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EVALUATION OF THE CONTRIBUTION OF CHINOOK SALMON REARED AT COLUMBIA RIVER HATCHERIES TO THE PACIFIC SALMON FISHERIES

Annual Report 1986

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Evaluation of the Contribution of
Chinook Salmon Reared at Columbia
River Hatcheries to the Pacific
Salmon Fisheries

Annual Report FY 1986

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ABSTRACT

FY 1986 was the eighth year of a study to determine the distribution, contribution, and value of artificially propagated fall chinook on the Columbia River. Tagging of hatchery fall chinook was completed in FY81. Sampling of sport and commercial marine fisheries from Alaska through California, Columbia River fisheries, and Columbia River hatcheries and adjacent streams occurred in 1986 as planned. Catches and returns of one brood year tagged for this study (1981) could have occurred in 1986.

Returns of fall chinook to Columbia River facilities as of December 1, 1986 are 108,154. This return is already the fourth largest of the past seven years. Several facilities (Cowlitz, Grays River, and Washougal) are having the greatest returns since inception of the study. However, Spring Creek and Lewis River hatcheries are having the smallest return.

Estimated Catches of coded wire tagged salmonids are available through 1984 for all fisheries except Alaska in 1981 and Washington in 1984. Catch proportions by fishery for the 1978 brood are .01, .39, .34, .07, 0, and .19 for the Alaska, Canada, Washington, Oregon, California, and Columbia River fisheries respectively. Catch proportions for the 1979 brood are similar to those for the 1978 brood (.03, .33, .37, .05, .01, and .21) for the same fisheries respectively. The proportion of recoveries for the four age groups of 1978-brood fish caught are .07, .69, .23, .01 for the two-through five-year-old chinook respectively. Recovery proportions by age for the 1979 brood are .12, .70, .17, and .01 for the same ages respectively. Catches by hatchery differed from the average considerably. For USFWS and ODFW facilities the three-year-old catch predominate and for the WDF facilities the four-year-old catch is dominant.

Contributions to the fisheries per 1,000 fish released for all hatcheries combined are 2.8, 3.9, and 2.0 for the 1978, 1979, and 1980 broods respectively. Spring Creek Hatchery has the greatest contribution to the fisheries of 8.5 and 12.9 fish per 1,000 fish released for the 1978 and 1979 broods respectively. The Spring Creek contribution is followed by Stayton Pond, Abernathy, Bonneville and Big Creek at 6.6, 4.6, 2.8 and 2.7 respectively for the 1978 brood and Big Creek, Stayton Pond and Abernathy at 8.6, 6.8 and 4.8 respectively for the 1979 brood. For the 1980 brood, Abernathy Hatchery had the greatest contribution at 7.5 followed by Spring Creek, Lower Kalama, Stayton Ponds, Clatsop County Ponds, Cowlitz, and Priest Rapids hatcheries at 3.7, 3.1, 2.8, 2.8, 2.5, and 2.5 respectively. Other facilities have contributions per 1,000 releases of approximately 2 or less.

STUDY GOALS AND OBJECTIVES

In 1979 the Bonneville Power Administration (BPA) began funding an 8-year study to determine the distribution, contribution, and value of fall chinook salmon raised at Columbia River rearing facilities. Information from this tagging study will provide data to determine the effectiveness of hatcheries constructed as mitigation for hydroelectric developments. In addition, this data will aid fishery agencies in planning further measures to protect, mitigate, and enhance salmon runs on the Columbia River. This information is important to regulating bodies, such as the Pacific Fishery Management Council, charged with negotiating, setting, and adjusting fishing seasons, locations, and limits. Current regulations are based on data from a fin-marking study completed over ten years ago. Since completion of that study, new rearing facilities have been built, existing facilities renovated, alterations in sport and commercial fisheries have occurred, and hatchery practices have changed.

The objectives of the study are to: 1) determine the contribution of fall chinook from Columbia River hatcheries to individual Pacific salmon fisheries by age class of fish, and 2) determine the distribution, contribution, and value of each hatchery's production of fall chinook to Pacific coast salmon fisheries.

The desired goal to achieve objective 1 was to tag a constant percentage of fish at each rearing facility. A goal of tagging at least 150,000 fish at each facility was set to achieve objective 2. We have attempted to meet both goals at each hatchery. This required additional tag codes at some hatcheries because the number of fish tagged for the constant percentage was insufficient to meet the 150,000 goal. This report briefly describes tagging, release and recovery activities during the first seven years of the study and details activities and preliminary results during FY 1986.

STUDY DESCRIPTION

The National Marine Fisheries Service (NMFS) is coordinating the study among three fisheries agencies: U.S. Fish and Wildlife Service (USFWS), Oregon Department of Fish and Wildlife (ODFW), and Washington Department of Fisheries (WDF).

Tagging

From 18 to 20 facilities rearing fall chinook on the Columbia River were included in this study each year (Figure 1). Personnel from the participating agencies tagged a portion of the fall chinook production at most Columbia River facilities rearing fall chinook. The fish at each facility received a distinctive mark consisting of an adipose fin clip and insertion of a unique coded wire tag in the snout. From 2.5 to 5 percent of the production at each facility was randomly selected for tagging. Sampling devices developed by WDF and NMFS were used to select the fish for tagging.

Figure 1. - COLUMBIA RIVER FACILITIES PARTICIPATING IN THE FALL CHINOOK STUDY

ODFW and USFWS personnel used a mobile tagging unit constructed by **NMFS** with BPA funds to tag fish at their facilities. WDF used their own tagging equipment. During the four brood years, 1978 through 1981, nearly 15 million fall chinook were tagged. The numbers tagged each year **were 4, 379, 300, 3,009,900, 3,660,500, and 3,651,300.**

Except for the 1978-brood fall chinook at ODFW and USFWS facilities, tagged fish were returned to the populations of untagged fish from which they came.

Prerelease Sampling

During the tagging operation at each facility, tagging supervisors randomly removed a minimum of 2,000 tagged fish. These fish were held separately and **were** examined at the time of the facility's production release to determine tag retention at release. Just prior to release, fall chinook populations at **most** participating facilities were sampled to determine the tagged to untagged ratios. In many cases these ratios were used to determine the numbers of tagged and untagged fish released.

Releases

Nearly 14 million tagged fall chinook were released from the participating facilities during the four brood years. Releases were 4,035,100, 2,864,700, 3,466,400, and 3,475,500 for the 1978 through 1981 brood years, respectively. The percentage of the releases tagged each year was 4.4, 3.5, 3.9, and 4.1 for the four broods, respectively. Total releases ranged from 81 million to 92 million from the participating facilities (Tables 1-4).

Downstream Migration

Research personnel from NMFS, Northwest and Alaska Fisheries Center sampled the Columbia River estuary and marine waters near the mouth of the Columbia during the migration time of the four broods of fall chinook. The purposes of this sampling were to: 1) define migrational characteristics of marked salmonid stocks from release site through the estuary, 2) provide data to assist in evaluating different hatchery production techniques within a release year, and 3) determine juvenile survival to the estuary for selected stocks and compare this survival with fishery contribution and hatchery returns of these stocks. The usefulness of this sampling for evaluating hatchery techniques and determining potential fishery contribution and survival ranges for fall chinook will not be fully evident until the final catch and return data are compiled.

Sport and Commercial Fishery Recoveries

Sport and commercial fisheries from Alaska through California are being sampled for wire tagged salmonids (Figure 2). Recoveries of the 1978-brood began in 1980. Fishery recoveries of the 1981 brood will not be complete until 1986 (Table 5).

TABLE 1. -- Releases of 1978-brood fall chinook salmon from Columbia River facilities in 1979

Rearing Facility	Tagged Fish Released	Tag Code	Ad Only Fish Released	X Tag Retention	Unmarked Fish Released	Total	Fish/lb	Release Dates
ADERNATHY	63,400	05-04-50	15,000	80.2	830,600	909,000	95	4/17 - 5/18
	48,900	05-04-51	11,600	80.2	640,700	701,200	61	4/17 - 5/18
BIG CREEK	224,900	07-18-44	26,400	89.5	4,996,000	5,247,300	81	5/21
BIG WHITE POND	141,400	05-04-43	3,200	97.8	2,884,100	3,028,700	69	5/21
BONNEVILLE	287,900	07-18-42	5,500	98.1	12,262,400	12,555,800	75	5/ 1 - 5/29
	15,100	07-18-43	200	98.7	824,000	839,300	80	5/21
COMLITZ	143,600	63-19-42	2,500	98.3	4,478,800	4,624,900	85	6/27 - 10/16
	11,100	63-19-51	0	100.0	0	11,100	85	6/27 - 10/16
ELOKOMIN	21,100	63-18-56	0	100.0	0	21,100	99	6/15
	117,000	63-19-56	5,800	95.3	2,730,700	2,854,300	99	6/15
GRAYS RIVER	73,900	63-16-46	2,600	100.0	1,220,800	1,297,300	92	6/ 9 - 6/12
	7,600	63-18-33	0	100.0	0	7,600	92	6/ 9 - 6/12
	68,100	63-19-37	0	98.3	0	68,100	92	6/ 9 - 6/12
KALAMA FALLS	214,500	63-19-57	3,300	98.5	3,940,300	4,158,100	177	6/22 - 7/13
KLASKANINE	244,100	07-18-45	28,600	89.5	5,218,100	5,490,800	71	5/29
KLICKITAT	225,400	63-19-49	3,700	98.4	3,366,400	3,595,500	80	5/14 - 6/13
LITTLE WHITE SALMON	177,800	05-04-48	8,900	95.2	5,655,500	5,842,200	111	6/22
	264,800	05-04-49	12,700	95.4	5,291,100	5,568,600	111	6/22
PRIEST RAPIDS	48,100	63-18-21	2,800	96.0	776,400	826,500	74	5/23
	17,500	63-18-57	700	100.0	267,700	285,900	77	6/28
	5,300	63-19-58	0	100.0	0	5,300	77	6/28
	82,200	63-20-17	0	99.2	0	82,200	77	6/28
SEA RESOURCES	24,200	63-19-18	300	98.6	957,500	982,000	112	5/ 1 - 5/31
SPEELYAI	51,700	63-19-20	400	99.2	0	52,100	28	9/ 5
	104,500	63-19-50	3,500	96.8	78,500	186,500	86	7/19
SPRING CREEK	148,900	05-04-33	13,600	91.2	3,568,600	3,723,100	54	5/18
	135,500	05-04-44	19,400	87.5	4,357,400	4,512,300	87	4/20
	55,600	05-04-45	6,300	89.9	1,141,600	1,243,500	19	8/13
	246,000	05-04-46	13,000	95.0	9,861,000	10,120,000	125	3/20
STAYTON POND	283,800	07-18-41	9,400	96.8	4,398,800	4,692,000	67	5/ 7 - 5/21
TOUTLE	12,000	63-18-54	0	100.0	0	12,000	160	6/17
	132,100	63-19-41	6,000	96.0	2,619,500	2,757,600	160	6/17
WASHOUCAL	97,400	63-19-38	8,300	100.0	4,826,800	4,932,500	78	6/14 - 9/ 2
	154,500	63-19-46	0	96.8	0	154,500	78	6/14 - 9/ 2
WEYCO POND	92,400	63-19-39	2,500	97.4	271,600	366,500	58	6/ 5
Total	4,835,100		215,400		87,464,900	91,715,400		

TABLE 2. -- Releases of 1979-breed fall chinook salmon from Columbia River facilities in 1980.

Rearing Facility	Tagged Fish Released	Tag Code	Ad Only Fish Released	% Tag Retention	Unmarked Fish Released	Total	Fish/lb	Release Dates
ADERMATHY	35,200	05-06-44	1,100	96.9	466,500	502,800	59	4/9 - 5/14
	112,500	05-06-46	2,400	97.9	1,360,000	1,474,900	59	4/9 - 5/14
BIG CREEK	143,400	07-21-60	2,200	98.5	6,287,900	6,433,500	78	5/13
BONNEVILLE	121,100	07-21-57	4,400	96.5	4,947,400	5,072,900	74	5/20 - 5/28
CONLITZ	20,700	63-21-37	200	99.7	543,400	564,300	9	3/21 - 4/1
	244,300	63-21-54	9,900	96.1	5,671,000	5,926,000	129	6/3 - 7/11
	70,500	63-21-59	2,900	96.1	1,566,600	1,640,000	119	6/18 - 7/11
ELOKOMIN	98,400	63-20-05	2,100	97.9	2,310,600	2,411,100	80	6/19
GRAYS RIVER	37,500	63-20-43	1,500	96.2	768,000	807,000	85	6/1 - 6/24
KALAMA FALLS	100,400	63-21-05	1,500	98.5	2,299,000	2,400,900	124	6/13 - 6/24
KLASKANINE	66,300	07-21-61	900	98.7	2,170,500	2,237,700	79	6/4
KLICKITAT	156,100	63-19-47	1,600	99.0	2,981,700	3,139,400	85	5/27
LEWIS RIVER	103,700	63-21-60	1,800	98.3	321,700	427,200	117	7/15
LITTLE WHITE SALMON	162,600	05-06-43	1,900	98.9	8,611,500	8,776,000	101	6/10
LOWER KALAMA	144,500	63-20-06	5,800	96.2	3,129,500	3,279,800	150	6/10
OXBOW	49,400	07-21-62	900	98.3	1,115,200	1,165,500	100	5/27
	51,900	07-21-63	900	98.3	1,170,100	1,222,900	100	5/27
PRIEST RAPIDS	110,100	63-19-48	700	99.7	2,272,900	2,383,700	69	5/20 - 6/24
RINGOLD POND	37,100	63-19-48	0	100.0	631,700	668,800	88	6/26
SEA RESOURCES	1,900	63-19-47	0	100.0	0	1,900	90	5/28
	10,400	63-20-61	400	98.1	745,400	764,200	98	5/28
SPRING CREEK	125,500	05-06-39	4,700	96.4	7,209,900	7,340,100	123	3/10
	75,200	05-06-40	2,500	96.8	3,836,300	3,914,000	83	4/10
	60,500	05-06-41	1,300	97.9	3,128,900	3,190,700	51	5/9
	23,100	05-06-42	500	98.2	1,088,900	1,112,500	19	8/7
STAYTON POND	282,000	07-20-55	3,400	98.7	6,063,200	6,348,600	87	4/28 - 5/21
WASHOUCAL	314,600	63-21-53	7,500	97.7	5,771,800	6,093,900	99	6/30
WEYCO POND	97,800	H1-02-03	3,600	96.5	1,850,500	1,951,900	90	6/10
Total	2,864,700		66,600		78,320,900	81,252,200		

TABLE 3. -- Releases of 1980-brood fall chinook salmon from Columbia River facilities in 1981.

Rearing Facility	Tagged Fish Released	Tag Code	Ad Only Fish Released	% Tag Retention	Unmarked Fish Released	Total	Fish/lb	Release Dates
ADERMATHY	19,100	05-07-44	3,300	85.4	278,000	300,400	69	4/15 - 5/26
	63,500	05-07-45	10,600	85.7	826,700	900,800	69	4/15 - 5/26
BIG CREEK	50,200	07-23-31	1,500	97.1	1,856,000	1,907,700	77	5/7 - 5/18
	51,100	07-23-33	1,600	97.0	1,888,600	1,941,300	77	5/7 - 5/18
	46,000	07-23-34	1,400	97.0	1,698,100	1,745,500	77	5/7 - 5/18
BONNEVILLE	130,000	07-21-56	4,800	96.5	5,007,400	5,142,200	73	4/24
	75,700	07-23-29	2,700	96.6	3,113,000	3,191,400	68	5/12
CLATSOP COUNTY PONDS	73,200	07-21-58	900	98.8	1,726,800	1,800,900	75	5/15
	48,900	07-21-59	300	99.3	1,308,500	1,357,700	70	5/22
COMLITZ	153,200	63-21-56	7,400	95.4	3,121,300	3,281,900	86	6/27 - 6/28
	121,300	63-22-55	2,200	98.2	2,773,400	2,896,900	77	6/12 - 6/28
ELOKOMIN	156,200	63-22-34	4,000	97.7	2,755,400	2,915,600	102	6/1
	9,400	63-23-17	0	100.0	0	9,400	100	6/1
GRAYS RIVER	64,100	63-22-63	800	99.8	1,145,700	1,210,600	85	6/1 - 6/8
	10,200	63-23-40	0	100.0	0	10,200	93	6/1
KALAMA FALLS	175,400	63-20-36	3,200	98.2	3,432,800	3,611,400	103	5/22 - 5/28
KLASKAMINE	18,900	07-22-27	500	97.5	718,000	737,400	86	5/18
	82,100	07-23-32	2,100	97.5	3,121,800	3,206,000	86	5/18
KLICKITAT	130,000	63-20-08	2,700	98.0	2,346,500	2,479,200	78	6/5
LITTLE WHITE SALMON	183,400	05-07-47	4,700	97.5	6,587,300	6,775,400	94	6/4 - 6/5
	52,400	05-08-49	1,400	97.4	1,883,300	1,937,100	94	6/4 - 6/5
	13,300	05-08-50	600	95.6	489,200	503,100	94	6/4 - 6/5
LOWER KALAMA	155,300	63-22-54	6,500	96.0	2,836,900	2,998,700	98	6/1 - 6/18
PRIEST RAPIDS	194,600	63-21-55	1,500	99.3	3,793,200	3,989,300	89	6/23 - 6/24
	42,100	63-22-61	100	99.7	787,900	830,100	67	5/18
SEA RESOURCES	43,300	63-22-01	1,100	97.4	786,800	831,200	98	4/16 - 4/29
SPRING CREEK	104,700	05-07-40	400	99.6	4,743,200	4,848,300	90	3/25
	76,700	05-07-41	800	99.0	3,117,800	3,195,300	71	4/15
	63,100	05-07-42	300	99.5	3,141,500	3,204,900	65	5/5
	25,700	05-07-43	100	99.5	123,900	149,700	75	4/21 - 4/22
	158,500	05-07-46	800	99.5	724,700	876,000	75	4/21 - 4/22
	28,000	05-07-48	100	99.5	1,345,400	1,374,300	118	3/25
	30,900	05-07-49	300	99.0	1,255,000	1,286,200	71	4/15
	13,700	05-07-50	0	100.0	635,200	648,900	121	3/25
	15,400	05-07-51	100	99.5	748,000	763,500	102	3/25
	7,200	05-07-52	200	97.8	283,600	291,000	15	8/12
STAYTON POND	245,500	07-23-35	7,500	97.0	5,649,700	5,902,700	75	4/27 - 6/15
WASHOUCAL	28,700	63-21-48	300	99.1	483,200	512,200	35	7/6 - 9/4
	278,000	63-22-51	3,100	98.9	5,228,000	5,509,900	74	6/30 - 7/6
WEYCO POND	169,500	H1-03-01	2,700	98.4	3,328,100	3,500,300	90	5/15 - 6/12
	64,300	H1-03-02	600	99.0	1,208,100	1,273,000	90	5/15 - 6/12
Total	3,466,400		83,200		86,298,000	89,847,600		

TABLE 4. -- Releases of 1981-breed fall chinook salmon from Columbia River facilities in 1982.

Rearing Facility	Tagged Fish Released	Tag Code	Ad Only Fish Released	% Tag Retention	Unmarked Fish Released	Total	Fish/lb	Release Dates
ADERMATHY	90,600 29,800	05-10-58 05-10-59	7,100 2,900	93.0 91.0	994,500 331,400	1,092,200 364,100	51 51	4/20 - 6/ 1 4/20 - 6/ 1
BIG CREEK	131,200	07-24-10	4,300	96.8	4,401,800	4,536,300	75	5/17
BONNEVILLE	105,900 96,800 102,400	07-24-07 07-24-08 07-26-63	700 1,500 2,000	99.3 98.4 98.1	1,086,100 2,095,500 2,724,500	1,192,700 2,193,800 2,828,900	80 80 92	4/23 5/21 - 6/ 4 4/14 - 4/20
CLATSOP COUNTY PONDS	79,700 33,900	07-24-12 07-24-13	1,100 500	98.6 98.6	1,038,100 788,000	1,918,900 822,400	80 80	5/28 5/28
CONULTZ	41,300 8,300 199,200 47,500	63-20-32 63-24-50 63-24-62 63-26-03	0 100 4,500 900	95.4 98.8 98.7 98.1	0 151,600 6,691,300 795,600	41,300 160,000 6,895,000 844,000	90 20 90 30	6/24 - 7/ 8 9/29 6/24 - 7/ 8 9/29
ELDKOMIN	52,200 58,600	63-22-42 63-22-60	1,000 2,000	98.1 98.2	1,246,900 1,247,400	1,300,100 1,300,000	80 80	6/15 6/15
GRAYS RIVER	27,500 45,400	63-24-58 63-24-59	1,100 1,600	96.2 96.6	279,400 471,400	308,000 518,400	87 87	6/ 1 6/ 1
KALAMA FALLS	177,100	63-24-60	600	99.7	3,375,200	3,552,900	102	6/10 - 7/ 2
KLASKANINE	100,300	07-24-09	1,000	98.8	1,927,000	2,028,300	85	6/ 7
KLICKITAT	204,100	63-21-57	2,000	99.0	3,473,600	3,679,700	83	6/ 4
LITTLE WHITE SALMON	101,300 98,500	05-04-35 05-04-36	1,500 1,800	98.5 98.2	3,933,100 3,902,400	4,035,900 4,002,700	93 93	6/ 2 - 6/ 3 6/ 2 - 6/ 3
LOWER KALAMA	139,400	63-24-63	1,600	98.3	3,027,000	3,168,000	117	6/13 - 6/25
OXBOW	52,300 52,500	07-23-30 07-24-11	700 700	98.6 98.6	2,083,800 2,092,200	2,136,800 2,145,400	78 78	6/ 4 - 6/25 6/ 4 - 6/25
PRIEST RAPIDS	262,200 48,700	63-22-52 63-24-56	800 900	99.7 98.2	4,360,300 836,400	4,623,300 886,000	87 67	5/24 - 6/16 5/18
SEA RESOURCES	45,000	63-24-57	2,500	94.8	783,100	830,600	100	4/ 1 - 5/ 7
SPRING CREEK	500 400 46,700 151,400 38,900 58,300 102,300	05-07-53 05-07-54 05-08-51 05-10-50 05-10-51 05-10-52 05-10-57	25 25 1,200 3,600 1,000 5,300 2,600	95.0 95.0 97.5 97.7 97.5 91.6 97.5	46,300 46,300 258,400 7,045,400 2,130,200 2,927,700 567,100	46,825 46,725 306,300 7,200,400 2,170,100 2,991,300 672,000	17 17 79 110 78 48 79	7/30 7/30 4/ 8 - 4/13 3/25 - 3/26 4/15 5/20 4/ 8 - 4/13
STAYTON POND	265,800	07-26-62	11,300	95.9	6,473,700	6,750,800	88	5/ 3 - 5/21
WASHOUGAL	170,400	63-24-61	4,400	97.5	3,321,100	3,495,900	90	6/30 - 7/ 6
WEYCO POND	217,100	H1-04-06	7,600	96.6	4,270,700	4,495,400	100	6/18
	75,500		8 0		82.0 0 8 8

Figure 2. Ports and zones sampled for marked fall chinook salmon of Columbia River origin.

Table 5. Recovery years of the 1978– through 1981 -brood fall chinook from Columbia River hatcheries.

Brood Year	Calendar Year						
	1980	1981	1982	1983	1984	1985	1986
1978	X	X	X	X			
1979		X	X	X	X		
1980			X	X	X	X	
1981				X	X	X	X

Hatchery Returns

Personnel from WDF, ODFW, and USFWS examine all returning fall chinook for the absence of fins. Biological data are collected from untagged returns at a predetermined systematic sampling rate. Samplers remove the snout of all fish with a missing adipose fin. The biological data will be used to estimate the ages of untagged fish. The age structure for tagged and untagged fish will be compared to determine if tagging changes the age distribution of returning adults.

Data Analysis

The factors to be examined at the completion of the study are summarized in Table 6. Analysis of some factors may be limited to simply noting an occurrence. Many of the factors are intertwined (confounded). This may prevent a direct cause and effect relationship. For example, there are no quantitative measures for disease history. It is not possible to make a comparison between groups of fish where group A is known to be X percent healthier than group B. The best that can be done is to note group A had such and such diseases and group B had none. Thus the diseases in group A would be a likely reason for lower survival (assuming there was lower survival). However, the confounding of the factors of disease, rearing environment, time and size of release, stock, hatchery, etc., may prevent determining a direct relationship between survival and any one factor.

RESULTS AND DISCUSSION

Tagging of fall chinook for this project was completed in 1982. Fishery and hatchery sampling occurred in 1986 as planned.

Fishery Recoveries

Final estimated recoveries of tagged fall chinook are available for 1980 through 1984 for most major salmon fisheries on the Pacific coast. The Pacific Marine Fisheries Commission publishes the data for the United States fisheries and has the British Columbia data on computer. Estimated catches are not available as yet for 1981 Alaska fisheries and 1984 Washington and Alaska fisheries. For 1985 finalized data is available Oregon fisheries and preliminary data is available for fisheries in Alaska, British Columbia, Washington, and California.

Catches of tagged fall chinook were expected to be completed in 1983 for the 1978 brood, 1984 for the 1979 brood, 1985 for the 1980 brood, and 1986 for the 1981 brood (Table 5). Estimated recoveries of fall chinook tagged for this project are presented by brood, hatchery and tag code in Tables 7 through 10.

Hatchery Returns

Returns of tagged fall chinook through 1985 are summarized by brood,

Table 6. Factors to be analyzed for the fall chinook study.

Brood	Hatchery	Disease History 1/	Rearing Environment 2/	Release Time and Size 3/	Release Location 4/	River Flow and Temp. 1/	Smolt Index 5/	Jones Beach Samp. 6/	Catch and Distrib. 1/	Returns 1/	Benefit/ Cost Ratio 1/
Within	Within	X	X	X	X	X	X	X	X	X	X
	Between	X	X	X	X	X		X	X	X	X
Between	Within	X	X	X		X	X		X	X	X
	Between								X		X

1/ All facilities all broods

2/ 78-brood: Grays River vs. Weyoo Pond, Bonneville vs. Stayton Pond, Spring Creek vs. Big White Pond.

80-brood: Grays River vs. Weyoo Pond, Bonneville vs. Stayton Pond vs. Clatsop County Ponds.

81-brood: Bonneville vs. Stayton Pond vs. Klaskanine vs. OxBow

3/ 78-brood: Speelyal, Spring Creek

79-brood: Cowlitz, Spring Creek

80-brood: Spring Creek

81-brood: Spring Creek, Cowlitz

4/ 80-brood: Spring Creek

81-brood: Spring Creek, Bonneville

5/ Measure of degree of smoltification based on ATPase, thyroxine, saltwater challenge tests, etc.

78-brood: Kalama Falls, Toutle, Bonneville, Big White, Elokomin, Washougal

79-brood: Spring Creek, Bonneville, Elokomin, Grays River

6/ All facilities

TABLE 7.-- Estimated recoveries of tagged 1978- brood fall chinook from Columbia River facilities to Pacific coast fisheries by facility, tag code and catch year.

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total
			Marine				Foreign	Indian	Non-Indian	All fish	
			Alaska	Canada	Washington	Oregon					California
BIG CREEK	07-18-44	1980	0	13	19	0	0	0	0	0	32
		1981	0	219	143	27	0	0	0	17	406
		1982	0	74	20	0	0	0	0	69	163
		1983	0	10	0	0	0	0	0	0	10
		Total	0	316	182	27	0	0	0	86	611
BONNEVILLE	07-18-42	1980	0	14	49	0	0	0	2	5	70
		1981	0	266	237	57	0	0	4	18	582
		1982	0	105	6	0	0	0	7	68	188
		1983	0	0	0	0	0	0	0	0	0
		Total	0	385	292	57	0	0	15	91	840
	07-18-43	1980	0	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	2	2
		1982	0	0	0	0	4	0	0	0	4
		1983	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	4	0	0	2	6
KLASKANINE	07-18-45	1980	0	11	0	0	0	0	0	0	11
		1981	0	92	32	34	0	0	0	18	176
		1982	0	26	1	0	0	0	0	87	114
		1983	0	0	0	0	0	0	0	0	0
		Total	0	129	33	34	0	0	0	105	301
STAYTON POND	07-18-41	1980	0	40	58	0	0	0	0	0	98
		1981	0	735	520	119	4	0	0	16	1,394
		1982	0	174	47	2	3	2	0	130	358
		1983	0	5	6	0	0	0	0	3	14
		Total	0	954	631	121	7	2	0	149	1,864
SEA RESOURCES	63-19-18	1980	0	6	0	12	0	0	0	0	18
		1981	0	0	0	0	0	0	0	2	2
		1982	0	0	3	0	0	0	0	3	6
		1983	0	0	0	0	0	0	0	0	0
		Total	0	6	3	12	0	0	0	5	26

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total		
			Marine					Columbia River					
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian		All fish	
ABERNATHY	05-04-50	1980	0	11	14	0	0	0	0	0	25		
		1981	0	165	60	15	5	0	0	11	256		
		1982	0	17	0	0	0	0	0	6	23		
		1983	0	0	0	0	0	0	0	0	0		
	Total		0	193	74	15	5	0	0	17	304		
		05-04-51	1980	0	12	12	0	0	0	0	12	36	
			1981	0	57	50	26	0	0	0	18	151	
			1982	0	4	4	4	0	0	0	9	21	
	1983		0	0	0	0	0	0	0	0	0		
	Total		0	73	66	30	0	0	0	39	208		
		BIG WHITE POND	05-04-43	1980	0	6	17	7	0	0	0	0	30
				1981	0	50	103	14	0	0	19	0	186
				1982	0	17	13	0	0	0	10	12	52
	1983			0	0	0	0	0	0	0	0	0	
Total		0	73	133	21	0	0	29	12	268			
	LITTLE WHITE SALMON	05-04-48	1980	0	0	0	0	0	0	0	0	0	
			1981	0	12	11	0	0	0	5	0	28	
			1982	0	0	0	0	0	0	3	0	3	
1983			0	0	0	0	0	0	0	0	0		
Total		0	12	11	0	0	0	8	0	31			
	05-04-49	1980	0	2	0	0	0	0	0	0	2		
		1981	0	0	11	5	0	0	0	0	16		
		1982	0	10	0	0	0	0	8	0	18		
1983		0	0	0	0	0	0	0	0	0			
Total		0	12	11	5	0	0	8	0	36			
	SPRING CREEK	05-04-33	1980	0	14	80	0	0	0	11	6	111	
			1981	0	352	425	115	0	0	200	21	1,113	
			1982	0	64	30	7	0	2	64	52	219	
1983			0	0	0	0	0	0	4	0	4		
Total		0	430	535	122	0	2	279	79	1,447			

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total
			Marine					Columbia River			
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian	
SPRING CREEK	05-04-44	1980	0	41	136	5	0	0	2	21	205
		1981	0	489	707	136	0	0	350	27	1,711
		1982	0	94	45	6	0	0	75	78	298
		1983	0	0	0	0	0	0	0	0	0
	Total	0	624	890	147	0	0	427	126	2,214	
	05-04-45	1980	0	0	0	0	0	0	0	0	0
		1981	0	0	2	0	0	0	0	0	2
		1982	0	0	0	0	0	0	0	0	0
		1983	0	0	0	0	0	0	0	0	0
	Total	0	0	2	0	0	0	0	0	2	
	05-04-46	1980	0	14	40	13	0	0	14	22	103
		1981	0	340	383	56	0	0	146	17	942
		1982	0	57	16	2	0	0	43	50	168
		1983	0	0	2	0	0	0	2	5	9
	Total	0	411	441	71	0	0	205	94	1,222	
COWLITZ	63-19-42	1980	0	0	0	0	0	0	0	2	2
		1981	0	29	32	15	0	0	0	7	83
		1982	7	56	49	25	0	0	0	18	155
		1983	1	4	2	0	0	0	0	0	7
	Total	8	89	83	40	0	0	0	27	247	
	63-19-51	1980	0	0	0	0	0	0	0	0	0
		1981	0	5	19	2	0	0	0	0	26
		1982	1	18	13	4	0	0	0	5	41
		1983	0	0	0	0	0	0	0	0	0
	Total	1	23	32	6	0	0	0	5	67	
ELOKOMIN	63-18-56	1980	0	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	1	1
		1982	0	0	0	0	0	0	0	3	3
		1983	0	3	0	0	0	0	0	0	3
	Total	0	3	0	0	0	0	0	4	7	

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries							Columbia River		Total
			Marine					Foreign	Indian	Non-Indian	All fish	
			Alaska	Canada	Washington	Oregon	California					
ELOKOMIN	63-19-56	1980	0	3	0	0	0	0	0	0	3	
		1981	0	4	3	0	0	0	0	1	8	
		1982	0	0	0	0	0	0	0	0	0	
		1983	0	0	0	0	0	0	0	0	0	
		Total	0	7	3	0	0	0	0	1	11	
GRAYS RIVER	63-16-46	1980	0	0	0	0	0	0	0	0	0	
		1981	0	0	0	2	0	0	0	4	6	
		1982	0	16	0	0	0	0	0	7	23	
		1983	4	0	0	0	0	0	0	0	4	
		Total	4	16	0	2	0	0	0	11	33	
	63-18-33	1980	0	0	0	0	0	0	0	0	0	
		1981	0	0	0	0	0	0	0	0	0	
		1982	0	4	0	0	0	0	0	0	4	
		1983	0	0	0	0	0	0	0	0	0	
		Total	0	4	0	0	0	0	0	0	4	
	63-19-37	1980	0	0	0	0	0	0	0	0	0	
		1981	0	0	7	11	0	0	0	9	27	
		1982	1	0	4	0	0	0	0	4	9	
		1983	0	0	6	0	0	0	0	0	6	
		Total	1	0	17	11	0	0	0	13	42	
KALAMA FALLS	63-19-57	1980	0	2	0	0	0	0	0	0	2	
		1981	0	3	8	3	0	0	0	0	14	
		1982	2	43	6	0	0	0	0	18	69	
		1983	0	0	0	0	0	0	0	2	2	
		Total	2	48	14	3	0	0	0	20	87	
KLICKITAT	63-19-49	1980	0	4	5	0	0	0	0	5	14	
		1981	0	63	50	7	0	0	10	3	133	
		1982	1	42	22	0	0	0	21	12	98	
		1983	0	0	0	0	0	0	0	0	0	
		Total	1	109	77	7	0	0	31	20	245	

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total
			Marine				Foreign	Indian	Non-Indian	All fish	
			Alaska	Canada	Washington	Oregon					California
PRIEST RAPIDS	63-18-21	1980	0	8	0	0	0	0	0	3	11
		1981	0	17	2	3	0	0	2	0	24
		1982	46	33	3	0	0	0	8	4	94
		1983	11	5	0	0	0	0	0	0	16
		Total	57	63	5	3	0	0	10	7	145
	63-18-57	1980	0	0	0	0	0	0	0	0	0
		1981	0	8	0	0	0	0	0	0	8
		1982	0	0	0	0	0	0	0	0	0
		1983	1	0	0	0	0	0	0	0	1
		Total	1	8	0	0	0	0	0	0	9
	63-19-58	1980	0	0	0	0	0	0	0	0	0
		1981	0	0	0	0	4	0	0	0	4
		1982	0	0	0	0	0	0	2	0	2
		1983	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	4	0	2	0	6
	63-20-17	1980	0	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	0	0
		1982	7	19	0	0	0	0	4	0	30
		1983	0	3	0	0	0	0	0	1	4
		Total	7	22	0	0	0	0	4	1	34
SPEELYAI	63-19-20	1980	0	7	0	0	0	0	0	3	10
		1981	0	12	30	0	0	0	0	9	51
		1982	10	27	17	11	0	0	0	16	81
		1983	2	0	3	0	0	0	0	4	9
		Total	12	46	50	11	0	0	0	32	151
	63-19-50	1980	0	2	0	0	0	0	0	6	8
		1981	0	20	22	9	0	0	0	2	53
		1982	10	55	25	0	0	0	0	24	114
		1983	0	9	5	0	0	0	0	4	18
		Total	10	86	52	9	0	0	0	36	193

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total	
			Marine					Columbia River				
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian		All fish
TOUTLE	63-18-54	1980	0	0	0	0	0	0	0	0	0	0
		1981	0	5	3	0	0	0	0	0	0	8
		1982	0	0	0	0	0	0	0	0	0	0
		1983	0	0	0	0	0	0	0	0	0	0
	Total	0	5	3	0	0	0	0	0	0	8	
	63-19-41	1980	0	1	0	0	0	0	0	0	0	1
		1981	0	20	3	0	0	0	0	0	11	34
		1982	3	49	6	15	0	0	0	0	18	91
		1983	0	0	0	0	0	0	0	0	0	0
	Total	3	70	9	15	0	0	0	0	29	126	
WASHOUGAL	63-19-38	1980	0	0	0	0	0	0	0	11	11	
		1981	0	35	18	8	0	0	0	0	6	67
		1982	0	11	8	0	0	0	0	0	29	48
		1983	0	0	0	0	0	0	0	0	4	4
	Total	0	46	26	8	0	0	0	0	50	130	
	63-19-46	1980	0	2	0	0	0	0	0	0	1	3
		1981	0	17	26	10	0	0	0	0	5	60
		1982	4	49	3	0	0	0	0	0	29	85
		1983	4	0	0	0	0	0	0	0	0	4
	Total	8	70	29	10	0	0	0	0	35	152	
WEYCO POND	63-19-39	1980	0	0	0	0	0	0	0	0	0	0
		1981	0	35	2	0	0	0	0	0	7	44
		1982	1	4	8	0	0	0	0	0	9	22
		1983	0	0	0	0	0	0	0	0	0	0
	Total	1	39	10	0	0	0	0	0	16	66	
Grand total			116	4,372	3,714	787	20	4	1,018	1,112	11,143	

TABLE 8.-- Estimated recoveries of tagged 1979- brood fall chinook from Columbia River facilities to Pacific coast fisheries by facility, tag code and catch year.

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total
			Marine					Foreign	Indian	Non-Indian	All fish
			Alaska	Canada	Washington	Oregon	California				
BIG CREEK	07-21-60	1981	0	81	29	4	0	0	0	5	119
		1982	0	461	342	55	8	4	0	108	978
		1983	0	71	13	0	0	0	0	47	131
		1984	0	0	0	0	0	0	0	0	0
	Total	0	613	384	59	8	4	0	160	1,228	
BONNEVILLE	07-21-57	1981	0	1	0	0	0	0	0	0	1
		1982	0	52	36	0	0	0	0	24	112
		1983	0	22	2	0	0	0	2	0	26
	Total	0	75	38	0	0	0	2	24	139	
KLASKANINE	07-21-61	1981	0	4	4	0	0	0	0	0	8
		1982	0	32	14	1	0	0	0	25	72
		1983	0	5	2	2	0	0	0	11	20
	Total	0	41	20	3	0	0	0	36	100	
OXBOW	07-21-62	1981	0	0	0	0	0	0	0	0	0
		1982	0	16	14	2	0	0	0	6	38
		1983	0	13	0	0	0	0	0	3	16
	Total	0	29	14	2	0	0	0	9	54	
	07-21-63	1981	0	0	2	0	0	0	0	0	2
		1982	0	40	25	7	0	0	0	10	84
		1983	0	7	7	0	0	0	0	3	17
	Total	0	47	34	9	0	0	0	13	103	
STAYTON POND	07-20-55	1981	0	46	187	7	0	0	0	2	242
		1982	0	529	691	109	3	4	0	201	1,537
		1983	0	97	27	0	0	0	0	18	142
		1984	0	4	0	0	0	0	0	0	4
	Total	0	676	905	116	3	4	0	221	1,925	
SEA RESOURCES	63-20-61	1981	0	1	2	0	0	0	0	0	3

Table 8 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries							Columbia River		Total
			Marine					Foreign	Indian	Non-Indian	All fish.	
			Alaska	Canada	Washington	Oregon	California					
SEA RESOURCES	63-20-61	1982	0	6	5	0	0	0	0	11	22	
		1983	7	8	0	0	0	0	0	0	15	
		Total	7	15	7	0	0	0	0	11	40	
ABERNATHY	05-06-44	1981	0	0	26	4	0	0	0	9	39	
		1982	0	46	61	4	8	0	0	24	143	
		1983	0	5	2	0	0	0	0	1	8	
	Total	0	51	89	8	8	0	0	34	190		
	05-06-46	1981	0	5	59	9	0	5	0	9	87	
		1982	0	135	200	49	0	0	0	32	416	
		1983	0	10	0	0	0	0	0	8	18	
		1984	0	0	0	0	0	0	0	2	2	
	Total	0	150	259	58	0	5	0	51	523		
	LITTLE WHITE SALMON	05-06-43	1981	0	0	0	0	0	0	0	0	0
1982			0	18	20	0	0	0	2	6	46	
1983			0	0	0	0	0	0	0	0	0	
Total		0	18	20	0	0	0	2	6	46		
SPRING CREEK	05-06-39	1981	0	34	114	23	0	0	41	3	215	
		1982	0	226	325	40	10	0	151	144	896	
		1983	0	12	5	0	0	0	9	3	29	
	Total	0	272	444	63	10	0	201	150	1,140		
	05-06-40	1981	0	15	110	11	0	0	52	8	196	
		1982	0	247	366	59	0	0	165	168	1,005	
		1983	0	18	3	0	0	0	12	7	40	
	Total	0	280	479	70	0	0	229	183	1,241		
	05-06-41	1981	0	54	148	5	0	0	59	1	267	
		1982	0	161	325	35	8	0	206	159	894	
		1983	0	9	0	0	0	0	12	4	25	
	Total	0	224	473	40	8	0	277	164	1,186		

Table 8 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total	
			Marine					Columbia River				
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian		All fish
SPRING CREEK	05-06-42	1981	0	0	0	0	0	0	0	0	0	
		1982	0	11	31	6	5	2	9	6	70	
		1983	0	21	4	0	0	0	5	0	30	
		Total	0	32	35	6	5	2	14	6	100	
COWLITZ	63-21-37	1981	0	0	2	0	0	0	0	14	16	
		1982	0	4	69	10	0	0	0	10	93	
		1983	0	59	89	6	0	0	0	8	162	
		Total	0	63	160	16	0	0	0	32	271	
	63-21-54	1981	0	8	0	0	0	0	0	8	16	
		1982	0	15	74	6	0	0	0	16	111	
		1983	19	48	39	0	0	0	0	14	120	
		1984	0	11	0	0	0	0	0	0	11	
		Total	19	82	113	6	0	0	0	38	258	
	63-21-59	1981	0	0	0	0	0	0	0	0	0	
		1982	0	12	26	3	0	0	0	3	44	
		1983	3	3	18	3	0	0	0	0	27	
		Total	3	15	44	6	0	0	0	3	71	
	ELOKOMIN	63-20-05	1981	0	0	0	0	0	0	0	2	2
			1982	0	7	11	12	0	0	0	3	33
			1983	0	16	4	0	0	2	0	6	28
Total			0	23	15	12	0	2	0	11	63	
GRAYS RIVER	63-20-43	1981	0	0	0	0	0	0	0	0	0	
		1982	3	18	9	2	0	0	0	4	36	
		1983	3	10	3	0	0	0	0	3	19	
		1984	0	9	0	0	0	0	0	0	9	
Total	6	37	12	2	0	0	0	7	64			
KALAMA FALLS	63-21-05	1981	0	8	0	0	0	0	0	4	12	
		1982	0	35	30	6	0	0	0	3	74	

Table 8 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total
			Marine					Columbia River			
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian	
KALAMA FALLS	63-21-05	1983	10	58	35	3	0	0	0	10	116
		1984	0	3	0	0	0	0	0	0	3
		Total	10	104	65	7	0	0	0	17	205
KLICKITAT	63-19-47	1981	0	8	4	6	0	0	0	0	18
		1982	0	54	76	7	17	0	4	19	177
		1983	9	32	3	1	0	0	12	0	57
		1984	0	0	0	0	0	0	3	0	3
		Total	9	94	83	14	17	0	19	19	255
LEWIS RIVER	63-21-60	1981	0	19	0	0	0	0	0	0	19
		1982	0	53	43	17	0	0	0	63	176
		1983	19	89	65	20	0	0	0	58	251
		1984	0	0	0	0	0	0	0	0	0
		Total	19	161	108	37	0	0	0	121	446
LOWER KALAMA	63-20-06	1981	0	0	3	3	0	0	0	0	6
		1982	2	57	23	5	0	0	0	23	110
		1983	6	25	6	0	0	0	0	14	51
		1984	0	11	0	0	0	0	0	12	23
		Total	8	93	32	8	0	0	0	49	190
PRIEST RAPIDS	63-19-48	1981	0	4	0	0	0	0	0	10	14
		1982	14	76	13	8	0	0	4	11	126
		1983	108	57	2	0	0	0	31	13	211
		1984	32	17	0	1	0	0	10	0	60
		Total	154	154	15	7	0	0	45	34	411
WASHOUGAL	63-21-53	1981	0	9	0	0	0	0	0	1	10
		1982	15	144	147	13	10	0	5	55	389
		1983	37	174	97	4	0	0	13	40	365
		1984	2	14	0	0	0	0	0	5	21
		Total	54	341	244	17	10	0	18	101	785

Table 8 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total
			Marine					Columbia River			
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian	
WEYCO POND	H1-02-03	1981	0	0	0	0	0	0	0	3	3
		1982	0	12	26	2	0	0	0	19	59
		1983	0	8	19	0	0	0	0	1	28
		1984	0	0	0	0	0	0	0	3	3
		Total	0	20	45	2	0	0	0	26	93
Grand total			289	3,710	4,137	572	69	17	807	1,526	11,127

TABLE 9.-- Estimated recoveries of tagged 1980- brood fall chinook from Columbia River facilities to Pacific coast fisheries by facility, tag code and catch year.

Rearing facility	Tag code	Catch year	Number of recoveries							Total	
			Marine				Columbia River			All fish	
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian	
STAYTON POND	07-23-35	1983	0	284	200	13	0	0	0	34	531
		1982	0	10	76	0	3	2	0	0	91
		1984	0	47	1	0	0	0	0	10	58
		Total	0	341	277	13	3	2	0	44	680
KLASKANINE	07-22-27	1982	0	0	0	0	0	0	0	1	1
		1983	0	0	0	0	0	0	0	3	3
		1984	0	0	0	0	0	0	0	2	2
		Total	0	0	0	0	0	0	0	6	6
	07-23-32	1983	0	31	8	0	0	0	0	21	60
		1982	0	0	0	0	0	0	0	2	2
		Total	0	31	8	0	0	0	0	23	62
WEYCO POND	H1-03-01	1982	0	0	0	0	0	0	0	0	0
		1984	0	0	0	0	0	0	0	0	0
		1983	0	0	5	0	0	0	0	0	5
		Total	0	0	5	0	0	0	0	0	5
	H1-03-02	1982	0	0	0	0	0	0	0	0	0
		1983	0	6	6	0	0	0	0	0	12
		1984	2	10	4	0	0	0	0	2	18
		Total	2	16	10	0	0	0	0	2	30
	07-21-56	1982	0	5	24	3	0	0	2	0	34
		1983	0	95	54	5	0	0	2	12	168
		1984	0	24	0	0	0	0	0	8	32
		Total	0	124	78	8	0	0	4	20	234
BONNEVILLE	07-23-27	1982	0	0	3	2	0	0	0	0	5
		1983	0	88	21	4	0	0	2	5	120
		1984	0	15	0	0	0	0	0	7	22
		Total	0	103	24	6	0	0	2	12	147

Table 9 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total
			Marine				Foreign	Indian	Non-Indian	All fish.	
			Alaska	Canada	Washington	Oregon					California
CLATSOP COUNTY PONDS	07-21-58	1982	0	3	0	0	0	0	0	0	3
		1983	0	29	11	0	0	0	0	6	46
		1984	0	15	3	0	0	0	0	5	23
		Total	0	47	14	0	0	0	0	11	72
	07-21-59	1982	0	1	20	0	0	0	0	0	21
		1983	0	129	50	3	0	0	0	33	215
		1984	0	12	0	2	0	0	0	25	39
		Total	0	142	70	5	0	0	0	58	275
	63-22-54	1983	0	131	35	7	0	0	0	3	176
		1982	2	21	6	0	0	0	0	17	46
		1984	47	118	12	3	0	0	0	79	259
		Total	49	270	53	10	0	0	0	99	481
COWLITZ	63-22-55	1982	0	2	0	0	0	0	0	3	5
		1983	0	48	13	2	0	0	0	5	68
		1984	15	51	1	4	0	0	0	31	102
		Total	15	101	14	6	0	0	0	39	175
	63-21-56	1983	0	71	91	18	0	0	0	16	196
		1982	0	10	0	0	0	0	0	4	14
		1984	19	184	15	13	4	0	0	65	300
		Total	19	265	106	31	4	0	0	85	510
	63-20-36	1982	0	4	0	0	0	0	0	0	4
		1983	4	45	22	0	0	0	0	3	74
		1984	18	63	0	1	0	0	0	15	97
		Total	22	112	22	1	0	0	0	18	175
SPRING CREEK	05-07-51	1982	0	0	0	0	0	0	2	0	2
		1983	0	5	2	0	0	0	2	3	12
	Total	0	5	2	0	0	0	4	3	14	

Table 9 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total	
			Marine					Columbia River				
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian		All fish
SPRING CREEK	05-07-52	1982	0	0	0	0	0	0	0	0	0	0
		1983	0	5	4	0	0	0	0	0	0	9
		1984	0	3	0	0	0	0	0	3	0	6
		Total	0	8	4	0	0	0	0	3	0	15
	05-07-50	1982	0	0	0	0	0	0	0	0	0	0
		1983	0	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0	0
	05-07-40	1982	0	1	0	0	0	0	0	0	0	1
		1983	0	31	26	2	0	0	18	11	88	
		1984	0	18	0	0	0	0	5	0	23	
		Total	0	50	26	2	0	0	23	11	112	
	05-07-49	1982	0	0	0	0	0	0	0	3	3	
		1983	0	40	16	0	0	0	2	0	58	
		1984	0	5	0	0	0	0	7	0	12	
		Total	0	45	16	0	0	0	9	3	73	
	05-07-46	1983	0	418	248	30	0	2	170	43	931	
		1982	0	8	58	2	0	2	9	1	80	
		1984	0	63	6	3	0	0	120	0	192	
		Total	0	489	312	35	0	4	319	44	1,203	
	05-07-43	1982	0	0	22	0	0	0	2	0	24	
		1983	0	94	40	3	0	0	23	3	171	
		1984	0	11	0	0	0	0	18	0	29	
		Total	0	105	70	3	0	0	43	3	224	
	05-07-42	1982	0	0	5	0	0	0	0	0	5	
		1983	0	70	27	0	0	0	11	8	116	
		1984	0	7	0	0	0	0	8	0	15	
		Total	0	77	32	0	0	0	19	8	136	

Table 9 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total	
			Marine						Indian	Non-Indian	All fish	
			Alaska	Canada	Washington	Oregon	California	Foreign				
SPRING CREEK	05-07-48	1982	0	6	4	0	0	0	0	0	10	
		1983	0	6	0	4	0	0	2	3	15	
		1984	0	0	0	0	0	0	3	0	3	
	Total		0	12	4	4	0	0	5	3	28	
		05-07-41	1982	0	6	11	0	0	0	0	0	17
			1983	0	37	44	0	0	0	6	5	92
	1984		0	10	0	0	0	0	3	0	13	
	Total		0	53	55	0	0	0	9	5	122	
		LITTLE WHITE SALMON	05-07-47	1982	0	0	0	0	0	0	0	0
				1983	0	20	17	0	0	0	0	5
	1984			0	4	0	0	0	0	8	0	12
	Total		0	24	17	0	0	0	8	5	54	
05-08-49		1982	0	0	0	0	0	0	0	0	0	
		1983	0	0	0	0	0	0	0	0	0	
	Total		0	0	0	0	0	0	0	0	0	
05-08-50		1982	0	0	0	0	0	0	0	0	0	
		1983	0	0	0	0	0	0	2	0	2	
	Total		0	0	0	0	0	0	2	0	2	
ABERNATHY		05-07-45	1982	0	33	70	4	0	0	0	12	119
			1983	0	152	143	8	0	0	2	17	322
	1984		0	5	0	0	0	0	0	8	13	
	Total		0	190	213	12	0	0	2	37	454	
05-07-44		1982	0	7	22	0	0	0	0	3	32	
		1983	0	70	30	2	0	0	2	6	130	
	1984	2	3	0	0	0	0	0	2	7		
Total		2	100	52	2	0	0	2	11	169		

Table 9 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total	
			Marine					Columbia River				
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian		All fish
KLICKITAT	63-20-08	1982	0	3	0	0	0	0	0	0	3	
		1983	0	9	0	0	0	0	0	0	9	
		1984	0	15	1	1	0	0	8	0	25	
		Total	0	27	1	1	0	0	8	0	37	
ELOKOMIN	63-22-34	1982	0	0	0	0	0	0	0	0	0	
		1983	0	53	17	4	0	0	0	1	75	
		1984	9	19	0	3	0	0	0	28	59	
		Total	9	72	17	7	0	0	0	29	134	
	63-23-17	1982	0	0	0	0	0	0	0	0	0	
		1983	0	0	5	4	0	0	0	0	9	
		1984	1	24	0	0	0	0	0	16	41	
		Total	1	24	5	4	0	0	0	16	50	
	PRIEST RAPIDS	63-21-55	1982	1	12	0	0	0	0	0	0	13
			1983	6	73	0	0	0	0	15	4	98
			1984	37	155	3	0	0	0	72	3	270
			Total	44	240	3	0	0	0	87	7	381
63-22-61		1982	0	4	0	0	0	0	2	0	6	
		1983	3	35	2	0	0	0	2	0	42	
		1984	70	69	0	1	0	0	25	0	165	
		Total	73	108	2	1	0	0	29	0	213	
BIG CREEK	07-23-34	1982	0	0	0	0	0	0	0	0	0	
		1983	0	38	28	2	0	0	0	12	80	
		Total	0	38	28	2	0	0	0	12	80	
	07-23-33	1982	0	5	4	0	0	0	0	0	9	
		1983	0	30	18	7	0	0	0	3	58	
		1984	0	8	0	0	0	0	0	6	14	
		Total	0	43	22	7	0	0	0	9	81	

Table 9 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total
			Marine					Foreign	Indian	Non-Indian	All fish
			Alaska	Canada	Washington	Oregon	California				
BIG CREEK	07-23-31	1982	0	1	5	0	0	0	0	0	6
		1983	0	77	26	0	0	0	0	15	118
		1984	0	17	0	0	0	0	0	0	17
		Total	0	95	31	0	0	0	0	15	141
SEA RESOURCES	63-22-01	1982	0	0	0	0	0	0	0	2	2
		1983	0	20	15	0	0	0	0	15	50
		1984	0	0	0	0	0	0	0	2	2
		Total	0	20	15	0	0	0	0	19	54
WASHOUGAL	63-21-48	1982	0	3	0	0	0	0	0	0	3
		1983	0	6	15	0	0	0	0	0	21
		1984	4	36	0	1	0	0	0	9	50
		Total	4	45	15	1	0	0	0	9	74
	63-22-51	1983	4	38	25	2	3	0	0	5	77
		1982	0	10	0	0	0	0	0	4	14
		1984	46	91	11	3	0	0	0	47	198
		Total	50	139	36	5	3	0	0	56	289
GRAYS RIVER	63-23-40	1982	0	0	0	0	0	0	0	0	0
		1983	0	8	0	0	0	0	0	0	8
		1984	0	19	0	0	0	0	0	2	21
		Total	0	27	0	0	0	0	0	2	29
	63-22-63	1982	0	4	0	0	0	0	0	0	4
		1983	0	7	10	2	0	0	0	0	19
		1984	9	21	1	0	0	0	0	19	50
		Total	9	32	11	2	0	0	0	19	73
Grand total			299	3,620	1,670	168	10	6	578	7,094	

TABLE 10.-- Estimated recoveries of tagged 1981- brood fall chinook from Columbia River facilities to Pacific coast fisheries by facility, tag code and catch year.

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total	
			Marine									
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian	All fish	
CLATSOP COUNTY PONDS	07-24-12	1983	0	4	0	0	0	0	0	0	4	
		1984	0	25	0	3	0	0	0	7	35	
		Total	0	29	0	3	0	0	0	7	39	
	07-24-13	1983	0	3	0	0	0	0	0	0	3	
		1984	0	0	0	0	0	0	0	2	2	
		Total	0	3	0	0	0	0	0	2	5	
BIG CREEK	07-24-10	1983	0	11	2	0	0	2	0	0	15	
		1984	0	270	23	15	5	0	0	52	365	
		Total	0	281	25	15	5	2	0	52	380	
BONNEVILLE	07-24-07	1983	0	8	19	0	5	0	2	0	34	
		1984	0	120	20	19	0	0	0	56	215	
		Total	0	128	39	19	5	0	2	56	249	
	07-24-08	1983	0	1	0	0	0	0	0	0	1	
		1984	0	48	6	0	0	0	0	5	59	
		Total	0	49	6	0	0	0	0	5	60	
	07-26-63	1983	0	9	21	0	0	0	2	0	32	
		1984	0	169	27	15	0	0	131	3	345	
		Total	0	178	48	15	0	0	133	3	377	
	KLASKANINE	07-24-09	1983	0	0	0	0	0	0	0	0	0
			1984	0	26	0	2	0	0	0	4	32
			Total	0	26	0	2	0	0	0	4	32
OXBOW	07-23-30	1983	0	8	0	0	0	0	0	0	8	
		1984	0	6	0	0	0	0	0	2	8	
		Total	0	14	0	0	0	0	0	2	16	

Table 10 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total
			Marine					Columbia River		All fish	
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian		
OXBOW	07-24-11	1983	0	0	0	0	0	0	0	0	0
		1984	0	4	0	0	0	0	0	5	9
		Total	0	4	0	0	0	0	0	5	9
STAYTON POND	07-26-62	1983	0	30	27	0	0	2	0	0	59
		1984	0	566	45	24	0	0	0	63	698
		Total	0	596	72	24	0	2	0	63	757
SEA RESOURCES	63-24-57	1983	0	1	4	0	0	0	0	3	8
		1984	0	123	4	13	0	0	0	43	183
		Total	0	124	8	13	0	0	0	46	191
ABERNATHY	05-10-58	1983	0	1	13	0	0	0	0	3	17
		1984	0	51	9	1	0	0	0	19	80
		Total	0	52	22	1	0	0	0	22	97
	05-10-59	1983	0	0	2	0	0	0	0	0	2
		1984	0	18	3	0	0	0	0	15	36
		Total	0	18	5	0	0	0	0	15	38
LITTLE WHITE SALMON	05-04-35	1983	0	0	0	0	0	0	0	0	0
		1984	0	10	0	0	0	0	8	0	18
		Total	0	10	0	0	0	0	8	0	18
	05-04-36	1983	0	0	0	0	0	0	0	0	0
		1984	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0
SPRING CREEK	05-07-53	1983	0	0	0	0	0	0	0	0	0
		1984	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0

Table 10 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries								Total
			Marine					Columbia River			
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian	
SPRING CREEK	05-07-54	1983	0	0	0	0	0	0	0	0	0
		1984	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0
	05-08-51	1983	0	0	7	2	0	0	10	0	19
		1984	0	79	13	10	0	0	71	0	173
		Total	0	79	20	12	0	0	81	0	192
	05-10-50	1983	0	1	15	2	0	0	15	3	36
		1984	0	101	27	14	13	0	92	0	247
		Total	0	102	42	16	13	0	107	3	283
	05-10-51	1983	0	0	2	5	0	2	0	0	9
		1984	0	16	5	3	0	0	18	0	42
		Total	0	16	7	8	0	2	18	0	51
	05-10-52	1983	0	2	10	6	0	0	5	1	24
		1984	0	150	13	10	0	0	92	11	276
		Total	0	152	23	16	0	0	97	12	300
	05-10-57	1983	0	7	34	0	0	0	8	0	49
		1984	0	188	42	28	0	0	169	5	432
		Total	0	195	76	28	0	0	177	5	481
COWLITZ	63-20-32	1983	0	0	0	0	0	0	0	0	0
		1984	0	9	0	0	0	0	0	0	9
		Total	0	9	0	0	0	0	0	0	9
	63-24-50	1983	0	3	0	0	0	0	0	0	3
		1984	0	0	0	0	0	0	0	3	3
		Total	0	3	0	0	0	0	0	3	6

Table 10 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries						Columbia River		Total
			Alaska	Canada	Washington	Oregon	California	Foreign	Indian	Non-Indian	All fish.
COWLITZ	63-24-62	1983	0	2	0	0	0	0	0	6	8
		1984	0	17	4	4	0	0	0	14	39
		Total	0	19	4	4	0	0	0	20	47
	63-26-03	1983	0	3	0	0	0	0	0	0	3
		1984	0	0	0	0	0	0	0	3	3
		Total	0	3	0	0	0	0	0	3	6
ELOKOMIN	63-22-42	1983	0	0	0	0	0	0	0	0	0
		1984	0	7	0	0	0	0	0	0	7
		Total	0	7	0	0	0	0	0	0	7
	63-22-60	1983	0	0	0	0	0	0	0	0	0
		1984	0	8	0	1	0	0	0	0	9
		Total	0	8	0	1	0	0	0	0	9
GRAYS RIVER	63-24-58	1983	0	0	0	0	0	0	0	0	0
		1984	0	3	3	0	0	0	0	0	6
		Total	0	3	3	0	0	0	0	0	6
	63-24-59	1983	0	2	0	0	0	0	0	0	2
		1984	0	4	2	0	0	0	0	6	12
		Total	0	6	2	0	0	0	0	6	14
KALAMA FALLS	63-24-60	1983	0	7	0	0	0	0	0	0	7
		1984	0	41	0	0	0	0	0	13	54
		Total	0	48	0	0	0	0	0	13	61
KLICKITAT	63-21-57	1983	0	0	4	0	0	0	0	0	4
		1984	0	27	8	1	0	0	0	23	59
		Total	0	27	12	1	0	0	0	23	63

Table 10 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries							Columbia River		Total
			Marine				Foreign	Indian	Non-Indian	All fish		
			Alaska	Canada	Washington	Oregon					California	
LOWER KALAMA	63-24-63	1983	0	11	0	0	0	0	0	0	11	
		1984	0	51	6	0	0	0	0	12	69	
		Total	0	62	6	0	0	0	0	12	80	
PRIEST RAPIDS	63-22-52	1983	0	20	0	0	0	0	2	0	22	
		1984	6	128	0	1	0	0	122	10	267	
		Total	6	148	0	1	0	0	124	10	289	
	63-24-56	1983	0	14	0	0	0	0	0	0	14	
		1984	10	17	0	0	0	0	41	0	68	
		Total	10	31	0	0	0	0	41	0	82	
WASHOUGAL	63-24-61	1983	0	10	0	0	0	0	0	4	14	
		1984	1	19	0	0	0	0	0	20	40	
		Total	1	29	0	0	0	0	0	24	54	
WEYCO POND	H1-04-06	1983	0	2	0	0	0	0	0	0	2	
		1984	0	17	3	1	0	0	0	3	24	
		Total	0	19	3	1	0	0	0	3	26	
Grand total			17	2,478	423	180	23	6	788	419	4,334	

rearing facility and year of return in Tables 11 through 15. As with the catches, returns of the 1978-brood fall chinook were completed in 1983, 1979 brood in 1984, 1980 brood in 1985 and 1981 brood in 1986. Appendix Tables 1 through 15 present the returns of tagged fish in more detail by brood, year of return, rearing facility and the site of return of the tagged fish. The total returns for 1980 through 1985 are listed in Table 15 by return facility. Appendix Tables 16 through 21 present the returns by return year, facility and sex of fish.

Returns to facilities in 1986 are not complete; although final return numbers for USFWS and ODFW facilities will likely change little from data now available. The return to Abernathy hatchery is the second largest since 1980. This is due to the large number of jacks returning. The adult return is the smallest since 1980. Little White Salmon had a larger return of lower river tule stock than in 1984 or 1985. The Spring Creek return in 1986 is the smallest since the hatchery was rebuilt in the early 1970's. The Big Creek return was the third largest since 1980 and the Bonneville return eclipsed the 1984 and 1985 returns. The returns to Grays River and Washougal hatcheries in 1986 exceed those since 1980, and the Priest Rapids return is approaching the record return in 1985.

Comparisons of individual hatchery returns over the seven years is complicated by several factors. The effects of openings and closings of commercial gillnet seasons in the Columbia River have differing influences on different hatcheries in the Columbia. Returns to hatcheries on small streams (Abernathy, Big Creek, Klaskanine, Elokomín, Grays River, and Lower Kalama) are influenced by the date and quantity of the first fall rains. In general the earlier the beginning of the rains the larger the return to these facilities. Also some hatcheries are not efficient at capturing returning jack salmon, particularly those where salmon are trapped in the stream below the hatchery (Elokomín and Kalama Falls). Some of the jack salmon can swim through the bars of the traps.

Observations

Fall chinook from the Columbia River contribute predominately to British Columbia marine troll, Washington and Oregon marine sport and troll and Columbia River gillnet fisheries. While catch data are not complete for any one brood, sufficient data are available to compare contributions for the 1978, 1979, and 1980 broods of fall chinook. Releases, catches, and returns by rearing facility and tag code for the 1978, 1979, and 1980 broods are compared in Tables 16, 17, and 18. The percent survival values in these tables were calculated by summing the catches and returns and dividing by the number of fish released. The catch per 1,000 releases and percent survival values are minimal for all broods due to incomplete fishery recovery data.

Catches of wire tagged fish from this study have occurred in all Pacific Coast fisheries from California through Alaska. The fractions of fish caught by fishery are displayed by brood in Figure 3. The British Columbia fisheries recovered the largest proportion of the 1978 brood, and the Washington fisheries the largest proportion of the 1979 brood. The chart of catch proportions for the 1980 brood may be misleading because of incomplete data.

Table 11. --Tag returns of 1978-brood fall chinook by rearing facility, tag code and return year
(estimated returns in brackets)

Rearing Facility	Tag code	Return Year				Total (estimated)
		1980	1981	1982	1983	
Abernathy	S-4-50	3[8]	35[48]	13[24]	0	80
	5-4-51	1	24[29]	16[24]	0	54
Big White	5-4-43	6	28	24[73]	1	108
Little White Salmon	5-4-48	1	6 [9]	2	1	13
	S-4-49	0	4	5	1	10
Spring Creek	5-4-46	18	122	50	1	191
	S-4-44	34	242	84	3	363
	5-4-33	26	175[180]	42	0	248
	5-4-45	1	0	0	0	1
Big Creek	7-18-44	3	52[62]	125[130]	10	205
Bonneville	7-18-42	12	197	95	3	307
	7-18-43	0	3	1	0	4
Klaskanine	7-18-45	0	4	9	1	14
Stayton Pond	7-18-41	1	93	156	4	254
Cowlitz	63-19-42	5[19]	25[26]	59[66]	7	118
	63-19-51	0	8	14[16]	2	26
Elokomin	63-18-56	0	0	0	1	1
	63-19-56	0	0	1	0	1
Grays River	63-16-46	1	3	4[5]	2	11
	63-18-33	0	0	2	0	2
	63-19-37	0	5	3	0	8
Kalama Falls	63-19-57	1	2	17[47]	15	65
Klickitat	63-19-49	0	0	0	0	0
Priest Rapids	63-18-21	3[16]	15[52]	27[97]	4	169
	63-18-57	0	0	2[11]	0	11
	63-20-17	0	5[8]	9	1	18
	63-19-58	0	1	0	0	1
Sea Resources	63-19-18	0	0	0	0	0
Speelyai	63-19-20	0	3[11]	12[27]	2	40
	63-19-50	4[16]	3	19[48]	4	71

table 11 (Continued)

Rearing Facility	Tag code	Return Year				Total 1983 (estimated)
		1980	1981	1982	1983	
Toutle	63-18-54	0	0	3	0	3
	63-19-41	2151	5	28[36]	3	49
Washougal	63-19-38	0	2	17[20]	4	26
	63-19-46	0	12[34]	26[36]	2	72
Weyco Pond	63-19-39	0	0	9	0	9

**Table 12. --fag returns of 19790brood fall chinook by rearing facility,
tag code and return year (estimated returns in brackets)**

Rearing Facility	Tag Code	Return Year				Total estimated
		1981	1982	1983	1984	
Abernathy	5-6-44	9(14)	20(28)	3	0	45
	5-6-46	26(34)	71(118)	17	0	169
Little White Salmon	5-6-43	0	1	1	0	2
Spring Creek	5-6-39	45	134(144)	18	0	207
	5-6-40	46	109(129)	25	0	200
	5-6-41	32	83(85)	20	0	137
	5-6-42	0	8	7	0	15
Big Creek	7-21-60	8	171(181)	99	1	289
Bonneville	7-21-57	3	17	11	0	31
Klaskanine	7-21-61	0	2	0	0	2
OXBOW	7-21-62	2	1	5	0	8
	7-21-63	1	7	6	0	14
Stayton Pond	7-20-55	0	159	28	0	187
Cowlitz	63-21-37	9	20	33	2	64
	63-21-54	2	22(27)	36	2	67
	63-21-59	0	6(11)	13	2	26
Elokunin	63-20-5	0	4	8	1	13
Grays River	63-20-43	0	5	5	0	10
Kalam Falls	63-21-5	0	9(13)	67	9	89
Klickitat	63-19-47	1	6	3	0	10
Lewis River	63-21-60	1(9)	10(29)	23	7	68
Lower Kalam	63-20-6	0	4(6)	34	10	50
Priest Rapids	63-19-48	22(39)	65(114)	60	19	232
Sea Resources	63-20-61	3	15(16)	3	1	23
Washougal	63-21-53	5	84(91)	157	9	262
Weyco Pond	H 1-2-3	0	23(25)	6	1	32

Table 13.-- Tag returns of 1980-brood fall chinook by rearing facility, tag code, and return year (estimated returns in brackets)

Rearing Facility	Tag Code	Return Year				Total Estimated
		1982	1983	1984	1985	
Abernathy	5-7-44	17[23]	21	1	0	45
	5-7-45	44[56]	99	3	0	158
Little White Salmon	5-7-47	0 ₁	3	6	0	9
	5-8-49	1 ¹	1	2	0	4
	S-8-50	0	0	0	0	0
Spring Creek	S-7-40	1	14	8	0	23
	5-7-41	4	22	11	0	37
	5-7-42	0	17	5	0	22
	5-7-43	0	1	0	0	1
	5-7-46	1[5]	6	0	0	11
	5-7-48	0	1	0	0	1
	5-7-49	0	10	4	0	14
	S-7-50	0	3	0	0	3
	5-7-51	0	0	0	0	0
	5-7-52	1	2	2	0	5
Big Creek	7-23-31	2[4]	16	5	1	26
	7-23-33	4	21	12	0	37
	7-23-34	0	14	10	0	24
Bonneville	7-21-56	12	81	8	0	101
	7-23-29	6	47	5	0	58
Clatsop County Ponds	7-21-58	0	4	3	0	7
	7-21-59	1	2	6	0	9
Klaskanine	7-22-27	0	2	1	0	3
	7-23-32	0	3	1	0	4
Stayton Pond	7-23-35	4	56	28[60]	0	120
Cowlitz	63-21-56	26[27]	97	128	25	277
	63-22-55	4	16	60	14	94
Elokomin	63-22-34	1	7	16	4	28
	63-23-17	0	2	5	0	7
Grays River	63-22-63	1	2	13	4	20
	63-23-40	0	0	0	1	1

1/ Fish returned in 1981

Table 13 (continued)

Rearing Facility	Tag Code	Return Year				Total Estimated
		1982	1983	1984	1985	
Kalama Falls	63-20-36	0	21	50	11	82
Klickitat	63-20-8	1	0	0	0	1
Lower Kalama	63-22-54	0	34	126	30	190
Priest Rapids	63-21-55	9	36	75	36	156
	63-22-61	3[130]	17	43	25	215
Sea Resources	63-22-1	0	3	2	0	5
Washougal	63-21-48	1	20	28	8	57
	63-22-51	2[4]	45	76[77]	15	141
Weyco Pond	H1-3-1	1	2	2	0	5
	H1-3-2	0	1	5	1	7

Table 14.-- Tag returns of 19810brood fall chinook by rearing facilities,
tag code and return year

Rearing Facility	Tag Code	1983	Return Year	
			1984	1985
Abernathy	S-10-58	5	26	14
	S-10-59	3	10	3
Little White Salmon	5-4-35	0	1	2
	5-4-36	0	0	0
Spring Creek	5-7-53	0	0	0
	5-7-54	0	0	0
	5-8-51	0	0	0
	5-10-50	12	44	4
	S-10-51	2 _{1/}	18	5
	S-10-52	7 _{1/}	44	19
	S-10-57	0	1	0
Big Creek	7-24-10	2	86	117
Bonneville	7-24-7	3	71	27
	7-24-8	0	7	9
	7-26-63	0	1	1
Clatsop County Ponds	7-24-12	0	2	4
	7-24-13	0	1	3
Klaskanine	7-24-9	0	1	2
OXBOW	7-23-30	0	1	7
	7-24-11	0	1	1
Stayton Pond	7-26-62	0	169[360]	172
Cowlitz	63-20-32	0	0	8
	63-24-50	0	0	5
	63-24-62	4	24	81
	63-26-03	0	0	23
Elokomin	63-22-42	0	0	3
	63-22-60	0	1	3
Grays River	63-24-58	0	0	0
	63-24-59	0	1	6

_{1/} one fish returned in 1982

Table 14 (Continued)

Rearing Facility	Tag Code	1983	Return Year	
			1984	1985
Kalama Falls	63-24-60	0	5	77
Klickitat	63-24-63	0	0	0
Lower Kalama	63-24-63	1	7	57
Priest Rapids	63-22-52	4	64	114
	63-24-56	2	25	44
Sea Resource	63-24-57	1	36	7
Washougal	63-24-61	1	7	60
Weyco Pond	H1-4-6	0	3	2

Table 15.--Total fall chinook returns to Columbia River facilities
participating in the BPA funded fall chinook evaluation project,
1980-1985

Hatchery	Return Year	Adults	Jacks	Total
Abernathy	1980	610	130	740
	1981	1,282	743	2,025
	1982	2,065	1,016	3,081
	1983	1,950	192	2,142
	1984	557	185	742
	1985	2,010	207	2,217
Little White Salmon	1980	1,559	114	1,673
	1981	1,241	256	1,497
	1982	2,047	101	2,148
	1983	1,139	53	1,192
	1984	560	17	577
	1985	201	43	244
Spring Creek	1980	24,610	2,822	27,432
	1981	23,862	6,662	30,524
	1982	26,708	739	27,447
	1983	9,403	1,005	10,408
	1984	8,697	799	9,496
	1985	5,428	53	5,481
Big Creek	1980	2,791	70	2,861
	1981	3,791	526	4,317
	1982	10,245	400	10,645
	1983	3,912	75	3,987
	1984	6,168	368	6,536
	1985	10,276	274	10,550
Bonneville	1980	19,159	2,202	21,361
	1981	29,103	5,162	34,265
	1982	21,081	2,199	23,280
	1983	12,816	585	13,401
	1984	5,234	244	5,478
	1985	9,179	102	9,281
Cascade	1980	1,753	104	1,857
	1981	234	15	249
	1982	814	76	890
	1983 ^{1/}	1,727	108	1,835
	1984	157	4	161
	1985	96	81	177

^{1/} Includes 1,268 adult and 87 jack upper river bright stock

Table 15 (Continued)

Hatchery	Return Year	Adults	Jacks	Total
Clatsop County Ponds	1980	0	0	0
	1981	0	0	0
	1982	0	0	0
	1983	5	0	5
	1984	0	62	62
	1985	10	2	12
Klaskanine	1980	114	1	115
	1981	60	3	63
	1982	94	3	97
	1983	47	1	48
	1984	41	0	41
	1985	12	0	12
Cowlitz	1980	1,968	221	2,189
	1981	4,697	976	5,673
	1982	4,767	1,023	5,790
	1983	6,300	147	6,447
	1984	5,840	169	6,009
	1985	6,848	2,926	9,774
Elokomin	1980^{2/}	1,074	0	1,074
	1981	633	1	634
	1982	2,056	6	2,062
	1983	2,690	1	2,691
	1984	1,704	10	1,714
	1985	1,810	22	1,832
Grays River	1980	91	6	97
	1981	59	26	85
	1982	678	23	701
	1983	273	1	274
	1984	169	68	237
	1985	245	112	357
Kalama Falls	1980	4,532	167	4,699
	1981	4,220	74	4,294
	1982	806	86	892
	1983	3,866	9	3,875
	1984	3,894	13	3,907
	1985	3,423	276	3,699

2/ Includes 619 adults transported from Kalama Falls Hatchery

Table 15 (Continued)

Hatchery	Return Year	Adults	Jacks	Total
Kalama Falls ^{3/}	1980	80	175	255
	1981	546	24	570
	1982	329	19	348
	1983	842	30	872
	1984	484	0	484
	1985	954	0	954
Klickitat	1980	99	115	214
	1981	282	0	282
	1982	314	23	337
	1983	147	13	160
	1984	138	2	140
	1985	8	7	15
Lewis River	1980	647	46	693
	1981	630	116	746
	1982	219	147	366
	1983 ^{4/}	515	80	595
	1984	159	195	354
	1985	514	283	797
Lower Kalama	1980	2,420	359	2,779
	1981	1,375	161	1,536
	1982	736	84	820
	1983	685	6	691
	1984	1,348	30	1,378
	1985	1,348	339	1,687
Lower Kalama ^{3/}	1980			
	1981			
	1982	472	271	743
	1983	457	89	546
	1984	1	0	1
	1985	0	0	0
Priest Rapids	1980	2,192	2,564	4,756
	1981	2,380	1,523	3,903
	1982	3,531	4,201	7,732
	1983	4,810	1,214	6,024
	1984	7,653	5,581	13,234
	1985	13,491	17,266	30,757

^{3/} Bright fall chinook^{4/} Includes 35 adult and 4 jack upper river bright stock

Table 15 (Continued)

Hatchery	Return Year	Adults	Jacks	Total
Ringold	1980			
	1981			
	1982	177	14	191
	1983	176	28	204
	1984	0	0	0
	1985	0	0	0
Sea Resources	1980	123	3	126
	1981	197	32	229
	1982	424	4	428
	1983	253	24	277
	1984	847	10	857
	1985	323	2	325
Washougal	1980	1,717	121	1,838
	1981	3,656	104	3,760
	1982	2,548	260	2,808
	1983	4,032	26	4,058
	1984	2,077	39	2,116
	1985	3,303	4,628	7,931
Willamette Falls	1980	7,760	625	8,385
	1981	16,799	1,127	17,926
	1982	25,760	1,123	26,883
	1983	13,205	528	13,733
	1984	20,086	1,084	21,170
	1985	29,089	1,490	30,579
All Facilities	1980	73,299	9,845	83,144
	1981	95,047	17,531	112,578
	1982	105,871	11,818	117,689
	1983	69,250	4,215	73,465
	1984	65,814	8,880	74,694
	1985	88,568	28,113	116,681

Table 16.--Release, catch and return statistics for 1978-brood fall chinook by facility and tag code

Rearing Facility	Tag Code	Number released	Catch	Return	Catch/ 1,000 releases	Percent Survival
Big Creek	7-18-44	224,900	611	205	2.7	.4
Bonneville	7-18-42	287,900	840	307	2.9	.4
	7-18-43	15,100	6	4	0.3	.1
Klaskanine	7-18-45	244,100	301	14	1.2	.1
Stayton Pond	7-18-41	283,800	1,864	254	6.6	.7
Sea Resources	63-19-18	24,200	26	0	1.1	.1
Abernathy	S-4-50	63,400	304	80	4.8	.6
	5-4-51	48,900	208	54	4.3	.5
Big White Pond	5-4-43	141,400	268	108	1.9	.3
Little White Salmon	5-4-48	177,800	31	13	.2	.0
	5-4-49	264,800	36	10	.1	.0
Spring Creek	5-4-33	140,900	1,447	248	10.3	1.2
	5-4-44	135,500	2,214	363	16.3	1.9
	5-4-45	55,600	2	1	.0	.0
	5-4-46	246,000	1,222	191	5.0	.6
Cowlitz	63-19-42	143,600	247	118	1.7	.3
	63-19-51	11,100	67	26	6.0	.8
Elokomin	63-18-56	21,100	7	1	.3	.0
	63-19-56	117,800	11	1	.1	.0
Grays River	63-16-46	73,900	33	11	.4	.0
	63-18-33	7,600	4	2	.5	.1
	63-19-37	68,100	42	8	.6	.1
Kalama Falls	63-19-57	214,500	87	65	.4	.0
Klickitat	63-19-49	225,400	245	0	1.1	.1
Priest Rapids	63-18-21	48,100	145	168	3.0	.7
	63-18-57	17,500	9	11	.5	.1
	63-19-58	5,300	6	1	1.1	.1
	63-20-17	82,200	34	18	.4	.0

Table 16 (Continued)

Rearing Facility	Tag Code	Number released	Catch	Return	Catch/ 1,000 releases	Percent survival
Speelyai	63-19-20	51,700	151	40	2.9	.4
	63-19-50	104,500	193	71	1.8	.3
Toutle	63-18-54	12,000	8	3	.9	.1
	63-19-41	132,100	126	49	1.0	.1
Washougal	63-19-38	97,400	130	26	1.3	.2
	63-19-46	154,500	152	72	1.0	.1
Weyco Pond	63-19-39	92,400	66	9	.7	.1
TOTAL		4,035,100	11,143	2,552	2.8	.3

Table 17.--Release, catch and return statistics for 19790brood fall chinook by facility and tag code

Rearing Facility	Tag Code	Number Released	Catch	Return	Catch/ 1,080 releases	Percent survival
Big Creek	7-21-60	143,408	1,228	289	8.6	1.1
Bonneville	7-21-57	121,100	139	31	1.1	.1
Klaskanine	7-21-61	66,300	100	2	1.5	.2
OXBOW	7-21-62	49,400	54	8	1.1	.1
	7-21-63	51,900	103	14	2.0	.2
Stayton Pond	7-20-55	282,000	1,925	187	6.8	.7
Sea Resources	63-20-61	18,400	40	23	2.2	.3
Abernathy	5-6-44	35,200	190	45	5.4	.7
	6-6-46	112,500	523	169	4.6	.6
Little White Salmon	5-6-43	162,600	46	2	.3	.0
Spring Creek	5-6-39	125,500	1,140	207	9.1	1.1
	S-6-40	75,200	1,241	200	16.5	1.9
	5-6-41	60,500	1,186	137	19.6	2.2
	5-6-42	23,100	100	15	4.3	.5
Cowlitz	63-21-37	20,700	271	64	13.1	1.6
	63-21-54	244,300	258	67	1.1	.1
	63-21-59	70,500	71	26	1.0	.1
Elokomin	63-20-S	98,400	63	13	.6	.1
Grays River	63-20-43	37,500	64	10	1.7	.2
Kalama Falls	63-21-5	100,400	205	89	2.0	.3
Klickitat	63-19-47	156,100	255	10	1.6	.2
Lewis River	63-21-60	103,700	446	68	4.3	.5
Lower Kalama	63-20-6	144,500	190	50	1.3	.2
Priest Rapids	63-19-48	147,200	411	232	2.8	.4
Washougal	63-21-53	314,600	785	262	2.5	.3
Weyco Pond	H1-2-3	97,800	93	32	1.0	.1
TOTLA		2,864,700	11,127	2,252	3.9	.5

Table 18. --Release, catch and return statistics for 1980-brood fall chinook by facility and tag code

Rearing Facility	Tag Code	Number Released	Catch	Return	Catch/ 1,000 releases	Percent survival
Clatsop County Ponds	7-21-58	73,200	72	7	1.0	.1
	7-21-59	48,900	275	9	5.6	.6
Big Creek	7-23-31	50,200	141	26	2.8	.3
	7-23-33	51,100	81	37	1.6	.2
	7-23-34	46,000	80	24	1.7	.2
Bonneville	7-21-56	130,000	234	101	1.8	.3
	7-23-29	75,700	147	58	1.9	.3
Klaskanine	7-22-27	18,900	6	3	.3	.0
	7-23-32	82,100	62	4	.8	.1
Stayton Pond	7-23-35	245,500	680	120	2.8	.3
Sea Resources	63-22-1	43,300	54	5	1.2	.1
Abernathy	5-7-44	19,100	169	45	8.8	1.1
	5-7-45	63,500	454	158	7.1	1.0
Little White Salmon	5-7-47	183,400	54	9	.3	.0
	5-8-49	52,400	0	4	.0	.0
	S-8-50	13,300	2	0	.2	.0
Spring Creek	S-7-40	104,700	112	23	1.1	.1
	5-7-41	76,700	122	37	1.6	.2
	5-7-42	63,100	136	22	2.2	.3
	5-7-43	25,700	224	1	8.7	.9
	5-7-46	150,500	1,203	11	8.0	.8
	5-7-48	28,800	28	1	1.0	.1
	5-7-49	30,900	73	14	2.4	.3
	S-7-50	13,700	0	3	.0	.0
	5-7-51	15,400	14	0	.9	.1
	5-7-52	7,200	15	5	2.1	.3
Cowlitz	63-21-56	153,200	510	277	3.3	.5
	63-22-55	121,300	175	94	1.4	.2
Elokomin	63-22-34	156,200	134	28	.9	.1
	63-23-17	9,400	50	7	5.3	.6
Grays River	63-22-63	64,100	73	20	1.1	.1
	63-23-40	10,200	29	1	2.8	.3

Table 18. (Continued)

Rearing Facility	Tas Code	Number Released	Catch	Return	Catch/ 1,000 releases	Percent survival
Kalama Falls	63-20-36	175,400	175	82	1.0	.1
Klickitat	63-20-8	130,000	37	1	.3	.0
Lower Kalama	63-22-54	155,300	481	190	3.1	.4
Priest Rapids	63-21-55	194,600	381	156	2.0	.3
	63-22-61	42,100	213	215	5.1	1.0
Washougal	63-21-48	28,700	74	57	2.6	.5
	63-22-51	278,800	289	141	1.0	.2
Weyco Pond	H1-3-1	169,500	5	5	.0	.0
	H1-3-2	64,300	30	7	.5	.1
TOTAL		3,466,400	7,094	2,008	2.0	.3

Figure 3.-- Catch percentages by fishery
by 'brood

1978 Brood

1979 Brood

1980 Brood

For the 1978 and 1979 broods, as the catch data became available for the 4- and 5-year-old fish, the British Columbia catch proportion dropped. This phenomenon may also occur for the 1980-brood fall chinook.

The proportions of the ages of chinook caught differ among hatcheries, but there are general trends by agency (Figures 4-6). Catches of three year old chinook predominate for USFWS and ODFW hatcheries. Three-year-old fish account for from 70 to 80 percent of the catch of all age groups. For WDF hatcheries, the four-year-old catches predominate. From 46 to 61 percent of the catches of all age groups are four-year-old fish.

Hatchery returns show a trend similar to the catches with the three-year-old returns predominant for all brood years at USFWS hatcheries and two of three brood years at ODFW hatcheries (Figures 7 and 8). For the 1978 brood at ODFW facilities, the proportion of the return made up of four-year-old fish (.50) is considerably larger than the four-year-old proportion of the catch (.23) (Figures 8 and 5). For all but one brood year at USFWS and ODFW hatcheries, the proportion of four-year-old fall chinook in the return is at least twice the proportion in the catch (Figures 7 and 8). Three-year-old returns accounted for from 46 to 70 percent of the total return for each of the three broods. At WDF hatcheries the four-year-old returns predominate, accounting for 47 to 62 percent of the returns for each brood (Figure 9).

The brood year comparison described in Vreeland (1985)¹ has become even stronger. The overall catches/1000 releases for the 1978 and 1979 broods are 2.8 and 3.9 fish respectively, (Table 16 and 17).

Comparisons of hatchery contributions and survivals among hatcheries for the 1978 and 1979 broods¹ of fall chinook are similar to those previously reported (Vreeland 1985)¹. Data available for the 1980-brood fall chinook indicate the contribution and survival will be lower than the 1978 brood. The three hatcheries with the best contribution to the fisheries for the 1979 brood (Spring Creek, Big Creek, and Stayton Pond; 12.9, 8.6, and 6.8 fish caught per 1000 fish released respectively) (Table 17) had considerably lower contributions for the 1980 brood (3.7, 2.1, and 2.8 respectively) (Table 18). However, Abernathy Hatchery which had contributions per 1000 releases of 4.6 and 4.8 for 1978 and 1979 broods respectively, contributed 7.5 fish to the fisheries for every 1000 fish released for the 1980 brood.

The Bonneville Hatchery contribution for the 1980-brood fall chinook was greater than the 1979 brood (1.9 versus 1.1 fish caught per 1000 releases) (Tables 17 and 18). The 1980 brood was composed of two releases, each with a separate tag code. Code 7-21-56 was placed in fish reared in well water and

¹Vreeland, R.E. 1985. Evaluation of the contribution of chinook salmon reared at Columbia River hatcheries to the Pacific salmon fisheries. Nat. Mar. Fish Serv., 847 NE 19th Ave., Suite 350, Portland, OR 97232. Unpubl. Manu. 91 p.

Figure 4.-- Age proportions of catches
of tagged fish from USFWS hatcheries

1978 Brood

1979 Brood

1980

Figure 5.-- Age proportions of catches
of tagged fish from ODFW hatcheries

1978 Brood

1979 Brood

1980 Brood

Figure 6.-- Age proportions of catches
of tagged fish from WDF hatcheries

1978 Brood

1979 Brood

1980 Brood

Figure 7.-- Age proportions of returns of tagged fish to USFWS hatcheries

1978 Brood

1979 Brood

1980 Brood

Figure 8.— Age proportions of returns
of tagged fish to ODFW hatcheries

Figure 9.-- Age proportions of returns
of tagged fish to WDF hatcheries

1978 Brood

1979 Brood

1980 Brood

released April 26, 1981. The code 7-23-29 was placed in fish reared in Tanner Creek water and released May 12. The Tanner Creek water is colder than the well water but the creek water reared group was slightly larger than the well water reared fish at release (73 fish per pound, well water and 68 per pound, creek water). From the data available at this point, the combination of rearing environment and time of release does not appear to have made a significant difference in survival between the two groups.

From hatchery records, it appears the 1980-brood fish at Spring Creek Hatchery had a greater problem with enteric redmouth disease (ERM) than in previous years. Despite this, one release had a contribution far larger than any of the other releases. A group of fall chinook transported from Spring Creek and released above John Day Dam in Rock Creek (tag codes 5-7-43 and 5-7-46) has nearly four times the contribution to the fisheries as the best release group from the hatchery (Table 18). The reason for this is not clear. There is no evidence from the Jones Beach sampling which would indicate this high survival from the John Day release. One might suspect the opposite from the Jones Beach data (Table 19). The Rock Creek release had the largest number of tagged fish released and the smallest number recovered when compared to the total tagged releases for the March, April and May groups at Spring Creek.

The Rock Creek release fish were recovered at Jones Beach later in the year than other groups from Spring Creek Hatchery. Also the Rock Creek fish were recovered at a larger average size than the Spring Creek groups. There is no evidence that the Rock Creek release fish entered the ocean at a different time than other groups from Spring Creek, although they may have entered the ocean at a larger size. One difference between the 1980-brood fish at Spring Creek Hatchery and the previous two broods is that the 1980 brood did not show an increase in ATPase activity (an indicator of the onset of smoltification) until after the May release. The ATPase activity increased in May for the 1978 brood and at the beginning of April for 1979 brood. It is possible the Rock Creek release developed smolting characteristics during their longer migration downstream. Thus they were more able to make the transition from fresh to salt water when they reached the Columbia River estuary. This hypothesis is purely speculative since *there* is no data from Jones Beach to compare ATPase levels of the groups as they entered the estuary.

Another interesting observation for the 1980-brood fish concerns the contribution rates for the WDF hatcheries. Fish from WDF facilities contribute to the fisheries more heavily as five-year-olds than do fish from USFWS and ODFW facilities. Estimated catches of five-year-old fall chinook (caught in 1985) are not yet available for the 1980 brood. Despite this, three WDF hatcheries (Cowlitz, Elokomin, and Lower Kalama) already show a greater fishery contribution for the 1980 brood than the 1978 or 1979 broods at these facilities (Tables 16, 17, and 18).

There was a large drop in the fishery contribution of 1980-brood fall chinook from Big Creek Hatchery compared to the previous two brood years (2 fish/1000 releases, 1980 brood; 8.6 fish/1000 releases, 1979 brood; and 2.7 fish/1000 releases, 1978 brood) (Tables 16, 17, and 18). All three broods

Table 1g.-- Jones Beach recoveries of 1980-brood fall chinook released
from Spring Creek Hatchery

Tag code	Release date	Release number	Adjusted recovery	Jones Beach recovery data		Average length (mm)
				Recovery first	dates last	
5-7-40	3/25/81	104,700	108	3/30/81	5/21/81	79
5-7-48	"	28,800	24	3/30/81	5/20/81	71
5-7-50	"	13,700	13	3/30/81	5/4/81	73
5-7-51	"	15,400	12	4/3/81	5/4/81	73
	Subtotal	162,600	157			
5-7-41	4/15/81	76,700	94	4/20/81	5/19/81	84
5-7-49	"	30,900	40	4/21/81	5/17/81	85
	Subtotal	107,600	134			
5-7-42	5/5/81	63,100	109	5/9/81	5/30/81	86
5-7-52	8/12/81	7,200	0	--	--	--
5-7-43 ¹	4/21-22/81	25,700	13	5/5/81	6/11/81	100
5-7-46 ¹	"	150,500	70	5/3/81	6/15/81	95
	Subtotal	176,200	83			

1 Released above John Day Dam in Rock Creek

were released in mid May, at near 80 fish per pound, minimal disease treatment was recorded, and from five to six million fish were released each year. The 1980-brood release consisted of three tag code groups of approximately equal size (50,000). One would expect near equal fishery recoveries and returns for each group. This was not the case. Nearly half (47 percent) of the estimated fishery recoveries **came** from one group (tag codes 7-23-31) with 26 percent and 27 percent coming from the other two groups (tag codes 7-23-33 and 7-23-34 respectively) (Table 18). However 43 percent of the returning tagged fish came from tag code group 7-23-33. The other two groups (7-23-31 and 7-23-34) contributed 30 and 28 percent respectively. There are two possible contributing factors for the differences among groups. The first is that the three tag groups represent different groups of ponds. There could be different survivals among groups due to pond differences. The second factor is the variability due to the sampling of the fisheries and expansion of the observed catch to the estimated catch. There is no way of know how much each of these factors contribute to the variability of the catch and return of the three groups.

The 1980-brood fish from Stayton Pond also showed a considerable drop in contribution to the fisheries over the previous two brood years (2.8 fish caught/1000 releases versus 6.8 and 6.6 for the 1980, 1979, and 1978 broods respectively) (Tables 16, 17, and 18). As with Big Creek Hatchery, the times of release, sizes of release, stock released, and disease treatments were similar for all three broods.

In the 1985 Annual Report for this project, it was reported that in general for the 1978 and 1979 broods, the hatcheries which released fish prior to June at a size larger than 100 fish per pound had the highest survivals. This trend is not clear for the 1980-brood fish. There appears to be a possible trend of the larger the fish the better the survival. The Abernathy Hatchery releases were the largest (averaging from 69 to 21 fish per pound) and had the best survivals. At several other facilities where releases were made at different times and sizes, the larger fish had the better survival (Clatsop County Ponds, Bonneville, Priest Rapids, and Washougal) (Tables 3 and 18). However, this is not the case at Spring Creek Hatchery where the August release was 15 fish per pound but the survival was no better than the smaller fish released in April and May. Also the differences in survival between tagged groups released at Cowlitz and Grays River hatcheries cannot be attributed to a larger size at release since the tag groups having the smaller average size are presently showing a greater survival. Given the incomplete nature of the 1980-brood data, the variability in the size of fish at release, and the limited precision in the measurement of fish **size at release, it is** presumptuous to scrutinize release size-survival comparisons at this time.

Summary of Expenditures

Expenditures for this project in FY85 were approximately \$16,500. They are itemized in Table 20.

Table 20. -- Summary of Cost **Estimates** - **FY86**

Contractual Services:	
U.S. Fish and Wildlife Service	\$ 9,900.00 ^{1/}
University of Washington	1,000.00 ^{1/}
Maintenance Contract on HP9845 Computer	4,100.00
Computer Supplies and Materials	1,400.00
<hr/>	
Total Direct Costs	\$16,400.00
Department of Commerce Support (.5%)	<u>100.00^{1/}</u>
Total	\$16,500.00^{1/}

^{1/} Total costs may prove less when final vouchers are received.

Appendix Table 1.--Returns in 1980 to Columbia River facilities and adjacent streams of 1978-brood fall chinook tagged for the BPA funded hatchery evaluation study (estimated returns in brackets)

Rearing facility	Tag code	Number of returns	Return site
Spring Creek	5-4-46	16	Spring Creek Hatchery
	"	2	Bonneville Hatchery
	5-4-44	32	Spring Creek Hatchery
	"	2	Bonneville Hatchery
	5-4-33	25	Spring Creek Hatchery
	"	1	Bonneville Hatchery
	5-4-45	1	Bonneville Hatchery
Big White Pond	5-4-4 3	5	Spring Creek Hatchery
	"	1	Bonneville Hatchery
Abernathy	S-4-50	2	Abernathy Hatchery
	"	1[6]	Abernathy Creek
	5-4-5 1	1	Abernathy Hatchery
Little White Salmon	5-4-4 8	1	Bonneville Hatchery
Bonneville	7-18-42	12	Bonneville Hatchery
Big Creek	7-18-44	3	Big Creek Hatchery
Stayton Pond	7-18-41	1	Willamette River
Grays River	63-16-46	1	Grays River Hatchery
Toutle	63-19-41	2[5]	Kalama Falls
Cowlitz	63-19-42	2[5]	Kalama Falls
	"	3[14]	North Fork Lewis R.
Kalama Falls	63-19-57	1	Kalama Falls
Speelyai	63-19-50	1[2]	Kalama Falls
	"	3[14]	N. Fork Lewis R.
Priest Rapids	63-18-21	2[15]	Priest Rapids
	"	1	Wells Dam

Appendix Table 1 (Continued)

Rearing Facility	Tag code	Number of returns	Return site
Lewis River	63-18-13	1	N. Fork Lewis R.
	63-18-58	1	N. Fork Lewis R.
	63-19-2	1	N. Fork Lewis R.
	63-19-10	1	Kalama Falls
	63-20-10	2	N. Fork Lewis R.
	63-20-2	1	N. Fork Lewis R.

Appendix Table 2.--Returns in 1981 to Columbia River facilities and adjacent streams of 1978-brood fall chinook tagged for the BPA funded hatchery evaluation study (estimated returns in brackets)

Rearing Facility	Tag code	Number of returns	Return site
Abernathy	5-4-50	25	Abernathy Hatchery
	"	2	Kalama Falls Hatchery
	"	1	Lower Kalama Hatchery
	"	2[8]	Kalama River
	"	5[12]	Abernathy Creek
	5-4-51	17	Abernathy Hatchery
	"	1	Lower Kalama Hatchery
	"	1	Spring Creek Hatchery
	"	1	Little White Salmon Hatchery
	"	4[9]	Abernathy Creek
Little White Salmon	5-4-48	3	Little White Salmon Hatchery
	"	2	Bonneville Hatchery
	"	1[4]	Big White Salmon River
	5-4-49	3	Little White Salmon Hatchery
	"	1	Spring Creek Hatchery
Spring Creek	5-4-46	87	Spring Creek Hatchery
	"	1	Abernathy Hatchery
	"	1	Little White Salmon Hatchery
	"	33	Bonneville Hatchery
	5-4-44	190	Spring Creek Hatchery
	"	52	Bonneville Hatchery
	5-4-33	137	Spring Creek Hatchery
	"	36	Bonneville Hatchery
	"	2[7]	Big White Salmon River
Big White Pond	5-4-43	12	Spring Creek Hatchery
	"	6	Little White Salmon Hatchery
	"	10	Bonneville Hatchery
Big Creek	7-18-44	41	Big Creek Hatchery
	"	2	Abernathy Hatchery
	"	3	Elokomin Hatchery
	"	1	Kalama Falls Hatchery
	"	2[5]	Abernathy Creek
	"	2[9]	Skamokawa Creek
	"	1	Gnat Creek

Appendix Table 2 (Continued)

Rearing Facility	Tag code	Number of returns	Return site
Bonneville	7-18-42 "	196 1	Bonneville Hatchery Spring Creek Hatchery
	7-18-43	3	Bonneville Hatchery
Klaskanine	7-18-45 "	3 1	Big Creek Hatchery Lewis & Clark River
Stayton Pond	7-18-41 "	75 18	Willamette Falls fish ladder Willamette River & tributar.
Grays River	63-16-46 "	1 2	Grays River Hatchery Big Creek Hatchery
	63-19-37 II	4 1	Grays River Hatchery Big Creek Hatchery
Cowlitz	63-19-42 "	24[25] 1	Cowlitz Hatchery Speelyai Hatchery
	63-19-51	8	Cowlitz Hatchery
Toutle	63-19-41 "	4 1	Cowlitz Hatchery Kalama Falls Hatchery
Kalama Falls	63-19-57	2	Kalama Falls Hatchery
Speelyai	63-19-20 " "	1 1 1[9]	Lower Kalama Hatchery Kalama Falls Hatchery Lewis River
	63-19-50 "	2 1	Cowlitz Hatchery Kalama Falls Hatchery
Washougal	63-19-38 II	1 1	Washougal Hatchery Bonneville Hatchery
	63-19-46 " " II	7[8] 1 3[16] 1[9]	Washougal Hatchery Kalama Falls Hatchery Washougal River Lewis River

Appendix Table 2 (Continued)

Rearing Facility	Tag code	Number of returns	Return site
Priest Rapids	63-18-21	11[14]	Priest Rapids Hatchery
	"	2	Wells Dam
	"	2[36]	Priest Rapids area
	63-19-58	1	Priest Rapids Hatchery
	63-20-17	5[8]	Priest Rapids Hatchery

Appendix Table 3.--Returns in 1982 to Columbia River facilities and adjacent streams of 1978-brood fall chinook tagged for the BPA funded hatchery evaluation study (estimated returns in brackets)

Rearing Facility	code	Number of returns	Return site
Abernathy	5-4-50	7	Abernathy Hatchery
	"	5[15]	Abernathy Creek
	"	1[2]	Germany Creek
	5-4-5 1	10	Abernathy Hatchery
	"	1	Lower Kalama Hatchery
	"	3[9]	Abernathy Creek
	"	2[4]	Germany Creek
Big White Pond	5-4-43	9	Spring Creek Hatchery
	"	6	Little White Salmon Hatchery
	"	4	Bonneville Hatchery
	"	5[54]	Big White Salmon River
Little White Salmon	5-4-48	1	Little White Salmon Hatchery
	"	1	Bonneville Hatchery
	5-4-49	5	Little White Salmon Hatchery
Spring Creek	5-4-33	37	Spring Creek Hatchery
	"	5	Bonneville Hatchery
	5-4-44	78	Spring Creek Hatchery
	"	6	Bonneville Hatchery
	5-4-46	47	Spring Creek Hatchery
	"	2	Bonneville Hatchery
	"	1	Cascade Hatchery
Big Creek	7-18-44	68	Big Creek Hatchery
	"	1	Abernathy Hatchery
	"	17	Elokomin Hatchery
	"	1	Gnat Creek
	"	14	Big Creek
	"	21	Plympton Creek
	"	1[3]	Abernathy Creek
	"	2[5]	Skamokowa Creek
Bonneville	7-18-42	91	Bonneville Hatchery
	"	4	Cascade Hatchery
	7-18-43	1	Cascade Hatchery

Appendix Table 3 (Continued)

Rearing Facility	Tag code	Number of returns	Return site
Klaskanine	7-18-45	3	Klaskanine Hatchery
	"	3	Big Creek Hatchery
	"	3	Lewis 6 Clark River
Stayton Pond	7-18-41	137	Willamette Falls ladder
	"	1	Bonneville Hatchery
	"	18	Willamette River system
Cowlitz	63-19-42	57	Cowlitz Hatchery
	"	1[6]	Cowlitz River
	"	1[3]	Lewis River
	63-19-51	13	Cowlitz Hatchery
	"	1[3]	Lewis River
Elokomin	63-19-56	1	Elokomin Hatchery
Grays River	63-16-46	2	Grays River Hatchery
	"	1	Big Creek Hatchery
	"	1[2]	Skamokawa Creek
	63-18-33	2	Grays River Hatchery
	63-19-37	2	Grays River Hatchery
	"	1	Elokomin Hatchery
Kalama Falls	63-19-57	2	Kalama Falls Hatchery
	"	3	Lower Kalama Hatchery
	"	1	Lewis River Hatchery
	"	9[28]	Kalama River
	"	1[3]	Lewis River
	"	1[10]	Upper Columbia River
Priest Rapids	63-18-21	18[19]	Priest Rapids Hatchery
	"	1	Bonneville Hatchery
	"	8[77]	Priest Rapids area
	"		
	63-18-57	1	Priest Rapids Hatchery
	"	1[10]	Priest Rapids Area
	63-20-17	9	Priest Rapids Hatchery

Appendix Table 3 (Continued)

Rearing Facility	Tag code	Number of returns	Return Site
Speelyai	63-19-20	1	Cowlitz Hatchery
	"	2	Lower Kalama Hatchery
	"	1	Kalama Falls Hatchery
	"	1	Lewis River Hatchery
	"	7[22]	Lewis River
	63-19-50	2	Cowlitz Hatchery
	"	3	Lower Kalama Hatchery
	"	1	Lewis River Hatchery
	"	13[42]	Lewis River
Toutle	63-18-54	3	Cowlitz Hatchery
	63-19-41	12	Cowlitz Hatchery
	"	2	Lower Kalama Hatchery
	"	9	Kalama Falls Hatchery
	"	1	Lewis River Hatchery
	"	4[12]	Kalama River
Washougal	63-19-38	14	Washougal Hatchery
	"	2	Bonneville Hatchery
	"	1[4]	Lewis River
	63-19-46	22	Washougal Hatchery
	"	1	Lower Kalama Hatchery
	"	2[6]	Kalama River
	"	1[7]	Washougal River
Weyco Pond	63-19-39	2	Grays River Hatchery
	"	3	Big Creek Hatchery
	"	3	Elokomin Hatchery
	"	1	Clatskanie River

Appendix Table 4.--Returns in 1983 to Columbia River facilities and adjacent streams of 1978-brood fall chinook tagged for the BPA funded hatchery evaluation study

Rearing Facility	Tag Code	Numbers of returns	Return site
Big White Pond	5-4-43	1	Little White Salmon Hatchery
Little White Salmon	5-4-48	1	Little White Salmon Hatchery
	5-4-49	1	Little White Salmon Hatchery
Spring Creek	5-4-44	3	Spring Creek Hatchery
	5-4-46	1	Spring Creek Hatchery
Big Creek	7-18-44	4	Big Creek Hatchery
	"	5	Big Creek
	"	1	Skamokawa Creek
Bonneville	7-18-42	3	Bonneville Hatchery
Klaskanine	7-18-45	1	Bear Creek
Stayton Pond	7-18-41	4	Willamette Falls
Cowlitz	63-19-42	7	Cowlitz Hatchery
	63-19-51	2	Cowlitz Hatchery
Elokomin	63-18-56	1	Abernathy Hatchery
Grays River	63-16-46	1	Grays River Hatchery
	"	1	Elokomin Hatchery
Kalama Falls	63-19-57	13	Kalama Falls Hatchery
	"	2	Lewis River
Priest Rapids	63-18-21	1	Priest Rapids Hatchery
	"	1	Wells Hatchery
	"	2	Mid Columbia River
	63-20-17	1	Priest Rapids Hatchery
Speelyai	63-19-20	2	Lewis River
	63-19-50	3	Lewis River
	"	1	Cowlitz River
Toutle	63-19-41	3	Cowlitz Hatchery
Washougal	63-19-38	3	Washougal Hatchery
		1	Washougal River
	63-19-46	2	Washougal Hatchery

Appendix Table 5.--Returns in 1981 to Columbia River facilities and adjacent streams of **1979-brood** fall chinook tagged for the BPA funded hatchery evaluation study (estimated returns in brackets)

Rearing Facility	Tag Code	Number of returns	Return site
Abernathy	5-6-44	4	Abernathy Hatchery
	"	4[9]	Abernathy Creek
	"	1	Big Creek
	5-6-46	19	Abernathy Hatchery
	"	1	Spring Creek Hatchery
	"	6[14]	Abernathy Creek
Spring Creek	5-6-39	27	Spring Creek Hatchery
	"	1	Little White Salmon Hatchery
	"	17	Bonneville Hatchery
	5-6-40	40	Spring Creek Hatchery
	"	6	Bonneville Hatchery
	5-6-41	28	Spring Creek Hatchery
	"	4	Bonneville Hatchery
Bonneville	7-21-57	3	Bonneville Hatchery
Big Creek	7-21-60	8	Big Creek Hatchery
OxBow	7-21-62	2	Bonneville Hatchery
	7-21-63	1	Bonneville Hatchery
Cowlitz	63-21-54	2	Grays River Hatchery
	63-21-37	9	Cowlitz Hatchery
Klickitat	63-19-47	1	Little White Salmon Hatchery
Lewis River	63-21-60	1[9]	Lewis River
Priest Rapids	63-19-48	22[39]	Priest Rapids Hatchery
Sea Resources	63-20-61	3	Sea Resources Hatchery
Washougal	63-21-53	5	Washougal Hatchery

Appendix Table 6.--Returns in 1982 to Columbia River facilities and adjacent streams of 1979-brood fall chinook tagged for the BPA funded hatchery evaluation study

Rearing Facility	Tag Code	Number of returns	Return site
Abernathy	5-6-44	13	Abernathy Hatchery
	"	3	Lower Kalama Hatchery
	"	4[12]	Abernathy Creek
	5-6-46	41	Abernathy Hatchery
	"	2	Spring Creek Hatchery
	"	1	Big Creek Hatchery
	"	1	Bonneville Hatchery
	"	1	Lower Kalama hatchery
	"	22[64]	Abernathy Creek
	"	2[6]	Kalama River
	"	1[2]	Germany Creek
Little White Salmon	5-6-43	1	Little White Salmon Hatchery
Spring Creek	5-6-39	109	Spring Creek Hatchery
	"	1	Little White Salmon Hatchery
	"	21	Bonneville Hatchery
	"	1	Cascade Hatchery
	"	1	Plympton Creek
		1[11]	Big White Salmon River
	5-6-40	95	Spring Creek Hatchery
	"	2	Little White Salmon Hatchery
	"	9	Bonneville Hatchery
	"	1	Cascade Hatchery
	"	2[22]	Big White Salmon River
	5-6-41	77	Spring Creek Hatchery
	"	3	Bonneville Hatchery
	"	2	Cascade Hatchery
	"	1[3]	Kalama River
	5-6-42	8	Spring Creek Hatchery
Big Creek	7-21-60	100	Big Creek Hatchery
	"	6	Abernathy Hatchery
	"	1	Bonneville Hatchery
	"	1	Willamette Falls
	"	18	Elokomin Hatchery
	"	19	Big Creek
	"	19	Plympton Creek
	"	4[9]	Skamokawa Creek
	"	2[6]	Abernathy Creek
	"	1[2]	Germany Creek

Appendix Table 6 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Bonneville	7-21-57	17	Bonneville Hatchery
Klaskanine	7-21-61 "	1 1	Elokomin Hatchery Big Creek
OxBow	7-21-62	1	Bonneville Hatchery
	7-21-63 "	6 1	Bonneville Hatchery Cascade Hatchery
Stayton Pond	7-20-55 "	155 4	Willamette Falls Willamette River
Cowlitz	63-21-37	20	Cowlitz Hatchery
	63-21-54 " " "	19 1 1[6] 1[1]	Cowlitz Hatchery Grays River Hatchery Cowlitz River Kalama River
	63-21-59 " "	4 1 1[6]	Cowlitz Hatchery Elokomin Hatchery Cowlitz River
Elokomin	63-20-5 "	3 1	Elokomin Hatchery Big Creek Hatchery
Grays River	63-20-43 "	2 3	Grays River Hatchery Big Creek Hatchery
Kalama Falls	63-21-5 " " "	4 2 1 2[6]	Kalama Falls Hatchery Lower Kalama Hatchery Cowlitz Hatchery Kalama River
Klickitat	63-19-47	5 1	Klickitat Hatchery Sea Resources Hatchery
Lewis River	63-21-60 " " "	1 1 1[3] 7[24]	Lewis River Hatchery Lower Kalama Hatchery Kalama River Lewis River
Lower Kalama	63-20-6 "	3 1[3]	Lower Kalama Hatchery Kalama River

Appendix Table 6 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Priest Rapids	63-19-48	54[56]	Priest Rapids Hatchery
	"	1	Ringold Pond
	"	5[16]	Wells Dam
	"	1[3]	Lewis River
	"	4[38]	Priest Rapids area
Sea Resources	63-20-61	15[16]	Sea Resources Hatchery
Washougal	63-21-53	68[69]	Washougal Hatchery
	"	1	Bonneville Hatchery
	"	4	Cascade Hatchery
	"	4	Lower Kalama Hatchery
	"	1[3]	Lewis River
	"	2[6]	Kalama River
	"	4	Kalama Falls Hatchery
Weyco Pond	H1-2-3	12[13]	Grays River Hatchery
	"	7	Big Creek Hatchery
	"	3	Elokomin Hatchery
	"	1[2]	Skamokawa Creek

Appendix Table 7.--Returns in 1983 to Columbia River facilities and adjacent streams of **1979-brood** fall chinook tagged for the BPA funded hatchery evaluation study

Rearing Facility	Tag Code	Number of returns	Return site
Abernathy	5-6-44	2	Abernathy Hatchery
	"	1	Abernathy Creek
	5-6-46	6	Abernathy Hatchery
	"	1	Spring Creek Hatchery
	"	3	Kalama Falls Hatchery
	"	6	Abernathy Creek
Little White Salmon	"	1	Germany Creek
	5-6-43	1	Little White Salmon Hatchery
Spring Creek	5-6-39	15	Spring Creek Hatchery
	"	1	Little White Salmon Hatchery
	"	2	Bonneville Hatchery
	5-6-40	24	Spring Creek Hatchery
	"	1	Bonneville Hatchery
	5-6-41	18	Spring Creek Hatchery
	"	1	Little White Salmon Hatchery
	"	1	Bonneville Hatchery
	5-6-42	7	Spring Creek Hatchery
Big Creek	7-21-60	36	Big Creek Hatchery
	"	2	Willamette Falls
	"	5	Bear Creek
	"	10	Big Creek
	"	10	Plympton Creek
	"	3	Abernathy Hatchery
	"	21	Elokomin Hatchery
	"	1	Lewis River
	"	2	Elochoman River
	"	7	Skamokowa Creek
Bonneville	"	2	Abernathy Creek
	7-21-57	10	Bonneville Hatchery
OxBow	"	1	Cascade Hatchery
	7-21-62	4	Bonneville Hatchery
	"	1	Cascade Hatchery

Appendix Table 7 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
OxBow	7-21-63	6	Bonneville Hatchery
Stayton Pond	7-20-55	28	Willamette Falls
Cowlitz	63-21-37	33	Cowlitz Hatchery
	63-21-54	17	Cowlitz Hatchery
	"	9	Elokomin Hatchery
	"	1	Lower Kalama Hatchery
	"	2	Kalama Falls Hatchery
	"	1	Lewis River Hatchery
	"	3	Cowlitz River
	"	3	Lewis River
	63-21-59	4	Cowlitz Hatchery
	"	3	Elokomin Hatchery
	"	2	Lower Kalama Hatchery
	"	3	Kalama Falls Hatchery
	"	1	Lewis River Hatchery
Elokomin	63-20-5	7	Elokomin Hatchery
	"	1	Elochoman River
Grays River	63-20-43	3	Grays River Hatchery
	"	1	Grays River
	"	1	Plympton Creek
Kalama Falls	63-21-5	58	Kalama Falls Hatchery
	"	7	Lower Kalama Hatchery
	"	1	Cowlitz River
	"	1	Kalama River
Klickitat	63-19-47	3	Klickitat Hatchery
Lewis River	63-21-60	3	Lewis River Hatchery
	"	2	Elokomin Hatchery
	"	2	Cowlitz Hatchery
	"	4	Kalama Falls Hatchery
	"	12	Lewis River
Lower Kalama	63-20-6	1	Lower Kalama Hatchery
	"	31	Kalama Falls Hatchery
	"	1	Cowlitz Hatchery
	"	1	Kalama River

Appendix Table 7 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Priest Rapids	63-19-48	52	Priest Rapids Hatchery
	"	1	Ringold Pond
	"	1	Wells Hatchery
	"	6	Mid Columbia River
Sea Resources	63-20-61	3	Sea Resources Hatchery
Washougal	63-21-53	129	Washougal Hatchery
		1	Lower Kalama Hatchery
		10	Kalama Falls Hatchery
		1	Lewis River Hatchery
		14	Washougal River
		2	Lewis River
Weyco Pond	H1-2-3	4	Big Creek Hatchery
		1	Elokomin Hatchery
		1	Skamokawa Creek

Appendix Table 8. --Returns in 1984 to Columbia River facilities and adjacent streams of **1979-brood** fall chinook tagged for the BPA funded hatchery evaluation study

Rearing Facility	Tag Code	Number of returns	Return Site
Big Creek	7-21-60	1	Plympton Creek
Cowlitz	63-21-37	2	Cowlitz Hatchery
	63-21-54	<u>1</u> ^{1/}	Cowlitz Hatchery
	"	1	Kalama Falls Hatchery
	"	1	Cowlitz River
	63-21-59	2	Cowlitz Hatchery
Elokomin	63-20-5	1	Elokomin Hatchery
Kalama Falls	63-21-5	5	Kalama Falls Hatchery
	"	1	Lower Kalama Hatchery
	"	3	Kalama River
Lewis River	63-21-60	1	Cowlitz Hatchery
	"	6	Lewis River
Lower Kalama	63-20-6	9	Kalama Falls Hatchery
	"	1	Kalama River
Priest Rapids	63-19-48	<u>7</u> ^{1/}	Priest Rapids Hatchery
	"	1	Bonneville Hatchery
	"	9	Bonneville Dam
	"	3	Mid-Columbia River
Sea Resources	63-20-61	1	Sea Resources Hatchery
Washougal	63-21-53	4	Washougal Hatchery
	"	3	Kalama Falls Hatchery
	"	2	Lower Kalama Hatchery
Weyco Pond	H1-2-3	1	Skamokawa Creek

1/ One fish returned in 1985

Appendix Table 9.--Returns in 1982 to Columbia River facilities and adjacent streams of **1980-brood** fall chinook tagged for the BPA funded hatchery evaluation study (estimated returns in brackets)

Rearing Facility	Tag Code	Number of returns	Return site
Abernathy	5-7-44 "	14 3[9]	Abernathy Hatchery Abernathy Creek
	S-7-45 " "	33 5 6[18]	Abernathy Hatchery Lower Kalama Hatchery Abernathy Creek
Little White Salmon <u>1/</u>	5-8-49	1	Spring Creek Hatchery
Spring Creek	5-7-40 s-7-41 5-7-46 5-7-52	1 4 1[5] 1	Spring Creek Hatchery Spring Creek Hatchery Columbia River Spring Creek Hatchery
Bonneville	7-21-56 7-23-29	12 6	Bonneville Hatchery Bonneville Hatchery
Big Creek	7-23-31 " 7-23-33	1 1[3] 4	Big Creek Hatchery Elochoman River Big Creek Hatchery
Clatsop County Ponds	7-21-59	1	Big Creek Hatchery
Stayton Pond	7-23-35	4	Willamette Falls
Cowlitz	63-21-56 " 63-22-55	25[26] 1 4	Cowlitz Hatchery Lewis River Hatchery Cowlitz Hatchery
Elokomin	63-22-34	1	Lower Kalama Hatchery
Grays River	63-22-63	1	Big Creek Hatchery
Klickitat	63-20-8	1	Klickitat Hatchery
Priest Rapids	63-21-55	9	Priest Rapids Hatchery

1/ Fish returned in 1981.

Appendix Table 9 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Priest Rapids	63-22-61 "	1 2[129]	Priest Rapids Hatchery Priest Rapids area
Washougal	63-21-48	1	Washougal Hatchery
	63-22-S 1 "	1 1[3]	Bonneville Hatchery Kalama River
Weyco Pond	H1-3-1	1	Grays River Hatchery

Appendix Table 10.--Returns in 1983 to Columbia River facilities and adjacent streams of **1980-brood** fall chinook tagged for the BPA funded hatchery evaluation study

Rearing Facility	Tag Code	Number of returns	Return site
Abernathy	5-7-44	13	Abernathy Hatchery
	"	1	Elokomin Hatchery
	"	2	Kalama Falls Hatchery
	"	5	Abernathy Creek
	5-7-45	63	Abernathy Hatchery
	"	1	Big Creek Hatchery
	"	2	Elokomin Hatchery
	"	1	Lower Kalama hatchery
	"	10	Kalama Falls Hatchery
	"	1	Washougal Hatchery
	"	1	Big Creek
	"	1	Kalama River
	"	1	Elochoman River
	"	3	Skamokowa Creek
	"	15	Abernathy Creek
Little White Salmon	5-7-47	2	Little White Salmon Hatchery
	"	1	Bonneville Hatchery
	5-8-49	1	Little White Salmon Hatchery
Spring Creek	5-7-40	13	Spring Creek Hatchery
	"	1	Bonneville Hatchery
	5-7-4 1	22	Spring Creek Hatchery
	5-7-42	16	Spring Creek Hatchery
	"	1	Bonneville Hatchery
	5-7-43	1	Spring Creek Hatchery
	5-7-46	5	Spring Creek Hatchery
	"	1	Icicle Creek
	5-7-48	1	Spring Creek Hatchery
	5-7-49	9	Spring Creek Hatchery
	"	1	Bonneville Hatchery
	S-7-50	3	Spring Creek Hatchery
	5-7-5 2	2	Spring Creek Hatchery

Appendix Table 10 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Big Creek	7-23-31	6	Big Creek Hatchery
	"	7	Elokomin Hatchery
	"	1	Big Creek
	"	1	Bear Creek
	"	1	Skamokawa Creek
	7-23-33	4	Big Creek Hatchery
	"	1	Abernathy Hatchery
	"	7	Elokomin Hatchery
	"	3	Bear Creek
	"	4	Big Creek
	"	1	Plympton Creek
	"	1	Abernathy Creek
	7-23-34	8	Big Creek Hatchery
	"	1	Elokomin Hatchery
	"	1	Bear Creek
	"	1	Elochoman River
	"	3	Skamokawa Creek
Bonneville	7-21-56	79	Bonneville Hatchery
	"	1	Cascade Hatchery
	"	1	Washougal Hatchery
	7-23-29	46	Bonneville Hatchery
	"	1	Spring Creek Hatchery
Clatsop County Pond	7-21-58	1	Grays River Hatchery
	"	3	Lewis & Clark River
	7-21-59	1	Big Creek
	"	1	Lewis & Clark River
Klaskanine	7-22-27	2	Lewis & Clark River
	7-23-32	2	Lewis & Clark River
	"	1	Bear Creek
Stayton Pond	7-23-35	56	Willamette Falls
Cowlitz	63-21-56	90	Cowlitz Hatchery
		1	Lewis River Hatchery
		4	Willamette Falls
		2	Cowlitz River

Appendix Table 10 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Cowlitz	63-22-M "	15 1	Cowlitz Hatchery Cowlitz River
Elokomin	63-22-34 " "	5 1 1	Elokomin Hatchery Big Creek Hatchery Abernathy Hatchery
	63-23-17	2	Elokomin Hatchery
Grays River	63-22-63	2	Grays River Hatchery
Kalama Falls	63-20-36 " " "	16 1 2 2	Kalama Falls Hatchery Cowlitz Hatchery Lower Kalama Hatchery Kalama River
Lower Kalama	63-22-54 " "	17 16 1	Lower Kalama Hatchery Kalama Falls Hatchery Cowlitz Hatchery
Priest Rapids	63-21-55 63-22-61	36 17	Priest Rapids Hatchery Priest Rapids Hatchery
Sea Resources	63-22-1	3	Sea Resources Hatchery
Washougal	63-21-48 " 63-22-51 " " " " "	19 1 39 1 2 1 1 1	Washougal Hatchery Washougal River Washougal Hatchery Bonneville Hatchery Lower Kalama Hatchery Kalama Falls Hatchery Kalama River Washougal River
Weyco Pond	H1-3-1 " H1-3-2	1 1 1	Big Creek Hatchery Grays River Hatchery Elokomin Hatchery

Appendix Table 11.--Returns in 1984 to Columbia River facilities and adjacent **streams** of 1980-brood fall chinook tagged for the BPA funded hatchery evaluation study (estimated return in brackets)

Rearing Site	Tag Code	Number of returns	Return Site
Abernathy	5-7-44	1	Abernathy Creek
	5-7-45 "	2 1	Abernathy Hatchery Elokomin Hatchery
Little White Salmon	5-7-47 "	5 1	Little White Salmon Hatchery Spring Creek Hatchery
	5-8-49	2	Little White Salmon Hatchery
Spring Creek	S-7-40	8	Spring Creek Hatchery
	5-7-41	11	Spring Creek Hatchery
	5-7-42	5	Spring Creek Hatchery
	5-7-49 "	3 1	Spring Creek Hatchery Bonneville Hatchery
	5-7-52	2	Spring Creek Hatchery
Bonneville	7-21-56	8	Bonneville Hatchery
	7-23-29	5	Bonneville Hatchery
Big Creek	7-23-31 " "	1 1 3	Big Creek Hatchery Elokomin Hatchery Big Creek
	7-23-33 " "	5 3 1	Big Creek Hatchery Elokomin Hatchery Bear Creek
	" "	1 1	Big Creek Big Creek
	"	2	Plympton Creek
	7-23-34 "	6 1	Big Creek Hatchery Elokomin Hatchery
	" "	2 1	Bear Creek Big Creek
Clatsop County Pond	7-21-58 " "	1 1 1	Elokomin Hatchery Lewis & Clark River Cowlitz River
	7-21-59 "	1 2	Big Creek Hatchery Big Creek

Appendix Table 11 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Clatsop Pond	7-21-59	1	Klaskanine River
	"	2	Lewis & Clark River
Klaskanine	7-22-27	1	Klaskanine River
	7-23-32	1	Big Creek Hatchery
Stayton Pond	7-23-35	28[60]	Willamette Falls Fishway
Cowlitz Hatchery	63-21-56	116	Cowlitz Hatchery
	"	1	Abernathy Hatchery
	"	11	Cowlitz River
Cowlitz	63-22-55	49	Cowlitz Hatchery
	"	11	Cowlitz River
Elokomin	63-22-34	8	Elokomin Hatchery
	"	1	Kalama Falls Hatchery
	"	2	Abernathy Hatchery
	"	4	Big Creek Hatchery
	"	1	Skamokowa Creek
	63-23-17	5	Elokomin Hatchery
Grays River	63-22-63	10	Grays River Hatchery
	"	2	Elokomin Hatchery
	"	1	Big Creek Hatchery
Kalama Falls	63-20-36	35	Kalama Falls Hatchery
	"	10	Lower Kalama Hatchery
	"	1	Cowlitz Hatchery
	"	4	Cowlitz River
	"	4	Kalama River
Lower Kalama	63-22-54	35	Lower Kalama Hatchery
	"	76	Kalama Falls Hatchery
	"	4	Cowlitz Hatchery
	"	11	Kalama River
Priest Rapids	63-21-55	64	Priest Rapids Hatchery
	"	6	Bonneville Dam
	"	2	Wells Dam
	"	3	Mid-Columbia River
	63-22-61	35	Priest Rapids Hatchery
	"	5	Bonneville Dam
	"	3	Mid-Columbia River

Appendix Table 11 (Continued)

Rearing Facility	Tag code	Number of returns	Return site
Sea Resources	63-22-1	2	Sea Resources Hatchery
Washougal	63-21-48	26	Washougal Hatchery
	"	2	Kalama Falls Hatchery
	63-22-5 1	44	Washougal Hatchery
	II	13	Kalama Falls Hatchery
	"	7	Lower Kalama Hatchery
	"	7	Washougal River
	"	3	Kalama River
	"	1[2]	Willamette Falls Fishway
		1	Sandy River
Weyco Pond	H1-3-1	1	Big Creek Hatchery
	II	1	Big Creek
	H1-3-2	3	Elokomin Hatchery
	"	2	Skamokawa Creek

Appendix Table 12. --Returns in 1985 to Columbia River facilities and adjacent streams of 1980-brood fall chinook tagged for the BPA funded hatchery evaluation study

Rearing facility	Tag code	Number of returns	Return site
Big Creek	7-23-31	1	Skamokawa Creek
Cowlitz	63-21-56	22 3	Cowlitz Hatchery Cowlitz River
	63-22-55	9 5	Cowlitz Hatchery Cowlitz River
Elokomin	63-22-34	2 1 1	Xalama Falls Hatchery Big Creek Cowlitz River
Grays River	63-22-63	2 1 1	Grays River Hatchery Big Creek Skamokawa Creek
	63-23-40	1	Elokomin Hatchery
Kalama Falls	63-20-36	8 2 1	Kalama Falls Hatchery Lower Kalama Hatchery Cowlitz Hatchery
Lower Kalama	63-22-54	4 24 1 1	Lower Kalama Hatchery Xalama Falls Hatchery Cowlitz Hatchery Kalama River
Priest Rapids	63-21-55	34 1 1	Priest Rapids Hatchery Wells Dam Columbia River
	63-22-61	25	Priest Rapids Hatchery
Washougal	63-21-48	7 1	Washougal Hatchery Kalama Falls Hatchery
	63-22-51	10 5	Washougal Hatchery Kalama Falls Hatchery
Weyco Pond	H1-3-2	1	Big Creek Hatchery

Appendix Table 13.--Returns in 1983 to Columbia River facilities and adjacent streams of 1981-brood fall chinook tagged for the BPA funded hatchery evaluation study

Rearing Facility	Tag Code	Number of returns	Return site
Abernathy	5-10-58	2	Abernathy Hatchery
	"	3	Abernathy Creek
	5-10-59	2	Abernathy Hatchery
	"	1	Abernathy Creek
Spring Creek	5-10-50	9	Spring Creek Hatchery
	"	3	Bonneville Hatchery
	5-10-51	1	Spring Creek Hatchery
	"	1	Bonneville Hatchery
	5-10-52	7 ^{1/} ₋	Spring Creek Hatchery
Big Creek	7-24-10	1	Big Creek Hatchery
		1	Skamokawa Creek
Bonneville	7-24-7	3	Bonneville Hatchery
Cowlitz	63-24-62	4	Cowlitz Hatchery
Lower Kalama	63-24-63	1	Lower Kalama Hatchery
Priest Rapids	63-22-52	4	Priest Rapids Hatchery
	63-24-56	2	Priest Rapids Hatchery
Sea Resources	63-24-57	1	Sea Resources Hatchery
Washougal	63-24-61	1	Washougal Hatchery

1/ One fish returned in 1982.

Appendix Table 14.--Returns in 1984 to Columbia River facilities and adjacent streams of 1981-brood fall chinook tagged for the BPA funded hatchery evaluation study (estimated return in brackets)

Rearing Facility	Tag Code	Number of returns	Return Site
Abernathy	S-10-58	18	Abernathy Hatchery
	"	1	Elokomin Hatchery
	"	2	Lower Kalama Hatchery
	"	2	Kalama Falls Hatchery
	"	1	Kalama River
	"	2	Abernathy Creek
	S-10-59	5	Abernathy Hatchery
	"	1	Big Creek Hatchery
	"	4	Abernathy Creek
Little White Salmon	5-4-35	1	Bonneville Hatchery
Spring Creek	S-10-50	34	Spring Creek Hatchery
	"	10	Bonneville Hatchery
	S-10-51	15	Spring Creek Hatchery
	"	3	Bonneville Hatchery
	S-10-52	41	Spring Creek Hatchery
	"	2	Bonneville Hatchery
	"	1	Cascade Hatchery
	S-10-57	1	Spring Creek Hatchery
Bonneville	7-24-7	69	Bonneville Hatchery
	"	1	Spring Creek Hatchery
	"	1	Cascade Hatchery
	7-24-8	7	Bonneville Hatchery
	7-26-63	1	Spring Creek Hatchery
Big Creek	7-24-10	56	Big Creek Hatchery
	"	1	Abernathy Hatchery
	"	11	Elokomin Hatchery
	"	4	Bear Creek
	"	9	Big Creek
	"	1	Plympton Creek
	"	4	Skamokawa Creek
Clatsop County Pond	7-24-12	2	Big Creek Hatchery
	7-24-13	1	Lewis & Clark River

Appendix Table 14 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Klaskanine	7-24-9	1	Bear Creek
OxBow	7-23-30	1	Bonneville Hatchery
	7-24-11	1	Abernathy Hatchery
Stayton Pond	7-26-62	169[360]	Willamette Falls Fishway
Cowlitz	63-24-62 "	16 8	Cowlitz Hatchery Cowlitz River
Elokomin	63-22-60	1	Big Creek Hatchery
Grays River Hatchery	63-24-59	1	Big Creek Hatchery
Kalama Falls	63-24-60 " "	3 1 1	Kalama Falls Hatchery Lower Kalama Hatchery Kalama River
Lower Kalama	63-24-63 "	5 2	Lower Kalama Hatchery Kalama Falls Hatchery
Priest Rapids	63-22-52 "	62 2	Priest Rapids Hatchery Mid-Columbia River
	63-24-56 "	24 1	Priest Rapids Hatchery Mid-Columbia River
Sea Resources	63-24-57	36	Sea Resources Hatchery
Washougal	63-24-61	7	Washougal Hatchery
Weyco Pond	HL-4-6 "	2 1	Big Creek Hatchery Skamokawa Creek

Appendix Table 15.--Returns in 1985 to Columbia River facilities and adjacent streams of 1981-brood fall chinook tagged for the BPA funded hatchery evaluation study

Rearing facility	Tag code	Number of returns	Return site
Clatsop County	7-24-12	2	Big Creek Hatchery
		1	Bear Creek
		1	S. F. Klaskanine River
	7-24-13	1	Big Creek Hatchery
		2	Willamette Falls
Big Creek	7-24-10	48	Big Creek Hatchery
		10	Elokomin Hatchery
		2	Kalama Falls Hatchery
		1	Grays River Hatchery
		4	Abernathy Hatchery
		16	Big Creek
		16	Skamokawa Creek
		9	Plympton Creek
		2	Abernathy Creek
		6	Bear Creek
		3	Willamette Falls
Bonneville	7-24-7	27	Bonneville Hatchery
	7-24-8	9	Bonneville Hatchery
	7-26-63	1	Bonneville Hatchery
Klaskanine	7-24-9	1	Big Creek Hatchery
		1	Big Creek
OxBow	7-23-30	7	Bonneville Hatchery
	7-24-11	1	Bonneville Hatchery
Stayton Pond	7-26-62	171	Willamette Falls
		1	Elokomin Hatchery
Sea Resources	63-24-57	7	Sea Resources Hatchery
Abernathy	5-10-58	12	Abernathy Hatchery
		1	Kalama Falls Hatchery
		1	Skamokawa Creek
Abernathy	5-10-59	2	Abernathy Hatchery
		1	Abernathy Creek

Appendix Table 15 (cont.)

Rearing facility	Tag code	Number of returns	Return site
Little White	5-4-35	1 1	Little White Hatchery Bonnevill Hatchery
Spring Creek	5-10-50	2 2	Spring Creek Hatchery Bonnevill Hatchery
	5-10-51	4 1	Spring Creek Hatchery Little White Salmon
	5-10-52	18 1	Spring Creek Hatchery Bonnevill Hatchery
Cowlitz	63-20-32	8	Cowlitz Hatchery
	63-24-50	5	Cowlitz Hatchery
	63-24-62	63 1 16 1	Cowlitz Hatchery Lower Kalama Hatchery Cowlitz River Lewis River
	63-26-3	22 1	Cowlitz Hatchery Cowlitz River
Elokomin	63-22-42	2 1	Elokomin Hatchery Abernathy Creek
	63-22-60	2 1	Elokomin Hatchery Skamokawa Creek
Grays River	63-24-59	6	Skamokawa Creek
Kalama Falls	63-24-60	51 17 3 1 2 2 1	Kalama Falls Hatchery Lower Kalama Hatchery Cowlitz Hatchery Lewis River Hatchery Washougal Hatchery Lewis River Coweeman River
Lower Kalama	63-24-63	10 41 2 3 1	Lower Kalama Hatchery Kalama Falls Hatchery Cowlitz Hatchery Lewis River Hatchery Lewis River

Appendix Table 15 (cont.)

Rearing facility	Tag code	Number of returns	Return site
Priest Rapids	63-22-52	109	Priest Rapids Hatchery
		4	Wells Dam
		1	Columbia River
	63-24-56	44	Priest Rapids Hatchery
Washougal	63-24-61	48	Washougal Hatchery
		6	Kalama Falls Hatchery
		1	Lower Kalama Hatchery
		2	Lewis River
		3	Washougal River
Weyco Pond	H1-4-6	1	Elokomin Hatchery
		1	Big Creek Hatchery

Appendix Table 16.--Returns of fall chinook to Columbia River facilities in 1980

Facility	Female	Returns Male	Jack	Total
Abernathy	336	274	130	740
Little White Salmon	1,126	433	114	1,673
Spring Creek	15,116	9,494	2,822	27,432
Big Creek	1,304	1,487	70	2,861
Bonneville	10,109	9,050	2,202	21,361
Cascade	1,010	743	104	1,857
Klaskanine	66	48	1	115
Willamette Falls ^{1/}	-	-	625	8,385
Cowlitz	1,046	922	221	2,189
Elokomin ^{2/}	645	429	0	1,074
Grays River	48	43	6	97
Kalama Falls ^{3/}	2,566	1,966	167	4,699
Kalama Falls ^{4/}	-	-	175	255
Klickitat	32	67	115	214
Lewis River	341	306	46	693
Lower Kalama	1,157	1,263	359	2,779
Priest Rapids	1,409	783	2,564	4,756
Sea Resources	59	64	3	126
Washougal	589	1,128	121	1,838
TOTAL	36,959	28,500	9,845	83,144

1/ Adults not sexed

2/ Includes 619 adults transported from Kalama Falls Hatchery

3/ **Lower** river production stock

4/ Upper river bright stock, adults not sexed

Appendix Table 17. --Returns of fall chinook to Columbia River facilities in 1981.

Facility	Female	Returns Male	Jack	Total
Abernathy	454	828	743	2,025
Big Creek	1,923	1,868	526	4,317
Bonneville	14,147	14,956	5,162	34,265
Cascade	131	103	15	249
Cowlitz	2,750	1,947	976	5,673
Elokomin	349	284	1	634
Grays River	22	37	26	85
Kalama Falls ^{1/}	2,419	1,801	74	4,294
Kalama Falls ^{2/}	311	235	24	570
Klaskanine	48	12	3	63
Klickitat	107	175	0	282
Lewis River	450	180	116	746
Little White Salmon	767	474	256	1,497
Lower Kalama	794	581	161	1,536
Priest Rapids	972	1,408	1,523	3,903
Sea Resources	130	67	32	229
Spring Creek	13,687	10,175	6,662	30,524
Washougal	2,036	1,620	104	3,760
Willamette Falls	6,695	10,104	1,127	17,926
TOTAL	48,192	46,855	17,531	112,578

^{1/} Lower river stock^{2/} Upper river bright stock

Appendix Table 18.--Returns of fall chinook to Columbia River facilities in 1982.

Facility	Female	Returns Male	Jack	Total
Abernathy	1,032	1,033	1,016	3,081
Big Creek	4,425	5,820	400	10,645
Bonneville	11,672	9,409	2,199	23,280
Cascade	450	364	76	890
Cowlitz	2,618	2,149	1,023	5,790
Elokomin	889	1,167	6	2,062
Grays River	284	394	23	701
Kalama Falls ^{1/}	357	449	86	892
Kalama Falls ^{2/}	61	268	19	348
Klaskanine	68	26	3	97
Klickitat	136	178	23	337
Lewis River	127	92	147	366
Little White Salmon	1,337	710	101	2,148
Lower Kalama ^{1/}	242	494	84	820
Lower Kalama ^{2/}	3	469	271	743
Priest Rapids	1,132	2,399	4,201	7,732
Ringold	65	112	14	191
Sea Resources ^{3/}			4	428
Spring Creek	17,210	9,498	739	27,447
Washougal	1,271	1,277	260	2,808
Willamette Falls	12,041	13,858	984	26,883
TOTAL	55,420	50,166	11,679	117,689

^{1/} Lower river stock
^{2/} Upper river bright stock
^{3/} Adults not sexed

Appendix Table 19. --Returns of fall chinook to Columbia River facilities in 1983.

Facility	Female	Returns Male	Jack	Total
Abernathy	1,096	854	192	2, 142
Big Creek	2,158	1, 754	75	3, 987
Bonneville	6,319	6, 497	585	13, 401
Cascade ^{1/}	272	187	21	480
Cascade ^{2/}	736	532	87	1, 355
Clatsop County Ponds			0	5 ^{3/}
Cowlitz	2, 646	3, 654	147	6, 447
Elokomin	1, 419	1, 271	1	2, 691
Grays River	123	150	1	274
Kalama Falls ^{1/}	2, 122	1, 744	9	3, 875
Kalama Falls ^{2/}	468	374	30	872
Klaskanine	30	17	1	48
Klickitat	57	90	13	160
Lewis River ^{1/}	185	295	76	556
Lewis River ^{2/}	10	25	4	39
Little White Salmon	664	475	53	1, 192
Lower Kalama ^{1/}	182	503	6	691
Lower Kalama ^{2/}	85	372	89	546
Priest Rapids	1, 530	3, 280	1, 214	6, 024

^{1/} Lower river stock
^{2/} Upper river bright stock
^{3/} Adults not sexed

Appendix Table 19 (continued)

Facility	Female	Returns	Jack	Total
		Male		
Ringold	89	87	28	204
Sea Resources	156	97	24	277
Spring Creek	5,889	3,514	1,005	10,408
Washougal	1,775	2,257	26	4,058
Willamette Falls	7,049	6,156	528	13,733
TOTAL	35,060	34,185	4,215	73,465

Appendix Table 20.--Returns of fall chinook to Columbia River facilities in 1984.

Hatchery	Returns			
	Female	Male	Jack	Total
Abernathy	297	260	185	742
Big Creek	2,458	3,710	368	6,536
Bonneville	2,280	2,954	244	5,478
Cascade	102	55	4	161
Clatsop County Ponds			62	62
Cowlitz	2,942	2,898	169	6,009
Elokomin	722	932	10	1,714
Grays River	102	67	68	237
Kalama Falls	2,106 268	1,788 216	13	3,907 ^{1/} 484
Klaskanine	26	15		41
Klickitat	46	92	2	140
Lewis River ^{2/}	78	81	195	354
Little White Salmon	407	153	17	577
Lower Kalama	705	643 1	30	1,378 ^{1/} 1
Priest Rapids	3,130	4,523	5,581	13,234
Sea Resources	413	434	10	857
Spring Creek	5,273	3,424	799	9,496
Washougal	1,028	1,049	39	2,116
Willamette Falls	7,946	12,140	1,084	21,170
TOTAL	30,379	35,435	8,880	74,694

^{1/} Upriver bright fall chinook
^{2/} Includes Speelyai Hatchery

Appendix Table 21.-- Returns of fall chinook to Columbia River facilities in 1985

Hatchery	Female	Returns		Total
		Male	Jack	
Abernathy	941	1069	207	2217
Big Creek	4306	5970	274	10550
Bonneville	3576	5603	102	9281
Cascade	39	57	81	177
Clatsop County Ponds	9	1	2	12
Cowlitz	3055	3793	2926	9774
Elokomin	803	1007	22	1832
Grays River	78	167	112	357
Kalama Falls	1902	1521	276	3699
Kalama Falls Brights	421	533	0	954
Klaskanine	8	4	0	12
Klickitat	0	8	7	15
Lewis River & Speely	199	315	283	797
Little White Salmon	96	105	43	244
Lower Kalama	472	876	339	1687
Priest Rapids	4597	8894	17266	30757
Sea Resources	200	123	2	325
Spring Creek	3258	2170	53	5481
Washougal	909	2394	4628	7931
Willamette Falls	13091	15998	1490	30579
Total	37960	50608	28113	116681

Appendix Table 22.--Returns of fall chinook to Columbia River facilities as of December 31, 1986

Hatchery	Returns			
	Female	Male	Jack	Total
Abernathy	276	173	1,819	2,268
Big Creek	3,356	2,932	3,554	9,842
Bonneville	2,768	3,586	6,907	13,261
Cascade	65	89	23	177
Clatsop County Ponds	1	1	9	11
Cowlitz	10,754		1,924	12,678
Elokomin	1,514		139	1,653
Grays River (Trapped Skamokawa Creek)	1,210 504		247 10	1,457 514
Kalama Falls (Upriver bright falls)	3,672 576		173	3,845 576
Klaskanine	24	7	8	39
Klickitat	198		41	239
Lewis River	113		91	204
Little White Salmon (Upriver bright falls)	303 868	347 673	80 286	730 1,827
Lower Kalama	2,495		145	2,640
Priest Rapids	14,865		11,588	26,453
Sea Resources	55	40	165	260
Spring Creek (Hatch. returns)	763	291	90	1,144
(Trapped Bonneville Dam)	1,496	749		2,245
(Big White Pond Return)	92	62	75	229
Washougal	10,402		586	10,988
Willamette Falls	14,037		810	14,847
	79,384		28,770	108,154