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Troll Salmon

PRIVATE SALMON HATCHERIES
IN OREGON

OREGON DEPARTMENT OF FISH AND WILDLIFE
FISH DIVISION

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January 1979

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INTRODUCTION

Salmon and trout have been produced in hatcheries in Oregon since the 1880's. By 1900, all salmon were produced in public hatcheries; but trout rearing continued in both public and private facilities. The private salmon hatchery law, passed by the Oregon Legislature, made it possible for the private sector to rear, release, and recapture salmon for profit. Because of improvements in nutrition, pathology, general hatchery techniques, and improved survival to release of salmon, the private sector became more optimistic that personal profits could be made from this type of program. One Oregon Department of Fish and Wildlife (ODFW) staff member has been assigned to be responsible for the private salmon hatchery program.

This review of private hatchery development includes some discussion on the limitations and problems pertinent to continued development.

DEVELOPMENT

General

In 1969, Oregon State University (OSU) began experimenting with an incubator for fish eggs, which could be built cheaply and installed beside a stream. These incubators evolved into a box in which egg trays are fixed over a gravel or artificial substrate. Water is piped to the box and passes over the eggs. This system is particularly adapted to hatching chum salmon eggs, the species being reared by OSU in their experimental hatchery on Whiskey Creek, near Netarts, Oregon. This experimentation is conducted under a cooperative agreement with ODFW.

Interest generated by the experimental program at Whiskey Creek brought about the private chum salmon hatchery law, passed in 1971. This law was modified by the 1973 Legislature to include coho and chinook salmon but with a restriction which allowed only four permits for that biennium. This restriction was not continued by the 1975 Legislature.

Interest has continued to increase. Permits for release of 37.8 million coho, 42 million chinook, and 100.5 million chum salmon have been authorized, to date. These totals are substantially more than produced by the State program (Table 1). However, the annual production is still well below this level (Table 2). Releases have been made from 10 of the 13 sites now authorized (Table 3). Four of these 13 sites will be used for release of more than one species while 9 are restricted to a single species (Figure 1). Permits have been issued for 11 chum, 4 coho, and 5 chinook release operations at the 13 authorized sites. In addition, we had 16 applications from 10 prospective operators on file as of December 31, 1978. A separate permit is required for each species.

Facilities constructed by private operators vary from a single battery of plywood chum egg incubators to large complete hatcheries. Some operators conduct all operations at the coastal site while others use their own or contract facilities at inland locations for early rearing, then transfer

Table 1. Oregon Salmon Hatchery Production Program^{1/}

	<u>Number of Smolts in Millions</u>		
	<u>Coho</u>	<u>Chinook</u>	<u>Chum</u>
<u>PRIVATE HATCHERIES</u>			
Releases Authorized	37.8	42.0	100.5
<u>OREGON PUBLIC HATCHERIES</u>			
Present Production	15.3	53.0	4.0
Projected Additions ^{2/}	<u>0.5</u>	<u>5.3</u>	<u>0.0</u>
Total	15.8	58.3	4.0
Combined Total		304.7 258.4	(as per exhibit dated 2-1-79)

^{1/} Includes private and government facilities (state and federal).

^{2/} Some Columbia River mitigation stations are not yet programmed and so are not included here.

Table 2. Salmon Released by Private Operators.

Brood Year ^{1/}	Species			Total All Species
	Coho	Chinook	Chum	
1971			51,150	51,150
1972		10,025	276,375	286,400
1973	103,782	40,000	575,082	718,864
1974	812,511	1,014,407 ^{2/}	2,796,730	4,623,648 ^{2/}
1975	2,019,000	650,000	2,400	2,671,400
1976	1,541,954	42,079	172,400	1,756,433
1977	(11,000,000) ^{3/}	(600,000)	(460,000)	(12,060,000)

^{1/} Brood year refers to the year the eggs were taken, not to the year of release.

^{2/} Includes 990,000 fish released in the Columbia River.

^{3/} Figures in parentheses () include estimated fish on hand for release.

Table 3. Private Salmon Hatchery Permits Authorized in Oregon.

Operator	Species	Have Released Fish	Location
<u>Permits Issued</u>			
Robert Stricklin	CS ^{1/}		Skipanon River (Youngs Bay)
Manseth and Jaqua	CS		Vosberg Creek (Nehalem Bay)
Harris and Hugie	CS	x ^{2/}	Dick Creek (Tillamook Bay)
Keta	CS	X	Sand Creek (Sand Lake Estuary)
Hampson	CS	X	Sand Creek (Sand Lake Estuary)
Oregon Aqua Foods	CS, CO, CH	X	Man-made tributary (Yaquina Bay)
Ceratodes Fisheries	CS	X	Divide Creek (Siuslaw System)
Siuslaw Fisheries	CS	X	Sweet Creek (Siuslaw System)
Domsea Farms, Inc.	CS, CO, CH	X	Man-made tributary (Siuslaw Bay)
Anadromous, Inc.	CO, CH	X	Man-made tributary (Coos Bay)
Oregon Aqua Foods	CS, CO, CH	x ^{2/}	Man-made tributary (Coos Bay)
Heckard	CS	x ^{2/}	Catching Slough (Coos Bay)
Burnt Hill, Inc.	CH		Burnt Hill Creek (Direct ocean tributary 13 miles south of Rogue River)

1/ CS - Chum Salmon; CO - Coho Salmon; CH - Chinook Salmon.

2/ Small or experimental releases only.

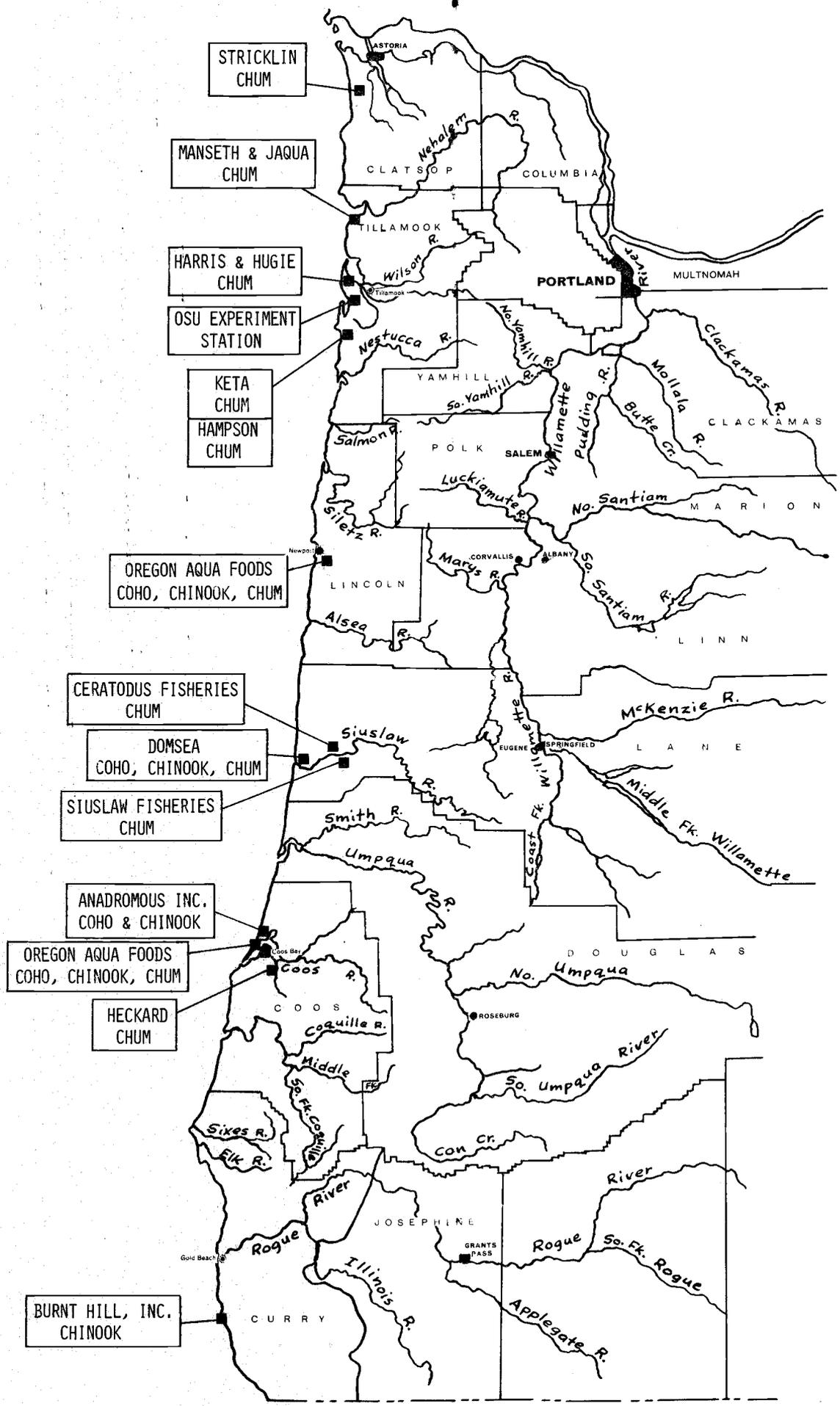


Figure 1. Location of Authorized Private Salmon Hatcheries in Oregon

fish to coastal sites for final rearing and release. Poor quality and quantity of water near the coast make inland rearing attractive. The inland sites may also afford warm water from wells or industrial plants, which improves fish growth. Inland rearing sites are operated under annual wildlife propagation licenses since no fish are released directly from these inland facilities. All private salmon hatchery release sites must be located on tidewater along the coast.

Coho

Three sites are now being used for release of coho, and another is under construction. Prior to 1978, relatively small releases were made at Yaquina and Coos bays. Over 8.5 million coho salmon were released at Yaquina Bay in 1978 (1977-brood) and smaller numbers were released in Siuslaw and Coos bays. To date, there have been some 11 million 1977-brood coho transported to the coast for release. About one million are being reared for spring release. The total of 11 million coho does not reflect loss during saltwater acclimation or through the winter. These releases when completed will nearly double coho production in Oregon. ODFW releases over 14 million coho annually including about 9 million into Columbia River tributaries and 5 million into coastal streams. Most of the coho stock for private hatcheries comes from Washington State as Oregon has not had enough surplus eggs to supply all operators in most years. Columbia River stocks of coho are not authorized for transfer to the coast because of genetic and disease concerns.

Chinook

Private operators have released chinook from two of the five authorized sites. These include both spring and fall races of chinook. The State program on the coast is small and few fish have returned to private facilities; so, egg availability has been poor. The one State facility where we have had good surpluses of chinook eggs is plagued with a virus problem and is under a quarantine program; so, eggs are not sold from this station. The Columbia River stocks of chinook are a different strain than coastal stocks and there are a variety of diseases apparent in the Columbia system. Some of these diseases are not found in coastal streams. Columbia River eggs are not sold for coastal release to protect the coastal stocks from genetic degradation and disease. We have marked and released, in cooperation with private operators, some local stocks to evaluate stock contribution. The Oregon Wild Fish Policy encourages use of local stocks in hatchery operation and development. This program includes release of fingerlings back to the stream of origin to replace what would have been reared naturally. This is possible because survival is better in the hatchery than in the wild. In the long run, it will benefit both the hatchery and natural stocks. To date, the use of wild stocks of chinook as a source for seed has been authorized in three areas (Coos, Siuslaw, and Yaquina rivers). Private operators contributed some \$15,000 to this project in 1978.

Chum

Eleven of the 20 permits now authorized are for chum salmon. Of these, 7 permittees have released chum in years when eggs were available. The

releases shown in Table 2 include cooperative experiments with ODFW to test the success of transferring chum eggs from a federal hatchery in Washington State (Hood Canal) to Oregon's mid-coast. Returns from these imports have been disappointing, to date; but efforts to establish brood stocks by importing eggs from various sources are continuing.

One company is actively attempting to purchase eggs and was authorized to import some 11 million 1978-brood chum from Russia for release in Coos Bay. Other operators are waiting for surplus eggs to be available from OSU's experimental facility, but none have been available since 1974. ODFW took 860,000 surplus chum eggs from Coal Creek, tributary to Kilchis River, in 1978. A portion of these eggs are being sold to private operators. The rest are hatched, reared, and returned to the stream as fingerlings to replace fish which would have survived from natural spawning.

LIMITATIONS

Chapter 197, Oregon Revised Statutes (ORS), and Oregon Administrative Rules (OAR), prohibit issuance of private salmon hatchery permits unless use of the specific site and proposed releases of salmon are consistent with goals, guidelines and local zoning for both the shoreland and estuary. The Wildlife Policy (ORS 496.012), the Food Fish Management Policy (ORS 506.109), and the Private Salmon Hatchery Permits statutes (ORS 508.700-745) all require protection of wild stocks of fish. The Fish and Wildlife Commission has adopted administrative rules which define upper deadlines within tidal reaches of some estuaries and close others to siting of private release-recapture facilities to protect wild stocks from competition. Copies of laws and rules can be made available by appropriate agencies.

A shortage of eggs for all species has slowed development by present permittees (Cummings, 1977). The ODFW has allowed import of selected stocks in some cases. Release of imported coho has been restricted to three estuaries and imported chinook have been released in only one bay. Both coho and chinook releases have been via man-made streams (pumped saltwater). Chum salmon imports are allowed south of Cascade Head which is the southernmost point where significant chum stocks persist. Oregon coastal stocks of chum salmon must be used in coastal streams north of Cascade Head.

Fish released by private operations must be marked, insofar as practical, under law. Marked fish in release groups will add to our knowledge of how and where the salmon contribute to ocean fisheries. Knowledge of how hatchery fish intermingle with wild fish is necessary to defining competition potential.

In addition to the biological matters above, there are some administrative and legal procedures of permit processing and issue that tend to limit development. Public hearings are required by statute. Permits cannot be issued under several circumstances specified in ORS 508.710. Intervention in permit processing and hearing procedure by various groups interested in affecting the decision on issue of permits has increased the cost to ODFW for processing and has extended the time required. Oregon statutes require

permit holders to pay for costs incurred by ODFW, but an applicant must pay only a \$100 application fee for each permit.

DISCUSSION

Production of salmon at private salmon hatcheries has been relatively small until this year when about 8.5 million 1977-brood coho were released into Yaquina Bay. Releases of coho to other bays and releases of chinook and chum remain comparatively small.

Selected stocks of imported coho are authorized for release in three estuaries and one stock of chinook is authorized for one estuary. Few surplus eggs have been available from Oregon hatcheries during the last three years. These imports have allowed us to begin evaluation of some major coho releases into coastal estuaries.

Private operators are accelerating rearing to allow release of coho in their first year of life, some 10 to 12 months ahead of their normal out-migrant timing. There is concern about how long these accelerated fish might stay in the estuaries competing with wild fish, how their ocean migration patterns might be affected, and how they contribute to the public fishery. Data from recapture of marked juveniles in the bay and adults at sea will help answer these concerns. Private operators are contributing funds and other assistance toward this work. They also pay for facility inspections and any other special projects which might be conducted for their benefit or at their request.

Our Research Section is conducting an evaluation of wild stocks to determine ocean migration and contribution. Private operators are cooperating in this effort, particularly for chinook. Some marked fish are released back to streams from which the eggs were collected and from the hatchery to evaluate returns. We are, in this manner, able to determine ocean migration, supplement natural production, and inject wild stock into the hatchery strains of chinook. This is in keeping with the ODFW Wild Fish Policy and concerns for maintaining suitable genetic strains. We have not, as yet, introduced wild coho into the private hatchery strains but are providing, when available, the strains of hatchery stock we would use to supplement wild stocks.

The availability of chum stocks continue to be a problem. Imports appear to be the only rapid way to improve production at this time. Returns to OSU's experimental facility have not provided the expected surpluses of eggs for private operators. Use of wild stocks could be increased, but the available areas for trapping are sport fishing areas. Obvious conflicts would result from trapping. These conflicts would probably be more people-oriented than actual damage to resources, particularly if fingerlings were released in the streams to replace egg production. Survival to fingerling is much higher in the hatchery than from natural spawning; so, we can replace the fish which would normally survive from natural spawning and still have fish to release at the hatchery. We are now harvesting chum eggs from one tributary of the Kilchis River using this replacement strategy.

The Fish and Wildlife Commission recognizes private salmon hatcheries as an alternative to public hatcheries and wild stocks to supply fish for public fisheries. The Commission members and Department staff are concerned about developing additional large private salmon hatcheries before the effects of present operations are evaluated. Oregon law prohibits issue of permits if wild stocks of salmon may be depleted. Other concerns include effects on Oregon's estuaries, economic factors, and the general public benefit to be derived from private salmon hatcheries.

At the end of 1978, no company had built up brood stocks to full production levels. All are still experimenting with release size, time of release, and hatchery operation. They have yet to show a profit. The major questions as to whether or not the large releases proposed by private operators will adversely affect wild stocks of salmon, compete in existing markets, or in general be a benefit to the public (Oregon citizens), continue to be unanswered. These questions dictate a go-slow approach to the private salmon hatchery permit system until some of these questions are answered.

SUMMARY

Development of private salmon hatcheries has been slow even though requests for permits have been relatively great. Large numbers of eggs, necessary to development, were not available until 1977, when major numbers of imported coho were reared for release at Yaquina Bay. Chinook and chum salmon production continues to be relatively low. Although actual releases of fish have been small, the potential for development remains high. Permits have been authorized for production of 37.8 million coho, 42.0 million chinook, and 100.5 million chum. In addition, requests for permits are on hand for 13.2 million coho, 17.0 million chinook, and 20.5 million chum. More applications for permits are coming in. However, a slow beginning has not yet shown whether or not the private hatchery system will be biologically or economically feasible. Legal, biological, and economic unknowns all suggest a cautious approach to further private hatchery expansion at this time.

REFERENCES

Cummings, T. Edwin. 1977. Private salmon hatcheries in Oregon, ODFW,
Fish Division. 11 pp.