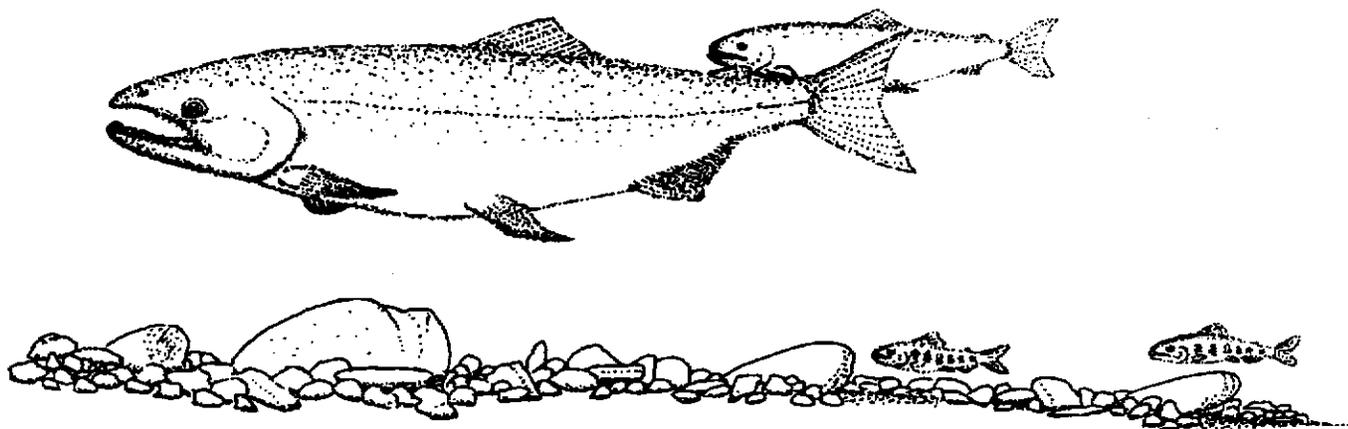




Broodyear Report for Olympic Peninsula National Fish Hatcheries:

Broods Completed 1996-1997

Western Washington Office
Aquatic Resources Division
Lacey, Washington
April 1999



BROODYEAR REPORT
FOR OLYMPIC PENINSULA
NATIONAL FISH HATCHERIES:
BROODS COMPLETED IN 1996-97

Thomas R. Kane
U.S. Fish and Wildlife Service
Western Washington Office
Aquatic Resources Division

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Introduction

This report presents data for Olympic Peninsula National Fish Hatchery (NFH) broods completing their life cycles in the fall of 1996 and winter of 1996-97. 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	1990
	Coho	1993
	Winter Steelhead	1991
	Fall Chum	1991
Quilcene NFH	Spring Chinook	1990
	Coho	1993
	Fall Chum	1991
	Summer Chum	1991
Quinault NFH	Fall Chinook	1990
	Coho	1993
	Winter Steelhead	1991
	Fall Chum	1991

The report details are presented chronologically in the following sections, from spawning through 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 the 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, and percent of green eggs hatched.
- Release and Transfer - locations, last date of release or transfer, fish size at release or transfer, 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, and ratio of sport catch to commercial catch. Contribution estimates reflect the total station production.
- Rack return for the surviving brood - number returning to the hatchery by age, and mean length at age.
- Estimated origin of returning coho adults:
Coho are coded-wire-tagged at all three hatcheries, and adults return predominately as a single age class, so the number of returning adults of known hatchery origin can be estimated. 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 have 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 1, 1999. The balance of the information in this report came from the Fisheries Resources Evaluation Database (FRED), maintained at the Western Washington Fishery Resource Office, Lacey, 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 completely represent hatchery escapement. Quinault NFH fall chinook numbers reported here result from both rack entry and broodstock collection efforts conducted in the mainstem Quinault River. Quilcene NFH summer chum numbers presented here are from fish that originated from natural spawning.

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	Hatchery escapement	Catch	Total	Total survival
Makah	Fall Chinook	1990	352	177	529	0.14%
Quinalt	Fall Chinook	1990	89	838	927	0.15%
Quilcene	Spring Chinook	1990	5	5	10	0.01%
Makah	Coho	1993	3,031	7,713	10,744	3.83%
Makah	Coho, transfer	1993	308	1,928	2,236	3.75%
Quilcene	Coho	1993	8,475	6,994	15,469	3.63%
Quilcene	Coho, transfer	1993	2,795	2,774	5,569	2.57%
Quinalt	Coho	1993	4,548	5,386	9,934	1.51%
Makah	Winter Steelhead	1991	361	1,171	1,532	1.72%
Quinalt	Winter Steelhead	1991	265	287	552	0.33%
Quilcene	Fall Chum	1991	4,787	12,736	17,523	0.79%
Quinalt	Fall Chum	1991	334	n/a	n/a	n/a

Quinalt fall chinook survival was below the long-term average of 0.80%.

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

Quinalt steelhead survival was below average. Recreational fisheries on the Quinalt Reservation are not sampled so total survival is greater than the figure reported here.

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.

Quinalt 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.

QUILCENE NFH COHO Broodyear 1993

Run timing

8,275 fish counted at entry Entry date range: 08/06/93 to 12/16/93 Median date: 9/28/93

Rack disposition, parents

Usage	Males	Females	Jacks	Unknown	Total	Percent
Spawned	844	849	19	0	1,712	22%
Surplus	2,807	2,784	301	0	5,892	75%
Dead in pond	20	58	0	0	78	1%
Bad females	0	9	0	0	9	0%
Jump out	20	25	0	20	65	1%
Live fish back to river	0	0	0	110	110	1%
Total	3,691	3,725	320	130	7,866	

Spawned fish

	Mean age (n)	Mean fork length (n)
Jacks	2 (19)	347 (5)
Males	3 (844)	520 (135)
Females	3 (849)	520 (136)
Spawned fish	3.0 (1,712)	517 (274)

Males : Females: Jacks
 Spawned fish 49% : 50% : 1%
 Spawning date range: 09/28/93 to 11/15/93 Median date: 10/22/93

Incubation

Eggs taken = 1,421,107 1,674 eggs per female
 Eggs eyed = 1,243,085 (87.5%)

Release and transfer

Release site	Final date	g/fish	Number		Tagcodes
Quilcene NFH	5/11/95	29.8	425,334	yearling	053747, 053748, 053750
<u>Transfer site</u>					
George Adams SFH	12/22/93	-	529,250	eyed eggs	
Quilcene Bay Net Pens	2/21/95	19	218,000	pre-smolt	053746

Contribution estimates, NFH release, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053747	2,780	319	77	0	0	286	1,857	0	0	3.70%
053748	2,625	489	111	0	0	244	1,668	0	0	3.65%
053749	3,070	490	69	0	20	167	1,197	0	0	3.55%
	8,475	1,298	257	0	20	697	4,722	0	0	3.63%



Total catch = 6,994
 Catch:Escapement = 1:1.2 Sport:Commercial = 1:3.4

Contribution estimates, netpen transfer, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053746	2,795	494	364	0	0	396	1,498	22	0	2.57%



Total Catch = 2,774

Catch:Escapement = 1:1

Sport:Commercial = 1:2.2

Rack return, progeny, (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	2	4,065	344
1996	3	7,947	564
	2.7	12,012	490

Estimated origin of adults processed at rack

Origin	1996 returning adults
Quilcene NFH	6,251
Local net pens, strays	1,395
Fry release, natural production, estimation error	301
Total	7,947

QUILCENE NFH SPRING CHINOOK Broodyear 1990

Run timing

71 fish counted at entry Entry date range: 05/10/90 to 09/10/90 Median date: 8/19/90

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	11	10	0	21	27%
Surplus	49	0	3	52	68%
Dead in pond	1	2	0	3	4%
Jump out	0	1	0	1	1%
Total	61	13	3	77	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.8 (11)	675 (11)
Females	4.4 (10)	751 (10)
Total	4.1 (21)	711 (21)

Males : Females: Jacks
 Spawned fish 52% : 48% : 0%
 Spawning date range: 08/17/90 to 09/12/90 Median date: 9/ 3/90

Release and transfer

Release site	Final date	g/fish	Number	Tagcodes
Quilcene NFH	5/13/92	58	123,319 yearling	052546, 052547, 052548, 052549, 052550, 052551, 052552
Transfer site				
Quilcene NFH	5/10/91	2.6	17,400	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	
052546	2	0	0	0	0	0	0	0	0	0.01%
052547	1	3	0	0	0	0	0	0	0	0.02%
052548	1	0	0	0	0	0	0	0	0	0.01%
052549	0	0	0	0	0	0	0	0	0	0.00%
052550	0	0	0	0	0	0	0	0	0	0.00%
052551	1	0	0	0	0	0	2	0	0	0.02%
052552	0	0	0	0	0	0	0	0	0	0.00%
	5	3	0	0	0	0	2	0	0	0.01%

Total catch = 5

Catch:Escapement = 1:1 Sport:Commercial = 1.5:1

Rack return, progeny, age estimated from scale samples (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1992	2	1	210
1993	3	1	440
1994	4	3	642
	3.4	5	515

QUILCENE NFH SUMMER CHUM Broodyear 1991

Rack handlings, (from hatchery rack and broodstocking in Quilcene Bay)

Return year	Age	Number processed	Mean length
1993	2	2	532
1994	3	332	648
1995	4	21	683
	3.1	355	650

QUILCENE NFH CHUM Broodyear 1991

Run timing

1,603 fish counted at entry Entry date range: 11/21/91 to 12/31/91 Median date: 12/ 4/91

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	605	602	1,207	75%
Surplus	396	0	396	25%
Total	1,001	602	1,603	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.0 (154)	707 (205)
Females	4.0 (137)	656 (203)
Total	4.0 (291)	682 (408)

Males : Females

Spawned fish 50% : 50%

Spawning date range: 11/21/91 to 12/31/91 Median date: 12/ 4/91

Incubation

Eggs taken = 1,483,750 2,465 eggs per female

Eggs eyed = 1,284,150(86.5%) Eggs hatched = 1,282,716(86.5%)

Release

Release site	Final date	g/fish	Number
Quilcene NFH	5/7/92	0.8	2,208,144 fry

Rack return, progeny, age estimated from scale samples (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1994	3	1,100	649
1995	4	3,622	724
1996	5	65	769
	3.8	4,787	707

MAKAH NFH COHO Broodyear 1993

Run timing

1,786 fish counted at entry Entry date range: 10/06/93 to 10/28/93 Median date: 11/17/93

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	255	262	4	521	29%
Surplus	51	56	17	124	7%
Passed over rack	518	535	56	1,109	62%
Dead in pond	13	15	0	28	2%
Bad females	0	4	0	4	0%
Total	837	872	77	1,786	

Spawned fish

	Mean age (n)	Mean fork length (n)
Jacks	2 (11)	353 (1)
Males	3 (378)	589 (29)
Females	3 (492)	620 (78)
Total	3.0 (881)	609 (108)

Males : Females: Jacks
 Spawned fish 49% : 50% : 1%
 Spawning date range: 11/02/93 to 11/23/93 Median date: 11/16/93

Incubation

Eggs taken = 712,002 2,718 eggs per female
 Eggs eyed = 538,668 (75.7%) Eggs hatched = 461,000 (64.7%)

Release and transfer

Release site	Final date	g/fish	Number	Tagcodes
Makah NFH	3/30/94	0.6	136,000	subyearling
Makah NFH	4/12/95	30.2	281,853	yearling
			417,853	053750,053751,053752
<u>Transfer site</u>				
Educket Hatchery	3/17/95	26.4	59,700	yearling
				053424

Contribution estimates, NFH release, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053750	929	180	152	0	19	948	1,241	151	0	4.22%
053751	1,066	190	0	0	38	829	990	105	0	3.28%
053752	1,036	361	0	0	0	1,112	1,340	57	0	3.99%
	3,031	731	152	0	57	2,889	3,571	313	0	3.83%



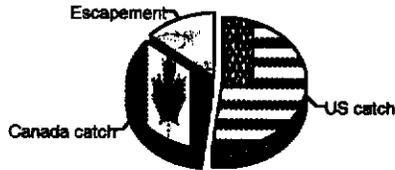
Total Catch = 7,713

Catch:Escapement = 2.5:1

Sport:Commercial = 1:7.1

Contribution estimates, Educket transfer from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053424	308	102	52	0	0	1,036	717	21	0	3.75%



Total Catch = 1,928
 Catch:Escapement = 6.3:1 Sport:Commercial = 1:11.5

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	2	493	340
1996	3	5,395	717
	2.9	5,888	685

Estimated origin of adults processed at rack

Origin	1996 returning adults
Makah NFH	3,022
Educket strays	304
Natural production, estimation error	2,069
Total	5,395

MAKAH NFH FALL CHINOOK Broodyear 1990

Run timing

320 fish counted at entry Entry date range: 10/03/90 to 10/31/90 Median date: 10/ 7/90

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	90	92	0	182	59%
Surplus	81	0	26	107	35%
Dead in pond	17	2	0	19	6%
Bad females	0	2	0	2	1%
Total	188	96	26	310	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.6 (90)	831 (90)
Females	4.4 (75)	906 (91)
Total	3.9 (165)	869 (181)

Males : Females
 Spawned fish 49% : 51%
 Spawning date range: 10/03/90 to 10/25/90 Median date: 10/10/90

Incubation

Eggs taken = 489,537 5,321 eggs per female
 Eggs eyed = 451,023(92.1%) Eggs hatched = 439,113(89.7%)

Release

Release site	Final date	g/fish	Number	Tagcodes
Sooes River	3/21/91	1.1	50,000	subyearling
Makah NFH	6/10/91	6.8	384,136	subyearling 052353,052354,052355,052356
			434,136	

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
052354	62	0	5	0	5	0	28	7	0	0.11%
052355	61	6	0	0	0	0	0	0	0	0.07%
052353	149	0	0	0	0	0	54	26	0	0.24%
052356	80	0	0	0	0	0	25	21	0	0.13%
	352	6	5	0	5	0	107	54	0	0.14%



Total catch = 177

Catch:Escapement = 1:2.0

Sport:Commercial = 1:10

Rack return, progeny, age estimated from scale samples (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1992	2	50	441
1993	3	153	723
1994	4	359	870
1995	5	275	915
1996	6	7	868
	4.0	844	833

MAKAH NFH WINTER STEELHEAD Broodyear 1991

Run timing

88 fish counted at entry Entry date range: 11/26/90 to 02/20/91 Median date: 12/17/91

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	29	48	77	95%
Dead in pond	0	4	4	5%
Total	29	52	81	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.6 (28)	721 (27)
Females	3.9 (48)	758 (48)
Total	3.8 (76)	745 (75)

Males : Females

Spawned fish 38% : 62%

Spawning date range: 12/12/90 to 02/13/91 Median date: 1/6/91

Incubation

Eggs taken = 227,626 4,742 eggs per female

Eggs eyed = 198,483 (87.2%) Eggs hatched = 191,569 (84.2%)

Release and transfer

Release site	Final date	g/fish	Number
Waatch River	5/17/91	0.9	24,000 subyearling
Makah NFH	5/8/91	0.9	48,700 subyearling
Makah NFH	4/21/92	71	88,951 yearling
			161,651
<u>Transfer site</u>			
Educket Hatchery	4/16/92	71	18,000

Rack return, progeny, age estimated from scale samples

Return year	Age	Number to rack	Mean length
1993	2	2	435
1994	3	195	621
1995	4	164	777
	3.4	361	691

MAKAH NFH CHUM Broodyear 1991

Run timing

257 fish counted at entry Entry date range: 10/15/91 to 01/13/92 Median date: 12/ 7/91

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	91	157	248	95%
Surplus	0	5	5	2%
Dead in pond	7	0	7	3%
Total	98	162	260	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.0 (62)	709 (82)
Females	4.0 (141)	677 (157)
Total	4.0 (203)	688 (239)

Males : Females

Spawned fish 37% : 63%

Spawning date range: 11/20/91 to 01/06/92 Median date: 12/ 6/91

Incubation

Eggs taken = 393,010 2,503 eggs per female

Eggs eyed = 360,391 (91.7%) Eggs hatched = 353,558 (90.0%)

Release

Release site	Final date	g/fish	Number
Makah NFH	4/29/92	1.2	344,862 fry

Rack return, progeny, age estimated from scale samples (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	4	8	716

QUINAULT NFH COHO Broodyear 1993

Run timing

1,111 fish counted at entry Entry date range: 10/01/93 to 12/08/93 Median date: 11/ 7/93

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	378	492	11	881	54%
Surplus	274	376	42	692	43%
Dead in pond	18	4	1	23	1%
Bad females	0	1	0	1	0%
Green females	0	3	0	3	0%
Jump out	21	1	1	23	1%
Spawned out	0	5	0	5	0%
Total	691	882	55	1,628	

Spawned fish

	Mean age (n)	Mean fork length (n)
Jacks	2 (4)	-
Males	3 (255)	708 (55)
Females	3 (262)	671 (87)
Total	3.0 (521)	685 (142)

Males : Females: Jacks
 Spawned fish 43% : 56% : 1%
 Spawning date range: 10/20/93 to 12/15/93 Median date: 11/10/93

Incubation

Eggs taken = 1,181,051 2,401 eggs per female
 Eggs eyed = 1,042,221 (88.2%) Eggs hatched = 876,996 (74.3%)

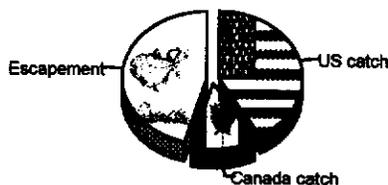
Release

Release site	Final date	g/fish	Number	Tagcodes
Quinault NFH	4/20/95	26.2	655,320 yearling	053615,053616,053617

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053615	1,531	157	0	0	0	1,356	525	44	0	1.58%
053616	1,601	160	0	0	0	1,396	489	0	0	1.68%
053617	1,416	79	0	0	0	944	236	0	0	1.27%
	4,548	396	0	0	0	3,696	1,250	44	0	1.51%

Total Catch = 5,386
 Catch:Escapement = 1.2:1 Sport:Commercial = 1:12.5



Rack return, progeny, (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	2	411	354
1996	3	6,446	652
	2.9	6,857	634

Estimated origin of adults processed at rack

Origin	1996 returning adults
Quinault NFH	4,407
Tagged strays	0
Natural production, estimation error	2,039
Total	6,446

QUINAULT NFH FALL CHINOOK Broodyear 1990

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	62	293	0	355	62%
Surplus	21	0	22	43	7%
Dead in pond	89	73	0	162	28%
Bad females	0	2	0	2	0%
Green females	0	5	0	5	1%
Jump out	5	0	0	5	1%
Spawned out	0	4	0	4	1%
Total	177	377	22	576	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.4 (34)	906 (59)
Females	4.8 (125)	952 (272)
Total	4.7 (159)	944 (331)

Males : Females: Jacks
 Spawned fish 17% : 83% : 0%
 Spawning date range: 10/09/90 to 11/19/90 Median date: 11/ 3/90

Incubation

Eggs taken = 1,508,143 5,147 eggs per female

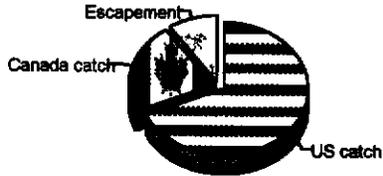
Eggs eyed = 1,350,365 (89.5%)

Release and transfer

Release site	Final date	g/fish	Number	Tagcodes
Quinault NFH	7/15/91	7.2	634,577	subyearling 212016
Transfer site				
Quinault Lake Hatchery	1/ 7/91		625,774	eyed eggs

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
212016	89	0	0	0	0	545	204	89	0	0.15%



Total catch = 838
 Catch:Escapement = 9.4:1

Rack return, progeny, age estimated from scale samples (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1992	2	8	424
1993	3	5	651
1994	4	99	846
1995	5	78	940
1996	6	5	981
	4.3	195	865

QUINAULT NFH WINTER STEELHEAD Broodyear 1991

Rack disposition, parents

Usage	Males	Females	Jacks	Unknown	Total	Percent
Spawned	230	301	0	0	531	81%
Surplus	105	0	2	1	108	17%
Dead in pond	8	4	0	0	12	2%
Spawned out	0	2	0	0	2	0%
Total	343	307	2	1	653	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.6 (157)	716 (148)
Females	3.9 (242)	741 (253)
Total	3.8 (399)	732 (401)

Males : Females
 Spawned fish 43% : 57%
 Spawning date range: 11/27/90 to 03/14/91 Median date: 1/19/91

Incubation

Eggs taken = 1,246,140 4,140 eggs per female

Eggs hatched = 1,096,460 (88.0%)

Release and transfer

Release site	Final date	g/fish	Number		Tagcodes
Hoh River	5/6/92	57	49,072	yearling	212052
Quinault River	5/31/91	0.3	225,684	subyearling	
Quinault NFH	8/5/91	3	275,437	subyearling	
Quinault NFH	5/6/92	66	169,611	yearling	212054
			719,804		
<u>Transfer site</u>					
Salmon River, QDNR	3/10/92	30	149,680		
Chalaat Creek, Hoh	3/11/92	31	51,103		
			200,783		

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
212052	2	0	0	0	0	37	0	0	0	0.08%
212054	265	0	0	0	0	287	0	0	0	0.33%
	267	0	0	0	0	324	0	0	0	

Total catch = 324
 Catch:Escapement = 1.2:1 Sport:Commercial = 0.00

Rack return, progeny, age estimated from scale samples (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1994	3	96	614
1995	4	479	769
1996	5	6	816
	3.8	581	744

QUINALT NFH CHUM Broodyear 1991

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	55	287	342	60%
Surplus	6	0	6	1%
Dead in pond	19	36	55	10%
Bad females	0	1	1	0%
Green females	0	3	3	1%
Post spawn dip	164	0	164	29%
Total	244	327	571	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.2 (20)	714 (20)
Females	4.2 (120)	697 (138)
Total	4.2 (140)	699 (158)

Males : Females
 Spawned fish 16% : 84%
 Spawning date range: 10/25/91 to 11/26/91 Median date: 11/14/91

Incubation

Eggs taken = 745,095 2,596 eggs per female
 Eggs eyed = 672,304 (90.2%) Eggs hatched = 670,798 (90.0%)

Release

Release site	Final date	g/fish	Number
Quinalt NFH	4/3/92	1.1	637,885 fry

Rack return, progeny, age estimated from scale samples (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1994	3	42	672
1995	4	267	726
1996	5	25	773
	3.9	334	723