PRIVATE SALMON HATCHERIES

IN OREGON

OREGON DEPARTMENT OF FISH AND WILDLIFE

FISH DIVISION

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PRIVATE SALMON HATCHERIES IN OREGON

INTRODUCTION

The first private salmon hatcheries in Oregon were built in the 1870's with hatcheries operated by R. D. Hume on the Rogue River and Oregon Washington Propagation Company on the Clackamas River. By 1900, the government had taken over operation of all salmon hatcheries in the state. As hatchery diets and rearing techniques improved in recent years, private citizens again became interested in propagating salmon. Research at Oregon State University (OSU) in hatching chum salmon using inexpensive streamside incubators increased public interest, and Oregon laws were enacted in 1971 to allow salmon propagation by private citizens.

This review of Oregon's private salmon industry includes information on experimental development by private operators, progress of permit holders, and current regulations governing private salmon hatchery operations in Oregon.

LAWS AND RULES

In 1971, the Oregon Legislature passed Oregon Revised Statutes (ORS) which authorized a program for private rearing, release, and recapture of chum salmon (ORS 508.700 through 508.745), and charged the Oregon Fish Commission with administration of the program. The Fish Commission and Oregon Wildlife Commission were combined in 1975 into the Oregon Department of Fish and Wildlife (ODFW), which is now responsible for this program. The statutes were modified by the Legislature in 1973 and 1979, to authorize permits for coho, chinook, and pink salmon. The Fish and Wildlife Commission (FWC) has adopted Administrative Rules (OAR 635-40-005 through 635-40-185), to facilitate conduct of the program.

ORS 506.036 gives the Commission "exclusive jurisdiction over all fish, shellfish, and other animals...within the waters of the state" and further states "the duty of protection, preservation, propagation, cultivation, development, and promotion of all fishes under its jurisdiction within the waters of this state is delegated to and imposed upon the Commission." Within the charge given in the above statute, the Wildlife Policy (ORS 496.012), the Food Fish Management Policy (ORS 506.109), and ORS 508.700-508.745, ODFW is responsible for management of the private salmon hatchery program as part of the salmon production of the state.

Regulations administered by other state agencies and the Federal Government are also applicable to private salmon ranching operations. Together the regulations give a rigid set of standards which must be met by the private salmon rancher as he selects a site, constructs facilities, and then conducts operations. He must meet the requirements of local and state zoning regulations; US Army Corps of Engineers and Division of State Lands requirements for work in waterways; health or Food and Drug restrictions for disease treatment and processing; and discharge permits as required by the Oregon Department of Environmental Quality and the US Environmental Protection Agency. Special Report 573, Oregon State University Extension Marine Advisory Program, 1980, is an excellent review of applicable regulations.

Following is a summary of regulations and practices applicable to obtaining a private salmon hatchery permit and operating a hatchery.

1. A $100 application fee is required for each species. Incomplete applications are not accepted. A minimum of 6 months is required for review and evaluation. No applications will be reviewed until the applicant is within 2 years of receiving eggs.

2. A public hearing must be held by the Oregon Fish and Wildlife Commission or their designated hearings officer prior to issue of a private salmon hatchery permit. Interested parties may intervene in the hearing in accordance with established procedure. The applicant must show, in his application and at the hearing, how he believes public stocks of salmon will be affected by his operation. OAR 635-40-100 through 185 cover the application and hearings' process.

3. Permits may not be issued if: the operation may be a threat to public fish populations; the proposed site is on a stream where a government hatchery is located; the site is not in close proximity to the ocean; the applicant does not have the technical and financial capability for hatchery construction and operation; there is sufficient evidence to show the applicant will not properly conduct the operation authorized under the permit; or the private hatchery operation would not be consistent with planning and zoning requirements.

4. Permits are permanent, personal to the permittee, and are not transferable unless authorized by the Commission.

5. The law and individual permits provide for marking of fish as ODFW determines practical, disease examinations, destruction of diseased fish under some circumstances, operation methods for the permitted hatchery, and harvest of returning fish. ODFW representatives review annual rearing/release plans and make periodic visits to private hatchery facilities to assure compliance with regulations.

6. Terms of a permit may be altered by ODFW, through due process, to include orderly termination of the permit.

7. The permittee is responsible for costs of replacing natural stocks of fish damaged by his operation.

8. Fish released by permittee are public property from the time of release until return to the private hatchery facility.

9. Hatchery operators are responsible for obtaining their own eggs or fish from a source approved by ODFW. The state can sell eggs, surplus to its own needs, to private operators. A guide for egg sales has been developed by ODFW and is available on request.

10. A fish transport permit must be obtained before live fish or eggs are transported or released into any waters, public or private, within the state (ORS 498.222; ORS 509.115). A separate release permit is required prior to each release of salmon by private salmon hatchery operators (ORS 508.715).

Requests for shipment of live eggs or fish into Oregon must be accompanied by a report showing results of a current disease inspection certified by a pathologist acceptable to ODFW (ORS 498.234). Disease certification may be required for shipments within the state. Fish or eggs moved prior to certification must be held in isolation facilities.

11. Individual commercial fishing licenses are required for employees involved in harvesting fish at private hatcheries; the permittee must have a wholesale fish dealer's license; taxes or poundage fees must be paid to the State on returning adults; and landing records must be maintained and submitted. No commercial fishery or harvest by the permittee is allowed under a private hatchery permit at any site other than at a designated hatchery facility (authorized release-recapture site).

12. No eggs or resulting fish may be sold by the permittee if he exercises a priority right with ODFW to purchase eggs of the same species and brood year. ODFW must approve all sales of eggs or fish for seed by private operators. Transfer and introduction of stocks or species of fish from one to another area of the state is subject to approval by ODFW.

13. Sick and dead fish must not be disposed of in Oregon waters. In the case of a disease epidemic, fish within a hatchery may be destroyed under the guidance of an ODFW pathologist and at the permittee's expense.

14. Facilities and records are subject to inspection at any time by an Oregon State Police officer or representative of ODFW. Monthly and annual reports on production and/or returns are required by ODFW. Reports must be on forms provided by or acceptable to ODFW. Return data for an individual permittee is tax information and cannot be released except when combined in total with other return data unless necessary for management purposes or as authorized by a permittee.

15. Charges are made to the private hatchery permittee for inspections and technical services provided by the State. These charges include wages, expenses, and an overhead assessment to cover administrative costs.

16. Failure to comply with pertinent rules and regulations may be grounds for termination of the permit.

The Fish and Wildlife Commission, after review at a public hearing on December 12, 1980, imposed a moratorium on additional permits for coho, chinook, and chum salmon. The moratorium will be in effect until 1985, unless modified earlier by Commission action. The basis for this action, recommended by ODFW staff, was the need for evaluation to assure that private operations meet the requirements of the statutes and remain consistent with the state's overall fish management program. Although the private salmon hatchery regulations have been in effect for several years, there has not been enough production or time for fish to return to effectively evaluate the potential impact.

ODFW budgets a coordinator, part time, to monitor private hatchery operations, make inspections of facilities, and generally coordinate, with the private operators, needs of the Department staff and Research Section for specific evaluations or information about private operations.

PROGRAM DEVELOPMENT

Egg Supply

Eggs surplus to the needs of the state of Oregon may be sold after the needs of the State program are met. State needs include eggs for: government hatchery programs in Oregon and along the Columbia River; ODFW's Salmon and Trout Enhancement Program (STEP); and educational programs in various schools. Adult salmon are transferred from State hatcheries to various streams to supplement natural spawning, and fingerlings or smolts are also used to supplement stream populations within the needs of the state.

The natural and artificial needs of the state are a combination of our capabilities to produce fish in the facilities available, requests from our field staff for supplemental stocking of streams, and the monies provided by legislature to meet these needs. We program egg-takes, rearing space, use of transportation necessary to transplanting fish, and other available facilities such as those operated by citizens (STEP), etc., within the constraint of our budget. In some years, more adult salmon return to our hatcheries than are needed for the agency program, or survival is better than expected during incubation and initial rearing. When this occurs excess eggs or fish may be sold to provide seed to the other part of the salmon rearing program in the state, private hatcheries. A comparison of eggs taken at our hatcheries and those sold to private operators is shown in Table 1.

Use of local stream stocks to develop a hatchery stock is the best way to minimize impacting those stocks with a hatchery program. The next alternative is the use of hatchery stocks that we (ODFW) would use to enhance the local stream. Developing local stocks continues to be a slow process because we are not willing to take a large proportion of wild runs even when smolts are returned to the stream in larger numbers than would have survived from natural spawning.

North of Cascade Head, where significant chum runs still exist, we will continue to rely on local chum stocks for seed. We have allowed imports of chum salmon south of Cascade Head where there are few natural stocks. Small chum runs exist in only a few central coast streams and there are no viable runs south of the Yaquina system.

We have allowed imports of coho salmon to Yaquina, Siuslaw and Coos bays. Coho imports will be terminated as the private operators are able to provide seed from their own returns, which is expected in 1981. We have been working with private operators to reduce any genetic potential for adverse impacts by providing (selling) Oregon coastal coho eggs when there is a surplus available. We have also provided male gametes for outcrossing with imports and for fertilizing eggs taken from adult coho returning to

Table 1. Salmon Eggs Taken at ODFW Coastal Stations and Numbers Sold to Private Operators, 1973-80 Broods.

Species	Fall Chinook	Spring Chinook	Coho
Brood Year			
1973	4,366,800 1/ (11.7) 2/ (510,915) 3/	2,068,900 (0) (0)	9,613,100 (5.3) (509,495)
1974	2,422,400 (0) (0)	1,984,883 (6.3) (125,050)	8,347,882 (9.0) (751,310)
1975	3,488,100 (20.8) (725,525)	2,610,300 (11.8) (308,015)	5,667,600 (5.6) (317,385)
1976	436,536 (0) (0)	2,592,078 (10.1) (261,800)	9,167,383 (25.2) (2,310,180)
1977	3,832,348 (14.1) (540,360)	2,948,986 (7.1) (209,380)	7,394,065 (1.1) (81,335)
1978	3,214,348 (0) (0)	4,845,104 (44.4) (2,151,230)	6,223,090 (0.2) (12,445)
1979	2,992,506 (13.2) (395,010)	4,809,160 (40.2) (1,933,280)	22,747,394 (25.8) (5,868,825)
1980	3,135,009 (12.9) (404,415)	6,587,306 (39.1) (2,575,635)	19,741,631 (14.4) (2,842,795)
Total	23,888,047 (10.8) (2,576,225)	28,446,717 (26.6) (7,564,390)	88,902,145 (14.3) (12,693,770)

1/ Number of eggs taken.

2/ Percentage sold: Percentages are misleading in some cases because addition eggs were taken specifically for sale as viable eggs as opposed to selling unspawned carcasses.

3/ Number of eggs sold.

the private operations. These efforts, along with improved homing as hatchery stocks are developed, will lessen the potential for long-term, adverse, influence of private hatchery operations on natural spawning stocks.

We are not allowing imports of chinook to coastal systems and have had only limited surpluses of chinook eggs available from Oregon coastal hatcheries. This problem has been compounded by a quarantine due to a persistent virus at Elk River Hatchery, research projects at Fall Creek Hatchery, and attempts to develop our own chinook seed, for ODFW hatchery use, from local stocks. The five private chinook salmon operators will probably not be able to develop projected production-level releases at all stations until at least 1988 even with improved egg availability.

Pink salmon eggs must be imported. No pink salmon permits have been issued so an effort to develop stocks at private facilities has not begun. Work conducted by Oregon State University indicates that initial releases of pink salmon must be large, compared to coho and chinook, to generate returns.

Evaluation

Permittees are conducting evaluations of their own hatchery operations, cooperating with ODFW in joint projects, funding work conducted by ODFW, and providing funds to others for work of interest to ODFW or to the operators themselves.

Chum Salmon: Evaluation and development of chum salmon operations began as a cooperative effort of OSU and the state to examine the requirements necessary for developing seed stocks, improve husbandry practices, and examine return data. OSU has maintained returns at a higher level than could have been expected from natural spawning in Whiskey Creek, their experimental stream. OSU has provided information and advice to prospective chum permit applicants and assisted new operators in planning and testing facilities.

Private operators have cooperated with ODFW to determine the effectiveness of using chum imports to develop a seed stock. Eggs have not been consistently available. Results have not been promising with unfed fry releases, however, the few returns from chum fed prior to release appear more promising. Oregon Aqua Foods expects to have adults return in 1981 from an experimental import of Russian chum eggs hatched and fed for release at Coos Bay in 1979. Several size groups were marked to determine survival and the best size at which to release these chum salmon.

A general poor availability of eggs has limited annual releases (Table 2), and examination of options available for determining the best technology for raising chum. Returns from chum salmon now at sea should provide information which will improve our knowledge of rearing methods and provide needed seed stock for expansion of the chum program.

Table 2. A Summary of Salmon Releases By Private Salmon Hatchery Operators in Oregon.

Year	Species				
	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 1/	14,817,346	1,268,718	438,136	8,000	16,532,200
Total	35,217,299	2,890,520	2,366,969	15,231,757	55,706,545

1/ Preliminary data.

Coho Salmon: Most of the evaluation and experimentation conducted at private hatcheries has been done with coho, the species for which seed has been the most available. Coho have been released as yearlings, and within the first year at "zero age" after accelerated rearing to smolts. Evaluation must be conducted for both rearing techniques. A listing of some studies is given in Table 3.

Development of a method to predict contribution to the ocean fisheries of coho released by private operators is important to fisheries management. Contribution rate forecasts are based on experience and a consistent rearing program for the same stocks. We do not yet have the information necessary to accurately make predictions prior to the season. Data is being collected, through tag recoveries and survival estimates to form this basis. Using mark sampling we can determine, the catch-escapement in each year that fish return to the private operator's facilities. We use the catch return information to infer contribution rates for the following year. This ratio of fish caught to those returning changes as new stocks are added or released and rearing sizes are changed in the private operator's efforts to improve survival of smolts to adults. In the last two years operators have increased the proportion of yearling smolts in their coho program. This change should give better survival (contribution to the fishery and return to the release site) and a larger size of adult coho. As our experience base improves and stocks stabilize, we will be able to refine the prediction techniques now used. These estimates have shown a contribution of coho to ocean fisheries of 63,000 coho in 1979; 53,600 in 1980; and predict 140,000 coho of private hatchery origin will be caught in 1981.

Private operators are contributing to studies of residence time in estuaries and the search for straying by adults. Some residence by juveniles has been noted, but there has not been sufficient evidence to quantify the effects, nor have adverse effects been identified by the observations. Straying into streams above the hatcheries has been noted, but again any

Table 3. Evaluation of Private Salmon Hatchery Operations for Coho.

1. Marking fish for:
   a. Stock identification in the ocean and on return
   b. Determining contribution of stocks to fisheries
   c. Survival of stocks and husbandry practices
   d. Overall hatchery evaluation.

2. Contract Studies (funding from private operators):
   a. Salmon Residence in Estuaries, OSU, 1977-78
   b. Maturation, OSU, 1978-79
   c. Sonar Counting of Fish in Estuaries, U of W, 1980
   d. Scale Studies, U of W, 1980
   e. Tag Recovery from Fisheries, ODFW, continuing
   f. Creel Census, Yaquina Estuary, ODFW, 1977
   g. Scale Studies, ODFW, 1980-continuing
   h. Estuary Residence, ODFW, 1980-continuing
   i. Spawning Ground Surveys, ODFW, 1980-continuing

3. Within-company studies:
   a. Size and time of release
   b. Fish survival
   c. Maturation
   d. Feeding and feed development
   e. Photo period
   f. Quality control
   g. Smoltification
   h. Water quality (fresh and saltwater)
   i. Warmwater growth acceleration
   j. Incubation technology
   k. Supplemental oxygenation.

4. Cooperative studies with ODFW:
   a. Outcrossing experiments, 1979-continuing
   b. Stock development, 1977-continuing
   c. Survival of stocks, 1974-continuing
   d. Contribution to fisheries, 1975-continuing
   e. Stock differentiation, 1975-continuing
   f. Fish size at capture, continuing.

effects have not been quantified. Inclusion of local stocks in the gene pool used at a particular hatchery and release of subsequent generations should improve the homing instincts of coho to each private release site. Evaluations are continuing as stocks are developed at each site.

Creel census was conducted several years ago to determine the contribution of fish, released as juveniles from private facilities, to the Yaquina Bay sport fishery upon return as adults. Comparatively few fish had been released up to that time. Although valuable information was obtained, the effort was discontinued until larger releases provided a better basis for evaluation.

Several operators are looking at various stocks, available fish foods, technology, etc., to evaluate various phases of their own operations. Some of the information from the self-evaluations may also be of value to state operations. One program is to develop and evaluate the methodology and results of accelerated rearing of coho. If the methodology can be worked out for accelerated rearing, without reduction in productivity, it could be useful at some state hatcheries in our effort to maintain production in the face of reduced budgets and purchase power.

Chinook Salmon: All chinook operators have cooperated with ODFW in an attempt to develop seed stock using eggs surplus to Oregon hatcheries or from local stock. The use of local stocks is part of an ODFW effort to evaluate the migration routes and contribution to the ocean fisheries by chinook native to selected streams. In this program, eggs are collected in selected streams, reared to smolts, and a group marked for release back into the stream of origin. This stream release group has at least twice the number of chinook that would be produced from natural spawning. When additional fish were available, the operator marked a predetermined number for release at his station. This gives a control group to compare with the stream release group. These individual projects are the subject of agreements with individual operators and ODFW costs are paid for by the private operator. In several years and sites the number of eggs collected has been well below expectation and all smolts were released into the stream of origin (Table 4).

Development of chinook stocks has been a slow process as few excess eggs have been available from Oregon coastal hatcheries. Private operators have been required to mark chinook smolts to obtain much the same information as is being collected for coho. The overall chinook production, wild and public hatchery, is relatively stable so little effort has been made to predict contribution, etc. However, data being collected will aid in predicting contribution of chinook when this effort begins.

Disease Protection

Private salmon hatchery operators must meet strict disease control requirements. Adults must be sampled for virus before eggs can be imported or moved from one stream system to another. Fish must be inspected by pathologists throughout the season at the various rearing stations to assure that certain diseases are not transferred from one stream system to another. ODFW has developed a disease control guide which lists various diseases and necessary actions. Some organisms are common to all waters so are of little concern in the movement of fish while the presence of other organisms would require destruction of the fish.

Disease examinations must be conducted by pathologists acceptable to ODFW. These pathologists are included on a list available from ODFW. Oregon State University operates a disease laboratory at Newport which is used on a fee basis by most of the growers. Oregon Aqua Foods maintains a laboratory with two pathologists at Springfield. ODFW can conduct some disease examination if the operator pays all expenses; however, we generally do not have time to do this kind of work. Through the use of import, fish or egg transfer, and release permits, ODFW is able to monitor and control compliance by private salmon hatchery operators with disease requirements.

Private operators maintain acceptable quarantine facilities to isolate eggs or fish if they must be transferred prior to completion of testing. For instance, virus examination may require 4 to 6 weeks to complete, so adults must be held in a quarantine facility if they are matured to spawning outside the system where they were captured. If eggs are taken within this period, they too must be isolated. Normally it is not necessary to quarantine small fish but this would be required if disease examination were not complete prior to request for transfer.

Table 4. Eggs Taken from Wild Fall Chinook for Stock Assessment and Brood Stock Development Program in Cooperation with Private Operators, 1977-80.

Brood Year	Cooperating Company				Total
	Anadromous	Oregon Aqua Foods	Burnt Hill	Domsea	
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 (24,296) Lobster Creek	188,000 (24,739) Siuslaw River	338,000 (49,035)
1980	--	69,000 (25,000) 2/ Tioga Creek	30,000 (25,000) Lobster Creek	80,000 (25,000) Siuslaw River	179,000 (75,000)
Total	185,402 (25,476)	300,765 (70,153)	180,000 (49,296)	556,000 (76,082)	1,222,167(221,007)

1/ Smolts returned to ODFW for release in stream of origin to replace eggs taken.
2/ Due back to ODFW as smolts in the fall of 1981.

STATUS OF OREGON PRIVATE SALMON HATCHERIES

Development of the private salmon hatchery concept began in 1969 with OSU's chum salmon experimentation. The original legislation in 1971 authorizing a private salmon hatchery industry was envisioned by some to be primarily a backyard endeavor with the local landowner hatching a few chum salmon to supplement his income. Others saw the chum salmon hatchery as a potentially viable business. In 1973, when coho and chinook were authorized for release by private operators, the interest in private salmon hatcheries again increased.

The 1973 legislature restricted the number of coho and chinook permits to 4 during the first 2 years (1973-75) but did not continue this limitation. The first permits were issued to Oregon Aqua Foods, a pond rearing operator at Newport (who already held a chum salmon permit); and to Anadromous, Inc. a new operator on the lower Columbia River at Deer Island. Oregon Aqua

Foods was subsequently taken over by Weyerhauser, Inc. who consolidated its Newport operation with their coho, chinook and chum site at Coos Bay, both supported by an inland rearing site near Springfield. Anadromous was authorized to develop a release site at Coos Bay and used the Deer Island site as a support facility without releasing fish there. Both companies have attempted to develop brood stocks since their initial releases of coho and chinook in 1974-75.

Domsea Farms was issued the fourth permit for each coho and chinook, with a chum permit, at a site on the lower Siuslaw Bay. Burnt Hill Salmon Ranch, Ltd. obtained a chinook permit for a site on Burnt Hill Creek, south of the Rogue River. Burnt Hill Creek is a direct ocean tributary.

Thirteen private hatchery sites have been authorized from the Columbia River estuary to Burnt Hill Creek (Figure 1 and Table 5). Permits issued include 11 chum salmon, 5 chinook, and 4 coho with 2 of the chum permits in a common site. Two additional authorized permits, at one site on Tillamook Bay, for coho and chinook are being held up pending action by the Oregon Supreme Court.

Columbia River Estuary

Skipanon River: A chum permit was authorized for Robert Stricklin in November 1975, for a site on the outlet of Taylor Lake, Skipanon River, in Clatsop County. Mr. Stricklin proposed to use chum eggs purchased from the Lummi and Quinault Indians, in Washington state, to initiate his operation. No eggs have been available.

Nehalem Bay

Arnold Manseth and Jon Jaqua: A chum permit was issued to Arnold Manseth on October 25, 1975, for a site on Larson Creek, Tillamook Bay. In 1978, Mr. Manseth, with Mr. Jon Jaqua, requested a change in the permitted site to a new site on Vosberg Creek, Nehalem Bay. After review by staff, and testimony at a public hearing, FWC authorized the transfer. The site on Tillamook Bay was terminated as a condition of the new site authorization. No eggs were available to Manseth and Jaqua until the fall of 1980. Releases will begin in the spring of 1981.

Tillamook Bay

Cecil Harris and Don Hugie: Messrs. Harris and David Kelly were issued a chum permit in September 1972 for a site on Dick Creek, tributary to the west side of Tillamook Bay, Tillamook County. The water supply in Dick Creek did not appear to be good at the time of evaluation and a limit of 100,000 eggs was specified in the permit for the first 3 years of operation. OSU placed 10,000 eggs in the facility each year from 1972 through 1974 to test the water supply. These eggs hatched comparatively well and a total of 26,600 chum fry were released over the 3-year period (Table 6). Returns were expected in 1975 but none were realized. Mr. Harris' partner has changed as the property has changed ownership and this permit now belongs to Cecil Harris and Don Hugie. Mr. Harris was not prepared to accept chum eggs available in the fall of 1980.

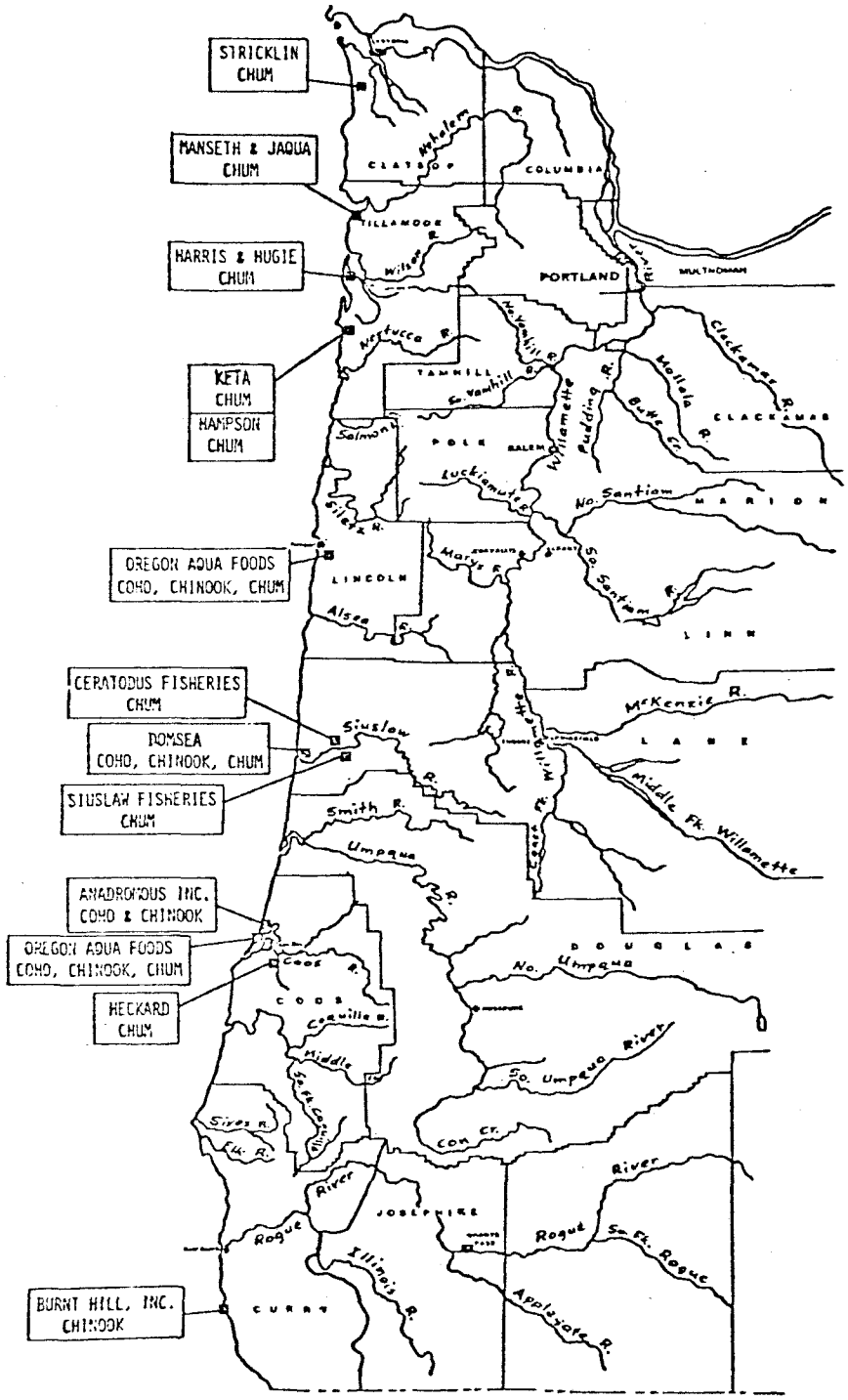

Figure 1. Location of Authorized Private Salmon Hatcheries in Oregon

Table 5. Oregon Private Salmon Hatcheries, March 1, 1981.

Name	Location	Permit Date	Release Limit by Brood and Species (Millions)				Priority[1/] for Chum	Year of First Release		
			Coho	Chinook	Chum	Pink		Coho	Chinook	Chum
Keta, Inc. 22930 Sandlake Rd. Cloverdale, OR 97112	Sand Cr., Sand Lake	12/01/71			5.0		0[2/]			1972[3/]
Siuslaw Fisheries, Inc. 31766 Freedom Lane Eugene, OR 97401	Sweet Cr., Siuslaw R.	3/19/72			5.0		0[2/]			1973[3/]
Alfred Hampson 505 Pacific Bldg. 520 SW Yamhill St. Portland, OR 97204	Sand Cr., Sand Lake	10/31/73			5.0		1		no releases	3/
Cecil Harris and Don Hugie 3460 Bayocean Rd., NW Tillamook, OR 97141	Dick Cr., Tillamook Bay	8/23/72			0.1		2			1973
Ceratodus Fisheries 6523 E. Street Springfield, OR 97477	Divide Cr., Siuslaw R.	12/28/73			5.0		4			1975[3/]
Oregon Aqua Foods, Inc. 88700 Marcola Rd. Springfield, OR 97477	Manmade Trib., Yaquina Bay	11/1/72 3/19/74	9.5	10.6	20.0		5	1974	1974	1973
	Manmade Trib., Coos Bay	7/30/76	11.3	9.4	20.4		10	1977	1979	1979
Anadromous, Inc. 203 S. Columbia River Hwy. St. Helens, OR 97051	Manmade Trib., Coos Bay (Prior permit on Columbia R. terminated)	10/24/74	5.0	5.0				1976	1975	
A. Manseth and J. Jaqua 34320 McKenzie View Dr. Eugene, OR 97401	Vosberg Cr., Nehalem Bay	3/4/76			5.0		3		no release	
Calvin Heckard 1281 West Catching Slough Rd. Coos Bay, OR 97420	Unnamed Trib., Coos Bay	3/4/76			5.0		7		no releases	
Robert Stricklin Rt. 1, Box 538 Warrenton, OR 97146	Unnamed Trib., Skipanon Rd.	3/4/76			5.0		9		no releases	
Domsea Farms, Inc. 510 Washington Ave. Bremerton, WA 98310	Manmade Trib., Siuslaw Bay	5/5/78	12.0	12.0	25.0		11	1978	1978	
Burnt Hill Salmon Ranch, Ltd. 2300 SW First Portland, OR 97201	Burnt Hill Cr. (direct ocean tributary)	4/25/78		5.0					1980	

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/ No limits. Assume 5 million and review if they reach that point.

Table 6. Salmon Releases by Individual Private Salmon Hatchery Operators, [illegible]2-80.

	Year									
	1972	1973	1974	1975	1976	1977	1978	1979	1980	Total
Harris & Hugie (Tillamook Bay)										
Chum		8,000	9,600	9,000						26,600
Total		8,000	9,600	9,000						26,600
Keta Corporation 1/ (Sand Lake)										
Chum	51,150	251,875	311,300	1,160,000		98,000	403,000	1,005,000		3,280,325
Total	51,150	251,875	311,300	1,160,000		98,000	403,000	1,005,000		3,280,325
Oregon Aqua Foods, Inc. (Yaquina Bay)										
Spring Chinook		-	-	5,551	161,251	42,079	15,790	886,588	-	1,111,259
Fall Chinook		-	27,000	17,982	147,662	-	393,202	141,034	151,915	878,795
Coho		-	87,782	142,032	1,170,875	1,376,048	8,898,287	3,894,344	7,584,916	23,154,284
Chum		7,000	33,182	323,930	2,447	14,900	2,174	684,245	-	1,067,878
Total		7,000	147,964	489,495	1,482,235	1,433,027	9,309,453	5,606,211	7,736,831	26,212,216
Siuslaw Fisheries, Inc. (Sweet Cr, Siuslaw R)										
Chum		9,500	221,000	800,000		7,500	60,000	1,038,600	8,000	2,144,600
Total		9,500	221,000	800,000		7,500	60,000	1,038,600	8,000	2,144,600
Ceratodus Fisheries (Divide Cr, Siuslaw R)										
Chum				500,000						500,000
Total				500,000						500,000
Domsea Farms, Inc. (Siuslaw Bay)										
Fall Chinook							-	62,458	91,206	153,664
Coho							399,858	738,211	240,920	1,378,989
Total							399,858	800,669	332,126	1,532,653
Oregon Aqua Foods, Inc. (Coos Bay)										
Spring Chinook						-		312,907	-	312,907
Coho						86,237		241,826	5,445,791	5,773,854
Chum						-		8,212,354	-	8,212,354
Total						86,237		8,767,087	5,445,791	14,299,115
Anadromous, Inc. (Coos Bay 2/)										
Spring Chinook				-	-	-	-	197,636	633,998	831,634
Fall Chinook				991,277	-	-	128,899	19,319	95,983	1,235,478
Coho				-	908,959	908,405	609,729	937,360	1,545,719	4,910,172
Total				991,277	908,959	908,405	738,628	1,154,315	2,275,700	6,977,284
Burnt Hill Salmon, Ltd. (Burnt Hill Cr)										
Spring Chinook									634,720	634,720
Fall Chinook									99,032	99,032
Total									733,752	733,752
Total										
Spring Chinook	-	-	-	5,551	161,251	42,079	15,790	1,397,131	1,263,718	2,890,520
Fall Chinook	-	-	27,000	1,009,259	147,662	-	522,101	222,811	439,136	2,366,969
Coho	-	-	87,782	142,032	2,079,834	2,370,690	9,907,874	5,811,741	14,817,346	35,217,299
Chum	51,150	276,375	575,082	2,792,930	2,447	120,400	465,174	10,940,199	8,000	15,231,757
Total	51,150	276,375	689,864	3,949,772	2,391,194	2,533,169	10,910,939	18,371,882	16,532,200	55,706,545

1/ Includes releases made on permit issued to Alfred Hampson.
2/ 1975 and part of 1976 releases were made at Columbia River location prior to Columbia River permit being terminated.

Sand Lake

Keta Corporation: A chum permit was issued to Keta Corporation in December 1971 for a facility located on Sand Creek and its tributary, Jewel Creek, at the north end of Sand Lake, a small estuary in Tillamook County. This was the first private chum operation established under the 1971 legislation. The facility includes a water diversion from Jewel Creek; settling/storage pond; incubators; discharge ditch; and two adult capture racks and traps, one in Jewel Creek and one above Jewel Creek in Sand Creek.

Keta was authorized to obtain seed stock in the initial three years of operation from the wild chum run after allowing a minimum number of adults upstream to spawn. Keta personnel recorded how many chum and other species were put above the rack, dates, etc., to provide information on the size of natural runs into the stream and give a basis for determining how many chum should be released above the racks for natural spawning in succeeding years. The numbers of chum fry released by Keta (Table 6) include offspring from wild stock, Whiskey Creek, ODFW's Coal Creek trap, and returns to Keta from their own releases. Keta's priority right to surplus Whiskey Creek eggs expired in 1979.

Alfred Hampson: In October 1973 Alfred Hampson was issued a chum permit which authorized: (1) a combined operation with Keta on Sand Creek; (2) separate purchase of his allocated eggs; and (3) identical restrictions as had been imposed on Keta. Mr. Hampson received chum eggs, surplus to OSU's needs at Whiskey Creek, in the fall of 1980.

Yaquina Bay

Oregon Aqua Foods: A chum salmon permit was issued to Oregon Aqua Foods, Inc., in November 1972, and permits for coho and chinook salmon releases were issued in March 1974. The company originally operated a hatchery on Wright Creek, tributary of Yaquina Bay, and a saltwater facility located just above the Highway 101 bridge on Yaquina Bay. They began with an integrated operation to release salmon for ocean ranching, and rear salmon and trout in ponds for processing and sale as pansize fish or sale from a catchout pond located at their saltwater release site.

Weyerhaeuser Company purchased Oregon Aqua Foods in 1975. The company's program changed to only ocean ranching under direction of the new owners. The numbers of both coho and chinook raised for release have increased with this change in policy (Table 6). The saltwater release site has been rebuilt to facilitate rearing salmon and the catchout pond eliminated.

Oregon Aqua Foods built a large support facility near Springfield, Oregon in 1977. Operation of this facility is authorized by a Wildlife Propagation License. No releases are allowed at the site. All fish must be transported to the company's coastal sites for release. As this inland facility has been developed, Oregon Aqua has begun a close out of the Wright Creek operation. ODFW requires stream stocking of coho and release of all chum for the three-year close out period.

Oregon Aqua Foods has continued its effort to build up brood stock for sustained operations. The company will approach full production of coho (permit limit) with a combination of yearling and zero age 1980 brood fish.

They have begun an aggressive grading program to improve the quality of coho released. This practice, with other continuing husbandry improvements, should begin to show results in 1981 with improved adult contribution to ocean fisheries and returns to the release site.

Development of brood stock for chum and chinook salmon has not progressed as well as for coho. ODFW does not allow imports of chinook to coastal streams and large numbers of chum eggs have not been available for import and release at Yaquina. The chinook program is really just beginning using mainly eggs from Ore Aqua's own returns of surplus seed from State hatchery needs in the past.

Siuslaw River

Siuslaw River Fisheries Inc.: A chum permit was issued to Karl J. Manseth and Ronald F. Hichens in April 1972, for a site located on Sweet Creek, Lane County. They tested the water supply at this facility with a small number of 1972 brood chum provided by OSU. Siuslaw Fisheries purchased 1 million Whiskey Creek chum eggs in 1974, but additional eggs were not available from OSU surplus at Whiskey Creek prior to 1979 when the company's 6-year priority right to eggs expired. Imported Quilcene chum have been released by Siuslaw Fisheries under agreement with ODFW. The company is now attempting to build up a brood stock through returns to their own facility. Total chum releases are shown in Table 6.

Ceratodus Fisheries: A chum permit was issued to John Marshall, Lester Nelson, and Timothy Morello in December 1973, for a site on Divide Creek, Lane County. Some 500,000 1974 brood Quilcene chum eggs were incubated at Ceratodus Fisheries under an agreement with ODFW (Table 6). No more eggs have been available. No adults returned from the single release in 1975.

Domsea Farms, Inc.: In 1977, FWC authorized issue of permits to Domsea Farms, Inc. for coho, chinook, and chum salmon at a release site on the Siuslaw estuary just inland from the jetty in Lane County. The authorization required the company to complete leases and meet zoning requirements before permits could be finalized. This was accomplished in May of 1978 and releases began that summer.

The company has made small releases of coho and chinook in an effort to develop a brood stock and to test the feasibility of ocean ranching at this site (Table 6). They harvested enough coho eggs from returns in the fall of 1980 for their immediate needs, but are still trying, through a cooperative project with ODFW, to start a chinook brood stock. The company has obtained chum salmon eggs to be released in 1981.

Domsea maintains limited rearing facilities at the release site. They have contracted with outside companies to rear fish prior to shipment to the site for acclimation or final rearing and release.

Coos Bay

Calvin Heckard: Mr. Heckard was issued a chum permit in October 1975, for a site located on a tributary of Catching Slough, Coos Bay, in Coos County. Mr. Heckard planned to obtain chum eggs from the Washington Indian tribes;

however, no eggs were available. OSU has placed some test lots in this facility to test the water supply, but no releases or returns have been reported.

Anadromous, Inc.: Permits to raise coho and chinook salmon were issued to Anadromous, Inc. in 1974 for a site on the lower Columbia River near St. Helens. In 1975, the company requested additional permits for release of these species at Coos Bay, Coos County. The company planned to support both operations from expanded incubation facilities at St. Helens. FWC authorized permits for Coos Bay but terminated the release permits for St. Helens. Anadromous followed an "orderly termination" procedure at St. Helens which allowed them to recapture salmon released previously but did not permit additional releases. Fish (1975 brood) were first moved to Coos Bay for release in 1976. The St. Helens incubation and rearing facility is still in operation under a Wildlife Propagation License which allows custom rearing, sale, or rearing of fish for their Coos Bay release site. The company also uses contract operators to rear fish until they can be moved to the Coos Bay facility for acclimation and release. Total releases are shown in Table 6.

Anadromous has developed their own brood stock of coho and is working on development of fall and spring chinook brood stocks when State surpluses occur.

Oregon Aqua Foods: Permits were authorized in 1976 for Weyerhaeuser Company to release coho, chinook, and chum salmon at a site located on Coos Bay, Coos County. In 1978, Weyerhaeuser Company combined the Yaquina and Coos Bay operations under management of Oregon Aqua Foods, Inc., their wholly owned Oregon subsidiary.

Chum salmon were imported in 1979 for release at Coos Bay (Table 6). None have been released since and returns are not due back until the fall of 1981 so a chum brood stock has yet to be developed.

Coho eggs imported from Washington state have been released at Coos Bay since 1977 (Table 6). The company collected eggs from returning adults in 1980 and should be able to supply their own needs for coho eggs in the fall of 1981.

The company has purchased surplus spring chinook eggs from ODFW. During the fall of 1980, they cooperated with ODFW in an attempt to collect a local stock of fall chinook for a Department stock assessment project, and some eggs for the company. ODFW also used the company financed capture site, on Tioga Creek, in an attempt to collect coho eggs for the local Salmon and Steelhead Enhancement Program (STEP). High water caused discouraging results for both efforts.

Burnt Hill Creek

Burnt Hill Salmon Ranch Ltd.: A chinook salmon hatchery permit was authorized for issue to Burnt Hill Salmon Ranch, Ltd., in 1978. The permit for a site located on Burnt Hill Creek, Curry County, was finalized in 1979. FWC authorized this permit understanding that Lobster Creek (Rogue River

system), would be used by ODFW as an egg source for fall chinook seed stock. This stream has not been a reliable source for chinook eggs due to variable run sizes. In 1981 all smolts, reared from eggs taken from the stream in 1980, will be returned to Lobster Creek to meet ODFW requirements for replacing potential natural production of eggs collected with smolts (priority requirement of egg collection).

Burnt Hill has purchased spring chinook eggs surplus to ODFW's needs. Fish reared from these eggs are being released by Burnt Hill in an effort to provide a cash crop during the company's attempt to develop a fall chinook brood stock. The company is considering methods of holding these fish for egg collection.

Chinook were first released by Burnt Hill in 1980 (Table 6) so returns are not expected until 1982-83.

In the fall of 1980, Burnt Hill offered to assist ODFW in establishing a local coho stock for the STEP program on the Coquille River. The company provided holding ponds for adult coho and personnel to help spawn the fish. Eggs were incubated, in facilities leased from ODFW by the company, until ready to move to local citizen's incubators for hatching. This was a cooperative project with ODFW, local citizens, and the company. Burnt Hill will not receive any compensation, fish, or eggs for this effort. Company personnel tell us it is satisfying to be a part of the community working with other citizens.

DISCUSSION

Burnt Hill, Anadromous, and Oregon Aqua Foods have released spring chinook surplus to the state hatchery needs. The effort to hold adults to maturity is continuing on an experimental basis with most of the adults slated for sale as a cash crop while they are developing a fall chinook brood stock.

The four coho permittees are expected to be able to collect enough eggs from returning adults in the fall of 1981 to provide their own seed. As coho now at sea mature and return, we will be better able to evaluate the stocks which provide the best returns to the fisheries and to the operators. We will then be able to work with each operator to further develop the best brood stock. Theoretically this would be the nearest available Oregon stock. However, depending on the location of a release site, use of other stocks might contribute better than a single Oregon stock. Definitions of the best stock or combination is a long-term effort requiring continued evaluation of survival, contribution, and interaction with other stocks.

A slow beginning in the effort to develop chum salmon seed stocks may have been due to the small numbers of chum released and lack of feeding prior to release. Releases were increased by OSU at the Whiskey Creek facility. In addition, Oregon Aqua Foods imported some 10 million chum eggs which provided about 9 million chum salmon for release in Yaquina and Coos bays in 1979. Oregon Aqua expects to release over 4 million chum salmon at Yaquina in 1981 while smaller operators and OSU will release a total of nearly 3 million chum at Whiskey Creek, Siuslaw Bay, Sand Creek, and Vosberg Creek. This combined effort suggests that the chum program is beginning to get started; however, only return of adults to the various facilities will prove this theory.

Investments in development of facilities, egg acquisition, and development of methodology for chum salmon has been pursued by OSU, Keta, other small operators, and Oregon Aqua Foods. ODFW has been a cooperator with OSU and private operators, without investing Department funds. OSU funding for Whiskey Creek is being reduced or nearing an end and ODFW has not budgeted for taking over the program. Industry will have to fund this experimentation, if it is to continue.

We have found that fish raised from coho eggs imported from Washington state generally return as adults to the release site from the north while Oregon coho tend to return from the south. This information has been used to recommend the sites from which the respective stocks should be released so that they would be more available to Oregonians as the adults return. We have found some straying of adults to upstream areas. If this straying continues the necessity for stocking by ODFW may be reduced and the use of Oregon stocks may be required. Obviously the companies will work to reduce straying through changes in husbandry practices or facilities to improve their returns and profit potential.

We are continuing to define, through recovery of marked salmon in the ocean, the migration routes and contribution rates of coho and chinook. As additional salmon are marked we are developing the basis necessary to predict expected availability and catch prior to ocean fishing seasons.

The very nature of salmon which return as adults at ages 2, 3, 4, 5, or even 6 years make evaluation long-term in nature. Hatchery operations can be modified based on evaluation of smolts prior to release. However, we cannot yet relate the well-being of smolts to rearing success of salmon in the ocean. No matter how much research and evaluation is conducted or how promising the results look, success is measured by adults caught and return of adults to the private operator. Contributions of fish to public fisheries are, to the private operator, a cost of doing business. Returns of coho were a disappointing average high of 0.5-0.7% in 1980 although some small groups survived at higher rates. Survival of chinook has been poor in the past but current returns seem to be better. The success of chinook operations cannot be predicted at this time. The success of chum operations is even more difficult to predict because we cannot draw comparisons with Oregon hatcheries as can be done for chinook and coho. Chum hatchery production success in Washington state suggests large releases must be made to obtain successful (yet variable) returns.

The key to ultimate success of the private salmon hatchery industry in Oregon appears to require a continued effort by operators who are willing to invest capital necessary for experimentation and facilities. Private operators report that financing is becoming more difficult for all operators as the flow of dollars diminishes and costs rise. Thus we find the present status of private salmon hatcheries to be somewhat of a race for development of programs and returns which prove the success of their operations to their own stockholders and the public. ODFW plans to use more of the eggs previously considered surplus to develop presmolt and STEP programs so will be of little help in this effort.

Private salmon operators are releasing salmon which contribute to public fisheries. They are developing technology which may be useful to the state and are complimenting other experimental efforts by assisting in funding

some of the pieces necessary to improving the total state salmon production picture. It remains to be seen whether or not private salmon hatcheries will be successful as an investment or as a contributor to the salmon program of the state as a whole.