

Secretary of State AUDIT REPORT

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Department of Fish and Wildlife: Hatchery Cost Effectiveness—State Fiscal Years 1994-1997



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Summary

PURPOSE

The objective of our audit was to assess the cost effectiveness of producing salmon at state funded hatcheries operated by the Department of Fish and Wildlife (department). To accomplish this, we compared the costs of producing fish (salmon and trout) at 13 hatcheries operated by the department that receive state funding. We also calculated the cost per adult salmon reported to have been caught or to have returned to freshwater for spawning. We limited this part of our review to selected Chinook salmon stocks released during state fiscal years 1994-1995, and selected Coho salmon stocks released during state fiscal years 1994-1997. These fish returned as adults during calendar years 1995-2000. The cost figures we report here are estimates based on available data.

RESULTS IN BRIEF

The estimated cost to produce a pound of salmon or trout during state fiscal years 1994-1997 varied considerably among the 13 hatcheries, ranging from \$4.08 per pound at the Butte Falls hatchery to \$8.97 per pound at the Trask hatchery.

Similarly, the audit showed considerable variation in the cost to produce an adult salmon that was reported to have been caught or to have returned to freshwater for spawning.

- For an adult fall Chinook salmon, the overall cost at the hatcheries reviewed was \$39. Adult fall Chinook costs ranged from \$14 per fish for fish produced by the

Salmon River hatchery to \$176 per fish for fish produced by the Rock Creek hatchery.

- For an adult spring Chinook salmon, the overall cost at the hatcheries was \$168. Spring Chinook costs ranged from \$90 per fish for fish produced by the Cedar Creek hatchery to \$249 per fish for fish produced by the McKenzie hatchery.
- The overall cost for an adult Coho salmon was \$96. Costs ranged from \$67 per fish for fish produced by the North Nehalem hatchery to \$530 per fish for fish produced by the Bandon hatchery.

Department management noted that ocean conditions were particularly poor during our audit period, resulting in very low salmon survival rates. Management also stated that fishing restrictions in place during this period resulted in lower catch rates. While the figures we report here may not be representative of current conditions, they do provide a means for making relative comparisons between hatcheries and the types of salmon they produce.

AGENCY'S RESPONSE

Department of Fish and Wildlife management generally agrees with the information presented. In its written response to this report, management provided additional information for readers. The text of the department's response is included at the end of this report.

Background

The Department of Fish and Wildlife (department), through its Fish Propagation program, operates 34 fish hatcheries and 15 satellite fish rearing facilities. According to department information, the hatcheries are funded entirely or in part with state funds, federal funds and, for four hatcheries, with funding from a private utility company, a city government, and/or a county government. The department may raise both salmon and trout at the same hatchery.

The department produces two main species of salmon—Chinook and Coho. Chinook return from the sea to spawn in freshwater at different times of the year. As such, there are both “fall Chinook” and “spring Chinook.” The department also uses different stocks of salmon.¹ Stocks native to a given stream are thought to be better adapted to survive in that stream.

Juvenile salmon are spawned and reared at hatcheries and rearing

facilities and then released into rivers and streams. Fish are released at hatcheries and also are trucked to other streams where they are released. Chinook typically return to freshwater to spawn as three- to five-year-olds. Most Coho return to spawn as three-year-olds.

The department often transfers fish from the hatchery where they were spawned to another hatchery, rearing facility, or acclimation facility, where they spend some period of time before release. According to department Fish Division management, the department transfers fish for such reasons as

¹ As used in this report, “stock” refers to a population of salmon from a specific water body.

maximizing the use of available hatchery capacity and avoiding disease problems.

Audit Results

Costs to Produce Salmon and Trout for Release

We estimated costs associated with producing a pound of salmon and trout at 13 hatcheries operated by the department. Six of the 13 hatcheries currently receive 100 percent of their direct funding from the state. They are the Bandon, Cedar Creek, Elk River, North Nehalem, Salmon River, and Trask hatcheries. The remaining seven hatcheries are partially state-funded.²

At \$4.08 per pound, the Butte Falls hatchery had the lowest production cost during our audit period (state fiscal years 1994-1997). The next lowest was the Salmon River hatchery, with a cost of \$4.76 per pound. In contrast, the Trask hatchery had the highest production cost at \$8.97 per pound. The Bandon hatchery had the next highest cost at \$8.34 per pound. Figure 1 shows production costs for the 13 hatcheries reviewed.

Figure 1: Estimated Cost Per Pound of Production Fiscal Years 1994-1997

Butte Falls	\$4.08
Salmon River	\$4.76
North Nehalem	\$5.35
McKenzie	\$5.69
Rock Creek	\$5.78
Cedar Creek	\$6.08
Willamette	\$6.13
South Santiam	\$6.22
Elk River	\$6.56
Marion Forks	\$6.68
Clackamas	\$8.29
Bandon	\$8.34
Trask	\$8.97

Figure 1 shows salmon and trout production costs stated in state fiscal

² This funding information was obtained from the department. It represents recent budgeted direct hatchery funding.

year 2001 dollars. They include direct hatchery expenditures, fixed asset and equipment depreciation, headquarters and regional Propagation program expenditures, Fish Division administrative expenditures, and general administrative expenditures incurred at headquarters and regional offices.

As shown in Figure 2, the department has identified significant deferred maintenance needs for hatcheries included in our review. These costs are not included in the production costs reported in Figure 1. Production costs are likely to rise in the future if the department expends funds to address these needs.

Figure 2: Estimated Deferred Maintenance Needs for the Next Five Years

South Santiam	\$105,000
Salmon River	\$198,250
Elk River	\$274,500
Trask	\$301,250
North Nehalem	\$310,150
Willamette	\$543,000
McKenzie	\$1,220,000
Rock Creek	\$1,860,500
Marion Forks	\$2,000,000
Clackamas	\$2,019,000
Cedar Creek	\$2,485,750
Butte Falls	\$2,714,625

The deferred maintenance costs shown in Figure 2 are those that, in the opinion of department management, must be completed in the next five years in order for the hatcheries to continue to operate effectively and in compliance with applicable state, federal and agency rules and policies. No such needs were reported for Bandon hatchery.

Reported Catch and Return Rates for Adult Salmon

We used two measures to estimate adult salmon survival. Smolt-to-adult survival rates (SARs) measure the percentage of released fish reported to have been caught in ocean and freshwater fisheries, or to have returned to the area where they

were released. We also determined the percentage of released fish caught in ocean or freshwater fisheries (catch rate).³

Figure 3 on page 6 shows estimated catch and return rates for adult salmon for the hatcheries reviewed. Fish are listed under the hatchery that released them, except in some cases when they were reared at the hatchery indicated but were actually released from an associated facility or non-department operated hatchery.

The overall percentage of released fall Chinook included in our review that were reported to have been caught or to have returned to the freshwater for spawning (SAR) was 0.96 percent, and ranged from a low of 0.14 percent for fish produced at the Rock Creek hatchery to a high of 2.42 percent for fish produced at the Salmon River hatchery. The overall SAR for spring Chinook was 0.39 percent, and ranged from 0.25 percent at the McKenzie hatchery to 0.70 percent at the Cedar Creek hatchery. Finally, the overall SAR for Coho was 0.50 percent. The lowest SAR was 0.17 percent for Coho produced at the Bandon hatchery; the highest SAR was 0.77 percent for Coho produced at the Trask hatchery. The catch rates shown in Figure 3 are lower than the SARs because they are limited to fish reported to have been caught in ocean or freshwater fisheries.

Figure 4 on page 7 shows, on a percentage basis, where adult fish were caught or recovered. In some cases, such as with fall Chinook salmon produced at the Rock Creek hatchery, a relatively high percentage of adult fish were caught outside of Oregon waters. Also noteworthy are cases such as Coho

³ This part of our analysis was limited to stocks released from 12 of our sample hatcheries or associated facilities, for which adult catch/return data is available. The Butte Falls hatchery was excluded, as we were unable to accurately estimate freshwater catch for stocks produced there.

salmon produced at the Bandon and Trask hatcheries in which a large percentage of adult fish were recovered at a hatchery.

Department management stated that returning hatchery fish not needed at the hatchery, and therefore left in the stream to spawn, as well as straying fish, are counted only in streams with active spawning ground surveys designed to collect coded wire tags.⁴ Accordingly, SARs at hatcheries without such surveys are somewhat underestimated.

Factors Influencing Salmon Catch and Return Rates

A variety of factors may directly impact the SARs and catch rates reported here. These include stocks used, freshwater habitat requirements, ocean conditions, and harvest regulations.

Department managers reported that because of poor ocean conditions, salmon survival rates in the early and mid 1990s were some of the worst on record. They stated that survival rates improved since 1999.

Coho ocean fisheries from Washington to California were closed in 1994 and very limited during 1995 through 1999. In addition, according to department management, Chinook fishing in the Willamette River was severely restricted. Given these factors, the SARs and catch rates reported above may not be representative of current conditions; nevertheless, this information allows for relative comparisons of adult survival between hatcheries and the types of salmon they produce.

⁴A coded wire tag is a small (up to 1.5 mm) device that is implanted in the snout of a fish. Recovered tags provide information used for calculating SARs and catch rates.

Costs to Produce Adult Salmon that are Caught or Return to Spawn

Using the cost and adult survival information discussed above, we estimated the overall cost to produce an adult salmon that was reported to have been caught or to have survived and returned to freshwater for spawning. As noted above, the department may transfer fish from one hatchery to another. Given that our cost per adult estimates use the hatchery-specific cost per pound figures above, our estimates indicate what it would cost for each adult had it been raised at the hatchery in question until released. Figure 5 on page 8 shows the results of our analysis.

- The overall cost to produce an adult fall Chinook was \$39. The lowest cost was \$14 per fish for fall Chinook produced at the Salmon River hatchery. The highest was \$176 per fish for fish produced at the Rock Creek hatchery.
- The overall cost to produce an adult spring Chinook was \$168. Spring Chinook costs ranged from \$90 per fish for fish produced at the Cedar Creek hatchery to \$249 per fish for fish produced at the McKenzie hatchery.
- The overall cost to produce an adult Coho was \$96. The lowest cost was \$67 per fish for Coho produced at the North Nehalem hatchery. The highest was \$530 per fish for fish produced at the Bandon hatchery.

Figure 5 includes cost estimates for fish that were caught in ocean or freshwater fisheries. These costs are higher than those discussed above because fish that returned to hatcheries or spawning grounds are not included, causing production costs to be spread over fewer fish.

Department management stated that program objectives at the hatcheries impact adult fish costs.

As one example, management stated that adult fish costs for the Bandon hatchery are high because it is operated largely as an egg incubation station and releases few fish.

Objectives, Scope and Methodology

The objective of our audit was to assess the cost-effectiveness of producing salmon at state-funded hatcheries operated by the Department of Fish and Wildlife. Our review included 13 hatcheries. We excluded the Cole Rivers hatchery because it received little state funding during our audit period. We also excluded the Big Creek hatchery which, according to the department, currently produces only one state-funded stock. Finally, we also excluded the Klaskanine hatchery. According to recent department production information, only one stock is produced at that hatchery. We did not find adult return information for this stock in the database that contains coded wire tag data.

Our audit period for production activity was state fiscal years 1994 through 1997. We chose this period because it corresponded to brood years for which runs are substantially complete and cost data were readily available.

To estimate hatchery costs, we worked with department officials to determine cost centers that relate primarily to hatchery production. The applicable hatchery cost information we collected consisted of direct costs incurred by the hatcheries, the depreciation of fixed assets and equipment, headquarters and regional Propagation program expenditures, Fish Division administrative expenditures, headquarters administrative expenditures, and regional administrative expenditures.

To estimate fixed asset and equipment depreciation, we obtained

lists of fixed assets and equipment from the department for our sample hatcheries. These lists include estimated values (fixed assets) acquisition costs (equipment) and estimated useful lives for these items. We then used a straight-line method to determine the amount of depreciation applicable for each asset and piece of equipment, for each hatchery and year included our review.

We allocated the headquarters and regional costs to our sample hatcheries as described below.

- Headquarters Propagation program expenditures were allocated using the percentage of production each of our sample hatcheries comprised of total production at all department hatcheries.
- Regional Propagation program expenditures were allocated using the percentage of total regional production each of our sample hatcheries in that region comprised.
- Fish Division administrative expenditures: we first determined the Propagation program's proportion of the Fish Division's budget. To do this, we subtracted the Fish Division administrative expenses from the Fish Division budget and then divided the Propagation program budget by this amount. We then took the resulting percentage of the Fish Division administrative expenses and allocated this total to our sample hatcheries based on their percentage of overall production at all hatcheries.⁵
- Headquarters administrative expenditures: these include such

⁵ To determine Propagation's budget for the 1995-97 biennium, we subtracted the Fish Division administrative expenses from the Propagation budget. This is because, during this biennium, the Propagation budget included the Fish Division administrative budget.

functions as the Director's office, Personnel, Information and Education, and the Administrative Services Division. We first determined the Propagation program's proportion of the department's overall budget. To do this, we subtracted the headquarters administrative expenses from the overall department budget and then divided the Propagation program budget by this amount. We then took the resulting percentage of the headquarters administrative expenditures and allocated this total to our sample hatcheries based on their percentage of overall production at all hatcheries.

- Regional administrative expenditures: these are regional administrative expenses specific to the regions where our sample hatcheries are located. We first determined Propagation program's proportion of the regional budget allocation. To do this, we subtracted the regional administrative budget allocation from the total regional budget allocation and then divided the regional Propagation program allocation by this amount. We then took the resulting percentage of the regional administrative expenses and allocated this total to the hatcheries in the region based on their percentage of regional production.

We made the above calculations for each of the four years in our audit period. We then adjusted our cost calculations so that they are stated in FY 2001 dollars. To do so, we used the Bureau of Labor Statistics' Portland-Salem consumer price indices applicable to the years included in our review. Finally, to arrive at a cost per pound figure, we aggregated all costs over the four-year period and divided this total by the aggregated net pounds of production over the same period.

Budget amounts for a given fiscal year were figured as half of the legislatively approved biennial total.

To determine hatchery production, we estimated the net gain in pounds of fish for each stock at all 34 department hatcheries. To do this, we subtracted the pounds of each stock received at a hatchery in a given fiscal year from the pounds the hatchery released or transferred to other facilities. Egg production is not included in these calculations. Using this methodology, we also calculated total production at each hatchery, as well as its percentages of regional and overall production. We excluded from these calculations production at acclimation facilities and other hatcheries that the department does not operate, but to which it supplies fish. Further, we did not collect cost information for facilities not operated by the department. According to department managers, fish generally spend relatively little time at acclimation facilities and the non-department operated hatcheries before being released.

The following are the sources of information we used to estimate hatchery costs:

- Production information: the department's fish liberation data, which is part of its Hatchery Management Information System database;
- Fiscal year 1994 costs: Executive Accounting System reports provided by the department; and
- Fiscal year 1995-1997 costs: State Financial Management Application data.

We did not independently verify the accuracy of this information.

Our review covered selected Chinook salmon stocks released during state fiscal years 1994-1995, and selected Coho stocks released during fiscal years 1994-1997. In general, this part of our analysis consisted of stocks released from

one of our sample hatcheries or associated facilities, for which adult catch/return data was available. We excluded the Butte Falls hatchery and one fall Chinook stock produced at the Elk River hatchery because we were unable to accurately estimate freshwater catch for stocks produced there.

We estimated catch rates and smolt-to-adult survival rates using data obtained from the Regional Mark Information System (RMIS), which is maintained by the Pacific States Marine Fisheries Commission. Spawning ground recoveries of coded wire tagged fish are not projected in RMIS, which has the effect of understating SARs somewhat. We supplemented the RMIS data with angler punchcard catch data to estimate Oregon freshwater catch. We did not independently verify the accuracy of the RMIS or punchcard data. However, we did compare RMIS data to similar data maintained by the department and consulted with Fish Division staff to resolve differences we found.

To estimate freshwater catch, we assigned the angler punchcard catch associated with a given hatchery to

the groups of coded wire tagged fish recovered by that hatchery. We did not include any groups of untagged fish, which tends to overstate the punchcard catch of the tagged groups included in our review. In addition, when apportioning punchcard catch data, we did not include non-ODFW facilities. This has the effect of overstating catch rates for fish released from an ODFW-operated hatchery and understating catch rates for fish released from all other locations. Also, we did not completely project for fish released from hatcheries located in other states. This tends to overstate freshwater catch for fish released from an Oregon facility. Finally, the SARs and catch rates for Rock Creek hatchery spring Chinook that returned in 1997 and 1999 are somewhat understated, as we were unable to allocate punchcard catch between the groups of tagged fish produced at this hatchery in these years.

According to the department's Hatchery Coordinator, the most complete accounting of returning adult fish would be for stocks released at a hatchery. This is because hatcheries generally have facilities for counting fish that return

to the hatchery. In contrast, counts of fish that returned to an off-site location without such facilities may not be complete. Accordingly, for stocks released off site, the SARs we have reported may be somewhat understated, and the resulting costs per adult fish may be somewhat overstated. According to a department staff member who has expertise in salmon catch and return data, the department no longer releases coded-wire-tagged fish from sites that do not have recovery facilities.

To estimate adult fish costs, we used department and RMIS data to determine the number of pounds of smolts that must be released to obtain:

- An adult that is caught or returns to the hatchery, and
- An adult that is caught.

We then multiplied these figures by the cost-per-pound figures presented in Figure 1.

We conducted this audit according to generally accepted government auditing standards.

Figure 3: Catch and Smolt-to-Adult Survival Rates for Salmon Produced at Hatcheries Operated by the Oregon Department of Fish and Wildlife

Hatchery/Type of Salmon	Total Caught	Total Caught & Returned	Total Smolts Released	Catch Rate	Smolt-to-Adult Survival Rate
BANDON					
Fall Chinook	1,077	2,433	1,113,845	0.10%	0.22%
Coho	0	110	64,147	0.00%	0.17%
CEDAR CREEK					
Fall Chinook	1,190	1,299	115,830	1.03%	1.12%
Spring Chinook	927	1,223	175,538	0.53%	0.70%
CLACKAMAS					
Spring Chinook	5,122	11,263	3,167,908	0.16%	0.36%
ELK RIVER					
Fall Chinook	8,768	12,824	776,421	1.13%	1.65%
MARION FORKS					
Spring Chinook	2,527	3,900	1,267,725	0.20%	0.31%
McKENZIE					
Spring Chinook	4,631	7,828	3,173,095	0.15%	0.25%
NORTH NEHALEM					
Coho	4,000	15,902	2,894,969	0.14%	0.55%
ROCK CREEK					
Fall Chinook	709	726	509,711	0.14%	0.14%
Spring Chinook*	3,819	3,956	605,278	0.63%	0.65%
Coho	2,643	4,126	566,428	0.47%	0.73%
SOUTH SANTIAM					
Spring Chinook	3,103	5,772	1,311,541	0.24%	0.44%
SALMON RIVER					
Fall Chinook	5,149	9,948	411,749	1.25%	2.42%
Coho	1,233	13,072	3,631,076	0.03%	0.36%
TRASK					
Fall Chinook	2,499	3,069	239,053	1.05%	1.28%
Spring Chinook	2,370	3,437	641,886	0.37%	0.54%
Winter Chinook	1,151	1,418	99,475	1.16%	1.43%
Coho	597	7,509	969,789	0.06%	0.77%
WILLAMETTE					
Spring Chinook	5,717	14,504	2,928,409	0.20%	0.50%
Overall Fall Chinook	19,393	30,300	3,166,609	0.61%	0.96%
Overall Spring Chinook	28,215	51,883	13,271,380	0.21%	0.39%
Overall Coho	8,474	40,720	8,126,409	0.10%	0.50%

Included are selected Chinook salmon stocks released during state fiscal years 1994-1995 and Coho stocks released during fiscal years 1994-1997, for which adult catch/return data are available. According to department staff, winter Chinook have similar return timing as fall Chinook. These fish are now referred to as late fall Chinook. Total caught and total caught and returned numbers have been rounded to the nearest whole number. *SARs and catch rates for Rock Creek hatchery spring Chinook that returned in 1997 and 1999 are somewhat understated, as they do not include freshwater catch. See the "Objective, Scope and Methodology" section for additional information.

**Figure 4: Location of Caught/Returned Salmon Produced at Hatcheries
Operated by the Oregon Department of Fish and Wildlife**

Hatchery/Type of Salmon	Total Caught & Returned	% Caught in Alaska	% Caught in California	% Caught in Canada	% Caught in Washington	% Caught in Oregon	% Recovered at ODFW Hatchery	% Recovered at Spawning Ground	% Other
BANDON									
Fall Chinook	2,433	23.17%	0.00%	10.93%	0.80%	9.35%	55.26%	0.49%	0.00%
Coho	110	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%
CEDAR CREEK									
Fall Chinook	1,299	13.09%	0.00%	0.00%	0.00%	78.54%	8.00%	0.36%	0.00%
Spring Chinook	1,223	2.35%	0.00%	0.66%	0.66%	72.11%	23.41%	0.00%	0.82%
CLACKAMAS									
Spring Chinook	11,263	3.67%	0.17%	2.09%	1.49%	38.05%	54.03%	0.37%	0.12%
ELK RIVER									
Fall Chinook	12,824	10.19%	1.70%	4.24%	0.71%	51.53%	25.91%	4.90%	0.81%
MARION FORKS									
Spring Chinook	3,900	21.29%	0.00%	0.00%	0.00%	43.49%	33.46%	1.75%	0.00%
McKENZIE									
Spring Chinook	7,828	4.67%	0.00%	2.04%	0.83%	51.61%	38.22%	1.11%	1.51%
NORTH NEHALEM									
Coho	15,902	0.36%	2.77%	0.82%	3.87%	17.34%	74.23%	0.61%	0.00%
ROCK CREEK									
Fall Chinook	726	40.65%	0.00%	20.64%	1.41%	35.00%	1.08%	0.00%	1.22%
Spring Chinook	3,956	0.61%	3.71%	0.25%	0.58%	91.39%	1.47%	0.00%	2.00%
Coho	4,126	0.00%	1.63%	1.00%	1.23%	59.98%	35.78%	0.39%	0.00%
SOUTH SANTIAM									
Spring Chinook	5,772	3.26%	0.00%	0.53%	0.87%	49.09%	45.39%	0.59%	0.27%
SALMON RIVER									
Fall Chinook	9,948	16.72%	0.04%	3.95%	0.13%	30.92%	2.52%	44.98%	0.74%
Coho	13,072	0.14%	0.50%	2.09%	3.39%	3.31%	85.27%	5.29%	0.00%
TRASK									
Fall Chinook	3,069	16.50%	0.00%	0.94%	0.00%	63.98%	18.35%	0.22%	0.00%
Spring Chinook	3,437	9.59%	0.88%	2.50%	0.00%	55.98%	30.64%	0.00%	0.42%
Winter Chinook	1,418	15.76%	0.00%	2.54%	0.00%	62.83%	16.27%	2.23%	0.37%
Coho	7,509	0.00%	0.21%	0.07%	6.37%	1.30%	91.88%	0.17%	0.00%
WILLAMETTE									
Spring Chinook	14,504	3.29%	0.00%	2.51%	0.00%	33.61%	60.08%	0.30%	0.20%
Overall Fall Chinook	30,300	14.87%	0.73%	4.56%	0.44%	43.40%	18.46%	16.92%	0.62%
Overall Spring Chinook	51,883	5.12%	0.38%	1.72%	0.60%	46.55%	44.55%	0.53%	0.54%
Overall Coho	40,720	0.19%	1.45%	1.10%	3.90%	14.15%	77.21%	2.01%	0.00%

Included are selected Chinook salmon stocks released during state fiscal years 1994-1995 and Coho stocks released during fiscal years 1994-1997, for which adult catch/return data are available. According to department staff, winter Chinook have similar return timing as fall Chinook. These fish are now referred to as late fall Chinook. Department staff also told us that staff members at the Salmon River hatchery recover many fall Chinook at the hatchery that are later released and counted on spawning grounds. "Other" includes fish recovered by staff of federal regulatory agencies, fish that returned to hatcheries in Washington, and fish counted during dead fish surveys.

**Figure 5: Cost per Caught and Caught/Returned Salmon Produced at Hatcheries
Operated by the Oregon Department of Fish and Wildlife in 2001 Dollars**

Hatchery/Type of Salmon	Pounds at Release	Cost/Pound FY 1994-97	Cost Per Caught Adult	Cost per Caught or Returned Adult
BANDON				
Fall Chinook	20,573.50	\$8.34	\$159	\$71
Coho	7,004.00	\$8.34	–	\$530
CEDAR CREEK				
Fall Chinook	5,780.00	\$6.08	\$30	\$27
Spring Chinook	18,032.20	\$6.08	\$118	\$90
CLACKAMAS				
Spring Chinook	268,339.00	\$8.29	\$434	\$198
ELK RIVER				
Fall Chinook	79,485.80	\$6.56	\$59	\$41
MARION FORKS				
Spring Chinook	108,641.00	\$6.68	\$287	\$186
McKENZIE				
Spring Chinook	342,950.70	\$5.69	\$421	\$249
NORTH NEHALEM				
Coho	199,178.00	\$5.35	\$266	\$67
ROCK CREEK				
Fall Chinook	22,152.00	\$5.78	\$180	\$176
Spring Chinook	93,126.90	\$5.78	\$141	\$136
Coho	55,827.81	\$5.78	\$122	\$78
SOUTH SANTIAM				
Spring Chinook	166,513.00	\$6.22	\$334	\$179
SALMON RIVER				
Fall Chinook	28,355.00	\$4.76	\$26	\$14
Coho	342,520.00	\$4.76	\$1,322	\$125
TRASK				
Fall Chinook	13,173.00	\$8.97	\$47	\$38
Spring Chinook	36,265.60	\$8.97	\$137	\$95
Winter Chinook	5,194.00	\$8.97	\$40	\$33
Coho	95,996.00	\$8.97	\$1,442	\$115
WILLAMETTE				
Spring Chinook	265,605.09	\$6.13	\$285	\$112
Overall Fall Chinook	169,519.30	\$6.99	\$61	\$39
Overall Spring Chinook	1,299,473.49	\$6.72	\$310	\$168
Overall Coho	700,525.81	\$5.57	\$461	\$96

Included are selected Chinook salmon stocks released during state fiscal years 1994-1995 and Coho stocks released during fiscal years 1994-1997, for which adult catch/return data are available. According to department staff, winter Chinook have similar return timing as fall Chinook. These fish are now referred to as late fall Chinook. Overall costs per adult fish utilize an average cost per pound weighted by numbers of fish released. Adult fish costs are rounded to the nearest whole dollar.

Oregon Department of Fish and Wildlife's Response



Oregon

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October 22, 2002

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Salem, OR 97310

Dear Ms. Pollino

The attached responds to the October 16, 2002 draft audit report on Hatchery Cost-Effectiveness forwarded to us by Mr. James D. Pitts. Our comments follow the order of each section in the draft audit report.

Thank you for the opportunity to comment on the draft report. Although we note concerns with the report, the researchers from your office produced some very valuable and potentially helpful information by working diligently and accurately over many long hours. The issue of hatchery costs relative to production and benefits is part of a larger debate going on in the state regarding the role of hatcheries. With some additional refinements and an update when the returns from FY 1998 – 2001 hatchery production are estimated, this type of analysis could produce information that is both important to the issue and a reliable guide for improving state hatchery programs.

We appreciate the thoroughness and attention to detail of your auditor's investigation and look forward to continuing to work with your team of auditors in finalizing this report for publication.

Sincerely,

Lindsay A. Ball
Director, Oregon Department of Fish and Wildlife

Attachment

- c: Mike Greenfield, Director, Department of Administrative Services
- Paddy McGuire, Deputy Secretary of State
- Oregon Fish and Wildlife Commission
- Steve Williams, ODFW, Fish Division Deputy Administrator
- George Nandor, ODFW, Acting Fish Propagation Manager



Oregon Department of Fish and Wildlife
Response to Draft Audit Report
Hatchery Cost-Effectiveness - Fiscal Years 1994-1997

Summary

The Department of Fish and Wildlife generally agrees with the information presented in the Summary section, with the following comments:

As background to this audit information, it is essential to realize that the fisheries time frame covered by the report represents a number of years of poor adult returns in the fisheries. This was a result of a combination of poor ocean survival conditions for salmon and the federal ESA listing of coho salmon stocks. These factors skew the cost-effectiveness results of this report significantly.

Fishing opportunities for both coho and chinook in Oregon's ocean and coastal streams were dramatically reduced from 1995 through 1998 because of very low ocean survival rates and the impact of the Federal Endangered Species Act listings. In fact there was **no** ocean fishing for coho from 1995 through 1998, and chinook fishing in the Willamette River was severely constrained. These factors directly impact the catch rates and the resulting estimates of cost-per-caught adult during these low survival years. Since 1999 the survival rates have improved dramatically and are estimated to be on the order of 5 to 10 times better than those reflected in the report.

For example, the 1998 brood year coho which returned as adults in 2001 at Trask River Hatchery and Salmon River Hatchery had smolt to hatchery return rates of 8.04% and 7.49% respectively. These figures do not include any catch. The average smolt to adult survival rate (includes catch) during the years audited were 0.77% for Trask River Hatchery coho and 0.36% for Salmon River Hatchery coho salmon. This demonstrates the wide variations in smolt to adult survival rates depending on ocean productivity.

Background

The Department of Fish and Wildlife generally agrees with the information presented in the Background section, with the following comments:

The report states that hatchery facilities are funded with a range of state, federal and private funds. The Department suggests that the funding splits for each facility be shown. While this will not change the costs of producing fish, it will convey the magnitude of the state's responsibility for funding. These funding splits are particularly important for the facilities located in the Willamette Basin where the programs are mitigation hatcheries funded to address habitat loss as a result of dams being built for flood control and hydroelectric generation.

Audit Results

The Department of Fish and Wildlife generally agrees with the information presented in the Audit Results section, with the following comments:

Although deferred maintenance cost estimates come from our own data base and staff input, it is very unlikely that the Department will have the funds (approximately \$14 million over five years) to complete all of the deferred maintenance costs in the time frame identified here. Our current expectation is that we will be able to fund about \$1 million per year to address these deferred maintenance items.

While the report identifies that cost estimates vary widely between hatcheries and different fish stocks, this variation can be explained in part by the environmental factors previously discussed (ocean survival conditions) and by the major variations in program objectives at each facility. While understanding the difficulty of describing each facility individually, the differing reasons and objectives for each facility have a direct effect on the cost and type of program being conducted. The report states that the cost to produce a caught or returned adult to Bandon Hatchery is the highest of all the hatcheries reviewed. This is the direct result of very few hatchery fish being released from the facility and the fact that the facility is operated largely as an egg incubation station for other programs such as the Salmon Trout Enhancement Program (STEP). Where these kinds of differences exist for other facilities, we suggest they be noted in the report.

Large variations occur in the reported number of hatchery fish returning to individual hatcheries. Returning hatchery fish not needed at the hatchery and left in the stream to spawn or straying hatchery fish are counted only in streams where active spawning ground surveys to collect coded wire tags occur. While page 5 discusses the situation where stocks might be released off site, other situations exist where fish do not return to facilities. The Clackamas River is an example of a stream where spawning ground surveys do not occur and where large numbers of hatchery fish may bypass the hatchery and continue upstream to spawn. These fish are not counted in the audit report as returning fish. This leads to an underestimate of adult production and smolt to adult survival rates. The report should clearly note that these kinds of situations exist within the individual hatchery programs reviewed in the audit.

Reported Catch and Return Rates for Adult Salmon

The Department of Fish and Wildlife agrees with the information presented.

Factors Influencing Salmon Catch and Return Rates

The Department of Fish and Wildlife agrees with the information presented.

Costs to Produce Adult Salmon that are Caught or Return to Spawn

The Department of Fish and Wildlife agrees with the information presented.

Objectives, Scope and Methodology

The Department of Fish and Wildlife generally agrees with the information presented in the Objectives, Scope and Methodology section, with the following comments:

The Department remains concerned about the appropriateness of using certain headquarters, regional and Fish Division costs in the definition and allocation to individual hatcheries. There are always differences of opinion about whether certain costs should be classified as indirect costs. Some cost allocations made in the course of the study might have been done differently, and been more reflective of the avoidable costs from shifts in hatchery production. A good example is the regional liberation costs that have been allocated without regard to species in the report, even though most of the liberation activity involves trout and not salmon.

Another possible problem concerns accurate allocation of certain costs. Some regional personal services costs might better be tied to the particular type of support provided. For example, regional administrative support staff spends an inordinate amount of time supporting ODFW's controlled hunt system. These associated personal services costs would be more accurately partitioned directly as costs of supporting the controlled hunt system. However, we recognize that without this specific information, and additional work, it was probably not possible for the study to distinguish among such costs and partition those costs more accurately.

More generally, it can be argued that certain headquarters, regional and Fish Division costs that are called administrative expenses are not related to the production of hatchery fish. The outputs produced by ODFW are many and not always as clearly defined as pounds of hatchery production. A consequence is that some "outputs" may be produced by the programs in headquarters, the regions or the Fish Division that are called administrative. The associated costs may actually not be administrative costs in the same sense as they would be in a manufacturing firm.

Additionally, the question is whether many of the administrative costs could be avoided if the hatchery production of salmon to which they were allocated in the study were to cease. This suggests something closer to a marginal cost approach for including and allocating these costs. Alternatively, some of the headquarters and regional costs tied directly to propagation could be used as the basis for the calculation of indirect hatchery costs, since these costs are clearly related to propagation activities.

It would be useful if the direct costs per pound and costs per returning fish and harvested fish could be presented in the report (i.e., Figures 1 and 5) along with the same estimates for total costs. Then there would be a cost estimate range for these measures that runs

from minimum to maximum, regardless of opinion regarding the appropriateness of including certain “indirect” costs. Comparison of these costs among hatcheries would provide just as good a basis for identifying the more expensive hatcheries and programs within hatcheries.

In addition, the Department questions whether the use of the Portland area Consumer Price Index (CPI) to adjust cost estimates to current 2001 dollars is the most accurate method to reflect inflation. Although the CPI is tied to this region, and the Implicit Price Deflator for Gross Domestic product is national, the latter index does not suffer from some problems associated with the CPI. The CPI tends to overstate the rate of inflation faced by consumers, because it does not allow for substitutions when prices change. In fact a new “chained” version of the CPI has been developed by the Bureau of Labor Statistics to address the problem. The Department notes that use of the CPI resulted in estimates six to eight percent higher than those which would have been computed using the GDP deflator.

It is possible a custom index based on actual inflation of such items as personal services costs and fish food costs would be more accurate. This problem could also have been avoided by stating the costs in 1997 dollars, the last year of data included in the study. Eventually, if a study is done on the costs of FY 1998 through 2001 production, it would be appropriate to state comparative results in 2001 dollars for the entire period since 1994.

Some description of the economic benefits associated with the harvests of hatchery fish would also be a useful addition. For example, estimates of the values and personal income impacts of commercial and recreational fisheries are described in ODFW’s 1999 draft Hatchery Program Review, Appendix C, Economic Considerations (see attached). This is particularly important information needed to help provide conclusions about the economic and social values of these fish to Oregon.

* [See auditor’s footnote.]

Generally

Throughout the report there are references to salmon and trout reared at our hatcheries and the cost to produce them, but none of the calculated costs-per-adult includes trout. It would be helpful to indicate more clearly why trout returns are not a focus of the audit.

Agency Actions

Finally, you have requested that I respond with the actions that this agency has taken or plans to take in response to the audit report and an estimated time frame for their implementation.

The department annually reviews hatchery production through annual hatchery production meetings where program managers set program goals. Hatchery programs are monitored through the use of coded wire tags and sampling of sport and commercial

fisheries along with hatchery recoveries to evaluate whether the programs are meeting expected goals.

One example of the changes that have been made since the audit report period is that there has been a significant reduction in coho production from coastal hatcheries. These reductions were a direct result of ESA limitations on the ability to harvest hatchery fish. Fin-clipping of hatchery coho was initiated to provide targeted fisheries on hatchery stocks thereby allowing harvest of hatchery fish while protecting wild stocks. This increased harvest rates of hatchery fish, improving the cost-per-caught-adult ratio and benefiting local economies.

This report, which is a public record, is intended to promote the best possible management of public resources. Copies may be obtained by mail at Oregon Audits Division, Public Service Building, Salem, Oregon 97310, by phone at 503-986-2255 and 800-336-8218 (hotline), or internet at Audits.Hotline@state.or.us and <http://www.sos.state.or.us/audits/auditfp.htm>.

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The courtesies and cooperation extended by the officials and staff of the Department of Fish and Wildlife were commendable and much appreciated.

Auditing to Protect the Public Interest and Improve Oregon Government
