

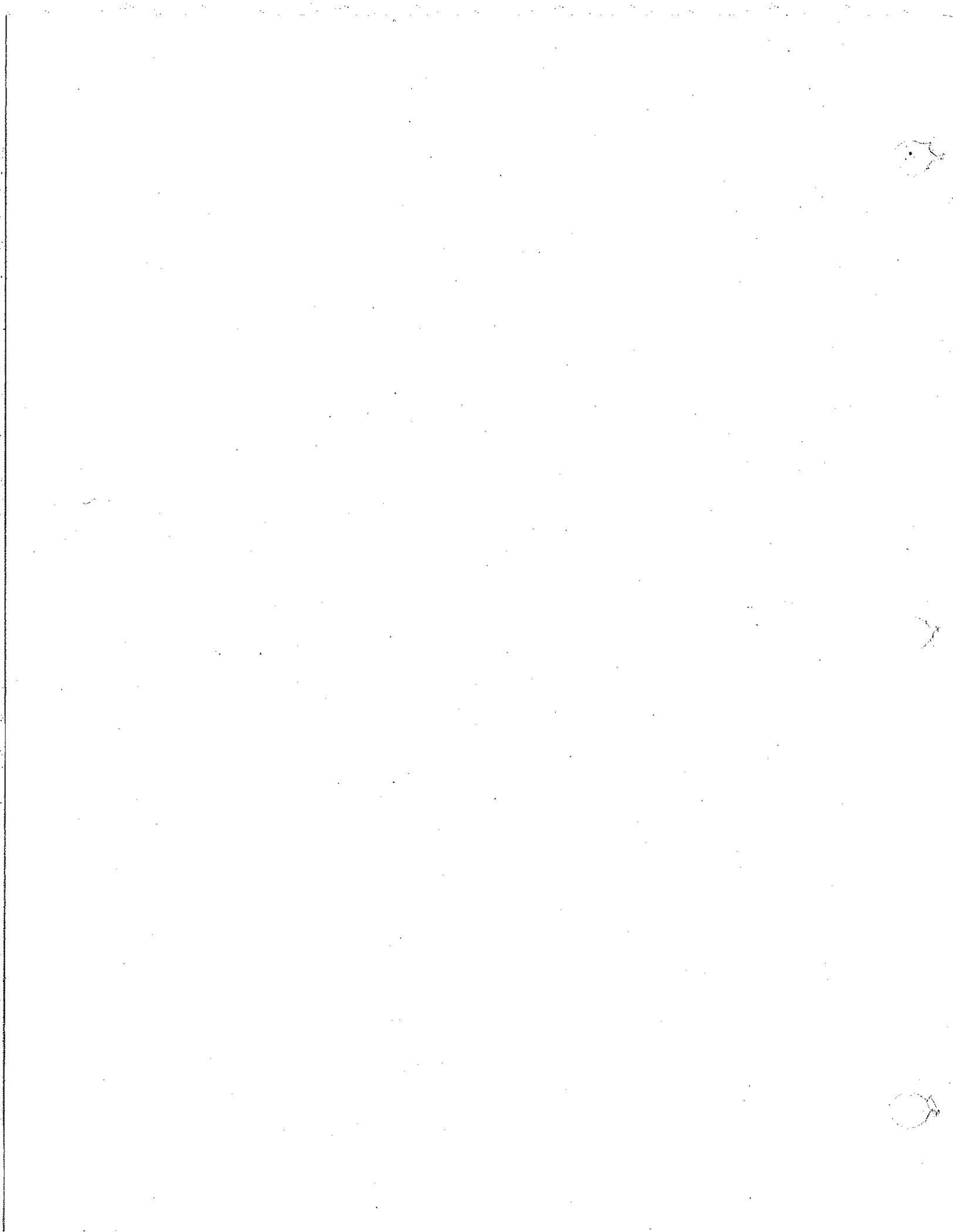
**1992 WASHINGTON STATE  
SALMON AND STEELHEAD STOCK  
INVENTORY**

**APPENDIX TWO  
COASTAL STOCKS**

**WASHINGTON DEPARTMENT OF FISH AND WILDLIFE  
AND  
WESTERN WASHINGTON TREATY INDIAN TRIBES**

**OLYMPIA, WASHINGTON**

**AUGUST 1994**

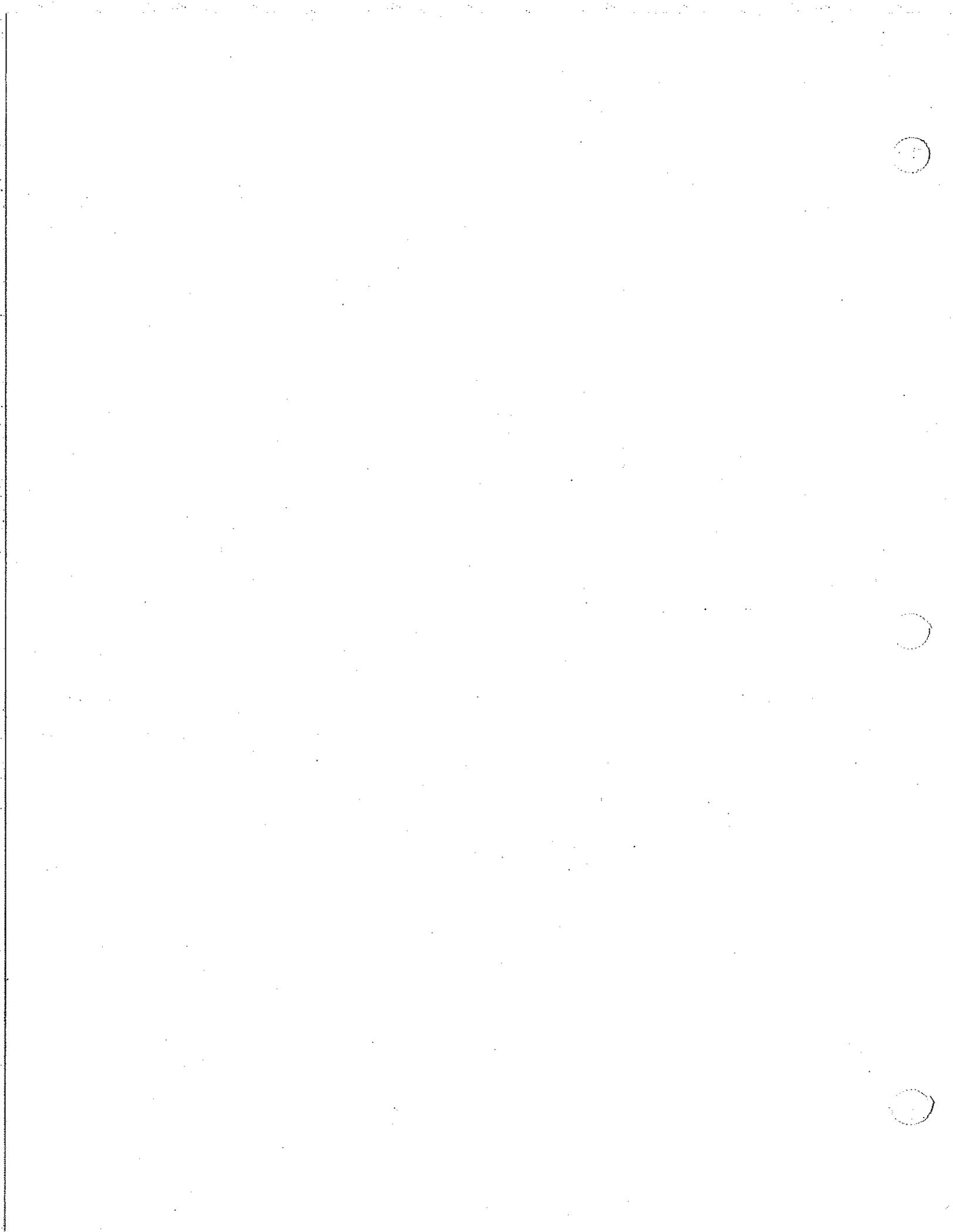


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**THE TECHNICAL STAFFS OF THE FOLLOWING TRIBES AND TRIBAL  
ORGANIZATIONS CONTRIBUTED TO THE  
PREPARATION OF THIS REPORT.**

**HOH TRIBE  
MAKAH TRIBE  
NORTHWEST INDIAN FISHERIES COMMISSION  
QUILEUTE TRIBE  
QUINAULT INDIAN NATION**

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# TABLE OF CONTENTS

	<u>PAGE</u>
INTRODUCTION .....	1
SPECIES OVERVIEW REPORTS .....	5
STOCK REPORTS .....	5
STOCK PROFILES .....	5
 SASSI SALMON AND STEELHEAD RIVER BASINS .....	 9
 GENETIC STOCK IDENTIFICATION .....	 13
 STOCK ASSESSMENT DATA .....	 17
ESCAPEMENT DATA .....	17
HARVEST DATA .....	18
RUN SIZE DATA .....	19
JUVENILE DATA .....	19
NO DATA .....	19
COASTAL STOCK REPORTS .....	21
OVERVIEW -- SOOES / OZETTE CHINOOK STOCK .....	23
SOOES / OZETTE -- SOOES FALL CHINOOK .....	25
OVERVIEW -- SOOES / OZETTE FALL CHUM STOCKS .....	29
SOOES / OZETTE -- SOOES FALL CHUM .....	31
SOOES / OZETTE -- OZETTE FALL CHUM .....	35
OVERVIEW -- SOOES / OZETTE COHO STOCKS .....	39
SOOES / OZETTE -- SOOES / WAATCH COHO .....	41
SOOES / OZETTE -- OZETTE COHO .....	45
OVERVIEW -- SOOES / OZETTE SOCKEYE STOCK .....	49
SOOES / OZETTE -- OZETTE SOCKEYE .....	51
OVERVIEW -- SOOES/OZETTE SUMMER AND WINTER STEELHEAD STOCKS .....	 57
SOOES / OZETTE -- SOOES / WAATCH WINTER STEELHEAD .....	59
SOOES / OZETTE -- OZETTE WINTER STEELHEAD .....	63
OVERVIEW -- QUILLAYUTE SPRING CHINOOK STOCK .....	67
✓ QUILLAYUTE -- SOL DUC SPRING CHINOOK .....	69
OVERVIEW -- QUILLAYUTE SUMMER CHINOOK STOCKS .....	73
✓ QUILLAYUTE -- QUILLAYUTE / BOGACHIEL SUMMER CHINOOK .....	75
✓ QUILLAYUTE -- SOL DUC SUMMER CHINOOK .....	79
✓ QUILLAYUTE -- CALAWAH SUMMER CHINOOK .....	83
OVERVIEW -- QUILLAYUTE FALL CHINOOK STOCKS .....	87
✓ QUILLAYUTE -- QUILLAYUTE / BOGACHIEL FALL CHINOOK .....	89
✓ QUILLAYUTE -- DICKEY FALL CHINOOK .....	93
✓ QUILLAYUTE -- SOL DUC FALL CHINOOK .....	97
✓ QUILLAYUTE -- CALAWAH FALL CHINOOK .....	101

	<u>PAGE</u>
OVERVIEW -- QUILLAYUTE FALL CHUM STOCK .....	105
— QUILLAYUTE -- QUILLAYUTE FALL CHUM .....	107
OVERVIEW -- QUILLAYUTE SUMMER COHO STOCK .....	111
✓ QUILLAYUTE -- SOL DUC SUMMER COHO .....	113
OVERVIEW -- QUILLAYUTE FALL COHO STOCKS .....	117
✓ QUILLAYUTE -- DICKEY FALL COHO .....	119
✓ QUILLAYUTE -- SOL DUC FALL COHO .....	123
✓ QUILLAYUTE -- BOGACHIEL FALL COHO .....	127
✓ QUILLAYUTE -- CALAWAH FALL COHO .....	131
OVERVIEW -- QUILLAYUTE SOCKEYE STOCK .....	135
— QUILLAYUTE -- LAKE PLEASANT SOCKEYE .....	137
OVERVIEW -- QUILLAYUTE SUMMER AND WINTER STEELHEAD STOCKS .....	141
QUILLAYUTE -- SOL DUC SUMMER STEELHEAD .....	145
QUILLAYUTE -- BOGACHIEL SUMMER STEELHEAD .....	149
QUILLAYUTE -- CALAWAH SUMMER STEELHEAD .....	153
QUILLAYUTE -- QUILLAYUTE / BOGACHIEL WINTER STEELHEAD .....	157
QUILLAYUTE -- DICKEY WINTER STEELHEAD .....	161
QUILLAYUTE -- SOL DUC WINTER STEELHEAD .....	165
QUILLAYUTE -- CALAWAH WINTER STEELHEAD .....	169
OVERVIEW -- HOH SPRING / SUMMER CHINOOK STOCK .....	173
✓ HOH -- HOH SPRING / SUMMER CHINOOK .....	175
OVERVIEW -- HOH FALL CHINOOK STOCK .....	179
✓ HOH -- HOH FALL CHINOOK .....	181
OVERVIEW -- HOH FALL CHUM STOCK .....	185
— HOH -- HOH FALL CHUM .....	187
OVERVIEW -- HOH COHO STOCKS .....	191
— HOH -- GOODMAN / MOSQUITO CREEKS COHO .....	193
✓ HOH -- HOH COHO .....	197
OVERVIEW -- HOH SUMMER AND WINTER STEELHEAD STOCKS .....	201
HOH -- HOH SUMMER STEELHEAD .....	205
HOH -- GOODMAN CREEK WINTER STEELHEAD .....	209
HOH -- MOSQUITO CREEK WINTER STEELHEAD .....	213
HOH -- HOH WINTER STEELHEAD .....	217
OVERVIEW -- KALALOCH CREEK COHO STOCK .....	221
KALALOCH CREEK -- KALALOCH CREEK COHO .....	223
OVERVIEW -- KALALOCH SUMMER AND WINTER STEELHEAD STOCKS .....	227
KALALOCH -- KALALOCH CREEK WINTER STEELHEAD .....	229

	<u>PAGE</u>
OVERVIEW -- QUEETS SPRING / SUMMER CHINOOK STOCKS .....	233
QUEETS -- QUEETS SPRING / SUMMER CHINOOK .....	237
QUEETS -- CLEARWATER SPRING / SUMMER CHINOOK .....	241
OVERVIEW -- QUEETS FALL CHINOOK STOCKS .....	245
QUEETS -- QUEETS FALL CHINOOK .....	247
QUEETS -- CLEARWATER FALL CHINOOK .....	251
OVERVIEW -- QUEETS FALL CHUM STOCK .....	255
QUEETS -- QUEETS FALL CHUM .....	257
OVERVIEW -- QUEETS COHO STOCKS .....	261
QUEETS -- QUEETS COHO .....	265
QUEETS -- CLEARWATER COHO .....	269
QUEETS -- SALMON RIVER COHO .....	273
OVERVIEW -- QUEETS SUMMER AND WINTER STEELHEAD STOCKS .	277
QUEETS -- QUEETS SUMMER STEELHEAD .....	281
QUEETS -- CLEARWATER SUMMER STEELHEAD .....	285
QUEETS -- QUEETS WINTER STEELHEAD .....	289
QUEETS -- CLEARWATER WINTER STEELHEAD .....	293
OVERVIEW -- RAFT FALL CHINOOK STOCK .....	297
OVERVIEW -- RAFT COHO STOCK .....	299
RAFT RIVER -- RAFT COHO .....	301
OVERVIEW -- RAFT SUMMER AND WINTER STEELHEAD STOCKS ....	305
RAFT -- WINTER STEELHEAD .....	307
OVERVIEW -- QUINAULT SPRING / SUMMER CHINOOK STOCK .....	311
QUINAULT -- QUINAULT SPRING / SUMMER CHINOOK .....	313
OVERVIEW -- QUINAULT FALL CHINOOK STOCKS .....	317
QUINAULT -- QUINAULT FALL CHINOOK .....	319
QUINAULT -- COOK CREEK FALL CHINOOK .....	323
OVERVIEW -- QUINAULT FALL CHUM STOCK .....	327
QUINAULT -- QUINAULT FALL CHUM .....	329
OVERVIEW -- QUINAULT COHO STOCKS .....	333
QUINAULT -- QUINAULT COHO .....	335
QUINAULT -- COOK CREEK COHO .....	339
OVERVIEW -- QUINAULT SOCKEYE STOCK .....	343
QUINAULT -- QUINAULT SOCKEYE .....	345 ✓
OVERVIEW -- QUINAULT SUMMER AND WINTER STEELHEAD	
STOCKS .....	349
QUINAULT -- QUINAULT SUMMER STEELHEAD .....	353
QUINAULT -- QUINAULT / LAKE QUINAULT WINTER	
STEELHEAD .....	357
QUINAULT -- QUINAULT WINTER STEELHEAD .....	361

	<u>PAGE</u>
OVERVIEW -- MOCLIPS / COPALIS CHINOOK STOCKS .....	365
OVERVIEW -- MOCLIPS / COPALIS COHO STOCKS .....	367
MOCLIPS / COPALIS -- MOCLIPS COHO .....	369
MOCLIPS / COPALIS -- COPALIS COHO .....	373
OVERVIEW -- MOCLIPS / COPALIS SUMMER AND WINTER STEELHEAD STOCKS .....	377
MOCLIPS / COPALIS -- MOCLIPS WINTER STEELHEAD .....	379
MOCLIPS / COPALIS -- COPALIS WINTER STEELHEAD .....	383
OVERVIEW -- GRAYS HARBOR SPRING / SUMMER CHINOOK STOCKS .....	387
GRAYS HARBOR -- CHEHALIS SPRING CHINOOK .....	389
GRAYS HARBOR -- SATSOP SUMMER CHINOOK .....	393
OVERVIEW -- GRAYS HARBOR FALL CHINOOK STOCKS .....	397
GRAYS HARBOR -- HUMPTULIPS FALL CHINOOK .....	399
GRAYS HARBOR -- HOQUIAM FALL CHINOOK .....	403
GRAYS HARBOR -- WISHKAH FALL CHINOOK .....	407
GRAYS HARBOR -- WYNOOCHEE FALL CHINOOK .....	411
GRAYS HARBOR -- SATSOP FALL CHINOOK .....	415
GRAYS HARBOR -- CHEHALIS FALL CHINOOK .....	419
GRAYS HARBOR -- JOHNS / ELK AND SOUTH BAY TRIBUTARIES FALL CHINOOK .....	423
OVERVIEW -- GRAYS HARBOR FALL CHUM STOCKS .....	427
GRAYS HARBOR -- HUMPTULIPS FALL CHUM .....	429
GRAYS HARBOR -- CHEHALIS FALL CHUM .....	433
OVERVIEW -- GRAYS HARBOR COHO STOCKS .....	437
GRAYS HARBOR -- HUMPTULIPS COHO .....	439
GRAYS HARBOR -- HOQUIAM COHO .....	443
GRAYS HARBOR -- WISHKAH COHO .....	447
GRAYS HARBOR -- WYNOOCHEE COHO .....	451
GRAYS HARBOR -- SATSOP COHO .....	455
GRAYS HARBOR -- CHEHALIS COHO .....	459
GRAYS HARBOR -- JOHNS / ELK AND SOUTH BAY TRIBUTARIES COHO .....	463
OVERVIEW -- GRAYS HARBOR SUMMER AND WINTER STEELHEAD STOCKS .....	467
GRAYS HARBOR -- HUMPTULIPS SUMMER STEELHEAD .....	473
GRAYS HARBOR -- CHEHALIS SUMMER STEELHEAD .....	477
GRAYS HARBOR -- HUMPTULIPS WINTER STEELHEAD .....	481
GRAYS HARBOR -- HOQUIAM WINTER STEELHEAD .....	485
GRAYS HARBOR -- WISHKAH WINTER STEELHEAD .....	489

	<u>PAGE</u>
GRAYS HARBOR -- WYNOOCHEE WINTER STEELHEAD .....	493
GRAYS HARBOR -- SATSOP WINTER STEELHEAD .....	497
GRAYS HARBOR -- CHEHALIS WINTER STEELHEAD .....	501
GRAYS HARBOR -- SKOOKUM CHUCK / NEWAUKUM WINTER STEELHEAD .....	505
GRAYS HARBOR -- SOUTH HARBOR WINTER STEELHEAD .....	509
OVERVIEW -- WILLAPA BAY FALL CHINOOK STOCKS .....	513
WILLAPA BAY -- WILLAPA BAY FALL CHINOOK .....	515
WILLAPA BAY -- FALL RIVER EARLY (NORTH R) FALL CHINOOK .....	519
OVERVIEW -- WILLAPA BAY FALL CHUM STOCKS .....	523
WILLAPA BAY -- NORTH RIVER FALL CHUM .....	525
WILLAPA BAY -- WILLAPA FALL CHUM .....	529
WILLAPA BAY -- PALIX FALL CHUM .....	533
WILLAPA BAY -- NEMAH FALL CHUM .....	537
WILLAPA BAY -- NASELLE FALL CHUM .....	541
WILLAPA BAY -- BEAR RIVER FALL CHUM .....	545
OVERVIEW -- WILLAPA BAY COHO STOCK .....	549
WILLAPA BAY -- WILLAPA BAY COHO .....	551
OVERVIEW -- WILLAPA BAY SUMMER AND WINTER STEELHEAD STOCKS .....	555
WILLAPA BAY -- NORTH RIVER / SMITH CREEK WINTER STEELHEAD .....	557
WILLAPA BAY -- WILLAPA WINTER STEELHEAD .....	561
WILLAPA BAY -- PALIX WINTER STEELHEAD .....	565
WILLAPA BAY -- NEMAH WINTER STEELHEAD .....	569
WILLAPA BAY -- NASELLE WINTER STEELHEAD .....	573
WILLAPA BAY -- BEAR RIVER WINTER STEELHEAD .....	577
LITERATURE CITED .....	581
GLOSSARY .....	583



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## INTRODUCTION

This appendix volume is the Coastal regional supplement to the *1992 Washington State Salmon and Steelhead Stock Inventory (SASSI)*,<sup>1</sup> and provides more detailed information on individual salmon and steelhead stocks identified in the inventory. This information was assembled jointly by the Washington State Departments of Fisheries and Wildlife and the Western Washington Treaty Tribes. The Departments of Fisheries and Wildlife merged to form the Washington Department of Fish and Wildlife early in 1994. The general approach used to develop these appendices is described in the above referenced document.

SASSI documents the results of an initial stock status inventory that is the first step in a statewide effort to maintain and restore wild<sup>2</sup> salmon and steelhead stocks and fisheries. The inventory's intent is to help identify currently available information and to guide future restoration planning and implementation.

The SASSI process inventories **naturally reproducing** stocks of salmon and steelhead regardless of origin (including native, non-native, and mixed parentage). Only those stocks that spawn within Washington State were included. The current status of each stock was rated based primarily on trends in survival rates or population size, but the process did not focus directly on causative factors like habitat loss or overfishing. Stocks with escapement, run-size, and survival levels within normal ranges and not displaying a pattern of chronically low abundance were rated as **Healthy** stocks. Those stocks that currently display low production or survival values were assigned to one of two separate rating categories: **Depressed** stocks or **Critical** stocks, depending on the current condition of the stock. Stocks were also rated as **Unknown** stocks when data limitations did not allow assessment of current status. A rating category for **Extinct** stocks was also included. However, the only extinctions listed in this inventory are those stocks that were thought to exist, based on recent data, but were subsequently found to be extinct. Past extinctions have not been included because SASSI is a **current** resource inventory and the historic information on lost stocks is incomplete and often anecdotal.

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<sup>1</sup> SASSI -- Washington Department of Fisheries et al. 1993.

<sup>2</sup> The term wild stock as used in this report refers to how fish reproduce, i.e. by spawning and rearing in the natural habitat, regardless of parentage, and does not refer to genetic heritage. The origin (e.g. native, non-native or mixed) and parentage (wild, cultured or composite) of individual stocks are specifically designated in this report where known. This terminology is not intended to diminish the importance of native stocks but rather emphasizes the need to protect a wide range of genetic resources maintained by natural reproduction. The terms natural and wild spawners are used synonymously as are the terms stocks and spawning populations.

Of the 435 total salmon and steelhead stocks identified state-wide, 115 stocks were found in the Coastal Region. Table 1 presents a summary of stock status for wild Coastal salmon and steelhead.

For a more detailed discussion of the methods used to identify individual stocks and rate current status, see the main SASSI summary volume.

Two elements of the 1992 SASSI process are presented in this appendix:

(1) Species Overview Reports for each basin in the Coastal region, and (2) Stock Reports for each individual stock. Any comments or questions regarding this information should be directed to the Washington State Department of Fish and Wildlife in Olympia, Washington.

Table 1. Summary of stock status for wild salmon and steelhead stocks in the Coastal basin.

	<u>HEALTHY</u>	<u>DEPRESSED</u>	<u>CRITICAL</u>	<u>UNKNOWN</u>	<u>EXTINCT</u>
<b>NORTH COAST</b>					
Chinook salmon	12	3	0	6	0
Chum salmon	1	0	0	5	0
Coho salmon	10	0	0	8	0
Pink salmon	--	--	--	--	--
Sockeye salmon	1	1	0	1	0
Steelhead	11	0	0	13	0
72 TOTAL STOCKS	35	4	0	33	0
PERCENT OF TOTAL	49%	6%	0%	46%	0%
<b>GRAYS HARBOR</b>					
Chinook salmon	7	1	0	1	0
Chum salmon	2	0	0	0	0
Coho salmon	7	0	0	0	0
Pink salmon	--	--	--	--	--
Sockeye salmon	--	--	--	--	--
Steelhead	5	2	0	3	0
28 TOTAL STOCKS	21	3	0	4	0
PERCENT OF TOTAL	75%	11%	0%	14%	0%
<b>WILLAPA BAY</b>					
Chinook salmon	1	1	0	0	0
Chum salmon	6	0	0	0	0
Coho salmon	0	0	0	1	0
Pink salmon	--	--	--	--	--
Sockeye salmon	--	--	--	--	--
Steelhead	2	0	0	4	0
15 TOTAL STOCKS	9	1	0	5	0
PERCENT OF TOTAL	60%	7%	0%	33%	0%
<b>COASTAL BASIN</b>					
115 TOTAL STOCKS	65	8	0	42	0
PERCENT OF TOTAL	57%	7%	0%	37%	0%



## SPECIES OVERVIEW REPORTS

An overview report is presented for each species of salmon or steelhead within a river basin or regional area. These overviews provide discussions of the definition and origin of stocks and review any uncertainties relating to the decisions to list specific stocks. The overviews also present information on trends in escapement and run-size for the combined stocks of each species within a river basin or region. The individual Stock Reports follow each Overview Report.

## STOCK REPORTS

Each stock of salmon and steelhead identified in SASSI is the subject of a report which presents detailed written descriptions of the rationales for the stock definitions in a **Stock Definition and Origin** section (which summarizes information on distribution, timing, and biological characteristics) and highlights any related uncertainties or caveats. Stock origin is also addressed with some discussion of the probable genetic make-up of each stock, and possible interactions with hatchery fish. The **Stock Status** section of these reports assesses the trends in escapement, production, or survival for each stock, and discusses the data used to measure current status. Stock ratings are also presented.

Additional written material was prepared for all stocks whose status was Depressed or Critical, and for some stocks in the Healthy and Unknown categories. The **Factors Affecting Production** section provides a brief description of harvest management, habitat status, and fish culture programs. The **Habitat** section reviews the general condition of the habitat used by each stock, and identifies specific environmental problems known to impact stock survivals. The **Harvest Management** section is a general discussion of the fisheries that impact each stock. The **Hatchery** section discusses salmon and steelhead culture programs in the areas utilized by each stock, and outlines possible interactions between wild fish and hatchery fish. **These discussions on factors affecting production are only meant to provide a very general overview of the type of problems faced by a stock.** More detailed examinations of these same topics will be developed for those stocks requiring priority attention as part of the overall Wild Stock Restoration Initiative (see SASSI Part 3 -- Current and Future Actions).

## STOCK PROFILES

One objective of SASSI is to provide a general presentation of the available information on each stock of salmon and steelhead included in the inventory. To accomplish this, a two-page Stock Profile is included in each Stock Report to provide a quick review of the definition and status of each salmon and steelhead stock.

The first page is a **Stock Definition Profile**, which summarizes the three criteria used in defining individual stocks; including spawn distribution, timing, and biological characteristics.

**Spawner distribution** is shown on a generalized basin maps, and distinct distribution is noted if applicable. These maps are provided to demonstrate differences in distributions between stocks and are not intended to show exact spawning locations. In some cases, spawning distributions are unknown, and the basin maps are left blank. This does not mean that such a stock cannot be distinct based on spawner distribution. The fact that a self-sustaining population is known to be present in a stream or streams can validate the stock, even if exact spawning locations are unknown. Distinct spawning distribution is the most commonly used criterion for identifying individual stocks in the SASSI process because general information on the geographic location of spawning and spawning habitat is the most readily available.

**Timing** of various life stages is presented in graphic form, and again any distinctions (differences between stocks) are identified. Distinct temporal distribution identifies stock differences based on variations in timing of critical life stages, e.g. spawning or return timing.

**Biological characteristics** are summarized at the bottom of the stock definition page. Distinct biological characteristics can include any observable distinctions between stocks such as size, age structure, scale patterns, parasites, or genetic differences. This criterion is applied in a number of different ways in this inventory. For some stocks, the stock differentiation is based on observable physical attributes.

However, genetic distinctions are the most common biological characteristic used in this document. There are indirect and direct approaches in SASSI for using genetic characterizations to distinguish among stocks. The indirect approach makes assumptions about the genetic makeup of a group of fish such as when it has been substantially changed by past or continuing introductions of non-native stocks. The direct approach is based on genetic stock identification (GSI), which is a method that can be used to characterize populations of organisms based on the genetic profiles of individuals. The GSI methodology relies on the combined use of biochemical, genetic, and statistical procedures to discriminate among populations. A more detailed discussion of the methods and applications of the use of GSI in SASSI is presented in the following Genetic Stock Identification section. Where GSI information exists it is graphically presented in the form of a dendrogram.

The second page is a **Stock Status Profile**, which presents current stock status information. The data used to determine stock status are presented in tabular and graphic form. Data quality is also noted. These data sets will vary by species and stock, depending on the nature of available stock specific information. The purpose of the numerical data is to describe the stock production trends, and may include data

sets that are direct measures of abundance (e.g. escapement or run size), as well as less direct statistics like fish/mile and fish days. Both direct and indirect data can be used to express trends. For a discussion of the types of data used in SASSI to evaluate stock status, see the following Stock Assessment Data section.

The distribution (percentage) of harvest and escapement are shown in the form of a pie chart, where stock specific data are available.

The final section of the Stock Profiles presents a summarized description of stock status, including stock origin, type, and current status. The terms used in the Stock Summary section of the profiles are defined below.

**Stock Origin** - The terms dealing with the origin of stocks identify the genetic history of each stock.

**Native** -- An indigenous stock of fish that has not been substantially impacted by genetic interactions with non-native stocks, or by other factors, and is still present in all or part of its original range. In limited cases, a native stock may also exist outside of its original habitat (e.g. captive brood stock programs).

**Non-native** -- A stock that has become established outside of its original range.

**Mixed** -- A stock whose individuals originated from commingled native and non-native parents, and/or by mating between native and non-native fish (hybridization); or a previously native stock that has undergone substantial genetic alteration.

**Unknown** -- This description is applied to stocks where there is insufficient information to identify stock origin with confidence.

**Production Type** - The terms defining production type describe the method of spawning and rearing that produced the fish that constitute each stock.

**Wild** -- A stock that is sustained by natural spawning and rearing in the natural habitat, regardless of parentage (includes native).

**Cultured** -- A stock that depends upon spawning, incubation, hatching, or rearing in a hatchery or other artificial production facility.

**Composite** -- A stock sustained by both wild and artificial production.

**Stock Status** - These terms describe the current condition of each stock of fish and may be based on trends in escapement, run size, survival, or fitness levels.

**Healthy Stock** -- A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.

**Depressed Stock** -- A stock of fish whose production is below expected levels based on available habitat and natural variations in survival rates, but above the level where permanent damage to the stock is likely.

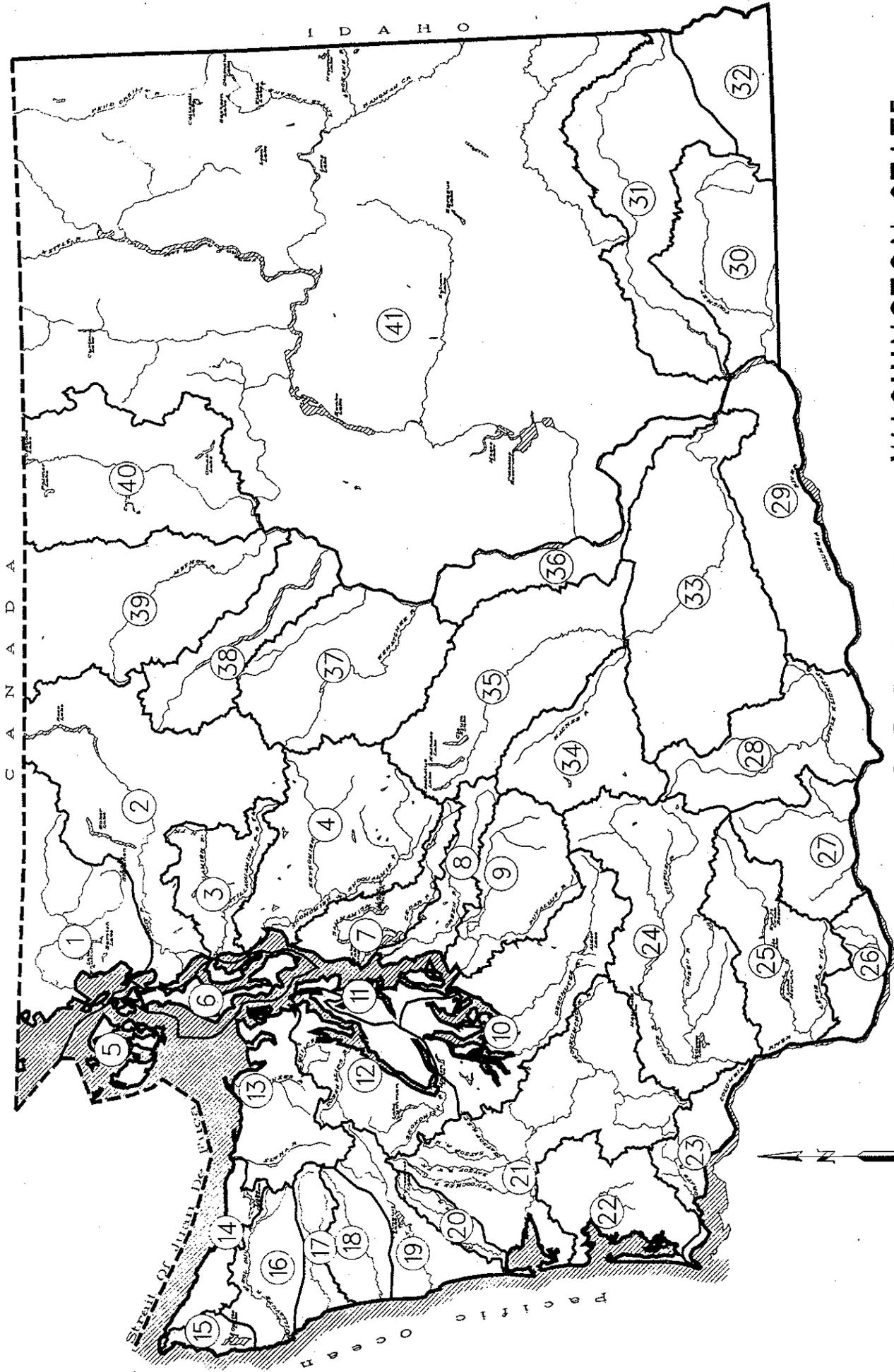
**Critical Stock** -- A stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

**Extinct Stock** -- A stock of fish that is no longer present in its original range, or as a distinct stock elsewhere. Individuals of the same species may be observed in very low numbers, consistent with straying from other stocks.

**Unknown Stock** -- This description is applied to stocks where there is insufficient information to identify stock status with confidence.

## **SASSI SALMON AND STEELHEAD RIVER BASINS**

SASSI Stock Definition Profiles display spawning distribution information for the salmon and steelhead stocks in Washington State on river basin maps. These maps are scaled not only to present spawner distributions, but must also fit the format of the profile pages. This sometimes makes it difficult to relate a specific river basin map with adjacent systems. To help orient the reader, the state map on the following page locates the river basins used in SASSI. The SASSI river basins are not the same as those identified by the state as Water Resource Inventory Areas (WRIAs), which are used by Washington State Natural resources agencies (Williams et al. 1975).



WASHINGTON STATE  
 Salmon and Steelhead River Basins

C A N A D A  
 I D A H O  
 O R E G O N  
 B R I T I S H C O L U M B I A

This appendix volume covers the Coastal region.

### **PUGET SOUND**

#### North Puget Sound

- 1- Nooksack/Samish
- 2- Skagit
- 3- Stillaguamish
- 4- Snohomish
- 5- San Juan Islands
- 6- Whidbey Island

#### South Puget Sound

- 7- Lake Washington
- 8- Duwamish/Green
- 9- Puyallup
- 10- Nisqually/Deep South Sound
- 11- East Kitsap

#### Hood Canal/ Strait of Juan de Fuca

- 12- Hood Canal
- 13- Elwha/ Dungeness
- 14- West Strait

### **COASTAL WASHINGTON**

#### North Coast

- 15- Sooes/Ozette
- 16- Quillayute
- 17- Hoh
- 18- Queets
- 19- Quinault

#### Grays Harbor

- 20- Humptulips
- 21- Chehalis

#### Willapa Bay

- 22- Willapa/Nemah/Naselle

### **COLUMBIA RIVER**

#### Lower Columbia River

- 23- Grays/Elochoman
- 24- Cowlitz
- 25- Kalama/Lewis
- 26- Washougal

#### Upper Columbia River

- 27- Wind/White Salmon
- 28- Klickitat
- 29- Rock Creek
- 30- Walla Walla/Touchet
- 31- Snake/Tucannon
- 32- Asotin/Grande Ronde
- 33- Lower Yakima
- 34- Naches
- 35- Upper Yakima
- 36- Hanford Reach
- 37- Wenatchee/Entiat
- 38- Lake Chelan
- 39- Methow
- 40- Okanogan
- 41- No anadromous fish



## GENETIC STOCK IDENTIFICATION

In SASSI, distinct biological characteristics can include any observable distinctions between stocks such as size or age structure, but are most commonly identified for chinook, chum, pink, and sockeye salmon by screening for genetic differences using a technique called **Genetic Stock Identification**. GSI is a method that can be used to characterize populations of organisms based on the genetic profiles of individuals. The methodology relies on the combined use of biochemical, genetic, and statistical procedures to characterize and discriminate stocks.

Although the GSI characterization of stocks and testing of stock structure provides a direct measure of genetic interrelationships, it is important to be aware of limitations of this approach. It is presently possible to investigate only a tiny and restricted fraction of the genetic traits of salmon by the electrophoretic analysis of proteins. To the extent that the characters that can be investigated do not represent the entire genome, the view of genetic interrelationships derived from GSI analysis will be incomplete (and could fail to detect existing reproductive isolation among stocks -- see below). Indeed, there are a large number of genetically influenced characteristics of salmon about which there is little or no information. It is assumed that most or all of the genetic variation that can be studied by electrophoresis is not subjected to natural selection, that is, it is selectively neutral. While this assumption seems justified given much of population genetics theory and a considerable amount of empirical data from a number of organisms, exceptions to it could complicate or even invalidate some of our interpretations. It must also be realized that the statistical test (e.g. G-test) of stock structure, like almost all tests of hypotheses, is one-side. While statistically significant differences among samples provide strong evidence for the existence of distinct gene pools (i.e. separate stocks), the absence of significant differences does **not** constitute proof that only a single stock exists.

As currently applied to the investigation of stocks of Pacific salmon, the GSI process consists of a series of steps: (1) Collect selected tissues (usually muscle, heart, eye, and liver) from a representative sample of individuals (usually 100 or more) from the population(s) under investigation, (2) Develop genetic profiles (at 15 or more variable loci) for the individuals in each population by conducting starch-gel electrophoresis and biochemical staining using tissue extracts, (3) Characterize each population sampled by aggregating the individual genetic profiles and computing allele frequency distributions, and (4) Conduct statistical tests (G-tests or chi-square) using the allele counts characterizing each population.

**Electrophoresis** is a process whereby charged molecules (such as enzymes and other proteins) are separated in an electric field. It is possible to document the genetic characteristics of individuals (and populations) using starch-gel electrophoresis, because of the relationship between the genetic code (DNA) and enzyme biochemical phenotypes. These phenotypes are expressed, after electrophoresis and enzyme staining, in the form of banding patterns on the gels. Each enzyme (protein) subunit is encoded by a specific segment of DNA - a gene locus - which specifies its structure. When a locus exhibits genetic variation it has two or more alternate forms or alleles. Much, but not all, of the allelic variation of enzyme-coding loci can be detected by electrophoretic analysis because it results in structural changes to the enzymes.

Reproductively isolated populations usually develop significant differences in allele frequencies at one or more loci over time. The power of GSI to identify and characterize stocks is derived from the differential distribution of alleles at many gene loci in different stocks.

The hypothesis being tested in step 4 (see above) - that the allele distributions of the populations being compared are no more different than multiple independent samples from a single, freely interbreeding population - is closely tied to the definition of stocks as reproductively isolated populations. A statistically significant result in this test causes the rejection of the null hypothesis and typically leads to the conclusion that the populations tested are genetically different and, therefore, represent distinct stocks (breeding units). The commonly used 0.05 rejection level is applied as a cutoff value to indicate statistical significance in these tests. The power of the statistical tests is dependent on the numbers of fish in the samples being compared. Because of this, differences in allele counts that are not significant at small sample sizes can become significant if the sample sizes are large enough.

Typically, the genetic testing of stock structure begins with G-tests (or chi-square tests) involving pairs of individual collections. When such tests reveal significant differences, this is usually considered to be evidence for the existence of two genetically distinct stocks. However, in some cases individual collections are combined during the testing process. This is usually done when there are two or more separate collections from the same locality (usually taken in different years). The individual collections are combined in such cases because it is believed that the combination provides a better characterization of the population than does any single sample. Samples may also be combined from adjacent localities after testing of the separate collections has revealed no significant differentiation among them. For example, if six separate samples of Skagit River pink salmon are collected from different localities (and possibly in different years) and no evidence of significant genetic differences among them is found, they may be combined to characterize pink salmon in the entire river system and this aggregate subsequently tested against collections or similar aggregates from nearby drainage (e.g. Nooksack River, Stillaguamish River, etc.).

In addition to the direct testing of stock structure using the G-test approach, dendrograms based on average genetic distances among samples have been used to summarize the genetic interrelationships among stocks. This commonly used approach provides a simple one-dimensional graphical representation of overall stock similarities and differences. The lengths of the horizontal branches that connect stocks in dendrograms are proportional to the average genetic distances between the stocks. The vertical position of individual stocks in a dendrogram does not necessarily reflect genetic relationships because each branch point is actually a point around which the lower level branches can be rotated without distorting the estimated genetic distances between them and other stocks in the dendrogram.

While dendrograms are useful because they simplify the often complex patterns of genetic interrelationships among stocks, they are not without disadvantages. The absolute magnitude of differences identified by this technique is influenced both by the specific suite of gene loci included in the analysis and the particular genetic distance measure used. As individual stocks that are most similar are connected in the process of building the dendrogram, their relationships to other stocks can be distorted. The dendrogram analysis is **not** a test of stock structure, in part because it is independent of sample size. Thus, while dendrograms can be useful for depicting genetic interrelationships among stocks and for summarizing among-stock diversity, they cannot be used to define or identify distinct stocks genetically; this must be done using the results of the direct statistical tests (e.g. G-test).



## **STOCK ASSESSMENT DATA**

The evaluation of the current status of the stocks of salmon and steelhead identified in SASSI is based on the best available escapement, harvest, run size, and survival data. Only-stock specific data were used, which sometimes limited the available data to a short span of recent years. These data were plotted and qualitatively examined for changes in abundance or survival. Often, only a single stock-specific statistic was available to analyze the production trend of a stock. When multiple types of data could be used to examine individual stock status, the available production or survival data sets were examined individually and each stock's rating was based on the statistic(s) that best described the current status.

The Stock Reports and Stock Status Profiles present the stock assessment data for individual stocks. The following discussion defines those stock assessment terms used in the evaluation of Coastal salmon and steelhead stocks.

### **ESCAPEMENT DATA**

For salmon and steelhead stocks, the term escapement refers to those mature fish that have returned to freshwater, have survived (escaped) all fisheries, and constitute the spawning population for a given stock. Escapement data collected during spawning ground surveys and by counts made at traps and fish passage facilities are the most frequently used sources of information on the status of salmon and steelhead stocks. Some types of escapement data represent a direct measure of all of the fish making up a spawning population. Examples of direct escapement measurements would include total escapement estimates, and trap and dam counts. For many stocks, direct escapement estimates are not available and indirect escapement numbers are used to evaluate stock status. Indirect escapements are generally actual count data for specific spawning ground reaches (index areas) and are usually collected on an annual basis. Examples would be redd or fish/mile counts. Indirect counts can be used to estimate total escapements, but rather are relative data sets that can be used to indicate changes in abundance and long-term escapement trends.

The following escapement data sets were used to determine the status of various Coastal salmon and steelhead stocks.

#### **ESCAPEMENT**

Fish/mile	A spawner count divided by the number of miles surveyed.
Hatchery	A count of all fish returning to a hatchery or hatchery rack.
Hat & Nat	Total number of hatchery and natural fish escaping to a particular stream area.
Index total	An estimate of total escapement in an index area.

Total	An estimate of all fish of a stock that have survived all fisheries and make up a spawning population.
Trap Count	A total count of fish destined for areas upstream of a fish-trapping facility.
Dam Count	A total count of fish destined for areas upstream of a dam.

### HARVEST DATA

The numbers of fish caught in various major fisheries can be used to measure relative abundance and to observe long-term trends. Harvest data sets are typically for specific fisheries or regions and do not necessarily represent all of the catches made everywhere that impact the stock. For example, total harvest might refer only to the combined sport and commercial catches in the Coastal region, but may not include ocean catches.

The following types of harvest data were used to assess the current status of some Coastal salmon and steelhead stocks.

#### HARVEST

Total	The combined catches of all fisheries in a specific region. In some cases, catch data for some fisheries may be unavailable, but the available catch data are thought to be representative of total harvest trends.
Hatchery	The combined escapement and harvest of a specific hatchery stock. This number may not include all of the catches made everywhere for the stock.
Net	The total net catches in a major fishery or the combined tribal and/or commercial net catches in a specific region.
Sport	The total catches in a single sport fishery or the combined catches in all sport fisheries in a specific region.

## RUN SIZE DATA

The term run size refers to the total number of salmon and steelhead measured at a particular point in their return migration, e.g. the total numbers entering the Coastal region. Run size estimates may not include all returning fish (e.g. a small harvest component may not be included), but the run sizes presented in SASSI are believed to be complete enough to represent the relative abundance of the stock. Run size data are not available for many stocks because of the difficulty in identifying stock specific harvests in mixed stock fisheries.

The following run size data were used to determine the status of some Coastal stocks.

### RUN SIZE

Inside	The total numbers of fish leaving the ocean on their return migration. For Coastal stocks, the inside run includes all fish entering bays (e.g. Grays Harbor) and independent streams.
Terminal	The number of fish in the run after separation from other runs.
Total	The combined escapement and harvest of a stock of fish in a specific region, but may not include all of the catches made everywhere for a specific stock.
Trap count	A total count of fish destined for areas upstream of a fish trapping facility.

## JUVENILE DATA

Counts of juvenile salmon and steelhead at various life stages are used to measure relative abundance and evaluate trends. These count data are most commonly collected during the freshwater incubation, rearing, or migration periods, and may include any life stage from egg to smolt. Juvenile count data are also used to measure a variety of survival rates.

### JUVENILE

Smolts	The number of smolts produced by spawners from a brood year.
--------	--

## NO DATA

For many stocks of salmon and steelhead, there are no stock-specific data that can be used as measures of stock status. These stocks are typically small populations and are rated as Unknown-status stocks.



# **COASTAL STOCK REPORTS**



# OVERVIEW -- SOOES / OZETTE CHINOOK STOCK

## SOOES

### STOCK DEFINITION AND ORIGIN

A single stock of chinook has been identified for the Sooes River. Records indicate sporadic outplants from exotic brood stock (Deschutes 1959, Minter Creek 1971, Quinault 1977 and 1978), but the majority of the hatchery brood stock has been from the native Sooes chinook. All adults are spawned at the U.S. Fish and Wildlife Service Hatchery. Once the run size increases to roughly 800 to 900 females, additional adults are anticipated to be passed upstream. Habitat decline and fishing pressure decreased the native run prior to the enhancement program.

### STOCK STATUS

Historic records from the late 1940s and early 1950s indicate chinook catches from the Ozette River near the mouth ranged from several hundred to nearly two thousand fish. Fishing pressure and habitat degradation led to the decline and possible elimination of chinook in this river. The last year chinook were taken was 1975 when thirty-three adults were caught. There has not been a target fishery in recent years. Consequently, little or no effort has been made to determine even presence or absence in this remote river. The outlet river has abundant old growth LWD (Large Woody Debris), and most likely has less fine sediment than the tributaries due to settling within the lake. Although we have no evidence indicating that chinook still exist, it is conceivable that a remnant of the run may remain in the outlet river. However, since there currently are no data documenting chinook in this system, we are not considering this a wild stock.



## **SOOES / OZETTE -- SOOES FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

This stock was designated on the basis of distinct geographical spawning distribution. The run timing is from late August through mid-November. There is no spawning distribution, the chinook are still below hatchery escapement needs, so the fish are removed from the river and spawned in the hatchery though some fry are outplanted in the drainage. Therefore, this is a stock native to the Sooes River that is reared at the U.S. Fish and Wildlife Service hatchery on the Sooes River. However, it is hoped that increasing run size will soon permit the passage of adults for natural spawning and rearing.

### **STOCK STATUS**

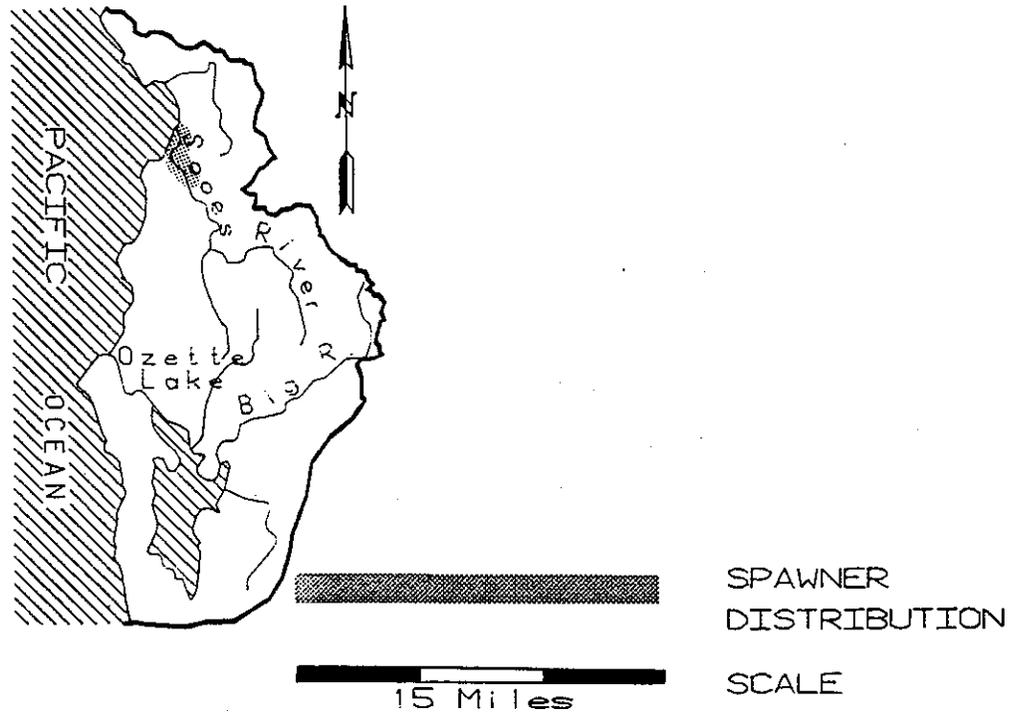
The status of this stock is Unknown.

In 1992, 1,196 males, 291 females, and 30 jacks returned to the hatchery, all of which were brought into the hatchery to spawn. No chinook were passed above the weir as the target number of approximately 400 females needed at the hatchery was not exceeded.

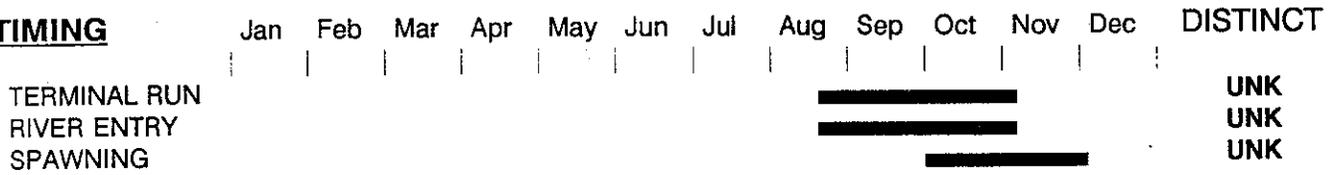
# STOCK DEFINITION PROFILE for Sooes Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

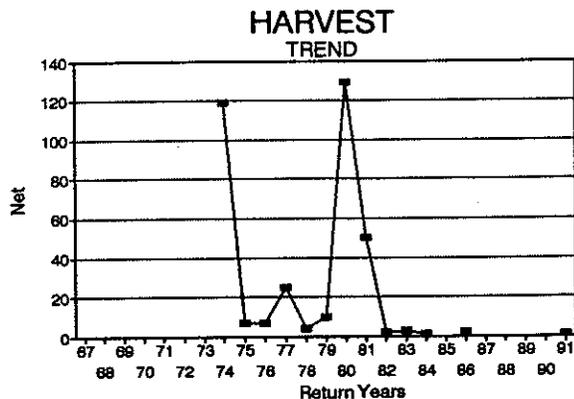
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Sooes Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	HARVEST Net	ESCAPE Hatchery
67		
68		
69		
70		
71		
72		
73		
74	119	
75	7	
76	7	
77	25	
78	4	
79	10	
80	129	
81	50	
82	2	
83	3	
84	1	
85		
86	2	587
87		434
88		569
89		569
90		316
91	1	1547



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Cultured*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## **OVERVIEW -- SOOES / OZETTE FALL CHUM STOCKS**

### **SOOES OZETTE**

#### **STOCK DEFINITION AND ORIGIN**

Two stocks of chum have been identified for the Sooes/Ozette area. The Sooes and Waatch rivers originally had a small run of chum, but substantial non-native introductions have occurred (Quinault 1975 and 1978, Quilcene-Walcott Slough 1976, 1977, 1980, 1982 through 1985). All returning adult Sooes chum are spawned at the U.S. Fish and Wildlife Service hatchery (40 fish in 1992). Substantial habitat degradation from timber management and fishing pressure led to the decline of the original stock. Interception during the hatchery coho target fishery further reduced the number of returning chum, even after the non-native enhancement program began. The combination of these factors has led to the replacement of the historically small native stock with the cultured production of this small non-native stock.

The Lake Ozette system has a native chum stock. Catch records indicate a range of 1,021 to 1,339 chum were taken from the lower river during the four-year period from 1948 through 1951. In 1955, 806 chum were caught. Records only show three fish caught after 1955 (one in 1963 and two in 1985), though fishing effort has almost certainly been light. Since there is currently no target fishery, no spawning surveys are conducted by the Makah Tribe, nor does WDFW survey for this stock. Consequently, the strength of the run is unknown, though habitat degradation and fishing pressure have no doubt reduced the strength of this stock. One adult was caught in Lake Ozette on December 13, 1990 off the mouth of the Big River during a predator-prey study, and one adult was suspected but not confirmed as seen in December of 1992 in Umbrella Creek above RM 4.5. Two chum were also netted while catching broodstock in the lake in the winter of 1983/1984 near Olson's Landing in the southeast portion of the lake.

#### **STOCK STATUS**

Both chum stocks are classified as Unknown.



## SOOES / OZETTE -- SOOES FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

This stock was designated on the basis of distinct geographical spawning distribution. The run timing is from October through early December. There is no natural spawning, as all chum are removed from the river and spawned in the U.S. Fish and Wildlife Service hatchery on the Sooes River. This stock is thought to be a Quilcene (Hood Canal) stock introduced from the Lake Quinault hatchery and is considered non-native.

### **STOCK STATUS**

The status of this stock is Unknown.

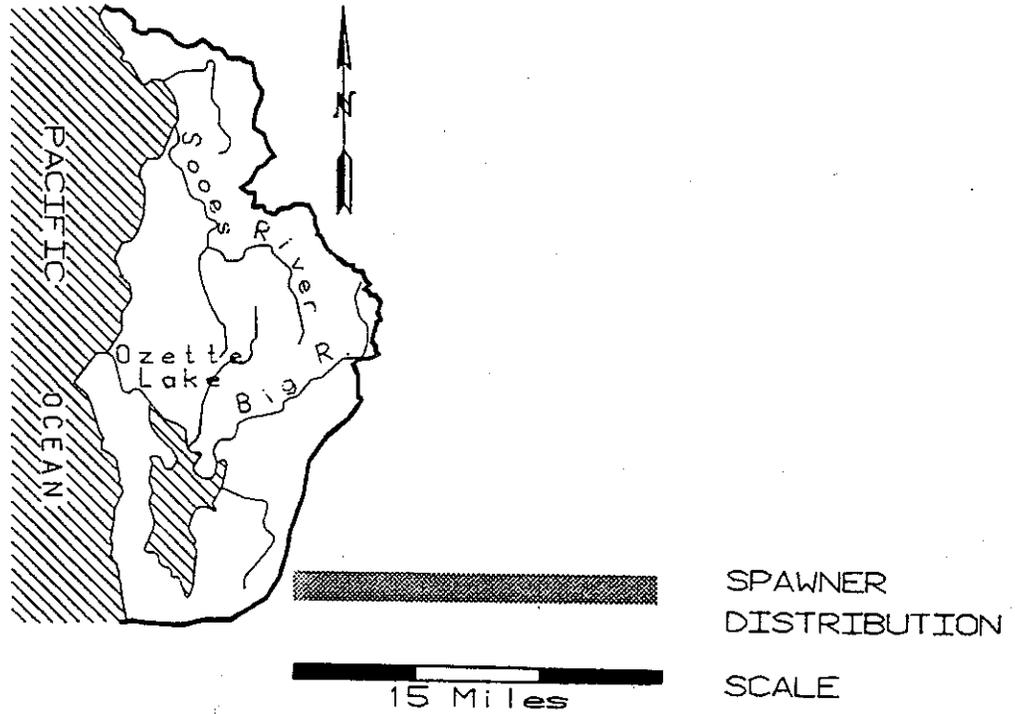
In 1992, 14 males and 26 females returned to the hatchery where all were spawned. There are no native chum remaining.

This stock may best be characterized as a hatchery stock. Further review of this question will occur in the next SASSI review.

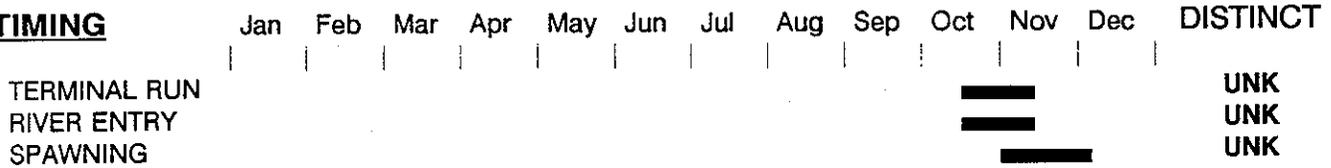
# STOCK DEFINITION PROFILE for Sooes Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

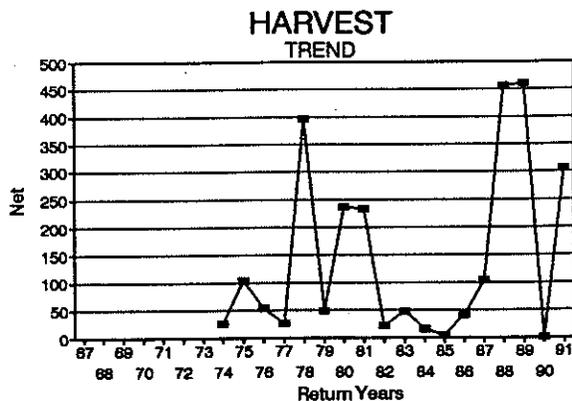
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Sooes Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	HARVEST Net	ESCAPE Hatchery
67		
68		
69		
70		
71		
72		
73		
74	26	
75	105	
76	54	
77	26	
78	396	
79	49	
80	237	
81	234	
82	21	
83	48	
84	16	
85	4	
86	41	51
87	104	187
88	456	641
89	460	91
90	1	1
91	306	260



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN  
*Non-Native*

PRODUCTION TYPE  
*Cultured*

STOCK DISTINCTION  
*Distribution*

STOCK STATUS  
*Unknown*

SCREENING CRITERIA



## **SOOES / OZETTE -- OZETTE FALL CHUM**

### **STOCK DEFINITION AND ORIGIN**

Little information is available for Ozette fall chum. Historical information suggests that significant returns occurred in the past. Chum have been caught in Lake Ozette in 1983 and 1990 in sockeye broodstock collections and in a recent study by the Makah Tribe. There is no fishery in the Lake Ozette system for chum. It is likely that chum spawning is concentrated in the outlet river, as well as in the larger tributaries since chum are typically mainstem spawners. Given the remoteness and lack of a target fishery, the Makah Tribe does not survey in that area. As a result no escapement data are available. The stock is considered native with wild production.

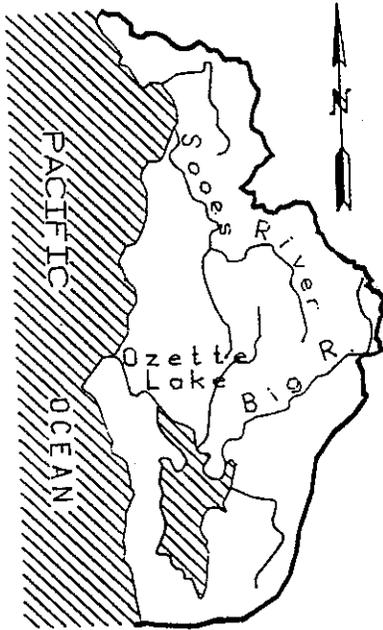
### **STOCK STATUS**

Stock status is Unknown.

# STOCK DEFINITION PROFILE for Ozette Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

UNK  
UNK  
UNK



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Ozette Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Poor

Brood Years	HARVEST Net			
----------------	----------------	--	--	--

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

2

### AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

### STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

*Return*



## **OVERVIEW -- SOOES / OZETTE COHO STOCKS**

### **SOOES / WAATCH OZETTE**

#### **STOCK DEFINITION AND ORIGIN**

Two stocks of coho have been designated for the Sooes/Ozette area: Sooes/Waatch and Ozette. The Sooes and Waatch rivers draining into Mukkaw Bay originally had native coho, though the current stock is considered mixed due to the combination of extensive use of non-local brood stock and subsequent fishing pressure. Non-local coho brood stock releases in the Sooes include Dungeness (1958), George Adams (1977), and Sol Duc (1981) fish. Annual releases into both the Sooes and Waatch rivers from 1967 through 1980 were from Quilcene stock, and the U.S. Fish and Wildlife Service hatchery used some Quinault brood stock from 1981 through 1984, 1986, 1988, and 1990. Significant numbers of coho returning to the Sooes hatchery are passed upstream. Habitat decline from timber management and fishing pressure reduced the numbers of the original native stock.

The Ozette coho stock has had little hatchery release history. Coho from the George Adams Hatchery (Hood Canal) were released in 1977, but the stock is considered to be a native stock. The peak catch occurred in 1952 (3,697 coho), but almost no fishing pressure has occurred since 1972 when the catch was 325 fish. Coho adults and fry are seen incidentally in most or all major tributaries of the lake, though spawning surveys are not conducted by either WDFW or the Makah Tribe since there currently is no target fishery. Habitat degradation from intensive timber management in the watershed and fishing pressure have reduced this stock from historic levels, but to what extent is unknown.

#### **STOCK STATUS**

The status of both stocks is Unknown.



## SOOES / OZETTE -- SOOES / WAATCH COHO

### **STOCK DEFINITION AND ORIGIN**

This stock was designated on the basis of distinct geographical spawning distribution. The run timing is from mid-September through January. From 1986-1992, the number of coho passed above the weir at the Makah National Hatchery (USFWS) on the Sooes River to spawn ranged from 0 to 2,684 fish. At extreme high tide (+10 feet), fish are able to circumvent the weir. Though originally there was a coho run native to the system, the current stock is thought to be predominantly from the Lake Quinault and Quilcene stocks due to hatchery introductions of these stocks. This stock is of mixed origin with composite production.

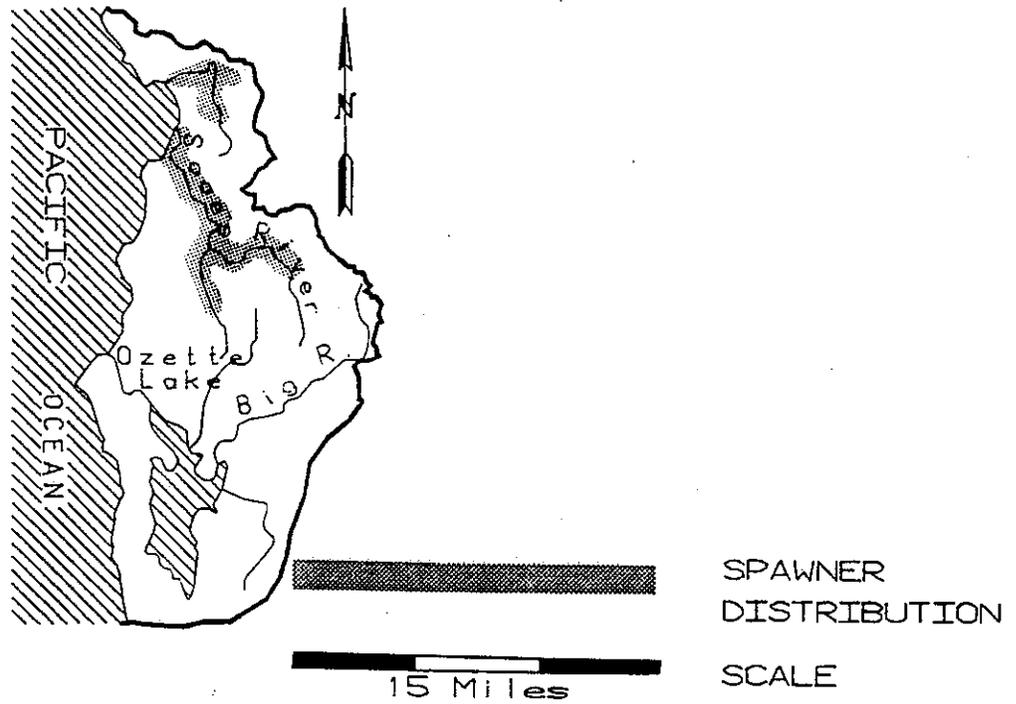
### **STOCK STATUS**

In 1992, 2,329 males, 2,216 females, and 347 jacks returned to the hatchery. Of these, 2,650 coho were passed upstream, the largest number ever. There are probably some original Sooes/Waatch coho in the river, but their overall status, along with that of the hatchery coho, is Unknown.

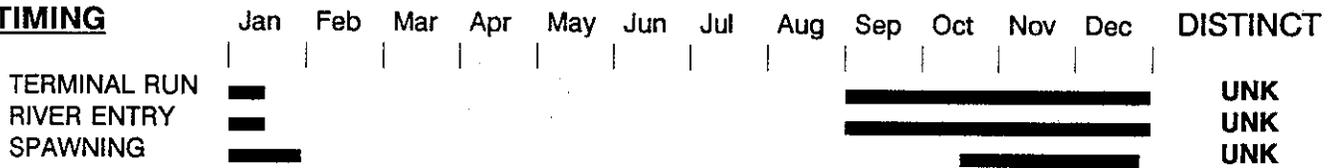
# STOCK DEFINITION PROFILE for Sooes/Waatch Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

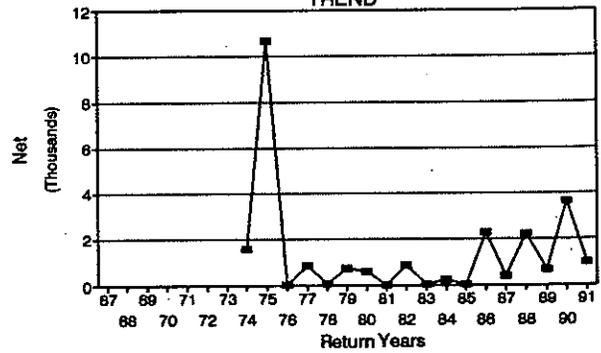
# STOCK STATUS PROFILE for Sooes/Waatch Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	HARVEST Net	ESCAPE Total
67		
68		
69		
70		
71		
72		
73		
74	1596	
75	10672	
76	2	
77	844	
78	74	
79	713	
80	595	
81	9	
82	874	
83	50	
84	221	
85	39	
86	2267	1452
87	417	793
88	2220	374
89	659	0
90	3644	0
91	995	2321

HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## SOOES / OZETTE -- OZETTE COHO

### **STOCK DEFINITION AND ORIGIN**

Adult coho and coho fry have been seen in the larger tributaries through the Lake Ozette system. Since there is no fishery in the Lake Ozette system for coho and there are no escapement data, there is no information available on the status of this species. River entry timing has been observed in the past from mid-October through January. Spawning occurs in the tributaries to the lake and possibly in the lake outlet.

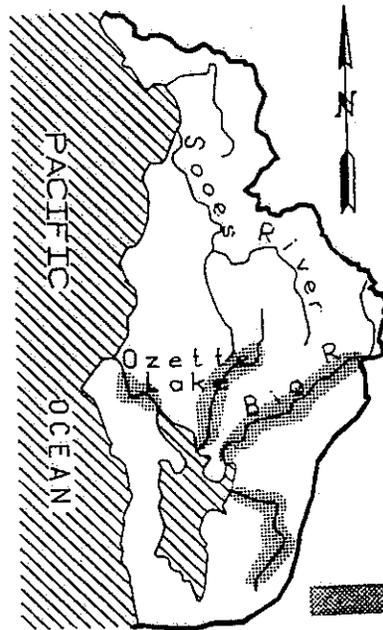
### **STOCK STATUS**

Stock status is Unknown.

# STOCK DEFINITION PROFILE for Ozette Coho

## SPAWNER DISTRIBUTION

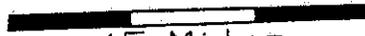
DISTINCT? - YES



SPAWNER  
DISTRIBUTION

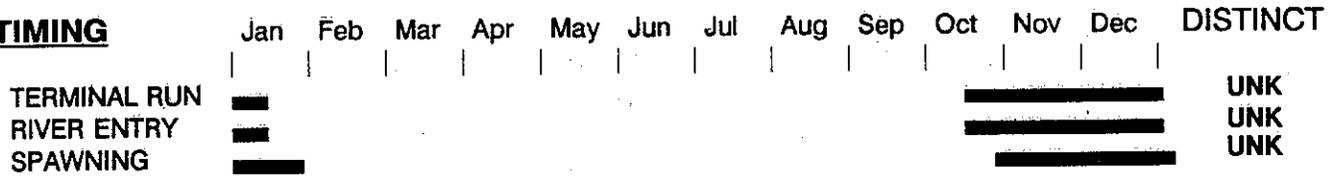


SCALE



15 Miles

## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

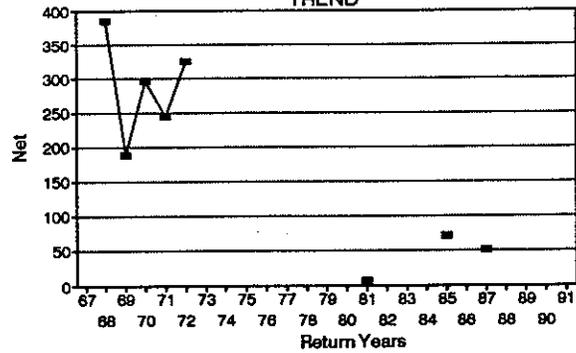
# STOCK STATUS PROFILE for Ozette Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Net			
67				
68	385			
69	189			
70	296			
71	244			
72	325			
73				
74				
75				
76				
77				
78				
79				
80				
81	7			
82				
83				
84				
85	71			
86				
87	51			
88				
89				
90				
91				

HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## OVERVIEW -- SOOES / OZETTE SOCKEYE STOCK

### OZETTE

#### STOCK DEFINITION AND ORIGIN

One native sockeye stock has been identified for the Lake Ozette drainage. Natural spawning is now apparently limited to the lakeshore and is supplemented with some hatchery outplanting from brood stock collected from lakeshore spawning areas. These are larger-bodied fish compared to those of the Quillayute system to the south. One year of non-native releases occurred in recent years (Quinault stock in 1983). In the 1930s the U.S. Fish and Wildlife Service released Quilcene reared sockeye fingerlings from Baker Lake stock, and there are also reports of Quinault stock outplantings from that era (Duglinski, et al. 1981). However, 1990 juvenile collection results from Lake Ozette showed them to be significantly different from all other Washington stocks. Significant habitat degradation from timber management in the drainage and past fishing pressure have reduced this formerly strong native run.



## **SOOES / OZETTE -- OZETTE SOCKEYE**

### **STOCK DEFINITION AND ORIGIN**

This native stock was designated on the basis of distinct geographical spawning distribution and genetic information collected by National Marine Fisheries Service (NMFS) in 1990. The run timing is from April through early August. Spawning occurs in the lake and perhaps in the Ozette River, but no longer in the tributaries. Specifically, sockeye spawn at Olson's Landing, Allen's Bay and near Umbrella Creek.

### **STOCK STATUS**

The status of this stock is Depressed, based on chronically low escapements.

The Lake Ozette sockeye run size for 1992 was 2,100 with the lower end of the four-year cycle averaging 300 to 400. This stock is supplemented with 40,000 to 100,000 fry from sockeye caught off the lake spawning beds. The fry are reared at the Makah Tribal Hatchery on Umbrella Creek.

### **FACTORS AFFECTING PRODUCTION**

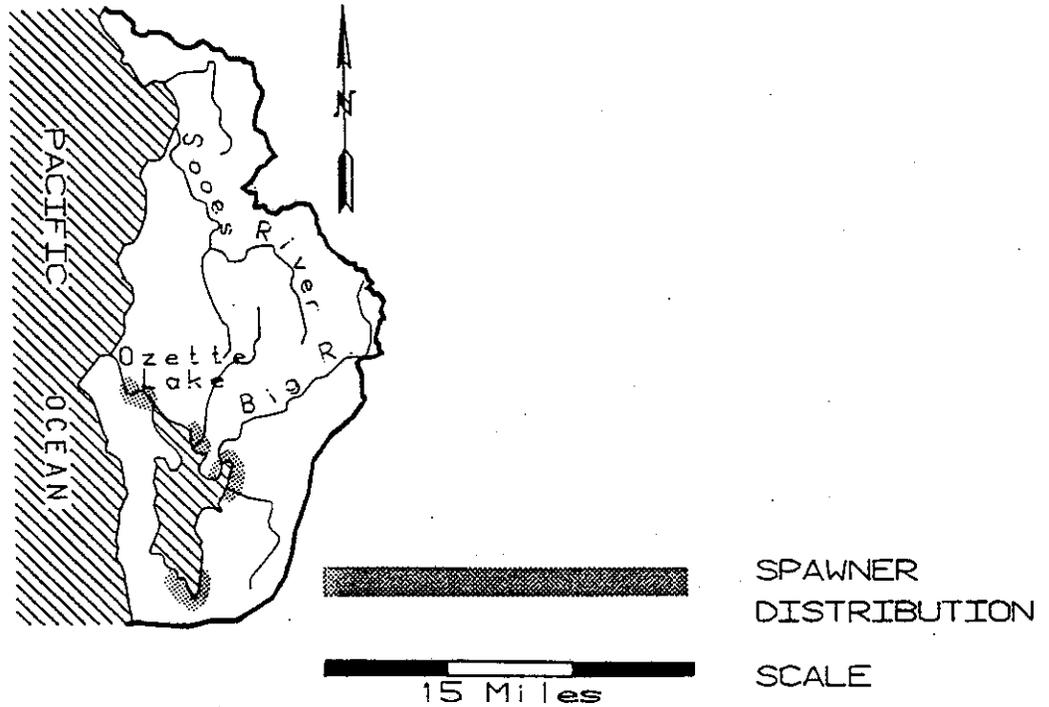
**Habitat** -- The Ozette drainage has been intensively logged, resulting in habitat degradation to the tributaries and lake. Railroad logging was underway by the 1930s and between 1940 and 1973 approximately 25 percent of the basin was harvested (Bortleson and Dion, 1979). Now virtually the entire watershed has been harvested, except for the small percentage in the Olympic National Park. Among the changes are an increased sediment load in the tributaries, with much of the finer sediment settling out in the lake. Most likely, spawning was formerly much more widespread in the lake and in the tributaries, but known spawning areas now are mostly along the shore north of Elk Creek and in Allen's Bay. Both of these areas are in the southern portion of the lake. Since the outlet is at the north end, these spawning areas may have experienced less siltation than other areas. However, 1992 analyses of cores from Siwash Creek measured fine sediment levels (<0.85 mm) averaging 24 percent of the total sample (McHenry et al. 1994).

Anecdotal tribal records exist of sockeye historically spawning in Big River, which is the largest tributary to the lake. Umbrella Creek and Crooked Creek may also have been used. In July, 1984, 31 mature sockeye were seen below the weir at the Lake Ozette outlet, but these fish did not go through the weir and may have gone up Coal Creek, may have spawned in the Ozette River or may have been dip-ins. Like the other major tributaries, Big River is processing an increased sediment load, and channel instability indicators include widening and shallowing, loss of pools, and bank-erosion areas. Bedload scour and fill of spawning gravels are also thought to be occurring. In 1992, fine sediment levels considered detrimental to salmonid egg to emergence survival

# STOCK DEFINITION PROFILE for Ozette Sockeye

## SPAWNER DISTRIBUTION

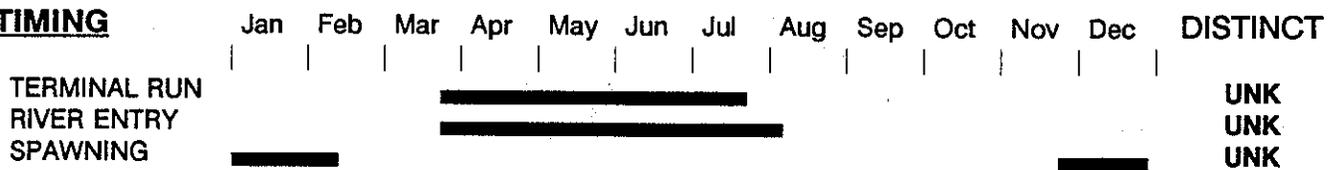
DISTINCT? - YES



SPAWNER  
DISTRIBUTION

SCALE

## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - YES

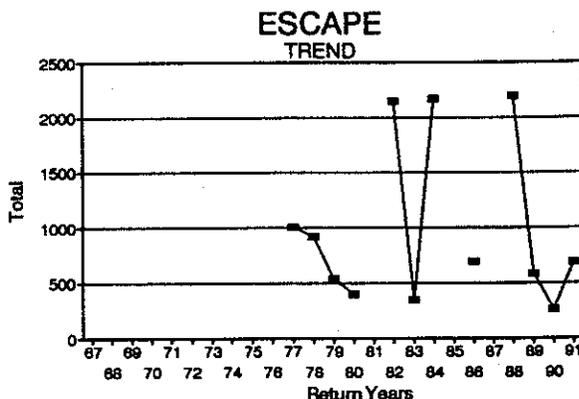
**GENETICS** - Stock is significantly different from all other Washington stocks [1990 juvenile collection from Lake Ozette (N=34); 30-locus G-tests:  $p < 0.001$ ]. [Source of information: NMFS - Seattle].

# STOCK STATUS PROFILE for Ozette Sockeye

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Net
67		313
68		468
69		295
70		432
71		328
72		346
73		49
74		0
75		0
76		0
77	1004	84
78	920	30
79	540	30
80	402	30
81		0
82	2147	29
83	350	0
84	2170	0
85		0
86	691	0
87		0
88	2191	0
89	588	0
90	263	0
91	684	0



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Genetics, Spawning Dist'n*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Chronically Low Escapement*

were documented in coho and steelhead spawning gravels in many of the major tributaries to the lake, including Big River and, Umbrella and Crooked creeks (McHenry et al. 1994). In 1990, thermographs were placed in lower Crooked Creek and Big River, and these recorded temperatures as high as 18 degrees C (Makah Tribal data). A thermograph placed by Olympic National Park personnel in lower Umbrella Creek in 1993 recorded temperatures as high as 21.8 degrees C. Unplanned fry releases occurred in 1988 and 1989 from lakeshore brood stock at the hatchery, just above river mile (RM) 4.5 on Umbrella Creek. The result was adults which spawned in Umbrella Creek near the hatchery in December of 1991 and 1992. The return as adults indicates that migration for lake rearing was successful, but it is unknown whether the original tributary spawning sockeye had earlier spawn timing than the lake stock.

*Daphnia* are the lake rearing sockeye's primary zooplankton food source, and studies suggest that less than one percent of this available food is consumed by either sockeye or kokanee (Beauchamp et al. 1993). The very large average size of sockeye smolts also suggests that competition for food is not a factor limiting production. Cutthroat and squawfish predation may be a limiting factor though, with per capita predation by cutthroat on salmonids in the lake much greater than squawfish predation (Beauchamp et al. 1993). Predation densities have not been established for predatory species in the lake, the outlet river, or in the tributaries. Kokanee populations, which spawn in the tributaries, remain strong.

**Harvest Management** -- There has not been a directed fishery on the Ozette River sockeye for the past several years, though catches in the Ozette River averaged 10,800 from 1949 through 1951. After 1963, catch rates never exceeded several hundred, and after 1972 the number of sockeye taken was always less than one hundred. There has been no fishery on this stock since 1982.

Once the returning steelhead are all wild (usually some time in March), the weir is turned off and these fish are allowed to pass unimpeded to their spawning grounds. Given the separation in run timing between hatchery and wild winter steelhead, the fact that the sport and tribal net fisheries end before the majority of the wild steelhead enter the river, and the attempt to prevent hatchery fish from naturally spawning, the impacts on the wild stock from stocking hatchery steelhead are assumed to be minimal.

**Hatchery** -- One hatchery is maintained in the Ozette drainage just above the confluence of Umbrella Creek (RM 4.5) and WRIA tributary #20.0056. This site is accessed via the 27E logging road off of the Hoko Ozette Road. The site is leased to the Makah Tribe, and this lease is renewable annually. Adults are caught off the lakeshore spawning beds. Experiments with adult holding pens in the lake resulted in both high mortality and a failure of adults to ripen. Currently, hatchery capacity is approximately 200,000 fry, and these fish are released into the lake. Eyed-egg capacity is 500,000 or more. The hatchery consists of two 10-foot diameter circular rearing areas. There is potential for a third, but available water supply is the limiting

factor, and capacity would still only be about 250,000 fry. Fry cannot be reared all summer at the facility due to both high water temperatures and low water supply.



## **OVERVIEW -- SOOES / OZETTE SUMMER AND WINTER STEELHEAD STOCKS**

**WINTER:  
SOOES / WAATCH  
OZETTE**

### **STOCK DEFINITION AND ORIGIN**

In the Sooes/Ozette basins, no summer steelhead stocks and two winter steelhead stocks have been identified. Wild winter steelhead in the Sooes/Waatch rivers and Ozette River are distinct stocks. Wild winter steelhead are native.

There is little or no information available to indicate that these are genetically distinct stocks. There are no records of hatchery introductions anywhere in the Ozette drainage. The stocks are treated separately due to the geographical isolation of the spawning populations. There may be more or fewer stocks identified once comprehensive genetic information is available.

### **STOCK STATUS**

Spawner escapements have not been monitored for the Sooes/Waatch and Ozette winter steelhead stocks. Both stocks have been classified Unknown because of insufficient information to determine their status.

More information on each stock is presented in separate Stock Reports.



## SOOES / OZETTE -- SOOES / WAATCH WINTER STEELHEAD

### STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Sooes River and Waatch River are native and a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock, though there are no known non-native steelhead outplantings in the Ozette drainage.

Run timing is generally from December through May and spawn timing is unknown but is believed to be similar to other wild winter steelhead stocks along the coast (mid-February to early June).

### STOCK STATUS

The status of the stock is Unknown. There is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

There is <sup>the</sup> a steelhead sport fishery on the Makah Reservation for these rivers, and records for this fishery are kept by the Makah Tribe. Since the data <sup>are</sup> is collected and kept by Tribe, and the punch cards do not differentiate between hatchery and wild steelhead anyway, this information cannot be used to assess the status of the wild stock.

Sport harvest information is available for many years, but wild winter steelhead were not reported separately on WDW steelhead permit cards until the 1986-87 winter steelhead season. As a result, sport harvest cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

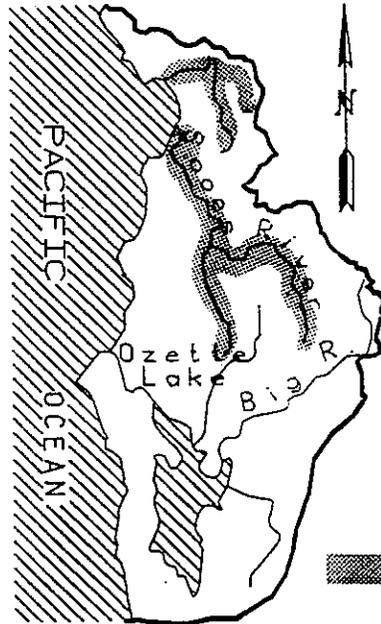
### FACTORS AFFECTING PRODUCTION

**Habitat** -- Freshwater habitat has been significantly degraded by land-use activities in the Sooes River primarily due to extensive logging. There have been substantial debris torrents and road-related slope failures into channels, and there continue to be temperature problems due to former harvesting of the riparian areas. Aerial photographs in 1990 revealed that older, poorly maintained timber management roads

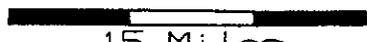
# STOCK DEFINITION PROFILE for Sooes/Waatch Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Sooes/Waatch Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
--------------	---------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	15
88	9
89	2
90	0
91	0
92	0

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

have contributed substantial sediment to virtually every major tributary in the Sooes drainage (mainstem, Miller, Grimes, Shafter, Snag, 20.0036, 20.0034, etc.). A landowner road maintenance plan has recently been required of the major landowner of the area, and the Makah Tribe will soon be initiating road maintenance improvements on some of their problematic roads. A thermograph placed in the mainstem in 1985 below Snag Creek recorded temperatures as high as 29 degrees C, and temperatures of 26 degrees C for six days (Blum et al. 1985). More recent temperatures, though lower, are still reaching 20 to 22 degrees C annually (data from USFWS Makah National Hatchery at the water intake on the mainstem).

The Waatch River has anadromous barriers due to man made reservoirs for domestic water supply on both Educket Creek and Waatch Creek about one-third up each creek. Temperature records from 1985 do not indicate major problems with the Waatch River (Blum et al. 1985), though more of the watershed timber has been harvested since then. There are also some timber management road maintenance problems in this drainage.

**Harvest Management** -- The Sooes and Waatch rivers are heavily stocked with hatchery winter steelhead smolts by the U.S. Fish and Wildlife Service from the Makah National Fish Hatchery on the Sooes River. All hatchery fish are fin-clipped and the weir prevents them from passing upstream on the Sooes River, except for extreme high tides (> +10 feet). Hatchery steelhead run timing starts in November and generally ends by the end of January. Wild steelhead begin showing up in significant numbers in February and are passed upstream to spawn in the Sooes River. The river net fisheries extend through February on the Sooes, and through March on the Waatch. There is also a year around sport fishery, though effort appears to be light prior to and after the hatchery steelhead run.

Once the returning steelhead are all wild (usually some time in March), the weir on the Sooes is turned off and these fish are allowed to pass unimpeded to their spawning grounds. Given the separation in run timing between hatchery and wild winter steelhead, the fact that the tribal fisheries end before the majority of the wild steelhead enter the river, and the attempt to prevent hatchery fish from naturally spawning, the impacts on the wild stock from stocking hatchery steelhead are assumed to be minimal.

**Hatchery** -- See Harvest Management.

## SOOES / OZETTE -- OZETTE WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Ozette River, Big River and tributaries are native and a distinct stock based on the geographical isolation of the spawning population.

Run timing is generally from December through May and spawn timing is unknown but believed to be similar to other wild winter steelhead stocks along the coast (mid-February to early June).

Little is known about the genetic composition of the stock, though there are no known non-native steelhead outplantings in the Ozette drainage.

### **STOCK STATUS**

The status of the stock is Unknown. There is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Sport harvest data of wild winter steelhead are available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data are limited. Sedimentation from timber management activities appears to have affected most major tributaries in the drainage. Fine sediment levels are high in spawning gravels throughout the major tributaries with the basin averaging 17.12 percent (<0.85mm) (McHenry et al. 1994). Wet weather timber hauling on low quality rock has contributed to the fine sediment problems. Instream temperatures are also a concern, at least in Crooked, Big and Umbrella creeks. See also the Ozette Sockeye Factors Affecting Production section.



# STOCK STATUS PROFILE for Ozette Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	0
88	2
89	0
90	0
91	0
92	0

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- In some years, there is a directed tribal fishery though usually the effort is minimal.

**Hatchery** -- There have been no hatchery steelhead releases in the Ozette. While hatchery steelhead smolts have been stocked in nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

## **OVERVIEW -- QUILLAYUTE SPRING CHINOOK STOCK**

### **SOL DUC**

One stock of spring chinook has been identified for the Quillayute River basin. The stock was introduced into the river basin by a Washington Department of Fisheries hatchery program in the mid-1970s. The origin of the stock is Cowlitz/Umpqua strain. All releases were made into the Sol Duc River drainage. The stock is a hatchery production unit, with some natural spawning from hatchery strays.

Additional information is provided in the individual stock report.



## **QUILLAYUTE -- SOL DUC SPRING CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

River entry is from early April to late June. Spawning is from late August to early October. This stock is primarily a hatchery stock, with significant natural spawning activity from strays (composite stock). Naturally-spawning spring chinook are currently enumerated as part of natural summer chinook reproduction, due to inability to differentiate stocks on spawning grounds. All hatchery program releases are into the Sol Duc River.

This stock is derived from a non-native Cowlitz/Umpqua hatchery stock. A substantial incidence of hatchery-stray spring chinook spawning in the wild has been suggested by the high incidence of spring chinook coded-wire tag recoveries during summer chinook spawning surveys and chinook brood stock collection activities. Similar spawn timing to Quillayute River summer chinook, coupled with the observed straying, suggests significant genetic exchange between hatchery spring and natural summer stocks is occurring. The stray rate has not been quantified. The natural production level from this stock is unknown.

### **STOCK STATUS**

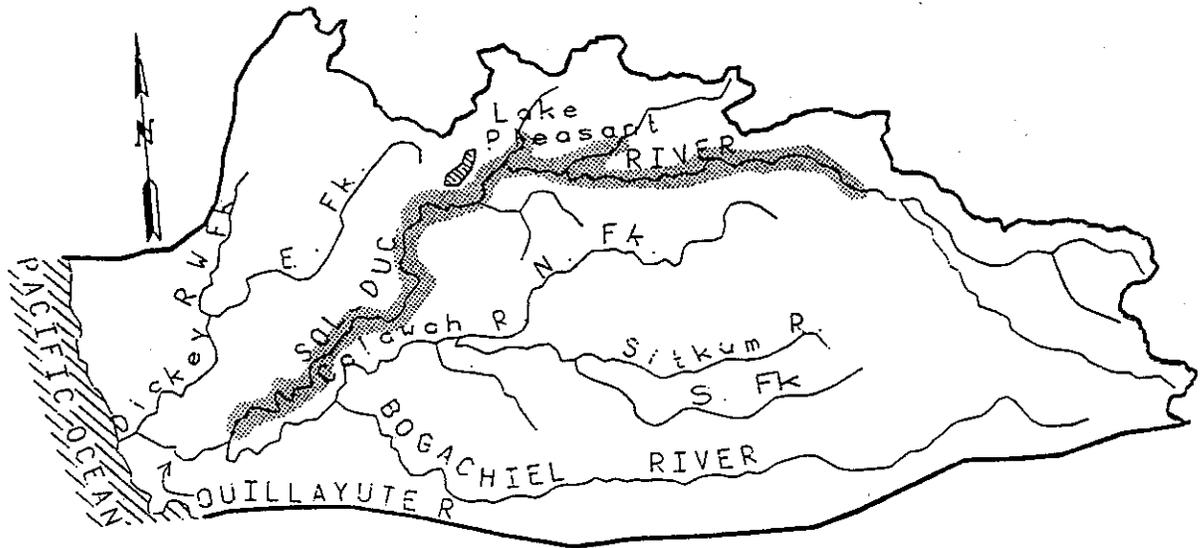
The status of this stock is Healthy.

This stock supports both marine and terminal area harvests. Terminal run size has averaged 2,429 fish. Terminal run size in the mid- to late 1980s has been consistently large enough to support a tribal in-river net fishery in May and June, a sport fishery and meet hatchery escapement goals. No natural escapement goal exists, as the stock is managed for hatchery production only.

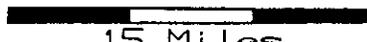
# STOCK DEFINITION PROFILE for Sol Duc Spring Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

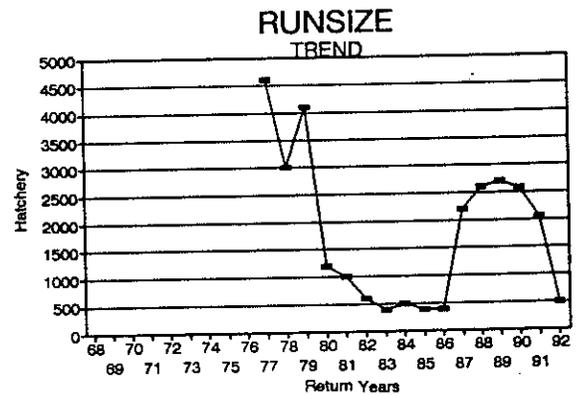
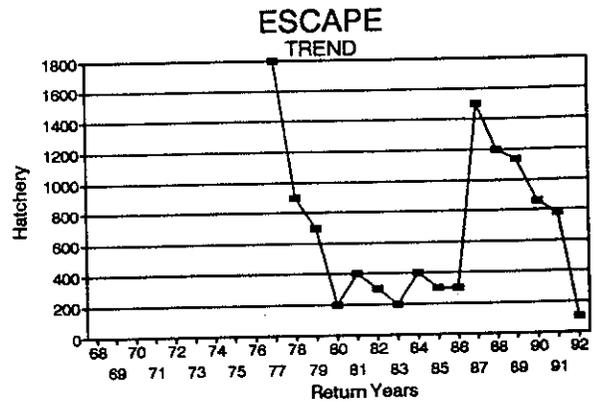
# STOCK STATUS PROFILE for Sol Duc Spring Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Hatchery	RUNSIZE Hatchery		
--------------	-----------------	------------------	--	--

68		
69		
70		
71		
72		
73		
74		
75		
76		
77	1800	4600
78	900	3000
79	700	4100
80	200	1200
81	400	1000
82	300	600
83	200	400
84	400	500
85	300	400
86	300	400
87	1500	2200
88	1200	2600
89	1135	2702
90	859	2584
91	781	2060
92	100	500



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Non-Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **OVERVIEW -- QUILLAYUTE SUMMER CHINOOK STOCKS**

**QUILLAYUTE/BOGACHIEL  
SOL DUC  
CALAWAH**

### **STOCK DEFINITION AND ORIGIN**

Three stocks of Quillayute basin summer chinook have been tentatively identified by the criterion of geographic isolation: (1) Bogachiel/Quillayute, (2) Calawah, and (3) Sol Duc. River entry is early April to mid-August. Spawning begins in late August to mid-October. The majority of spawning is in the mainstem Sol Duc, Bogachiel, and Calawah rivers. The stocks are considered to be of native origin.

### **STOCK STATUS**

The combined stocks support marine and terminal area (in-river) fisheries. Stocks are harvested in troll fisheries off Alaska, Canada, and U.S. Data on impacts of these fisheries on the summer stocks are not currently available. The Quileute tribal in-river fishery harvests both hatchery spring and natural summer stocks during the entry timing of the summer chinook.

Basin escapements have ranged from 555 to 2,242. The escapement goal is 1,200 natural summer chinook. Escapements during the period 1980 through 1991 have averaged 1,048, somewhat short of the goal. Two of the three stocks (Bogachiel/Quillayute and Calawah) have had erratic escapement patterns, sometimes declining below 100 fish, while the Sol Duc has maintained a consistent 500 to 1,000 fish escapement.



## **QUILLAYUTE -- QUILLAYUTE / BOGACHIEL SUMMER CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other summer chinook stocks on the basis of geographic isolation.

River entry is from early April to mid-August and spawning is from late August to mid-October. The majority of spawning is in the mainstem Bogachiel River. Redds are only sporadically observed in the mainstem Quillayute River.

The stock is of native origin, and production type is wild.

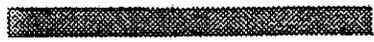
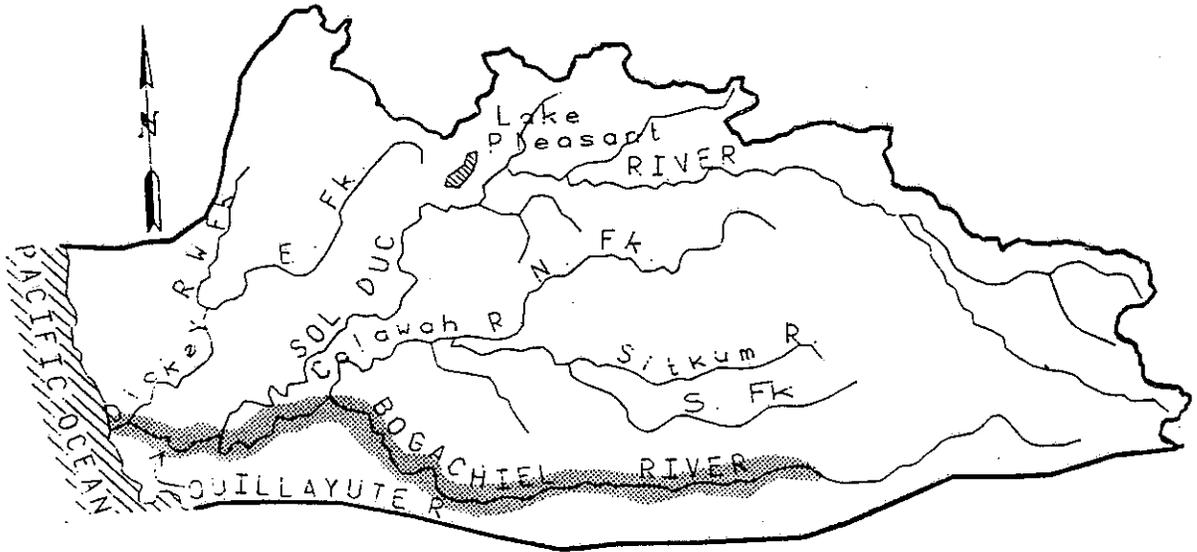
### **STOCK STATUS**

The stock status is considered Unknown due to wide fluctuations in spawning activity from very low to moderate numbers in the period 1980 through 1991. Escapements of summer chinook in the Bogachiel River drainage have ranged from 35 to 656 between 1980 through 1991, while escapements for the entire Quillayute River basin have varied from 555 to 2,242. Data quality is considered good.

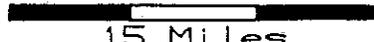
# STOCK DEFINITION PROFILE for Quillayute/Bogachiel Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

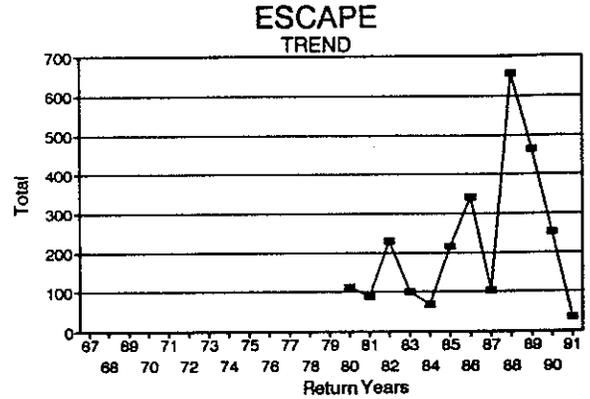
DISTINCT? - NO

# STOCK STATUS PROFILE for Quillayute/Bogachiel Summer Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	113			
81	90			
82	230			
83	101			
84	68			
85	215			
86	341			
87	103			
88	656			
89	467			
90	252			
91	35			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## QUILLAYUTE -- SOL DUC SUMMER CHINOOK

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other summer chinook stocks on the basis of geographic isolation.

River entry is from early April to mid-August. Spawning is from late August to mid-October. The majority of spawning is in the mainstem Sol Duc River. In years with moderate to high late summer flows, some spawning is observed in Beaver and Bear creeks. Spawning is distributed the entire length of the Sol Duc, but concentrations of activity exist from RM 18.0 to RM 45.0.

The stock is of native origin. Production type is composite. A summer chinook indicator stock, broodstock capture and juvenile production program has been conducted in the Sol Duc River by the Quileute Tribe since 1987. One hundred to 200 adult fish are captured and spawned each year. Approximately 150,000 to 200,000 juveniles are tagged and released back into the Sol Duc River at the WDFW Bear Springs facility each year.

A potential genetic problem is the hybridization of spring and summer chinook in the natural spawning populations. This is due to the presence of large numbers of stray Sol Duc Hatchery spring chinook (of Cowlitz/Umpqua origin, with similar spawn timing to that of summer stock) in the Sol Duc River. Some hybridization of these two groups has also occurred in the brood stock program. A summer chinook hatchery program, based upon the indigenous summer stock, also existed at the Sol Duc Hatchery from the mid-1970s to 1987. The extent of the problem is not yet known.

### **STOCK STATUS**

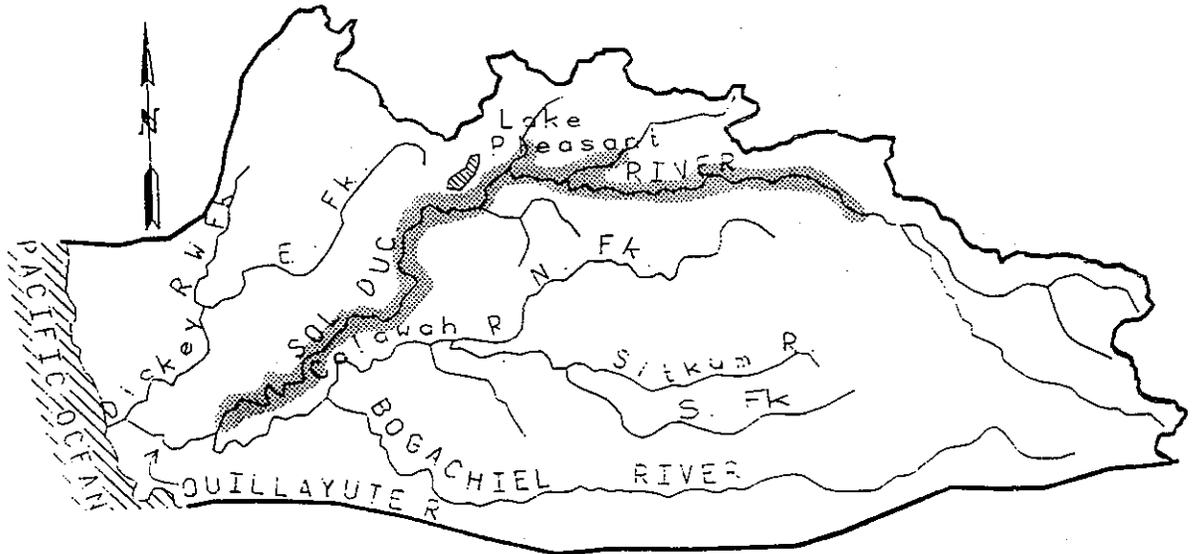
The status of this stock is Healthy.

Escapements of summer chinook in the Sol Duc River drainage have ranged from 250 to 1,131 from 1980 to 1991, while escapements for the entire Quillayute River basin have varied from 555 to 2,242. These estimates may be overestimates due to the presence of significant numbers of spring chinook spawning in many of the same areas. Data quality is considered good.

# STOCK DEFINITION PROFILE for Sol Duc Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



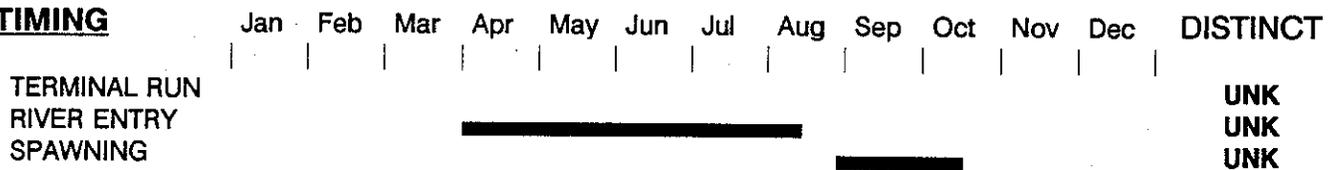
SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING



## BIOLOGICAL CHARACTERISTICS

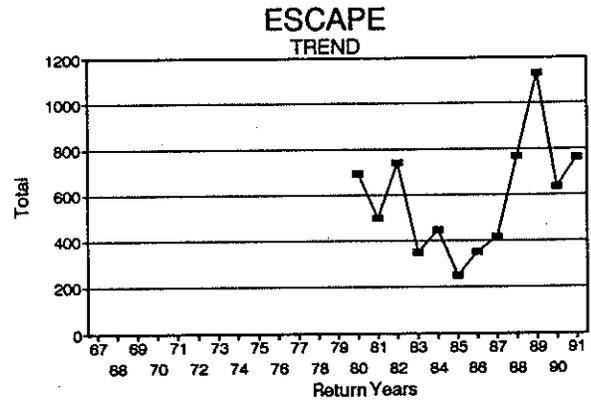
DISTINCT? - NO

# STOCK STATUS PROFILE for Sol Duc Summer Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	693			
81	500			
82	738			
83	351			
84	447			
85	250			
86	352			
87	416			
88	768			
89	1131			
90	634			
91	763			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **QUILLAYUTE -- CALAWAH SUMMER CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other summer chinook stocks on the basis of geographic isolation.

River entry is from early April to mid-August. Spawning is from late August to mid-October. The majority of spawning is in the mainstem and South Fork Calawah rivers. In years with moderate to high late summer flows, some spawning is observed in the lower three miles of the Sitkum River, and lower three miles of the North Fork Calawah.

This stock is of native origin, and the production type is wild.

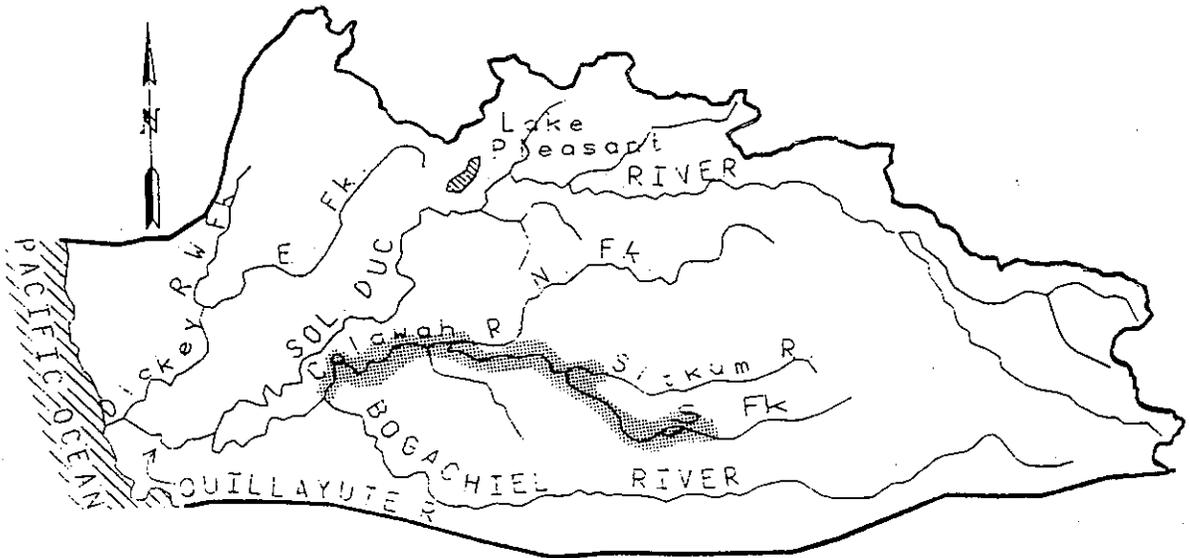
### **STOCK STATUS**

The stock status is considered Unknown due to wide fluctuations in spawning activity from very low to moderate numbers in the period 1980 through 1991. Escapements of summer chinook in the Calawah River drainage have ranged from 85 to 1,125 between 1980 and 1991, while escapements for the entire Quillayute River basin have varied from 555 to 2,242. Data quality is considered good.

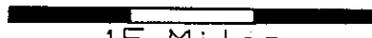
# STOCK DEFINITION PROFILE for Calawah Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



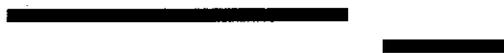
15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Calawah Summer Chinook

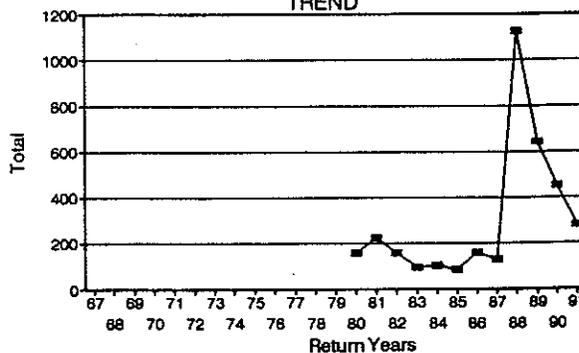
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	158
81	225
82	158
83	96
84	103
85	85
86	160
87	131
88	1125
89	644
90	453
91	281

## ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## OVERVIEW -- QUILLAYUTE FALL CHINOOK STOCKS

QUILLAYUTE / BOGACHIEL DICKEY	SOL DUC CALAWAH
----------------------------------	--------------------

### STOCK DEFINITION AND ORIGIN

Four stocks of native Quillayute basin fall chinook have been tentatively identified by the criterion of geographic isolation: (1) Bogachiel/Quillayute, (2) Calawah, (3) Sol Duc, and (4) Dickey. River entry is early September to late November. Spawning is from late October to early December. The majority of spawning is in mainstem Sol Duc, Bogachiel, and Calawah rivers, and Lake Creek. The lower Dickey River drainage, as well as moderate to large tributaries throughout the lower to mid-Quillayute River basin, have significant spawning populations as well. Tributary spawning is highest in moderate-to-high-flow years. All stocks except Sol Duc are wild production type; Sol Duc is a composite production unit. A small fall chinook hatchery program is present in the Sol Duc drainage.

### STOCK STATUS

The combined stocks support marine and terminal area (in-river) fisheries. Stocks are harvested in troll and sport fisheries off Alaska, Canada, and U.S. Data on impacts of these fisheries on the fall chinook stocks are not currently available. The Quileute tribal in-river fishery harvests fall chinook stocks during the directed fall chinook and fall coho fishery in September, October and November.

The basin terminal run sizes have ranged from 5,826 to 22,668, with an average of 13,496 (1982 through 1991 data). Basin natural spawning escapements have ranged from 2,359 to 15,167, with an average of 9,222 (1982 through 1991 data). The escapement goal is 60 percent of the terminal run size with a floor escapement of 3,000. This goal has been met in the majority of years from 1982 through 1991. The status of all fall chinook stocks is considered Healthy.



## **QUILLAYUTE -- QUILLAYUTE / BOGACHIEL FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall chinook stocks on the basis of geographic isolation.

River entry is early September to late November. Spawning is from late October to early December. The majority of spawning is in the mainstem Bogachiel River. Redd densities are low in the mainstem Quillayute River, except in low flow years that impede upstream salmon migration. Only one major spawning tributary is present and is suitable for significant chinook production (Bear Creek). During some years, Bear Creek can have up to 100+ redds in the lower 1.5 miles. Other small tributaries have limited chinook spawning in high flow years.

The stock is of native origin, and the production type is wild.

### **STOCK STATUS**

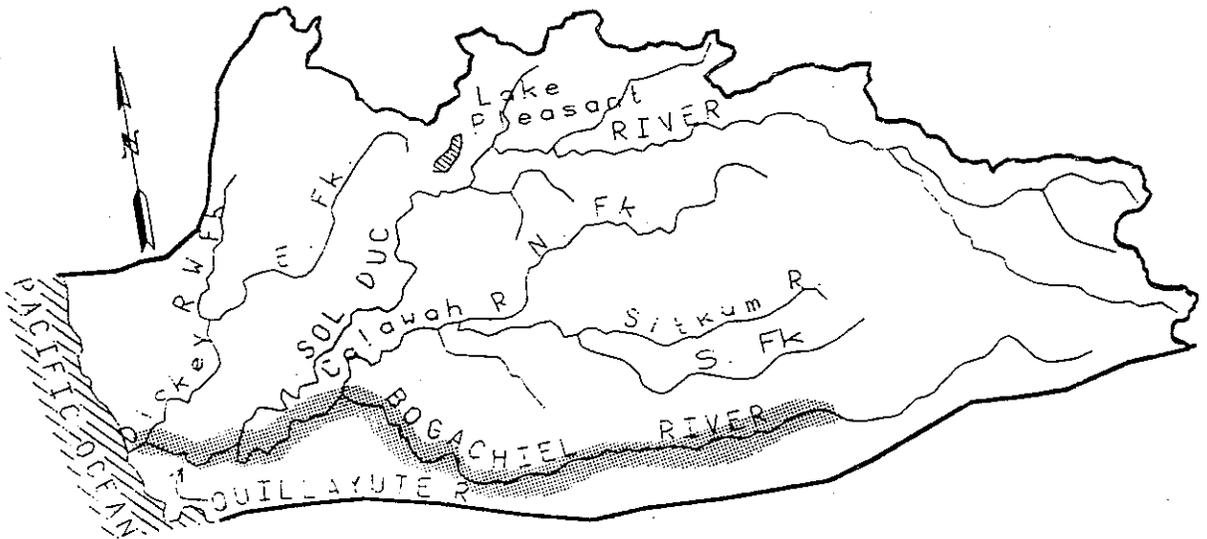
The status of this stock is Healthy.

Natural escapements of fall chinook in the Bogachiel/Quillayute River drainage have ranged from 308 to 3,210 through 1982 through 1990. Data quality is considered good.

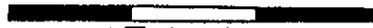
# STOCK DEFINITION PROFILE for Quillayute/Bogachiel Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



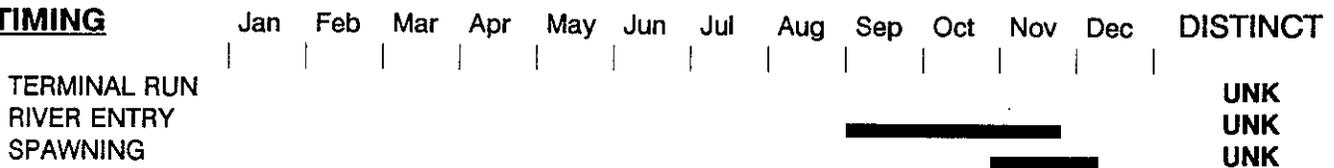
SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Quillayute/Bogachiel Fall Chinook

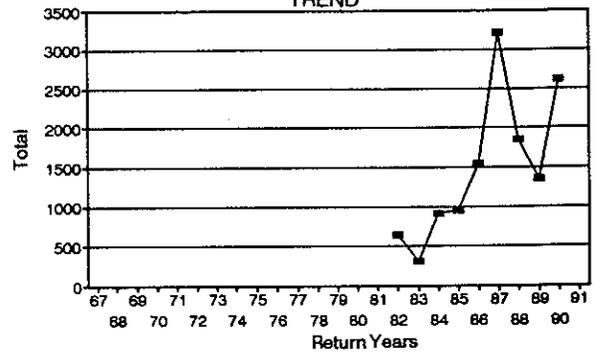
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	640
83	308
84	916
85	956
86	1540
87	3210
88	1853
89	1350
90	2615
91	

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## QUILLAYUTE -- DICKEY FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall chinook stocks on the basis of geographic isolation.

River entry is from early September to late November. Spawning is from late October to early December. Both the mainstem and East Fork support small to moderate spawning populations. Coal Creek can have very high numbers of spawners in some years (100+ redds in lower 1.0 mile). Several small and medium tributaries support small numbers of spawners.

The stock is of native origin and the production type is wild.

### **STOCK STATUS**

The status of this stock is Healthy.

Natural escapements of fall chinook in the Dickey River drainage have ranged from 363 to 1,393 in the period from 1982 through 1990. Data quality is considered good.



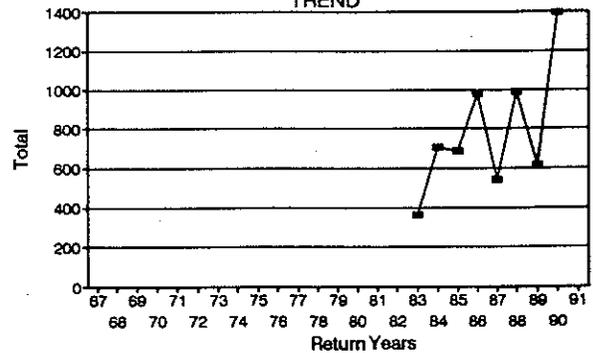
# STOCK STATUS PROFILE for Dickey Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83	363			
84	705			
85	685			
86	980			
87	540			
88	988			
89	615			
90	1393			
91				

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## QUILLAYUTE -- SOL DUC FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall chinook stocks on the basis of geographic isolation.

River entry is from September to late November. Spawning is from late October to early December. Both the mainstem and larger tributaries support large spawning populations. In dry years, the majority of spawning is in the lower and mid-mainstem Sol Duc River. However, in moderate to high-flow years, large numbers of spawners can be found in Gundersen, Lake, Beaver, and Bear creeks. Lake Creek is known for exceptionally high densities of spawners (200 to 500+ redds/mile). Numerous other small and medium tributaries support small to moderate numbers of spawners.

The stock is of native origin, and the production type is composite. A small hatchery chinook program (created from native brood stock) is present at the Sol Duc Hatchery, primarily for production of juveniles for coded-wire tagging. Hatchery terminal run size averages 0.1 to two percent of natural Quillayute basin terminal run size.

### **STOCK STATUS**

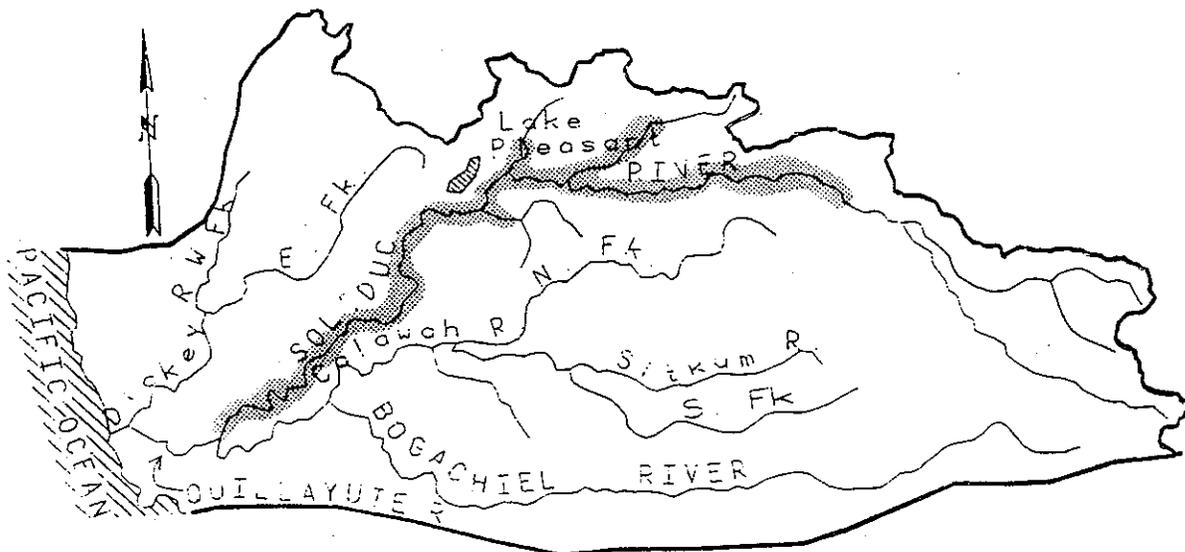
The status of this stock is Healthy.

Natural escapements of fall chinook in the Sol Duc River drainage have ranged from 1,235 to 7,658 in the period from 1982 through 1990. Data quality is considered good.

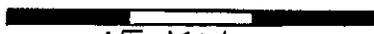
# STOCK DEFINITION PROFILE for Sol Duc Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

UNK  
UNK  
UNK



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Sol Duc Fall Chinook

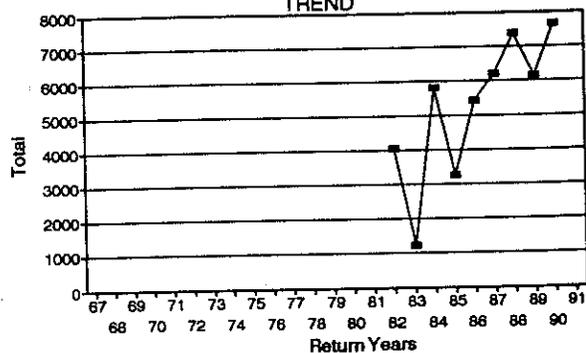
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	4057
83	1235
84	5826
85	3247
86	5438
87	6199
88	7379
89	6156
90	7658
91	

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## QUILLAYUTE -- CALAWAH FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall chinook stocks on the basis of geographic isolation.

River entry is from early September to late November. Spawning is from late October to early December. The majority of spawning is in the mainstem and lower South Fork Calawah rivers. In some years significant spawning is observed in the lower three miles of the Sitkum River, and lower 11 miles of the North Fork Calawah. No other large tributaries suitable for chinook production are present in the Calawah drainage.

The stock is of native origin, and the production type is wild.

### **STOCK STATUS**

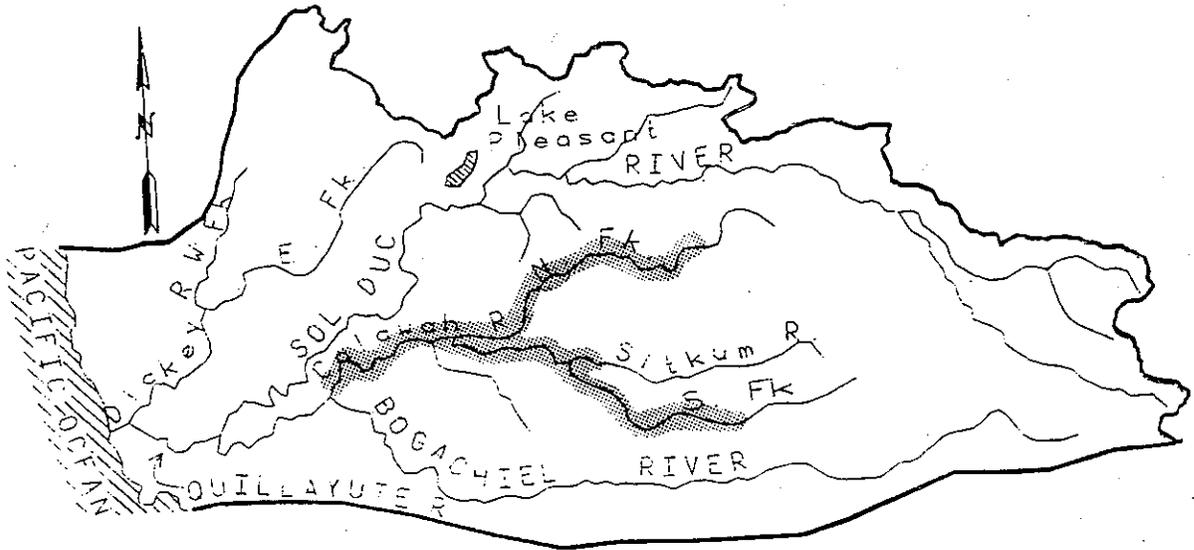
The status of this stock is Healthy.

Escapements of fall chinook in the Calawah River drainage have ranged from 453 to 4,947 in the period 1982-1990. Data quality is considered good.

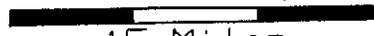
# STOCK DEFINITION PROFILE for Calawah Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

UNK  
UNK  
UNK



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Calawah Fall Chinook

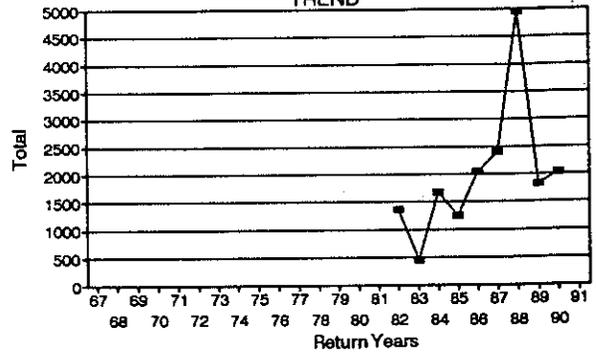
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	1364
83	453
84	1681
85	1257
86	2048
87	2403
88	4947
89	1830
90	2045
91	

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **OVERVIEW -- QUILLAYUTE FALL CHUM STOCK**

### **QUILLAYUTE**

Only one stock is currently identified for the Quillayute River basin because spawning is sporadically observed at low levels throughout the drainage, with no clear population groupings evident. Stock status and population size are unknown.

Additional information is provided in the individual stock report.



## QUILLAYUTE -- QUILLAYUTE FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

River entry is from September through December. Spawning is from mid-November to early January. The stock origin is native and the production type is wild. Non-native chum were released into the Quillayute basin for a brief period in the 1980s. Genetic impact was assumed to be minimal.

### **STOCK STATUS**

Stock status is Unknown.

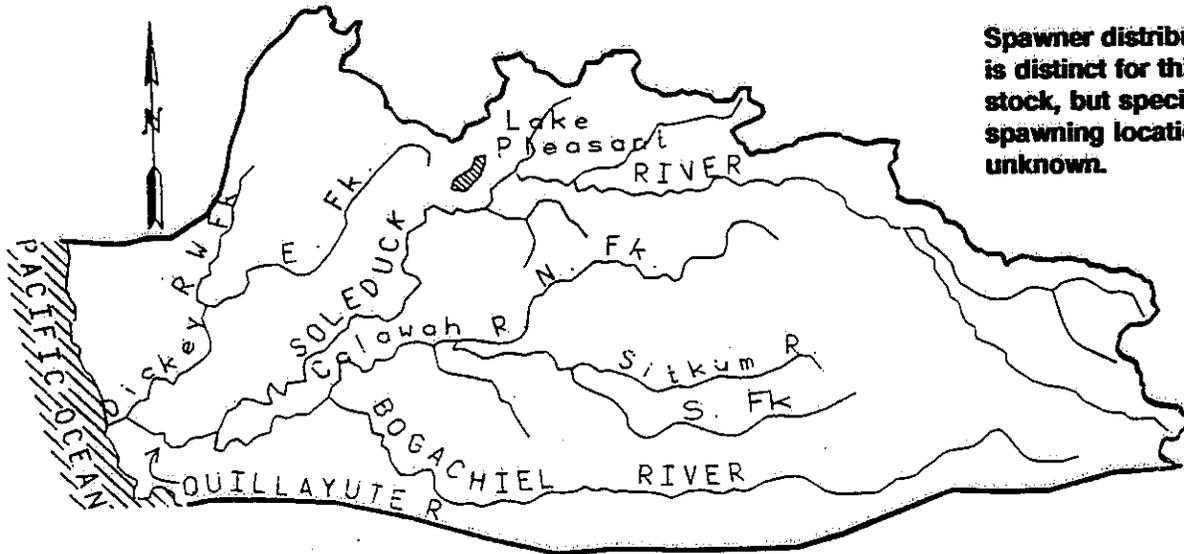
The stock supports incidental sport and tribal commercial harvests. Catches for both fisheries are low (less than 100 fish per year for tribal fishery and are probably similar for the sport fishery).

This stock is not actively managed. Terminal run sizes and escapements are unknown. Spawners are observed sporadically throughout basin during fall coho and chinook spawning surveys.

# STOCK DEFINITION PROFILE for Quillayute Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Quillayute Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Brood	NO DATA			
Years				

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

---

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## **OVERVIEW -- QUILLAYUTE SUMMER COHO STOCK**

### **SOL DUC**

One stock of summer coho has been identified for the Quillayute River basin. The majority of natural spawning activity occurs in the upper reaches of the Sol Duc River. A large summer coho hatchery program at the WDFW Sol Duc Hatchery accounts for the majority of the stock production (70 to 90 percent of the total terminal run size).

Additional information is provided in the individual stock report.



## QUILLAYUTE -- SOL DUC SUMMER COHO

### **STOCK DEFINITION AND ORIGIN**

River entry is from early August to mid-September. Spawning is from late October to early December. This stock has hatchery and wild components (composite production type). Stock origin is native. The hatchery component is derived from natural stock. All hatchery program releases are into the Sol Duc River. The majority of natural production occurs in a short stretch of the Sol Duc River (RM 61.0 to RM 63.0), above the Salmon Cascades. The Salmon Cascades present a difficult passage problem to salmonids, and the summer coho population is the only salmon stock to make significant use of spawning habitat upstream of this point. Reproduction is also observed in Bear, Camp, and Beaver creeks in years of larger run sizes. The hatchery stray rate into natural spawning population is unknown.

### **STOCK STATUS**

This status of this stock is Healthy.

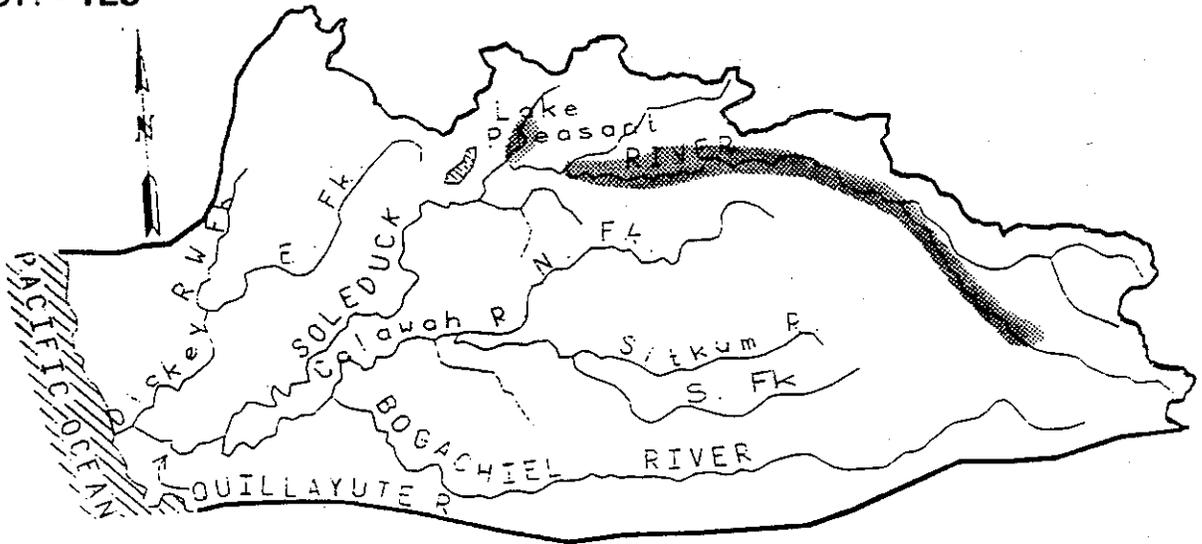
This stock supports both ocean and terminal area (in-river) sport and commercial fisheries. Limited coded-wire tag data suggest ocean recovery rates of this stock are low.

Historically, this stock was managed primarily for hatchery production. Future management approaches are being discussed. Hatchery component terminal run sizes have averaged 7,310 fish, and natural-component terminal run sizes have averaged 1,825 fish (1982 through 1991 data). No agreed natural escapement goal exists. Natural escapements have ranged from 674 to 1,573. The hatchery frequently has large surplus rack returns. Data quality is considered good.

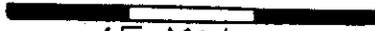
# STOCK DEFINITION PROFILE for Sol Duc Summer Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													UNK
RIVER ENTRY													UNK
SPAWNING								█				█	UNK

## BIOLOGICAL CHARACTERISTICS

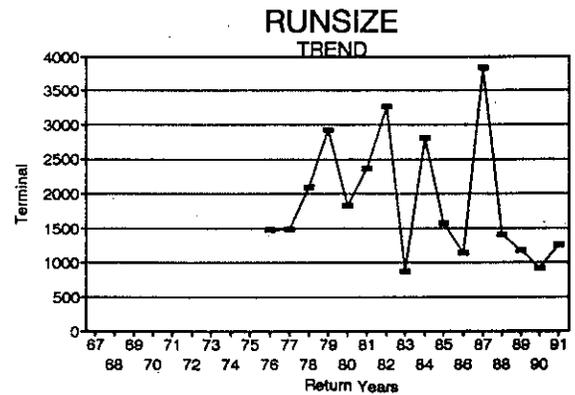
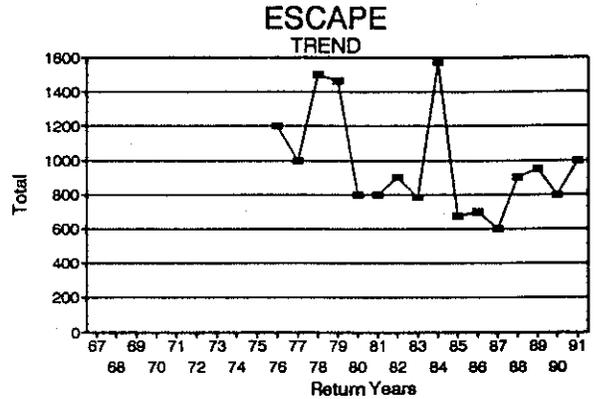
DISTINCT? - NO

# STOCK STATUS PROFILE for Sol Duc Summer Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total	RUNSIZE Terminal		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76	1200	1477		
77	1000	1479		
78	1500	2087		
79	1460	2928		
80	800	1830		
81	800	2366		
82	900	3266		
83	784	877		
84	1573	2808		
85	674	1569		
86	700	1138		
87	600	3839		
88	900	1408		
89	950	1168		
90	800	915		
91	1001	1258		



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## OVERVIEW -- QUILLAYUTE FALL COHO STOCKS

DICKEY  
SOL DUC

BOGACHIEL  
CALAWAH

### STOCK DEFINITION AND ORIGIN

Four stocks of Quillayute basin fall coho have been tentatively identified by the criterion of geographic isolation: (1) Bogachiel (2) Calawah, (3) Sol Duc, and (4) Dickey. Significant hatchery coho production occurs at the WDFW Soleduck Hatchery. These fish are considered part of the Sol Duc stock (composite production type), as their origin and periodic natural stock introductions to the rack return (from brood stock collection programs) are primarily from the Sol Duc River. All stocks are considered to be native origin. River entry is from mid-September to early December. Spawning is from mid-November to mid-January. The majority of spawning is in tributaries to the Sol Duc, Bogachiel, Dickey, and Calawah rivers.

Significant fry planting was done basin-wide in the mid-1980s. Fry were from natural brood stock captured in the Sol Duc, Bogachiel, and Dickey rivers. No significant genetic impact was assumed from this activity (poor return rates were noted from these plants, and progeny were from local natural brood stock).

### STOCK STATUS

The combined stocks support marine and terminal area (in-river) fisheries. Stocks are harvested in troll and sport fisheries off Canada and U.S. Data on impacts of these fisheries on the fall stocks are not currently available. The Quileute tribal in-river fishery harvests fall coho stocks during the directed fall chinook and fall coho fisheries in September, October and November.

Basin terminal run sizes (combined hatchery and wild population) have ranged from 4,126 to 18,861, averaging 15,574 (1980 through 1991 data). Basin natural spawning escapements have ranged from 2,660 to 11,416, averaging 9,222 (1982 through 1991 data). The escapement goal is a range of 6,300 to 15,800 fish. This goal has been met the majority of the year period from 1980 to 1991.

Although escapement goals are being met, total stock productivity has declined in recent years. Ocean recruitment of natural Quillayute coho has dropped low enough to result in consideration of these coho as a limiting stock in ocean harvest management in some years. A natural brood stock collection and fry outplanting program was conducted in the mid-1980s on the Quillayute system. Poor results resulted in the elimination of the program by 1990. Other enhancement experiments to increase natural stock productivity in the basin are being conducted by WDFW and the Quileute Tribe.



## QUILLAYUTE -- DICKEY FALL COHO

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall coho stocks on the basis of geographic isolation. River entry is from mid-September to early December. Spawning is from mid-November to mid-January. The majority of the drainage is suitable coho spawning habitat (small to medium-size streams). Numerous moderate- to high-spawning-density tributaries are present in the system.

The stock is of native origin, and the production type is wild.

### **STOCK STATUS**

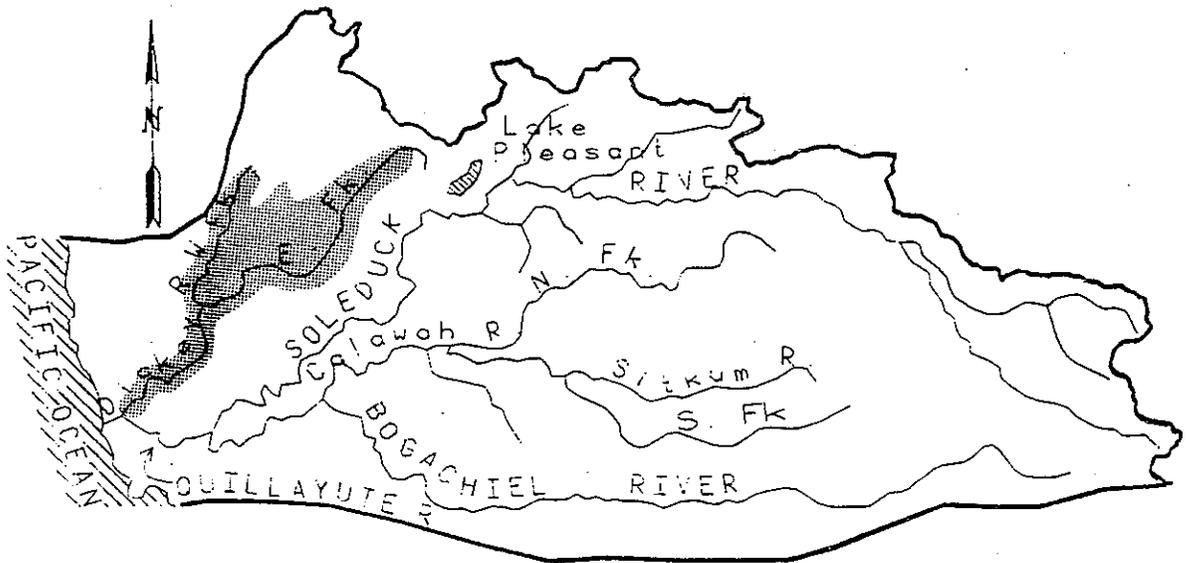
The status of this stock is Healthy.

Natural escapements of fall coho in the Dickey River drainage have ranged from 438 to 4,670 in the period 1980 through 1991. Data quality is considered good.

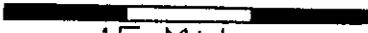
# STOCK DEFINITION PROFILE for Dickey Fall Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Dickey Fall Coho

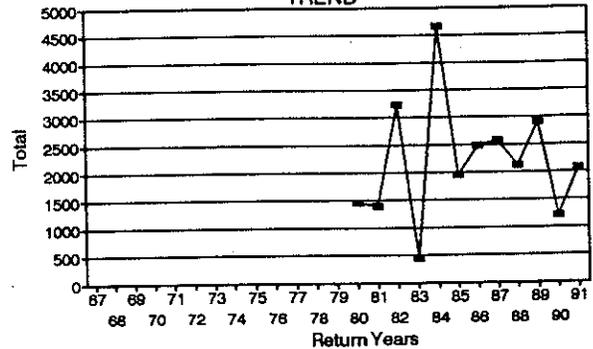
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	1463
81	1403
82	3236
83	438
84	4670
85	1958
86	2485
87	2579
88	2129
89	2911
90	1219
91	2073

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## QUILLAYUTE -- SOL DUC FALL COHO

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall coho stocks on the basis of geographic isolation. River entry is from mid-September to early December. Spawning is from mid-November to mid-January. The majority of spawning is in small and medium-size tributaries.

This stock is of native origin and the production type is composite. A large hatchery fall coho program (created from native brood stock) is present at the Soleduck Hatchery. Hatchery terminal run-size averages 20 percent of the total Quillayute basin terminal run size, with a range of six to 44 percent (1980 through 1991 data).

### **STOCK STATUS**

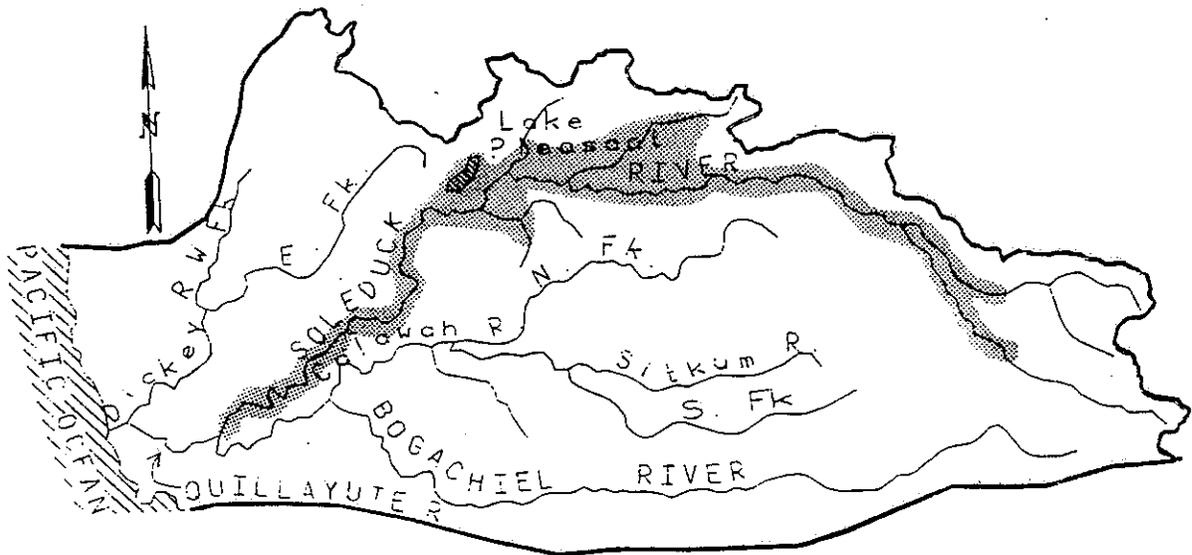
The status of this stock is Healthy.

Natural escapements of fall coho in the Sol Duc River drainage have ranged from 1,348 to 5,743 in the period 1982 through 1991. Data quality is considered good.

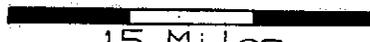
# STOCK DEFINITION PROFILE for Sol Duc Fall Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Sol Duc Fall Coho

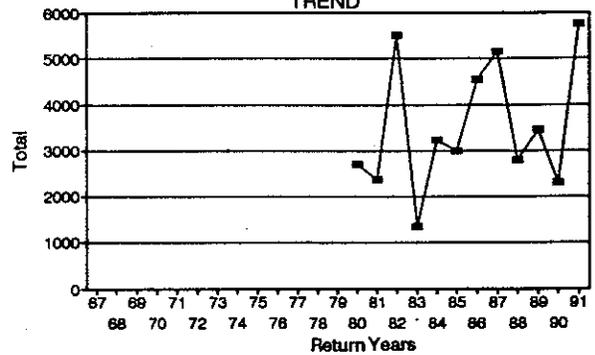
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	2697
81	2376
82	5506
83	1348
84	3239
85	2996
86	4555
87	5149
88	2800
89	3446
90	2300
91	5743

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **QUILLAYUTE -- BOGACHIEL FALL COHO**

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall coho stocks on the basis of geographic isolation. River entry is from mid-September to early December. Spawning is from mid-November to mid-January. The majority of spawning is in small to moderate-size tributaries. There is some mainstem spawning in side channels on the upper river.

This stock is of native origin and the production type is wild.

### **STOCK STATUS**

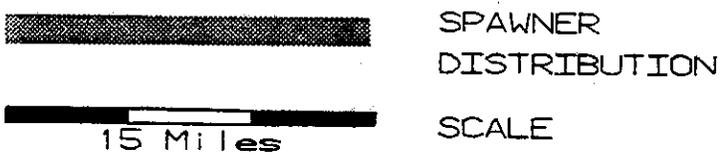
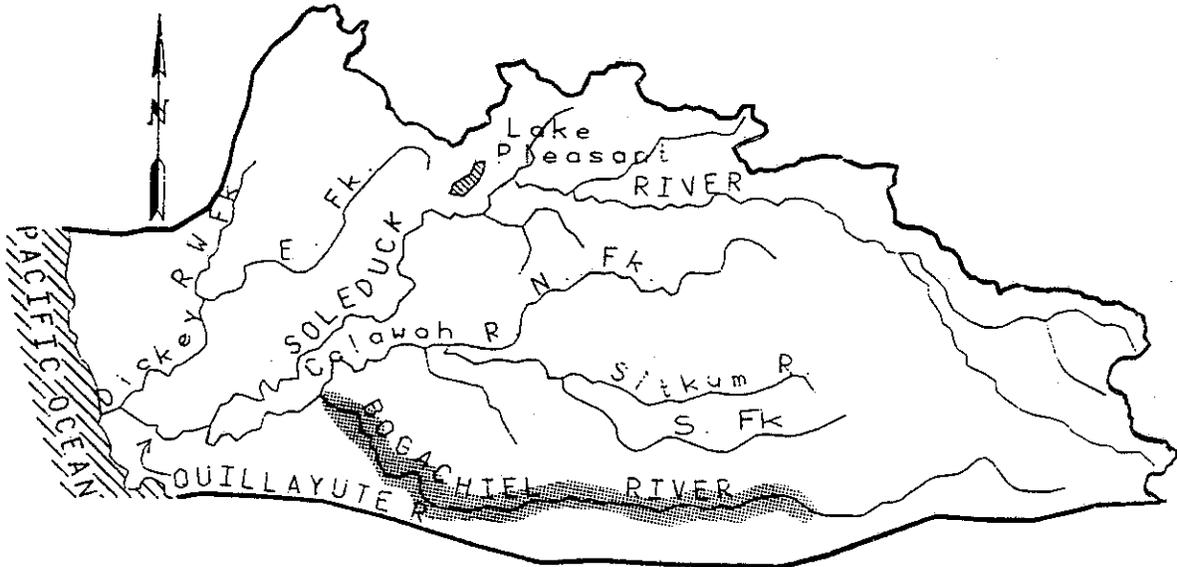
The status of this stock is Healthy.

Natural escapements of fall coho in the Bogachiel River drainage have ranged from 934 to 1,918 from 1982 through 1991 (1981 and 1983 excluded). Data quality is considered good.

# STOCK DEFINITION PROFILE for Bogachiel Fall Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													UNK
RIVER ENTRY													UNK
SPAWNING									██████████				UNK

## BIOLOGICAL CHARACTERISTICS

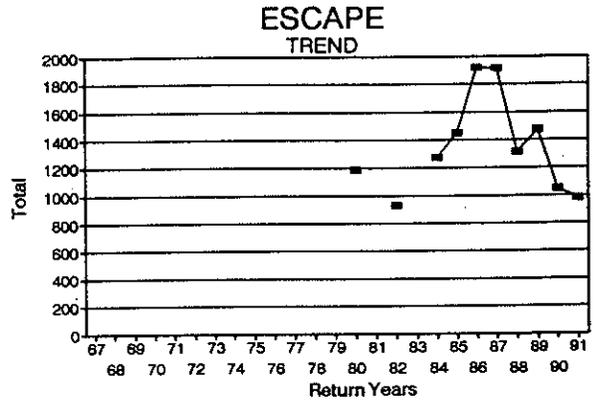
DISTINCT? - NO

# STOCK STATUS PROFILE for Bogachiel Fall Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	1187			
81				
82	934			
83				
84	1274			
85	1452			
86	1918			
87	1915			
88	1316			
89	1471			
90	1048			
91	978			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## QUILLAYUTE -- CALAWAH FALL COHO

### **STOCK DEFINITION AND ORIGIN**

This stock is separated from other fall coho stocks on the basis of geographic isolation. River entry is from mid-September to early December. Spawning is from mid-November to mid-January. The majority of spawning is in small - to moderate-sized tributaries.

The stock is of native origin and the production type is wild.

### **STOCK STATUS**

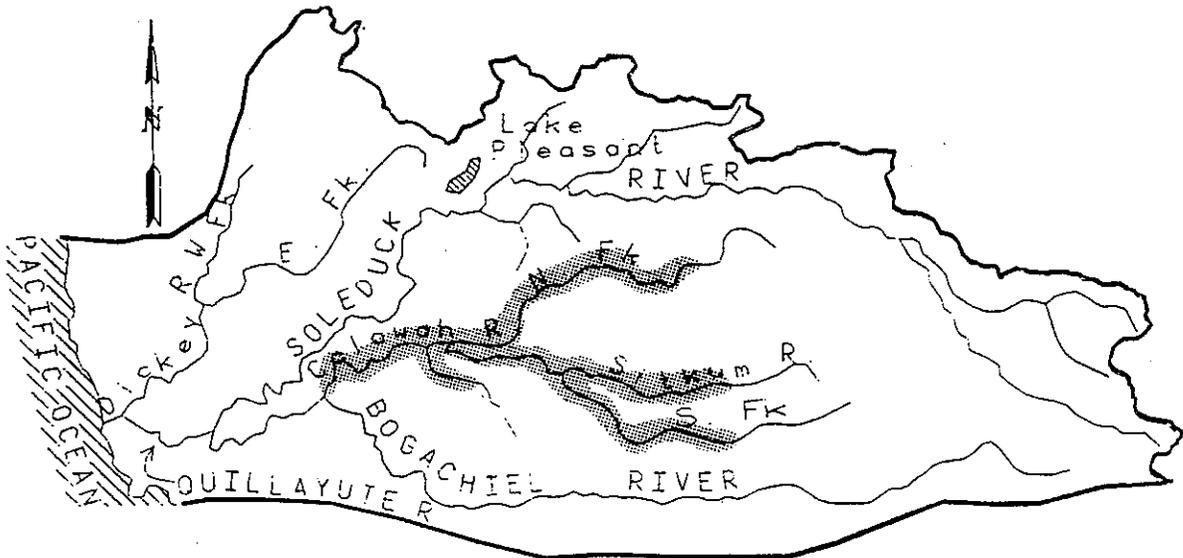
The stock status is rated Healthy.

Natural escapements of fall coho in the Calawah River drainage have ranged from 709 to 1,670 in the period from 1980 through 1991 (1981 and 1983 excluded). Data quality is considered good.

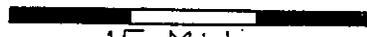
# STOCK DEFINITION PROFILE for Calawah Fall Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



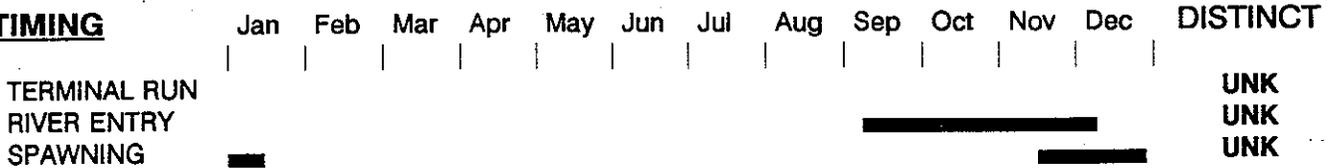
SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING



## BIOLOGICAL CHARACTERISTICS

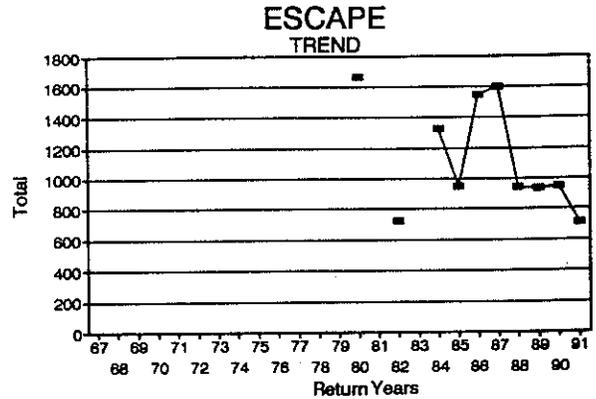
DISTINCT? - NO

# STOCK STATUS PROFILE for Calawah Fall Coho

## STOCK ASSESSMENT

DATA QUALITY----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	1670			
81				
82	724			
83				
84	1325			
85	948			
86	1546			
87	1603			
88	944			
89	935			
90	946			
91	709			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **OVERVIEW -- QUILLAYUTE SOCKEYE STOCK**

### **LAKE PLEASANT**

One stock of sockeye has been identified for the Quillayute River basin. All known significant reproduction occurs in the Lake Pleasant drainage.

Additional information is provided in the individual stock report.



## QUILLAYUTE -- LAKE PLEASANT SOCKEYE

### **STOCK DEFINITION AND ORIGIN**

River entry is May to September. Spawning is from late November to early January. The stock origin is native, and the production type is wild. These fish are predominantly beach spawners, with little reproduction observed in tributaries. Non-native sockeye were stocked in the lake for a brief period in the 1930s. Genetic impact was assumed to be minimal.

### **STOCK STATUS**

No hard numerical estimates of escapements from the survey data have been generated. Consequently the stock status is Unknown.

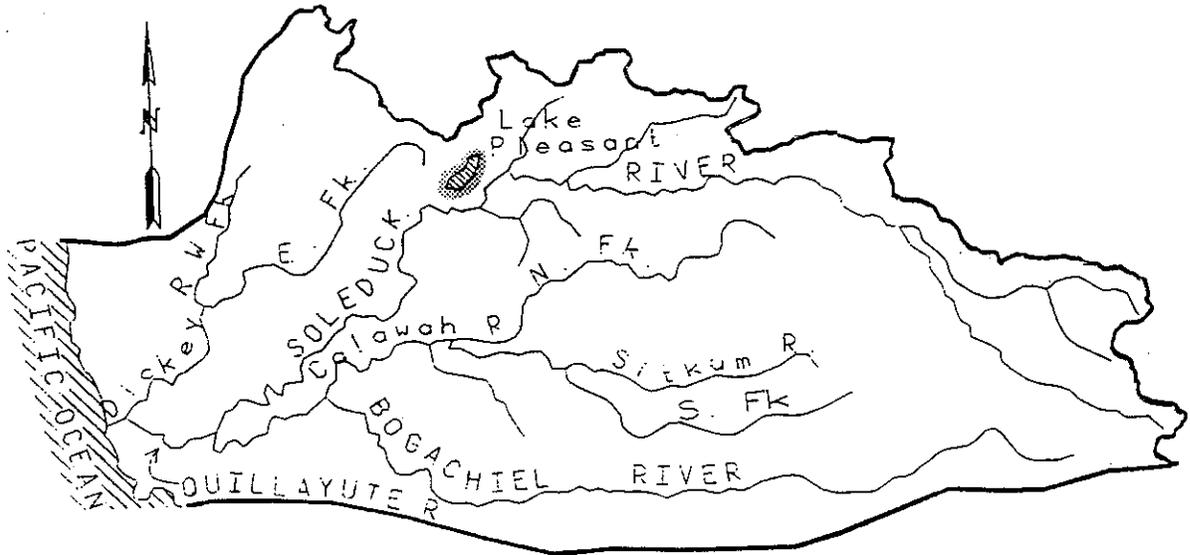
This stock supports incidental sport and tribal commercial harvests. Catches for both fisheries are low (less than 100 fish per year for tribal fishery and are probably similar for the sport fishery).

The stock is not currently actively managed. Escapement counts have shown a range of several hundred to several thousand fish from year to year. The escapement numbers are based on bi-weekly fish counts in the lake and are approximate.

# STOCK DEFINITION PROFILE for Lake Pleasant Sockeye

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



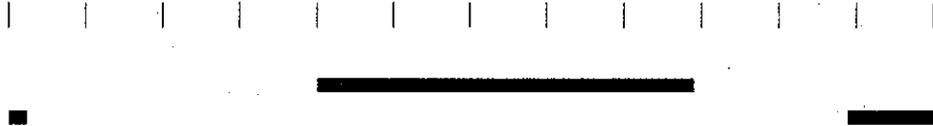
15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Lake Pleasant Sockeye

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Brood Years	NO DATA			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

---

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## OVERVIEW -- QUILLAYUTE SUMMER AND WINTER STEELHEAD STOCKS

<b><u>SUMMER:</u></b>	<b><u>WINTER:</u></b>
SOL DUC	QUILLAYUTE / BOGACHIEL
BOGACHIEL	DICKEY
CALAWAH	CALAWAH

### STOCK DEFINITION AND ORIGIN

In the Quillayute River system, three summer steelhead stocks and four winter steelhead stocks have been identified. Wild summer steelhead in the Sol Duc, Bogachiel, and Calawah rivers and wild winter steelhead in the Quillayute/Bogachiel, Dickey, Sol Duc and Calawah rivers are distinct stocks. Wild summer and winter steelhead in each stock are native.

There is little or no information available to indicate that these are genetically distinct stocks. The stocks are treated separately due to the geographical isolation of the spawning populations. More or fewer stocks may be identified once comprehensive genetic information is available.

Run timing of the summer steelhead stocks (May through October) is distinct from run timing of the winter steelhead stocks (December through May).

The native summer stocks were historically small runs of fish limited by their habitats. These fish developed in areas isolated from the native winter stocks. Since only a few miles of stream were used, summer steelhead populations were small.

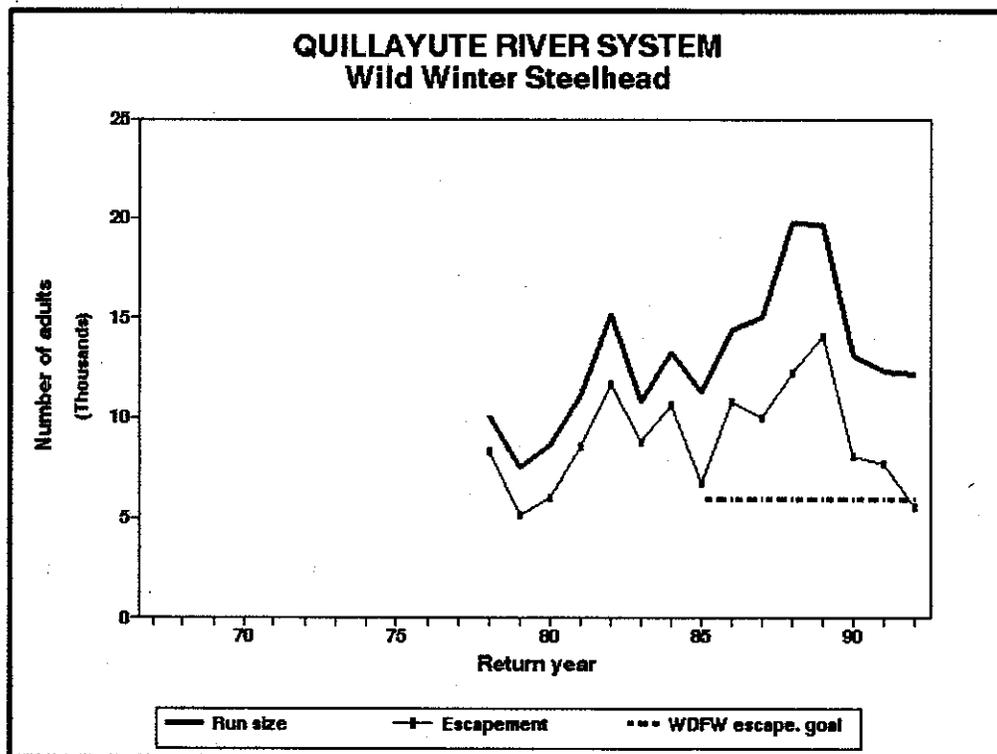
While about 150,000 hatchery winter steelhead smolts are planted in the Quillayute River system annually, there is little contribution to the wild stock from hatchery fish spawning in the wild. The returning hatchery adults support tribal and sport fisheries with a combined exploitation rate of about 80 percent. Given the high exploitation of the hatchery fish, healthy wild spawner escapements, and the difference in spawn timing between the hatchery fish (January and February) and the wild fish (mid-February through May), the potential for interbreeding is limited.

About 40,000 hatchery summer steelhead smolts are stocked in the Quillayute River system annually. The potential for interbreeding between the more numerous hatchery fish and the wild fish certainly exists, but the contribution to the wild stock by hatchery fish spawning in the wild is unknown. Management strategies are presently being reviewed to reduce potential interbreeding.

## STOCK STATUS

Wild winter steelhead spawner escapement and run size have been monitored for the Quillayute River system since the 1977-78 season. Wild escapement has ranged from 5,087 to 14,048 fish, and wild run size has ranged from 7,555 to 19,746 fish (see figure).

Beginning with the 1984-85 season, a WDW escapement goal of 5,900 winter steelhead was set for the Quillayute River system and the fisheries were managed to achieve the goal. This goal is to be achieved by wild adults and does not include hatchery fish spawning in the wild. In the eight seasons since the escapement goal was set, wild escapement has averaged 9,368 fish and exceeded the goal seven times (see figure).



The wild winter steelhead run in the Quillayute River system is fished upon by the Quileute Tribe in the Quillayute River. Sport anglers fish in the mainstems of the Quillayute, Dickey, Bogachiel, Sol Duc, and Calawah rivers. The season-long targeted tribal fishery occurs from late November through March while the sport fishery occurs from November through April.

During the 1977-78 through 1991-92 return years, the wild winter steelhead run in the Quillayute River system was comprised of 14.3 percent sport harvest, 16.7 percent tribal harvest, and 69.0 percent escapement (see table).

**Quillayute River system wild winter steelhead sport harvest, tribal harvest, spawner escapement, and run size from 1977-78 through 1991-92.**

Return year	Sport harvest	Tribal harvest	Spawner escapement	Run size
1977-78	789	939	8,303	10,031
1978-79	382	2,086	5,087	7,555
1979-80	1,707	958	6,006	8,671
1980-81	1,770	704	8,570	11,044
1981-82	1,605	1,879	11,660	15,144
1982-83	1,312	701	8,761	10,774
1983-84	1,604	972	10,669	13,245
1984-85	1,833	2,751	6,676	11,260
1985-86	2,110	1,529	10,742	14,381
1986-87	2,501	2,493	10,000	14,994
1987-88	2,990	4,571	12,185	19,746
1988-89	2,692	2,895	14,048	19,635
1989-90	2,288	2,724	8,096	13,108
1990-91	2,054	2,640	7,658	12,352
1991-92	2,005	4,615	5,535	12,155
Mean run size distribution, 1977-78 to 1991-92				
	1,843	2,164	8,933	12,940
	14.3%	16.7%	69.0%	

Wild summer steelhead spawning escapement is not monitored, and escapement goals have not been identified. There are no tribal fisheries that target Quillayute River system summer steelhead, but they may be caught incidentally in other tribal salmon and steelhead fisheries. These stocks have been managed with wild steelhead release regulations to protect the wild stocks from sport harvest since 1992. It is expected that with current regulations in place these stocks will reach populations levels dictated by their limited habitats. Because of the small population sizes and limited habitats used, wild summer steelhead populations will always be fragile.

More information on each stock is presented in separate Stock Reports.



## QUILLAYUTE -- SOL DUC SUMMER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Sol Duc River and its forks are a distinct stock based on the geographical isolation of the spawning population. They are distinct from wild winter steelhead in the Sol Duc River based on run timing.

The specific spawning distribution is unknown, but spawning is generally believed to take place in the upper reaches of the river. This would geographically isolate the summer steelhead in the Sol Duc River from other summer steelhead stocks in the Quillayute River system.

Little is known about the genetic composition of the stock.

Similar to other wild summer steelhead stocks, run timing is generally from May through October and spawn timing is unknown but believed to be from February through April.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information of wild summer steelhead is available over the entire run, but unmarked hatchery summer steelhead returned in 1986 and 1987 and would have been reported as wild steelhead in the sport harvest. As a result, sport harvest cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

### **FACTORS AFFECTING PRODUCTION**

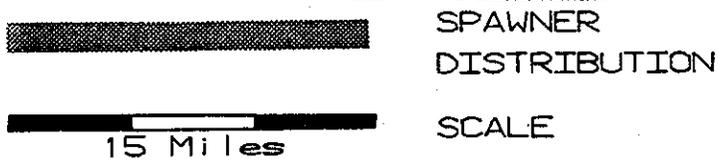
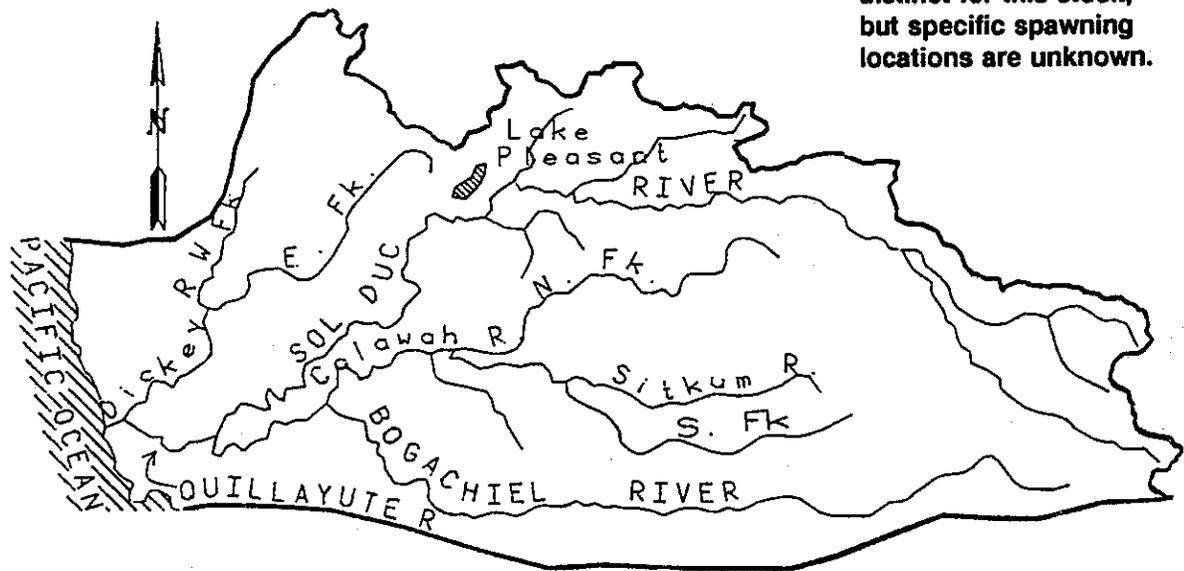
**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited.

# STOCK DEFINITION PROFILE for Sol Duc Summer Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

## BIOLOGICAL CHARACTERISTICS

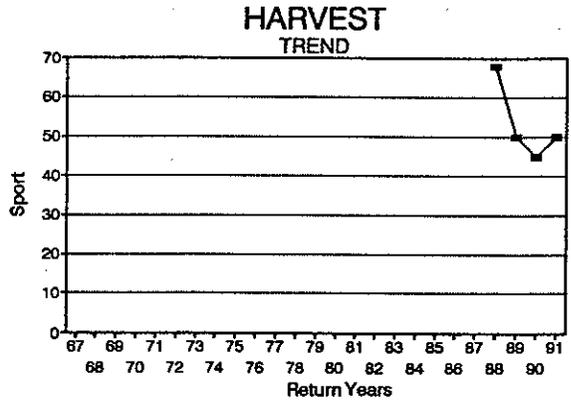
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Sol Duc Summer Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	68			
89	50			
90	45			
91	50			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

### STOCK ORIGIN

*Unresolved by State and Tribes*

### PRODUCTION TYPE

*Wild*

### STOCK DISTINCTION

*Spawning Distribution*

### STOCK STATUS

*Unknown*

### SCREENING CRITERIA

**Harvest Management** -- There is no directed tribal fishery on this stock, but some harvest of wild steelhead may occur in other tribal salmon and steelhead fisheries. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992, but some hook-and-release mortality of wild steelhead may occur.

**Hatchery** -- While hatchery steelhead smolts have been stocked in this and nearby streams, contribution to the wild stock from hatchery fish spawning in the wild is unknown.

## **QUILLAYUTE -- BOGACHIEL SUMMER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Bogachiel River are a distinct stock based on the geographical isolation of the spawning population. They are distinct from wild winter steelhead in the Bogachiel River based on run timing.

The specific spawning distribution is unknown, but spawning is generally believed to take place in the upper reaches of the river. This would geographically isolate the summer steelhead in the Bogachiel River from other summer steelhead stocks in the Quillayute River system.

Little is known about the genetic composition of the stock.

Similar to other wild summer steelhead stocks, run timing is generally from May through October and spawn timing is unknown but believed to be from February through April.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information for wild summer steelhead is available over the entire run, but unmarked hatchery summer steelhead returned in 1986 and 1987 and would have been reported as wild steelhead in the sport harvest. As a result, sport harvest cannot be used to assess the status of the wild stock.

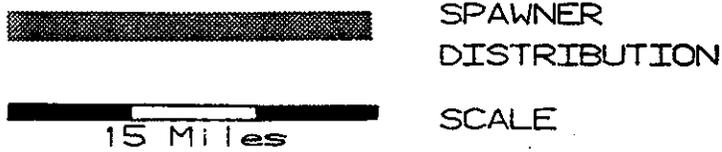
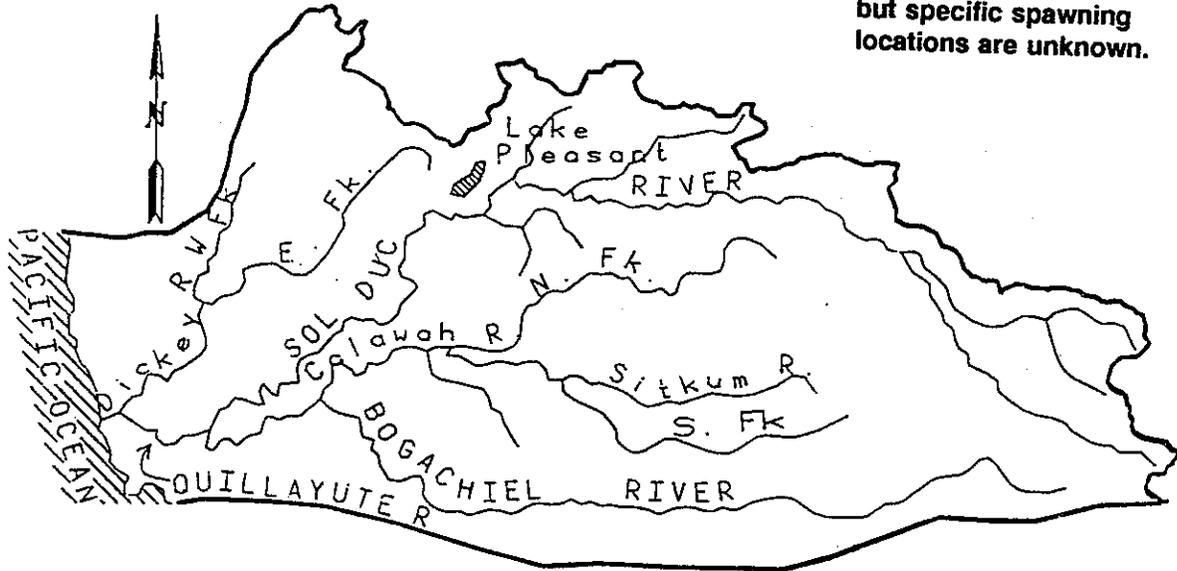
More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

# STOCK DEFINITION PROFILE for Bogachiel Summer Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Bogachiel Summer Steelhead

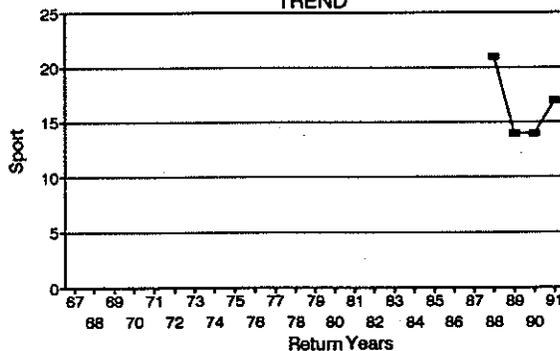
## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
--------------	---------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	
88	21
89	14
90	14
91	17

HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

### STOCK ORIGIN

*Unresolved by State and Tribes*

### PRODUCTION TYPE

*Wild*

### STOCK DISTINCTION

*Spawning Distribution*

### STOCK STATUS

*Unknown*

### SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited.

**Harvest Management** -- There is no directed tribal fishery on this stock, but some harvest of wild steelhead may occur in other tribal salmon and steelhead fisheries. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992, but some hook-and-release mortality of wild steelhead may occur.

**Hatchery** -- While hatchery steelhead smolts have been stocked in this and nearby streams, contribution to the wild stock from hatchery fish spawning in the wild is unknown.

## **QUILLAYUTE -- CALAWAH SUMMER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Calawah River are a distinct stock based on the geographical isolation of the spawning population. They are distinct from wild winter steelhead in the Calawah River based on run timing.

The specific spawning distribution is unknown, but spawning is generally believed to take place in the upper reaches of the river. This would geographically isolate the summer steelhead in the Calawah River from other summer steelhead stocks in the Quillayute River system.

Little is known about the genetic composition of the stock.

Similar to other wild summer steelhead stocks, run timing is generally from May through October and spawn timing is unknown but believed to be from February through April.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information for wild summer steelhead is available over the entire run, but unmarked hatchery summer steelhead returned in 1986 and 1987 and would have been reported as wild steelhead in the sport harvest. As a result, sport harvest cannot be used to assess the status of the wild stock.

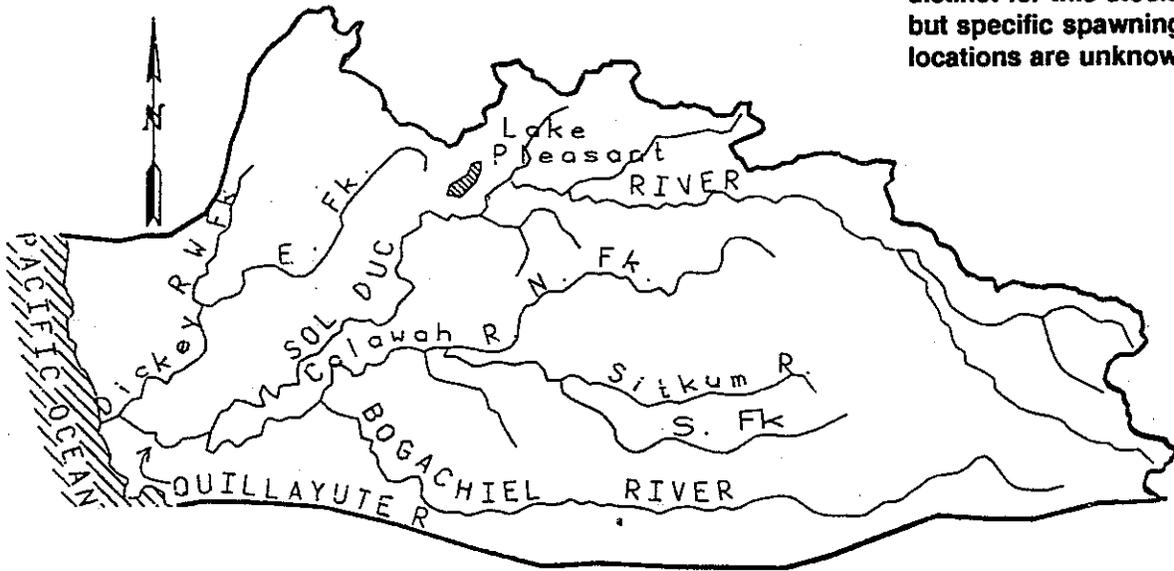
More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

# STOCK DEFINITION PROFILE for Calawah Summer Steelhead

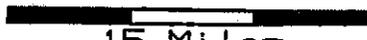
## SPAWNER DISTRIBUTION

DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



SPAWNER DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

## BIOLOGICAL CHARACTERISTICS

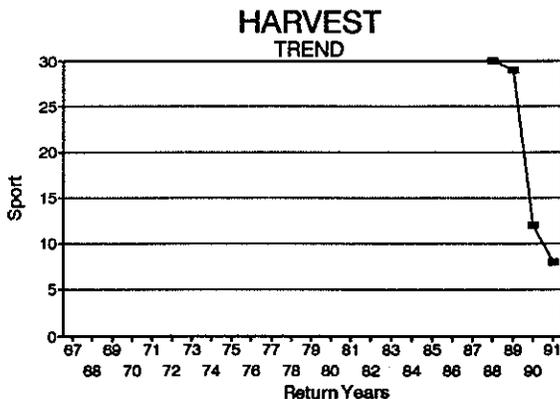
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Calawah Summer Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	30			
89	29			
90	12			
91	8			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

### STOCK ORIGIN

*Unresolved by State and Tribes*

### PRODUCTION TYPE

*Wild*

### STOCK DISTINCTION

*Spawning Distribution*

### STOCK STATUS

*Unknown*

### SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited.

**Harvest Management** -- There is no directed tribal fishery on this stock, but some harvest of wild steelhead may occur in other tribal salmon and steelhead fisheries. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992, but some hook-and-release mortality of wild steelhead may occur.

**Hatchery** -- While hatchery steelhead smolts have been stocked in this and nearby streams, contribution to the wild stock from hatchery fish spawning in the wild is unknown.

## QUILLAYUTE -- QUILLAYUTE / BOGACHIEL WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Quillayute River, Bogachiel River and tributaries are a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using enzyme electrophoretic techniques. This does not prove, however, that the stocks are not distinct. More information is needed to determine if steelhead stocks are genetically distinct.

Run timing (December through May) and spawn timing (mid-February to mid-June) are similar to other wild winter steelhead stocks in the north Pacific coast area.

Wild winter steelhead are native in the Quillayute/Bogachiel River. While hatchery steelhead smolts have been stocked in this and nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

### **STOCK STATUS**

The wild winter steelhead stock in the Quillayute/Bogachiel River is Healthy.

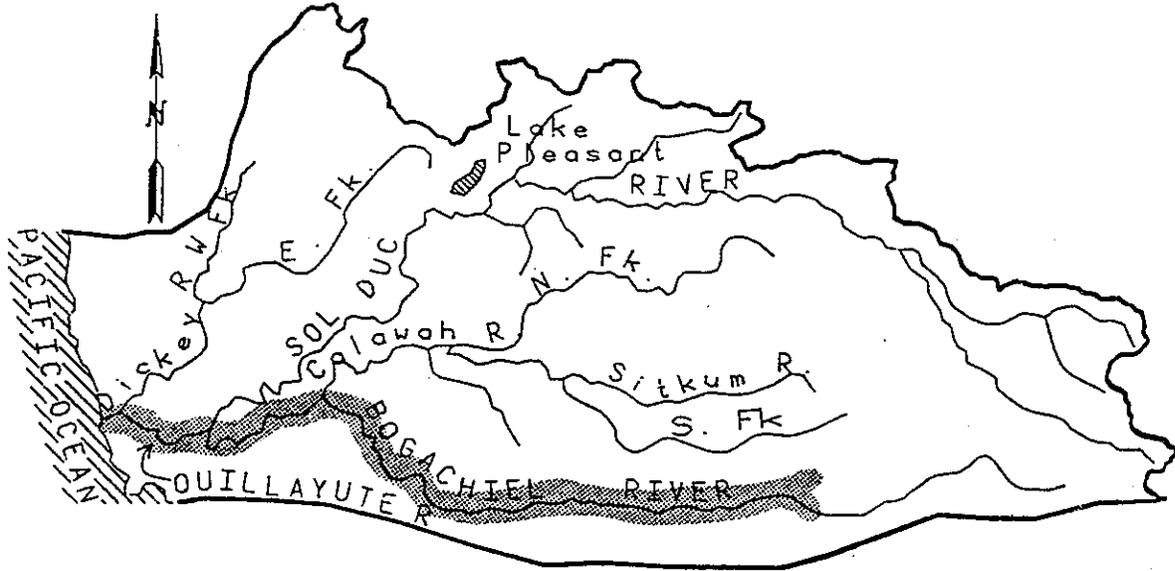
Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from 1,222 to 2,892 (averaging 2,004) wild winter steelhead during the 1978 through 1987 seasons and from 973 to 4,553 (averaging 2,445) wild winter steelhead during the 1988 through 1992 seasons.

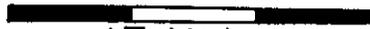
# STOCK DEFINITION PROFILE for Quillayute/Bogachiel Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

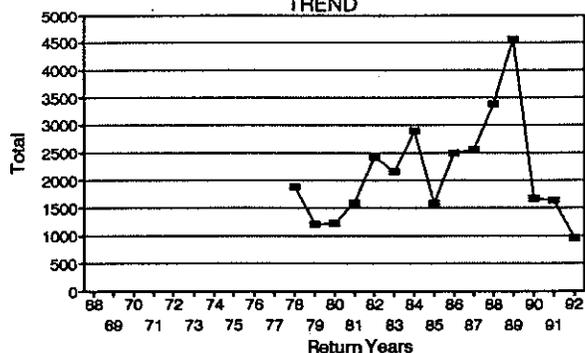
# STOCK STATUS PROFILE for Quillayute/Bogachiel Winter Steelhead

## STOCK ASSESSMENT

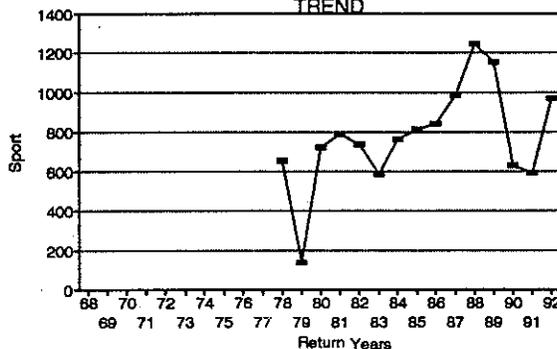
DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78	1887	654		
79	1222	138		
80	1228	724		
81	1587	789		
82	2428	739		
83	2163	589		
84	2892	764		
85	1576	812		
86	2501	841		
87	2560	988		
88	3381	1246		
89	4553	1153		
90	1680	633		
91	1642	594		
92	973	969		

ESCAPE TREND



HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

### STOCK ORIGIN

*Native*

### PRODUCTION TYPE

*Wild*

### STOCK DISTINCTION

*Spawning Distribution*

### STOCK STATUS

*Healthy*

### SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK



## QUILLAYUTE -- DICKEY WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Dickey River, its forks and tributaries are a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using enzyme electrophoretic techniques. This does not prove, however, that the stocks are not distinct. More information is needed to determine if steelhead stocks are genetically distinct.

Run timing (December through May) and spawn timing (mid-February to mid-June) are similar to other wild winter steelhead stocks in the north Pacific coast area.

Wild winter steelhead are native to the Dickey River. While hatchery steelhead smolts have been stocked in this and nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

### **STOCK STATUS**

The wild winter steelhead stock in the Dickey River is Healthy.

Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from 312 to 1,607 (averaging 570) wild winter steelhead during the 1978 through 1987 seasons and from 179 to 606 (averaging 414) wild winter steelhead during the 1988 through 1992 seasons.



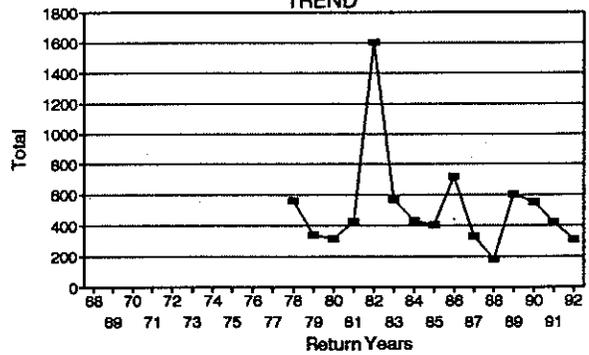
# STOCK STATUS PROFILE for Dickey Winter Steelhead

## STOCK ASSESSMENT

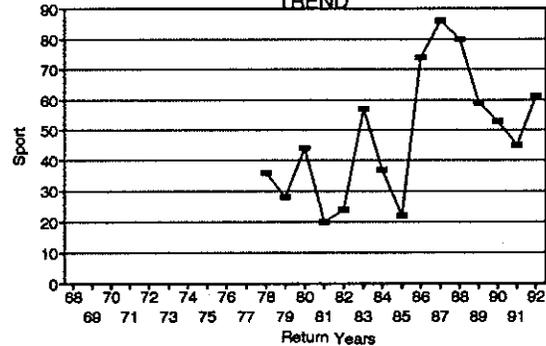
DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78	563	36		
79	336	28		
80	312	44		
81	429	20		
82	1607	24		
83	568	57		
84	430	37		
85	405	22		
86	719	74		
87	330	86		
88	179	80		
89	606	59		
90	554	53		
91	419	45		
92	310	61		

ESCAPE TREND



HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK



## QUILLAYUTE -- SOL DUC WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Sol Duc River and tributaries are a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using enzyme electrophoretic techniques. This does not prove, however, that the stocks are not distinct. More information is needed to determine if steelhead stocks are genetically distinct.

Run timing (December through May) and spawn timing (mid-February to mid-June) are similar to other wild winter steelhead stocks in the north Pacific coast area.

Wild winter steelhead are native to the Sol Duc River. While hatchery steelhead smolts have been stocked in this and nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

### **STOCK STATUS**

The wild winter steelhead stock in the Sol Duc River is Healthy.

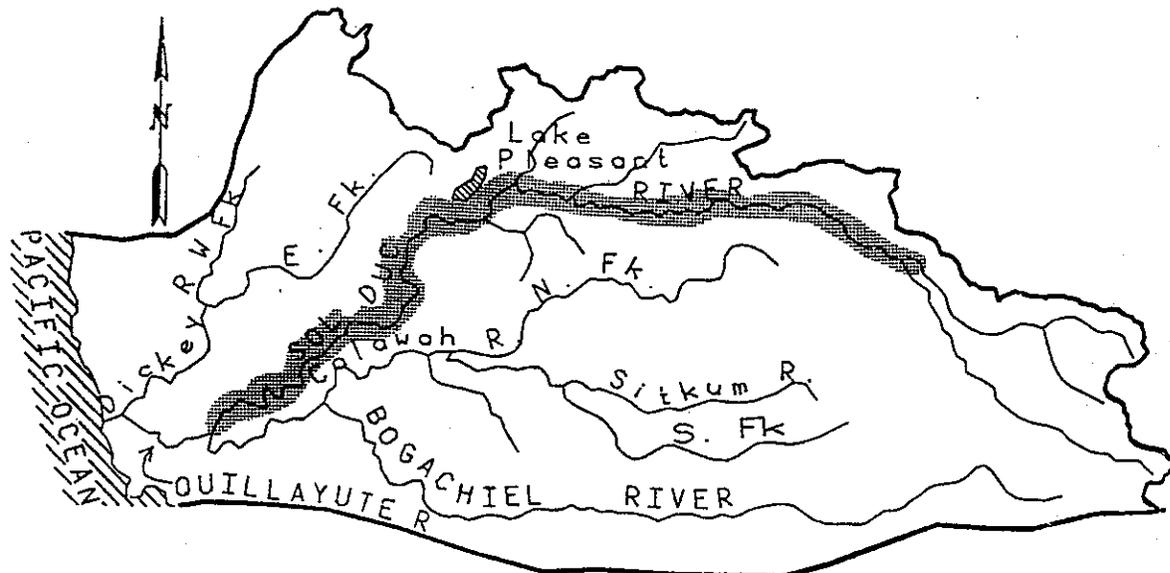
Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from 1,967 to 4,712 (averaging 3,664) wild winter steelhead during the 1978 through 1987 seasons and from 2,295 to 5,333 (averaging 3,713) wild winter steelhead during the 1988 through 1992 seasons.

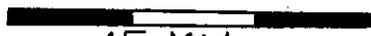
# STOCK DEFINITION PROFILE for Sol Duc Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN

RIVER ENTRY

SPAWNING



NO

NO

## BIOLOGICAL CHARACTERISTICS

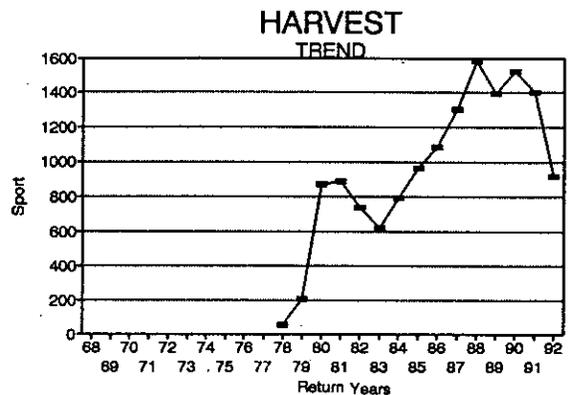
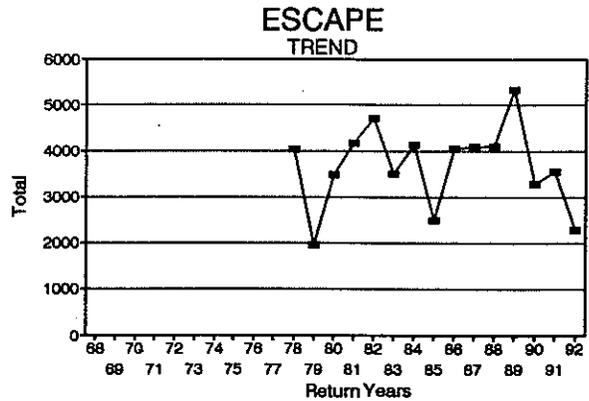
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Sol Duc Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78	4040	55		
79	1967	205		
80	3477	870		
81	4170	888		
82	4712	739		
83	3509	620		
84	4127	793		
85	2504	967		
86	4046	1085		
87	4085	1302		
88	4099	1583		
89	5333	1395		
90	3289	1524		
91	3551	1403		
92	2295	919		



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

### STOCK ORIGIN

*Native*

### PRODUCTION TYPE

*Wild*

### STOCK DISTINCTION

*Spawning Distribution*

### STOCK STATUS

*Healthy*

### SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK



## QUILLAYUTE -- CALAWAH WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Calawah River and its forks, Sitkum River, and tributaries are a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using electrophoretic techniques. This does not prove, however, that the stocks are not distinct. More information is needed to determine if steelhead stocks are genetically distinct.

Run timing (December through May) and spawn timing (mid-February to mid-June) are similar to other wild winter steelhead stocks in the north Pacific coast area.

Wild winter steelhead are native to the Calawah River. While hatchery steelhead smolts have been stocked in this and nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

### **STOCK STATUS**

The wild winter steelhead stock in the Calawah River is Healthy.

Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from 989 to 3,480 (averaging 2,396) wild winter steelhead during the 1978 through 1987 seasons and from 1,957 to 4,526 (averaging 2,932) wild winter steelhead during the 1988 through 1992 seasons.



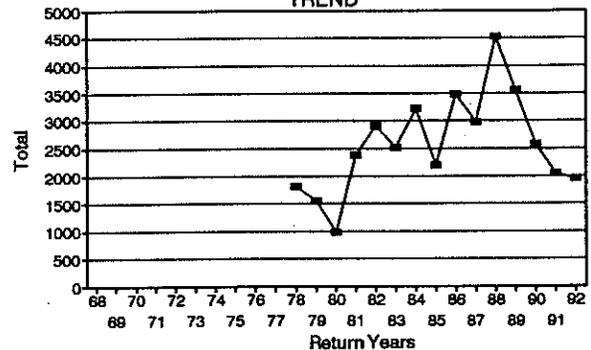
# STOCK STATUS PROFILE for Calawah Winter Steelhead

## STOCK ASSESSMENT

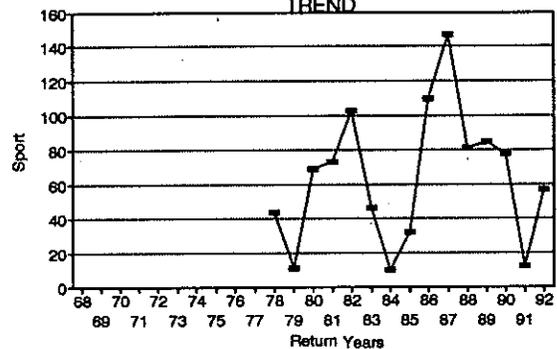
DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78	1813	44		
79	1562	11		
80	989	69		
81	2384	73		
82	2913	103		
83	2521	46		
84	3220	10		
85	2191	32		
86	3480	110		
87	2982	147		
88	4526	81		
89	3556	85		
90	2573	78		
91	2046	12		
92	1957	57		

ESCAPE TREND



HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

### STOCK ORIGIN

*Native*

### PRODUCTION TYPE

*Wild*

### STOCK DISTINCTION

*Spawning Distribution*

### STOCK STATUS

*Healthy*

### SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK

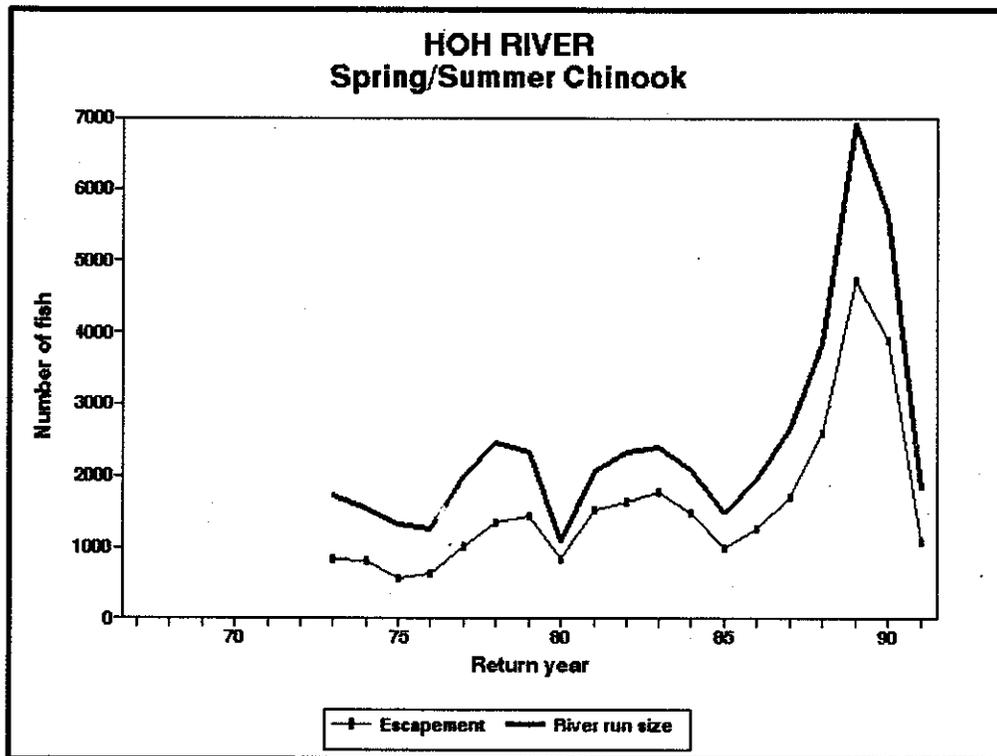


# OVERVIEW -- HOH SPRING / SUMMER CHINOOK STOCK

## HOH

One stock of spring/summer chinook has been identified for the Hoh River system.

The figure below shows escapement and terminal run size estimates for this stock. Escapements have been relatively stable across time except for the unusually high returns associated with the 1984 brood. The status of the stock is currently considered Healthy, however, there is considerable concern about the future of the stock as a result of significant recent habitat degradation.





## **HOH -- HOH SPRING / SUMMER CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Spring/summer chinook are designated as a separate stock based on return timing to the Hoh River and geographic isolation from neighboring watersheds. The spring/summer chinook stock begins entering the river in late April and continues through August. Stock separation from later returning fall chinook stocks is based on a decline in river entry activity in late August and spawning activity in mid-October. Coded-wire tagging of wild brood stock and the resultant catch, spawning distribution, and spawn timing confirm the separation of these two components.

Spawning is believed to begin simultaneously in the uppermost reaches of the South Fork and the North Fork Hoh River. Spawning activity starts progressively later as one moves downstream. Spawning at the convergence of the two forks begins approximately mid-September, up to a month after initial spawning in the uppermost areas above the forks. Spring/summer chinook generally spawn in the mainstem areas and Mt. Tom Creek. Spawning in some larger or upper river spring-fed tributaries usually occurs only in conjunction with large and early freshets. Spawning overlap with fall chinook occurs from mainstem RM 15.0 through the first three miles above the confluence of each fork.

Physical separation occurs between the earliest spawners in the upper reaches of the two forks. However, the overlaps in timing with spawners in the downstream reaches suggests that a physical separation of the two components is not likely.

Infrequent releases of fish from outside stocks, primarily small fry releases, occurred in the 1960s and early 1970s and are believed to have had minimal impacts on the native population.

The origin of the stock is from wild, native spawners.

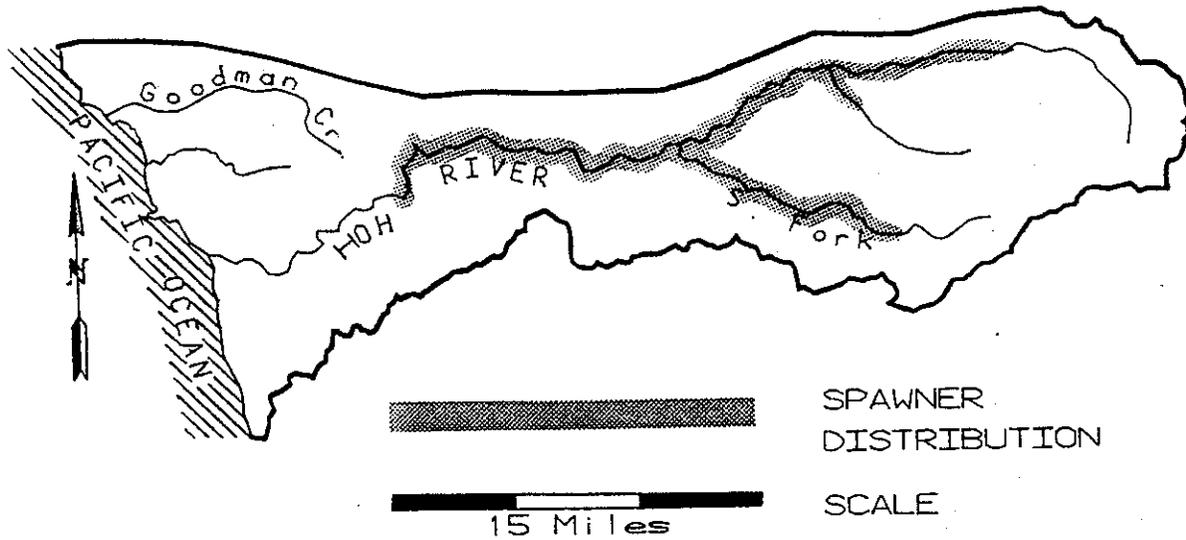
### **STOCK STATUS**

The spring/summer chinook stock has remained Healthy and relatively productive compared to the escapement objectives. However, the varying levels of impacts of prior interceptions in offshore fisheries obscure analysis of overall productivity trends.

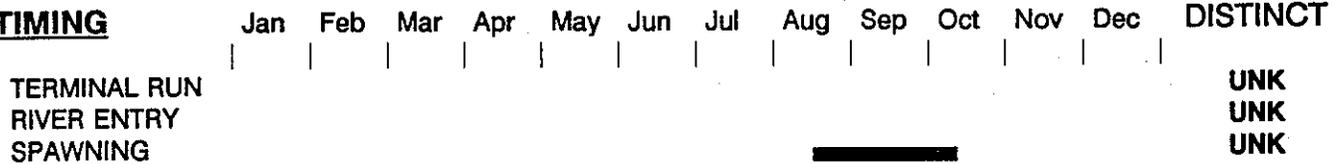
# STOCK DEFINITION PROFILE for Hoh Spring/Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Hoh Spring/Summer Chinook

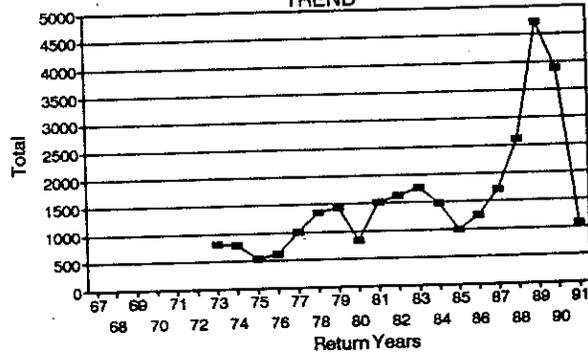
## STOCK ASSESSMENT

DATA QUALITY-----> Good

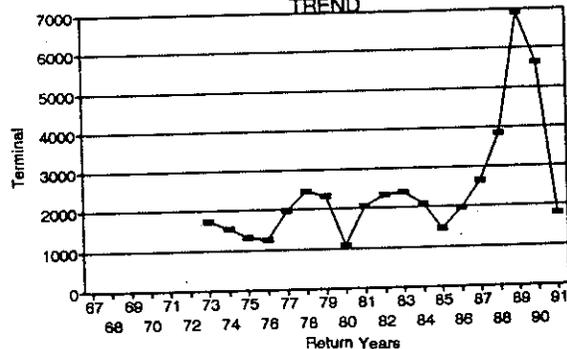
Return Years	ESCAPE Total	RUNSIZE Terminal		
--------------	--------------	------------------	--	--

67		
68		
69		
70		
71		
72		
73	817	1727
74	791	1545
75	546	1312
76	621	1255
77	1015	1981
78	1351	2448
79	1442	2324
80	842	1065
81	1520	2054
82	1640	2330
83	1763	2390
84	1480	2088
85	1000	1466
86	1248	1955
87	1710	2651
88	2605	3853
89	4721	6906
90	3894	5639
91	1078	1811

ESCAPE TREND



RUNSIZE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution, Timing*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

Hoh River chinook, like other naturally occurring coastal chinook stocks, are far north migrating fish and contribute extensively to the offshore fisheries of southeastern Alaska and British Columbia. Relatively minor contributions are made to ocean fisheries off Washington. A significant portion of the stock returns to the terminal area, contributing to terminal tribal and recreational fisheries, and escapements. Terminal run sizes ranged from 1,500 to 6,900 during the period from 1984 to 1991. The larger run sizes in 1988-1990 resulted from the exceptional returns of the 1984 brood and do not appear to be typical for this stock. Escapements over the same period ranged from 1,000 to 4,700 compared to a floor escapement need of 900.

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Winter freshet activity scouring out incubating eggs and debris flows affecting the percolation of oxygenated water around those eggs are thought to have the greatest effects on chinook freshwater residence. In the more protected spring and tributary-fed side-channel areas outside of the Olympic National Park, better incubation conditions should exist. However, we have seen significant deterioration of spawning gravels due to deposition of mud and silt from debris flows. The overall loss of large woody debris (LWD) and log jams in the lower river may have resulted in loss of habitat heterogeneity. The river tends to become shallower, leaving less of the habitat preferred by larger sub-migratory-sized fish as opposed to the smaller fish of the same cohorts.

**Harvest Management** -- The far north-migrating behavior of these north coastal natural chinook stocks results in their main ocean interception in fisheries off of southeast Alaska and northern British Columbia. At present, these fish are managed according to the Pacific Salmon Treaty fixed ceilings of 260,000 chinook in each of the intercepting Alaskan and Canadian fisheries where they are commingled with stocks from the Columbia River and other areas.

Analysis of coded-wire tag data from several small releases of Hoh stocks have indicated typical ocean interception rates ranging from 45-55 percent. The spring/summer chinook stock is managed for in-river escapement targets of 69 percent of the terminal run or 900 fish, whichever is higher.

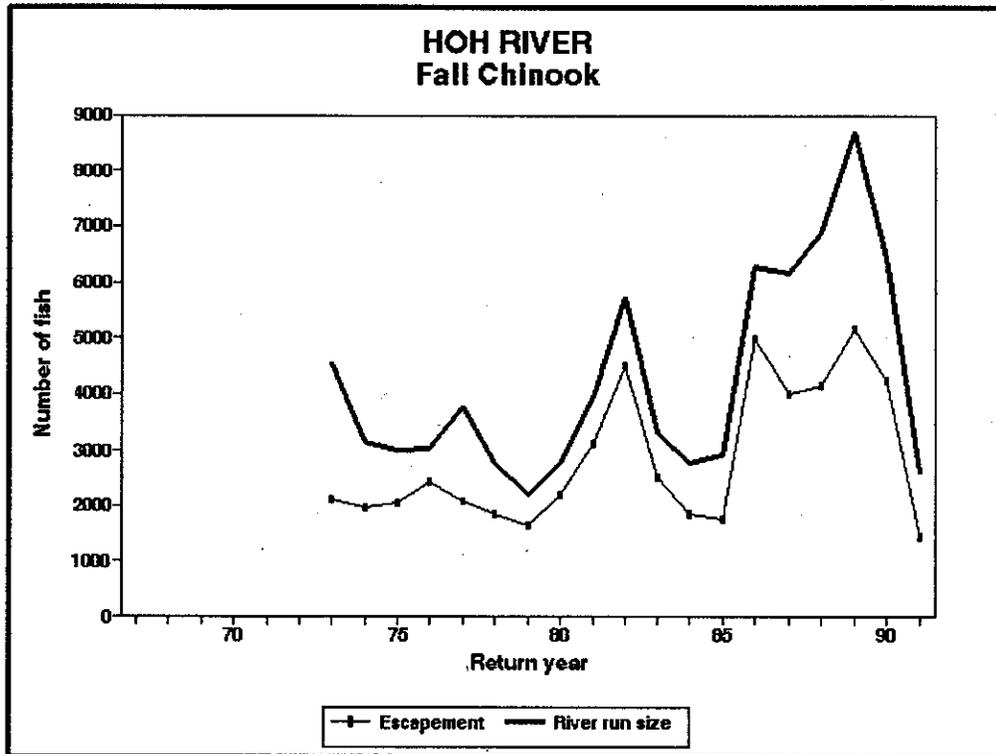
**Hatchery** -- Only limited hatchery activity has occurred with this stock. It is unlikely that it has affected the production in any meaningful way.

# OVERVIEW -- HOH FALL CHINOOK STOCK

## HOH

One fall chinook stock has been identified for the Hoh River system.

The figure below shows escapement and terminal run size estimates for this stock. Escapements have consistently exceeded minimum needs, however, as with Hoh spring/ summer chinook, there is concern about the future status of this stock as a result of significant recent habitat degradation.





## HOH -- HOH FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

The Hoh fall chinook are designated as a separate stock based on return timing to the Hoh River and geographic isolation from neighboring watersheds. Fall chinook enter the river beginning in early September and continue through mid-November. Spawning begins after mid-October and continues through late December. Stock separation from the earlier spring/summer chinook stock is based on a decline in river entry activity in late August and spawning activity in mid-October between the two stocks. Coded-wire-tagging of wild brood stock and the resultant catch, spawning distribution and spawn timing confirm the separation of these two components.

Fall chinook spawn in both mainstem and larger tributary areas. Spawning occurs from RM 3.0 in the mainstem upstream to the lower three miles of the north and south forks. As with spring/summer chinook spawning moves progressively downstream over time. Spawning overlaps with spring/summer chinook occur upstream of mainstem RM 15.

Infrequent releases of fish from non-local stocks, primarily small fry releases, occurred in the 1960s and early 1970s and are believed to have had minimal impacts on the native population.

The origin of the stock is from wild, native spawners.

### **STOCK STATUS**

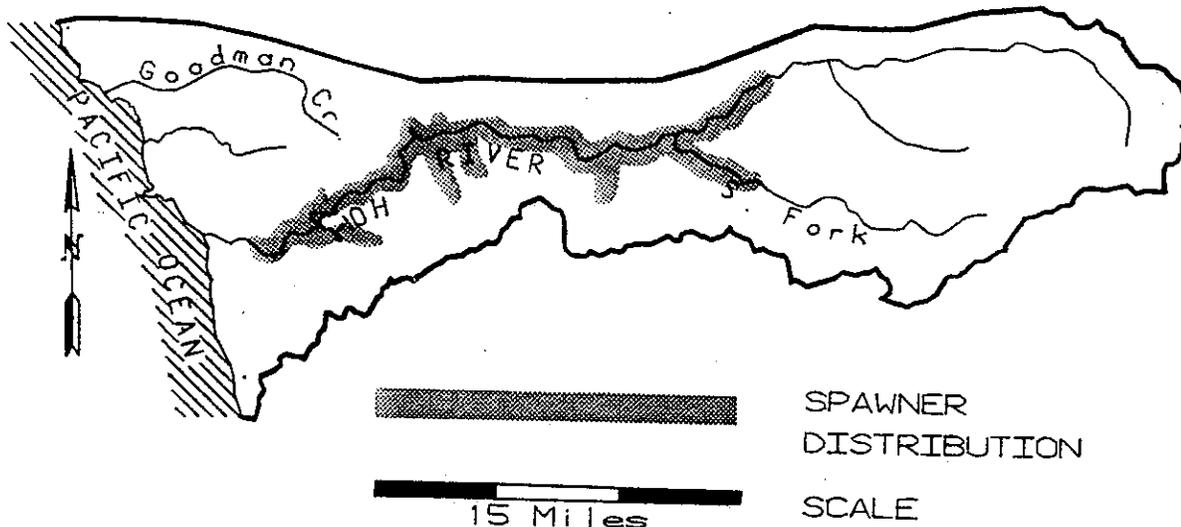
The Hoh fall chinook stock is Healthy and relatively productive compared to the escapement objectives. However, varying levels of impacts of prior interceptions in offshore fisheries obscure analysis of overall productivity trends.

Hoh River fall chinook, like other naturally occurring coastal chinook stocks, are far north migrating fish, and contribute extensively to the off-shore fisheries of southeastern Alaska and British Columbia. Relatively minor contributions are made to ocean fisheries off Washington. A significant portion of the stock returns to the terminal area, contributing to terminal tribal and recreational fisheries and escapements. Terminal run sizes ranged from 2,600 to 8,700 during the period from 1984 to 1991. The large run size in 1989 resulted from the exceptional returns of the 1984 brood and does not appear to be typical for this stock. Escapements over the same period ranged from 1,400 to 5,100 compared to a minimum escapement need of 1,200.

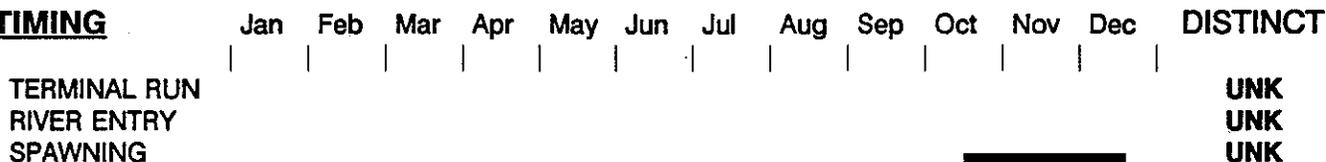
# STOCK DEFINITION PROFILE for Hoh Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



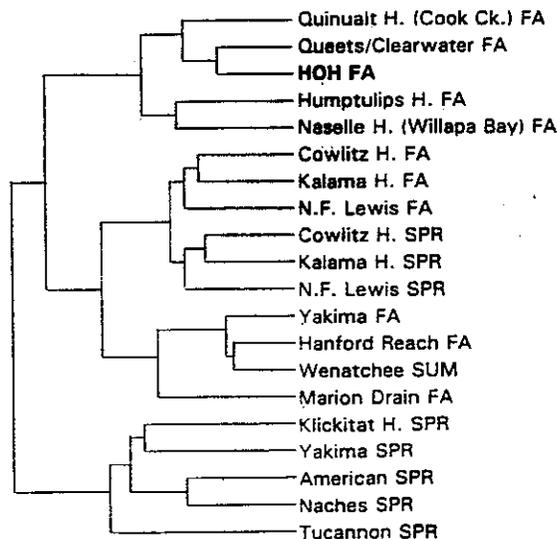
## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - YES

**GENETICS** - Hoh River fall Chinook sampled in 1981, 1982 and 1990 showed no differences between years in their genetic characteristics and were combined into one data set. This Hoh fall stock was significantly different from all other chinook stocks examined ( $p < .05$ ).



0.200 0.1667 0.1333 0.1000 0.0667 0.0333 0.0000

Genetic Distance (Cavalli-Sforza & Edwards (1967) chord distance: UPGMA)

# STOCK STATUS PROFILE for Hoh Fall Chinook

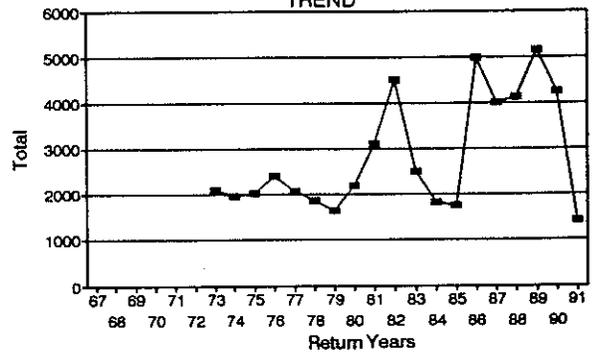
## STOCK ASSESSMENT

DATA QUALITY-----> Good

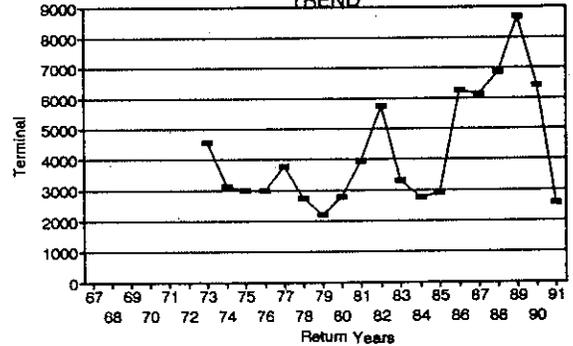
Return Years	ESCAPE Total	RUNSIZE Terminal		
--------------	--------------	------------------	--	--

67		
68		
69		
70		
71		
72		
73	2100	4554
74	1960	3132
75	2028	2995
76	2402	3007
77	2070	3776
78	1852	2753
79	1638	2208
80	2200	2774
81	3100	3941
82	4500	5729
83	2498	3304
84	1823	2767
85	1750	2915
86	4981	6258
87	4006	6148
88	4124	6873
89	5148	8682
90	4236	6428
91	1420	2583

ESCAPE TREND



RUNSIZE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution, Timing, Genetics*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Winter freshet activity scouring out incubating eggs and debris flows affecting the percolation of oxygenated water around those eggs are thought to have the greatest impact on chinook freshwater residence. In the more protected spring and tributary-fed side-channel areas outside of the Olympic National Park, better incubation conditions should exist. However, we have seen significant deterioration of spawning gravels due to deposition of mud and silt from debris flows. The overall loss of large woody debris (LWD) and log jams in the lower river may result in loss of habitat heterogeneity. The river tends to become shallower, leaving less of the larger habitat preferred by larger sub-migratory-sized fish as opposed to the smaller fish of the same cohorts.

**Harvest Management** -- The far north-migrating behavior of these north coastal natural chinook stocks results in their main ocean interception in fisheries off of southeast Alaska and northern British Columbia. At present, these fish are managed according to the Pacific Salmon Treaty fixed ceilings of 260,000 chinook in each of the intercepting Alaskan and Canadian fisheries where they are commingled with stocks from the Columbia River and other areas.

Analysis of coded-wire tag data from several small releases of Hoh stocks have indicated typical ocean interception rates ranging from 45 to 55 percent. The fall chinook stock is managed for in-river escapement targets of 60 percent of the terminal run or 1,200, whichever is higher.

**Hatchery** -- Only limited hatchery activity has occurred with this stock. It is unlikely that it has affected the production in any meaningful way.

## OVERVIEW -- HOH FALL CHUM STOCK

### HOH

Small numbers of chum are observed spawning in the Hoh River system.

The area is not surveyed consistently so very little information on escapements or run sizes is available. What information is available is found in the following Stock Report.



## HOH -- HOH FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Chum salmon spawn in low numbers through much of the lower Hoh River system. Little is known about entry timing into the river, but spawning occurs primarily in November and December.

Little hatchery activity has occurred.

The stock is best described as a native stock.

### **STOCK STATUS**

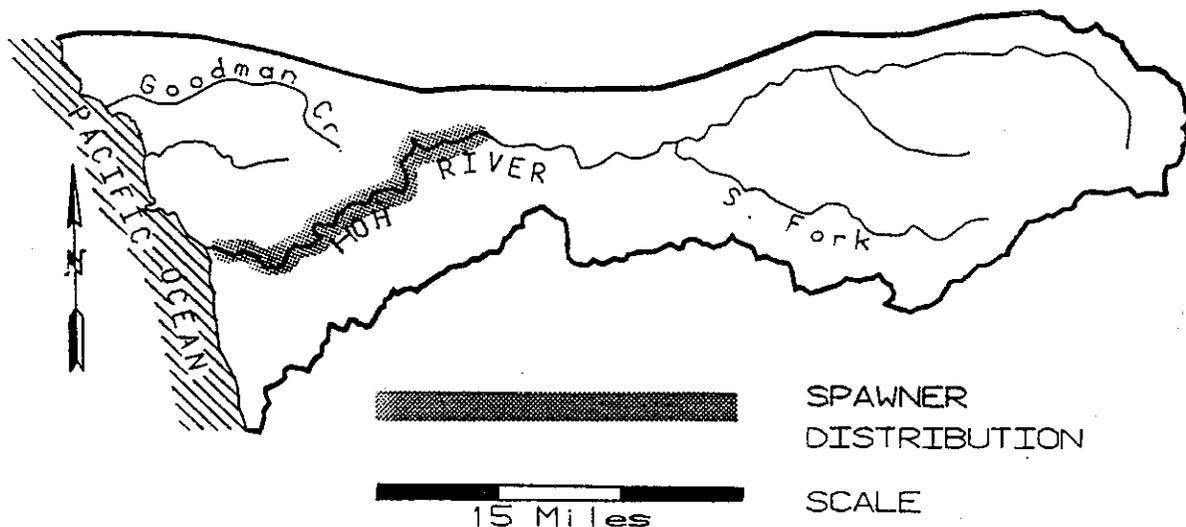
Due to the lack of information, the stock status is Unknown.

Little information on run size or escapements is available. Limited catch information suggests a long-term decline of the stock.

# STOCK DEFINITION PROFILE for Hoh Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													UNK
RIVER ENTRY													UNK
SPAWNING											██████████		UNK

## BIOLOGICAL CHARACTERISTICS

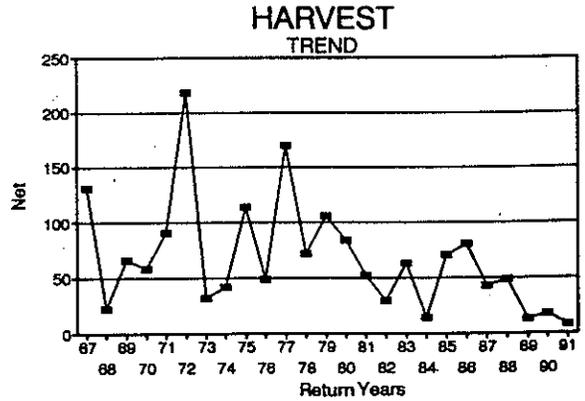
DISTINCT? - NO

# STOCK STATUS PROFILE for Hoh Fall Chum

## STOCK ASSESSMENT

DATA QUALITY----> Good

Return Years	HARVEST Net			
67	131			
68	22			
69	66			
70	59			
71	91			
72	218			
73	32			
74	42			
75	114			
76	49			
77	170			
78	72			
79	106			
80	84			
81	52			
82	29			
83	63			
84	14			
85	71			
86	80			
87	43			
88	49			
89	13			
90	18			
91	8			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Unknown*

PRODUCTION TYPE

*Unknown*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



# OVERVIEW -- HOH COHO STOCKS

## GOODMAN / MOSQUITO CREEKS HOH

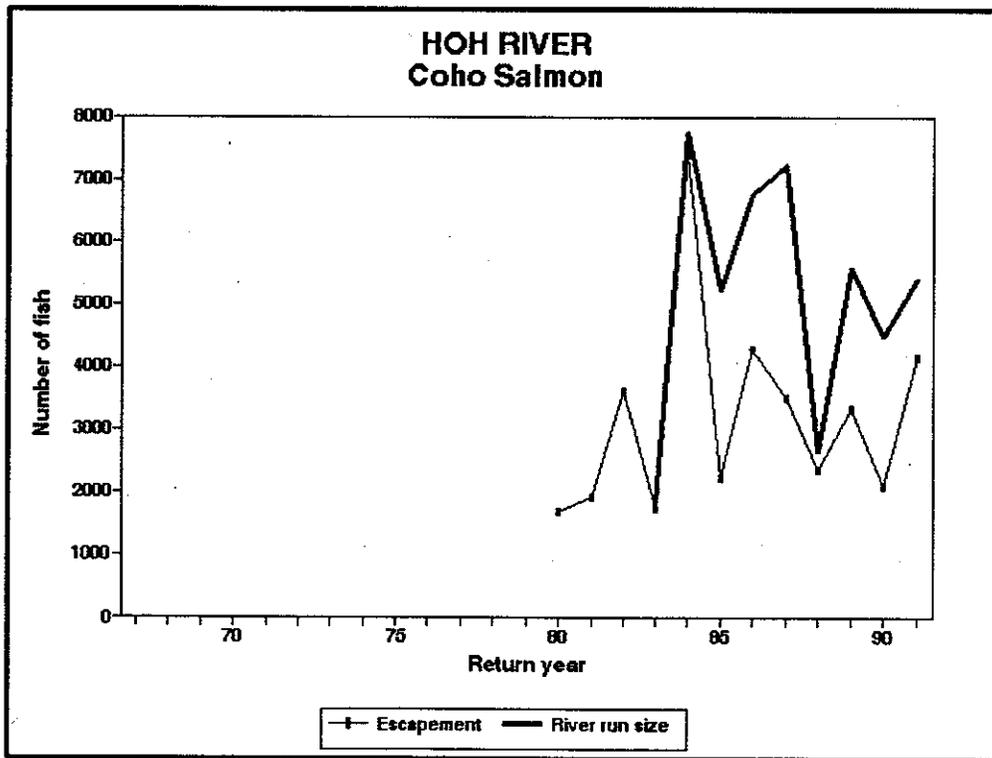
### STOCK DEFINITION AND ORIGIN

Two coho stocks have been identified in the Hoh River area: Goodman/Mosquito creeks and Hoh River. Goodman and Mosquito creeks are independent tributaries to the Pacific Ocean. Stock identification and separation are based on geographic isolation.

### STOCK STATUS

Virtually nothing is known about the status of the Goodman/Mosquito creeks stocks. The figure below shows escapement and terminal run size estimates for the Hoh stock only. Although the stock is currently considered Healthy, there is considerable concern about its future status due to significant recent habitat degradation.

More information is found in the Stock Reports which follow.





## HOH -- GOODMAN / MOSQUITO CREEKS COHO

### **STOCK DEFINITION AND ORIGIN**

The Goodman/Mosquito creeks coho are considered an independent stock based on geographic isolation from neighboring stocks.

Essentially no information is available for this stock. Run timing is assumed to be similar to that of other coho stocks in the north coast area.

The stock is considered native, with wild production.

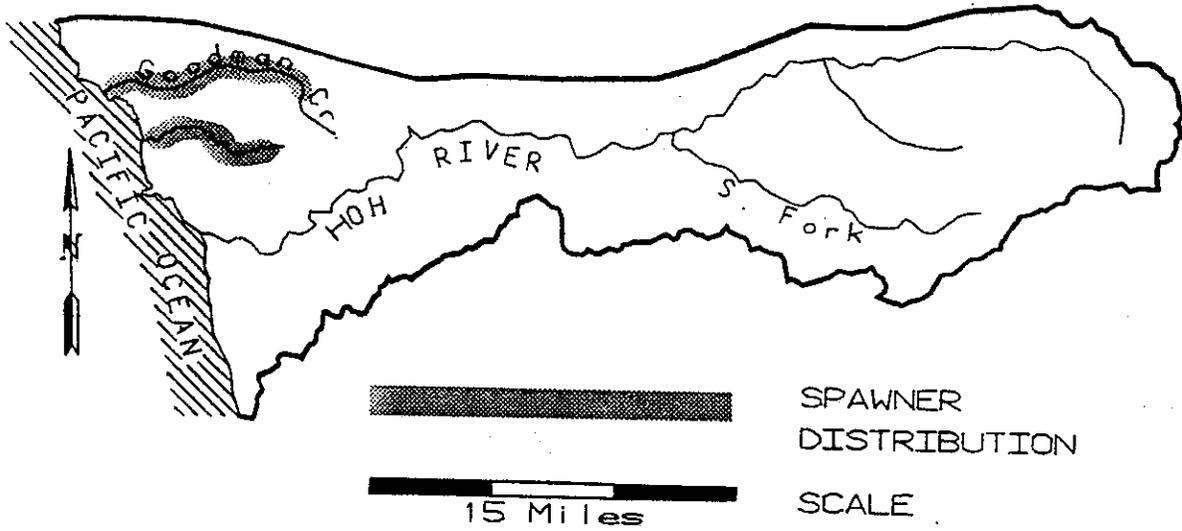
### **STOCK STATUS**

The status of this stock is Unknown.

# STOCK DEFINITION PROFILE for Goodman/Mosquito Creeks Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													UNK
RIVER ENTRY													UNK
SPAWNING	█										█		UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Goodman/Mosquito Creeks Coho

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Return	NO DATA			
Years				

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

---

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

---

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## HOH -- HOH COHO

### **STOCK DEFINITION AND ORIGIN**

Hoh fall coho are designated a separate stock based on geographic isolation from neighboring watersheds. Spawning occurs in tributaries and river side-channels from the mouth of the river upstream to RM 48 on the North Fork and RM 10 on the South Fork.

The wild run generally enters the river from early September through early January. Spawn timing ranges from late October through mid-February.

During the late 1970s and early 1980s there were yearly releases of early-timed Quinault-origin smolts from the Quinault National Fish Hatchery. Most spawners returned to the tribal hatchery where they had imprinted. Little straying of this stock occurred and was likely limited to the lower five miles of the river. Recent returns of hatchery coho have been from infrequent releases of wild coho that were brood stocked from the Hoh system. Entry timing has remained identical to that of the wild run.

Hoh River coho are of native origin.

### **STOCK STATUS**

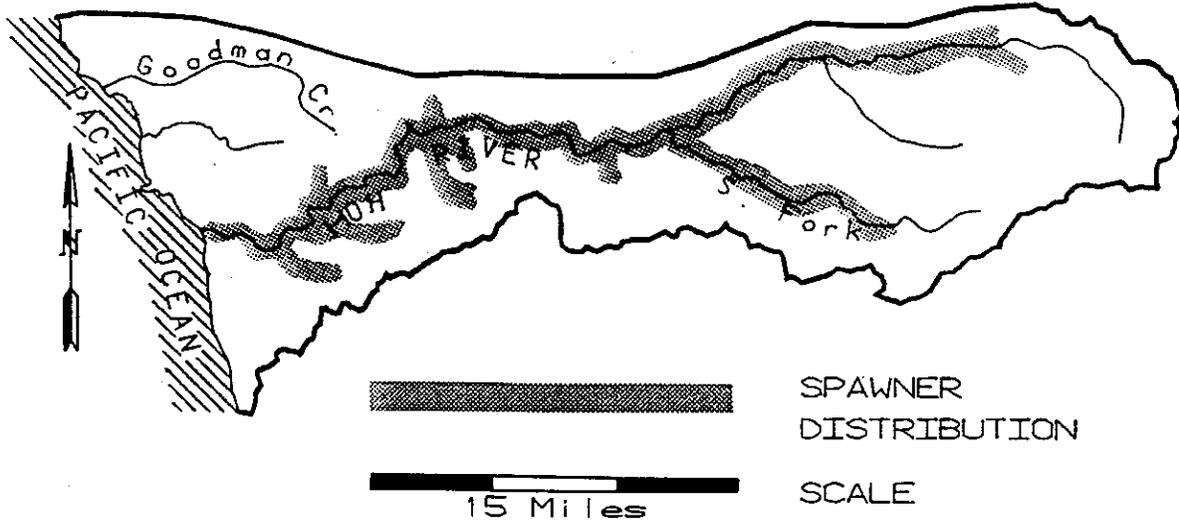
Hoh coho are Healthy and relatively productive compared to the escapement objectives. Terminal tribal catches averaged 3,500 to 4,000 in the 1950s and 1960s, compared to the recent six-year average of 2,200. However, varying levels of impacts of prior interceptions in offshore fisheries and trends in marine survival obscure analysis of overall productivity trends.

Hoh coho are north-migrating and contribute extensively to offshore fisheries in British Columbia. Lesser catches are taken off the Washington and Oregon coasts and in the Strait of Juan De Fuca treaty and non-treaty commercial fisheries and recreational fisheries. A large proportion of the run returns to the terminal area, contributing to treaty commercial and non-treaty recreational fisheries and escapements. Terminal run sizes ranged from 3,400 to 8,000 during the period from 1984 to 1991. Escapements over the same period ranged from 2,100 to 7,400 compared to a desired escapement range of 2,000 to 5,000.

# STOCK DEFINITION PROFILE for Hoh Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													
RIVER ENTRY													UNK
SPAWNING													UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

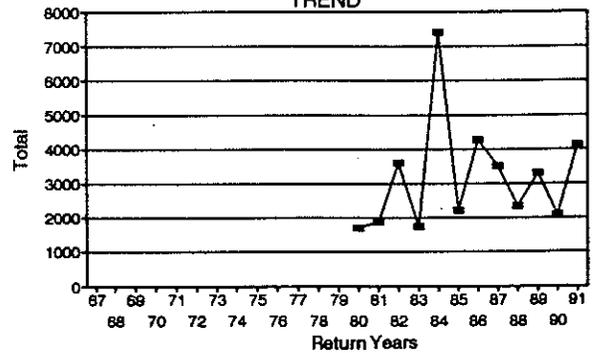
# STOCK STATUS PROFILE for Hoh Coho

## STOCK ASSESSMENT

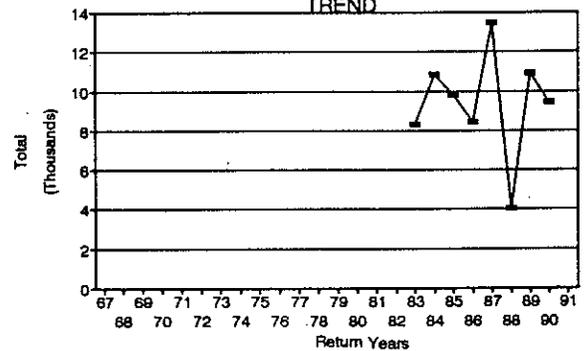
DATA QUALITY-----> Good

Return Years	ESCAPE Total	RUNSIZE Total	RUNSIZE Terminal	HARVEST Net
67				
68				
69				
70				
71				
72				
73				6701
74				6548
75				2550
76				1813
77				960
78				2804
79				2165
80	1700			792
81	1900			1338
82	3600			1745
83	1735	8315	1821	66
84	7400	10849	7740	250
85	2218	9818	5233	2881
86	4270	8432	6751	2047
87	3516	13468	7228	3410
88	2350	4037	2619	250
89	3321	10942	5588	2001
90	2094	9456	4480	2324
91	4129		5390	965

ESCAPE TREND



RUNSIZE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Long-term habitat and environmental coho spawning and rearing habitats have been directly impacted by the effect of current land-use practices. The debris flows along the protected spring-fed terrace side-channels smother many coho redds in this primary coho spawning area. In the river mainstem, and along several tributaries, loss of riparian and Large Woody Debris (LWD) cover raises summer low flow water temperatures above those considered optimum for salmonids and results in loss of pool hiding cover for fish as well as habitat-forming scouring agents in those streams. Overwinter pond and wetland habitat has been lost to competing land-use activities, though some has been improved by WDFW habitat improvement projects. Actual estimates from such losses await more detailed study of individual habitat components.

**Harvest Management** -- Escapements within the desired escapement range are routine with the Hoh coho stock, so that harvest levels do not appear to be adversely affecting the production of this stock.

However, changes in ocean stock distribution, relative abundance and fishing activity from year-to-year can significantly affect terminal run sizes, making run size predictions and other management tasks difficult. This uncertainty increases the risk of harvest related production problems in the future. The estimated terminal run size ranged from 28.6 percent of total ocean run size in 1983 to 51.7 percent in 1987, based on preliminary analyses of tag recoveries of Hoh River wild coho release groups from several return years. Canadian catches of Hoh in fisheries off the west coast of Vancouver Island varied from 53.8 percent of the total ocean run size in 1983 to 32.8 percent in 1989 and 30.6 percent in 1987. These shifts in run size and catch impacts can be difficult to anticipate and may be difficult to compensate for in either domestic ocean or terminal fisheries.

The large impact of the Canadian fisheries also makes it difficult to meet all the needs of domestic fishers, while still consistently providing escapements within the escapement range.

**Hatchery** -- No information is available at this time.

## OVERVIEW -- HOH SUMMER AND WINTER STEELHEAD STOCKS

**SUMMER:**  
HOH

**WINTER:**  
GOODMAN CREEK  
MOSQUITO  
HOH

### STOCK DEFINITION AND ORIGIN

In the Hoh River area, one summer steelhead stock and three winter steelhead stocks have been identified. Wild summer steelhead in the Hoh River and wild winter steelhead in Goodman Creek, Mosquito Creek, and the Hoh River are distinct stocks. Goodman Creek and Mosquito Creek are independent drainages flowing into the Pacific Ocean just north of the Hoh River. Wild summer and winter steelhead are native.

There is little or no information available to indicate that these are genetically distinct stocks. The stocks are treated separately due to the geographic isolation of the spawning populations. There may be more or fewer stocks identified once comprehensive genetic information is available.

Differences in run timing, relative abundance, and physical size of fish in the wild steelhead stocks in the Hoh River allows separation of the summer and winter steelhead stocks. Run timing of the small wild summer steelhead stock (May through October) is distinct from run timing of the more abundant and larger wild winter steelhead (mid-November through April).

The native summer stocks were historically small runs of fish limited by their habitats. These fish developed in areas isolated from the native winter stocks. Since only a few miles of stream were used, summer steelhead populations were small.

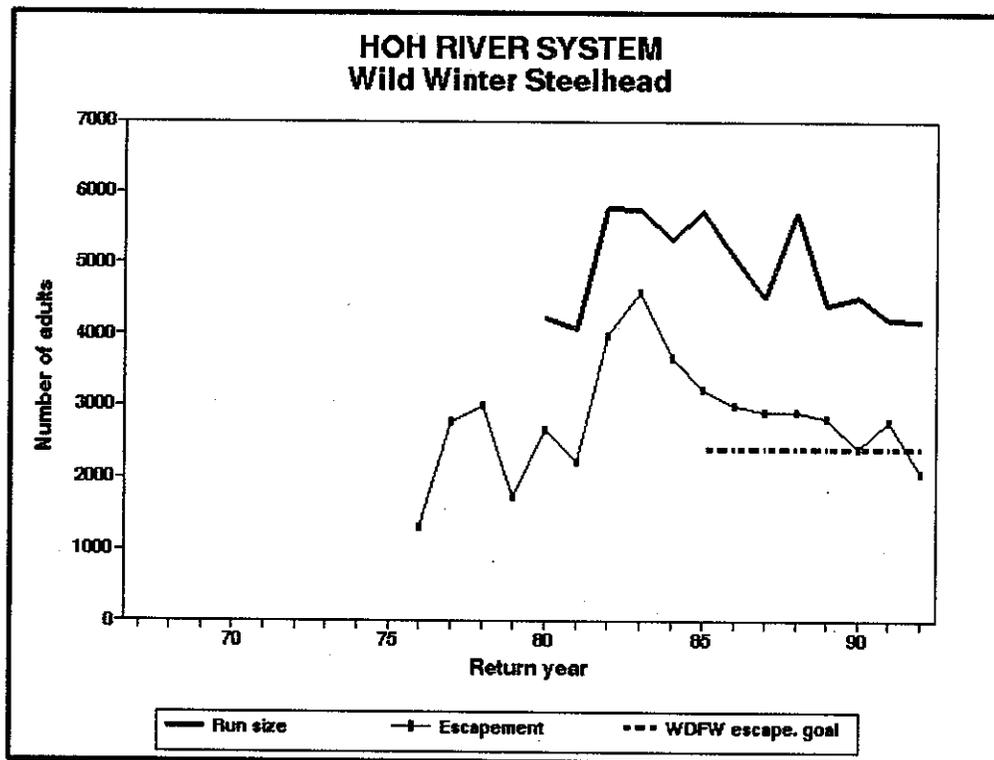
While about 100,000 hatchery winter steelhead smolts of Quinault River-origin are planted in the Hoh River system annually, there is little contribution to the wild stock from hatchery fish spawning in the wild. The returning hatchery adults support tribal and sport fisheries with a combined exploitation rate of about 80 percent. Given the high exploitation of the hatchery fish, healthy wild spawner escapements, and the difference in spawn timing between the hatchery fish (January and February) and the wild fish (mid-February through May), the potential for interbreeding is limited. Hatchery summer steelhead smolts have not been stocked in the Hoh River. Substantial numbers of hatchery summer steelhead stray into the Hoh River from smolts stocked in the Quillayute River system and are caught in the sport and tribal fisheries. The potential for interbreeding between the more numerous hatchery fish and the wild fish certainly exists, but whether hatchery adults spawn in the Hoh River or return to the Quillayute River system or stray to other areas to spawn is not known.

The contribution to the wild stock of hatchery fish spawning in the wild is also unknown. Management strategies are presently being reviewed to reduce potential interbreeding.

### STOCK STATUS

For the Hoh River, wild winter steelhead spawner escapement has been monitored since the 1975-76 season and wild run size has been monitored since the 1979-80 season. Wild escapement has ranged from 1,290 to 4,593 fish and wild run size has ranged from 4,078 to 5,783 fish (see figure).

Beginning with the 1984-85 season, a WDW escapement goal of 2,400 winter steelhead was set for the Hoh River system and the fisheries were managed to achieve the goal. This goal is to be achieved by wild adults and does not include hatchery fish spawning in the wild. In the eight seasons since the escapement goal was set, wild escapement has averaged 2,760 fish and met or exceeded the goal seven times (see figure).



The wild winter steelhead run in the Hoh River is fished upon by the Hoh Tribe and sports anglers. The tribal fishery targeted on winter steelhead occurs from late November through March. Sport anglers fish for steelhead in the mainstems of the Hoh and South Fork Hoh rivers from November through mid-April.

During the 1979-80 through 1991-92 return years, the wild winter steelhead run in the Hoh River system was comprised of 12.4 percent sport harvest, 25.9 percent tribal harvest, and 61.7 percent spawner escapement (see table).

---

**Hoh River system wild winter steelhead sport harvest, tribal harvest, spawner escapement, and run size from 1975-76 through 1991-92.**

---

Return year	Sport harvest	Tribal harvest	Spawner escapement	Run size
1975-76			1,290	
1976-77			2,786	
1977-78			3,002	
1978-79			1,723	
1979-80	568	1,006	2,660	4,234
1980-81	787	1,067	2,224	4,078
1981-82	473	1,326	3,984	5,783
1982-83	385	765	4,593	5,743
1983-84	582	1,064	3,670	5,316
1984-85	605	1,888	3,228	5,721
1985-86	368	1,726	3,000	5,094
1986-87	357	1,262	2,908	4,527
1987-88	873	1,927	2,906	5,706
1988-89	608	999	2,808	4,415
1989-90	696	1,439	2,390	4,525
1990-91	571	852	2,783	4,206
1991-92	970	1,151	2,061	4,182

Mean run size distribution, 1979-80 to 1991-92

603	1,267	3,017	4,887
12.4%	25.9%	61.7%	

---

Wild summer steelhead spawning escapement is not monitored, and escapement goals have not been identified. In tribal fisheries, summer steelhead are managed as incidental catch to the spring/summer chinook fishery. Because of their much smaller size and the much higher price per pound of chinook which are fished with larger mesh gill net, few (generally fewer than 200) wild summer steelhead are harvested. Wild summer steelhead have been managed with wild steelhead-release regulations to

protect the wild stock from sport harvest since 1992. It is expected that with current regulations in place these stocks will reach populations levels dictated by their limited habitats. Because of small population sizes and limited habitats used, wild summer steelhead populations will always be fragile.

More information on each stock is presented in separate Stock Reports.

## HOH -- HOH SUMMER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Hoh River, South Fork Hoh River, and tributaries are native and a distinct stock based on the geographic isolation of the spawning population. Summer steelhead are distinct from wild winter steelhead in the Hoh River based on run timing. The specific spawning distribution is unknown, but spawning is generally believed to take place in the upper reaches of the river. Little is known about the genetic composition of the stock. Similar to other wild summer steelhead stocks, run timing is generally from May through October and spawn timing is unknown but believed to be from February through April.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information for wild summer steelhead is available over the entire run, but wild sport harvest is too low to be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

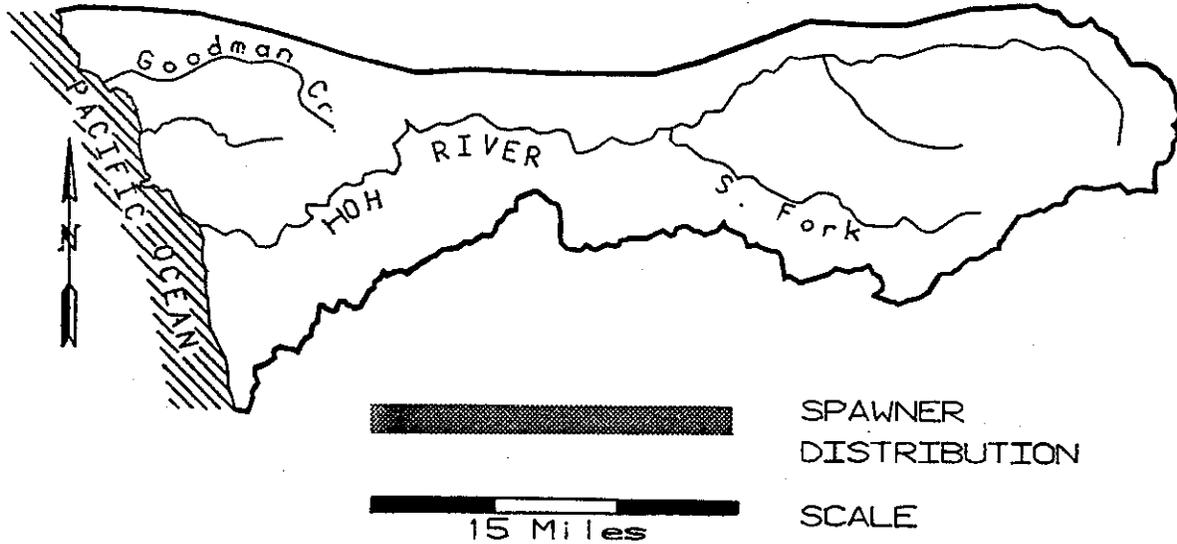
### **FACTORS AFFECTING PRODUCTION**

**Habitat** --Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited. The same factors affecting chinook egg survival would also affect steelhead egg survival. The effects of freshets would be much reduced on incubating eggs, however, since steelhead eggs would be deposited after most significant freshets have occurred. Loss of large woody debris and logjams could have a larger impact on steelhead than on chinook since the steelhead's ability to find refuge habitat could be more limited during their overwintering as yearling fish.

# STOCK DEFINITION PROFILE for Hoh Summer Steelhead

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



**TIMING**

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - UNKNOWN

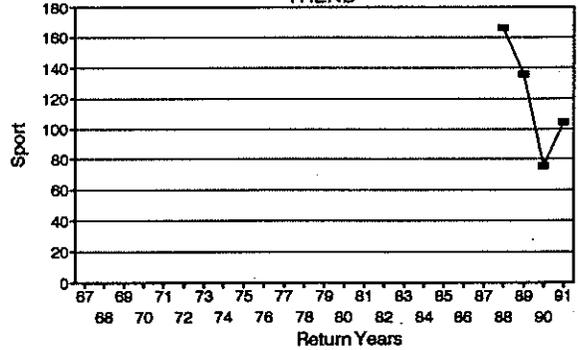
# STOCK STATUS PROFILE for Hoh Summer Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	166			
89	136			
90	76			
91	104			

HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- There is no directed tribal fishery on this stock, but some incidental harvest of wild summer steelhead occurs in some years during the tribal spring/summer chinook fishery. Because of their much smaller size and the much higher price per pound of chinook which are fished with larger mesh gill net, few (generally fewer than 200) wild summer steelhead are harvested. This stock has been managed with wild steelhead-release regulations to protect the wild stock from sport harvest since 1992, but some hook-and release mortality of wild steelhead may occur.

**Hatchery** -- Hatchery summer steelhead smolts have not been stocked in the Hoh River. However, substantial numbers of hatchery summer steelhead stray (dip-in) into the Hoh River from smolts stocked in the Quillayute River system and are caught in the sport and tribal fisheries. Hatchery and wild summer steelhead can be distinguished by the marked fins on hatchery fish and differences in body shape (wild fish are compact replicas of the winter steelhead's body shape while dip-in hatchery summer steelhead have a more snake-like body shape). The potential for interbreeding between the more numerous hatchery fish and the wild fish certainly exists, but whether hatchery adults spawn in the Hoh River or return to the Quillayute River system or stray to other areas is unknown. The contribution to the wild stock by hatchery fish spawning in the wild is also unknown. Management strategies are presently being reviewed to reduce potential interbreeding.

## **HOH -- GOODMAN CREEK WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in Goodman Creek are native and a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using enzyme electrophoretic techniques. This does not prove, however, that the stocks are not distinct. More information is needed.

Run timing is generally from December through May and spawn timing is unknown, but believed to be similar to other wild winter steelhead stocks in the north Pacific coast area (mid-February to early June).

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Sport harvest information for wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

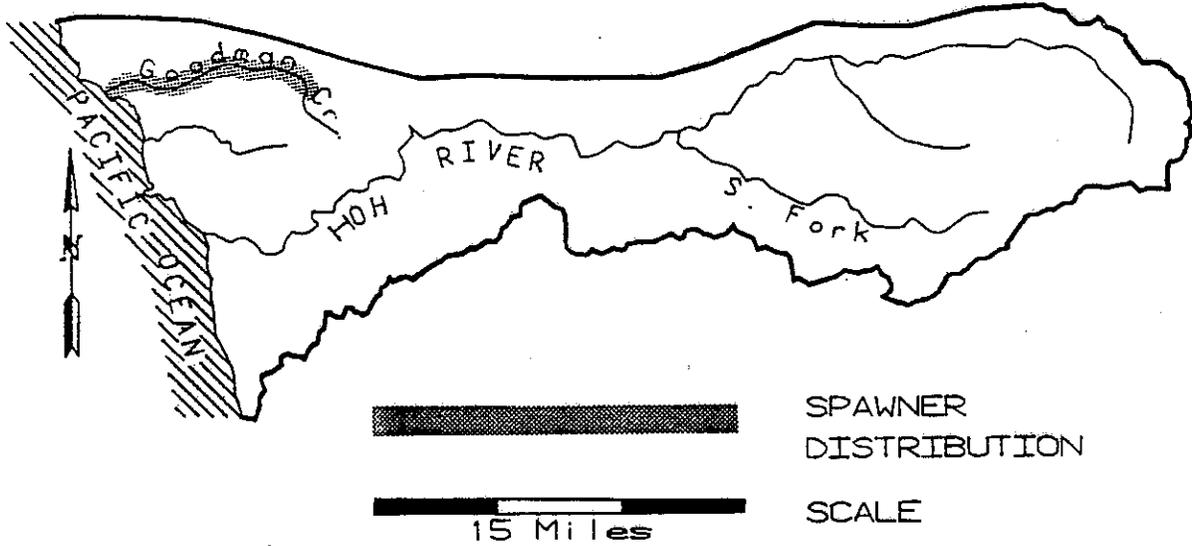
### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited.

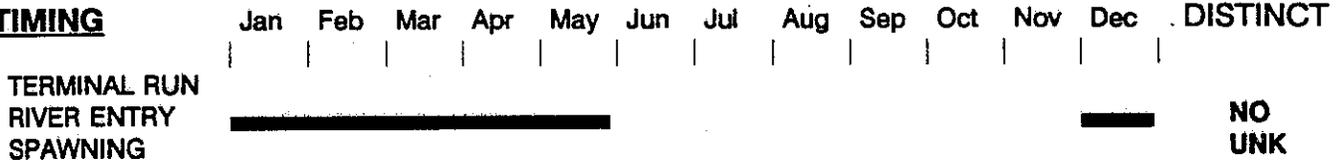
**Harvest Management** -- There is no directed tribal fishery on this stock. The sport fishery closes on February 28 before the majority of the wild stock enters the stream.

# STOCK DEFINITION PROFILE for Goodman Creek Winter Steelhead

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES



**TIMING**



**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Goodman Creek Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	30
88	57
89	45
90	46
91	14
92	15

---

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Hatchery** --While hatchery winter steelhead smolts have been stocked in nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

## **HOH -- MOSQUITO CREEK WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in Mosquito Creek are native and a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using enzyme electrophoretic techniques. This does not prove, however, that the stocks are not distinct. More information is needed.

Run timing is generally from December through May and spawn timing is unknown, but believed to be similar to other wild winter steelhead stocks in the north Pacific coast area (mid-February to early June).

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Sport harvest information for wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

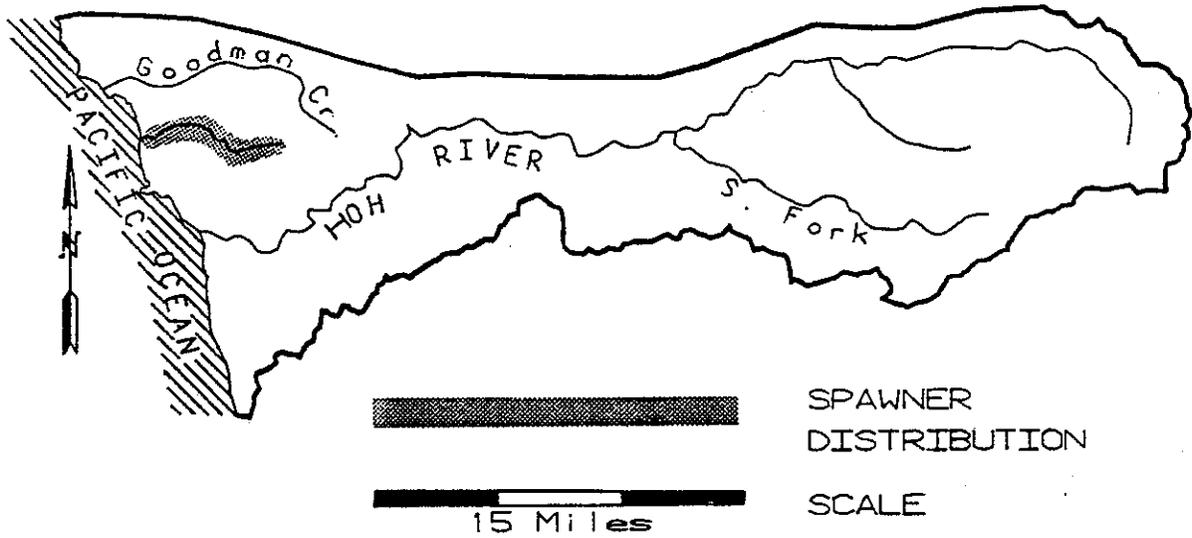
### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited.

# STOCK DEFINITION PROFILE for Mosquito Creek Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT

NO  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Mosquito Creek Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	19
88	18
89	6
90	12
91	0
92	6

### AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

### STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- There is no directed tribal fishery on this stock. The sport fishery closes on February 28 before the majority of the wild stock enters the stream.

**Hatchery** --While hatchery winter steelhead smolts have been stocked in nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

## **HOH -- HOH WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Hoh River, South Fork Hoh River, and tributaries are native and a distinct stock based on the geographical isolation of the spawning population. Spawning is primarily distributed in the river channels with significant numbers spawning in the five largest surface tributaries. Small numbers of earlier wild natives appear to spawn in headwaters of all the significant tributaries at least to the degree that those tributaries are probably seeded and optimally used each brood year.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using enzyme electrophoretic techniques. This does not prove, however, that the stocks are not distinct. More information is needed to determine if steelhead stocks are genetically distinct.

Run timing (December through May) and spawn timing (mid-February to mid-June) are similar to other wild winter steelhead stocks in the north Pacific coast area.

While hatchery winter steelhead smolts have been stocked in the Hoh River and nearby rivers, there is little contribution to the wild stock from hatchery fish spawning in the wild.

### **STOCK STATUS**

The wild winter steelhead stock in the Hoh River is Healthy.

Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from 1,290 to 4,593 (averaging 2,922) wild winter steelhead during the 1976 through 1987 seasons and from 2,061 to 2,906 (averaging 2,590) wild winter steelhead during the 1988 through 1992 seasons.

### **FACTORS AFFECTING PRODUCTION**

**Habitat --** Land-use practices in the Hoh River have an adverse effect on steelhead egg survival just as with chinook salmon. This effect might be somewhat reduced due to the later spawn timing of wild steelhead after most significant freshets or flow and debris events occur. However, reduction of prime areas protected from main river flow impacts steelhead because more eggs may be laid in areas where natural river silt would occur at higher levels. Also, loss of large woody debris in the tributaries



# STOCK STATUS PROFILE for Hoh Winter Steelhead

## STOCK ASSESSMENT

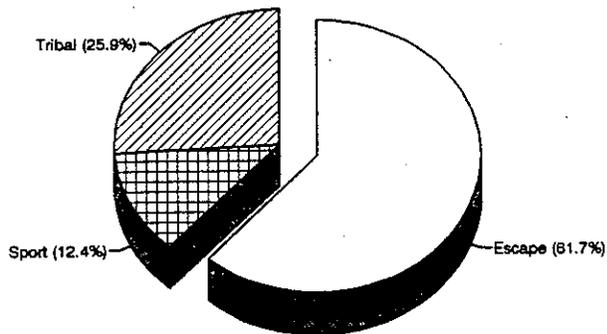
DATA QUALITY-----> Good

Return Years	ESCAPE Total	RUNSIZE Total	HARVEST Sport	HARVEST Net
68				
69				
70				
71				
72				
73				
74				
75				
76	1290			
77	2786			
78	3002			
79	1723			
80	2660	4234	568	1006
81	2224	4078	787	1067
82	3984	5783	473	1326
83	4593	5743	385	765
84	3670	5316	582	1064
85	3228	5721	605	1888
86	3000	5094	368	1726
87	2908	4527	357	1262
88	2906	5706	873	1927
89	2808	4415	608	999
90	2390	4525	696	1439
91	2783	4206	571	852
92	2061	4182	970	1151

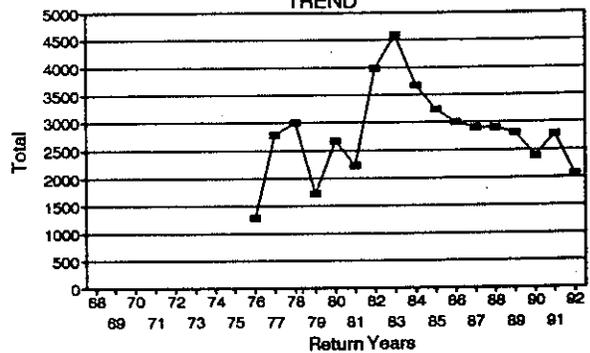
WDFW Escapement goal = 2400

## AVERAGE RUNSIZE DISTRIBUTION

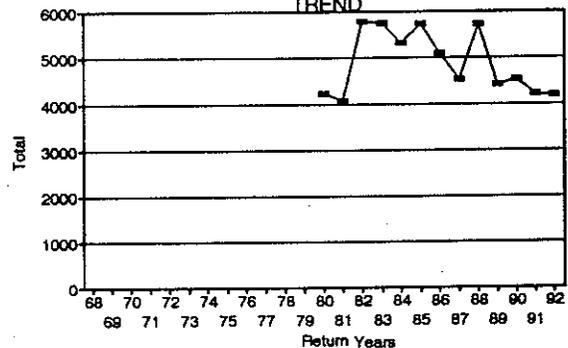
YEARS 1980-1992



## ESCAPE TREND



## RUNSIZE TREND



## STOCK SUMMARY

### STOCK ORIGIN

**Native**

### PRODUCTION TYPE

**Wild**

### STOCK DISTINCTION

**Spawning Distribution**

### STOCK STATUS

**Healthy**

### SCREENING CRITERIA

and mainstem may result in loss of pool habitat and overall habitat heterogeneity, reducing the numbers of older fish which can be carried at later stages of the steelhead's freshwater residence as well as through winter high flow periods.

**Harvest Management** -- The wild winter steelhead run in the Hoh River is fished upon by the Hoh Tribe and sports anglers. The tribal fishery targeted on winter steelhead occurs from late November through March. Sport anglers fish for steelhead in the mainstems of the Hoh and South Fork Hoh rivers from November through mid-April. Overall in-river harvest of winter steelhead is managed for expected run sizes of approximately 4,500 to 5,000 wild fish and a WDFW escapement goal of 2,400 steelhead or approximately 50 percent of the run.

**Hatchery** -- While about 100,000 hatchery winter steelhead smolts of Quinault River-origin are stocked in the Hoh River system annually, there is little contribution to the wild stock from hatchery fish spawning in the wild. The returning hatchery adults support tribal and sport fisheries with a combined exploitation rate of about 80 percent. Given the high exploitation of the hatchery fish, healthy wild spawner escapements, and the difference in spawn timing between the hatchery fish (January and February) and the wild fish (mid-February through mid-June), the potential for interbreeding is limited.

## **OVERVIEW -- KALALOCH CREEK COHO STOCK**

### **KALALOCH CREEK**

This is a single stock of coho found in Kalaloch Creek, an independent tributary to the Pacific Ocean.

Little or no information is available for this stock. It is considered a separate stock based on geographic isolation from other coho stocks. Timing and general distribution are assumed to be similar to other coastal coho stocks.

More information on this stock is presented in the Stock Report.



## KALALOCH CREEK -- KALALOCH CREEK COHO

### **STOCK DEFINITION AND ORIGIN**

The wild fall coho in Kalaloch Creek and its tributaries are believed to be a distinct stock based on geographic isolation from other coastal coho stocks.

Run timing and general distribution are assumed to be similar to those of other coastal coho stocks. Run timing will range from late September through November. Spawn timing starts in late November and continues into January. Ocean distribution will range from northern Oregon through northern British Columbia.

The stock is considered native, with wild production.

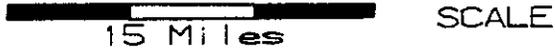
### **STOCK STATUS**

The status of the stock is Unknown.

Spawning escapements for this stock are not monitored, and no escapement objective has been established.

# STOCK DEFINITION PROFILE for Kalaloch Creek Coho

## SPAWNER DISTRIBUTION DISTINCT? - UNKNOWN



Spawner distribution is distinct for this stock, but specific spawning locations are unknown.

## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													UNK
RIVER ENTRY													UNK
SPAWNING											██████████		UNK

## BIOLOGICAL CHARACTERISTICS DISTINCT? - NO

# STOCK STATUS PROFILE for Kalaloch Creek Coho

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Brood Years	NO DATA			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

### AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

### STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## **OVERVIEW -- KALALOCH SUMMER AND WINTER STEELHEAD STOCKS**

### **WINTER: KALALOCH CREEK**

#### **STOCK DEFINITION AND ORIGIN**

In the Kalaloch Creek basin, no summer steelhead stocks and one winter steelhead stock have been identified. Wild winter steelhead in Kalaloch Creek are a distinct stock and are native.

There is little or no information available to indicate that this is a genetically distinct stock. The stock is treated separately due to the geographic isolation of the spawning population. More or fewer stocks may be identified once comprehensive genetic information is available.

#### **STOCK STATUS**

Spawner escapements have not been monitored for this stock. There is insufficient information to determine its status and, therefore, it is classified as Unknown.

More information on this stock is presented in a separate Stock Report.



## **KALALOCH -- KALALOCH CREEK WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in Kalaloch Creek, its forks and tributaries are native and a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock.

Run timing is generally from December through May. Spawn timing is unknown, but believed to be similar to that of other wild winter steelhead stocks in the North Pacific Coast area (mid-February to mid-June).

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Sport harvest information for wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited.

**Harvest Management** -- There is no directed tribal fishery on this stock. The sport fishery closes before the majority of the wild stock enters the stream.

**Hatchery** -- While hatchery steelhead smolts have been stocked in this and/or nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

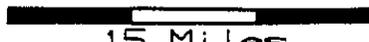
# STOCK DEFINITION PROFILE for Kalaloch Creek Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Kalaloch Creek Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	7
88	0
89	2
90	0
91	6
92	4

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## **OVERVIEW -- QUEETS SPRING / SUMMER CHINOOK STOCKS**

### **QUEETS CLEARWATER**

#### **STOCK DEFINITION AND ORIGIN**

The Queets River basin consists of two major watersheds: the Queets and Clearwater drainage. The Queets River drainage makes up roughly two-thirds of the total basin, with the remaining one-third in the Clearwater drainage.

Wild spring/summer chinook in the Queets River Basin are a distinct stock on the basis of geographical isolation of the spawning populations from other north coast areas. Little is known about the genetic composition of these fish to completely separate the Queets and Clearwater into individual stocks. The spring component is distributed exclusively in the Queets watershed. The summer component is distributed in both the Queets and Clearwater watersheds. A limited amount of straying from nearby coastal systems is expected.

Run timing is similar to that of other spring/summer-run chinook stocks in the north coast areas. River entry occurs during the months of April through August. Spawn timing is similar to that of other spring/summer chinook stocks in the north coast areas. Spawning occurs during the months of September through October.

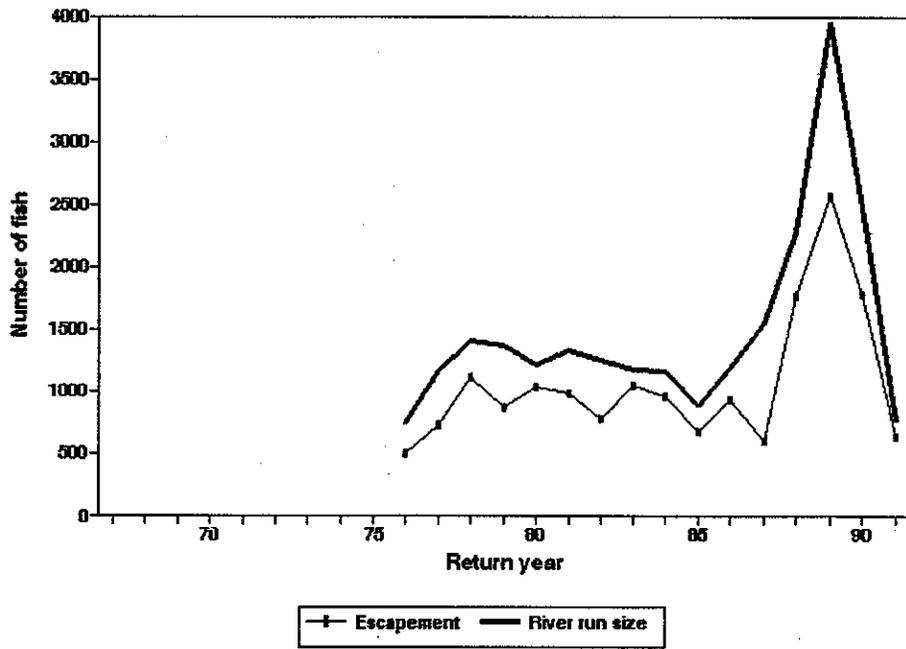
Wild spring/summer chinook are native to the Queets River System.

#### **STOCK STATUS**

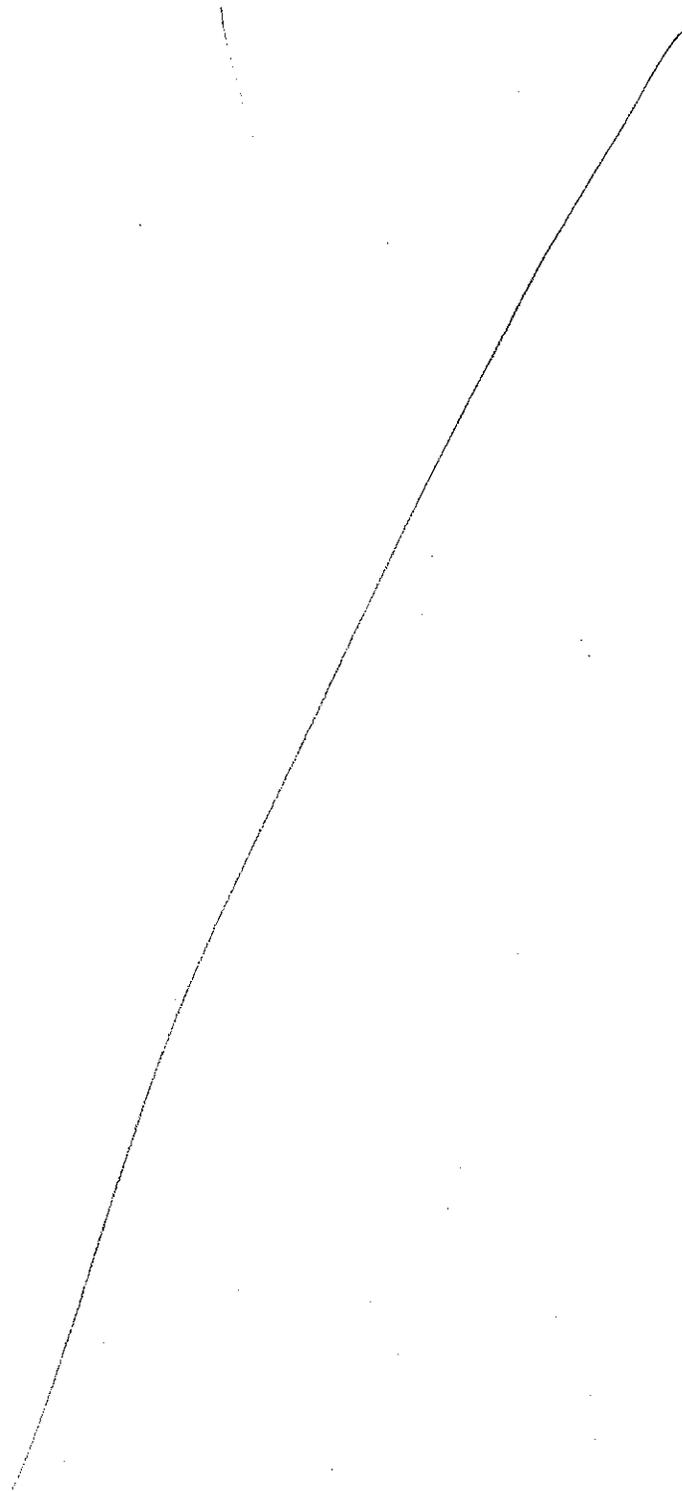
The stock has been listed as a Depressed stock based on a short-term severe decline in escapements. The long-term abundance of Queets spring/summer chinook is stable. Run size has ranged from 732 to 3,954. Increases in the run sizes during 1987 to 1990 were from a high contribution by the 1984 broodyear escapement. Escapements ranged from 505 to 2,568 from 1969 through 1991. Escapement averaged 1,200 fish during the last ten years and 1,500 fish during the last five years. Escapement levels well above average were followed by low escapement years during the last two years.

It is estimated that the escapement has not reached the goal (700) during the last two seasons (including 1992). It is expected that mortalities (in addition to those in commercial and sport fisheries) occurred to the spawning population prior to egg deposition during 1992.

### QUEETS RIVER SYSTEM Spring/Summer Chinook Salmon



START NEXT REPORT?





## **QUEETS -- QUEETS SPRING / SUMMER CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

The Queets River drainage makes up roughly two-thirds of the Queets basin.

Wild spring/summer chinook in the Queets River are identified as a distinct stock only on the basis of geographic isolation of the spawning distribution. Too little is known about the genetic composition of the stock to separate it from the Clearwater stock on genetic grounds. The spring component is distributed exclusively in the Queets watershed. The summer component is distributed in both the Queets and Clearwater watersheds. A limited amount of straying between nearby coastal systems is expected.

Run timing is similar to that of other spring/summer-run chinook stocks in the north coast areas. River entry occurs during the months of April through August. Spawn timing is similar to that of other spring/summer chinook stocks in the north coast areas. Spawning occurs during the months of September through October.

Wild spring/summer chinook are native to the Queets River.

Limited numbers of cultured spring/summer chinook have been released in the Queets River. Contribution to and hybridization with the wild stock are thought to be minimal. Recent releases have not occurred.

### **STOCK STATUS**

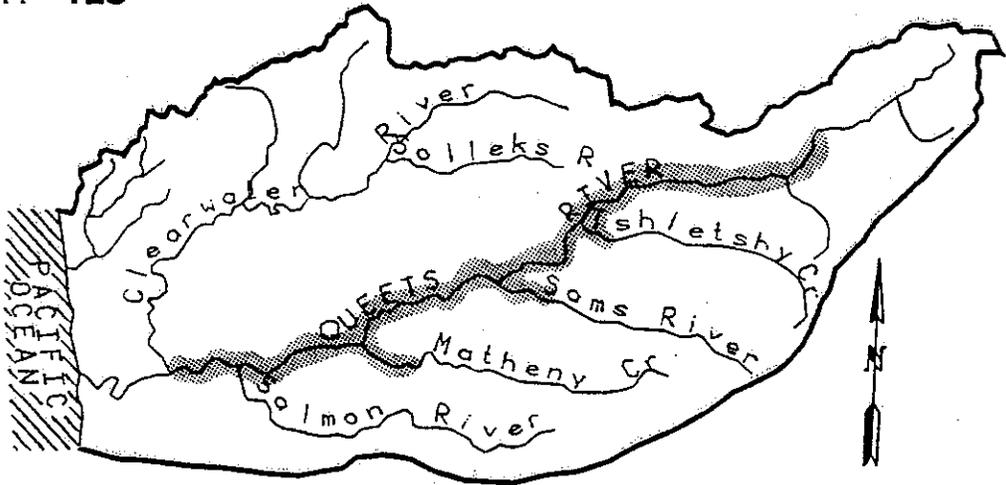
Queets spring/summer chinook were designated Depressed based on recent escapement patterns. This stock is experiencing a short-term severe decline, and it is important to identify possible stocks of concern early. The long-term abundance of Queets spring/summer chinook is stable.

Queets spawner escapements have averaged 82 percent of the total basin aggregate escapement since 1981. Escapements ranged from 525 to 2,295 from 1981 through 1991. Escapements averaged 960 fish during the last ten years and 1,240 fish during the last five years. The escapements in the last two years may be the two lowest escapements since 1981, including 1992. Additional terminal-area mortalities (beyond those incurred in commercial and sport fisheries) occurred to the spawning population prior to egg deposition during 1992. These mortalities, due to low flows and high water temperatures, increased natural predation and possibly by increased disease or parasitism were also observed in other spring/summer chinook stocks in 1992.

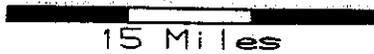
# STOCK DEFINITION PROFILE for Queets Spring/Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Queets Spring/Summer Chinook

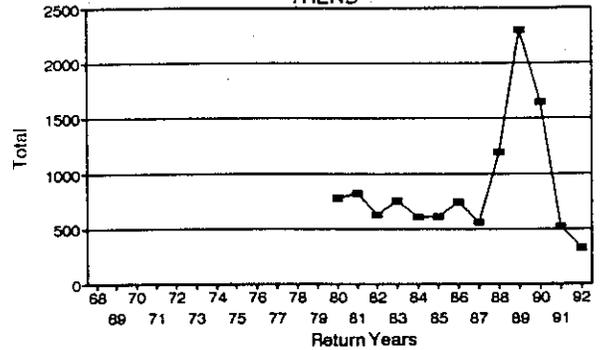
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	780
81	828
82	633
83	759
84	610
85	614
86	745
87	560
88	1195
89	2295
90	1643
91	525
92	325

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Short-term Severe Decline*

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries.

**Harvest Management** -- Queets spring/summer chinook are expected to contribute to southeast Alaska, British Columbia, and Washington ocean troll fisheries. The level of contributions to these fisheries is presently unknown.

There is a limited directed tribal and sport terminal-area fishery on this stock. The aggregate terminal-area harvest objective is a 30 percent harvest rate (25 percent Treaty, 5 percent non-treaty), provided a minimum aggregate escapement of 700 fish occurs.

Sport fishery regulations have become increasingly restrictive in the last few seasons. The non-tribal sport fishery is regulated by Olympic National Park and Washington Department of Fish and Wildlife.

**Hatchery** -- There have been no recent releases of spring/summer chinook into the Queets River.

## **QUEETS -- CLEARWATER SPRING / SUMMER CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

The Clearwater River drainage consists of roughly one-third of the total Queets basin.

Run timing is similar to that of other summer chinook stocks in the north coast areas. River entry occurs during the months of May through August.

Spawn timing is similar to other summer chinook stocks in the north coast areas. Spawning occurs during the months of September through October. Wild summer chinook in the Clearwater River are native and are identified as a distinct stock on the basis of geographic isolation of the spawning distribution. Too little is known about the genetic composition of the stock to separate it from the Queets River stock on genetic grounds. Summer chinook are distributed in both the Queets and Clearwater watersheds.

A limited amount of straying from nearby coastal systems is expected.

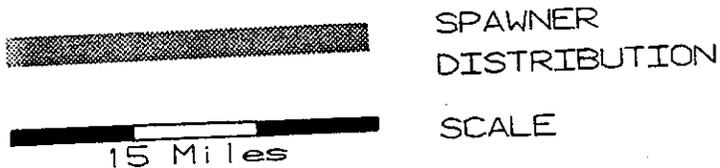
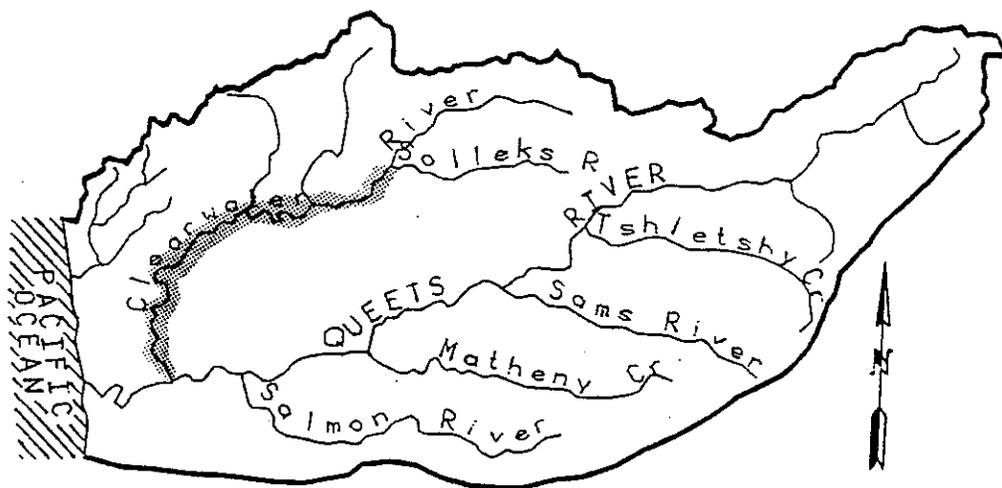
### **STOCK STATUS**

This stock is Depressed based on a short-term severe decline in escapements. Escapement levels well above average have been followed by low escapements during the last two years. The long-term abundance of Clearwater summer chinook is stable. The Clearwater spawner escapements have averaged 18 percent of the total basin aggregate escapement since 1981. Escapements ranged from 40 to 570 from 1981 through 1991. Escapements averaged 220 fish during the last five years. This stock has been listed as Depressed since it is important to identify declining stocks as early as possible. It is expected that mortalities (in addition to those in commercial and sport fisheries) occurred to the spawning population prior to egg deposition during 1992. Additional mortalities caused by low flows, increased water temperature, increased natural predation, and possibly by increased disease and/or parasites were observed in other spring/summer chinook stocks.

# STOCK DEFINITION PROFILE for Clearwater Spring/Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Clearwater Spring/Summer Chinook

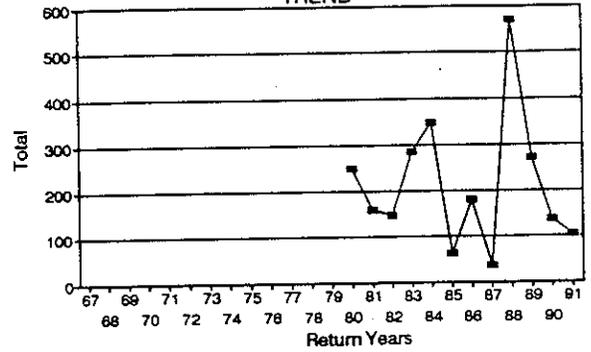
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	250
81	160
82	148
83	285
84	348
85	63
86	180
87	38
88	570
89	273
90	137
91	105

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Short-term Severe Decline*

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries.

**Harvest Management** -- Clearwater summer chinook are believed to contribute to southeast Alaska, British Columbia and Washington ocean troll fisheries. The level of contributions to these fisheries is presently unknown.

There are limited directed tribal and sport terminal area fisheries on this stock. The aggregate terminal area harvest objective is a 30 percent harvest rate (25 percent treaty, 5 percent non-treaty), provided a minimum aggregate escapement of 700 fish occurs.

Sport fishery regulations have become increasingly restrictive in the last few seasons. The non-tribal sport fishery is regulated by the Washington Department of Fish and Wildlife.

**Hatchery** -- There have been no recent releases of spring/summer chinook.

## **CONCLUSION**

The stock has been listed as a Depressed stock exhibiting a short-term severe decline, based on escapement. The long-term abundance of Clearwater spring/summer chinook is stable. It has been listed as Depressed since it is important to identify declining stocks as early as possible.

## **OVERVIEW -- QUEETS FALL CHINOOK STOCKS**

### **QUEETS CLEARWATER**

#### **STOCK DEFINITION AND ORIGIN**

The Queets River basin consists of two major watersheds: the Queets River and Clearwater River. The Queets River drainage makes up roughly two-thirds of the total basin, with the remaining one-third in the Clearwater drainage.

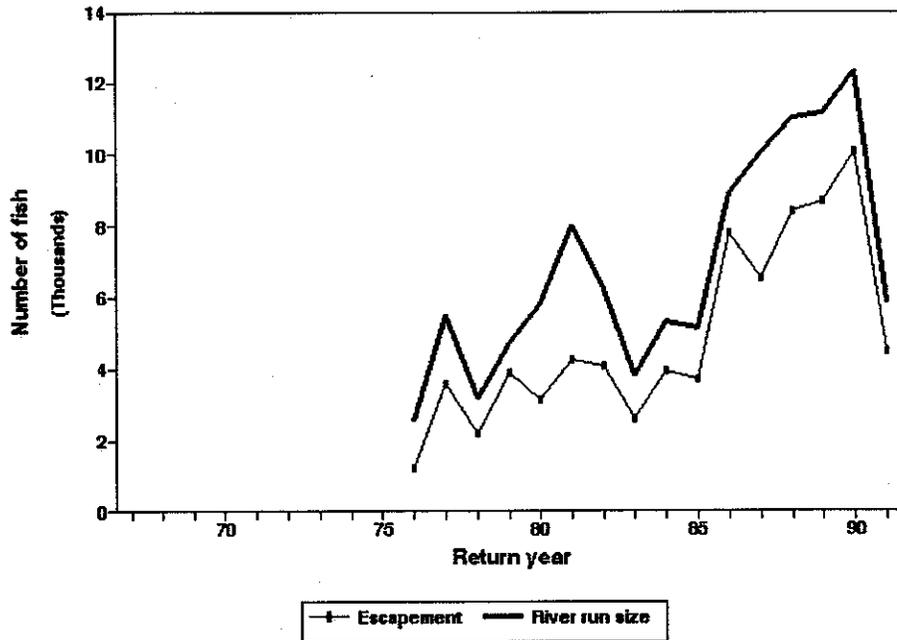
Wild fall chinook in the Queets River Basin are native and a distinct stock only on the basis of geographical isolation of the spawning populations from other north coast basins. Too little is known about the genetic composition of the stock to separate the Queets and Clearwater fall chinook into individual stocks on genetic grounds. A limited amount of straying between nearby coastal systems is expected.

Run timing is similar to that of other fall chinook stocks in the north coast areas. River entry occurs during the months of September through November. Spawn timing is similar to that of other fall chinook stocks in the north coast areas. Spawning occurs during the months of October through December.

#### **STOCK STATUS**

The status of each stock is Healthy. Total basin run size has ranged from 2,500 to 12,300 since 1976. Increases in the run sizes during 1987 to 1990 were from a high contribution by the 1984 brood year. Escapements ranged from 1,200 to 10,100 during 1976 through 1991. Escapements averaged 6,000 fish during the last ten years. Escapements averaged 7,600 fish during the last five years. Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries. Queets fall chinook are expected to contribute to Alaska, British Columbia, and Washington ocean troll fisheries. The level of contributions to these fisheries is unknown. The harvest management objective for the terminal area is a 40 percent total harvest rate (37 percent Tribal, 3 percent non-tribal), provided a minimum aggregate basin escapement of 2,500 fish occurs. Wild chinook harvests are typically limited by wild coho concerns. The actual terminal harvest rate has averaged 25 percent since 1981. The non-tribal sport fishery is regulated by Olympic National Park and Washington Department of Fish and Wildlife.

**QUEETS RIVER SYSTEM  
Fall Chinook**



## QUEETS -- QUEETS FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

The Queets River basin consists of two major watersheds: the Queets and Clearwater drainages. The Queets River drainage makes up roughly two-thirds of the total basin, with the remaining one-third in the Clearwater drainage.

Queets River fall chinook were distinguished from other coastal chinook stocks solely on the basis of geographic isolation of the spawning population. Too little is known about the genetic composition of the stock to separate it from the Clearwater fall chinook stock on genetic grounds. A limited amount of straying between nearby coastal systems is expected.

Run timing is similar to that of other fall chinook stocks in the north coast area. River entry occurs during the months of September through November. Spawn timing is similar to that of other fall chinook stocks in the north coast area. Spawning occurs during the months of October through December.

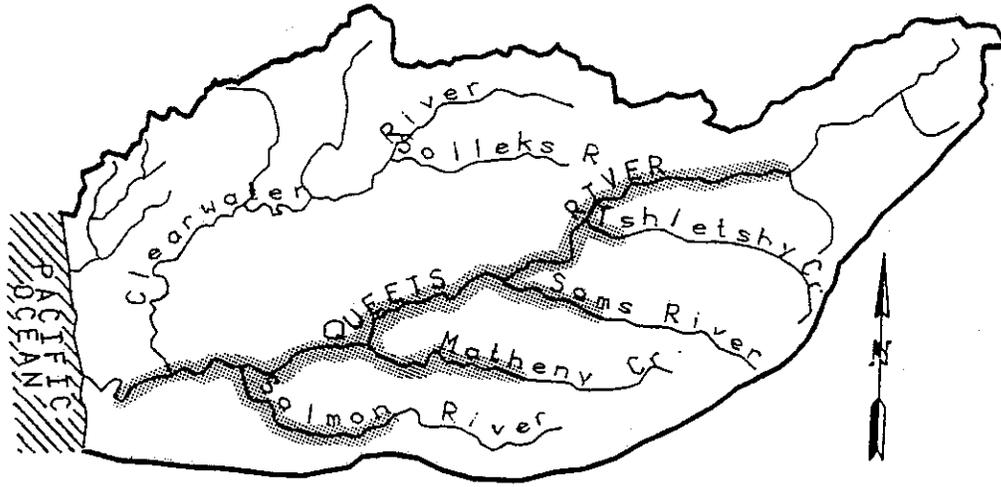
### **STOCK STATUS**

The Queets River stock is Healthy based on escapements. Increased production of the Queets River stock from 1987 to 1990 was from a high contribution by the 1984 brood year. Escapements have ranged from 1,700 to 6,850 since 1981. The Queets spawner escapements have averaged 69 percent of the aggregate total basin escapement since 1981. Escapements averaged 4,100 fish during the last ten years and 5,200 fish during the last five years.

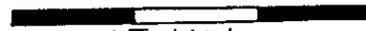
# STOCK DEFINITION PROFILE for Queets Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

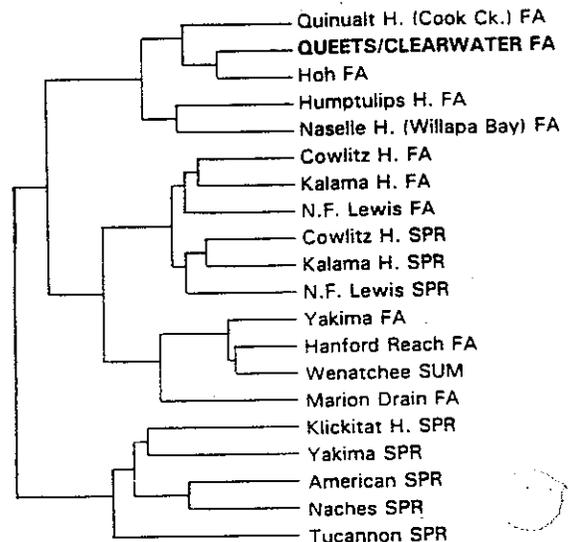


NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - YES

**GENETICS** - Queets\Clearwater fall chinook sampled in 1981 and 1990 showed no differences between years in their genetic characteristics and were combined into one data set. This Queets fall stock was significantly different from all other chinook stocks examined ( $p < 0.05$ ).



0.200 0.1667 0.1333 0.1000 0.0667 0.0333 0.0000

Genetic Distance (Cavalli-Storza & Edwards (1967) chord distance; UPGMA)

# STOCK STATUS PROFILE for Queets Fall Chinook

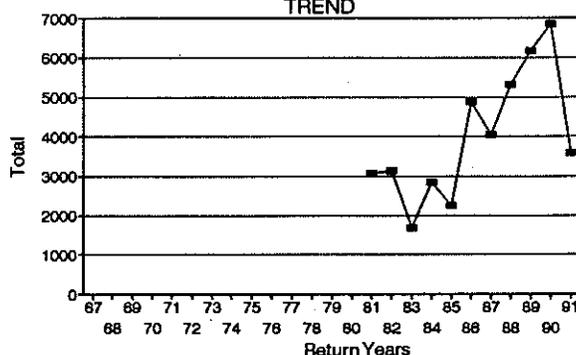
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	3077
82	3135
83	1688
84	2841
85	2262
86	4875
87	4054
88	5321
89	6160
90	6855
91	3590

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution, Genetics*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries.

**Harvest Management** -- Queets fall chinook are expected to contribute to Alaska, British Columbia and Washington ocean troll fisheries. The level of contributions to these fisheries is unknown.

The harvest management objective for the aggregate terminal area is a 40 percent total harvest rate (37 percent tribal, 3 percent non-tribal), provided a minimum aggregate basin escapement of 2,500 fish occurs.

The non-tribal sport fishery is regulated by Olympic National Park and Washington Department of Fish and Wildlife.

Wild chinook harvests are typically limited by wild coho concerns.

**Hatchery** -- A cultured wild brood stock is released from the Salmon River, a tributary of the Queets River. This production is associated with the U.S./Canadian indicator stock studies. The wild brood stock was obtained from the Queets mainstem and raised at the Quinault Indian Nation's Lake Quinault Hatchery (pre-1985) and the Quinault National Fish Hatchery at Cook Creek beginning in 1985 to the present and released in the Salmon River within the Quinault Indian Reservation. Returning brood stock adults were allowed to spawn naturally in the wild. Entry and spawn timing are similar to those of the Queets native stock.

Run sizes have ranged from 300 to 1,500 since 1982. Escapements have ranged from 200 to 1,300 since 1982. Many of the returning adults are permitted to spawn naturally within the Salmon River. It is expected that the production in mid- to lower Salmon River production may be from hybrids or direct offspring from the wild brood stock production. The cultured wild brood stock production supplements Queets River commercial and sport fisheries.

## **CONCLUSION**

Queets fall chinook are Healthy based on escapement. The long-term abundance of Queets fall chinook is stable.

## QUEETS -- CLEARWATER FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

The Queets River consists of two major watersheds; the Queets and Clearwater drainage. The Clearwater River drainage makes up of roughly one-third of the total Queets basin.

The Clearwater River stock was distinguished from other coastal chinook stocks solely on the basis of geographic isolation of the spawning distribution. A limited amount of straying between nearby coastal systems is expected. Too little is known about the genetic composition of the stock to separate it from the Queets fall chinook stock on genetic grounds.

Run timing is similar to that of other fall chinook stocks in the north coast areas. River entry occurs during the months of September through November. Spawn timing is similar to that of other fall chinook stocks in the north coast areas. Spawning occurs during the months of October through December.

### **STOCK STATUS**

The Clearwater River stock is Healthy based on escapement. Increased production of the Clearwater River stock from 1987 to 1990 was from a high contribution by the 1984 brood year. Escapements have ranged from 800 to 3,200 since 1981. The Clearwater River stock escapements have averaged 31 percent of the total aggregate basin escapement since 1981. Escapements averaged 1,870 fish during the last ten years and 2,290 fish during the last five years.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries.

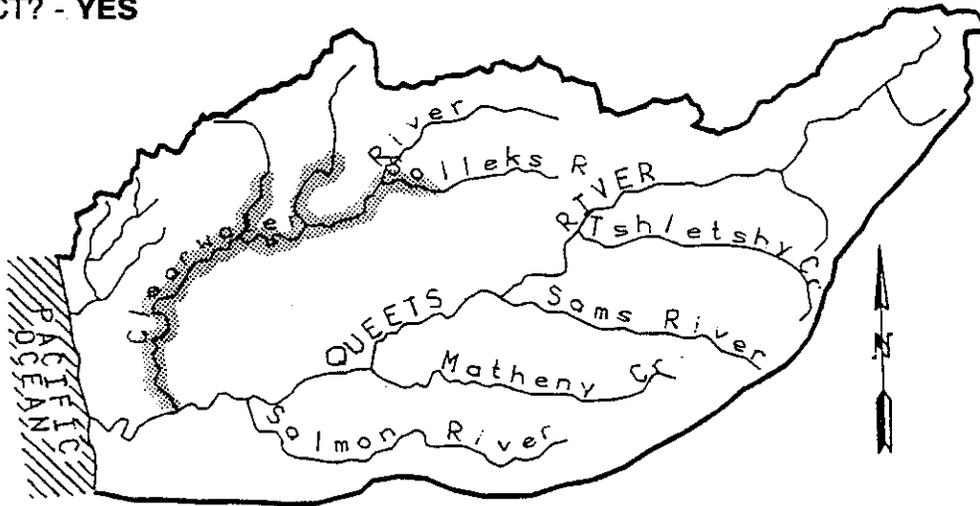
**Harvest** -- Clearwater fall chinook are expected to contribute to Alaska, British Columbia, and Washington ocean troll fisheries. The level of contributions to these fisheries is unknown.

The harvest management objective for the aggregate terminal area is a 40 percent total harvest rate (37 percent tribal, 3 percent non-tribal), provided a minimum aggregate basin escapement of 2,500 fish occurs.

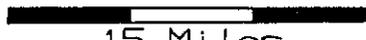
# STOCK DEFINITION PROFILE for Clearwater Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

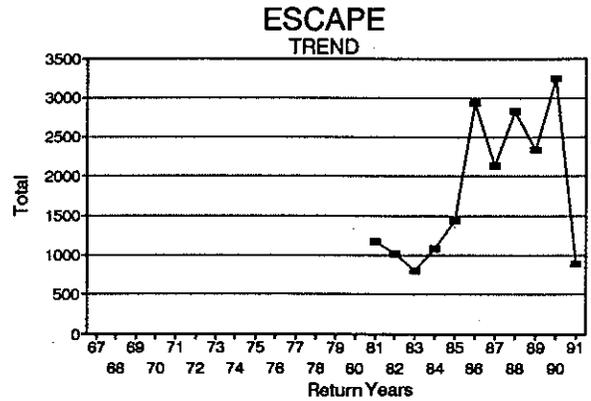
DISTINCT? - NO

# STOCK STATUS PROFILE for Clearwater Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81	1179			
82	1025			
83	799			
84	1086			
85	1440			
86	2930			
87	2135			
88	2833			
89	2336			
90	3248			
91	896			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

The non-tribal sport fishery is regulated by Olympic National Park and the Washington Department of Fish and Wildlife.

Wild chinook harvests are typically limited by wild coho concerns.

**Hatchery** -- There have been no releases of hatchery fish into the Clearwater River.

### **CONCLUSION**

The Clearwater stock is Healthy based on escapement. The long-term abundance of Queets fall chinook is stable.

## **OVERVIEW -- QUEETS FALL CHUM STOCK**

### **QUEETS**

#### **STOCK DEFINITION AND ORIGIN**

The Quinault Indian Nation does not believe that Queets chum are a distinct stock.

For more information regarding stock origin, please refer to the Stock Report.

#### **STOCK STATUS**

The status of this stock is Unknown.



## QUEETS -- QUEETS FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

The Queets River basin consists of two major watersheds: the Queets and Clearwater drainages. The Queets River drainage makes up roughly two-thirds of the total basin.

Chum in the Queets River basin may be native and a distinct stock on the basis of geographical isolation of the spawning populations from other north coast basins. State managers believe this small population is likely a reproductively isolated stock. Tribal managers believe chum spawning in the Queets River are primarily strays from populations in the Quinault River and perhaps the Grays Harbor drainage. Straying from nearby coastal systems is evident (based on coded-wire tag recoveries) and is expected to occur. Coded-wire tag recoveries of chum in the Queets River originated from the nearby Quinault River system.

Nothing is known about the genetic composition of the stock.

Run timing is similar to that of other wild chum stocks in the north coast area. River entry occurs during the months of October through November. Spawn timing is similar to that of other wild chum stocks in the north coast area. Spawning occurs during the months of November through December. Spawning distribution is not well understood, but some spawning in the lower Queets and Clearwater Rivers does occur.

### **STOCK STATUS**

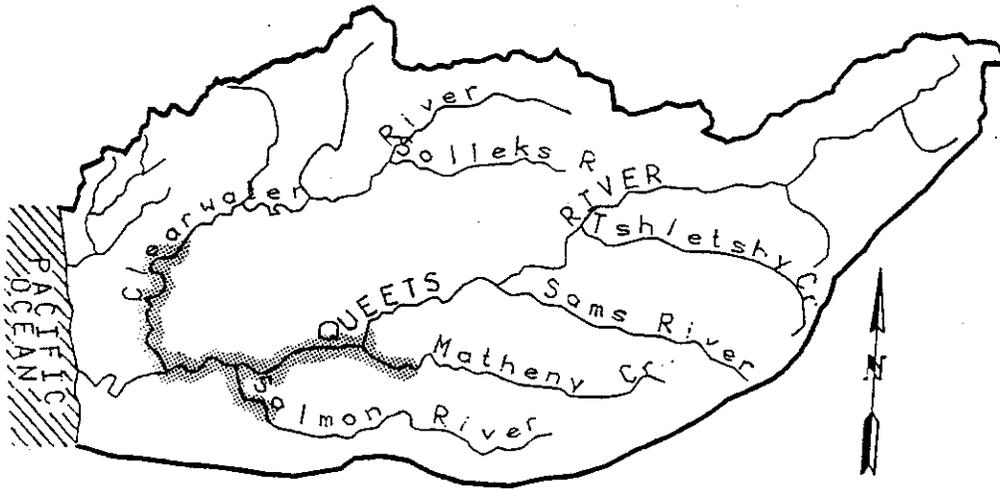
The status of this stock is Unknown. The Queets basin chum have been considered a non-viable stock by the Washington Department of Fish and Wildlife and Quinault Indian Nation since the mid-1970s. This stock may be comprised of a small number of chum, but there is insufficient information to classify its status as either a Healthy, Depressed or Critical Stock.

More information needs to be collected on this stock so that the status can be determined.

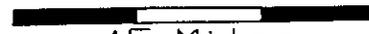
# STOCK DEFINITION PROFILE for Queets Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

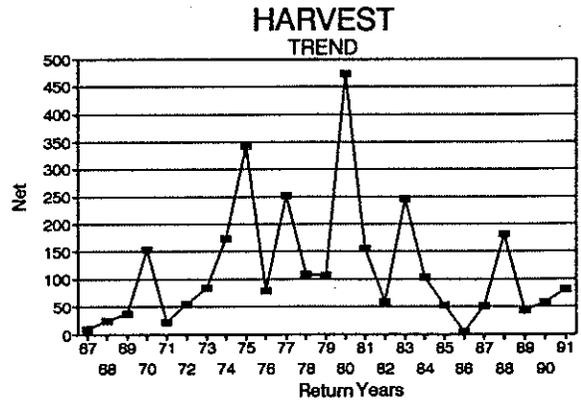
DISTINCT? - NO

# STOCK STATUS PROFILE for Queets Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Net			
67	10			
68	25			
69	38			
70	154			
71	22			
72	55			
73	85			
74	173			
75	343			
76	79			
77	252			
78	109			
79	107			
80	473			
81	155			
82	60			
83	246			
84	103			
85	53			
86	5			
87	51			
88	182			
89	43			
90	58			
91	81			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Unknown*

PRODUCTION TYPE

*Unknown*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries.

**Harvest Management** -- There is no directed tribal fishery on this stock. Tribal chum catches occur during limited hatchery coho and wild fall chinook fisheries. Chum catches since 1969 have ranged from 10 to 470. It is expected that much of the catch can be attributed to strays and dip-ins from other nearby chum producing basins based on historical coded wire tag recoveries.

Limited sport fishery catches occurred prior to 1993. Recent proposed Olympic National Park regulations provide for a non-retention fishery beginning in 1993.

**Hatchery**-- No hatchery production of chum has occurred in the Queets River basin.

## OVERVIEW -- QUEETS COHO STOCKS

### QUEETS CLEARWATER SALMON RIVER

#### STOCK DEFINITION AND ORIGIN

Queets coho are composed of three stocks: Queets and Clearwater wild coho, and the Salmon River hatchery stock. The Queets River is stocked with a variety of cultured production. This production ranges from a cultured wild brood stock to an introduced stock originating outside the basin.

Wild brood stock is obtained from both the Queets and Clearwater mainstems. Various rearing sites for the wild brood stock have been used ranging from the Sol Duc River (Quillayute) to the Humptulips Fish Hatchery. The Queets and Clearwater wild brood stocks exhibit similar entry and spawn timing as the native stocks within the system. Varying numbers of the returning hatchery adults are allowed to spawn naturally in the wild. Wild coho supplementation efforts currently underway assume biological differences between the Queets and Clearwater watersheds, but no conclusive evidence of genetic stock separation is available.

The Salmon River hatchery stock is a non-native stock obtained from and raised at the Quinault Indian Nation's Lake Quinault Hatchery (pre-1985) or the Quinault National Fish Hatchery at Cook Creek 1985 to the present and released into the Salmon River (a Queets River tributary) within the Quinault Indian Reservation.

River entry timing of the Salmon River hatchery stocks is earlier than that of the wild population, a condition that is encouraged for harvest benefits. River-entry timing occurs primarily during September to mid-October. Varying numbers of the returning adults are allowed to spawn naturally. A significant portion of the natural spawners in Salmon River continue to demonstrate wild coho spawn timing.

Queets River basin wild coho run timing is similar to that of other fall coho stocks in the north coast areas. River entry occurs during the months of September through December. Spawn timing is similar to that of other fall coho stocks in the north coast areas. Spawning occurs during the months of November through January.

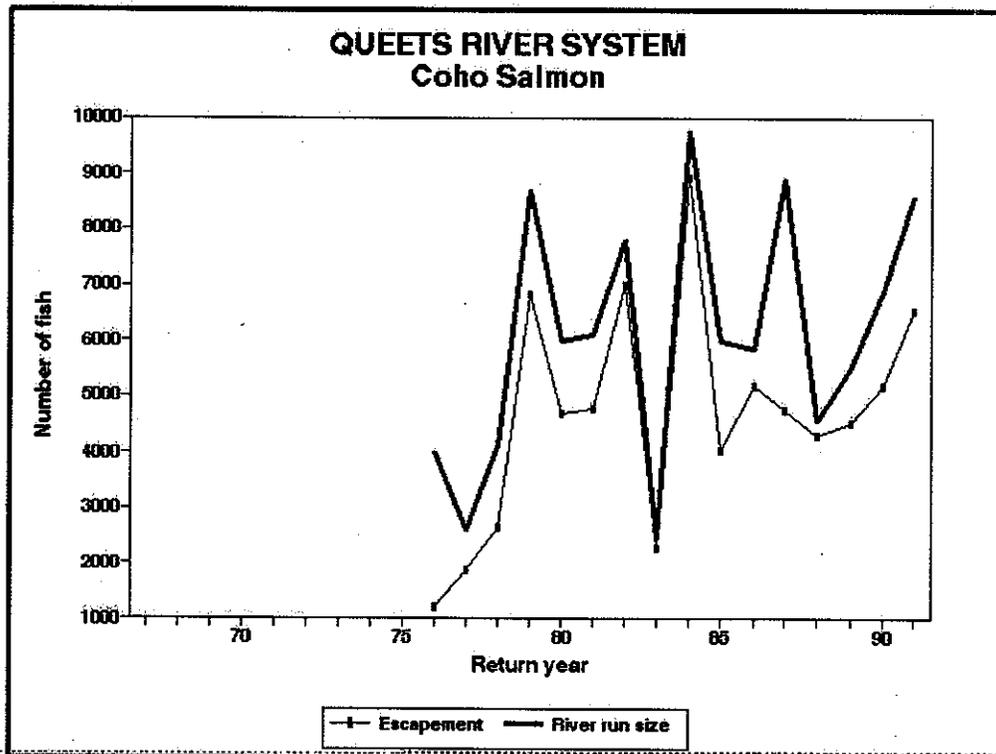
Wild coho in the Queets River Basin are considered a distinct stock on the basis of geographic isolation of the spawning populations from other north coast areas. Too little is known about the genetic composition of the stock to separate the Queets and Clearwater populations on genetic grounds.

The Queets and Clearwater wild populations have not been greatly impacted by the culture programs. Since 1984 emphasis has been placed on culture practices and programs designed to benefit wild production. Hatchery fish are found only in the lower portions of the basin. A limited amount of straying from nearby coastal systems is expected.

Fall coho are native to the Queets River system.

### STOCK STATUS

Wild brood stock production is expected to stabilize in the near future. The aggregate cultured stock's run sizes have ranged from 300 to 13,700 since 1976. Escapements have ranged from 1,100 to 8,600 since 1976. It is thought that the production in the mid- to lower Salmon River may be from hybrids or direct offspring from the cultured production.



The Queets basin wild coho stock is Healthy based on escapements, smolt production, and improved production via cultured wild brood stock. This stock is expected to be within production levels consistent with its available habitat and within the natural variations in survival for this stock. The long-term abundance of Queets coho is stable. Run size has ranged from 2,500 to 9,700 since 1976. Escapements have ranged from 1,200 to 9,200 during 1976 through 1991. Escapements have exceeded the escapement floor (5,800) only four times since 1976. Escapements averaged 5,300

fish during the last ten years. Escapements averaged 5,000 fish during the last five years. The escapement floor was exceeded during the 1991 and 1992 seasons.

Queets fall coho contribute to British Columbia, Washington, Oregon, and California ocean fisheries. Average ocean harvest of the Queets basin coho stock has been 47 percent since 1982.

A limited terminal area tribal fishery occurs on this stock. Tribal harvest occurs during evaluation fisheries to update terminal run-sizes (coho and chinook) and a large mesh fall chinook fishery. Terminal area harvest rates have averaged about 18 percent since 1982.



## QUEETS -- QUEETS COHO

### **STOCK DEFINITION AND ORIGIN**

The Queets River consists of two major watersheds: the Queets and Clearwater drainages. The Queets River drainage makes up roughly two-thirds of the total basin.

Queets River wild coho are distinguished from other coastal coho stocks solely on the basis of geographic isolation of the spawning population. Too little is known about the genetic composition of the stock to separate the Queets and Clearwater into individual stocks. A limited amount of straying from nearby coastal systems is expected.

Run timing is similar to that of other fall coho stocks in the north coast area. River entry occurs during the months of September through December. Spawn timing is similar to that of other fall coho stocks in the north coast areas. Spawning occurs during the months of November through January.

Wild fall coho are native to the Queets River system, and production type is composite.

Cultured wild brood stock releases have occurred in the Queets River to supplement wild coho production.

### **STOCK STATUS**

The Queets stock of fall coho is Healthy, based on escapements, smolt production, and cultured wild brood stock supplementation.

This stock is thought to be within production levels consistent with its available habitat and within the natural variations in survival for this stock. The long-term abundance of Queets coho smolt production is stable. Smolt production has ranged from 73,150 to 307,400 since smolt year 1981. Smolt production averaged 155,700 smolts during the last ten years. Smolt production averaged 162,500 smolts during the last five years.

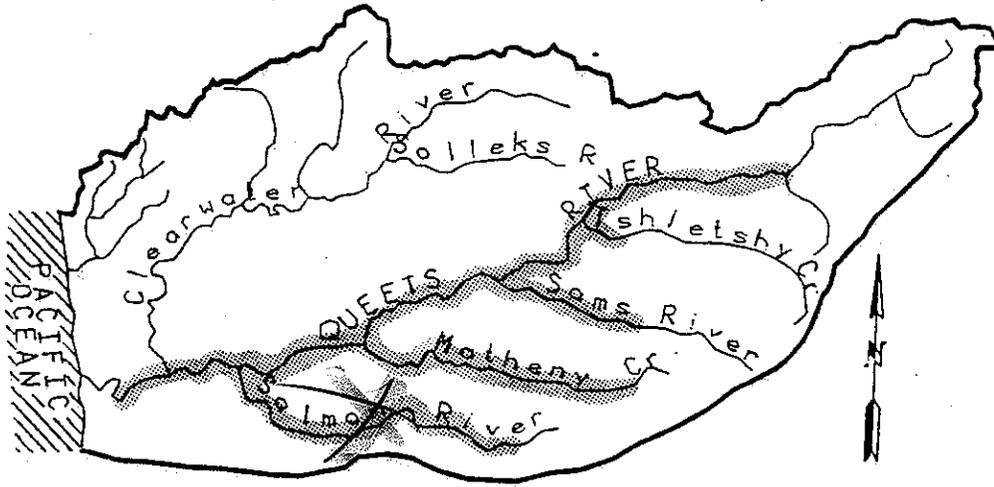
### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries.

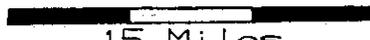
# STOCK DEFINITION PROFILE for Queets Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

DISTINCT



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Queets Coho

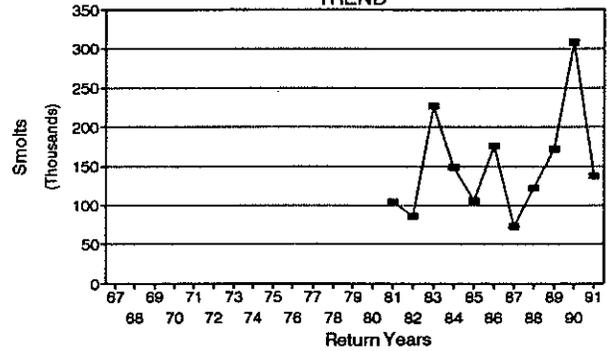
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	JUVENILE Smolts			
--------------	-----------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	104557
82	85929
83	227069
84	149014
85	105966
86	176435
87	73150
88	122095
89	172711
90	307415
91	137179

JUVENILE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

**Harvest Management** -- Queets coho contribute to British Columbia, Washington, Oregon, and California ocean fisheries.

A limited terminal-area tribal fishery occurs on the Queets basin stock aggregate. Tribal harvest occurs during evaluation fisheries to update terminal run sizes (coho and chinook) and in a large-mesh fall chinook fishery.

The non-tribal sport fishery is regulated by Olympic National Park and Washington Department of Fish and Wildlife.

**Hatchery**-- The hatchery production consists of wild brood stock and introduced Quinault River hatchery stock within the Queets River.

## **CONCLUSION**

The Queets River fall coho stock is Healthy based on escapements, smolt production, and cultured brood stock supplementation. This stock is thought to be within production levels consistent with its available habitat and within the natural variations in survival for this stock. The long-term abundance of Queets coho is stable.

## QUEETS -- CLEARWATER COHO

### **STOCK DEFINITION AND ORIGIN**

The Queets River basin consists of two major watersheds: the Queets and Clearwater drainage. The Clearwater River drainage makes up roughly one-third of the total basin.

Clearwater River wild coho are native and are distinguished from other coastal coho stocks solely on the basis of geographic isolation of the spawning population. Too little is known about the genetic composition of the stock to separate it from the Queets fall coho stock on genetic grounds. A limited amount of straying from nearby coastal systems is expected.

Run timing is similar to that of other fall coho stocks in the north coast area. River entry occurs during the months of September through December. Spawn timing is similar to that of other fall coho stocks in the north coast area. Spawning occurs during the months of November through January.

Wild coho brood stock fry and smolt releases have occurred in the Clearwater River basin to supplement wild coho production.

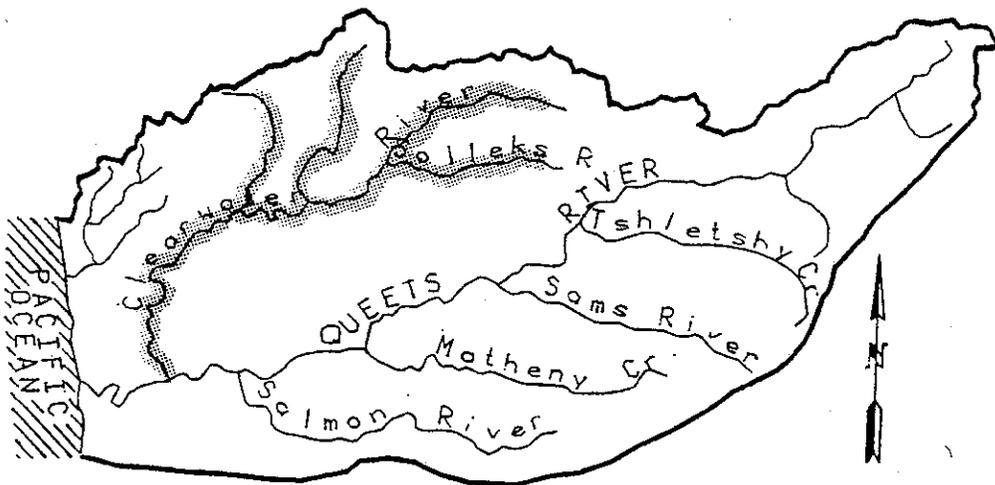
### **STOCK STATUS**

The Clearwater coho stock is Healthy based on escapements, smolt production and cultured brood stock supplementation. This stock is thought to be within production levels consistent with its available habitat and within the natural variations in survival for this stock. The long-term abundance of Clearwater coho smolt production is stable. Smolt production has ranged from 42,900 to 94,800 since smolt year 1981. Smolt production has averaged 66,600 smolts during the last ten years and 65,700 smolts during the last five years.

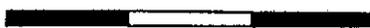
# STOCK DEFINITION PROFILE for Clearwater Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



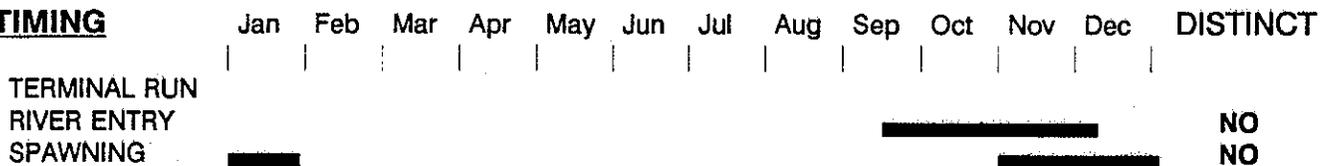
SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Clearwater Coho

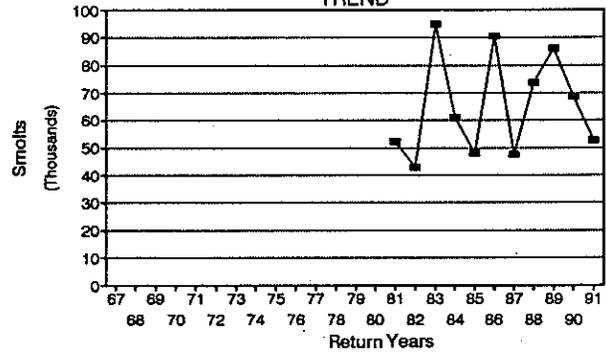
## STOCK ASSESSMENT

DATA QUALITY-----> Excellent

*Good*

Return Years	JUVENILE Smolts			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81	52200			
82	42900			
83	94800			
84	61000			
85	48000			
86	90500			
87	47500			
88	73700			
89	86000			
90	68600			
91	52600			

JUVENILE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundaries.

**Harvest Management** -- Clearwater River coho contribute to British Columbia, Washington, Oregon, and California ocean fisheries.

A limited terminal area tribal fishery occurs on the Queets basin stock aggregate. Tribal harvest occurs during evaluation fisheries to update terminal run sizes (coho and chinook) and a large-mesh fall chinook fishery.

The non-tribal sport fishery is regulated by Olympic National Park and the Washington Department of Fish and Wildlife.

**Hatchery**-- The production consists of cultured wild brood stock within the Clearwater basin.

## **CONCLUSION**

The Clearwater River coho stock is Healthy based on escapements, smolt production, and cultured brood stock supplementation. This stock is expected to be within production levels consistent with its available habitat and within the natural variations in survival for this stock. The long-term abundance of Clearwater coho is stable.

## **QUEETS -- SALMON RIVER COHO**

### **STOCK DEFINITION AND ORIGIN**

Salmon River coho are defined as a separate stock based primarily on stock origin. Salmon River coho are a non-native stock derived from a variety of brood sources outside the Queets basin. The hatchery production was originally obtained from and raised at the Quinault National Fish Hatchery (pre-1985) and is now reared at the Quinault Indian Nation's Lake Quinault Hatchery. Hatchery production is transferred to rearing ponds on Salmon River for acclimation and release. The stock is sustained by both wild and artificial production. Returning hatchery fish are allowed to spawn naturally in the Salmon River system, and it is expected that much of the production in the lower to middle reaches of Salmon River is hybrids or direct offspring of hatchery fish.

River entry and spawn timing is earlier than for other Queets coho stocks. River entry primarily occurs during September to mid-October. Spawn timing is mid-October to mid-November. This timing difference is used to provide a selective harvest on Salmon River coho.

### **STOCK STATUS**

The Salmon River hatchery stock is Healthy.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use activities outside of the Olympic National Park boundary.

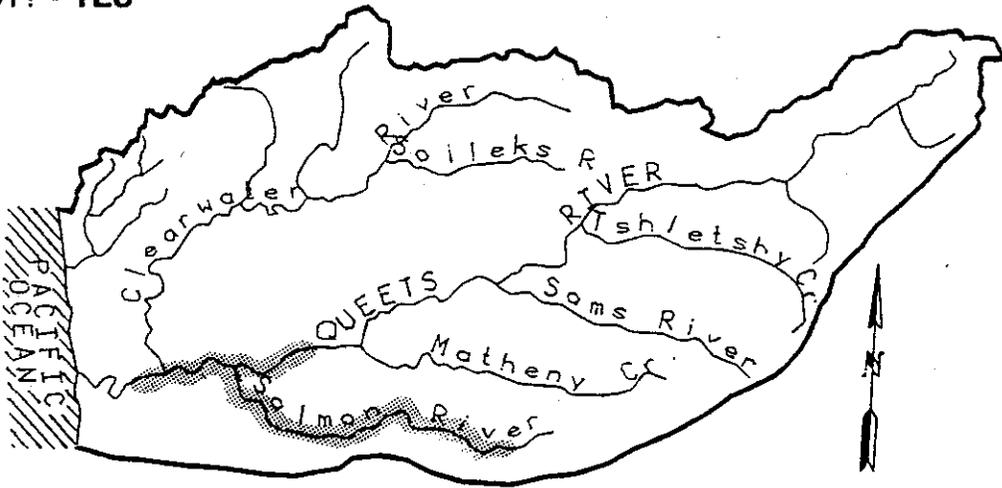
**Harvest Management** -- Salmon River hatchery production supplements both tribal and non-tribal fisheries in the Queets and Salmon river systems.

**Hatchery** -- This is a composite stock that is heavily supported by hatchery production.

# STOCK DEFINITION PROFILE for Salmon River Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



YES  
YES

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

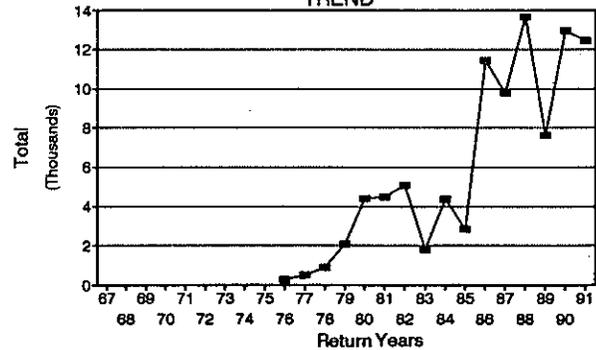
# STOCK STATUS PROFILE for Salmon River Coho

## STOCK ASSESSMENT

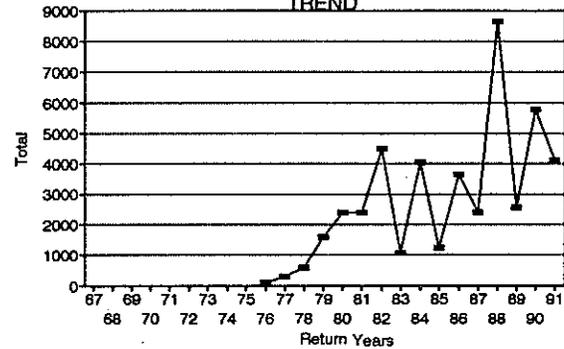
DATA QUALITY-----> Very Good

Return Years	RUNSIZE Total	ESCAPE Total	HARVEST Net	HARVEST Sport
67				
68				
69				
70				
71				
72				
73				
74				
75				
76	300	100		
77	500	300		
78	900	600		
79	2100	1600		
80	4400	2400		
81	4500	2400		
82	5098	4500		
83	1804	1079	720	5
84	4356	4042	314	
85	2868	1228	1593	35
86	11441	3654	8506	15
87	9774	2401	7306	56
88	13666	8644	4809	191
89	7636	2565	4973	91
90	12984	5769	6950	255
91	12441	4129	8036	263

**RUNSIZE TREND**



**ESCAPE TREND**



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Non-native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **OVERVIEW -- QUEETS SUMMER AND WINTER STEELHEAD STOCKS**

**SUMMER:**  
**QUEETS**  
**CLEARWATER**

**WINTER:**  
**QUEETS**  
**CLEARWATER**

### **STOCK DEFINITION AND ORIGIN**

In the Queets River basin, two possible summer steelhead stocks or spawning populations and two possible winter steelhead stocks or spawning populations have been identified: wild summer steelhead in the Queets River and Clearwater River and wild winter steelhead in the Queets River and Clearwater River. Wild summer and winter steelhead in the Queets and Clearwater rivers are native.

There is little or no information available to indicate that these are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. There may be more or fewer stocks identified once comprehensive genetic information is available.

Run timing of the summer steelhead stocks (May through October) is distinct from run timing of the winter steelhead stocks (November through April), but there is some overlap in May.

The native summer stocks were historically small runs of fish limited by their habitats. These fish are assumed to have developed in areas isolated from the native winter stocks. Since only a few miles of stream were used, summer steelhead populations were small. The Queets summer steelhead stock/spawning population probably comprises most of the wild summer steelhead in the Queets River basin.

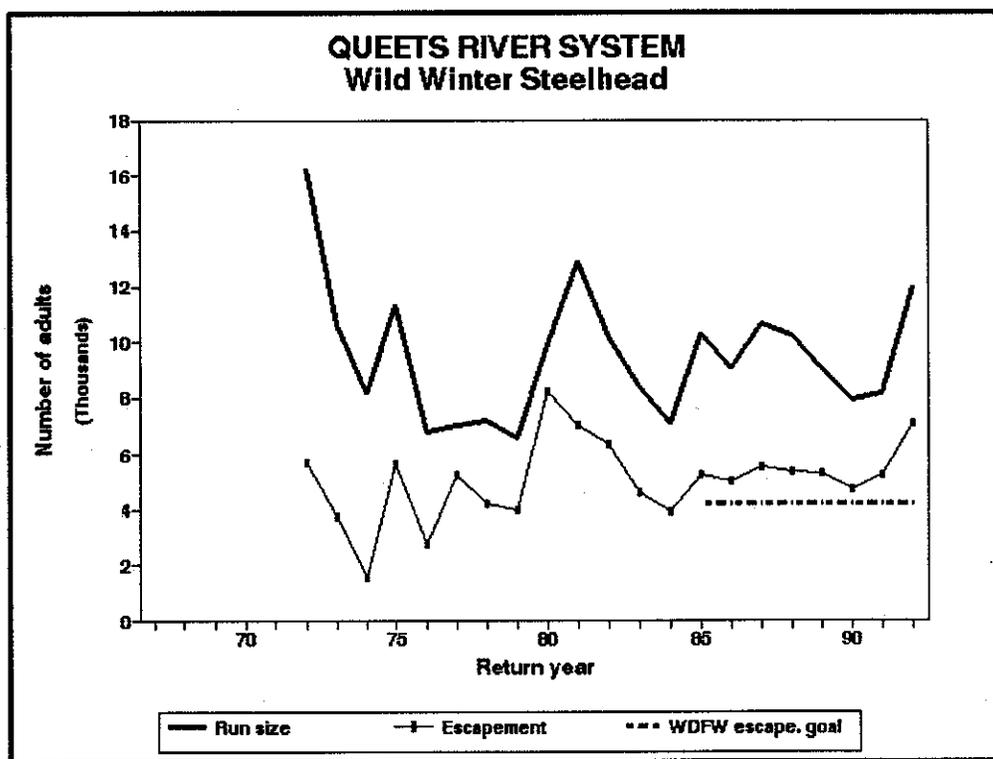
While about 150,000 to 200,000 hatchery winter steelhead smolts are planted in the Queets River system annually, and some hatchery winter steelhead adults stray in the basin, there is little contribution to the wild stock from hatchery fish spawning in the wild. Given the high exploitation of the hatchery fish in sport and tribal fisheries, healthy wild spawner escapements, and the difference in spawn timing between the hatchery fish (January and February) and the wild fish (February through June), the potential for interbreeding is limited.

No hatchery summer steelhead smolts are stocked in the Queets River basin. Hatchery summer steelhead adults from other rivers, however, are known to stray into the Queets basin.

## STOCK STATUS

Wild winter steelhead spawner escapement and run size have been monitored for the Queets River system since the 1971-72 season. Wild escapement has ranged from 1,571 to 8,215 fish and wild run size has ranged from 6,586 to 16,227 fish (see figure).

Beginning with the 1984-85 season, a joint management approach having a 37 percent treaty harvest rate and a sport fishery through April was implemented. The WDFW escapement goal is 4,200 winter steelhead for the Queets River system and this goal is to be achieved by wild adults and does not include hatchery fish spawning in the wild. In the eight seasons since the WDW escapement goal was established, wild escapement has averaged 5,427 and exceeded the goal eight times (see figure).



Wild winter steelhead are harvested in significant numbers by both commercial and recreational fisheries. The wild winter steelhead run in the Queets River system is fished upon by the Quinault Indian Nation on the lower seven miles of the Queets River. Sport anglers fish in the mainstream of the Queets, Clearwater, and Salmon rivers. The season-long targeted tribal fishery occurs from late November through early May while the sport fishery occurs from November through April in the Queets and Clearwater rivers and through February on the Salmon River. The sport fishery is managed with regulations provided by the Olympic National Park (in park waters), the Washington Department of Wildlife (in state waters), and the Quinault Indian Nation (in reservation waters).

During the 1971-72 through 1991-92 return years, the wild winter steelhead run in the Queets River system was comprised of 5.1 percent sport harvest, 41.9 percent tribal harvest and 53.2 percent escapement (see table). Spawner escapement of wild winter steelhead in the Queets basin was comprised of about 61 percent in the Queets River and 39 percent in the Clearwater River since the 1981-82 season.

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**Queets River system wild winter steelhead sport harvest, tribal harvest, spawner escapement, and run size from 1971-72 through 1991-92.**

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Return year	Sport harvest	Tribal harvest	Spawner escapement	Run size
1971-72	603	9,915	5,709	16,227
1972-73	416	6,494	3,718	10,628
1973-74	258	6,307	1,571	8,136
1974-75	372	5,396	5,606	11,374
1975-76	79	3,980	2,741	6,800
1976-77	96	1,719	5,209	7,024
1977-78	133	2,856	4,207	7,196
1978-79	389	2,255	3,942	6,586
1979-80	464	1,212	8,215	9,891
1980-81	660	5,188	7,018	12,866
1981-82	470	3,388	6,332	10,180
1982-83	264	3,535	4,622	8,421
1983-84	678	2,519	3,886	7,083
1984-85	1,173	3,857	5,240	10,270
1985-86	650	3,403	5,002	9,055
1986-87	778	4,356	5,526	10,660
1987-88	700	4,224	5,344	10,268
1988-89	620	3,099	5,320	9,039
1989-90	544	2,898	4,708	7,927
1990-91	260	2,748	5,194	8,202
1991-92	543	4,313	7,083	11,939

Mean run size distribution, 1971-72 to 1991-92

483	3,984	5,057	9,513
5.1%	41.9%	53.2%	

---

Numbers in table are subject to revision.

Wild summer steelhead spawner escapement is not monitored, and escapement goals have not been identified. Because spawn timing overlaps with both coho salmon and wild winter steelhead, spawner escapement is not presently used to measure abundance.

There is no directed tribal fishery on wild summer steelhead stocks/spawning populations. Incidental harvest of summer steelhead occurs during a limited tribal fishery on spring/summer chinook. Prior to 1992, sport fishery regulations allowed harvest of wild summer steelhead. These stocks have been managed with wild steelhead release regulations to protect the wild stocks from sport harvest since 1992. It is expected that with current sport and tribal regulations in place these stocks will reach levels dictated by their limited habitats.

More information on each stock is presented in separate Stock Reports.

## **QUEETS -- QUEETS SUMMER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Queets River are native and may be a distinct stock/spawning population based on the geographic distribution of the spawning population. They are distinct from wild winter steelhead in the Queets River based on run timing.

Spawning distribution is not well-known for summer steelhead in the Queets basin, although sport catch data suggests pre-spawning adults tend to congregate in the upper reaches of the Queets River and Clearwater River by late summer and early fall. Spawning is generally believed to take place in the upper reaches of each river. This would geographically separate summer steelhead spawners in the Queets River from summer steelhead spawners in the Clearwater River.

There is little or no information available to indicate that wild summer steelhead stocks in the Queets basin are genetically distinct stocks. The stock/spawning populations are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using enzyme electrophoretic techniques. There may be more or fewer stocks identified once comprehensive genetic information is available.

Similar to other wild summer steelhead stocks in the north Pacific coast area, run timing is generally from May through October and spawn timing is unknown but believed to be from January through April.

### **STOCK STATUS**

The status of the stock is Healthy.

Spawning escapement is not monitored for this stock/spawning population nor has an escapement goal been identified. Because spawn timing overlaps with both coho salmon and wild winter steelhead, spawner escapement is not presently used to measure abundance.

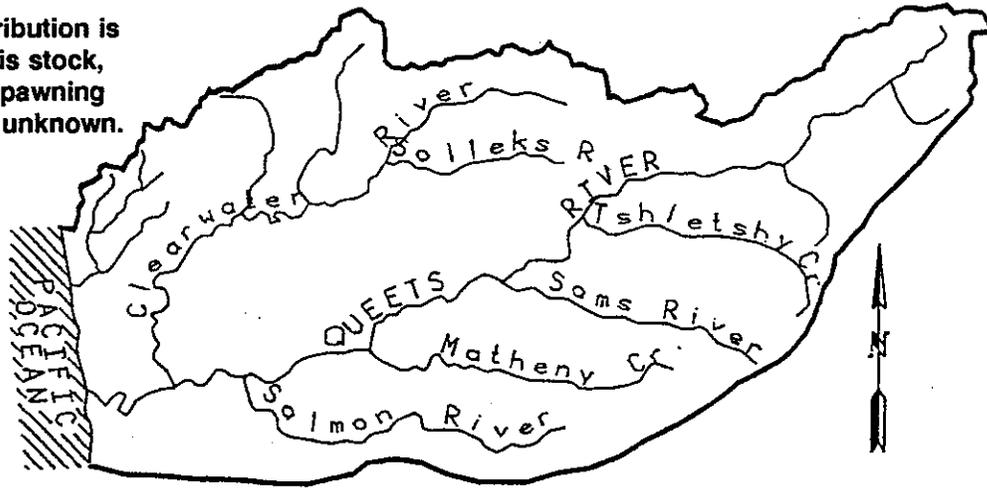
Stock status is based on total (sport + tribal) harvest of wild summer steelhead in the Queets basin. The Queets summer steelhead stock probably comprises most of the wild summer steelhead in the Queets River basin. Available data indicate that the Clearwater summer steelhead stock is comprised of a much smaller number of fish. Separation of the treaty commercial catch between Queets and Clearwater summer steelhead stocks is unavailable at this time, however.

# STOCK DEFINITION PROFILE for Queets Summer Steelhead

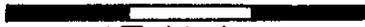
## SPAWNER DISTRIBUTION

DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



SPAWNER DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

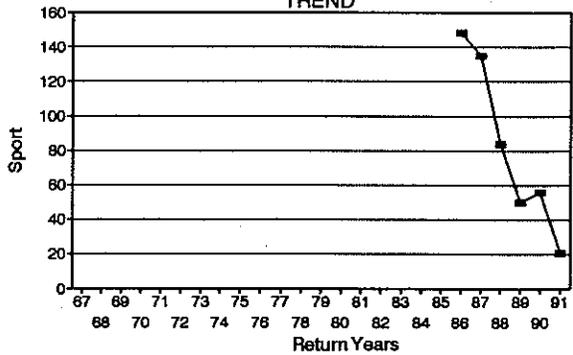
# STOCK STATUS PROFILE for Queets Summer Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86	148			
87	135			
88	84			
89	50			
90	56			
91	21			

HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

Although the stock/spawning population is exhibiting a short-term decline in sport harvest of wild steelhead, the total harvest data set spans more years and is a better indicator of trends in abundance. This demonstrates that a short-term decline in abundance from a limited number of years is often difficult to distinguish from the normal fluctuation in abundance of all naturally produced stocks of fish. Separation of hatchery and wild composition of the harvest total needs to be completed.

Sport harvest were lowest on record during 1991 and we will continue to monitor the trends in abundance for this stock. We anticipate it will remain a Healthy stock as ocean survival improves.

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- The short-term decline for this stock is primarily due to recent changes in ocean survival. A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter-run, summer-run, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that common factor(s) to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean, and catch of steelhead in authorized and unauthorized high seas drift net fisheries.

Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundary, although quantitative data are limited.

**Harvest Management** -- There is no directed tribal fishery on this stock. Summer steelhead are harvested incidentally in a tribal fishery on spring/summer chinook in the lower reaches of the Queets River. Prior to 1992, sport fishery regulations allowed harvest of wild summer steelhead in the Queets basin. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992. Beginning in the 1993-94 season, sport anglers will be able to document on a permit card the number of steelhead that are caught and released. This may allow the WDFW to monitor trends in the wild stock abundance and assess the status of the stock/spawning population.

**Hatchery** -- Hatchery summer steelhead smolts have not been stocked in the Queets River basin. Straying of hatchery summer steelhead adults generally occurs from nearby coastal areas.

## QUEETS -- CLEARWATER SUMMER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Clearwater River are native and are designated as a distinct stock/spawning population based on the geographic distribution of the spawning population. They are distinct from wild winter steelhead in the Clearwater River based on run timing.

Spawning distribution is not well-known for summer steelhead in the Queets basin, although sport catch data suggests pre-spawning adults tend to congregate in the upper reaches of the Clearwater River and Queets River by late summer and early fall. Spawning is generally believed to take place in the upper reaches of each river. This would geographically separate summer steelhead spawners in the Clearwater River from summer steelhead spawners in the Queets River.

There is little or no information available to indicate that wild summer steelhead stocks in the Queets basin are genetically distinct stocks. The stock/spawning population are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using enzyme electrophoretic techniques. There may be more or fewer stocks identified once comprehensive genetic information is available.

Similar to other wild summer steelhead stocks in the north Pacific coast area, run timing is generally from May through October and spawn timing is unknown but believed to be from January through April.

### **STOCK STATUS**

The status of the stock is Unknown. This stock/spawning population is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified. Because spawn timing overlaps with both coho salmon and wild winter steelhead, spawner escapement is not presently used to measure abundance.

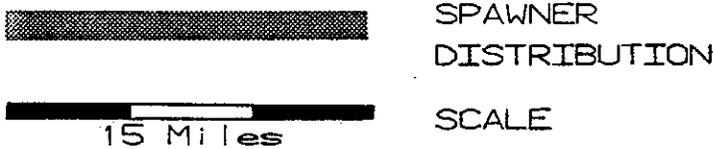
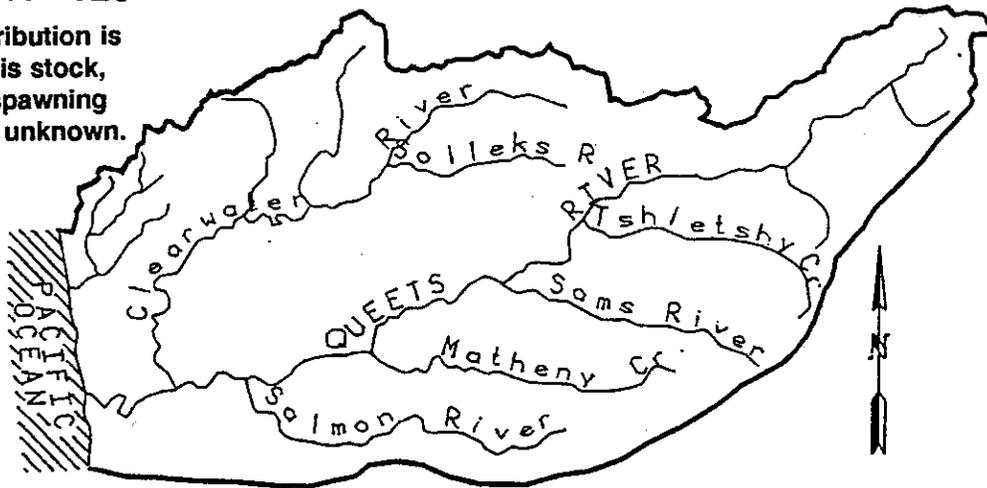
The Queets summer steelhead stock/spawning population probably comprises most of the wild summer steelhead in the Queets River basin. Available data indicates that the Clearwater summer steelhead stock is comprised of a much smaller number of fish. Separation of the treaty commercial catch between Queets and Clearwater summer steelhead stocks is unavailable at this time.

# STOCK DEFINITION PROFILE for Clearwater Summer Steelhead

## SPAWNER DISTRIBUTION

**DISTINCT? - YES**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec **DISTINCT**

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



**NO  
UNK**

## BIOLOGICAL CHARACTERISTICS

**DISTINCT? - UNKNOWN**

# STOCK STATUS PROFILE for Clearwater Summer Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

67	
68	4
69	19
70	12
71	22
72	59
73	25
74	8
75	7
76	16
77	15
78	
79	
80	
81	
82	
83	
84	
85	
86	6
87	2
88	2
89	2
90	0
91	2

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

Sport harvest information is available for many years but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information of wild summer steelhead is available over the entire run, but wild sport harvest is low. As a result, neither tribal harvest nor sport harvest can be used to assess the status of the wild stock/spawning population.

More information needs to be collected on this stock so that stock status can be determined.

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- The short-term decline for this stock is primarily due to recent changes in ocean survival. A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter-run, summer-run, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that common factor(s) to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean and catch of steelhead in authorized and unauthorized high seas drift net fisheries.

Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundary, although quantitative data is limited.

**Harvest Management** -- There is no directed tribal fishery on this stock/spawning population. Summer steelhead are harvested incidentally in a tribal fishery on spring/summer chinook in the lower reaches of the Queets River. Prior to 1992, sport fishery regulations allowed harvest of wild summer steelhead in the Queets basin. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992. Beginning in the 1993-94 season, sport anglers will be able to document on a permit card the number of steelhead that are caught and released. This may allow the WDFW to monitor trends in wild stock abundance and assess the status of the stock/spawning population.

**Hatchery** -- Hatchery summer steelhead smolts have not been stocked in the Queets River basin. Straying of hatchery summer steelhead adults generally occurs from nearby coastal areas.

## **QUEETS -- QUEETS WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Queets River, and its tributaries including Salmon River, Sams River, and Matheny Creek are native and a distinct stock/spawning population based on the geographic distribution of the spawning population. The majority of wild winter steelhead in this stock spawn in all accessible reaches of mainstem river and larger tributaries to the Queets River.

There is little or no information available to indicate that wild winter steelhead stocks in the Queets basin are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using enzyme electrophoretic techniques. There may be more or fewer stocks identified once comprehensive genetic information is available.

Similar to some other wild winter steelhead stocks in the north Pacific coast area, run timing is generally from November through April and spawn timing is generally from February through June.

Wild winter steelhead are native to the Queets River. Hatchery steelhead smolts originating from Queets River and Quinault River stocks are raised in the Quinault Indian Nation Lake Quinault Hatchery and the Quinault National Fish Hatchery at Cook Creek and stocked in the Salmon River within the Quinault Reservation. This hatchery steelhead program is designed to separate, to an extent, wild and hatchery winter steelhead temporally and spatially to minimize interactions. Returning hatchery adults spawn naturally in the wild, but there is little contribution to the wild stock.

### **STOCK STATUS**

The wild winter steelhead stock in the Queets River is Healthy.

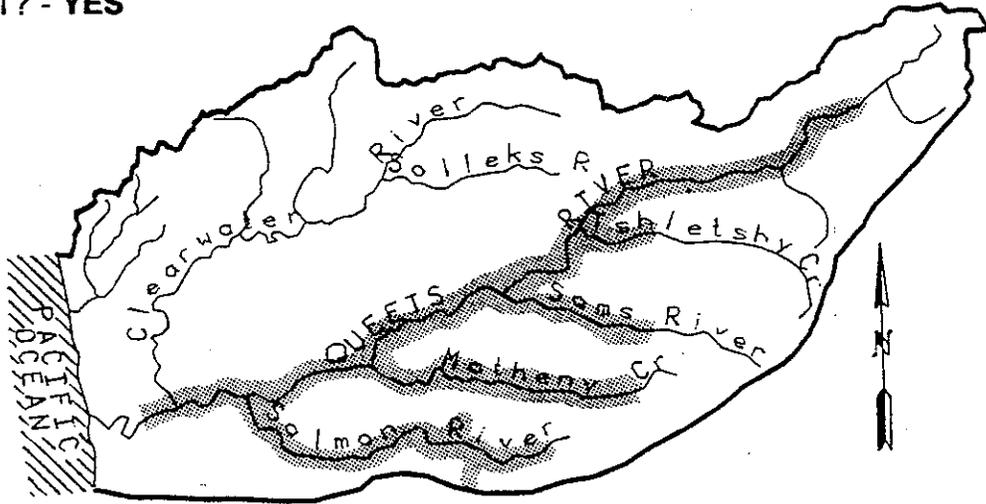
Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from 2,248 to 4,841 (averaging 3,429) wild winter steelhead during the 1980 through 1987 seasons and from 2,973 to 4,421 (averaging 3,381) wild winter steelhead during the 1988 through 1992 seasons.

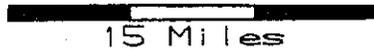
# STOCK DEFINITION PROFILE for Queets Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

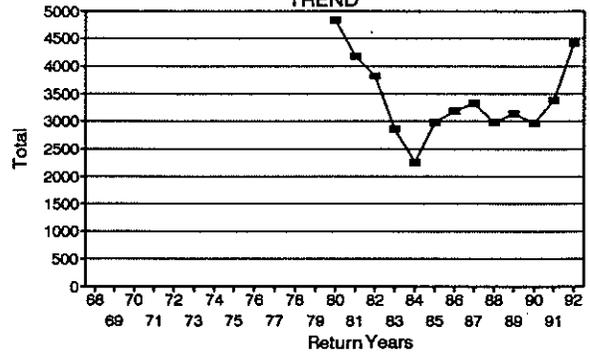
# STOCK STATUS PROFILE for Queets Winter Steelhead

## STOCK ASSESSMENT

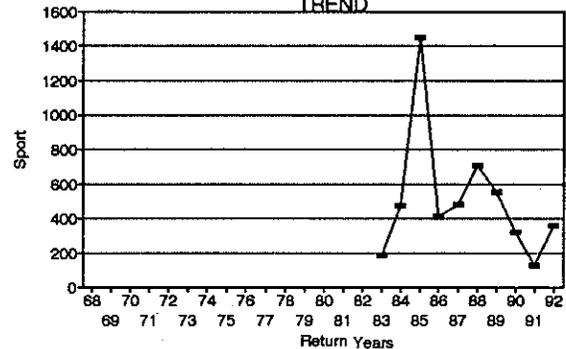
DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	4841			
81	4170			
82	3824			
83	2864	190		
84	2248	474		
85	2978	1452		
86	3186	412		
87	3323	480		
88	2981	709		
89	3142	553		
90	2973	319		
91	3387	131		
92	4421	361		

ESCAPE TREND



HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter-run, summer-run, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that common factor(s) to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean, and catch of steelhead in authorized and unauthorized high seas drift net fisheries.

Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundary, although quantitative data is limited.

**Harvest Management** -- There is a directed tribal fishery that operates on a fixed schedule to obtain an aggregate basin-wide harvest rate on wild winter steelhead in the Queets basin. Separation of the treaty commercial catch between Queets and Clearwater winter steelhead stocks/spawning populations is unavailable at this time. A recreational sport fishery occurs from November through April 15 on the Queets River. A recreational sport fishery occurs from November through the end of February on the Salmon River. The sport fishery is managed with regulations provided by the Olympic National Park (in park waters), the Washington Department of Fish and Wildlife (in state waters), and the Quinault Indian Nation (in reservation waters).

**Hatchery** -- Hatchery winter steelhead smolts have been stocked in Salmon River, a Queets River tributary. The returning adults have been permitted to spawn naturally. These hatchery spawners are not counted toward the wild spawner escapement.

## **QUEETS -- CLEARWATER WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Clearwater River and its tributaries including Solleks River, Miller Creek, Christmas Creek, Snahapish River and tributaries may be a distinct stock based on the geographic distribution of the spawning population. The majority of wild winter steelhead in this stock spawn in all accessible reaches of mainstem river and larger tributaries to the Clearwater River. The Clearwater River is a tributary to the Queets River.

There is little or no information available to indicate that wild winter steelhead stocks/spawning populations in the Queets basin are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using enzyme electrophoretic techniques. There may be more or fewer stocks identified once comprehensive genetic information is available.

Similar to some other wild winter steelhead stocks in the north Pacific coast area, run timing is generally from November through April and spawn timing is generally from February through June.

Wild winter steelhead are native to the Clearwater River. Hatchery steelhead smolts originating from Queets River and Quinault River stocks are raised in the Quinault Indian Nation Lake Quinault Hatchery and the Quinault National Fish Hatchery at Cook Creek and stocked in the Salmon River (a Queets River tributary) within the Quinault Reservation. Hatchery smolts have not been stocked in the Clearwater River, but hatchery adults are known to stray into the system. There is little contribution to the wild stock from hatchery fish spawning in the wild.

### **STOCK STATUS**

The wild winter steelhead stock in the Clearwater River is Healthy.

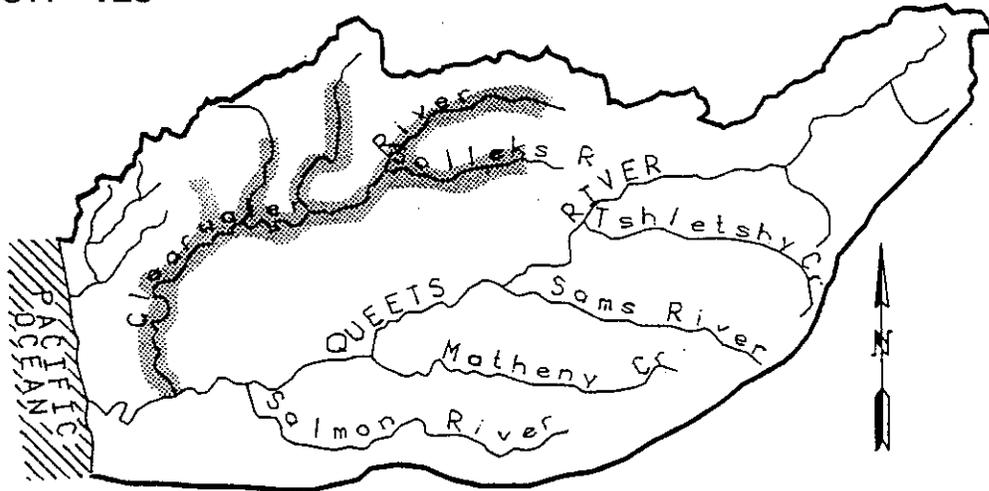
Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from 1,638 to 2,508 (averaging 2,030) wild winter steelhead during the 1982 through 1987 seasons and from 1,735 to 2,662 (averaging 2,149) wild winter steelhead during the 1988 through 1992 seasons.

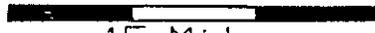
# STOCK DEFINITION PROFILE for Clearwater Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

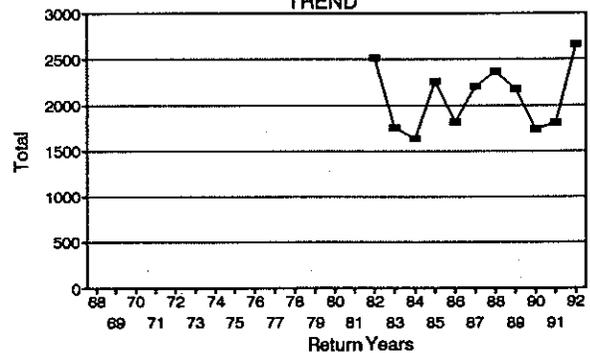
# STOCK STATUS PROFILE for Clearwater Winter Steelhead

## STOCK ASSESSMENT

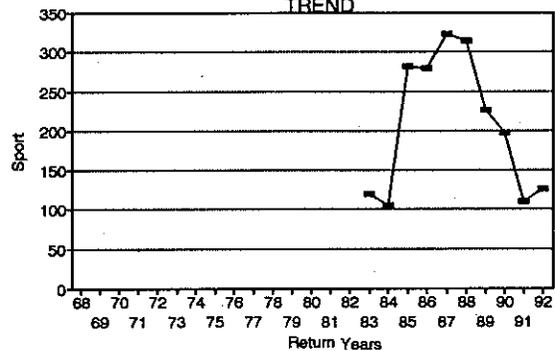
DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82	2508			
83	1758	120		
84	1638	105		
85	2262	282		
86	1816	279		
87	2203	323		
88	2363	314		
89	2178	227		
90	1735	197		
91	1807	110		
92	2662	126		

ESCAPE TREND



HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter-run, summer-run, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that common factor(s) to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean, and catch of steelhead in authorized and unauthorized high seas driftnet fisheries.

Freshwater habitat has been degraded by land-use (forest management) activities outside of the Olympic National Park boundary, although quantitative data is limited.

**Harvest Management** -- There is a directed tribal fishery that operates on a fixed schedule to obtain an aggregate basin-wide harvest rate on wild winter steelhead in the Queets basin. Separation of the treaty commercial catch between Queets and Clearwater winter steelhead stocks/spawning populations is unavailable at this time. A recreational sport fishery occurs from November through April 15 on the Clearwater River. The sport fishery is managed with regulations provided by the Olympic National Park (in park waters), the Washington Department of Fish and Wildlife (in state waters), and the Quinault Indian Nation (in reservation waters).

**Hatchery** -- Hatchery winter steelhead smolts have not been stocked in the Clearwater River, but hatchery adults are known to stray into the system. Hatchery steelhead smolts originating from Queets River and Quinault River stocks are raised in the Quinault Indian Nation Lake Quinault Hatchery and the Quinault National Fish Hatchery at Cook Creek and stocked in the Salmon River (a Queets River tributary) within the Quinault Reservation. There is little contribution to the wild stock from hatchery fish spawning in the wild.

## **OVERVIEW -- RAFT FALL CHINOOK STOCK**

### **RAFT**

#### **STOCK DEFINITION AND ORIGIN**

A Raft River fall chinook stock likely does not exist. The Quinault Indian Nation technical staff reviewed past data and have concluded that no fall chinook stocks have existed in this system. The Raft River historical catch record shows essentially no chinook catches. Following the tribal catch records from 1936 to 1961 we find a chinook catch in only four of twenty-six years of an active fishery. Straying likely was the source of these fish. The Raft River was closed to commercial and sport fishing in 1962 and remains closed.

Escapement has not been monitored on this river.

There is no information for an individual stock report.

The presence of this stock will be formally reviewed as part of the next SASSI review.



## **OVERVIEW -- RAFT COHO STOCK**

### **RAFT**

#### **STOCK DEFINITION AND ORIGIN**

Raft River natural coho can be considered as a composite stock. The Raft River was heavily planted with Quinault stock coho smolts, fingerlings, and fry throughout the 1980s and into the 1990s.

There is little or no information available to indicate that this is a genetically distinct stock. The stock is treated separately due to the geographic distribution of the spawning population.

#### **STOCK STATUS**

Logging practices during the 1950s severely impacted the native stock. An active treaty net fishery was closed in 1962 and remains closed. Escapement has not been monitored. Terminal run size has not been estimated.



## RAFT RIVER -- RAFT COHO

### **STOCK DEFINITION AND ORIGIN**

Run and spawn timing are assumed to be similar to those of other fall coho stocks in the north Pacific coast area. River entry occurs during the months of September through December. Spawning occurs during the months of November through January. Stray coho (hatchery and wild stocks) from larger near by river systems may contribute to this population.

The current stock is best described as a composite stock sustained by both wild and artificial production.

### **STOCK STATUS**

The coho stock status in the Raft River is Unknown.

Ocean distribution/contribution of Raft River natural fall coho has not been established through coded-wire tag studies. It is assumed they follow the same pattern as the hatchery stocks from the Salmon River and Quinault National Fish Hatchery. Information gained from hatchery stock tagging studies indicates that contributions are highest to the British Columbia fisheries. Similar to other coastal coho stocks, contributions are also made to the Oregon, and Washington ocean fisheries. Much smaller contributions are made to the southeast Alaska, Puget Sound and Columbia River fisheries.

Neither terminal run-sizes nor spawning escapements are estimated for Raft River natural coho.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data are limited.

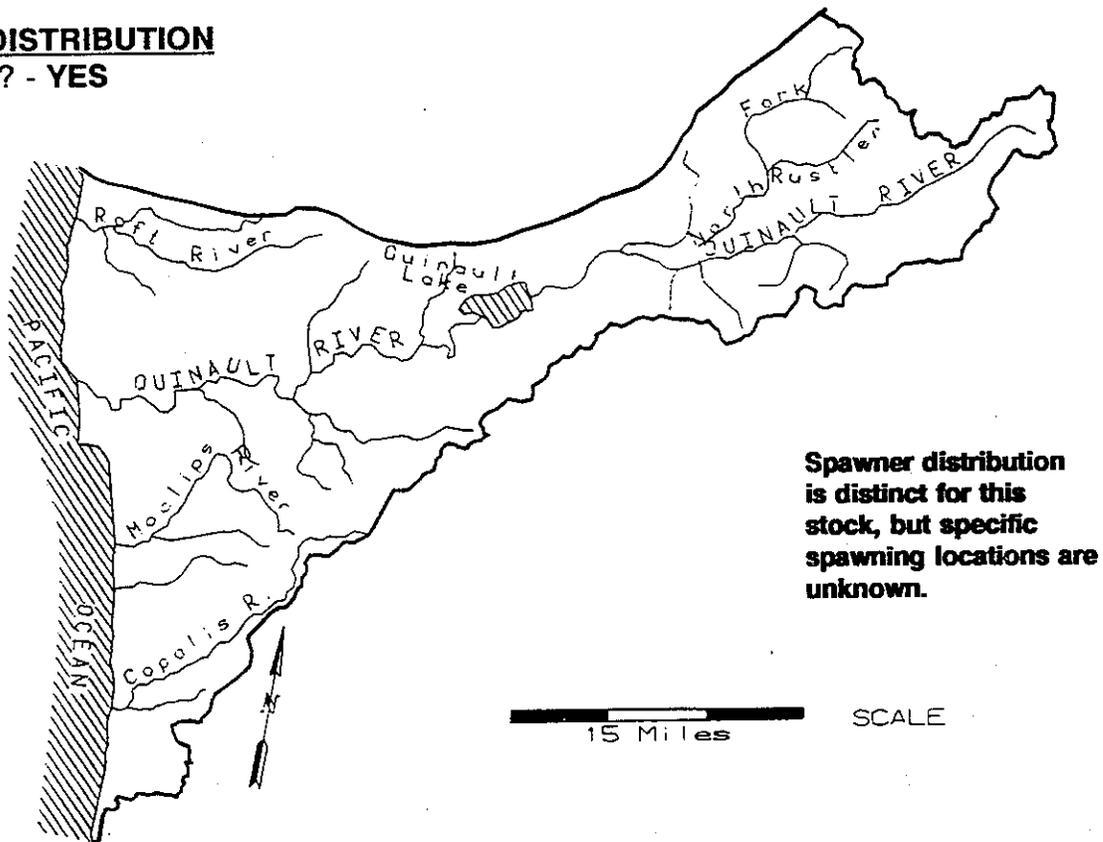
**Harvest Management** -- Within the Quinault Reservation, there has been no sport or tribal commercial fishery since the 1962 closure. There was a limited harvest of hatchery stock coho in the mid-1980s associated with an ocean ranching program.

**Hatchery** -- The Raft River has received Quinault and Salmon River stock coho plants of smolts and fry throughout the 1980s and up to 1992. The returning adults have been permitted to spawn naturally. It is thought that there is considerable contribution to the wild distribution from hatchery spawners.

# STOCK DEFINITION PROFILE for Raft Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Raft Coho

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Brood Years	NO DATA			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

---

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

## **CONCLUSION**

This stock is classified as Unknown.

This population is thought to be experiencing production levels consistent with its available habitat and within the natural variations in survival for this stock.

## **OVERVIEW -- RAFT SUMMER AND WINTER STEELHEAD STOCKS**

### **WINTER: RAFT**

#### **STOCK DEFINITION AND ORIGIN**

In the Raft River, no summer steelhead stock and one winter steelhead stock have been identified. Due to Quinault-origin fry and smolts being stocked in the Raft River since the 1980s, hatchery steelhead may make a substantial contribution to the wild stock by spawning in the wild. This is considered a mixed-origin stock sustained by both natural and artificial production.

There is little or no information available to indicate that this is a genetically distinct stock. The stock is treated separately due to the geographic distribution of the spawning population. There may be more or fewer stocks identified once comprehensive genetic information is available.

#### **STOCK STATUS**

The Raft winter steelhead stock status is Unknown. Logging impacts during the 1950s severely impacted the native stock. An active treaty net fishery was closed in 1962 and remains closed. Sport harvest information is available for the early portion of the run because the sport steelhead season closes on February 28. Spawner escapement has not been monitored for this stock.

More information on the Raft River winter steelhead is presented in the Stock Report.



## **RAFT -- WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Raft River and tributaries are a distinct stock based on the geographic distribution of the spawning population. Due to Quinault-origin smolts stocked in the Raft River since the 1980s, hatchery steelhead may make a substantial contribution to the wild stock by spawning in the wild. This is considered a mixed - origin stock sustained by both natural and artificial production.

Little is known about the genetic composition of the stock. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north coast area using enzyme electrophoretic techniques. The stock is treated separately due to the geographic distribution of the spawning population. There may be more or fewer stocks identified once comprehensive genetic information is available.

Run timing is generally from November through April and spawn timing is unknown but is believed to be similar to other wild winter steelhead stocks in the north Pacific coast area (mid-February to early June).

Spawning distribution is not well known for wild winter steelhead in the Raft River.

### **STOCK STATUS**

The status of the stock is Unknown. There is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

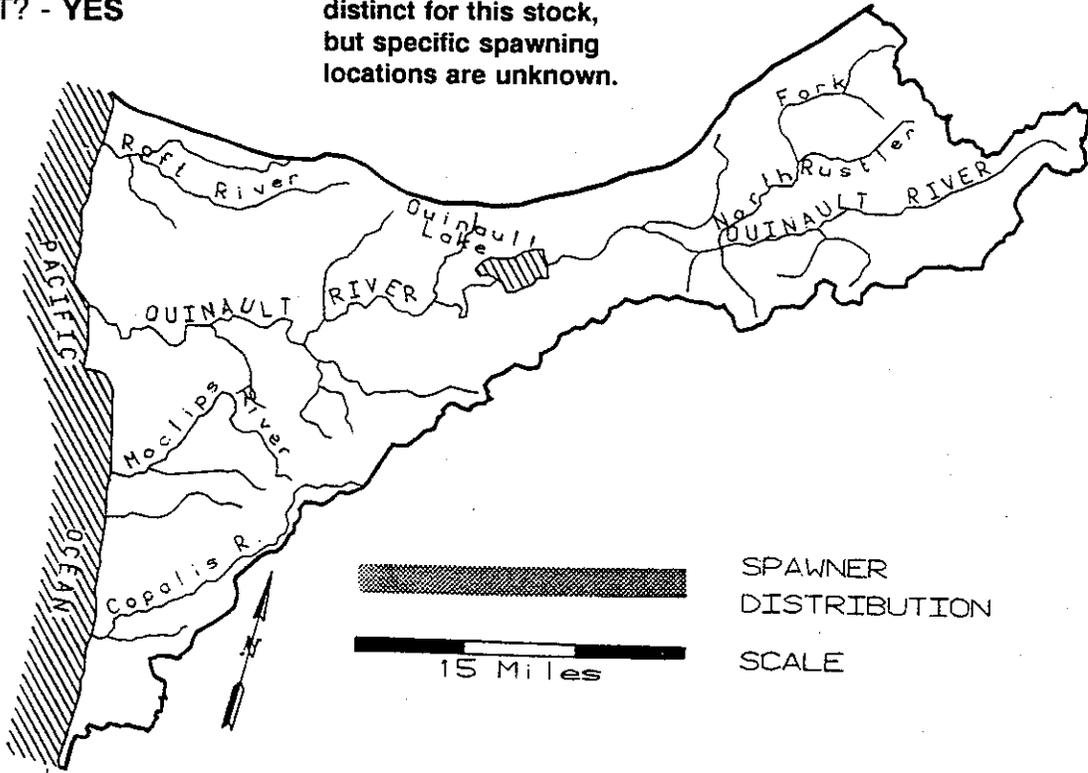
There are no reliable catch data available to assess the status of the stock. Within the Quinault Reservation, the Raft River has been closed to both sport and commercial harvests since 1962. A portion of the upper North Fork Raft River has remained open to sport harvest, however only a small portion of the stock would be expected to utilize this area. In addition, sport harvest information is available for only the early portion of the run because the sport steelhead season closes on February 28. There was some steelhead harvest in the mid-1980s associated with an ocean ranching program, but few wild steelhead were caught.

More information needs to be collected on this stock so that stock status can be determined.

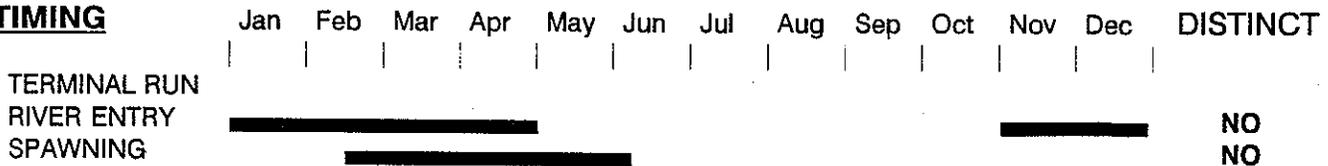
# STOCK DEFINITION PROFILE for Raft Winter Steelhead

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



**TIMING**



**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Raft Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	
88	0
89	2
90	2
91	2
92	0

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data are limited.

**Harvest Management** -- There is no sport or commercial fishery on the Raft River within the Quinault Reservation. A small portion of the upper North Fork Raft River has been open to sport fishing, but the sport fishery closes on February 28 before the majority of the wild stock enters the stream.

**Hatchery** -- The Raft River has received Quinault-origin hatchery stock winter steelhead plants of both smolts and fry throughout the 1980s and up to 1992. The returning adults have been permitted to spawn naturally. It is expected that there is considerable contribution to the wild distribution from hatchery stock spawners.

# OVERVIEW -- QUINAULT SPRING / SUMMER CHINOOK STOCK

## QUINAULT

### STOCK DEFINITION AND ORIGIN

Wild spring/summer chinook in the Quinault River are a distinct stock on the basis of geographical isolation of the spawning populations from other north coast areas.

Run timing is similar to that of other spring/summer chinook stocks in the north coast area. River entry occurs during the months of April through July. Spawn timing is similar to that of other spring/summer chinook stocks in the north coast area. Spawning occurs during the months of September through October.

A limited amount of straying between nearby coastal systems is expected.

Wild spring/summer chinook are native to the Quinault River system.

Early-returning hatchery fall chinook in the month of August overlap with native spring/summer chinook and cannot be distinguished from them. Late-spawning summer chinook and early spawning fall chinook may hybridize.

### STOCK STATUS

The spring/summer chinook stock is Depressed based on recent escapement patterns including 1992. The long-term abundance of Quinault spring/summer chinook is stable. Escapement data based on spawning ground surveys are limited at this time. It is thought that reduced survival of 1992 prespawners was probably similar to that in the Queets River system. The Quinault River spring/summer chinook was considered Depressed since it is important to identify stocks of concern early. This stock may be experiencing a short-term severe decline. Spawning escapements based on spawning ground surveys prior to 1987 are unavailable at this time. This distribution may be experiencing production levels consistent with its available habitat and within the natural variations in survival for this stock.



## QUINAULT -- QUINAULT SPRING / SUMMER CHINOOK

### **STOCK DEFINITION AND ORIGIN**

Wild spring/summer chinook in the Quinault River basin are native and are considered a distinct stock on the basis of geographic isolation of the spawning populations from other north coast basins. Too little is known about the genetic composition of the stock to separate the chinook which spawn in the upper and lower portions of the river into distinct stocks. A limited amount of straying between nearby coastal systems is expected.

Run timing is similar to that of other spring/summer-run chinook stocks in the north Pacific coast areas. River entry occurs during the months of April through July. Spawn timing is similar to that of other spring/summer chinook stocks in the north coast area occurring during the months of September through October.

### **STOCK STATUS**

Quinault spring/summer chinook were designated Depressed based on recent escapement patterns. This stock is experiencing a short-term severe decline, and it is important to identify possible stocks of concern early. The long-term abundance of Quinault spring/summer chinook is stable.

Harvest has ranged from 20 to 530 fish per year. Escapement data are limited, but ranged from 298 to 1,685 from 1987 to 1991. Escapement estimates based on spawning ground surveys is unavailable prior to 1987. It is thought that reduced survival of 1992 prespawners was similar to the Queets River system. Increases in run sizes during 1987 through 1990 were due to a high contribution by the 1984 brood escapement.

### **FACTORS AFFECTING PRODUCTION**

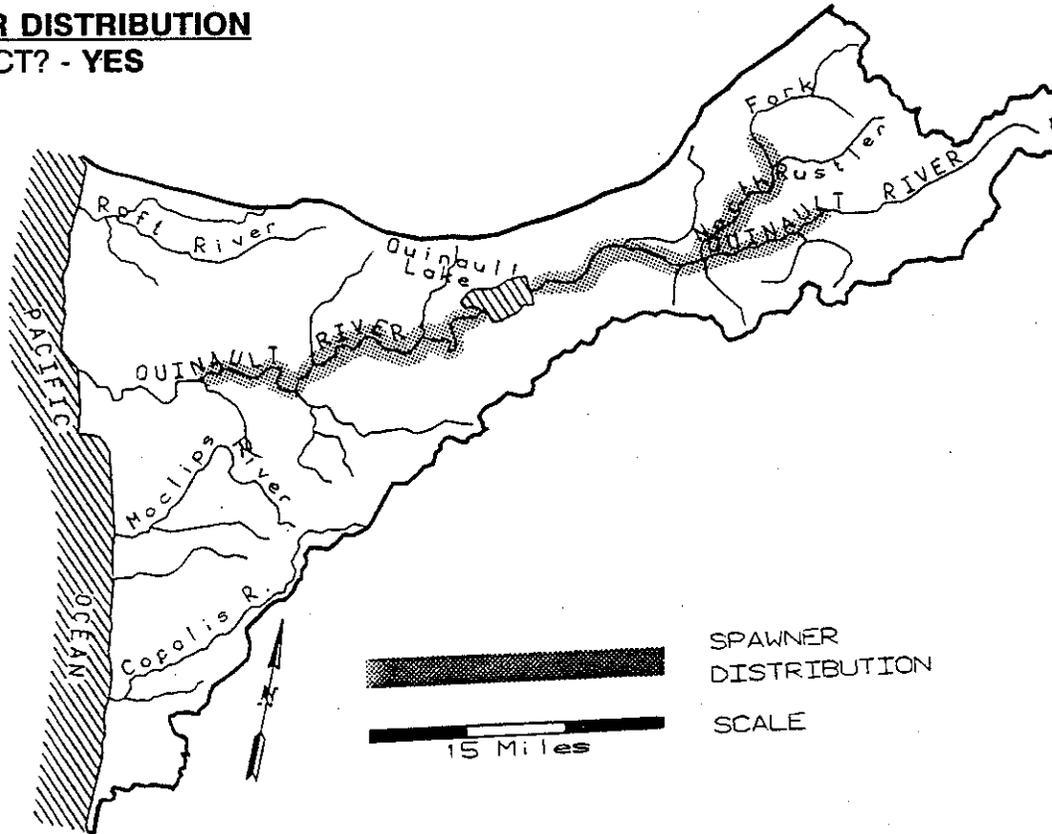
**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the National Park Boundaries.

**Harvest Management** -- Quinault spring/summer chinook are expected to contribute to southeast Alaska, British Columbia, and Washington ocean fisheries. The level of contributions to these fisheries is unknown.

# STOCK DEFINITION PROFILE for Quinault Spring/Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													
RIVER ENTRY				████████████████████									NO
SPAWNING								████████					NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Quinault Spring/Summer Chinook

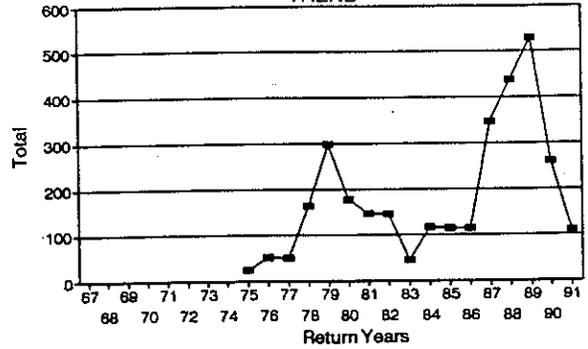
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

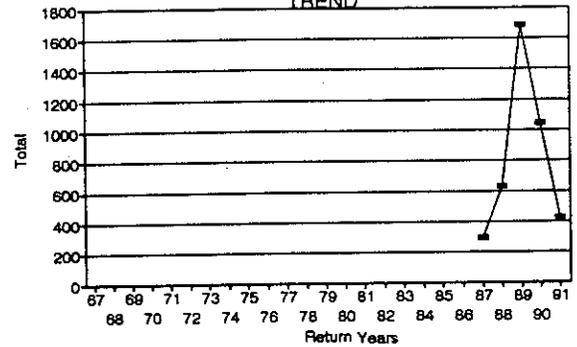
Return Years	HARVEST Total	ESCAPE Total	RUNSIZE Total
--------------	---------------	--------------	---------------

67			
68			
69			
70			
71			
72			
73			
74			
75	24		
76	52		
77	51		
78	163		
79	299		
80	178		
81	148		
82	146		
83	45		
84	118		
85	115		
86	115		
87	346	298	644
88	437	630	1067
89	530	1685	2215
90	260	1043	1303
91	109	430	539

HARVEST TREND



ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Short-term Severe Decline*

There is no directed tribal terminal area fishery on this stock. Tribal harvest occurs during sockeye and summer steelhead directed fisheries during the months of April through July with small mesh gear. In the month of August, the overlap between early-returning hatchery fall chinook and this stock in August has obstructed separation of summer and fall chinook. Late-spawning summer chinook and early-spawning fall chinook could possibly hybridize.

A limited sport fishery in the lower Quinault River is regulated by Quinault Indian Nation.

**Hatchery** -- Limited releases have occurred within the Quinault River basin. Adult production and escapements from the releases were expected to be minimal. There have been no recent releases of spring/summer chinook.

### **CONCLUSION**

The stock has been described as a Depressed stock since it may be important to identify stocks of concern early. The long-term abundance of Quinault spring/summer chinook has been stable but may be experiencing a severe short-term decline.

# OVERVIEW -- QUINAULT FALL CHINOOK STOCKS

## QUINAULT COOK CREEK

### STOCK DEFINITION AND ORIGIN

Quinault fall chinook are composed of two stocks, the Quinault and Cook Creek spawning stocks.

The Quinault wild chinook stock is native to the Quinault River system. Quinault wild chinook run timing is similar to other fall chinook stocks in the north coast area. River entry occurs during the months of August through November. Spawn timing is similar to that of other fall chinook stocks in the north Pacific coast area during the months of October through December. Wild fall chinook in the Quinault River Basin are a distinct stock on the basis of geographical isolation of the spawning populations from other north coast basins. A limited amount of straying between nearby coastal systems is expected. Little is known about the genetic composition of the stock to separate the Quinault and Cook Creek distributions into completely separate stocks. Wild fall chinook are native to the Quinault River System. Extensive hybridization with hatchery fish originating from the Quinault National Fish Hatchery (U. S. Fish and Wildlife Service) stocks may have occurred in the lower river.

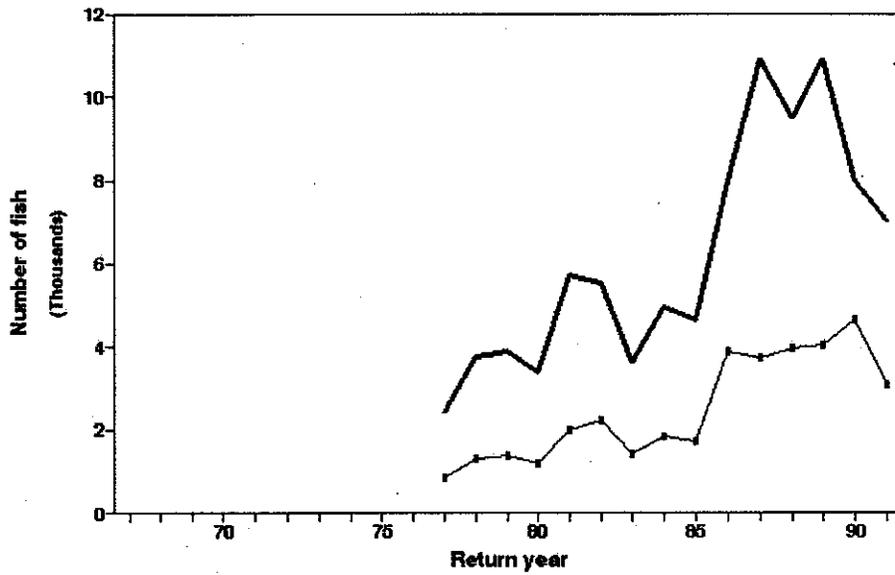
The Cook Creek stock is a mixture of non-local stock originally developed to create an early timed fall chinook that would provide additional harvest opportunities. The stock was originally comprised of a variety of north coast and Puget Sound stocks raised at the Quinault National Fish Hatchery (USFWS). Recent production has been obtained from mainstem brood stocking efforts. This production is associated with the U.S.- Canadian indicator stock studies. The tribal facility at Lake Quinault has recently included fall chinook into its official production goals. The present production goal is 1,400,000 chinook combined between the two facilities. Returning hatchery adults are expected to contribute to the natural spawning population. Rack returns to the Quinault National Fish hatchery are minimal due to low flow patterns occurring during adult fish entry. The Lake Quinault facility lacks a rack return facility.

### STOCK STATUS

Since 1987 the combined Quinault River/Cook Creek fall chinook run sizes have averaged 16,206 and escapements have averaged 7,482.

The figure below shows escapements and run sizes for the Quinault River stock only. Prior to 1987 when spawning ground escapement surveys were initiated, escapements were estimated from catch data.

### QUINULT RIVER SYSTEM Fall Chinook



—+— Escapement    — River run size

## QUINAULT -- QUINAULT FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

Wild fall chinook are native in the Quinault River basin and are a distinct stock on the basis of geographical isolation of the spawning populations from other north coast basins. Too little is known about the genetic composition of the stock to separate the Quinault and Cook Creek populations into different stocks on genetic grounds. A limited amount of straying from nearby coastal systems is expected.

Run timing for Quinault fall chinook is similar to that of other fall chinook stocks in the north coast area. River entry occurs during the months of September through November. Spawn timing is also similar to other fall chinook stocks in the north Pacific coast areas, occurring during the months of October through December.

### **STOCK STATUS**

The Quinault fall chinook stock is a Healthy stock.

The long-term abundance of Quinault fall chinook is stable. Harvests have ranged from 1,576 to 7,168 since 1977. Increases in the run sizes were expected to occur during 1987 to 1990 from a high contribution by the 1984 brood year escapement. Harvests have averaged 4,200 fish during the last ten years and 5,400 fish during the last five years.

Spawning escapement numbers based on spawning ground surveys have been estimated since 1987, escapements have ranged from 3,726 to 4,630.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the National Park boundaries.

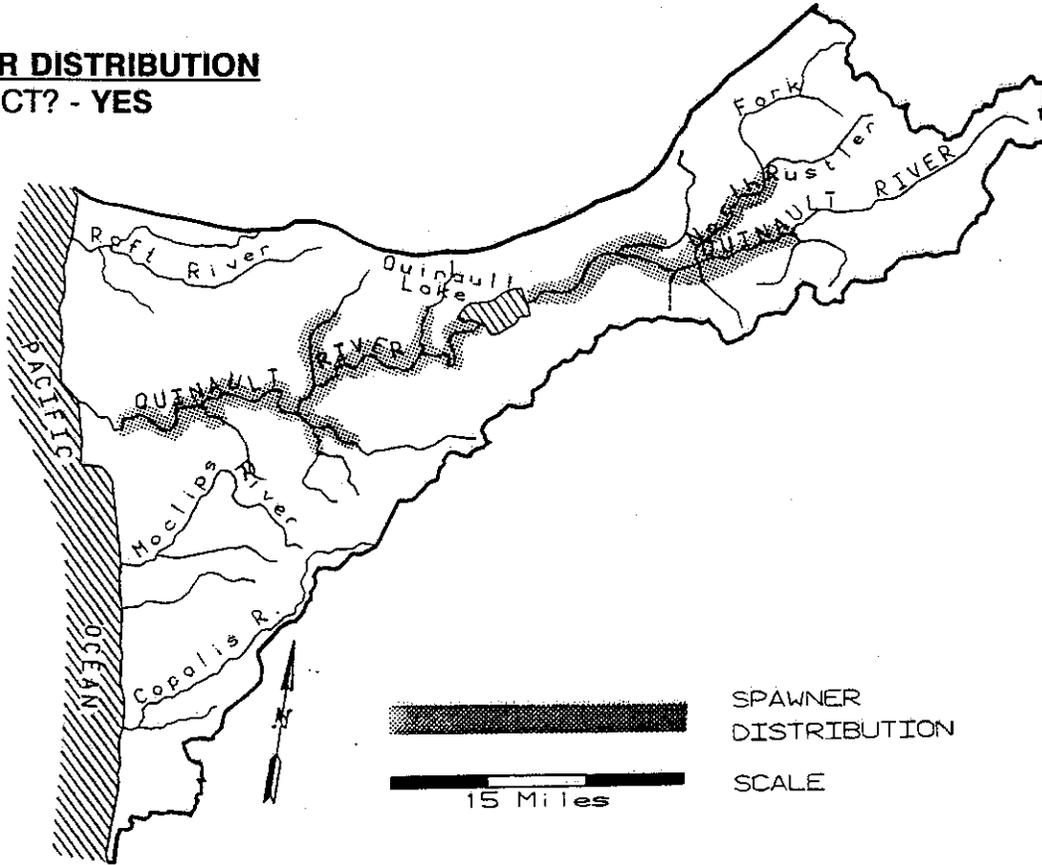
**Harvest Management** -- Quinault fall chinook are expected to contribute to Alaska, British Columbia, and Washington ocean fisheries. The level of contributions to these fisheries are unknown.

The harvest management objective for the terminal area is a 60 percent total harvest rate provided an aggregate spawning escapement (hatchery and wild) of 2,500 spawn naturally. Wild chinook harvests are limited by wild coho and chum management. The terminal harvest rate has averaged 55 percent since 1987 when spawning escapement estimates became available.

# STOCK DEFINITION PROFILE for Quinault Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION

SCALE

15 Miles

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

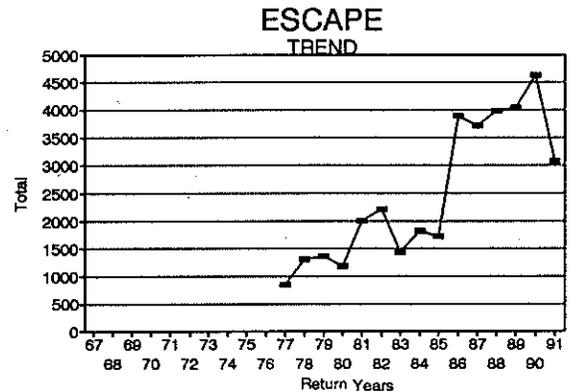
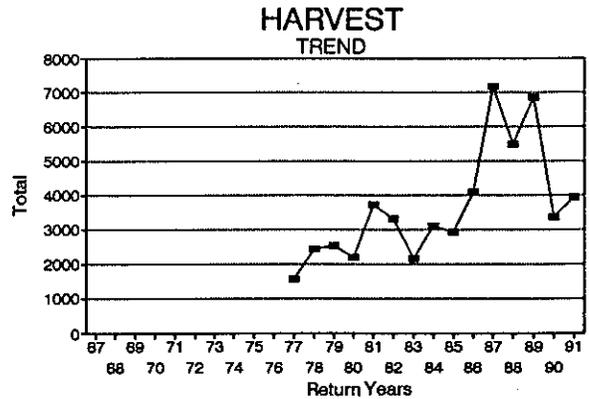
DISTINCT? - NO

# STOCK STATUS PROFILE for Quinault Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Total	ESCAPE Total	RUNSIZE Total
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77	1576	844	2411
78	2434	1313	3752
79	2533	1364	3897
80	2197	1183	3380
81	3724	2005	5729
82	3317	2211	5528
83	2155	1437	3592
84	3109	1826	4935
85	2930	1721	4651
86	4095	3887	7982
87	7168	3726	10894
88	5486	3975	9461
89	6861	4042	10904
90	3366	4630	7996
91	3940	3078	7018



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

A limited sport fishery regulated by the Quinault Indian Nation occurs in the lower Quinault River.

**Hatchery** -- Hatchery fish have been released into and below Lake Quinault. It is thought that a majority of the hatchery production spawns naturally in the wild.

### **CONCLUSION**

The Quinault stock is a Healthy stock. The long-term abundance of Quinault fall chinook is stable.

## QUINALT -- COOK CREEK FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

This stock is a mixture of non-local stock originally developed to create an early-timed fall chinook run that would provide addition harvest opportunities. The stock was originally composed of a variety of north coast and Puget Sound stocks raised at the Quinalt National Fish Hatchery (USFWS). Present production is obtained from mainstem brood stocking efforts. This production is associated with the U.S./Canadian indicator stock studies. The tribal facility at Lake Quinalt has recently included fall chinook into its official production goals. The present production goal is 1,400,000 between both facilities fall chinook combined. Returning hatchery adults are expected to contribute to the natural spawning population. Rack returns in to Quinalt National Fish hatchery minimal due to low flow patterns occurring during adult fish river entry. The Lake Quinalt facility lacks a rack return facility.

### **STOCK STATUS**

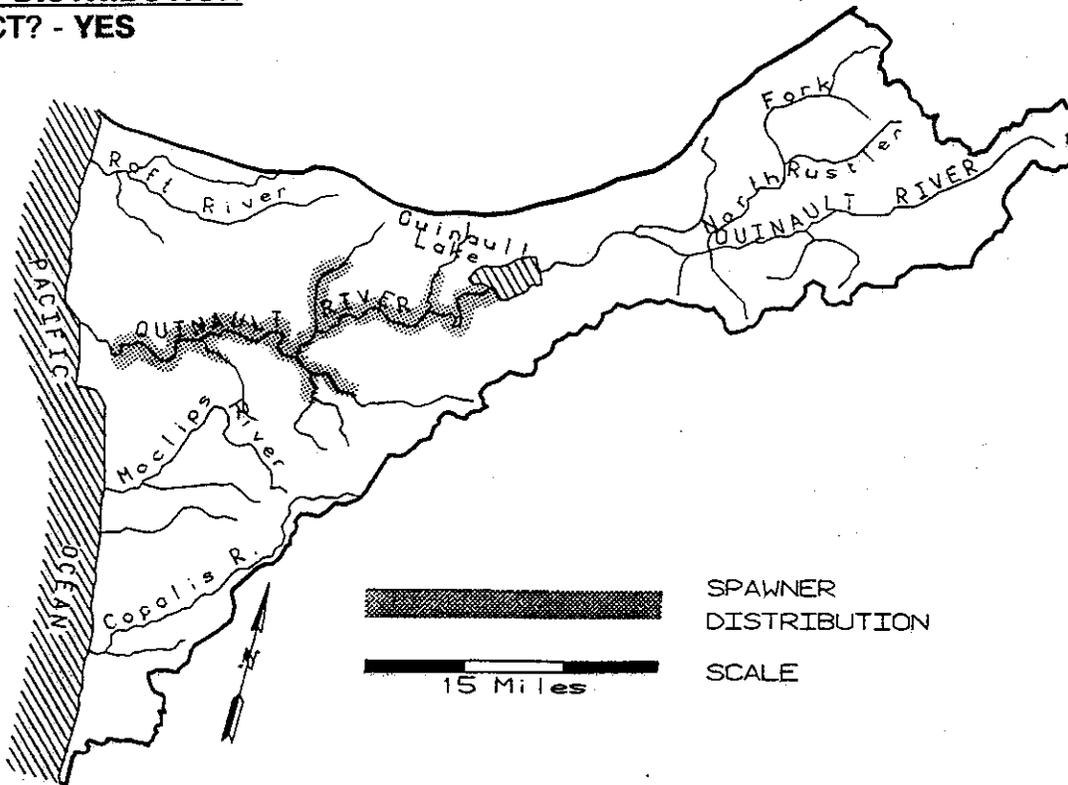
The status of the stock is Healthy, and the abundance of the hatchery stock has been stable.

Run sizes have ranged from 2,191 to 8,261 since 1977. Escapement estimates have ranged from 3,244 to 4,730 since 1987. Many of the returning adults are permitted to spawn naturally within the Quinalt River system. Escapement estimates based on spawning ground surveys began in 1987. Spawning ground survey data prior to 1987 will need to be examined to estimate hatchery escapement. It is expected that some of the lower river production is from hybrids or direct offspring from hatchery production.

# STOCK DEFINITION PROFILE for Cook Creek Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

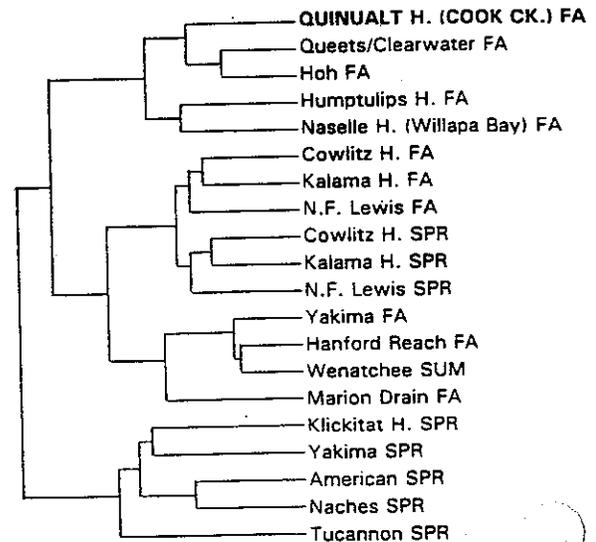


NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - YES

**GENETICS** - Quinault Hatchery fall chinook sampled in 1981 and 1990 showed no differences between years in their genetic characteristics and were combined in to one data set. This Quinault Hatchery stock was significantly different from all other chinook stocks examined ( $p < .05$ ). No natural spawners have been analyzed by WDF.



0.200 0.1667 0.1333 0.1000 0.0667 0.0333 0.0000

Genetic Distance (Cavalli-Storza & Edwards (1967) chord distance; UPGMA)

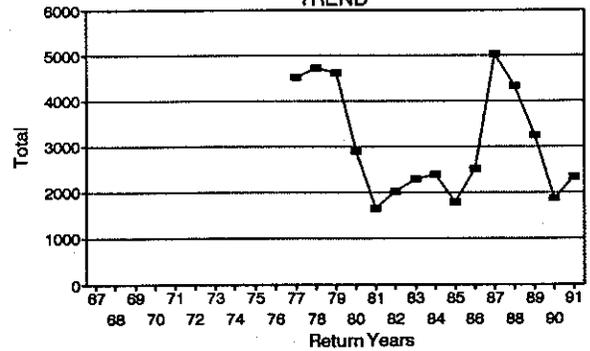
# STOCK STATUS PROFILE for Cook Creek Fall Chinook

## STOCK ASSESSMENT

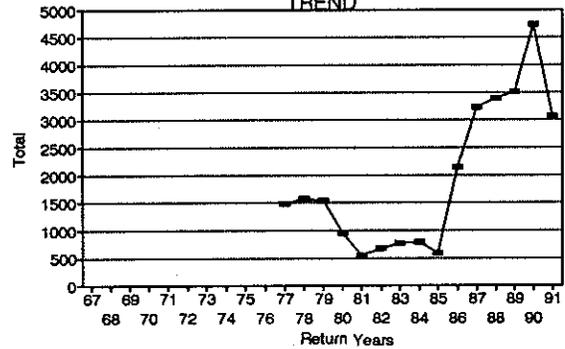
DATA QUALITY-----> Fair

Return Years	HARVEST Total	ESCAPE Total	RUNSIZE Total
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77	4526	1481	6007
78	4720	1573	6293
79	4612	1537	6149
80	2891	946	3855
81	1643	548	2191
82	2026	675	2701
83	2288	763	3051
84	2383	794	3177
85	1795	598	2393
86	2512	2140	4652
87	5017	3244	8261
88	4330	3391	7721
89	3247	3517	6763
90	1877	4730	6566
91	2329	3078	5399

HARVEST TREND



ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution, Genetics*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **OVERVIEW -- QUINAULT FALL CHUM STOCK**

### **QUINAULT**

#### **STOCK DEFINITION AND ORIGIN**

The Quinault River stock contains both natural and hatchery-produced chum. Quinault chum are of mixed-stock origin, and extensive hybridization between the hatchery component and the native Quinault component is thought to occur.

River entry occurs during the months of October through November, with spawning occurring during November and December.

#### **STOCK STATUS**

The status of this stock is Healthy, with run size averaging 8,500 during the last five years.



## QUINAULT -- QUINAULT FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

The Quinault River stock contains natural and hatchery-produced chum.

Consequently, Quinault fall chum are of mixed-stock origin, and extensive hybridization between hatchery and native chum is thought to occur. A limited amount of straying from nearby coastal systems is expected.

Little is known about the genetic composition of the stock.

Run timing of both stocks is similar to that of other chum stocks in the north coast area. River entry occurs during the months of October through November. Spawn timing is also thought to be similar to that of other chum stocks and to occur during the months of November through December.

### **STOCK STATUS**

The status of this stock is Healthy.

Estimated run sizes and escapements are based on a relative measure of effort associated with hatchery coho. Estimated run sizes have ranged from 4,594 to 25,798 since 1977. It is thought that the large production was associated with the large hatchery releases during the late 1970s and early 1980s. The run size has averaged 9,000 for the during the last ten years and 8,500 during the last five years.

### **FACTORS AFFECTING PRODUCTION**

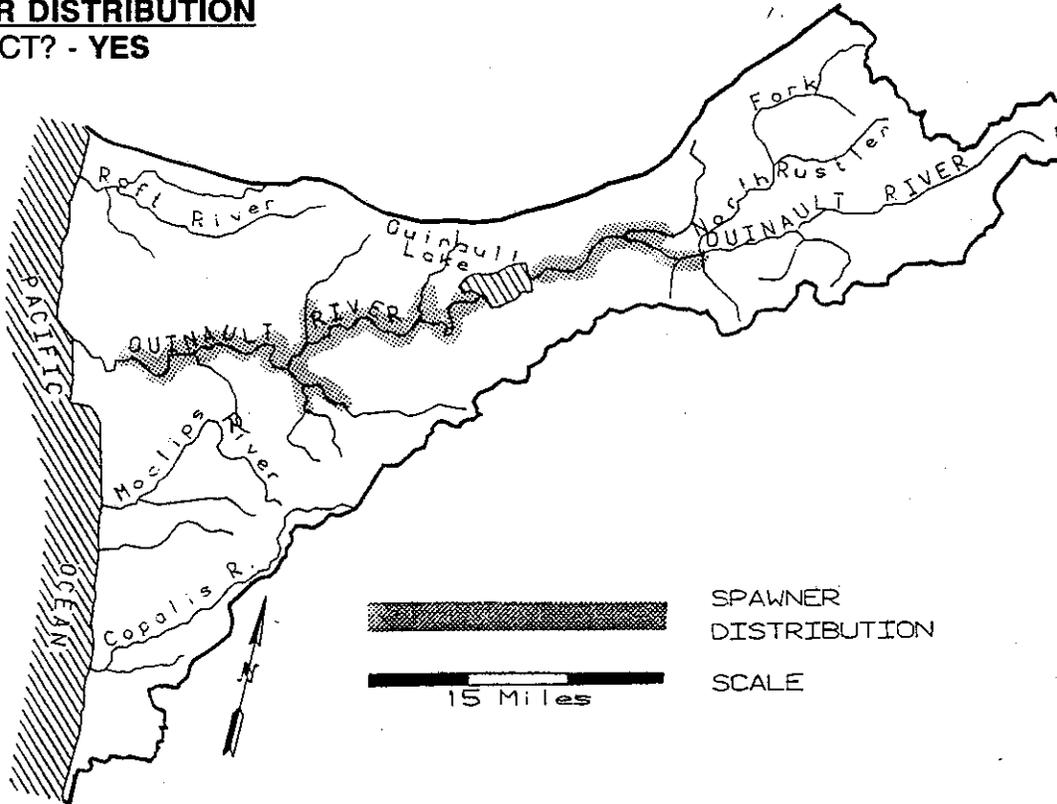
**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the National Park boundaries.

**Harvest Management** -- The tribal fishery presently directs a 50 percent harvest rate on the aggregate hatchery/natural stocks. Chum catches since 1977 have ranged from 1,656 to 13,673. Chum catches have averaged 4,500 during the last ten years and 3,800 during the last five years. Reduced catches have occurred during the last three years due to reduced fishing effort during the early portion of the run to aid chinook brood stock efforts and to protect natural coho concerns.

# STOCK DEFINITION PROFILE for Quinault Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

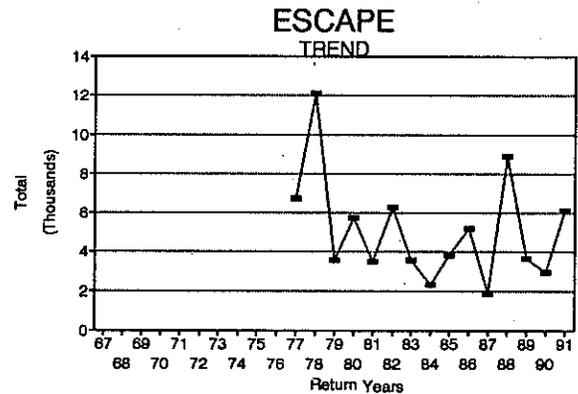
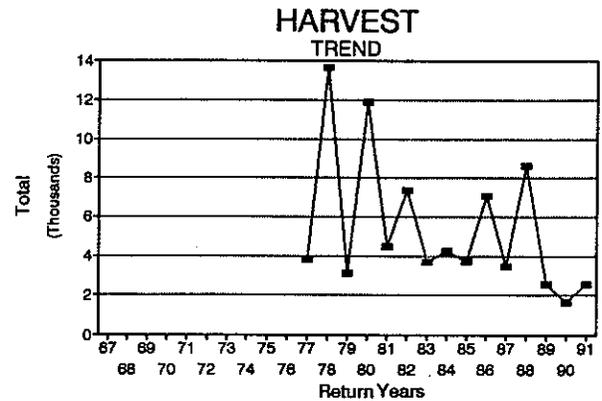
DISTINCT? - NO

# STOCK STATUS PROFILE for Quinault Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Total	ESCAPE Total	RUNSIZE Total
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77	3809	6742	10551
78	13643	12125	25798
79	3103	3542	6645
80	11901	5756	17657
81	4457	3488	7945
82	7381	6288	13669
83	3694	3549	7243
84	4257	2312	6596
85	3737	3797	7534
86	7098	5205	12303
87	3486	1860	5346
88	8623	8901	17524
89	2563	3673	6236
90	1656	2938	4594
91	2565	6136	8701



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

**Hatchery**--Various amounts of chum production have occurred in the Quinault River basin. Present hatchery production is limited to rack returns to the Quinault National Fish Hatchery (USFWS). Large production releases comprised of various Puget Sound and north coast hatchery stocks have occurred in the Quinault basin in past years. It is thought that a majority of the chum production in the late 1970s and early 1980s was associated with the non-native releases throughout the basin. Most of the hatchery production was allowed to spawn naturally in the wild.

Present natural production of chum is thought to be composed of hybrids between natural and cultured stocks.

## **CONCLUSIONS**

The Quinault basin aggregate fall chum stocks are Healthy.

Hatchery production is used to supplement the terminal area commercial fishery.

## OVERVIEW -- QUINAULT COHO STOCKS

### QUINAULT COOK CREEK

#### STOCK DEFINITION AND ORIGIN

The Quinault River coho are composed of two stocks, the Quinault and Cook Creek stocks.

Wild coho in the Quinault River basin are considered distinct stocks on the basis of geographic isolation of the spawning populations from other north coast basins. Wild coho are native to the Quinault River System. Quinault natural production run timing is similar to that of other fall coho stocks in the north coast area. River entry occurs during the months of September through December. Spawn timing is also similar to that of other fall coho stocks in the north Pacific coast area and occurs during the months of November through January. A limited amount of straying between nearby coastal systems is expected. Too little is known about the genetic composition of the stock to separate the Quinault stock into different stocks.

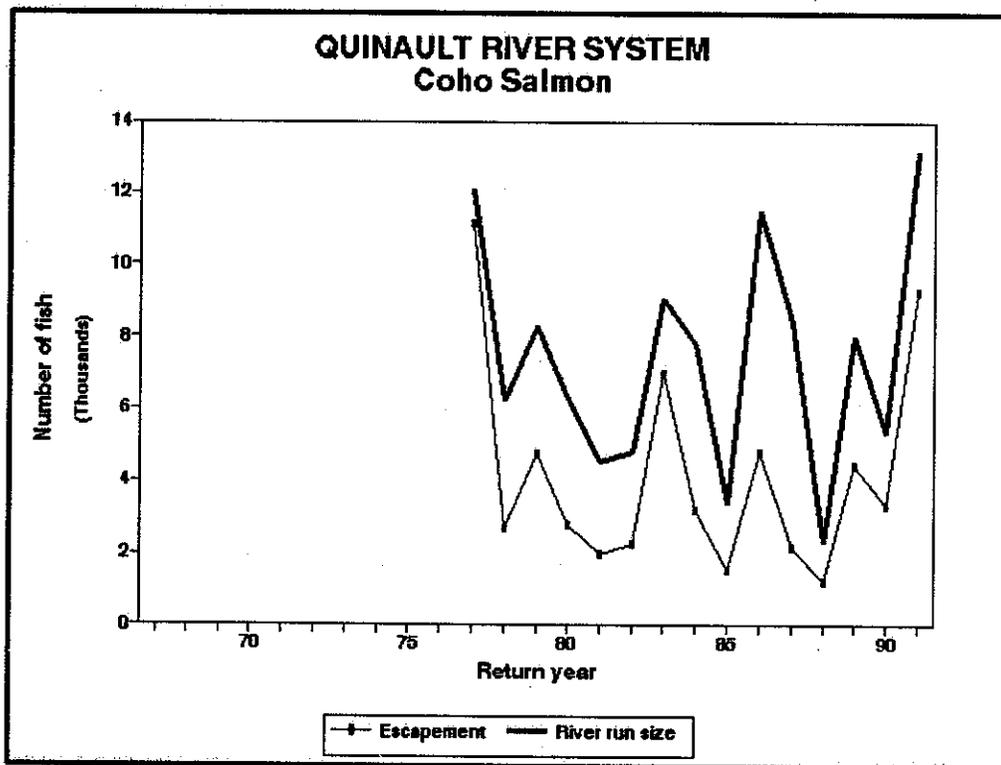
The Quinault River has been stocked with large releases of hatchery smolts and fry in recent years. It is thought that the present wild population consists of a mixed stock with composite production due to mass fry releases and hatchery straying throughout the system. No releases have occurred recently in the upper Quinault River. It is thought that past hatchery adults returning to the Lake Quinault facility may have contributed to some of the wild production above and around Lake Quinault.

The Cook Creek stock is composed of various Puget Sound and north coastal coho stocks with early return run timing to allow increased harvest rates. River entry occurs during the months of September and October. Spawn timing occurs during the months of October and November. Recent production is obtained from hatchery rack returns to the Quinault National Fish Hatchery (USFWS) facility. Minimal fry releases will occur beginning with the 1993 brood. It is expected that some of the returning adults from the various productions will spawn naturally in the wild.

## STOCK STATUS

The status of the Quinault coho stock is Unknown due to uncertainty about escapements. Spawning ground survey data have not been analyzed to estimate escapements. There have been no recent efforts to assess natural coho production and escapement goals since the Quinault River is managed to meet hatchery production needs. Wild coho are given secondary management status to hatchery production within the system. Commercial catch data suggest that long-term abundance of Quinault natural coho is stable.

The Cook Creek fall coho stock is Healthy. Hatchery production enhances the terminal area commercial fishery.



## QUINAULT -- QUINAULT COHO

### **STOCK DEFINITION AND ORIGIN**

Wild coho in the Quinault River basin are native and are considered a distinct stock on the basis of geographic isolation of the spawning populations from other north coast basins. Too little is known about the genetic composition of the stock to separate the Quinault River population into multiple stocks. A limited amount of straying from nearby coastal systems is expected.

Run timing is similar to that of other fall coho stocks in the north coast areas. River entry occurs during the months of September through December. Spawn timing is also similar to that of other fall coho stocks in the north coast areas and occurs during the months of November through January.

It is thought that the present natural population is a mixed stock sustained by both wild and artificial production due to mass fry releases and hatchery straying throughout out the system. No releases have occurred recently in the upper Quinault River. It is believed that hatchery adults returning to the Lake Quinault facility may have contributed to some of the wild production above and around Lake Quinault.

### **STOCK STATUS**

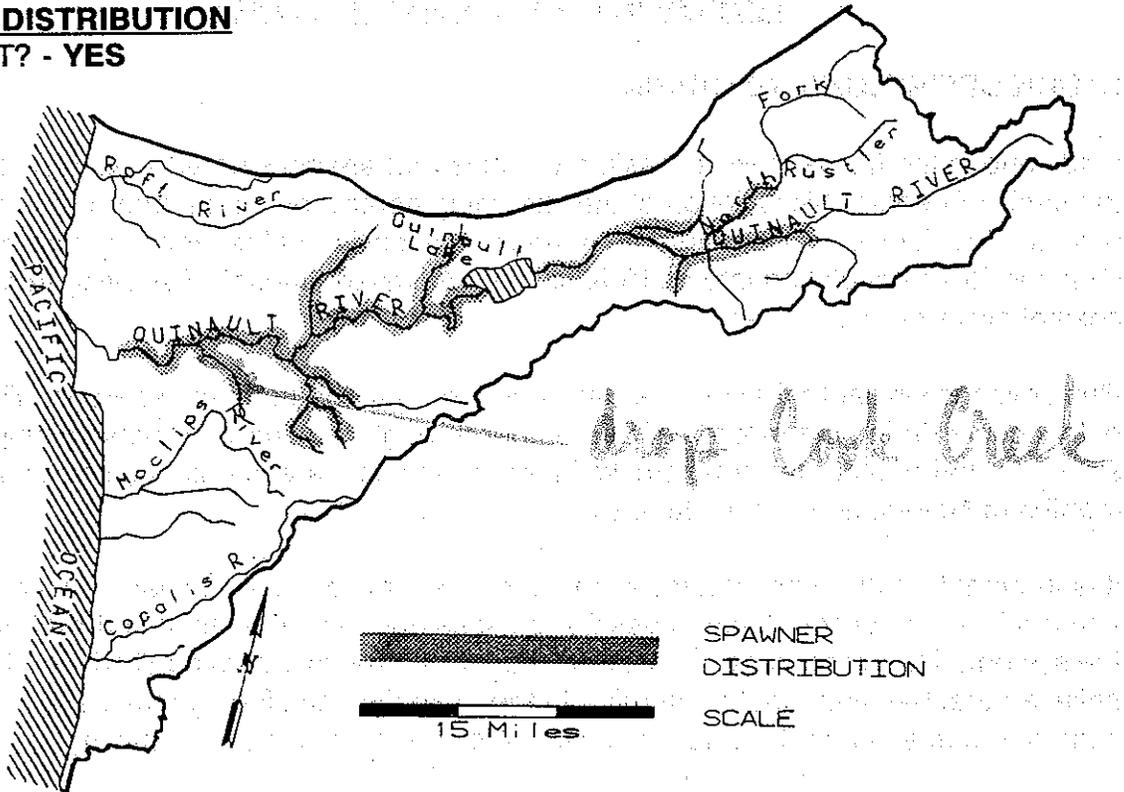
The status of the Quinault fall coho stock is Unknown due to uncertainty about escapements.

Spawning ground survey data have not been analyzed to estimate escapements. There have been no recent efforts to assess natural coho production and escapement goals. Wild coho are given secondary management status to hatchery production within the system. The long-term abundance of Quinault natural coho appears to be stable based on commercial catches. Estimated run sizes (based on a relative measure of effort to hatchery coho) has ranged from 2,282 to 13,166 since 1977. Estimated escapements have ranged from 1,194 to 11,132 since 1977. Estimated escapement has averaged 3,900 fish during the last ten years and 4,100 fish during the last five years.

# STOCK DEFINITION PROFILE for Quinault Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN

RIVER ENTRY

SPAWNING



NO

NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

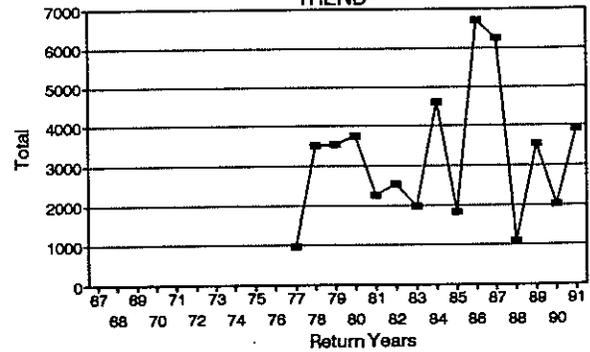
# STOCK STATUS PROFILE for Quinault Coho

## STOCK ASSESSMENT

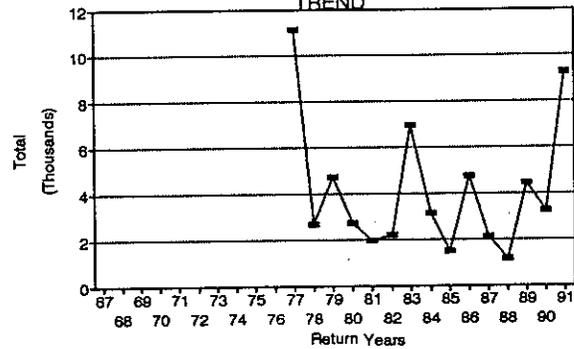
DATA QUALITY-----> Fair

Return Years	HARVEST Total	ESCAPE Total	RUNSIZE Total
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77	968	11132	12100
78	3520	2710	6230
79	3541	4752	8293
80	3761	2757	6260
81	2281	1991	4498
82	2547	2241	4788
83	1987	6963	9032
84	4604	3160	7764
85	1826	1524	3350
86	6703	4780	11483
87	6252	2167	8419
88	1089	1194	2282
89	3550	4443	7993
90	2028	3301	5329
91	3916	9250	13166

HARVEST TREND



ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the National Park boundaries.

**Harvest Management** -- Quinault River fall coho contribute to ocean fisheries British Columbia, Washington, Oregon and California.

The stock is given secondary management consideration to hatchery production. A limited and reduced directed tribal fishery on this stock occurs during fisheries directed at hatchery coho, chum, and wild fall chinook. A limited sport fishery occurs within the Quinault Indian Reservation. The commercial fishing schedule has been reduced during peak entry timing due to chinook brood stock efforts, chum, and natural coho concerns.

**Hatchery**-- The hatchery production consists of large smolt and fry releases within the Quinault River basin. Efforts are being made to minimize the size of fry releases, beginning with the 1993 brood.

## **CONCLUSION**

The status of the Quinault basin fall coho stock is Unknown based on lack of present escapement estimates. The long-term abundance of Quinault coho appears to be stable.

## QUINAULT -- COOK CREEK COHO

### **STOCK DEFINITION AND ORIGIN**

The Quinault River has been stocked with large releases of hatchery smolts and fry in recent years. The hatchery stocks were comprised of various Puget Sound and north coastal coho stocks to manipulate return run timing to allow increased harvest rates. Recent production is obtained from hatchery rack returns to the Quinault National Fish Hatchery (USFWS) facility. The majority of the hatchery production is from the USFWS facility. The USFWS facility smolt production is currently about 650,000 smolts per year, with less than 200,000 being released yearly from the tribal facility. It is believed that minimal amounts of fry releases will occur beginning with the 1993 brood. It is expected that some of the returning adults from the various productions spawn naturally in the wild.

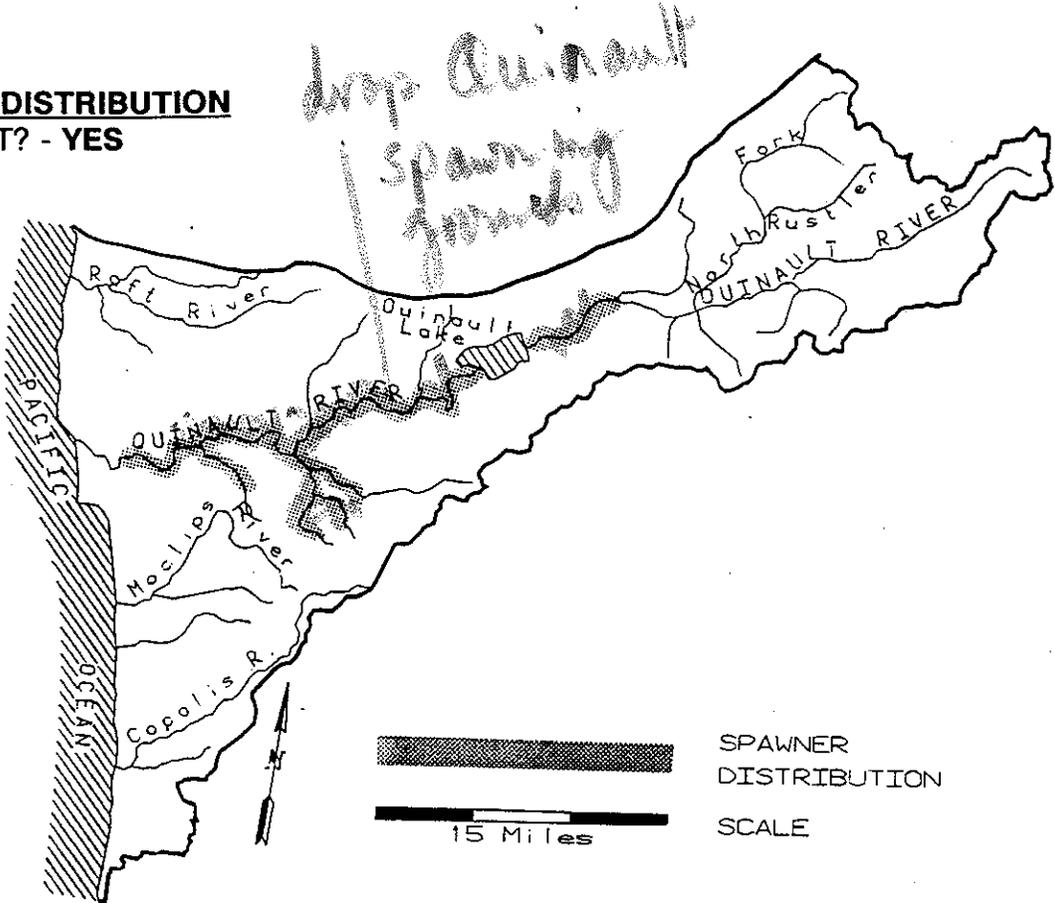
### **STOCK STATUS**

The Cook Creek stock has been stable and is rated as Healthy.

Hatchery (all cultured stocks) run sizes have ranged from 6,249 to 38,517 since 1977. Escapements have ranged from 1,431 to 22,531 since 1977. The hatchery production supplements tribal and non-tribal ocean fisheries from British Columbia to California. Large contributions to the terminal commercial fishery occur. A limited amount of sport fishing occurs in the lower river mainstem.

# STOCK DEFINITION PROFILE for Cook Creek Coho

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES



**TIMING**

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec **DISTINCT**

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



**YES**  
**YES**

**BIOLOGICAL CHARACTERISTICS**

DISTINCT? - NO

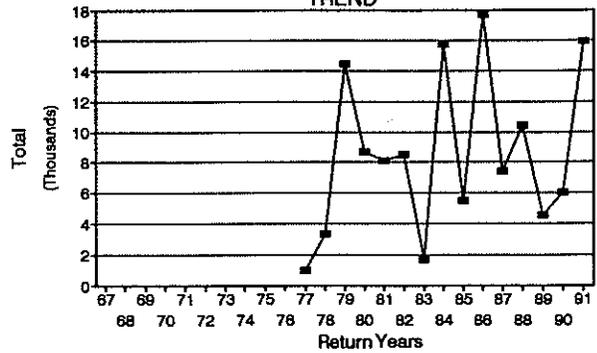
# STOCK STATUS PROFILE for Cook Creek Coho

## STOCK ASSESSMENT

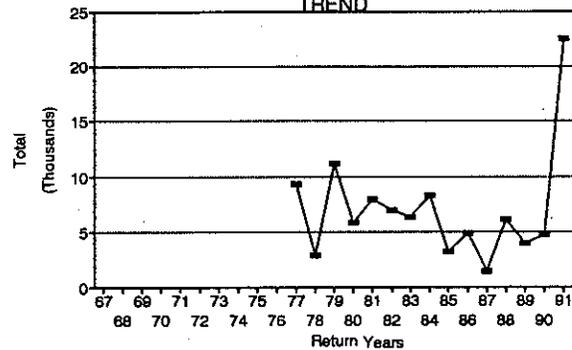
DATA QUALITY-----> Good

Return Years	HARVEST Total	ESCAPE Total	RUNSIZE Hatchery
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77	957	9347	10304
78	3343	2856	6249
79	14471	11189	25663
80	8671	5829	14500
81	8134	7995	14443
82	8512	7021	15533
83	1679	6392	8071
84	15737	8287	24024
85	5492	3186	8678
86	17687	4907	21332
87	7431	1431	8801
88	10425	6156	16582
89	4562	3964	8526
90	6048	4738	10787
91	15986	22531	38517

HARVEST TREND



ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **OVERVIEW -- QUINAULT SOCKEYE STOCK**

### **QUINAULT**

#### **STOCK DEFINITION AND ORIGIN**

The Quinault River stock presently consists of naturally produced sockeye. The early run timing of the sockeye stock is unique to the Quinault River system. River entry begins during January, peaks from late May to early July and entry is usually complete by the end of July.

#### **STOCK STATUS**

The stock status is Healthy, with run size averaging 41,500 during the last five years.



## QUINAULT -- QUINAULT SOCKEYE

### **STOCK DEFINITION AND ORIGIN**

The Quinault River basin presently supports naturally-produced sockeye. Large releases of hatchery sockeye obtained from native brood stock were made during the 1940s but were discontinued. The Quinault tribal facility did release sockeye during the late 1970s and early 1980s, but discontinued this program due to disease concerns.

Run timing of the sockeye stock is unique to the Quinault River system. A small amount of river entry begins during January and continues until the peak run timing in late May or early July. River entry is usually complete by the end of July.

The Quinault sockeye are also unique in that over-summer adult rearing occurs in Lake Quinault until upper river entry beginning in November.

Spawning occurs from November through February.

### **STOCK STATUS**

The status of this stock is Healthy.

Estimated run sizes have ranged from 12,200 to 134,100 since 1971. The run size has averaged 48,500 for the last ten years and 41,500 during the last five years.

Spawning escapement abundance has been estimated using hydroacoustic techniques since the mid-1970s.

Past genetic research has shown that the Quinault River sockeye is distinct from other sockeye stocks.

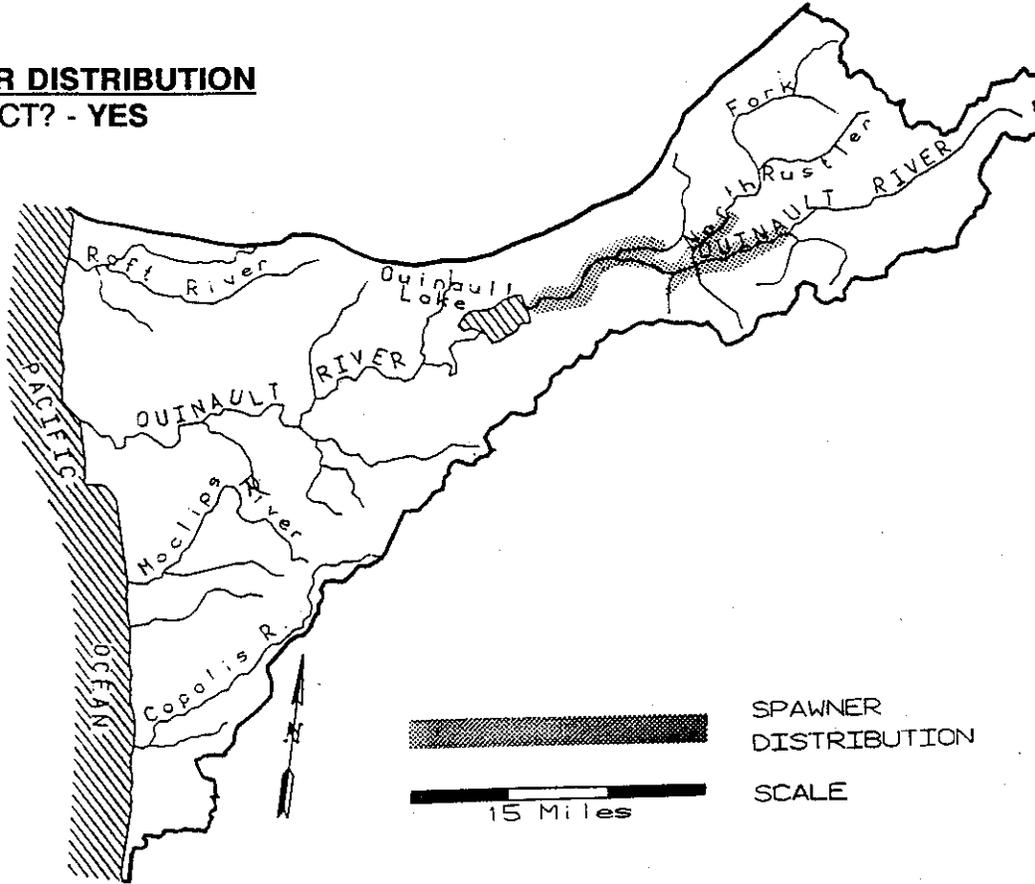
### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities outside of the National Park Boundaries.

**Harvest Management** -- The present tribal escapement floor is 26,500 adults past the commercial fishery. Sockeye catches since 1967 have ranged from 413 to 73,612. Sockeye catches have averaged 10,300 during the last ten years and 11,950 during the last five years.

# STOCK DEFINITION PROFILE for Quinault Sockeye

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES



**TIMING**

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - NO

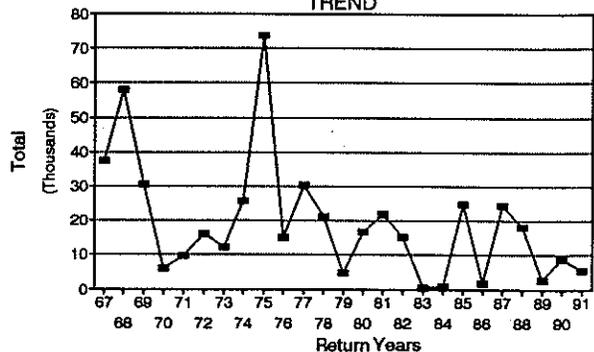
# STOCK STATUS PROFILE for Quinault Sockeye

## STOCK ASSESSMENT

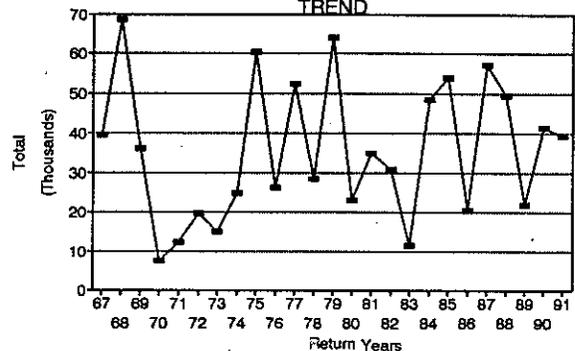
DATA QUALITY-----> Good

Return Years	HARVEST Total	ESCAPE Total	RUNSIZE Total
67	37556	39517	77127
68	58010	68649	126659
69	30576	36184	66760
70	5987	7496	13483
71	9701	12454	22155
72	16185	19816	36001
73	12369	15200	27567
74	25629	25000	50629
75	73612	60487	134099
76	14904	26420	43324
77	30400	52390	82790
78	21022	28586	49608
79	4666	64172	68838
80	16653	23057	39710
81	21743	34949	56692
82	15329	30909	46238
83	413	11546	12225
84	838	48550	49497
85	24736	54000	78736
86	1894	20516	22789
87	24347	57186	83698
88	18169	49492	69471
89	2691	22017	25596
90	8965	41536	51642
91	5566	39317	45475

HARVEST TREND



ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution, Timing*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

**Hatchery--** No hatchery production has occurred in recent years. It is expected that a small scale release program may occur in the near future in cooperation with the U.S. Forest Service.

## OVERVIEW -- QUINAULT SUMMER AND WINTER STEELHEAD STOCKS

SUMMER:  
QUINAULT

WINTER:  
QUINAULT/LAKE QUINAULT  
QUINAULT

### STOCK DEFINITION AND ORIGIN

In the Quinault River basin, one summer steelhead stock and two possible winter steelhead stocks/spawning populations have been identified. Wild summer steelhead in the Quinault River and wild winter steelhead in the lower Quinault River/Lake Quinault and the upper Quinault River may be distinct stocks. Wild summer and winter steelhead are native.

There is little or no information available to indicate that these are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. There may be more or fewer stocks identified once comprehensive genetic information is available.

Run timing of the summer steelhead stock (May through October) is distinct from run timing of the winter steelhead stocks (November through April) with some overlap in May.

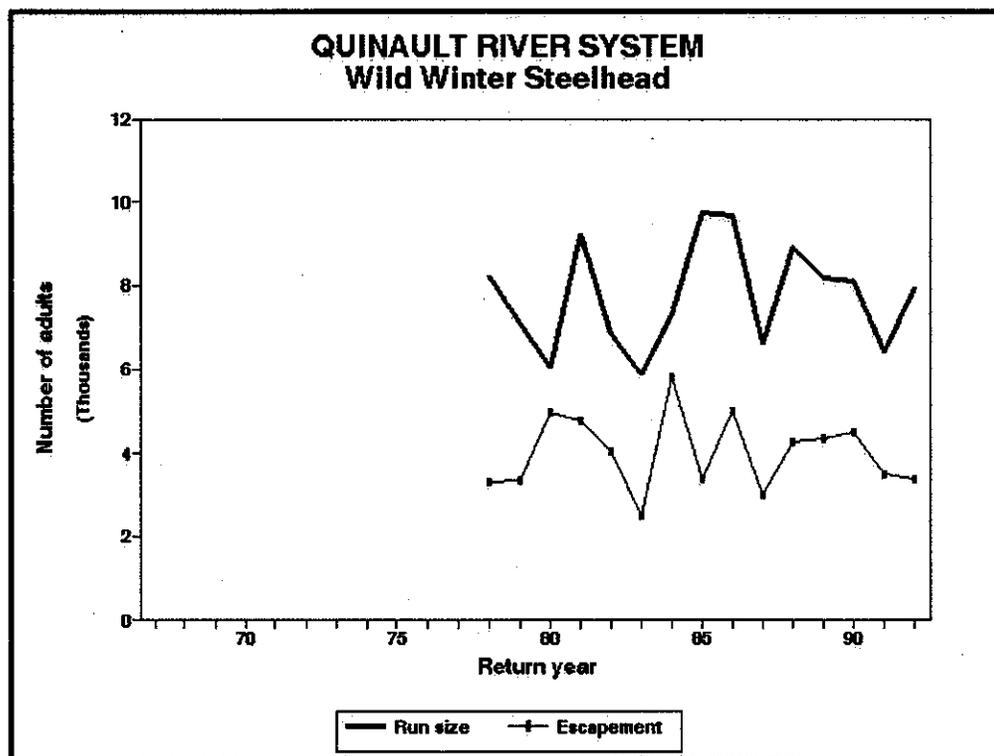
The native summer stock was historically a small run of fish limited by its habitat. These fish are assumed to have developed in areas isolated from the native winter stocks. Since only a few miles of stream were used, summer steelhead populations were small.

About 300,000 hatchery winter steelhead smolts are planted in the Quinault River system annually. Hatchery smolts originating from Quinault River stocks are raised in the Quinault Indian Nation Lake Quinault Hatchery and the U.S. Fish and Wildlife Service Quinault National Fish Hatchery. Both facilities have also historically released a wide range of fry into the lower Quinault system. Returning adults from smolt and fry releases are expected to contribute to natural production. The contribution to the wild stock from hatchery fish spawning in the wild, however, is unknown.

No hatchery summer steelhead smolts are stocked in the Quinault River system. Hatchery summer steelhead adults from other coastal rivers, however, are known to stray into the Quinault basin.

## STOCK STATUS

Wild winter steelhead spawner escapement and run size have been monitored for the Quinault River system since the 1977-78 season. Wild escapement has ranged from 2,488 to 5,774 fish and wild run size has ranged from 5,853 to 9,726 fish (see figure).



Beginning with the 1984-85 season, an escapement objective of 1,200 winter steelhead was derived for the Upper Quinault River, and the fisheries were managed to achieve this objective. This objective is to be achieved by wild adults and does not include hatchery fish spawning in the wild. Since the escapement objective was derived, wild escapement in the Upper Quinault River has ranged from 1,192 to 2,644 fish and averaged 1,566 fish, exceeding the objective in all years (see Stock Report).

Wild winter steelhead are harvested in significant numbers by both the commercial and recreational fisheries. The wild winter steelhead run in the Quinault River system supports a gill net fishery by the Quinault Tribe on the lower eight miles of the Quinault River from November through April. A tribal sport fishery, which includes non-tribal participants accompanied by tribal members, occurs throughout the mainstem downstream of Lake Quinault. Non-tribal sport anglers fish in the upper Quinault River from Lake Quinault inlet upstream to the forks, a distance of 10.5 miles, from November through March.

During the 1977-78 through 1991-92 return years, the wild winter steelhead run in the

Quinault River system was comprised of 5.8 percent sport harvest, 41.8 percent tribal harvest and 51.7 percent escapement (see table). Spawner escapement of wild winter steelhead in the Quinault basin was comprised of about 65 percent in the Quinault/Lake Quinault stock and 35 percent in the Quinault stock.

**Quinault River system wild winter steelhead sport harvest, tribal harvest, spawner escapement, and run size from 1977-78 through 1991-92. 1/**

Return year	Sport harvest	Tribal harvest	Spawner escapement	Run size
1977-78	1,371	3,342	3,295	8,212
1978-79	1,183	2,109	3,328	7,071
1979-80	227	670	4,940	6,032
1980-81	158	3,676	4,784	9,189
1981-82	620	3,055	4,042	6,830
1982-83	303	2,962	2,488	5,853
1983-84	15	1,329	5,774	7,268
1984-85	278	6,068	3,380	9,726
1985-86	332	4,323	4,998	9,654
1986-87	296	3,327	2,991	6,614
1987-88	353	4,268	4,266	8,887
1988-89	365	3,481	4,340	8,186
1989-90	633	2,934	4,514	8,081
1990-91	204	2,748	3,464	6,416
1991-92	373	4,187	3,384	7,944

Mean run size distribution, 1977-78 to 1991-92

447	3,232	3,99	7,731
5.8%	41.8%	51.7%	

1/ Numbers in table are subject to revision.

Wild summer steelhead spawner escapement is not monitored and escapement goals have not been identified. Because spawn timing overlaps with both coho salmon and wild winter steelhead, spawner escapement is not used to measure abundance.

There is a limited directed tribal fishery on the wild summer steelhead stock mainly during the month of July. Wild summer steelhead are also harvested incidentally during a directed sockeye fishery with small mesh gill nets. Prior to 1992, sport fishery regulations allowed harvest of wild summer steelhead. The stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992. Little sport fishery effort occurs within the Quinault Indian Reservation on the summer stock. It is expected that with current regulations in place these stocks will reach populations levels dictated by their limited habitats.



## QUINAULT -- QUINAULT SUMMER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Quinault River are native and a distinct stock based on the geographic distribution of the spawning population. They are distinct from wild winter steelhead in the Quinault River based on run timing.

Spawning distribution is not well known for summer steelhead in the Quinault basin, although sport catch data suggests pre-spawning adults tend to congregate in the upper reaches of the Quinault River by late summer and early fall. Spawning is generally believed to take place in the upper reaches of the river.

There is little or no information available to indicate that the wild summer steelhead stock in the Quinault basin is a genetically distinct stock. The stock is treated separately due to the geographic distribution of the spawning population. There may be more or fewer stocks identified once comprehensive genetic information is available.

Similar to other wild summer steelhead stocks in the north Pacific coast area, run timing is generally from May through October and spawn timing is unknown but believed to be from January through April.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified. Because spawn timing overlaps with both coho salmon and wild winter steelhead, spawner escapement is not presently used to measure abundance.

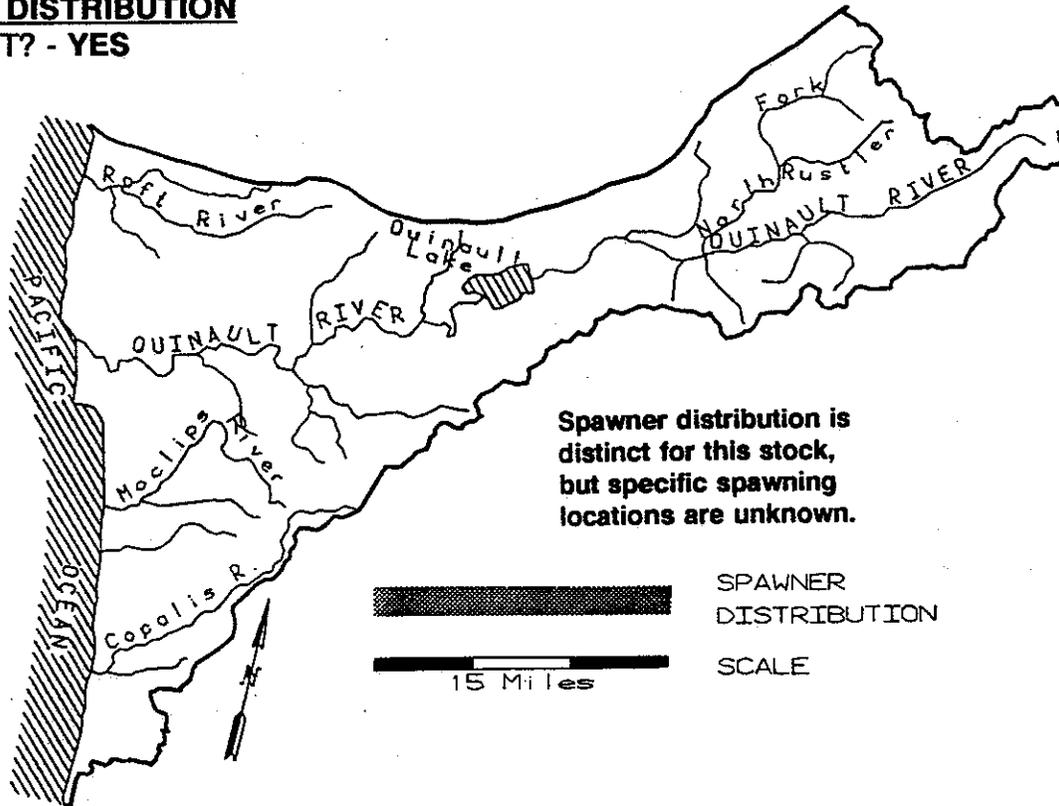
Total (sport + tribal) harvest of summer steelhead (which may include some hatchery strays) has ranged from about 150 to 1,800 fish since 1975. The average harvest for the last ten years has been 910 fish. The average harvest for the last five years has been 780 fish. This trend information may indicate that the status of the stock is Healthy. Separation of hatchery and wild composition of the harvest needs to be completed.

Sport harvest information is available for many years, but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information of wild summer steelhead is available over the entire run, but wild sport harvest is too low to be used to assess the status of the wild stock.

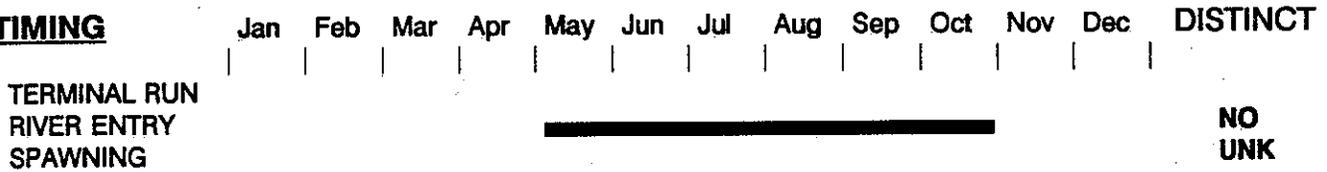
# STOCK DEFINITION PROFILE for Quinault Summer Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Quinault Summer Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return	HARVEST			
Years	Sport			

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	12
87	8
88	0
89	18
90	4
91	2

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

More information needs to be collected on this stock so that stock status can be determined.

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter-run, summer-run, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that common factor(s) to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean, and catch of steelhead in authorized and unauthorized high seas drift net fisheries.

Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data are limited.

**Harvest Management** -- There is a limited directed tribal fishery on the wild summer steelhead stock mainly during the month of July. Wild summer steelhead are also harvested incidentally during a directed sockeye fishery with small mesh gill nets. Prior to 1992, sport fishery regulations allowed harvest of wild summer steelhead. The stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992. Little sport fishery effort occurs within the Quinault Indian Reservation on the summer stock. Beginning in the 1993-1994 season, sport anglers will be able to document on a permit card the number of steelhead that are caught and released. This may allow WDFW to monitor trends in wild stock abundance and assess the status of the stock/spawning population.

**Hatchery** -- Hatchery summer steelhead smolts have not been stocked, but strays from Grays Harbor and the Columbia River are caught in sport and tribal fisheries.

## **QUINAULT -- QUINAULT / LAKE QUINAULT WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in Lake Quinault and the lower Quinault River, primarily downstream of Lake Quinault, may be a distinct stock based on the geographic distribution of the spawning population.

There is little or no information available to indicate that wild winter steelhead stocks/spawning populations in the Quinault basin are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using enzyme electrophoretic techniques, but cluster analyses suggest that steelhead from the upper Quinault River may be a distinct stock and that Lake Quinault may possibly serve as a barrier to gene flow. There may be more or fewer stocks identified once comprehensive genetic information is available.

Similar to some other wild winter steelhead stocks in the north Pacific coast area, run timing is generally from November through April and spawn timing is generally from February through June.

Wild winter steelhead are native to the lower Quinault River. Hatchery steelhead smolts originating from Quinault River stocks are raised in the Quinault Indian Nation Lake Quinault Hatchery and the Quinault National Fish Hatchery on Cook Creek within the Quinault Reservation. Some returning hatchery adults are expected to stray and spawn naturally in the wild. Releases of large numbers of hatchery fry have occurred throughout the Quinault Indian Reservation on the lower Quinault River. There is some contribution to the wild stock from hatchery fish spawning in the wild, so the stock is of mixed origin and sustained by natural production.

### **STOCK STATUS**

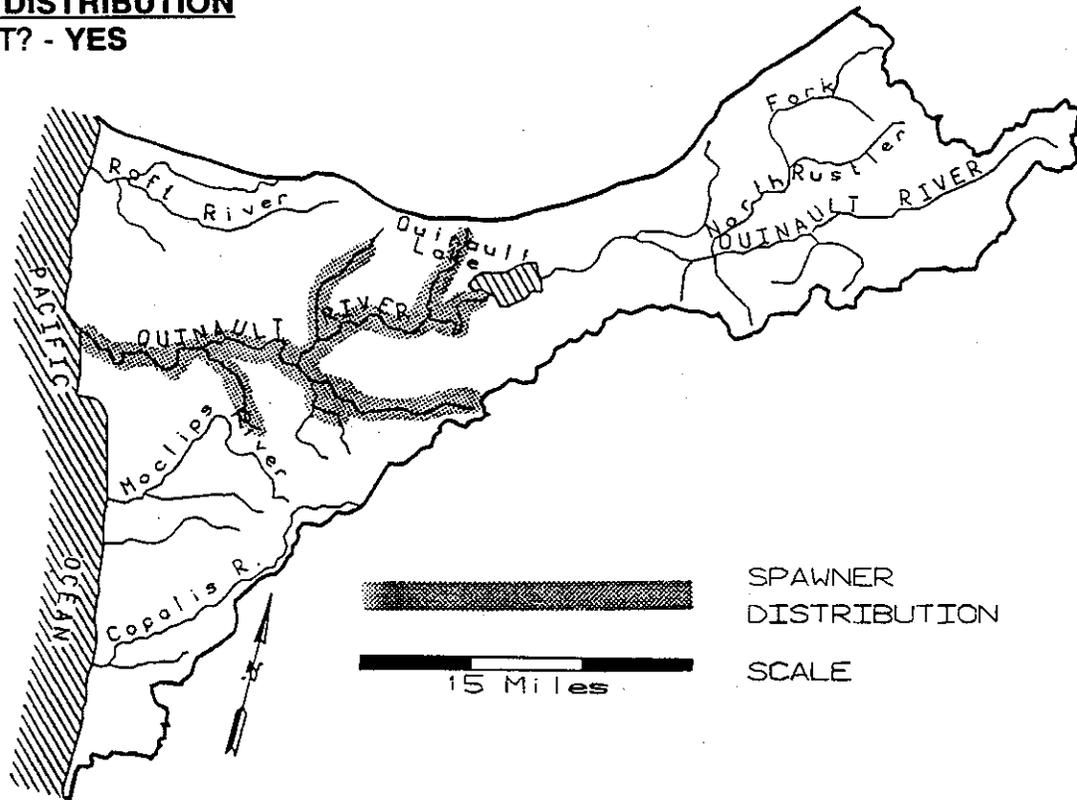
Stock status is based upon wild steelhead spawner escapement. Spawner escapement of wild winter steelhead in the Quinault basin was comprised of about 65 percent Quinault/Lake Quinault stock and 35 percent Quinault stock.

Spawner escapement has ranged from 1,716 to 3,646 wild steelhead during the 1978 through 1987 seasons and from 1,745 to 3,002 wild steelhead during the 1988 through 1992 seasons. Spawner escapement averaged 2,358 fish during the last ten years and averaged 2,506 fish during the last five years.

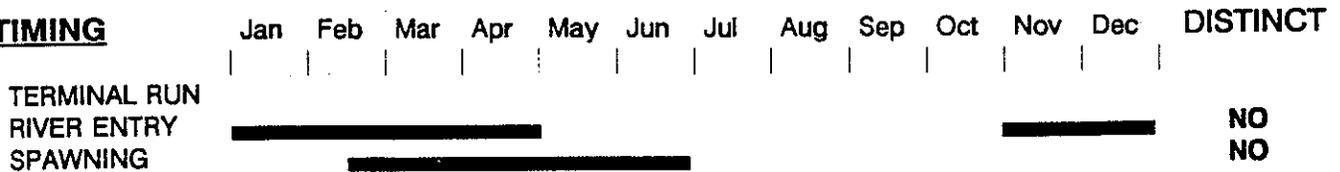
# STOCK DEFINITION PROFILE for Quinault/Lake Quinault Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

**GENETICS** - Genetic cluster analyses suggest that steelhead from the upper Quinault River may be a distinct stock and that Lake Quinault may possibly serve as a barrier to gene flow.

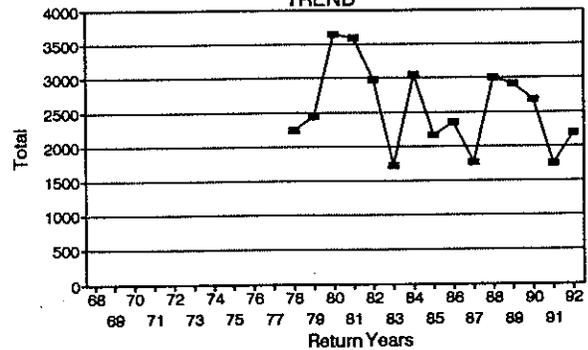
# STOCK STATUS PROFILE for Quinault/Lake Quinault Winter Steelhead

## STOCK ASSESSMENT

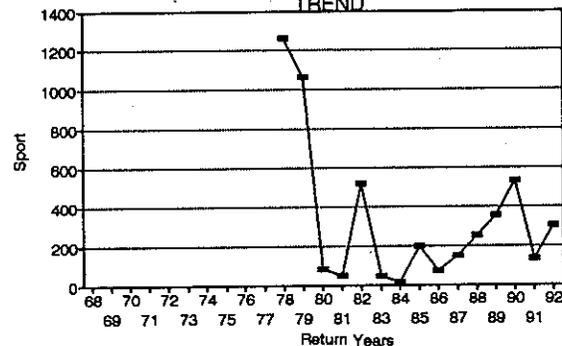
DATA QUALITY-----> Good

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78	2234	1263		
79	2436	1061		
80	3646	84		
81	3592	51		
82	2972	519		
83	1716	47		
84	3052	15		
85	2162	200		
86	2354	72		
87	1764	150		
88	3002	253		
89	2910	356		
90	2682	536		
91	1745	135		
92	2192	306		

ESCAPE TREND



HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter-run, summer-run, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that common factor(s) to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean, and catch of steelhead in authorized and unauthorized high seas drift net fisheries.

Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data is limited.

**Harvest Management** -- There is a directed tribal fishery on the wild winter steelhead run which operates on a fixed schedule to obtain an escapement objective of 1,200 fish in the Quinault wild winter stock. The Quinault/Lake Quinault wild stock is given secondary management consideration to the harvest of hatchery fish. Separation of the tribal harvest between the two possible wild winter stocks is unavailable at this time. The lower river sport fishery operates with regulations provided by the Quinault Indian Nation on reservation waters. Sport harvest includes some Quinault (upper) stock which cannot be distinguished from the Quinault/Lake Quinault stock.

**Hatchery** -- Hatchery winter steelhead smolts have been stocked in the lower Quinault River since the early 1970s. Some returning hatchery adults are expected to stray and spawn naturally in the wild. Releases of large numbers of hatchery fry have occurred throughout the Quinault Indian Reservation on the lower Quinault River. There is some contribution to the wild stock from hatchery fish spawning in the wild.

## QUINAULT -- QUINAULT WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the upper Quinault River, primarily upstream of Lake Quinault, may be a distinct stock based on the geographic distribution of the spawning population.

There is little or no information available to indicate that wild winter steelhead stocks/spawning population in the Quinault basin are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using electrophoretic techniques, but cluster analyses suggest that steelhead from the upper Quinault River are a distinct stock and that Lake Quinault may serve as a barrier to gene flow. There may be more or fewer stocks identified once comprehensive genetic information is available.

Similar to some other wild winter steelhead stocks in the north Pacific coast area, run timing is generally from November through April and spawn timing is generally from February through June.

Wild winter steelhead are native to the upper Quinault River. Hatchery steelhead smolts originating from Queets River and Quinault River stocks are raised in the Quinault Indian Nation Lake Quinault Hatchery and the Quinault National Fish Hatchery at Cook Creek and stocked in the lower Quinault River within the Quinault Reservation. There is little contribution to the wild stock from hatchery fish spawning in the wild.

### **STOCK STATUS**

The wild winter steelhead stock in the upper Quinault River is Healthy.

Stock status is based upon wild steelhead spawner escapement.

Spawner escapement has ranged from about 772 to 2,722 wild steelhead during the 1978 through 1987 seasons and from 1,192 to 1,832 wild steelhead during the 1988 through 1992 seasons. Spawner escapements averaged about 1,600 fish during the last ten years and averaged about 1,500 fish during the last five years. The escapement objective for the area upstream of Lake Quinault is 1,200 fish.



# STOCK STATUS PROFILE for Quinault Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Good

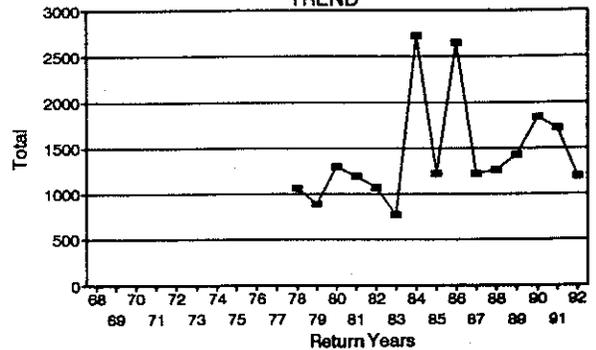
Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78	1061	108		
79	892	122		
80	1294	143		
81	1192	107		
82	1070	101		
83	772	256		
84	2722	0		
85	1218	78		
86	2644	260		
87	1227	146		
88	1264	100		
89	1430	9		
90	1832	97		
91	1719	69		
92	1192	67		

Escapement objective = 1200

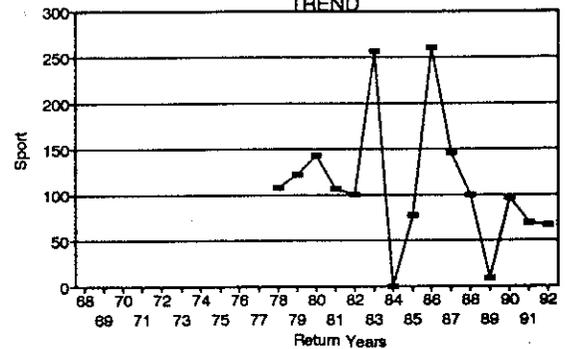
## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

ESCAPE TREND



HARVEST TREND



## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

SPORT AND TRIBAL HARVEST OCCURS IN MIXED STOCK AREAS BUT CANNOT BE SEPARATED FOR EACH STOCK

## **FACTORS AFFECTING PRODUCTION**

**Habitat --** A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter-run, summer-run, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that common factor(s) to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean, and catch of steelhead in authorized and unauthorized high seas drift net fisheries.

Freshwater habitat has been degraded by land-use (forest management) activities outside National Park boundaries, although quantitative data are limited.

**Harvest Management --** There is a directed tribal fishery on the wild winter steelhead run which operates on a fixed schedule to obtain an escapement objective of 1,200 fish in the Quinault wild winter stock while providing a limited sport fishery in the upper river. Separation of the tribal harvest between the Quinault/Lake Quinault and Quinault wild winter stocks is unavailable at this time. The upper river sport fishery operates with regulations provided by the Washington Department of Fish and Wildlife (state waters) and Olympic National Park (park waters).

**Hatchery --** Limited numbers of hatchery winter steelhead fry have been stocked in the upper Quinault River. Many of the releases were part of migration and production studies. It is expected that there is some contribution to the wild stock from hatchery fish spawning in the wild. Hatchery strays would also come from the Quinault Indian Nation's tribal net pen and hatchery facility located within Lake Quinault which has an annual production of about 160,000 smolts and has contributed a wide range of fry releases to areas downstream and around Lake Quinault.

## OVERVIEW -- MOCLIPS / COPALIS CHINOOK STOCKS

### MOCLIPS COPALIS

#### STOCK DEFINITION AND ORIGIN

Moclips and Copalis fall chinook stocks likely do not exist. Straying may be the sole source of the small catch numbers sporadically observed. Escapement has not been monitored.

#### STOCK STATUS

The Quinault Indian Nation technical staff, after further review of past and current data, have concluded that no fall chinook stocks exist in this system. It is assumed that any catches are strays from neighboring river systems.

The Moclips River has a historical record of essentially no chinook catches. Tribal catch records from 1939 to 1962, and from 1984 to 1993, show a total chinook catch of three fish, two in 1988 and one in 1991. Although the Moclips has been closed to sport fishing, the WDFW sport catch punch cards do show four total chinook caught in the Moclips, two fish in both 1986 and 1987.

The existence of a Copalis fall chinook stock is also debatable in light of a sport catch of zero to eight chinook a year since 1974, an average of two fish a year. The treaty net catch has general been zero or one chinook a year, except for 1986 when 18 were caught. These tidal area catches were likely strays from nearby river systems which contain productive runs of chinook.

There is no information for individual stock reports.



## **OVERVIEW -- MOCLIPS / COPALIS COHO STOCKS**

### **MOCLIPS COPALIS**

#### **STOCK DEFINITION AND ORIGIN**

Coho salmon are native to both the Moclips and Copalis rivers. Due to the lack of genetic data, stocks have been separated based primarily on geography. The Moclips and Copalis Rivers have separate watersheds that independently drain into the Pacific Ocean.

Run and spawn timing are similar to those of other fall coho stocks in the north coast area. River entry occurs during the months of September through December. Spawning occurs during the months of November through January.

Composite production due to mass fry releases has been the mode from 1962 through 1992 in the Moclips. The Copalis was planted with hatchery fry from the mid-1970s through the mid-1980s. Hatchery straying may continue to impact these relatively small populations. Moclips and Copalis natural coho stocks can both be considered as mixed stocks.

#### **STOCK STATUS**

The status of both the Moclips and Copalis coho stocks is Unknown. Escapement has not been monitored. Terminal run sizes have not been estimated.

Ocean distribution/contribution of Moclips/Copalis natural fall coho has not been established through coded-wire tag studies. It is assumed they follow the same pattern as the hatchery stocks from the Quinault National Fish Hatchery. Information gained from hatchery stock tagging studies indicates that contributions are highest to the British Columbia fisheries. Similar to other coastal coho stocks, contributions are also made to Oregon fisheries, Washington ocean, Washington coastal net, freshwater sport, and to a much smaller degree, to southeast Alaska, Puget Sound and Columbia River fisheries.



## **MOCLIPS / COPALIS -- MOCLIPS COHO**

### **STOCK DEFINITION AND ORIGIN**

Run and spawn timing are assumed to be similar to those of other coho stocks in the north coast area. River entry occurs during the months of September through December, and spawning occurs during the months of November through January. Spawning distribution is not known.

Composite production due to Quilcene, Lake Pleasant, Purdy Creek, Sol Duc, Willapa, and Quinault hatchery smolt, fingerling, and fry releases has been on-going from 1962 through 1992 in the Moclips. Stray coho (hatchery and wild stocks) from larger nearby river systems could also have a significant influence upon the stock in this small river. Therefore, the current stock is best described as a composite.

### **STOCK STATUS**

The status of Moclips coho is Unknown but believed to be stable based upon recent harvest numbers.

Escapement has not been monitored. There are some limited spawning ground survey data from the Moclips, but not sufficient to estimate escapements. Terminal run sizes have not been estimated.

Ocean distribution/contribution of Moclips natural fall coho has not been established through coded-wire tag studies. It is assumed they follow the same pattern as the hatchery stocks from the Quinault National Fish Hatchery. Information gained from hatchery stock tagging studies indicates that contributions are highest to the British Columbia fisheries. Similar to other coastal coho stocks, contributions are also made to Oregon fisheries, Washington ocean, Washington coastal net, and to a much smaller degree, to southeast Alaska, Puget Sound, and Columbia River fisheries.

The Moclips River has been closed to salmon sport fishing, but punch card reports since 1979 have ranged from zero to 27 sport-caught coho. The Moclips treaty net fishery averaged over 600 coho/year from the mid-1930s through the mid-1950s. Then catches dropped dramatically to less than 100 fish a year, due to forest practices within the watershed. A treaty net fishery has opened sporadically since 1984, and with a very limited effort catches have averaged about 170 coho/year for the 1988 to 1991 seasons.

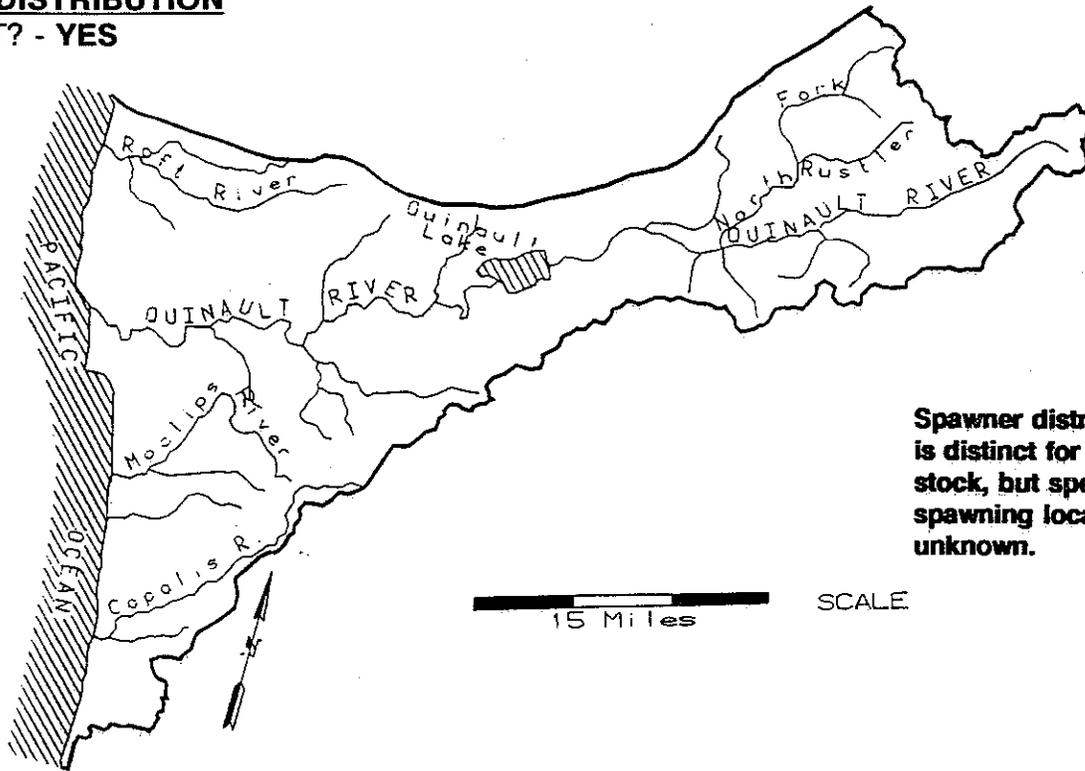
### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data are limited.

# STOCK DEFINITION PROFILE for Moclips Coho

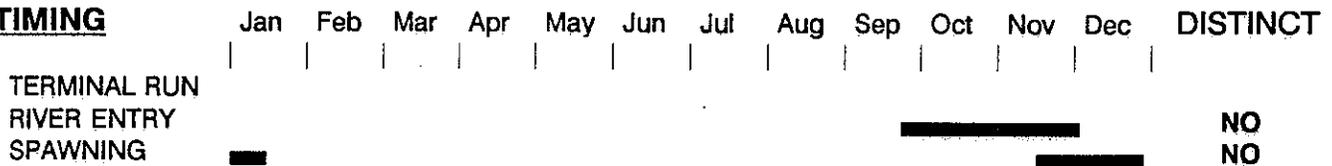
## SPAWNER DISTRIBUTION

DISTINCT? - YES



Spawner distribution is distinct for this stock, but specific spawning locations are unknown.

## TIMING



## BIOLOGICAL CHARACTERISTICS

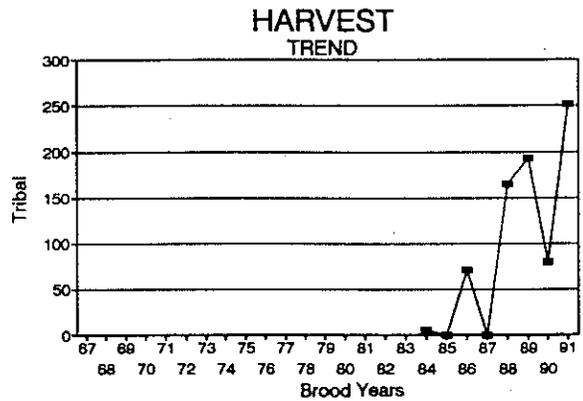
DISTINCT? - NO

# STOCK STATUS PROFILE for Moclips Coho

## STOCK ASSESSMENT

DATA QUALITY----> FAIR

Brood Years	HARVEST Tribal			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	5			
85	0			
86	72			
87	0			
88	165			
89	193			
90	80			
91	251			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- There is no salmon sport fishery on the Moclips River. A tribal fishery, open to one designated fisherman for three days a week, generally runs from mid-September through February.

**Hatchery** -- The Moclips River has been planted with fry and smolts from numerous hatcheries between 1962 and 1992. The returning adults have been permitted to spawn naturally. It is believed that there was considerable contribution to the wild population from hatchery spawners and that strays from other systems continue to support this population.

## MOCLIPS / COPALIS -- COPALIS COHO

### **STOCK DEFINITION AND ORIGIN**

Run and spawn timing for Copalis coho are assumed to be similar to those of other fall coho stocks in the north coast area. River entry occurs during the months of September through December, and spawning occurs during the months of November through January. Spawning distribution is not known.

The Copalis River was planted with Willapa, Humptulips, Sol Duc, and Quinault hatchery smolts and fry from the mid-1970s through the mid-1980s. Stray coho (hatchery and wild stocks) from larger nearby river systems could also have a significant influence upon the stock in this small river. Therefore, the current stock is best described as a mixed stock with composite production.

### **STOCK STATUS**

The stock status of Copalis coho is Unknown, but believed to be stable.

Escapement has not been monitored. Terminal run sizes have not been estimated.

Ocean distribution/contribution of Copalis natural fall coho has not been established through coded-wire tag studies. It is assumed they follow the same pattern as the hatchery stocks from the Humptulips Salmon Hatchery and Quinault National Fish Hatchery. Information gained from hatchery stock tagging studies indicates that contributions are highest to the British Columbia fisheries. Similar to other coastal coho stocks, contributions are also made to Oregon fisheries, Washington ocean fisheries, local freshwater sport fisheries, and to a much smaller degree, to Washington coastal net, southeast Alaska, Puget Sound, and Columbia River fisheries.

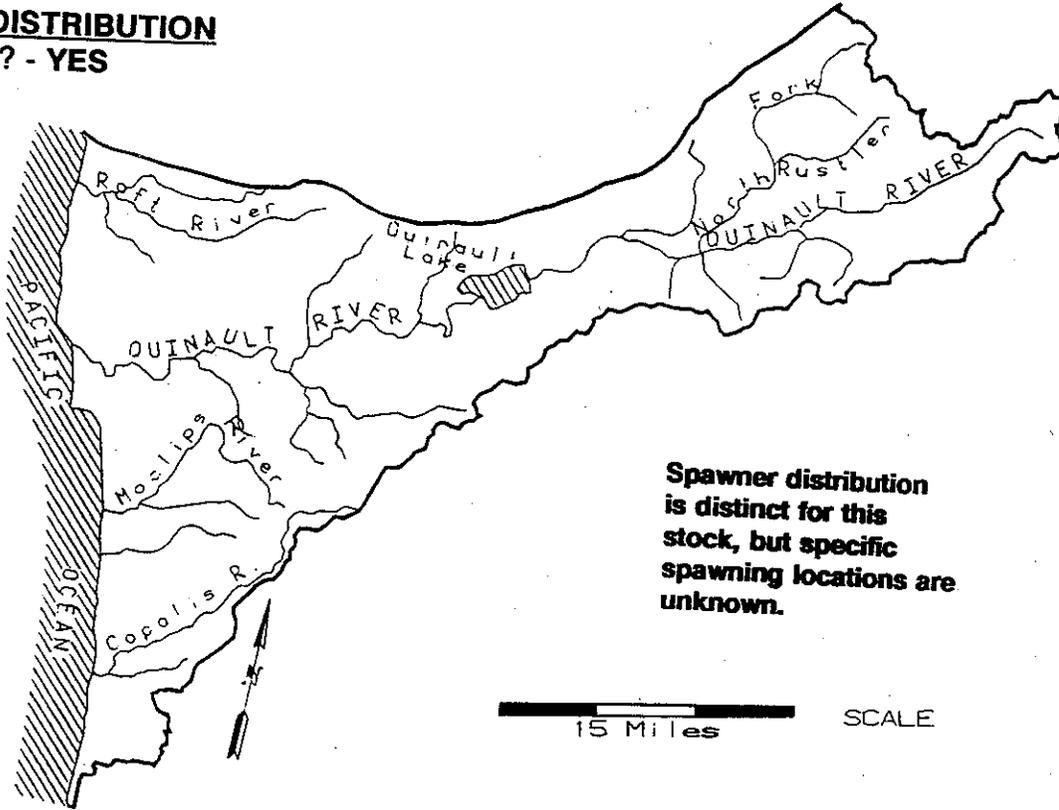
The Copalis sport fishery caught less than two dozen coho a year until consistent fry plants started in the early 1980s. The Copalis coho sport catch averaged close to 100 fish a year during the period of fry plants, and then dropped back to the previous lower level until the 1991 return year. The 203 sport caught Copalis River coho in 1991 may be attributable to strays and a high production year. The Copalis treaty net fishery operated sporadically between 1984 and 1991, catching zero to 64 coho per year.

### **FACTORS AFFECTING PRODUCTION**

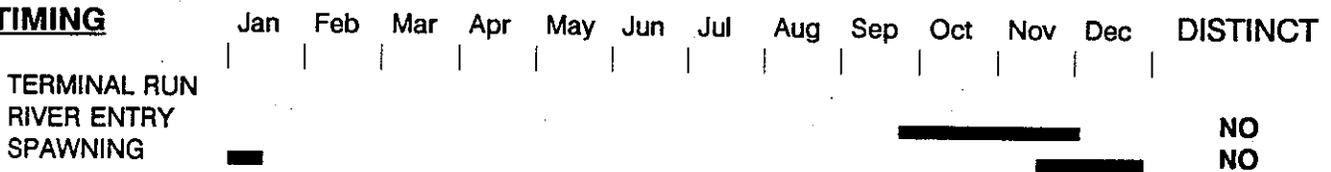
**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data are limited.

# STOCK DEFINITION PROFILE for Copalis Coho

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES



**TIMING**



**BIOLOGICAL CHARACTERISTICS**

DISTINCT? - NO

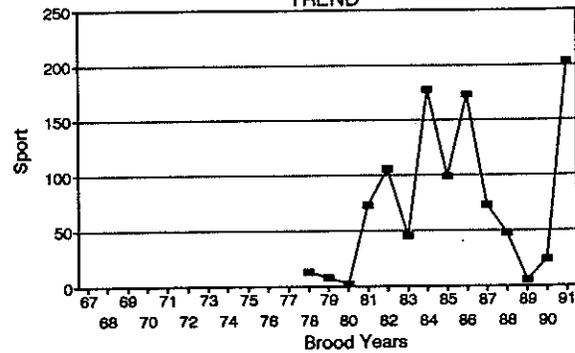
# STOCK STATUS PROFILE for Copalis Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Brood Years	HARVEST Sport	HARVEST Net
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78	13	
79	8	
80	2	
81	73	
82	106	
83	45	
84	178	0
85	99	64
86	173	6
87	73	0
88	48	0
89	6	0
90	24	0
91	203	50

HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- There is a salmon sport fishery on the Copalis River. A treaty net fishery has been available to one fisherman in recent years, but has received little participation.

**Hatchery** -- The Copalis River has been planted with fry and smolts from numerous hatcheries from the mid-1970s to the mid-1980s. The returning adults have been permitted to spawn naturally. It is believed that there was considerable contribution to the wild population from hatchery spawners, and that strays from other systems continue to support this population.

## **OVERVIEW -- MOCLIPS / COPALIS SUMMER AND WINTER STEELHEAD STOCKS**

**WINTER:  
MOCLIPS  
COPALIS**

### **STOCK DEFINITION AND ORIGIN**

In the Moclips/Copalis basin, no summer steelhead stocks and two winter steelhead stocks have been identified. Wild winter steelhead in the Moclips River and Copalis River are distinct stocks based on geographic distribution of the spawning populations and are native.

There is little or no information available to indicate that these are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. There may be more or fewer stocks identified once comprehensive genetic information is available.

### **STOCK STATUS**

The stock status for Moclips winter steelhead is Healthy based on wild spawner escapement.

The status of the Copalis winter steelhead stock is Unknown because of insufficient information. Spawner escapements for the Copalis have not been monitored.

Neither sport or tribal net data can be used to assess stock status as both these fisheries close before traditional wild steelhead peak run timing.

More information on the Moclips River and Copalis River winter steelhead are presented in separate Stock Reports.



## **MOCLIPS / COPALIS -- MOCLIPS WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Moclips River and tributaries are native and a distinct stock based on the geographic distribution of the spawning population.

There is little or no information available to indicate that wild winter steelhead stocks in the Moclips/Copalis basin are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using electrophoretic techniques. There may be more or fewer stocks identified once comprehensive genetic information is available.

Hatchery steelhead smolts and fry originating from WDFW Chambers Creek hatchery were stocked in 1972. Quinault stock hatchery fry were stocked throughout the 1980s and up to 1992. The contribution to the wild stock from hatchery fish spawning in the wild is unknown but may be considerable.

Run timing (November through April) and spawn timing (January to early June) are similar to other wild winter steelhead stocks in the north Pacific coast area.

### **STOCK STATUS**

The status of the stock is Healthy.

Stock status is based on wild spawner escapement. Spawner escapement has been monitored since 1988 and has ranged from 130 wild winter steelhead in 1988 to 492 wild winter steelhead in 1992.

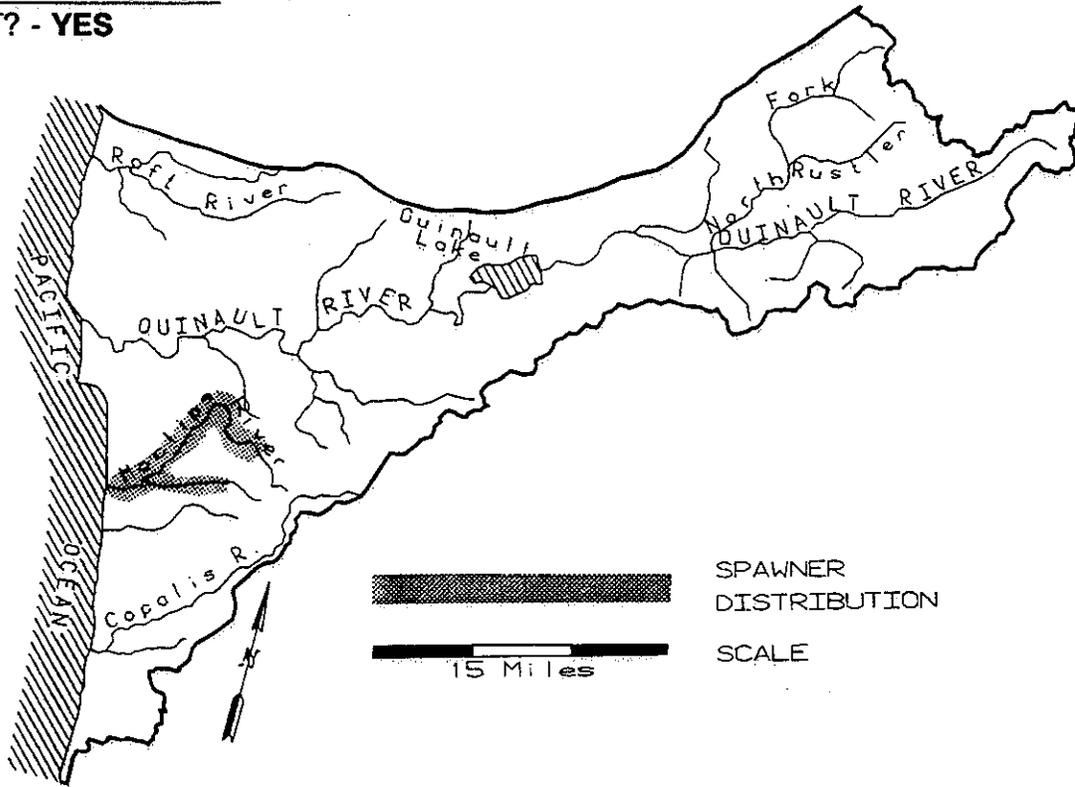
The Moclips wild stock supported a treaty commercial fishery through 1962. A treaty commercial fishery directed at hatchery winter steelhead and strays was re-established in 1984. Since 1986, a limited fishery closing February 28 has been conducted, but with inconsistent effort. As a result, tribal harvest cannot be used to assess the status of the wild stock.

Sport harvest information is available for many years but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Information on sport harvest of wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest cannot be used to assess the status of the wild stock.

# STOCK DEFINITION PROFILE for Moclips Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													
RIVER ENTRY	████████████████████												
SPAWNING	████████████████					████████████████							

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

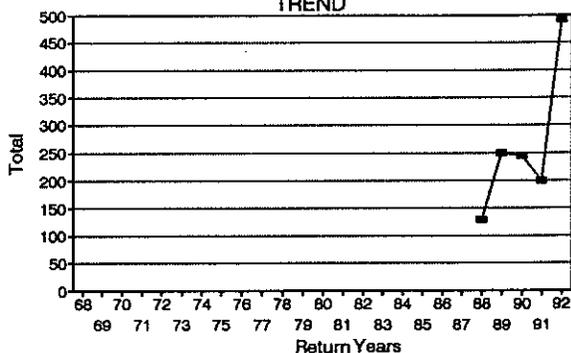
# STOCK STATUS PROFILE for Moclips Winter Steelhead

## STOCK ASSESSMENT

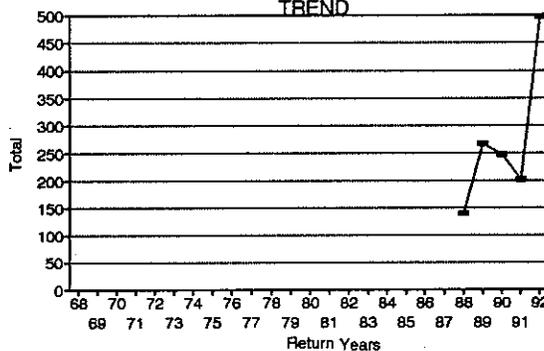
DATA QUALITY-----> Fair

Return Years	ESCAPE Total	RUNSIZE Total	HARVEST Sport	HARVEST Net
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				0
86				0
87				2
88	130	140		10
89	250	267	0	17
90	244	248	1	3
91	200	202	0	2
92	492	497	0	5

ESCAPE TREND



RUNSIZE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data is limited.

**Harvest Management** -- There is no directed tribal fishery on this wild stock. A limited tribal fishery directed on hatchery stocks has occurred since the 1986-87 season with hatchery winter steelhead comprising about 85 percent of the catch. The tribal commercial net fishery closes at the end of February before the traditional peak run timing for wild winter steelhead along the coast. The sport fishery is closed on February 28 before the majority of the wild stock enters the stream.

**Hatchery** -- The Moclips River has received hatchery plants over the years. The returning adults have been permitted to spawn naturally. Adult hatchery strays are caught in the treaty commercial fishery. It is likely that there is some contribution to the natural production from hatchery fish spawning in the wild.

## **MOCLIPS / COPALIS -- COPALIS WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Copalis River and tributaries are native and a distinct stock based on the geographic distribution of the spawning population.

There is little or no information available to indicate that wild winter steelhead stocks in the Moclips/Copalis basin are genetically distinct stocks. The stocks are treated separately due to the geographic distribution of the spawning populations. Reisenbichler and Phelps (1989) could not demonstrate genetic differences between winter steelhead stocks in the north Pacific coast area using enzyme electrophoretic techniques. There may be more or fewer stocks identified once comprehensive genetic information is available.

Run timing (November through April) and spawn timing (February to early June) are similar to other wild winter steelhead stocks in the north Pacific coast area.

Spawning distribution is not well known for winter steelhead in the Copalis River.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

The sport fishery was closed prior to the 1992-93 season. A limited tribal fishery directed at hatchery steelhead has been re-established. Since 1984, this fishery has had limited success due to lack of interest. The tribal net fishery closes at the end of February before the traditional peak run timing for wild winter steelhead stocks along the coast. As a result, neither tribal harvest nor sport harvest can be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, although quantitative data are limited.



# STOCK STATUS PROFILE for Copalis Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Return	NO DATA			
Years				

68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92

---

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

SPORT FISHERY CLOSED DURING  
1985-86 THROUGH 1991-92 SEASONS

**Harvest Management** -- There is no directed tribal fishery on this wild stock. A limited tribal fishery directed at hatchery steelhead has been attempted, but had limited success due to lack of interest. The tribal net fishery closes at the end of February before the traditional peak run timing for wild winter steelhead stocks along the coast. The sport fishery was closed prior to the 1992-93 season. During 1992-93, a sport fishery will close on February 28 before the majority of the wild stock enter the stream.

**Hatchery** -- Hatchery steelhead fingerlings originating from the Quinault National Fish Hatchery were stocked in the Copalis River in 1985. While hatchery steelhead smolts have been stocked in nearby streams, there is little contribution to the wild stock from hatchery fish spawning in the wild.

# OVERVIEW -- GRAYS HARBOR SPRING / SUMMER CHINOOK STOCKS

## CHEHALIS SPRING SATSOP SUMMER

### STOCK DEFINITION AND ORIGIN

Chehalis spring and summer chinook are considered separate stocks based on both geographic distribution and timing (river entry and historical spawner timing). Spring chinook are found in upper Chehalis areas (Skookumchuck River, Newaukum River and upper Chehalis River mainstem), while summer chinook are found in the East Fork Satsop River. Precise entry timing of adult spring chinook into the Chehalis River is unknown but is believed to start in late January or early February. Spring chinook catches in the Chehalis tribal reservation fishery (RM 44.0) have been reported as early as February supporting the January/February entry timing. Summer chinook entry timing is also unknown, but is believed to occur in late July and August (unpublished report, 1956). Spring chinook spawning typically begins in early September, peaks in late September/early October, and is generally completed by mid-October. Summer chinook spawning follows a similar timing pattern beginning in early September, peaking in late September, and is generally completed by early to mid-October.

A historical run of spring chinook has been widely reported to occur in the Wynoochee River. Very little information is available to confirm the existence of this run or establish historical abundance levels. A run size of 250, based on available spawning habitat and assumed contributions to various fisheries, was estimated in 1966. Aside from the returns of spring chinook likely resulting from mid-1970s releases of Cowlitz stock, no direct observations of chinook resembling spring chinook have been reported since the mid-1960s. The last recorded observations of spring like chinook in the Wynoochee were in 1955 and 1959, when adult/redd spawner counts of 2/2 and 1/0 were made in late August and early September. These observations were in upper mainstem areas near Big and Sixteen creeks. For whatever reason, a native spring chinook run has not been significantly present in the Wynoochee River since at least the mid-1950s. The presence of spring chinook in the Wynoochee remains disputed.

The only spring chinook introductions into the Chehalis basin occurred in the mid-1970s in the Wynoochee River with Cowlitz hatchery stock. Returns of these fish were minimal and have declined to near zero. This, coupled with the geographic separation (the Wynoochee river is 54.0 miles downstream from the closest major group), makes unlikely that any significant hybridization has taken place.

## STOCK STATUS

Due to a lack of ocean interception information it is difficult to describe the stocks' status. Like other spring/summer chinook stocks along the coast, it is highly probable that Chehalis spring/summer chinook contribute to southeast Alaska and British Columbia troll fisheries. The level of these contributions is unknown. In addition to these fisheries, spring chinook also contribute to the Chehalis tribal reservation fishery and in recent years to a small sport fishery. Summer chinook are not known to contribute to any local fishery. They may be taken in the July/August net fishery in Grays Harbor and/or the Chehalis River sport fishery, however these contributions have not been clearly documented.

## **GRAYS HARBOR -- CHEHALIS SPRING CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Chehalis spring chinook are found primarily in the Skookumchuck, Newaukum, and upper mainstem Chehalis (RM 88.0 to RM 108.0) rivers. Over 90 percent of spawning occurs in these three areas. The remainder are found in the North Fork Newaukum, Elk Creek, Stillman Creek, and the Chehalis mainstem downstream of RM 88.0. The limited existing genetic data do not indicate differences between the major groups. Precise timing information of adult entry into the Chehalis River is unavailable. Spring chinook are believed to begin entering the Chehalis River in late January or early February. Chinook catches in the Chehalis tribal reservation fishery (RM 44.0) have been reported as early as February and continue through the end of August. The catch peaks in this fishery in May and early June. Spawning typically begins in early September, peaks late September/early October, and is generally completed by mid-October.

The only spring chinook introductions into the Chehalis basin occurred in the mid-1970s in the Wynoochee River with Cowlitz hatchery stock. Returns of these fish were minimal and have declined to near zero. This coupled with the geographic separation (the Wynoochee river is 54.0 miles downstream from the closest major group), makes it unlikely that any significant hybridization has taken place.

Chehalis River spring chinook are assumed to be of native origin, with wild production.

### **STOCK STATUS**

The long-term abundance of Chehalis River spring chinook is stable, and status is Healthy.

It is highly probable that Chehalis spring chinook contribute to southeast Alaska and British Columbia troll fisheries. The level of these contributions are unknown.

Terminal run sizes have ranged from 669 in 1982 to nearly 3,600 in 1988. The average run size from 1982 through 1991 was just under 1,600. Over 90 percent of the total terminal run contributes to escapement. Escapements are averaging just under 1,500. Terminal runs appeared to build through the middle 1980s but since 1988 appear to be declining. The average total run size excluding 1988 (1988 was 50 percent higher than the next highest total run during this time) is 1,380, near the escapement goal. Average escapement excluding 1988 is 1,270, slightly below the desired escapement goal. Estimates of escapement are calculated using the cumulative redd technique. Due to the time of year, level of survey coverage, and normally excellent survey conditions, the escapement estimates are considered very good.



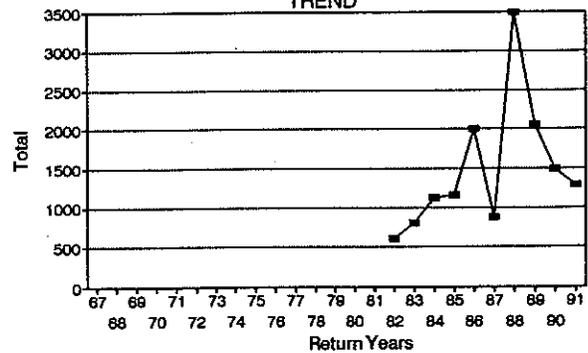
# STOCK STATUS PROFILE for Chehalis Spring Chinook

## STOCK ASSESSMENT

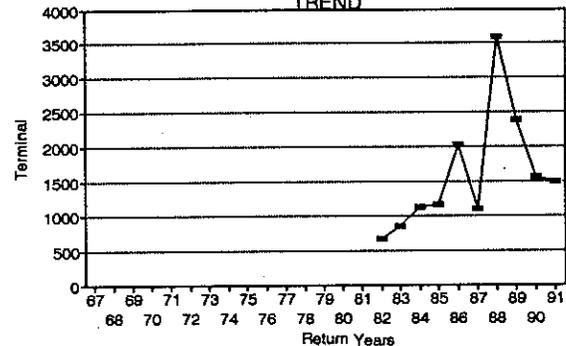
DATA QUALITY-----> Very Good

Return Years	ESCAPE Total	RUNSIZE Terminal		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82	610	669		
83	800	850		
84	1128	1130		
85	1157	1159		
86	1999	2030		
87	874	1104		
88	3488	3590		
89	2065	2390		
90	1486	1568		
91	1289	1501		

ESCAPE TREND



RUNSIZE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- SATSOP SUMMER CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Early-timed chinook (presently referred to as summer chinook) in the Satsop River are generally confined to the East Fork Satsop River. Occasionally a few can be found in Decker Creek, a tributary to the East Fork Satsop. Entry timing into Grays Harbor is unknown. Entry into the Satsop River begins in late August to early September. Spawning typically begins in early September, peaks in mid- to late September and tails out into mid-October.

The Satsop river has been the recipient of a large number of hatchery plants from a variety of sources. These sources include the following early-timed stocks: Green River, Deschutes River, Dungeness River, Finch Creek (Hood Canal), and Spring Creek (Columbia River). Releases have occurred sporadically at least since the 1950s and well into the 1970s. While the Satsop summer stock has a slightly earlier timing than most of these imported stocks, it is assumed that due to timing overlap, hybridization has taken place.

This stock can best be described as a likely hybrid with significant native genetic characteristics remaining.

### **STOCK STATUS**

The abundance of Satsop River summer chinook is declining and the status is Depressed.

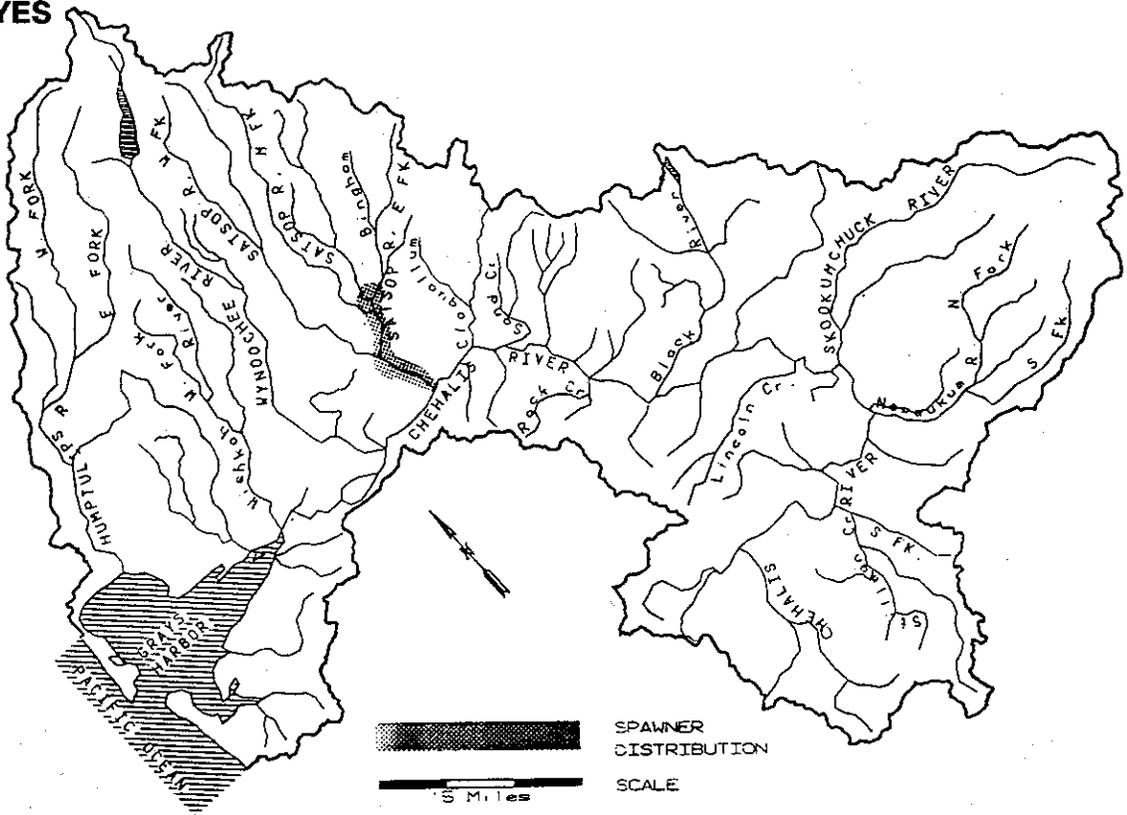
Similar to other Grays Harbor chinook stocks, specific information regarding ocean distribution/contribution is unavailable. It is assumed, however, this stock contributes to the same ocean fisheries as other coastal chinook stocks. These include primarily the southeast Alaska and British Columbia troll fisheries and minor contributions to Washington coastal ocean fisheries.

Terminal run sizes are not readily available because terminal area catch information has not been estimated for individual Grays Harbor (excepting Humptulips River) fall chinook stocks. Also, since the mid-1980s, escapement estimates of Satsop early chinook have not been separated from normal timed fall chinook. However, adult spawner surveys have been conducted on a continuous basis allowing for rough estimates of escapement. Prior to the mid-1980s, Satsop River chinook escapement estimates were based on surveys of early spawning adults. Since the early 1970s, the abundance of early chinook in the Satsop has declined steadily. In 1982 the escapement was estimated at over 750. In 1985 escapement had declined to an estimated 204 adults. Since 1990, indications are that they number under 100.

# STOCK DEFINITION PROFILE for Satsop Summer Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

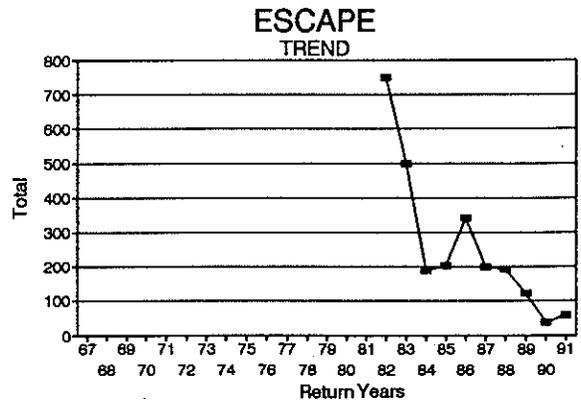
DISTINCT? - NO

# STOCK STATUS PROFILE for Satsop Summer Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82	750			
83	500			
84	190			
85	204			
86	343			
87	200			
88	193			
89	124			
90	37			
91	58			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Long-term Negative Trend*

The quality of early escapement estimates is not very good. Spawner surveys were conducted only one to three times per year, sometimes missing peak activity. Because estimates use peak count fish per mile data, inaccurate results are assured. Regardless of the errors in historical escapement estimates, the general trend is accurate. Recent improvements in adult spawner information continue to support the declining trend.

## OVERVIEW -- GRAYS HARBOR FALL CHINOOK STOCKS

HUMPTULIPS  
HOQUIAM  
WISHKAH  
WYNOOCHEE

SATSOP  
CHEHALIS  
JOHNS/ELK & SOUTH BAY TRIBS

### STOCK DEFINITION AND ORIGIN

Fall chinook occur in all major Grays Harbor tributaries. Due to the similarity in return and spawn timing and the lack of genetic data, stocks have been separated based primarily on geography. Each of the Grays Harbor fall chinook stocks occurs in rivers whose lower reaches are tidally influenced. In the case of the Satsop this influence is merely some flow reversal. In other systems (i.e. Hoquiam and Wishkah) there is salt water intrusion. These tidal effects reduce the likelihood that juvenile chinook migrating downstream to the Grays Harbor estuary would enter and imprint in a non-natal stream. As a result, Grays Harbor chinook stocks may be less likely to interbreed than they would be in the absence of the tidal influence.

Entry of fall chinook into Grays Harbor begins in early September and continues into October. Spawning begins in October, peaks in late October/early November and is generally completed by late November.

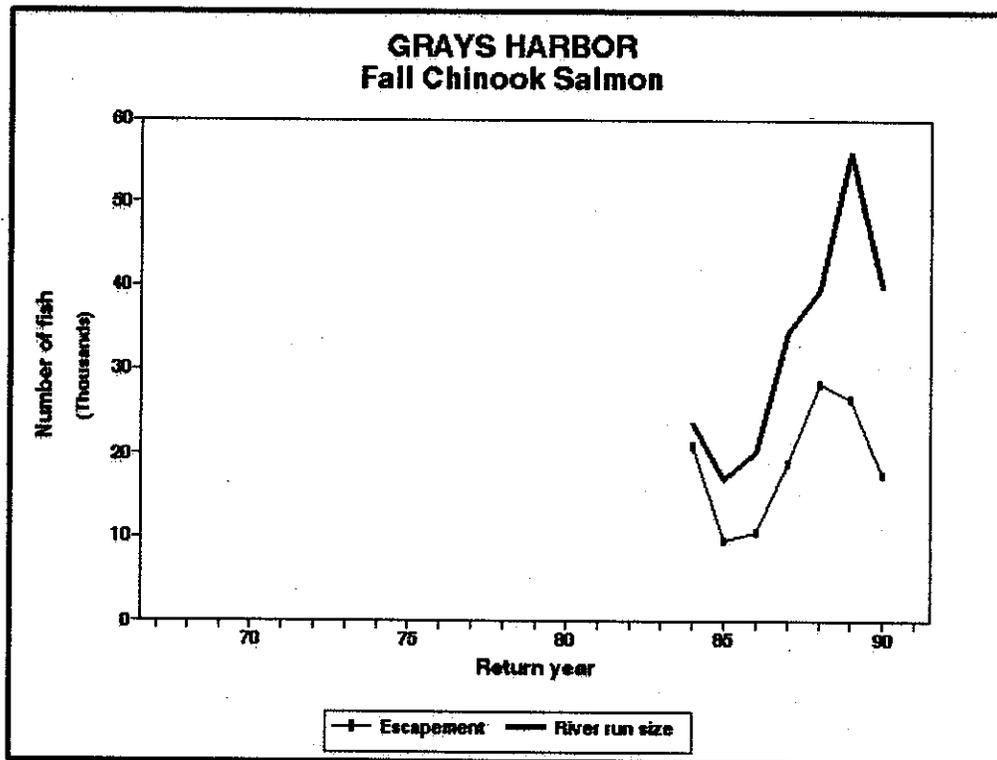
Fall chinook fingerlings and fry (from outside the basin) have been released into Grays Harbor basin systems since the early 1950s. Releases occurred primarily in the Satsop, Humptulips, Chehalis, and Wynoochee rivers. While not monitored, it is assumed that adults from these releases returned and interbred with local (native) stocks. As a result of this interbreeding it is assumed that some genetic mixing occurred. However, it is generally (excepting Satsop River) felt that native characteristics continue to dominate.

### STOCK STATUS

Specific information on ocean distribution and contribution is not available. It is assumed that they are similar to those of other coastal fall chinook stocks. What information is available suggests a high contribution to southeast Alaska and British Columbia troll fisheries and only a minor contribution to Washington coastal fisheries. Moderate contributions of individual stocks are made to terminal net fisheries.

Grays Harbor fall chinook run sizes have ranged from 9,925 in 1983 to 56,060 in 1989. At the present time total run size has not been split into hatchery and wild components. While these run-sizes include hatchery-origin production, the large majority of fish are produced in the natural environment. Run sizes have increased dramatically in recent years. The 1982-1986 run sizes ranged from 9,925 in 1983 to 23,614 in 1984,

averaging 17,004. The 1987 through 1992 run sizes ranged from 27,427 to 56,060, and averaged 38,224 (see figure). Not all of the apparent increase in terminal run size is due to increases in actual fish abundance. Some can be attributed to a change in the escapement estimation technique that occurred in 1987. Prior to 1987 escapement estimates were based on peak count fish per mile data. While these data may have been useful for year-to-year comparisons, they better reflected peak counts rather than total abundance. The current technique (redd accounting) more accurately reflects total abundance. This technique typically results in larger estimates, which are part of the reason for the higher total run sizes in recent years. Two factors resulting in "real" abundance increases are the strong returns of the 1984 brood and the 1985 U.S./Canada treaty which reduced Canadian interceptions of Washington coastal chinook stocks.



## **GRAYS HARBOR -- HUMPTULIPS FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Fall chinook occur throughout the Humptulips River system. Primary spawning areas are the mainstem, East Fork (to mile 9.75) and West Fork (to mile 46.0), and Big, Stevens, Donkey, O'Brien, Newberry, Rainbow, and Grouse creeks. Chinook begin entering the river in September and continue into November. Spawning begins in October, peaks in late October to early November and typically ends in early December.

A number of releases of fall chinook fingerling have occurred since the 1950s. Stock origin of these fish ranges from Spring Creek (Columbia River) to Green River (Puget Sound) to the Satsop River. In the late 1970s and early 1980s Willapa Hatchery stock was released from Humptulips Hatchery in an attempt to develop a hatchery return. Releases ranged from 564,000 to 1,854,000 from 1978 through 1984. Importing Willapa stock was abandoned in 1984 in favor of developing a hatchery return using local ("native") stock.

It is assumed that a significant number of hatchery origin adults spawned in the natural environment, particularly in spawning areas near the hatchery. As a result, it is likely that a significant amount of hatchery-wild interbreeding took place.

The current Humptulips fall chinook stock is a likely hybrid with significant native genetic characteristics.

### **STOCK STATUS**

Current information indicates the Humptulips fall chinook stock is Healthy.

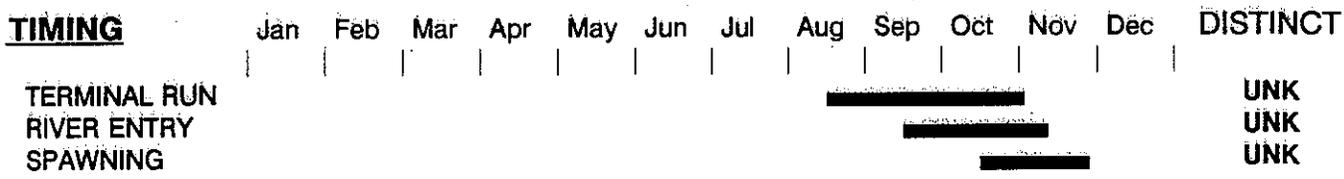
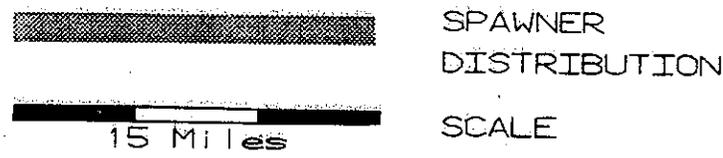
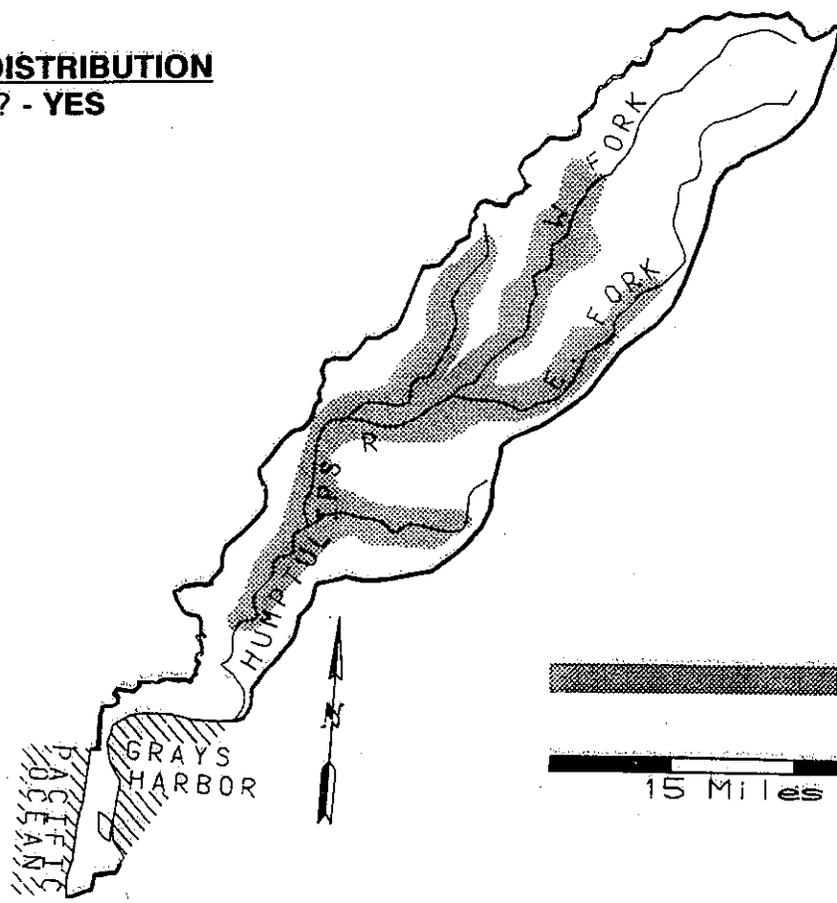
Results of code-wire tag studies indicate Humptulips fall chinook contribute heavily to Alaska and British Columbia ocean troll fisheries. Few are taken in fisheries off the Washington coast with primary benefit to terminal area treaty and non-treaty net and river sport fisheries.

Terminal run sizes for Humptulips fall chinook ranged from 4,154 (1985) to 17,272 (1989) and have averaged 10,510 from the 1984 through 1991. During this same time, escapements have ranged from a low of 1,821 in 1991 to a high of 9,542 in 1984 while averaging 4,825.

As indicated in the overview statement, the larger run sizes of the late 1980s reflect a mix of three factors, a strong return of the 1984 brood, the 1985 U.S./Canada treaty and changes in the escapement estimation techniques to better reflect actual spawning populations.

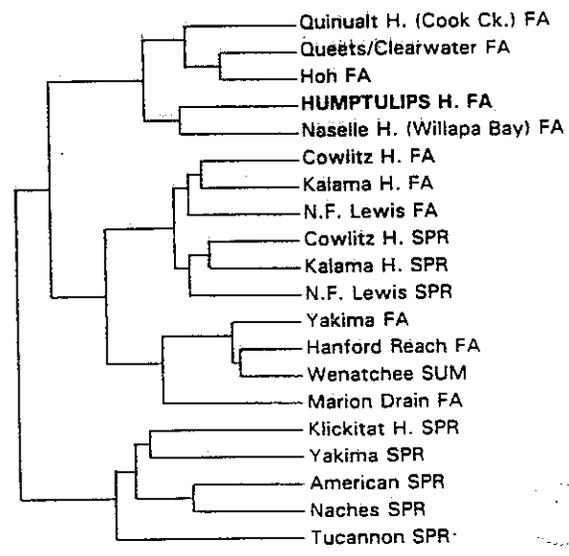
# STOCK DEFINITION PROFILE for Humptulips Fall Chinook

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES



**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - YES

**GENETICS** - No genetic data exist for natural spawners in the Humptulips, however, Humptulips Hatchery fall chinook sampled in 1990 were significantly different in their genetic characteristics from all other chinook stocks examined ( $p < .05$ ).



0.200 0.1667 0.1333 0.1000 0.0667 0.0333 0.0000  
Genetic Distance (Cavalli-Storza & Edwards (1967) chord distance: UPGMA)

# STOCK STATUS PROFILE for Hump Tulips Fall Chinook

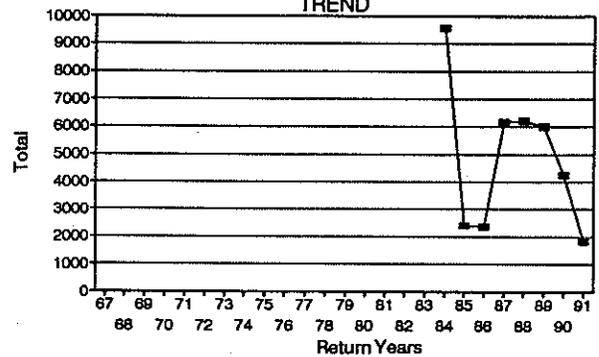
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

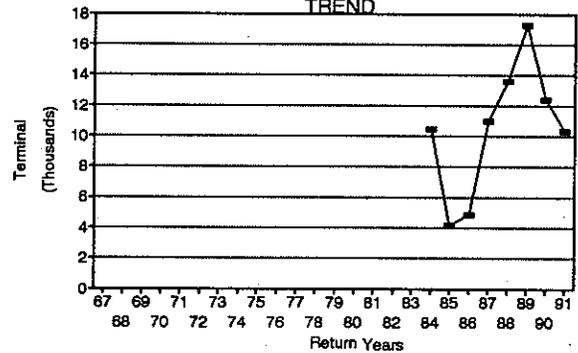
Return Years	ESCAPE Total	RUNSIZE Terminal		
--------------	--------------	------------------	--	--

67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84	9542	10425
85	2415	4154
86	2380	4846
87	6163	11012
88	6213	13580
89	6013	17272
90	4260	12383
91	1821	10335

ESCAPE TREND



RUNSIZE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- HOQUIAM FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Hoquiam fall chinook are found primarily in the East and West forks of the Hoquiam River. At times they are found in abundance in Davis Creek and to a lesser degree in the Middle Fork Hoquiam. They begin entering the rivers in September and continue into November. Spawning begins in October, peaks in late October to early November and typically ends in early December.

Historical records do not indicate any imports of foreign stocks into the Hoquiam River system.

This stock is considered native. There are no genetic data.

### **STOCK STATUS**

Current information indicates the Hoquiam fall chinook stock is Healthy.

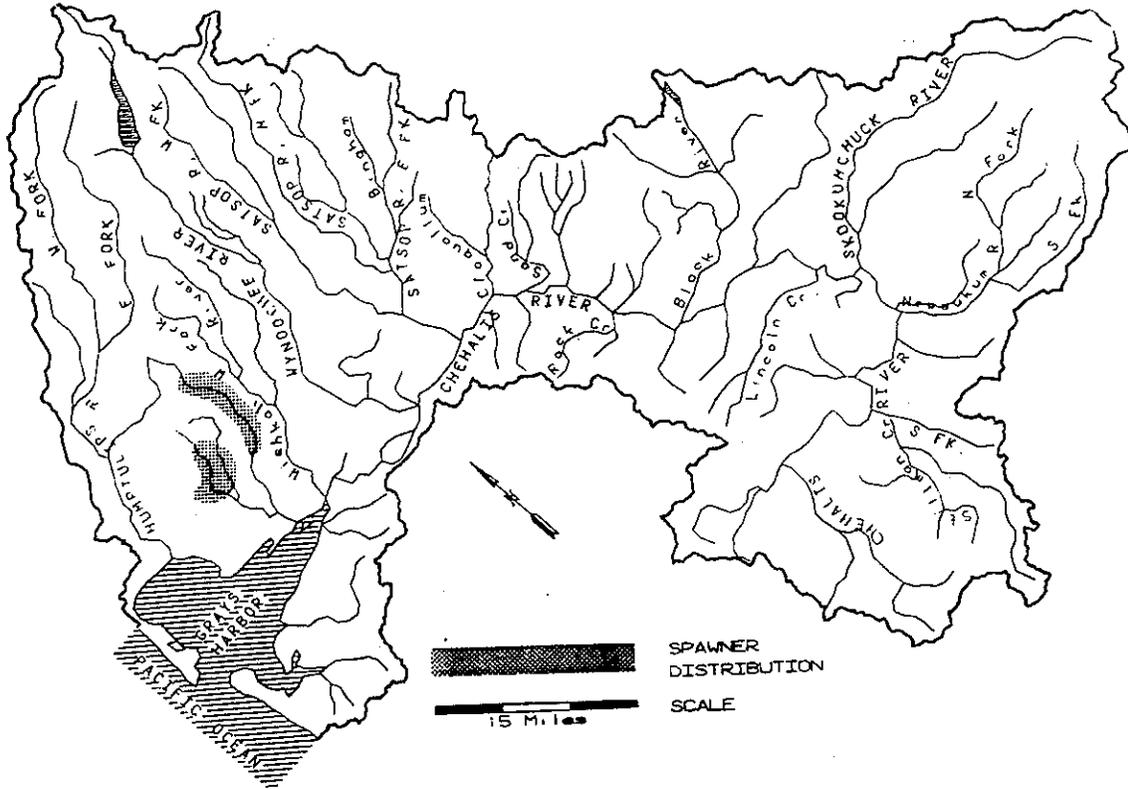
Specific information on ocean distribution and contribution is not available. It is assumed that they are similar to other coastal fall chinook stocks. What information is available suggests a high contribution to southeast Alaska and British Columbia troll fisheries and only a minor contribution to Washington coastal fisheries. Moderate contributions are made to terminal net fisheries. Freshwater sport fishery catches are generally small.

Terminal run sizes are not readily available because terminal area catches have not been estimated for individual Grays Harbor (excepting Humptulips) fall chinook stocks. Estimates of escapement are available, however, and can serve as an indicator of the relative status of this stock. Estimated escapements have ranged from a low of 644 in 1985 to a high of 1,480 in 1990, averaging 988 during the 1985 through 1991 period.

As indicated in the overview statement, the larger run sizes of the late 1980s reflect a mix of three factors, a strong return of the 1984 brood, the 1985 U.S./Canada treaty, and changes in the escapement estimation techniques to better reflect actual spawning populations.

# STOCK DEFINITION PROFILE for Hoquiam Fall Chinook

## SPAWNER DISTRIBUTION DISTINCT? - YES



## TIMING

TERMINAL RUN  
 RIVER ENTRY  
 SPAWNING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



DISTINCT

UNK  
 UNK  
 UNK

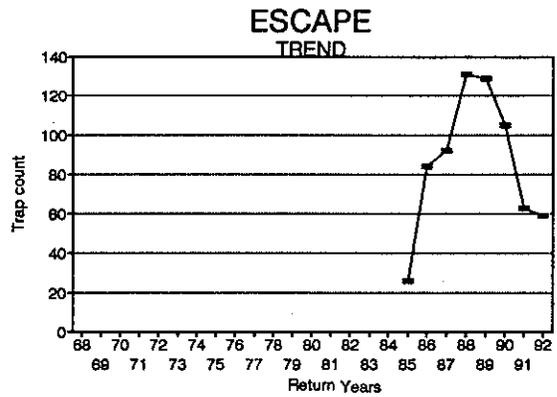
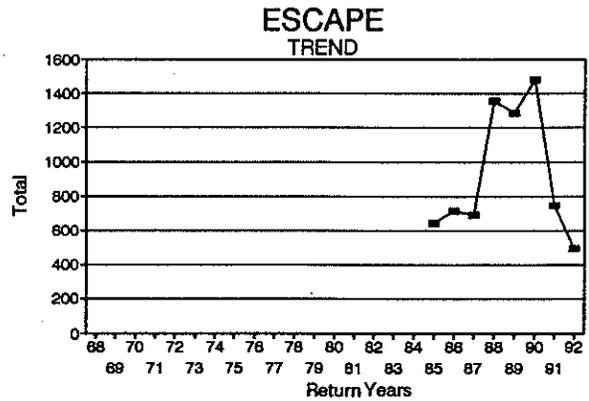
## BIOLOGICAL CHARACTERISTICS DISTINCT? - NO

# STOCK STATUS PROFILE for Hoquiam Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Excellent

Return Years	ESCAPE Total	ESCAPE Trap count		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85	644	26		
86	712	84		
87	690	92		
88	1355	131		
89	1285	129		
90	1480	105		
91	749	63		
92	494	59		



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- WISHKAH FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Wishkah fall chinook are found primarily in the mainstem of the Wishkah River. At times they are found in the West Fork Wishkah and occasionally the East Fork Wishkah. They begin entering the river in September and continue into November. Spawning begins in October, peaks in late October to early November and typically ends in November.

The history of hatchery releases is short. In 1985 a local or "native" chinook program began in the Wishkah River. Egg takes from brood stock collected in the Wishkah have ranged from 15,000 in 1985 to over 400,000 in 1988. Because of the emphasis on "native" or local stocks hatchery straying is not felt to be a potential problem. Historical records do not indicate any imports of foreign stocks into the Wishkah area.

This stock is considered native. There are no genetic data.

### **STOCK STATUS**

The status of this stock is Healthy despite an apparent recent decrease in escapements.

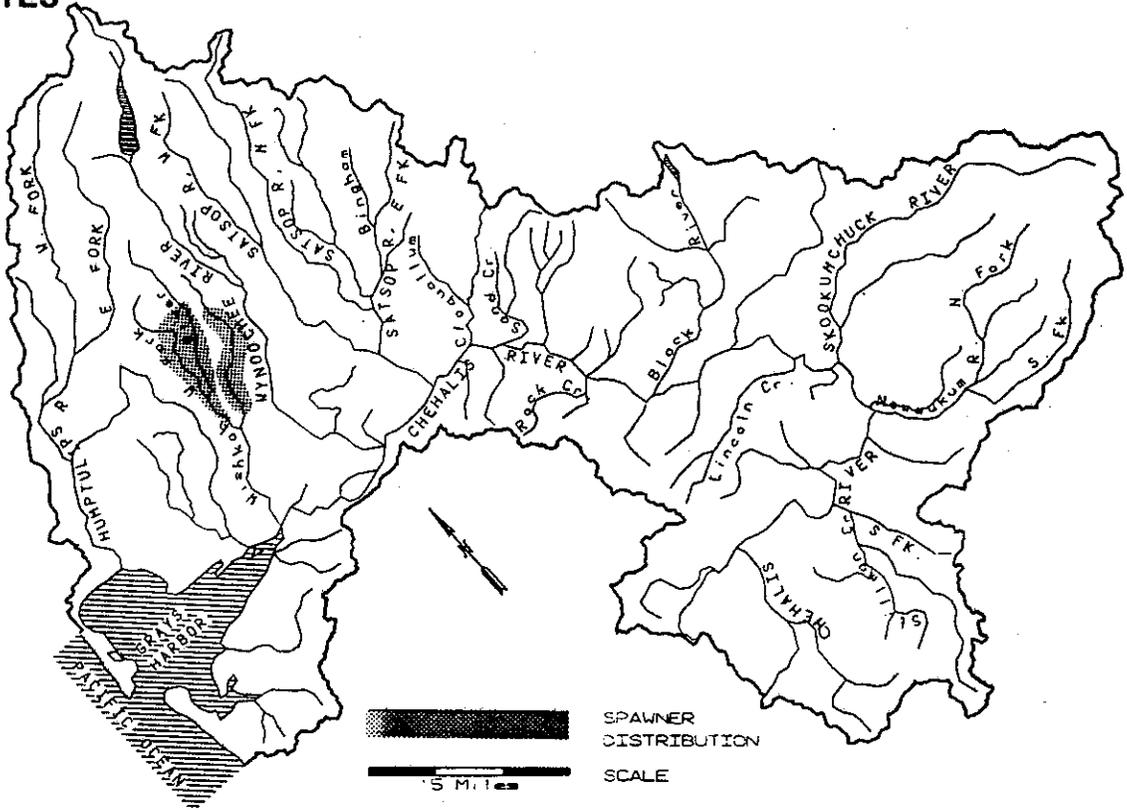
When coded-wire tag studies being conducted at the Wishkah River enhancement facility (Mayr Brothers Pond) are completed, better information on distribution/contribution will be available. Until that time it is assumed that this stock has the same characteristics as other Washington coastal fall chinook stocks. Available data indicate a high contribution to Alaska and British Columbia troll fisheries, relatively low contribution to Washington coastal ocean fisheries, and moderate contributions to Washington terminal-area fisheries.

Terminal run sizes are not readily available because terminal-area catch information has not been estimated for individual Grays Harbor (excepting Humptulips) fall chinook stocks. Estimates of escapement are available, however, and can serve as an indicator of the relative status of this stock. Estimated escapements have ranged from a low of 719 in 1989 to a high of 1,473 in 1987, averaging 1,111 from 1985 through 1991. As with other Grays Harbor fall chinook stocks, the method used to estimate escapement was changed to the cumulative redd technique in 1987. This technique is believed to result in more accurate escapement estimates. While a downward trend in escapement is apparent it is unclear whether this is due to the changes in estimation technique, "native" brood stocking efforts, or a genuine downturn.

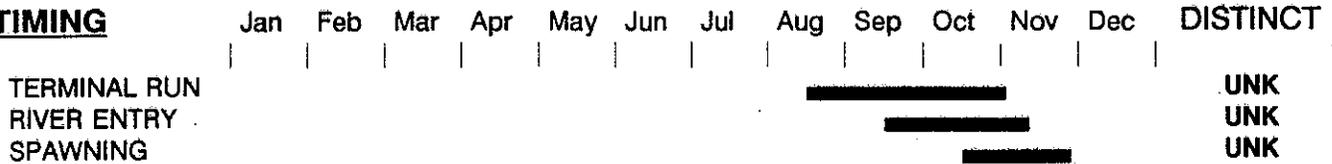
# STOCK DEFINITION PROFILE for Wishkah Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

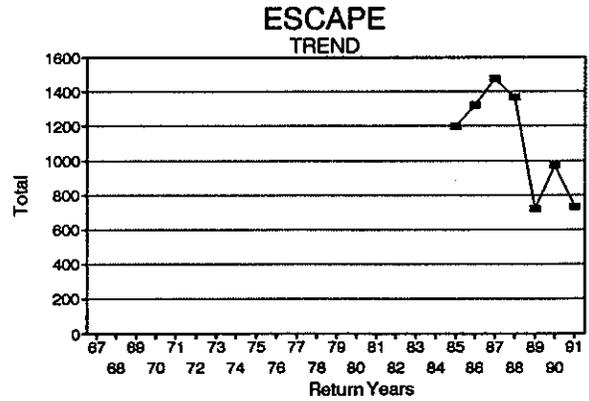
DISTINCT? - NO

# STOCK STATUS PROFILE for Wishkah Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85	1194			
86	1320			
87	1473			
88	1367			
89	719			
90	970			
91	732			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- WYNOOCHEE FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Fall chinook are found throughout the Wynoochee River system. Primary spawning areas are the mainstem (above RM 10.5) and in Carter, Schafer, and Helm creeks. Small numbers are found in Big and both Anderson creeks. Fall chinook begin entering the Wynoochee River in early September and continue well into November. Spawning begins in late September, usually peaks in late October to early November, and is completed by early December.

Since 1952, only three releases of hatchery origin fall chinook have occurred in the Wynoochee River system. These releases are from the 1971-1973 broods reared at Simpson hatchery. Release numbers are small, ranging from 8,000 to 20,000, representing a mix of Deschutes, Satsop, Nemah, and Hood Canal stocks.

Due to the likely low numbers of returning adults from these releases, Wynoochee River fall chinook are considered native.

### **STOCK STATUS**

The status of Wynoochee River fall chinook can best be described as Healthy.

Stock-specific fishery distribution/contribution information is not available. It is assumed that it is similar to that for other coastal fall chinook stocks. What information is available suggests a high contribution to southeast Alaska and British Columbia troll fisheries and only minor contributions to Washington coastal fisheries. Moderate contributions are made to terminal area treaty and non-treaty net fisheries. River sport catches are generally small.

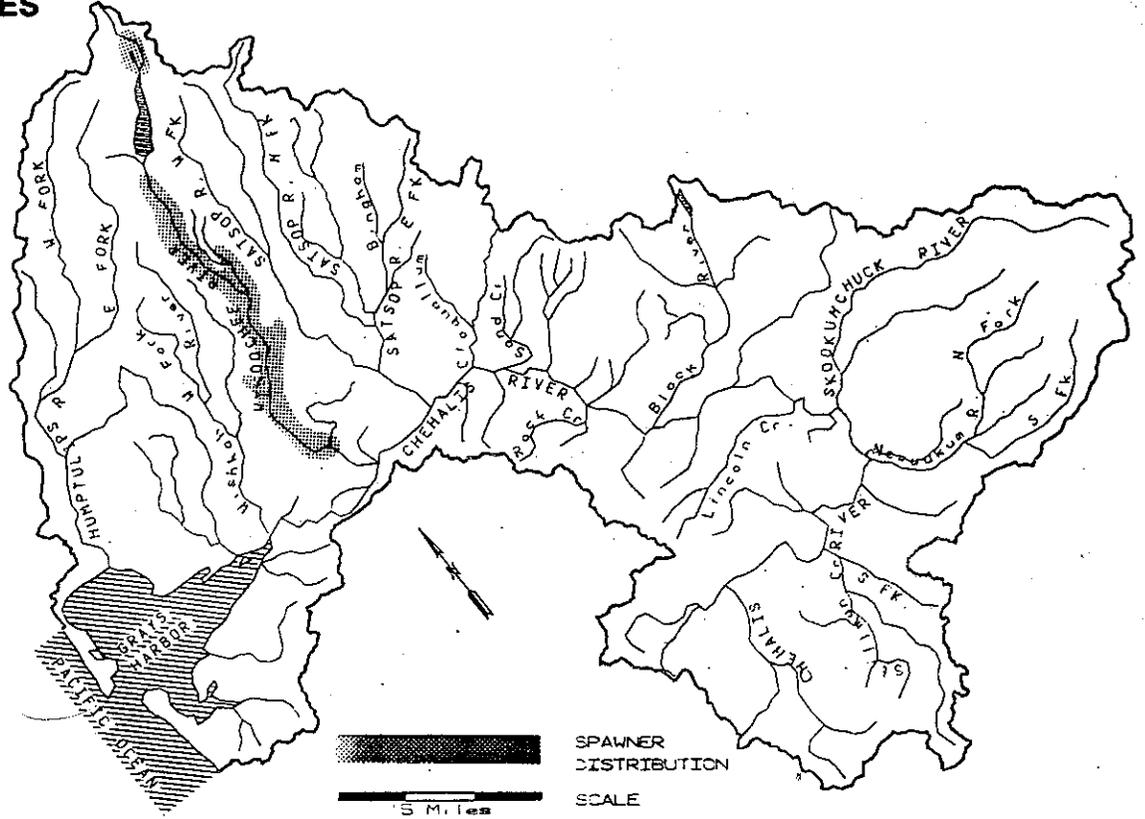
Terminal run sizes are not available because terminal catch information has not been estimated for individual Grays Harbor (excepting Humptulips) fall chinook stocks. Estimates of escapements are available, however, and can serve as indicators of relative status of this stock. Estimated escapements have ranged from a low of 1,681 in 1987 to a high 7,601 in 1988, averaging 3,763 from 1985 through 1991.

As indicated in the overview statement, the larger run sizes of the late 1980s reflect a mix of three factors, a strong return of the 1984 brood, the 1985 U.S./Canada treaty and changes in the escapement estimation techniques to better reflect actual spawning populations.

# STOCK DEFINITION PROFILE for Wynoochee Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													UNK
RIVER ENTRY													UNK
SPAWNING													UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Wynoochee Fall Chinook

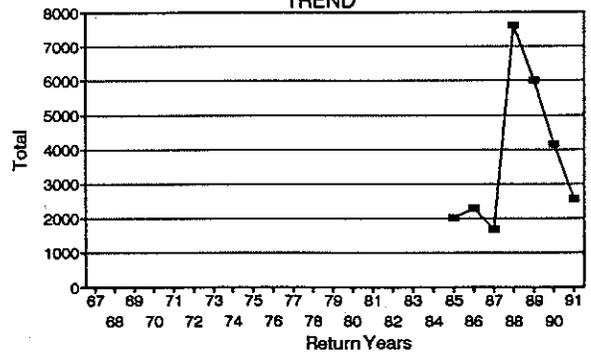
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	2020
86	2301
87	1681
88	7601
89	6002
90	4151
91	2582

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- SATSOP FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Fall chinook in the Satsop River are found in each of the major forks, East Fork, West Fork, Main Fork, and a number of tributaries, including Black Creek, Decker Creek, and unnamed tributaries 22.0366 and 22.0372 (Williams et al. 1975). Entry into Grays Harbor begins in late August with entry into the Satsop River beginning in early October. Spawning peaks in early November and generally ends by late November. Occasionally some spawning is still taking place in early December.

The history of hatchery releases of various stocks of chinook into the Satsop River system goes back to the early 1950s. Significant releases of chinook have occurred in all forks of the Satsop as well as in the mainstem and Bingham Creek. A large variety of stocks have been used. These include early-timed (September-October) Puget Sound and Columbia River hatchery stocks (Green, Dungeness, Deschutes, Finch Creek, and Spring Creek), "normal"-timed (October) Washington coastal hatchery stocks (Nemah and Willapa), and late (November-December) stocks from the Oregon coast (Trask and Elk). Currently, there is a chinook program on the East Fork Satsop River (at Satsop Springs) that began by using fish from Humptulips hatchery that originated as Willapa and Willapa-Humptulips hybrids.

Due to the history and variety of imported stocks, Satsop fall chinook are considered a hybrid stock.

### **STOCK STATUS**

The status of Satsop River fall chinook is best described as Healthy.

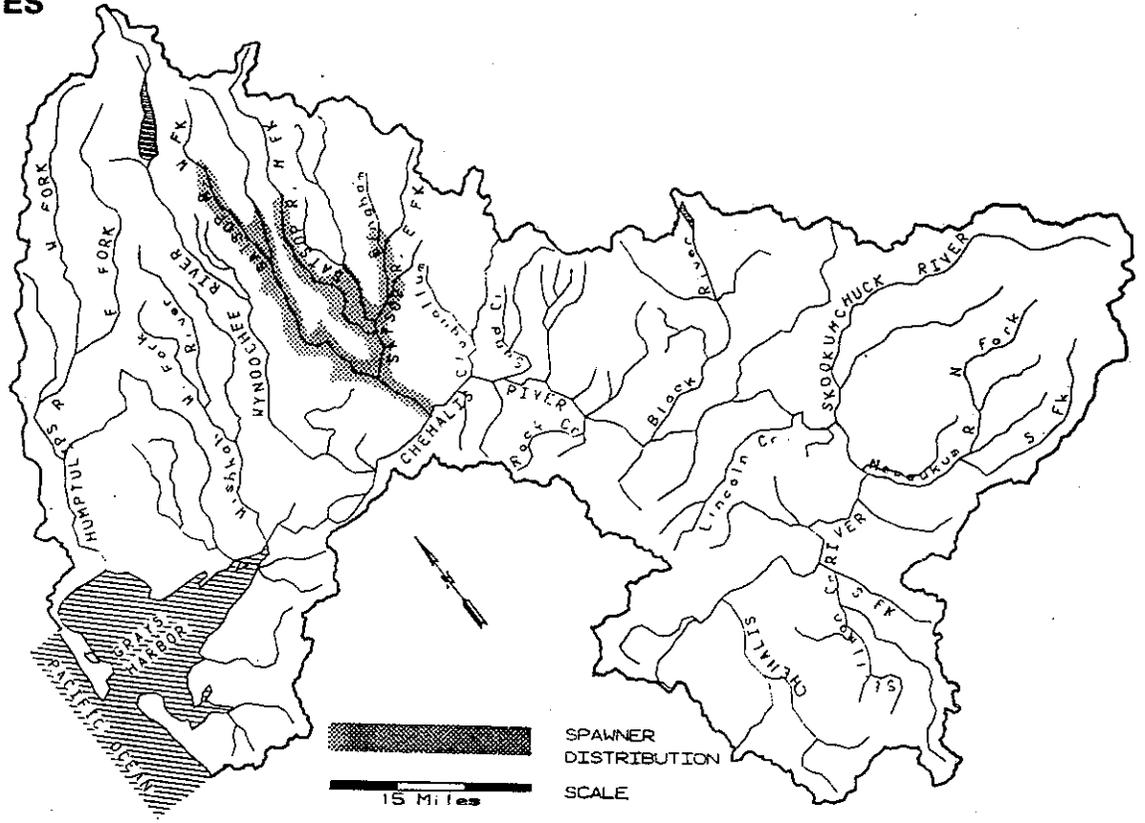
Stock specific information on ocean distribution and contribution is not available. It is assumed that it is similar to that for other coastal Washington chinook stocks. What information is available suggests a high contribution to southeast Alaskan and British Columbia troll fisheries and only minor contributions to coastal Washington ocean fisheries. Moderate contributions are made to treaty and non-treaty net fisheries. River sport fishery catches are generally small.

Terminal run sizes are not readily available because terminal area catch information has not been estimated for individual Grays Harbor (excepting Humptulips) fall chinook stocks. Estimates of escapement are available, however, and can serve as an indicator of relative status of this stock. Estimated escapements have ranged from a low of 2,009 in 1986 to a high 4,234 in 1989, averaging 3,398 from 1986 through 1991.

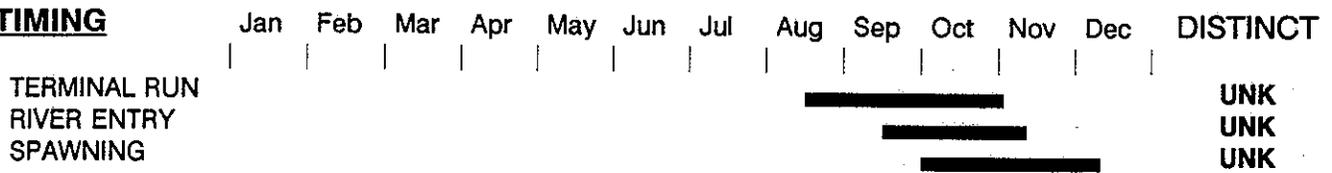
# STOCK DEFINITION PROFILE for Satsop Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

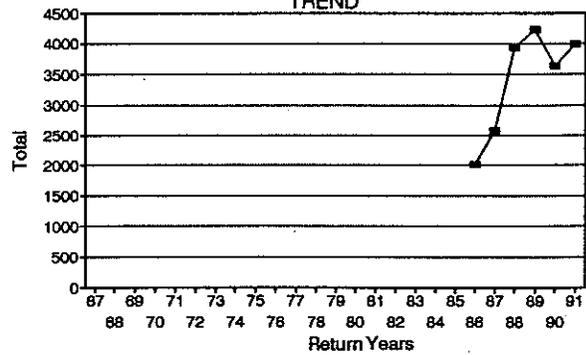
# STOCK STATUS PROFILE for Satsop Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86	2009			
87	2574			
88	3937			
89	4234			
90	3643			
91	3992			

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

As indicated in the overview statement the larger run sizes of the late 1980s reflect a mix of three factors, a strong return of the 1984 brood, the 1985 U.S./Canada treaty, and changes in the escapement estimation techniques to better reflect actual spawning populations.

## **GRAYS HARBOR -- CHEHALIS FALL CHINOOK**

### **STOCK DEFINITION AND ORIGIN**

Chehalis River fall chinook are found throughout the Chehalis River basin upstream of the Satsop River. Primary areas used are the mainstem (RM 28-67, RM 80-108), Cloquallum Creek, Porter Creek, Black River, and Skookumchuck River. Less important use areas include the Newaukum River, Cedar Creek, Stillman Creek, and South Fork Chehalis River. Entry into Grays Harbor begins in early September and continues into October. Spawning begins in October, peaks in late October to early November and is generally completed by late November.

Fall chinook fingerlings and fry have been released into the Chehalis River and/or its tributaries since the early 1950s. Releases occurred in the early 1950s, throughout the 1960s, and in the early 1970s. Since the early 1970s very few releases of hatchery-reared chinook have been made into the Chehalis system. Precise information regarding the success of these releases is poor. It is likely that some returned to spawn and some hybridization with wild chinook took place.

Chehalis fall chinook are considered a hybrid with significant native genetic characteristics.

### **STOCK STATUS**

The status of Chehalis River fall chinook is best described as Healthy.

Specific information on ocean distribution and contribution is not available. It is assumed that it is similar to that for other coastal fall chinook stocks. What information is available suggests a high contribution to southeast Alaska and British Columbia troll fisheries and only minor contribution to Washington coastal fisheries. Moderate contributions are made to terminal net fisheries. Freshwater sport fishery catches are generally small.

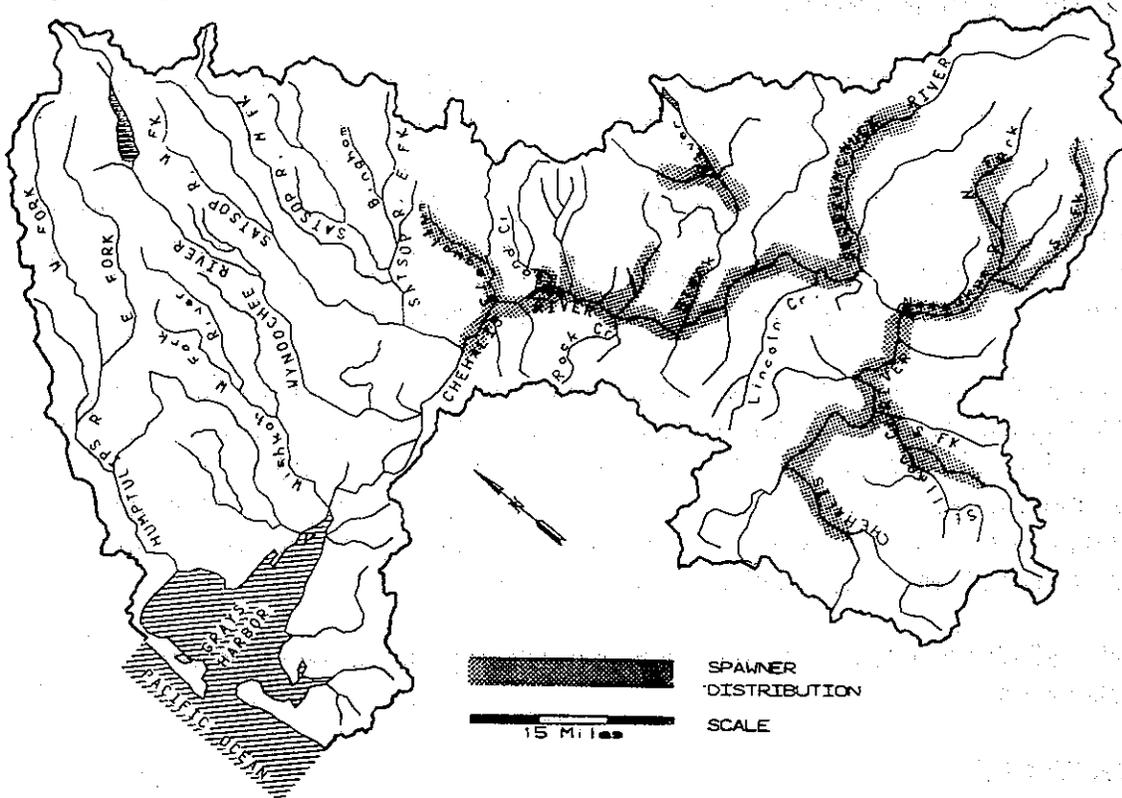
Terminal run sizes are not readily available because terminal area catch information has not been estimated for individual Grays Harbor (excepting Humptulips) fall chinook stocks. Estimates of escapement are available, however, and can serve as indicators of relative status of this stock. Estimated escapements have ranged from a low of 2,971 in 1985 and 1990 to a high 7,837 in 1989, averaging 5,083 during the 1985-1991 period.

As indicated in the overview statement, the larger run sizes of the late 1980s reflect a mix of three factors, a strong return of the 1984 brood, the 1985 U.S./Canada treaty, and changes in the escapement estimation techniques to better reflect actual spawning populations.

# STOCK DEFINITION PROFILE for Chehalis Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT
TERMINAL RUN													UNK
RIVER ENTRY													UNK
SPAWNING													UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Chehalis Fall Chinook

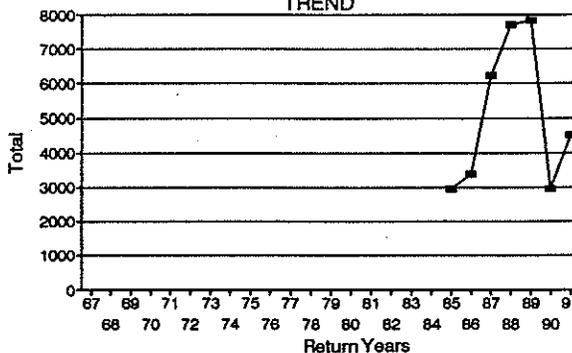
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	2971
86	3379
87	6226
88	7685
89	7837
90	2971
91	4514

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



**GRAYS HARBOR -- JOHNS / ELK AND SOUTH BAY TRIBUTARIES**  
**FALL CHINOOK**

**STOCK DEFINITION AND ORIGIN**

Johns/Elk River and South Bay tributaries fall chinook are found in the mainstem areas of Johns and Elk rivers and in the North Fork Johns River. Spawning occurs in October to early November, usually peaking in late October or early November.

Historical records of salmon utilization in these areas make no mention of fall chinook presence (Royal, 1932). In the early 1950s and late 1960s to early 1970s releases of hatchery stocks were made. Imported stocks similar to those of other Grays Harbor areas were used. The performance of these releases was not monitored.

**STOCK STATUS**

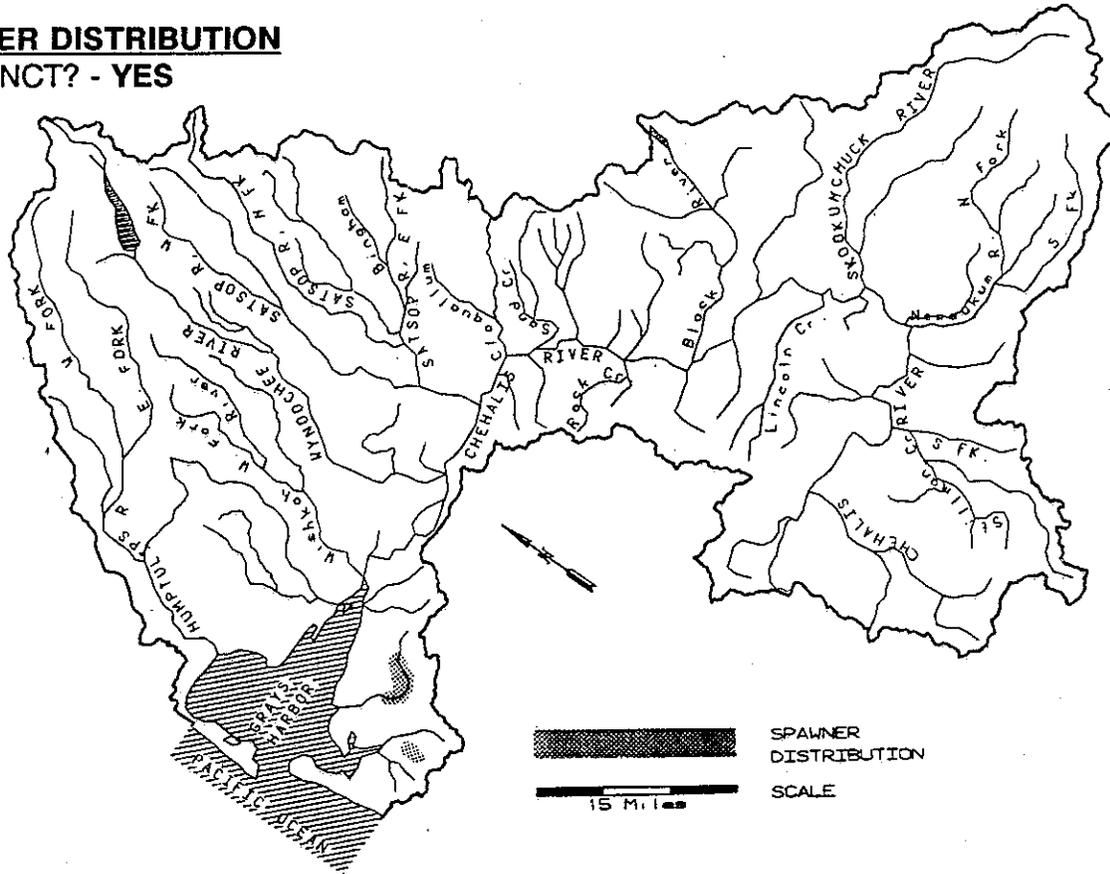
The status of this stock is Unknown.

Information regarding the status of these fish has not been actively pursued. Except for Humptulips chinook, catch information for independent Grays Harbor stocks is not monitored. In addition, adult spawner surveys for this stock are not routinely conducted.

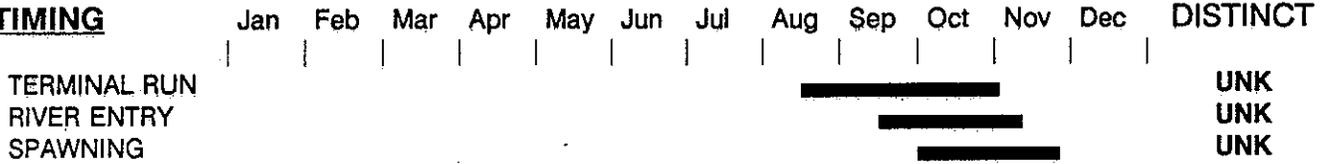
# STOCK DEFINITION PROFILE for Johns/Elk and S. Bay Tributaries Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Johns/Elk and S. Bay Tributaries Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Brood	NO DATA			
Years				

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

---

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



# OVERVIEW -- GRAYS HARBOR FALL CHUM STOCKS

## HUMPTULIPS CHEHALIS

### STOCK DEFINITION AND ORIGIN

Chum salmon are found throughout the Grays Harbor basin. Spawning occurs in each of the major river systems within the basin. Two stocks have been identified, the Humptulips and the Chehalis. Separation is based solely on the distance between the Humptulips River and remaining Grays Harbor chum-producing systems. Genetic stock identification studies using fish from Stevens Creek on the Humptulips River and the Satsop River detected no difference between the two areas.

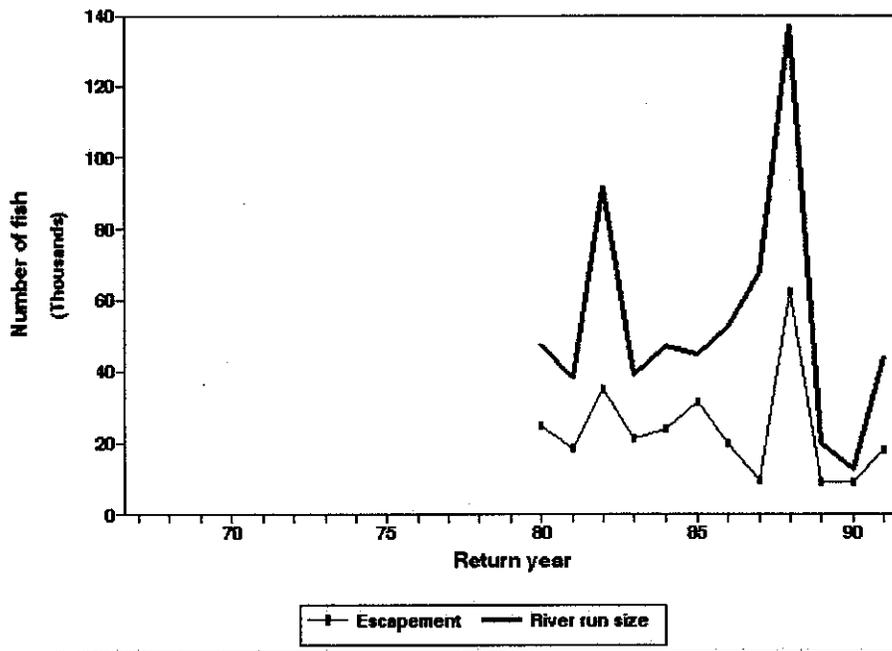
Adults begin entering Grays Harbor in early October, peaking in early November. Spawning begins in all systems in late October, peaks in mid- to late November and is usually completed by early December.

Introductions of stocks have been infrequent and are not a significant influence on the genetic makeup of the current stocks. Attempts to develop hatchery programs at Satsop Springs (Chehalis system) and at Humptulips Hatchery were abandoned due to poor returns of imported stocks and the inability to attract adults into the production facilities.

### STOCK STATUS

The 1980 through 1991 terminal run size of Grays Harbor chum has ranged from 12,571 in 1990 to 137,074 in 1988, averaging 55,506 (see figure). Natural spawning escapements have ranged from under 8,900 in 1990 to 62,175 in 1988 and averaged 23,424. Escapement estimates are generated from peak count fish per mile data to only a few areas. As a result, they are likely not as reliable as estimates for other species or areas. Generally, they adequately reflect relative year-to-year abundance. Additional status information is presented in the individual stock reports.

### GRAYS HARBOR Chum Salmon



## GRAYS HARBOR -- HUMPTULIPS FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Chum salmon are found throughout the Humptulips River system. Primary spawning areas are Big Creek, Stevens Creek, lower West Fork Humptulips (RM 28.1-46), and mainstem Humptulips (between RM 7.0 and RM 28.1). Areas used to a lesser degree are Donkey Creek, O'Brien Creek, Brittan Creek, East Fork Humptulips River and Newberry Creek. Adults begin entering the river in October. Spawning begins in late October, peaks in mid-late November and is usually completed by early December.

Introductions of foreign stocks into the Humptulips River have been infrequent and are not a significant influence on the genetic makeup of the current stock. Attempts in the mid-1980s (1983 through 1985 broods) to develop a return at Humptulips Hatchery met with little success and were abandoned.

The current stock is considered native.

### **STOCK STATUS**

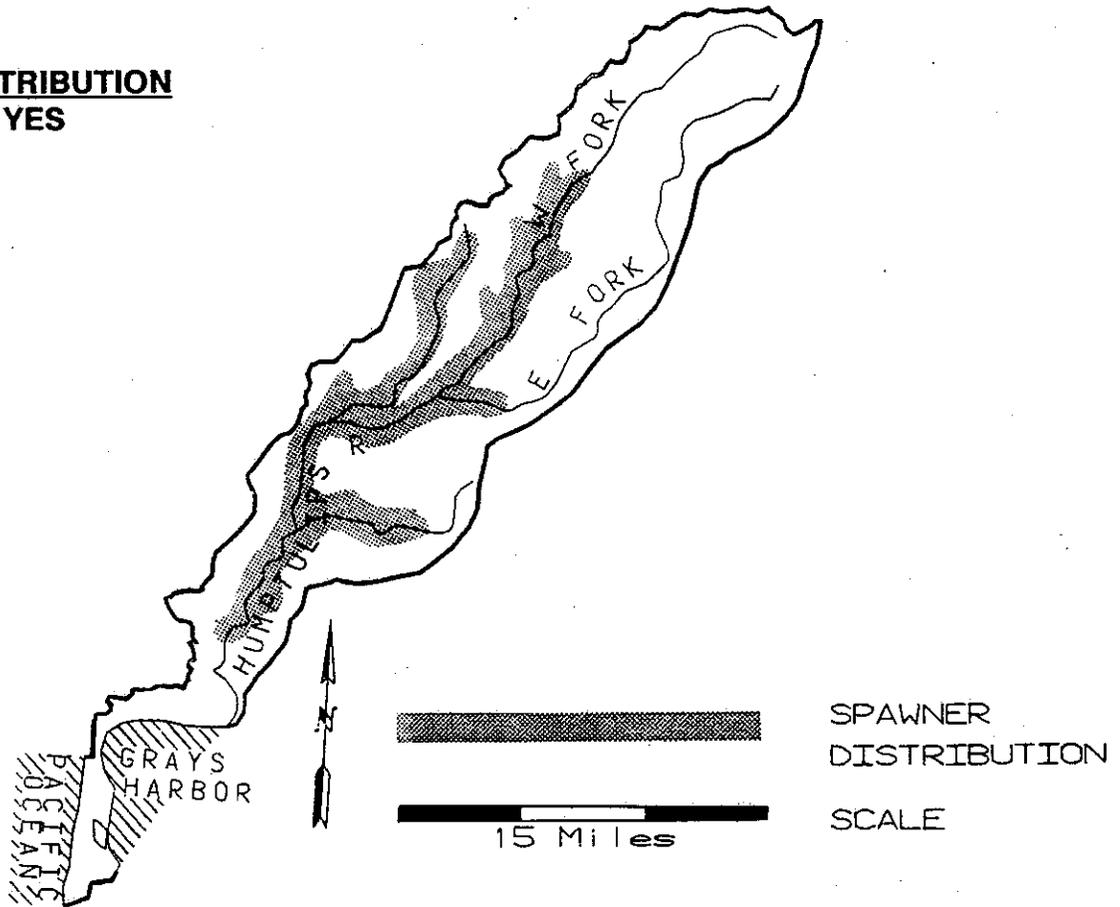
Though abundance fluctuates, the status of the Humptulips chum stock is Healthy.

The status of Humptulips River fall chum is not monitored as a separate unit within Grays Harbor. Neither terminal run-size nor escapements are estimated. Currently the best measure of stock status for Humptulips chum is adult spawning peak count fish per mile in Stevens Creek. Adult spawner surveys have been conducted in Stevens Creek for a number of years. These peak fish-per-mile counts range from 16 adults in 1979 to 1,420 adults in 1988. Average peak adult fish-per-mile for 1969 through 1991 is 391, for the most recent ten-year period (1982 through 1991) the average is 478. These data are conservative representation of actual escapements. There are two primary reasons for this, relating both to flows and the ability to obtain accurate peak counts. High flows prevent or impair surveys resulting in undercounting the number of spawning adults. Conversely, when low flows prohibit fish access to traditional-use areas and or established index areas, index area counts may underrepresent actual abundance. Abundance trends based on peak count data from Stevens Creek are not clear.

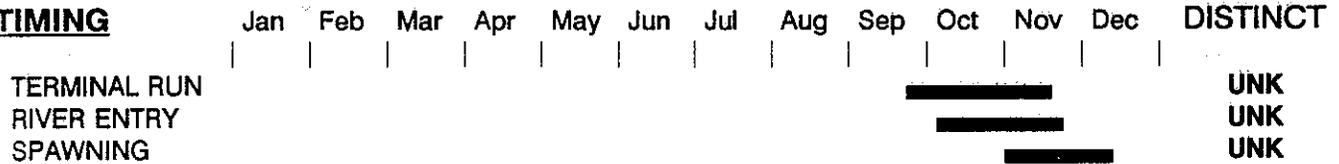
# STOCK DEFINITION PROFILE for Humptulips Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



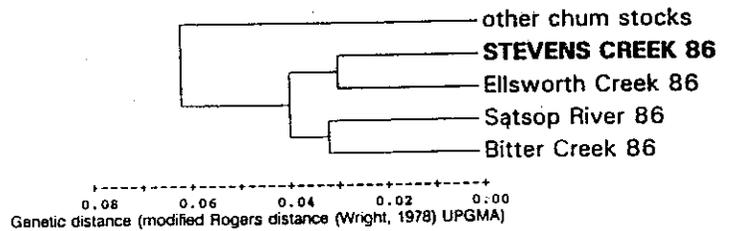
## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

**GENETICS** - Analysis of a 1986 GSI collection from Stevens Creek (N=100) indicated that this collection was not significantly different from a collection from the Satsop River (21-locus G-tests:  $p > 0.1$ ).

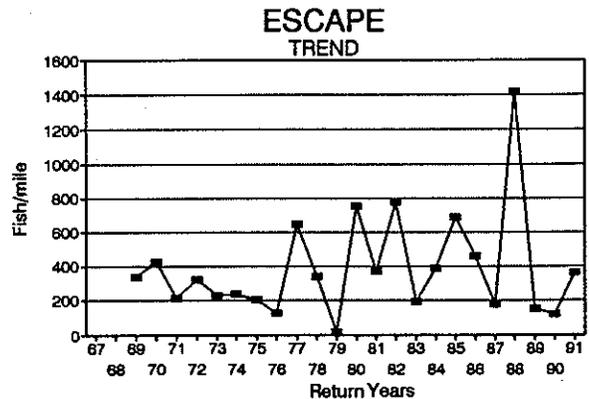


# STOCK STATUS PROFILE for Humptulips Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Fish/mile			
67				
68				
69	339.0			
70	424.0			
71	216.0			
72	323.0			
73	231.0			
74	241.0			
75	204.0			
76	127.0			
77	647.0			
78	340.0			
79	16.0			
80	756.0			
81	370.0			
82	776.0			
83	193.0			
84	390.0			
85	689.0			
86	462.0			
87	182.0			
88	1420.0			
89	154.0			
90	122.0			
91	361.0			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## GRAYS HARBOR -- CHEHALIS FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Chum salmon are found throughout the lower Chehalis River tributaries. Information regarding relative abundance in various systems within the Chehalis basin is limited. Significant numbers use the mainstem Wynoochee and Satsop rivers. A number of side channels and/or spring- (or seep-) fed slough areas in the Satsop normally have high spawner densities. It is believed that the East Fork Hoquiam, Wishkah River and tributaries, Cloquallum Creek and tributaries, Chehalis mainstem and Black River also are used by significant numbers of spawning adults. It is also assumed that chum use other side channel/slough areas throughout the lower Chehalis basin. Adults begin entering the river in October. Spawning begins in late October, peaks in mid-late November and is usually completed by early December.

Introductions of foreign stocks in the Chehalis Basin have been infrequent. Imported stocks include Hood Canal, Nemah River, and North River (Willapa Bay). These imports have occurred into the Satsop River and generally have been unsuccessful. As a result it is felt no significant influence on the genetic makeup of the native stock occurred.

The current stock is considered native.

### **STOCK STATUS**

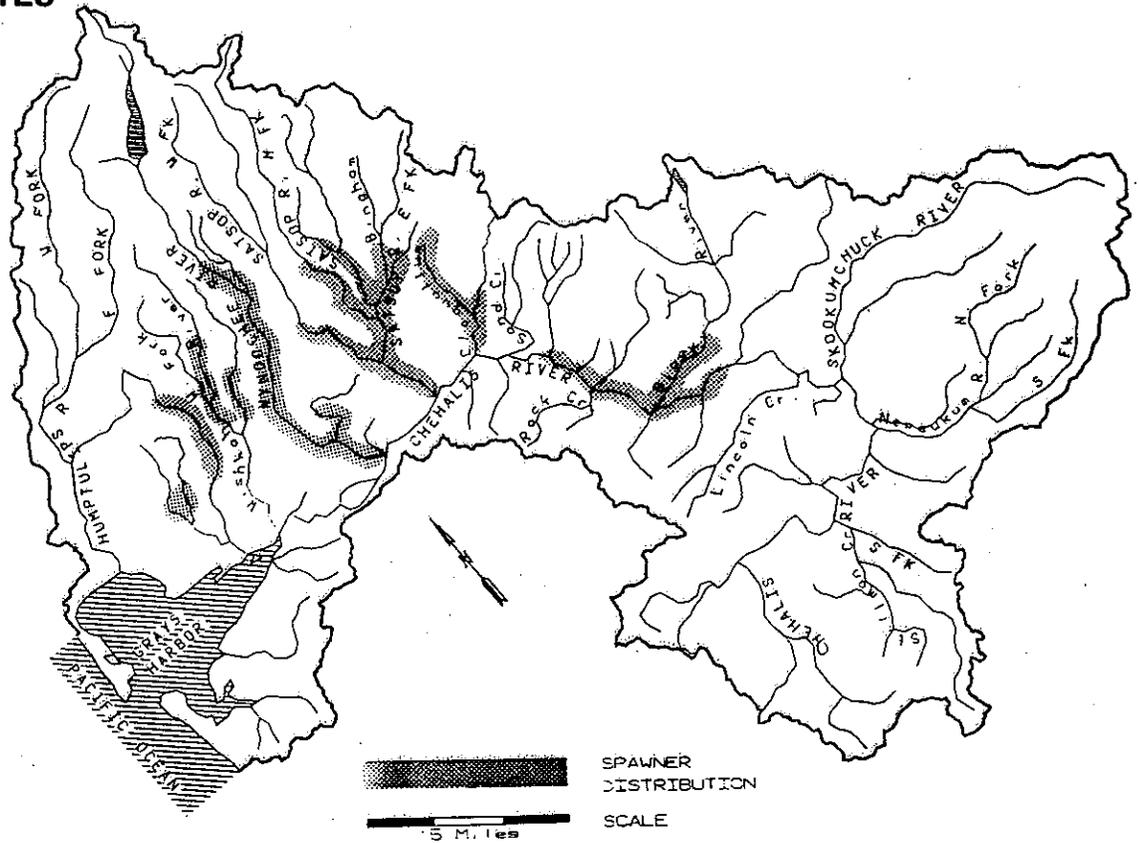
Though abundance fluctuates, the status of the Chehalis chum stock is Healthy.

The status of Chehalis basin chum is not monitored as a separate unit within Grays Harbor. Neither terminal run size nor escapements are estimated. Currently the best measure of stock status is adult spawning peak-count fish-per-mile data for several Satsop River side channel and slough areas. Adult spawner surveys have been conducted in these areas for a number of years. Cumulative peak-adult fish per mile counts ranged from 170 adults in 1979 to 14,489 adults in 1988. Average cumulative peak-adult fish-per-mile for 1969-1991 is 3,798, for the most recent ten-year period, (1982-1991) the average is 5,399. These data are difficult to interpret. The areas used to develop escapement indices are all specialty areas, most of which have been improved through various enhancement techniques. Furthermore, they are highly sensitive to flows. For example, on high-abundance and low-flow years these index areas may not be utilized at a representative rate. Likewise, on moderate-abundance, high-flow years, they may be used at a disproportionately high rate. No distinct long-term trends are detected.

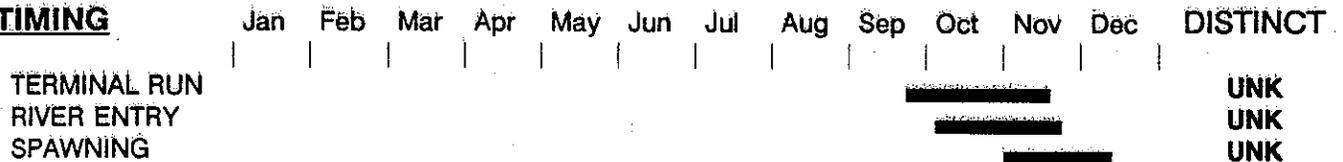
# STOCK DEFINITION PROFILE for Chehalis Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



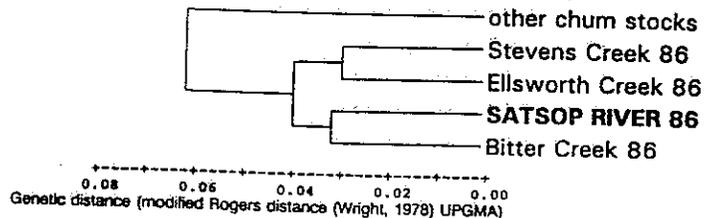
## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? NO

**GENETICS** - Analysis of a 1986 GSI collection from the Satsop River (N=100) indicated that this collection was not significantly different from a collection from Stevens Creek (21-locus G-tests:  $p > 0.1$ ).

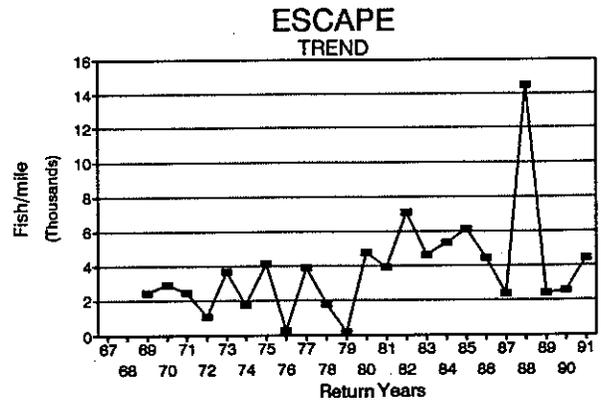


# STOCK STATUS PROFILE for Chehalis Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	ESCAPE Fish/mile			
67				
68				
69	2478.0			
70	2918.0			
71	2477.0			
72	1096.0			
73	3650.0			
74	1765.0			
75	4152.0			
76	251.0			
77	3888.0			
78	1791.0			
79	170.0			
80	4786.0			
81	3943.0			
82	7086.0			
83	4637.0			
84	5323.0			
85	6121.0			
86	4423.0			
87	2415.0			
88	14489.0			
89	2437.0			
90	2589.0			
91	4472.0			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## OVERVIEW -- GRAYS HARBOR COHO STOCKS

HUMPTULIPS	SATSOP
HOQUIAM	CHEHALIS
WISHKAH	JOHNS/ELK & SOUTH BAY TRIBS
WYNOOCHEE	

### STOCK DEFINITION AND ORIGIN

Coho are found in nearly all significant streams throughout the Grays Harbor drainage. Stock separation is based on major tributary systems within tidal influence. Tidal influence represents the clearest mechanism that "to a substantial degree" would reduce interbreeding with other spawning populations.

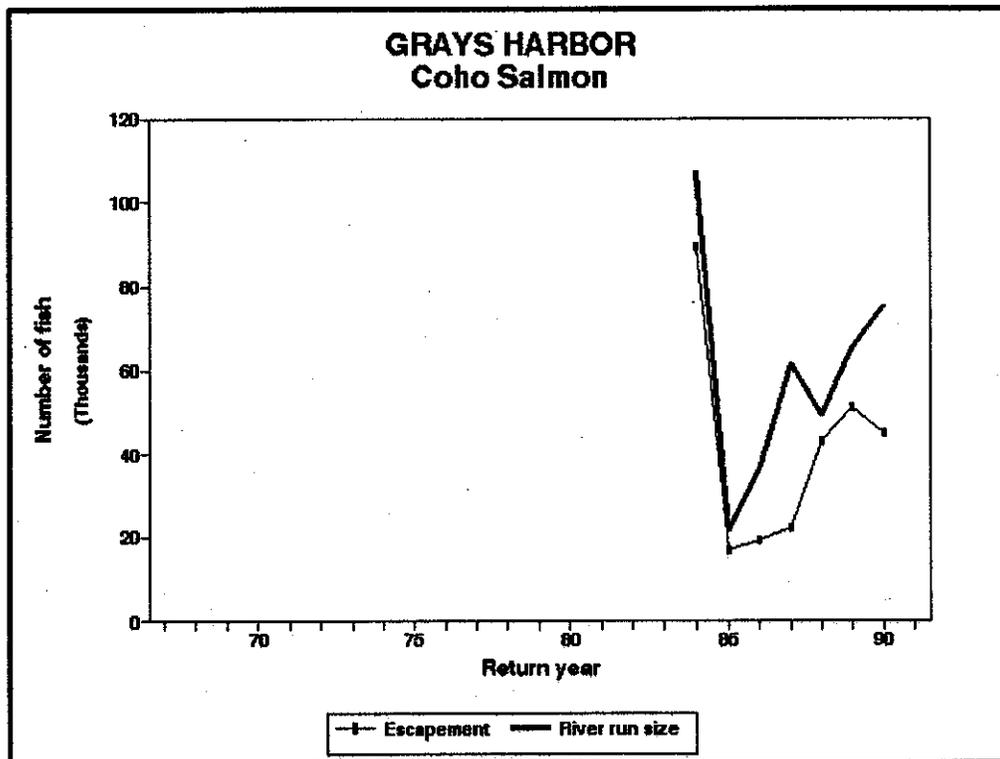
No timing differences in entry or spawn timing have been identified among Grays Harbor stocks. Adults enter the harbor from mid- to late September through mid-December. Spawning begins in November and continues into January and February. Peak spawning typically occurs in early December. There has been considerable discussion as to whether the late-spawning component (January-February) represents a separate stock or simply represents the later portion of a single stock. While the discussions continue, the late component is not being considered a separate stock.

The practice of using hatchery stocks to enhance the Grays Harbor coho salmon resource has been going on since the late 1800s. In more recent years, off-station releases of hatchery-reared coho yearlings were continuous from the 1950s through the early 1980s. In the late 1970s, through the 1980s, and into the early 1990s a large-scale fingerling program was carried out. The stock used (primarily Simpson Hatchery origin) for these programs originated from a mix of stocks that include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek (Sol Duc), and Satsop River. It is assumed that as a result of interbreeding of hatchery and native stocks, a different genetic mix (hybrid) has evolved for each of the listed stocks.

### STOCK STATUS

Ocean distribution/contribution of Grays Harbor natural coho has been established through coded-wire tag studies. Information from natural stock tagging studies indicates highest catches by coastal British Columbia fisheries, followed by the Grays Harbor net fisheries. The remaining contributions are to Oregon/California, Washington ocean sport and troll fisheries, and to a much smaller degree, to southeast Alaska, Puget Sound, and freshwater sport fisheries.

The 1984 to 1990 terminal run size of Grays Harbor natural coho ranged from 21,556 in 1985 to 107,202 in 1984 and averaged 56,736 (see figure). Terminal area run sizes for individual Grays Harbor stocks cannot be calculated because catches of each stock are not estimated. Individual stock status is monitored through estimates of escapement. These data are provided in the stock reports. Overall basin adult spawning escapements (excluding known natural spawning hatchery origin adults) during the 1984 through 1990 period ranged from 17,081 in 1985 to 89,373 in 1984 and averaged 40,284. The method used to calculate these estimates is the cumulative redd technique used throughout the Washington coast. Results are reasonable representations of escapement and offer excellent year-to-year comparability.



## **GRAYS HARBOR -- HUMPTULIPS COHO**

### **STOCK DEFINITION AND ORIGIN**

Coho are found throughout the Humptulips River watershed. Spawning occurs in the mainstem, mainstem West and East Forks and all significant accessible tributaries. Adults begin entering the river in October and spawning begins in November and continues into January and February. Peak spawning typically occurs in early December. There has been considerable discussion as to whether the late-spawning component (January-February) represents a separate stock or a continuation of a single stock. These late-spawning fish are included in the Humptulips stock until the matter is resolved.

Releases of hatchery-reared coho yearlings have been continuous since the early 1950s. Most of the releases were into the mainstem. Stock origins for these releases include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek and Satsop River. This same stock mix is found in the Satsop River (Simpson Hatchery) and throughout Grays Harbor. It is the foundation for Humptulips Hatchery production. In 1977 the Humptulips Hatchery began large-scale on-station and off-station production releases. In recent years a significant number of natural spawning hatchery-origin adults has been identified. As a result of the historical movement of stocks and the size of yearling release groups, and in more recent years the large numbers of naturally spawning hatchery adults, this stock is best described as mixed origin.

### **STOCK STATUS**

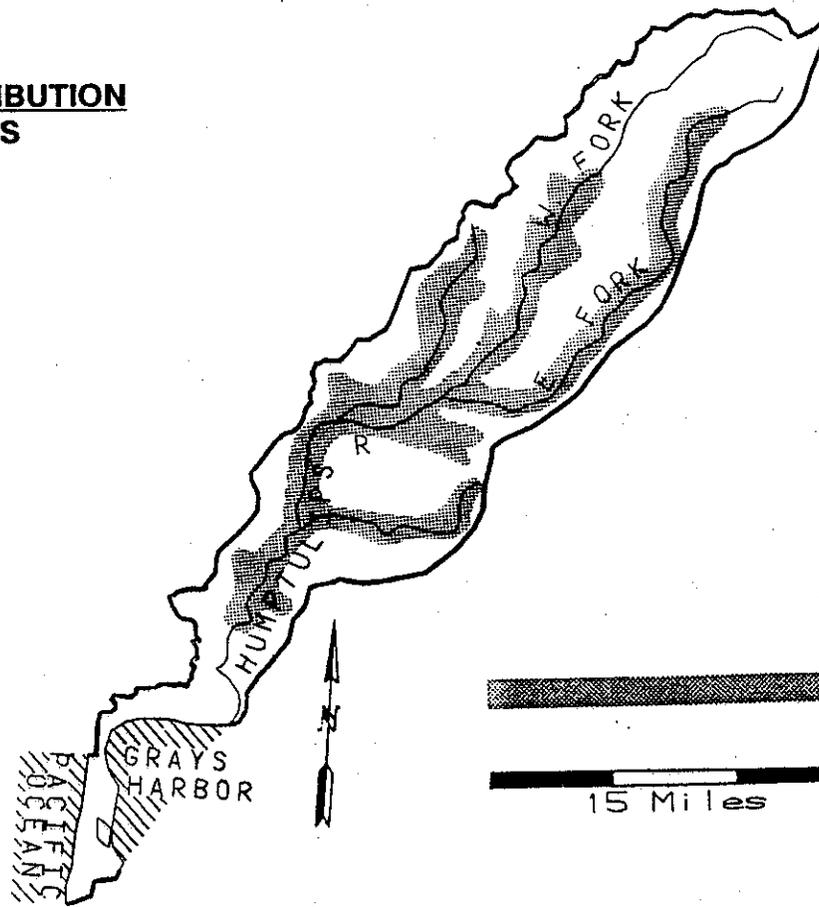
The status of Humptulips natural coho is Healthy.

Ocean distribution and fishery contribution of Humptulips natural coho has been established through coded-wire tag studies of coho originating from Stevens Creek. Information from these studies indicates that coastal British Columbia fisheries take in excess of 50 percent of Humptulips natural coho harvest. Another 30 percent are taken in Grays Harbor net fisheries. The remaining contributions are to Oregon and Washington ocean sport and troll fisheries, and to a much smaller degree to the southeast Alaska, Puget Sound, and freshwater sport fisheries.

While estimates of terminal run-size for Humptulips coho are available, they are not presented here because escapement represents a more reliable indicator of stock status. Escapements from 1984 through 1991 ranged from 4,432 to 18,334 averaging 8,445. While not consistently estimated, a significant portion of the escapement is believed to result from strays from Humptulips Hatchery. Currently, the method used to estimate escapement is the cumulative redd method. Prior to 1984 escapement estimates were estimated from harvest data and peak-count fish-per-mile data from

# STOCK DEFINITION PROFILE for Humptulips Coho

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES

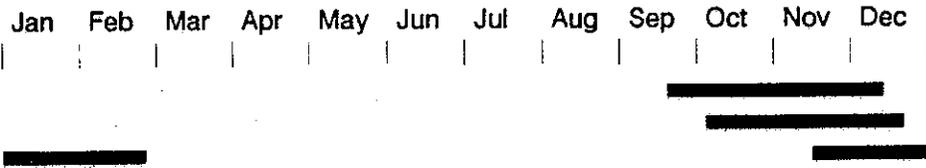


SPAWNER  
DISTRIBUTION  
SCALE

**TIMING**

DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - NO

# STOCK STATUS PROFILE for Humptulips Coho

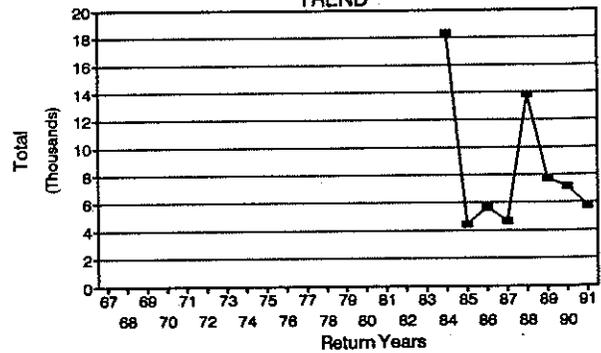
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	18334
85	4432
86	5666
87	4681
88	13789
89	7724
90	7176
91	5758

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

selected index streams. As a result of the change to the cumulative redd technique, historical estimates are not directly comparable and are not provided.

## GRAYS HARBOR -- HOQUIAM COHO

### **STOCK DEFINITION AND ORIGIN**

Coho are found throughout the Hoquiam River watershed. Spawning occurs in the mainstem West and East forks and in all significant accessible tributaries. Adults begin entering the river in October and spawning begins in November and continues into January and sometimes February or later. Peak spawning typically occurs in late November to early December. There has been considerable discussion whether the late-spawning component (January-February) represents a separate stock or a continuation of a single stock. At the present these fish are included in the Hoquiam stock until the matter is resolved.

Releases of hatchery-reared coho yearlings were continuous throughout the 1950s, dropped off in the 1960s and began again in the 1970s. In the late 1970s and through the 1980s a large-scale fingerling release program was carried out. Most of the yearling releases were into the mainstem (and East Fork and Mainstem Hoquiam) areas, while fingerling releases were scatter-planted into small tributaries. Stock origins for these releases include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek (Sol Duc), Satsop River and Humptulips River. This same stock mix is found throughout Grays Harbor. As a result of the historical movement of stocks and the size and frequency of hatchery release groups, this stock is no longer considered to be native. The stock is best described as being of mixed origin.

### **STOCK STATUS**

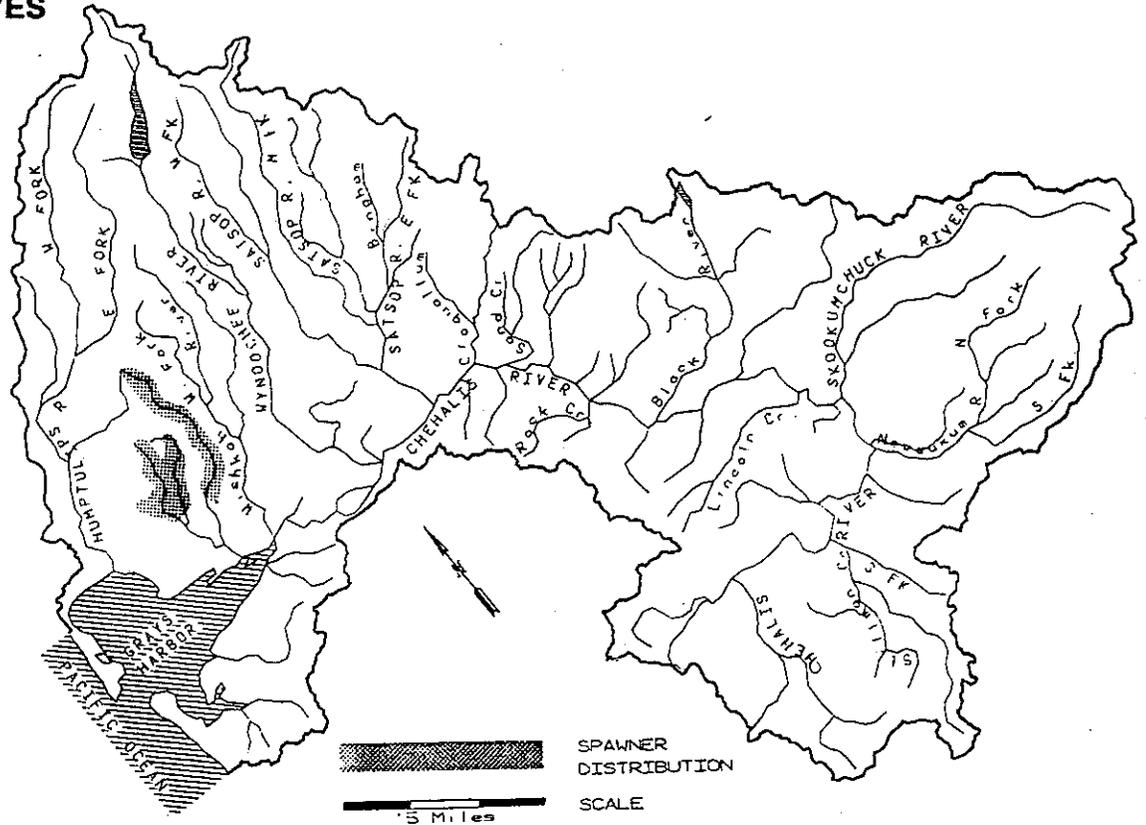
The status of the naturally-spawning Hoquiam River coho stock is Healthy.

Ocean distribution and fishery contribution of Hoquiam natural coho have not been directly established through coded-wire tag studies. It is likely that they follow the same pattern as other coho stocks in the Grays Harbor drainage area. Information gained from these natural-stock tagging studies indicates that coastal British Columbia fisheries take approximately one-half of natural Grays Harbor coho harvest. Another 30 percent is taken in Grays Harbor net fisheries. The remaining contributions are to Oregon and Washington ocean sport and troll fisheries, and to a much smaller degree southeast Alaska, Puget Sound, and freshwater sport fisheries.

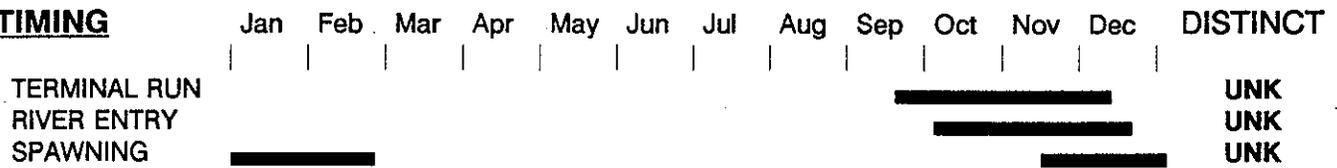
# STOCK DEFINITION PROFILE for Hoquiam Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

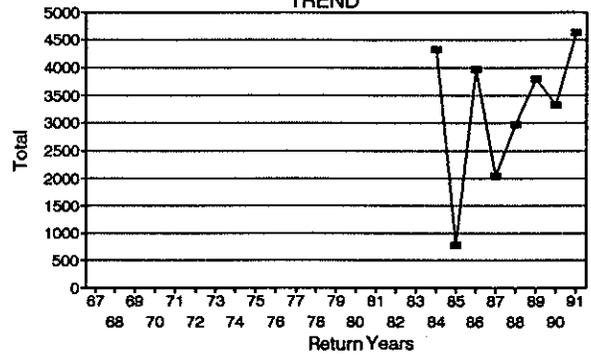
# STOCK STATUS PROFILE for Hoquiam Coho

## STOCK ASSESSMENT

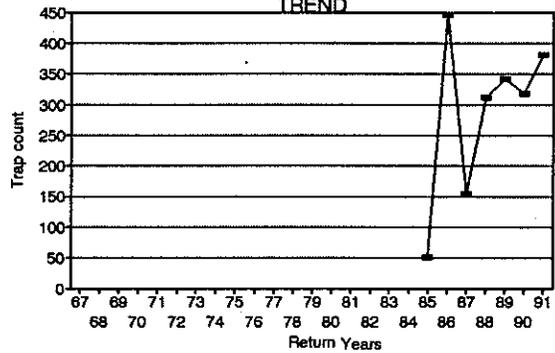
DATA QUALITY-----> Excellent

Return Years	ESCAPE Total	ESCAPE Trap count		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	4324			
85	782	51		
86	3977	446		
87	2047	155		
88	2976	312		
89	3803	341		
90	3327	318		
91	4627	381		

ESCAPE TREND



ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

Terminal area run size of Hoquiam coho is not estimated. Escapements are estimated annually and represent the best measure of stock health. Escapements of adults from 1984 through 1992 ranged from 782 to 4,627 and averaged 3,233. The method used to calculate these estimates is the cumulative redd method used throughout the Washington coast. Results are reasonable representations of escapement and offer excellent year to year comparability. Prior to 1984, escapements were estimated from harvest data and peak count fish per mile data. These are not comparable to current estimates.

## GRAYS HARBOR -- WISHKAH COHO

### **STOCK DEFINITION AND ORIGIN**

Wild coho are found throughout the Wishkah River watershed. Spawning occurs in the mainstem, mainstem West and East Forks and all significant accessible tributaries. Adults begin entering the river in October, and spawning begins in November and continues into January and February. Peak spawning typically occurs in late November to early December. There has been considerable discussion whether the late-spawning component (January-February) represents a separate stock or a continuation of a single stock. At the present, late-spawning fish are included in the Wishkah coho stock, until the matter is resolved.

Releases of hatchery-reared coho yearlings were continuous throughout the 1950s, dropped off in the 1960s, and began again in the 1970s. In the late 1970s and through the 1980s a large-scale fingerling release program was carried out. Most of the yearling releases were into mainstem areas, while fingerling releases were scatter-planted into small tributaries streams. Stock origins for these releases include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek (Sol Duc), Satsop River, and Humptulips River. This same stock mix is found throughout Grays Harbor. As a result of the historical movement of stocks and the size and frequency of hatchery release groups, this stock is no longer considered native. It is best described as a mixed- origin stock.

### **STOCK STATUS**

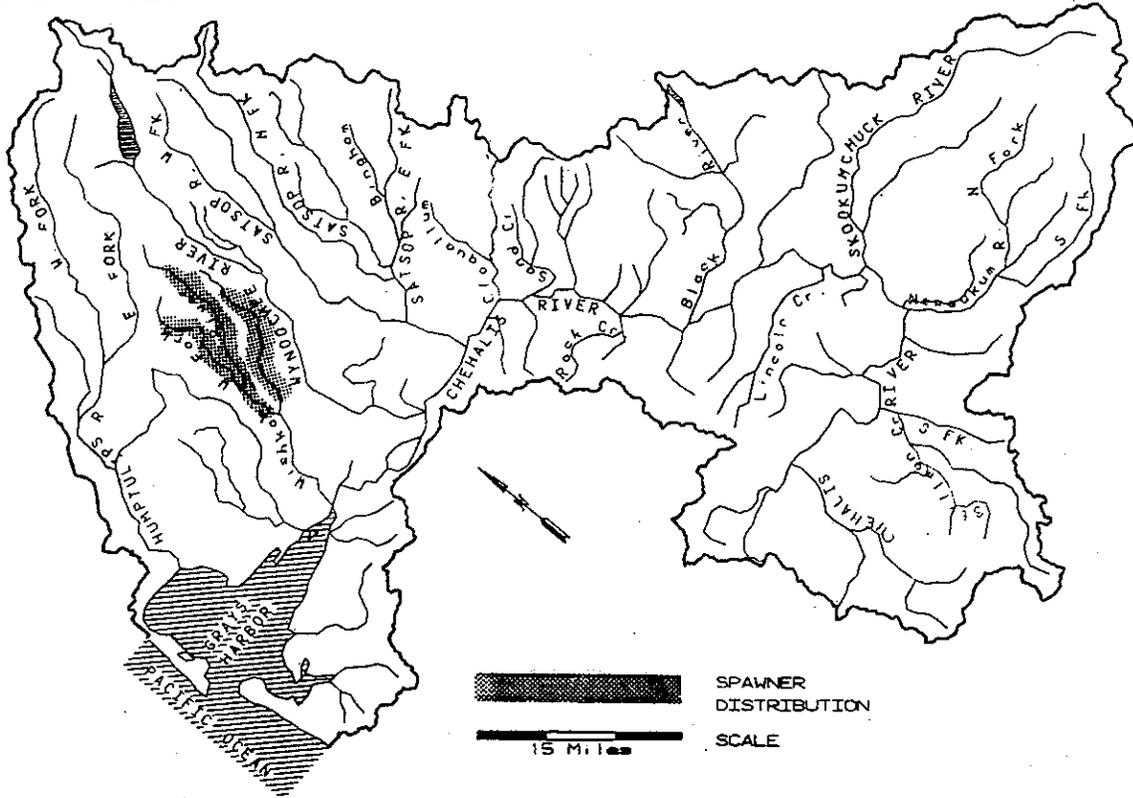
The naturally-spawning Wishkah coho stock is Healthy.

Ocean distribution and fishery contribution of Wishkah natural coho have not been directly established through coded-wire tag studies. It is likely that they follow the same pattern as other coho stocks in the Grays Harbor drainage area. Information gained from these natural stock tagging studies indicates that coastal British Columbia fisheries take approximately one-half of natural coho harvest. Another 30 percent is taken in Grays Harbor net fisheries. The remaining contributions are to Oregon and Washington ocean sport and troll fisheries, and to a much smaller degree, to southeast Alaska, Puget Sound and freshwater sport fisheries.

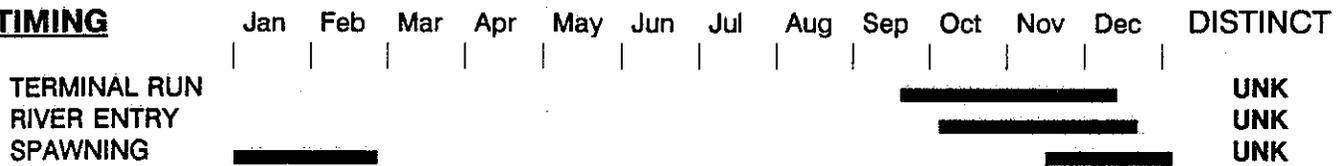
Terminal area run size of Wishkah coho is not estimated. Escapements are estimated annually and represent the best measure of stock health. Adult escapements from 1984 to 1992 ranged from 1,182 to 8,297 and averaged 3,394. The method used to calculate these estimates is the cumulative redd method used throughout the Washington coast. Results are reasonable representations of escapement and offer excellent year-to-year comparability. Prior to 1984 escapements were estimated from

# STOCK DEFINITION PROFILE for Wishkah Coho

## SPAWNER DISTRIBUTION DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

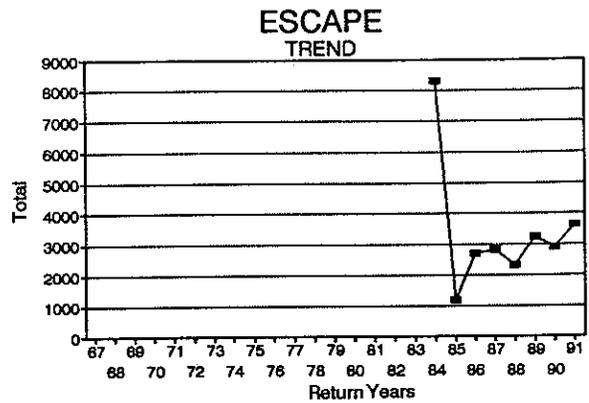
DISTINCT? - NO

# STOCK STATUS PROFILE for Wishkah Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	8297			
85	1182			
86	2717			
87	2829			
88	2329			
89	3233			
90	2930			
91	3636			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

harvest data and peak-count fish-per-mile data. These are not comparable to current estimates.

## GRAYS HARBOR -- WYNOOCHEE COHO

### **STOCK DEFINITION AND ORIGIN**

Coho are found throughout the Wynoochee River watershed. Spawning occurs primarily in the mid- and upper reach tributaries (Carter, Schafer and Big Creeks.) and the mainstem. At times, the lower river tributaries of Black Creek, Helm Creek and Wedekind Creek also produce significant coho as well. On average, about 20 percent of the total escapement is passed above the Wynoochee collection facility at RM 47.7. Adults have been observed entering the river as early as September but generally do not enter until October. Spawning begins in November and continues into January and February. Peak spawning typically occurs in late November to early December. There has been considerable discussion whether the late-spawning component (January-February) represents a separate stock or a continuation of a single stock. At the present these late-spawning fish are included in the Wynoochee stock until the matter is resolved.

Releases of hatchery-reared coho yearlings were continuous since throughout the 1950s. In the late 1970s and through the 1980s a large-scale fingerling program was carried out. Most of the yearling releases were into mainstem areas, while fingerling releases have a history of both mainstem and widespread small tributary scatter-planting. Stock origins for these releases include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek (Sol Duc), Satsop River, and Humptulips River. This same stock mix is found throughout Grays Harbor. As a result of the historical movement of stocks and the size and frequency of hatchery release groups, this stock is no longer considered native. It is best described as a mixed-origin stock.

### **STOCK STATUS**

The status of Wynoochee coho is best described as Healthy.

Ocean distribution and fishery contribution of Wynoochee natural coho have not been directly established through coded-wire tag studies. It is likely that they follow the same pattern as other coho stocks in the Grays Harbor drainage area. Information gained from these natural-stock tagging studies indicates that coastal British Columbia fisheries take approximately one-half of the Grays Harbor natural coho harvest. Another 30 percent is taken in Grays Harbor net fisheries. The remaining contributions are to Oregon and Washington ocean sport and troll fisheries, and to a much smaller degree, to southeast Alaska, Puget Sound and freshwater sport fisheries.

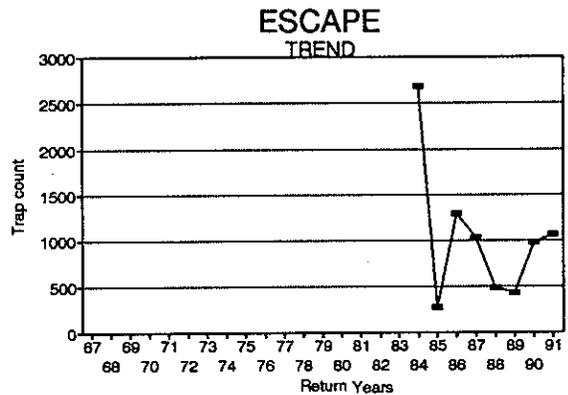
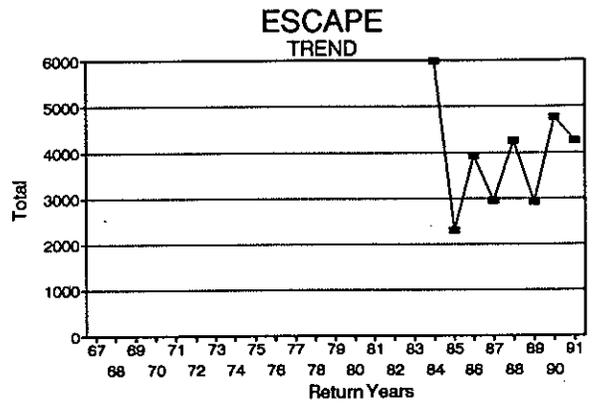


# STOCK STATUS PROFILE for Wynoochee Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total	ESCAPE Trap count		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	5979	2676		
85	2303	272		
86	3924	1294		
87	2960	1033		
88	4241	490		
89	2920	434		
90	4769	976		
91	4261	1066		



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

Terminal area run-size of Wynoochee coho is not estimated. Escapements are estimated annually and represent the best measure of stock health. Escapements of adults from 1984 through 1991 ranged from 2,303 to 5,972 and averaged 3,920. No trends are apparent. The highest escapement occurred in 1984 and the lowest in 1985. The method used to calculate these estimates is the cumulative redd technique used throughout the Washington coast. Results are reasonable representations of escapement and offer excellent year-to-year comparability.

## GRAYS HARBOR -- SATSOP COHO

### **STOCK DEFINITION AND ORIGIN**

Coho spawn in all tributaries and all forks of the mainstem Satsop River. Adults have been observed entering the river as early as late September but generally do not enter until October. Spawning begins in November and continues into January and February. Peak spawning typically occurs in late November to early December. There has been considerable discussion whether the late-spawning component (January-February) represents a separate stock or a continuation of a single stock. At the present these late-spawning fish are included in the Satsop stock, until the matter is resolved.

Releases of hatchery-reared coho yearlings extends back to the 1930s and 1940s. Yearling releases have been continuous since the early 1950s. In the late 1970s and through the 1980s, a large-scale fingerling release program was carried out. Stock origins for these releases include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek (Sol Duc), Satsop River and Humptulips River. There are reports of the use of Willapa stocks in the 1940s. While most yearling releases were into mainstem areas, fingerling releases have a history of both mainstem and widespread small tributary scatter-planting. The large, ongoing hatchery production program contributes significantly to the annual spawning escapement and thus to the naturally spawning stock gene pool. As a result of the historical movement of stocks, the size and frequency of off-station hatchery release groups, and natural spawning hatchery adults this stock is best described as a mixed-origin stock.

### **STOCK STATUS**

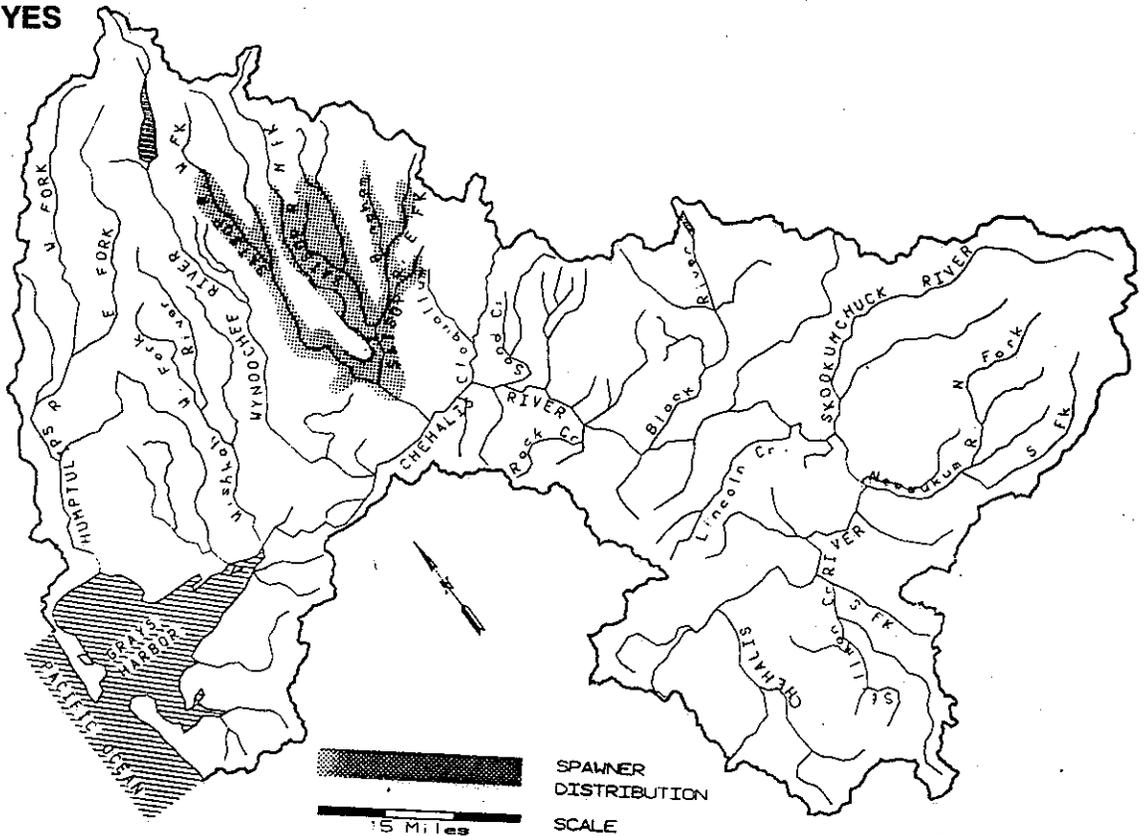
The status of Satsop coho is best described as Healthy.

Ocean distribution and fisheries contribution of Satsop natural coho have been established through coded-wire tag studies conducted at Bingham Creek, a tributary to the East Fork Satsop River. Information from these natural stock tagging studies indicates that coastal British Columbia fisheries take approximately one-half of natural coho harvest. Another 30 percent is taken in Grays Harbor net fisheries. The remaining contributions are to Oregon and Washington ocean sport and troll, and to a much smaller degree, to southeast Alaska, Puget Sound and the local freshwater sport fisheries. If escapement is included in the contribution profile, the British Columbia troll and Grays Harbor net each account for less than 20 percent of the total contribution while the escapement contribution exceeds 55 percent. The average total (all fisheries) catch to escapement ratio for the 1980 through 1987 brood years 1.0:1.3.

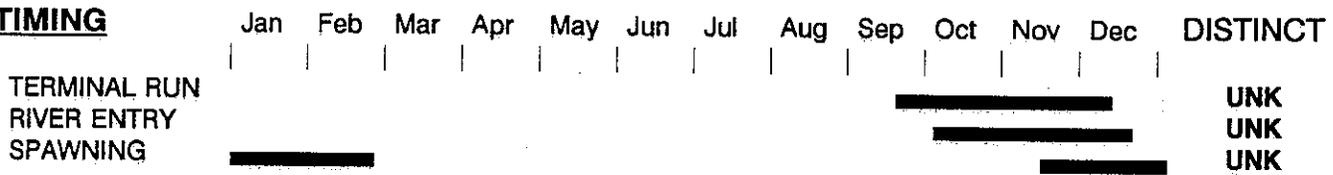
# STOCK DEFINITION PROFILE for Satsop Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - NO

# STOCK STATUS PROFILE for Satsop Coho

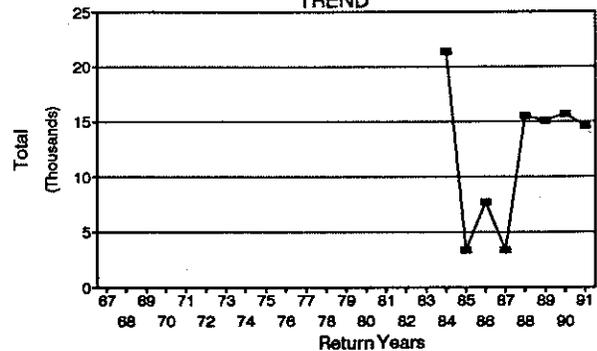
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	21374
85	3381
86	7659
87	3354
88	15497
89	15106
90	15736
91	14622

## ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

Terminal area run size of Satsop coho is not estimated. Escapements are estimated annually and represent the best measure of stock health. Escapements (excluding hatchery strays and Bingham Creek) of adults from 1984 through 1991 ranged from 1,355 to 9,185 and averaged 3,136. No trends are apparent. The highest escapement occurred in 1984 and the lowest in 1987. A large portion of the natural spawning escapement results from hatchery-origin adults utilizing available habitat both downstream and upstream of the hatchery on the East Fork Satsop. Significant numbers of hatchery origin adults also stray into Bingham Creek. Including naturally-spawning hatchery fish (East Fork Satsop and Bingham Creek) in the estimates, escapements range from 3,354 to 21,374, averaging 12,091. The method used to calculate these estimates is the cumulative redd technique used for coho throughout the Washington coast. Results are reasonable representations of escapement and offer excellent year-to-year comparability.

## GRAYS HARBOR -- CHEHALIS COHO

### **STOCK DEFINITION AND ORIGIN**

Coho are found throughout the Chehalis River watershed. Spawning occurs in the upper mainstem, mainstem West and East Forks and all suitable accessible tributaries. Adults begin entering the river in October and spawning begins in November and continues into January and sometimes February. Peak spawning typically occurs in late November to early December. There has been considerable discussion whether the late-spawning component (January-February) represents a separate stock or a continuation of a single stock. At the present these late-spawning fish are included in the Chehalis stock, until the matter is resolved.

Releases of hatchery-reared coho yearlings have been continuous since the 1950s. In the late 1970s and through the 1980s a large-scale fingerling program was carried out. Most of the yearling releases were into the mainstem areas while fingerling releases have a history of both mainstem release and widespread scatter-planting into small tributaries. Stock origins for these releases include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek (Sol Duc), Satsop River, and Humptulips River. This same stock mix is found throughout Grays Harbor. As a result of the historical movement of stocks and the size and frequency of hatchery release groups, this stock is best described as a mixed-origin stock.

### **STOCK STATUS**

The Chehalis River coho stock is Healthy.

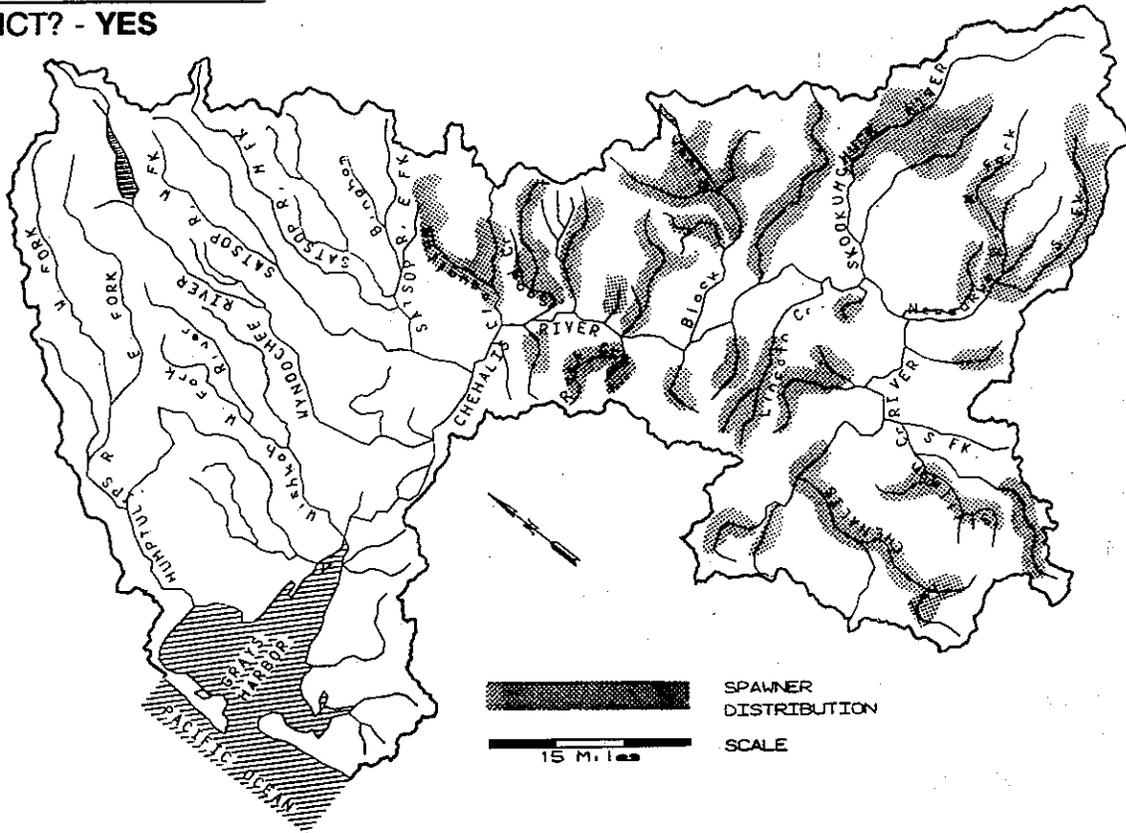
Ocean distribution/contribution of Chehalis natural coho has been established through coded-wire tag studies in tributaries of the "upper" Chehalis (Black River upstream) watershed. Information from natural stock tagging studies indicates that coastal British Columbia fisheries take approximately one-half of natural coho harvest. Another 30 percent is taken in Grays Harbor net fisheries. The remaining contributions are to Oregon and Washington ocean sport and troll fisheries, and to a much smaller degree to southeast Alaska, Puget Sound, and freshwater sport fisheries.

Terminal-area run size of Chehalis coho is not estimated. Escapements are estimated annually and represent the best measure of stock health. Escapements of adults from 1984 through 1991 ranged from 5,803 to 46,362 and averaged 18,510. No trends are apparent. The method used to calculate these estimates is the cumulative redd technique used throughout the Washington coast. Results are reasonable representations of escapement and offer excellent year-to-year comparability.

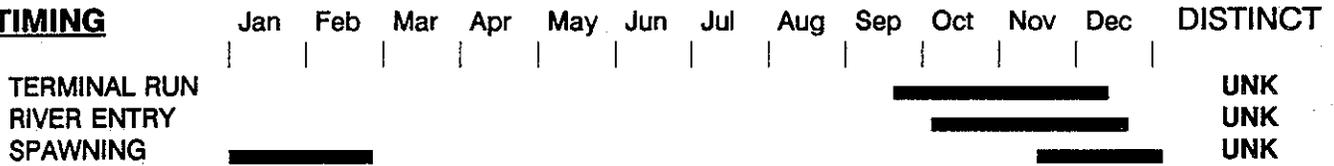
# STOCK DEFINITION PROFILE for Chehalis Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

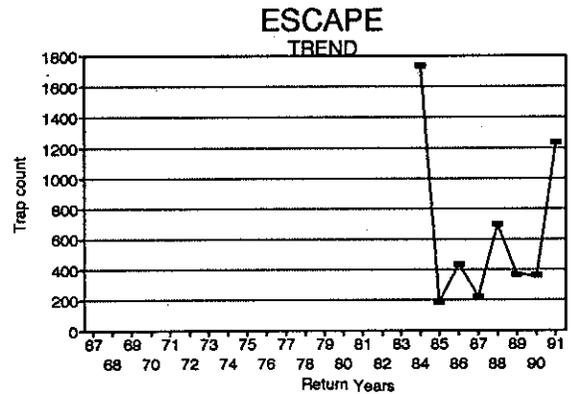
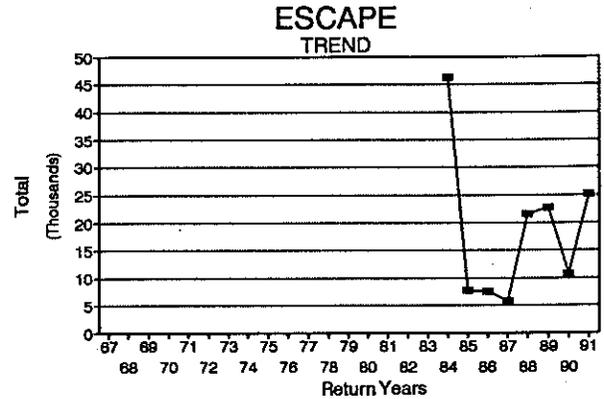
DISTINCT? - NO

# STOCK STATUS PROFILE for Chehalis Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total	ESCAPE Trap count		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	46362	1736		
85	7840	189		
86	7608	434		
87	5803	222		
88	21641	698		
89	22824	369		
90	10768	363		
91	25231	1235		



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- JOHNS / ELK RIVERS AND SOUTH BAY TRIBUTARIES COHO**

### **STOCK DEFINITION AND ORIGIN**

Coho are found throughout Johns River, Elk River and the South Bay tributaries. Spawning occurs primarily in upper Johns River mainstem, North and South Fork Johns River, and most accessible Johns River tributaries. In the Elk River spawning occurs in primarily the West Branch Elk River. The primary South Bay tributaries are Newskah and Andrews creeks. Adults begin entering their parent stream in October. Spawning begins in November and continues into January and February. Peak spawning typically occurs in late November to early December. There has been considerable discussion as to whether the late-spawning component (January-February) represents a separate stock or a continuation of a single stock. These fish are included in the Johns/Elk Rivers and South Bay tribs stock until the matter is resolved.

Releases of hatchery-reared coho yearlings were continuous through the early and mid-1950s. No releases are reported in the early 1960s, with large yearling releases not occurring again until 1969, 1970 and 1980. In 1980 (1979 brood) a large cooperative fingerling project with the Grays Harbor Gillnetters began. Using Humptulips Hatchery stock, up to 200,000 fingerlings per year are released into the Johns/Elk River drainage. Most of the yearling releases were into mainstem areas. Fingerling releases have a history of both mainstem release and widespread scatter-planting in small groups in small tributaries. Stock origins for these releases include Green River, Minter Creek, Samish River, Dungeness River, Lake Creek (Sol Duc), Satsop River and Humptulips River. This same stock mix is found throughout Grays Harbor. As a result of the historical movement of stocks and the size and frequency of hatchery release groups and large scale co-operative project, this stock is best described as a mixed origin stock.

### **STOCK STATUS**

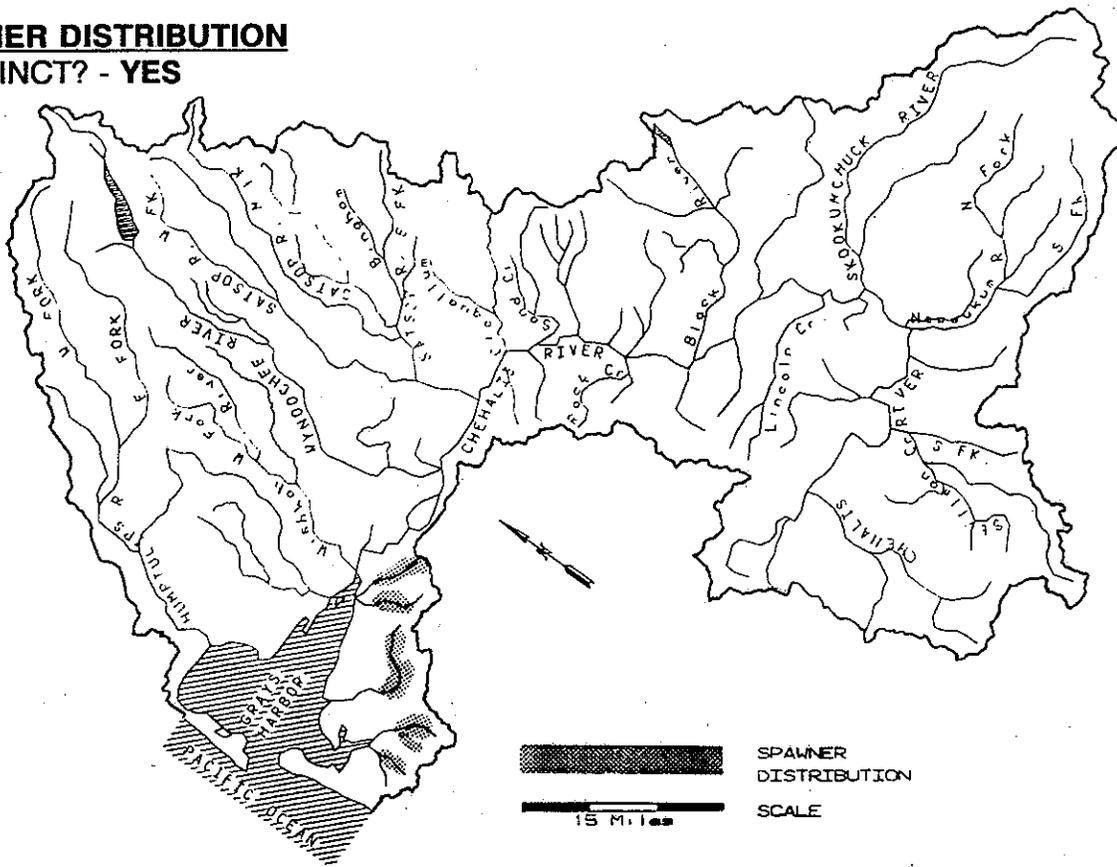
The Johns/Elk Rivers and South Bay tributaries coho stock is Healthy.

Ocean distribution and fishery contribution of Johns/Elk Rivers and South Bay tribs coho have not been directly established through coded-wire tag studies. It is assumed they follow the same pattern as other coho stocks in the Grays Harbor drainage area. This information indicates that coastal British Columbia fisheries take approximately 50 percent of natural coho produced. Another 30 percent is taken in Grays Harbor net fisheries. The remaining contributions are to Oregon and Washington ocean sport and troll fisheries, and to a much smaller degree, to southeast Alaska, Puget Sound and freshwater sport fisheries.

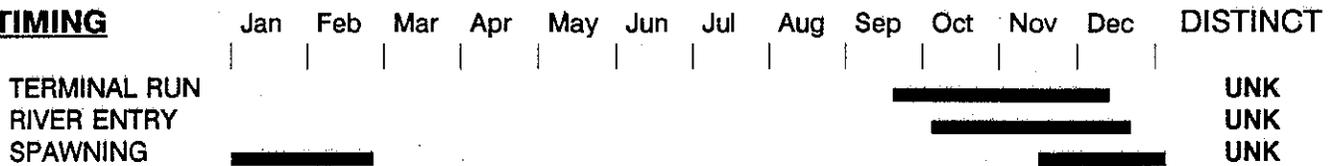
# STOCK DEFINITION PROFILE for Johns/Elk & S. Bay Tributaries Coho

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

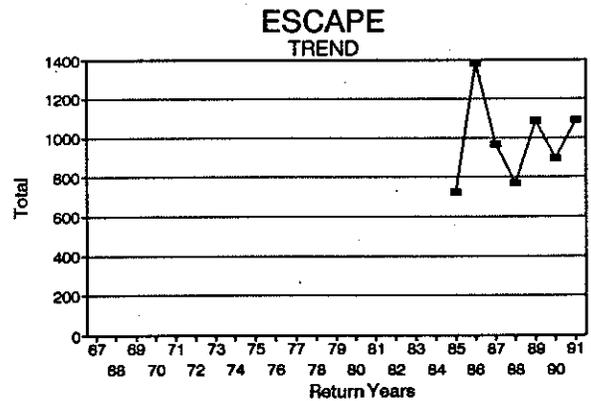
DISTINCT? - NO

# STOCK STATUS PROFILE for Johns/Elk and S. Bay Tributaries Coho

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85	724			
86	1383			
87	968			
88	771			
89	1085			
90	897			
91	1090			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

Terminal-area run size of Johns/Elk Rivers coho is not estimated. Escapements are estimated annually and represent the best measure of stock health. Escapements of adults from 1985 through 1991 ranged from 724 to 1,383 and averaged 988. No trends are apparent. The method used to calculate escapement is the cumulative redd technique used throughout the Washington coast. Results are reasonable representations of escapement and offer excellent year to year comparability.

## OVERVIEW -- GRAYS HARBOR SUMMER AND WINTER STEELHEAD STOCKS

### SUMMER:

HUMPTULIPS  
CHEHALIS

### WINTER:

HUMPTULIPS      SATSOP  
HOQUIAM          CHEHALIS  
WISHKAH          SOUTH HARBOR  
WYNOOCHEE  
SKOOKUMCHUCK/NEWAUKUM

### STOCK DEFINITION AND ORIGIN

In Grays Harbor, two wild summer steelhead stocks and eight wild winter steelhead stocks have been identified. Wild summer steelhead in the Humptulips River are native and a distinct stock. Wild summer steelhead in the Chehalis River are a distinct stock; a native stock originally returned, but the present origin of the stock is unknown since there is uncertainty about the amount of contribution by hatchery summer steelhead spawning in the wild. Wild winter steelhead in the Hoquiam River, Wishkah River, Wynoochee River, Satsop River, Chehalis River and small tributaries, Skookumchuck/Newaukum River, and South Harbor are distinct stocks. Wild winter steelhead are native, except the Wynoochee and Skookumchuck/Newaukum stocks are a mixture of native steelhead and hatchery adults originating from the native stocks.

There is little or no information available to indicate that these are genetically distinct stocks. The stocks are treated separately due to the geographic isolation of the spawning populations. There may be more or fewer stocks identified once comprehensive genetic information is available.

Humptulips River System: About 125,000 to 230,000 hatchery winter steelhead smolts and about 17,000 hatchery summer steelhead smolts are stocked in the Humptulips River system annually.

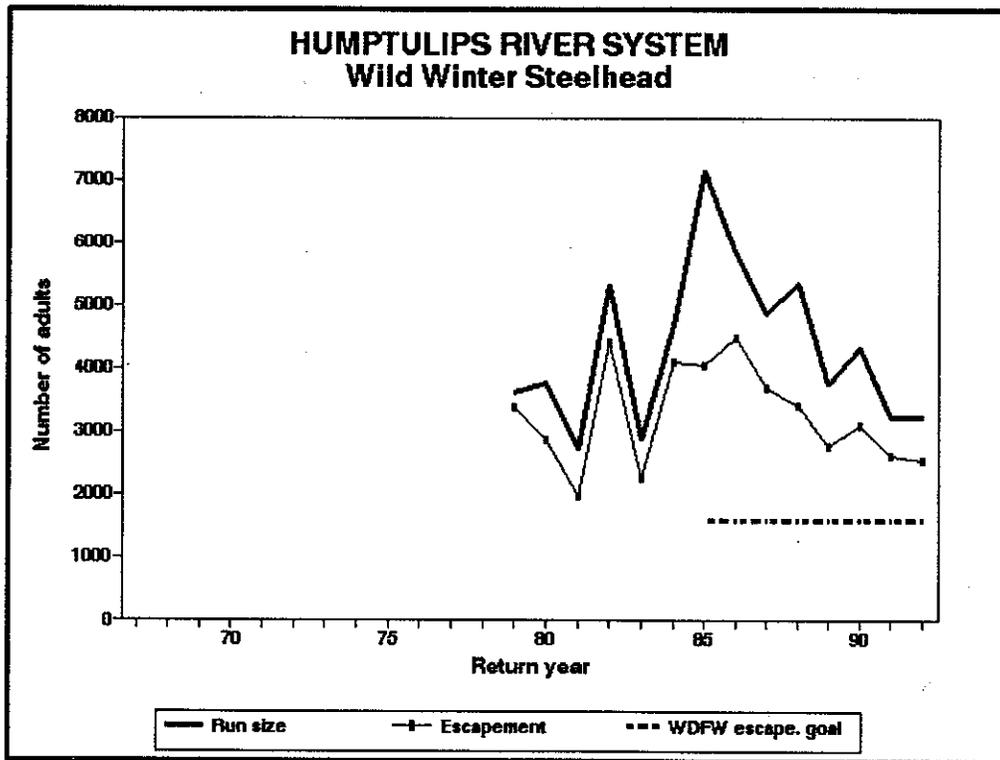
Chehalis River System: About 130,000 to 350,000 hatchery winter steelhead smolts and 40,000 to 50,000 hatchery summer steelhead smolts are stocked in the Chehalis River system annually. Originally, an early-returning hatchery winter steelhead stock (Chambers Creek) was used. In recent years, winter steelhead brood stock has been collected from the Skookumchuck, Wynoochee, and Wishkah rivers and Van Winkle Creek. Timing of these stocks is closer to the wild stock timing, and the potential for substantial interbreeding is present.

## STOCK STATUS

### Humptulips River System

Wild winter steelhead spawner escapement and run size have been monitored for the Humptulips River system since the 1978-79 season. Wild escapement has ranged from 1,967 to 4,470 fish and wild run size has ranged from 2,712 to 7,125 fish (see figure).

Beginning with the 1984-85 season, a WDFW escapement goal of 1,600 winter steelhead was set for the Humptulips River system, and the fisheries were managed to achieve the goal. This goal is to be achieved by wild adults and does not include hatchery fish spawning in the wild. Since the escapement goal was set, wild escapement in the Humptulips River has averaged 3,324 fish and exceeded the goal in all years (see figure).



The wild winter steelhead run in the Humptulips River system is fished upon by the Quinault Indian Nation on the lower Humptulips River and in the estuary (Area 2C). Sport anglers fish the mainstem Humptulips River, and the East Fork and West Fork Humptulips. The tribal fishery occurs from November through March while the sport fishery occurs from November through April.

During the 1978-79 through 1991-92 return years, the wild winter steelhead run in the Humptulips River system was comprised of 14.3 percent sport harvest, 10.6 percent tribal harvest and 75.1 percent spawner escapement (see table).

**Humptulips River system wild winter steelhead sport harvest, tribal harvest, spawner escapement, and run size from 1974-75 through 1991-92.**

Return year	Sport harvest	Tribal harvest	Spawner escapement	Run size
1974-75	74	1,305		
1975-76	205	405		
1976-77				
1977-78	320	243		
1978-79	212	31	3,371	3,614
1979-80	662	260	2,854	3,776
1980-81	478	267	1,967	2,712
1981-82	543	382	4,400	5,325
1982-83	298	321	2,248	2,867
1983-84	379	222	4,074	4,675
1984-85	1,962	1,115	4,048	7,125
1985-86	509	830	4,470	5,809
1986-87	671	511	3,666	4,848
1987-88	878	1,066	3,410	5,354
1988-89	467	493	2,754	3,714
1989-90	699	525	3,100	4,324
1990-91	441	170	2,604	3,215
1991-92	443	252	2,538	3,233

Mean run size distribution, 1978-79 to 1991-92

617	460	3,250	4,328
14.3%	10.6%	75.1%	

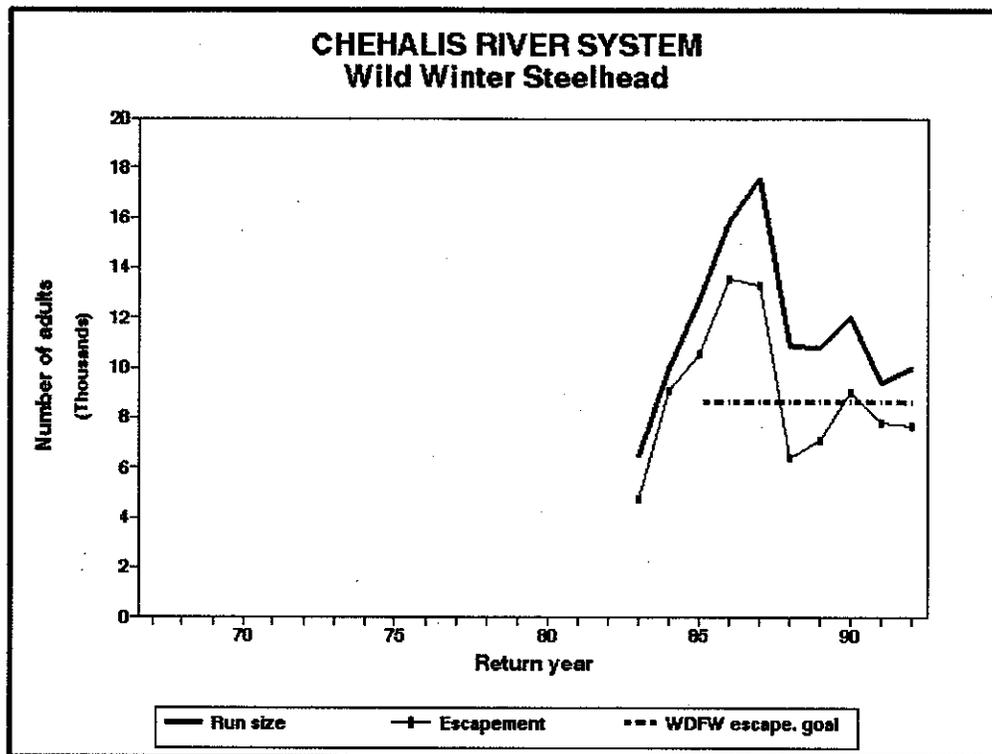
More information on each stock in the Humptulips River system is presented in separate Stock Reports.

Chehalis River System

Wild winter steelhead spawner escapement and run size have been monitored for the Chehalis River system since the 1982-83 season. Wild escapement has ranged from 4,710 to 13,558 fish and wild run-size has ranged from 6,457 to 17,554 fish (see figure).

Beginning with the 1984-85 season, a WDFW escapement goal of 8,600 winter steelhead was set for the Chehalis River system (excluding the Hoquiam River) and the

fisheries were managed to achieve the goal. This goal is to be achieved by wild adults and does not include hatchery fish spawning in the wild. In the eight seasons since the escapement goal was set, wild escapement has averaged 9,417 fish, exceeded the goal four times, and was very close to goal (at about 8,000 fish) another two times (see figure).



The wild winter steelhead run in the Chehalis River system is fished upon by the Quinault Indian Nation on the lower Chehalis River, and in the estuary (Areas 2A and 2D). The Chehalis Tribe conducts a commercial fishery on its reservation near Oakville. Sport anglers fish the mainstem Chehalis and all of the major tributaries. The tribal fishery occurs from November through March while the sport fishery occurs from November through March or April 15.

During the 1982-83 through 1991-92 return years, the wild winter steelhead run in the Chehalis River system (excluding the Hoquiam River) was comprised of 7.9 percent sport harvest, 15.0 percent tribal harvest (11.5 percent by Quinault Indian Nation and 3.5 percent by Chehalis Tribe), and 77.1 percent spawner escapement (see table).

Chehalis River system wild winter steelhead sport harvest, tribal harvest, spawner escapement, and run size from 1982-83 through 1991-92. The Hoquiam River is not included.

Return year	Sport harvest	Tribal Harvest		Spawner escapement	Run size
		Quinault Nation	Chehalis Tribe		
1982-83	639	861	247	4,710	6,457
1983-84	293	418	186	9,095	9,992
1984-85	1,095	718	346	10,583	12,742
1985-86	428	1,617	228	13,558	15,831
1986-87	1,742	2,043	507	13,262	17,554
1987-88	1,298	2,687	521	6,381	10,887
1988-89	878	2,134	645	7,110	10,767
1989-90	858	1,724	400	9,010	11,992
1990-91	765	316	543	7,781	9,405
1991-92	1,182	782	364	7,652	9,980
Mean run size distribution, 1982-83 to 1991-92					
	918	1,330	399	8,914	11,561
	7.9%	11.5%	3.5%	77.1%	

More information on each stock in the Chehalis River system is presented in separate Stock Reports.



## **GRAYS HARBOR -- HUMPTULIPS SUMMER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Humptulips River are native and a distinct stock based on the geographic isolation of the spawning population. Sport harvest records show summer steelhead were present before hatchery smolt stocking began in the mid-1970s. They are distinct from wild winter steelhead in the Humptulips River based on run timing.

The specific spawning distribution is unknown, but spawning is generally believed to take place in the upper reaches of the river.

Little is known about the genetic composition of the stock.

Similar to other wild summer steelhead stocks, run timing is generally from May through October and spawn timing is unknown, but generally believed to be from February through April.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information of wild summer steelhead is available over the entire run, but wild sport harvest is too low to be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

### **FACTORS AFFECTING PRODUCTION**

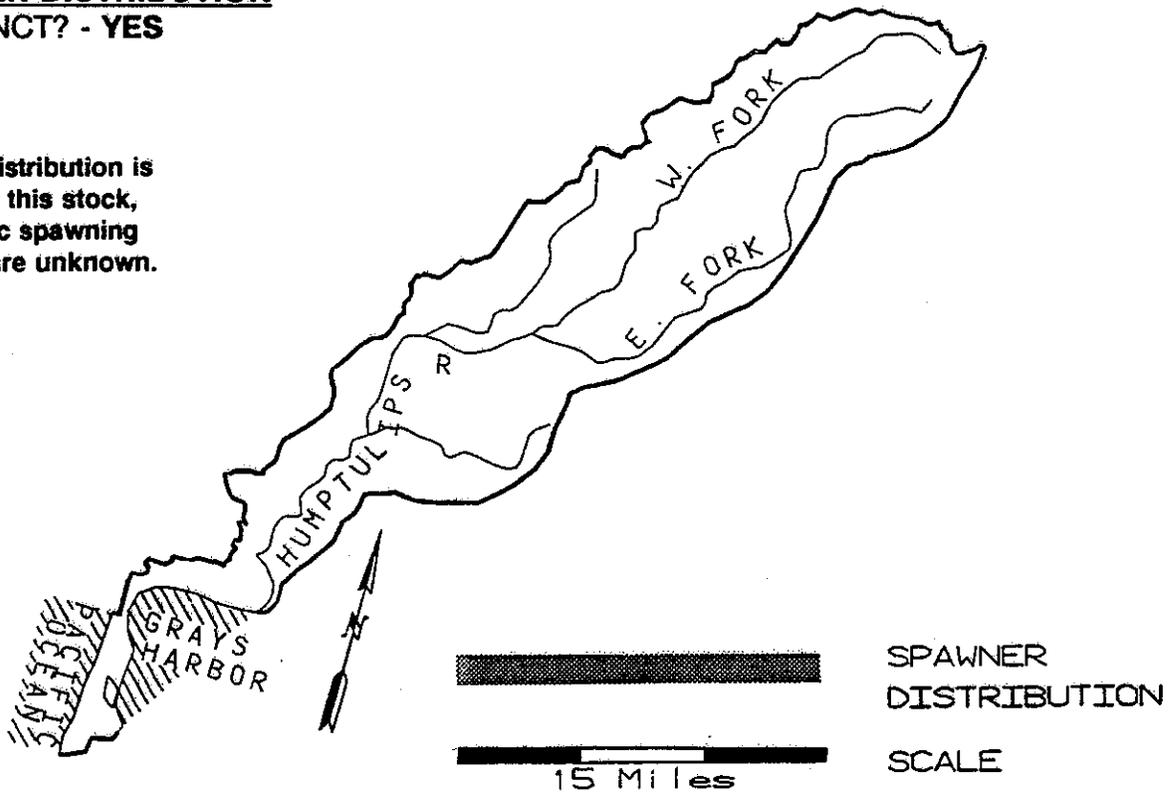
**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities. The Humptulips has had sedimentation from logging activities. Commercial gravel removal operations may impact spawning habitat.

# STOCK DEFINITION PROFILE for Humptulips Summer Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Humptulips Summer Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

67	
68	40
69	64
70	48
71	52
72	104
73	73
74	46
75	16
76	16
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	24
88	32
89	14
90	14
91	26

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- There is no directed tribal fishery on this stock. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992.

**Hatchery** -- While hatchery steelhead smolts have been stocked in this and nearby streams, contribution to the wild stock from hatchery fish spawning in the wild is unknown.

## GRAYS HARBOR -- CHEHALIS SUMMER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild summer steelhead in the Chehalis River system are a distinct stock based on the geographical isolation of the spawning population. A native stock originally returned to the Chehalis River system, but there is uncertainty about the amount of contribution by hatchery summer steelhead spawning in the wild, and the present origin is unknown. Since summer steelhead in sport harvest were caught before summer steelhead smolts were first planted, it is believed a native stock originally returned. Specific spawning locations are unknown, but spawning by wild summer steelhead probably takes place in the upper Wynoochee River and possibly in the upper reaches of the Chehalis River and other streams.

Wild summer steelhead are distinct from wild winter steelhead in the Chehalis River system based on run timing. Similar to other wild summer steelhead stocks, run timing is generally from May through October and spawn-timing is unknown, but believed to be from February through April.

Little is known about the genetic composition of the stock.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years but wild summer steelhead were not reported separately on steelhead permit cards until the 1986 summer steelhead season. Sport harvest information of wild summer steelhead is available over the entire run, but wild sport harvest is too low to be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

### **FACTORS AFFECTING PRODUCTION**

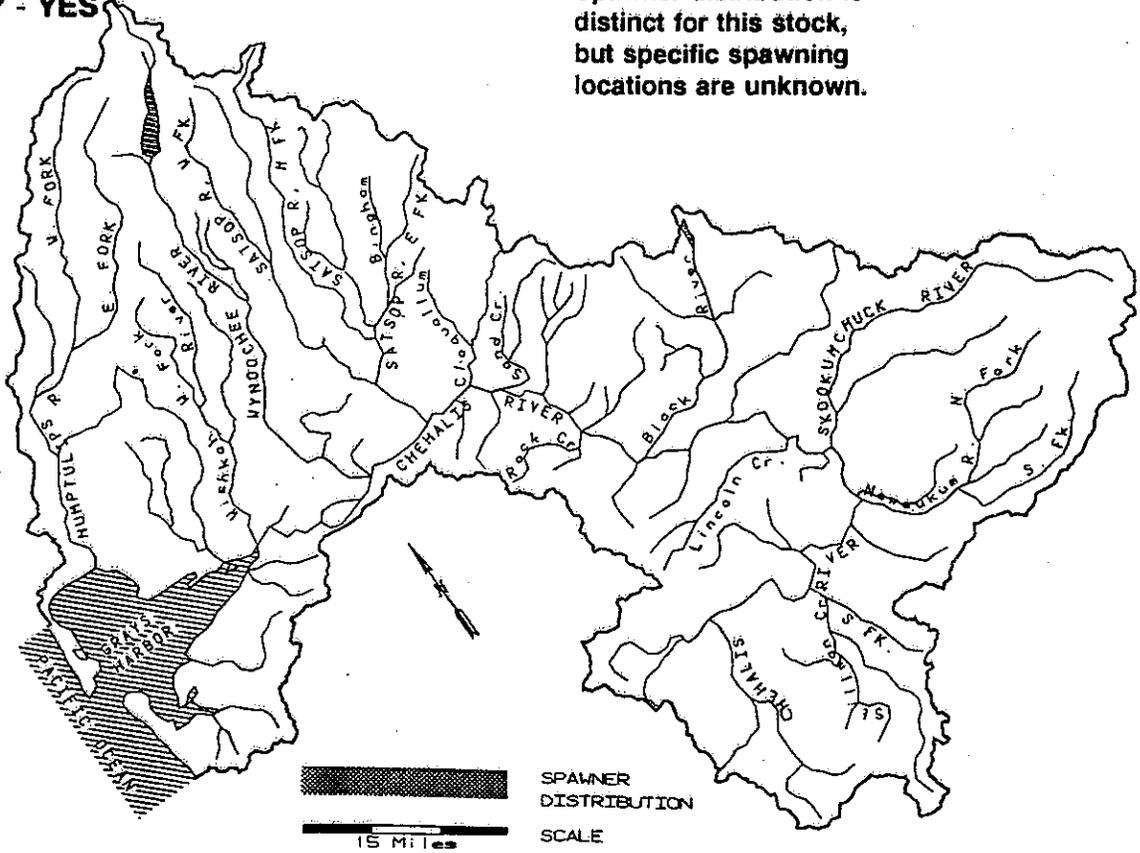
**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities. The Chehalis River system has had sedimentation from logging activities. Pollution in Grays Harbor also continues to be a problem for fish runs.

# STOCK DEFINITION PROFILE for Chehalis Summer Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec **DISTINCT**

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

**UNK**  
**UNK**

## BIOLOGICAL CHARACTERISTICS

DISTINCT? -

GENETICS -

# STOCK STATUS PROFILE for Chehalis Summer Steelhead

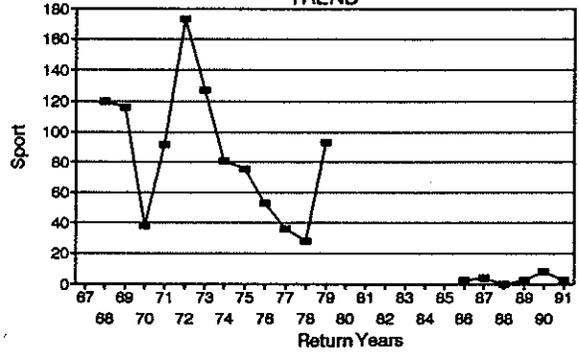
## STOCK ASSESSMENT

DATA QUALITY-----> Poor

Return Years	HARVEST Sport			
--------------	---------------	--	--	--

67	
68	120
69	116
70	38
71	92
72	173
73	127
74	81
75	76
76	53
77	36
78	28
79	93
80	
81	
82	
83	
84	
85	
86	2
87	4
88	0
89	2
90	8
91	2

HARVEST TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Unknown*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Unknown*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- There is no directed tribal fishery on this stock. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1992. The Chehalis and Quinault tribes both engage in a gill net fishery in the Chehalis River on the Chehalis River wild steelhead run which is comprised of several wild steelhead stocks. The number of intercepted wild fish from the Chehalis summer steelhead stock is not known.

**Hatchery** -- While hatchery summer steelhead smolts have been stocked in this and nearby streams, contribution to the wild stock from hatchery fish spawning in the wild is unknown.

## **GRAYS HARBOR -- HUMPTULIPS WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Humptulips River and tributaries are native and a distinct stock based on geographical isolation of the spawning population.

Run timing (December through May) and spawn timing (mid-February through early June) are similar to that of other wild winter steelhead stocks in the Grays Harbor area.

Little is known about the genetic composition of the stock.

### **STOCK STATUS**

The status of the stock is Healthy.

Stock status is based on wild steelhead spawner escapement.

The WDFW escapement goal is 1,600 wild winter steelhead for the Humptulips River. Wild winter steelhead spawner escapement from 1978-79 to 1991-92 has ranged from 1,967 to 4,470.

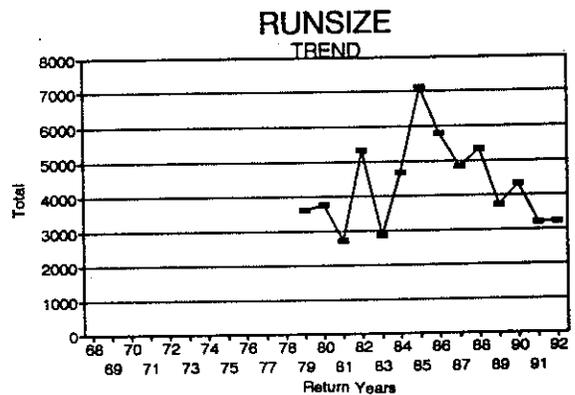
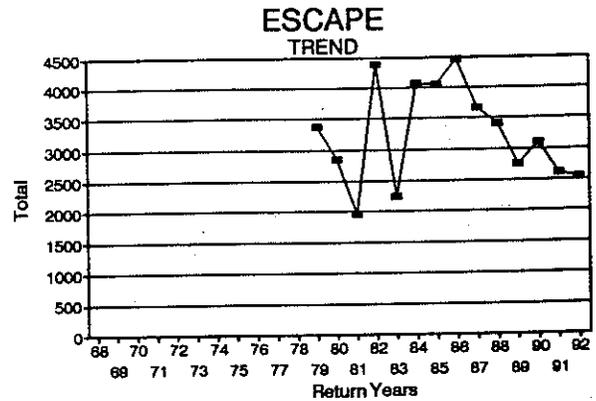


# STOCK STATUS PROFILE for Humptulips Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Good

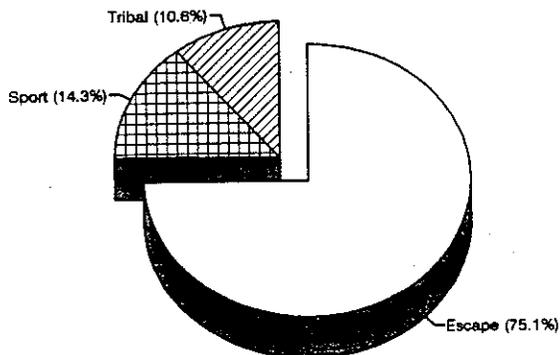
Return Years	ESCAPE Total	RUNSIZE Total	HARVEST Sport	HARVEST Net
68				
69				
70				
71				
72				
73				
74				
75			74	1305
76			205	405
77				
78			320	243
79	3371	3614	212	31
80	2854	3776	662	260
81	1967	2712	478	267
82	4400	5325	543	382
83	2248	2867	298	321
84	4074	4675	379	222
85	4048	7125	1962	1115
86	4470	5809	509	830
87	3666	4848	671	511
88	3410	5354	878	1066
89	2754	3714	467	493
90	3100	4324	699	525
91	2604	3215	441	170
92	2538	3233	443	252



WDFW Escapement goal = 1600

## AVERAGE RUNSIZE DISTRIBUTION

YEARS 1979-1992



## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- HOQUIAM WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Hoquiam River and tributaries are native and a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock.

Run timing (December through May) and spawn timing (mid-February to early June) are similar to those of other wild winter steelhead stocks in the Grays Harbor area.

### **STOCK STATUS**

The status of the stock is Healthy based on wild steelhead spawner escapement.

Using the WDFW methodology (Gibbons et al. 1985), a maximum sustained harvest (MSH) escapement goal for this stock would be 450 wild steelhead. Spawner escapements have exceeded 450 wild steelhead in all years monitored between 1984 and 1992 and averaged 678 wild steelhead. Spawner escapements for the Hoquiam River are not included as part of the Chehalis River system escapement goal of 8,600.

The Quinault Indian Nation operates a trap on the West Branch of the Hoquiam. The number of adult steelhead trapped has ranged from 23 to 50 adults from 1985 to 1992.



# STOCK STATUS PROFILE for Hoquiam Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total	ESCAPE Trap count	HARVEST Sport	
--------------	--------------	-------------------	---------------	--

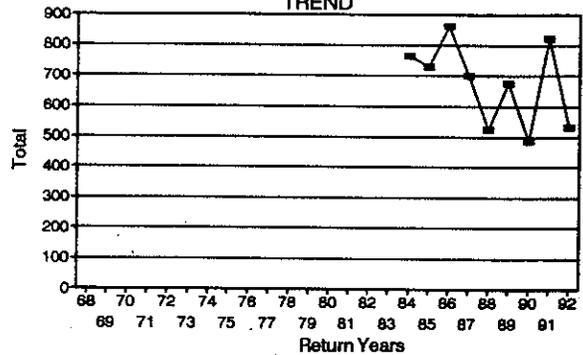
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	766			
85	730	50		
86	862	31		
87	700	33	22	
88	525	42	10	
89	675	35	2	
90	487	23	16	
91	822	35	17	
92	533	44	7	

WDFW Escapement goal = 450

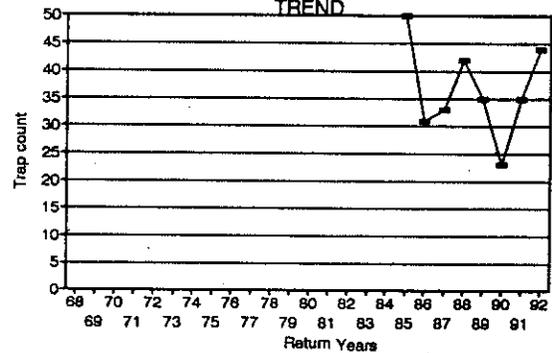
## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

ESCAPE TREND



ESCAPE TREND



## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- WISHKAH WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Wishkah River, West Fork Wishkah River and tributaries are native and a distinct stock based on the geographic isolation of the spawning population.

Little is known about the genetic composition of the stock.

Run timing (December through May) and spawn timing (mid-February to early June) are similar to those of other wild winter steelhead stocks in the Grays Harbor area.

### **STOCK STATUS**

The status of the stock is Healthy.

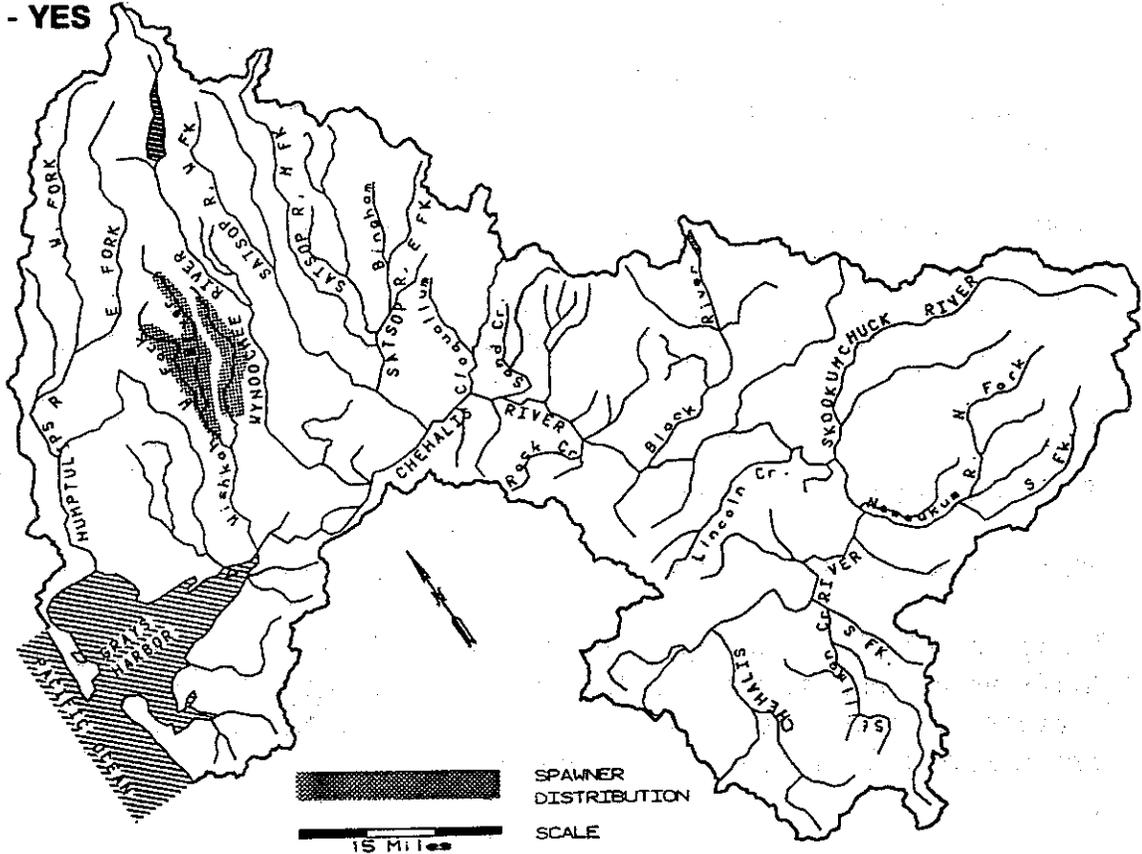
Stock status is based on wild steelhead spawner escapement.

Using the WDFW methodology (Gibbons et al. 1985), a maximum sustained harvest (MSH) escapement goal for this stock would be 412 wild steelhead. Spawner escapements have exceeded 412 wild steelhead in all years monitored between 1984 and 1992 and averaged 922 wild steelhead.

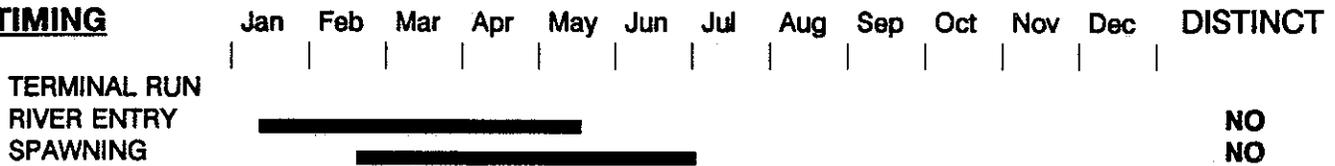
# STOCK DEFINITION PROFILE for Wishkah Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Wishkah Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Good

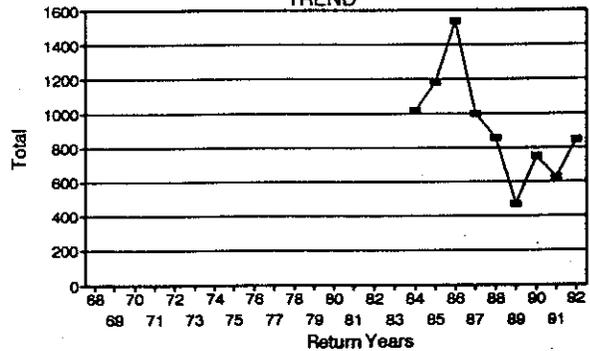
Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	1016			
85	1182			
86	1534			
87	998	122		
88	860			
89	472			
90	752	27		
91	624			
92	846	26		

WDFW Escapement goal = 412

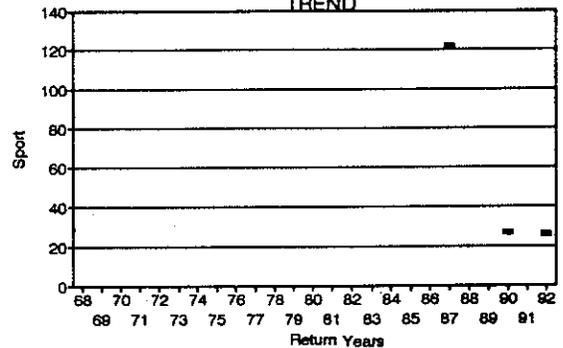
## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

ESCAPE TREND



HARVEST TREND



## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## GRAYS HARBOR -- WYNOOCHEE WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Wynoochee River and tributaries are a distinct stock based on the geographical isolation of the spawning population. Wild stocks have been supplemented with hatchery smolt plants originating from native stocks. As a result, substantial interbreeding between hatchery and wild fish has probably occurred since the early 1980s due to similar spawn timing of native and hatchery stocks. This is considered a mixed origin, composite stock sustained by both natural and artificial production.

Little is known about the genetic composition of the stock.

Run timing (December through May) and spawn timing (mid-February through June) are similar to those of some other wild winter steelhead stocks in the Grays Harbor area.

### **STOCK STATUS**

The status of the stock is Healthy.

Stock status is based on wild steelhead spawner escapement.

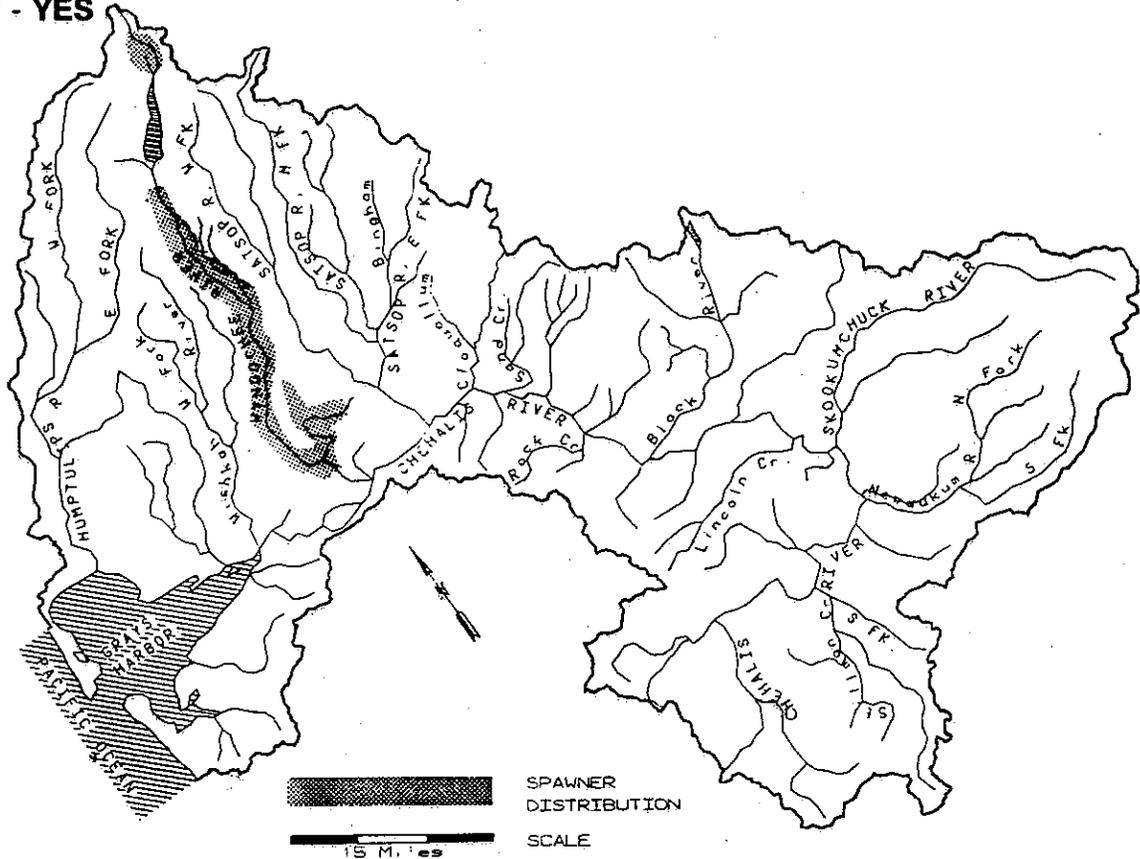
Using the WDFW methodology (Gibbons et al. 1985), a maximum sustained harvest (MSH) escapement goal for this stock would be 1,260 wild steelhead. Between 1984 and 1992, spawner escapements in the river downstream of the trap have ranged from 988 to 3,190 wild steelhead, exceeded the escapement goal in seven of nine years, and averaged 2,052 wild steelhead.

Total number of hatchery and wild steelhead to the trap has ranged from 42 to 1,165 from 1971 to 1992. This total includes fish used for brood stock and those released upstream of the trap.

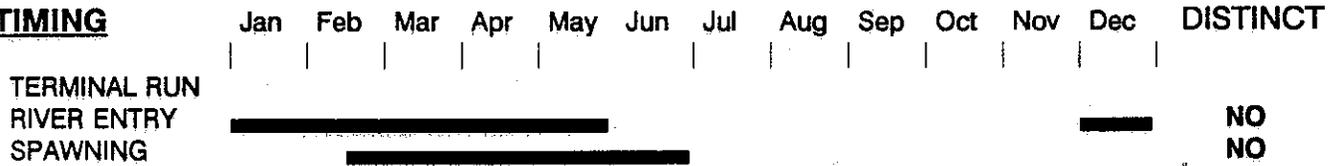
# STOCK DEFINITION PROFILE for Wynoochee Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Wynoochee Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Good

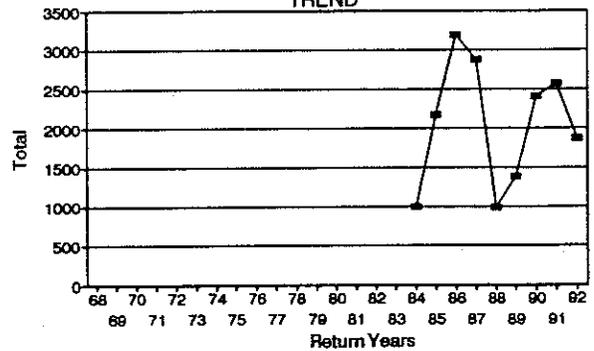
Return Years	ESCAPE Total	HARVEST Sport	ESCAPE Trap count
	Downstream of trap		Hatchery + Wild
68			
69			
70			
71			
72			1165
73			557
74			714
75			515
76			412
77			145
78			143
79			42
80			62
81			325
82			440
83			564
84	998		463
85	2168		682
86	3190		680
87	2878	389	338
88	988	300	310
89	1384	243	253
90	2406	297	219
91	2572	266	392
92	1882	273	341

WDFW Escapement goal = 1260

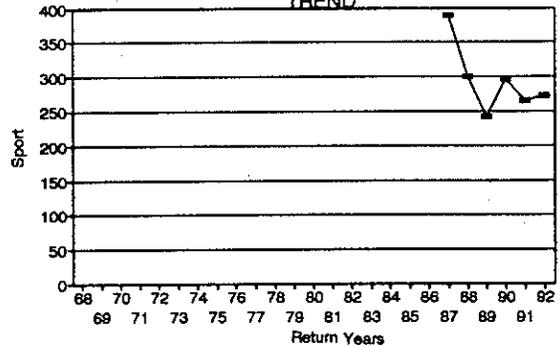
### AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

### ESCAPE TREND



### HARVEST TREND



### STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## **GRAYS HARBOR -- SATSOP WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Satsop River, West Fork Satsop, Middle Fork Satsop, East Fork Satsop, Bingham Creek, and tributaries are native and a distinct stock based on the geographical isolation of the spawning population. A very small hatchery smolt supplementation program from native stocks was maintained for a few years allowing hatchery and wild stocks to interbreed.

Little is known about the genetic composition of the stock.

Similar to other wild winter steelhead stocks in the Grays Harbor area, run timing is generally from December through May and spawn timing is generally from mid-February through June.

### **STOCK STATUS**

The status of the stock is Depressed.

Stock status is based on spawner escapement.

Using the WDFW methodology (Gibbons et al. 1985), a maximum sustained harvest (MSH) escapement goal for this stock would be 2,800 wild steelhead. Spawner escapement from 1984 to 1987 ranged from 3,126 to 4,602 wild steelhead and averaged about 3,900 fish (about 39 percent higher than 2,800). Escapement from 1988 to 1992 has been relatively stable and ranged from 1,466 to 2,399 wild steelhead, but escapement has been chronically lower than 2,800 fish every year by an average of about 28 percent.

### **FACTORS AFFECTING PRODUCTION**

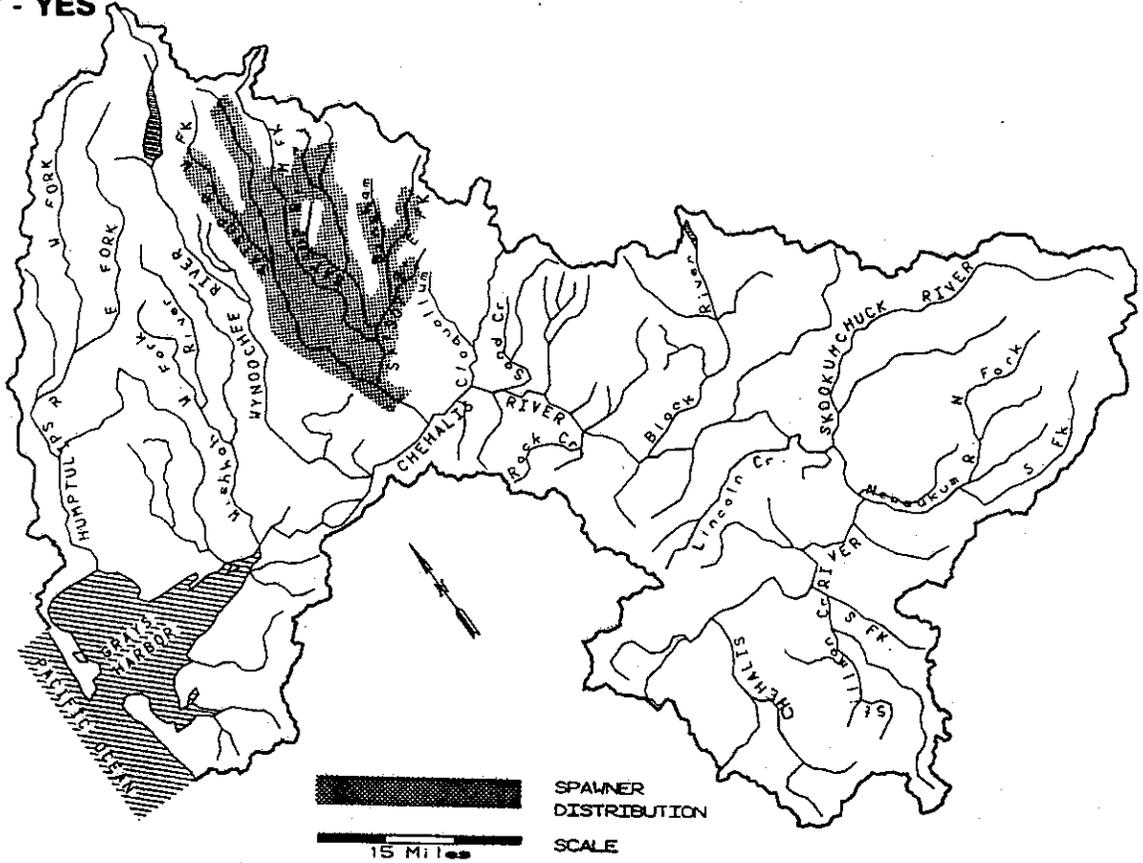
**Habitat** -- Pollution in Grays Harbor and heavy sedimentation in the West Fork Satsop continue to be problems for fish runs.

**Harvest Management** -- A sport harvest fishery and the Quinault tribal fishery both impact this run. The mainstem and East Fork to Schafer State Park are open to sport harvest through March. The Middle Fork and West Fork both close at the end of January to protect native fish. The Quinault Indian Nation engages in a gill net fishery on the Chehalis River wild steelhead run which is comprised of several steelhead stocks. The number of intercepted wild fish from the Satsop stock that contribute to the Quinault Indian Nation gill net fishery is not known.

# STOCK DEFINITION PROFILE for Satsop Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Satsop Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY → Good

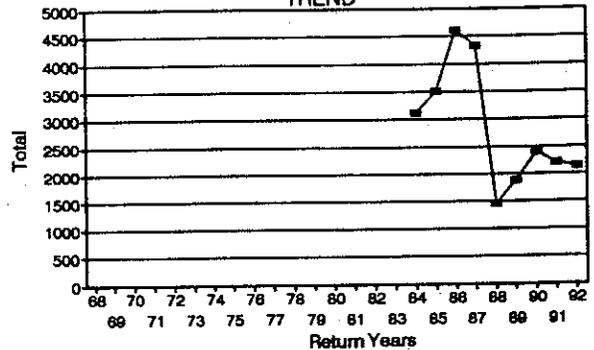
Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	3126			
85	3504			
86	4602			
87	4330	343		
88	1466	318		
89	1890	185		
90	2399	160		
91	2203	161		
92	2136	236		

WDFW Escapement goal = 2800

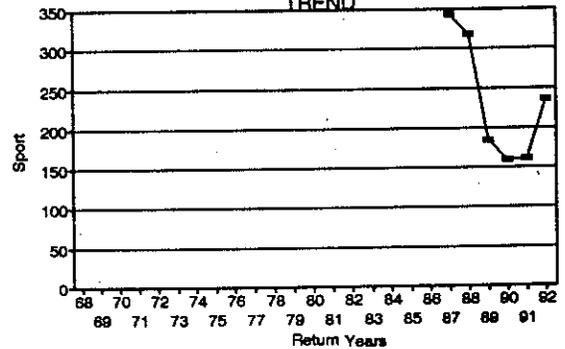
## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## ESCAPE TREND



## HARVEST TREND



## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Chronically Low*

**Hatchery** -- Portions of the Satsop system are subject to extremely large numbers of coho fry plants which may compete with wild steelhead juveniles.

## **GRAYS HARBOR -- CHEHALIS WINTER STEELHEAD**

### **STOCK DEFINITION AND STATUS**

Wild winter steelhead in the Chehalis River are native and a distinct stock based on the geographical isolation of the spawning population. Wild fish from Chehalis River tributaries have probably intermingled with mainstem spawning stocks. Wild steelhead spawning in the mainstem Chehalis and its forks, Cloquallum Creek, and other smaller tributaries are included in this stock.

Little is known about the genetic composition of the stock.

Run timing (December through May) and spawn timing (mid-February to early June) are similar to those of other wild winter steelhead stocks in the Grays Harbor area.

### **STOCK STATUS**

The status of the stock is Healthy.

Stock status is based on wild spawner escapement.

Using the WDFW methodology (Gibbons et al. 1985), a maximum sustained harvest (MSH) escapement goal for this stock would be about 2,700 wild steelhead. Between 1984 and 1992, spawner escapements have ranged from 1,694 to 3,682 wild steelhead, exceeded 2,700 wild steelhead in 4 of 9 years monitored, and averaged 2,640 wild steelhead.

Spawner escapements in Cloquallum Creek ranged from 477 to 1,002 wild steelhead. Using the WDFW methodology, an MSH spawning escapement goal would be about 173 fish.

Spawner escapements in the mainstem Chehalis River ranged from 894 to 3,064 wild steelhead and may be exhibiting a short-term decline. Escapement in the lower river (below RM 88) is, however, difficult to evaluate due to turbid river conditions. Using the WDFW methodology, an MSH spawning escapement goal would be 2,400 fish for the mainstem and small tributaries to RM 118. Escapements were 1,164 and 894 wild steelhead in 1991 and 1992 compared to 1,702 to 3,064 wild steelhead between 1984 and 1990. A short-term decline in abundance is often difficult to distinguish from the normal fluctuation in abundance of all naturally produced stocks of fish. We will closely monitor the trends in abundance for this stock.



# STOCK STATUS PROFILE for Chehalis Winter Steelhead

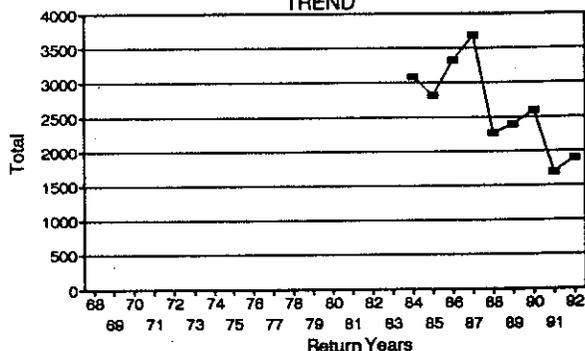
## STOCK ASSESSMENT

DATA QUALITY-----> Fair

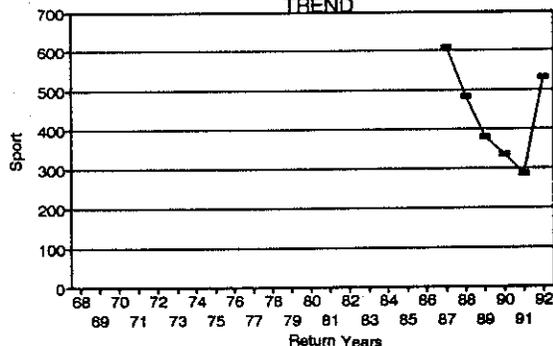
Return Years	ESCAPE Total	HARVEST Sport	ESCAPE Index total	ESCAPE Index total
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	3084		2275	809
85	2818		2233	585
86	3322		2594	728
87	3682	609	3064	618
88	2264	483	1702	562
89	2392	380	1915	477
90	2596	336	1898	698
91	1694	288	1164	530
92	1896	532	894	1002

MS Chehalis / Tribs Cloqualum Cr

### ESCAPE TREND



### HARVEST TREND



WDFW Escapement goal = 2700

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- The short-term decline in abundance for the mainstem Chehalis River portion of this winter steelhead stock is primarily due to recent changes in ocean survival. A recent Washington Department of Wildlife study (Cooper and Johnson 1992) concluded that there have been long-term fluctuations and recent declines in winter, summer, hatchery and wild steelhead abundance and survival in the Puget Sound, Strait of Juan de Fuca, Pacific coast, and Columbia River areas in Washington. There were also similarities in the overall trends and year-to-year trends of steelhead abundance in Washington, British Columbia and Oregon. Similarities in survival trends over widespread geographic areas indicate that factor(s) common to each of these areas are responsible for recent changes in steelhead survival. A combination of factors contributed to the recent decline in steelhead abundance including low ocean productivity, competition for food in the ocean, and catch of steelhead in authorized and unauthorized high seas drift net fisheries.

Sedimentation in tributaries, water withdrawals for irrigation, and poor water quality in Grays Harbor and the mainstem Chehalis River during the summer months limit the productivity of this system.

**Harvest Management** -- There are two directed tribal fisheries and a directed sport fishery on this stock. The sport fishery is open from June 1 to April 15. Between 1987 and 1992, sport harvest ranged from 264 to 594 wild winter steelhead in the mainstem Chehalis River and ranged from 8 to 24 wild winter steelhead in Cloquallum Creek. The Chehalis Tribe and Quinault Indian Nation both engage in a gill net fishery on the Chehalis River wild steelhead run which is comprised of several steelhead stocks. The number of intercepted wild fish from the Chehalis stock is not known.

**Hatchery** -- Hatchery steelhead smolts have been stocked in tributary systems, however, the mainstem is not directly stocked. No significant interbreeding with hatchery-origin fish is likely in this system.

Hatchery-planted coho fingerlings may compete for rearing space with wild steelhead juveniles.

## GRAYS HARBOR -- SKOOKUMCHUCK / NEWAUKUM WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Skookumchuck River, Newaukum River and forks, and tributaries are a distinct stock based on the geographic isolation of the spawning population.

Little is known about the genetic composition of the stock.

Run timing (December through May) and spawn timing (mid-February to early June) are similar to those of some other wild winter steelhead stocks in Grays Harbor.

Hybridization with hatchery adults originating from the native Skookumchuck River stock has likely been occurring since 1976 due to similar spawn timing of native and hatchery stocks in both rivers. This is considered a mixed-origin stock.

### **STOCK STATUS**

The status of the stock is Depressed.

Since the stock type is considered composite (sustained by both wild and artificial production) because of the occurrence of substantial wild brood stock origin hatchery fish spawning in the wild, stock status is based on the combined spawner escapement of wild and hatchery stocks.

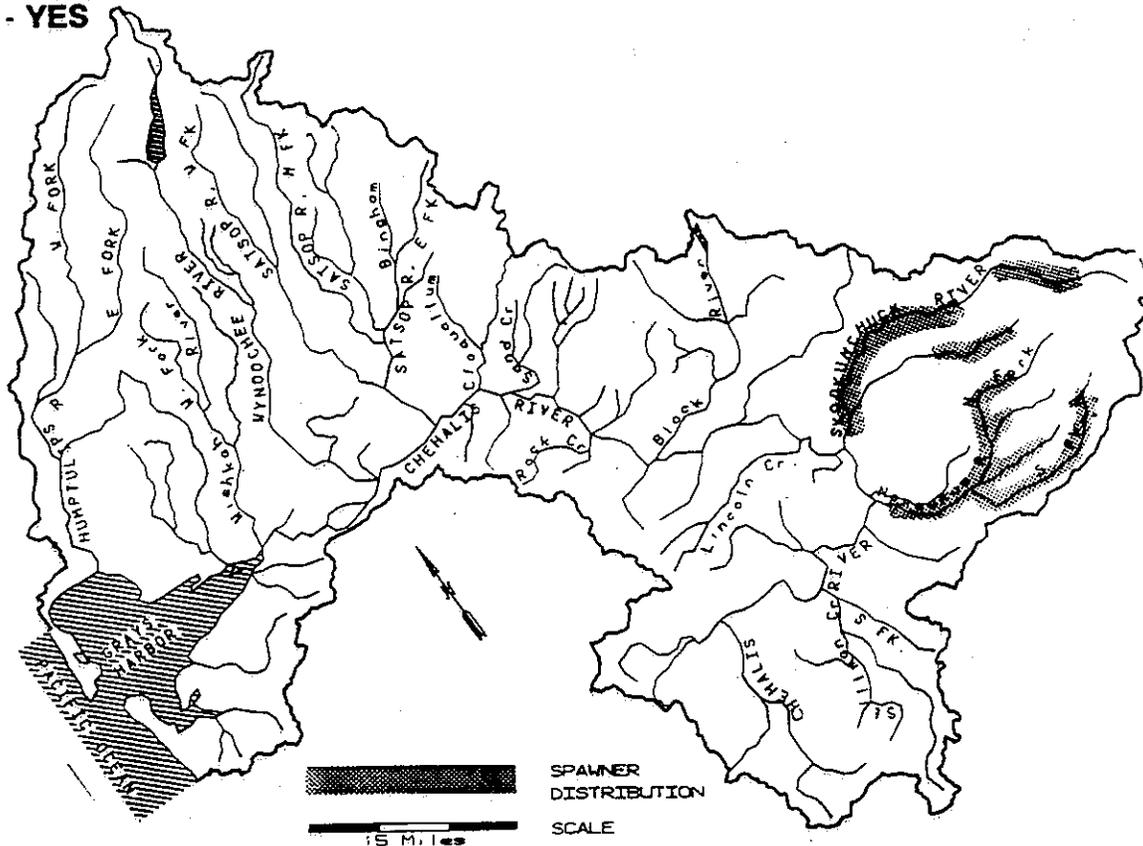
Using the WDFW methodology (Gibbons et al. 1985), a maximum sustained harvest (MSH) escapement goal for this stock would be 1,429 wild steelhead. This escapement goal includes 766 for the Skookumchuck River index area (316 downstream of the dam plus 450 upstream of the dam) plus 663 in the Newaukum River index area. To meet the escapement goal of 450 upstream of the dam hatchery steelhead are included with wild steelhead. Between 1984 and 1992 the number of hatchery and wild steelhead released upstream of the dam has ranged from 144 to 2,014. Spawner escapements in the Skookumchuck index area (downstream of the dam) and Newaukum index areas have been chronically low ranging from 106 to 336 and from 350 to 892, respectively.

Trends in abundance for wild fish are also available from counts of steelhead adults at Skookumchuck Dam, where hatchery and wild fish are counted separately. Prior to 1976, winter steelhead counted were essentially all wild fish and more than 1,000 wild fish returned to the dam annually from 1971 to 1974. From 1987 to 1992, the run was comprised of about 10 percent wild fish and about 100 wild steelhead annually returned to the dam.

# STOCK DEFINITION PROFILE for Skookumchuck/Newaukum Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

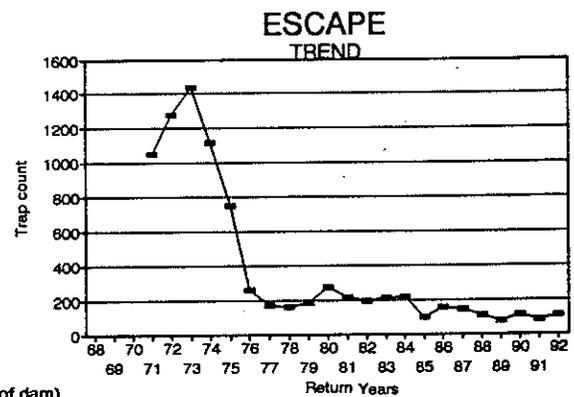
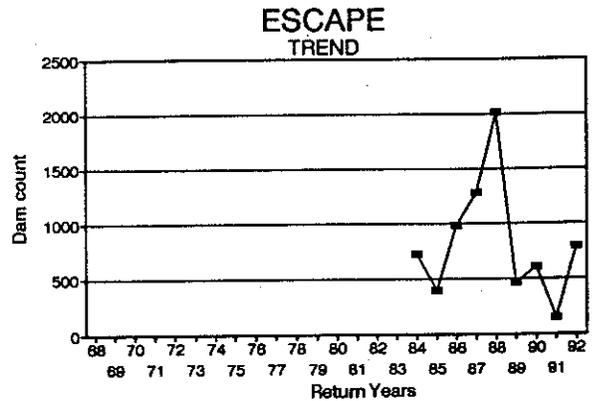
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Skookumchuck/Newaukum Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Dam count	ESCAPE Trap count	ESCAPE Index total	ESCAPE Index total
	Hatchery + Wild	Wild	Skookumchuck	Newaukum
68				
69				
70				
71		1049		
72		1277		
73		1436		
74		1115		
75		747		
76		262		
77		173		
78		163		
79		187		
80		275		
81		216		
82		197		
83		211		
84	726	215	306	350
85	396	101	274	536
86	982	158	170	582
87	1285	146	336	892
88	2014	109	106	588
89	460	78	312	582
90	609	113	148	544
91	144	84	120	442
92	792	110	294	350



Skookumchuck WDFW escapement goal - 766 (450 upstream of dam + 316 downstream of dam)

Newaukum WDFW escapement goal - 663

Total WDFW escapement goal for stock - 1429

### AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

### STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Chronically Low*

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- The loss of access to available habitat is the main factor affecting the production of steelhead in the Skookumchuck River. Dams constructed in past years at river mile 3.7, 21.5, and 23.8 were not properly equipped with fish passage facilities and partially or completely blocked upstream migration. The last of these dams was removed in 1969. The present Skookumchuck dam was completed in 1970 at river mile 21.9 and blocks access to much of the available habitat in the upper watershed.

Logging in the upper Skookumchuck watershed and coal mining in the lower watershed have had serious impacts on habitat.

Poor water quality in the mainstem Chehalis River downstream of the Newaukum is common during summer months. Historic gravel removal operations, water diversions and municipal sewage discharge for the cities of Centralia and Chehalis have adversely impacted fish habitat.

**Harvest Management** -- In the Skookumchuck River, the number of sport caught wild steelhead has dropped as the percentage of wild fish in the overall population has dropped. The sport fishing season is open through April and targets the harvest of hatchery and wild steelhead. The sport harvest season on the Newaukum is on wild-fish release regulations to protect returning wild spawners.

The Chehalis Tribe and Quinault Indian Nation both engage in a gill net fishery on the Chehalis River wild steelhead run which is comprised of several steelhead stocks. The number of intercepted wild fish of Skookumchuck or Newaukum origin is not known.

**Hatchery** -- On the Skookumchuck River, a mitigation program to rear 75,000 steelhead smolts from native brood stock was initiated with Pacific Power and Light after dam construction in 1970. This supplementation program includes an on-site acclimation pond with initial rearing at WDFW South Tacoma hatchery.

About 90 percent of the steelhead returning to the Skookumchuck River to spawn in recent years are of hatchery origin. Significant spawning interaction likely occurs between hatchery and wild fish.

Currently, 10,000 wild Skookumchuck origin marked hatchery smolts are planted into the Newaukum River to provide harvestable fish for the sport angler. Similar spawn timing between the two stocks likely leads to some interbreeding between hatchery and wild fish in the Newaukum.

## **GRAYS HARBOR -- SOUTH HARBOR WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Johns River, Elk River, Andrews Creek, and other small streams of South Bay in Grays Harbor are native and a distinct stock based on the geographical isolation of the spawning population.

Little is known about the genetic composition of the stock.

Run timing (December through May) and spawn timing (mid-February to early June) are similar to those of other wild winter steelhead stocks in the Grays Harbor area.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement has not been regularly monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Sport harvest information of wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest cannot be used to assess the status of the wild stock. More information needs to be collected on this stock so that stock status can be determined.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Sedimentation and riparian destruction during logging activities after 1932 limits the production potential of these fragile low-gradient watersheds. There may be insufficient spawning and rearing habitat left to maintain a healthy wild population of steelhead.

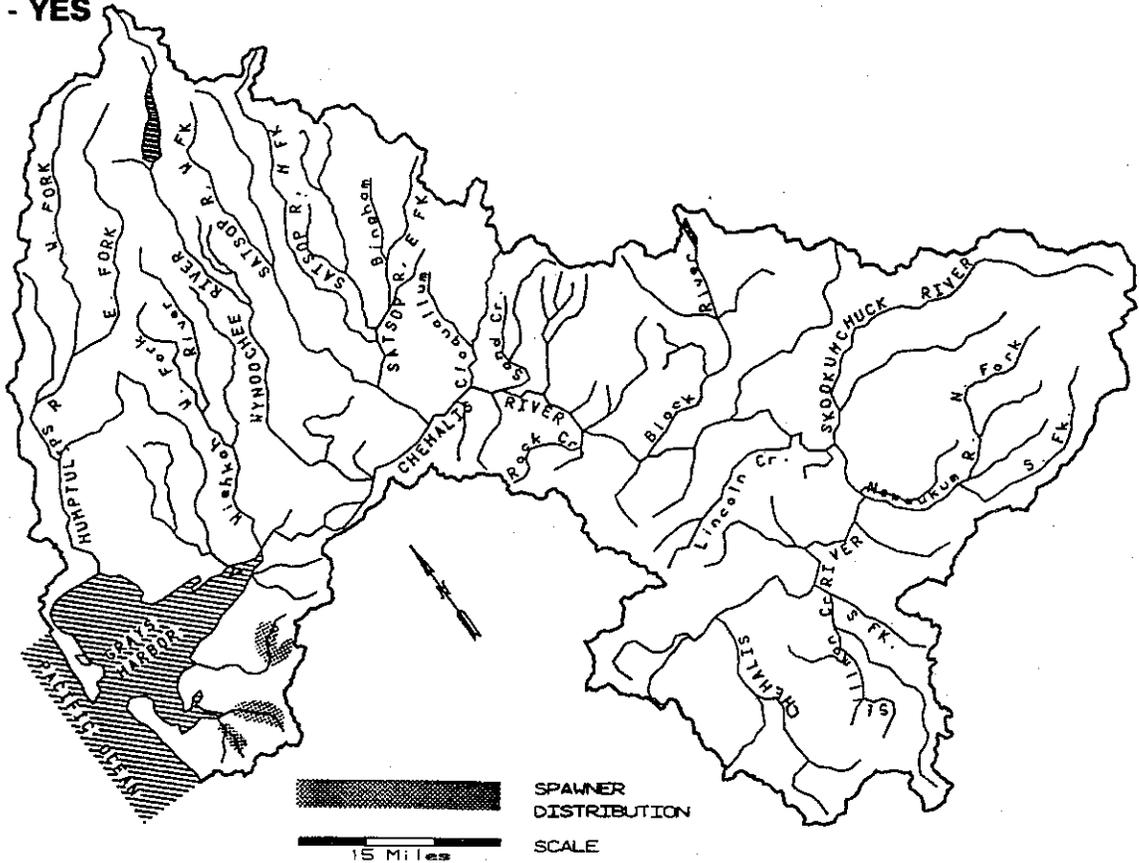
**Harvest Management** -- The sport harvest is 75 percent hatchery fish and both the Johns and Elk rivers are open until the end of February. This "early" closure is to protect wild fish returning later. Andrews Creek is closed to winter steelheading. There is no directed tribal fishery on this stock.

**Hatchery** -- Johns River receives hatchery smolt plants of "early"-returning steelhead. Spawn timing differences will minimize interbreeding with wild fish.

# STOCK DEFINITION PROFILE for South Harbor Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for South Harbor Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	
88	14
89	2
90	16
91	7
92	8

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## **OVERVIEW -- WILLAPA BAY FALL CHINOOK STOCKS**

### **WILLAPA BAY FALL RIVER EARLY (NORTH R)**

#### **STOCK DEFINITION AND ORIGIN**

Although fall chinook are found in all major Willapa Bay tributary systems, no stock separations were made other than that between Willapa Bay fall chinook and Fall River early fall chinook for several reasons. First, hatchery programs in the Willapa, Nemah and Naselle rivers dominate fall chinook production. This dominance results in harvest strategies designed to harvest large numbers of hatchery adults, which in turn reduces the abundance of native fish. Second, all of the major drainage are influenced by some type of enhancement program whether state hatchery or (hatchery stock-supported) large-scale volunteer enhancement projects. Finally, adults from hatchery programs are currently providing the majority of the natural spawning escapement. Since 1988 over 65 percent of the estimated natural spawning escapement is first-generation hatchery returns. As a result of the overwhelming dominance of hatchery origin fish, attempts at stock separations are inappropriate.

Additional information is provided in the individual stock reports.



## WILLAPA BAY -- WILLAPA BAY FALL CHINOOK

### **STOCK DEFINITION AND ORIGIN**

Willapa Bay fall chinook are found in all major Willapa Bay systems, including North, Willapa, Palix, Nemah (primarily North Nemah), and Naselle rivers. Adults begin entering Willapa Bay in August and their respective home streams in September. Spawning begins late September, peaks in late October and is generally completed by mid-November.

Willapa Bay has a long history of hatchery production and releases of imported stocks. Imported stocks include Finch Creek, Trask and Elk rivers (both Oregon Coast), Spring Creek, Green River, Klickitat River, and Elochoman River. In recent years, hatchery programs in the Willapa (Forks Creek), Nemah (North Nemah) River, and Naselle River have dominated fall chinook production. In addition to the hatchery program, large scale volunteer enhancement projects in the Willapa/South Fork Willapa Rivers and North River drainage are ongoing. In recent years adults from hatchery programs provided the majority of the natural spawning escapement.

Due to the high natural spawning rate of hatchery origin adults, Willapa Bay fall chinook are hybrids.

### **STOCK STATUS**

The Willapa Bay fall chinook stock is Healthy, and stock abundance is stable.

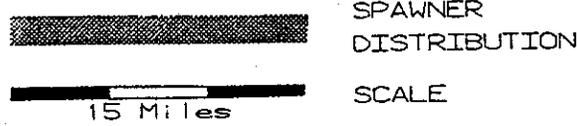
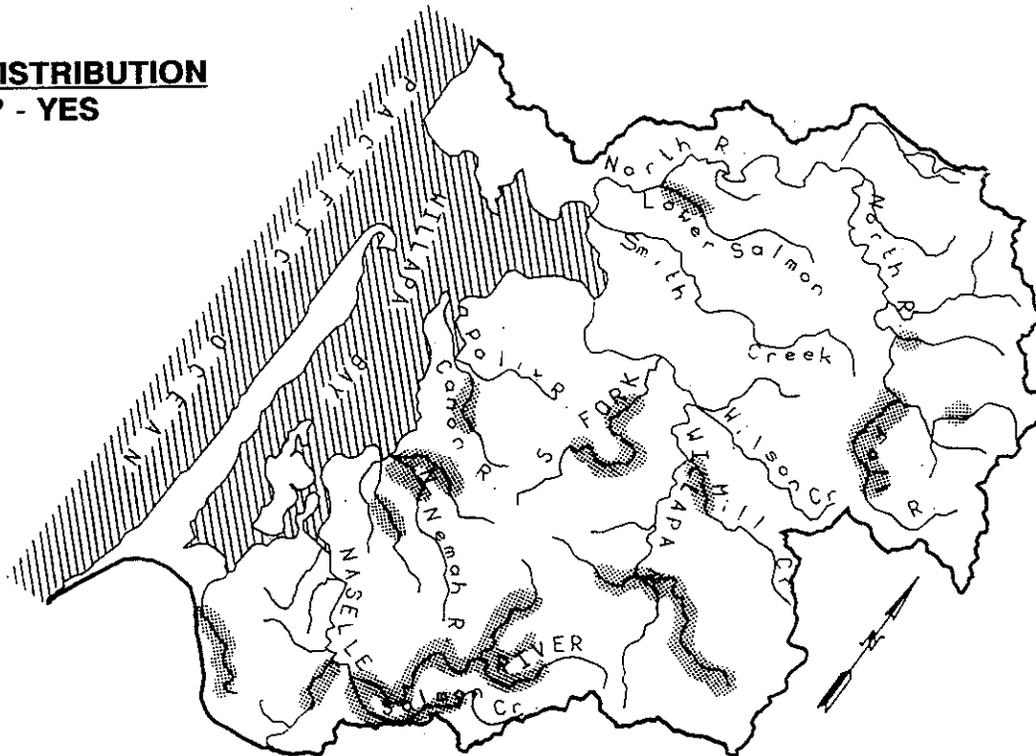
It is assumed that the natural spawning stock of Willapa Bay fall chinook contributes to various fisheries at the same rate as hatchery stocks. This assumption is based on the high rate of hatchery origin strays contributing to the natural spawning escapement and the resulting hatchery-wild similarities in genetic make-up. Using hatchery contribution rates, Willapa fall chinook contribute most to British Columbia troll, Oregon ocean, and Willapa Bay net fisheries. Only minor contributions are made to Washington ocean sport and troll fisheries.

Terminal run sizes have ranged from 1,828 in 1975 to 15,776 in 1988. The 1969 through 1991 average terminal run-size is 6,675. Average escapement, from 1985 through 1991, excluding hatchery strays, is 4,691. This is higher than the average prior to the overwhelming dominance of the hatchery program which began in the late 1980s. In total, natural spawning escapements have increased dramatically in recent years. This increase is due to greatly increased hatchery production and the resulting increase in the number of naturally-spawning hatchery adults.

# STOCK DEFINITION PROFILE for Willapa Bay Fall Chinook

## SPAWNER DISTRIBUTION

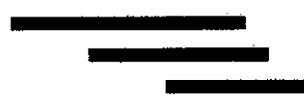
DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

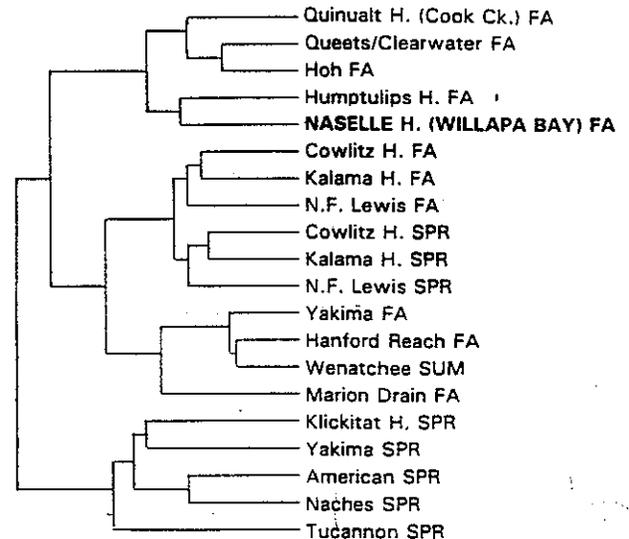


UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - YES

**GENETICS** - No genetic data exist for the various natural spawner populations in Willapa Bay. However, Naselle Hatchery fall chinook sampled in 1987, 1988, 1989, and 1990 showed no differences between years in their genetic characteristics and were combined into one data set. This Naselle Hatchery stock was significantly different from all other chinook stocks examined ( $P < .05$ ).



0.200 0.1667 0.1333 0.1000 0.0667 0.0333 0.0000

Genetic Distance (Cavalli-Sforza & Edwards (1967) chord distance; UPGMA)

# STOCK STATUS PROFILE for Willapa Bay Fall Chinook

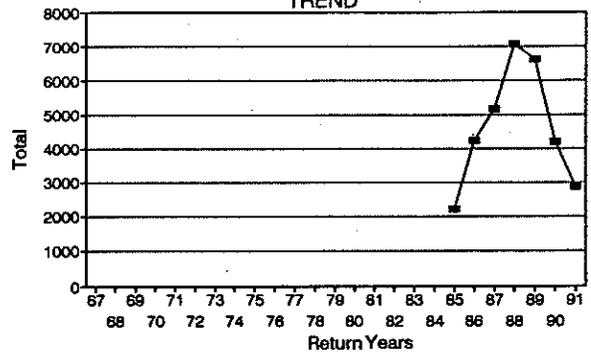
## STOCK ASSESSMENT

DATA QUALITY-----> Fair

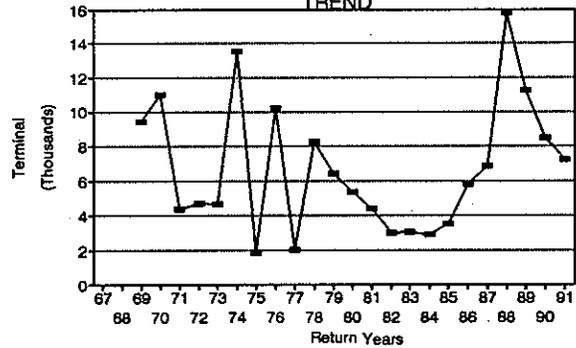
Return Years	ESCAPE Total	RUNSIZE Terminal		
--------------	--------------	------------------	--	--

67		
68		
69		9438
70		11026
71		4342
72		4716
73		4656
74		13548
75		1828
76		10230
77		2016
78		8269
79		6415
80		5364
81		4423
82		3005
83		3035
84		2892
85	2233	3527
86	4222	5792
87	5172	6859
88	7089	15776
89	6628	11289
90	4195	8487
91	2865	7255

ESCAPE TREND



RUNSIZE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA

Prior to 1988 naturally-spawning hatchery adults represented an average of 17 percent of the total natural spawning escapement. Since 1988 hatchery adults have represented over 65 percent of the total natural spawning escapement. Translated into numbers the 1988 through 1992 average natural spawning escapement is 15,501, of which an estimated average of 10,383 were of hatchery origin. For purposes of run forecasting, naturally-spawning hatchery-origin adults are considered Willapa Bay natural fall chinook.

## WILLAPA BAY -- FALL RIVER EARLY (NORTH R) FALL CHINOOK

### STOCK DEFINITION AND ORIGIN

Fall River early chinook are found only in Fall River and the mainstem North River in the immediate area of its confluence with Fall River. Little is known about the entry timing of these fish into Willapa Bay, but it is assumed to occur in mid- to late August. Spawning begins in September, peaks early October and is complete by mid- to late October.

*a week before Willapa stock*

Only a few releases of fall chinook have been made into Fall River. These releases occurred in 1962, 1964 and 1969. The source for these fish was Willapa Bay hatcheries, and they were normal-timed. There is no history of release of early-timed chinook into Fall River. In addition to normal-timed fall chinook releases into Fall River, a number of releases have been made throughout the North River system. A moderate-sized (150,000 fingerlings) enhancement program on North River is ongoing in the nearby area.

While some hybridization is likely occurring as a result of releases of normal-timed fall chinook throughout the North River system, Fall River early chinook are thought to be primarily native.

### STOCK STATUS

The status of this stock is Depressed.

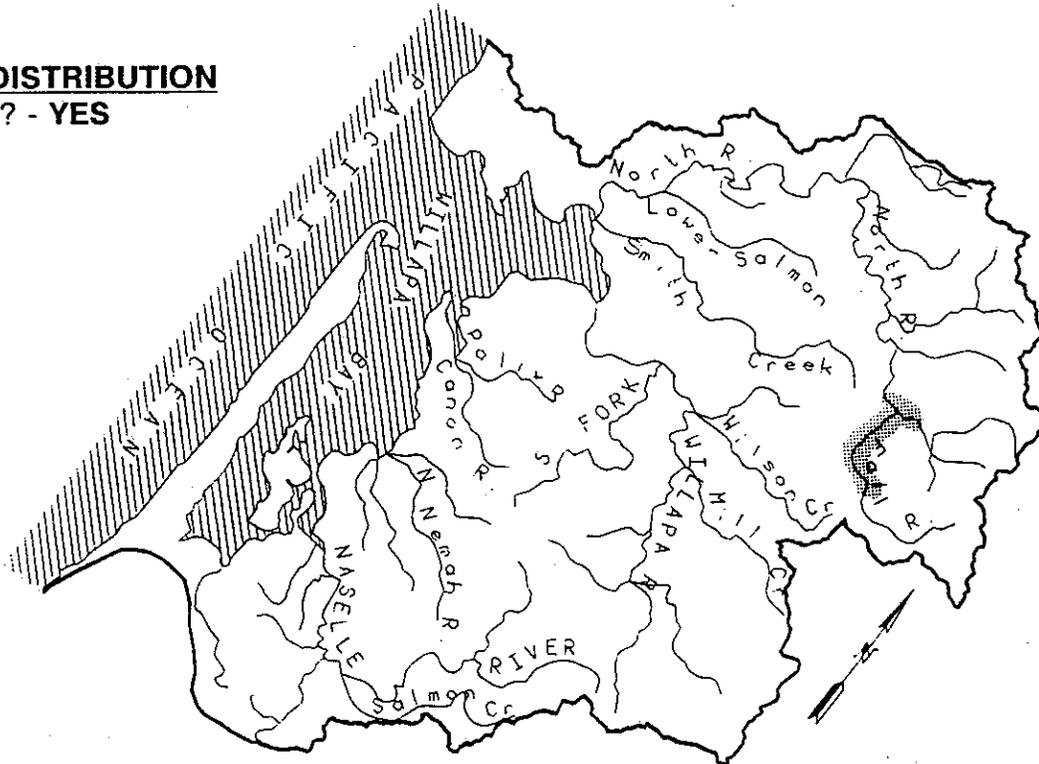
No direct information is currently available to describe the fishery contribution or distribution of Fall River early chinook. Based on normal fall chinook however, contributions to British Columbia troll fisheries, Washington ocean fisheries and Willapa Bay gill net fishery are likely.

Terminal run sizes are not estimated separately from normal fall chinook returns to Willapa Bay. Escapement of these fish has been monitored since the early 1950s. The historical measure of escapement has been adult peak-count fish-per-mile. This index averaged 32.5 fish per mile during the 1950s and 37.4 fish per mile in the 1960s. Beginning in the mid-1970s estimates of actual escapement are available. Average escapement from 1975 through 1991 is 203, ranging from 64 in 1975 to 823 in 1988.

# STOCK DEFINITION PROFILE for Fall River Early (North R) Fall Chinook

## SPAWNER DISTRIBUTION

DISTINCT? - YES



## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING

UNK  
UNK  
UNK



## BIOLOGICAL CHARACTERISTICS

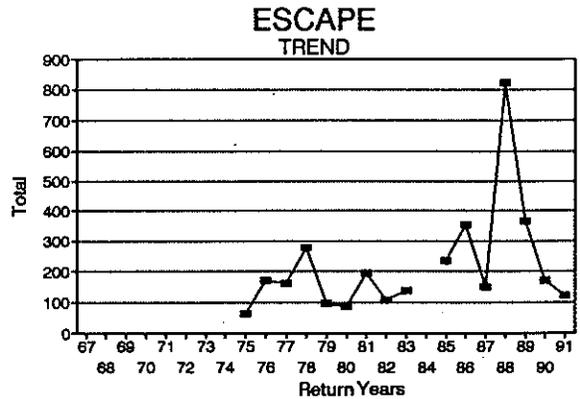
DISTINCT? - NO

# STOCK STATUS PROFILE for Fall River Early (North River) Fall Chinook

## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75	64			
76	172			
77	161			
78	279			
79	97			
80	86			
81	193			
82	107			
83	139			
84				
85	236			
86	354			
87	151			
88	823			
89	367			
90	173			
91	122			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Depressed*

SCREENING CRITERIA

*Chronically Low*

## **FACTORS AFFECTING PRODUCTION**

**Habitat** -- The primary natural limiting factor in the North River is a poor supply of gravel for spawning. The gravel supply in Fall River is good. The major human-caused limiting factors in this area are destruction of riparian zones and sedimentation in spawning gravels. Both are associated with intensive recent and current logging and logging-related roading activities. Logging in riparian zones has reduced the number of large trees which serve as sources of large woody debris in streams. Road and landing construction and traffic on logging roads, particularly in wet weather, have resulted in increased sedimentation. Large numbers of recent slope failures on steep slopes in the North River watershed, particularly in the little North River and Vesta Creek, have contributed to increased sedimentation. Cattle crossing the lower Fall River also contributes to river bank erosion and increased sedimentation.

**Harvest Management** - Little is known about the harvest impacts on the early fall chinook returning to Fall River. This group of fish has never been tagged and is dissimilar to any nearby stocks for which tagging data is available. In general, it is safe to assume that this stock behaves similarly to other summer/fall chinook stocks on the Washington Coast. These stocks are all north-migrating and make significant contributions to fisheries off of both Alaska and British Columbia, with only limited contributions off of Washington.

No terminal fisheries are directed at this stock. The summer gill net fishery in Willapa Bay (Area 2G), which is directed primarily at non-local chinook stocks from the Columbia River, occurs at a time when some of this stock may be migrating through Willapa Bay. There is also the potential for some catch of these fish during July and August in the sport fishery in North River.

**Hatchery** -- Normal-timed hatchery fall chinook (Willapa Bay stock) were released infrequently into the Fall River in the 1960s. Willapa Bay chinook are also released into the North River as part of a regional enhancement program.

## OVERVIEW -- WILLAPA BAY FALL CHUM STOCKS

NORTH RIVER  
WILLAPA  
PALIX

NEMAH  
NASELLE  
BEAR

### STOCK DEFINITION AND ORIGIN

Chum salmon are found in all major Willapa Bay tributary systems. Stocks have been separated based primarily on perceived spawn timing differences (southern bay groups seem to spawn seven to ten days earlier than northern bay groups) and geographic separation (each of the listed stocks originates from an independent tributary to Willapa Bay). Adults begin entering the bay in late September to early October. Generally, spawning begins in mid- to late October, peaks in early November and is complete by late November.

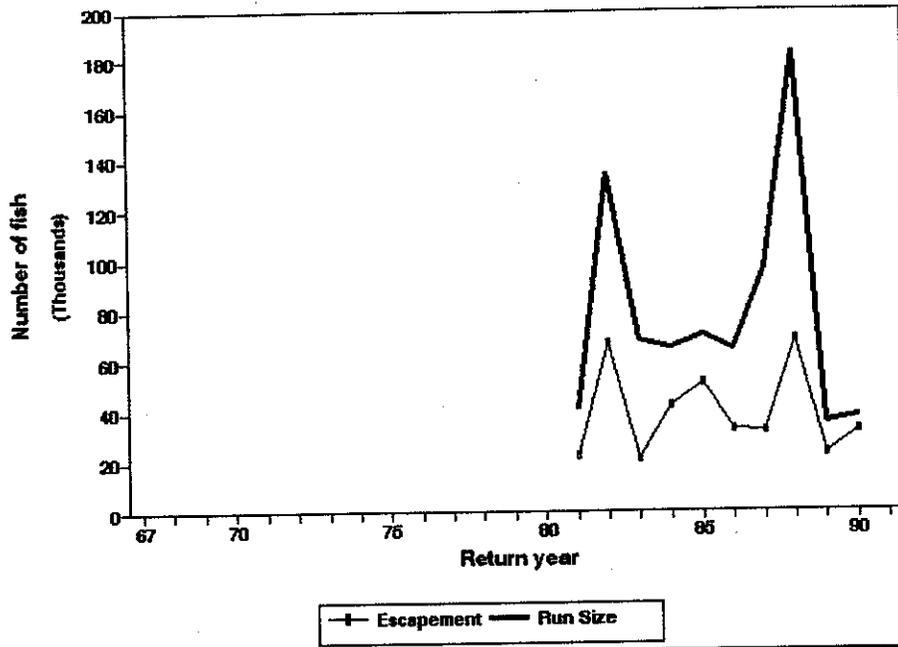
Historically, hatchery production of chum salmon has been centered at Nemah Hatchery. A production program began at Naselle Hatchery in the middle 1980s but has since been discontinued. Typically, hatchery production programs used local stocks rather than stocks from other basins. Some infrequent movement of a variety of local tributary groups has occurred, e. g., the use of Ellsworth Creek (Naselle River) as an egg source for enhancement in the Willapa River system. The impact of these movements is felt to be minimal. Because of the use of local groups for hatchery programs, and an infrequent/inconsistent distribution of hatchery production to other Willapa Bay systems, it is felt that no significant genetic influence occurred to "native" populations.

### STOCK STATUS

Terminal run sizes of natural populations of Willapa Bay-origin chum from 1968 through 1991 range from 7,497 in 1979 to 183,042 in 1988 (see figure). The average terminal run size is 60,113. Catches of individual stocks are not available, so terminal run size by stock cannot be estimated. The status of individual stocks is monitored through escapement estimates to primary spawning areas. While not a measure of total escapement, these estimates accurately reflect of production trends and stock status.

Judging from large harvests of chum salmon in Willapa Bay in the early 1900s, it is probable that historic chum abundance was much higher than it is today. It is likely that through loss of habitat the historic productive capability has been lost.

### WILLAPA BAY Chum Salmon



## WILLAPA BAY -- NORTH RIVER FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Chum salmon are found primarily in lower North River tributaries. The two most important streams are Lower Salmon and Bitter creeks. Historically, chum were also found in other suitable lower mainstem North River areas, including North Branch, North River and Hatchery Creek. Adults begin entering the river in October. Spawning begins in mid- to late October, peaks in early November and is usually completed by late November.

Until the early 1990s there had been no introductions of non-local stocks into the system. Recent introductions of Nemah River stock have not yet begun to return. As a result no significant influence on the genetic makeup of the native stock has yet occurred.

The current stock is considered native.

### **STOCK STATUS**

The status of North River chum stock, based on current habitat, is Healthy.

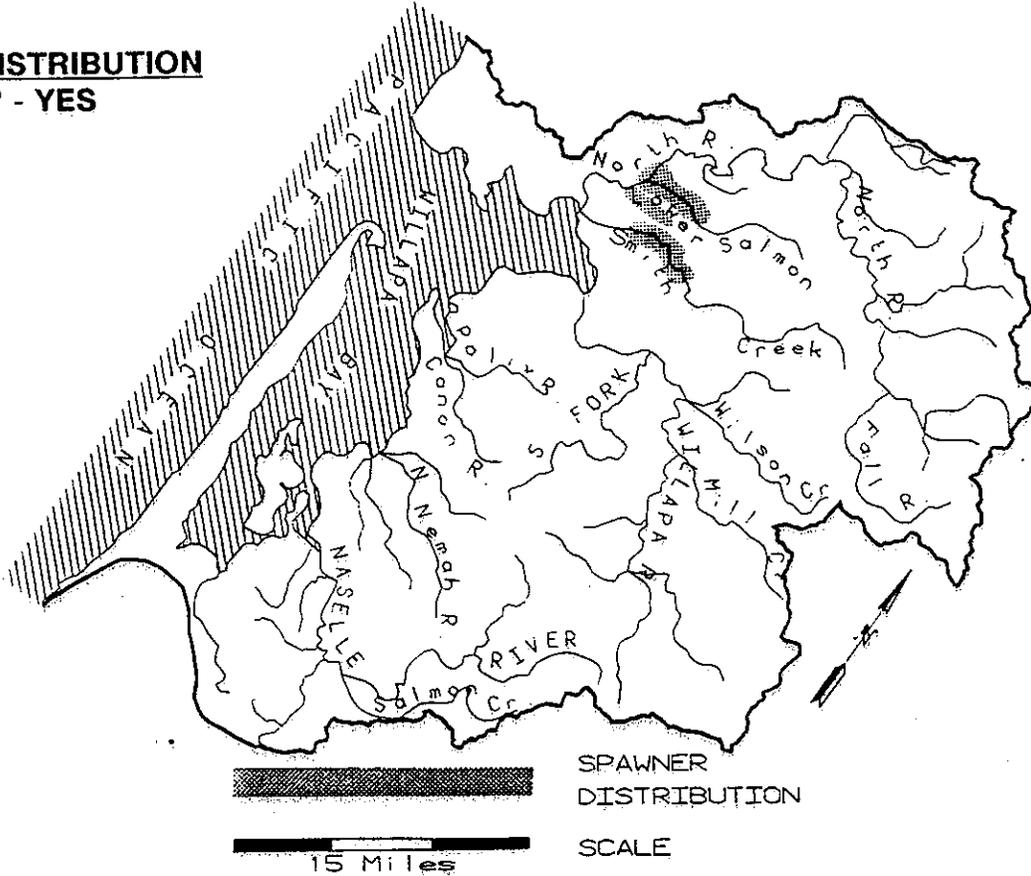
Terminal run sizes for individual stocks within Willapa Bay are not available. The status of North River chum is monitored through estimates of escapements to Bitter and Lower Salmon creeks. While not a measure of total escapement to the North River system, these estimates are thought to be an accurate reflection of production trends and status of the stock. Combined escapement to these index streams has ranged from 2,256 spawners in 1973 to 15,950 in 1988. The long-term (1968 through 1990) average is 6,938. The recent ten-year (1981 through 1990) average is 9,025.

Based on large harvests of chum salmon in Willapa Bay in the early 1900s it is probable that historic chum abundance was much higher than it is today. It is likely that through loss of habitat and high harvests, historic productivity has been lost. While there is a modest improvement shown in recent escapements no distinct long-term trends (since 1968) have been detected.

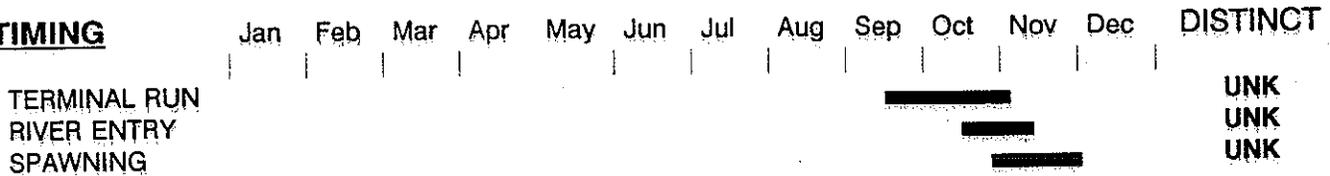
# STOCK DEFINITION PROFILE for North River Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



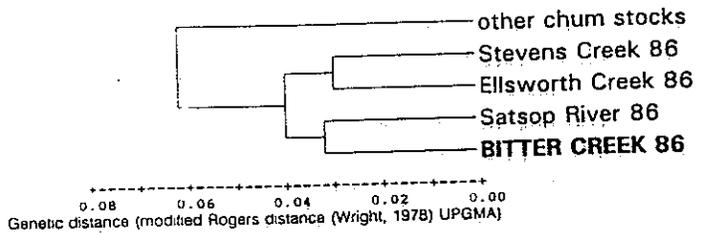
## TIMING



## BIOLOGICAL CHARACTERISTICS

DISTINCT? - YES

**GENETICS** - Analysis of a 1986 GSI collection from Bitter Creek, (N=100) indicated that this collection was significantly different from a collection from Ellsworth Creek (21-locus G-tests:  $p < 0.05$ ).



# STOCK STATUS PROFILE for North River Fall Chum

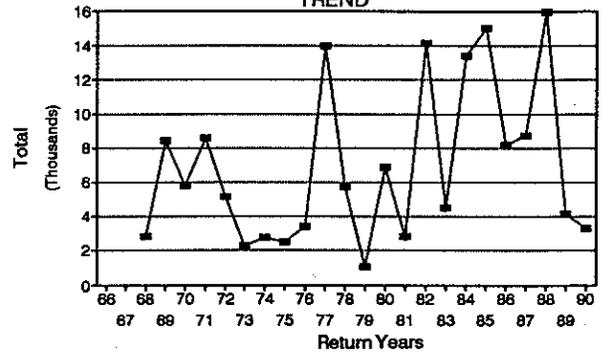
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

66	
67	
68	2824
69	8412
70	5825
71	8570
72	5125
73	2256
74	2735
75	2508
76	3412
77	13997
78	5722
79	1052
80	6879
81	2822
82	14162
83	4535
84	13388
85	15022
86	8190
87	8725
88	15950
89	4142
90	3315

## ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## WILLAPA BAY -- WILLAPA FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Chum salmon are found primarily in lower South Fork Willapa River. Small numbers are found in the lower mainstem, Wilson, Mill and Trap creeks. Adults begin entering the river in October. Spawning begins in mid- to late October, peaks in early November, and is usually completed by late November.

Hatchery releases of chum occurred from 1957 through 1961 and in 1968. Stock origin in 1957 and 1968 was Nemah River, releases from 1958 through 1967 were identified as "wild stock." Since 1968 additional releases and have occurred on an irregular basis, generally with Nemah stock. Naselle stock (Ellsworth Creek) was also used in the early 1980s. Based on the infrequent nature of these releases it is felt that there has been no significant genetic influence has occurred to the "native" population.

### **STOCK STATUS**

Willapa fall chum are currently considered Healthy.

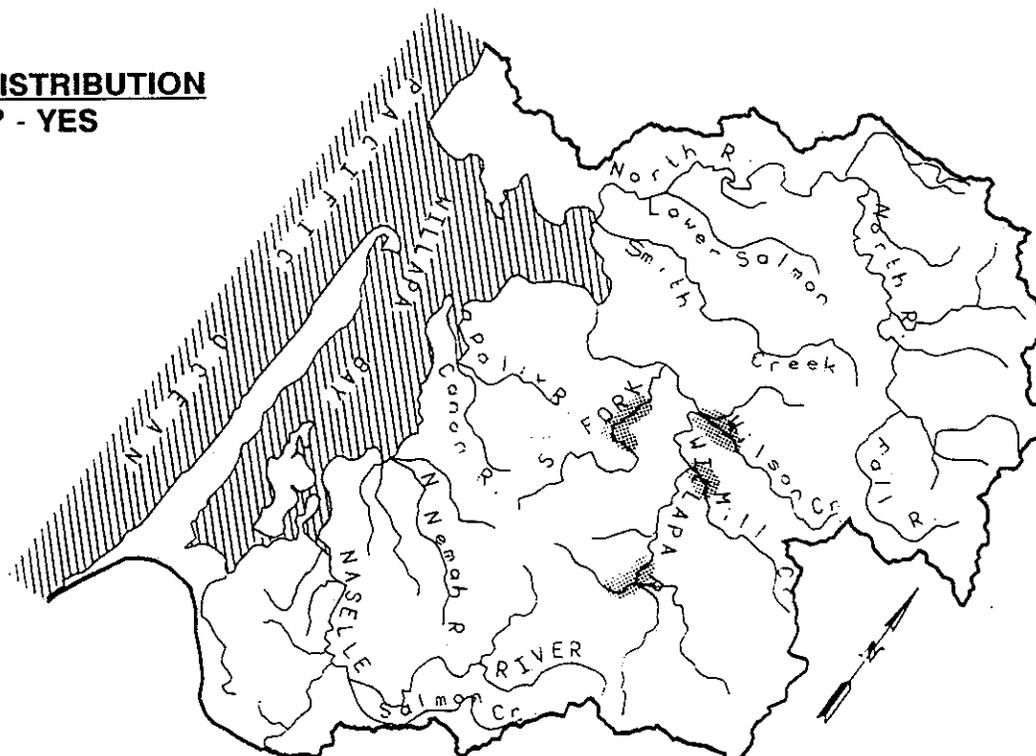
Terminal run sizes for individual stocks within Willapa Bay are not available. The status of Willapa River chum is monitored through estimates of escapements to South Fork Willapa River and Trap Creek. While not a measure of total escapement, these estimates are thought to be an accurate reflection of production trends and status of the stock. Combined escapement to these index streams has ranged from 29 spawners in 1989 to 1,212 spawners in 1978. The long-term (1968 through 1990) average is 432. The recent ten-year (1981 through 1990) average is 303.

Based on large harvests of chum salmon in Willapa Bay in the early 1900s it is probable that historic chum abundance was much higher than it is today. It is likely that through loss of habitat and high harvests, historic productivity has been lost. A long-term declining trend is apparent.

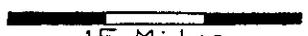
# STOCK DEFINITION PROFILE for Willapa Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER DISTRIBUTION



15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNK

**GENETICS** - No chum GSI samples have been taken from this location.

# STOCK STATUS PROFILE for Willapa Fall Chum

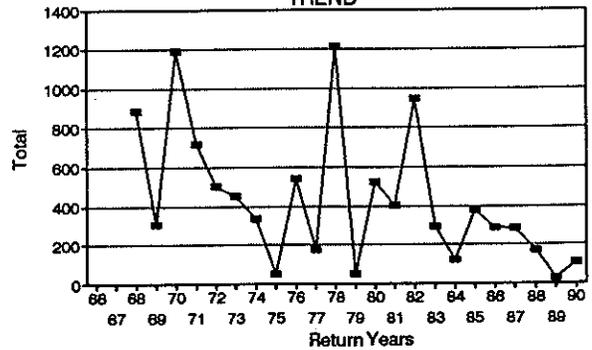
## STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

66	
67	
68	888
69	309
70	1191
71	719
72	501
73	455
74	337
75	50
76	540
77	176
78	1212
79	52
80	525
81	405
82	948
83	295
84	122
85	378
86	288
87	286
88	172
89	29
90	110

ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## WILLAPA BAY -- PALIX FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Palix River chum salmon are found primarily in Canon River, tributary to the Middle Fork Palix River. Small numbers are found in the mainstem downstream from the falls at RM 3.1. Historically, they were also found in the South Fork Palix. Adults begin entering the river in October. Spawning begins in mid- to late October, peaks in early to mid-November and is usually completed by late November.

No significant releases of non local stocks have been made into the Palix system. Consequently, the current stock is considered Native. From 1952 through 1972 only one small release of 31,050 fry (1972 brood) occurred. No significant genetic influence has occurred to the "native" population.

### **STOCK STATUS**

Based on an increasing long-term trend in escapements, Palix River chum are considered Healthy.

Terminal run sizes for individual stocks within Willapa Bay are not available. The status of Palix River chum is monitored through estimates of escapements to the Canon River. While not a measure of total escapement, these estimates are an accurate reflection of production trends and status of the stock. Estimated escapement to the Canon River has ranged from 1,361 in 1979 to 13,475 in 1982. The long-term (1968 through 1990) average is 5,642. The recent ten-year (1981 through 1990) average is 7,291.

Based on large harvests of chum salmon in Willapa Bay in the early 1900s it is probable that historic chum abundance was much higher than it is today. It is likely that through loss of habitat and high harvests, historic productivity has been lost.

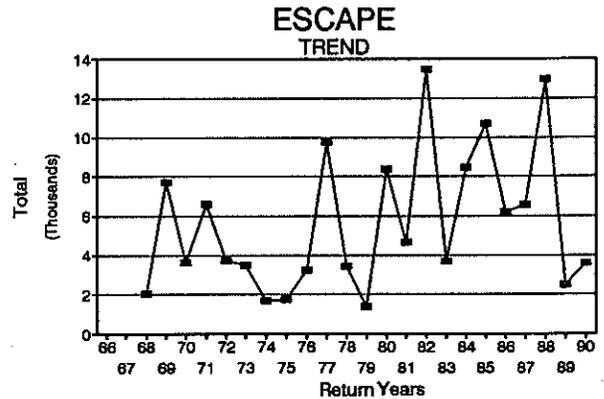


# STOCK STATUS PROFILE for Palix Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
66				
67				
68	2043			
69	7741			
70	3627			
71	6600			
72	3708			
73	3504			
74	1698			
75	1752			
76	3235			
77	9754			
78	3440			
79	1361			
80	8388			
81	4685			
82	13475			
83	3700			
84	8476			
85	10703			
86	6194			
87	6580			
88	12987			
89	2498			
90	3608			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## WILLAPA BAY -- NEMAH FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Fall chum salmon are found throughout the Nemah River system. Primary-use areas are the North Nemah and Williams Creek and to a lesser degree the Middle and South Nemah rivers. Adults begin entering the river in October. Spawning begins in mid- to late October, peaks in early to mid-November and is usually completed by late November.

A large hatchery chum production program was carried out at Nemah Hatchery (located on the North Nemah River) for many years. The primary source for brood stock for this program was Nemah native stock. No record of importing non-local stocks from 1952 through 1972 has been found. Some brood stocking efforts on Williams Creek (North Nemah tributary) in the late 1970s, and limited use of Naselle stock in the Middle Nemah in the early 1980s occurred. There has been no identified genetic influence from imported stocks on the native population.

### **STOCK STATUS**

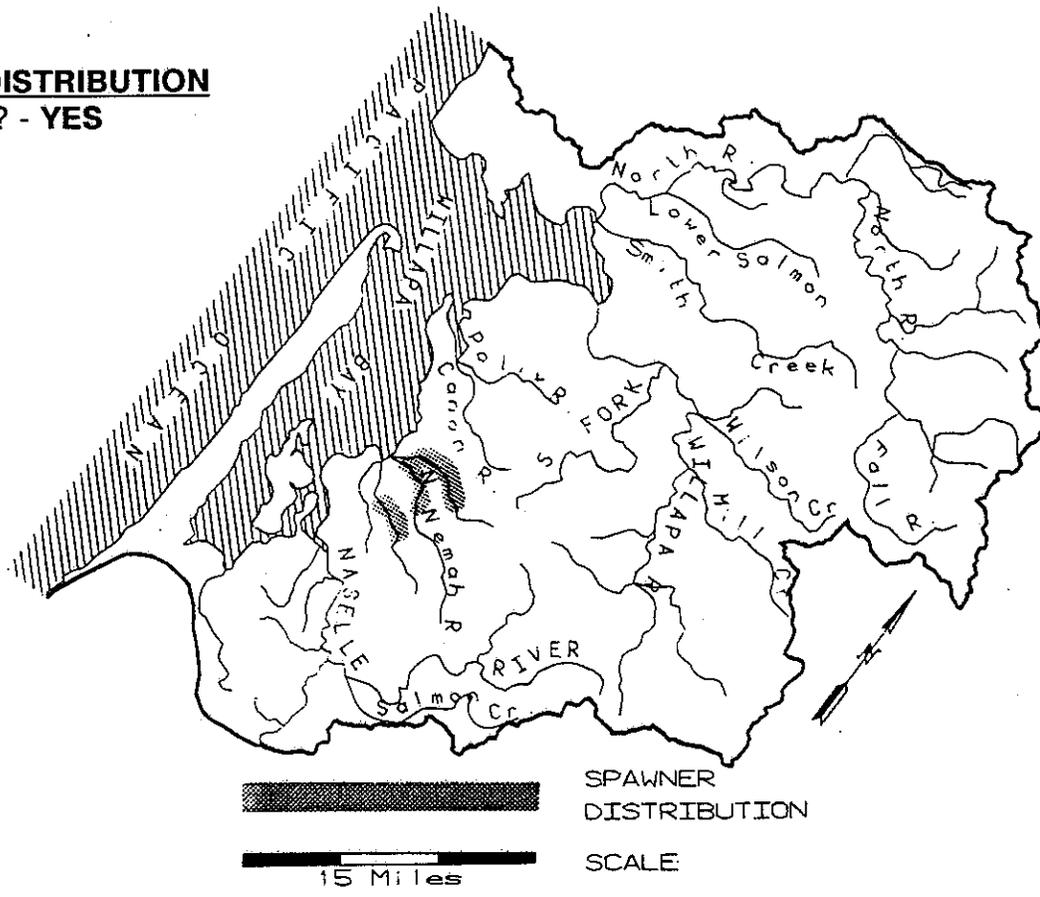
Based on an increasing long-term trend in escapements, the Nemah River chum stock is Healthy.

Terminal run sizes for individual stocks within Willapa Bay are not available. The status of Nemah River chum is monitored through estimates of escapements to Williams Creek, a tributary to North Nemah River. While not a measure of total escapement, these estimates are thought to provide an accurate reflection of production trends and status of the stock. Estimated escapements to Williams Creek ranged from 1,234 spawners in 1979 to 12,645 spawners in 1982. The long-term (1968 through 1990) average is 4,467. The recent ten-year (1981 through 1990) average is 6,229.

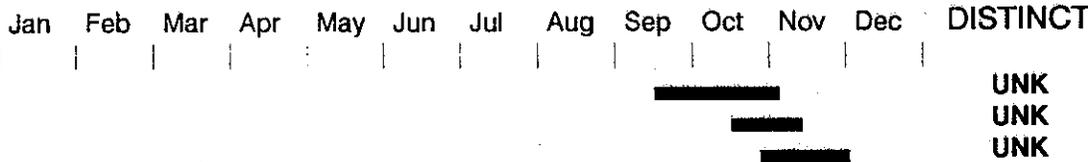
Based on large harvests of chum salmon in Willapa Bay in the early 1900s it is probable that historic chum abundance was much higher than it is today. It is likely that through loss of habitat and high harvests, historic productivity has been lost.

# STOCK DEFINITION PROFILE for Nemah Fall Chum

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES



**TIMING**



**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - UNKNOWN

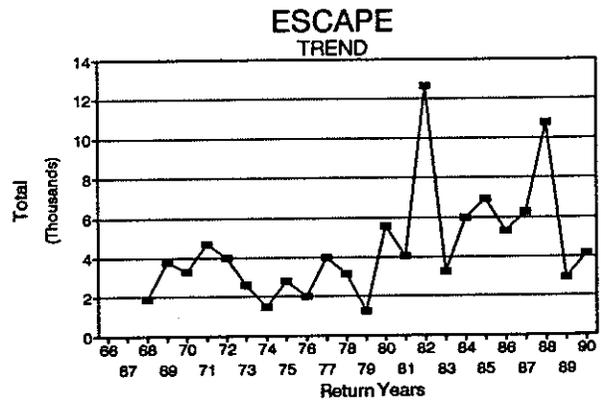
**GENETICS** - No chum GSI samples have been taken from this location.

# STOCK STATUS PROFILE for Nemah Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	ESCAPE Total			
66				
67				
68	1894			
69	3788			
70	3264			
71	4701			
72	3983			
73	2588			
74	1488			
75	2809			
76	1995			
77	4003			
78	3141			
79	1234			
80	5558			
81	4058			
82	12645			
83	3237			
84	5979			
85	6940			
86	5326			
87	6259			
88	10758			
89	2938			
90	4148			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## WILLAPA BAY -- NASELLE FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Fall chum salmon are found throughout the Naselle River system. Primary use areas are the lower mainstem tributaries of Ellsworth, Dell, Davis creeks (South Fork Naselle), and the Naselle mainstem. To a lesser degree, chum also utilize Salmon, Bean and Cement creeks. Adults begin entering the river in October. Spawning begins in mid- to late October, peaks in early to mid-November and is usually completed by late November.

A large hatchery chum production program was carried out at Naselle Hatchery during the middle 1980s. The primary source for brood stock for this program was Nemah stock, although brood stock from Ellsworth Creek, a tributary to the Naselle, was also used. A single release of Hood Canal stock in 1980 (1979 brood) also occurred. Because of the limited use of non-local stocks, it is unlikely native stock characteristics have been materially influenced.

The stock is of mixed origin with wild production.

### **STOCK STATUS**

The Naselle River chum stock is considered Healthy due to an increasing escapement trend.

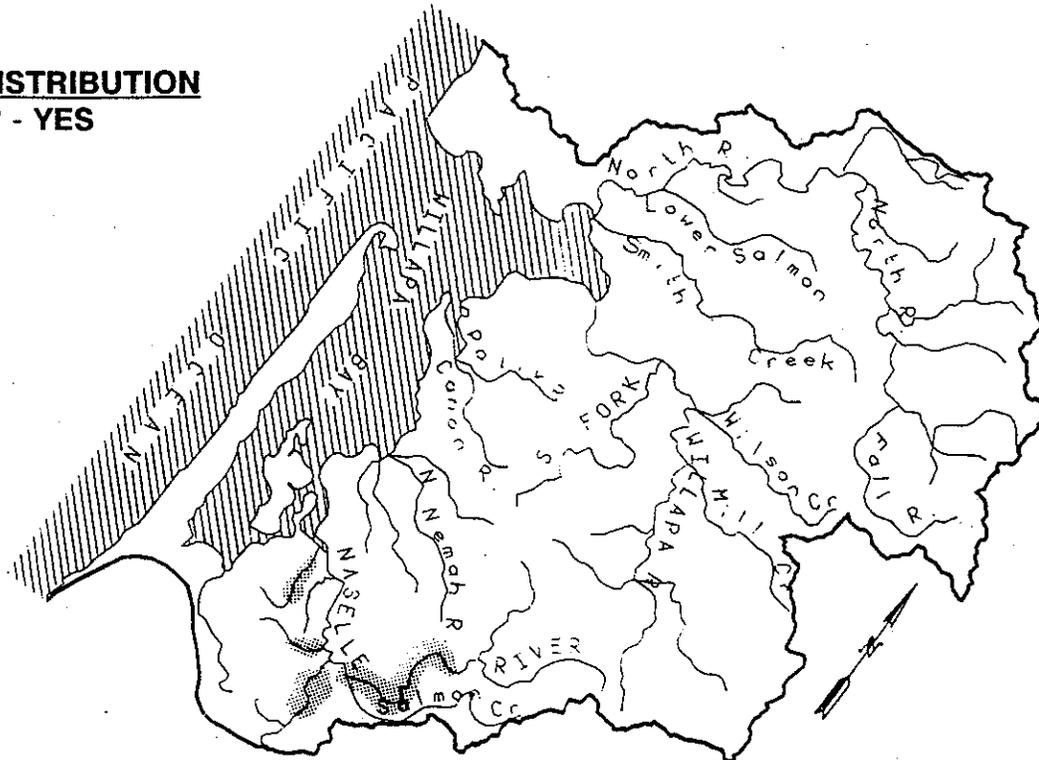
Terminal run sizes for individual stocks within Willapa Bay are not available. The status of Naselle River chum is monitored through estimates of escapements to Ellsworth Creek. Until recently, estimates of escapement to Davis and Dell creeks were also calculated. While not measures of total escapement, these estimates are thought to provide an accurate reflection of production trends and status of the stock. Estimated escapement to Ellsworth Creek has ranged from 970 spawners in 1968 to 6,872 spawners in 1982. The long-term (1968 through 1990) average escapement is 3,542 spawners. The recent ten-year (1981 through 1990) average is 4,313.

Based on large harvests of chum salmon in Willapa Bay in the early 1900s it is probable that historic chum abundance was much higher than it is today. It is likely that through loss of habitat and high harvests, historic productivity has been lost.

# STOCK DEFINITION PROFILE for Naselle Fall Chum

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER DISTRIBUTION  
SCALE  
15 Miles

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

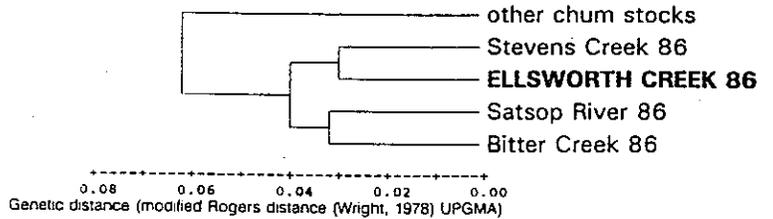
TERMINAL RUN  
RIVER ENTRY  
SPAWNING

UNK  
UNK  
UNK

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - YES

**GENETICS** - Analysis of a 1986 GSI collection from Ellsworth Creek (N=100) indicated that this collection was significantly different from a collection from Bitter Creek (21-locus G-tests:  $p < 0.05$ ).



# STOCK STATUS PROFILE for Naselle Fall Chum

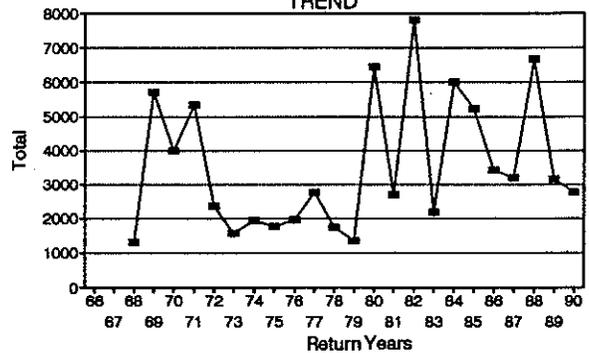
## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

66	
67	
68	1318
69	5711
70	3996
71	5343
72	2373
73	1576
74	1951
75	1783
76	1968
77	2783
78	1755
79	1351
80	6444
81	2708
82	7809
83	2178
84	5999
85	5226
86	3429
87	3189
88	6657
89	3151
90	2780

## ESCAPE TREND



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## WILLAPA BAY -- BEAR RIVER FALL CHUM

### **STOCK DEFINITION AND ORIGIN**

Fall chum salmon are found in the mainstem Bear River from river mile 3.5 to 8.0. Limited spawning occasionally occurs in an unnamed tributary at RM 7.3. Adults begin entering the river in October. Spawning begins in mid- to late October, peaks in early November and is usually completed by late November.

There is no history of imports of non-local stocks into the Bear River system. A volunteer cooperative brood stocking program was conducted for a number of years in the late 1970s. Eggs collected by this effort were placed into an eggbox on a tributary to Bear River and returned to the system. Limited use of Nemah stock in Spyder Creek egg boxes during the early 1980s occurred. Because of the limited use of non-local stocks it is unlikely the genetic integrity of the native Bear River chum stock has been materially influenced.

### **STOCK STATUS**

The Bear River chum stock is considered Healthy due to increasing escapements.

Terminal run sizes for individual stocks within Willapa Bay are not available. The status of Bear River chum is monitored through estimates of escapements. While not a measure of total escapement these estimates are thought to provide an accurate reflection of production trends and status of the stock. Estimated escapement to Bear River has ranged from 508 spawners in 1979 to 8,700 spawners in 1982. The long-term (1968 through 1990) average escapement is 3,539 spawners. The recent ten-year (1981 through 1990) average is 4,267. Poor survey conditions are a continuing problem with obtaining good spawner survey data. As a result, the escapement estimate database may be understating actual escapements.

Based on large harvests of chum salmon in Willapa Bay in the early 1900s it is probable that historic chum abundance was much higher than it is today. It is likely that through loss of habitat and high harvests, historic productivity has been lost.



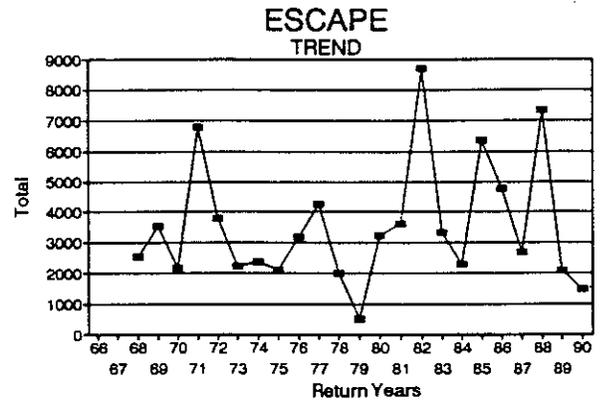
# STOCK STATUS PROFILE for Bear River Fall Chum

## STOCK ASSESSMENT

DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
--------------	--------------	--	--	--

66	
67	
68	2548
69	3529
70	2168
71	6795
72	3818
73	2233
74	2368
75	2101
76	3177
77	4269
78	2001
79	508
80	3220
81	3608
82	8700
83	3344
84	2297
85	6351
86	4783
87	2686
88	7343
89	2073
90	1484



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



# OVERVIEW -- WILLAPA BAY COHO STOCK

## WILLAPA BAY

### STOCK DEFINITION AND ORIGIN

Only a single stock of coho salmon has been identified for Willapa Bay. This determination was made for several reasons. First, intensive gill net fisheries designed to harvest large returns of hatchery coho reduced the abundance of native coho. Second, a significant number of hatchery-origin adults spawn naturally throughout the basin. Finally, large-scale enhancement programs utilizing hatchery-origin fish are ongoing. Combined, these factors have resulted in replacing (to a substantial degree) native stocks with a single naturally-spawning hatchery stock.

Additional information is provided in the following Stock Report.



## WILLAPA BAY -- WILLAPA BAY COHO

### **STOCK DEFINITION AND ORIGIN**

Normal-timed coho are found throughout Willapa Bay and its tributaries. Spawning occurs in all the major drainages in nearly all accessible tributaries. Adults begin entering the harbor in September, enter parent rivers in October and spawn from November through December. Peak spawning typically occurs in late November to early December.

Annual releases of hatchery-reared coho began prior to 1950. Large-scale off-station hatchery releases of yearlings and/or fingerlings have taken place since the early 1950s. In addition, in recent years a number of large enhancement programs have been initiated. Stock origins for these programs include Green River, Dungeness, Lake Creek and Satsop River (Grays Harbor hybrid). As a result of the historical movement of stocks, the size and frequency of hatchery release groups, and large scale cooperative projects, this stock is considered to be a hybrid.

The stock is of mixed origin with composite production.

### **STOCK STATUS**

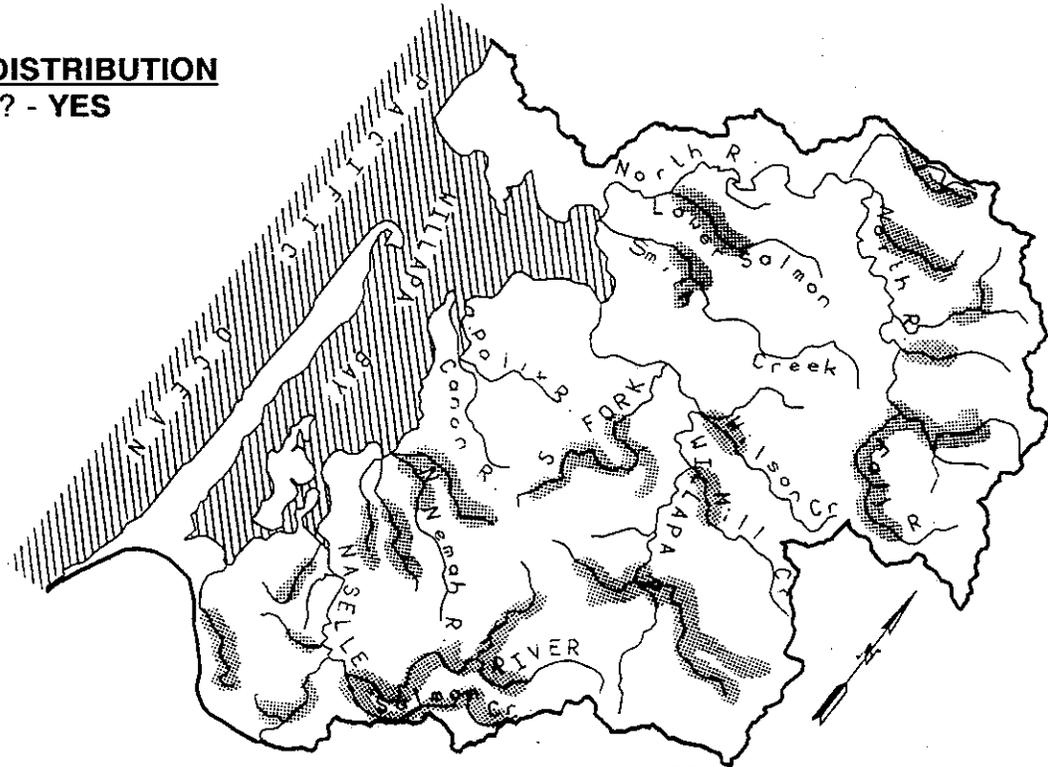
The status of Willapa Bay natural coho is Unknown.

Ocean distribution and contribution of Willapa Bay natural fall coho to fisheries have not been established through coded-wire tag studies. It is assumed they follow the same pattern as hatchery coho stocks in the Willapa Bay drainage area. Information gained from hatchery stock tagging studies indicates that contributions are highest to the British Columbia fisheries followed by the Washington coastal net and Oregon fisheries. As with other coastal coho stocks, minor contributions are also made to Washington ocean, Alaska, Puget Sound, Columbia River and freshwater sport fisheries.

Neither terminal run sizes nor spawning escapements are estimated for Willapa natural coho. Due to the heavy emphasis on the hatchery stock, production from the natural stock is not monitored. Although there is no directed effort to collect adult coho spawner survey data, incidental observations are recorded during surveys for chinook and chum. These surveys are generally conducted at times and in areas not typically preferred by coho spawners. The information collected indicates wide distribution of wild spawning coho throughout Willapa Bay. In addition, good numbers are observed in hatchery systems suggesting hatchery straying significantly contributes to the natural spawning escapement.

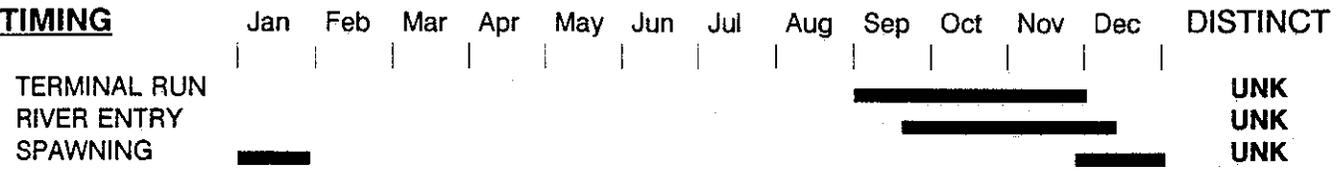
# STOCK DEFINITION PROFILE for Willapa Bay Coho

**SPAWNER DISTRIBUTION**  
DISTINCT? - YES



SPAWNER DISTRIBUTION  
SCALE  
15 Miles

**TIMING**



**BIOLOGICAL CHARACTERISTICS**  
DISTINCT? - NO

# STOCK STATUS PROFILE for Willapa Bay Coho

## STOCK ASSESSMENT

DATA QUALITY-----> No Data

Return	NO DATA			
Years				

67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91

---

### AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

### STOCK SUMMARY

STOCK ORIGIN

*Mixed*

PRODUCTION TYPE

*Composite*

STOCK DISTINCTION

*Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## OVERVIEW -- WILLAPA BAY SUMMER AND WINTER STEELHEAD STOCKS

### WINTER:

NORTH RIVER/SMITH CREEK  
WILLAPA  
PALIX

NEMAH  
NASELLE  
BEAR

### STOCK DEFINITION AND ORIGIN

In Willapa Bay, no summer steelhead stocks and six winter steelhead stocks have been identified. Wild winter steelhead in the North River/Smith Creek, Willapa, Palix, Nemah, Naselle and Bear rivers are distinct stocks. Wild winter steelhead are native.

There is little or no information available to indicate that these are genetically distinct stocks. The stocks are treated separately due to the geographic isolation of the spawning populations. There may be more or fewer stocks identified once comprehensive information is available.

More information on each stock is presented in separate Stock Reports.



## WILLAPA BAY -- NORTH RIVER / SMITH CREEK WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in North River, Smith Creek and Cedar River are native and a distinct stock based on the geographic isolation of the spawning population.

North River had a significant anadromous blockage until the mid-1940s when removal allowed re-establishment of native stocks. Smith Creek and North River share a common river mouth. Cedar River is a small, occasionally-blocked stream which enters North Bay near the mouth of the North River.

The stock origin is native with no hatchery supplementation on later returning stocks. Run timing (December through May) and spawn timing (February through May) are similar to those of other wild winter steelhead stocks in the Willapa Bay area.

### **STOCK STATUS**

The status of the stock is currently Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Information on sport harvest of wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest data cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined.

Based on limited index spawner surveys in Fall River (North River tributary), the number of wild fish in the sport harvest in North River and Smith Creek and stock status of the Naselle River winter steelhead, the status of the stock may be Healthy.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Freshwater habitat has been degraded by land-use (forest management) activities, but quantitative data are limited. Splash-dam logging during the turn of the century impacted spawning gravel and habitat in these systems.

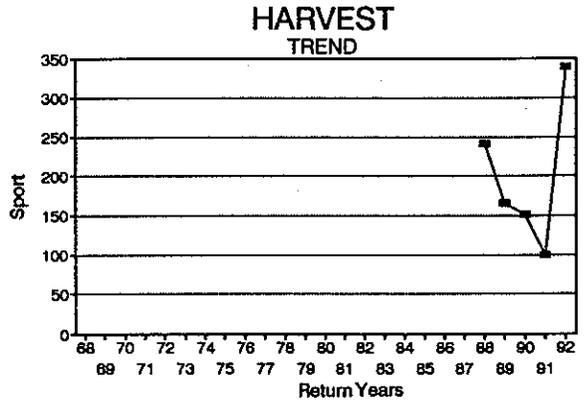


# STOCK STATUS PROFILE for North R/Smith Creek Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	242			
89	166			
90	151			
91	100			
92	340			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA

**Harvest Management** -- No tribal fishery targets on this stock although incidental catch of wild steelhead may occur. The sport fishery is open from June 1 through February 28 and the majority of the later returning native steelhead are protected from harvest.

**Hatchery** -- Hatchery smolt plants are made annually with a non-local stock of early returning (December - February) winter steelhead. The average percentage of wild fish in the sport harvest by month from December to the end of February season is: 55.0, 63.5, and 74.1 percent, respectively.

## WILLAPA BAY -- WILLAPA WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Willapa River, South Fork Willapa River, Wilson Creek, Mill Creek, and tributaries are native and a distinct stock based on the geographical isolation of the spawning population.

Run timing (December through May) and spawn timing (February through May) are similar to other wild winter steelhead stocks in the Willapa Bay area.

Little is known about the genetic composition of the stock.

Hatchery smolt plants are from a non-local early-returning stock of winter steelhead to reduce interbreeding with wild stocks.

### **STOCK STATUS**

The status of the stock is Healthy.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified. Spawner surveys occurred in 1989 and 1992 on selected areas. Initial data are inadequate to estimate escapement.

Stock status is based on sport harvest of wild steelhead. Sport harvest information is available for many years, but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Information on sport harvest of wild winter steelhead is available over the majority of the run because the sport steelhead season is open through March 31. As a result, sport harvest data can be used to rate the status of the wild stock as Healthy.

The sport harvest of wild steelhead was fairly constant from 1988 through 1991 and increased substantially in 1992. The average percentage of wild fish in the harvest by month from December to the end of the March 31 season is: 29.2, 40.0, 56.2, and 62.8 percent, respectively. No tribal fishery exists in this system.

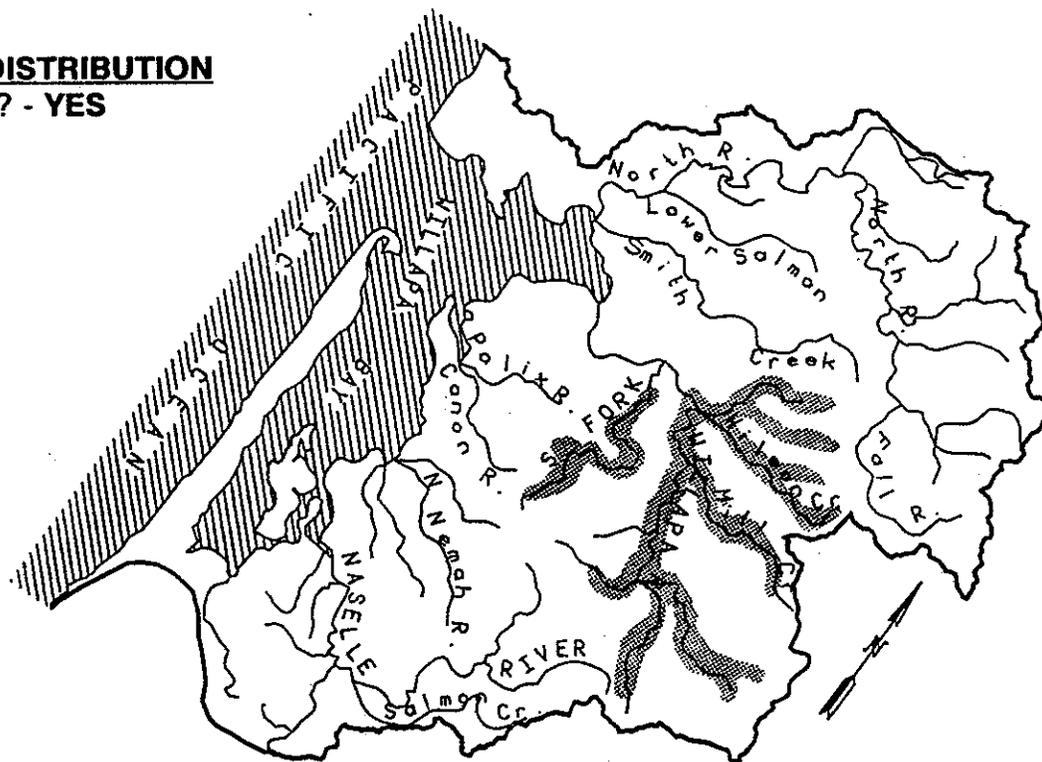
Historic sedimentation from logging practices and cattle utilization of the mainstem and tributaries has reduced spawning potential in this system.

Use of the chemical SEVIN in Willapa Harbor to control ghost shrimp may have reduced the food available for salmonids.

# STOCK DEFINITION PROFILE for Willapa Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER DISTRIBUTION



SCALE

15 Miles

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

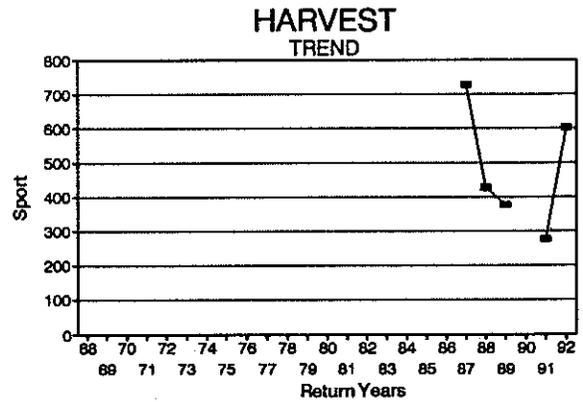
DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Willapa Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87	727			
88	427			
89	378			
90				
91	278			
92	603			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## WILLAPA BAY -- PALIX WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Nawiakum and Bone river drainage and all three forks of the Palix and Canon rivers are a distinct stock based on the geographic isolation of the spawning population.

Little is known about the genetic composition of the stock. Run timing (December through May) and spawn-timing (February through May) are similar to those of other wild winter steelhead stocks in the Willapa Bay area. Wild winter steelhead in this stock are native.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Information on sport harvest of wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest data cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Low gradient topography combined with previous logging sedimentation has resulted in adverse impacts to spawning gravels.

**Harvest Management** -- The sport season is open from June 1 to the end of February. The majority of later returning native steelhead are protected from harvest. No tribal fishery exists in this system.

**Hatchery** -- No hatchery steelhead are currently stocked in the Palix system. However, hatchery strays which are stocked in other Willapa Bay tributaries are harvested in the Palix.

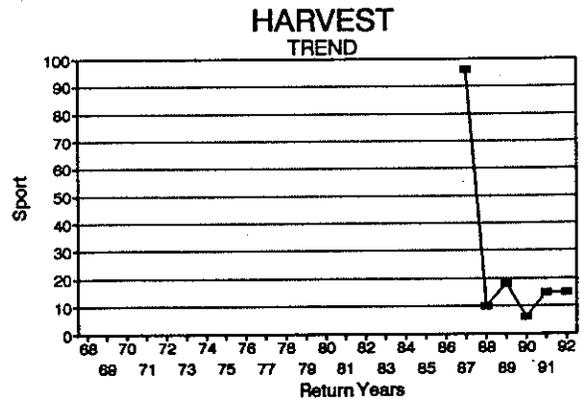


# STOCK STATUS PROFILE for Palix Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Poor

Return Years	HARVEST Sport			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87	96			
88	10			
89	18			
90	6			
91	15			
92	15			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## WILLAPA BAY -- NEMAH WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the North, Middle, and South Forks of the Nemah River and in Williams Creek are a distinct stock based on the geographic isolation of the spawning population. Very few winter steelhead seem to be using the South Fork Nemah. Wild winter steelhead in this stock are native.

Run timing (December through May) and spawn-timing (February through May) are similar to those of other wild winter steelhead stocks in the Willapa Bay area.

Little is known about the genetic composition of the stock.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock. More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years, but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Information on sport harvest of wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest data cannot be used to assess the status of the wild stock.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- Low gradient topography and a history of significant logging sedimentation have led to loss of spawning habitat. Use of the chemical SEVIN to control ghost shrimp in Willapa Harbor may have reduced the food available to salmonids.

**Harvest Management** -- The three forks of the Nemah are open through February for sport harvest. Sport harvest in the Nemah between 1986 and 1992 was comprised of 80 percent in the North Fork, 16 percent in the Middle Fork, and 4 percent in the South Fork. No tribal fishery exists in this system.

**Hatchery** -- Early-returning non-local hatchery fish are stocked as smolts to reduce spawning interaction with later returning native fish.

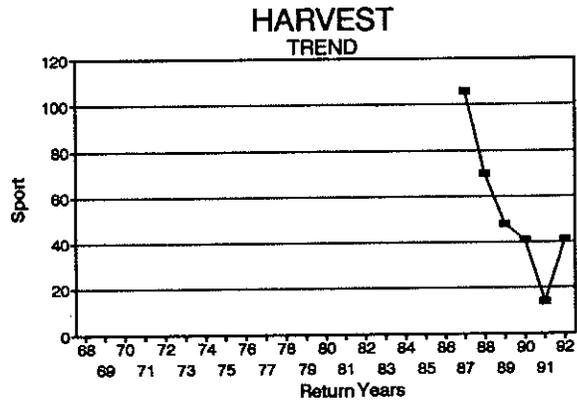


# STOCK STATUS PROFILE for Nemah Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87	106			
88	70			
89	48			
90	41			
91	14			
92	41			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## **WILLAPA BAY -- NASELLE WINTER STEELHEAD**

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Naselle River, Salmon Creek, and tributaries are a distinct stock based on the geographical isolation of the spawning population.

Run timing (December through May) and spawn timing (February through May) are similar to those of other wild winter steelhead stocks in the Willapa Bay area.

Wild winter steelhead in this stock are native. Early-returning non-local hatchery fish are used to reduce spawning interaction with native fish.

Little is known about the genetic composition of the stock.

### **STOCK STATUS**

The status of the stock is Healthy.

Spawner surveys were begun in cooperation with local sportsmen in 1992, but initial data are inadequate to estimate escapement. No escapement goal has been identified. Stock status is based on sport harvest of wild steelhead. Sport harvest information is available for many years, but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Information on sport harvest of wild winter steelhead is available over the majority of the run because the sport steelhead season is open through March 31. As a result, sport harvest data can be used to rate the status of the wild stock as Healthy.

Sport harvest of wild steelhead fluctuated from 1988 through 1992 primarily due to natural variations in survival for the stock. The average percentage of wild fish in the harvest by month is 37.2, 46.0, 65.0 and 79.4 percent from December to the end of the March 31 season, respectively. No tribal fishery occurs in the Naselle system.

The presence of low gradient streams and a history of significant sedimentation due to logging has led to the loss of spawning habitat. Use of the chemical SEVIN to control ghost shrimp in Willapa Harbor may have reduced the food available to salmonids.

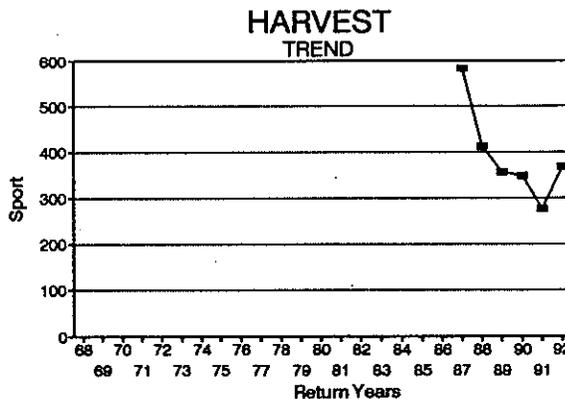


# STOCK STATUS PROFILE for Naselle Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87	583			
88	411			
89	356			
90	347			
91	276			
92	367			



## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Healthy*

SCREENING CRITERIA



## WILLAPA BAY -- BEAR RIVER WINTER STEELHEAD

### **STOCK DEFINITION AND ORIGIN**

Wild winter steelhead in the Bear River are native and a distinct stock based on the geographic isolation of the spawning population.

Little is known about the genetic composition of the stock.

Run timing (December through May) and spawn timing (February through May) are similar to other wild winter steelhead stocks in the Willapa Bay area.

### **STOCK STATUS**

The status of the stock is Unknown. This stock is comprised of a historically small number of steelhead, but there is insufficient information to classify its status as either a Healthy, Depressed, or Critical stock.

Spawning escapement is not monitored for this stock nor has an escapement goal been identified.

Sport harvest information is available for many years but wild winter steelhead were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season. Information on sport harvest of wild winter steelhead is available for only the early portion of the run because the sport steelhead season closes on February 28. As a result, sport harvest data cannot be used to assess the status of the wild stock.

More information needs to be collected on this stock so that stock status can be determined. As a small stock, it could be especially vulnerable to any negative impacts.

### **FACTORS AFFECTING PRODUCTION**

**Habitat** -- A low gradient watershed and historic sedimentation from logging practices have reduced spawning habitat.

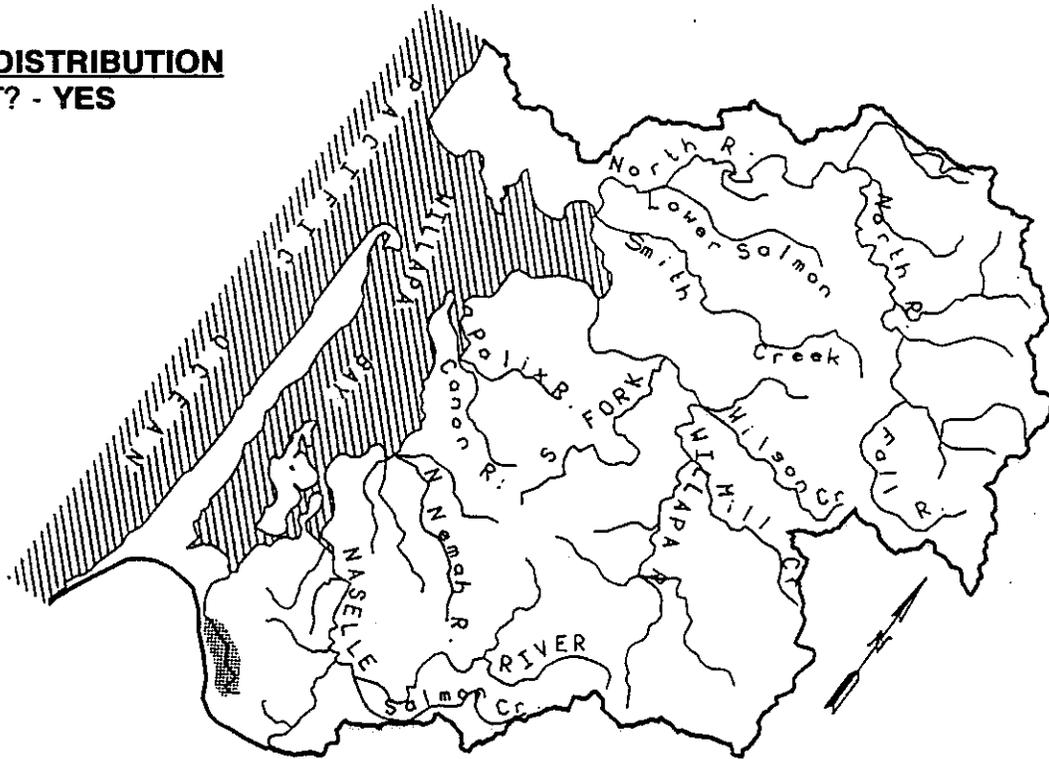
**Harvest Management** -- The sport fishing season is open from June 1 to the last day of February. The majority of fish harvested by the sport angler are wild fish. No tribal fishery exists in this system.

**Hatchery** -- No hatchery smolt plants are made into this system, however, about 7 percent of all fish harvested are hatchery-origin strays from other Willapa Harbor tributaries. Impacts on the wild stocks from these strays are unknown.

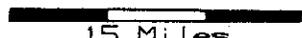
# STOCK DEFINITION PROFILE for Bear River Winter Steelhead

## SPAWNER DISTRIBUTION

DISTINCT? - YES



SPAWNER  
DISTRIBUTION



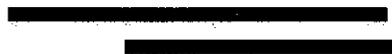
15 Miles

SCALE

## TIMING

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec DISTINCT

TERMINAL RUN  
RIVER ENTRY  
SPAWNING



NO  
NO

## BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

# STOCK STATUS PROFILE for Bear River Winter Steelhead

## STOCK ASSESSMENT

DATA QUALITY-----> Fair

Return Years	HARVEST Sport			
-----------------	------------------	--	--	--

68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	64
88	22
89	2
90	4
91	6
92	2

## AVERAGE RUNSIZE DISTRIBUTION

DATA NOT AVAILABLE.

## STOCK SUMMARY

STOCK ORIGIN

*Native*

PRODUCTION TYPE

*Wild*

STOCK DISTINCTION

*Spawning Distribution*

STOCK STATUS

*Unknown*

SCREENING CRITERIA



## LITERATURE CITED

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need to add:

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## GLOSSARY

**ALLELE** -- One of two or more alternative forms of a gene.

**ANADROMOUS FISH** -- Species that are hatched in freshwater, mature in saltwater and return to freshwater to spawn.

**BROODSTOCK** -- Those adult salmonids that are destined to be the parents for a particular stock or smaller group of fish.

**COMPOSITE STOCK** -- A stock sustained by both wild and artificial production.

**CRITICAL STOCK** -- A stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

**CULTURED STOCK** -- A stock that depends upon spawning, incubation, hatching, or rearing in a hatchery or other artificial production facility.

**DENDROGRAM** -- A graphic summary of the genetic relationships among populations. The horizontal distance at which the stock branches connect indicates the degree of similarity/dissimilarity. The longer the distance at which the branch points connect, the greater the average genetic differences among stocks.

**DEPRESSED STOCK** -- A stock of fish whose production is below expected levels based on available habitat and natural variations in survival rates but above the level where permanent damage to the stock is likely.

**ELECTROPHORESIS** -- A process whereby charged molecules (such as enzymes and other proteins) are separated in an electric field.

**ESCAPEMENT** -- Those fish that have survived all fisheries and will make up a spawning population.

**ESCAPEMENT FLOOR** -- The lower bound of an escapement range.

**ESCAPEMENT GOAL** -- A predetermined biologically-derived number of salmonids that are not harvested and will be the parent spawners for a wild or hatchery stock of fish.

**ESCAPEMENT OBJECTIVE** -- A predetermined number of salmonids that varies from the escapement goal and are not harvested and will be the parent spawners for a wild or hatchery stock of fish.

**EXTINCT STOCK** -- A stock of fish that is no longer present in its original range or as a distinct stock elsewhere. Individuals of the same species may be observed in very low numbers, consistent with straying from other stocks.

**FISHERY** -- The act, process, or occupation of attempting to catch fish, which may be retained or released.

**FRY** -- Young salmonids that have emerged from the gravel and are up to one month of age or any cultured salmonid from hatching through fourteen days after being ponded.

**GENE** -- A specific unit of genetic material (DNA) that encodes the information for a single genetic trait.

**GENE POOL** -- The total variety and proportions of alleles within a population.

**GENETIC DISTANCE** -- A statistical measure that summarizes the detectable genetic differentiation among collections or stocks based on allele frequency differences across all gene loci screened. There are a variety of different genetic distance statistics in the published literature (e.g. Nei, Rogers, Cavalli-Sforza & Edwards), each with its strengths and weaknesses.

**GENETIC STOCK IDENTIFICATION (GSI)** -- A method that can be used to characterize populations of organisms based on the genetic profiles of individuals. The GSI process consists of a series of steps: (1) collect selected tissues from a representative sample of individuals from the population(s) under investigation; (2) develop genetic profiles for the individuals in each population by conducting starch-gel electrophoresis and histochemical staining using tissue extracts; (3) characterize each population by aggregating the individual genetic profiles and computing allele frequency distributions; and (4) conduct statistical tests using the allele counts characterizing each population to identify significantly different populations.

**GENOME** -- The total genetic composition of an individual. The complete genetic information possessed by an organism.

**HABITAT** -- An area that supplies food, water, shelter and a space necessary for a particular animal's existence.

**HARVEST** -- Fish that are caught and retained in a fishery (consumptive harvest).

**HARVEST RATE** -- The proportion of a returning run or total population of salmonids that is taken by fisheries, usually expressed as a catch-to-escapement ratio.

**HATCHERY PRODUCTION** -- The spawning, incubation, hatching or rearing of fish in a hatchery or other artificial production facility (e.g. spawning channels, egg incubation boxes, or pens).

**HEALTHY STOCK** -- A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.

**HYBRIDIZATION** -- The interbreeding of fish from two or more different stocks.

**LARGE WOODY DEBRIS (LWD)** -- Conifer or deciduous logs, limbs or root wads twelve inches or larger in diameter.

**LOCUS (LOCI)** -- The site of a specific gene on a chromosome. Often used to refer to a gene and its alleles.

**MAXIMUM SUSTAINED HARVEST (MSH)** -- The maximum number of fish of a management unit that can be harvested on a sustained basis, measured as the number of fish that would enter fresh water to spawn in the absence of fishing after accounting for natural mortality. MSH is intended to mean maximum sustained harvest to Washington fisheries.

**MIXED STOCK** -- A stock whose individuals originated from commingled native and non-native parents, and/or by mating between native and non-native fish (hybridization); or a previously native stock that has undergone substantial genetic alteration.

**MIXED STOCK FISHERIES** -- Any fishery that catches fish that represent a number of commingled stocks.

**NATIVE STOCK** -- An indigenous stock of fish that has not been substantially impacted by genetic interactions with non-native stocks or by other factors, and is still present in all or part of its original range. In limited cases, a native stock may also exist outside of its original habitat (e.g. captive brood stock programs).

**NET PEN** -- A fish-rearing enclosure used in lakes and marine areas.

**NMFS** -- National Marine Fisheries Service.

**NON-NATIVE STOCK** -- A native species residing in an area outside its original habitat in Washington State (e.g. Chambers Creek steelhead, Sooes Creek chinook).

**OFF-STATION RELEASES** -- Releases of juvenile hatchery-reared fish into streams or lakes at some distance from the hatchery where they were reared.

**ON-STATION RELEASES** -- Releases of juvenile hatchery-reared fish from hatchery facilities.

**PRODUCTION TYPE** -- The method of spawning and rearing that produced the fish that constitute a stock.

**PRODUCTIVITY** -- A measure of the capacity of a biological system. Also used as a measure of the efficiency with which a biological system converts energy into growth and production.

**REMOTE SITE INCUBATOR** -- A lightweight, dark-colored poly barrel incubator that employs plastic substrate (hatching medium), and can be sized to accommodate 5,000 to 125,000 eggs per incubator. They are used for incubating chum salmon eggs.

**RIPARIAN HABITAT** -- The aquatic and terrestrial habitat adjacent to streams, lakes, estuaries, or other waterways.

**RM** -- River mile.

**RUN** -- The sum of stocks of a single salmonid species which migrates to a particular region, river, or stream of origin at a particular season.

**SALMONID** -- Any member of the taxonomic family Salmonidae, which includes all species of salmon, trout, and char. SASSI deals only with the Pacific salmon (chinook, chum, coho, pink, and sockeye) and with steelhead trout.

**SASSI** -- Salmon and Steelhead Stock Inventory. A cooperative program by the Department of Fish and Wildlife and Washington Treaty Indian Tribes to inventory and rate the status of salmon and steelhead stocks on a recurring basis.

**SMOLT** -- A juvenile salmonid that is silvery with distinct parr marks and is undergoing the physiological change to migrate from fresh to salt water.

**SPAWNING POPULATION** -- Synonymous with the term stock.

**STOCK** -- The fish spawning in a particular lake or stream(s) at a particular season, which fish to a substantial degree do not interbreed with any group spawning in a different place, or in the same place at a different season.

**STOCK ORIGIN** -- The genetic history of a stock.

**STOCK STATUS** -- The current condition of a stock, which may be based on escapement, run-size, survival or fitness level.

**SUPPLEMENTATION** -- The release and management of artificially propagated fish in streams with the intent to increase or establish wild fish populations while minimizing associated genetic and ecological risks.

**TERMINAL AREA** -- A fishing area where a salmonid stock or run has separated from other stocks/runs.

**TREATY TRIBE** -- Any Indian tribe recognized by the United States government, with usual and accustomed fishing grounds, whose fishing rights were reserved under a treaty and have been affirmed by a federal court.

**TREND** -- The directional change in a time series data set.

**UNKNOWN STOCK** -- This description is applied to stocks where there is insufficient information to identify stock origin or stock status with confidence.

**USFWS** -- U. S. Fish and Wildlife Service.

**WATERSHED** -- A basin including all water and land areas that drain to a common body of water.

**WILD STEELHEAD RELEASE (WSR)** -- A hook-and-line fishery that requires wild steelhead (defined by not having fin clips) to be released. Hatchery steelhead (defined by having fin clips) may be retained.

**WDF** -- Washington Department of Fisheries.

**WDFW** -- Washington Department of Fish and Wildlife.

**WDW** -- Washington Department of Wildlife.

**WILD STOCK** -- A stock that is sustained by natural spawning and rearing in the natural habitat, regardless of parentage (includes native).