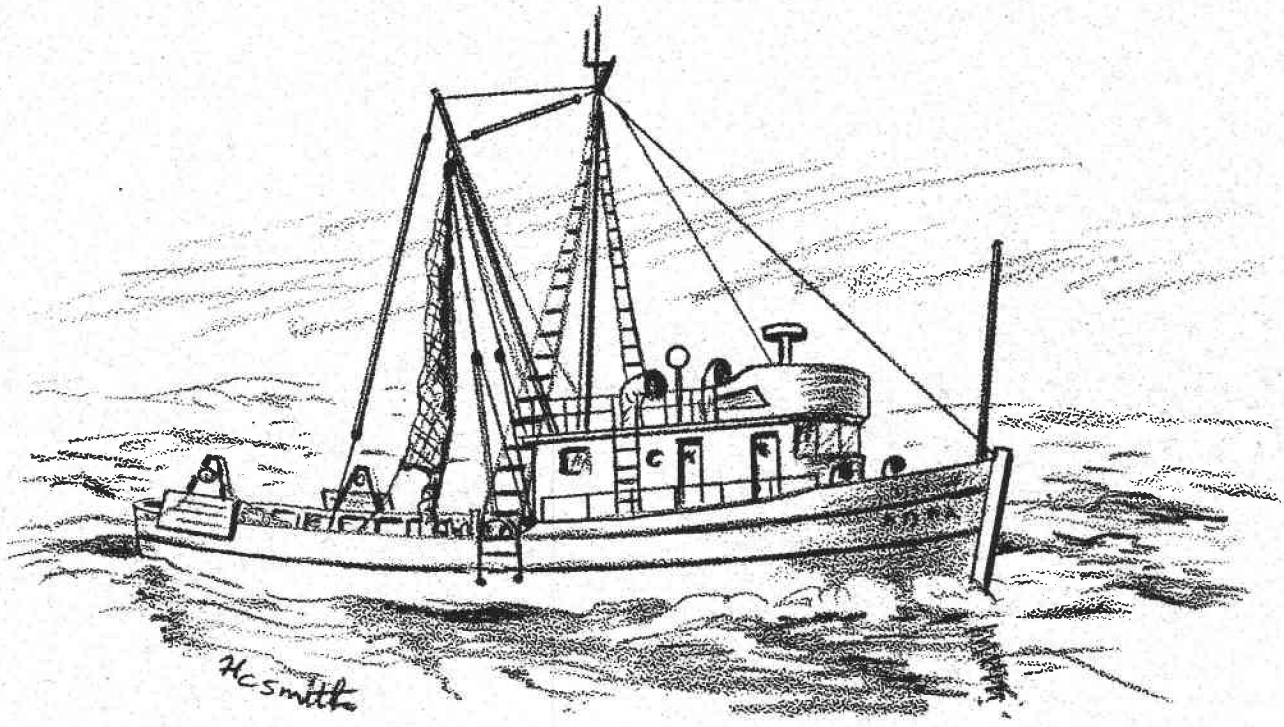
1976 ANNUAL REPORT



fisheries

OREGON
Fish & Wildlife

1976 ANNUAL REPORT

fisheries

JOHN R. DONALDSON
Director

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

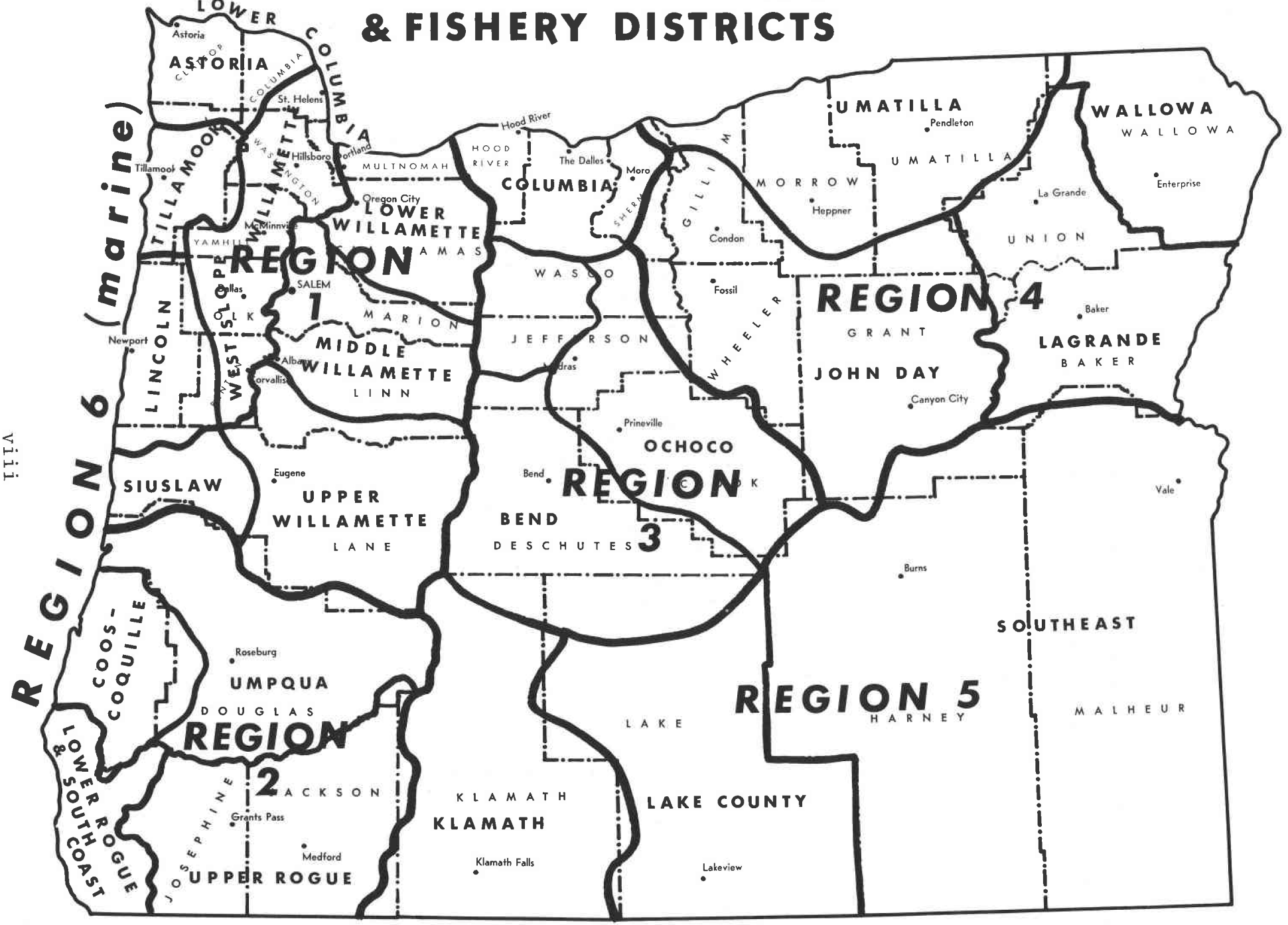
TABLE INDEX

TABLE INDEX
(Continued)

TABLE INDEX
(Continued)

TABLE INDEX
(Continued)

ADMINISTRATIVE REGIONS & FISHERY DISTRICTS



INTRODUCTION

The 1976 Annual Report presents activities of the Fish Division and fish-related activities by other sections of the Department for the period January 1, 1976, through December 31, 1976.

The number of angling licenses issued in 1976 totaled 806,167 (571,541 annual and 234,626 daily), above the 784,476 licenses (598,571 annual and 185,905 daily) issued in 1975. The number of commercial fishing licenses issued increased from 5,566 in 1975 to 5,990 in 1976 and the number of commercial boat licenses issued increased from 3,067 in 1975 to 3,452.

The 1976 recreational salmon fishery harvested an estimated 656,374 salmon, a record catch. The high catch was due entirely to the large number of coho taken in the ocean fishery. The inland salmon catch was comparable to the 1975 catch level, but was still 41,000 fish below the past 10-year average catch. The decline can be attributed to the low return of adult spring chinook into the Columbia River and low flows in coastal streams during the fall and winter months.

The ocean troll salmon fishery experienced an excellent year as over 2 million salmon were landed in Oregon. A record coho catch and an above average catch of chinook accounted for the success.

The recreational steelhead catch of 118,275 fish was below both the 1975 catch and the past 10-year average catch. The decline was due to a poor return of summer steelhead into the Columbia River and to below average returns of winter-run fish to the Columbia River and coastal streams. Low winter stream flows along the coast also affected the catch as fish could not enter many streams until late in the year.

Angling for resident game fish (trout and warm-water) provided considerable enjoyment. The various trout populations remained generally capable of supporting the intensive recreational fishery. Angler demand for warm-water game fish continued to increase.

Nongame marine food fish landings by the trawl fishery totaled over 25 million lb., the highest catch since 1966. Shrimp landings reached a new record high of 25.4 lb. The commercial crab harvest of 9.1 million lb. was almost threefold higher than annual landings in the 1973-75 low cycle years and represented the expected recovery of crab abundance.

In an effort to maintain existing fishery habitat, district biologists investigated almost 2,900 water-related activities such as channel changes, forest practices, and pollution and took action necessary to protect fishery resources. Several chemical treatment projects were conducted to control undesirable fish populations. A number of projects were undertaken to improve fish passage. Construction, operation, and maintenance of fish screens at water diversions remained a major activity.

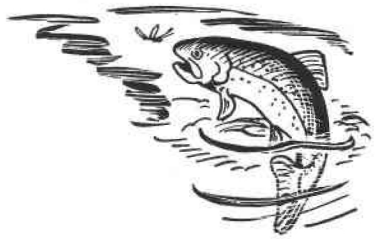
The Department operated 32 fish hatcheries and four salmon rearing ponds during the year. Over 76 million fish were released from these facilities to carry out management objectives. Fish health was monitored by the Technical Services Section.

The Research Section continued studies to provide information which forms the base to manage the fish resources.

The Environmental Management Section spent considerable time reviewing environmental impact statements and applications for state and federal permits to perform work which would impact fish habitat. They also cooperated with federal agencies in planning for fish protection at federal projects.

The Fish Division's organizational structure contains two main staff sections--management and fish culture. A planning section charged with developing comprehensive long-range plans for both recreational and commercial fisheries is also part of the Division. The headquarters staff works closely with the six regional supervisors, 23 district fishery biologists, fish culture personnel, and other sections and divisions in the Department.

Cooperation and assistance from individuals, groups, and other public agencies contributed to the success of the Division's programs. Federal agencies making substantial contributions included the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Bureau of Land Management, U.S. Forest Service, Soil Conservation Service, and Bureau of Reclamation. The State Environmental Quality, Oregon State University, and various branches of city and county governments were but a few of the local agencies providing valuable assistance.



ANADROMOUS FISH

Oregon's anadromous fish include five species of salmon (chinook, coho, chum, sockeye, and pink); summer and winter steelhead; coastal cutthroat trout; shad; striped bass; and smelt. Sturgeon, migratory but not anadromous, are also managed with this group. A brief status of the individual stocks of anadromous fish and the 1976 recreational and commercial harvests of these stocks are discussed in this section. Detailed reports on the individual fish runs, particularly Columbia River runs, can be found in other Department reports.

Status of individual stocks is often difficult to assess as the number of fish spawning in a certain stream is not known and cannot be readily estimated. However, some indices of their abundance can be determined from counts of fish at tributary dams, hatcheries, and spawning fish surveys and from sport and commercial catch estimates.

Estimates of the 1976 recreational catch were determined from: (1) Salmon-Steelhead catch card returns, (2) sales of Daily Angler licenses (ocean only), and (3) creel sampling programs. A statewide Oregon Angler Survey conducted in 1975 by the Survey Research Center and Department of Statistics at Oregon State University was also used to provide catch information where sampling programs have not been conducted.

In 1976, 291,160 anglers purchased Salmon-Steelhead tags and an additional 74,652 anglers bought one or more Daily Angler licenses to fish for these species (Table 1). Fifty-three percent (195,373) of the licensed anglers were successful in catching a salmon or steelhead, 21% (76,690) fished but failed to catch a fish, and 26% (93,749) did not fish. Table 2 shows the number of cards issued, percentage of cards returned, and the salmon and steelhead catch for the years 1966-76.

Statistics on the commercial catch were obtained from landings reported by Oregon fish buyers. The Department issued 5,990 commercial fishing licenses and 101 Fish Buyer licenses in 1976. It is impossible to determine the number of commercial fishermen who fished for anadromous fish because many fish for one or more species of fish or shellfish.

Status of the individual stocks of fish and the recreational and commercial harvests of these stocks are discussed by area or stream within or bounding the state. Angler catch is reported by run-year (year that most fish of a specific run enter fresh water to spawn) rather than by calendar year, which sometimes results in combining the catch from two different years.

Table 1. Estimated catch of salmon and steelhead and angler success by category, 1976.

	Salmon	Steelhead	Total
Number of anglers buying Salmon-Steelhead tags			291,160
Number of anglers buying daily licenses for salmon and steelhead angling 1/			74,652
			365,812
Percentage of Salmon-Steelhead tags returned			19.78
Number of anglers not fishing			93,749
Number of anglers fishing for salmon or steelhead			272,063
Percentage of licensed anglers fishing			74.4
Number of unsuccessful anglers			76,690
Number of successful anglers	171,734	44,247	195,373
Number of fish caught	656,374	118,275	774,649
Number of fish caught per angler fishing			2.8
Number of fish caught per successful angler	3.8	2.7	4.2

1/ Daily license holders were not required to purchase a Salmon-Steelhead Tag.

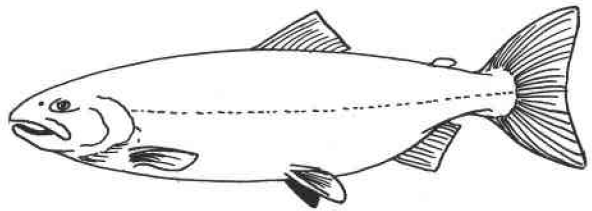
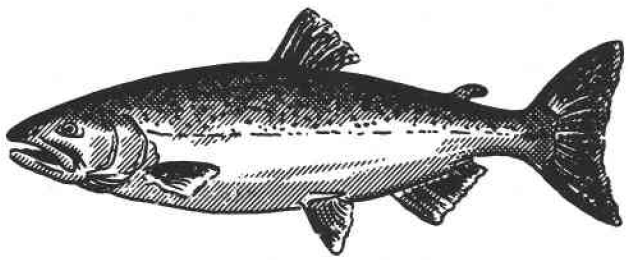


Table 2. Salmon-Steelhead Tag return data and estimated salmon and steelhead catch, 1966-76.

Year	Cards Issued[1/]	Percent Cards Returned	Salmon Catch	Steelhead Catch	Total Catch
1966	288,197	23.48	287,200	168,083	455,283
1967	326,410	20.09	456,896	134,040	590,936
1968	312,063	22.09	350,113	153,909	504,022
1969	327,424	23.96	348,793	130,219	479,012
1970	353,183	21.27	422,382	164,778	587,160
1971	360,563	21.69	463,679	197,549	661,228
1972	381,235	14.80	403,010	157,907	560,917
1973	426,866	21.18	406,618	162,191	568,809
1974	417,598	21.60	465,045	166,789	631,834
1975	407,864	18.97	415,928	186,450	602,378
1976	406,542	19.78	656,374	118,275	774,649
Average 1966-75			401,966	162,191	564,158

1/ Starting with 1972, this includes Daily Angling licenses (in one-day equivalents) purchased for salmon or steelhead angling.



SALMON

COLUMBIA RIVER STOCKS

Runs of adult salmon entering the Columbia River in 1976 were generally poor. As in 1974 and 1975, all runs destined for the Snake River and upper Columbia River drainages were again low. Upriver spring chinook, summer chinook, and sockeye runs were again record or near-record lows. The coho run was also below average despite record ocean catches. Only the fall chinook run was above average, being a record minimum run since 1950. Severe restrictions to the commercial and recreational fisheries were necessary to protect the depressed runs of upriver salmon and to comply with federal court requirements.

Counts of salmon at Columbia River dams, in spawning tributaries and at Oregon hatcheries are shown in Table 3. The 1976 counts are compared with the past 5-year average counts as an index of abundance of the various stocks.

Oregon anglers caught an estimated 29,581 salmon in the Columbia River and its tributaries in 1976, the second lowest catch recorded during the past 10 years. The poor catch was due primarily to poor returns of spring chinook for the third consecutive year.

Columbia River fish runs are classified as either lower river (below Bonneville Dam) or upriver (above Bonneville Dam) in origin. Runs destined for lower river tributaries are commercially harvested primarily by nontreaty fishermen while those destined for upriver tributaries are harvested by both treaty and nontreaty fishermen. As a result of a 1968 U.S. Supreme Court decision that affirmed the authority of the states to regulate treaty Indian off-reservation fishing, an exclusive commercial treaty fishery zone was established between Bonneville and McNary dams. The area below Bonneville Dam is open to all commercial fishermen.

Catch records of the commercial fishery on lower river stocks are summarized in Table 4 and catch records on upriver stocks are summarized in Tables 5 and 6.

A 1975 federal court decision required the states of Oregon and Washington to allocate to the Indian fishery 50% of the harvest by those states of all fish runs destined for usual and accustomed Indian fishing areas. In order to comply with this court order during 1976, the states attempted to reduce the catch in the ocean and lower Columbia River while, at the same time, attempting to distribute the permissible catch of these fish among the nontreaty user groups.

Spring Chinook

Status: The 1976 upriver spring chinook run of 63,900 adult fish was a record low for the third consecutive year. The escapement of 20,400 adults over Ice Harbor Dam and into the Snake River was well below the past 5-year average count of 34,540 fish and the escapement goal of 40,000 fish.

The low adult returns during 1974-76 were attributed to high losses of juveniles migrating downstream from the Snake River during 1972-73. In 1972, a high water flow year, fish were subjected to high levels of nitrogen supersaturation; while in 1973, a low water flow year, there was no spill at the dams and juveniles suffered high mortality passing through the turbines.

Table 3. Indices of abundance of adult salmon in the Columbia River and its Oregon tributaries during 1976 and past 5-year averages.

Index	Spring Chinook		Fall Chinook		Coho	
	1976	Average (1971-75)	1976	Average (1971-75)	1976	Average (1971-75)
DAM COUNTS						
Columbia River						
Bonneville	63,900	120,100	228,700	147,980	35,500	35,640
Ice Harbor	20,400	34,540	1,100	5,560	840	1,120
Willamette River						
Willamette Falls	21,031	34,340	29,269	21,030	2,333	8,000
North Fork	433	350			1,132	1,730
Foster	941	2,860			20	100
Leaburg	1,833	2,690				
Fall Creek	1,805	1,440				
HATCHERIES						
Columbia River						
Klaskanine					2,343	2,090
Big Creek			10,379	8,720	2,176	2,430
Sandy					8,409	5,660
Bonneville Complex			30,968	15,050	13,682	24,910
Willamette River						
Marion Forks	727	1,480				
South Santiam	3,333	3,000				
Willamette	2,251	4,790				
FISH TRAPS						
Deschutes River						
Pelton Trap	180	400				
SPAWNING FISH COUNTS						
Snake River System	Peak Spawning Fish Counts [1]					
Imnaha	172	446				
Grande Ronde (Upper)	14	33				
Wallowa					48	28
Lostine	76	153				
Minam	25	82				
Catherine Creek	82	134				
Wenaha	9	79				
Bear Creek	13	23				
Lookingglass Creek	13	36				
John Day System						
N. Fk. John Day	26	122				
Granite Creek	53	175				
Lower Columbia Tributaries						
McKenzie (Willamette River)	6.4 [2]	7.0 [2]				
Big Creek			510	1,173		
Gnat Creek			35	268		
Plympton Creek			656	408		
Coho Tributaries					17	46

1/ Count includes both adults and jacks.
2/ Redds per mile.

Table 4. Commercial catch (in thousands of fish) of lower Columbia River stocks of salmon below Bonneville Dam, 1966-76.

Year	Chinook		Coho	Chum
	Spring	Fall		
1966	4.1	33.8	414.2	0.9
1967	6.8	36.9	365.5	0.9
1968	8.7	99.0	104.6	0.3
1969	8.6	78.3	187.4	0.3
1970	12.5	102.8	453.9	0.6
1971	13.4	122.1	232.5	0.5
1972	15.8	43.4	110.7	1.3
1973	17.2	165.3	173.4	1.4
1974	13.3	44.7	240.9	0.9
1975	9.1	77.4	150.1	0.5
1976	4.7	114.2	163.3	1.2
Average 1966-75	10.9	80.4	243.3	0.8

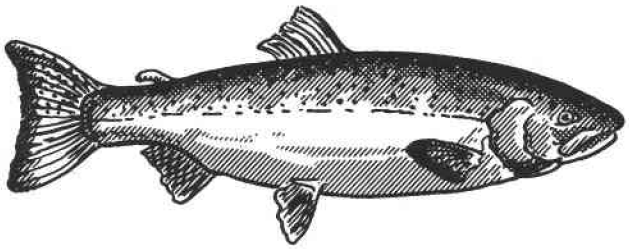


Table 5. Commercial catch (in thousands of fish) of upriver Columbia River stocks of salmon below Bonneville Dam, 1966-76.

Year	Chinook			Coho 1/	Sockeye
	Spring	Summer 2/	Fall		
1966	38.3	0.0	112.4	0.7	0.2
1967	33.0	0.7	121.9	1.7	21.2
1968	13.1	1.4	50.6	10.3	20.3
1969	30.7	1.6	108.0	1.4	16.2
1970	31.4	3.1	149.6	33.5	13.0
1971	22.6	4.5	93.8	15.9	54.9
1972	69.9	3.2	96.3	9.8	51.8
1973	60.5	1.2	105.4	5.1	2.3
1974	8.4	0.0	52.2	10.1	0.0
1975	0.0	0.0	95.9	3.3	0.0
1976	0.0	0.0	33.3	1.2	0.1
Average 1966-75	30.8	1.6	98.6	9.2	18.0

1/ Based on one-half the early fall season catch.
2/ Incidental catch made during the open shad and sockeye seasons.

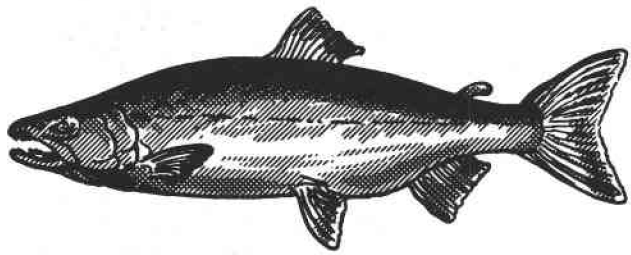
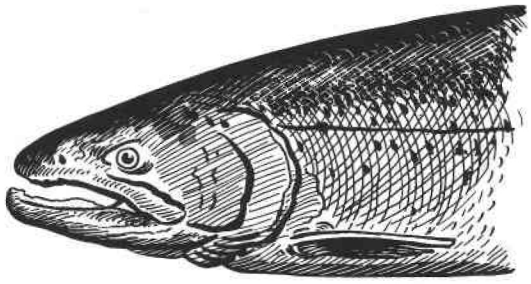


Table 6. Commercial catch (in thousands of fish) of upriver Columbia River stocks of salmon and steelhead by Indians fishing above Bonneville Dam, 1966-76.

Year	Chinook			Coho	Sockeye	Summer Steelhead
	Spring	Summer 1/	Fall			
1966	2.3	1.1	9.0	8.3	4.2	3.1
1967	11.8	9.5	42.9	13.6	34.5	15.8
1968	16.0	2.1	29.1	7.6	5.0	9.4
1969	33.0	9.4	48.3	7.8	11.3	14.1
1970	14.0	4.0	39.1	15.5	4.1	13.2
1971	12.7	5.8	56.5	13.1	21.3	25.7
1972	42.8	4.4	42.9	8.7	26.1	28.8
1973	34.1	2.0	67.9	11.1	1.4	26.8
1974	17.5	0.0	54.9	6.8	0.1	12.9
1975	0.0	0.0	140.6	5.7	0.0	7.0
1976	0.0	0.0	134.9	4.0	0.1	9.2
Average 1966-75	18.4	3.8	58.1	9.8	10.8	15.7

1/ Incidental catch made during the open shad and sockeye seasons.



Spring chinook spawning ground surveys in Oregon tributaries of the Snake River again revealed very low fish and redd counts. The 1976 spawning fish counts and past 5-year average counts are shown in Table 3.

The Willamette River spring chinook run was also below average. The count at Willamette Falls of 21,031 adult fish was well below the 5-year average of 34,340 fish for the second consecutive year. The number of adults returning to most Willamette River hatcheries was also below the past 5-year average.

Recreational Harvest: The spring chinook catch in the Columbia River system rose slightly from 17,539 fish in 1975 to 21,171 fish in 1976 (Table 7). Both the 1975 and 1976 catches were less than one-half the 1970-74 average of 50,463. The decline in catch can be attributed to low returns of adult fish and the resulting closure of the mainstem Columbia River to angling between March 31 and July 31 in order to protect adult fish destined for above Bonneville Dam. The sport catch in this area averaged over 20,000 fish between 1970-74; however, in 1975 and 1976 only 1,855 and 2,518 fish were caught. The catch in tributary streams also declined and reflected the poor return of adult fish.

Commercial Harvest: Lower river spring chinook, primarily Willamette and Cowlitz stocks, are harvested below Bonneville Dam during the winter gill-net season. In 1976, an 8-inch minimum mesh size restriction was imposed on the fishery to minimize the steelhead catch. The area above the mouth of the Willamette River was also closed to protect upriver spring chinook destined to pass Bonneville Dam. During the 5-day season from February 29 to March 5 approximately 4,700 chinook were caught, one-half of the past 10-year average catch of 10,900 fish (Table 4).

Upriver spring chinook are predominantly harvested during the spring commercial seasons both below and above Bonneville Dam. Due to the poor return of upriver fish in 1976 no spring seasons were allowed. However, a few upriver fish were caught during the winter gill-net season for lower river spring chinook and during the Indian winter set-net season.

Summer Chinook

Status: The summer chinook is the most threatened race of all chinook salmon present in the Columbia River. The run size has steadily declined since 1957 and the 1976 run of 42,100 fish was the second poorest on record. Spawning areas have been blocked and inundated, rearing areas have deteriorated, high smolt mortality has occurred at hydroelectric dams, and high prespawning losses of adults due to upstream passage stress have all contributed to the declining runs.

Table 7. Sport catch of spring chinook salmon in the Columbia River system, 1967-76. 1/

Stream	Run Year									
	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Columbia River System										
Calapooya River	0	16	0	27	13	17	4	11	0	7
Catherine Creek	101	36	44	4	30	11	124	0	0	0
Clackamas River	567	592	525	789	995	1,322	250	963	701	585
Columbia River (Lower)	23,200	15,700	17,500	28,800	18,700	23,000	26,452	10,578	1,855	2,518
Columbia River (Upper)	1,600	600	500	700	174	653	1,010	199	18	16
Deschutes River	848	989	1,686	2,124	1,700	3,481	4,804	1,344	402	811
Eagle Creek (Clackamas)	-	-	-	-	-	-	60	115	24	32
Grande Ronde River	73	97	78	50	17	17	18	0	0	0
Imnaha River	31	116	46	48	26	45	96	0	0	0
John Day River	156	49	12	42	16	38	117	24	8	11
McKenzie River	1,276	970	850	521	617	1,125	1,510	1,022	461	139
Minam River	18	26	123	63	4	6	7	0	0	0
Molalla River	56	29	33	17	7	24	39	3	12	0
Sandy River	77	39	120	146	92	142	36	36	0	159
Santiam River	803	728	998	1,582	1,320	597	698	698	278	53
Santiam River, N. F.	-	-	-	-	-	-	-	-	167	48
Santiam River, S. F.	-	-	-	-	-	-	-	-	44	80
Snake River	39	49	27	19	4	0	30	0	0	0
Wallowa River	25	33	65	10	4	0	29	0	0	0
Wenaha River	11	23	53	16	36	0	8	0	0	0
Willamette River	16,216	16,531	22,669	21,446	25,740	20,924	16,128	28,599	13,569	16,712
Total	45,097	36,623	45,329	56,404	49,495	51,402	51,420	43,592	17,539	21,171

1/ Estimates from 1971 on are corrected for bias.

Recreational Harvest: No recreational harvest of summer chinook was allowed in 1974, 1975, or 1976.

Commercial Harvest: Commercial seasons for summer chinook have not been set since 1964; however, a few fish are taken incidentally in the shad and sockeye fisheries both below and above Bonneville Dam. Although a shad season was established below Bonneville Dam in 1976, summer chinook were not allowed to be landed. An estimated 500 summer chinook were handled during the fishery of which 150 were mortalities. A minimum of 600 fish were taken incidental to a treaty shad season above the dam. Additional fish are taken by treaty ceremonial and subsistence fishermen.

Fall Chinook

Status: Fall chinook destined for tributaries below Bonneville Dam enter the river from late August through October. The 1976 estimated lower river run of 204,900 fish was above the 1971-75 5-year average of 163,600 fish. A total of 10,379 adults returned to Big Creek Hatchery and 30,698 adults to the Bonneville Hatchery complex. The Bonneville returns were double the 5-year average. The Willamette Falls fishway count of 29,269 adults was similar to the 1974 and 1975 counts, indicating the continued importance of this introduced and newly developed run.

The upriver fall chinook run enters the Columbia River during August with peak passage over Bonneville Dam occurring in early September. The 1976 Bonneville count of 228,700 adults was significantly greater than the past 5-year average count of 147,980 fish. Adult escapement past all fisheries was about 107,300 fish which fell within the escapement goal of 90,000-110,000 fish. Counts of fall chinook passing over dams in the upper Columbia and Snake rivers were poor in comparison to the Bonneville count. The contribution of the USFWS Spring Creek Hatchery in Washington, as evidenced by a return of over 16,000 chinook, was a major factor in producing the above-average 1976 upriver run.

Recreational Harvest: The fall chinook sport catch in the Columbia River and its tributaries has steadily declined from about 15,000 fish in the early 1970's to 3,347 fish in 1976 (Table 8). A possible contributing factor to the declining catch is a decline in the abundance of bright upriver fish which have a tendency to bite better and are preferred by anglers over the darker, lower river race commonly called "tules."

Commercial Harvest: Lower river fall chinook are harvested by the nontreaty gill-net fishery below Bonneville Dam during September and October. The late fall season again opened in three stages in 1976 in order to reduce the catch of upriver chinook and

Table 8. Sport catch of fall chinook salmon in the Columbia River system, 1967-76. 1/

Stream	Run Year 1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Columbia River System										
Big Creek	1,175	663	997	1,540	363	34	77	230	5	21
Clackamas River	244	420	750	1,691	497	234	53	200	54	153
Clatskanie River	70	74	99	7	0	51	5	66	0	0
Columbia River (Lower)	11,142	8,147	6,771	9,996	9,671	6,801	4,445	1,305	1,289	1,127
Columbia River (Upper)	900	300	300	600	589	417	358	274	578	333
Deschutes River	1,057	2,410	2,562	2,283	1,823	697	514	605	215	615
Eagle Creek (Clackamas)	-	-	-	-	-	-	247	149	0	0
Gnat Creek	4	6	54	439	276	1,035	273	11	167	230
Grande Ronde River	77	60	68	63	16	0	0	0	0	0
John Day River	66	16	50	27	36	50	32	74	36	60
Klaskanine River	882	575	685	133	206	18	25	122	1	0
Lewis and Clark River	4	10	3	0	19	17	4	8	0	0
Sandy River	493	920	707	2,715	427	71	112	477	76	94
Santiam River	0	36	9	27	0	53	353	30	363	320
Santiam River, N. F.	-	-	-	-	-	-	-	-	198	-
Santiam River, S. F.	-	-	-	-	-	-	-	-	107	217
Scappoose Creek	0	0	27	0	10	0	7	0	0	0
Snake River	38	74	93	70	4	6	0	0	0	0
Willamette River	261	161	620	334	300	356	42	98	434	177
Total	16,413	13,872	13,795	19,925	14,237	9,840	6,547	3,649	3,523	3,347

1/ Estimates from 1971 on are corrected for bias.

steelhead which had not yet passed over Bonneville Dam. The season opened September 7 below Tongue Point, September 12 below the Interstate Bridge at Vancouver, and September 19 in the entire below-Bonneville area. The season closed on November 12. The 1976 harvest of 114,200 chinook was nearly 35,000 fish above the past 10-year catch average (Table 4).

The commercial harvest of upriver fall chinook by the nontreaty gill-net fishery occurs during August. The 1976 catch of 33,300 chinook was one-third the past 10-year average catch of 98,600 fish (Table 5). The reduced catch was due to an early season closure adopted to provide more fish to the treaty Indian fishery in compliance with a federal court order.

The 1976 fall season for treaty fishermen above Bonneville Dam opened on August 8 and ran until October 15. The Indian fishery harvested 134,900 fall chinook. This was the second consecutive year the catch was more than double the previous 1973 record catch of 67,900 fish (Table 6).

Coho

Status: The 1976 minimum Columbia River coho run was estimated to be 370,600 fish, well below the past 10-year average of 574,880 fish. Improved fish cultural techniques are believed responsible for the increased coho runs beginning in the mid-1960's; however, variable juvenile survival and increasing ocean fisheries have resulted in significant fluctuations in the run size in recent years. The Bonneville Dam count of 35,500 adult coho was similar to the 5-year average count of 35,640 fish but declining from counts in the late 1960's and early 1970's. The Willamette Falls fishway count of 2,333 adults was well below the recent average of this introduced run. Adult returns to Oregon Columbia River hatcheries were about average at all hatcheries except Bonneville where the return was one-half of average. Spawning fish counts of wild coho in tributaries of the lower Columbia increased over the 1975 level but continued well below past levels.

Recreational Harvest: The 1976 sport catch of 5,063 coho in the Columbia River system was slightly above average (Table 9). Coho do not contribute significantly to the freshwater sport fishery as adults do not bite well once they enter fresh water.

Commercial Harvest: The commercial harvest of coho in the Columbia River occurs from late August to early November primarily below Bonneville Dam. The 1976 harvest of lower river coho was 163,300 fish, well below the past 10-year average catch of 243,300 fish (Table 4). The poor catch was attributed to an increased ocean catch and the late season opening.

Table 9. Sport catch of coho salmon in the Columbia River system, 1967-76. 1/

Stream	Run Year 1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Columbia River System										
Bear Creek	0	0	6	11	4	-	-	-	0	0
Big Creek	115	221	142	142	198	170	95	230	98	137
Calapooya River	0	4	0	13	0	17	0	0	0	0
Clackamas River	535	1,323	920	821	1,685	1,607	232	200	402	723
Clatskanie River	34	20	42	7	63	29	74	66	56	19
Columbia River (Lower)	3,234	2,017	2,016	2,926	2,662	3,287	1,491	536	447	517
Columbia River (Upper)	24	17	15	29	18	18	17	10	22	13
Deschutes River	10	22	27	30	52	61	64	55	20	58
Eagle Creek (Clackamas)	-	-	-	-	-	-	1,330	149	461	1,257
Gnat Creek	0	0	0	7	75	33	32	11	8	0
Grande Ronde River	7	24	26	4	3	82	53	3	0	0
Hood River	13	6	22	40	29	27	18	30	46	52
John Day River	21	0	25	44	43	0	0	0	0	0
Johnson Creek	22	7	3	10	4	0	7	3	8	0
Klaskanine River	78	102	107	74	86	144	322	122	274	283
Lewis and Clark River	3	3	0	0	4	6	19	8	16	0
McKenzie River	4	3	0	4	0	0	0	0	0	0
Minam River	10	4	3	7	3	0	7	0	0	0
Molalla River	0	6	0	4	9	0	0	0	0	8
Sandy River	387	589	739	1,099	635	818	740	477	1,115	1,801
Santiam River	13	21	0	13	10	15	27	30	14	0
Santiam River, N. F.	-	-	-	-	-	-	-	-	0	0
Santiam River, S. F.	-	-	-	-	-	-	-	-	0	29
Scappoose Creek	25	3	3	0	4	19	12	0	0	0
Snake River	0	0	0	0	0	0	0	0	0	0
Sucker Creek	11	19	0	0	0	0	0	0	8	0
Umatilla River	0	0	0	0	10	0	0	0	0	0
Wallowa River	20	6	3	13	16	6	11	14	8	0
Willamette River	80	96	191	176	173	115	412	98	237	166
Total	4,646	4,513	4,290	5,474	5,786	6,460	4,966	2,042	3,240	5,063

1/ Estimates from 1971 on are corrected for bias.

The catch of upriver coho was 1,200 fish by nontreaty gillnetters (Table 5) and 4,000 fish by treaty fishermen (Table 6). Both catches were below average and were the result of mesh restrictions imposed to protect steelhead, a shortened season, and a below-average coho run.

Sockeye

Status: The 1976 Columbia River sockeye run of 33,700 fish was the poorest on record and less than one-half of the past 10-year average of 105,500 fish. The small sockeye run can at least partially be attributed to poor smolt production in Lake Wenatchee and Lake Osoyoos in Washington. Spawning fish counts in the Okanogan River system in Washington revealed 8,600 fish, less than one-half the 10-year average. The spawning index of 1,900 fish in the Wenatchee River system in Washington was the smallest on record and a fraction of the 10-year average of 9,600 fish. Few sockeye spawn in Oregon tributary streams.

Recreational Harvest: Sockeye are rarely caught by the sport angler.

Commercial Harvest: Commercial sockeye seasons were not established below or above Bonneville Dam in 1976 due to the low number of returning adults. However, a few fish were handled by nontreaty shad fishermen below Bonneville Dam and by treaty fishermen during ceremonial, subsistence, and shad fishing above the dam.

Chum

Status: Native chum runs in the Columbia River have been at low levels since the early 1950's and they are not expected to improve. Most chum entering the Columbia River spawn in Washington tributary streams below Bonneville Dam.

Recreational Harvest: Chum salmon are seldom caught by the sport angler.

Commercial Harvest: The commercial catch of chum in the Columbia River is small as the remaining runs are remnant runs and the majority of the fish enter the river after the commercial seasons have closed. Approximately 1,200 chum were caught in the commercial fisheries in 1976, about 400 fish more than the past 10-year average catch (Table 4).

COASTAL STOCKS

Salmon enter many coastal rivers and tributaries on the Oregon coast, and it is difficult to assess the condition of the various stocks of fish. Table 10 summarizes the available fish counts at dams, hatcheries, and on spawning grounds and provides the only numerical index of their abundance.

The river sport catch of fall chinook and coho has generally declined from the levels of the late 1960's. With few exceptions this trend is shown by all of the coastal tributaries. The reduction in catch appears correlated with the increasing offshore catch which results in fewer fish returning to their stream of origin. Increased fishing pressure in fresh water as well as in the ocean sport and troll fisheries has been stimulated in part by increased hatchery production. As effort has increased to harvest hatchery fish, heavier cropping of the wild stocks has also occurred.

In the past, environmental degradation of the watersheds as well as commercial fishing in coastal streams contributed to declining runs. Commercial fishing was closed by state law in 1957 (except Tillamook Bay which was closed by regulatory action in 1962), and major efforts to improve spawning habitat have not resulted in a large increase in the number of returning adults.

Spring Chinook

Status: The number of spring chinook entering the Umpqua and Rogue rivers, the two major coastal watersheds where they occur, was below average again in 1976. The adult count over Winchester Dam (Umpqua River) was 6,432 fish compared to the past 5-year average count of 9,765 fish. The count over Gold Ray Dam (Rogue River) was 16,178 chinook, well below the past 5-year average count of 23,559 fish. Resting pool surveys conducted on the South Umpqua River and Jackson Creek revealed only 45 spring chinook, about one-half the past 5-year average count of 98 chinook. Resting pool surveys conducted on the Wilson, Trask, and Nestucca rivers revealed an average of 0.8, 12.4, and 1.3 spring chinook per resting hole, respectively. The Wilson and Nestucca counts were below average while the Trask count was the highest observed and reflects the increased stocking program on the river.

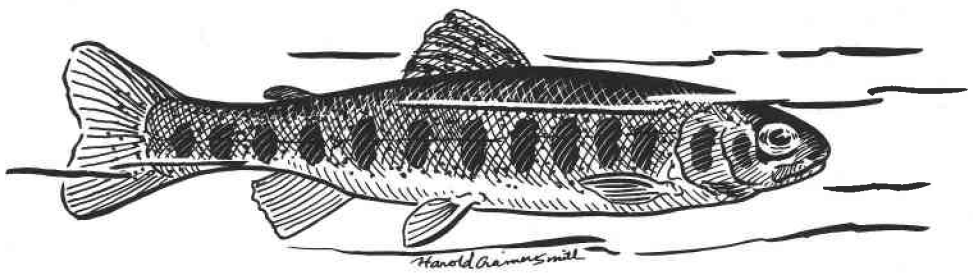
Recreational Harvest: Most spring chinook are caught in the Rogue and Umpqua river systems. Catch levels in the Rogue have shown a general declining trend during the 1970's while catches from the Umpqua have fluctuated between 1,600 and 5,000 fish. The catch in north coast streams like the Nestucca, Trask, and

Table 10. Indices of abundance of adult salmon in coastal streams of Oregon during 1976 and past average or median values.

Index	Spring Chinook		Fall Chinook		Coho	
	1976	Average (1971-75)	1976	Average (1971-75)	1976	Average (1971-75)
DAM COUNTS						
Winchester (Umpqua)	6,432	9,765	21	87	318	397
Gold Ray (Rogue)	16,178	23,559			27	165
HATCHERIES						
North Nehalem					7,988	3,750
Trask	288	280	13	501	6,881	5,135
Siletz					4,754	2,210
Fall Creek (Alsea)					18,719	8,935
Cole Rivers	2,580	-				
Elk River			546 1/	3,090	7	50

SPAWNING COUNTS				
Stream System	Count 2/	15-Year Median	Count 2/	14-Year Median
Nehalem	174 (39)	104	9 (1)	33
Wilson			32 (2)	51
Nestucca	0 (0)	61	0 (0)	13
Siletz	30 (12)	45		
Yaquina	16 (6)	52	1 (0)	96
Alsea	1 (0)	30	7 (0)	30
Siuslaw	262 (74)	122	21 (2)	9
Smith			0 (0)	19
Umpqua			118 (39)	145
Tenmile Lake			99 (21)	899
Coos	52 (24)	7	82 (20)	52
Coquille	0 (0)	19	96 (9)	44

1/ Includes fish returning to the trap on Jack Creek (Chetco River).
2/ Jacks, included in total, in parentheses.



Wilson rivers has increased, primarily due to increased stocking of hatchery smolts. The spring chinook catch from all coastal streams totaled 14,180 fish in 1976 (Table 11).

Commercial Harvest: The commercial harvest of spring chinook salmon is not permitted in coastal streams.

Fall Chinook

Status: Fall chinook occur in most coastal streams. Eight representative streams were surveyed for spawning fish in 1976 to obtain data on the relative status of the wild stocks on a coast-wide basis. Counts of chinook exceeded median numbers in only three of the eight streams surveyed (Table 10). The number of fish observed on the Coos and Siuslaw rivers continued the increasing trend of recent years while on many other streams the counts remained near their median values or declined.

Recreational Harvest: The fall chinook salmon sport catch in coastal streams has declined from the late 1960's but has remained fairly constant the past 5 years. The 1976 catch of 20,314 fish was near the past 5-year average catch (Table 12).

Commercial Harvest: The commercial harvest of fall chinook salmon is not permitted in coastal streams.

Coho

Status: Coho salmon occur in most coastal streams and usually spawn in the smaller tributaries. Eleven different stream systems were surveyed coast-wide in 1976 to evaluate the wild coho spawning population. Counts of spawning fish were above their median values in only 3 of the 11 streams surveyed and only the Coos and Coquille rivers showed a large increase above their median values (Table 10). The general trend of counts appears to show a continuing decline in the stocks of wild coho.

Recreational Harvest: The river sport catch of coho has declined since 1970 and is probably correlated with the increasing offshore catch which results in fewer fish returning to their stream of origin. Best angler success generally occurs on streams where hatchery smolts are released such as the Alsea, Nehalem, Siletz, and Trask rivers. The 1976 catch of 19,186 coho was the best catch since 1971 (Table 13).

Table 11. Spring chinook salmon sport catch in Oregon coastal streams, 1967-76.

Stream	Run Year 1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Coastal Tributaries										
Alsea River & Bay	17	37	105	35	30	10	5	11	17	7
Kilchis River	26	20	4	21	45	14	26	18	34	24
Miami River	30	100	8	6	1	33	8	0	8	4
Nestucca River & Bay	231	454	493	433	379	468	417	629	938	585
Nestucca River, Little	-	-	-	47	17	5	34	7	5	40
Rogue River	5,886	6,210	17,957	11,970	9,395	9,577	6,589	6,836	5,223	4,566
Salmon River	164	105	125	103	0	28	7	0	24	26
Siletz River & Bay	190	71	129	56	89	39	15	118	100	94
Siuslaw River & Bay	70	534	346	673	10	389	25	39	0	0
Tillamook Bay	45	99	150	71	30	28	28	38	0	45
Tillamook River	160	121	832	498	35	128	95	140	117	0
Trask River	376	762	809	996	1,340	557	1,325	1,686	1,430	2,485
Umpqua River	7,720	10,688	11,254	12,059	7,854	7,236	3,193	2,854	4,092	3,252
Umpqua River, N. F.	700	921	5,001	2,016	1,659	3,973	2,052	2,286	1,902	2,691
Umpqua River, S. F.	-	1	4	19	4	11	0	5	37	57
Wilson River	71	175	245	130	311	229	316	355	516	304
Total	15,686	20,298	37,462	29,199	21,199	22,725	14,135	15,022	14,443	14,180

Table 12. Fall chinook salmon sport catch in Oregon coastal streams, 1967-76.

Stream	Run Year 1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Coastal Tributaries										
Alsea River & Bay	3,037	3,489	3,256	1,664	1,188	534	706	424	652	1,131
Beaver Creek	25	158	48	75	68	-	67	28	24	49
Big Elk Creek (Yaquina System)	-	-	-	-	-	-	-	-	206	23
Chetco River & Bay	2,172	1,042	1,526	3,816	3,224	4,590	1,243	1,855	3,642	3,269
Coos River & Bay	1,932	4,863	4,900	3,757	203	85	110	141	161	270+
Coquille River & Bay	733	599	554	648	936	329	390	308	1,092	908
Drift Creek	277	439	313	287	144	67	156	95	249	225
Elk River	858	771	1,010	3,063	1,099	1,685	1,118	2,144	3,535	2,290
Euchre Creek	-	0	13	9	8	-	0	0	0	0
Floras Creek & New River	324	54	288	403	571	109	217	156	151	86
Hunter Creek	183	353	158	202	226	251	53	80	123	4+
Illinois River	155	81	29	103	84	211	135	295	182	56
Kilchis River	565	384	400	371	371	241	429	331	308	202
Miami River	37	9	30	6	36	47	20	146	76	99
Millicoma River	3	1	0	3	12	2	3	22	38	11
Nehalem River & Bay	1,127	647	775	406	506	300	157	137	85	72
Nehalem River, N. F.	-	-	-	-	-	-	41	41	21	29
Neskowin Creek	14	22	43	20	22	26	6	4	24	1
Nestucca River & Bay	2,429	3,006	2,164	2,478	1,768	1,921	1,939	1,682	1,835	1,701+
Nestucca River, Little	-	-	-	87	72	47	107	29	44	251
Pistol River	85	118	396	140	94	303	32	64	115	0
Rock Creek	116	14	50	87	27	49	18	0	21	135
Rogue River	4,090	3,765	3,896	2,595	2,402	2,524	3,144	3,660	2,044	2,162
Salmon River	240	363	284	329	309	170	204	76	127	81
Siletz River & Bay	1,362	1,540	1,125	596	563	446	354	268	357	349
Siuslaw River & Bay	620	1,901	1,947	2,024	237	687	198	146	121	139
Sixes River	730	472	901	676	703	350	136	376	1,305	418
Smith River	11	8	4	6	2	3	2	1	2	5
Tillamook Bay	3,959	3,663	3,840	1,760	1,573	1,011	1,597	1,897	640	2,189
Tillamook River	36	65	201	150	106	41	133	282	214	8+
Trask River	1,660	2,001	1,711	2,161	1,734	986	1,975	2,928	1,346	2,072+
Umpqua River & Bay	2,151	3,719	2,911	4,195	1,302	1,778	706	438	388	325
Umpqua River, N. F.	45	103	488	158	79	228	169	103	118	90
Umpqua River, S. F.	-	13	0	5	8	3	14	12	5	0
Wilson River	1,119	962	1,369	1,071	1,032	567	1,307	1,063	1,016	862
Winchuck River	219	1,829	221	546	160	347	248	153	449	619
Yachats River	40	84	18	8	15	2	5	1	8	7
Yaquina River & Bay	2,201	1,595	1,329	1,944	351	474	331	715	131	176
Total	32,555	38,133	36,234	35,849	21,235	20,414	17,470	20,106	20,864	20,314+

Table 13. Coho salmon sport catch in Oregon coastal streams, 1967-76.

Stream	Run Year 1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Coastal Tributaries										
Alsea River & Bay	12,758	10,012	12,504	7,801	5,573	2,684	3,900	2,618	3,151	5,514+
Big Elk Creek (Yaquina System)	-	-	-	-	-	-	-	-	198	37+
Chetco River & Bay	112	52	70	200	166	215	64	98	166	162+
Coos River & Bay	595	501	526	400	248	165	193	99	351	489+
Coquille River & Bay	481	292	467	718	506	529	270	292	336	807+
Devils Lake	10	0	62	-	-	22	0	18	4	0
Elk River	8	8	9	30	11	17	11	21	24	19
Kilchis River	320	211	211	195	215	152	223	169	145	92+
Miami River	47	17	37	13	48	66	39	226	111	150
Millicoma River	17	8	31	42	66	27	8	69	73	79+
Necanicum River	198	198	270	325	81	110	162	70	32	101
Nehalem River & Bay	6,746	6,500	10,768	5,428	5,701	2,553	1,856	1,952	614	1,071
Nehalem River, N. F.	-	-	-	-	-	-	1,303	1,359	595	1,437
Neskowin Creek	11	57	51	23	14	6	9	7	12	3
Nestucca River & Bay	1,489	1,842	1,233	1,511	1,152	1,199	1,158	1,049	890	875+
Nestucca River, Little	-	-	-	97	77	67	69	35	27	249
Rock Creek	422	63	125	435	131	213	82	143	86	541
Rogue River	104	113	94	61	46	53	69	76	44	51
Salmon River	858	1,186	868	1,151	1,026	679	659	485	646	454+
Salmonberry River	24	32	56	69	10	33	11	26	4	4
Siletz River & Bay	5,099	5,294	4,145	2,457	2,219	1,894	1,388	1,184	1,478	1,543+
Siltcoos Lake	319	1,055	371	207	100	373	280	244	413	207
Siuslaw River & Bay	4,045	6,737	5,716	4,099	2,434	1,569	1,257	733	1,288	1,334+
Sixes River	7	4	8	6	7	3	1	2	8	4
Smith River	172	414	397	1,264	413	507	197	206	396	493
Tahkenitch Lake	15	108	69	23	53	19	30	8	4	4
Tenmile Creek	-	388	254	910	665	200	228	103	266	0
Tenmile Lakes	-	739	227	844	223	31	160	70	159	19
Tenmile Creek & Bay	362	-	-	-	-	-	-	-	-	-
Tillamook Bay	1,431	1,111	1,369	443	522	212	276	400	105	334
Tillamook River	18	54	133	94	83	30	131	137	192	18+
Trask River	1,347	1,488	1,310	1,713	1,240	836	1,337	2,401	1,056	1,566+
Umpqua River & Bay	4,330	7,346	7,616	9,467	1,432	2,702	1,200	1,153	1,727	506
Umpqua River, N. F.	17	14	67	87	16	159	12	74	31	30
Umpqua River, S. F.	5	18	24	29	19	14	14	21	10	0
Wilson River	1,197	767	1,118	1,201	968	561	1,192	918	950	748+
Yachats River	366	349	129	105	39	50	35	28	84	75
Yaquina River	1,131	844	704	732	218	226	174	333	100	170
Total	44,061	47,822	51,039	42,180	25,722	18,176	13,048	16,877	15,797	19,186+

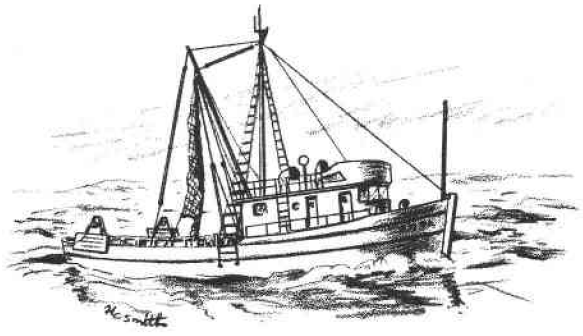
Commercial Harvest: The commercial harvest of coho salmon is not permitted in coastal streams.

Chum

Status: Chum salmon enter north coastal streams in November and December with the largest number being found in tributary streams of Tillamook and Nestucca bays. Spawning counts are conducted annually on selected tributaries of Tillamook Bay in order to establish trends in the wild run. The 1976 average peak count of 203 chum per mile was considerably less than the 1975 count of 556 and also below the past 10-year average of 345. The 1976 run was not as low as the counts indicated. Extremely low streamflows delayed migration and prevented many fish from reaching their usual spawning area; consequently, many fish spawned below the survey areas.

Recreational Harvest: Chum salmon are not generally caught on sport gear but a few are taken from the Kilchis and Miami rivers, tributaries of Tillamook Bay.

Commercial Harvest: The commercial harvest of chum salmon is not permitted in coastal streams.



OFFSHORE SALMON HARVEST

Recreational Harvest of Ocean Salmon: Most salmon caught by recreational anglers are caught in the ocean fishery. The 1976 season opened on May 1 and extended through December 31. The total 1976 Oregon offshore salmon catch is listed by port and species in Table 14.

The number of chinook salmon landed by sport fishermen during the past 10 years has ranged from 25,100 fish in 1968 to nearly 76,000 fish in 1975 (Table 15). Coho landings for the same period have ranged from 227,900 fish in 1966 to 501,600 fish in 1976 (Table 15). Chinook landings have generally increased while coho landings have remained relatively stable. However, the 1976 record coho catch exceeded the previous 10-year average by over 232,000 fish. Generally the Oregon catch accounts for about 8% of the total chinook salmon and 20% of the total coho salmon landed by the offshore sport fishery along the Pacific Coast.

Table 14. Oregon offshore salmon sport fishing effort and catch (in thousands) for 1976.

Area	Total Angler Trips	Catch			Salmon Per Angler Trip
		Coho	Chinook	Total	
Brookings	71.7	44.2	5.2	49.4	0.69
Cape Kiwanda	12.1	11.4	0.5	11.9	0.98
Columbia	107.5	116.6	44.6	161.2	1.50
Coos Bay	39.5	46.9	2.5	49.4 1/	1.25
Depoe Bay	50.9	46.8	1.5	48.3	0.95
Florence	26.2	27.5	1.3	28.8	1.10
Garibaldi	39.5	34.2	1.3	35.5 2/	0.90
Gold Beach	16.8	10.8	0.8	11.6	0.69
Nehalem	4.7	4.1	0.2	4.3	0.90
Newport	85.7	71.0	2.7	73.7	0.86
Winchester	82.4	86.6	5.7	92.3	1.12
Minor Ports and "Pacific Ocean"	1.4	1.4	0.1	1.5	1.05
Totals	538.4	501.5	66.4	567.9 3/	1.00

1/ Includes 15 pink salmon.
2/ Includes 9 pink salmon.
3/ Includes 26 pink salmon.

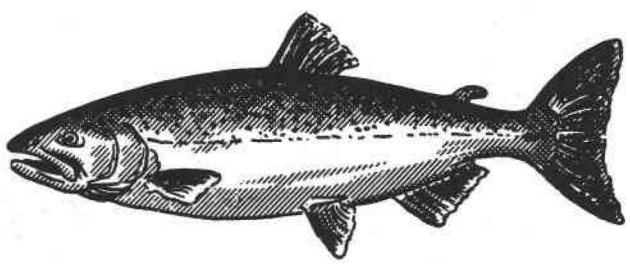
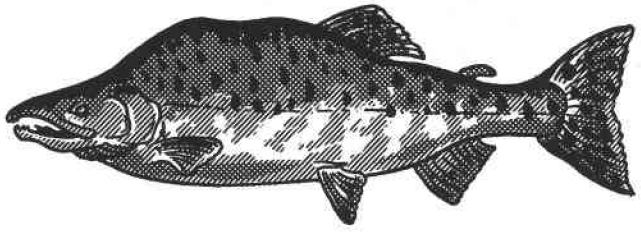


Table 15. Oregon offshore salmon sport catch (in thousands of fish) for the years 1966-76. 1/

Year	Species		
	Chinook	Coho	Total Salmon
1966	37.4	227.9	265.3
1967	42.8	351.0	393.8
1968	25.1	265.8	290.9
1969	31.8	232.9	264.7
1970	42.9	257.4	300.3
1971	29.6	311.7	341.3
1972	44.1	248.4	292.5
1973	61.0	234.1 2/	295.1
1974	40.3	311.0 3/	351.3
1975	75.7	253.4 4/	329.1
1976	66.4	501.6 5/	568.0 6/
Average 1966-75	43.1	269.4	312.5

1/ Jack salmon landed at sampled ports during the creel sampling program are included in the chinook and coho catch for the years 1966 to 1975.
2/ Includes 2,008 pink salmon.
3/ Includes 34 pink salmon.
4/ Includes 1,218 pink salmon.
5/ Includes 50 pink salmon.
6/ An additional 4,586 jack coho and 8,051 jack chinook were landed at sampled ports during the creel sampling period.



Offshore sport fishing effort, indicated by the number of individual angler trips, was relatively stable from 1966 through 1974 but increased significantly in 1975 and again in 1976 (Table 16). Record catches of coho salmon and excellent ocean conditions were believed responsible for the increased angler effort in 1976 as the total catch was by far the best in the last 10 years. Angler success, expressed as fish caught per angler trip, shows no trend during the past 10-year period and was average or better during 1976.

Commercial Harvest of Ocean Salmon: Chinook, coho, and pink salmon are caught in the ocean troll fishery. The 1976 troll season opened on May 1 for chinook, June 15 for coho salmon south of Tillamook Head, and July 1 for coho north of Tillamook Head. The chinook season was closed for the last 2 weeks of June north of Tillamook Head to increase returns to the Columbia River in compliance with a federal court order allocating 50% of the harvestable surplus of upriver runs to the treaty fishery. The closing date was October 31 for most of the coast except for an area around the mouths of the Elk and Chetco rivers which remained open through December in order to harvest returning hatchery fish. Minimum size limit of 28 inches north of Tillamook Head and 26 inches south of Tillamook Head was in effect during the season for chinook. Minimum size limit of 15 inches for coho was in effect along the entire coast.

During the 1976 season, 1,826,968 coho (Table 17) and 184,345 chinook (Table 18) were landed at Oregon ports. Coho landings were a record high while chinook landings were about 20,000 fish above average. Pink salmon contribute to the troll fishery principally in odd years and usually represent an insignificant portion of the total catch (Table 19).

Department samplers examined 37,639 chinook and 282,703 coho for marks and coded-wire tags during the season. The number of chinook marks and tags found was 1,549 and 213, respectively. Most of the chinook marks originated from Oregon coastal streams, particularly the Umpqua, Rogue, Elk, and Chetco rivers, as well as the Columbia River. Coho marks and tags were mainly from Oregon coastal rivers, the Columbia River, and Washington coastal streams. Some marks and tags were also recovered from fish which originated in the Sacramento River.

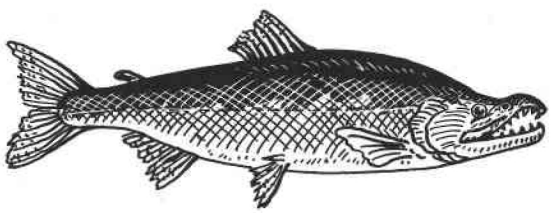


Table 16. Effort and catch-per-unit-of-effort by the Oregon offshore salmon sport fishery for the years 1966-76.

Year	Salmon/Angler Trip		Number of Angler Trips (in thousands)
	Astoria	Tillamook Head South	
1966	1.55	0.65	341.9
1967	1.89	0.97	351.5
1968	1.49	0.86	300.1
1969	1.23	0.73	326.7
1970	1.36	0.82	322.2
1971	2.09	0.97	303.7
1972	1.70	0.66	331.7
1973	0.88	0.83	350.4
1974	1.65	0.89	335.8
1975	1.13	0.73	407.5
1976	1.50	0.95	538.4
Average 1966-75	1.50	0.81	337.2

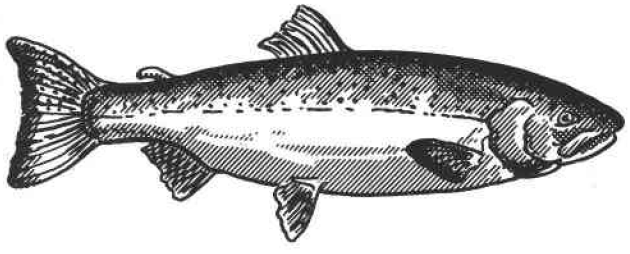


Table 17. Number of coho salmon landed, by area, in the Oregon commercial troll fishery, 1966-76.

Year	Area					Total
	Astoria to Tillamook Head	Tillamook Head To Cascade Head	Cascade Head To Heceta Head	Heceta Head To Cape Blanco	Cape Blanco To California	
1966	129,519	64,798	139,657	216,474	96,236	646,684
1967	158,375	134,252	275,174	323,297	112,978	1,004,076
1968	97,843	132,636	121,439	397,908	75,526	825,352
1969	48,372	68,902	140,102	228,777	71,184	557,337
1970	100,537	84,756	368,752	335,133	112,332	1,001,510
1971	129,135	221,423	340,392	514,726	284,446	1,490,122
1972	63,714	116,858	225,903	352,962	65,165	824,602
1973	31,720	79,869	258,001	324,000	101,887	795,477
1974	44,151	153,697	402,390	441,667	95,291	1,137,196
1975	42,808	109,815	176,653	251,427	76,684	657,387
1976	176,985	307,143	445,584	778,589	118,667	1,826,968
Average 1966-75	84,617	116,700	244,846	338,637	109,173	893,974

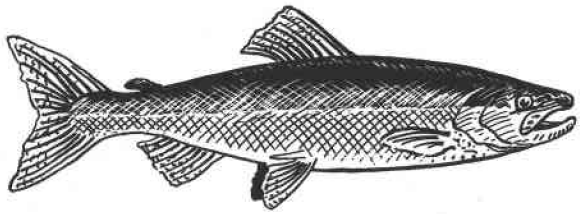


Table 18. Number of chinook salmon landed, by area, in the Oregon commercial troll fishery, 1966-76.

Year	Area					Total
	Astoria to Tillamook Head	Tillamook Head To Cascade Head	Cascade Head To Heceta Head	Heceta Head To Cape Blanco	Cape Blanco To California	
1966	20,027	1,890	15,684	26,506	16,753	80,860
1967	19,761	3,613	17,486	35,300	23,589	99,749
1968	22,481	5,186	9,040	55,137	18,306	110,150
1969	10,639	5,096	14,510	70,721	39,319	140,285
1970	25,208	4,889	24,491	62,670	46,111	163,369
1971	16,060	3,012	8,545	17,659	57,650	102,926
1972	8,848	4,102	19,881	40,196	54,260	127,287
1973	8,613	7,702	96,683	195,549	54,720	363,267
1974	17,705	7,515	37,581	126,023	35,286	224,110
1975	10,955	5,848	24,209	113,047	70,649	224,708
1976	28,107	9,071	29,943	75,025	42,199	184,345
Average 1966-75	16,030	4,885	26,811	74,281	41,664	163,671

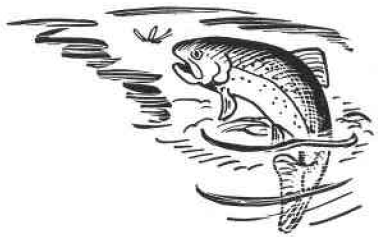
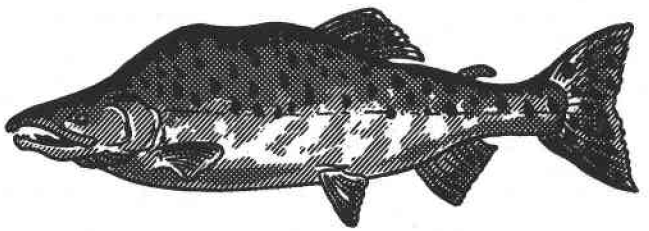


Table 19. Number of pink salmon landed, by area, in the Oregon commercial troll fishery, 1966-76.

Year	Area: Astoria to Tillamook Head	Tillamook Head To Cascade Head	Cascade Head To Heceta Head	Heceta Head To Cape Blanco	Cape Blanco To California	Total
1966						1/
1967						201,239
1968	83	154	0	542	0	779
1969	2,008	8,016	22,656	17,197	7,806	57,683
1970	63	0	76	52	3	194
1971	23	5	628	855	499	2,010
1972	0	0	4	21	0	25
1973	933	1	24	1,315	888	3,161
1974	1	0	7	8	13	29
1975	88	0	67	15	22	192
1976	0	0	0	0	0	0
Average 1968-75	400	1,022	2,933	2,501	1,154	8,009

1/ None reported.



STEELHEAD

This section discusses the steelhead stocks entering the Columbia River and Oregon coastal rivers and reviews the 1976 recreational and commercial catch.

COLUMBIA RIVER STOCKS

The various steelhead stocks in the Columbia River system range from a relatively healthy status to a very critical status. Summer steelhead stocks destined for Snake River tributaries in Idaho and Oregon are in very poor condition. Winter steelhead runs into lower Columbia River tributaries fluctuate but remain basically healthy. Counts of steelhead passing over Columbia and Willamette river dams and numbers of fish returning to Oregon hatcheries in 1976 are shown in Table 20.

Legislation in 1969 designating steelhead a game fish and an initiative petition in 1974 banning the commercial sale of steelhead in Oregon has resulted in the elimination of commercial landings of steelhead by nontreaty gillnetters. The 1974 initiative also required that steelhead caught by commercial fishermen be turned over to the state for use at public institutions. Compliance with this requirement has been poor, resulting in no available estimates of the number of steelhead caught by commercial gillnetters. The steelhead laws do not apply to treaty Indian fishermen.

Summer Steelhead

Status: Summer steelhead stocks destined for tributaries of the Snake River are in poor condition. The 1976 Bonneville Dam count of 115,278 summer steelhead (Table 20) was well below the past 5-year average count but improved over the 1975 count of 75,514 fish. The Ice Harbor Dam count of 23,235 steelhead was also well below average. The single largest factor contributing to the poor steelhead runs is the mortality of juveniles as they migrate downstream through eight successive main river hydroelectric projects.

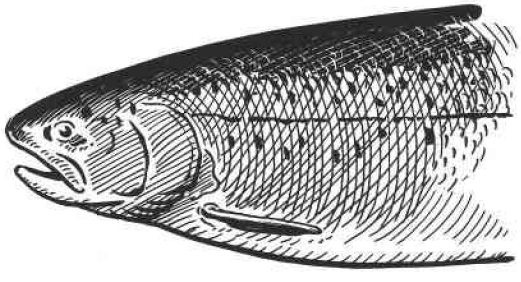
Summer steelhead stocks from mid-Columbia tributaries such as the John Day, Deschutes, and Hood rivers are in a healthier condition as a result of having fewer dams to pass and limited sport and commercial fisheries in the main stem Columbia on returning adults.

The 1976 Willamette Falls fishway count of 3,876 summer steelhead was well above the 5-year average of 2,490 fish. Over 1,500 summer steelhead passed over North Fork Dam into the upper Clackamas River and continued to provide a newly developed summer steelhead fishery for anglers near the Portland metropolitan area.

Table 20. Indices of abundance of adult steelhead in the Columbia River system in 1976 and past 5-year averages.

Index	Summer Steelhead 1976	Summer Steelhead Average (1971-75)	Winter Steelhead 1976	Winter Steelhead Average (1971-75)
DAM COUNTS				
Columbia River				
Bonneville	115,278	144,871		
Ice Harbor	23,235	37,470		
Willamette River				
Willamette Falls	3,876	2,490	9,400	17,650
North Fork	1,515	860 1/	1,158	2,205
Foster	947	1,995	294	1,635
Leaburg	1,442	100	6	10
Fall Creek			547	460
HATCHERIES				
Columbia River				
Klaskanine			823	1,260
Big Creek			2,188	2,630
Willamette River				
Marion Forks			389	395
South Santiam	1,250	800 1/		
FISH TRAPS				
Deschutes River				
Pelton Trap	1,956	4,090		

1/ Four-year average.



Recreational Harvest: The sport catch of summer steelhead in the Columbia River and its tributaries was the lowest catch in the past 10 years as only 14,620 fish were caught (Table 21). Most fish were caught in the Deschutes and Hood rivers and in tributaries below Bonneville Dam. Angling was prohibited in the main stem Columbia and the Snake River and its tributaries in order to protect the depleted Snake River run.

Commercial Harvest: The treaty Indian fishery has traditionally harvested summer steelhead during the summer sockeye and shad seasons and during the fall season. As the treaty set-net fishery rapidly expanded in the late 1960's the summer steelhead catch increased dramatically and reached a peak of 28,800 fish in 1972 (Table 6). Poor returns of adult steelhead in 1974, 1975, and 1976 made it necessary to impose minimum mesh restrictions of 7-1/2 inches and 8 inches on the treaty set-net fishery during the 1975 and 1976 fall seasons, respectively. Consequently, the 1975 treaty fall season steelhead catch dropped to 6,400 fish and the 1976 catch to 9,200 fish, a result of both the mesh restriction and poor runs. An additional 969 steelhead were taken during the 1976 treaty winter season. These fish were a mixture of summer and winter steelhead.

No estimates are available of the incidental steelhead catch made by lower river gillnetters, but few were landed at the receiving stations.

Winter Steelhead

Status: Most winter steelhead returning to the Columbia River spawn in tributary streams below Bonneville Dam. The most important Oregon tributaries are the Willamette and Sandy river systems. Tagging studies conducted during the 1950's indicated a run size of about 220,000 fish returning to the Columbia River. Recent estimates of abundance have not been made; but, based on increased hatchery production, the increasing sport catch, and a few isolated indices such as hatchery returns and dam counts, it is believed the run may now approach 400,000 fish.

The 1976 Willamette Falls fishway count of 9,400 winter steelhead was considerably below the past 5-year average count for the second consecutive year (Table 20). The North Fork Dam (Clackamas River) count of 1,158 steelhead was also below average. Returns to Klaskanine and Big Creek hatcheries were both slightly below average.

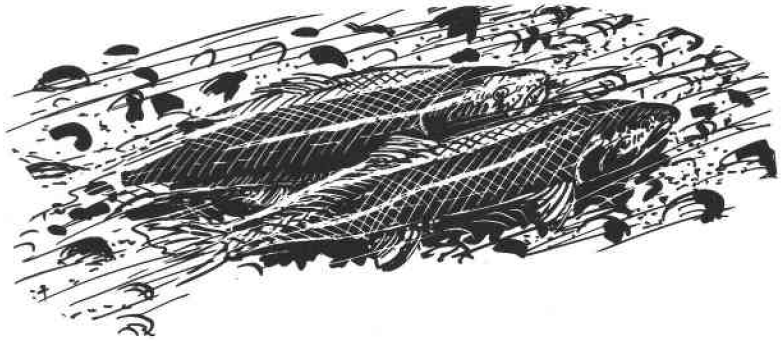
Table 21. Sport catch of summer-run steelhead in the Columbia River system, 1967-77. 1/

Stream	Run Year									
	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
Columbia River System										
Catherine Creek	0	0	0	8	0	4	12	0	0	0
Clackamas River (Eagle Creek)	0	0	0	0	0	582	--	--	--	--
Clackamas River	0	0	0	0	0	--	359	576	1,095	1,477+
Columbia River (Lower)	10,148	12,640	8,907	6,520	10,801	6,988	5,902	3,839	0	11+
Columbia River (Upper)	6,227	3,470	1,655	1,943	1,829	1,716	1,568	825	0	0
Deschutes River	5,958	10,181	9,735	9,205	13,367	14,829	8,437	10,400	7,348	10,090+
Eagle Creek (Clackamas)	0	0	0	0	0	--	476	51	60	128+
Grande Ronde River	1,039	621	1,319	743	510	832	133	16	0	0
Hood River	1,359	1,428	1,321	1,698	899	1,045	1,395	2,307	2,670	1,159+
Imnaha River	615	1,105	667	473	638	609	280	16	0	0
John Day River	3,521	2,882	2,667	1,789	2,666	3,359	906	2,784	1,511	1,304+
McKenzie River	--	--	--	--	--	23	24	366	610	467
Minam River	71	93	34	65	35	4	26	0	0	0
Santiam River	--	--	--	--	452	283	204	1,745	129	487
Santiam River, N. F.	--	--	--	--	--	--	--	--	385	1,081+
Santiam River, S. F.	--	--	--	--	--	--	--	--	91	238
Snake River	785	1,466	1,154	715	1,207	857	332	26	0	0
Umatilla River	560	775	803	1,307	735	1,913	326	338	379	58+
Walla Walla River	23	58	19	76	126	73	31	40	92	0+
Wallowa River	220	80	214	97	36	52	74	0	0	0
Wenaha River	20	52	20	87	33	6	12	13	0	0
Willamette River	--	--	--	--	--	128	85	147	250	148
Total	30,546	34,851	28,515	24,726	33,334	35,299	20,582	23,489	14,620	16,648

1/ Estimates from 1971 on are corrected for bias.

Recreational Harvest: Angling for winter steelhead in the Columbia River system produced about an average catch with 22,073 fish being caught (Table 22). The Sandy River continued to produce the best catch followed by the Clackamas and Klaskanine rivers.

Commercial Harvest: A minimum 8-inch mesh restriction was imposed during the 1976 winter salmon season in order to minimize the incidental steelhead catch. Eleven dead steelhead were turned in by fishermen during the season.



COASTAL STOCKS

There are few reliable indices of abundance of summer and winter steelhead in Oregon's coastal streams. Spawning counts are difficult to obtain due to high water conditions and the extended spawning period which lasts throughout the entire winter and early spring. The recreational catch is not a reliable index as the catch is affected by water conditions during the peak of the run.

Summer Steelhead

Status: The Umpqua and Rogue rivers produce the major wild runs of summer steelhead on the coast. The Siletz River run has been rebuilt and is now sustained by releases of hatchery smolts. Hatchery production also maintains introduced runs in the Nestucca and Wilson rivers.

The 1976 count of 6,705 summer steelhead over Winchester Dam (Umpqua River) was well below the past 5-year average count of 11,317 fish and was the lowest count during the same period. The count over Gold Ray Dam (Rogue River) of 1,997 steelhead was also well below the past 5-year average count of 5,980 fish and the lowest count during the last 5 years. Underwater surveys of resting holes in the Siletz River revealed the fourth highest count in the past 17 years as 648 fish were observed.

Table 22. Sport catch of winter-run steelhead in the Columbia River system, 1967-77. 1/

Stream	Run Year 1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
Columbia River System										
Bear Creek	56	92	61	35	23	0	0	13	13	4+
Big Creek	3,371	3,948	2,068	2,973	3,946	2,333	2,080	3,705	2,042	293+
Calapooia River	104	59	104	205	169	182	51	33	177	0+
Clackamas River (Eagle Creek)	4,694	4,650	2,528	5,221	8,856	--	--	--	--	--
Clackamas River	--	--	--	--	--	2,612	1,628	4,753	2,335	824+
Clatskanie River	491	578	700	692	673	271	686	1,027	1,198	49+
Columbia River (Lower)	2,118	2,114	1,264	2,010	930	896	507	725	460	499+
Eagle Creek (Clackamas)	--	--	--	--	--	1,697	1,095	2,418	1,449	44+
Gnat Creek	226	167	218	240	351	250	319	668	499	70+
Johnson Creek	44	58	46	35	19	12	10	32	4	0+
Klaskanine River	2,707	2,327	991	1,723	1,833	1,531	2,531	2,927	2,906	307+
Lewis and Clark River	212	219	153	288	345	189	164	566	407	158+
McKenzie River	12	10	0	12	34	0	0	0	0	0+
Molalla River	260	314	189	494	323	570	419	589	573	44+
Sandy River	4,986	5,185	5,425	8,647	10,315	5,640	5,937	8,738	7,566	896+
Santiam River	417	941	580	2,035	1,224	1,528	698	679	636	113+
Santiam River, N. F.	--	--	--	--	--	--	--	321	277	76+
Santiam River, S. F.	--	--	--	--	--	--	--	64	127	7+
Scappoose Creek	50	139	50	153	56	22	59	101	26	0+
Sucker Creek	60	4	0	92	35	6	21	5	0	0+
Willamette River	1,232	862	651	1,447	2,256	1,415	823	986	1,380	360+
Total	21,040	21,667	15,028	26,302	31,388	19,154	17,028	28,350	22,073	3,744+

1/ Estimates from 1971 on are corrected for bias.

Recreational Harvest: Anglers harvested 25,385 summer steelhead in coastal tributaries during the 1975-76 fishing season (Table 23). Best catches again occurred on the Nestucca, Siletz, Rogue, and Umpqua rivers.

Commercial Harvest: The commercial harvest of summer steelhead is not permitted in coastal streams.

Winter Steelhead

Status: Winter steelhead runs into coastal streams have fluctuated from year to year but are maintained at fairly stable levels by releases of hatchery smolts. The count of 6,012 steelhead over Winchester Dam was the poorest recorded count since 1963 and was considerably less than the past 5-year average. The Gold Ray Dam count of 6,048 fish was also below the past 5-year average of 10,980 fish.

Recreational Harvest: The 1975-76 sport catch of 74,277 winter steelhead in coastal streams was the lowest catch reported in the past 10 years (Table 24). Low streamflows during much of November and December contributed to the low catch as fish could not enter the river. Anglers on the Rogue River experienced a catch of 14,629 fish, slightly above the annual harvest made during the past 10 years, but significantly less than the record catch of 23,296 during 1974-75. The Alsea River catch continued below average, as were other streams like the Nestucca, Wilson, and Umpqua. The Coquille continued to produce above-average angling success.

Commercial Harvest: The commercial harvest of winter steelhead is not permitted in coastal streams.

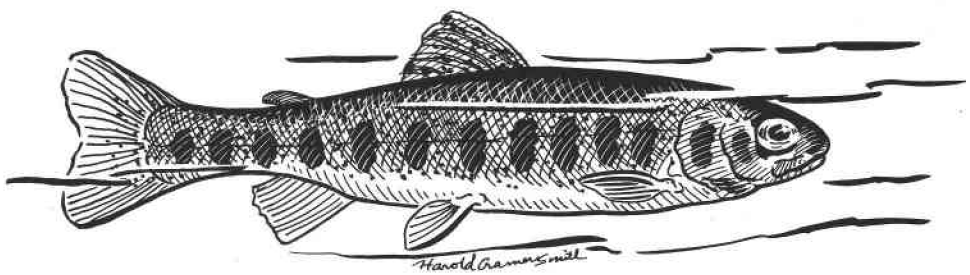


Table 23. Sport catch of summer-run steelhead in Oregon coastal streams, 1967-77. 1/

Stream	Run Year 1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
Coastal Tributaries										
Alsea River & Bay	225	153	159	154	154	128	126	129	198	140
Applegate River	646	305	543	480	291	274	124	953	388	8+
Drift Creek	0	14	21	10	19	17	8	4	23	26
Illinois River	122	71	38	189	69	41	62	150	120	97
Kilchis River	6	13	11	5	38	29	8	10	293	129
Miami River	0	0	0	10	4	0	8	8	19	20
Nehalem River	--	--	--	--	--	--	--	--	--	39
Nestucca River & Bay	1,503	3,733	2,947	3,599	3,666	4,223	2,611	6,688	5,458	2,479+
Nestucca River, Little	--	17	8	5	22	6	0	27	21	58
Rock Creek	1	41	46	53	72	149	30	0	0	0
Rogue River	4,161	2,756	4,490	4,334	6,242	3,659	1,943	6,939	4,290	2,791+
Salmon River	70	151	95	260	353	196	59	153	273	91
Siletz River & Bay	1,955	2,999	2,680	3,740	6,172	3,601	2,976	6,096	5,647	3,963
Smith River	20	18	11	22	17	24	0	15	6	0
Tillamook Bay	15	14	12	14	0	0	4	0	0	0
Tillamook River	0	10	21	1	3	13	7	53	6	3
Trask River	241	303	306	846	893	656	423	745	746	503+
Umpqua River & Bay	813	1,584	1,815	3,723	3,091	3,598	1,183	3,908	1,535	1,454
Umpqua River, N. F.	1,910	2,520	4,802	7,011	6,352	8,294	3,256	4,007	3,749	3,111
Umpqua River, S. F.	--	0	8	42	5	6	4	0	0	18
Wilson River	60	100	148	1,163	2,345	1,819	1,016	2,404	2,613	1,178+
Total	11,748	14,802	18,161	25,661	29,808	26,733	13,848	32,389	25,385	16,108+

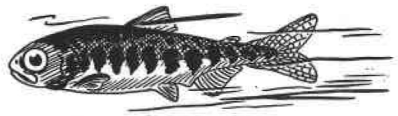


Table 24. Sport catch of winter-run steelhead in Oregon coastal streams, 1967-77. 1/

Stream	Run Year 1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
Coastal Tributaries										
Alsea River & Bay	14,496	12,181	8,012	16,773	11,977	7,299	11,631	8,333	7,438	1,703+
Applegate River	1,281	1,108	1,317	1,529	799	931	151	1,549	920	0+
Beaver Creek	65	89	56	62	49	30	72	120	70	0+
Big Elk Creek (Yaquina System)	--	--	--	--	--	--	--	656	569	9+
Chetco River & Bay	1,320	1,277	1,612	2,591	2,168	3,205	2,954	3,506	2,331	325+
Coos River & Bay	764	737	518	950	956	477	618	1,240	665	92+
Coquille River & Bay	2,193	1,926	2,621	8,023	4,189	5,577	5,543	5,927	6,312	487+
Devils Lake	10	0	39	13	31	19	8	50	4	0+
Drift Creek	1,946	1,961	895	1,319	718	670	1,386	1,173	921	93+
Elk River	1,026	1,214	1,086	1,867	1,745	1,554	1,951	1,571	1,111	127+
Euchre Creek	36	42	56	56	54	118	68	82	44	0+
Floras Creek	291	41	334	537	220	--	--	--	--	--
Floras Creek and New River	--	--	--	--	--	188	174	174	203	9+
Hunter Creek	336	654	244	420	164	212	207	153	117	0+
Illinois River	2,072	3,204	2,395	3,444	2,699	1,893	2,491	2,815	1,772	17+
Kilchis River	1,549	1,492	936	2,302	1,748	878	1,683	2,194	1,029	511+
Miami River	136	248	133	160	272	545	628	708	307	172+
Millicoma River (Middle Fork Coos)	298	435	287	610	999	1,194	1,589	1,182	904	31+
Necanicum River	619	952	1,203	2,061	1,411	1,476	1,736	1,834	667	553+
Nehalem River & Bay	4,257	5,255	5,241	6,317	4,502	4,692	1,193	1,349	983	404+
Nehalem River, N. F.	--	--	--	--	--	--	2,704	3,279	1,785	887+
Neskowin Creek	132	174	139	165	177	42	113	61	37	0+
Nestucca River & Bay	12,680	12,311	8,589	14,362	12,619	10,453	10,281	13,454	7,472	3,710+
Nestucca River, Little	--	--	254	360	482	505	485	517	403	320+
Pistol River	281	372	189	282	204	252	234	284	347	4+
Rock Creek	50	77	79	79	187	326	58	67	117	17+
Rogue River	12,968	9,963	12,883	11,201	13,939	13,200	5,674	23,296	14,629	4,002+
Salmon River	3,307	3,459	2,122	4,815	4,339	1,975	2,742	2,702	1,423	857+
Salmonberry River	240	195	284	474	166	111	130	100	73	9+
Siletz River & Bay	5,536	4,189	3,597	6,242	4,807	4,937	4,897	4,937	2,690	1,385+
Siltcoos Lake	10	82	39	18	27	44	24	22	23	9+
Siuslaw River & Bay	6,331	6,456	3,141	7,186	6,122	3,773	7,355	4,793	3,484	269+
Sixes River	448	346	226	612	457	402	287	626	634	22+
Smith River	1,194	1,435	914	1,969	2,006	989	1,547	1,236	724	26+
Tahkenitch Lake	14	0	13	5	--	0	4	4	9	0+
Tenmile Creek & Lakes	867	--	--	--	--	--	--	--	--	--
Tenmile Lakes	--	356	122	131	120	136	85	46	36	0+
Tenmile Creek	--	507	609	691	1,071	652	515	448	218	0+
Tillamook Bay	194	270	109	112	146	30	58	12	0	0+
Tillamook River	63	114	178	502	413	302	857	1,197	438	115+
Trask River	3,362	4,219	4,226	6,859	4,133	3,186	1,739	3,000	1,790	890+
Umpqua River & Bay	5,556	6,690	5,627	7,083	6,128	4,471	3,167	6,795	4,243	1,945+
Umpqua River, N. F.	1,897	1,814	1,972	1,953	2,359	1,389	793	1,419	1,336	162+
Umpqua River, S. F.	629	656	385	533	122	611	240	584	764	13+
Wilson River	13,034	7,238	6,441	13,363	10,881	6,261	6,846	8,221	4,746	2,485+
Winchuk River	237	414	440	848	303	384	380	387	379	61+
Yachats River	249	439	242	172	176	106	142	147	69	9+
Yaquina River & Bay	136	95	53	89	87	36	16	159	41	44+
Total	102,110	94,687	79,858	129,140	106,172	85,531	85,476	112,409	74,277	21,774+

1/ Estimates from 1971 on are corrected for bias.

SHAD

COLUMBIA RIVER STOCKS

Status: American shad have flourished in the Columbia River since their introduction in the 1870's. Shad migrations were confined to the area below Celilo Falls until 1957 when The Dalles Dam was completed and submerged the falls. The dam allowed shad to extend their range upstream to over 643.6 km (400 miles) from the river mouth. Impoundments behind the dams have provided suitable spawning and rearing habitat. Shad runs into the Columbia River peaked in 1965 when over 617,000 shad were counted past Bonneville Dam. In 1976 many shad apparently continued to use the navigation lock to pass Bonneville Dam instead of the fish ladders as the count at The Dalles Dam (508,900 shad) again exceeded the Bonneville count (305,200 shad).

Recreational Harvest: Angling for shad occurs primarily in the Camas to Bonneville Dam area of the Columbia River and below the falls on the Willamette River. Accurate estimates of the sport catch are not available for most areas due to the lack of creel sampling effort. Sport catch estimates for the lower Columbia River have ranged between 10,000 and 15,000 shad during the last 5 years. The 1976 estimated catch was 15,900 fish. Catch estimates are not available for the Willamette Falls area; however, the catch may be as large as in the Columbia.

Commercial Harvest: Prior to 1965 shad were harvested during the regular summer salmon seasons in June and July. With the last of the summer seasons in 1964, shad have since been harvested during short shad and sockeye salmon seasons. Gear restrictions have been imposed during these seasons to protect summer chinook. In 1974 and 1975 general shad seasons were not established due to the continuing decline of the summer chinook runs; however, shad were harvested by special area and permit fisheries. Commercial netting for shad resumed during 1976 in the main stem Columbia River with nets restricted to mesh of a 10 lb. maximum breaking strength. Approximately 79,200 shad were harvested by all commercial fisheries in 1976.

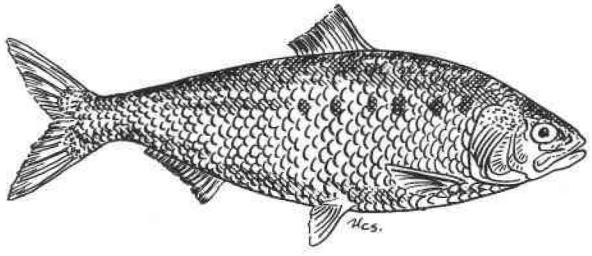
COASTAL STOCKS

Status: Shad probably occur in most of Oregon's coastal streams with large populations being found in the Umpqua, Smith, Coos, Coquille, and Siuslaw rivers. The only index available to evaluate the status of the shad populations is the magnitude of the sport and commercial catch. This information is not completely reliable as the catch can be influenced by many factors. In recent years the commercial fishery has been influenced by a reduction in the areas open to fishing, gear restrictions, variable effort, and the timing of the runs into the river. Sport effort also varies from year to year and an accurate estimate of the sport catch is usually not obtained.

Recreational Harvest: The coastal shad sport fishery occurs primarily on the Coos and Umpqua rivers. Limited creel sampling conducted on the Coos River in 1976 showed an average catch rate of 1.3 shad per angler and 2.1 hours per fish. Data from the 1975 Angler Survey showed 4,045 angler days were expended on south coastal streams to catch 5,267 shad.

Commercial Harvest: Commercial shad fisheries exist on the Siuslaw, Smith, Umpqua, Coos, and Coquille rivers. Set nets are used in all streams except the Umpqua where drift nets are used. The combined landings from all streams averaged 226,800 kg (500,000 lb.) per year during 1950-72, but declined during the early 1970's to an average of 158,760 kg (350,000 lb.). The 1976 landings totaled 72,893 kg (160,700 lb.).

The 1973 legislature removed the commercial fish classification from striped bass and instructed the Department to reduce the incidental catch of bass in the shad fishery. As a result, area and season restrictions were instituted in the shad fishery to protect striped bass. In 1975 and 1976, nets were restricted to a maximum breaking strength of 30 lb. to further reduce the incidental catch. These restrictions have contributed to the reduction in shad landings during the past few years. Striped bass could not be landed or sold during 1976.



STURGEON

Sturgeon are found primarily in the Columbia River and its larger tributaries. A few have been reported caught in some of the coastal bays and rivers but little is known of these stocks.

COLUMBIA RIVER STOCKS

Status: White and green sturgeon are found in the Columbia River but the white sturgeon is the predominant species taken by both the commercial and recreational fishermen. White sturgeon stocks were in a healthy condition in the Columbia River until the early 1900's when overfishing depleted the number of larger spawning fish. The decline was rapid as sturgeon grow slowly, mature at an advanced age, and do not spawn every year. Size limits imposed to protect large spawners, as well as season restrictions on the commercial fisheries for other species, have reversed the trend and a relatively healthy population once again occurs in the river.

Recreational Harvest: The sport fishery, concentrated mainly in the area below Bonneville Dam, has experienced increasingly good catches of white sturgeon over the past 3 years. During the spring and fall of 1976, an estimated 15,000 sturgeon were taken by sport anglers during the various sampling periods. This is not a total catch estimate but indicates that anglers took more sturgeon in 1976 than ever before.

Commercial Harvest: Prior to 1975, most commercially caught sturgeon in the Columbia River were taken incidentally while fishing for other species. Landings from the below-Bonneville Dam fisheries have averaged about 7,000 sturgeon during the past 10 years (Table 25). Commercial fishermen, faced with severely curtailed salmon seasons, turned to setlining to harvest sturgeon beginning in 1975. The combined 1976 landings from all seasons totaled a record 22,500 fish. The large catch, made despite reductions in fishing time, indicates the general good health of the sturgeon population in the lower river. Approximately 600 sturgeon were landed by the Indian fisheries above Bonneville Dam in 1976.

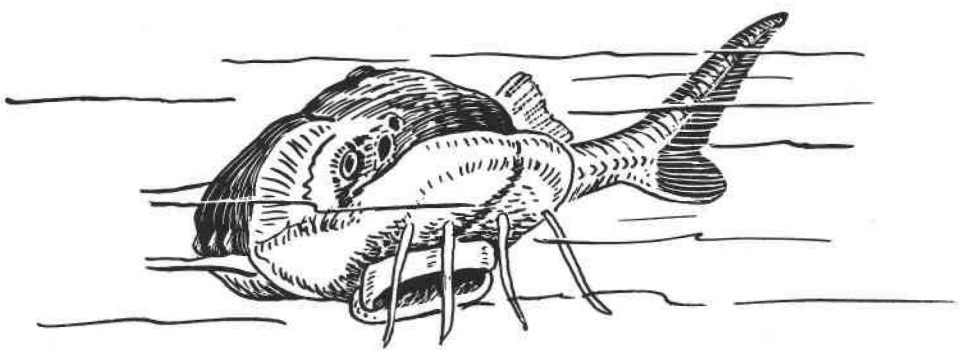


Table 25. Commercial landings (in thousands of fish) of sturgeon, shad, and smelt from the Columbia River by non-Indian and Indian fisheries, 1966-76.

Year	Sturgeon 1/			Shad		Smelt 2/
	White					
	Non-Indian	Indian	Green	Non-Indian	Indian	(Pounds)
1966	4.9	0.1	2.0	205.5	4.2	1,028.3
1967	3.8	0.2	1.3	221.8	5.7	1,000.8
1968	3.5	0.3	0.7	81.5	1.4	948.5
1969	7.3	0.4	2.0	45.5	2.1	1,090.1
1970	6.3	0.4	1.5	59.1	6.4	1,198.9
1971	7.0	0.8	1.5	40.3	6.7	1,761.7
1972	7.4	0.8	1.3	55.3	4.9	1,643.5
1973	9.7	1.0	1.0	49.1	4.8	2,434.4
1974	8.6	0.7	3.5	45.9	3.6	2,361.2
1975	11.4	0.7	1.2	64.5	8.5	2,071.7
1976	18.8	0.6	2.5	59.7	19.5	3,060.1
Average (1966-75)	7.0	0.5	1.6	86.9	4.8	1,553.9

1/ Numbers of white sturgeon based on 40 lb./fish average weight; green sturgeon 35 lb./fish average weight.

2/ Total landings from Columbia River and tributaries.

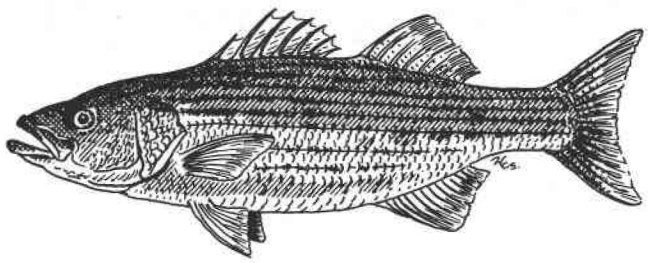
STRIPED BASS

Coastal Stocks

Status: Striped bass occur in many of Oregon's central and south coastal estuaries with the major populations found in the Siuslaw, Smith, Umpqua, Coos, and Coquille rivers. They are subjected to an intensive recreational fishery and, until 1975, a commercial fishery. Two independent Department studies conducted in 1972 estimated the number of bass in the catchable population to be between 50,000 and 70,000 fish. A 1973 study showed a drop in the population to about 35,000 fish. The decrease was not unexpected as fish from the dominant 1966-brood year were being removed from the population by both natural and fishing mortality.

Population estimates have not been made since 1973; however, the absence of any real dominant brood years has probably resulted in recruitment to the fisheries each year of around the 1973 value or less.

Recreational Harvest: Angling for striped bass is open the entire year although most fish are caught in the spring and summer months. The 1975 Angler Survey showed an estimated catch of 5,413 striped bass from coastal streams with approximately 80% of the catch occurring in the Umpqua-Smith River estuary.



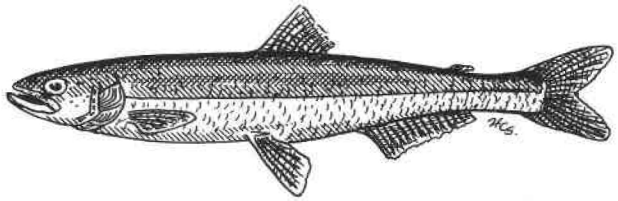
SMELT

COLUMBIA RIVER STOCKS

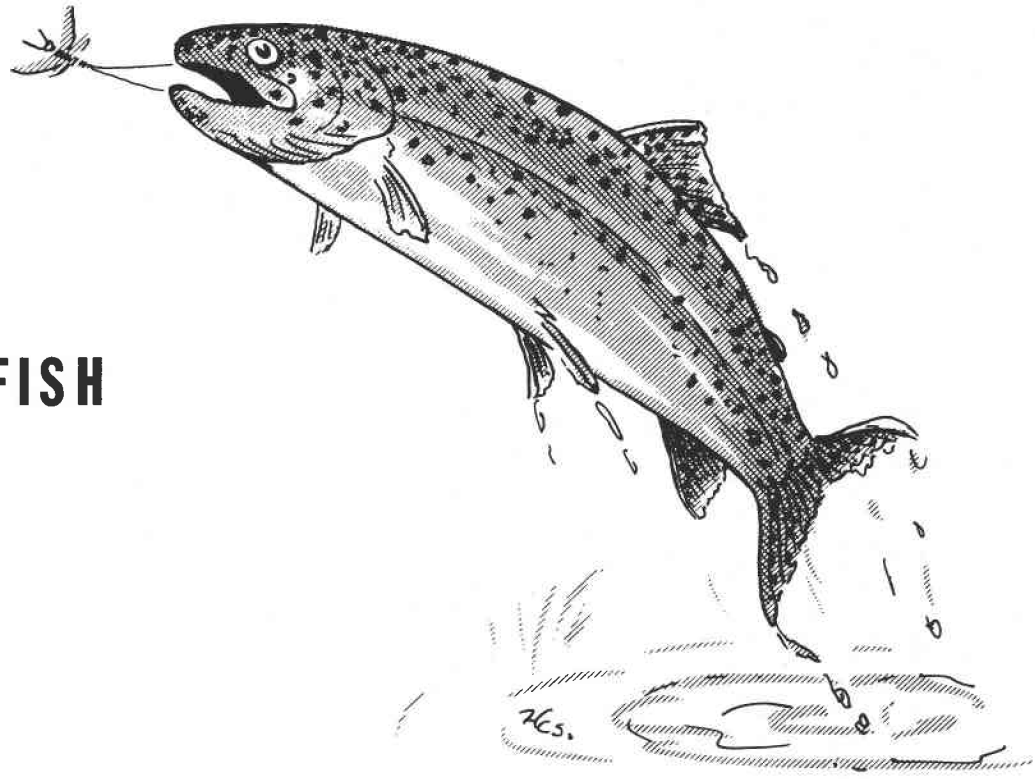
Status: The annual migration of Columbia River smelt or euchalon begins in late November and peaks in February. Millions of fish ascend the river to spawn in the main stem or glacier-fed tributaries, and ultimately die. Smelt runs have increased in the past few years and the outlook is for continued good runs.

Recreational Harvest: Sport dipping for smelt is enjoyed by many people in the Sandy River and main stem Columbia below Bonneville Dam. All time and area restrictions regulating dipping were removed in Oregon in 1975; however, dippers are limited to 25 lb. of smelt per day. No estimate of the sport catch is available.

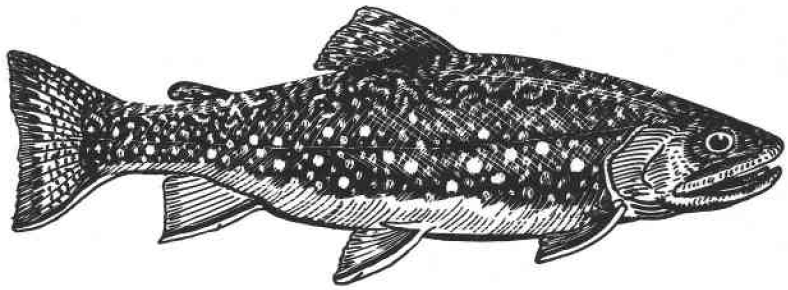
Commercial Harvest: Smelt are commercially caught by gill net, trawl, and dip net in the main stem Columbia River; and dip nets are used in the Cowlitz River in Washington. In 1976, more than 3 million lb. of smelt were commercially landed from the Columbia River and its tributaries (Table 25).



RESIDENT FISH



Resident game fish (trout and warm-water) annually provide more angling recreation than any other category of fish in the state. Trout or warm-water game fish reside in over 6,000 streams and 1,700 standing water bodies.



TROUT

Trout occur in a variety of waters and require various management programs to support the intensive recreational fisheries placed upon them. This section highlights the resident trout program by drainage basin.

NORTH COAST BASIN

Trout management on the North Coast consists primarily of stocking yearling cutthroat trout into streams to accommodate an early-season crowd, to supplement the fall sea-run population, or to provide a fishery for anglers fishing only for trout. Past stocking of fingerling trout provided poor adult returns.

Yearling Trout

Streams or stream portions supplemented with yearling trout are: Gnat Creek, Lewis and Clark River, Necanicum River, Nehalem River, North Fork Nehalem River, Rock Creek, Youngs River, Kilchis River, Miami River, Nestucca River, Little Nestucca River, Three Rivers, Tillamook River, Trask River, and Wilson River. Standing water bodies receiving yearling trout are: Coffenbury Lake, Cullaby Lake, Gunners Lake, Kauppi Lake, Lost Lake, Sunset Lake, Blue Lake, Vernonia Pond, Cape Meares Lake, Hebo Lake, Lytle Lake, Smith Lake, South Lake, Spring Lake, and Town Lake.

Several of the lakes are open to year-round angling. No statistical or expanded creel sampling programs were carried out during the year.

MID-COAST BASIN

Alsea, Salmon, Siletz, Yachats and Siuslaw River Systems

Management programs will soon be undertaken to improve the fall sea-run cutthroat fishery in these streams. Fish size and uniformity at release, release dates, stocking locations and spring fisheries will be evaluated.

Yearling Trout

Approximately 186,000 yearling trout were stocked into 5 stream systems and 25 standing water bodies along the mid-coast to provide an early season trout fishery, augment a fall sea-run cutthroat population, or "start" a spring trout fishery in companionship with a warm-water species population. Cutthroat are stocked in streams while rainbow have provided the best returns in standing waters.

No statistical or expanded creel sampling programs were carried out during the year.

WILLAMETTE BASIN (Including Sandy River)

Trout management programs are varied within the Willamette Basin. Most high lakes are air stocked annually with rainbow, brook, or cutthroat trout fingerling. Several lakes and reservoirs provide a fishery on stocked fingerling trout while others require stocking of yearling trout. Some waters are managed with both trout and warm-water species. Approximately 553 stream miles were stocked with yearling trout in 1976.

The Department's Research Section has been conducting a catchable rainbow trout evaluation on a number of the basin streams. The study continued through 1976 with numbers of fish stocked being manipulated.

Blue River, Cougar, and Dorena Reservoirs

These waters are managed with releases of fingerling and yearling trout. Overall angler success averaged 1.2 fish per angler. Bluegills were taken for the first time in Dorena Reservoir.

Blue Star Pond

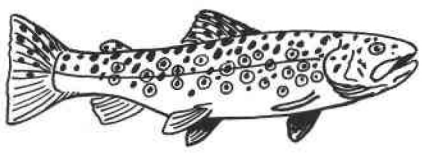
Blue Star Pond, located near Eugene, was chemically treated to remove a population of rough fish and stunted crappie. In 1975 the 3.2 acre pond produced 1,600 angler days of effort during the first 8 days of the trout season.

Clear Lake

This 166-acre water body is located at the head of the McKenzie River. Finglerling and yearling rainbow were stocked during 1976. Anglers averaged 2.8 trout each.

Detroit Reservoir

Detroit Reservoir is managed with releases of fingerling and yearling trout. Angling was good in 1976 as fishermen averaged 1.7 trout each.



Foster Reservoir

Expanded creel data collected by the Research Section showed a decrease in total angler use (down to 39,000 trips) from 1975. Seventy-seven percent of the 31,300 yearling rainbow stocked were caught by anglers. The 1976 stocking level represented an increase of 31% over the 1975 level. The reservoir water level was lower than normal and consequently 31% of the summer steelhead smolts released above the reservoir were caught in the reservoir trout fishery.

Gold Lake

Effort continued to reduce the brook trout population in the lake. Trap nets were set during the spring and fall and all brook trout captured were transported to Waldo Lake. Tributary streams were blocked to discourage spawning. The angling regulation is "fly only" and anglers averaged 4.2 trout each.

Green Peter Reservoir

This 3,700 acre reservoir was stocked with fingerling rainbow, kokanee, and spring chinook. Squawfish were recovered in the reservoir for the first time.

Henry Hagg Lake

The water continued to be a popular fishing lake. Use estimates by the county showed a 50% increase in opening weekend activities over 1975. Growth of fingerling trout remained good. The lake was again supplemented with yearling trout as spring-stocked rainbow fingerling were heavily cropped as zero-aged fish. Anglers averaged 1.5 trout each. Largescale suckers were collected in gill nets for the first time since the lake was impounded.

Hills Creek Reservoir, Lost Lake, and Waldo Lake

All three waters are managed by stocking fingerling trout. The crappie population is increasing in Hills Creek Reservoir and fewer large trout are being taken.

Lookout Point and Dexter Reservoirs

Meetings were held with the Corps of Engineers to assess the potential of chemically rehabilitating these reservoirs. The Research Section began gathering needed limnological data in case the reservoirs were treated.

Little Luckiamute River

The catchable trout evaluation study continued on the river. Fewer anglers fished the stream in 1976 than in 1975, probably due to the 26% reduction in the number of yearling trout stocked. Since the liberation truck must pass through Falls City to reach the stream, many local anglers were probably aware of the reduced stocking level and did not fish the stream. Only 62% of the stocked trout were caught compared to 82% in 1975. Approximately 56,600 anglers fished the 6.4 km (4-mile) study section during the year and averaged 0.5 fish each. More anglers reported catching no fish and fewer anglers caught their limit than in 1975.

McKenzie River

The stream received 120,000 yearling rainbow in 1976. No statistical creel sampling was conducted. Information received from two licensed guides revealed 5% of the catch of 548 anglers was trout over 35.6 cm (14 inches) in length.

Mill Creek (Yamhill System)

The number of rainbow trout normally stocked in a 16.1 km (10-mile) section of the stream was reduced by 25%. Approximately 6,200 anglers caught 71% of the stocked fish at a rate of 0.5 fish per angler. Fifty-four percent of the anglers caught no fish while 3% caught their limit. Contrasted to 1975 when a higher stocking rate was used, more anglers fished, the fish-per-angler average dropped, a higher percent of the fish were caught, fewer anglers limited, and more anglers did not catch a fish.

Quartzville Creek (Middle Santiam)

Fewer anglers, but still 7,500, fished the 19.3 km (12-mile) study section in 1976 than in 1975. The number of yearling trout stocked was reduced by 25% in 1976; however, the percent of

stocked trout caught (83%) remained the same. Fewer anglers limited and more failed to catch a fish than in 1975. Overall angler success averaged 1.1 fish per angler.

South Santiam (above Foster Reservoir)

The 32.2 km (20-mile) study section was stocked with 13,800 yearling trout in 1976, a reduction of 25% from 1975. Angler use (15,000 trips) declined from 1975 (18,000 trips). Approximately 80% of the stocked fish were caught as anglers averaged slightly less than 1 fish per angler.

Timothy Lake

Anglers experienced the best success since 1970 with an average catch of 1.9 fish per angler. The lake is managed by stocking finglerling trout. The kokanee population is maintained by natural reproduction. Approximately 10,000 kokanee were removed from the spawning population as they entered Crater Creek to spawn in an attempt to reduce the number of kokanee in the lake.

Walling Pond

Walling Pond, located near Salem, is managed by stocking yearling trout. Warm-water game fish, illegally introduced, were found in the pond in 1976.

Willamette River, North Fork of Middle Fork

This 70.8 km (44-mile) stream section was once managed by stocking yearling trout, but it has not been stocked since 1974. Wild rainbow and cutthroat are presently carrying the fishery. A study conducted during the year by a graduate student revealed:

1. The 15.2 cm (6-inch) minimum size length does not protect spawning rainbow, but does protect cutthroat.
2. 2,344 anglers caught 6,253 trout.
3. 12% of the anglers caught 75% of the fish.
4. The most successful angling method was fly fishing.

Wild Trout

Periodic creel data from three streams managed for a wild trout fishery revealed cutthroat and rainbow returns averaging 0.6 fish per angler trip.

Yearling Trout

Forty-five stream segments and 17 standing water bodies were stocked with yearling trout. No statistical or expanded creel programs were carried out on these waters.

UMPQUA BASIN

The trout program in the Umpqua Basin consists of managing wild trout populations, supplementing standing waters with fingerling trout, and stocking yearling trout.

Diamond Lake

Diamond Lake produced another good season of angling; however, total catch and effort dropped due to poor weather during the fall. A modified creel sampling program revealed 93,000 anglers harvested 202,000 trout. Approximately 400,000 fingerling rainbow trout were stocked during the spring of 1976 in contrast to the 300,000 fingerlings stocked annually for the past few years. About 417,000 rainbow trout eggs were collected from spawning fish during the spring to be used for fish culture purposes.

Lemolo Reservoir

The trophy brown trout fishery at Lemolo Reservoir appears to be reasonably well accepted by anglers. A modified statistical creel sampling program revealed 5,100 angler trips resulted in a catch of 2,700 brown trout in excess of 30.5 cm (12 inches), the legal minimum length. Angler use and catch both exceeded that of 1975. Lemolo Reservoir is not stocked.

Yearling Trout

Sections of Calapooya Creek, Cow Creek, Little River, and the South Umpqua River were stocked with yearling trout to provide a spring and early summer fishery. No expanded or statistical

creel programs were carried out. The Smith River system and North Umpqua River were stocked with yearling cutthroat to provide a spring fishery as well as supplement a fall sea-run population. Yearling rainbow trout were also stocked in the North Umpqua River and provided a fair (1.0 fish per angler) fishery. A statistical creel sampling program will be carried out on the North Umpqua in 1977.

SOUTH COAST BASIN

Bradley, Eel, and Garrison Lakes

These three South Coast lakes contain good warm-water game fish populations. Fingerling and yearling trout are released into the lakes to provide an additional fishery. Intensive management is showing favorable results.

Empire Lakes, Floras Lake, Powers Pond, Saunders Lake, and Tenmile Lakes

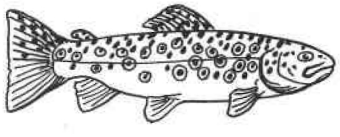
Satisfactory management programs have been realized from stocking yearling trout into these waters to supplement the existing warm-water fishery. Legal trout were stocked into Tenmile Lakes for the first time in 1976 as annual stocking of fingerling trout proved to be unsatisfactory.

Wild Trout

Six streams managed as wild trout streams were periodically creel sampled. The combined angler success from these streams was 1.2 cutthroat per angler.

Yearling Trout

Yearling trout were stocked into the following streams: Chetco River, Hunter Creek, Pistol River, Winchuck River, East Fork Coquille River, North Fork Coquille River, South Fork Coquille River, West Fork Millicoma River, and South Coos River. Creel sampling of 316 anglers on opening weekend revealed an average success of 2.8 fish per angler from these releases.



ROGUE BASIN

Fish Lake

Fish Lake was chemically treated during the fall to remove the large roach population; however, many spring areas provided refuge for the fish and live roach were found soon after treatment. The lake was restocked with fingerling rainbow and brook trout.

Howard Prairie Reservoir

Rainbow trout in the reservoir showed poor body condition, probably resulting from competition with roach and brown bullheads. The average catch of 1.9 fish per angler was the same as in 1975. The water is managed with annual releases of fingerling trout.

Hyatt Lake

The management objective of having "good-conditioned trout with an average size of 10 plus inches in the spring" was not met in 1976. The reservoir is heavily populated with brown bullheads and needs to be chemically treated to reduce this population.

Selmac Lake

Selmac Lake is managed for warm-water species but is stocked with yearling trout in the spring. The lake was treated with fertilizer in 1976; however, results of the treatment are questionable.

Willow Creek Reservoir

The reservoir is managed by making annual releases of fingerling rainbow and kokanee. However, few kokanee are seen in the creels. Ozark crayfish have been found and identified from the water body.

Wild Trout

Wild cutthroat trout were caught by anglers at the rate of 4.6 fish per angler from Upper Squaw Lake.

Yearling Trout

Yearling trout were stocked into approximately 418.3 km (260 miles) of Rogue system streams in 1976. Precocial two-year-old male

steelhead continued to be released in portions of the Rogue River in place of yearling trout. No statistical or expanded creel programs were carried out.

HOOD BASIN

Trout management in the Hood River system consists primarily of habitat protection to maintain wild populations and some supplemental stocking of yearling trout.

Yearling Trout

Yearling cutthroat trout stocked into the East Fork Hood River and Neal Creek provided a satisfactory spring fishery. No known fall fishery has resulted from the use of this species. Good trout fisheries resulted from stocking yearling rainbow and excess rainbow brood stock into Kingsley Reservoir and Lost Lake. Kingsley Reservoir is drawn down annually and consequently there is little opportunity to manage with fingerling trout. Lost Lake received heavy angling pressure and kokanee, brown trout, and brook trout made up 7% of the total catch. These three species are maintained by natural reproduction.

DESCHUTES BASIN

Billy Chinook Lake

Seventy-five percent of the angler catch was 20.3 to 30.5 cm (8- to 12-inch) kokanee from a self-sustaining population. No population sampling was conducted in 1976.

Clear Lake

Spring netting showed limited carry-over of fingerling rainbow stocked in 1975. Excess rainbow brood stock were released into the lake during the year to provide a fishery. Periodic creel data revealed an average catch of only 1 trout per angler.

Crane Prairie Reservoir

May-June creel sampling showed anglers averaging 2.5 fish each with the bulk of the catch being rainbow. Rainbow fingerling are stocked annually while brook trout and kokanee populations are maintained by natural reproduction. Spring net sampling revealed a large roach population.

Crooked River

The Crooked River below Prineville Reservoir was muddy after mid-August and the siltation had an adverse effect on angler success. Only 5% of the trout creeled exceeded 30.5 cm (12 inches) in length, well below the past 5-year average. Population sampling with electrofishing gear has not been successful and none was done in 1976.

Davis Lake

Deschutes stock rainbow fingerling were stocked in the lake in 1976. This stock appears to be resistant to Ceratomyxa shasta, a disease which has periodically caused serious losses in the trout population. Coho were maturing at 28.4 cm (11.2 inches) in length. Limited creel data (primarily voluntary creel box information) revealed an average catch of 0.9 fish per angler.

Deschutes River

Sections 1 and 2 - below Pelton Dam. The Research Section did not undertake population work in 1976. A final report on the research work conducted on the stream is due in the near future.

The area below Sherars Falls (RM 43) is not stocked and is under a "6 fish, no terminal tackle restriction" regulation. Limited creel sampling during the spring and early summer revealed an average success of 1.3 trout per angler and 0.4 trout per hour. No use estimates or population work has been done in this river segment.

Approximately 40,000 yearling rainbow trout were released below the Deschutes Club gate (RM 59) in 1976. Angler access is virtually unlimited between the gate and Sherars Falls and the area receives heavy angler use. A "6 fish, no terminal tackle restriction" regulation is in effect for this area. Periodic creel sampling showed a catch of 1.2 fish per angler and 0.3 fish per hour. Population work was conducted in this area in 1975.

Between Dant (RM 64.5) and the Warm Springs Highway (RM 97) a "2 fish, flies and lures only" restriction prevails. Vehicle access is limited and trout are not stocked in the stream section. Population sampling was conducted in this segment in 1975. Limited creel sampling showed a catch of 0.3 fish per angler and 0.1 fish per hour.

Approximately 25,000 yearling rainbow trout were stocked between the Warm Springs Highway (RM 97) and Pelton regulating dam (RM 100). The angling regulation is "6 fish, no terminal tackle restriction." Creel data showed 1.3 fish per angler and 0.5 fish per hour.

Section 3 - Head of Lake Billy Chinook to Bend. Most of this section of the river is open to angling the entire year since streamflow is low during the summer. Yearling trout are stocked to enhance the spring fishery. The potential exists for a major whitefish fishery during the winter months but angler use is light.

Section 4 - Bend to Benham Falls. Few yearling trout are stocked in this stream section as the primary management objective is for a wild brown trout fishery. Few brown trout were observed in the creels.

Section 5 - Top of Benham Falls to Wickiup Dam. Management consists of stocking yearling rainbow trout. Brown trout, brook trout, kokanee, and whitefish are also present. Minimum streamflow below Wickiup Dam during irrigation storage season is 20 cfs.

A turbidity study will soon be undertaken with the U.S. Forest Service as there is concern about the sediment caused by outboard motors. The Little Deschutes River, Spring River, and Fall River enter in this section.

Section 7 - Above Crane Prairie Reservoir. This section is managed by stocking yearling rainbow trout. Angler pressure is heavy as the stream parallels Century Drive. Brook trout, rainbow, and kokanee move up from Crane Prairie Reservoir to spawn in this river section. During most years, the Deschutes River immediately below Little Lava Lake is dry during the early spring.

East Lake

The management objective of providing 2.5 fish per angler and 0.7 fish per hour was not met in 1976. Creel sampling revealed anglers averaged only 0.7 fish each and 0.2 fish per hour. Fifty-six percent of the catch made during the spring fishery was yearling trout, as compared to 60+% in previous years. Overwinter survival of fingerlings stocked in 1975 was poor. Net sampling showed yearling-aged brook trout averaged 22.6 cm (8.9 inches). Two- and three-year-old rainbow averaged 37.6 cm (14.8 inches) and 39.6 cm (15.6 inches), respectively.

Fall River

Electrofishing inventory and stocking continued in the lower river as part of the management program to bring fish populations back to pre-1973 conditions. The river was chemically treated in 1973. Approximately 1,000 yearling grayling were stocked in the upper river along with yearling rainbow trout.

Gilchrist Mill Pond

This impoundment, located in the Little Deschutes stream channel at Gilchrist, was chemically treated in 1973 to remove a population of roach and stunted brown bullheads. A portion of the river above the pond was also treated. Brown trout stocked after treatment showed poor body condition in 1976. Whitefish were recovered for the first time since the chemical rehabilitation.

Hosmer Lake

There was better carry-over of Atlantic salmon through 1976 than has been realized for the past few years. However, only 32% of the salmon creeled were in excess of 40.6 cm (16 inches) in length and 46% were less than 30.5 cm (12 inches).

Big Lava Lake

Brook trout were again stocked after not having been available for stocking during 1973 and 1974. The brook trout stocked in 1975 showed good growth. The roach population is continuing to increase, and control work was conducted for the third consecutive year.

Metolius River

A statistical creel sampling program was conducted for a second year since errors were found in the 1975 expanded data. The upper 16.7 km (10.4 miles) of river were sampled for a period of 106 days. The river was stocked with yearling rainbow trout every two weeks during the sampling period. Sampling revealed: (a) the Cape Cod strain showed less movement than did the Roaring River strain, (b) approximately 69% of the stocked trout were caught within 5 days of release, (c) the best average catch came from the bait area (lower 1.5 miles of the study section), and (d) approximately 38,300 anglers caught 19,200 trout (48% of the stocked fish) at a rate of 0.8 fish per angler.

Ochoco Reservoir

Fall inventory net sampling revealed an increasing population of suckers. The reservoir was full in the spring and supported a good fishery (0.5 trout per hour) for rainbow 15.2 cm to 30.5 cm (6 to 12 inches) in length.

Odell Lake

The Department Research Section continued limnological and creel sampling programs at the lake and found: (a) comparisons of limnological data from 1968 to 1976 indicate an apparent decline in lake productivity; (b) during 1976, 16,600 anglers caught 12,000 kokanee (0.7 fish per angler), the lowest catch ever recorded, and an estimated 395 lake trout; (c) several causes may be responsible for the decline in the kokanee population but further study and identification is needed.

Paulina Lake

Approximately 95% of the spring trout catch was yearling trout stocked as fingerlings in 1975. Creel data revealed an average return of 2.5 trout per angler. Few anglers fished for kokanee which were maturing at 35.6 cm (14 inches) in length.

Pinehollow Reservoir

Anglers experienced poor success at Pinehollow Reservoir averaging only 0.7 fish per angler and 0.3 fish per hour. Temperature and dissolved oxygen readings indicate trout habitat is limited during the summer months. It will be necessary to supplement the fingerling stocking with yearling trout in order to provide an adequate return to the angler.

Prineville Reservoir

Warm-water fish populations are increasing in the reservoir and competing with trout for available food. However, these fish are also providing an added fishery. Turbid water conditions curtailed the trout catch after mid-August. Rainbow trout fingerlings are stocked in the spring and fall. A few Lahontan cutthroat, stocked in 1974, continue to be caught by anglers. Although they grow slower than rainbow, survival has been good.

Simtustus Lake

Angler pressure was again low since the main road and campground were still closed due to a slide on the hillside above the road and park. Rough fish control work continued with the operation of a weir at the mouth of Willow Creek to prevent suckers from moving into the stream to spawn.

Sparks Lake

Creel data (mostly voluntary) showed an average catch of 4.9 fish per angler. The catch was primarily small brook trout. Gill-net sampling indicates the brook trout population is recovering from the extremely low water year of 1973 and the absence of stocking in 1973 and 1974 due to fish not being available. Length at maturity is increasing and the average catch per net, although not as high as the pre-1973 years, was better than in 1975.

Suttle Lake

The kokanee and brown trout populations (naturally reproduced) were again supplemented with yearling trout during the early spring. Spawning female kokanee averaged 26.2 cm (10.3 inches) in length, a decline of 1.8 cm (0.7 inches) from 1975. Approximately 50,000 kokanee eggs and 91,000 brown trout eggs were collected from spawning fish at the lake.

North Twin Lake

A potential exists for a kokanee egg-take at the lake but a virus check could not be completed in time for a fall egg-take. Kokanee did not appear in the angler catch although they were captured during net sampling. Average length at maturity was 28.4 cm (11.2 inches).

South Twin Lake

Limited creel sampling showed a return of 0.9 fish per angler from the fingerling and yearling rainbow trout stocking programs.

Wickiup Reservoir

Creel sampling results showed an average catch of 0.9 fish per angler, similar to 1975. Sixty-eight percent of the catch was

kokanee. Net sampling revealed kokanee and coho were both maturing at 29.2 cm (11.5 inches) in length. Fingerling rainbow, coho, kokanee, and brown trout are stocked annually.

Yearling Trout

In addition to the previously mentioned waters stocked with yearling trout, 10 other standing water bodies and 4 stream segments are managed by stocking yearling trout. No statistical or expanded creel sampling programs were carried out on these waters.

KLAMATH BASIN

Agency and Klamath Lakes

Two hundred seventeen anglers fishing Agency and Klamath lakes caught 61 large rainbows for a catch rate of less than 1 fish per angler. Fingerling rainbow trout are stocked into Klamath Lake annually.

Fourmile Lake and Lake of the Woods

These lakes continue to be problem waters. Fourmile Lake water is drawn down heavily each year. There is also a naturally reproducing population of small brook trout. Lake of the Woods contains small rainbow, brook trout, and kokanee; a growing population of brown bullheads; and competition between anglers and water skiers.

Klamath River

Yearling trout are stocked in the Klamath River below Keno and Boyle dams to supplement the wild trout population. The river is open to angling year-round except closed to trout angling June 15 to September 30.

Miller Lake

Miller Lake continued to be a popular angling lake even though kokanee are small in size. Kokanee have not been stocked into the lake since 1971. In an attempt to reduce the kokanee population and achieve better growth, tributary streams used for spawning were blocked off in an attempt to reduce the number of spawning fish. Rainbow fingerling are stocked annually.

Spring Creek

Spring Creek runs through the middle of Collier State Park and receives heavy angler use. Yearling rainbow trout are released into the stream to support the fishery. Rainbow trout from the Williamson River enter the creek to spawn and their spawning activity is monitored during the early spring.

Williamson River

The Lower Williamson River fishery continued to be monitored as the area below the Chiloquin bridge remained under restrictive regulations. Anglers were limited to terminal tackle of artificial flies or lures and a limit of 2 fish 20 cm (6 inches) or over per day. Periodic creel sampling showed anglers averaged less than 1 fish per trip, virtually the same as in 1975 when a statistical creel sampling program was conducted.

The angling regulation on the Upper Williamson River was changed from 2 trout over 40 cm (12 inches) to 2 trout over 20 cm (6 inches) for 1976. The size limit was changed when electrofishing in 1975 revealed few trout exceeded 40 cm in length. No trout are stocked in this area.

Yearling Trout

Virtually no creel sampling was done on Sevenmile Creek, Spencer Creek, Sprague River, and Wood River, all streams receiving yearling trout in 1976.

JOHN DAY BASIN

Bull Prairie Reservoir

Brook trout, rainbow fingerling and a few yearling rainbow trout were stocked into Bull Prairie Reservoir in 1976. Fingerling trout stocked in 1975 and the 1976 yearling rainbow provided an average angler success of 2.0 fish per angler.

Main Stem, Middle Fork, North Fork, and South Fork John Day River.

Portions of the main stem John Day, Middle Fork, North Fork, and South Fork are managed by making annual releases of yearling trout in those areas with limited wild trout populations, good

access, or heavy angling pressure. Areas of high use are usually associated with campground development. Limited creel sampling revealed an overall angler success of 3.0 fish per angler resulting from the 22,000 yearling rainbow trout released. Fingerling rainbow trout were again stocked into the section of the Middle Fork John Day that was chemically treated in 1974.

Magone Lake

Approximately 98% of the total catch at Magone Lake was brook trout. A few rainbow are also present in the lake. Most fish caught were from 20.3 to 25.4 cm (8 to 10 inches) in length and entered the creel at the rate of 1.9 per angler.

Olive Lake

The lake remained drawn down approximately 7.6 m (25 feet) to allow for repairs and consequently no fish were stocked in 1976. The kokanee population continues to maintain itself. In the past, Lahontan cutthroat and California rainbow have been released in the lake.

Penland Lake

Penland Lake was not scheduled to receive yearling trout in 1976. However, a winterkill occurred for the second consecutive year and stocking was necessary. No trout were caught until the yearlings were released on May 25.

Wild Trout

Creel sampling from miscellaneous streams containing wild trout revealed an average success of 3.3 fish per angler on small rainbow, brook, cutthroat, and Dolly Varden trout.

Yearling Trout

Yearling rainbow trout were stocked into several small ponds: Bates, Carpenter, Dollarhide, and Long Creek. A good deal of angling recreation is provided in these waters. Canyon Meadows Reservoir continues to leak but still provides an early season fishery on yearling rainbow trout. Prior to going dry in the fall, Rowe Creek Reservoir provided good angling on the 12,000 yearling rainbows stocked earlier in the year. The warm-water fish population is increasing in Wineland Lake but the bulk of

the fishery is provided by stocked yearling rainbow trout. Sections of Camas Creek, Canyon Creek, Desolation Creek, and Rock Creek were stocked with yearling rainbow trout and minimal creel sampling revealed success of 1.8 fish per angler.

UMATILLA BASIN

Umatilla River

Approximately 6,000 yearling rainbow trout were released in several high-use sections of the Umatilla River. In addition, 41,000 fingerling rainbow trout were stocked into the area chemically rehabilitated in 1974.

Wild Trout

Periodic creel sampling on three wild trout streams revealed an average catch of 2.0 trout (rainbow and/or Dolly Varden) per angler.

Yearling Trout

Three stream segments and five ponds are managed by stocking yearling trout: Rhea Creek, Walla Walla River, Willow Creek, Cutsforth Pond, Hatrock Pond, McNary Pond, Tatone Pond, and Weston Pond. No expanded or statistical creel programs were carried out on these waters in 1976.

GRANDE RONDE BASIN

Grande Ronde and Wallowa Rivers

A management plan, initiated in 1974 to improve trout angling in the Grande Ronde River from Rondowa to Wildcat Creek and in the Wallowa River from Minam to Rondowa, was continued in 1976. Approximately 136,000 fingerling rainbow trout were stocked into the stream sections, including 25,000 released by aircraft. The Wallowa River from RM 8 to RM 19 is stocked annually with yearling rainbow trout. The Grande Ronde River also receives yearling rainbow from RM 187 to RM 204. The current management plan will be evaluated in 1977.

Habitat structures were placed in the Grande Ronde to create pool and spawning areas. If successful, future installations are planned. Flood repair projects continued into 1976 with major

emphasis on debris removal, gravel bar removal, and in-channel rock structural work. All in-channel work was completed by April 17. Impacts on fish habitat will take several years to evaluate.

Hells Canyon and Oxbow Reservoirs

The trout fishery was poor in both reservoirs. Water quality and limnological work will be conducted in the future to determine if a potential exists for improving the limited fishery.

High Lakes

A change in angling regulations placed all high lakes under a 10 fish per day bag limit. A checking station on the Lostine Road access was operated from July through early September and revealed 896 anglers caught 5,800 trout for an average catch of 6.5 fish per angler. About 33% of the visitors checked did some angling.

Lostine River

A yearling rainbow trout evaluation study was conducted during July and early August. Expanded data showed 1,900 anglers caught 6,300 yearling trout for a 63% return of stocked fish. Their catch rate was 3.5 fish per angler. A few Dolly Varden and brook trout were also caught. A flash flood in late July curtailed angling for part of the sample period.

Snake River

During 1976, ODFW released 412,000 fingerling rainbow into the Snake River downstream from Hells Canyon Dam. The Idaho Department of Fish and Game stocked an additional 59,000 fingerling rainbow trout in the area. Few trout or gradeout steelhead have been stocked during the last few years.

Wallowa Lake

A stratified creel sampling program was again used to calculate angler use and catch. The estimated catch of 33,000 kokanee was an all-time record. Hatchery kokanee were last stocked into the lake in 1970. In addition to kokanee, 16,000 rainbow and 500 Dolly Varden were also taken. Approximately 50,000 angler hours were expended on the lake.

Wild Trout

Periodic creel sampling from 16 streams managed as a wild trout fishery revealed a catch of 2.3 fish per angler on rainbow, brook trout, Dolly Varden, and whitefish.

Yearling Trout

Portions of Catherine Creek, Bear Creek, and the Imnaha River received plants of yearling trout as did Grande Ronde Lake, Roulet Pond, Vogel Pond, Victor Pond, and Twin Lake.

POWDER BASIN

Higgins Reservoir

Chemical rehabilitation is planned for 1977 since only 20% of the fish population is trout. The water is managed with releases of fingerling rainbow.

Murray Reservoir

This water is managed by stocking fingerling and yearling rainbow. Inventory nets show the sucker population to be increasing.

Phillips Reservoir

Angling was slow in the reservoir as the squawfish and sucker populations continued to increase while the salmonid populations decreased. Fingerling rainbow, coho and cutthroat are stocked annually.

Sumpter Wildlife Area Ponds

The water level was raised in 13 pond areas in the dredge tailings and three of them were stocked with fingerling cutthroat. A potential exists for many more impoundments.

Thief Valley Reservoir

Chemical rehabilitation is scheduled for 1977. Rough fish presently comprise 85% to 90% of the fish population. Although the catch of rainbow trout was poor, the fish remain in excellent condition. A copepod infestation was noted on trout caught during August and

September, the first such infestation observed. The water is managed with releases of fingerling rainbow trout.

Unity Reservoir

The reservoir is managed by releases of fingerling rainbows. Although angling was good, the roach population is continuing to increase and will cause problems in the future.

Wolf Creek Reservoir

Fair angling (1.2 fish per angler) was provided from the annual fingerling releases. For the second year, no rough fish were found during net sampling. Recreation facilities were constructed at the reservoir this year.

Wild Trout

Periodic sampling from 5 streams containing wild trout revealed an average catch of 1.8 fish per angler.

Yearling Trout

Yearling trout provided a good early season fishery in Haines Pond 1, Haines Pond 2, Highway 203 Pond, North Powder Pond 1, North Powder Pond 2, Wyatt Reservoir, and Anthony Lake.

Several stream sections received yearling trout. These were the South Fork Burnt River, Eagle Creek, West Fork Eagle Creek, Pine Creek, North Fork Pine Creek, and the Powder River. The Powder River went dry below Thief Valley Reservoir in late October as no minimum flow has been established below the reservoir.

MALHEUR BASIN

Five BLM impoundments in the basin were managed for a trout fishery and provided satisfactory catches.

Beulah Reservoir

The reservoir was chemically treated in 1973; however, the fall net inventory revealed an increase in the sucker population. The water is managed with releases of fingerling trout.

Malheur Reservoir

Malheur Reservoir was scheduled to be chemically treated in 1976 but the treatment was postponed because of too much water. Angling pressure has declined considerably in the past few years. Fall net sampling was not conducted because of the large crayfish population present in the reservoir. The reservoir is managed with releases of fingerling trout.

Malheur River

The Malheur River between Riverside and Namorf Dam provided good trout angling from stocked fingerling rainbow. Boaters are increasing on the river. The Department purchased the Blaylock Ranch below Riverside during the year to provide additional angler access. Portions of the Middle Fork, North Fork, and Little Malheur were stocked with yearling rainbow trout.

Wild Trout

Periodic creel sampling of 11 streams managed for wild trout revealed anglers averaged 3.0 fish per angler on small cutthroat, rainbow, and brook trout.

OWYHEE BASIN

Twelve BLM impoundments continued to be managed for a trout fishery and provided satisfactory catches for many local anglers.

Antelope Reservoir

Inadequate water was a problem at Antelope Reservoir during 1976. The reservoir filled in the spring but a leak developed and it was at minimum pool by September. The low water level necessitated lifting the trout bag limit in order to harvest the remaining fish. Throughout the season, anglers realized a return of 2.3 rainbow per angler with most fish being 25 to 36 cm (10 to 14 inches) in length.

Lower Owyhee River

The Owyhee River below Owyhee Dam contains cool water and is managed by releases of fingerling and yearling trout. Spring-released fingerling rainbow (stocked in the upper 10-mile section) exhibited good growth in 1976.

MALHEUR LAKE BASIN

Blitzen River

A 12-mile segment of the Middle Blitzen River was restricted to "flies and lures, barbless hook, and a 1 fish bag limit" during 1976. The area extended from Blitzen Crossing downstream to the gauging station above Page Springs campground. Approximately 200 angler trips were made into this stream portion as verified by voluntary creel boxes, aircraft flights, and personal interviews. This represented a reduction of about 50% in angler use from past years. Electrofishing and angling were used to tag 166 trout (108 in the Middle Blitzen and 58 in the Lower Blitzen) to monitor growth and movement. Angling in the middle portion of the river provided a return of 4.2 trout per angler. Yearling trout continue to be stocked at Page Springs campground and downstream.

Chickahominy Reservoir

Chickahominy Reservoir water storage was below normal for the fourth straight year. This water continues to be managed with releases of fingerling rainbow trout and provided a return of 25.4 to 30.6 cm (10- to 12-inch) rainbow at a rate of 2.4 fish per angler.

Fish Lake

Lahontan cutthroat trout were mistakenly air stocked into the lake in 1976. The Bureau of Land Management estimated 2,700 angler trips were expended on this small water body located on the Steens Loop Road.

Mann Lake

Mann Lake received the heaviest angling pressure it has experienced in the past 5 years as the Bureau of Land Management traffic counter recorded 3,500 angler trips. Angler catch was roughly one-half rainbow and one-half cutthroat at a rate of 4.3 trout per angler. Approximately 548,000 Lahontan cutthroat eggs were collected from spawning adults during the spring.

Yellowjacket Lake

Yellowjacket Lake continues to experience an aquatic weed problem which necessitates a water drawdown during the fall. The lake is managed with fingerling and yearling trout.

Wild Trout

Periodic creel sampling from 15 streams managed for wild trout (not including the Blitzen River) revealed an angler success of 3.6 trout per angler.

Yearling Trout

Emigrant Creek is the only stream in the basin stocked with yearling trout. Distribution is throughout a 15-mile section. Yearling trout were returned to the angler at a rate of 1.4 trout each from releases made into Burns Pond and Delintment Lake. The U.S. Fish and Wildlife Service is discontinuing stocking yearling rainbow into Krumbo Reservoir and the water will now be managed for a warm-water fishery.

GOOSE AND SUMMER LAKE BASINS

Many waters in the basin are managed with trout although they have high turbidity readings. These include Lucky Lake, Mud Lake, Big Rock Reservoir, Priday Reservoir, Spaulding Reservoir and Squaw Lake.

Heart Lake

Most fish caught at Heart Lake were kokanee 20.3 to 20.4 cm (8 to 10 inches) in size. This species was last stocked in 1974. Fingerling rainbow are now stocked to support the fishery.

Lofton Reservoir

Lofton Reservoir was chemically treated during the fall to remove brown bullheads. It was restocked with rainbow trout after detoxification.

Thompson Reservoir

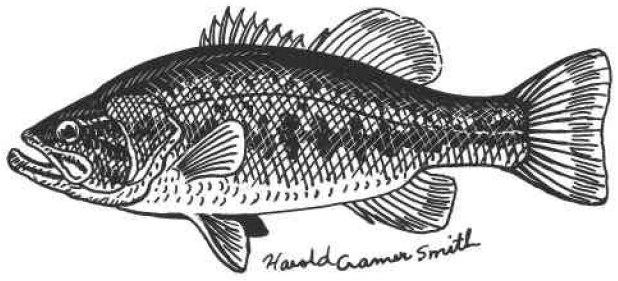
A statistical creel sampling program conducted at the reservoir in 1976 revealed 7,700 angler days were expended to catch 7,000 trout. The water is stocked annually with fingerling rainbow with a future objective of using California rainbow trout. These fish should feed heavily on the large number of roach in the reservoir. If the water volume drops to a low level in 1977 the reservoir will be chemically treated to reduce the roach population.

Wild Trout

Sixteen streams managed for wild trout showed a return of 1.8 trout per angler from periodic creel sampling.

Yearling Trout

The Chewaucan River, Dairy Creek, Deep Creek, Camas Creek, and Silver Creek were stocked with yearling trout during the year. Deadhorse and Campbell lakes were supplemented with yearling trout as both waters experienced a partial winterkill. No expanded or statistical creel programs were carried out on these waters.



WARM-WATER GAME FISH

Angler demand for warm-water game fish continues to increase. The 1975 Angler Survey revealed warm-water species provided nearly 500,000 angler days of recreation, or over 9% of the total angler use in 1975.

NORTH COAST BASIN

Cullaby Lake

Population samples indicated a slight increase in the number of most warm-water species except for yellow perch.

MID-COAST BASIN

Devils Lake

The number of brown bullhead taken in population samples dropped sharply from 25.9% in 1975 to only 8.2% in 1976. Average fork length increased to 29.7 cm. (11.6 inches). Yellow perch numbers increased significantly to 23.3% of the sample and were the most abundant warm-water species taken. Seventy-six percent of the perch were over 23 cm (9 inches) in length. Once again white crappie did not appear in the samples.

Eckman Lake

Brown bullhead introduced into Eckman Lake in 1970 are now making a good contribution to the angler catch.

Siltcoos Lake

Increased interest in angling for largemouth bass was evident as the number of club tournaments held on the lake increased in 1976.

Angler catch information for the late February through mid-April period of 0.6 bass per completed angler trip was identical to that of 1975. Catch information indicated a sharp decline in the percent of bass creeled under 30.5 cm (12 inches) in length while the size groups 30.5 cm (12 inches) to 58.3 cm (17 inches) and over 58.3 cm showed small and moderate increase, respectively.

Population samples indicated little change in the fish population except for black crappie which comprised only 1% of the sample compared to 21% for the previous 1970-74 period. Yellow perch (37%) and brown bullhead (20%) were the most abundant species taken.

Tahkenitch Lake

The first Oregon open team bass tournament was held June 5-6, 1976, and was sponsored by the Oregon Hawghunters Bass Club. Seventy-four two-man teams participated on Saturday while 60 teams participated on Sunday. The total catch of bass over the minimum length limit (30.5 cm; 12 inches) was 93 fish. Fork length measurements averaged 33.0 cm (13.9 inches) while the average weight was 0.8 kg (1.8 pounds). Initial mortality was 3% while delayed mortality was 5%. All live fish were released back into the lake.

White crappie and brown bullhead have been numerous in previous population samples; however, they were not recovered in large numbers in the 1976 sample.

Hult Reservoir

Largemouth bass, bluegill and black crappie were introduced into the reservoir to establish a warm-water fishery.

WILLAMETTE BASIN

Tualatin River

Late August population samples collected between river kilometer 8.0 (RM 5) and river kilometer 24.1 (RM 15) were not considered representative of the fish population present. Few game fish were taken. One 45.8 cm (16-inch) long channel catfish was recovered although catfish have never been stocked in the river.

Willamette River

Seven sloughs between Independence and Peoria were inventoried. Population samples indicated extensive populations of rough fish were present. White crappie and bluegill were the most abundant warm-water species taken.

Electrofishing gear was used on several sloughs between Independence and Salem. This equipment was considered to be an effective method to sample warm-water species, especially bass.

Freeway Lakes

Population sampling indicated the presence of good warm-water fish populations. White crappie, bluegill, and largemouth bass were the predominant game fish species recovered. Coarse scale suckers were also abundant.

Foster Reservoir

Three species of warm-water game fish (bluegill, largemouth bass, and brown bullhead) were taken in trap-net samples. Bluegill represented 17% of the total catch.

Walter Wirth Lake

Largemouth bass fingerling and adult bluegill were introduced into the lake in an effort to establish a warm-water fishery for summer angling.

St. Louis Ponds

State highway activity in the ponds area was completed as far as excavation work was concerned. Seven ponds were completed and six ponds were stocked with warm-water game fish. All but one of the ponds was near full and turbidity showed indications of clearing.

Bond Butte Pond

Turbidity continues to be a problem at the pond and no improvement was noted in 1976. Channel catfish adults spawned successfully for the second year in a row since being stocked in 1974.

Barnick Pond

Largemouth bass fry stocked in July 1975 averaged 19.4 cm (7.6 inches) fork length by September 1976. Black crappie stocked at an average fork length of 10.2 cm (4.0 inches) in October 1975 averaged 18.4 cm (7.2 inches) fork length by September 1976. Channel catfish stocked at an average fork length of 17.6 cm (6.9 inches) in October 1975 averaged 27.6 cm fork length (10.8 inches) by September 1976.

UMPQUA BASIN

Whistler's Bend Pond

In an effort to improve spawning success, spawning habitat in the form of gravel pads and astroturf mats was placed at depths ranging from 0.6 m (2 ft) to 1.8 m (6 ft). Gravel pads at the lesser depths were used readily by the bass. Most astroturf mats and all gravel pads in the deeper water were not used.

A September drawdown was undertaken to reduce predation on fingerling bass by birds. Total production was 32,000 fingerling bass. Two hundred and twenty-five adult brood bass were transferred to the St. Paul Ponds for holding over winter.

South Umpqua River

Bass from the South Umpqua River have been positively identified as smallmouth. The population size and distribution has not been determined although reports of bass have been received from the forks upstream to the mouth of Cow Creek, a distance of 75 km (47 miles).

SOUTH COAST BASIN

Garrison Lake

Population samples indicate warm-water fish populations are relatively stable. A large increase in the number of red-sided shiners and stickleback recovered was the result of a change in net type.

ROGUE BASIN

Selmac Lake

Brown bullheads continued to be plentiful while crappie and bluegill numbers remained low. In May, 182 black crappie and 429 bluegill were released into the lake in an effort to improve these populations.

Twenty-five brush piles and 35 yards of spawning gravel were distributed in key locations around the lake in an effort to improve spawning success. Later investigation revealed considerable use of these areas by both bass and bluegill.

DESCHUTES BASIN

Prineville Reservoir

Angler interest continues to increase at the reservoir as the reservoir has been the site of a number of club fishing tournaments. Two open invitational team tournaments were held in 1976. The spring tournament, held May 22 and 23, attracted 38 two-man teams. The catch consisted of 27% smallmouth and 73% largemouth bass. Average fork length measurements for smallmouth bass weighed in was 30.7 cm (12.1 inches) while the average fork length for the largemouth bass was 44.0 cm (15.3 inches). Mortality for largemouth bass was 25% and for smallmouth bass 8%.

The fall tournament was held on September 19 and attracted 22 two-man teams. The catch consisted of 46% largemouth bass and 54% smallmouth bass. Average fork lengths were 41.0 cm (14.1 inches) for largemouth and 39.8 cm (13.6 inches) for smallmouth bass. A minimum length limit of 30.5 cm (12 inches) is adopted for all tournaments.

Lake Billy Chinook

Bass angling is increasing in popularity at the lake. The bass population is rapidly increasing and the lake was the site of a number of club tournaments.

JOHN DAY BASIN

Wineland Lake

Largemouth bass appear to be in good condition and averaged about 20.4 cm (8.0 inches) fork length. Anglers averaged 0.4 bass

per hour and 1.1 bass per angler. Good numbers of 10.2 to 11.5 cm (4- to 4.5-inch) bluegill have been observed.

John Day River

Angling for smallmouth bass is increasing in popularity. Angler success averaged 0.6 bass per angler and 0.3 bass per hour.

John Day Pool - John Day Arm

Smallmouth bass comprised 64.3% of the warm-water game fish caught in the Columbia River portion of the John Day pool and 41.9% of the catch from the John Day Arm. Angling pressure was heavier in the John Day Arm than in the main pool and more bass were taken in the Arm. Small numbers of channel catfish were taken in both areas. Angler success in the John Day Arm was 0.8 fish per angler and 0.3 fish per hour while success in the main pool averaged 0.4 fish per angler and 0.3 fish per hour.

UMATILLA BASIN

Cold Springs Reservoir

Angler success for warm-water fish averaged 1.3 fish per angler and 0.6 fish per hour, a decrease from the 1975 catch level. Good numbers of crappie, brown bullhead, and largemouth bass were taken.

Population sampling indicated a sharp decline in the number of white crappie and a moderate decline in the number of brown bullhead present as compared to 1975. The dominant age class of crappie present in 1975 was absent from the 1976 samples.

McKay Reservoir

Angler success averaged 1.9 fish per angler and 0.9 fish per hour. The catch was comprised primarily of black crappie (72.6%), largemouth bass (8.7%), and bluegill (9.2%). Population samples indicated a substantial decrease in the number of black crappie and brown bullhead while bluegill numbers increased from 1975.

McCormack Slough

Bass angling success continued to decline as the carp population increased. Brown bullhead comprised 90.5% of the angler catch. Sampling with electrofishing gear turned up numerous large carp.

POWDER BASIN

Thief Valley Reservoir

A noticeable change in the black crappie population was evident as they increased from 0.4% of the population in 1975 to 6.1% in 1976. The majority of the crappie were taken near the tire attractors. Three additional fish attractors were constructed and installed in September.

Brownlee Reservoir

Angler success averaged 1.6 fish per angler and 0.6 fish per hour. Black crappie and channel catfish comprised 78% of the angler catch. Good numbers of black crappie 20.4 cm to 30.5 cm (8 to 12 inches) and channel catfish 40.8 cm to 45.3 cm (14 to 16 inches) were taken. The Powder River Arm continued to be a popular fishing area in Brownlee Reservoir.

MALHEUR BASIN

Bully Creek Reservoir

Angler activity was well below normal as the reservoir management program is being switched to a warm-water game fish fishery. White crappie, averaging 15.3 cm (6 inches) in length, comprised 53% of the trap-net sample. Channel catfish 23 cm to 28 cm (9 to 11 inches) in length comprised a surprising 12% of the gill-net catch. The crayfish population continued to increase.

OWYHEE BASIN

Owyhee Reservoir

An estimated 8,330 visits were made to the Leslie Gulch area and 147,000 visitors to the dam in 1976. Angler success improved in 1976 to a rate of 7.1 fish per angler and 2.2 fish per hour. Crappie comprised 96% of the catch.

Fall population samples indicated another year of poor growth for all species. Few "0" age crappie were taken. Good numbers of channel catfish ranging from 10.3 to 51.0 cm (4 to 18 inches) were represented in the catch. Yellow perch comprised only 1% of the catch compared to 65% in 1975.

Owyhee River (Upper)

Boating activity on the river continued to increase, particularly between Rome and the reservoir. An estimated 5,077 recreational days were spent on the river; 1,420 guided and 3,657 private boater days. Angling for smallmouth bass and channel catfish continued to improve. Limited creel data indicated an angler success rate of 2.6 fish per angler and 0.7 fish per hour.

A study conducted by the Bureau of Outdoor Recreation indicates the Owyhee River meets all requirements for "Wild and Scenic Classification."

GOOSE LAKE BASIN

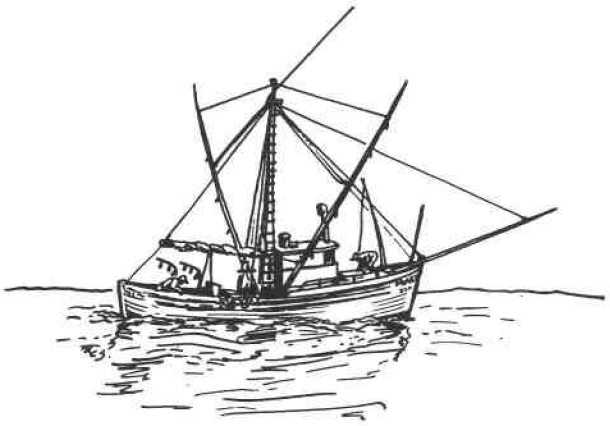
Crump Lake

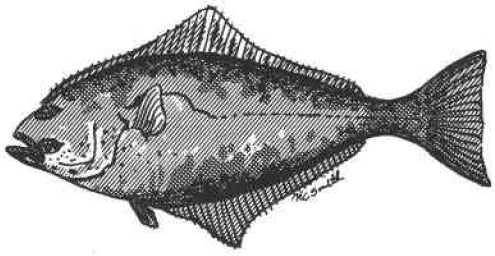
Population sampling in mid-October indicated the presence of a good population of crappie and brown bullhead. Black and white crappie represented 31.1% and 22.8% of the total catch, respectively. All game fish examined were heavily infested with a parasitic round worm in the body cavity.

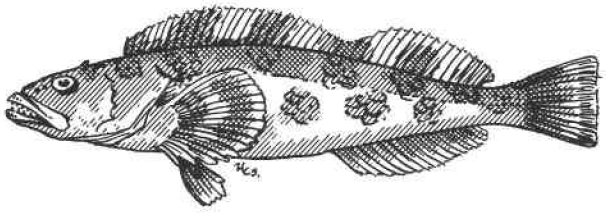
COLUMBIA RIVER

Sauvie Island Lakes

Anglers averaged 3.4 fish per angler and 1.4 fish per hour in the Sauvie Island lakes. Brown bullhead and white crappie represented 62% and 28.7% of the angler catch, respectively. Pete's Slough and Sturgeon Lake were two of the more popular fishing areas.



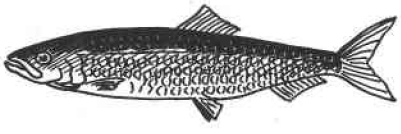




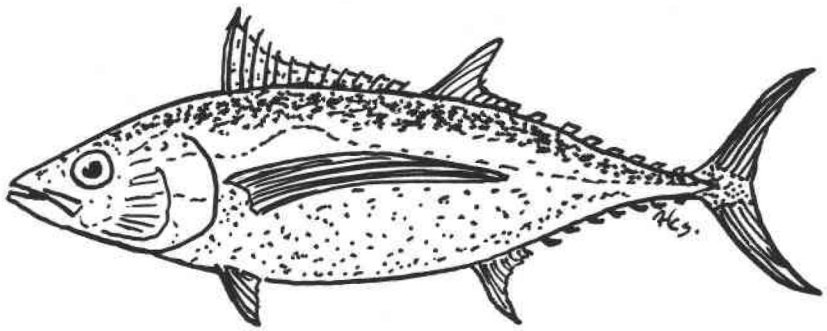
MARINE FISH AND SHELLFISH

Marine fish and shellfish include all marine and estuarine fish and shellfish except anadromous fish. Most of the groundfish, ocean pink shrimp and ocean stocks of Dungeness crab are utilized only by commercial fisheries, as they occur too deep or too far offshore to be available to recreational fishermen. Species harvested almost entirely by the recreational fisheries include some of the bay or inshore groundfishes (surf perch, greenling, cabezon), abalone, bay clams, razor clams, crawfish, and mud or ghost shrimp. Some support both commercial and sport fisheries (lingcod, some species of rockfish, Dungeness crab in bays, albacore tuna, starry flounder, and baitfish).

In 1976 Oregon's marine fisheries were worth over 17 million dollars to commercial fishermen in the albacore, crab, groundfish, and shrimp fisheries. The value of a growing recreational fishery along the ocean beaches, jetties, bays, and near offshore areas is unknown, but probably substantial.



An angling license is not required for recreational users of these resources. About the only restrictions on recreational users are bag limits and special restrictions on some popular intertidal invertebrates along the open coast. Commercial fishermen are required to purchase a commercial fishing license. Restrictions include seasonal closures on the Dungeness crab and shrimp fisheries and gear limitations on groundfish trawlers.



ALBACORE TUNA

The 1976 season saw a shift in distribution of albacore in the North American fishery from north to south, with only 31% of the catch being taken from waters off Oregon and Washington. The remainder was caught off California.

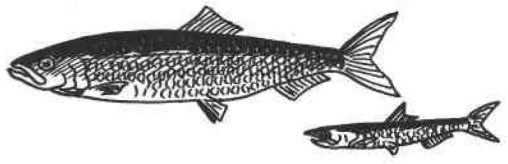
Status of the Stock: In 1976 the total harvest of North Pacific albacore again increased and reached the lower limits of the preliminary maximum sustainable yield (MSY) at about 115,000 tons. The Japanese fishery again had a record high level of catch and the U.S. fishery was down only slightly from the past 10-year average catch.

Work is progressing on analysis of past data and as yet no new estimates of MSY have been made. The next working meeting of U.S. and Japanese albacore scientists is scheduled for June 1977.

Recreational Fishery: The albacore sport catch was down from 1975 in Oregon due to the excellent salmon fishing and the short time albacore were readily available to the fleet. The Oregon sport catch was not well documented but an estimated 2,000 to 3,000 fish were taken. The sport catch in Washington about doubled from 1975; however, the total fishing effort quadrupled so the overall catch rate was actually lower than in 1975.

Commercial Fishery: The albacore fishery in the Pacific Northwest in 1976 was down from the previous year with landings for Oregon and Washington declining by about 9,074 mt (20 million lb.). Fish were scattered this year and did not concentrate in any

given location for very long, making it difficult for the fleet to stay on the fish. Oregon landings totaled 2,692 mt (5,933,612 lb.) in 1976, down 65% from 1975 landings, and 25% under the 25-year average (Table 26).



BAITFISH

The principal baitfish species taken in Oregon are the Pacific herring and northern anchovy.

Status of the Stocks: No estimate of the stock size of either herring or anchovy in Oregon is available. Fisheries on these two species are relatively small, and the resource does not appear to be overharvested.

Recreational Fishery: Most of Oregon's estuaries support a recreational fishery for herring. The fishery is particularly prominent in the Tillamook, Yaquina, Siuslaw, and Umpqua estuaries. The major fishing effort in most of the state occurs in the summer months; however, in 1976 a sizeable sport fishery developed in February and March in Yaquina Bay. The recreational fishery for northern anchovy is confined to the Chetco estuary because large numbers of anchovy do not normally enter other estuaries.

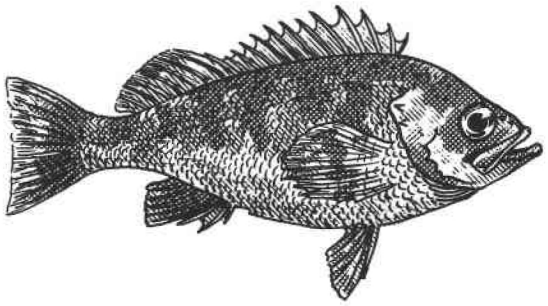
Commercial Fishery: During the 10-year period 1967-76, Oregon's commercial landings of herring ranged from 12.4 to 37.7 mt (27,285 to 83,042 lb.) and averaged 24.7 mt (54,400 lb.). All commercial fishing occurs inside estuaries. For the past several years the Tillamook, Yaquina, and Umpqua estuaries have provided nearly all of Oregon's landings with the Umpqua accounting for over 50% of the total. The 1976 catch of 35.4 mt (77,922 lb.) was taken entirely from the Umpqua and Yaquina estuaries since herring failed to enter Tillamook Bay in large numbers.

Complete commercial landing records for anchovy are available only from 1969 to present. During this period landings ranged from 0.7 to 17.8 mt (1,500 to 32,127 lb.) and averaged 5.5 mt (12,200 lb.). The only dependable anchovy fishery occurs in the Chetco estuary; in 1976, all of the state's total landings of 0.7 mt (1,500 lb.) occurred there.

Table 26. Oregon albacore tuna landings, in pounds, by month of landing, 1936-76.

Year	July	August	September	October	November	December	Total
1936							27,600
1937	-	65,818	944,137	288,077	49,154	6,336	1,353,522
1938	-	-	-	-	-	-	8,000,000
1939	6,346	2,835,941	2,912,702	729,806	-	-	6,484,795
1940	2,589,505	5,232,822	1,319,707	144,227	-	-	9,286,261
1941	778,890	5,652,549	1,063,971	44,437	5,284	-	7,545,131
1942	2,061,574	5,047,732	2,876,280	957,370	-	-	10,942,956
1943	1,752,612	4,083,183	3,446,139	1,214,022	-	-	10,495,956
1944	1,587,917	8,978,984	8,778,448	3,142,838	3,838	-	22,492,025
1945	1,454,131	7,902,500	2,589,762	231,978	-	-	12,178,371
1946	393,890	2,371,039	1,185,875	-	-	-	3,950,804
1947	1,028,515	2,650,556	4,815,158	1,063,433	-	-	9,557,662
1948	2,620,140	3,707,332	1,372,126	175,372	129,357	-	8,004,327
1949	631,604	2,180,496	2,188,800	1,425,920	30,337	225	6,457,382
1950	1,534,713	1,902,085	495,972	1,242,483	210,851	-	5,386,104
1951	41,183	216,786	1,302,648	1,254,324	101,604	-	2,916,545
1952	13,994	123,099	1,299,165	840,039	256,469	52,591	2,585,357
1953	-	21,378	566,188	187,201	1,000	-	775,767
1954	-	-	98,952	360,251	10,237	-	469,440
1955	-	-	26,881	318,211	158,212	-	503,304
1956	-	447,482	2,615,237	424,692	156,962	8,727	3,653,100
1957	82,659	896,063	626,374	1,064,218	32,193	-	2,701,507
1958	393,361	5,372,518	3,042,537	944,507	1,066	-	9,753,989
1959	1,444,097	4,081,597	4,362,101	573,578	111,597	1,060	10,574,030
1960	19,126	899,974	2,605,238	932,842	105,415	-	4,562,595
1961	23,050	1,188,391	1,496,130	538,566	3,626	-	3,249,763
1962	28,101	4,662,613	2,727,483	1,414,345	103,577	13,369	8,949,488
1963	76,097	5,445,516	3,990,480	1,835,435	44,917	7,084	11,399,529
1964	39,155	1,066,575	2,096,195	1,229,179	20,896	-	4,452,000
1965	5,641	3,059,139	6,550,461	2,261,195	243,805	2,193	12,122,434
1966	635,276	11,362,964	3,375,579	2,630,157	36,638	-	18,040,614
1967	432,402	15,296,637	10,465,139	3,045,594	2,924	-	29,242,696
1968	8,082,701	18,018,089	8,649,553	2,986,855	13,921	697	37,751,816
1969 1/	2,913,115	18,265,216	6,906,048	1,525,507	151,120	66,049	29,827,549
1970	7,589,773	7,169,072	5,749,076	961,575	296,257	15,821	21,781,574
1971	2,799,145	4,886,922	165,325	530,390	37,803	-	8,419,585
1972	4,815,644	13,633,518	4,463,855	122,481	20,506	-	23,056,004
1973 2/	96,179	10,083,885	5,500,339	656,225	4,456	-	16,349,895
1974	2,759,245	12,433,103	8,881,669	1,126,150	24,553	-	25,224,720
1975	1,325,988	12,256,369	2,745,129	761,515	76,536	-	17,165,537
1976 3/	1,144,532	3,640,801	637,557	315,051	149,171	29,868	5,933,612

1/ June - 494 lb.
2/ June - 8,811 lb.
3/ February - 6,648 lb.; June - 9,984 lb.



GROUNDFISH

Status of Stocks: Stock status of these resources is believed healthy with possible highly localized depletion of rockfish and/or lingcod in some heavily used nearshore reef areas.

Recreational Fishery: The recreational fishery for marine food fish is increasing in popularity. Although the resource is holding its own right now, problems may develop in the future as harvests increase on the species for which we have limited biological knowledge.

There are three primary geographic fisheries in Oregon: estuary, open coast, and offshore. The estuarine fisheries are pursued from both beach and in boats, the open coast is a beach fishery, and offshore is a boat fishery which includes both "private" and chartered boats.

There are some important differences between these geographic divisions in respect to target species. Estuarine fisheries target on starry flounder, surf perch, and rockfish. Open coast fishermen tend to target on greenling, Pacific tomcod, and surfperch (mainly redtail). Offshore fisheries tend to target on salmon, lingcod, and rockfish.

Commercial Fishery: The Oregon groundfish trawl fleet (76 vessels in 1976) landed 11,353 mt (25 million lb.) of fish during the year (Table 27). The 1976 catch was the largest catch since 1966 when 11,701 mt (25.8 million lb.) were landed. It also was 20% greater than the 10-year average (1966-75).

Catch per unit effort, at 0.34 mt per hour (752 lb. per hour), was above last year's average and the best since 1969. Improved market demand and abnormally favorable weather contributed to the improved groundfish landings and effort average in 1976. Certain flatfish and rockfish species were available in good abundance. Strong market demand through the year resulted in few limits being imposed on the fishermen by buyers.

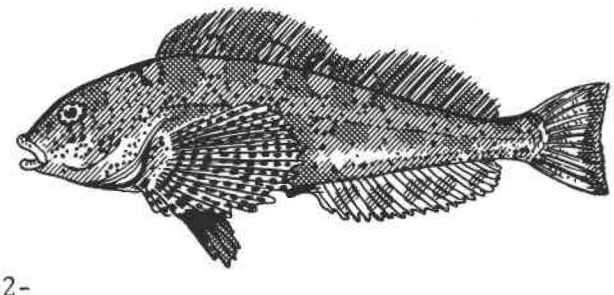


Table 27. Landings (in thousands of pounds) and effort (in hours) of the Oregon trawl fishery, 1966-76.

Species	Year										
	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
English sole	3,537	2,304	2,360	1,716	1,884	1,799	2,196	2,371	1,747	2,166	3,622
Rock sole	18	8	51	25	5	122	2	T	4	31	15
Petrale sole	1,838	1,771	1,653	1,835	2,141	2,284	2,185	2,191	2,692	2,649	1,749
Dover sole	3,492	3,565	4,325	5,553	5,538	5,538	5,942	4,416	5,604	4,780	4,987
Rex sole	1,498	1,219	1,075	1,215	1,074	839	1,314	1,256	1,300	1,024	1,052
Starry flounder	477	277	454	251	426	485	439	339	408	820	1,705
Other flatfish	205	245	215	506	646	521	600	657	581	1,014	1,248
Pacific cod	628	430	385	47	78	483	1,069	453	685	584	611
Lingcod	993	1,067	1,526	1,084	945	1,281	1,349	1,999	1,937	1,534	968
Sablefish	68	67	56	135	111	240	403	838	547	672	975
Pacific ocean perch	4,518	1,706	1,649	940	1,595	1,649	602	540	831	960	2,247
Other rockfish	5,069	4,061	4,253	5,101	3,515	3,404	4,057	3,558	2,545	2,498	4,578
Misc. species	12	8	31	4	17	28	36	63	59	36	1,128
Dogfish	0	0	2	T	17	4	T	T	12	4	13
Animal food 1/	3,357	3,999	2,815	2,599	2,052	1,786	730	603	708	580	124
Reduction use	79	18	49	45	0	0	0	0	0	0	0
Total	25,789	20,745	20,899	21,057	20,044	20,463	20,924	19,284	19,660	19,352	25,022
Total hours	23,676	20,183	24,456	25,692	27,587	28,644	29,206	28,243	27,258	28,468	33,259
Pounds/hour	1,089	1,028	855	818	727	714	716	683	721	679	752
Ocean Shrimp	4,751	10,373	10,977	10,505	13,734	9,291	20,581	24,517	19,968	23,893	25,392

1/ Scrap species used primarily by the mink food industry; increasing use since 1973 by salmon mariculturists.

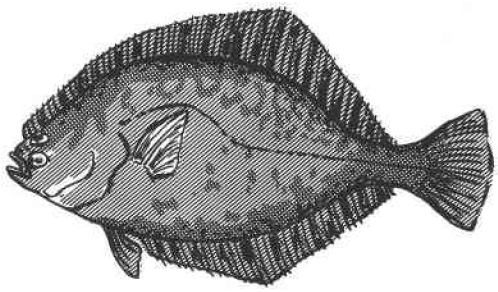
T = trace or less than 500 lb.

Groundfish landings by four other fisheries totaled 743 mt (1.6 million lb.). The shrimp trawl and troll salmon fisheries accounted for nearly 94% of this total (Table 28). Rockfish were the major component of species amounting to over 72% of the total incidental groundfish landings. All groundfish caught in these fisheries are incidental to the target--shrimp and salmon, respectively. The pot fishery targets on sablefish and takes a few other species as by-catch, principally lingcod and rockfish. Only 45 mt (99,000 lb.) of fish were landed by pot fishermen in 1976, almost all sablefish.

Table 28. Groundfish landings (in thousands of pounds) by other ocean fisheries in Oregon, 1976.

Species	Fishery				
	Shrimp Trawl	Troll Salmon	Pot	Jig	Longline
English Sole	2				
Rock Sole					
Petrale Sole	9				
Dover Sole	50				
Rex Sole	6				
Starry Flounder	1	T			
Other Flatfish	2				
Pacific True Cod	20				
Lingcod	52	80	1	T	
Sablefish	44	T	98		
Pacific Ocean Perch	78				
Other Rockfish	785	403		1	
Misc. Species	4	T			
Total Landings	1,054	483	99	1	0

T = trace or less than 500 lb.



ABALONE

Four species of abalone have been reported from Oregon: the red, black, flat, and pinto abalone. Only the flat and red abalone are found with any frequency and only the red abalone attains the 8-inch minimum size limit required for recreational harvest. It is unlawful to take abalone for commercial purposes in Oregon.

Status of the Stocks: The exact status of red abalone stocks is unknown but various surveys have determined the Curry County coast is the focus of red abalone in Oregon. The Sunset Bay area near Coos Bay is the northernmost point where natural populations of red abalone have been noted. In 1967 an experimental introduction of red abalone was made in Whale Cove on the central coast. Subsequent checks indicate that the species will survive and grow north of its normal range but there is no evidence successful spawning has occurred. Mark-recovery data collected in 1976 indicated that 202 (3.7%) of the original 5,500 juveniles planted still survive. Average annual survival rate has been 67% and the abalone are growing at a rate comparable to abalone found in California.

Recreational Fishery: Abalone are taken by Scuba divers and a few shore pickers. To obtain information on recreational use, the Department initiated a permit system in 1973 requiring all persons taking abalone to report their trips and success to the Department. Table 29 summarizes these reports for 1973 through 1976.

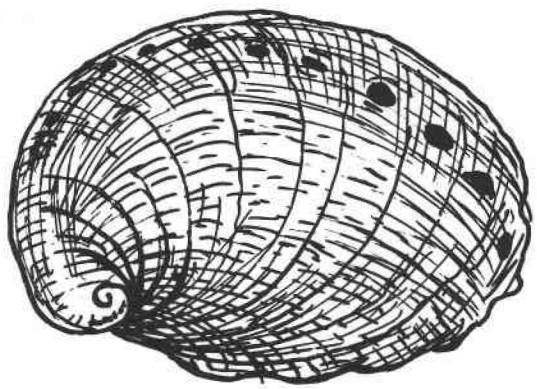
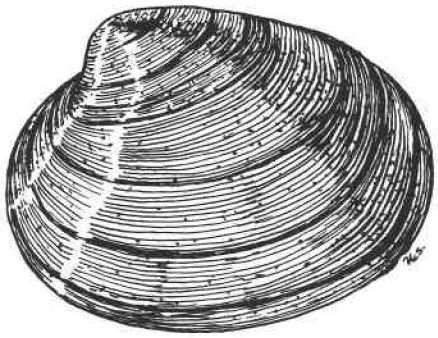


Table 29. Summary of abalone permits issued in Oregon, 1973-76.

	1973	1974	1975	1976
Number of permits issued	108	100	103	153
Number of usable permits returned	96	79	65	86
Number of permits used	21	28	20	28
Number of trips 1/	65	57	99	266
Number of abalone taken	55 2/	50	5	12
Abalone per trip	0.8	0.8	0.05	0.04

1/ Trip data are probably underestimated as some pickers only listed their successful trips. In 1975 one permit holder listed 45 trips while the other pickers reported a mean of 3 trips per person.

2/ One permit holder reported taking a total of 18 abalone while the other pickers reported a mean of 1.8 abalone per person.



BAY CLAMS

Status of the Stocks: Stocks of bay clams in each Oregon estuary appear to be in a healthy condition although some popular tideflat areas are experiencing some problems. Of primary concern is the continuing decrease in average size of clams harvested, especially from the more heavily used clam beds. Catch per effort data also substantiates the problem of increased digging pressure on the clam resources. As a result, the shellfish staff proposed regulation changes to reduce the digging pressure on the clam stocks. Regulation changes approved by the ODFW Commission for 1977 were:

1. A reduction in the bag limit of butter, cockle, and littleneck clams from 36/day to 20/day. The gaper clam bag limit remained at 12/day.

2. Unbroken butter, cockle, and littleneck clams could be replaced but only in the immediate digging area.

3. In addition to the above bag limit of 20 clams/day, the clam digger may also dig 36 softshell or "other" clams/day.

Intertidal and subtidal clam distribution surveys have been completed in Alsea, Nestucca, Siletz, and Yaquina bays. Surveys are currently being conducted on Coos, Nehalem, Netarts, Salmon, Siuslaw, and Tillamook bays. A population estimate of 18.7 million clams was made for a 34.4 acre subtidal clam bed in Tillamook Bay. Irus and gaper clams were the primary species collected. Gaper clams of the 1975 year class were dominant while cockle and littleneck clams exhibited strong 1971 through 1974 year classes.

Recreational Fishery: Five species of bay clams are utilized by recreational diggers. These are the cockle, softshell, gaper, native littleneck, and butter clams in order of importance. One or more of these species are harvested in sizable numbers from Tillamook, Netarts, Nestucca, Yaquina, Alsea, Siuslaw, Umpqua, and Coos estuaries. Other estuaries are utilized to a lesser degree.

A survey conducted on Tillamook Bay's Garibaldi Flat showed clams harvested per trip remained nearly the same as for 1975. Species composition changed substantially with fewer cockles taken but more gapers and littlenecks harvested. The harvest of butter clams remained nearly the same as in 1975.

Commercial Fishery: The commercial harvest of bay clams from 1941 to 1976 is shown in Table 30. The increased harvest in 1976 reflects the subtidal harvest by one operator in Coos Bay working under a special permit to salvage clams from a proposed USACE spoil disposal site.

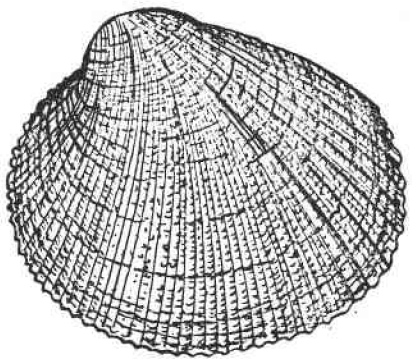
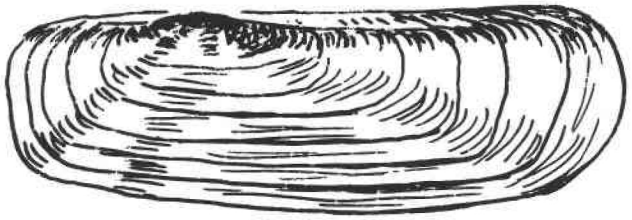


Table 30. Commercial bay clam landings in Oregon from 1941-76.

Year	Pounds (1,000's)	Year	Pounds (1,000's)
1941	214	1959	65
1942	121	1960	76
1943	178	1961	68
1944	204	1962	109
1945	306	1963	71
1946	265	1964	61
1947	178	1965	48
1948	122	1966	40
1949	135	1967	28
1950	149	1968	28
1951	155	1969	21
1952	149	1970	26
1953	135	1971	29
1954	134	1972	62
1955	113	1973	17
1956	124	1974	16
1957	96	1975	27
1958	77	1976	96



RAZOR CLAMS

Status of the Stocks: Razor clams are found intermittently along the entire Oregon coast. However, approximately 90% of the annual Oregon harvest is taken from the 29 km (18-mile) long Clatsop beach which extends from the Columbia River south to Tillamook Head near Seaside. Beaches south of Seaside tend to be sporadic in razor clam production or availability.

Razor clam production has shown marked fluctuations and generally reflects the relative abundance and survival of individual age groups. Most clams in the population are less than 2 years of age and in years of poor set or survival of small clams the resource abundance can be substantially affected the following year or two.

The subtidal razor clam population exists beyond the beaches to about the minus 6.1 m (20 ft) water depth. Spawning by the subtidal portion of the stocks probably provides much of the set for the intertidal beaches.

Recreational Fishery: The recreational harvest and effort level fluctuates annually and is usually proportional to the clam population size. However, the general state of the economy may also affect the fishery as, for example, when the energy crisis in 1974 limited travel and greatly reduced the number of diggers.

The 1976 season resulted in an estimated harvest of 1,500,000 clams from 119,000 digger-trips, the highest harvest since 1967 and fifth highest on record. Effort was the highest ever recorded (Table 31).

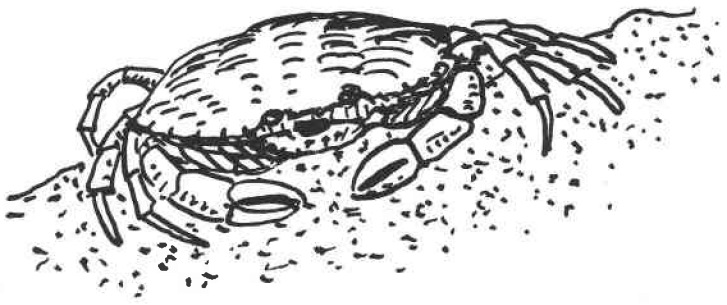
A major problem occurring in the recreational fishery is clam wastage. Previous studies conducted by the Department have shown that up to 20% of the clams dug each year are willfully discarded because they are too small or broken. Consequently, current regulations require all clams to be retained, regardless of size or condition. In order to obtain additional growth from small clams and to reduce wastage, a 6-week (July 16-August 31) digging closure was initiated on Clatsop beaches in 1967. The closure appeared to ease the problem; however, an increase in the number of diggers has caused the problem to reoccur.

Commercial Fishery: The Clatsop beach commercial fishery in 1976 resulted in a landed catch of 53.5 mt (118,019 lb.). This catch, at the average weight of 6.08 clams per pound, totaled 717,000 clams, the largest commercial catch since 1955 (Table 31). A total of 391 persons participated in the fishery, compared to 146 in 1975, and the 20-year mean of 171. Many of the new commercial diggers were attracted into the fishery by the unusually high abundance and availability of clams as were the record number of personal use diggers. Commercial diggers received from 75-80 cents per pound (round), or a total of $88,000-$95,000. Commercial clam digging did not occur in areas south of Tillamook Bay in 1976.

The 1976 catch and high number of trips (5,160) represented a definite departure from the trend since 1955 for a diminishing commercial catch and effort. Clam abundance in 1977 is expected to be about average and will probably result in a decline in both catch and effort.

Table 31. Recreational and commercial harvest of razor clams from Clatsop beaches and number of digger trips, 1941-76.

Year	Harvest (Millions)			Effort (Thousands)		
	Rec.	Comm.	Total	Rec. Trips	Comm. Trips	Total
1941	-	0.5	0.5	-	-	-
1942	-	0.05	0.05	-	-	-
1943	-	0.06	0.06	-	-	-
1944	-	0.2	0.2	-	-	-
1945	-	0.3	0.3	-	-	-
1946	-	0.6	0.6	-	-	-
1947	-	0.7	0.7	-	2.7	2.7
1948	-	0.8	0.8	-	6.8	6.8
1949	-	0.8	0.8	-	6.7	6.7
1950	-	1.3	1.3	-	12.4	12.4
1951	-	1.5	1.5	-	8.3	8.3
1952	-	1.9	1.9	-	11.1	11.1
1953	-	1.3	1.3	-	8.5	8.5
1954	-	0.8	0.8	-	7.6	7.6
1955	1.5	0.9	2.4	49.0	5.5	54.5
1956	1.4	0.5	1.9	52.0	3.2	55.2
1957	2.1	0.3	2.4	77.0	2.5	79.5
1958	1.9	0.4	2.3	86.0	2.8	88.8
1959	0.8	0.2	1.0	54.0	1.5	55.5
1960	0.6	0.2	0.8	49.0	1.3	50.3
1961	0.7	0.08	0.78	51.0	0.7	51.7
1962	1.0	0.1	1.1	52.0	0.9	52.9
1963	0.8	0.1	0.9	56.0	0.9	56.9
1964	1.4	0.1	1.5	70.0	1.2	71.2
1965	1.3	0.4	1.7	76.0	2.3	78.3
1966	1.5	0.3	1.8	78.0	2.2	80.2
1967	1.7	0.5	2.2	74.0	4.1	78.1
1968	1.0	0.4	1.4	64.0	3.1	67.1
1969	1.0	0.1	1.1	59.0	1.0	60.0
1970	0.8	0.06	0.86	56.0	0.6	56.6
1971	1.2	0.1	1.3	78.0	1.5	79.5
1972	0.8	0.05	0.85	69.0	0.7	69.7
1973	0.9	0.09	0.99	76.0	0.7	76.7
1974	0.4	0.03	0.43	44.0	0.5	44.5
1975	0.9	0.2	1.1	75.0	1.5	76.5
1976	1.5	0.72	2.2	119.0	5.2	124.2



CRABS

Status of the Stocks: Status of the crab stocks is best shown by examining the commercial ocean fishery on Dungeness crab, the best measure of abundance available. Pacific Coast biologists believe that up to 90% of the available legal crabs are harvested annually and the yearly harvest effectively reflects the actual population size. A single age group (4-year-olds) dominates annual catches. The commercial minimum size regulation effectively limits harvest to crabs of that age (4) and older. This means at least one, possibly two age groups of male crabs are available for mating purposes with the completely protected females before being caught.

The crab population, coast-wide, fluctuates widely and is believed to do so in response to natural fluctuations in survival of larvae and/or juveniles long before they are available to fishing. Two hypotheses offered for the fluctuations are coastal upwelling phenomena resulting in offshore transport of larvae, and coastal rainfall affecting (presumably) salinity and primary productivity in the ocean where crabs are normally found (inside about 50 fm).

Recreational Fishery: Recreational crabbing is a popular pastime and occurs in almost all of Oregon's estuaries. A 1971 recreational use survey indicated about 200,000 crabs were taken by recreational users during the survey period. Coos, Yaquina, Tillamook, Netarts, and Alsea estuaries experienced the highest recreational use. Although the Dungeness crab is the primary species sought, a small number of red rock crab are also taken. It appears that the number of recreational crabbers will continue to increase. A very small recreational fishery exists in the open ocean. Recreational crabbers are subject to the same regulations with which commercial crabbers must comply, except sports crabbers may keep males at or above 5-3/4 inches in width and have no seasonal restrictions.

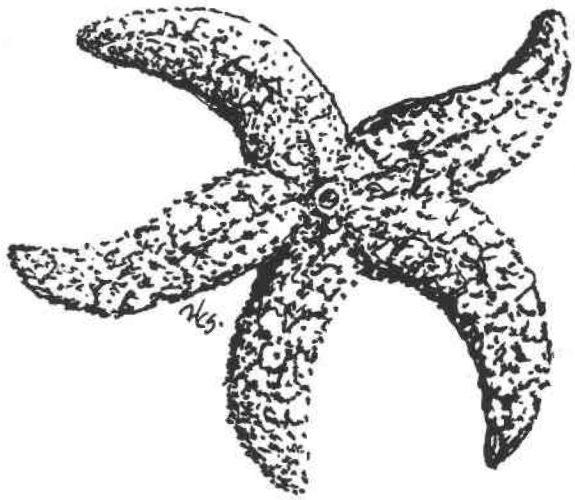
Commercial Fishery: Regulations governing minimum size (6-1/4 inches), sex (males only), and season (December 1-August 15) effectively prevent overharvest of the crab population and promote good order and optimum yield of the fishery. The season closure is designed to prevent or minimize handling mortality of females, undersized males, and soft-shelled crabs.

The 1976 harvest of 4,541 mt (9.1 million lb.) was slightly better than average as shown in Table 32. The harvest was almost threefold higher than in the 1973-75 low-cycle years and represented the expected recovery of crab abundance.

Table 32. Oregon Dungeness crab commercial landings, 1951-76.

Year	Pounds (Millions)	Year	Pounds (Millions)
1951	7.5	1964	3.6
1952	5.4	1965	6.4
1953	6.4	1966	8.7
1954	10.1	1967	9.6
1955	6.4	1968	10.2
1956	8.9	1969	12.0
1957	11.7	1970	14.0
1958	10.1	1971	15.0
1959	7.1	1972	6.9
1960	8.3	1973	3.1
1961	11.4	1974	3.5
1962	5.7	1975	3.3
1963	3.6	1976	9.1

Most of the catch (93%) was taken during the period December to July 1. The July-August harvest totaled only 5% of the total catch while the September through November harvest, all taken in estuaries, was only 2.8% of the harvest. The estuary fishery normally amounts to less than 10% of the total annual harvest. Many crabbers ceased fishing by the end of March due to poor catches and entry into the shrimp fishery.



SHRIMP

Status of the Stocks: Shrimp stocks are assessed by an annual survey cruise and routine sampling of commercial landings during the season. Midpoint biomass estimates for the 1976 spring survey and prior surveys are shown in Table 33.

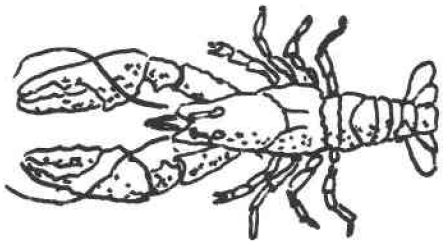
Table 33. Midpoint biomass estimates for the 1971-76 shrimp surveys.

Year	Area Coos Bay	95% C.I.	Area Northern Oregon	95% C.I.
1971 (Fall)	9,029,000 lb.	±45%	12,877,000 lb.	±46%
1972 (Fall)	13,184,000 lb.	±50%	13,027,000 lb.	±46%
1973 (Fall)	13,426,000 lb.	±28%	13,272,000 lb.	±30%
1974 (Spring)	18,467,000 lb.	±42%	---	--
1974 (Fall)	11,813,000 lb.	±43%	13,981,000 lb.	±40%
1975 (Spring)	16,789,000 lb.	±63%	---	--
1976 (Spring)	14,789,000 lb.	±35%	21,808,000 lb.	±45%

The biomass estimate for Coos Bay decreased in 1976; however, stock status continues to remain in a healthy condition. Sampling of commercial landings at Coos Bay showed a strong incoming year class (age 1) that contributed substantially to landings, beginning in midsummer.

The larger biomass estimate for the 1976 spring survey of the northern Oregon area compared with smaller estimates made in the fall of prior years is thought to reflect recruitment of 1-year-old shrimp to the sampling gear. This age group (6-months-old in fall) is not normally available to sampling or commercial gear in the fall. Analysis of samples of commercial landings indicated a nearly even distribution of three-year classes through most of the season. The status of the northern Oregon shrimp stocks appears to remain stable.

Commercial Fishery: Shrimp landings for 1976 were a record 11,521 mt (25.4 million lb.), up 6.3% from 1975 (Table 27). Favorable weather through most of the season resulted in consistently good monthly production. August landings were a record 2,717 mt (6.0 million lb.). The major shrimp producing area for Oregon boats was off northern Oregon with 5,234 mt (11.5 million lb.) landed. This exceeded 1975 landings by 1,557 mt (3.4 million lb.). Production from Coos Bay shrimp grounds was 3,811 mt (8.4 million lb.), down 907 mt (2.0 million lb.) from 1975 landings. Oregon landings of shrimp caught in California waters, 164 mt (362,000 lb.), were the highest they have been in several years. Catches off Washington by Oregon boats totaled 1,270 mt (2.8 million lb.), down from last year's 1,905 mt (4.2 million lb.). Oregon vessels caught 681 mt (1.5 million lb.) of shrimp off Vancouver Island in 1976.

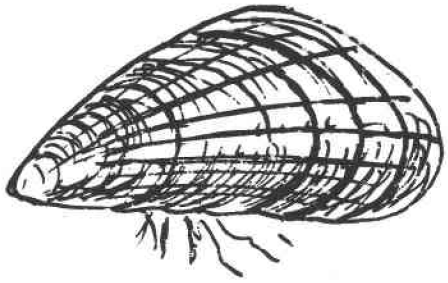


MISCELLANEOUS ANIMALS

Crawfish

Crawfish are found in nearly every stream, lake, and river in the state; however, no population assessments have been made. The few studies that have been done dealt with the animals directly and not their use. The stocks appear to be in good condition; and, although a few problems have been reported, investigation revealed no specific problems.

The recreational use of crawfish is unknown except that many people fish for them for bait and for food. Commercial crawfish catch records date from 1893 and are shown in Table 34. Environmental changes have probably played an important role in the general decline of the fishery. The commercial fishery is located mainly in the lower Columbia and Willamette rivers.

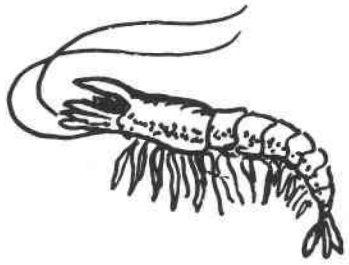


Mussels

The California or sea mussel is abundant in nearly all rocky areas along the coast. Mussels, while little used, are more commonly taken for bait than for food by the recreational user. The only commercial harvests recorded since 1970 were 0.4 mt (949 lb.) in 1973, 0.2 mt (394 lb.) in 1975, and 0.3 mt (666 lb.) in 1976; all of the mussels were used for bait or fixed specimens for biological supply houses.

Table 34. Commercial crawfish landings in Oregon, 1893-1976.

Year	Pounds Landed	Number of Licenses	Year	Pounds Landed	Number of Licenses
1893	66,288	--	1935	79,300	39
1894	72,000	--	1936	86,900	37
1895	76,055	--	1937	84,200	34
1896	96,000	--	1938	93,700	25
1897	120,000	--	1939	98,900	31
1898	140,000	--	1940	100,400	24
1899	138,248	--	1941	51,900	23
1900	111,321	--	1942	23,600	16
1901	62,445	--	1943	26,128	11
1902	21,673	--	1944	28,625	12
1903	8,650	--	1945	26,568	21
1904	8,800	--	1946	35,035	28
1905	9,100	--	1947	52,722	24
1906	13,500	--	1948	42,285	18
1907	5,800	--	1949	53,750	14
1908	42,360	--	1950	44,813	19
1909	45,720	--	1951	44,453	19
1910	9,490	--	1952	60,408	14
1911	10,640	--	1953	52,918	18
1912	132,843	--	1954	46,596	15
1913	137,000	--	1955	32,711	24
1914	141,000	--	1956	30,503	25
1915	146,610	52	1957	--	--
1916	128,643	46	1958	--	--
1917	101,693	37	1959	--	--
1918	50,787	20	1960	--	--
1919	62,000	--	1961	--	--
1920	74,000	--	1962	--	--
1921	86,500	32	1963	7,000	--
1922	89,500	33	1964	15,800	--
1923	80,500	30	1965	8,700	--
1924	143,200	51	1966	2,000	--
1925	125,500	45	1967	5,400	--
1926	116,500	42	1968	2,200	--
1927	134,500	48	1969	5,200	--
1928	158,200	44	1970	39,019	30
1929	146,000	44	1971	39,537	43
1930	176,800	54	1972	8,730	7
1931	123,000	43	1973	9,942	16
1932	80,000	22	1974	12,094	12
1933	99,000	--	1975	26,279	10
1934	143,600	--	1976	10,696	--



Bait Shrimp

Mud and ghost shrimp are abundant in most of our estuaries. The 1971 recreational use survey showed an estimated 347,000 shrimp were harvested for bait in 1971. The commercial harvest from 1970 to 1976 is shown in Table 35. The intertidal and subtidal bay clam surveys have revealed that ghost shrimp populations are barely being utilized by the bait fishery.

Table 35. Bait shrimp landings in Oregon, 1970-76.

Year	Landings	Pounds	No. Licenses
1970	290	6,349	9
1971	432	8,002	18
1972	651	10,082	25
1973	852	12,756	37
1974	830	14,628	30
1975	1,003	19,916	27
1976	--	26,862	--

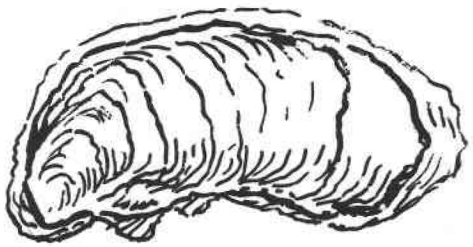
Intertidal Animals

Regulations governing the harvest of nonfood intertidal animals were enacted in 1962. Recreational users, including teachers and students, were restricted to 10 animals in the aggregate per day. Seven areas were set aside for collecting by permit only, and the Marine Gardens area at Otter Rock was closed to all collecting.

The magnitude of the recreational harvest is unknown. Table 36 shows the harvest reported by permit holders and the commercial harvest from areas open for collection. The bulk of the commercial harvest is composed of starfish and shore crabs and, in some years, tube worms for bait.

Table 36. Number of nonfood intertidal animals taken by recreational and commercial collectors in Oregon, 1962-76.

Year	Recreational	Commercial
1962	52,000	88,000
1963	35,000	18,000
1964	24,000	36,000
1965	38,000	68,000
1966	123,000	33,000
1967	35,000	105,000
1968	13,000	204,000
1969	13,000	118,000
1970	40,000	110,000
1971	39,000	92,000
1972	101,000	60,000
1973	17,000	67,000
1974	20,000	43,000
1975	18,000	43,000
1976	11,000	22,000

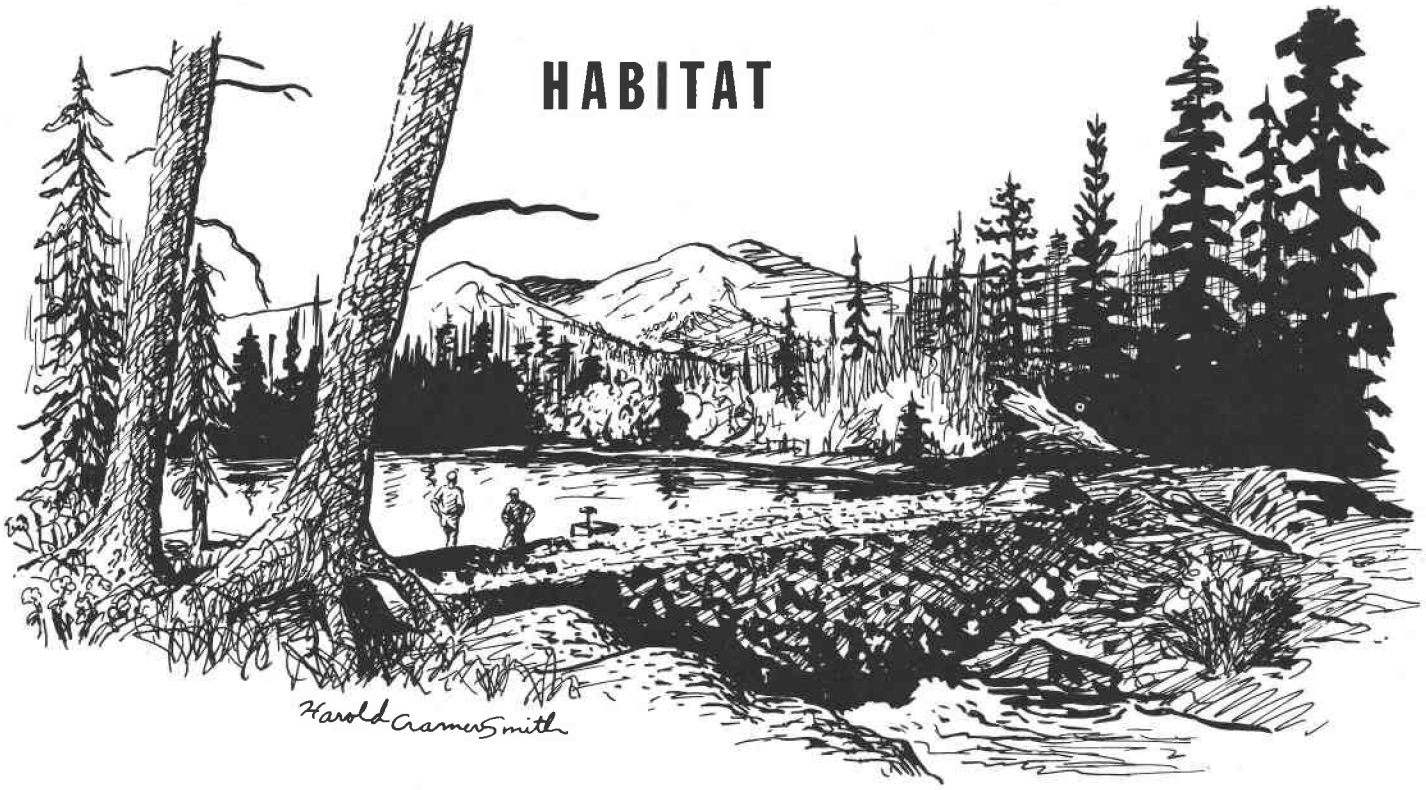


Oysters

About 1,134 hectares (2,800 acres) of land are held as Pacific oyster claims in Tillamook, Netarts, Yaquina, and Coos estuaries. Since Pacific oysters do not reproduce in Oregon estuaries, seed oysters are bought and planted by the grower. Most of the seed comes from Japan with lesser amounts from Washington, California, and Canada. Spat failures in recent years in Washington and Canada and high prices for Japanese seed have posed problems to the Oregon industry. The annual harvest has ranged from 21,531 to 71,265 gallons with 1976 having the lowest harvest in the past 10 years (Table 37).

Table 37. Oregon oyster harvest (in gallons), 1966-76.

Year	Gallons	Year	Gallons
1966	29,412	1972	22,000
1967	47,716	1973	24,750
1968	71,625	1974	29,250
1969	60,146	1975	23,756
1970	38,375	1976	21,531
1971	34,875		



District fishery biologists spent a considerable amount of time and effort investigating fill and removal activities, Corps of Engineers permits, forest practices, road construction, stream channel alterations, water rights, pollution and miscellaneous operations affecting fish habitat. Land use planning became a major involvement where fishery values were concerned. Activities are summarized in Table 38. Table 39 lists waters chemically rehabilitated. Highlights of other activities are noted under region headings.

NORTHWEST REGION

Protection

County planners were assisted in compiling fishery resource summaries to aid them in meeting L.C.D.C. planning goals. Similar plans were developed for nine cities in Clackamas County.

National Forest Service personnel were assisted in developing a fish and wildlife protection plan for the Mt. Hood National Forest. Stream classification maps were revised for use of the

Table 38. Summary of environmental investigations by district biologists, 1976.

Investigations	Number Examined by Region					
	Northwest	Southwest	Central	Northeast	Southeast	Total
Removal and Fill Permits	530	170	43	115	17	875
Corps of Engineers Permits	108	70	2	12	2	194
Channel Changes	33	16	5	18	4	76
Forest Practices Act	106	51	10	97	3	267
Road Construction	68	31	22	14	6	141
Barriers 1/	46	37	10	5	1	99
Fishways	39	23	26	47	0	135
Pollution and Siltation	72	11	11	81	3	178
Water Rights	191	5	2	113	7	318
External Planning Projects 2/	126	20	30	32	13	221
Miscellaneous	96	88	22	180	1	387
Totals	1,415	522	183	714	57	2,891

1/ Includes culverts, logjams, beaver dams, etc.
2/ Includes planning requests for County, City, Port, OCDC, etc.

Table 39. Summary of Oregon Department of Fish and Wildlife fishery rehabilitation projects, 1976.

Water	Surface Acreage at Treatment	Surface Acreage Normal	Water Volume Treated (Acre-Feet)	Miles of Stream Treated	Location by County	Month of Treatment	Chemical Used	Gallons of Chemical Used	Species of Undesirable Fish Removed	Estimated Cost of Total Project	Species of fish Restocked
Lofton Reservoir	55	61.4	450	-	Lake	August	Rotenone	440	Catfish	$5,000	Rainbow
Blue Star Pond	3	3	30	-	Lane	September	Rotenone	19	Suckers	300	WW Fish
Racetrack Pond	8.5	8.5	18	-	Multnomah	September	Rotenone	12	Carp	250	Rainbow
Seal Lake	8	-	16	-	Multnomah	September	Rotenone	11	Carp	225	--
Grassy Lake	2	-	10	-	Multnomah	September	Rotenone	4	Carp	75	--
Big Martin Lake	4	-	15	-	Multnomah	September	Rotenone	7	Carp	150	--
Haldeman Pond	3	3	20	-	Multnomah	September	Rotenone	10	Carp	200	--
Fish Lake	361	439	5,200	-	Jackson	October	Rotenone	2,200	Roach	22,500	Rainbow

State Department of Forestry in administering the Forest Practices Act. Timber harvest plans were reviewed for the State Department of Forestry, the U. S. Forest Service, the Bureau of Land Management, International Paper Company, and U.S. Plywood Corporation to determine where fish protective measures were needed.

A notification plan was developed whereby the district biologist would be notified when streams originating on Willamette National Forest or Bureau of Land Management lands in the upper Willamette watershed began showing signs of excessive turbidity.

A considerable amount of time and effort was expended by the Tillamook district biologist in monitoring an extensive stream bank repair program conducted by the Soil Conservation Service under Public Law 216. He was also selected to serve on a committee assigned the task of evaluating the effectiveness of the Forest Practices Act in protecting fish and wildlife.

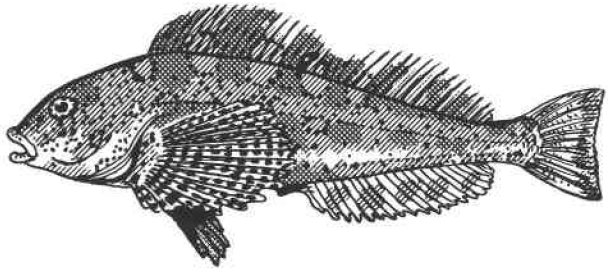
Rehabilitation and Development

An artificial reef was constructed in Tillamook Bay by using old automobile tires. Observations made by scuba diving one month after placement revealed a large number of juvenile crabs had moved into the reef area. Subsequent observations noted barnacles established on the tires and numerous small fish were observed around the reef.

The Mapleton District of the Siuslaw National Forest removed 50 logjams which had developed during winter flooding. Over 4,000 yards of unstable sidecast and slide material were also removed and approximately 150 acres of exposed area were revegetated to control erosion. The district fishery biologist assisted in selecting the sites requiring attention.

Fish passage at the falls on Eckman Creek (Lincoln District) was improved through efforts of the U.S. Forest Service and the Oregon Department of Fish and Wildlife.

Blue Star Pond near Eugene and Haldeman Pond on Sauvie Island were chemically treated to remove populations of rough fish.



SOUTHWEST REGION

Protection

Timber harvest plans of the Elliot State Forest, Umpqua National Forest, Bureau of Land Management, and International Paper Company were reviewed and problem areas identified. A meeting was held with U.S. Forest Service personnel to discuss alternate methods of logging on fragile soils. A coordinated effort of U.S. Plywood and the State Forest Practices office resulted in protection of a Class I stream where the situation was not covered by law. Research projects on erosion control and slash burning were suggested to the Oregon Department of Forestry.

The Coos Bay and North Bend city planners were assisted in compiling fishery resource data for their areas. The proposed North Bend Airport extension required a considerable amount of the district biologist's time.

The realignment of Highway 42 along the Middle Fork of the Coquille River was monitored to assure fish habitat disturbance was minimal. An application to fill 40 acres of tideland on Davis Slough (Coos Bay) was opposed because the area suggested for exchange was not of equal value in estuary production potential. A proposed charter boat dock on South Slough (Coos Bay) was also opposed as the proposed dock was in an area of high clam production.

An irrigation system complete with pumps and sprinklers was provided by the Corps of Engineers to ensure survival of spring chinook eggs in the gravel below Lost Creek Dam during the filling of Lost Creek Reservoir. The system was finally activated in January of 1977 and functioned well until the river again rose to the desired level.

Rehabilitation and Development

Logjams spanning 11.3 km (7 miles) in 13 tributaries of the Smith River were removed in a joint effort of the Bureau of Land Management and the International Paper Company. The work was supervised by Department of Fish and Wildlife personnel. The Bureau of Land Management also funded clearance of logs and debris in the South Coos and North Fork Coquille rivers.

Department of Fish and Wildlife personnel removed barriers on O'Shea Creek (South Umpqua) to open 2.1 km (1.3 miles) of stream to anadromous fish. Large boulders were placed in a channel change of the Middle Fork of the Coquille River to reduce water velocity and provide fish habitat.

Fish Lake in Jackson County was chemically treated to remove a dense population of roach.

CENTRAL REGION

Protection

Arrangements were made with the Tumalo Irrigation District to screen its diversion of Deschutes River water at Bend. The design and construction were to be done by the Oregon Department of Fish and Wildlife with irrigation district financing. A similar agreement was negotiated for the Farmers Irrigation District diversion on Hood River.

The Deschutes National Forest (USFS) agreed to write a management plan for the Sparks Lake area in an attempt to reduce stream bank erosion. Stream bank erosion was the target of a cooperative study with the Deschutes Forest on the effects of boat wakes on a section of the upper Deschutes River. It was determined that erosion and sedimentation were substantial.

Columbia fishery district personnel replaced six break-away fence crossings on Fifteenmile Creek to protect newly established vegetation. In the Klamath fishery district, approximately 2.3 km (1.4 miles) of fence were constructed to exclude livestock from grazing on 1.3 km (0.8 miles) of Fivemile Creek, a Sprague River tributary. One-half mile of the upper Williamson River was also fenced to allow riparian vegetation to reestablish.

A meeting was held with Hood River pesticide applicators to stress avoidance of stream contamination.

Rehabilitation and Development

Partial control of roach continued at Big Lava and East lakes. There were no heavy concentrations of roach in Paulina Lake in 1976. Extremely heavy concentrations of roach appeared along the shoreline of Davis Lake but treatment was held in abeyance as Forest Service policy requires an environmental analysis before any chemical can be applied. The roach dispersed by the time the assessment was written.

Engineering plans were developed for a fishway at the Dufur city water supply dam on Fifteenmile Creek. The eroding falls on the West Fork of Hood River required the use of heavy equipment to maintain fish passage.

An overgrazed area along the Little Deschutes River was planted with 1,500 willow cuttings to reestablish bank cover.

NORTHEAST REGION

Protection

One hundred and eleven fish screens were operated in Wallowa and Union counties. Bypass traps at 23 of the screens captured 4,302 summer steelhead, 6,247 spring chinook, and 1,920 coho smolts. There were 253 screens in the John Day system, and 37 bypass traps there collected 9,764 summer steelhead and 1,396 spring chinook smolts. Total estimates of fish numbers being diverted were not made because of the wide variation in streamflows, proportion of stream diverted, and diversion locations.

Traps on the Maxwell, Westland, and Threemile diversions on the Umatilla River collected 9,358 summer steelhead smolts. These fish were hauled downstream for release. River flows were adequate for downstream migration until late May and a large percentage of the smolts had already moved out of the stream by the time the traps were activated.

Rehabilitation and Development

Three additional fish attractor units were placed in Thief Valley Reservoir and 13 were placed in Phillips Reservoir. The water level in 27 dredge ponds near Sumpter was raised to provide additional fish habitat.

Aspen and cottonwood cuttings were planted at Morgan Lake to provide wildlife habitat and shoreline shade. A cooperative habitat improvement project with the Wallowa-Whitman National Forest involved the placement of a trash barrier, a gabion, and two groups of boulders in the Grande Ronde River to determine if such improvements could withstand winter icing and spring flooding.

A considerable amount of stream bank protection work under the Soil Conservation Service 216 program was conducted in the region. Bank repair work was undertaken on the South and Middle forks of the John Day River, the Walla Walla River, Camas Creek, and Birch Creek. Work on 22.2 km (13.8-mile) section of the Wallowa River was begun under the program in 1975 and completed in 1976 with the planting of vegetation on disturbed areas. Additional stream bank work was conducted on the South Fork of the John Day River in a joint effort of our Department and the Bureau of Land Management.

Personnel from the Wallowa-Whitman National Forest cleared 20 miles of stream channel and constructed a three-step log fishway on Deer Creek. Also vegetative plantings were made in 42.6 km (26.5 miles) of stream bottom.

An unused mill pond at Unity was chemically treated to remove goldfish before they had an opportunity to move downstream into Unity Reservoir.

SOUTHEAST REGION

Protection

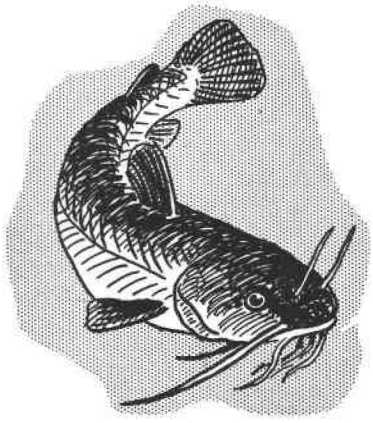
Improvement in acceptance of the fill and removal law was noted in Malheur and Harney counties. Recommendations were made for minimum pools in proposed irrigation reservoirs on Cox and Thomas creeks in Lake County.

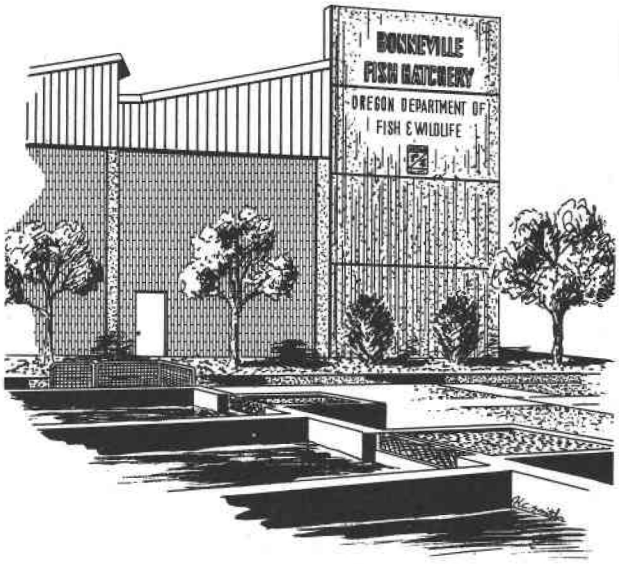
Habitat protection projects were discussed with the Lakeview Ranger District personnel. Two projects suggested were fencing portions of Dismal and Willow creeks.

Rehabilitation and Development

Weed growth began to reestablish in Cottonwood Meadows Reservoir after being treated with Casoron in 1974. Heavy growths of elodea were present in the upper portion of the reservoir but coontail and pondweeds were still scarce.

Lofton Reservoir in Lake County was chemically treated to remove a stunted bullhead catfish population.





FISH PROPAGATION

HATCHERY OPERATIONS

Production

The following tables cover the fish production data for 1976 at the Department of Fish and Wildlife hatcheries or rearing ponds. Fiscal year expenditures covering salaries, feed, maintenance and supplies, and capital costs for each hatchery are shown in Table 40.

Salmonid Production

Total egg-take in 1976 was 134,622,757 eggs collected from a variety of salmonid brood stocks. Egg collection by species and hatchery is shown in Table 41.

Fish feed utilized in 1976 totaled 6,245,018 lb. of which 6,001,913 lb. was fed to production stocks and 243,105 to brood stocks. A total of 76,512,079 fish (3,788,523 lb.) were produced for release. A summary of fish food fed and production releases by hatchery appears in Table 42.

Table 40. Fiscal year hatchery expenditures as shown on the June 1976 financial statement.

Region	Hatchery	Salaries	Feed	Maintenance and Supplies	Capital Expenses	Total Fiscal Costs
Northwest						
	Alsea	$ 52,241	$ 45,951	$ 6,402	$ 4,505	$ 109,099
	Cedar Creek	52,381	53,541	6,007	6,552	118,481
	Fall Creek	55,390	27,129	13,566	-	96,085
	Leaburg	91,333	85,079	24,157	1,816	202,385
	Marion Forks	74,326	40,686	30,376	9,603	154,991
	McKenzie	17,628	2,505	6,533	-	26,666
	Nehalem	46,077	36,574	17,895	-	100,546
	Oakridge	99,164	94,024	20,377	3,032	216,597
	Roaring River	55,471	46,001	8,995	4,005	114,472
	Salmon River	-	-	-	-	-
	Siletz	28,736	11,698	7,201	-	47,635
	South Santiam	40,558	18,903	20,752	-	80,213
	Trask	62,821	46,137	10,252	327	119,537
	Willamette	50,631	28,845	5,910	-	85,386
	Aumsville-Stayton	33,097	31,459	9,430	-	73,986
	Dexter 1/					
	Trask R. Pond 2/					
	Subtotal	$759,854	$568,532	$187,853	$29,840	$1,546,079
Southwest						
	Bandon	$ 52,714	$ 27,233	$ 16,996	$ 1,211	$ 98,154
	Butte Falls	49,061	20,694	8,208	1,875	79,838
	Cole Rivers	131,091	72,590	45,078	1,716	250,475
	Elk River	55,072	28,951	20,383	-	104,406
	Rock Creek	22,675	5,639	9,363	-	37,677
	Subtotal	$310,613	$155,107	$100,028	$ 4,802	$570,550
Central						
	Fall River	$ 37,900	$ 13,652	$ 7,999	-	$ 59,551
	Klamath	55,666	31,886	8,171	676	96,399
	Oak Springs	81,344	86,439	14,848	4,046	186,677
	Round Butte	31,680	16,939	7,885	-	56,504
	Wizard Falls	69,015	41,116	23,442	3,035	136,608
	Subtotal	$275,605	$190,032	$ 62,345	$ 7,757	$535,739
Northeast						
	Wallowa	$ 34,931	$ 21,211	$ 5,988	$ 5,431	$ 67,561
	Subtotal	$ 34,931	$ 21,211	$ 5,988	$ 5,431	$ 67,561
Columbia						
	Big Creek	$ 74,688	$ 54,293	$ 50,752	$ 1,630	$181,363
	Bonneville	145,683	121,650	31,824	21,242	320,399
	Cascade	63,585	56,825	17,151	568	138,129
	Gnat Creek	54,125	20,707	27,616	3,690	106,138
	Klaskanine	60,756	51,212	24,815	2,272	139,055
	Oxbow	43,689	12,523	17,005	568	73,785
	Sandy	64,680	44,393	41,182	568	150,823
	Wahkeena Pond	24,268	32,316	1,431	2,104	60,119
	Subtotal	$ 531,474	$393,919	$211,776	$32,642	$1,169,811
	TOTALS	$1,912,477	$1,328,801	$567,990	$80,472	$3,889,740

1/ Listed with Oakridge Hatchery
2/ Listed with Trask Hatchery

Table 41. Eggs collected at Oregon Department of Fish and Wildlife hatcheries, calendar year 1976.

Hatchery	Chinook		Coho	Steelhead		Trout[1/]	Total
	Fall	Spring		Winter	Summer		
Alsea				2,453,580		1,796,880	4,250,460
Bandon						575,257	575,257
Big Creek	12,605,405		1,676,592	1,162,714			15,444,711
Bonneville	46,740,040		6,430,289				53,170,329
Butte Falls							-0-
Cascade			4,499,898				4,499,898
Cedar Creek	30,000	13,500					43,500
Cole Rivers		1,291,428		362,293	321,805		1,975,526
Elk River	208,000						208,000
Fall Creek	64,892		2,053,811				2,118,703
Fall River						767,260	767,260
Gnat Creek							-0-
Klamath						1,204,820	1,204,820
Klaskanine			3,152,256				3,152,256
Leaburg						1,159,477	1,159,477
Marion Forks		854,285		217,764			1,072,049
McKenzie		725,200					725,200
Nehalem			1,436,100	213,210			1,649,310
Oakridge		621,800					621,800
Oak Springs						9,521,000	9,521,000
Oxbow							-0-
Roaring River					383,708	9,863,671	10,247,379
Rock Creek		325,000	451,143		476,287		1,252,430
Round Butte		325,700			1,494,303		1,820,003
Salmon River	75,954		379,103				455,057
Sandy			3,508,800				3,508,800
Siletz			1,712,226				1,712,226
So. Santiam		1,076,500			752,688		1,829,188
Trask	57,690	962,150	3,135,000				4,154,840
Wallowa					152,853	307,470	460,323
Willamette						4,091,840	4,091,840
Wizard Falls						2,971,115	2,971,115
Total	59,781,981	6,195,563	28,435,218	4,409,561	3,581,644	32,258,790	134,662,757

1/ Includes seven species of trout.

Table 42. Pounds of food fed and number and pounds of fish released from Oregon Department of Fish and Wildlife hatcheries, 1976.

Hatchery	Pounds of Food Fed: Brood Fish	Pounds of Food Fed: Fry, Fingerling, Yearlings	Pounds of Food Fed: Total Pounds	Fish Releases: Number Released	Fish Releases: Pounds Released	Net Production in Pounds
Alsea	14,425	213,615	228,040	1,081,835	152,395	160,915
Bandon	8,650	124,270	132,920	568,200	79,715	103,876
Big Creek	-	203,110	203,110	6,601,780	148,174	152,724
Bonneville	-	461,590	461,590	22,207,740	394,974	385,781
Butte Falls	-	121,640	121,640	315,306	74,201	89,719
Cascade	-	223,721	223,721	2,021,733	99,938	136,979
Cedar Creek	-	274,287	274,287	1,452,127	183,964	203,263
Cole Rivers	25,097	502,567	527,664	1,273,973	249,081	254,918
Elk River	-	164,235	164,235	1,211,749	111,169	111,172
Fall Creek	-	88,540	88,540	1,058,252	72,231	74,172
Fall River	-	138,101	138,101	1,153,835	46,797	60,913
Gnat Creek	-	119,322	119,322	723,976	77,185	67,922
Klamath	12,832	148,073	160,905	2,443,585	94,532	94,020
Klaskanine	-	195,230	195,230	5,070,425	148,250	143,348
Leaburg	8,850	424,520	433,370	876,392	242,634	299,412
Marion Forks	-	152,986	152,986	1,247,249	91,222	115,031
McKenzie	-	100,170	100,170	409,231	51,677	7,568/1
Nehalem	-	131,115	131,115	1,479,977	115,657	103,117
Oakridge	-	357,710	357,710	3,752,013	233,240	286,305
Oaksprings	87,900	333,670	421,570	3,206,532	204,941	246,144
Oxbow	-	47,886	47,886	61,095	5,188	10,071
Roaring R.	42,350	166,920	209,270	582,416	120,153	121,306
Rock Creek	-	85,551	85,551	86,747	7,030	33,674
Round Butte	-	88,110	88,110	593,826	44,919	44,919
Sandy	-	117,196	117,196	1,308,674	73,094	77,211
Siletz	-	32,145	32,145	515,550	38,333	37,032
S. Santiam	-	93,051	93,051	472,501	78,457	59,075
Trask	-	174,830	174,830	2,322,420	122,979	123,923
Wallowa	-	98,855	98,855	403,317	70,695	59,766
Willamette	33,850	129,300	163,150	523,002	98,703	97,830
Wizard Falls	9,151	208,020	217,171	3,298,984	112,318	131,344
Ponds						
Aumsville Stayton Ponds	-	159,760	159,760	7,359,850	83,158	80,756
St. Paul Pond				6,903	780	
Wahkeena Pond	-	121,817	121,817	920,920	73,089	67,203
TOTALS	243,105	6,001,913	6,245,018	76,612,115	3,800,873	

/1 Large incoming shipments in first year of operations.

Warm-water Production

Principal activities at the St. Paul Rearing Ponds near Newberg were concerned with the production of bass, crappie, and bluegill fingerling and the collection of adult crappie and bluegill stock to fulfill district requests.

Adult black and white crappie and bluegill were trapped from Willamette Valley waters and held at the Ponds for later distribution into northwest and southwest Oregon waters.

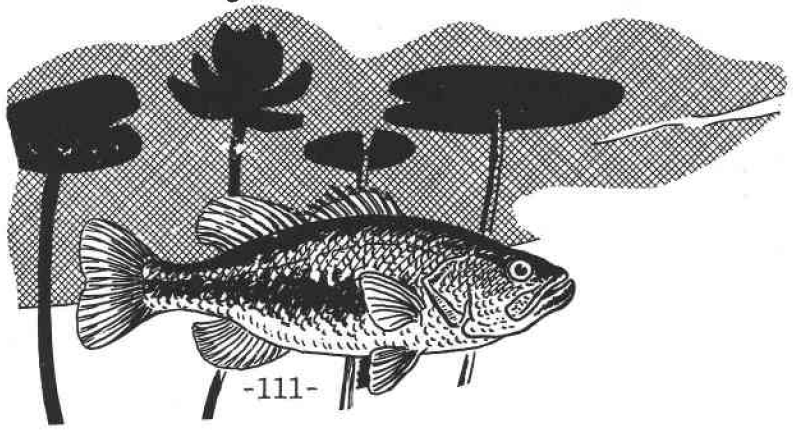
Adult largemouth bass spawned successfully at the Ponds, however, a dense growth of aquatic vegetation throughout the summer may have reduced total production and survival. Small numbers of bass fry were first observed on July 14. Final production was only 747 fingerling weighing 6.3 kg. (13.9 lb.). Variations in size from 4.1 cm (1.6 inches) to 10.2 cm (4.0 inches) fork length indicate the regular spawning period may have been interrupted, thus producing two size groups of fingerling.

Largemouth bass fry were collected from Lambert Slough and reared to fingerling size at the St. Paul Ponds. Fry were first observed in the slough on July 9; however, they were less abundant than in previous years and only a small number were collected. Survival to fingerling size ranged from 11% to 75% in the various ponds. Predation, resulting from stocking uneven size groups of fry together, was primarily responsible for the low production in one pond. Dense aquatic vegetation was also a problem. Growth was good as the bass averaged from 7.9 cm to 11 cm (3.1 to 4.3 inches) fork length at time of pond drawdown.

Black crappie brood fish spawning was poor and resulted in insignificant production. A dense plankton bloom discolored the water for an extensive period of time and affected spawning.

White crappie fingerling production and growth were good. Approximately 3,100 fingerling weighing 22 kg (49 lb.) and averaging 7.9 cm (3.1 inches) fork length were seined and transplanted.

Two hundred and twenty-five adult brood bass from Whistler's Bend Pond (Douglas County) were held over the winter at the St. Paul Ponds until sufficient filling at Whistler's Bend permitted restocking.



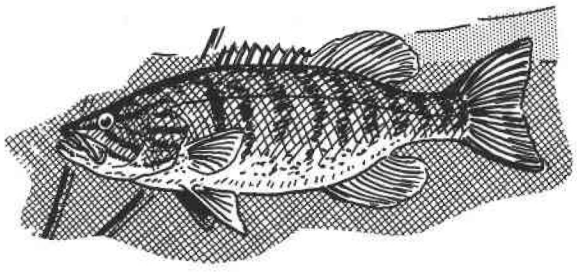
Distribution

Salmonid Distribution

The number and pounds of fish released by each hatchery in 1976 are shown in Table 43. Table 44 shows the number and pounds of salmonids, by species, stocked into the 18 watersheds of the state during 1976.

Warm-water Distribution

Statewide distribution of warm-water game fish in 1976 totaled 55,517 fish weighing 970.6 kg (2,139.9 lb.). A record of waters stocked is presented in Table 45.



TECHNICAL SERVICES

Hatchery Practices

Laboratory studies were conducted to verify suspected differences in resistance to bacterial kidney disease (BKD) between the transferrin genotypes of Big Creek coho salmon. In three separate experiments, the AA genotype was the most susceptible, the CC genotype the most resistant, and the heterozygate AC intermediate in susceptibility.

In pond loading studies a relationship existed where a doubling of water exchange rates allowed a doubling of fish densities without measurable adverse effects on the coho being studied.

Infectious Diseases

Investigations were conducted at all hatcheries, rearing ponds, and spawning sites operated by the Oregon Department of Fish and Wildlife to monitor fish health, isolate and identify disease agents, and prescribe therapy.

Table 43. Number and pounds of fish released, by hatchery, 1976.

Hatchery	Trout						Atlantic Salmon	Steelhead		Salmon			Total
	Rainbow	Cutthroat	Brook	Kokanee	Brown	Misc.[1]		Summer	Winter	Chinook Spring	Chinook Fall	Coho	
Alsea		152,318 12,716						159,602 24,908	769,915 114,771				1,081,835 152,395
Bandon		127,604 29,993						275,599 24,896	164,997 24,826				568,200 79,715
Big Creek									61,895 9,526		5,664,015 80,058	875,870 58,590	6,601,780 148,174
Bonneville											19,970,092 250,054	2,237,648 144,920	22,207,740 394,974
Butte Falls	153,924									161,382 18,484			315,306 74,201
Cascade												2,021,733 99,938	2,021,733 99,938
Cedar Creek		202,959 54,168						290,101 34,966	741,024 71,404	56,918 10,542	161,125 12,854		1,452,127 183,964
Cole Rivers	73,931 26,813							166,296 38,689	84,357 18,203	929,267 163,959		20,122 1,417	1,273,973 249,081
Elk River											1,211,749 111,169		1,211,749 111,169
Fall Creek											43,726 3,617	1,014,526 68,614	1,058,252 72,231
Fall River	319,047 42,016	40,648 129	792,952 4,544			1,188[Gr] 108							1,153,835 46,797
Gnat Creek								143,596 22,178	580,380 55,007				723,976 77,185
Klamath	2,239,807 91,849	54,838 934	148,940 1,749										2,443,585 94,532
Klaskanine									32,762 5,371		3,935,644 54,623	1,102,019 88,256	5,070,425 148,250
Leaburg	725,577 225,520	70,993 3,096						79,822 14,018					876,392 242,634
Marion Forks									86,901 13,967	1,160,348 77,255			1,247,249 91,222
McKenzie										409,231 51,677			409,231 51,677
Nehalem									55,661 9,269		138,916 17,150	1,285,400 89,238	1,479,977 115,657
Oak Springs	3,013,704 157,789							192,828 47,152					3,206,532 204,941

(continued on page 114)

Table 43. Number and pounds of fish released, by hatchery, 1976. (continued)

Hatchery	Trout						Atlantic Salmon	Steelhead		Salmon			Total
	Rainbow	Cutthroat	Brook	Kokanee	Brown	Misc.[1]		Summer	Winter	Chinook Spring	Chinook Fall	Coho	
Oxbow										61,095 5,188			61,095 5,188
Roaring River	255,884 79,239	49,997 289						88,600 14,913	187,935 25,712				582,416 120,153
Rock Creek		22,862 1,610						6,201 234		57,684 5,186			86,747 7,030
Round Butte								491,223 38,399		39,812 4,280	62,791[2] 2,240		593,826 44,919
Sandy									14,930 2,280	17,389 1,616	25,038 356	1,251,317 68,842	1,308,674 73,094
Siletz												515,550 38,333	515,550 38,333
St. Paul						6,903[Ww] 780							6,903 780
South Santiam	67,546 24,170							192,203 32,578		212,752 21,709			472,501 78,457
Trask										718,658 25,012	445,597 22,580	1,158,165 75,387	2,322,420 122,979
Wallowa	267,974 68,270		8,649 23			26,054[DV] 1,810						100,640 592	403,317 70,695
Willamette	523,002 98,703												523,002 98,703
Oakridge										3,752,013 233,240			3,752,013 233,240
Wizard Falls	2,721,095 86,063		23,479 10,044	461,361 4,987	47,472 1,133		45,577 10,091						3,298,984 112,318
Aumsville-Stayton Pond											7,359,850 83,158		7,359,850 83,158
Wahkeena Pond												920,920 73,089	920,920 73,089
TOTAL	10,361,491 956,149	722,219 102,935	974,020 16,360	461,361 4,987	47,472 1,133	34,145 2,698	45,577 10,091	2,086,071 292,961	2,780,757 350,336	7,576,549 618,148	39,018,543 637,859	12,503,910 807,216	76,612,115 3,800,873

Note: Lower Figures denote pounds of fish.

1/ Gr-Grayling; DV-Dolly Varden; Ww-Warm-water

2/ Summer chinook

Table 44. Number and pounds of trout, steelhead, and salmon stocked by watershed (drainage basin), 1976.

Watershed	Drainage Basin	Trout					Atlantic Salmon	Steelhead		Salmon				
		Rainbow	Cutthroat	Brook	Brown	Misc.[1]		Summer	Winter	Chinook Spring	Chinook Summer	Chinook Fall	Coho	Total
1	North Coast	50,015 16,155	100,868 27,175					211,119 21,906	1,056,131 107,159	775,576 35,554		10,345,297 187,265	4,445,507 312,564	16,984,513 707,778
2	Willamette	2,719,985 334,734	81,953 4,501	277,576 802		100,018[K] 954		537,714 97,824	241,699 34,758	5,542,913 384,517		7,368,254 83,254	578,892 24,230	17,455,287 966,284
3	Clackamas/ Sandy	362,217 88,140	37,305 1,637	26,453 75				208,224 31,299	362,020 46,855	69,915 6,168		19,986,726 250,314	5,728,649 361,042	26,781,509 785,530
4	Hood	42,404 18,927	32,950 9,271	12,112 31				110,713 26,624	101,638 3,764					299,817 58,617
5	Deschutes	2,288,947 148,758	15,586 50	456,748 9,302	47,472 1,133	287,326[K,Gr] 3,389	45,577 10,091	491,223 38,399		39,812 4,280	62,791 2,240		100,024 424	3,835,506 218,066
6	John Day	170,416 23,319	1,328 43	15,040 188										186,784 23,550
7	Umatilla	99,137 15,886												99,137 15,886
8	Grande Ronde	739,582 51,952		9,029 74		26,054[DV] 1,810								774,665 53,836
9	Powder	833,022 32,308	38,794 326	4,650 12									100,640 592	977,106 33,238
10	Malheur	287,320 5,387												287,320 5,387
11	Owyhee	128,945 2,986												128,945 2,986
12	Malheur Lake	121,592 10,656	41,510 748											163,102 11,404
13	Goose and Summer Lks	273,756 26,302	6,000 120											279,756 26,422
14	Klamath	680,884 34,062	6,000 23	24,350 57		25,092[K] 255								736,326 34,397
15	Rogue	775,844 44,973	4,476 1,597	113,950 5,739		10,044[K] 93		146,352 34,146	136,283 29,993	929,267 163,959		429,055 47,593	20,122 1,417	2,565,393 329,510
16	Umpqua	587,028 48,231	34,728 8,562	34,112 80				190,251 28,741	104,974 16,551	219,066 23,670				1,170,159 125,835
17	South Coast	93,677 13,889	91,262 14,992					111,493 932	263,029 37,359			782,694 63,576		1,342,155 130,748
18	Mid Coast	106,720 39,484	229,459 33,890			40,069[K] 404		78,982 13,090	514,983 73,897			43,726 3,617	1,530,076 106,947	2,544,015 271,329
TOTAL		10,361,491 956,149	722,219 102,935	974,020 16,360	47,472 1,133	488,603 6,905	45,577 10,091	2,086,071 292,961	2,780,757 350,336	7,576,549 618,148	62,791 2,240	38,955,752 635,619	12,503,910 807,216	76,612,115 3,800,873

NOTE: Lower figures denote pounds of fish stocked.

1/ K - Kokanee; DV - Dolly Varden; Gr - Grayling

Table 45. Warm-water game fish stocking, by region, in 1976.

Region	Waters Stocked	Date	Species[1/]	Number Stocked	Pounds Stocked	Average Fork Length (inches)
Northwest	Barnick Pond	3-11	LB	26	12.0	7-12
	Clackamas C. College Pond	9-30	LB	53	11.5	7
	Eugene Rest Area Pond	7-22	SB	7	6.5	9-16
	Frank Henny Pond	5-5	BG	250	21.7	5
		9-24	LB	30	7.0	7
	Hult Pond	2-18	LB	1,350	15.0	3
			BC	58	10.5	6-8
			BG	500	34.0	3-6
		4-2	BG	359	34.0	3-6
			BC	395	36.0	4-7
		5-6	BC	163	20.5	3-7
			BG	374	24.0	5
	St. Louis Pond #1	5-20	BG	223	38.0	5
		5-26	CC	400	47.0	7
		9-23	LB	100	22.2	7
	St. Louis Pond #2	7-1	LB	53	15.0	8
		9-23	LB	75	16.7	7
	St. Louis Pond #3	4-16	CC	27	29.0	11-15
			WC	150	16.0	6
	St. Louis Pond #5	7-30	BC	37	9.0	3-6
	St. Louis Pond #6	4-16	CC	171	42.0	9
		5-26	CC	407	42.5	7
		7-30	WC	149	31.0	4-8
		9-23	LB	45	10.1	7
	St. Louis Pond #7	4-28	LB	249	10.7	5
			BG	392	55.0	5
		5-5	CC	232	33.5	7
		5-26	CC	182	18.7	7
	Ted Bell Pond	9-24	LB	35	7.0	7
	Walter Wirth Lake	1-22	BG	600	70.0	4-6
		2-5	LB	1,000	12.0	2-4
		2-12	BG	1,824	164.0	3-6
	Wilsonville Pond	2-25	LB	96	14.0	5-9
Southwest	Cooper Cr. Reservoir	10-4	LB	1,470	21.0	3
	Ford's Pond	10-4	LB	1,470	21.0	3
	Garrison Lake	10-27	LB	851	27.0	4
	Hoover Ponds	10-5	LB	1,260	21.0	3
	Jackson County	12-9	LB	12	4.0	3-14
	Sportsmen Pond		BC	50	10.6	Adult
			BG	25	5.0	Adult
	Military Pond #1	12-9	BC	44	10.0	Adult
			BG	24	4.7	Adult
	Military Pond #2	12-9	BC	80	17.0	Adult
			BG	33	6.6	Adult
	Military Pond #3	12-9	BC	30	6.4	Adult
			BG	15	3.0	Adult
	Military Pond #4	12-9	BC	57	12.1	Adult
			BG	30	6.0	Adult
	Plat I Reservoir	10-4	LB	1,540	22.0	3
	Selmac Lake	5-11	BC	182	-	-
			BG	429	-	-
		10-5	LB	2,040	34.0	3
Central	Largent Pond	5-31	WC	11	-	7-9
Northeast	Umatilla River	7-22	SB	205	102.5	4-14
Southeast	Cow Lake	2-10	LB	8,340	153.0	2-6
		10-6	LB	22,657	326.0	3
		11-10	WC	513	108.4	4-9
	Drew's Reservoir	11-4	WC	3,047	48.5	3
	Fredricksen Pond	6-21	LB	36	72.0	Adult
	Krumbo Reservoir	4-16	WC	630	70.0	4-9
	Newmann's Pond	6-21	LB	16	32.0	Adult
	Silvies River	8-26	SB	380	4.0	3
	Succor Creek	5-29	SB	28	56.0	Adult
		TOTAL		55,517	2,139.9	

1/ LB= largemouth bass; SB= smallmouth bass; BC= black crappie; WC= white crappie; CC= channel catfish; BG= bluegill sunfish

Erythromycin fed in the diet reduced loss due to Bacterial Kidney Disease (BKD) in juvenile coho salmon but did not lower the incidence of the disease in the population.

Adult Elk River fall chinook were found to be carriers of IHN (infectious hematopoietic necrosis) virus; this is the first isolation of a fish virus from populations of salmonids inhabiting Oregon coastal streams.

Nutrition-Physiology

Measurements of hydrolytic changes in herring oil (free fatty acids and total nitrogen assays) were significantly correlated with lipid nutritional value in feeding tests with chinook fingerlings.

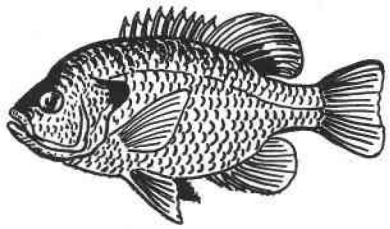
Testing again demonstrated that diets containing substantial amounts of soybean meal are unpalatable to salmonids. The objectionable taste was at least partially masked by use of 45% wet fish in the formula (hydrolyzed tuna viscera/herring, 1:1 ratio).

Field experiments indicate that both the amount and type of supplemental lipid used in salmon diets during hatchery rearing markedly influence rates of fish survival to adulthood.

Pollutant discharges (BOD, solids, and ammonia) from ODFW salmon culturing stations are very low during normal operations. Estimated monthly average suspended solids in effluents (lb./day) were less than 30% of the permit limitations at six study stations.

Mark Processing

The Mark Processing staff assembled, organized, and made visual checks of sampling and fin-mark and coded-wire tag recoveries from the Oregon commercial and sport fisheries. After the data were keypunched, machine error-check procedures were utilized to detect errors and make appropriate corrections. From these data a report was prepared at the Oregon State University Computer Center that formed the basis for input by Oregon Department of Fish and Wildlife to the Regional Mark Processing Center.



FISH PLANNING

Departmental planning has three objectives:

1. To improve operating efficiency within the Department by providing program continuity and cohesion, and

2. To provide an opportunity for public review of the Department's programs and aspirations, and

3. To alert others of the need to consider the impact of their activities on the state's fish and wildlife resources.

Long-range planning to meet these objectives has been under way by the Fish Division for several years. Funding for the planning effort is through a Federal Aid agreement with the U.S. Fish and Wildlife Service. Major accomplishments in 1976 included development to draft stage of management plans for 9 species groups and collection of data on 13 others.

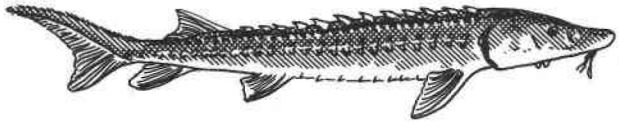
Strategic management plans (broad statewide long-term plans) were prepared to draft stage for the following species:

1. Steelhead Trout
2. Coastal Cutthroat Trout
3. Shad
4. Striped Bass
5. Sturgeon
6. Resident Trout--Lakes and Reservoirs
7. Resident Trout-Streams
8. Warm-water Game Fish
9. Miscellaneous Freshwater Fish

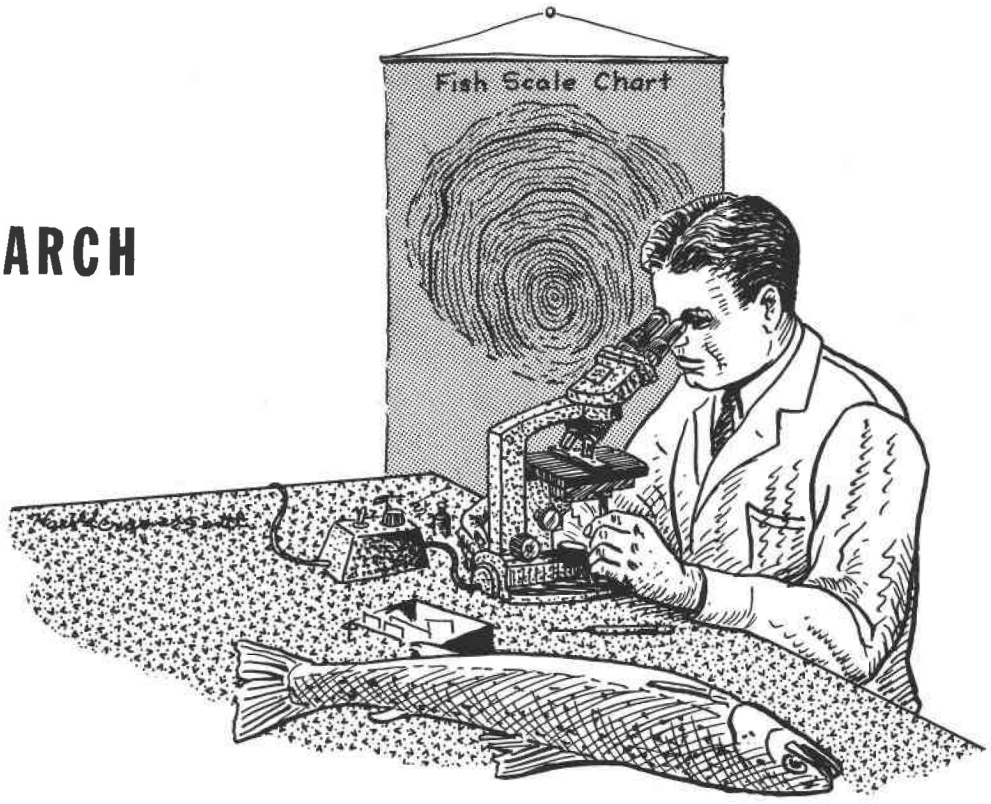
Each plan presents goals and objectives to pursue over the next 15 years, identifies problems in meeting these goals and objectives, and recommends strategies to overcome the problems cited.

In addition to the drafts completed, major effort has been concentrated on literature review and meetings with specialists as the first step in preparation of plans for:

1. Chinook Salmon
2. Chum Salmon
3. Columbia River Smelt
4. Freshwater Invertebrates
5. Endangered and Rare Fish
6. Marine Fish
7. Tuna
8. Marine Invertebrates
9. Razor Clams
10. Bay Clams
11. Oysters
12. Shrimp
13. Crabs



FISH RESEARCH



The Research Section primarily provides management with new information or techniques to improve existing programs or give direction to new ones.

Following is a summary of the projects worked on in 1976.

Catchable Rainbow Trout Evaluation

In order to measure the contribution of hatchery-reared rainbow trout to the Oregon sport fishery, and recommend techniques for better utilization of catchable trout, five representative streams in the Willamette Valley were studied in 1976, to complete a 2-year experimental segment. Using creel survey assessment, catch rates for the five streams (Middle Fork of the Willamette River, Little Luckiamute River, Quartzville Creek, Mill Creek, and South Santiam River) ranged from 0.4 to 0.9 trout/hour and 0.5 to 1.1 trout/angler in response to a 25% reduction in numbers stocked. These catch rates decreased from the levels of 1975, when higher numbers were stocked. From 62.1% to 82.7% of the fish stocked were caught by anglers, most within the first 1 to 2 weeks. These values remained essentially unchanged from 1975, despite the 25% reduction in numbers stocked.

Studies of two genetic strains of rainbow trout planted in Mill Creek (Yamhill system) revealed statistically significant (95% C.I.) differences in the movement of fishes out of the stream, and catches of various groups of anglers. This supported the results found in 1975. Roaring River strain rainbow trout tended to move out of the stream, while Cape Cod strain rainbow tended to remain in the stream and were found in angler creels in the greatest numbers.

A report was issued dealing with the origins and status of Oregon's rainbow trout brood stocks (Information Report Series, Fisheries 76-7). The 1976 Report served as a job final report, and listed some recommendations for efficient utilization of stocked rainbow trout.

Genetic Studies of Anadromous Salmonids

Time of return, life-history patterns, size, fecundity, and survival of North Umpqua hatchery summer steelhead and Alsea winter steelhead stocks were compared with their respective hatchery and wild fish of the past and with present wild fish, where possible. The purpose of the comparison was to determine if hatchery fish differ from wild fish and from their ancestors in biological characteristics important to the stability, quality, and availability of the hatchery stocks.

The time of return of winter steelhead to the Alsea Trout Hatchery has shifted towards an earlier run, whereas there has been no change in the mean time of passage of summer steelhead as monitored over Winchester Dam on the North Umpqua River. Marine life-history patterns of Alsea Hatchery steelhead are stable through time, although less variable than those of historical wild steelhead. The age at maturity of North Umpqua summer steelhead has increased during the period of artificial propagation.

A direct correlation exists between the age of brood stock and the age at maturity of the resulting progeny. Adult hatchery and wild fish of the same marine age did not differ in length. Hatchery smolts enter the ocean, on the average, at a larger size than wild smolts. Back calculation of lengths at ocean annuli showed the wild fish growing at a faster rate than the hatchery fish during the first ocean summer. Fecundity of hatchery fish has not changed through time for either stock.

Survival of North Umpqua summer steelhead calculated as percentage return over Winchester Dam increased through the 1969 brood up to a high of 7.8% but has since dropped and is fluctuating at approximately 4.0% return. Survival of Alsea winter steelhead has been

stable at an average annual return of 4.2%. The apparent ability to change time of return and age at maturity by hatchery brood stock selection practices must be used wisely in order to insure the long-term stability, quality, and availability of hatchery fish.

Selective breeding experiments with steelhead trout at the Alsea Trout Hatchery were initiated with adults from the 1974, 1975, and 1976 spawning populations. Groups from parents selected for early-return, late-return, and above-average body length were produced in each brood year. In addition, groups from 3-salt and "repeat" spawning parents were produced. During the winter of 1975-76, 3,698 adult steelhead from the trap on the North Fork of the Alsea River were examined for age, size, and time of return. A creel program was also conducted to estimate the catch by area, month, time period, angler type, and day type.

Kokanee Population Dynamics

Kokanee salmon populations were studied at Odell Lake from 1972 through 1976; work included estimates of spawning escapement, egg deposition, survival to emergence, year-class abundance, and survival. Low year-class production of kokanee salmon has been observed since 1972 and has resulted in a major decline in the population. The kokanee population declined 87% and 78% in number and biomass, respectively, between 1972 and 1976. A general downward trend has been noted in the sport catch since 1972, and the harvest and catch rates reported in 1975 and 1976 were the lowest ever recorded. Previous fluctuations have been noted in the kokanee population; however, the amplitude and duration of the current decline is greater than previously experienced. Recent limnological data and a study of past limnological conditions indicated a recent decline in lake productivity associated with a decline in nutrient loading. Causes for the declines are being investigated.

Lookout Point-Dexter Reservoirs: Pretreatment Studies

A research proposal was submitted to the Corps of Engineers to evaluate the effects of proposed chemical treatment on reservoir productivity and fisheries enhancement. Baseline, pretreatment data were collected in the summer and fall of 1976 in Lookout Point and Dexter reservoirs. Limnological parameters were measured and fish populations were sampled with shore and midwater gill nets.

Relative abundance of fish species in Lookout Point varied with the type of gill nets used. The midwater catch averaged 22% salmonids (chinook salmon and rainbow trout) and 78% rough fish (squawfish, redside shiner, and chiselmouth). The littoral net

catch averaged 5% salmonids (rainbow trout and chinook salmon) and 95% rough fish (squawfish, suckers, shiners, bullhead, and chiselmouth). The catch in Dexter was comprised primarily of squawfish (70%) and redside shiner (27%). Squawfish were more abundant in the upper section of Lookout Point than in the lower sections near the dam, while rainbow and chinook were more abundant in the lower section. Mean lengths of chinook, rainbow, and squawfish taken in Lookout Point in October net catches were 24, 30, and 28 cm, respectively.

Willamette Steelhead

A comprehensive smolt migration study monitored peak movement from the release site to Willamette Falls in the spring of 1976. Over 2,600 steelhead smolts were caught by seines and electrofishing gear at four sampling sites. Only 19% were wild, the remainder being from various hatchery releases. Hatchery smolts released above and below Foster Dam exhibited similar migratory patterns, but significantly fewer smolts reached Willamette Falls from the group released above the dam as opposed to those released below the dam. Data from the North Santiam River indicate that rate of downstream movement varied with time of release. Smolts released in early April took 1 month to peak at Willamette Falls, yet a late April release peaked in 10 days. Stock selection studies indicate that summer steelhead from the Umpqua River should not be introduced into the Willamette or Columbia rivers because of their high susceptibility to Ceratomyxa shasta.

Rearing Spring Chinook Salmon in Willamette Reservoirs

A study designed to enhance production of adult spring chinook salmon in the Willamette River by rearing juveniles to smolt size in reservoirs was completed in 1976. Fall Creek and Green Peter reservoirs successfully produced spring chinook smolts without intensive management efforts. Annual survival of juveniles has remained high in both reservoirs without benefit of periodic chemical treatments to remove predators and competitors. Annual return of adults to Fall Creek Reservoir from 1969 to 1976 ranged between 906 and 4,696 fish. The annual return of adults to Foster Dam from juveniles produced in Green Peter Reservoir averaged 1,450 fish from 1971 to 1976.

We obtained significant survival of juveniles at Cottage Grove Reservoir, but more intensive management techniques were required. Substantial migration of smolts was observed in some years; however, the best return observed was 371 adults from migration of over 345,000 1971-brood smolts. Because adult returns were unusually low for the number of smolts migrating from the reservoir, research efforts were terminated. Management of the fisheries in this impoundment was returned to the Northwest Region for production of resident fish species.

Enhancement of Fall Salmon Species in the Willamette River System

This program has primarily concentrated on developing natural runs of fall chinook and coho salmon above Willamette Falls. The Falls were, historically, a barrier to fall run fish, but they are now passable due to construction of a new fishway.

In 1976 the observed return of 33,772 adult fall chinook to the Willamette River nearly equalled the record return of 34,189 adults counted in 1975. The small return of 6,000 coho may be partly related to a recent general decline in the coho runs entering Pacific Coast rivers. However, the early run stocks of coho may not be adapted to the available habitat.

Approximately 538,000 late-spawning Cowlitz stock coho salmon, 6,000,000 early-spawning Columbia River stock fall chinook, and 2,302,000 late-spawning Cowlitz stock fall chinook were released into the Willamette River and its tributaries in 1976. The late-spawning stocks should provide a quality fish for the Willamette sport fishery, contribute to the various other downstream fisheries, and increase adult survival to spawning. Spawning surveys conducted in the Willamette River and most major tributaries have found that significant fall chinook spawning is occurring.

Deschutes Salmonid Studies

Peak downstream migration of juvenile wild spring chinook from the Warm Springs River occurred in the first week of May, although some movement of 0-age fish occurred from May through October. Yearling migrants ranged from 9 to 12 cm fork length.

Downstream migration of juvenile summer steelhead in the Warm Springs River peaked in early May, and the fish ranged from 14 to 25 cm in length. Large numbers of coho, 9 to 12 cm, were also captured in the same scoop trap.

A sharp peak in downstream migration occurred for juvenile wild chinook salmon in the Deschutes River in late June and early July. Seine catches verified their abundance during this period. Juvenile chinook captured in the scoop trap ranged from 8 to 12 cm, while those captured by beach seine ranged from 6 to 12 cm. Peak downstream migration of juvenile spring and summer chinook released from Round Butte Hatchery was similar to that observed for wild chinook in the Deschutes and Warm Springs rivers.

Eight different life-history patterns were found from scale analysis of 100 randomly selected wild adult summer steelhead. The freshwater rearing period ranged from 1 to 4 years; and, for

each category, steelhead resided for 1 and 2 years in saltwater. The most common life-history pattern, found in 35% of the sample, consisted of 2 years in fresh water and 1 year in saltwater. Variation in life-history and scale characteristics prevented separating juvenile steelhead and resident rainbow by scale characterisitcs.

A food habits study revealed very little predation of juvenile salmonids by resident rainbow trout and whitefish. An evaluation of electrofishing gear indicated that 17% to 33% of adult steelhead and 75% to 80% of adult spring chinook received back injuries from pulsed direct current. Regular direct current had the lowest rate of injury to adult summer steelhead.

Tillamook Bay Project

A 2½-year survey of the fish and shellfish of Tillamook Bay was completed in November 1976. Fifty-nine species of fish were identified in seine and trawl collections with Northern anchovy (Engraulis mordax), surf smelt (Hypomesus pretiosus), and shiner perch (Cymatogaster aggregata) accounting for more than 70% of all individuals caught during the study.

The survey provided data concerning the food habits of selected species as well as information about the temporal and spatial distribution and relative abundance of Tillamook Bay fishes. More qualitative information was gathered for clams, ghost shrimp, birds, and marine mammals in the estuary.

Coastal Fall Chinook Stock Assessment Project

The study was designed to determine if the offshore distribution of Trask, Elk, and Chetco River stocks of fall chinook salmon can be manipulated by altering their release sites, thereby enhancing Oregon's coastal fisheries.

Four groups of 1973-brood fall chinook were tagged with coded wire and released at Alsea (Elk and Trask stocks), Trask (Trask stock only), and Elk (Elk stock only) hatcheries in 1974. The groups consisted of 109,985 Elk stock and 99,609 Chetco stock. The following year, the study was expanded when 1974-brood Trask and Chetco stocks were liberated at Klaskanine Hatchery. These were in addition to replicate releases in the Alsea River, using Trask and Elk stocks, and in Coos Bay using Elk and Chetco stocks. Appropriate controls of fall chinook smolts were planted from each donor stock in their native rivers. The total release of 286,417 was divided into approximately equal-sized groups. Further releases of tagged smolts were terminated in 1976 when infectious hematopoietic necrosis (IHN) was discovered in 1975-brood fall chinook at Elk River Salmon Hatchery.

Age-2 fall chinook appeared in the ocean sport fisheries in 1975 from the 1973-brood releases. Eighty marked fish were captured in the Oregon sport fishery, 67 in the Washington ocean sport fishery, and 41 in the Puget Sound sport fishery. None were taken in the California ocean sport fishery and no data were available from British Columbia or Alaskan fisheries. The largest numbers of marked fish came from control groups released into Trask and Elk rivers (65 and 43 fish, respectively). Trask stock produced 13 fish compared to 25 fish from Elk stock liberated into Alsea River. Chetco stock contributed 29 fish compared to 13 fish from Elk stock planted into Coos Bay. Elk stock liberated into Elk River and Elk and Trask stocks released at Alsea River contributed to Oregon and Washington fisheries; whereas, Trask stock released into Trask River contributed north of Oregon. Marked fish planted into Coos Bay contributed exclusively to the Oregon fishery in 1975.

The 1975 catches were biased towards ocean sport fisheries since 2-year-old chinook were too small to enter commercial troll fisheries. A clearer picture of the regional distribution of catch between marked groups will appear when landing data are reported from coastal mark sampling programs in subsequent years.

Salmon River Project

The temporal and spatial distributions of juvenile chinook and coho salmon in Salmon River (Lincoln County) were studied in order to recommend initial hatchery rearing schedules. Seining in the estuary suggested most juvenile fall chinook salmon migrated from the estuary in August with a second peak in migration occurring in October.

Juvenile coho salmon passed through the estuary in late May and June. Coded-wire tagged release groups (1976 brood) will mimic these times of migration and be examined for ocean distribution of catch and total contributions to the fisheries.

Estimates of population size of adult chinook and coho salmon were made by the Petersen tag recapture method. Returning adults were seined or gillnetted in the estuary and tagged. Carcasses were then examined on the spawning grounds. The estimated population sizes were 648 adult fall chinook, 479 jack fall chinook, and 1,526 adult coho. Jack coho were not estimated because of the small number tagged. These estimated populations were for wild fish prior to any hatchery releases.

A creel survey was conducted to evaluate prehatchery fishing pressure and success. Of particular interest is the extent of salmon fishing within the boundaries of the Cascade Head Scenic Research Area prior to the release of hatchery stocks. The drought and hatchery electric barrier no doubt impacted the distribution of fishing pressure in 1976. Approximately 29% of the anglers fishing Salmon River fished within the scenic area boundaries from September through mid-December. These anglers accounted for about 26% of the chinook and 18% of the coho catch in 1976. We estimated 6,159 angler hours were expended in 1976 to catch 196 fall chinook and 79 coho during the entire river sport fishery.

Elk River Fall Chinook Project

The purpose of this study is to recommend rearing programs for Elk River Hatchery, determine the survival and contribution of fall chinook salmon released from the hatchery, and evaluate long-term changes in the biological characteristics of hatchery and wild stocks in the river.

Unusually dry weather during the fall of 1976 considerably modified the run of fall chinook salmon into Elk River from previous years. An estimated 9,600 fall chinook salmon entered the river including 2,800 wild jacks, 1,500 wild adults, 4,000 hatchery jacks, and 1,300 hatchery adults. Although the run was substantial, the egg-take at the hatchery was low as few fish reached the hatchery. Most fish spawned in the lower main river below the hatchery.

The Elk River sport fishery caught approximately 3,000 fish in 1976. An estimated 20,200 hours of fishing effort were expended, about one-half that of the previous year. However, the catch rate of 6.6 hours/fish was almost double that of the previous year so the total catch for the 2 years was similar. The extended troll fishery off the mouth of Elk River during November harvested an additional 1,200 fish.

Since fish failed to reach the hatchery, our program to sample the biological characteristics of returning hatchery fish was minimal compared to other years.

Rogue Basin Evaluation Program

The purposes of the study are to (1) determine the effect of Lost Creek Dam on the wild salmonid fishery of the Rogue River, (2) determine operational guidelines for the dam which will maximize project fishery benefits, and (3) develop procedures for the operation of Cole Rivers Fish Hatchery to insure meeting mitigation goals.

Adult salmonids were seined and electrofished in the lower Rogue River and trapped at Gold Ray Dam (RM 125), and spawned-out chinook carcasses were counted on most major spawning areas. This sampling was used to determine migration rates and timing, spawning times and distribution, and size and age composition of the populations. Each of these parameters of the adult populations remained similar to the previous 2 years of the study except age composition. The proportion of jacks in the run for both spring and fall chinook increased over past years. Our analysis of sensitivity to change indicates we will have high probability of detecting small changes during postimpoundment in migration time, spawning time, and distribution.

Juvenile salmonids were seined and trapped throughout the Rogue River to determine their rearing and migration behavior. Growth rate of juvenile chinook during the spring was related to water temperature, with warmer temperatures causing faster growth. Water temperatures became too warm in July through September and fish growth was substantially slowed. Juvenile chinook migrated slowly downstream while rearing and then migrated three to five times faster while migrating to sea. The relationship of migration rate to variation in the environment has been partially quantified. Further quantification should be possible following collection of another year of data.

Laboratory physiology studies indicated there is a probable interaction between time of smolting in juvenile chinook and growth rate. The fastest growing fish had peak gill (Na+K)-ATPase activity in June and November compared to October for chinook with moderate growth rates. This may explain the differences among years in timing of the fall out-migration of juvenile chinook.

Effects of Logging on the Environment of Salmonids: Laboratory Studies of Temperature

During the winter of 1976, hatchery and wild coastal cutthroat trout eggs were obtained from the Alsea Trout Hatchery and Big Creek Salmon Hatchery, respectively. These eggs were held under identical conditions at the Research Section Laboratory in Corvallis. Juvenile fish from these egg lots were acclimated gradually to a fluctuating temperature regime simulating a post-logging condition, similar to one that occurred on Needle Branch, a tributary of the Alsea Watershed. Maximum diel temperatures ranged from 13-23 C. Other hatchery and wild fish from the same lots were acclimated to 23 C and served as controls.

During the summer of 1976, both constant and fluctuating temperature bioassays were conducted on samples of hatchery and wild fish acclimated to 13-23 C and 23 C. Data analysis and the final report write-up was initiated.

Effects of Several Metals on Smolting in Coho Salmon

The 96 h LC50 values for cadmium (Cd) and inorganic mercury (Hg) were calculated for yearling coho salmon. Survivors of these two metals (Cd and Hg), when challenged with seawater ($30^{o}/_{oo}$), died in a dose dependent manner. Concentrations of nickel and chromium (hexavalent form), that were 100 x the allowable level in fresh water, did not result in deaths during the freshwater exposure or in the subsequent seawater challenge tests. Coho salmon yearling given a 5-day rest (nontoxicant exposure) between the Cd exposure and subsequent seawater challenge tests exhibited seawater survivals equal to the control groups.

Yearling coho salmon exposed to Cd or zinc (Zn) migrated as well as the control group following release into a natural stream. However, when a low level of copper (10 µ/liter) was added to chronic Cd or Zn exposed fish, a reduced downstream migration of the released fish was noted.

No apparent histological changes were noted in the tissues examined from fish chronically exposed to Cd, Zn, or combinations with Cu. However, Cd was found to accumulate in the gills, liver, and kidneys but not in the muscle of yearling coho salmon.

Some metals singly (Cu) or in combination (Cd-Cu or Zn-Cu) have been shown to affect seawater survival and downstream migration of yearling coho salmon. Therefore, greater concern should be given in setting of water quality standards to insure that adequate protection is afforded salmonids so adverse effects will not occur if the fish are exposed to sublethal concentrations of metals.

Immunization Studies

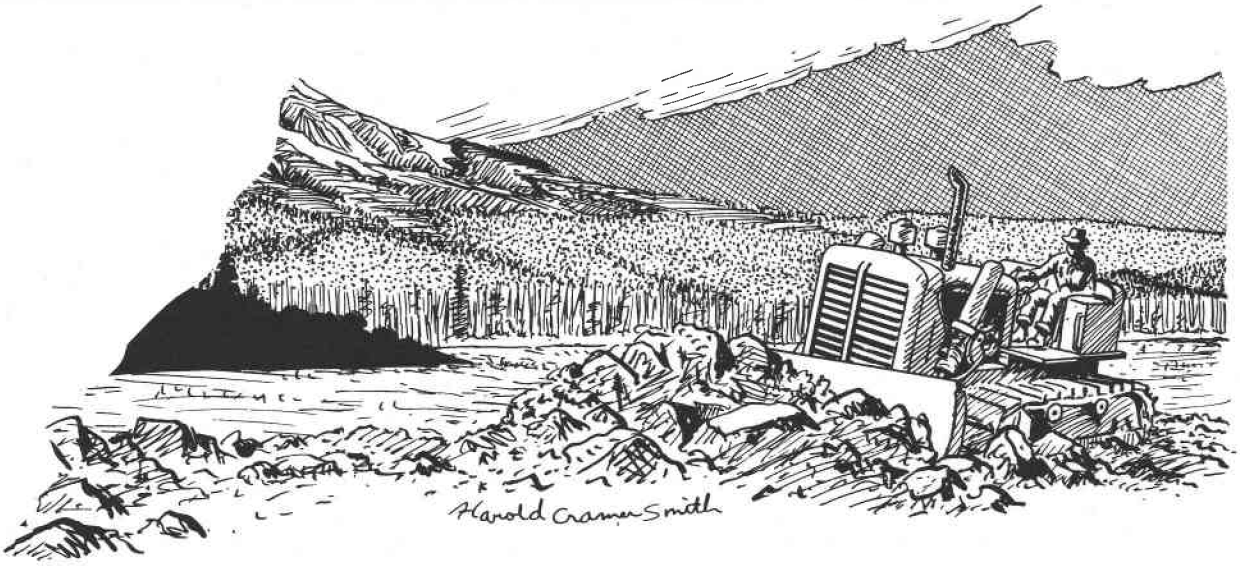
A bacterin (a preparation of formalin-killed whole cells) made from the Lint Slough strain of Vibrio anguillarum has been developed. Fish were immunized against vibriosis by spray application with a sandblasting gun containing the killed bacterin culture. The addition of scarifiers such as alumina and pumice did not increase antigenicity or potency.

Bacterins consisting of formalin-killed cultures of V. anguillarum growth at 18 or 30 C were protective in coho salmon when applied by spray vaccination. The addition of 0.15% bentonite increased the production of agglutinating antibody tenfold. Coho salmon sprayed with V. anguillarum bacterin containing bentonite possessed a 1:24 antibody titer after 112 days. The fish were protected from challenge by virulent V. anguillarum after 125 days. Spray vaccination against V. anguillarum resulted in a higher level of protection than oral immunization. Trivalent spray bacterins for controlling "fast" Vibrio, "slow" Vibrio, and furunculosis

produced an adjuvant effect for agglutinating antibody titers against all three. Spray vaccination preparation containing heat-killed bacterial kidney disease bacterin stimulated higher bacterial kidney disease antibody titers than were observed in the unvaccinated coho salmon controls.

The development of an artificial challenge system has reduced the necessity of reliance on a natural challenge of a seasonal test period for development of immunization procedures. Replicate samples provided reliable results with similar groups of test fish. Interest in Vibrio immunization by the marine salmonid aquaculture industry has developed rapidly in the past few years. Continued evaluation of mass immunization of anadromous salmonids is needed to determine the influence of vibriosis on ocean survival. Research will continue in development of an economical and efficient mass immunization technique.

ENVIRONMENTAL MANAGEMENT



Planning and Permit Processing

Considerable effort was devoted to reviewing environmental impact statements and applications for state and federal permits to perform work which could impact fish and wildlife habitats; and, cooperating with federal agencies in planning for fish and wildlife protection at federal projects. Environmental investigations are summarized in Table 46.

Table 46. Environmental investigations in 1976.

Investigations	Number Received and Processed	Investigated
Fill/Removal (DSL)	846	826
Corps of Engineers Permit (Sec. 10)	239	90
Mined Land Reclamation Permits	70	42
NPDES Waste Discharge Permits	236	58
OMB A-95 and Other Federal Notices	1,048	809
Environmental Impact Statements	130	86
Highway and Corridor Projects	45	33
Water Right Applications	1,430	745
Pesticide Use Programs	17	7
In-water Blasting Permits	10	9
One-stop Permit System	6	5
TOTAL	4,077	2,710

Twenty-five water development projects proposed by the Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service were reviewed to determine their impacts to fish and wildlife.

Habitat Evaluation Procedures (HEP) developed by the U.S. Fish and Wildlife Service under the Water Resources Council's 1973 Principles and Standards for Water Development Projects were applied to several water projects to develop fish and wildlife compensation plans.

Considerable effort was given to review of waterway permits. Two major projects which required extensive coordination were the expansion of the North Bend Airport (a 32-acre fill proposal) and the Port of Astoria (80-acre fill proposal).

The Soil Conservation Service's emergency flood restoration program (Section 216) in Wallowa, Tillamook, and Umatilla counties required considerable staff effort.

The Department was very active with the Land Conservation and Development Commission (LCDC) in identifying appropriate mechanisms to insure fish and wildlife habitat protection through land-use planning. The department was actively involved with the development of coastal goals which were adopted by the LCDC.

Fish Passage & Water Resources Development Projects

Conditions for migration of anadromous fish runs of the Columbia and Snake rivers were relatively favorable in 1976. Runoff was above normal, providing for flexibility in hydropower operation to assist fish movement. The multiagency Committee on Fishery Operations continued to coordinate with the Corps of Engineers, Bonneville Power Administration, and mid-Columbia PUDs to manipulate power loads and spill to reduce adverse conditions for downstream migrants. Special measures were taken to reduce nitrogen supersaturation during the time smolts were released at lower Columbia River hatcheries. Approximately 1,250,000 chinook and steelhead smolts were collected at Lower Granite and Little Goose dams on the Snake River and transported to below Bonneville Dam.

The Lower Snake River Compensation Plan was authorized through the Water Resources Development Act of 1976 at an estimated cost of $58 million. Fish agencies and allied interests worked extensively to get this law enacted, coordinating closely with the governors and Congressional delegations of Oregon, Idaho, and Washington. The act provides for construction of hatcheries in three states to produce 2 million lb. of salmon and steelhead smolts for an artificial production increase in the Columbia system of nearly 40%. We represented the fish agencies at a meeting with the Corps of Engineers to discuss how the compensation plan could be implemented as quickly as possible.

State fish agencies of Idaho, Oregon, and Washington and their federal counterparts submitted a petition requesting the Federal Power Commission (FPC) to order Idaho Power Company (IPCo) to complete compensation for anadromous fish losses at Hells Canyon hydroelectric project on the middle Snake River. If the request is granted, IPCo would be required to expand two existing company-funded hatcheries, one for spring chinook and one for steelhead, to enable restoration of these species to the Hells Canyon area. Also, IPCo would be required to provide a permanent trap below Hells Canyon Dam for collecting adult fish and to regulate flows from Hells Canyon Dam to improve fish production and harvest downstream.

Our Department successfully petitioned the Federal Power Commission for permission to join the Washington Department of Fisheries in requiring Grant County Public Utility District on the mid-Columbia River to increase the minimum flow below Priest Rapids Dam from 36,000 to 70,000 cubic feet per second (cfs). Prolonged flows of 36,000 cfs below Priest Rapids Dam in 1975 resulted in a massive kill of fall chinook eggs and fry due to exposure and dehydration of redds.

The three mid-Columbia PUDs submitted a position paper on compensation for anadromous fish killed in turbines at their five major hydroelectric dams. The PUDs supported a minimum effort to replace losses. The Washington Department of Fisheries proposed a compensation plan which would require the PUDs to replace more than 11 million smolts annually unless flow and other concessions on operating procedures are granted to reduce turbine-caused losses. We provided extensive comment to the PUDs on their paper.

We submitted testimony to the Senate Public Works Committee through Senator Hatfield on hatchery compensation needed if McNary Second Powerhouse is constructed. Authorization was being considered without adequate provision for fish compensation. The Corps of Engineers proposes to install 10 additional turbines on the Oregon end of the dam, which would increase the powerhouse hydraulic capacity to about 420,000 cfs.

Alternative plans for enlarging the Bonneville Dam navigation lock were reviewed and comments on fish and wildlife impacts provided to the Corps. Most of the plans would seriously affect Bonneville Hatchery, eliminate some important angling areas, and interfere with fish passage during construction.

The Bureau of Reclamation started work to improve fish passage facilities at Savage Rapids Dam on the Rogue River. The left bank fishway will be improved, a new ladder will be constructed

on the right bank, and modifications will be made to the dam to protect downstream migrating fish. This construction is to assure better passage in the 12- to 15-year period it will take to study how best to provide for area water needs and to obtain appropriations and construct facilities required to meet those needs.

Plans were made to fill the Corps of Engineers' Lost Creek Dam (Rogue River) in late autumn, but extremely low precipitation throughout the last half of the year caused postponement until early in 1977.

The Umatilla River irrigation districts were assisted in developing a plan to allow most of McKay Reservoir storage to flow to the river's mouth. The irrigation districts own 55,000 acre feet of storage which could greatly enhance fish production if used to provide summer and autumn flows in the lower 80 km (50 miles) of river. The irrigation water could then be pumped from the mouth of the river along with a substantial supplemental supply from the Columbia River.

Pollution Investigation

The Department continued its coordination with the Oregon Accident Response System, responding to transportation accidents and other water pollution incidents resulting in fish or wildlife mortality.

A chemical demossing agent, Magnicide H, applied to an irrigation ditch in the lower Umatilla River killed 3,000 rough fish and 1,000 trout. The Stanfield Irrigation District was assessed $539 to pay for restocking trout in the river.

A Portland firm manufacturing 2,4-D was directed to cease operations by the Department of Environmental Quality. Among other environmental hazards, its discharge into the harbor has been identified as the agent responsible for tainted salmon caught in Multnomah Channel.

Procedures to reduce contamination of local streams during pesticide applications were discussed with the Chemical Field Men's Association. Several fish kills within the last 2 years prompted the meeting. The group agreed to help with the problem.

The rapid increase in mining activity in the state, principally gold dredging, has generated significant water quality and land use problems. We requested that the Department of Environmental Quality play a more active role in monitoring mining activities.

Environmental monitoring near the Trojan nuclear generating plant was accomplished on a semiannual basis in cooperation with the Health Division.

A staff biologist was assigned to be a member of an interagency task force studying selected river basins and coordinating citizen and agencies' input to identify nonpoint source pollution. The project is funded by local and federal funds under PL 92-500, Section 208.

Forest Practices Act

Section 208 of the Federal Water Pollution Control Act includes a requirement for evaluation of silvicultural nonpoint pollution control programs. An interagency technical team was formed to evaluate effectiveness of the Oregon forest practices in meeting that requirement. Our department participated on both the policy advisory committee and study team formed for this purpose.

LANDS

During 1976, 15 sites were acquired that were related to the statewide fishery program (Table 47).

Eleven stream access sites were acquired as either bank angling or boat launching sites. One easement was acquired for installation of a fish ladder over an impassable barrier and one easement was acquired for a fish trapping site.

One water source was purchased for the OxBow Hatchery. The Trask River Hatchery boundary line was straightened out by the purchase of land adjacent to the hatchery.

Table 47. Fishery related land acquisition, January 1, 1976, to December 31, 1976.

Region	Stream Access		Fish Mgt. Areas	Habitat Improvement Projects	Fish Culture
	Bank Angling	Boat Sites			
Northwest	Nehalem River (Chornley Access)	Nehalem River (Mist Access)	--	Fall Creek - Ladder (Easement)	Oxbow - Herman Creek (Water source purchase)
	Hagg Lake (Parking Access)	Willamette River (McCartney Park Boat Ramp)		Kilchis River (Trap agreement)	Trask Hatchery (Boundary - land deed)
	Pacific Hwy (99W) Pond (Agreement)	Coos Bay (Catching Slough Agreement)			
Southwest	Rogue River (Dowden Falls)	--	--	--	--
	Rogue River (Sardine Creek)				
Central	--	--	--	--	--
Northeast	N.F. John Day River (Louisiana Pacific Agreement)	--	--	--	--
	N.F. John Day River (John Woodside)	--	--	--	--
Southeast	Mid. Fk. Malheur River (Blaylock)	--	--	--	--
Statewide Totals	8 sites	3 sites	--	2 sites	2 sites

Table 48. Fishery resource expenditures, fiscal year July 1, 1975, to June 30, 1976.

Activity	State		Federal						
	General	Other	Dingell Johnson	Columbia River	Corps of Engineers	Anadromous Fish	Commercial R.& D. Act	Misc.	Total
Propagation	$ 769,840	$1,549,165	$	$ 968,233	$ 858,448	$ 43,719	$	$ 86,326	$ 4,275,731
Habitat Improvement	48,261	219,864	61,231	198,564				1,274	529,194
Management & Research	490,127	1,353,507	204,935	212,254	311,829	336,793		158,188	3,067,633
Marine Fish & Shellfish	303,088						113,059	80,709	496,856
Administration	544,113	1,523,048						818,494	2,885,655
Capital Construction	93,349	3,096		122,494	195			3,976	223,110
Total	$2,248,778	$4,648,680	$266,166	$1,501,545	$1,170,472	$380,512	$113,059	$1,148,967	$11,478,179

Table 49. Contributing personnel.

Name	Title	District or Section
Bauer, Jerry A.	District Biologist, Fish	Umpqua District
Berry, Richard L.	Staff Biologist, Fish	Fish Division
Bisbee, Larry E.	Staff Biologist, Warm-Water Fish	Fish Division
Campbell, Homer J.	Assistant Research Supervisor	Research Section
Christianson, Wernald H.	District Biologist, Fish	Upper Willamette District
Claire, Errol W.	District Biologist, Fish	John Day District
Cummings, Melvin S.	Lands Supervisor	Lands Section
Fortune, John D.	District Biologist, Fish	Lincoln District
Golden, Michael P.	District Biologist, Fish	Bend District
Griggs, James D.	Staff Biologist, Resident Fish	Fish Division
Haight, William I.	District Biologist, Fish	Upper Rogue District
Haxton, John C.	District Biologist, Fish	West-Slope Willamette District
Heckeroth, David N.	District Biologist, Fish	Tillamook District
Hosford, William E.	District Biologist, Fish	Southeast District
Hutchinson, James M.	District Biologist, Fish	Siuslaw District
Jensen, Christopher C.	Assistant Supervisor, Fish Culture	Fish Division
Knispel, Warren M.	District Biologist, Fish	Astoria District
Lichens, Allan B.	District Biologist, Fish	Columbia District
Massey, Julius B.	District Biologist, Fish	Lower Willamette District
Mastin, Henry E.	District Biologist, Fish	Lake County District
Mullarkey, William G.	District Biologist, Fish	Coos-Coquille District
Phelps, James V.	District Biologist, Fish	Umatilla District
Pitney, William E.	Chief	Environmental Management Section
Pulford, Earl F.	Supervisor, Technical Services	Fish Division
Riikula, Arvo G.	District Biologist, Fish	Lower Rogue and South Coast District
Robinson, Jack G.	Assistant Marine Supervisor	Marine Region
Robinson, William L.	Biologist, Fish	Columbia River Management
Saltzman, William O.	Staff Biologist, Planning	Fish Division
Schwartz, Edward H.	District Biologist, Fish	Ochoco District
Smith, Harold P.	Wildlife Artist	Information and Education Section
Stout, Wendell H.	District Biologist, Fish	Klamath District
Sullivan, Perry A.	Accountant	Fiscal Section
Swan, Ralph L.	Staff Biologist, Habitat	Fish Division
West, Duane C.	District Biologist, Fish	La Grande District
Wetherbee, Julian J.	District Biologist, Fish	Mid-Willamette District
Witty, Kenneth L.	District Biologist, Fish	Wallowa District