PRIVATE SALMON HATCHERIES

IN OREGON

OREGON DEPARTMENT OF FISH AND WILDLIFE

FISH DIVISION

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INTRODUCTION

The Oregon Legislature adopted Oregon Revised Statutes (ORS's) in 1971 which authorized permits for private rearing, release, and recapture of chum salmon when they return as adults. Coho and chinook salmon were added in 1973, and pink salmon were included in the statutes in 1979. The Oregon Fish and Wildlife Department (ODFW) is charged with administering this program with guidance of the Fish and Wildlife Commission (FWC). The FWC has adopted Oregon Administrative Rules (OAR's) to guide conduct of the program. These OAR's include a moratorium on issue of new permits for chum, coho, and chinook salmon through 1985. Copies of these regulations are available from ODFW on request.

An ODFW Fish Staff Biologist monitors private hatchery operations, inspects facilities, and generally coordinates needs of the Department for specific evaluations and information about private operations. Other staff and field personnel also visit or inspect private hatchery facilities and operations. This report summarizes information on development, monitoring, evaluation, and gives production and return information for 1983.

DEVELOPMENT

Regulations

Private salmon hatcheries are regulated by ORS's passed in Legislative session and OAR's adopted by the FWC in public hearing. Prospective operators must review and comply with regulations as they search for a site and apply for private salmon hatchery permits. Processing of applications include a series of reviews and a public hearing procedure set forth by OAR's. If permits are authorized hatchery operations are controlled by restrictions of the permit then by annual program or production proposal reviews, site inspection, examinations of fish for presence of disease, fish transport and fish release permits.

Individual permits are required for each transport or release of fish in a specified period of time. Reports are required to show numbers, pounds, and special marking of fish released. The operator must report species, numbers, and pounds of fish harvested at the permitted site along with biological data necessary to ODFW evaluation of the site. Commercial wholesale fish dealer licenses are required and poundage tax must be paid on all fish harvested. ODFW staff including pathologists and auditors, and Oregon State Police visit the sites for inspection of facilities, fish, and/or records as necessary to assure compliance with regulations.

Regulations administered by other state agencies and the Federal Government are also applicable to private salmon hatchery operations. Together the regulations give a set of standards which must be met by

private operators as they select a site, construct facilities, and then conduct operations. They must meet the requirements of local and state zoning agencies; U.S. Army Corps of Engineers and Division of State Lands who regulate work in waterways; health or Food and Drug restrictions for disease treatment (use of chemicals); the Oregon Department of Agriculture for food processing; and discharge permits required by the Oregon Department of Environmental Quality or the U.S. Environmental Protection Agency. Construction at private sites is subject to local and state building regulations and permits.

The 1983 Oregon Legislature directed (ORS 506.124) the FWC to adopt OAR's governing public and private salmon hatchery practices. Proposed rules were drafted, distributed for public comment, again revised for comment then proposed for FWC review and adoption in public hearing. The proposed rules were based on public comments and existing statutes, policies and procedures followed in regulating private salmon hatcheries and/or ODFW fish culture operations. Adoption of procedures and constraints as OAR's assures public review and hearing of agency policies and procedures.

Permits

Permits have been issued for private hatchery operation and release of salmon at 13 sites. Permits for one site was terminated and another site is in the termination process. Two chum permits have been authorized at a single site. Permits are required for each species of salmon even if they are released at the same site. Permittees, species, and release limits are shown in Table 1. The status of several permits changed in 1983 and early 1984. Sites where releases could be made are shown in Figure 1 but several of the chum sites are not in operation.

Anadromous, Inc.

Cummings (1983) reported that Anadromous was leasing and operating the Oregon Aqua-Foods' Coos Bay (OAFC) site. In 1983 Anadromous requested and FWC authorized transfer of the OAFC permits to Anadromous when purchase of the site is completed. A condition of this transfer is orderly termination and surrender of the Anadromous permits for 5 million each coho and chinook at Jordan Point, Coos Bay. The orderly termination period allows for capture of returning adults. Anadromous is no longer releasing fish at their Jordan Point site. The company expects to complete purchase of the OAFC site with its permits for 11.3 million coho, 9.4 million chinook, and 20.4 million chum salmon in December of 1984. With this change private salmon hatchery annual total release authorization (permits) will be reduced by 5 million each coho and chinook. All releases are now made at the OAFC site so the old Anadromous site is not shown on Figure 1.

Table 1. Oregon private salmon hatcheries, June 1984.

Name	Location	Permit Date	Release Limit by Brood and Species (Millions)				'84 Egg Priority 1/ for Chum
			Coho	Chinook	Chum	Pink	
Robert Sticklin Rt. 1, Box 538 Warrenton, OR 97146	Unnamed Trib., Skipanon R.	3/4/76			5.0		pass
Nehalem Land n' Salmon PO Box 54 Wheeler, OR 97147	Vosberg Cr., Nehalem Bay	3/4/76			5.0		2
Cecil Harris and Don Hugie 1985 Bayocean Rd., NW Tillamook, OR 97141	Dick Cr., Tillamook Bay	8/23/72			0.1		pass
Keta, Inc. 22930 Sandlake Rd. Cloverdale, OR 97112	Sand Cr., Sand Lake	12/1/71			5.0		0 2/
Alfred Hampson 430 Pacific Bldg. 520 SW Yamhill St. Portland, OR 97204	Sand Cr., Sand Lake	10/31/73			5.0		1 3/
Oregon Aqua-Foods, Inc. 88700 Marcola Rd. Springfield, OR 97477	Manmade Trib., Yaquina Bay Manmade Trib., Coos Bay	11/1/72 3/19/74 7/30/76	9.5 Purchase by Anadromous in Process	10.6	20.0		3
Ceratodus Fisheries 6523 E. Street Springfield, OR 97477	Divide Cr., Siuslaw R.	12/18/73			5.0		pass
Domsea Farms, Inc. PO Box 1656 Florence, OR 97439	Manmade Trib., Siuslaw Bay	5/5/78	12.0	12.0	25.0		6
Siuslaw Fisheries, Inc. 32047 Coburg Bottom Loop Rd. Eugene, OR 97401	Sweet Cr., Siuslaw R.	3/19/72			5.0		0 2/
Anadromous, Inc. 500 SW Madison St. Corvallis, OR 97333	Manmade Trib., Coos Bay		When purchase of OAF site is completed 11.3	9.4	20.4		5
Calvin Heckard 1281 West Catching Slough Rd. Coos Bay, OR 97420	Unnamed Trib., Coos Bay	3/4/76			5.0		4
Oregon-Pacific Salmon Ranch Inc. 2300 SW First, Suite 100 Portland, OR 97201	Burnt Hill Cr. (Direct ocean tributary)	4/25/78 4/		5.0			
Total			32.8	37.0	100.5		

1/ Priority for Oregon chum salmon eggs based on date of application or permit issue.
2/ Priority for chum salmon eggs expired with 1979 brood.
3/ Permit authorized at Keta's site and combined with Keta for records.
4/ Permit transferred to Oregon Pacific effective 3/30/84.

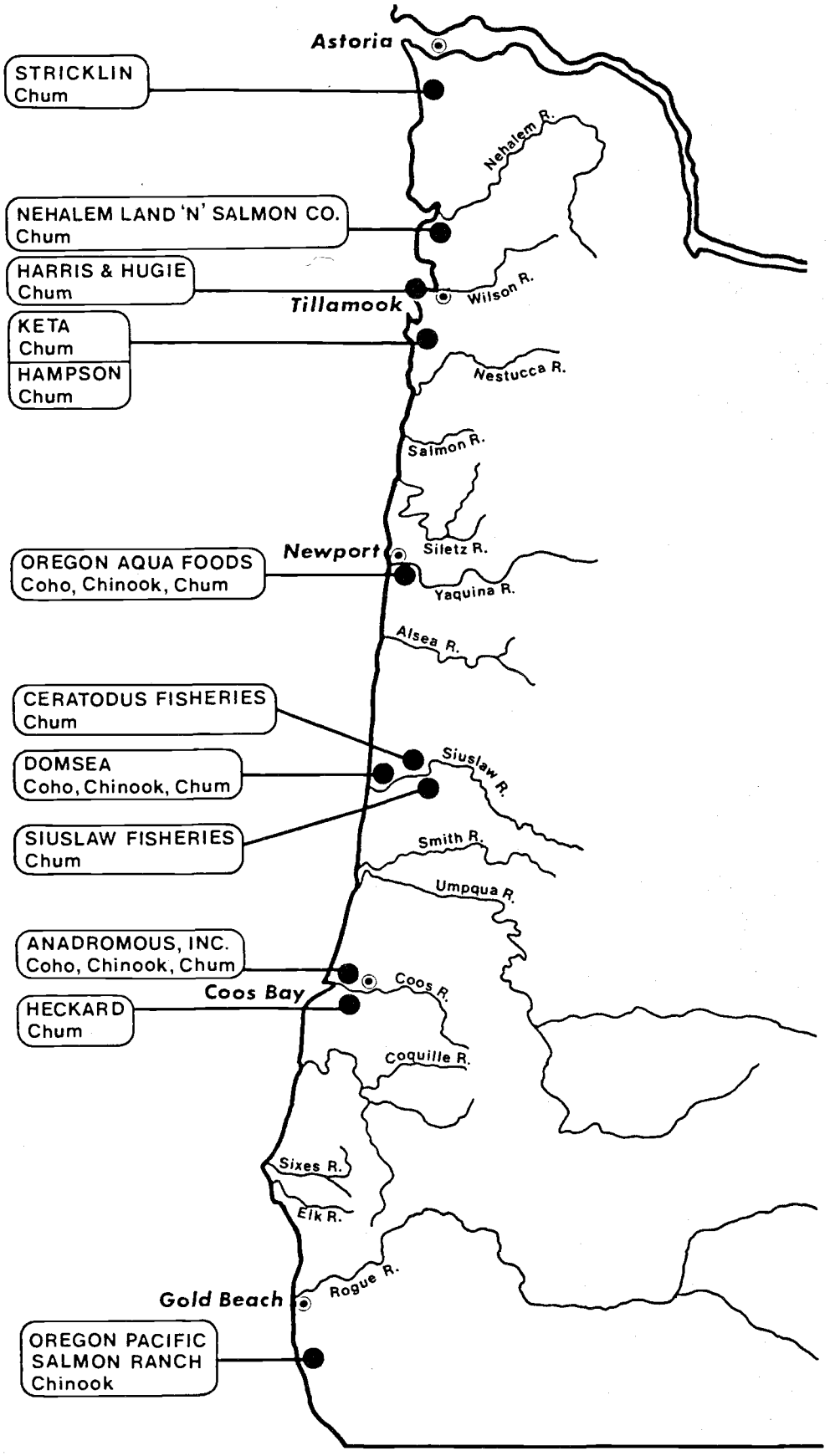

Figure 1. Location of Authorized Private Salmon Hatcheries in Oregon

Anadromous began major construction at the optioned Coos release site this spring. They will build a large permanent support hatchery this summer (1984) at Fort Creek, Klamath County, where they operated a temporary facility in 1983.

Oregon-Pacific Salmon Ranch, Inc.

In August of 1983 Burnt Hill Salmon Ranch Ltd. (BHSR) notified ODFW that they were in the process of turning their assets over to creditors. The Small Business Administration (SBA) was the primary creditor and subsequently advertised the assets for bid. Oregon-Pacific Salmon Ranch, Inc. (OPSR) was the successful bidder. In March 1984 the FWC, in public hearing, authorized transfer of the BHSR permits for 5 million chinook to OPSR, which is now rearing spring chinook juveniles from eggs collected from adults which returned to BHSR in 1983.

Domsea Farms, Inc.

Domsea Farms gave ODFW the 18,500 eyed coho eggs which resulted from adult returns to their site on the Siuslaw in 1983. These were used in the Salmon and Trout Enhancement Program (STEP) on a nearby tributary to the Siuslaw estuary. Domsea's 1982 brood coho are to be used in pen culture in Washington state so they do not intend to release Domsea stock coho in 1984 or 1985. Negotiations are underway between Domsea and Oregon Aqua-Foods (OAF) for lease purchase of this site in 1984.

Nehalem Land 'n' Salmon Co.

In 1983 Manseth and Jaqua reorganized their company which operates a chum salmon facility on Vosberg Creek, Nehalem Bay. The company name was changed to Nehalem Land 'n' Salmon Co. but this did not change the focus of their chum salmon operation. They constructed recapture facilities to collect adult chum which began returning in 1983 and now have a complete harvest, egg incubation, and rearing facility on Vosberg Creek near the south city limits of Wheeler, Oregon.

Brood Stock

Each private hatchery operator must develop a brood stock, acceptable to ODFW, for their permitted site. We believe local stream stocks or ODFW brood stock from a nearby hatchery should be used to develop private salmon hatchery runs. If state program needs including authorized STEP projects are met and acceptable eggs are available, they become surplus and are distributed to other agencies or sold to private operators according to guidelines (OAR 635-07-830) adopted by the FWC. A comparison of eggs taken at ODFW coastal hatcheries and those sold to private salmon operators is shown in Table 2. ODFW has not been able to fill all requests for eggs in any year and no fall chinook or coho eggs have been sold since 1980 when the STEP program was expanded. Some surplus chum eggs have been available to private hatchery operators mainly from the Oregon State University facility at Whiskey Creek, Netarts Bay.

Table 2. Salmon Eggs Taken at ODFW coastal stations and numbers sold to private operators, 1973-83 broods.

Species	Fall Chinook			Spring Chinook			Coho		
Brood Year	Eggs Taken	Eggs Sold	(%) 1/	Eggs Taken	Eggs Sold	(%)	Eggs Taken	Eggs Sold	(%)
1973	4,366,800	510,915 2/	(11.7)	2,068,900	0	(0)	9,613,100	509,495	(5.3)
1974	2,422,400	0	(0)	1,984,883	125,050	(6.3)	8,347,882	751,310	(9.0)
1975	3,488,100	725,525	(20.8)	2,610,300	308,015	(11.8)	5,667,600	317,385	(5.6)
1976	436,536	0	(0)	2,592,078	261,800	(10.1)	9,167,383	2,310,180	(25.2)
1977	3,832,348	540,360	(14.1)	2,948,986	209,380	(7.1)	7,394,065	81,335	(1.1)
1978	3,214,348	0	(0)	4,845,104	2,151,230	(44.4)	6,223,090	12,445	(0.2)
1979	2,992,506	395,010	(13.2)	4,809,160	1,933,280	(40.2)	22,747,394	5,868,825	(25.8)
1980	3,135,009	404,415	(12.9)	6,587,306	2,575,635	(39.1)	19,741,631	2,842,795	(14.4)
1981	2,780,428	0	(0)	3,251,847	411,786	(12.6)	12,184,136	0	(0)
1982	4,264,256	0	(0)	6,219,780	3,685,256	(60.5)	10,693,073	0	(0)
1983 3/	4,733,000	0	(0)	3,264,000	0	(0)	5,592,000	0	(0)
TOTAL	35,665,731	2,576,225	(7.2)	41,182,344	11,661,432	(28.3)	117,371,354	12,693,770	(10.8)

1/ Percentages sold: Percentages are misleading in some cases because additional eggs were taken specifically for sale as viable eggs as opposed to selling unspawned carcasses.
2/ 27,000 released as smolts with the remainder harvested for sale as pan-size juveniles.
3/ Preliminary data.

Chinook

Eggs from both Oregon hatcheries and local stream stocks have been used by private operators in their effort to develop chinook brood stock. Annual coastal releases by private operators were comparatively small prior to 1978 (Table 3). Anadromous made sizeable releases at their Deer Island, Columbia River site in 1975 but releases there ended when the company was allowed to transfer operations to Coos Bay where a new brood stock is being developed.

Table 3. Salmon released by private salmon hatchery operators in Oregon, 1972-83

	Species				
Year	Coho	Spring Chinook	Fall Chinook	Chum	Total
1972	--	--	--	51,150	51,150
1973	--	--	--	276,375	276,375
1974	87,782	--	27,000	575,082	689,864
1975	142,032	5,551	1,009,259	2,792,930	3,949,772
1976	2,079,834	161,251	147,662	2,447	2,391,194
1977	2,370,690	42,079	--	120,400	2,533,169
1978	9,907,874	15,790	522,101	465,174	10,910,939
1979	5,811,741	1,397,131	222,811	10,940,199	18,371,882
1980	14,817,346	1,268,718	438,136	8,000	16,532,200
1981	23,852,408	1,755,892	499,728	5,528,589	31,636,717
1982	23,107,316	351,416	630,951	1,649,406	25,666,778
1983 1/	16,276,775	1,984,723	1,193,690	5,602,617	25,057,805
Total 1/	98,453,798	6,982,551	4,691,338	28,012,369	138,140,056

1/ Preliminary data.

Fall Chinook Eggs surplus to ODFW rearing programs provided most of the fall chinook stock used at private facilities prior to 1977 when we began to collect eggs from local natural spawners to develop brood stocks. This effort was conducted by ODFW through funding contracts with individual private operators. We required reimbursement for our costs and return of smolts to replace fish which would otherwise have accrued from natural spawning. This procedure was examined by the legislature in 1981 and our smolt pay back system is now required by ORS 496.455.

OAF has outcrossed or replaced all fall chinook with local brood stock. In 1984 they expect to release 350,000 fall chinook smolts. Domsea obtained enough eggs to begin a brood stock but, although the pay back groups are returning well to the streams where released, returns to the hatchery release site have not been encouraging. The fall chinook brood stock at Anadromous was developed with a combination of Coos system eggs and ODFW hatchery surplus. The company has begun an outcrossing program to further localize their fall chinook brood stock. We tried to collect fall chinook eggs on the Rogue system for use at BHSR but it took most of the resultant smolts to meet the payback requirement in two of the three years we collected eggs there. BHSR terminated their fall chinook program.

All fish released for pay back on the several collection projects were marked and provided valuable information on distribution of the respective stream stocks in the ocean. In total 1,467,027 fall chinook eggs were collected and we received 291,000 smolts for stocking in streams. No wild fall chinook have been collected under these contracts since 1981 (Table 4).

Table 4. Eggs taken from wild fall chinook for stock assessment and brood stock development program in cooperation with private operators, 1977-83.

Cooperating Company	Anadromous	Oregon Aqua Foods	Burnt Hill	Domsea	TOTAL
Year					
1977	--	62,040 (18,810) 1/ Yaquina River	--	--	62,040 (18,810)
1978	185,402 (25,476) Coos River	169,725 (26,343) Yaquina River	--	288,000 (26,343) Siuslaw River	643,127 (78,162)
1979	--	--	150,000 (24,945) Lobster Creek	188,000 (24,739) Siuslaw River	338,000 (49,035)
1980	--	69,000 (25,000) Tioga Creek	30,000 (24,582) Lobster Creek	80,000 (25,000) Siuslaw River	179,000 (75,000)
1981	--	90,900 (25,000) Tioga Creek	31,000 (19,800) Lobster Creek	122,960 (25,000) Siuslaw River	244,860 (75,000)
1982	None Taken	--	--	--	--
1983	None Taken	--	--	--	--
Total	185,402 (25,476)	391,665 (95,153)	211,000 (69,327)	678,960 (101,082)	1,467,027 (291,038)

1/ Smolts returned to ODFW for release in stream of origin to replace eggs taken.

Spring Chinook No spring chinook eggs have been collected from natural spawning stocks. Eggs surplus to ODFW spring chinook hatchery program needs have been used to develop brood stock at Yaquina Bay, Coos Bay, and at Burnt Hill Creek. Anadromous and BHSR (now OPSR) are working to increase their releases of spring chinook (Table 5). OAF continues with spring chinook on an experimental basis. Surplus spring chinook eggs were available from relatively large returns to Cole Rivers hatchery through 1982 but none were available in 1983 and no surplus is expected in 1984.

Coho

No coho eggs have been collected from natural runs for private hatchery use. Brood stock development was begun using eggs surplus to ODFW hatchery program and sold to private operators. ODFW hatchery coho returns peaked in 1979 then began to decline. As less fish were available fewer eggs were collected. During this same period the demand for eggs increased as more citizens became interested in STEP which is part of ODFW's production program and has priority for eggs next to ODFW's hatchery production. No surplus coho eggs of the appropriate Oregon stocks have been sold to private hatcheries since 1980. Stocks appropriate for various areas are shown in ODFW's Coho Plan (1981).

Private operators were allowed to make experimental releases of Puget Sound origin coho beginning in 1976. These early releases appeared to do well in comparison to other coho raised by the private operators who were at that time using a combination of contract and company facilities to rear smolts. As more Oregon eggs of stocks appropriate for private hatcheries were retained for use by ODFW, the operators were allowed to increase their use of Puget Sound coho eggs. This practice ceased in 1980 and operators now are required to use eggs from adults returning to Oregon facilities. The private hatchery stocks are being outcrossed with known lineage (marked) Oregon stocks in their returns or male gametes from ODFW programs because no eggs have been available from ODFW facilities to replace the operators' mixed coho stock.

Chum

Private facilities The rationale for chum salmon programs was discussed previously (Cummings, 1983). Comparison of releases (Table 3) and returns (Table 6) suggest that the chum programs have not been too satisfactory to date. The Oregon State University (OSU) Whiskey Creek experimental facility continues to be the main source of eggs for the private operators.

Table 5. Salmon Releases by Individual Private Salmon Hatchery Operators, 1972-83

	Year of Release					
	1972-78	1979	1980	1981	1982	1983
Nehalem Land 'n' Salmon Co. (Nehalem Bay)						
Chum				650,000	577,700	893,000
Harris & Hugie (Tillamook Bay)						
Chum	26,600					
Keta Corp. (Sand Lake) 1/						
Chum	2,275,325	1,005,000		1,413,000	770,000	1,190,000
Oregon Aqua Foods, Inc. (Yaquina Bay)						
Spring Chinook	224,671	886,588		89,026		55,176
Fall Chinook	585,846	141,034	151,915	249,254	338,449	860,814 2/
Coho	11,675,024	3,894,344	7,584,916	11,925,359	20,588,602	14,653,633 2/
Chum	383,633	684,245		3,179,589	243,706	2,957,617
Ceratodus Fisheries (Divide Cr., Siuslaw R.)						
Chum	500,000					
Domsea Farms,Inc. (Siuslaw Bay)						
Fall Chinook		62,458	91,206	33,662	74,100	21,615
Coho	399,858	738,211	240,920	157,680	61,000	47,000
Chum				176,000	58,000	212,000
Siuslaw Fisheries, Inc. (Sweet Cr., Siuslaw R.)						
Chum	1,098,000	1,038,600	8,000	110,000		
OregonAqua Foods, Inc. (Coos Bay)	Oregon Aqua-Foods made no releases here in 1983.					
Spring Chinook		312,907		112,199		
Fall Chinook				42,551		
Coho	86,237	241,826	5,445,791	10,870,247	802,672	
Chum		8,212,354				
Anadromous,Inc. (Coos Bay) 3/						
Spring Chinook		197,636	622,998	616,067	93,474	923,651
Fall Chinook	1,120,176	19,319	95,983	174,261	159,346	311,261
Coho	2,427,093	937,360	1,545,719	899,122	1,655,042	1,340,781
Heckard (Coos Bay)						
Chum						
Burnt Hill Salmon Ranch, Ltd. (Burnt Hill Cr.)						
Spring Chinook			634,720	938,600	257,942	1,005,896
Fall Chinook			99,032		59,056	
Total						
Spring Chinook	224,671	1,397,131	1,268,718	1,755,892	351,416	1,984,723
Fall Chinook	1,706,022	222,811	438,136	499,728	630,951	1,193,690
Coho	14,588,212	5,811,741	14,817,346	23,852,408	23,107,316	16,276,775
Chum	4,283,558	10,940,199	8,000	5,528,589	1,649,406	5,602,617

1/ Includes releases made on permit issued to Alfred Hampson.
2/ Plus 235,361 coho smolts released offshore.
3/ 1975 and part of 1976 releases were made at Columbia River location prior to Columbia River permit being terminated. Anadromous operated the OreAqua site in 1983 and released all fish there.

Table 6. Return of Salmon to Private Facilities, Sites Combined, 1978-83

	1978	1979	1980	1981	1982	1983 3/
Chinook Adults	213 1/	271	752	2,588	7,456	5,117
	(3,952) 2/	(2,872)	(9,386)	(35,860)	(85,238)	(54,441)
Chinook Jacks	31	145	2,642	2,499	4,426	974
	(23)	(519)	(7,179)	(6,046)	(13,620)	(2,052)
Coho Adults	8,069	47,726	27,856	98,681	164,614	127,845
	(38,903)	(225,105)	(146,263)	(631,619)	(930,638)	(504,685)
Coho Jacks	6,557	1,445	15,639	19,681	19,592	6,098
	(15,736)	(2,224)	(31,922)	(42,070)	(48,211)	(10,210)
Chum	539	14	545	477	1,132	652
	(4,841)	(110)	(4,815)	(4,053)	(9,133)	(5,014)

1/ Number.
2/ Pounds.
3/ Preliminary Data.

OSU experimental facility In 1983 we reported the OSU site was being operated by a private nonprofit corporation under contract with ODFW and OSU due to an OSU funding problem. OSU will again operate the facility in 1984. Any surplus eggs will be sold by OSU, in accordance with ODFW regulations, to help support their operation of the site. Returns to the project site have not been consistent from year to year but continue to demonstrate that chum operations could achieve some success.

Some 2,600 adult chum returned to Whiskey Creek in 1983. These provided 1,200,000 eggs for use at Whiskey Creek, and sales of 1,000,000 to OAF; 169,000 to Calvin Heckard; and 40,000 to Hampson, Inc. from a total egg take of 2,409,000. This is well below the total of 6,597,000 eggs collected from 6,700 adults in 1982 but comparable to the 1981 return and egg take. Three private operators collected in total some 400,000 chum eggs from their own returns of 650 chum in 1983.

EVALUATION

Private operators have provided data and funding to ODFW for a variety of data gathering and analysis efforts. In 1983 these funds were used to sample juvenile salmon on the Yaquina, adult spawners on the Yaquina and Coos systems, analyze scales collected from adults at ODFW hatcheries and on the spawning grounds, to evaluate straying, process coded wire tags (CWT) collected from various fishing or spawning areas, and begin an evaluation of sampling methods used for collection of scales and CWT from fish caught in the ocean fisheries. Additional data was collected during routine surveys and catch analysis work done by ODFW personnel.

Coho catch and return

Much of the work concentrated on coho contribution in the ocean fisheries and in looking for stray juvenile or adult coho in 1983.

Catch and return (survival) estimates are made as part of our routine analysis of ocean salmon catch. The data presented here was provided by Bob Garrison of the ODFW Research and Development Section. Release and return data from all salmon hatcheries in Oregon are analyzed in our continuing effort to identify the most successful hatchery techniques and stocks for future use. Private salmon hatchery operators are required to submit reports which include biological and fish marking data to be used for these comparisons. ODFW also conducts a fish marking program for the fish released from public hatcheries and collects data from fish caught in the ocean and from returning adults.

Survival data shown in Table 7 includes coho released as yearlings and as zero-age smolts. Lower survival of coho returning in 1983 is consistent with expectations for a year of El Nino occurrence. Coho catch and return data has been calculated for ODFW's Fall Creek hatchery where a portion of the fish have been marked for several years (Table 8). There is a problem with coho anemic disease at Fall Creek which may account for part of the variability in catch and return rates. There also is an unexplainable variability in the rate of return, when nonmarked fish are included, which does not follow the annual changes in rate for marked coho. Release and return rates for ODFW coastal hatcheries (Table 9) show that estimated ocean catch rates, although variable between hatcheries, are generally higher than those for private hatcheries (Table 10).

Private hatchery coho catch and return rates appear to be more consistent than those shown annually for Fall Creek or between ODFW coastal hatcheries, here, for 1983 and in Cummings (1983) for the 1982 returns. ODFW began in 1983 to representatively mark coho production at all public hatcheries rather than marking only experimental groups of fish. We should be able to do a better job of evaluation for ODFW and private hatcheries beginning with 1984 returns due to these more uniform marking practices.

The coho return rate to private operators in 1983 is relatively high in comparison with ODFW hatcheries and may show the influence of Puget Sound coho stocks in their production brood. CWT recoveries show these coho stay off Oregon and may move to the North more than do Oregon hatchery and stream reared fish. In years when the ocean is warmed from the South by the El Nino effect, coho which rear in cooler waters to the North, would be expected to survive better in warm waters off California. Marked Siletz origin coho released by OAF returned poorly compared to their production stocks in 1983.

Table 7. Percentage return to facilities and total survival (catch + return) of adult coho originating from private hatcheries, sites combined, based on expansion of CWT recoveries from fisheries and returns at the hatcheries, 1978-83.

	Year of Return 1/					
	1978	1979	1980	1981	1982	1983 2/
%Return to facilities	0.49	0.48	0.48	0.66	0.69	0.59
Catch + Return	3/	1.11	1.40	1.60	1.20	1.03
Return of individual marked groups ranged from 0.00 up to -	1.61	2.06	1.93	1.90	5.08	1.45

1/ Year of release plus 1 year.
2/ Preliminary.
3/ No ocean contribution estimate was made for 1978.

Table 8. Percentage return to facilities and total survival (catch + return) of CWT marked adult coho to the Department's Fall Creek Hatchery in 1978-83.

	Year of Return 1/					
	1978	1979	1980	1981	1982	1983 2/
March Release						
Return	0.42	0.86	0.82	1.15	0.27	0.29
Catch + Return	1.64	3.04	2.80	6.12	1.80	1.62
May Release						
Return	--	--	1.00	0.90	0.50	0.63
Catch + Return			3.56	5.26	3.20	3.27
Hatchery returns 2/	0.40	1.81	1.18	1.68	1.43	0.57

1/ Year of release plus 1 year.
2/ Includes non-marked coho; does not include catch.

Table 9. Percentage return and total survival (catch + return) of CWT marked adult coho to ODFW coastal hatcheries, 1983.

	Nehalem	Trask	Salmon	Siletz	Fall Cr.	Cole Rivers
March 15 Release						
Return	0.13	0.08	0.09	0.37	0.29	0.11
Catch + Return	1.10	0.49	0.57	2.24	1.62	0.48
May 1 Release						
Return	0.03	0.21	0.38	0.42	0.63	0.30
Catch + Return	1.31	1.08	2.72	2.74	3.27	1.87
Hatchery returns 1/	0.10	0.10	0.14	0.26	0.57	0.31

1/ Includes non-marked adult coho; does not include catch.

Table 10. Coho released by private salmon hatchery operators, estimated catch in the ocean, and return, all sites combined by year of release, 1978-83

Year (N) 1/ Released	Number Released 2/	Catch in the Ocean (N+1) 1/	Return to Hatchery		% Catch and Return	
			Jacks (N)	Adults (N+1) 1/	Hatchery	Total 3/
1978	9,907,874	63,000	6,557	47,726	0.55	1.18
1979	5,811,741	53,600	1,445	27,856	0.50	1.43
1980	14,817,346	142,000	15,639	98,681	0.77	1.73
1981	23,852,408	122,100	19,098	165,034	0.78	1.28
1982	23,107,316	110,300	19,687	127,845	0.64	1.16
1983	16,276,775	--	6,098	--	--	--

1/ N is year released (including summer and fall); N+1 is 2nd summer and fall after release.
2/ Includes yearling and zero-age coho released that year.
3/ Includes jacks.

Straying

Straying of coho released by private operators was reported previously (Nicholas, VanDyke, and Buckman 1982; Nicholas and VanDyke, 1982; Cummings, 1983; and Jonasson, 1983). We used funding provided by OAF to look for stray juvenile and adult coho in the Yaquina system in 1983 and also surveyed spawning grounds for adult coho strays in the Coos system (funded by Anadromous).

Juvenile strays

We found few juvenile coho in the Yaquina system according to a summary by Will Beidler (ODFW files) who supervised sampling there in 1983. In all, 13 tributaries were checked for evidence of coho juveniles which were found in three of the streams; 71 fish in Wright Creek, 6 in Simpson Creek, and 3 in Mill creek. Beidler pointed out that the sampling was not representative of the whole Yaquina in that it was restricted to those streams where we had previously found stray juveniles. These were reported for 1982 by Jonasson (1983). Beidler concluded that "the extent of straying was miniscule compared to 1982". It appears our requirement that all production coho releases be made before August 20, 1983 aided in controlling upstream movement of juveniles. Grading (size control) procedures used by the operator probably helped also.

Adult strays

Adult coho strayed past the OAF facility to the spawning grounds on the Yaquina system. Numbers of spawning coho were low on all Oregon streams in 1983 (Alan McGie, personal communication). McGie estimated that some 1,800 coho spawned in the Yaquina. Beidler summarized adult salmon survey information for the Yaquina (ODFW files). Surveys totalled 256 miles covering 41 stream sections an average of 8.8 times from the first week of October 1983 through mid January 1984. Two samplers conducted surveys and collected scales from 104 coho carcasses but only 76 were suitable for analysis. They also found four coded wire tags in dead fish.

The small sample of tags could not be used to estimate a total number of strays for the Yaquina. The scale sample which we used to estimate straying was smaller than desired for a good estimate and could have been biased by the small number of spawners which entered a wide area of the stream over a prolonged period of time. Freshets tend to move carcasses and dying (weak) fish out before scales are collected. Available information suggests that strays provided up to 90% of the spawning population in the Yaquina in 1983 (Table 11) a year of poor wild coho runs. Considering the small sample size and its' effect on the accuracy of estimated numbers, we concluded that about 1.3% of the total Ore-Aqua coho which entered Yaquina Bay in 1983 strayed to the spawning grounds. This was lower than stray rates estimated in previous years.

Table 11. Oregon Aqua-Foods (Yaquina) adult coho salmon estimated to be present in the spawning population of the Yaquina River above the release site based on recovery of CWT and analysis of scale patterns, 1979-83.

Return Year	Estimated Occurrence
1979	--- 1/
1980	40%
1981	75%
1982	62% 2/
1983	90% 3/

1/ Few scales or tags were collected and no estimate could be made.
2/ Small sample size may bias this estimate.

Strays were also found in adjacent streams and hatcheries. The largest proportion of strays into hatcheries occurred at Salmon River. We intend to concentrate sampling there in 1984 to better define the extent of straying into the hatchery and stream. We need to know if OAF strays there are 'testing' when caught in the fishway at the head of tide; if they comprise a major portion of the upstream spawning population; or if they would drop out of Salmon River to the ocean and continue on to the Yaquina under normal circumstances.

Anadromous provided funds for ODFW to hire one person to survey spawning areas of the Coos System and nearby streams in late 1983 and early 1984 to cover 18 sections of stream for a total of 121 miles. Scales were collected from 23 coho (18 readable). Three coded wire tags were found. High flows hampered observation of live fish and collection of information from carcasses which are normally washed downstream during heavy runoff. Scale analysis showed coho on the spawning grounds which had strayed past Anadromous Inc. on the lower Bay. The very small sample does not allow estimation of stray rates for 1983.

Anadromous and OAF also contributed funds and participated in evaluation of coded wire tag and scale sampling methods in 1983-84. A report on this preliminary evaluation is being prepared by ODFW Research and Development Section (Mary Buckman, personal communication).

Plans for evaluation in 1984

We will again concentrate on evaluating coho this year except that recoveries of marked coho and chinook both will be used where appropriate to determine respective contribution rates and distribution in the ocean. Specific areas which will be examined are:

1. Ocean mark recovery of coded wire tags, scales and other biological data. All private coho and chinook operators will contribute funds to recover marks and scales, and for processing and analysis of the data. Operators are billed for this work in the proportion that

their individual production made up the total releases one year earlier. Additional analysis will accrue from ongoing ODFW projects which encompass all mark recoveries.

2. An evaluation of coho straying into Salmon River and Salmon River Hatchery is planned for funding by OAF.

3. We will be examining spawning grounds for stray fish, recover tags, and collect scales from adult coho on Coos River. A major effort will be made to obtain sperm from coho available at various ODFW projects here for incorporation in the Anadromous brood stock development project. Anadromous will provide funding and assistance in these projects.

4. Information will be collected during routine spawning fish surveys and at ODFW hatcheries along the coast for comparison with and evaluation of data from private salmon hatchery returns. Private operators will supply data and assist in analysis as required by ODFW.

THE 1984 OUTLOOK

Fewer coho will be released in 1984 as OAF cuts back to below permitted limits at Yaquina. Anadromous is in the building process at Coos Bay and will not maintain the level of releases made by the two companies there in 1981 and 1982. In total about five million fewer coho will be released by private operators in 1984 than were released in 1982. Chinook releases will be about the same as last year but chum releases will be down by about one million in 1984.

Low survival and returns of fish at sea are predicted so, even with restrictive ocean fisheries to protect natural spawners, the outlook for profitable operation remains poor in 1984. All operators report costs for facilities and operation remain well above the break-even level under current conditions of egg availability and ocean conditions.

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