JOB PROGRESS REPORT

ANADROMOUS FISH PROJECT

PROJECT TITLE: Research on anadromous fish in coastal watersheds of Oregon

PROJECT NUMBER: AFC-67-3

CONTRACT NUMBER: 04-6-208-4

PROJECT PERIOD: Annual Report, July 1, 1975-June 30, 1976

Completion Reports, July 1, 1973-June 30, 1976

Prepared by: Alan M. McGie
Program Leader
Research Section

Oregon Department of Fish & Wildlife
1634 S. W. Alder Street
P. O. Box 3503
Portland, OR 97208

This project was financed in part with Anadromous Fish Act (PL-89-304) funds through the National Marine Fisheries Service.

CONTENTS

TABLES

Research on Anadromous Fish in Coastal Watersheds of Oregon

INTRODUCTION

Following merger of the Fish and Wildlife commissions into a unified agency in FY 1976, work responsibilities of the Coastal Rivers Investigation were reassigned from management and research in the Fish Commission to the Research Section (Operations Division) of the Department of Fish and Wildlife. Coastal Rivers Investigation was relieved of all management functions and assigned four research projects during FY 1976: (1) Elk River Fall Chinook Project; (2) Salmon River Project; (3) Coastal Fall Chinook Stock Assessment Project; and (4) Tillamook Estuary Study. Former projects on coastal lakes and reservoirs were terminated during the fiscal year. The Tillamook Estuary Study was assigned to the program in November 1975, on a separate budget outside the realm of the Anadromous Fish Act cooperative agreement.

Program headquarters is located in Charleston near Coos Bay. Field research stations are located in Tillamook and Port Orford (Elk River Salmon Hatchery). At the close of FY 1976, the program was staffed by five biologists, one researcher, two technicians, and a secretary. Federal cooperation has enlarged the scope of each research project with the provision of federal funds under the Anadromous Fish Act (P.L. 89-304). The operating budget for FY 1976 was $232,100 and the federal share was $116,050; however, due to a reduction in federal funds, the project cost was amended December 24, 1975, to $228,416 for the remainder of the fiscal year. The federal share was $112,366 and the state share remained at $116,050. State General and Daily Ocean Salmon Angler License (DOSAL) funds comprised the state share. A separate unmatched DOSAL account of $24,141 brought the total operating budget to $252,557 in FY 1976.

This report is divided into two sections. The first presents a resumé of work accomplished in FY 1976. The second part gives a synopsis of accomplishments during the 3-year, federal-state cooperative program beginning July 1, 1973, under annual federal Grant-in-Aid awards in compliance of the stipulations promulgated by the Anadromous Fish Act.

SECTION I: ANNUAL PROGRESS REPORT - FY 1976

Reports Prepared

The results of various segments of research completed within the Coastal Rivers Program were presented in a numbered series of mimeographed "Information Reports." In FY 1976, five Information Reports and one progress report were prepared and submitted to Department of Fish and Wildlife headquarters (Table 1). The processed reports were distributed to Department personnel and other agencies upon request.

Table 1. Reports submitted by the staff of Coastal Rivers program, FY 1976

Berry, R. L. 1975. Spawning salmon surveys in coastal watersheds, 1974. Oreg. Dept. Fish and Wildl., Coastal Rivers Info, Rept. 75-4. 27 p.

_____. 1975. Rearing spring chinook salmon *(Oncorhynchus tshawytscha)* in J. W. Barney Reservoir, Trask River, Oregon, 1973-74. Oreg. Dept. Fish and Wildl., Coastal Rivers Info. Rept. 75-6. 15 p.

Hostick, G. A. 1975. Salmon sport fishing census on New River Estuary, 1974. Oreg. Dept. Fish and Wildl., Coastal Rivers Info. Rept. 75-5. 7 p.

McGie, A. M. 1975. Research on anadromous fish in coastal watersheds of Oregon. Fish Comm. Oreg., Coastal Rivers Invest. Annual Rept. July 1, 1974 to June 30, 1975. 19 p.

Reimers, P. E. 1975. Fecundity of fall chinook salmon in Sixes River, Oregon. Oreg. Dept. Fish and Wildl., Coastal Rivers Info. Rept. 75-3. 5 p.

_____. 1975. Length-weight relationship of fall chinook salmon in the Sixes River sport fishery, 1969. Oreg. Dept. Fish and Wildl., Coastal Rivers Info. Rept. 75-7. 6 p.

Coastal Reservoirs

Municipal water storage reservoirs for the cities of Hillsboro and McMinnville are located on the headwaters of the Trask and Nestucca rivers, respectively. J. W. Barney Reservoir on the Trask River has 205 surface acres at full pool and McGuire Reservoir on the Nestucca River has 130 acres. Maximum depths are about 18 m (60') in both reservoirs.

The feasibility of rearing juvenile spring chinook salmon *(Oncorhynchus tshawytscha)* in the reservoirs has been under investigation since 1973. McGuire Reservoir was stocked with 150,000 spring chinook fingerlings (1974 brood) weighing 205 fish/lb on March 18, 1975. Barney Reservoir received 250,000 spring chinook. One-half of the total was liberated on March 19, 1975, at 191 fish/lb and the remainder on April 9-10, at 139 fish/lb. Routine limnological and biological samples were collected from the reservoirs after chinook were liberated.

McGuire Reservoir, Nestucca River

Spring chinook grew from 59 mm in March to 107 mm in September in McGuire Reservoir. The spring chinook experienced a slower growth rate than 1973-brood fingerlings stocked the previous year which grew from 51 to 122 mm during the same time interval. In 1975, we requested city personnel to discharge water through the lower gate valve (+2.75 m) during the summer to disrupt thermal stratification, thereby increasing the available rearing area for chinook in the reservoir. Monthly limnological samples revealed thermal stratification again occurred, but was weaker than in previous years.

Survival of spring chinook appeared to be similar to estimates obtained in 1974. The catch per unit of effort in experimental gill nets set in September 1975 was comparable to 1974 when an estimated 57,000 fish (36.8% of the fingerlings stocked) were counted at a downstream-migrant trap installed below the reservoir. The trap was not installed in 1975 preventing a more definitive estimate of survival.

McGuire Reservoir was restocked with 153,000 1975-brood spring chinook fingerlings averaging 262 fish/lb on March 16, 1976.

Barney Reservoir, Trask River

Spring chinook grew from an average length of 63 mm when stocked to 109 mm in September 1975, and increase of 46 mm. Growth was smaller by 10 mm than for 1973-brood spring chinook stocked in 1974.

The reservoir pool level remained above 14 m (45') during 1975, providing a substantial rearing area during the summer. Limnological conditions were satisfactory throughout the critical summer months, with dissolved oxygen measurements above 7 ppm.

Survival of juvenile spring chinook appeared to be excellent since catches per unit effort in gill nets set in September 1975, were the highest yet recorded in the reservoir.

Barney Reservoir was restocked with 251,000 spring chinook fingerlings on March 17 and 22, 1976. The fish were liberated at an average weight of 272 and 266/lb, respectively.

Tenmile Lakes

In September 1968, the Fish and Game commissions applied rotenone to eradicate large populations of stunted brown bullheads *(Ictalurus nebulosus)*, yellow perch *(Perca flavescens)*, and bluegills *(Lepomis macrochirus)* in the Tenmile Lakes system. The project was conceived to enhance declining trout and native coho salmon *(Oncorhynchus kisutch)* populations inhabiting the lakes. Nearly 1.0 million young coho were salvaged from the lake system before treatment and restocked as smolts when the project was completed. In subsequent years, we evaluated coho salmon populations following their reintroduction and monitored changes in the warm-water fish populations after some bluegills and brown bullheads survived treatment of the lakes.

Personnel transfers and lack of funds forced curtailment of field work at Tenmile Lakes during FY 1976. However, we completed the annual population estimate of spawning adult coho salmon in late 1975, and trap netted in South Tenmile Lake to monitor the composition of fish populations.

Coho Spawning Population

The annual spawning populations of jack and adult coho salmon in the Tenmile Lakes system have been estimated since 1956 from data collected in

standard stream surveys. These estimates are based upon a tagging study completed in 1955. The 1975 population estimates were compiled from spawning fish counted in lake tributaries totaling 7.0 miles.

An estimated 2,500 adult coho (age 3) and 3,500 jacks (age 2) spawned in the Tenmile Lakes system in 1975. The total return (including jacks) from the 1972-brood year was 5,500 coho or approximately one-half the previous record low of 10,000 coho produced by the 1967 brood. Scale samples were collected from spawned-out coho to compare with scales taken from juveniles in previous years. Scales will be analyzed to determine if the collapse of the coho salmon population was due to a lack of lake-reared smolts.

The sex ratio of adult coho salmon in 1975 was 68.1% females and 31.9% males based on a sample of 185 spawned-out carcasses recovered in tributaries. The average size (FL) of jacks was 45.9 cm compared to 74.2 cm for adult males and 71.1 cm for female coho. Fork lengths were calculated from mid-eye to posterior scale (MEPS) measurements. The combined average length of adult coho was 72.2 cm in 1975.

Trap Catch in South Tenmile Lake

A floating trap placed at a fixed site in Templeton Arm, South Tenmile Lake, has provided an index of population changes since the lakes were treated with rotenone. The trap was fished at standard intervals from July through December 1975.

Bluegills and brown bullheads were the most abundant fish captured in the trap (Table 2). The two species combined comprised 97% of the total catch.

Compared to 1974, the index catch (number captured per net day) of all species, except brown bullheads, declined in 1975 (Table 3). The catch of largemouth bass *(Micropterus salmoides)* declined from 8.8/net day in 1974 to only 0.4/net day in 1975. The decrease reflects the loss of age 2 and younger bass since these were the only age groups taken in the trap. The catch per unit effort of juvenile coho (1974-brood year) continued to decline from a high of 21.7/net day in 1971 to a record low of 0.5/net day in 1975. The CPUE for bluegill (46.3 fish/net day) was 15% less than in 1974; whereas, the catch rate of brown bullheads (14.3 fish/net day) was 19% greater than in 1974.

Fall Chinook Ecology

Elk River

Population Estimates. Populations of wild and hatchery-reared fall chinook entering Elk River were estimated in 1975. We tagged 437 salmon in lower Elk River from October 1 through December 29. In 1975, large numbers of salmon moved upriver in October following increased river flows. Seining became ineffective in late October because of high stream flows; therefore, gill nets were used almost exclusively until the tagging operation terminated in late December. Seventy-one percent (215) of the 301 adult chinook tagged

Table 2. Species composition of fish caught in a floating trap, Templeton Arm, South Tenmile Lake, 1975

Dates fished	6/30 to 12/15/75
Hours fished	1,785.6
Coho Salmon	
Juveniles (1974 brood)	42
Jacks (1973 brood)	29
Adults (1972 brood)	7
Kokanee	20
Trout	
Rainbow	3
Cutthroat	21
Steelhead (adult)	2
Bluegill	3,442
Brown bullhead	1,060
Largemouth bass 1/	31
Pacific lamprey	1

1/ *All age 2+ or younger.*

Table 3. Numbers of fish captured per net day in Templeton Arm, South Tenmile Lake, July through December 1969-75

Species	Year							Yearly change
	1969	1970	1971	1972	1973	1974	1975	1974-75
Coho (Juvenile)	8.3	1.1	21.7	4.2	0.9	0.8	0.5	-0.3
Trout 1/	76.9	20.6	3.7	14.9	5.5	0.9	0.4	-0.5
Bluegill	0.0	2.0	70.8	205.3	100.8	54.6	46.3	-8.3
Brown bullhead	14.2	34.5	24.7	170.7	78.9	12.0	14.3	+2.3
Threespine stickleback	0.0	140.7	2,858.4	1,404.9	0.0	0.0	0.0	0.0
Prickly sculpin	0.7	3.3	6.5	19.5	1.8	0.1	0.0	-0.1
Largemouth bass 2/	0.0	0.0	0.0	0.2	7.9	8.8	0.4	-8.4

1/ *Varying numbers of trout annually stocked by ODF&W.*
2/ *Stocked in 1971.*

in 1975 were captured in gill nets fished primarily at night in the lower 6 km of river. Tagged fish were recovered from the sport fishery, at the hatchery adult pond, and during spawning fish surveys from October 10, 1975, to February 17, 1976.

The total run of adult chinook salmon (ages 3 through 6) was estimated at 10,895 fish (CI_{95}: $\underline{N}$ = 7,865; $\overline{N}$ = 15,252). This was the largest run of adult chinook since the hatchery began operations in 1968. The estimate was based on 301 tagged wild and hatchery adults, a combined sample of 1,442 carcasses, and 39 tag recoveries.

The wild run of chinook adults was estimated at 1,882 by applying the percentage of wild adults in the combined tagging and sport catch samples (17.3%) to the total adult estimate of 10,895 fish. Timing of wild and hatchery chinook has been similar in past years and we assumed that neither tagged nor sport catch samples were biased. The estimated 1,882 wild chinook adults in 1975 represented a substantial increase over the average of 1,383 for the past 4 years in Elk River.

The total run of age-2 chinook (jacks) in Elk River was estimated to be 2,255 fish (CI_{95}: $\underline{N}$ = 1,317; $\overline{N}$ = 4,004). This estimate was based on 116 tagged wild and hatchery jacks, a combined sample of 310 carcasses and 15 tag recoveries. No direct estimate of wild chinook jacks could be calculated because of the small sample size. However, an estimate of 1,654 wild chinook jacks was derived by applying the percentage of wild jacks in the combined sample (73.4%) to the total jack estimate of 2,255. The estimated wild run of chinook jacks in 1975 represented a substantial increase over the average of 1,000 for the past 4 years.

Returns from 15 separate test groups of hatchery-reared fall chinook entered Elk River in 1975. Four groups from the 1973 brood returned as jacks, four groups from the 1972 brood returned at age 3, three groups from the 1971 brood returned at age 4, three groups from the 1970 brood returned at age 5, and a single group from the 1969 brood returned at age 6. We estimated 9,614 hatchery chinook (9,013 adults and 601 jacks) returned to Elk River in 1975 (Table 4). The run of hatchery jacks was small in 1975, similar to that in 1974. The reasons for the recent decline in the number of jacks are unknown, but the hatchery program may possibly be altering the maturity schedule of hatchery fish as second and third generation propagated adults become incorporated into the egg take. Jacks appear to contribute to the gene pool in the natural spawning population but are discarded in the hatchery program.

Sport Fishery Survey. A statistical creel census was conducted on the lower 19 km of Elk River from early October, when chinook first entered the river, until the end of the fishing season on December 31. The sport salmon season was extended by 1 month for the second successive year to allow anglers to harvest more late returning hatchery adults.

We interviewed 3,011 anglers and estimated 3,601 fall chinook salmon were harvested in the Elk River sport fishery. A total of 841 fish or 23.4% of the catch in 1975 was taken in December during the 1-month extension of the season. Hatchery-reared fish comprised an estimated 81.0% of the adults

Table 4. Estimated return and survival of hatchery chinook salmon to Elk River, 1975

Brood year	Age	Mark	Number released	Size and time of release		1975 Estimate	% Survival of no. released	Accum. % survival (all ages)
1973	2	RV	102,935	10.0/lb	10/74	227	0.22	0.22
	2	LV	121,784	10.0/lb	10/74	103	0.09	0.09
	2	Ad+CWT	39,660	10.0/lb	10/74	189	0.48	0.48
	2	RP	38,502	32.0/lb	6/74	82	0.21	0.21
1972	3	LV	102,785	37.4/lb	6/73	103	0.10	0.19
	3	LP	121,642	8.0/lb	11/73	784	0.64	0.71
	3	RP	114,311	15.7/lb	11/73	433	0.38	0.46
	3	½D-Ad-RP	97,428	5.0/lb	3/74	582	0.60	0.97
1971	4	RV	105,410	7.2/lb	11/72	1,456	1.38	4.08
	4	½-D-LP	105,397	6.6/lb	11/72	932	0.88	2.20
	4	LV	334,157	12.5/lb	11/72	3,840	1.15	2.02
1970	5	RV	409,092	47.0/lb	6/71	250	0.06	0.31
	5	Ad-RM	97,568	12.7/lb	9/71	228	0.23	4.43
	5	LV	171,757	12.7/lb	9/71	369	0.22	3.59
1969	6	Ad-LM	107,808	8.0/lb	10/70	36	0.03	5.75
Total						9,614		

caught and 27.3% of the catch of jacks. Total estimated angler effort was 52,365 hours with an average catch rate of 14.5 hours per salmon for the entire season. Anglers spent 15,778 hours of effort, 30.1% of the total, during the season extension in December.

In addition to the catch of 3,601 fall chinook, we estimated a catch of 76 trout (under 20") and 172 steelhead (over 20"). The overall catch rate for all species was 13.6 hrs/fish for the entire season. All of the trout were caught prior to December and 125 or 72.7% of the steelhead were caught during December. The estimated steelhead catch represents an unknown percentage of the total harvest of that species from Elk River since many fish were caught in January-March, after the survey was terminated.

Total fishing effort and the catch from Elk River increased substantially in 1975 compared to previous years. The increase followed a trend that probably started in 1970, the first year that hatchery-reared chinook returned to Elk River. We have documented increases in catch and/or effort each year since the first creel census in 1972 (Table 5). The estimated 36,587 hours of effort during the regular season (through November 30) in 1975 represents a 107% increase over the 1974 season and a 114% increase over the average for 1972-74. The percentage of local anglers participating in this fishery declined over the 4-year period while the percentage of out-of-state anglers

Table 5. Summary of the sport fishery for fall chinook in Elk River, 1972-75

Year	Total catch			%	%	Angler effort (hrs.)			Hours/fish		
	Regular season	Extended season	Comb. 1/	hatchery	of run	Regular season	Extended season	Comb.	Regular season	Extended season	Comb.
1972	2,075	--	--	79.8	16.5	19,622	--	--	9.5	--	--
1973	2,435	--	--	81.1	19.3	14,074	--	--	5.8	--	--
1974	1,585	923	2,508	79.7	26.1	17,671	22,173	39,844	11.1	24.0	15.9
1975	2,760	841	3,601	65.7	27.4	36,587	15,778	52,365	13.3	18.8	14.5

1/ *The catch of adults was 413 in 1972 and 365 in 1973 compared to 2,149 in 1974 and 2,573 in 1975 after the season was extended through December.*

remained at about the same level and the percentage from other areas in Oregon increased substantially (Table 6). While total catch increased over the 4-year period, the catch rate gradually declined.

Table 6. Origin of anglers interviewed during creel census surveys on Elk River, 1972-75

Year	Percentage of total			Number of anglers furnishing information
	Local 1/	Remainder of Oregon	Out-of-state	
1972	89.0 (863) 3/	6.2 (60)	4.8 (47)	970
1973	83.2 (804)	10.9 (105)	5.9 (57)	966
1974 2/	78.4 (1,973)	16.5 (416)	5.1 (129)	2,518
1975 2/	77.2 (2,283)	17.4 (515)	5.4 (160)	2,958

1/ *Includes area within 1 hour's driving distance of Elk River.*
2/ *Includes extended December season.*
3/ *Number of interviewed anglers in parentheses.*

Accelerated Growth and Early Release. On June 25, 1971, we released 409,092 fingerling chinook averaging 47 fish/lb into Elk River following accelerated growth in the hatchery. The intent of the experiment was to produce large, viable migrant chinook by late June of their first year. For this experiment to be successful, the chinook needed to attain sufficient size to produce good survival and migrate out of Elk River while avoiding competition with wild chinook rearing in the river.

Age 5 chinook returned in 1975, essentially completing the life cycle of fish in this experimental release. Total survival was only 0.31% of the 409,092 fingerlings released (Table 7). Detailed scale analysis indicated that surviving chinook remained in Elk River following their release and most migrated with the wild fish in autumn. Comparative analyses of juvenile and adult scales showed that these fish averaged 12 circuli at release (range 8 to 15) and added about 12 circuli (range 10 to 15) during their extended residence in the river before entering the ocean.

Scale samples were used to back calculate size at release of returning adults and calculate survival rates according to size groups at liberation. Highest survival came from the largest fish among the fingerlings released (Table 8). Survival rates of fingerlings between 6.8 and 8.7 cm was only 0.07% compared to 3.26% for those attaining lengths between 9.8 and 10.7 cm at release.

In summary, the average size at release was 10.0 cm among surviving adult chinook in the experiment. The juvenile fish reared in Elk River until autumn and grew to an average size of 12.8 cm. Their extended residence may have had a deleterious impact on wild fish by virtue of their cohabitation, but no direct data are available to confirm or refute this premise.

Table 7. Survival of 1970-brood fall chinook hatched in heated water incubators

Age composition	Estimated survival 1/	
	Number	Percentage
2	521	0.13
3	190	0.05
4	297	0.07
5	250	0.06
Total	1,258	0.31

1/ Based upon 409,092 fish marked RV and released June 25, 1971, at 147 fish/lb.

Table 8. Size-specific survival rates for 1970-brood fall chinook released June 5, 1971

Size at release (cm)	Number of fall chinook		Percentage survival
	Released	Total return	
6.8-7.7	12,232	9	0.07
7.8-8.7	140,605	103	0.07
8.8-9.7	230,278	298	0.13
9.8-10.7	25,977	848	3.26

Estimated Contribution of 1969-Brood Fall Chinook Salmon. On October 21, 1970, 107,808 fall chinook salmon smolts from the 1969-brood year were released into Elk River at an average weight of 8.0 fish/lb. The smolts were given an unduplicated mark (Ad-LM) to determine their contribution to Pacific Coast commercial and sport fisheries. Six-year-old chinook salmon from this group returned to Elk River in 1975 completing the experiment.

Commercial fishermen landed 3,642 fish (75%) and 1,212 (25%) were taken in recreational fisheries from a total estimated catch of 4,854 fall chinook salmon. About 78% of the total catch came from ocean fisheries compared to 22% in the Elk River sport fishery. A preponderance of the sport catch (1,048 fish or 86.5%) occurred in Elk River with the remainder (164 fish) taken by anglers fishing offshore. The fish contributed to ocean fisheries over a large geographical area from Alaska to central California, but the primary contribution was to Oregon. Sport and commercial fishermen in Oregon landed 2,771 chinook or 72.8% of the total known ocean catch while only 628 (16.5%)

were landed in California, 316 (8.3%) in Washington, and 91 (2.4%) in Alaska. The total estimated ocean catch of 3,806 1969-brood fall chinook from Elk River Hatchery is minimal and the percentage taken by Oregon fishermen is maximal since British Columbia landings were not examined for marked fish.

An estimated 5,157 fall chinook either returned to Elk River Hatchery or spawned in the river system bringing the total yield (catch plus escapement) to 10,011 or 9.3% of the 107,808 marked smolts released. The catch to escapement ratio was approximately 1:1 for 1969-brood fall chinook released at Elk River Hatchery.

Hatchery Rearing Program, 1974 Brood. Hatchery personnel took 360,831 fall chinook eggs for projects in Elk River (Table 9). Two groups were marked with coded wire tags. One group (36,971 smolts) served as a control to compare with the ocean contribution and distribution of Elk River fall chinook reared and released at Alsea River Salmon Hatchery. The second tagged group (31,065 smolts) identified smolts reared from wild parents trapped in Anvil Creek, Elk River. The remaining smolts were divided between those originating from age-5 and age-3 parents (31,601 and 171,339 smolts, respectively) and marked with single fin clips. The total number of smolts released was 270,976 in October 1975. The total mortality was 24.9% from egg to smolt stage in October.

Chetco River

Jack Creek Trap. Curry County officials and Department of Fish and Wildlife personnel jointly operated a trap on Jack Creek, Chetco River to take fall chinook eggs. The eggs were incubated at Elk River Hatchery and the resulting smolts mainly returned to the Chetco River. Some were also released into the Coos River system. The program has significantly enhanced the river's chinook population and recreational fishery since its inception in 1968.

Hatchery Rearing Program, 1974 Brood. Elk River Hatchery personnel collected 546,198 fall chinook salmon eggs at the Jack Creek trap in 1974. Total mortality during incubation and rearing at the hatchery was 22.3% (Table 10), compared to 28.3% the previous year. Total chinook production was 424,348 from Chetco River during 1975. Chetco River was restocked with 318,908 smolts (Table 11) and the remainder (105,440 fish) were liberated into Coos and Millicoma rivers, Coos Bay.

Sport Fishery Survey. A creel census survey was conducted in the Chetco River to estimate the total angler effort, catch of fall chinook, and proportion of hatchery-reared fish contributing to the catch in 1975. Both the October-November and extended season in December were censused, duplicating a similar study at Elk River.

The total angling effort was about 52,747 hours (preliminary) in 1975. Seventy-five percent of the effort came from shore anglers and 25% from boat anglers. Anglers fished 11,595 hours in tidewater (22%) compared to 41,152 hours in freshwater (78%). Twenty-seven percent of the total effort occurred in the extended season. The estimated seasonal catch was 3,072 fall chinook

Table 9. Fall chinook salmon (1974 brood) reared and released into Elk River

Spawning period (December 3, 1974-January 24, 1975)

Females spawned	100
Eggs taken	360,831
Mortality of eggs	28,481 (7.9%)
Mortality of alevins	6,437 (1.9%)

Ponding period (March 18-April 25, 1975)

Number of fish ponded	325,913
Average size of fish ponded	1,001/lb
Total weight of fish ponded	326 lbs
Mortality of fingerlings in ponds (including marking)	44,626 (13.7%)
Unaccounted mortality	10,311 (3.2%)
OTC marked	All

Marking periods

Fin marking (May 27-June 9, 1975)
Coded wire tagging (June 18-20 and September 22-26, 1975)

Release groups

Date	Mark	Number released	Size at release	Treatment
10/20/75	Ad+CWT	36,971	11.2/lb	Alsea R. control
10/20/75	Ad+CWT	31,065	10.9/lb	Anvil Cr. wild stock
10/20/75	RV	31,601	11.1/lb	Age-5 parents
10/20-21/75	LV	171,339	10.6/lb	Age-3 parents

Total number of fish released 270,976

Total mortality, 1974 brood 89,855 (24.9%)

Table 10. Fall chinook salmon (1974 brood, Chetco stock) reared at Elk River Hatchery and released into the Chetco, Coos, and Millicoma rivers

Spawning period (December 4, 1974-January 15, 1975)	
Females spawned	154
Eggs taken	546,198
Mortality of eggs	62,964 (11.5%)
Mortality of alevins	12,306 (2.5%)
Ponding period (March 18, 1975-May 19, 1975)	
Number of fish ponded	470,928
Average size of fish ponded	831/lb
Total weight of fish ponded	567 lbs
Unaccounted mortality	46,580 (9.9%)

Release groups

Date	Area	Number released	Size at release
6/10/75	Millicoma R.	2,684	244/lb
9/16-17/75	Chetco R.	35,890	17.9/lb
10/21/75	Millicoma R.	41,250	11.0/lb
10/21-22/75	S. Fork Coos R.	61,506	11.3/lb
10/21-31/75	Chetco R.	242,616	11.2/lb
11/18-20/75	Chetco R.	40,402	9.9/lb
Total number of fish released		424,348	
Total mortality, 1974 brood		121,850 (22.3%)	

Table 11. Distribution of 1974-brood fall chinook salmon released into the Chetco River, September-November 1975

Location	Date	Number	Size (fish/lb)
Chetco R.	Sept. 16-17, 1975	35,890	17.9/lb
Chetco R.	Oct. 22-23, 1975	82,109	11.6/lb
Hamilton Cr.	Oct. 28-31, 1975	130,257	11.1/lb
Jack Cr.	Oct. 28, 1975	30,250	11.0/lb
Chetco R.	Nov. 18-20, 1975	40,402	9.9/lb
Total		318,908	

(preliminary) with only 2% (65 fish) taken in December. Anglers harvested 1,097 fall chinook (36%) from tidewater and 1,975 (64%) from freshwater in 1975. The overall catch rate was 17.1 hours per salmon.

The catch of fall chinook was divided between 1,267 jacks (41%) and 1,805 adults (59%). Hatchery-reared chinook comprised 39% of the jack catch and 72% of the adult landings (ages 3 through 5). About 59% of the total sport catch was composed of hatchery-reared fish released into the Chetco River.

Coastal Fall Chinook Stock Assessment Project

Several Pacific Coast fisheries agencies have recently begun evaluating selected stocks of salmon to enhance provincial sport and commercial fisheries. Prior fin-marking experiments have demonstrated that some stocks remain offshore near their natal streams or primarily disperse along nearby coastlines, favoring provincial fisheries, while others migrate long distances and contribute few if any fish to these fisheries at sea.

The Oregon Department of Fish and Wildlife currently propagates three stocks of fall chinook salmon at coastal hatcheries. Elk River Hatchery rears both Elk River and Chetco River stocks. The Chetco River stock is reared separately and the smolts transplanted into the Chetco River each fall. Trask River fall chinook are reared and released at Trask Hatchery under similar rearing regimes practiced at Elk River Hatchery.

Some recent fin-marking experiments have given us an insight into the offshore distribution and contribution of Elk, Chetco, and Trask stocks. Preliminary evidence indicates the Elk and Chetco stocks primarily contribute to ocean fisheries between northern California and Newport, Oregon. In contrast, Trask River fall chinook apparently migrate north of Oregon and exclusively enter Washington, British Columbia, and southern Alaskan commercial and sport fisheries. Therefore, no direct benefits are derived from the Trask River stock by Oregon fishermen until the salmon enter recreational fisheries inside Tillamook Bay.

In FY 1975, we began a comprehensive study to determine if the offshore distribution of coastal fall chinook stocks can be manipulated by altering release sites within a broad geographical range. During the first year, four experimental groups tagged with coded wire were released at Alsea, Elk, and Trask hatcheries and two groups with paired fin marks were liberated into Coos Bay.

Tagged Smolts Released in FY 1976

In FY 1976, the study was expanded when tagged smolts were released at Klaskanine Hatchery located on the lower Columbia River (Trask and Chetco stocks) additional to replicate releases at Alsea Salmon Hatchery (Trask and Elk stocks) and in the Coos Bay estuary (Elk and Chetco stocks). Appropriate controls of tagged smolts were liberated from each donor stock in their native rivers. A total of 286,417 tagged fall chinook smolts was released in 1975

(Table 12). Although we planned to release about 38,000 tagged fish in each group, the actual number liberated ranged from 23,616 to 39,150 due to poor tag retention among certain groups. Percentage tag retention ranged from 67.6% to 96.6% with an overall average of 85.1%.

Coded Wire Tag Recoveries, 1973 Brood

Pacific Coast Fisheries. Pacific Coast fisheries' agencies reported a total of 46 coded wire tag recoveries in 1975 from 1973-brood fall chinook released at Trask, Alsea, and Elk River hatcheries (Table 13). The recoveries were biased towards the Washington sport and Canadian commercial fisheries since the 2-year-old chinook were too small to enter most remaining commercial offshore fisheries in 1975. Tag recoveries from Canadian sources were primarily from Johnston Strait, Central Coast, and Juan de Fuca commercial seine fisheries. Reports of fin mark recoveries from smolt releases in the Coos Bay estuary remain incomplete.

Oregon Hatcheries. Eight tagged fall chinook salmon jacks were tallied at Alsea Salmon Hatchery between October 19 and December 19, 1975. The tagged jacks were composed of six fish from Elk River stock and two from Trask River stock released at the hatchery. Fourteen jacks with adipose fin clips were recovered from the adult holding pond between November 19 and December 6, 1975, at Elk River Hatchery. All adipose-marked jacks contained tags except one fish that sustained a severely lacerated snout which may have dislodged the tag. All tagged jacks examined at Elk River Hatchery originated from smolts released into Elk River as controls for experimental releases at Alsea Salmon Hatchery. No tagged jacks were recovered at Trask River Hatchery in 1975.

Salmon River Project

A detailed project proposal outlining the long-term goals of the Salmon River project was prepared and intensive field work began in FY 1976. Specific goals and related objectives spanning each recognized phase of the project were included in the proposal along with major experimental approaches necessary to accomplish the work. Three broad goals were recognized: (1) to optimize the contribution of salmon from Salmon River Hatchery to Oregon's sport and commercial fisheries; (2) to minimize adverse impacts of hatchery fish on native fish species; and (3) to develop management alternatives that are complementary to the goals of the Cascade Head Scenic Research Area established in the lower Salmon River watershed by congressional action in 1974.

Four phases of the project were identified to simplify discussion and execution of the project goals. These phases are: (1) a pre-hatchery evaluation of existing fish populations within the Salmon River watershed; (2) development of a hatchery rearing schedule and documentation of the stocks selected for enhancement; (3) impact and evaluation of the hatchery stocks based on adult population size and contributions to recreational and commercial fisheries; and (4) final analyses and recommendations.

Table 12. Number of fall chinook salmon smolts (1974 brood) marked with coded wire tags and released in 1975

Tag codes 1/ Data 1	Tag codes 1/ Data 2	Hatchery	Stock	Date released	Size at release (no/lb)	Number tagged	Number released Ad+CWT	Number released Ad-only	Number released Total	% tag retention	Area released
11	09	Elk	Elk	10/20-21	11.2	38,193	26,307	7,248	33,555	78.4	Coos Bay
11	10	Elk	Chetco	10/21	10.9	37,130	23,616	8,212	31,828	74.2	Coos Bay
11	11	Klaskanine	Trask	11/21	9.5	41,313	30,550	8,818	39,368	77.6	Klask R.
11	12	Klaskanine	Chetco	11/21	9.4	39,553	34,620	4,279	38,899	89.0	Klask. R.
11	13	Trask	Trask	10/22	10.1	40,014	38,233	1,428	39,661	96.4	Trask R.
11	14	Alsea	Trask	10/21	9.8	38,663	25,578	12,240	37,818	67.6	Alsea R.
11	15	Alsea	Elk	10/21	10.1	38,768	32,538	5,656	38,194	85.2	Alsea R.
12	09	Elk	Elk	10/20	11.2	39,942	35,825	1,146	36,971	96.9	Elk R.
12	10	Elk	Chetco	11/18-20	9.9	41,704	39,150	1,252	40,402	96.9	Chetco R.
Total						355,280	286,417	50,279	336,696	85.1	

1/ *Agency Code 07.*

Table 13. Coded wire tag recoveries from 1973-brood fall chinook salmon sampled in coastal fisheries in 1975

Stock	Release site	Number released	Tag recoveries: Ore. sport	Wash. sport	Canadian: Sport	Canadian: Comm.	Total
Trask	Trask R.	36,519	0	12	0	6	18
Trask	Alsea R.	38,883	0	2	1	5	8
Elk	Alsea R.	38,030	1	1	0	2	4
Elk	Elk R.	39,660	0	5	0	11	16
Total		153,092	1	20	1	24	46

Field Studies

Field studies in FY 1976 were primarily confined to four main approaches within the framework of Phase I: (1) juvenile salmonid studies; (2) tagging and sampling adult salmonids; (3) spawning fish surveys; and (4) fish species composition within the watershed.

Juvenile Studies. Seining, gillnetting, and electroshocking were used to collect juvenile salmonids. Samples were collected semimonthly by seining in the estuary at both high and low tides, except in the winter when sampling was reduced to monthly intervals. Monthly fish samples were also collected from key tributaries for growth rates, length-weight relationships, and to collect scales for comparison with adult scale patterns. Samples taken in spring and early summer months documented the upstream distributions of salmonid species. Juvenile coho and chinook salmon were marked by cold branding and fin excision to study migration patterns.

Adult Tagging. Estuarine seining and gillnetting resulted in 89 chinook salmon, 15 coho salmon, and 7 steelhead trout being tagged between August 1975 and January 1976. The numbers of fish tagged were too few to permit accurate population estimates. However, preliminary estimates on the timing of the runs and biological characteristics (sex ratios, mean lengths, age distribution, etc.) of the salmon populations were obtained during the tagging work.

Spawning Fish Surveys. Approximately 30 miles of the main river and tributaries were identified as primary spawning sites for chinook and coho salmon based on the distribution of juveniles, gravel composition, prior surveys, and preliminary surveys completed in 1975. The survey areas were systematically examined during the salmon spawning season to recover tagged fish, to collect biological samples from spawning fish, and to determine the timing and distribution of fish in Salmon River. Scale samples were collected from all carcasses of spawned-out salmon encountered during the surveys. The scales will be analyzed to determine life histories.

Species Composition. Records were maintained of all fish species encountered during routine sampling work. So far, 30 species have been identified within the Salmon River estuary. These records should provide a means of anticipating possible interactions of salmon released from the hatchery and fish species residing in the estuary.

Data Analysis

Virtually all field data were directly recorded onto field forms designed for transfer onto punch cards. Coded data were double checked prior to key punching and rechecked once more after punching. Computer programs will be developed to summarize and analyze these data.

Shad and Striped Bass

American shad *(Alosa sapidissima)* and striped bass *(Morone saxatilis)* were landed in commercial gill-net fisheries in the Siuslaw, Smith, Umpqua, Coos, and Coquille rivers in 1975. The commercial season began May 10 and ended July 1, except in Coos Bay. The Coos Bay season opened April 20 and closed June 21.

Set nets were fished on all rivers except the Umpqua where only drift gill nets were allowed.

Commercial fishermen landed 63,184 shad weighing 231,483 lbs from coastal streams in 1975 (Table 14). The poundage was slightly higher than in 1974 (11%), but remained 46% below the previous 10-year average of 426,111 lbs taken from coastal rivers. Of the total poundage landed 71% came from the Umpqua River. Female (roe) shad comprised 66% of the total coastal catch.

Table 14. Commercial landings of shad and striped bass, 1975

River	Shad landings			Striped bass landings (lbs)
	Number		Total pounds	
	Male	Female		
Siuslaw	1,163	2,746	14,473	133
Smith	1,185	3,599	17,951	574
Umpqua	15,799	29,260	164,437	12,806
Coos	1,797	3,707	20,219	4,025
Coquille	1,309	2,619	14,403	397
Total	21,253	41,931	231,483	17,935

The commercial landings of striped bass continued their downward trend in 1975 with a 49% decrease from 1974 landings and a 59% decrease from the previous 10-year average. Only 17,935 lbs of striped bass were landed in 1975 (Table 14). The Umpqua River produced 71% of the total coastal catch, followed by Coos Bay with 22%.

The Oregon State Legislature passed a law during the 1975 session prohibiting the commercial harvest of striped bass beginning with the 1976 commercial shad season.

SECTION II. COMPLETION REPORT - JULY 1, 1973, TO JUNE 30, 1976

Work accomplished the past 3 fiscal years has included the major projects described in the previous section for fiscal year 1976. However, prior to FY 1976 Coastal Rivers Investigation was responsible for both management and research functions on Oregon's coastal stocks of anadromous fish. Following merger of the Fish Commission of Oregon and the Oregon Wildlife Commission into a unified agency effective July 1, 1975, the Investigation's mission was changed to fisheries research in the coastal area. Former management functions were delegated to district management personnel in the new agency. These included activities such as spawning fish surveys to chart trends in the escapement of wild salmon stocks, private salmon hatchery operations, excess adult and fingerling salmon transplants, management of coastal commercial shad and striped bass fisheries, environmental protection, and habitat management functions reported upon during the first 2 fiscal years of the program. These projects generally formed a portion of the state's contribution within the joint state-federal program under the Anadromous Fish Act (PL 89-304) in force during the 3-year interim.

Specific details on the management projects can be obtained by consulting the appropriate annual reports prepared for FY 1974 and FY 1975. In addition to the annual reports, program personnel prepared 23 serially numbered "Information Reports" on specific research and management topics during the current completion report period. The mimeographed reports were distributed to Oregon Department of Fish and Wildlife personnel, selected universities, and other governmental agencies upon request.

The following narrative briefly summarizes the results of major projects undertaken during the 3-year period beginning July 1, 1973, and ending June 30, 1976, partially supported under Anadromous Fish Act funding.

Tenmile Lakes

The Tenmile Lakes' project began in 1968 when the Fish and Game commissions undertook a joint program to eradicate competing warmwater fish populations and enhance existing coho salmon and trout populations. The lake system was treated with rotenone in September 1968, primarily to remove stunted yellow perch, brown bullheads, and bluegills. Prior to treatment, native coho were salvaged, reared in Fish Commission hatcheries, and restocked as smolts the following spring.

Since 1968, we have monitored the fish populations in the lakes and collected data on the status of coho spawning in tributary streams and their progeny rearing in the lakes. Rotenone treatment was only partially successful. Yellow perch were eliminated, but both bluegill and brown bullhead populations reestablished.

A floating trap placed at a fixed site in South Tenmile Lake and fished each year between July and January has provided insight on "trend-through-time" changes that have occurred among surviving fish populations. Data collected from the trap indicate that populations of bluegills, brown bullheads, and prickly sculpins peaked 4 years after the lakes were treated, and have generally declined since 1972 (Table 3). The catch of bluegills reached 205.3 fish/net day in 1972 and declined to 46.3 fish/net day by 1975. The catch per unit of effort for brown bullheads rose to 170.7 fish/net day by 1972 and subsided to 14.3 fish/net day in 1975. The catch rate of brown bullheads in 1975 was similar to the catch in 1969 (14.2 fish/net day), 1 year after the lakes were treated. The Oregon Game Commission released largemouth bass into Tenmile Lake in 1971 to stem the increase of bluegills and provide a sport fishery. The bass reached a peak catch of 8.8 fish/net day in 1974, but declined to only 0.4 bass/net day in 1975. The largemouth bass catch primarily reflects the status of recruitment since only age 2 and younger bass were vulnerable to trapping gear. The peak catch of juvenile coho salmon occurred in 1971 (21.7 fish/net day). However, since 1971, the catch rate has progressively declined. From 1973 to 1975 the catch rate of coho was 0.9, 0.8, and 0.5 fish/net day each respective year. The low CPUE obtained for juvenile coho in 1974 and 1975 indicates few adults will return to spawn in 1976 and 1977. In recent years, the bulk of the coho captured in the trap consisted of recent emigrants entering the lakes from tributary streams during autumn freshets. The absence of juvenile coho in the trap during summer indicates nomad fry failed to survive after entering the lakes in the spring. Lake-reared juveniles formerly comprised the dominant type of freshwater life history among jack and adult coho salmon returning to the system. These observations and the trap data indicate the coho population may not regain former levels of abundance in the lake system.

Data collected from a trap placed at the outlet of Tenmile Lake revealed that coho smolt migration peaked between May 28 and June 3 in 1975, about 2 weeks later than in previous years. The average fork length of the migrants was 164 mm compared to 139 to 170 mm in 4 previous years.

Annual population estimates of spawning coho salmon were derived from standard stream surveys in the Tenmile Lakes watershed. An estimated 8,000 jacks and 13,000 adults spawned in 1973, 3,000 jacks and 4,500 adults returned in 1974, and the 1975 run was composed of 3,500 jacks and only 2,500 adults. Production by brood years was 16,500, 12,500, and 5,500 coho for the 1970, 1971, and 1972 broods, respectively. These runs were low compared to the average return of 36,500 during the past 26 brood years. The recent decline in the spawning populations reflects the related failure of juvenile coho obtained from standard index trapping in the lake system.

Average fork lengths of jacks ranged from 45.9 to 46.5 cm and adults ranged from 70.0 to 72.2 cm during the 3-year interval.

Floras Lake

Prior experimental releases of juvenile coho salmon into Floras Lake proved unsuccessful. However, physical and limnological data collected during initial phases of the study in 1972-73 indicated fall chinook might be adaptable to Floras Lake. To test the hypothesis, Floras Lake was stocked with 100,045 fingerling fall chinook from Elk River stock on June 11, 1973. The following year, 102,696 fingerling chinook were released on June 13, 1974. The chinook were marked with single fin clips prior to liberation. The primary purpose was to determine if significant numbers of fall chinook would survive, grow to smolt size during the summer, and migrate in the fall similar to natural populations in south coastal rivers.

The first group of fall chinook stocked into Floras Lake grew from 69 mm in June to 115 mm by late October 1973. In 1974, the fall chinook grew from 76 mm to 108 mm in the same interval. The growth rate of fall chinook in 1974 may have been affected by an influx of wild chinook in mid-summer that were absent the previous year. Wild chinook entered the lake from downstream populations after landowners altered streamflow patterns in New River below the lake outlet. Wild chinook comprised approximately one-third of the total chinook population in Floras Lake in 1974.

Insects were the most frequent food item found in stomach samples of juvenile chinook salmon collected in summer 1973, occurring in 78% of the stomachs examined. Opossum shrimp, *Neomysis mercedis*, and amphipods, *Corophium* sp., were identified in 42% and 36% of the stomachs, respectively. Cladocerans, water mites *(Hydracarina* sp.), and isopods were also ingested. Copepods were taken in plankton tows in Floras Lake but none were found in fall chinook stomach samples.

Each year we attempted to estimate the number of fall chinook migrants and survival rate of planted fingerlings by trapping marked smolts at the outlet of Floras Lake. Persistant vandalism to the trap and erratic currents in the lake outlet precluded obtaining valid estimates. However, lack of chinook in seine hauls in late autumn suggested the fish migrated by November each year.

Creel surveys were conducted in New River in 1973 and 1974 to estimate the sport catch of 1971-brood coho and 1972-brood chinook salmon reared in Floras Lake. In 1973, anglers fished 5,317 hours and landed 358 coho and 335 fall chinook salmon. Only 1% of the coho jacks harvested in 1973 were wild fish, the remainder originated from either fingerling plants (14%) or smolt releases (85%) in Floras Lake. In 1974, a creel census was conducted to estimate the catch of coho salmon adults (1971 brood) and jack chinook (1972 brood) returning from previous liberations in Floras Lake. Sportsmen harvested 51 adult chinook salmon with 2,716 angler hours of effort. The foredune blocking the mouth of New River opened late in the fall and many of the marked coho adults destined for Floras Lake entered Elk River in 1974. We were unable to determine the fate of jack chinook that were expected to return to Floras Lake.

Field work terminated at Floras Lake in 1975 because of reduction in funds and personnel transfers. No further releases of juvenile fall chinook are planned so long as wild juveniles continue to enter the lake in the summer months.

Fall Chinook Ecology

The ecology and life history of fall chinook salmon in Elk and Chetco rivers have been examined during the past 3 years. Major emphasis was placed on evaluating chinook reared at Elk River Hatchery and released into Elk and Chetco rivers during the past 7 years (Table 15) and the effects of the hatchery programs on wild stocks in these rivers. Rearing and release programs were designed to improve the survival of hatchery fish while minimizing possible adverse impacts on wild salmon populations. Most detailed studies were confined to Elk River, although several important aspects of the Chetco River program were investigated and compared with data collected from Elk River.

Table 15. Numbers of fall chinook released into Elk and Chetco rivers, by brood year

Brood year	Elk River		Chetco River	
	Number	Size range (fish/lb)	Number	Size range (fish/lb)
1968	321,032	6.8-15.7	333,024	15.3-19.7
1969	107,808	8.0	225,520	7.0-12.5
1970	678,417	12.7-47.0	68,330	14.6
1971	554,964	6.6-12.5	134,782	7.6
1972	436,166	5.0-37.4	354,004	9.1
1973	302,881	10.0-32.0	339,696	8.9-12.0
1974	270,976	10.6-11.2	318,908	9.9-17.9

Population estimates of fall chinook salmon were derived from tagging studies in Elk River during the 3-year interim. The estimates included both the wild and hatchery segments of the total run. The total hatchery run was subdivided into individual groups comprising former experimental releases from the hatchery. In 1973, 10 different groups returned compared to 12 in 1974 and 15 in 1975. The estimated populations were 12,638 in 1973, 9,488 in 1974, and 13,150 in 1975. Hatchery fish comprised 81.1%, 72.6%, and 73.1% of the total fall chinook run each successive year. Survival rates for 1968, 1969, and 1970 broods ranged from 0.31% for fingerlings released in June at 47.0 fish/lb to 5.75% for smolts released in October at 8.0 fish/lb. Since 1974, there has been a severe decrease in the number of hatchery-reared jacks

returning to Elk River while there has been no apparent reduction in the number of wild jacks entering the river. The reasons for the loss of hatchery jacks remains obscure, but the hatchery program may possibly be altering the maturity schedule of propagated chinook as second and third generation hatchery adults become incorporated into the egg take. The jacks have been routinely discarded in the hatchery program since egg takes began in 1968, but they may play an important role by contributing to the gene pool of natural spawning chinook.

Several different experimental projects were undertaken during the 3-year interim and others were completed. On three occasions, we liberated fingerling chinook salmon in June of their first year to study the effects of an early release from the hatchery. To be successful, the chinook needed to attain sufficient size to immediately migrate out of Elk River and avoid competition with wild chinook. The first group was selected from the largest fingerlings among the hatchery population and liberated on June 25, 1971, at an average size of 47 fish/lb. The fingerlings remained in Elk River longer than anticipated and migrated with wild fish in autumn. Total survival through age 5 amounted to only 0.31%. Analysis of scales taken from returning adults indicated survival was highest among the largest fingerlings released. In two subsequent experiments, the development of eggs and alevins was accelerated in heated water incubators. The initial results appeared promising since both groups attained larger sizes than fingerlings in the initial experiment and apparently migrated into the ocean soon after release. In June 1973, 102,785 were released at 37.4 fish/lb and the following year, 38,502 were liberated at 32 fish/lb. The final results of the latter two experiments should be known in 1977 and 1978.

In 1973, two groups of juveniles were placed on different feeding regimes to investigate the effects of smolt size on their survival and age at return to Elk River. One group (114,311 fish) was reared to 15.7 fish/lb, marked RP, and released in November 1973. The second group (121,642 fish) was reared to 8.0 fish/lb and marked LP prior to release with the first group. A third group (97,428 fish) was reared for an extended period, marked D-Ad-RP, and released as yearlings in March 1974 at an average size of 5.0 fish/lb. The yearlings will provide data on survival, changes in age at maturity, distribution, and contribution in offshore fisheries when smolts are held beyond their normal time of release. In 1974, we released 102,935 smolts marked RV from early run parents and 121,784 smolts marked LV from late run parents at Elk River Hatchery to determine if any differences result in the time of entry and survival of their offspring. Eggs were taken from age-3 and age-5 parents, reared separately in the hatchery, and given reciprocal fin marks (LV and RV) before they were liberated into Elk River in October 1975. Age at maturity and survival will be obtained from the two groups to learn if any advantages might exist by selectively spawning either age group of parents. The survivors of known age parents may also provide the initial nucleus for selective breeding experiments at Elk River.

Beginning with the 1969 brood, we released three successive broods marked with unduplicated double fin marks to determine the contribution and distribution of Elk and Chetco River stocks in offshore fisheries. The results from marked 1969-brood chinook released at Elk River Hatchery were compiled after 6-year-old adults returned in 1975. The experiment involved 107,808 smolts

released on October 21, 1970, at an average size of 8.0 fish/lb. The total catch was 4,854 fish spread from Alaska to San Francisco, California. Oregon commercial and ocean sport fisheries landed 2,771 chinook or 72.8% of the total known ocean catch of Ad-LM-marked fish and recreational fishermen harvested 1,048 chinook in Elk River. The total escapement in Elk River was 5,157 fish and catch plus escapement totalled 10,011 chinook or 9.3% of the 107,808 smolts released from Elk River Hatchery.

Hatchery-reared fall chinook released into Elk and Chetco rivers have attracted a growing number of anglers to both rivers. Creel census surveys were conducted in both rivers in 1973, 1974, and 1975. In 1973, the fishing seasons terminated November 30; however, in 1974 and 1975 the seasons were extended through December to increase the harvest of late run hatchery adults. Anglers harvested an estimated 2,435 fall chinook in Elk River during the 1973 season, expending 14,075 angler hours of effort. The adult catch was 365 fall chinook. In 1974, 2,479 fall chinook were taken by anglers and the effort increased to 39,844 angler hours. Nearly 56% of the total effort occurred during the extended season in December. The adult catch dramatically increased to 2,149 fish with 37.7% taken in December. Sports fishermen caught 3,601 fall chinook in 1975 and 23.4% of the total catch occurred in December. The adult catch was again impressive, totalling 2,760 fish. Angling effort rose to 52,365 hours in 1975, the highest yet attained in Elk River. Hatchery-reared fall chinook comprised about 81% of the total angler catch during the 3-year period.

In 1973, an estimated 1,739 fall chinook were harvested from the Chetco River by sports fishermen. The total effort was 20,750 angler hours. Hatchery fish accounted for 57% of the total catch. Chetco River fishermen landed 2,789 fall chinook in 1974 with 50,403 angler hours of effort. Only 12% of the chinook (346 fish) were caught with 30% of the total effort during the extended season in December, primarily because most of the fishing effort was directed toward steelhead trout. In 1975, effort increased to 52,747 angler hours and the total catch reached 3,072 fall chinook from the Chetco River. However, contrary to the results from Elk River, only 2% of the total catch occurred during December even though 27% of the effort was expended during the month. About 59% of the total catch was composed of hatchery chinook released into the Chetco River. The creel census showed that hatchery-reared fall chinook have played a significant role in supporting sport fisheries in both Elk and Chetco rivers.

Besides extending the sport fishing season to harvest more hatchery adult fall chinook salmon, the troll salmon season was also extended 2 months through November and December to accomplish the same goal. The troll season was first extended in 1974 in narrowly defined fishing zones off the mouths of Elk and Chetco rivers. In 1974, commercial landings during the season extension totalled 34,856 lbs or about 1,896 fall chinook with a dockside value of $35,000. A high incidence of fin marks in the landings indicated the catch was almost entirely composed of Elk and Chetco River chinook stocks. Approximately 16,000 lbs were landed from both zones in 1975. However, final estimates of the poundage, numbers, and proportion of hatchery fall chinook in the commercial catch will not be available until early in FY 1977.

Coastal Fall Chinook Stock Assessment Project

The Coastal Fall Chinook Stock Assessment Project began in 1974 when a series of experiments was designed to determine if the offshore distribution of Elk, Chetco, and Trask River fall chinook stocks changes if reared and released outside of their natal rivers. Prior studies demonstrated that Elk and Chetco stocks contributed a high proportion of the total offshore catch to Oregon's coastal ports compared to Trask River fall chinook released at Tillamook Bay. Trask River fall chinook apparently migrate north of Oregon and primarily enter southern Alaskan, British Columbia, and Washington fisheries.

Alsea River Salmon Hatchery and Coos Bay were chosen for the initial experiment using 1973-brood fall chinook. Alsea Hatchery lies midway between Elk River on the southern Oregon coast and Trask Hatchery on the north coast. In 1974, 38,883 Trask River chinook and 38,030 from Elk River were reared at Alsea Hatchery, differentially tagged with coded wire, and released. Tagged controls (36,519 Trask and 39,660 Elk stock) were released at each donor hatchery. We released 153,092 fall chinook smolts implanted with coded wire tags in 1974 (1973 brood). Elk and Chetco stocks of fall chinook were selected for experiments at Coos Bay. Smolts were given reciprocal paired fin marks (Elk stock Ad-RV, Chetco stock Ad-LV) prior to liberation. In October 1974, 109,985 Elk River smolts and 99,609 Chetco River smolts were released into the upper Coos Bay estuary above the confluence of Coos and Millicoma rivers.

In 1975, replicate tagged fall chinook smolts were released at Alsea Hatchery (Trask vs. Elk stock) and into Coos Bay (Elk vs. Chetco stock). Appropriate controls were simultaneously liberated at each donor hatchery. However, the initial experiment was expanded to test Trask vs. Chetco stocks of fall chinook at Klaskanine Hatchery situated on the lower Columbia River. The tests at Klaskanine Hatchery will provide additional comparison of ocean distribution from stocks released at two geographically diverse localities since control lots of tagged smolts were also liberated in Chetco River on the extreme southern Oregon coast and at Trask Hatchery. In recent years, the Oregon Department of Fish and Wildlife has authorized a special gill-net fishery in Youngs Bay to harvest surplus hatchery-reared coho salmon returning to Klaskanine Hatchery. One or both stocks of fall chinook may significantly enhance the commercial catch in Youngs Bay.

We released 286,417 fall chinook smolts tagged with coded wire in 1975 (1974-brood year). Nine distinctively tagged groups were distributed between Klaskanine, Trask, Alsea, Coos, Elk, and Chetco rivers. The number of tagged chinook in each group ranged from 23,616 to 39,150. Tag loss prior to liberation ranged from 3.1 to 32.4% and averaged 14.9% among the nine experimental groups. The smolts were liberated in October ranging in size from 9.4 to 11.2 fish/lb, except at Klaskanine Hatchery and Chetco River where the smolt release was delayed until mid-November 1975. The smolt release at Klaskanine Hatchery was delayed until water temperatures in the Columbia River subsided below 50 F to avoid major losses from *Ceratomyxa* prevalent in lower Columbia River water.

Forty-six tag recoveries from 1973-brood fall chinook were reported by Pacific Coast fishery agencies in 1975. Tag recoveries were reported from smolts released at Trask, Alsea, and Elk River hatcheries. Tagged chinook were primarily recovered in Washington sport and Canadian commercial seine fisheries during the first year. More extensive tag recoveries are expected in the summer of 1976 when the chinook attain sufficient size to enter a greater array of Pacific Coast fisheries.

Salmon River Project

Construction of the Salmon River Hatchery is scheduled for completion in July 1976. Late in FY 1975, a new research project was designed to develop and evaluate a salmon rearing program for the hatchery. Primary emphasis was placed on field studies associated with juvenile salmonid ecology and life history in FY 1975. Seining at estuarine, river, and tributary stations provided data on the distribution and relative abundance of salmonids and associated species within the Salmon River watershed. Environmental measurements began in the estuary and selected freshwater sites.

During FY 1976, the long-term goals and objectives of the project were more rigorously outlined. Field work was expanded to include tagging and sampling of adult salmon populations entering Salmon River. Surveys were initiated to delineate the timing and distribution of spawning adults. Juvenile salmonids continued to be sampled on a regular basis during the year. Considerable progress was made in the design and adoption of field data forms for efficient recording, summarizing, sorting, and retrieval of information collected during the course of the project.

Shad and Striped Bass

Both American shad and striped bass were landed by commercial shad fishermen from 1973 to 1975. The fish were netted from the Siuslaw, Smith, Umpqua, Coos, and Coquille rivers. The 1973 Oregon Legislature designated striped bass a game fish and directed the Fish Commission to reduce the incidental catch in shad nets. Subsequently, the commission enacted regulations prohibiting nets in Coos Bay (Coos and Millicoma rivers remained open to commercial fishing) and shortened the season by setting April 20 to June 21 fishing dates rather than April 1 to July 1 in effect prior to 1974. The season remained unchanged in the other four rivers, opening May 10 and closing July 1 each year. A maximum mesh breaking strength of 30 lbs went into effect in 1975, followed by a 21 lb maximum in 1976. The 1975 Oregon Legislature eliminated any further harvest of striped bass by enacting legislation prohibiting their commercial harvest during shad netting seasons effective in 1976.

Approximately 107 to 150 set nets were registered to fish shad in coastal rivers since 1973. Forty-eight drift nets were licensed in 1973, but beginning in 1974, fishermen were no longer required to license or register drift nets. Fishermen were restricted to fishing drift nets in the Umpqua River; whereas, most shad fishermen employed set nets on the remaining rivers open to commercial fishing.

Commercial landings totalled 270,493 lbs of shad and 39,517 lbs of striped bass in 1973. In 1974, landings declined to 208,367 lbs of shad and 35,151 lbs of striped bass. Commercial fishermen landed 231,483 lbs of shad and only 17,935 lbs of striped bass in 1975. In comparison, the 10-year average landings (1966-75) were 397,458 lbs of shad (range: 208,367-550,083 lbs) and 40,948 lbs of striped bass (range: 17,935-67,084 lbs) from coastal rivers. The decrease in striped bass landings reflect the recent changes in regulations and the downward trend of the dominant 1966-brood year in the Umpqua River and lack of a significant dominant brood since 1958 in Coos Bay.

Biological samples were taken from the commercial landings in 1973 and 1974. Age composition, age at first spawning, and number of spawning migrations were determined from shad scale samples collected from each river. The age composition, relative strengths of individual brood years, and average weight data were compiled from striped bass landed in the Umpqua and Coos River fisheries. Basic statistics on the biological structure of shad and striped bass populations, landing trends, and fishing effort provided necessary perspectives in managing the fisheries and judging the probable effects of altering commercial fishing regulations.

Post Office Box 3503
Portland, Oregon 97208