

BROODYEAR REPORT
FOR OLYMPIC PENINSULA
NATIONAL FISH HATCHERIES:
BROODS COMPLETED IN 1994-5

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Introduction

This report is the first in a planned series of completed brood reports for salmon and steelhead stocks raised at Olympic Peninsula National Fish Hatcheries (NFH). Data presented here are for broods completing their life cycle in the fall of 1994 and winter of 1994-5. Information from the adults creating the brood, egg production, rearing and release, survival to fisheries, and spawning escapement is presented on a broodyear basis. This report is intended to provide a single-broodyear "snapshot" of stock performance. In-depth analyses of trends and possible causes of results are addressed by comprehensive analytical reports that use these broodyear reports as components. Broodyear reports are one of three products specified as action elements under the hatchery evaluation component of the Region One, U.S. Fish and Wildlife Service, Fisheries Vision Action Plan.

The stocks and broods included in this report are:

Hatchery	Species	Brood
Makah NFH	Fall Chinook	1988
	Coho	1991
	Winter Steelhead	1989
	Fall Chum	1989
Quilcene NFH	Spring Chinook	1988
	Coho	1991
	Fall Chum	1989
Quinalt NFH	Fall Chinook	1988
	Coho	1991
	Winter Steelhead	1989
	Fall Chum	1989

The report details are presented chronologically in the following sections, from spawning to adult return. If a section is missing for a given stock, those data were not collected, or are not available.

- Run timing - adult entry, including total counted, date range, and median date of entry.
- Rack disposition - disposition of returning fish comprising the brood.
- Spawned fish data - mean age, mean length, sex ratio, spawning date range, and median spawning date.
- Incubation - number of eggs spawned, green eggs per female spawned, number of eggs eyed, percent of green eggs eyed, number of eggs hatched, percent of green eggs hatched.
- Release and Transfer - locations, last date of release, fish size at release, number of fish, life history stage, and associated tagcodes.
- Contribution estimates to fisheries and escapement, from coded-wire tagging - number of fish, percent total survival, ratio of catch to escapement, ratio of sport catch to commercial catch. Contribution estimates reflect total station production.
- Rack return for the surviving brood - number returning to hatchery by age, mean length at age.
- Estimated origin of returning coho adults:
 - Coho are coded-wire tagged at all three hatcheries, so the number of returning adults of known hatchery origin can be determined. Fish of other origins can be accounted for by their most likely possible origins. These origins may include statistical error in coded-wire tag data expansion, straying from other systems, natural spawning of hatchery or natural fish below the hatchery, and natural spawning of hatchery or natural fish which may be passed above the hatchery intentionally or unintentionally.

Contribution information was generated from the coastwide coded-wire tag release and recovery data maintained by the Pacific States Marine Fisheries Commission in Gladstone, Oregon. Data used in this report were obtained April 15, 1996. The balance of the information in this report came from the Fisheries Resources Evaluation Database (FRED), maintained at the Western Washington Fishery Resource Office, Olympia, Washington. All lengths are reported in millimeters and all weights are reported in grams.

Fish counted as rack returns at all three hatcheries may have originated from hatchery releases or from natural spawning below or above the hatchery. Likewise, returning adult hatchery fish may not enter the hatchery, but may contribute to natural spawning. Thus, the number of fish shown as returned to the rack may not represent hatchery escapement. Quinault fall chinook numbers

reported here result from both rack entry and broodstocking efforts conducted in the mainstem Quinault River.

Anomalies to the maximum age at return can have a minor influence on the reported data. Occasionally a four-year-old coho may be recovered or a seven-year-old chinook may be recovered. In the interest of timely reporting of results, those anomalies are not included in this report. Maximum ages used for this report are: coho - three years, chinook - six years, fall chum - five years, and winter steelhead - five years.

CONTRIBUTION SUMMARY

Hatchery	Species	Broodyear	Escapement	Catch	Total	Total survival
Makah	Fall Chinook	1988	-----	lot destroyed for VHS	-----	-----
Quinault	Fall Chinook	1988	102	1,704	1,806	0.27%
Quilcene	Spring Chinook	1988	33	86	119	0.06%
Makah	Coho	1991	2,184	2,306	4,490	1.61%
Makah	Coho, transfer	1991	68	340	408	0.72%
Quilcene	Coho	1991	13,368	21,473	34,841	8.76%
Quilcene	Coho, transfer	1991	508	7,287	7,795	4.37%
Quinault	Coho	1991	84	509	593	0.09%
Makah	Winter Steelhead	1989	642	4,032	4,674	4.67%
Quinault	Winter Steelhead	1989	1,234	3,302	4,536	2.64%
Makah	Fall Chum	1989	22	negligible	22	0.02%
Quilcene	Fall Chum	1989	802	1,236	2,038	0.09%
Quinault	Fall Chum	1989	1,196	n/a		

Quinault fall chinook survival was below the long-term average of 0.97%.

Quilcene spring chinook total survival was barely above the 0.058% hatchery return level required for brood maintenance. Continued low survival rates for this program led to its termination in 1993.

Survival rates for 1991 brood coho were greatly reduced for Makah, Quinault, and many other coastal stocks in Washington and Oregon. Survival rates for Puget Sound stocks did not reflect the lowered survival rates seen for coastal stocks. Quilcene coho survival was above average.

Makah steelhead are not coded-wire tagged, so return and catch represent both hatchery production and hatchery-timed production realized from adults passed upstream of the hatchery.

Quinault steelhead survival was above average. Recreational fisheries on the Quinault Reservation are not sampled. Total survival is greater than the figure reported here.

Makah chum runs were small historically. They increased while stock transfers from outside sources were in effect, but have returned to low levels since the transfers were stopped. The hatchery chum program was discontinued in 1996.

Quilcene chum were partitioned in the fishery using genetic stock identification by the Washington Department of Fish and Wildlife. The survival estimate is a crude calculation based only on hatchery escapement.

Quinault chum are not coded-wire tagged, nor are fisheries sampled for genetic stock identification, so separation of hatchery and natural components within the catch is not possible.

MAKAH NFH FALL CHINOOK Broodyear 1988

Run Timing

566 fish counted at entry Entry date range: 09/21/88 to 11/21/88 Median date: 10/08/88

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	158	264	0	422	75%
Surplus	17	0	73	90	16%
Passed over rack	12	7	0	19	3%
Dead in pond	18	12	0	30	5%
Bad females	0	4	1	5	1%
Total	205	287	74	566	

Spawned Fish

	mean age (n)	mean fork length (n)
Spawned males	4.0 (126)	863 (157)
Spawned females	4.2 (209)	886 (264)
Spawned fish	4.1 (335)	877 (421)

Males : Females: Jacks
37% : 63% : 0%

Progeny from this brood were not released. They were destroyed due to isolation of viral hemorrhagic septicemia in 1988 brood coho.

Rack Return, progeny of natural spawning fish, age estimated from scale samples

Return year	age	number to rack	mean length
1990	2	1	497
1991	3	14	468
1992	4	92	817
	3.9	107	769

MAKAH NFH COHO Broodyear 1991

Run Timing

5,036 fish counted at entry Entry date range: 10/10/91 to 01/13/92 Median date: 11/01/91

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	288	316	1	605	11%
Surplus	758	822	798	2,378	45%
Passed over rack	1,021	1,025	275	2,321	44%
Dead in pond	6	3	0	9	0%
Bad females	0	3	0	3	0%
Total	2,073	2,169	1,074	5,316	

Spawned Fish

	mean age (n)	mean fork length (n)
Spawned males	3.0 (49)	709 (49)
Spawned females	3.0 (49)	696 (49)
Spawned fish	3.0 (98)	702 (98)

Males : Females: Jacks
48% : 52% : 0%

Spawning date range: 10/23/91 - 11/04/91

Median date: 10/29/91

Incubation

Eggs taken = 957,032

3,029 eggs per female

Eggs eyed = 813,194 (85.0%)

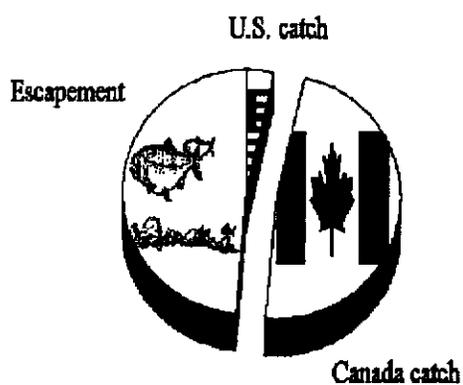
Eggs hatched = 454,800 (47.5%)

Release and Transfer

Release site	final date	g/fish	number	tagcodes
Waatch River	03/02/92	0.8	69,000	subyearling
Makah NFH	02/02/92	0.5	180,000	subyearling
Makah NFH	04/14/93	36.9	278,532	yearling
			527,532	
Transfer site				
Educket Hatchery	03/18/93	27.5	56,677	053123

Contribution Estimates, NFH release, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
052912	594	19	0	0	0	128	623	0	0	1.50%
052913	686	0	0	0	0	0	702	12	0	1.50%
052914	904	0	0	0	0	0	822	0	0	1.84%
	2,184	19	0	0	0	128	2,147	12	0	1.61%



Total Catch = 2,306

Catch:Escapement = 1.1:1

Sport:Commercial = 1:120

Contribution Estimates, Educket transfer, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053123	68	0	0	0	0	71	269	0	0	0.72%

Total Catch = 340

Catch:Escapement = 5:1

Rack Return, progeny

Return year	age	number to rack	mean length
1993	2	77	336
1994	3	3,911	724
	3.0	3,988	717

Estimated Origin of Adults Processed at Rack

Origin	1994 returning adults
Makah NFH	2,175
Educket Tribal Hatchery	68
Fry release, upstream passage, estimation error	1,668
Total	3,911

MAKAH NFH WINTER STEELHEAD Broodyear 1989

Run Timing

625 fish counted at entry Entry date range: 11/14/88 to 05/10/89 Median date: 01/02/89

Fish returning after 01/31/89 were excessed (except for 12 fish passed upstream on 02/04/89) due to isolation of viral hemorrhagic septicemia in 1988 brood coho.

Rack Disposition, parents

Usage	Males	Females	Jacks	Unknown	Total	Percent
Spawned	62	73	0	0	135	17%
Surplus	155	265	31	16	467	57%
Passed over rack	94	118	0	0	212	26%
Dead in pond	0	1	0	0	1	0%
Bad females	0	3	0	0	3	0%
Total	311	460	31	16	818	

Spawned fish

	mean age (n)	mean fork length (n)
Spawned males	3.3 (59)	716 (62)
Spawned females	3.6 (59)	731 (73)
Spawned fish	3.5 (118)	724 (135)

Males : Females: Jacks
46% : 54% : 0%

Release and Transfer

Progeny of the 1989 Makah steelhead brood were not released. They were destroyed due to isolation of viral hemorrhagic septicemia in 1988 brood coho. Quinalt NFH stock steelhead were transferred into Makah NFH for rearing and release.

Release site	final date	g/fish	number	
Makah NFH	04/20/90	60.5	82,187	yearling
Transfer site				
Educket Hatchery	04/20/90	60.5	18,000	yearling

Rack Return, progeny, age estimated from scale samples

Return year	age	number to rack	mean length
1992	3	512	626
1993	4	126	775
1994	5	4	936
	3.2	642	657

MAKAH NFH FALL CHUM Broodyear 1989

Run Timing

89 fish counted at entry Entry date range: 11/06/89 to 12/18/89 Median date: 11/24/89

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	41	43	0	84	93%
Surplus	1	0	1	2	2%
Dead in pond	3	1	0	4	4%
Total	45	44	1	90	

Spawned fish

	mean age (n)	mean fork length (n)
Spawned males	4.0 (40)	755 (40)
Spawned females	3.9 (40)	698 (43)
Spawned fish	3.9 (80)	726 (83)

Males : Females: Jacks
49% : 51% : 0%

Spawning date range: 11/20/89 - 12/04/89

Median date: 11/26/89

Incubation

Eggs taken = 118,412

2,754 eggs per female

Eggs eyed = 115,240 (97.3%)

Eggs hatched = 115,165 (97.3%)

Release and Transfer

Release site	final date	g/fish	number
Makah NFH	04/26/90	1.7	114,681 fry

Rack Return, progeny, age estimated from scale samples

Return year	age	number to rack	mean length
1992	3	14	595
1993	4	8	644
	3.4	22	613

QUILCENE NFH SPRING CHINOOK Broodyear 1988

Run Timing

119 fish counted at entry Entry date range: 05/ 4/88 to 08/18/88 Median date: 07/01/88

Rack Disposition, parents

Usage	Males	Females	Jacks	Unknown	Total	Percent
Unknown	1	5	0	2	8	6%
Spawned	5	56	0	0	61	48%
Surplus	0	0	0	2	2	2%
Dead in pond	18	25	0	0	43	34%
Died after spawn	13	0	0	0	13	10%
Total	37	86	0	4	127	

Spawned fish

	mean age (n)	mean fork length (n)
Spawned males	3.9 (14)	684 (14)
Spawned females	4.7 (56)	827 (56)
Spawned fish	4.5 (70)	799 (70)

Males : Females: Jacks
24% : 76% : 0%

Spawning date range: 08/11/88 - 9/27/88

Median date: 9/03/88

Incubation

4,194 eggs per female
Eggs hatched = 248,350

Release and Transfer

Release site	final date	g/fish	number		tagcodes
Quilcene NFH	05/07/90	35.4	211,300	yearling	052121,052122,052125,052126, 052128,052131,052132,052135, 052150,052152
<u>Transfer site</u>					
Quilcene NFH	05/23/89	4.5	95,000	fry	received from Solduc Hatchery

Contribution Estimates, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
<u>Quilcene stock</u>										
052121	5	0	4	0	0	4	0	0	0	0.05%
052122	4	15	0	0	0	3	9	0	0	0.11%
052125	6	0	0	0	0	2	2	0	0	0.04%
052126	9	0	1	0	0	2	2	0	0	0.05%
052150 - low density	4	12	0	0	0	0	4	0	0	0.15%
<u>Solduc stock</u>										
052128	1	3	0	0	0	0	4	0	0	0.04%
052131	3	3	0	0	0	0	0	2	0	0.04%
052132	1	0	0	0	0	0	4	0	0	0.03%
052135	0	4	0	0	0	0	3	3	0	0.06%
052152 - low density	0	0	0	0	0	0	0	0	0	0.00%
	33	37	5	0	0	11	28	5	0	0.06%



Total Catch = 86

Catch:Escapement = 2.6:1

Sport:Commercial = 1:1.05

Rack Return, progeny, age estimated from scale samples

Return year	age	number to rack	mean length
1990	2	5	263
1992	4	21	679
1993	5	28	780
	4.3	54	693

QUILCENE NFH COHO Broodyear 1991

Run Timing

1,842 fish counted at entry Entry date range: 08/08/91 to 12/31/91 Median date: 10/18/91

Rack Disposition, parents

Usage	Males	Females	Jacks	Unknowns	Total	Percent
Spawned	325	323	0	0	648	23%
Surplus	1,200	836	15	3	2,054	74%
Dead in pond	2	7	0	82	91	3%
Green females	0	1	0	0	1	0%
Total	1,527	1,167	15	85	2,794	

Spawned fish

	mean age (n)	mean fork length (n)
Spawned males	3.0 (62)	552 (62)
Spawned females	3.0 (69)	571 (76)
Spawned fish	3.0 (131)	563 (138)

Males : Females: Jacks
50% : 50% : 0%

Spawning date range: 10/07/91 - 11/12/91

Median date: 10/30/91

Incubation

Eggs taken = 787,158

2,437 eggs per female

Eggs eyed = 684,600 (87.0%)

Eggs hatched = 669,153 (85.0%)

Release and Transfer

Release site	final date	g/fish	number		tagcodes
Big Quilcene River	03/19/92	0.9	24,232	subyearling	
Quilcene NFH	05/12/93	23.0	397,701	yearling	052910,052911
			421,933		
Transfer site					
Port Gamble Bay	01/12/93	13.8	195,780	subyearling	052450,053140

Contribution Estimates, NFH release, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
052910	6,239	0	41	0	0	3,219	6,714	0	0	8.22%
052911	7,129	45	41	0	0	3,286	8,127	0	0	9.29%
	13,368	45	82	0	0	6,505	14,841	0	0	8.76%



Total Catch = 21,473

Catch:Escapement = 1.6:1

Sport:Commercial = 1:168

Contribution Estimates, Port Gamble Net Pen transfer, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
052450	246	0	0	0	0	1,391	1,883	0	0	4.52%
053140	262	28	0	0	0	1,714	2,585	0	0	4.21%
	508	28	0	0	0	3,105	4,468	0	0	4.35%

Total catch = 7,601

Catch:Escapement = 15.0:1

Sport:Commercial = 1:270

Rack Return, progeny

Return year	age	number to rack	mean length
1993	2	320	332
1994	3	14,068	575
	3.0	14,388	570

Estimated Origin of Adults Processed at Rack

Origin	1994 returning adults
Quilcene NFH	13,049
Local net pens, strays	578
Fry release, natural production, estimation error	441
Total	14,068

QUILCENE NFH FALL CHUM Broodyear 1989

Run Timing

1,137 fish counted at entry Entry date range: 11/27/89 to 12/26/89 Median date: 12/09/89

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	591	557	0	1,148	98%
Bad females	0	12	0	12	1%
Green females	0	9	0	9	1%
Total	591	578	0	1,169	

Spawned fish

	mean age (n)	mean fork length (n)
Spawned males	3.7 (161)	715 (178)
Spawned females	3.6 (151)	649 (164)
Spawned fish	3.6 (312)	683 (342)

Males : Females: Jacks
51% : 49% : 0%

Spawning date range: 11/27/89 - 12/26/89

Median date: 12/11/89

Incubation

Eggs taken = 1,242,209

2,230 eggs per female

Eggs eyed = 1,159,500 (93.3%)

Eggs hatched = 1,159,500 (93.3%)

Release and Transfer

Release site	final date	g/fish	number
Quilcene NFH	05/10/90	1	2,353,069 fry

Rack Return, progeny, age estimated from scale samples

Return year	age	number to rack	mean length
1992	3	20	613
1993	4	763	673
1994	5	19	741
	4.0	802	673

QUINAULT NFH FALL CHINOOK Broodyear 1988

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	176	264	0	440	72%
Surplus	6	0	18	24	4%
Dead in pond	62	62	4	128	21%
Bad females	0	2	0	2	0%
Green females	0	4	0	4	1%
Jump out	10	4	0	14	2%
Spawned out	0	1	0	1	0%
Total	254	337	22	613	

Spawned Fish

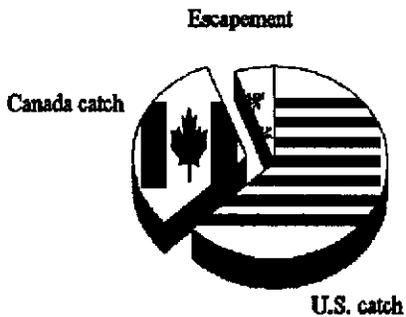
Males : Females: Jacks
 40% : 60% : 0%

Release and Transfer

Release site	final date	g/fish	number	tagcodes
Quinault NFH	07/25/89	8.8	670,341	subyearling 213152,213501
Transfer site				
Salmon River, QDNR	06/20/89	4.1	220,555	subyearling

Contribution Estimates, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
213152	18	0	0	0	0	142	126	37	0	0.32%
213501	84	0	19	0	0	839	424	117	0	0.26%
	102	0	19	0	0	981	550	154	0	0.27%



Total Catch = 1,704

Catch:Escapement = 16.7:1

Sport:Commercial = 1:88.7

Rack and Broodstocked Return, progeny, ages estimated from scale samples

Return year	age	number to rack	mean length
1990	2	17	463
1991	3	36	690
1992	4	45	865
1993	5	91	950
1994	6	7	1,012
	4.2	196	843

QUINAULT NFH COHO Broodyear 1991

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	724	807	44	1,575	12%
Surplus	3,408	5,609	1,732	10,749	84%
Dead in pond	96	93	33	222	2%
Bad females	0	13	0	13	0%
Green females	0	10	0	10	0%
Jump out	58	18	98	174	1%
Total	4,286	6,550	1,907	12,743	

Spawned fish

	mean age (n)	mean fork length (n)
Spawned males	3.0 (95)	673 (95)
Spawned females	3.0 (81)	670 (103)
Spawned jacks	2.0 (6)	372 (6)
Spawned fish	3.0 (182)	663 (204)

Males : Females: Jacks
46% : 51% : 3%

Spawning date range: 10/02/91 - 11/20/91

Median date: 10/26/91

Incubation

Eggs taken = 2,206,350
Eggs eyed = 1,732,200 (78.5%)

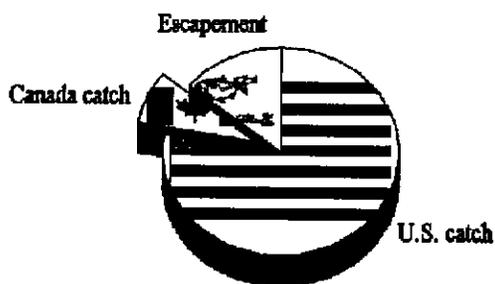
2,734 eggs per female
Eggs hatched = 1,722,200 (78.1%)

Release and Transfer

Release site	final date	g/fish	number		tagcodes
Quinault River	07/30/92	3.9	166,453	subyearling	
Cook Creek	04/01/92	1.1	100,359	subyearling	
Chow Chow Creek	03/24/92	1.2	115,380	subyearling	
Elk Creek	03/12/92	1.1	51,840	subyearling	
Red Creek	03/24/92	1.2	101,840	subyearling	
Boulder Creek	03/17/92	1.0	100,000	subyearling	
Moclips River	04/28/92	2.5	120,000	subyearling	
Quinault NFH	04/29/93	24.2	636,802	yearling	053128,053129, 053130
			1,392,674		

Contribution Estimates, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053128	27	0	0	0	0	71	0	0	0	0.05%
053129	19	17	0	0	0	148	48	0	0	0.11%
053130	38	0	0	0	0	225	0	0	0	0.11%
	84	17	0	0	0	444	48	0	0	0.09%



Total Catch = 509

Catch:Escapement = 6.1:1

Sport:Commercial = 1:29

Rack Return, progeny

Return year	age	number to rack	mean length
1993	2	55	-
1994	3	331	714
	2.9	386	714

Estimated Origin of Adults Processed at Rack

Origin	1994 returning adults
Quinault NFH	84
Tagged strays	9
Fry releases, natural production, untagged strays, estimation error	238
Total	331

QUINAULT NFH WINTER STEELHEAD Broodyear 1989

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	268	321	0	589	76%
Surplus	143	21	0	164	21%
Dead in pond	6	6	0	12	2%
Bad females	0	1	0	1	0%
Green females	0	1	0	1	0%
Spawned out	0	4	0	4	1%
Total	417	354	0	771	

Spawned Fish

Males : Females: Jacks
 46% : 54% : 0%

Incubation

Eggs taken = 1,447,417
 Eyed eggs shipped = 557,194

4,991 eggs per female
 762,226 eyed eggs kept
 91.1% eyed

Release and Transfer

Release site	final date	g/fish	number		tagcodes
Quinault NFH	08/15/89	3.9	45,000	subyearling	
Quinault NFH	05/02/90	70.9	171,825	yearling	213526
Hoh River	05/03/90	58.2	48,356	yearling	213521
			265,181		
Transfer site					
Wishkah Ponds	05/14/89	1.3	50,000	subyearling	
Makah NFH	08/11/89	3.8	104,000	subyearling	
Chalaat Creek, Hoh	02/21/90	31.7	45,910	yearling	213519
Salmon River, QDNR	03/06/90	35.5	156,063	yearling	213525
			355,973		

Contribution Estimates, from coded-wire tagging

tagcode	hatchery	sport fisheries				commercial fisheries				total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
213526	1,234	n/a	0	0	0	3,302	0	0	0	2.64%

Escapement



U.S. catch

Total Catch = 3,302

Catch:Escapement = 2.7:1

Rack Return, progeny, age estimated from scale samples

Return year	age	number to rack	mean length
1991	2	1	206
1992	3	1,327	617
1993	4	927	749
	3.4	2,255	671

QUINAULT NFH FALL CHUM Broodyear 1989

Rack Disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	337	165	0	502	87%
Surplus	1	2	0	3	1%
Dead in pond	62	4	0	66	11%
Bad females	0	4	0	4	1%
Green females	0	1	0	1	0%
Total	400	176	0	576	

Spawned Fish

Males : Females: Jacks
67% : 33% : 0%

Release and Transfer

Release site	final date	g/fish	number
Quinault NFH	04/19/90	1.3	491,744 fry

Rack Return, progeny, age estimated from scale samples

Return year	age	number to rack	mean length
1992	3	86	635
1993	4	662	696
1994	5	434	766
1995	6	14	836
	4.3	1,196	719