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

Annual Report FY 1984

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ABSTRACT

FY 1984 was the sixth year of an eight-year 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 1984. Catches and returns of three brood years tagged (1979-1981) could have occurred in 1984.

Total returns of fall chinook to Columbia River facilities in 1984 were 74,401. This was the second smallest return over the past five years. Returns to Bonneville, Spring Creek, Little White Salmon, Klickitat and Klaskanine hatcheries were smaller than any previous year during this study. However, returns to Priest Rapids and Sea Resources hatcheries were greater than in previous years.

Final estimated catch values are available through 1982 for British Columbia, Washington, Oregon and Columbia River fisheries. Fall chinook from the Columbia River hatcheries are predominately recovered in these fisheries. The percentages of the 1978-brood fish caught in these fisheries was 40.3, 35.0, 7.5 and 17.2 respectively.

Contributions to the fisheries per 1,000 fish released for all hatcheries combined were 2.6 and 3.0 for the 1978 and 1979 broods respectively. Three years (1980-1982) were included in the contribution values for the 1978 brood and two years (1981 and 1982) for the 1979 brood- Spring Creek Hatchery had the greatest contribution to the fisheries of 8.2 and 12.7 fish per 1,000 fish released for the 1978 and 1979-broods respectively. The Spring Creek contribution was followed by Stayton Pond, Abernathy, Bonneville and Big Creek at 6.3, 4.1, 2.9 and 2.6 respectively for the 1978 brood and Big Creek, Stayton Pond and Abernathy at 7.4, 6.2 and 3.9 respectively for the 1979 brood. Other facilities had contributions per 1,000 releases of less than 2. These contributions are minimums since all possible catch years are not included.

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 hatchery 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.

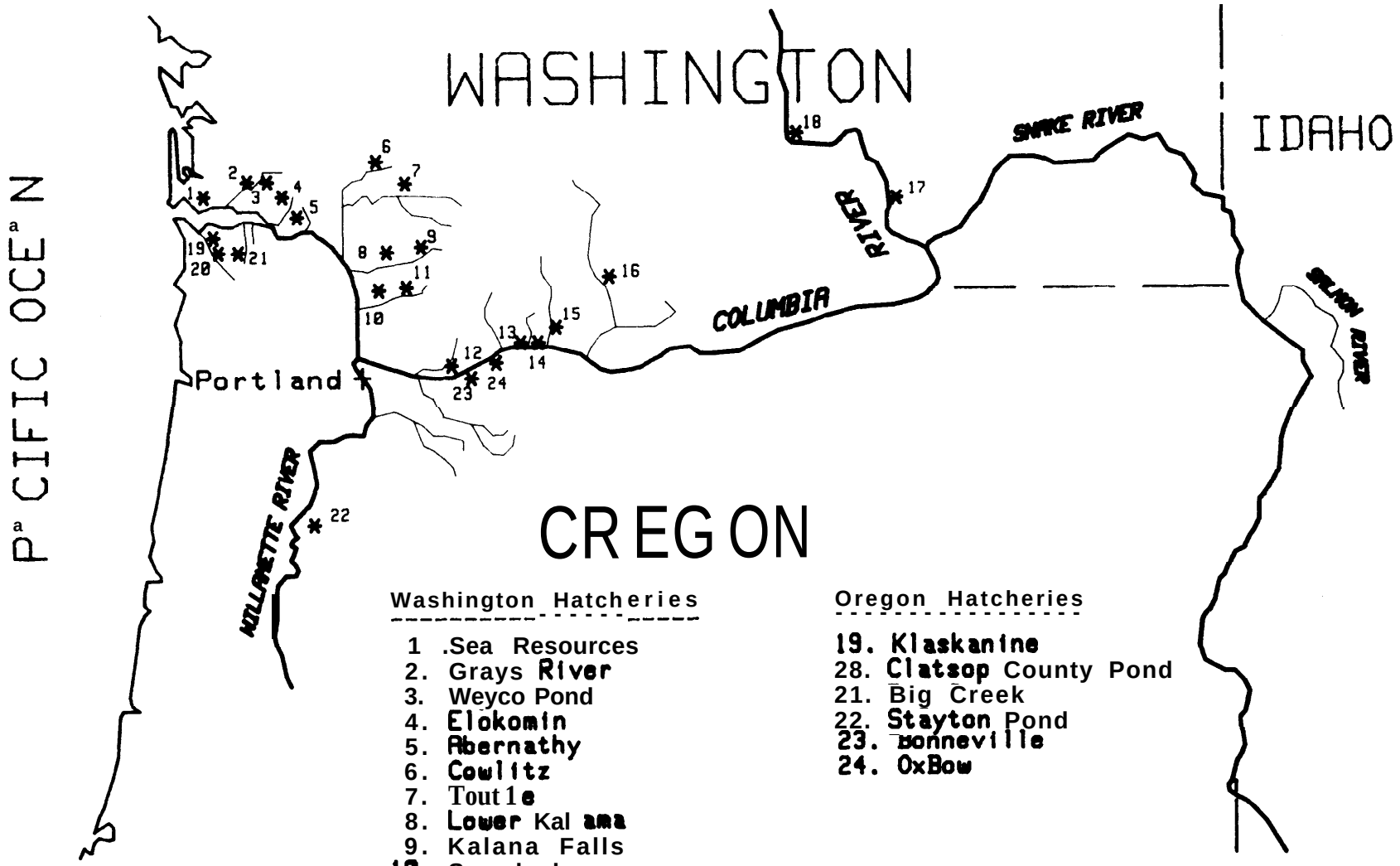
The desired goal to achieve objective 1 was to tag a constant percentage of fish at each rearing facility. A goal of tagging at least 150,000 fish at each facility was set to achieve objective 2. We have attempted to meet both goals at each hatchery. This required additional tag codes at some hatcheries 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 six years of the study and details activities and preliminary results during FY 1984.

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.



Washington Hatcheries

1. Sea Resources
2. Grays River
3. Weyco Pond
4. Elokomin
5. Abernathy
6. Cowlitz
7. Tout 1e
8. Lower Kal ama
9. Kalana Falls
10. Speelyrl
11. Lewis River
12. Washougal
13. Little White Salmon
14. Spr ng Creek
15. Big White Pond
16: Klickitat
17. Ringold
18. Priest Rapids

Oregon Hatcheries

19. Klaskanine
28. Clatsop County Pond
21. Big Creek
22. Stayton Pond
23. Bonneville
24. OxBow

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 the 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 l-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	% Tag Retention	Unmarked Fish Released	Total	Fish/lb	Release Dates
ABERNATHY	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
COWLITZ	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
	117,800	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	2,000	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	140,900	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	1,203,500	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
WASHOUGAL	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	4,035,100		215,400		87,464,900	91,715,400		

TABLE 2. -- Releases of 1979-brood 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
ABERNATHY	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
COWLITZ	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	5,671,800	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	1,000	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
	18,400	63-20-61	400	98.1	745,400	764,200	90	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	96.0	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
WASHOUGAL	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
ABERNATHY	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
COWLITZ	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	99.0	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
KLASKANINE	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 - 6/10
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	90	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
	150,500	05-07-46	800	99.5	724,700	876,000	75	4/21 - 4/22
	28,800	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	97.0	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
WASHOUGAL	28,700	63-21-48	300	99.1	483,200	512,200	35	7/ 6 - 9/ 4
	278,800	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-brood 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
ABERNATHY	90,600	05-10-58	7,100	93.0	994,500	1,092,200	51	4/20 - 6/ 1
	29,800	05-10-59	2,900	91.0	331,400	364,100	51	4/20 - 6/ 1
BIG CREEK	131,200	07-24-10	4,300	96.8	4,400,800	4,536,300	75	5/17
BONNEVILLE	105,900	07-24-07	700	99.3	1,086,100	1,192,700	80	4/23
	96,800	07-24-08	1,500	98.4	2,095,500	2,193,800	80	5/21 - 6/ 4
	102,400	07-26-63	2,000	98.1	2,724,500	2,828,900	92	4/14 - 4/20
CLATSOP COUNTY PONDS	79,700	07-24-12	1,100	98.6	1,838,100	1,918,900	80	5/20
	33,900	07-24-13	500	98.6	788,000	822,400	80	5/20
COWLITZ	41,300	63-20-32	0	95.4	0	41,300	90	6/24 - 7/ 8
	8,300	63-24-50	100	98.8	151,600	160,000	20	9/29
	199,200	63-24-62	4,500	98.7	6,691,300	6,895,000	90	6/24 - 7/ 8
	47,500	63-26-03	900	98.1	795,600	844,000	30	9/29
ELOKOMIN	52,200	63-22-42	1,000	98.1	1,246,900	1,300,100	80	6/15
	50,600	63-22-60	2,000	96.2	1,247,400	1,300,000	80	6/15
GRAYS RIVER	27,500	63-24-58	1,100	96.2	279,400	308,000	87	6/ 1
	45,400	63-24-59	1,600	96.6	471,400	518,400	87	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	98.0	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	05-04-35	1,500	98.5	3,933,100	4,035,900	93	6/ 2 - 6/ 3
	98,500	05-04-36	1,800	98.2	3,902,400	4,002,700	93	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	07-23-30	700	98.6	2,083,800	2,136,800	78	6/ 4 - 6/25
	52,500	07-24-11	700	98.6	2,092,200	2,145,400	78	6/ 4 - 6/25
PRIEST RAPIDS	262,200	63-22-52	800	99.7	4,360,300	4,623,300	87	5/24 - 6/16
	48,700	63-24-56	900	98.2	836,400	886,000	67	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	05-07-53	25	95.0	46,300	46,825	17	7/30
	400	05-07-54	25	95.0	46,300	46,725	17	7/30
	46,700	05-08-51	1,200	97.5	258,400	306,300	79	4/ 8 - 4/13
	151,400	05-10-50	3,600	97.7	7,045,400	7,200,400	110	3/25 - 3/26
	38,900	05-10-51	1,000	97.5	2,130,200	2,170,100	78	4/15
	58,300	05-10-52	5,300	91.6	2,927,700	2,991,300	48	5/20
	102,300	05-10-57	2,600	97.5	567,100	672,000	79	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
Total	3,475,500		82,450		82,023,500	85,581,450		

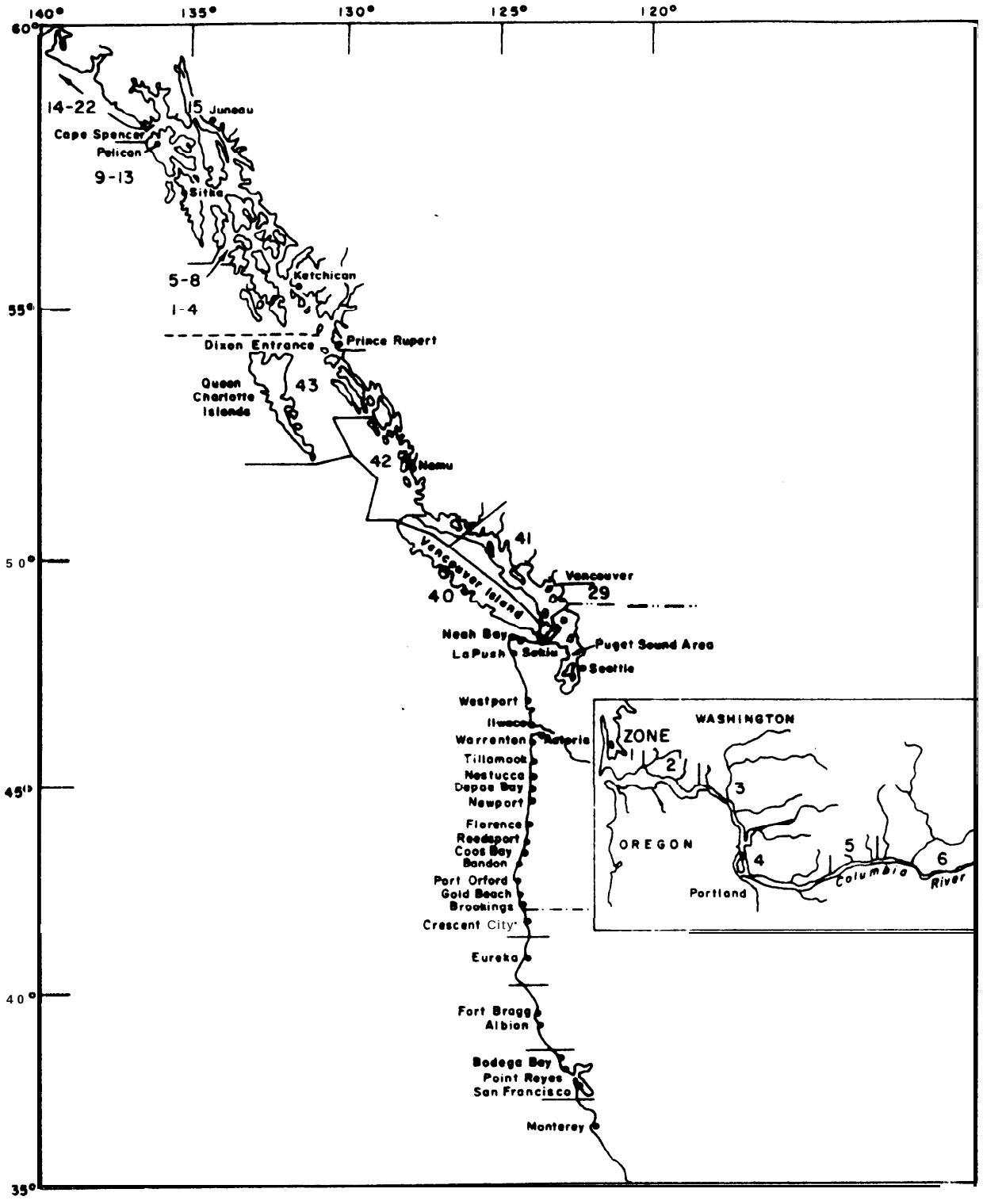


Figure 2. Ports and zones sampled for marked **fall** chinook solmon of Columbia River origin.

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

	Calendar Year						
Brood 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) which 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 1984 as planned.

Fishery Recoveries

Final estimated recoveries of tagged fall chinook are available for 1980 and 1981 from the Pacific Elarine Fisheries Commission for all U.S. Pacific coast fisheries except California in 1980 and California and Alaska in 1981. Final estimated recoveries for Canadian recoveries of salmon are available for 1980 through 1982 from the Department of Fisheries and Oceans. Preliminary estimated recoveries are available for 1982 from Oregon and Washington from State agency computer reports. Observed recoveries are available for all Pacific coast fisheries through 1983. Only preliminary observed recoveries are available for 1984.

Catches of 1978-brood fall chinook were expected to be completed in 1983. Catches of 1979-through 1981-brood fish could have occurred in 1984 (Table 5). Estimated recoveries of fall chinook tagged for this project are presented in Tables 7 through 9. Appendix Tables 1 through 4 contain the observed recoveries 'by brood year.

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 Ratios 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. Weyco Pond, Bonneville vs. Stayton Pond, Spring Creek vs. Big White Pond.
80-brood: Grays River vs. Weyco Pond, Bonneville vs. Stayton Pond vs. Clatsop County Ponds.
81 -brood: Bonneville vs. Stayton Pond vs. Klaskanine vs. OxBow

3/ 78--brood: Speelyai, 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: Marine					Columbia River		Total
			Alaska	Canada	Washington	Oregon	California	Indian	Non-Indian	All fish
BIG CREEK	07-18-44	1980	0	12	19	0	0	0	0	31
		1981	0	216	143	27	0	0	0	386
		1982	0	71	20	0	0	0	68	159
		Total	0	299	182	27	0	0	68	576
BONNEVILLE	07-18-42	1980	0	14	49	0	0	2	5	70
		1981	0	264	237	57	0	4	7	569
		1982	0	99	6	0	0	9	69	183
		Total	0	377	292	57	0	15	81	822
	07-18-43	1980	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	0
		1982	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0
KLASKANINE	07-18-45	1980	0	11	0	0	0	0	0	11
		1981	0	82	32	34	0	0	15	163
		1982	0	26	0	0	0	0	87	113
		Total	0	119	32	34	0	0	102	287
STAYTON POND	07-18-41	1980	0	39	58	0	0	0	0	97
		1981	0	713	520	117	0	0	0	1,352
		1982	0	165	47	2	0	0	130	344
		Total	0	917	625	121	0	0	130	1,793
SEA RESOURCES	63-19-18	1980	0	6	0	12	0	0	0	18
		1981	0	0	0	0	0	0	0	0
		1982	0	0	3	0	0	0	3	6
		Total	0	6	3	12	0	0	3	24
ABERNATHY	05-04-50	1980	0	12	14	0	0	0	0	26
		1981	0	155	60	15	0	0	0	230
		1982	0	18	0	0	0	0	6	24
		Total	0	185	74	15	0	0	6	280

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
ABERNATHY	05-04-51	1980	0	12	12	0	0	0	0	24
		1981	0	52	50	26	0	0	0	135
		1982	0	4	4	4	0	0	9	21
		Total	0	75	66	30	0	0	9	180
BIG WHITE POND	05-04-43	1980	0	6	17	7	0	0	0	30
		1981	0	51	103	14	0	12	0	187
		1982	0	18	13	0	0	10	12	53
		Total	0	75	133	21	0	22	12	270
LITTLE WHITE SALMON	05-04-48	1980	0	0	0	0	0	0	0	0
		1981	0	11	11	0	0	5	0	27
		1982	0	0	0	0	0	3	0	3
		Total	0	11	11	0	0	8	0	30
	05-04-49	1980	0	2	0	0	0	0	0	2
		1981	0	0	11	5	0	0	0	16
		1982	0	10	0	0	0	8	0	18
		Total	0	12	11	5	0	8	0	36
SPRING CREEK	05-04-33	1980	0	14	80	0	0	11	2	107
		1981	0	347	425	115	0	200	0	1,087
		1982	0	66	30	6	0	66	50	218
		Total	0	427	535	121	0	277	52	1,412
	05-04-44	1980	0	40	136	5	0	2	9	192
		1981	0	485	709	136	0	350	1	1,681
		1982	0	93	45	6	0	76	77	297
		Total	0	618	890	147	0	428	87	2,170
	05-04-45	1980	0	0	0	0	0	0	0	0
		1981	0	0	2	0	0	0	0	2
		1982	0	0	0	0	0	0	0	0
		Total	0	0	2	0	0	0	0	2

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
SPRING CREEK	05-04-46	1980	0	14	40	13	0	14	11	92
		1981	0	316	383	56	0	146	2	703
		1982	0	52	15	2	0	43	50	162
		Total	0	382	438	71	0	203	63	1,157
COWLIT	63-19-42	1980	0	0	0	0	0	0	0	0
		1981	0	28	32	15	0	0	0	75
		1982	0	55	49	25	0	0	18	147
		Total	0	83	81	40	0	0	18	222
	63-19-51	1980	0	0	0	0	0	0	0	0
		1981	0	5	19	2	0	0	0	26
		1982	0	18	12	4	0	0	5	39
		Total	0	23	31	6	0	0	5	65
ELOKOM	63-18-56	1980	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	0
		1982	0	0	0	0	0	0	3	3
		Total	0	0	0	0	0	0	3	3
	63-19-56	1980	0	3	0	0	0	0	0	3
		1981	0	3	3	0	0	0	0	6
		1982	0	0	0	0	0	0	0	0
		Total	0	6	3	0	0	0	0	9
GRAYS RIVER	63-16-46	1980	0	0	0	0	0	0	0	0
		1981	0	0	0	2	0	0	2	4
		1982	0	15	0	0	0	0	6	21
		Total	0	15	0	2	0	0	8	25
	63-18-33	1980	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	0
		1982	0	4	0	0	0	0	0	4
		Total	0	4	0	0	0	0	0	4

Table 7 (Continued)

Rearing facilit	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
GRAYS RIVER	63-19-37	1980	0	0	0	0	0	0	0	0
		1981	0	0	7	11	0	0	2	20
		1982	0	0	4	0	0	0	3	7
		Total	0	0	11	11	0	0	5	27
KALAMA FALLS	63-19-57	1980	0	2	0	0	0	0	0	2
		1981	0	2	8	3	0	0	0	13
		1982	0	41	6	0	0	0	9	56
		Total	0	45	14	3	0	0	9	71
KLICKI[illegible]	63-19-49	1980	0	4	5	0	0	0	5	14
		1981	0	62	50	7	0	9	0	128
		1982	0	42	23	0	0	21	12	98
		Total	0	108	78	7	0	30	17	240
PRIEST RAPIDS	63-18-21	1980	0	11	0	0	0	0	3	14
		1981	0	16	2	3	0	2	0	23
		1982	0	31	3	0	0	9	3	46
		Total	0	58	5	3	0	11	6	83
	63-18-57	1980	0	0	0	0	0	0	0	0
		1981	0	8	0	0	0	0	0	8
		1982	0	0	0	0	0	0	0	0
		Total	0	8	0	0	0	0	0	8
	63-19-58	1980	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	0
		1982	0	0	0	0	0	2	0	2
		Total	0	0	0	0	0	2	0	2
	63-20-17	1980	0	0	0	0	0	0	0	0
		1981	0	0	0	0	0	0	0	0
		1982	0	19	0	0	0	4	0	23
		Total	0	19	0	0	0	4	0	23

Table 7 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
SPEELYAI	63-19-20	1980	0	8	0	0	0	0	0	8
		1981	0	12	30	0	0	0	0	42
		1982	0	26	17	11	0	0	6	60
		Total	0	46	47	11	0	0	6	110
	63-19-50	1980	0	2	0	0	0	0	0	2
		1981	0	20	22	7	0	0	0	51
		1982	0	52	20	0	0	0	24	96
		Total	0	74	42	7	0	0	24	149
TOUTLE	63-18-54	1980	0	0	0	0	0	0	0	0
		1981	0	5	3	0	0	0	0	8
		1982	0	0	0	0	0	0	0	0
		Total	0	5	3	0	0	0	0	8
	63-19-41	1980	0	1	0	0	0	0	0	1
		1981	0	19	3	0	0	0	0	22
		1982	0	46	6	15	0	0	18	85
		Total	0	66	9	15	0	0	18	108
WASHOUGAL	63-19-38	1980	0	0	0	0	0	0	0	0
		1981	0	36	0	0	0	0	0	36
		1982	0	11	8	0	0	0	25	44
		Total	0	47	8	0	0	0	25	80
	63-19-46	1980	0	2	0	0	0	0	0	2
		1981	0	19	18	8	0	0	0	45
		1982	0	49	3	0	0	0	25	77
		Total	0	70	21	8	0	0	25	124
WEYCO POND	63-19-39	1980	0	0	0	0	0	0	0	0
		1981	0	36	2	0	0	0	3	41
		1982	0	4	8	0	0	0	0	20
	Grand total		0	4,220	3,657	776	0	1,015	723	10,461

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: Marine					Columbia River		Total
			Alaska	Canada	Washington	Oregon	California	Indian	Non-Indian	All fish
BIG CREEK	07-2160	1981	0	81	29	4	0	0	0	114
		1982	0	442	343	55	0	0	106	946
		Total	0	523	372	59	0	0	106	1,060
BONNEVILLE	07-2157	1981	0	1	0	0	0	0	0	1
		1982	0	49	37	0	0	0	24	110
		Total	0	50	37	0	0	0	24	111
KLASKANINE	07-2161	1981	0	4	4	0	0	0	0	8
		1982	0	32	13	1	0	0	25	71
		Total	0	36	17	1	0	0	25	79
OXBOW	07-2162	1981	0	0	0	0	0	0	0	0
		1982	0	15	14	2	0	0	6	37
		Total	0	15	14	2	0	0	6	37
	07-2163	1981	0	0	2	0	0	0	0	2
		1982	0	41	25	8	0	0	9	83
		Total	0	41	27	8	0	0	9	85
STAYTON POND	07-2065	1981	0	54	186	7	0	0	0	247
		1982	0	499	690	109	0	0	201	1,499
		Total	0	553	876	116	0	0	201	1,746
SEA RESOURCES	63-2061	1981	0	0	2	0	0	0	0	2
ABERNATHY	05-0644	1981	0	0	26	4	0	0	0	30
		1982	0	46	60	4	0	0	24	134
		Total	0	46	88	8	0	0	24	166
	05-0646	1981	0	5	59	9	0	0	0	73
		1982	0	130	83	49	0	0	33	295
		Total	0	135	142	58	0	0	33	368

Table 8 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
LITTLE WHITE SALMON	05-06-43	1981	0	0	0	0	0	0	0	0
		1982	0	19	20	0	0	2	6	47
		Total	0	19	20	0	0	2	6	47
SPRING CREEK	05-06-39	1981	0	33	114	23	0	41	0	211
		1982	0	215	475	41	0	152	142	1,025
		Total	0	248	589	64	0	193	142	1,236
	05-06-40	1981	0	15	110	11	0	52	0	188
		1982	0	239	363	59	0	165	168	994
		Total	0	254	473	70	0	217	168	1,182
	05-06-41	1981	0	52	148	5	0	59	0	264
		1982	0	151	326	34	0	207	159	877
		Total	0	203	474	39	0	266	159	1,141
	05-06-42	1981	0	0	0	0	0	0	0	0
		1982	0	12	31	6	0	9	6	64
		Total	0	12	31	6	0	9	6	64
COWLITZ	63-21-37	1981	0	0	2	0	0	0	0	2
		1982	0	4	69	10	0	0	3	86
		Total	0	4	71	10	0	0	3	88
	63-21-54	1981	0	8	0	0	0	0	0	8
		1982	0	14	74	6	0	0	11	105
		Total	0	22	74	6	0	0	11	113
	63-21-59	1981	0	0	0	0	0	0	0	0
		1982	0	12	26	3	0	0	3	44
		Total	0	12	26	3	0	0	3	44

Table 8 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
ELOKOMIN	63-20-05	1981	0	0	0	0	0	0	0	0
		1982	0	8	11	12	0	0	4	35
		Total	0	8	11	12	0	0	4	35
GRAYS RIVER	63-20-43	1981	0	0	0	0	0	0	0	0
		1982	0	12	8	1	0	0	3	31
		Total	0	12	8	1	0	0	3	31
KALAMA FALLS	63-21-05	1981	0	8	0	0	0	0	0	8
		1982	0	37	29	6	0	0	3	75
		Total	0	45	29	6	0	0	3	83
KLICKITAT	63-19-47	1981	0	8	4	6	0	0	0	18
		1982	0	53	76	7	0	4	18	158
		Total	0	61	80	13	0	4	18	176
LEWIS RIVER	63-21-60	1981	0	19	0	0	0	0	0	19
		1982	0	53	43	17	0	0	3	116
		Total	0	72	43	17	0	0	3	135
LOWER KALAMA	63-20-06	1981	0	0	3	3	0	0	0	6
		1982	0	52	22	5	0	0	6	85
		Total	0	52	25	8	0	0	6	91
PRIEST RAPIDS	63-19-48	1981	0	4	0	0	0	0	0	4
		1982	0	74	14	8	0	4	11	111
		Total	0	78	14	8	0	4	11	115
WASHOUGAL	63-21-53	1981	0	9	0	0	0	0	0	9
		1982	0	143	147	13	0	5	42	350
		Total	0	152	147	13	0	5	42	359

Table 8 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
WEYCO POND	Hi-02 03	1981	0	0	0	0	0	0	0	0
		1982	0	12	26	2	0	0	14	54
	Grand total		0	2,672	3,714	530	0	700	1,030	8,646

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							
			Marine					Columbia River		Total
			Alaska	Canada	Washington	Oregon	California	Indian	Non-Indian	All fish.
CLATSOP COUNTY PONDS	07-21-58	1982	0	3	0	0	0	0	0	3
	07-21-59	1982	0	1	20	0	0	0	0	21
BIG CREEK	07-23-31	1982	0	1	5	0	0	0	0	6
	07-23-33	1982	0	5	4	0	0	0	0	9
	07-23-34	1982	0	0	0	0	0	0	0	0
BONNEVILLE	07-21-56	1982	0	5	25	3	0	2	0	35
	07-23-29	1982	0	0	3	2	0	0	0	5
KLASKANINE	07-22-27	1982	0	0	0	0	0	0	1	1
	07-23-32	1982	0	0	0	0	0	0	2	2
STAYTON POND	07-23-35	1982	0	10	75	0	0	0	0	85
SEA RESOURCES	63-22-01	1982	0	0	0	0	0	0	2	2
ABERNATHY	05-07-44	1982	0	7	22	0	0	0	3	32
	05-07-45	1982	0	33	69	3	0	0	12	117
LITTLE WHITE SALMON	05-07-47	1982	0	0	0	0	0	0	0	0
	05-08-49	1982	0	0	0	0	0	0	0	0
	05-08-50	1982	0	0	0	0	0	0	0	0
SPRING CREEK	05-07-40	1982	0	1	0	0	0	0	0	1
	05-07-41	1982	0	6	11	0	0	0	0	17
	05-07-42	1982	0	0	5	0	0	0	0	5
	05-07-43	1982	0	0	22	0	0	2	0	24
	05-07-46	1982	0	8	59	2	0	10	0	79

Table 9 (Continued)

Rearing facility	Tag code	Catch year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River: Indian	Non-Indian	Total: All fish
SPRING CREEK	05-07-48	1982	0	6	4	0	0	0	0	10
	05-07-49	1982	0	0	0	0	0	0	3	3
	05-07-50	1982	0	0	0	0	0	0	0	0
	05-07-51	1982	0	0	0	0	0	2	0	2
	05-07-52	1982	0	0	0	0	0	0	0	0
COWLITZ	63-21-56	1982	0	11	0	0	0	0	0	11
	63-22-55	1982	0	2	0	0	0	0	3	5
ELOKOMIN	63-22-34	1982	0	0	0	0	0	0	0	0
	63-23-17	1982	0	0	0	0	0	0	0	0
GRAYS RIVER	63-22-63	1982	0	4	0	0	0	0	0	4
	63-23-40	1982	0	0	0	0	0	0	0	0
KALAMA FALLS	[illegible] 20-36	1982	0	4	0	0	0	0	0	4
KLICKITAT	63-2[illegible] [illegible]	1982	0	3	0	0	0	0	0	3
L[illegible] KALAMA	63-22-54	1982	0	21	6	0	0	0	0	27
PRIEST RAPIDS	63-21-55	1982	0	13	0	0	0	0	0	13
	63-22-61	1982	0	4	0	0	0	2	0	6
WASHOUGAL	63-21-48	1982	0	3	0	0	0	0	0	3
	63-22-51	1982	0	10	0	0	0	0	3	13
WEYCO POND	H1-03-01	1982	0	0	0	0	0	0	0	0
	H1-03-02	1982	0	0	0	0	0	0	0	0
	Grand total		0	161	330	10	0	10	29	548

Hatchery Returns

Returns of tagged fall chinook through 1983 are summarized by brood, rearing facility and year of return in Tables 10 through 13. As with the catches, returns of the 1978-brood fall chinook were likely completed in 1983 and 1979 through 1981 broods could have returned in 1984. Appendix Tables 5 through 13 present the tag returns 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 1984 are listed in Table 14 by return facility. Appendix Tables 14 through 18 present the returns by return year, facility and sex.

Total fall chinook returns in 1983 for all facilities were the lowest of the five return years of the study (73,465). Despite this several hatcheries (Cowlitz, Elokomin, and Washougal) had the best returns of the five years in 1983.

Total returns in 1984 were slightly higher than in 1983 (74,401). Return numbers to Bonneville, Spring Creek, Little White Salmon, Klickitat and Klaskanine hatcheries were lower than any previous year during this study. Returns to Priest Rapids and Sea Resources; however, were greater than in the previous five years.

Comparisons of individual hatchery returns over the five 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, Elokimin, 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 (Elokomin and Kalama Falls). Some of the jack salmon can swim through the bars of the traps.

Observations ,

Final estimated catch data is not yet available for any complete brood of fall chinook marked for this study. Values are available through 1982 for British Columbia, Washington, Oregon and Columbia River fisheries. Fall chinook from the Columbia River hatcheries are predominately recovered in these fisheries. The available catch data for Pacific coast fisheries are sufficient for making some interesting observations. Catches, returns and releases by rearing facility and tag code for the 1978 and 1979 broods of fall chinook are compared in Tables 15 and 16. The catch per 1,000 releases and percent survival figures are minimal for broods. The estimated catches in 1983 of 5-year-old marked fish from the 1978 brood are not available for inclusion in the catch. This is also the case for catches in 1983 and 1984 of 4-and 5-year-old fish from the 1979 brood. Also no adjustments in catches have been made for potential post release mortality of tagged fish. The percent survival values in Table 15 were calculated by summing the catches and returns and dividing by the releases.

Table 10.--Tag returns of 1978-brood fall chinook by rearing facility, tag code, and return year.

Rearing Facility	Tag Code	Return Year 1980	1981	1982	1983
Abernathy	5-4-50	3	36	13	0
	5-4-51	1	25	16	0
Big 'White	5-4-43	6	28	22	1
Little White Salmon	5-4-48	1	6	2	1
	5-4-49	0	4	5	1
Spring Creek	5-4-46	18	122	50	1
	5-4-44	34	242	84	3
	5-4-33	26	175	42	0
	5-4-45	1	0	0	0
Big Creek	7-18-44	3	52	125	10
Bonneville	7-18-42	12	197	95	3
	7-18-43	0	3	1	0
Klaskanine	7-18-45	0	4	9	1
Stayton Pond	7-18-41	1	93	156	4
Cowlitz	63-14-42	5	25	59	7
	63-19-51	0	8	14	2
Elokomin	63-18-56	0	0	1	1
	63-19-56	0	0	0	0
Grays River	63-16-46	1	3	4	2
	63-18-33	0	0	2	0
	63-19-37	0	5	3	0
Kalama Falls	63-19-57	1	2	17	15
Klickitat	63-19-49	0	0	0	0
Priest Rapids	63-18-21	3	15	27	4
	63-18-57	0	0	2	0
	63-20-17	0	5	9	1
	63-19-58	0	1	0	0
Sea Resources	63-19-18	0	0	0	0
Speelyai	63-19-20	0	3	12	2
	63-19-50	4	3	19	4
Toutle	63-18-54	0	0	3	0
	63-19-41	2	5	28	3
Washougal	63-19-38	0	2	17	4
	63-19-46	0	12	26	2
Weyco Pond	63-19-39	0	0	9	0

Table 11.- Tag returns of 1979-brood fall chinook by rearing facility, tag code, and return year.

Rearing Facility	Tag Code	Return Year 1981	1982	1983
Abernathy	5-6-44	9	20	3
	5-6-46	26	71	17
Little White Salmon	5-6-43	0	1	1
Spring Creek	5-6-39	45	133	18
	5-6-40	46	109	25
	5-6-41	32	83	20
	5-6-42	0	8	7
Big Creek	7-21-60	8	154	99
Bonneville	7-21-57	3	17	11
Klaskanine	7-21-61	0	2	0
OxBow	7-21-62	2	1	5
	7-21-63	1	7	6
Stayton Pond	7-20-55	0	159	28
Cowlitz	63-21-37	9	20	33
	63-21-54	2	22	36
	63-21-59	0	6	13
Elokomin	63-20-5	0	2	8
Grays River	63-20-43	0	5	5
Kalama Falls	63-21-5	0	9	67
Klickitat	63-19-47	1	6	3
Lewis River	63-21-60	1	10	23
Lower Kalama	63-20-6	0	4	34
Priest Rapids	63-19-48	22	63	60
Sea Resources	63-20-61	3	15	3
Washougal	63-21-53	5	84	157
Weyco Pond	H l-2-3	0	23	6

Table 12.--Tag returns of 1980-brood fall chinook by rearing facility, tag code, and return year.

Rearing facility	Tag code	Return Year 1982	1983
Abernathy	5-7-44	17	21
	s-7-45	44	99
Little White Salmon	5-7-47	0	3
	5-8-49	1	1
	5-8-50	0	0
Spring Creek	s-7-40	1	14
	5-7-41	4	22
	5-7-42	0	17
	5-7-43	0	1
	5-7-46	1	6
	5-7-48	0	1
	5-7-49	0	10
	5-7-50	0	3
	5-7-51	0	0
	S-7-52	1	2
Big Creek	7-23-31	2	16
	7-23-33	4	21
	7-23-34	0	14
Bonneville	7-21-56	12	81
	7-23-29	6	47
Clatsop County Ponds	7-21-58	0	4
	7-21-59	1	2
Klaskanine	7-22-27	0	2
	7-23-32	0	3
Stayton Pond	7-23-35	4	56
Cowlitz	63-21-56	26	97
	63-22-55	4	16
Elokomin	63-22-34	1	7
	63-23-17	0	2
Grays River	63-22-63	1	2
	63-23-40	0	0

Table 12 (Continued)

Rearing facility	Tag code	Return Year 1982	1983
Kalama Falls	63-20-36	0	21
Klickitat	63-20-8	1	0
Lower Kalama	63-22-54	0	34
Priest Rapids	63-21-55	9	36
	63-22-61	3	17
Sea Resources	63-22-l	0	3
Washougal	63-21-48	1	20
	63-22-51	2	45
Weyco Pond	H 1-3-l	1	2
	H l-3-2	0	1

Table 13.--Tag returns of 1981-brood fall chinook to Columbia River facilities and adjacent streams in 1983

Rearing Facility	Tag Code	Return Year 1983
Abernathy	S-10-58	5
	5-10-59	3
Little White Salmon	5-4-35	0
	S-4-36	0
Spring Creek	s-7-53	0
	5-7-54	0
	5-8-51	0
	5-10-50	12
	S-10-51	2
	5-10-52	7
	S-10-57	0
Big Creek	7-24-10	2
Bonneville	7-24-7	3
	7-24-8	0
	7-26-63	0
Clatsop County Ponds	7-24-12	0
	7-24-13	0
Klaskanine	7-24-9	0
OxBow	7-23-30	0
	7-24-11	0
Stayton Pond	7-26-62	0
Cowlitz	63-20-32	O
	63-24-50	O
	63-24-62	4
	63-26-03	O
Elokomin	63-25-42	0
	63-22-60	0
Grays River	63-24-58	0
	63-24-59	0
Kalama Falls	63-24-60	0
Klickitat	63-21-57	0

Table 13 (Continued)

Rearing Facility	Tag Code	Return Year 1983
Lower Kalama	63-24-63	1
Priest Rapids	63-22-52	4
	63-24-56	2
Sea Resource	63-24-57	1
Washougal	63-24-61	1
Weyco Pond	Hl-4-6	0

Table 14.--Total fall chinook returns to Columbia River facilities participating in the BPA funded fall chinook evaluation project, 1980-1983.

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
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
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
Big Creek	1980	2,791	70	2,661
	1981	3,791	526	4,317
	1982	10,245	400	10,645
	1983	3,912	7s	3,987
	1984	6,168	368	6,536
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
Cascade	1980	1,753	104	1,857
	1981	234	15	249
	1982	814	76	890
	1983 1/	1727	108	1,835
	1984	157	4	161
Clatsop County Ponds	1980	0	0	0
	1981	0	0	0
	1982	0	0	0
	1983	5	0	5
	1984	0	62	62

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

Table 14 (Continued)

Hatchery	Return year	Adults	Jacks	Total
Klaskanine	1980	114	1	115
	1981	60	3	63
	1982	94	3	97
	1983	47	1	48
	1984	41	0	41
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	5,071	582	5,653
Elokomin 2/	1980	1,074	0	1,074
	1981	633	1	634
	1982	2,056	6	2,062
	1983	2,690	1	2,691
	1984	1,710	6	1,716
Grays River	1980	91	6	97
	1981	59	26	85
	1982	678	23	701
	1983	273	1	274
	1984	169	68	237
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
Kalama Falls 3/	1980	80	17s	255
	1981	546	24	570
	1982	329	19	348
	1983	842	30	872
	1984	484	0	484
Klickitat	1980	99	115	214
	1981	282	0	282
	1982	314	23	337
	1983	147	13	160
	1984	137	3	140

2/ Includes 619 adults transported from Kalama Falls Hatchery
3/ Bright fall chinook

Table 14 (Continued)

Hatchery	Return year	Adults	Jacks	Total
Lewis River	1980	647	46	693
	1981	630	116	746
	1982	219	147	366
	1983 4/	515	80	595
	1984	147	222	369
Lower Kalama	1980	2,420	359	2,779
	1981	1,375	161	1,536
	1982	736	84	820
	1983	685	6	691
	1984	1,374	31	1,405
Lower Kalama 3/	1980	-		
	1981			
	1982	472	271	743
	1983	457	89	546
	1984	96	0	96
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	6,342	6,846	13,188
Ringold	1980	-		
	1981			
	1982	177	14	191
	1983	176	28	204
	1984	0	0	0
Sea Resources	1980	123	3	126
	1981	197	32	229
	1982	424	4	428
	1983	253	24	277
	1984	838	16	854
Washougal	1980	1,717	121	1,838
	1981	3,656	104	3,760
	1982	2,548	260	2,808
	1583	4,032	26	4,058
	1984	1,956	159	2,115

4/ Includes 35 adult and 4 jack upper river bright stock

Table 14 (Continued)

Hatchery	Return year	Adults	Jacks	Total
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	20,060	1,084	21,144
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	63,692	10,709	74,401

Table 15.--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	576	190	2.6	.3
Bonneville	7-18-42	287,900	822	297	2.9	.4
	7-18-43	15,100	0	4	0	.0
Klaskanine	7-18-45	244,100	287	14	1.2	.l
Stayton Pond	7-18-41	283,800	1,793	250	6.3	.7
Sea Resources	63-19-18	24,200	24	0	1.0	.l
Abernathy	S-4-50	63,400	280	52	4.4	.5
	S-4-51	48,900	180	42	3.7	.5
Big White Pond	s-4-43	141,400	270	56	1.9	.2
Little White Salmon	5-4-48	177,800	30	10	.2	.0
	5-4-49	264,800	36	10	.l	.0
Spring Creek	s-4-33	140,900	1,412	243	10.0	1.2
	s-4-44	135,500	2,170	363	16.0	1.9
	5-4-45	55,600	2	1	.0	.0
	S-4-46	246,000	1,157	191	4.7	.5
Cowlitz	63-19-42	143,600	222	96	1.6	.2
	63-19-51	11,100	65	24	5.9	.8
Elokomin	63-18-56	21,100	3	2	.l	.0
	63-19-56	117,800	9	0	.9	.0
Grays River	63-16-46	73,900	25	10	.3	.0
	63-18-33	7,600	4	2	.5	.l
	63-19-37	68,100	27	8	.4	.l
Kalama Falls	63-19-57	214,500	71	35	.3	.0
Klickitat	63-19-49	225,400	240	0	1.1	.l
Priest Rapids	63-18-21	48,100	83	49	1.7	.3
	63-18-57	17,500	8	2	.5	.l
	63-19-58	5,300	2	1	.4	.l
	63-20-17	82,200	23	15	.3	.0

Table 15. --(Continued)

Rearing facility	Tag code	Number released	catch	return	Catch/ 1,000 releases	Percent survival
Speelyai	63-19-20	51,700	110	17	2.1	.2
	63-19-50	104,500	149	30	1.4	.2
Toutle	63-18-54	12,000	8	3	.7	.l
	63-19-41	132,100	108	38	.8	.l
Washougal	63-19-38	97,400	80	23	.8	.l
	63-19-46	154,500	124	40	.8	-1
Weyco Pond	63-19-39	92,400	61	9	.7	.l
TOTAL		4,035,100	10,491	2,127	2.6	.3

Table 16.--Release catch and return statistics for 1979-brood fall chinook by facility and tag code.

Rearing Facility	Tag Code	Number Released	Catch	Return	Catch 1,000 releases	
Big Creek	7-21-60	143,400	1,060	261	7.4
Bonneville	7-21-57	121,100	111	31	.9
Klaskanine	7-21-61	66,300	79	2	1.2
OxBow	7-21-62	49,400	37	8	.7
	7-21-63	51,900	85	14	1.6
Stayton Pond	7-20-55	282,000	1,746	187	6.2
Sea Resources	63-20-61	18,400	2	21	.1
Abernathy	5-6-44	35,200	164	32	4.7
	6-6-46	112,500	368	114	3.3
Little White Salmon	5-6-43	162,600	47	2	.3
Spring Creek	5-6-39	125,500	1,236	196	9.8
	5-6-40	75,200	1,182	180	15.7
	5-6-41	60,500	1,141	135	18.9
	5-6-42	23,100	64	15	2.8
Cowlitz	63-21-37	20,700	88	62	4.3
	63-21-54	244,300	113	60	.5
63-21-59	63-21-59	70,500	44	19	.6
Elokomin	63-20-5	98,400	35	10	.8
Grays River	63-20-43	37,500	31	10	.8
Kalama Falls	63-21-5	100,400	83	76	.8
Klickitat	63-19-47	156,100	176	10	1.1
Lewis River	63-21-60	103,700	135	34	1.3
Lower Kalama	63-20-6	144,500	91	38	.6
Priest Rapids	63-19-48	147,200	115	145	.8
Washougal	63-21-53	314,600	359	246	1.1
Weyco Pond	Hl-2-3	97,800	54	29	.6
TOTAL		2,864,700	8,665	1,937	3.0

A comparison of the catches of 1978 and 1979-brood fall chinook salmon from all hatcheries combined shows a higher contribution for the 1979 brood. This is in spite of the fact only two years of estimated catches are included in the catch per 1,000 releases figures for this brood versus three years for the 1978 brood. The percent catches by fishery are 40.3, 35.0, 7.5 and 17.2 for the Canadian, Washington, Oregon and Columbia River fisheries for the 1978-brood and 31.1, 42.9, 6.1 and 20.0 for the same fisheries respectively for the 1979 brood.

Fall chinook salmon from Spring Creek Hatchery are showing the best contributions to the fisheries. The catch per 1,000 release figures for Spring Creek, in most cases, far exceed the figures for other hatcheries. Spring Creek is followed in contribution by Stayton Pond, Abernathy, Big Creek and Bonneville. The descending order of the contribution rate of these hatcheries differs among the broods.

A preliminary comparison of contributions between 1978 and 1979 broods and among release dates at Spring Creek can be made using available estimated catches. From the 1978-brood estimated catches it appears about 85% of the Spring Creek fall chinook are caught as 2- and 3-year-old fish. The observed catches of 4-year-old fish from the 1979 brood do not indicate estimated recoveries of these fish in 1983 will increase the catches much more than 15%.

Releases of 1978- and 1979-brood fall chinook salmon occurred in March, April, May and August at Spring Creek. The releases of the 1979 brood occurred 6 to 10 days earlier than the 1978 brood in all cases (Tables 2 and 3). The sizes of releases were approximately the same for the same release months for both broods. Even without including 4-year-old catches of 1979-brood fish, the catches per 1,000 releases are higher fur the 1979 brood, for all but one of the release times, than the 1978 brood (Tables 15 and 16). When the 4-year-old catches are added to the April release of 1979-brood fish, it will likely be higher than the 1978-brood April release.

For the 1978 brood at Spring Creek, the April release has the largest contribution to the fisheries. For the 1979 brood, the May release has a slightly higher contribution than the April release. This could change when estimated catches for 1983 become available since there are 11 observed catches for the April release and 8 for the May release (Appendix Table 2). The May release of 1975 brood chinook occurred on the 9th prior to the Mt. St. Helens eruption. The Jones Beach smolt sampling operation, which is below the confluence of the Columbia and Cowlitz rivers, began capturing chinook from the May release, on May 12. Half of the fish captured at Jones Beach from this release had occurred by May 14, 1980. Thus it appears better than half the May release had migrated past Jones Beach prior to the eruption. The reasons for the higher contribution of the 1979-brood fish are not evident at this time.

There is considerable similarity between the catch per 1,000 releases for the 1978 and 1979 broods of fall chinook from Stayton Pond and Abernathy Hatchery. The values are 6.3 for the 1978 brood and 6.2 for the 1979 brood for Stayton Pond. For Abernathy Hatchery the values are 4.1 and 3.6 for the same broods respectively.

There is a dramatic difference between brood year contributions at Big Creek and Bonneville. The catch per 1,000 release values at Big Creek were 2.6 for the 1978 brood and 7.4 for the 1979 brood. Both broods were released at a similar size, 81 fish per pound and 78 fish per pond for the 1978 and 1979 broods respectively. The fish were also released about the same time of year May 21, 1979 for the 1978 brood and May 13, 1980 for the 1979 brood. Minor disease problems were recorded for the 1978-brood fish but no treatment was deemed necessary. No disease problems were recorded for the 1979 brood. Similar total numbers of fish were released both years, 5.2 and 6.4 million for the 1978 and 1979 broods respectively.

One difference between broods is the 1979-brood fish were released five days prior to the eruption of Mt. St. Helens in 1980. Six million fish could not have held in Big Creek and migrated when the Columbia River cleared. Thus the fish must have been in the Columbia River when the eruption occurred. One would speculate the turbid water in the Lower Columbia after the eruption would be a detriment to the health and survival of these fish. Thus one might expect the Big Creek fish to migrate into the clearer water of adjacent streams or be forced out to sea. From the examination of Appendix Tables 5 through 13, it can be seen returns of Big Creek fall chinook have a tendency to stray to adjacent streams. The magnitude of the straying does not appear to be different among the four broods released from the hatchery. It appears a majority of the fish were forced or quickly voluntarily migrated to sea.

Catches of Big Creek fish occurred in Canadian, Washington and Oregon marine and in the Columbia River fisheries. Increased catches of 1979-brood fish occurred in all of these fisheries as jacks and adults. The reason for the vast difference between the contribution of the two broods is not clear at this time.

At Bonneville Hatchery, the fall chinook are reared in two different water sources, constant temperature well water and fluctuating colder Tanner Creek water. The well water reared fish reach a 70 to 80 fish per pound release size 3 to 4 weeks before the creek water reared chinook. The well water reared fish are released in early May and the creek water fish in late May. The well and creek water reared fall chinook were both represented by the same tag code for the 1978 brood. Disease prevented tagging of the 1979-brood chinook reared in well water. Thus only the creek water reared fish were represented by a tag code.

The contribution per 1,000 releases for the 1978-brood fish from Bonneville Hatchery is over three times that of the 1979 brood. Observed catches of 1979-brood chinook do not appear to be extensive enough to make up much of the difference between the two contributions rates. The release of 1979-brood fish reared in creek water occurred after the eruption of Mt. St. Helens; May 20, 27 and 28, 1980. These fish had to migrate through the turbid water in the lower Columbia River. One could speculate the creek water reared chinook do not survive as well as well water reared fish and/or the migration of the 1979-brood fish through the turbid water of the Lower Columbia River had a significant negative impact on the survival of these fish.

The remainder of the hatcheries had catches per 1,000 release of 2 or less for both the 1978 and 1979 broods, except for two small releases at Cowlitz Hatchery. A 1978-brood release represented by code 63-19-51 contributed 6 fish per 1,000 releases and a 1979 brood represented by code 63-21-37 has so far contributed over 4 fish per 1,000 releases. Tag code 63-19-51 represented a small group from two ponds at the hatchery. Releases were made in late June and mid October in 1979. The October release fish were 19 per pound and made up 70% of the release. Tag code 63-21-37 represented a yearling release of fall chinook in March and April of 1981. These fish were about 10 fish per pound. It appears the larger fish had a higher survival than their smaller sub-yearling counter parts released in June of 1979 and 1980. Survival comparisons of the 1987- and 1979-brood fish at Cowlitz Hatchery are somewhat complicated by the eruption of Mt. St. Helens in 1980 and the transport of all the 1979-brood releases of sub-yearlings made in June and July to streams outside the Cowlitz system.

There is some indication from comparisons of the catches of the 1978 and 1979 broods that releases of fall chinook salmon under 100 fish per pond prior to June have a higher fishery contribution and survival than fish released smaller than 100 per pound and/or after the end of May. Fall releases of large fall chinook appear to have a better fishery contribution than early summer releases of fish in the 100 per pound size range. This trend will be examined further as estimated catch data become available for years after 1982.

Summary of Expenditures

Expenditures for this project in FY84 were approximately $29,500. They are itemized in Table 17.

Table 17.--Summary of Costs - FY 1984

Personnel Services and Benefits	$10,225.87
Travel and Transportation of Persons	184.96
Transportation of Things	0
SLUC	643.35
Contractual Services (USFWS)	15,100.00*
Total Direct Costs	$26,154.18
NOAA Support	3,252.62
DOC Support	71.55
TOTAL	$29,478.35

* U.S. Fish and Wildlife Service has not submitted a final voucher. When they do, this cost may diminish slightly, since it includes a small accrual.

Appendix Table 1.-- Observed recoveries of tagged 1978-brood fall chinook from Columbia River rearing facilities to Pacific coast fisheries by facility, tag code and catch year.

Rearing facility	Tag code	Catch Year	Number of recoveries: Alaska	Canada	Marine: Washington	Oregon	California	Columbia River
BIG CREEK	07-18-44	1980	0	8	5	0	0	0
		1981	0	44	49	5	0	0
		1982	0	19	8	0	0	23
		1983	0	2	1	0	0	0
		Total	0	73	63	5	0	23
BONNEVILLE	07-i8-42	1980	0	7	13	0	0	3
		1981	0	40	80	12	0	3
		1982	0	20	3	0	0	28
		Total	0	77	96	12	0	34
KLASKANINE	07-18-45	1980	0	4	S	0	0	0
		1981	0	20	10	4	0	9
		1982	0	6	1	0	0	37
		Total	0	30	16	4	0	46
STAYTON POND	07-18-41	1980	0	24	20	0	0	0
		1981	0	13s	172	20	0	0
		1982	0	39	18	1	0	44
		1983	0	1	2	0	0	1
		Total	0	199	212	21	0	4s
SEA RESOURCES .	63-19-18	1980	0	2	0	1	n	0
		1981	0	0	0	0	0	1
		1982	0	0	0	0	0	1
		Total	0	2	0	1	0	3
ABERNATHY	OS-04-50	1980	0	8	S	0	0	0
		1981	0	28	22	5	1	0
		1982	0	4	0	1	0	3
		Total	n	40	27	6	1	3
	05-04-51	1980	0	6	4	0	0	0
		1981	0	9	20	4	n	0

Appendix Table 1 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
ABERNATHY	05-04-51	1982	0	1	1	1	0	3
		1983	0	0	1	0	0	0
		Total	0	16	26	5	0	3
BIG WHITE POND	05-04-43	1980	0	4	5	1	0	0
		1981	0	9	33	4	0	8
		1982	0	0	4	0	0	8
		Total	0	13	42	5	0	16
LITTLE WHITE SALMON	05-04-48	1981	0	2	4	0	0	2
		1982	0	0	0	0	0	1
		Total	0	2	4	0	0	3
	05-04-49	1980	0	1	0	0	0	0
		1981	0	0	4	2	0	0
		1982	0	3	0	0	0	3
		Total	0	4	4	2	0	3
SPRING CREEK	05-04-33	1980	0	8	23	0	3	6
		1981	0	65	145	30	0	86
		1982	0	14	9	1	0	45
		1983	0	2	0	0	0	2
		Total	0	89	177	31	3	139
	05-04-44	1980	0	25	40	1	0	4
		1981	0	91	240	32	0	150
		1982	0	21	17	2	0	58
		Total	0	137	297	35	0	212
	05-04-45	1981	0	0	1	0	0	0
	05-04-46	1980	0	9	13	4	0	10
		1981	0	56	133	18	0	63
		1982	0	13	6	1	0	37
		1983	0	0	1	0	0	3
		Total	0	78	154	23	0	113

Appendi Table 1 (Continued)

Rearin facility	Tag code	Catch Year	Number of recoveries: Marine					Columbia
			Alaska	Canada	Washington	Oregon	California	River
COWLITZ	63-19-42	1981	0	5	10	5	0	0
		1982	0	11	19	6	0	6
		1983	0	1	1	0	0	0
		Total	0	17	30	11	0	6
	63-19-51	1981	0	1	7	1	0	0
		1982	0	4	6	2	0	2
		Total	0	5	13	3	0	2
ELOKOMI	63-18-56	1982	0	0	0	0	0	1
		1983	0	1	0	0	0	0
		Total	0	1	0	0	0	1
	63-19-56	1980	0	1	0	0	0	0
		1981	0	1	1	0	0	0
		1983	0	1	0	0	0	0
		Total	0	3	1	0	0	0
GRAYS RVER	63-16-46	1981	0	0	0	1	0	1
		1982	0	2	3	0	0	2
		Total	0	2	3	1	0	3
	63-18-33	1982	0	1	0	0	0	0
	63-19-37	1981	0	0	2	2	0	1
		1982	0	0	1	0	0	1
		1983	0	0	1	0	0	0
		Total	0	1	4	2	0	2
KALAMÃALLS	63-19-57	1980	0	2	0	0	0	0
		1981	0	1	4	1	0	0
		1982	0	7	2	0	0	3
		1983	0	0	0	0	0	1
		Total	0	10	6	1	0	4
KLICKITT	63-19-49	1980	0	2	2	1	0	0

Appendix Table 1 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
KLICKITAT	63-19-49	1981	0	11	14	3	0	4
		1982	0	10	8	0	0	13
		Total	0	23	24	4	0	17
PRIEST RAPIDS	63-18-21	1980	0	2	0	0	0	2
		1981	0	3	1	1	0	1
		1982	0	8	1	0	0	5
		1983	0	1	1	0	0	0
		Total	0	14	3	1	0	8
	63-18-57	1981	0	1	0	0	0	0
	63-19-58	1982	0	0	0	0	0	1
	63-20-17	1982	0	4	0	0	0	2
		1983	0	1	0	0	0	0
		Total	0	6	0	0	0	3
SPEELYAI	63-19-20	1980	0	3	0	0	0	0
		1981	0	2	7	0	0	0
		1982	0	8	7	3	0	2
		1983	0	0	2	0	0	0
		Total	0	13	16	3	0	2
	63-19-50	1980	0	1	0	0	0	0
		1981	0	5	7	3	0	2
		1982	0	11	8	0	0	8
		1983	0	2	1	0	0	1
		Total	0	19	16	3	0	11
TOUTLE	63-18-54	1981	0	1	1	0	0	0
	63-19-41	1980	0	1	0	0	0	0
		1981	0	3	1	0	0	0
		1982	0	11	2	3	0	6
		Total	0	16	4	3	0	6
WASHOUGAL	63-19-38	1981	0	6	6	2	0	0

Appendix Table 1 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
WASHOUGAL	63-19-38	1982	0	3	3	0	0	5
		1983	0	0	1	0	0	0
		Total	0	9	10	2	0	5
	63-19-46	1980	0	1	0	0	0	0
		1981	0	5	9	3	0	1
		1982	0	13	1	0	0	5
		Total	0	19	10	3	0	6
WEYCO POND	63-19-39	1981	0	5	1	0	0	2
		1982	0	1	2	0	0	3
		Total	0	6	3	0	0	5

Appendix Table 2.-- Observed recoveries of tagged 1979-brood fall chinook from Columbia River rearing facilities to Pacific coast fisheries by facility, tag code and catch year.

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
BIG CREEK	07-21-60	1981	0	19	13	2	0	0
		1982	0	94	110	23	0	30
		1983	0	11	5	0	0	22
		Total	0	124	128	25	0	52
BONNEVILLE	07-21-57	1981	0	1	0	0	0	0
		1982	0	9	12	0	0	8
		1983	0	4	2	0	0	1
		Total	0	14	14	0	0	9
KLASKANINE	07-21-61	1981	0	1	1	0	0	0
		1982	0	7	5	1	0	11
		1983	0	1	1	1	0	7
		Total	0	9	7	2	0	18
OXBOW	07-21-62	1982	0	3	7	1	0	2
		1983	0	2	0	0	0	1
		Total	0	5	7	1	0	3
	07-21-63	1981	0	0	1	0	0	0
		1982	0	8	9	3	0	3
		1983	0	2	2	0	0	1
		Total	0	10	12	3	0	4
STAYTON POND	07-20-55	1981	0	12	59	3	0	0
		1982	0	112	231	40	0	68
		1983	0	15	12	0	0	7
		Total	0	139	302	43	0	75
SEA RESOURCES	63-20-61	1981	0	1	1	0	0	0
		1982	0	1	0	0	0	4
		1983	0	1	0	0	0	0
		Total	0	3	1	0	0	4
ABERNATHY	05-06-44	1981	0	0	8	1	0	0

Appendix Table 2 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
ABERNATHY	05-06-44	1982	0	11	31	2	2	8
		1983	0	1	4	0	0	0
		Total	0	12	33	3	2	8
	05-06-46	1981	0	1	22	4	0	0
		1982	0	27	60	18	0	11
		1983	0	2	0	0	0	3
		Total	0	32	82	22	0	14
LITTLE WHITE SALMON	05-06-43	1982	0	3	6	0	0	3
SPRING CREEK	05-06-39	1981	0	7	43	9	0	18
		1982	0	54	108	16	3	117
		1983	0	2	2	0	0	6
		Total	0	66	159	25	3	144
	05-06-40	1981	0	6	40	4	0	22
		1982	0	56	123	21	0	128
		1983	0	3	1	0	0	9
		Total	0	65	164	25	0	159
	05-06-41	1981	0	8	45	2	0	25
		1982	0	32	116	17	2	145
		1983	0	1	0	0	0	7
		Total	0	41	161	19	2	177
	05-06-42	1982	0	3	14	3	1	6
		1983	0	4	1	0	0	3
		Total	0	7	15	3	1	9
COWLITZ	63-21-37	1981	0	0	1	0	0	0
		1982	0	1	28	4	0	1
		1983	0	10	37	3	0	2
		Total	0	11	66	3	0	3
	63-21-54	1981	0	8	0	0	0	4

Appendix Table 2 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
COWLITZ	63-21-54	1982	0	4	34	3	0	4
		1983	0	9	18	0	0	5
		Total	0	21	52	3	0	13
	63-21-59	1982	0	3	7	1	0	1
		1983	0	1	7	1	0	0
		Total	0	4	14	2	0	1
ELOKOMIN	63-20-05	1982	0	2	5	4	0	2
		1983	0	3	1	0	0	3
		Total	0	5	6	4	0	5
GOODYS RIVER	63-20-43	1982	0	5	4	0	0	4
		1983	0	3	1	0	0	1
		Total	0	8	5	0	0	5
KALAMA FALLS	63-21-05	1981	0	2	0	0	0	0
		1982	0	8	9	3	0	1
		1983	0	12	9	1	0	2
		Total	0	22	18	4	0	3
KLICKITAT	63-19-47	1981	0	1	2	2	0	0
		1982	0	11	22	4	0	8
		1983	0	7	2	1	0	6
		Total	0	19	26	7	0	14
LEWIS RIVER	63-21-60	1981	0	5	0	0	0	0
		1982	0	10	12	6	0	1
		1983	0	15	0	8	0	4
		Total	0	30	12	14	0	5
LOWER KALAMA	63-20-06	1981	0	0	1	1	0	0
		1982	0	11	12	2	0	2
		1983	0	6	3	0	0	4
		Total	0	17	16	3	0	6

Appendix Table 2 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine					Columbia
			Alaska	Canada	Washington	Oregon	California	River
PRIEST RAPIDS	63-19-48	1981	0	1	0	0	0	0
		1982	0	13	5	2	0	6
		1983	0	17	1	0	0	22
		Total	0	31	6	2	0	28
WASHOUGAL	63-21-53	1981	0	3	0	0	0	0
		1982	0	29	53	6	0	10
		1983	0	31	41	3	0	15
		Total	0	63	94	9	0	25
WEYCO POND	H1-02-03	1982	0	3	12	1	0	5
		1983	0	1	4	0	0	1
		Total	0	4	16	1	0	6

Appendix Table 3.-- Observed recoveries of tagged 1980-brood fall chinook from Columbia River rearing facilities to Pacific coast fisheries by facility, tag code and catch year.

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
CLATSOP COUNTY PONDS	07-21-58	1982	0	1	0	0	0	0
		1983	0	6	6	0	0	4
		Total	0	7	6	0	0	4
	07-21-59	1982	0	1	4	0	0	0
		1983	0	22	21	1	0	18
		Total	0	23	25	1	0	18
BIG CREEK	07-23-31	1982	0	1	2	0	0	0
		1983	0	15	9	0	0	8
		Total	0	16	11	0	0	8
	07-23-33	1982	0	2	1	0	0	0
		1983	0	9	8	3	0	1
		Total	0	11	9	3	0	1
	07-23-34	1983	0	[illegible]	9	1	0	5
BONNEVILLE	07-21-56	1982	0	1	8	1	0	1
		1983	0	20	22	2	0	5
		Total	0	28	39	3	0	11
	07-23-29	1982	0	0	1	1	0	0
		1983	[illegible]	18	10	1	0	3
		Total	0	18	11	2	0	3
KLASKANINE	07-22-27	1982	0	0	0	0	0	1
		1983	0	[illegible]	[illegible]	0	0	1
		Total	0	0	0	0	0	2
	07-23-32	1982	0	0	0	0	0	1
		1983	0	5	5	0	0	11
		Total	0	5	[illegible]	0	0	12

Appendix Table 3 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
STAYTON POND	07-23-35	1982	0	6	18	0	0	0
		1983	0	55	75	5	0	13
		Total	0	61	93	5	0	13
SEA RESOURCES	63-22-01	1982	0	0	0	0	0	1
		1983	0	5	0	0	0	8
		Total	0	5	0	0	0	9
ABERNATHY	05-07-44	1982	0	2	6	0	0	1
		1983	0	20	13	1	0	4
		Total	0	22	19	1	0	5
	05-07-45	1982	0	8	20	2	0	4
		1983	1	31	51	4	0	7
		Total	1	39	71	6	0	11
LITTLE WHITE SALMON	05-07-47	1983	0	4	7	0	0	2
	05-08-50	1983	0	0	0	0	0	1
SPRING CREEK	05-07-40	1982	0	1	0	0	0	0
		1983	0	8	1	1	0	13
		Total	0	13	1	1	0	16
	05-07-41	1982	0	2	4	0	0	0
		1983	0	7	12	0	0	5
		Total	0	9	16	0	0	5
	05-07-42	1982	0	0	1	0	0	0
		1983	0	11	11	0	0	9
		Total	0	11	12	0	0	9
	05-07-43	1982	0	0	3	0	0	1

Appendix Table 3 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
SPRING CREEK	05-07-43	1983	0	16	18	1	0	13
		Total	0	16	21	1	0	14
	05-07-46	1982	0	6	17	1	0	5
		1983	0	87	91	9	0	108
		Total	0	93	110	10	0	113
	05-07-48	1982	0	1	2	0	0	0
		1983	0	1	0	1	0	2
		Total	0	2	2	1	0	2
	05-07-49	1982	0	0	0	0	0	1
		1983	0	8	6	0	0	1
		Total	0	8	6	0	0	2
	05-07-51	1982	0	0	0	0	0	1
		1983	0	1	0	0	0	2
		Total	0	1	0	0	0	3
	05-07-52	1983	0	1	1	0	0	0
COWLITZ	63-21-56	1982	0	3	0	0	0	0
		1983	0	10	40	8	0	4
		Total	0	14	41	8	0	4
	63-22-55	1982	0	1	0	0	0	1
		1983	0	9	4	1	0	1
		Total	0	10	4	1	0	2
ELOKOMIN	63-22-34	1983	0	11	5	1	0	1
	63-23-17	1983	0	0	3	1	0	0

Appendix Table 3 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine: Alaska	Canada	Washington	Oregon	California	Columbia River
GRAYS RIVER	63-22-63	1982	0	1	0	0	0	0
		1983	0	2	4	1	0	0
		Total	0	14	12	3	0	1
KALAMA FALLS	63-20-36	1982	0	1	0	0	0	0
		1983	0	7	5	0	0	0
		Total	0	8	5	0	0	0
KLICKITAT	63-20-08	1982	0	2	0	0	0	0
		1983	0	1	0	0	0	0
		Total	0	3	0	0	0	0
LOWER KALAMA	63-22-54	1982	0	6	1	0	0	0
		1983	0	27	14	3	0	0
		Total	0	33	15	3	0	0
PRIEST RAPIDS	63-21-55	1982	0	4	0	0	0	0
		1983	0	16	0	0	0	8
		Total	0	20	0	0	0	8
	63-22-61	1982	0	2	0	0	0	1
		1983	0	7	1	0	0	1
		Total	0	9	1	0	0	2
WASHOUGAL	63-21-48	1982	0	1	0	0	0	0
		1983	0	1	5	0	0	0
		Total	0	2	5	0	0	0
	63-22-51	1982	0	3	0	0	0	1
		1983	0	8	11	1	0	2
		Total	0	11	11	1	0	3

Appendix Table 3 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries: Marine					Columbia River
			Alaska	Canada	Washington	Oregon	California	
WEYCO POND	Hi-03-01	1983	0	0	2	0	0	0
	Hi-03-02	1983	0	1	2	0	0	0

Appendix Table 4.--- Observed recoveries of tagged 1981-brood fall chinook from Columbia River rearing facilites to Pacific coast fisheries by facility, tag code and catch year

Rearing facility	Tag code	Catch Year	Number of recoveries					
			Alaska	Canada	Marine Uashinqton	Oregon	California	Columbia River
CLATSOP COUNTY PONDS	07-24-i2	1983	0	I	0	0	0	0
	07-24-13	I.983	0	1	0	0	0	0
BIG CREEK	07-24-10	1983	0	3	1	0	0	0
BONNEVILLE	07-24-07	1983	0	3	5	0	0	1
	07-24-08	1983	0	1	0	0	0	0
	07-26-63	1983	0	2	7	0	0	1
OXBOW	07-23-30	1983	0	2	0	0	0	0
STAYTON POND	07-26-62	1983	0	9	10	0	0	0
SEA RESOURCES	63-24-57	1983	0	0	0	0	0	2
ABERNATHY	OS-i o-se	1983	0	1	0	0	0	1
SPRING CREEK	05-08-51	1983	0	0	2	1	0	5
	05-10-50	1983 ,	0	1	4	1	0	9
	05-10-51	1983	0	0	1	0	0	0
	05-10-52	1983	0	1	2	1	0	3
	OS-10-57	1983	0	1	9	0	0	S
COWLITZ	63-24-50	1983	0	1	0	0	0	0
	63-24-62	1983	0	1	0	0	0	1
	63-26-03	1983	0	1	0	0	0	0
GRAYS RIVER	63-24-59	5983	0	1	0	0	0	0
KALAHA FALLS	63-24-60	1983	0	3	0	0	0	0
KLICKITAT	63-21-57	1983	0	0	1	0	0	0

Appendix Table 4 (Continued)

Rearing facility	Tag code	Catch Year	Number of recoveries					
			Alaska	Canada	Hrr ine Washington	Oregon	California	Columbia River
LOWER KALAMA	63-24-63	1983	0	3	0	0	0	0
PRIEST RAPIDS	63-22-W	1983	0	0	0	0	0	1
	63-24-S	1983	0	6	0	0	0	0
WASHOUGAL	63-24-61	1983	0	4	0	0	0	0
YEYCO POND	Hi-04-06	1983	0	1	0	0	0	0

Appendix Table 5.--Returns in 1980 to Columbia River facilities and adjacent streams of 1978-brood fall chinook tagged for the BPA funded hatchery evaluation study.

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	5-4-43	5	Spring Creek Hatchery
"	"	1	Bonneville Hatchery
Abernathy	5-4-50	2	Abernathy Hatchery
"	"	1	Abernathy Creek
"	5-4-51	1	Abernathy Hatchery
Little White Salmon	5-4-48	1	Bonneville Hatchery
"	5-4-49	0	
Bonneville	7-18-42	12	Bonneville Hatchery
"	7-18-43	0	
Big Creek	7-18-44	3	Big Creek Hatchery
Klaskanine	7-18-45	0	
Stayton Pond	7-18-41	1	Willamette River
Grays River	63-16-46	1	Grays River Hatchery
"	63-18-33	0	
"	63-19-37	0	
Weyco Pond	63-19-39	0	
Elokomin	63-18-56	0	
"	63-19-56	0	
Toutle	63-19-41	2	Kalama Falls
"	63-18-54	0	
Cowlitz	63-19-42	2	Kalama Falls
"	"	3	North Fork Lewis R.
"	63-19-51	0	

Appendix Table 5 (Continued)

Rearing facility	Tag code	Number of returns	Return site
Kalama Falls	63-19-57	1	Kalama Falls
Speelyai	63-19-50	1	Kalama Falls
"		3	N. Fork Lewis R.
"	63-19-20	0	
Washougal	63-19-38	0	-
"	63-19-46	0	-
Klickitat	63-19-49	0	-
Priest Rapids	63-18-21	2	Priest Rapids
"	"	1	Wells Dam
"	63-18-57	0	
"	63-20-17	0	-
"	63-19-58	0	-
Sea Resources	63-19-18	0	-
Lewis River	63-18-13	1	N. Fork Lewis R.
"	63-18-58	1	"
"	63-19-2	1	"
"	63-19-10	1	Kalama Falls
"	63-20-10	2	N. fork Lewis R.
"	63-20-2	1	

Appendix Table 6.--Returns in 1981 to Columbia River facilities and adjacent streams of 1978-brood fall chinook tagged for the BPA funded hatchery evaluation study.

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	Kalama River
	"	6	Abernathy Creek
Abernathy	5-4-51	17	Abernathy Hatchery
	"	1	Lower Kalama Hatchery
	"	1	Spring Creek Hatchery
	"	1	Little White Salmon Hatchery
	"	5	Abernathy Creek
Little White Salmon	5-4-48	3	Little White Salmon Hatchery
	"	2	Bonneville Hatchery
	"	1	Big White Salmon River
Little White Salmon	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
Spring Creek	5-4-44	190	Spring Creek Hatchery
	"	52	Bonneville Hatchery
Spring Creek	5-4-33	137	Spring Creek Hatchery
	"	36	Bonneville Hatchery
	"	2	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	Abernathy Creek
	"	2	Skamokowa Creek
	"	1	Gnat Creek

Appendix Table 6 (Continued)

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

Appendix Table 6 (Continued)

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

Appendix Table 7.--Returns in 1982 to Columbia River facilities and adjacent streams of 1978-brood fall chinook tagged for the BPA funded hatchery evaluation study.

Rearing Facility	Tag code	Number of returns	Return site
Abernathy	5-4-50	7	Abernathy Hatchery
	"	5	Abernathy Creek
	"	1	Germany Creek
Abernathy	5-4-51	10	Abernathy Hatchery
	"	1	Lower Kalama Hatchery
	"	3	Abernathy Creek
	"	2	Germany Creek
Big White Pond	5-4-43	9	Spring Creek Hatchery
	"	6	Little White Salmon Hatchery
	"	4	Bonneville Hatchery
	"	3	Big White Salmon River
Little White Salmon	5-4-48	1	Little White Salmon Hatchery
	"	1	Bonneville Hatchery
Little White Salmon	5-4-49	5	Little White Salmon Hatchery
Spring Creek	5-4-33	37	Spring Creek Hatchery
	"	5	Bonneville Hatchery
Spring Creek	5-4-44	78	Spring Creek Hatchery
	"	6	Bonneville Hatchery
Spring Creek	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	Abernathy Creek
	"	2	Skamokowa Creek
Bonneville	7-18-42	91	Bonneville Hatchery
	"	4	Cascade Hatchery
Bonneville	7-18-43	1	Cascade Hatchery

Appendix Table 7 (Continued)

Rearing Facility	Tag code	Number of returns	Return site
Klaskanine	7-18-45	3	Klaskanine Hatchery
	"	3	Big Creek Hatchery
	"	3	Lewis & 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	Cowlitz River
	"	1	Lewis River
Cowlitz .	63-19-51	13	Cowlitz Hatchery
	"	1	Lewis River
Elokomin	63-18-56	1	Elokomin Hatchery
Grays River	63-16-46	2	Grays River Hatchery
	"	1	Big Creek Hatchery
	"	1	Skamokawa Creek
Grays River	63-18-33	2	Grays River Hatchery
Grays River	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	Kalama River
	"	1	Washougal River
	"	1	Lower Columbia River
Priest Rapids	63-18-21	18	Priest Rapids Hatchery
	"	1	Bonneville Hatchery
	"	7	Priest Rapids area
	"	1	Lower Columbia River
Priest Rapids	63-18-57	1	Priest Rapids Hatchery
	"	1	Lower Columbia River
Priest Rapids	63-20-17	9	Priest Rapids Hatchery

Appendix Table 7 (Continued)

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

Appendix Table 8.--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	Skamokowa 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
Priest Rapids	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 9.--Returns in 1981 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	4	Abernathy Hatchery
	"	4	Abernathy Creek
	"	1	Big Creek
Abernathy	5-6-46	19	Abernathy Hatchery
	"	1	Spring Creek Hatchery
	"	6	Abernathy Creek
Spring Creek	5-6-39	27	Spring Creek Hatchery
	"	1	Little White Salmon Hatchery
	"	17	Bonneville Hatchery
Spring Creek	5-6-40	40	Spring Creek Hatchery
	"	6	Bonneville Hatchery
Spring Creek	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
OxBow	7-21-63	1	Bonneville Hatchery
Cowlitz	63-21-54	2	Grays River Hatchery
Cowlitz	63-21-37	9	Cowlitz Hatchery
Klickitat	63-19-47	1	Little White Salmon Hatchery
Lewis River	63-21-60	1	Lewis River
Priest Rapids	63-19-48	22	Priest Rapids Hatchery
Sea Resources	63-20-61	3	Sea Resources Hatchery
Washougal	63-21-53	5	Washougal Hatchery

Appendix Table 10.--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	Abernathy Creek
Abernathy	5-6-46	41	Abernathy Hatchery
	"	2	Spring Creek Hatchery
	"	1	Big Creek Hatchery
	"	1	Bonneville Hatchery
	"	1	Lower Kalama hatchery
	"	22	Abernathy Creek
	"	2	Kalama River
	"	1	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
Spring Creek	5-6-40	95	Spring Creek Hatchery
	"	2	Little White Salmon Hatchery
	"	9	Bonneville Hatchery
	"	1	Cascade Hatchery
	"	2	Big White Salmon River
Spring Creek	5-6-41	77	Spring Creek Hatchery
	"	3	Bonneville Hatchery
Spring Creek	5-6-41	2	Cascade Hatchery
	"	1	Kalama River
Spring Creek	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
	"	1	Elokomin Hatchery
	"	19	Big Creek
	"	19	Plympton Creek
	"	4	Skamokowa Creek
	"	2	Abernathy Creek
	"	1	Germany Creek

Appendix Table 10 (Continued)

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

Appendix Table 10 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Priest Rapids	63-19-48	54	Priest Rapids Hatchery
	"	1	Ringold Pond
	"	5	Wells Dam
	"	1	Lewis River
	"	2	Priest Rapids area
Sea Resources	63-20-61	15	Sea Resources Hatchery
Washougal	63-21-53	68	Washougal Hatchery
	"	1	Bonneville Hatchery
	"	4	Cascade Hatchery
	"	4	Lower Kalama Hatchery
	"	1	Washougal River
	"	2	Kalama River
Weyco Pond	Hl-2-3	12	Grays River Hatchery
	"	7	Big Creek Hatchery
	"	3	Elokomin Hatchery
	"	1	Skamokowa Creek

Appendix Table 11.--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
	"	1	Germany Creek
Little White Salmon	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
Big Creek	7-21-60	3	Abernathy Hatchery
	"	21	Elokomin Hatchery
	"	1	Lewis River
	"	2	Elochoman River
	"	7	Skamokowa Creek
	"	2	Abernathy Creek
Bonneville	7-21-57	10	Bonneville Hatchery
	"	1	Cascade Hatchery
OxBow	7-21-62	4	Bonneville Hatchery
	"	1	Cascade Hatchery

Appendix Table 11 (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
Cowlitz	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		1	Lower Kalama Hatchery
		31	Kalama Falls Hatchery
		1	Cowlitz Hatchery
		1	Kalama River

Appendix Table 11 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Pr st 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	Hl-2-3	4	Big Creek Hatchery
		1	Elokomin Hatchery
		1	Skamokowa Creek

Appendix Table 12.--Returns in 1982 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	14	Abernathy Hatchery
	"	3	Abernathy Creek
Abernathy	5-7-45	33	Abernathy Hatchery
	"	5	Lower Kalama Hatchery
	"	6	Abernathy Creek
Little White Salmon [1/]	5-8-49	1	Spring Creek Hatchery
Spring Creek	5-7-40	1	Spring Creek Hatchery
Spring Creek	5-7-41	4	Spring Creek Hatchery
Spring Creek	5-7-52	1	Spring Creek Hatchery
Bonneville	7-21-56	12	Bonneville Hatchery
Bonneville	7-23-29	6	Bonneville Hatchery
Big Creek	7-23-31	1	Big Creek Hatchery
	"	1	Elochoman River
Big Creek	7-23-33	4	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	25	Cowlitz Hatchery
	"	1	Lewis River Hatchery
Cowlitz	63-22-55	4	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 12 (Continued)

Rearing Facility	Tag Code	Number of returns	Return site
Priest Rapids	63-22-61	1	Priest Rapids Hatchery
	"	2	Priest Rapids area
Washougal	63-21-48	1	Washougal Hatchery
Washougal	63-22-51	1	Bonneville Hatchery
	"	1	Kalama River
Weyco Pond	Hl-3-1	1	Grays River Hatchery

Appendix Table 13.--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
	5-7-41	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
	5-7-50	3	Spring Creek Hatchery
	5-7-52	2	Spring Creek Hatchery

Appendix Table 13 (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	Skamokowa 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
Big Creek	7-23-34	8	Big Creek Hatchery
	"	1	Elokomin Hatchery
	"	1	Bear Creek
	"	1	Elochoman River
	"	3	Skamokowa 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 13 (Continued)

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

Appendix Table 14.--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	Skamokowa 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

l/ One fish returned in 1982.

Appendix Table 15.--Returns of Fall Chinook to Columbia River Facilities in 1980.

Facility	Returns Female	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		-	625	8,385 1/
Cowlitz	1,046	922	221	2,189
Elokomin	645	429	0	1,074 2/
Grays River	48	43	6	97
Kalama Falls 3/	2,566	1,966	167	4,699
Kalama Falls 4/		-	175	255 1/
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

l/ 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 16.--Returns of Fall Chinook to Columbia River Facilities in 1981.

Facility	Returns Female	Male	Jack	Total
Abernathy	454	828	743	2,025
Little White Salmon	767	474	256	1,497
Spring Creek	13,687	10,175	6,662	30,524
Big Creek	1,923	1,868	526	4,317
Bonneville	14,147	14,956	5,162	34,265
Cascade	131	103	15	249
Klaskanine	48	12	3	63
Willamette Falls	6,695	10,104	1,127	17,926
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
Klickitat	107	175	0	282
Lewis River	450	180	116	746
Lower Kalama	794	581	161	1,536
Priest Rapids	972	1,408	1,523	3,903
Sea Resources	130	67	32	229
Washougal	2,036	1,620	104	3,760
TOTAL	48,192	46,855	17,531	112,578

[1/] Lower river production stock
[2/] Upper river bright stock

Appendix Table 17.--Returns of fall Chinook to Columbia River Facilities in 1982.

Facility	Returns Female	Male	Jack	Total
Abernathy	1,032	1,033	1,016	3,081
Little White Salmon	1,337	710	101	2,148
Spring Creek	17,210	9,498	739	27,447
Big Creek	4,425	5,820	400	10,645
Bonneville	11,672	9,409	2,199	23,280
Cascade	450	364	76	890
Klaskanine	68	26	3	97
Willamette Falls	12,041	13,858	984	26,883
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
Klickitat	136	178	23	337
Lewis River	127	92	147	366
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	-		4	428 3/
Washougal	1,271	1,277	260	2,808
TOTAL	55,420	50,166	11,679	117,685

1/ Lower river production stock
2/ Upper river bright stock
3/ Adults not sexed

Appendix Table 18.--Returns of fall chinook to Columbia River facilities in 1983.

Facility	Returns Female	Male	Jack	Total
Abernathy	1,096	854	192	2,142
Little White Salmon	664	475	53	1,192
Spring Creek	5,889	3,514	1,005	10,408
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/
Klaskanine	30	17	1	48
Willamette Falls	7,049	6,156	528	13,733
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
Klickitat	57	90	13	160
Lewis River 1/	185	295	76	556
Lewis River 2/	10	25	4	39
Lower Kalama 1/	182	503	6	691
Lower Kalama 2/	85	372	89	546
Priest Rapids	1,530	3,280	1,214	6,024
Ringold	89	87	28	204

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

Appendix Table 18 (Continued)

Facility	Returns Female	Male	Jack	Total
Sea Resources	156	97	24	277
Washougal	1,775	2,257	26	4,058
TOTAL	35,060	34,185	4,215	73,465

Appendix Table 19.-- Returns of fall chinook to Columbia River facilities as of December 28, 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	5,071		582	5,653
Elokomin	1,710		6	1,716
Grays River	169		68	237
Kalama Falls	3,894		13	3,907
	484			484 1/
Klaskanine	26	15		41
Klickitat	137		3	140
Lewis River 2/	147		222	369
Little White Salmon	407	153	17	577
Lower Kalama	1,374		31	1,405
	96			96 1/
Priest Rapids	6,342		6,846	13,188
Sea Resources	413	425	16	854
Spring Creek	5,273	3,424	799	9,496
Washougal	1,956		159	2,115
Willamette Falls	20,060		1,084	21,144
	63,692		10,709	74,401

1/ Upriver bright fall chinook

2/ Includes Speelyai Hatchery