaup <sup>1</sup>	Hood Canal	Lilliwaup, Mason County	48,500
Rick Endicott's Pond <sup>1</sup>	Hood Canal	Union, Mason County	1,050,350
<b>Hatcheries Releasing Summer or Spring Chinook</b>			
Allison Springs	South Puget Sound	Olympia, Thurston County	12,000
Puyallup	Central Puget Sound	Puyallup, Pierce County	76,500
Dungeness	North Puget Sound	Sequim, Clallam County	258,460
Elwha Channel	North Puget Sound	Port Angeles, Clallam County	1,386,450
Hurd Creek	North Puget Sound	Sequim, Clallam County	535,966
Kendall Creek	North Puget Sound	Deming, Whatcom County	908,903
Marblemount	North Puget Sound	Marblemount, Skagit	2,394,181
Whatcom Creek <sup>1</sup>	North Puget Sound	Bellingham, Whatcom County	562,331
Hupp	Hood Canal	Gig Harbor, Pierce County	1,243,646
McKernan	Hood Canal	Shelton, Mason County	175,150
Minter Creek	Hood Canal	Gig Harbor, Pierce County	144,400
<b>Total</b>			<b>60,127,669</b>

Notes: <sup>1</sup> Hatcheries are operated by independent cooperators.

<sup>2</sup> This table does not include saltwater net pen Chinook yearling releases, which were discontinued in 2002.

## APPENDIX C: METHODOLOGY FOR CALCULATIONS USED IN REPORT

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- A. **Yearling and Subyearling Contribution Rates.** We calculated contribution rates for yearling Chinook by dividing the number of tagged hatchery-released yearlings caught in the Puget Sound recreational fishery during each decade by the number of tagged yearlings the Department released in each decade. Substituting subyearlings for yearlings, we used the same equation to calculate the contribution rates for subyearlings. We obtained this data from the Regional Mark Information System.

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$$\text{Contribution Rate} = \frac{\text{No. of Tagged Hatchery Released Chinook Caught in the Puget Sound Recreational Fishery}}{\text{Tagged Chinook Released}}$$

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- B. **Number of Fish Released to Contribute One to the Puget Sound Recreational Fishery.** We calculated the number of Chinook that must be released to contribute one to the Puget Sound recreational fishery by dividing 1 by the contribution rate.

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$$\text{Number of Releases to Contribute One to the Fishery} = 1 \div \text{Contribution Rate (from calculation A above)}$$

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- C. **Cost to Produce One Chinook.** We estimated the cost to produce one yearling Chinook to be \$0.85 by dividing the Department's expenditures for the activity by the number of yearling Chinook the Department released. We estimated the cost to produce one subyearling Chinook to be \$0.11 by dividing the Department's estimated expenditures for the activity by the number of subyearling Chinook the Department released. We could not use actual expenditures to estimate the cost of subyearlings because their production costs are blended with the cost of other hatchery species and could not be isolated.

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$$\text{Cost to Produce a Chinook} = \frac{\text{Expenditures}}{\text{Number of Yearlings or Subyearlings Released}}$$

---

- D. **Cost Per Chinook Caught in the Puget Sound Recreational Fishery.** We calculated the cost per Chinook caught in the Puget Sound recreational fishery by multiplying the number of released Chinook to contribute one Chinook to the Puget Sound recreational fishery by the cost per yearling or subyearling.

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$$\text{Cost Per Chinook Caught in the Puget Sound Recreational Fishery} = \text{Number of Released Chinook to Contribute One to the Fishery (from calculation B above)} \times \text{Cost to Produce a Chinook (from calculation C above)}$$

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## APPENDIX D: RESPONSE

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State of Washington  
**DEPARTMENT OF FISH AND WILDLIFE**

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Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

April 5, 2010

The Honorable Brian Sonntag  
State Auditor  
Post Office Box 40021  
Olympia, Washington 98504-0021

Dear Auditor Sonntag:

Thank you for the opportunity to respond to the performance audit of the Washington Department of Fish and Wildlife's (Department) Delayed-Release Chinook Program. The Department strongly supports the use of performance audits as an important tool to improve state government, which is why we have worked so closely with the Auditor's staff on this and past performance audits. We appreciate the Auditor's staff for their efforts to work diligently through the details in an effort to make each performance audit report helpful to the Department in an effort to improve state government.

We agree with the issue stated in the audit that the Department did not meet the statutory goal to release three million delayed-release Chinook salmon annually. As stated in the report, environmental and wild salmon policies prohibited the achievement of this goal. Of the three recommendations contained in the audit, Recommendation 3 addressed the lack of attaining three million delayed-release Chinook. Our response addresses only Recommendation 3 in that it relates directly to Department actions.

The remaining Recommendations 1 and 2 require action by the legislature. These two recommendations call for the legislature to establish outcome-oriented goals and regular reporting by the Department. We support outcome-oriented goals and regularly reporting on their progress. We will follow the policy direction provided by the legislature with respect to these recommendations.

We appreciate the Auditor's commendation on the Department's use of adaptive management as a best management practice in its salmon recovery efforts, and recognition that the Department has reliable, high quality data.

The Honorable Brian Sonntag  
April 5, 2010  
Page 2

Enclosed is the Department's response to the audit. We will track and report our progress on completing the task to the Governor.

Sincerely,



Philip Anderson  
Director

Enclosure

cc: Kimberly Dutton Cregeur  
Office of the Governor, Accountability and Performance Office

**Official Response to the Performance Audit of the Department of Fish and Wildlife  
Delayed-Release Chinook Salmon  
From the Department of Fish and Wildlife  
April 5, 2010**

**Issue:** The Department does not meet the statutory goal to release three million delayed-release Chinook salmon annually. However, the goal does not align with hatchery management best practice, and the low contribution rate and high cost per contributed fish make it an ineffective and inefficient strategy for restoring the Puget Sound recreational fishery.

**AGENCY RESPONSE:**

The Department of Fish and Wildlife concurs with the issue as outlined in the report. The three million delayed-release Chinook goal was not sustainable due to environmental constraints and genetic risks posed to federal ESA listed Puget Sound Chinook.

**Recommendation 3:** If the Department continues to produce delayed-release Chinook, it should define the term, including which yearlings to count as delayed-release Chinook.

**AGENCY RESPONSE:**

The Department concurs with the recommendation.

**Action Steps and Timeframe:**

- The Department will develop and formalize by December 31, 2010 a definition for delayed-release Chinook as it relates to which yearlings to count in the Program.

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# Appendix 2: 2013 Puget Sound Recreational Salmon and Marine Fish Enhancement Program Goals and Objectives (RCW 77.105.160)



## **Puget Sound Recreational Salmon and Marine Fish Enhancement Program Goals and Objectives (adopted February 22, 2013)**

### RCW 77.105.160

The Puget Sound Recreational Salmon and Marine Fish Enhancement Program (PSRE) Oversight Committee has the following duties:

- (A) Develop recommendations, with assistance from the coordinator, for outcome-based goals and objectives to assess the effectiveness of the program;
- (B) Meet with the director each year to review these goals and objectives;
- (C) Report annually with the director to the commission on the goals of the program and the effectiveness of the program in meeting those goals;

The purpose of the PSRE is to conserve, enhance, and promote recreational fisheries within Puget Sound and Lake Washington. These goals and objectives were developed jointly by the Oversight Committee and WDFW, and may be modified over time as new information becomes available.

- Program Goal: Improve the recreational fishing opportunities in Puget Sound and Lake Washington and increase the economic benefits from the fishery.
    - Outcome Performance Measure: Increase angler trips in Puget Sound and Lake Washington by 5% per biennium.
    - i) Strategy: Improve marketing and remove obstacles to build interest and participation in the fishery.
- 

(1) Objective: Increase the percentage of Puget Sound anglers that are aware of Puget Sound fishing opportunities supported by PSRE.

(a) Performance Measure: 10% increase in awareness per biennium.

(2) Objective: Identify and promote fisheries on healthy stocks currently underutilized.

(a) Performance Measure: Identify underutilized fish stocks in Puget Sound by 2015.

(b) Performance Measure: Increase angler trips on identified and abundant underutilized stocks within the constraints of available stock surplus by 2022.

(3) Objective: Capitalize on WDFW activities to develop marketing tools in a unified approach to encourage participation and educate new and experienced anglers when, where, and how to fish in Puget Sound.

(a) Performance Measure: Develop 5 new tools by 2017 to increase awareness of Puget Sound fishing opportunities.

ii) Strategy: Increase effectiveness of hatcheries providing salmon to Puget Sound fisheries.

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(1) Objective: Review salmon production programs and facilities in Puget Sound to better understand their capabilities, limitations, and ways to increase the contribution rate.

(a) Performance Measure: Report completed by 2014 that calculates and summarizes survival rates, contribution rates, and cost/fish; in addition, identifies new rearing and release strategies to be evaluated in a future study.

(b) Performance Measure: Report completed by 2022 that evaluates new rearing and release strategies identified by the 2014 report to increase contribution rate.

(2) Objective: Minimize the cost/fish of hatchery salmon caught in Puget Sound marine fisheries

(a) Performance Measure: Reduce average production cost/fish caught in Puget Sound marine recreational fisheries by 30% for yearling and sub-yearling Chinook by 2022 after adjustment for cost of living (e.g. CPI, current inflation rate).

(3) Objective: Evaluate potential to improve fishing opportunities with artificial production of other salmon species, e.g. coho, consistent with Hatchery and Fishery Reform Policy.

(a) Performance Measure: Report completed by 2015 that evaluates other species for cost/benefit ratio, timing of fishing opportunities, and ability to attract and retain new or lapsed anglers.

(4) Objective: Increase the survival of Lake Washington sockeye.

(a) Performance Measure: Report that identifies alternative rearing strategies (e.g. timing, size, acclimation, release location, rearing conditions) to increase survival rate by 2015.

iii) Strategy: Develop a long term strategy for improving recreational bottomfish fisheries in Puget Sound.

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(1) Objective: Support research to evaluate the risks and uncertainties associated with the release of cultured bottomfish and artificial habitats.

(a) Performance Measure: Report that evaluates studies to date on lingcod culture and provides recommendations by 2015.

(2) Objective: Use outreach and education to decrease mortality on rockfish.

(a) Performance Measure: Improve angler identification of rockfish species by 50% by 2017.

(b) Performance Measure: Increase use of descender tools on rockfish to 50% of the encounters by 2017.

(c) Performance Measure: Decrease angler encounters (e.g. released bycatch and unintentional retention) of rockfish by 10% by 2017.

iv) Strategy: Stabilize and enhance resources invested in improving Puget Sound recreational fisheries.

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(1) Objective: License fees and contribution rate of enhancement funds are adjusted regularly to reflect the cost of living (e.g. CPI, current inflation rate).

(a) Performance Measure: Legislation is modified so license fees and the contribution rate adjust each biennium to reflect the cost of living.

(2) Objective: Identify and pursue other funding sources.

(a) Performance Measure: PSRE funding is leveraged by 20% by 2017.

(3) Objective: Increase the number of licensed anglers that fish in Puget Sound and Lake Washington.

(a) Performance Measure: Ten-year rolling average of the number of saltwater and combination licenses purchased by anglers that fish in Puget Sound and Lake Washington trends upwards.