State Auditor's Office Performance Audit

Department of Fish and Wildlife Delayed-Release Chinook Salmon

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Washington
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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 credibly.
- Promote the development and responsible use of sound, objective science to inform decision-making.

Introduction

We 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.

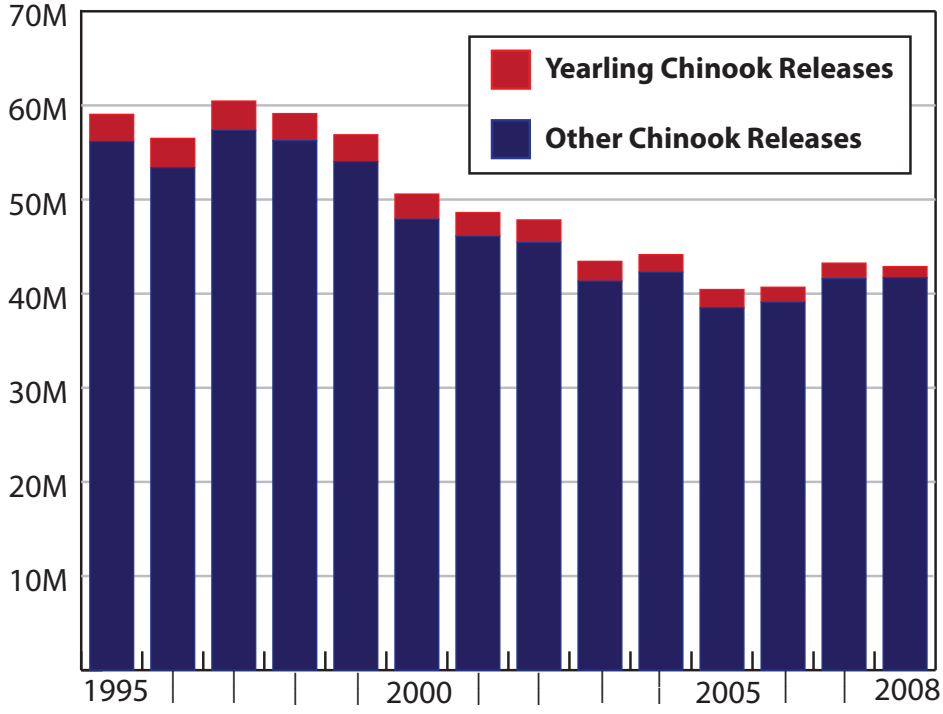
The Department sends samplers out to landing docks to identify hatchery-released Chinook that anglers have caught. The sampler runs a wand over the snouts of caught Chinook and removes and sends the heads of tagged Chinook to the Department's lab. The Department removes the tag, reads it through a microscope, 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.

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.

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[1] 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 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.

[1] *PLANTS is the name of the database; it is not an acronym.*

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.[2]

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.

[2] *"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), 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

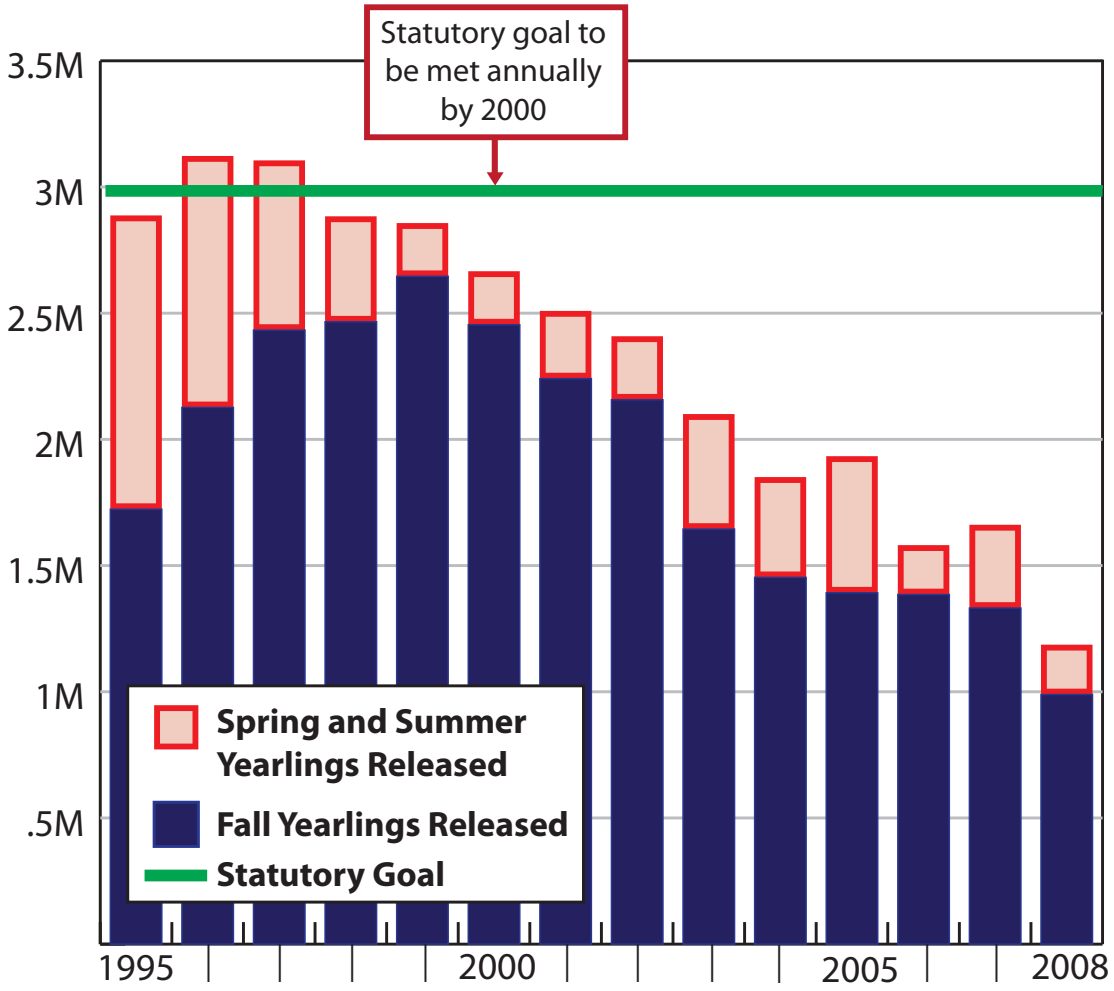
Although the Department has not formally defined what a delayed-release Chinook salmon is or how to count them, Department records show it historically counted only fall delayed-release Chinook. However, some Department staff believe that spring and summer yearlings also should be counted. If fall, spring 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

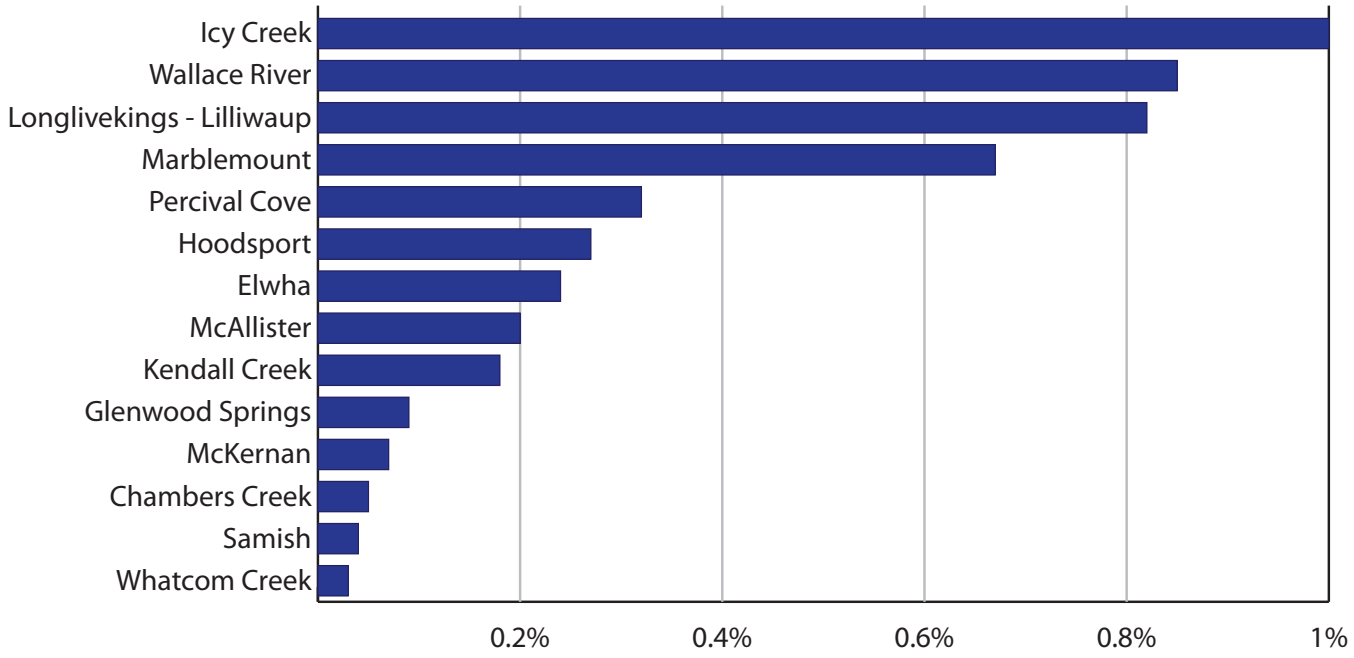
The statutory goal to release 3 million delayed-release Chinook annually was established based on data from the 1970s and 1980s when the Department released 3 million delayed-release Chinook annually and the survival rates were higher than they are today.

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.

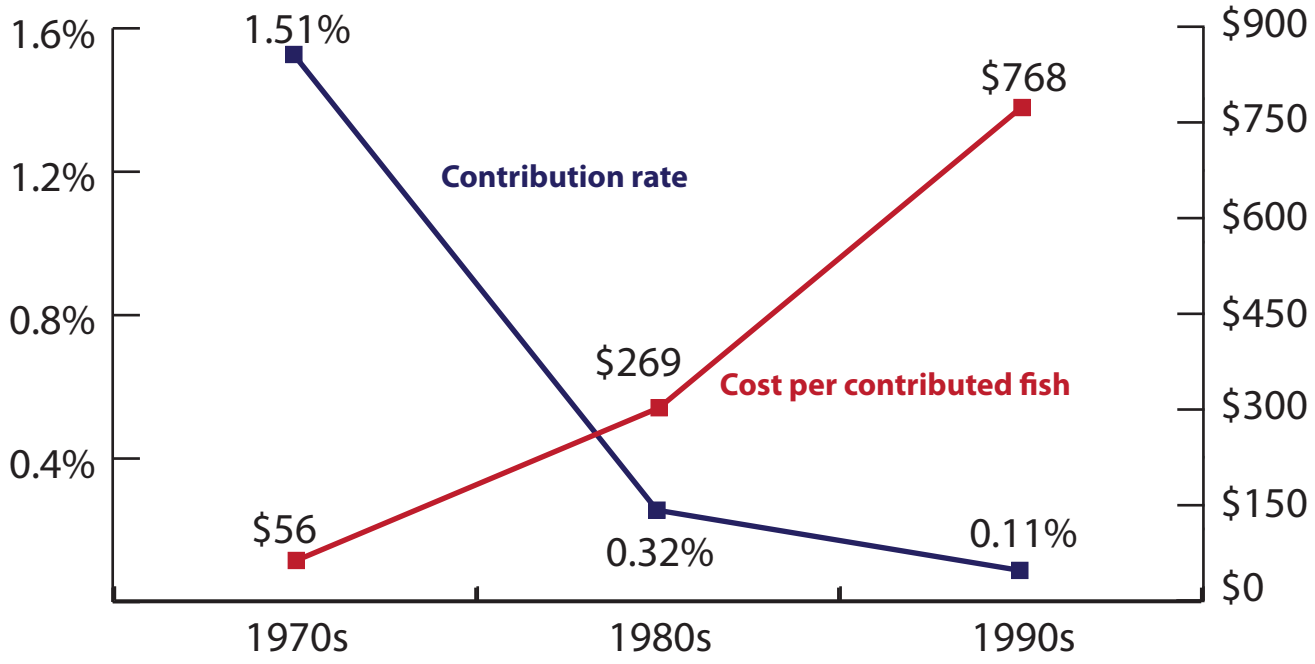
Exhibit 5
Cost per hatchery-released Chinook caught in the Puget Sound recreational fishery

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

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

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Appendix A: Initiative 900 Elements

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[2]
Hatcheries Releasing Fall Yearling Chinook			
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[1]	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[1]	Hood Canal	Lilliwaup, Mason County	48,500
Rick Endicott's Pond[1]	Hood Canal	Union, Mason County	1,050,350
Hatcheries Releasing Summer or Spring Chinook			
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[1]	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
Total			**60,127,669**

Notes: [1] *Hatcheries are operated by independent cooperators.*

[2] *This table does not include saltwater net pen Chinook yearling releases, which were discontinued in 2002.*

Appendix C: Methodology for Calculations Used in Report

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.

Contribution Rate =
No. of Tagged Hatchery Released Chinook Caught in the Puget Sound Recreational Fishery
÷
Tagged Chinook Released

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.

Number of Releases to Contribute One to the Fishery =
1 ÷ Contribution Rate (from calculation A above)

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.

Cost to Produce a Chinook =
Expenditures ÷ 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.

Cost Per Chinook Caught in the Puget Sound Recreational Fishery =
Number of Released Chinook to Contribute One to the Fishery (from calculation B above) x
Cost to Produce a Chinook (from calculation C above)

Appendix D: Response

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
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
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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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