

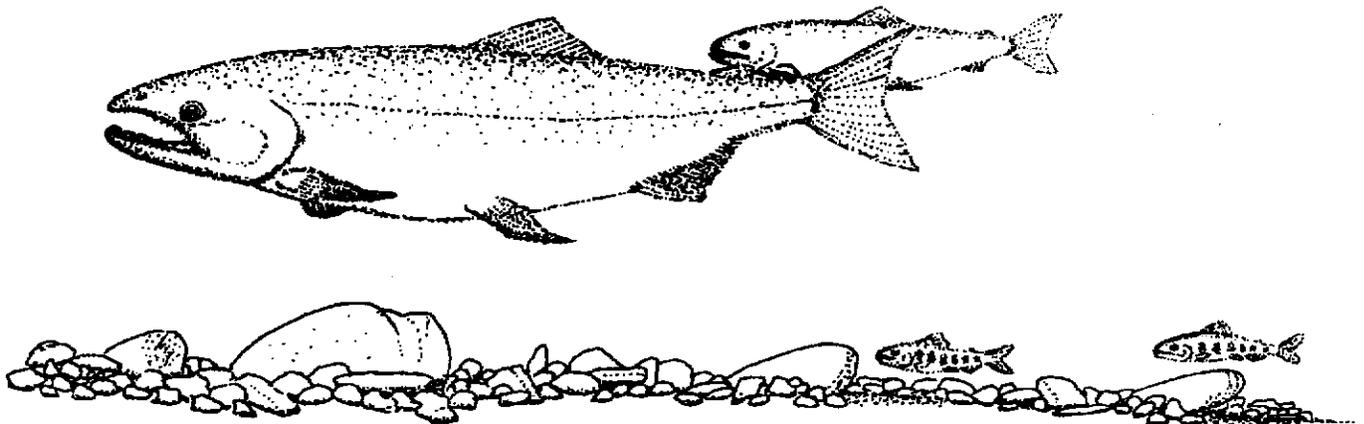


Broodyear Report for Olympic Peninsula National Fish Hatcheries:

Broods Completed in 1997-1998

Western Washington Office
Division of Fisheries and Watershed Assessment

Lacey, Washington
April 2000



BROODYEAR REPORT
FOR OLYMPIC PENINSULA
NATIONAL FISH HATCHERIES:
BROODS COMPLETED IN 1997-1998

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Division of Fisheries and Watershed Assessment

April 2000

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INTRODUCTION

This report presents data for Olympic Peninsula National Fish Hatchery (NFH) salmon broods completing their life cycles in the fall of 1997 and winter of 1997-98. 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.

The stocks and broods included in this report are:

Hatchery	Species	Brood
Makah NFH	Fall Chinook	1991
	Coho	1994
	Winter Steelhead	1992
	Fall Chum	1992
Quilcene NFH	Spring Chinook	1991
	Coho	1994
	Fall Chum	1992
	Summer Chum	1992
Quinault NFH	Fall Chinook	1991
	Coho	1994
	Winter Steelhead	1992
	Fall Chum	1992

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, are not available, or are not meaningful. Some data may be represented as zero due to rounding of numbers and some columns of data may not total 100% due to rounding of numbers.

- 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 February 18, 2000. The balance of the information in this report came from the Fisheries Resources Evaluation Database (FRED), maintained at the Western Washington Office, Division of Fisheries and Watershed Assessment, Branch of Fisheries Assistance, 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 reported here result from both rack entry and broodstock collection efforts conducted in Quilcene Bay and Big Quilcene 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, summer chum - five years, fall chum - five years, and winter steelhead - five years.

CONTRIBUTION SUMMARY

Hatchery	Species	Broodyear	Hatchery escapement	Catch	Total	Total survival
Makah	Fall chinook	1991	94	33	127	0.02%
Quinault	Fall chinook	1991	36	628	513	0.16%
Quilcene	Spring chinook	1991	14	5	19	0.02%
Makah	Coho	1994	1,402	237	1,639	0.60%
Makah	Coho, transfer	1994	82	60	142	0.28%
Quilcene	Coho	1994	19,169	4,515	23,684	4.51%
Quinault	Coho	1994	578	209	787	0.33%
Makah	Winter steelhead	1992	509	1,395	1,904	2.58%
Makah	Winter steelhead, transfer	1992	0	123	123	1.23%
Quinault	Winter steelhead	1992	1,422	1,746	3,168	1.27%
Quilcene	Summer chum	1992	894	252	1,146	0.54%
Quilcene	Fall chum	1992	2,260	1,879	4,139	0.30%
Quinault	Fall chum	1992	74	n/a	n/a	n/a

Quinault fall chinook survival was below the long-term average of 0.82%.

Makah fall chinook survival was below the long-term average of 0.18%

Coho survival at the coastal hatcheries (Quinault and Makah) was low relative to long-term averages, while survival at Quilcene was comparable to its long-term average.

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.

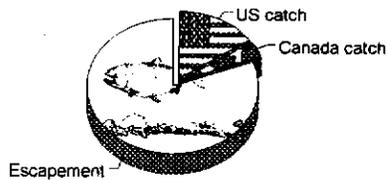
Recreational fisheries for steelhead on the Quinault Reservation are not sampled so total survival is greater than the figure reported here.

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.

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.

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
054058	4,604	654	61	0	0	206	0	0	0	4.14%
054059	4,879	611	441	0	0	283	23	0	0	4.85%
054060	5,704	699	355	0	0	435	0	0	0	5.37%
054061	3,982	453	0	0	0	294	0	0	0	3.69%
	19,169	2,417	857	0	0	1,218	23	0	0	4.51%



Total Catch = 4,515
 Catch:Escapement = 1:4.2 Sport:Commercial = 2.6:1

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1996	2	199	294
1997	3	24,998	507
	3.0	25,197	504

Estimated origin of adults processed at rack

Origin	1997 returning adults
Quilcene NFH	19,096
Port Gamble net pen strays	5
Subyearling release, natural production, estimation error ¹	5,897
Total	24,998

¹ estimation error is the most likely source, given the wide variability in total survival

QUILCENE NFH SPRING CHINOOK Broodyear 1991

Run timing

21 fish counted at entry Entry date range: 05/10/91 to 10/10/91 Median date 7/13/91

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	15	11	0	26	76%
Surplus	2	0	1	3	9%
Dead in pond	3	1	0	4	12%
Jump out	1	0	0	1	3%
Total	21	12	1	34	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.2 (15)	733 (15)
Females	4.6 (10)	748 (10)
Spawned fish	4.4 (25)	739 (25)

Males : Females: Jacks
 Spawned fish 58% : 42% : 0%
 Spawning date range: 08/23/91 to 09/10/91 Median date: 9/01/91

Release and transfer

Release site	Final date	g/fish	Number	Stage	Tagcodes
Quilcene NFH	05/11/93	43.6	120,465	yearling	052863,052905,052906, 052907,052908,052909
			120,465		
Transfer site					
Hood Canal SFH	06/08/92	6.2	33,866	subyearling	-
Quilcene NFH			251,740	green egg	received from SolDuc SFH

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
052863	0	0	0	0	0	0	4	0	0	0.02%
052905	3	0	0	0	0	0	0	0	0	0.02%
052906	2	0	0	0	0	0	0	0	0	0.01%
052907	2	0	0	0	0	0	0	0	0	0.01%
052908	4	0	0	0	0	0	0	0	0	0.02%
052909	3	0	0	0	0	1	0	0	0	0.02%
	14	0	0	0	0	1	4	0	0	0.02%

Total Catch = 5
 Catch:Escapement = 1:2.8

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1993	2	1	265
1995	4	15	709
1996	5	5	844
	4.1	21	720

QUILCENE NFH SUMMER CHUM Broodyear 1992

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	188	170	358	87%
Surplus	24	0	24	6%
Dead in pond	13	14	27	7%
Spawned out	0	2	2	0%
Total	225	186	411	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.9 (92)	662 (100)
Females	4.0 (109)	618 (109)
Spawned fish	4.0 (201)	639 (209)

Males : Females
 Spawned fish 53% : 47%

Incubation

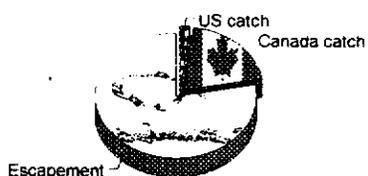
Eggs taken = 365,170 2,148 eggs per female
 Eggs eyed = 292,407 (80.1%) Eggs hatched = 291,489 (79.8%)

Release and transfer

Release site	Final date	g/fish	Number	Stage	Tagcodes
Quilcene NFH	04/13/93	1.0	216,441	fry	0501010115, 0501010201

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
0501010115	343	24	0	0	0	0	69	0	0	0.55%
0501010201	551	0	0	0	0	0	159	0	0	0.52%
	894	24	0	0	0	0	228	0	0	0.54%



Total Catch = 252
 Catch:Escapement = 1:3.5 Sport:Commercial = 1:9.5

Rack and broodstocked return, progeny (includes natural origin fish)

Return year	Age	Number to rack	Mean length
1994	2	4	525
1995	3	478	619
1996	4	726	704
1997	5	26	721
	3.6	1.234	671

QUILCENE NFH FALL CHUM Broodyear 1992

Run timing

357 fish counted at entry Entry date range: 11/23/92 to 12/14/92 Median date 12/01/92

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	90	89	179	50%
Surplus	172	0	172	48%
Dead in pond	5	0	5	1%
Bad females	0	1	1	0%
Green females	0	1	1	0%
Total	267	91	358	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.5 (57)	738 (69)
Females	4.1 (69)	664 (80)
Spawned Fish	4.3 (126)	698 (149)

Males : Females

Spawned fish 50% : 50%

Spawning date range: 11/23/92 to 12/14/92 Median date: 12/01/92

Incubation

Eggs taken = 218,002 2,449 eggs per female

Eggs eyed = 184,750 (84.7%)

Release and transfer

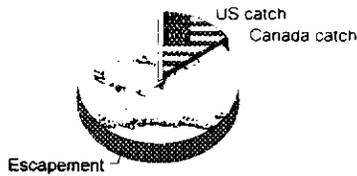
Release site	Final date	g/fish	Number	Stage	
Quilcene NFH	05/04/93	0.8	1,361,724	fry	
<u>Transfer site</u>					
Quilcene NFH	01/26/93		1,150,202	eyed egg	received from Enetai Hatchery
Quilcene NFH	11/23/92		12,400	green egg	received from Walcott Slough
Quilcene NFH	11/30/92		29,893	green egg	received from Walcott Slough
			<u>1,192,495</u>		

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	3	361	645
1996	4	1,847	698
1997	5	52	766
		<u>2,260</u>	<u>691</u>

Contribution estimates, NFH release, from coded-wire tagging

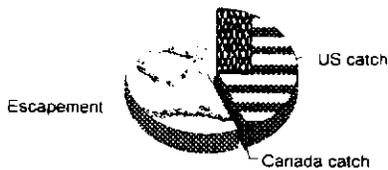
Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
054044	386	35	0	0	0	35	0	0	0	0.64%
054045	391	9	0	0	0	0	0	26	0	0.61%
054046	317	26	0	0	0	18	0	0	0	0.55%
054047	308	70	0	0	18	0	0	0	0	0.59%
	1,402	140	0	0	18	53	0	26	0	0.60%



Total Catch = 237
 Catch:Escapement = 1:5.9 Sport:Commercial = 1:2.0

Contribution estimates, Educket transfer, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
054057	82	40	0	0	0	8	0	15	0	0.29%



Total Catch = 63
 Catch:Escapement = 1:1.3 Sport:Commercial = 1.7:1

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1996	2	200	352
1997	3	2,193	684
	2.9	2,393	656

Estimated origin of adults processed at rack

Origin	1997 returning adults
Makah NFH	1,315
Educket transfer, strays	82
Subyearling release, natural production, estimation error	796
Total	2,193

MAKAH NFH FALL CHINOOK Broodyear 1991

Run timing

1,525 fish counted at entry Entry date range: 10/10/91 to 11/26/91 Median date: 10/18/91

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	155	179	6	340	22%
Surplus	1	0	1,200	1,201	77%
Dead in pond	2	1	1	4	0%
Bad females	0	5	0	5	0%
Green females	0	1	0	1	0%
Total	158	186	1,207	1,551	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.0 (123)	853 (149)
Females	4.3 (107)	893 (169)
Spawned fish	4.1 (230)	875 (318)

Males : Females: Jacks
 Spawned fish 46% : 53% : 2%
 Spawning date range: 10/10/91 to 11/26/91 Median date: 10/20/91

Incubation

Eggs taken = 912,619 5,098 eggs per female
 Eggs eyed = 804,502 (88.2%) Eggs hatched = 660,939 (72.4%)

Release and transfer

Release site	Final date	g/fish	Number	Stage	Tagcodes
Sooes River	03/27/92	1.4	119,227	subyearling	-
Makah NFH	06/02/92	7.6	648,160	subyearling	052824,052825, 052822,052823
			767,387		

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
052824	10	0	0	0	0	0	0	0	0	0.01%
052825	51	0	0	0	0	0	17	5	0	0.04%
052822	28	0	0	0	0	0	11	0	0	0.02%
052823	5	0	0	0	0	0	0	0	0	0.00%
	94	0	0	0	0	0	28	5	0	0.02%



Total Catch = 33
 Catch:Escapement = 1:2.8

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1993	2	11	478
1994	3	35	707
1995	4	156	868
1996	5	115	920
	4.2	317	855

MAKAH NFH WINTER STEELHEAD Broodyear 1992

Run timing

547 fish counted at entry Entry date range: 11/26/91 to 02/04/92 Median date: 1/17/92

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	99	96	0	195	36%
Surplus	260	81	1	342	63%
Passed over rack	1	3	0	4	1%
Dead in pond	3	1	0	4	1%
Total	363	181	1	545	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.1 (88)	646 (94)
Females	3.1 (95)	621 (95)
Spawned fish	3.1 (183)	633 (189)

Males : Females: Jacks
 Spawned fish 51% : 49% : 0%
 Spawning date range: 12/17/91 to 02/04/92 Median date: 1/23/92

Incubation

Eggs taken = 336,145 3,502 eggs per female
 Eggs eyed = 215,806 (64.2%) Eggs hatched = 215,762 (64.2%)

Release and transfer

Release site	Final date	g/fish	Number	Stage
Waatch River	04/16/92	0.7	25,700	subyearling
Makah NFH	04/28/92	0.8	73,490	subyearling
Makah NFH	04/29/93	68.2	73,955	yearling
			173,145	
<u>Transfer site</u>				
Educket Hatchery	04/14/93	69.8	10,000	yearling

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1994	2	2	406
1995	3	456	621
1996	4	46	731
1997	5	5	835
	3.1	509	632

MAKAH NFH CHUM Broodyear 1992

Run timing

40 fish counted at entry Entry date range: 11/02/92 to 11/30/92 Median date: 11/19/92

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	14	25	39	100%
Total	14	25	39	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.8 (13)	678 (13)
Females	4.0 (25)	660 (25)
Spawned Fish	3.9 (38)	666 (38)

Males : Females
 Spawned fish 36% : 64%
 Spawning date range: 11/05/92 to 11/30/92 Median date: 11/20/92

Incubation

Eggs taken = 65,784 2,631 eggs per female
 Eggs eyed = 61,164 (93.0%) Eggs hatched = 60,026 (91.2%)

Release and transfer

Release site	Final date	g/fish	Number
Makah NFH	05/12/93	1.3	59,959 fry

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	3	14	667

QUINALT NFH COHO Broodyear 1994

Run timing

438 fish counted at entry Entry date range: 10/12/94 to 12/14/94 Median date: 10/28/94

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	121	139	8	268	60%
Surplus	63	0	104	167	37%
Dead in pond	3	1	3	7	2%
Green females	0	1	0	1	0%
Jump out	1	2	0	3	1%
Total	188	143	115	446	

Spawned fish

Males : Females: Jacks
 Spawned fish 45% : 52% : 3%
 Spawning date range: 10/19/94 to 12/14/94 Median date: 11/04/94

Incubation

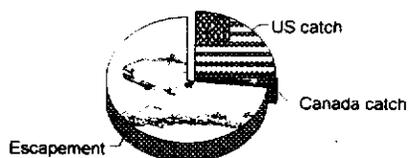
Eggs taken = 457,060 3,288 eggs per female
 Eggs eyed = 365,812 (80.0%) Eggs hatched = 345,670 (75.6%)

Release and transfer

Release site	Final date	g/fish	Number	Stage	Tagcodes
Quinalt NFH	04/23/96	26.7	241,374	yearling	053857,053858, 053859,053860

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
053857	78	0	0	0	0	16	0	0	0	0.16%
053858	109	0	0	0	6	6	0	0	0	0.20%
053859	260	25	0	0	0	75	13	0	0	0.62%
053860	131	22	0	0	6	40	0	0	0	0.33%
	578	47	0	0	12	137	13	0	0	0.33%



Total Catch = 209
 Catch:Escapement = 1:2.8 Sport:Commercial = 1:2.5

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1996	2	109	344
1997	3	698	665
	2.9	807	622

Estimated origin of adults processed at rack

Origin	1997 returning adults
Quinault NFH	525
Tagged strays	0
Natural production, estimation error	173
Total	698

QUINAULT NFH FALL CHINOOK Broodyear 1991

Rack disposition, parents

Usage	Males	Females	Jacks	Total	Percent
Spawned	65	142	3	210	73%
Surplus	7	0	5	12	4%
Dead in pond	19	27	1	47	16%
Jump out	0	0	1	1	0%
Spawned out	0	1	0	1	0%
Post spawn dip	17	0	0	17	6%
Total	108	170	10	288	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.9 (46)	794 (59)
Females	5.1 (83)	959 (142)
Jacks	2.0 (2)	410 (2)
Spawned fish	4.6 (131)	906 (203)

Males : Females: Jacks
 Spawned fish 31% : 68% : 1%
 Spawning date range: 10/17/91 to 12/04/91 Median date: 11/09/91

Incubation

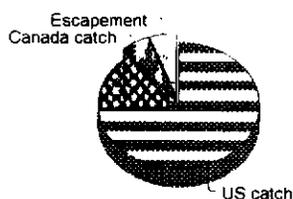
Eggs taken = 671.257 4.727 eggs per female
 Eggs eyed = 613.311 (91.4%)

Release and transfer

Release site	Final date	g/fish	Number	Stage	Tagcodes
Quinalt NFH	07/16/92	9.6	416,212	subyearling	052730,052731, 052860,052861

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
052730	0	0	0	0	0	48	11	48	0	0.10%
052731	3	0	0	0	0	115	16	13	0	0.14%
052860	23	0	0	0	0	189	0	25	0	0.22%
052861	10	0	0	0	0	125	10	28	0	0.18%
	36	0	0	0	0	477	37	114	0	0.16%



Total Catch = 628
 Catch:Escapement = 17.4:1

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1993	2	5	449
1994	3	13	658
1995	4	31	862
1996	5	25	932
1997	6	5	1,097
	4.2	79	839

QUINAULT NFH WINTER STEELHEAD Broodyear 1992

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	430	433	863	49%
Surplus	856	0	856	49%
Dead in pond	13	7	20	1%
Green females	0	6	6	0%
Jump out	2	1	3	0%
Spawned out	0	6	6	0%
Total	1,301	453	1,754	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	3.3 (143)	645 (204)
Females	3.3 (171)	637 (237)
Spawned fish	3.3 (314)	641 (441)

Males : Females: Jacks
 Spawned fish 50% : 50% : 0%
 Spawning date range: 11/20/91 to 02/26/92 Median date: 1/26/92

Incubation

Eggs taken = 1,575,200 3,638 eggs per female
 Eggs eyed = 1,322,507 (84.0%) Eggs hatched = 1,242,269 (78.9%)

Release and transfer

Release site	Final date	g/fish	Number		Tagcodes
Hoh River	05/13/93	70.5	50,869	yearling	212303
Quinault River	07/24/92	1.5	367,500	subyearling	-
Quinault NFH	11/17/92	13.0	29,000	subyearling	-
Quinault NFH	05/11/93	77.7	197,706	yearling	212306
			645,075		
<u>Transfer site</u>					
Chalaat Creek, Hoh	02/23/93	33.1	51,292	yearling	-
Salmon River, QDNR	02/25/93	45.9	167,187	yearling	-
			218,479		

Contribution estimates, from coded-wire tagging

Tagcode	Hatchery	Sport fisheries				Commercial fisheries				Total survival
		WA	Canada	AK	OR	WA	Canada	AK	OR	
212303	27	0	0	0	0	186	0	0	0	0.42%
212306	1,395	0	0	0	0	1,560	0	0	0	1.49%
	1,422	0	0	0	0	1,746	0	0	0	

Total Catch = 1,746
 Catch:Escapement = 1.2:1

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	3	1,547	631
1996	4	608	755
	3.3	2,155	666

QUINAULT NFH CHUM Broodyear 1992

Run timing

Entry date range: 10/22/92 to 12/09/92

Rack disposition, parents

Usage	Males	Females	Total	Percent
Spawned	207	341	548	82%
Surplus	1	2	3	0%
Dead in pond	107	7	114	17%
Green females	0	1	1	0%
Spawned out	0	3	3	0%
Total	315	354	669	

Spawned fish

	Mean age (n)	Mean fork length (n)
Males	4.0 (78)	714 (91)
Females	3.9 (153)	688 (161)
Spawned fish	4.0 (231)	698 (252)

Males : Females
 Spawned fish 38% : 62%
 Spawning date range: 10/28/92 to 12/02/92 Median date: 11/11/92

Incubation

Eggs taken = 796,372 2,335 eggs per female
 Eggs hatched = 730,900 (91.8%)

Release and transfer

Release site	Final date	g/fish	Number	Stage
Quinault NFH	04/09/93	0.7	722,729	fry

Rack return, progeny (may include natural origin fish)

Return year	Age	Number to rack	Mean length
1995	3	22	680
1996	4	47	708
1997	5	5	776
	3.8	74	704