1992 WASHINGTON STATE

SALMON AND STEELHEAD STOCK INVENTORY

APPENDIX THREE
COLUMBIA RIVER STOCKS

WASHINGTON DEPARTMENT OF FISHERIES
AND
WASHINGTON DEPARTMENT OF WILDLIFE

OLYMPIA, WASHINGTON

June 1993

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

This report represents the dedicated efforts of numerous staff within the Washington Departments of Fisheries and Wildlife. While the Columbia River Inter-Tribal Fish Commission and Columbia River Treaty Tribes did not participate as authors, we are indebted for their review and contribution of ideas. These state and tribal biologists invested considerable time in review, comment and ultimate improvement of the overall work products. We appreciate their efforts, most of which required unusual personal dedication of time and energy.

We extend special thanks to the assistance provided to the contributors by Dana Anderson, Mary Braxmeyer, Larry Brown, Pat Michael, Darrel Pruett, and Shandi Schwegler in helping create the components and final products of this inventory.

Finally, the work reflected in this report was partly funded by National Oceanographic and Atmospheric Administration (NOAA) Cooperative Agreement No. NA17FA0241 with the Washington Department of Fisheries, and by the U.S. Fish and Wildlife Service (USFWS) Sport Fish Restoration Project No. F-109-R with the Washington Department of Wildlife. The views reflected herein are those of the authors and do not necessarily reflect the views of the USFWS, or NOAA and any of its subagencies.

INTRODUCTION

This appendix volume is the Columbia River regional supplement to the *1992 Washington State Salmon and Steelhead Stock Inventory* (SASSI),[1] 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. 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[2] 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.

---

[1] SASSI -- Washington Department of Fisheries et al. 1993.

[2] 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, 111 stocks were from the Columbia River system. Table 1 presents a summary of stock status for wild Columbia River salmon and steelhead.

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

Table 1. Summary of stock status for wild salmon and steelhead stocks in the Columbia River area (Washington stocks only).

	HEALTHY	DEPRESSED	CRITICAL	UNKNOWN	EXTINCT
LOWER COLUMBIA					
Chinook salmon	15	2	0	0	0
Chum salmon	1	2	0	0	0
Coho salmon	0	17	0	0	0
Pink salmon	--	--	--	--	--
Sockeye salmon	--	--	--	--	--
Steelhead	2	14	0	7	0
UPPER COLUMBIA					
Chinook salmon	9	20	1	0	0
Chum salmon	--	--	--	--	--
Coho salmon	0	1	0	0	0
Pink salmon	--	--	--	--	--
Sockeye salmon	2	0	0	0	0
Steelhead	0	14	0	4	0
COLUMBIA RIVER 111 TOTAL STOCKS	29	70	1	11	0
PERCENT OF TOTAL	26%	63%	1%	10%	0%

Two elements of the 1992 SASSI process are presented in this appendix: (1) Species Overview Reports for each basin in the Columbia River region, and (2) Stock Reports for each individual stock. Any comments or questions regarding this information should be directed to the Washington State Departments of Fisheries and Wildlife in Olympia, Washington.

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 runsize 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

It is an objective of SASSI 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 spawning 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 are describing 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 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.

Lori added to the map from the facing page.

This appendix volume covers the lower and upper Columbia River regions.

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 drainages (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 Columbia River 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 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 escapements 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 do not provide 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 Columbia River salmon and steelhead stocks.

ESCAPEMENT

Total	An estimate of all fish of a stock that have survived all fisheries and make up a spawning population.
Index total	An estimate of total escapement in an index area.
Redds	A count of redds (spawning nests) in a stream index area.
Fish/mile	A spawner count divided by the number of miles surveyed.
Redds/mile	A redd count divided by the number of miles surveyed.
Dam count	A total count of fish destined for spawning grounds upstream of a dam.
Trap count	A total count of fish destined for spawning grounds upstream of a fish trapping facility.

HARVEST DATA

The numbers of fish harvested 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 harvests made everywhere that impact the stock. For example, total harvest might refer only to the combined sport and commercial harvest in the Columbia River system, but may not include ocean harvests.

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

HARVEST

Total	The combined harvest of all fisheries in a specific region. In some cases, harvest data for some fisheries may be unavailable, but the available harvest data are thought to be representative of total harvest trends.
Net	The total net harvest in a major fishery or the combined tribal and/or commercial net harvest in a specific region.
Sport	The total harvest in a single sport fishery or the combined harvest 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 Columbia River. 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 Columbia River salmon and steelhead stocks.

RUN SIZE

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.

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.

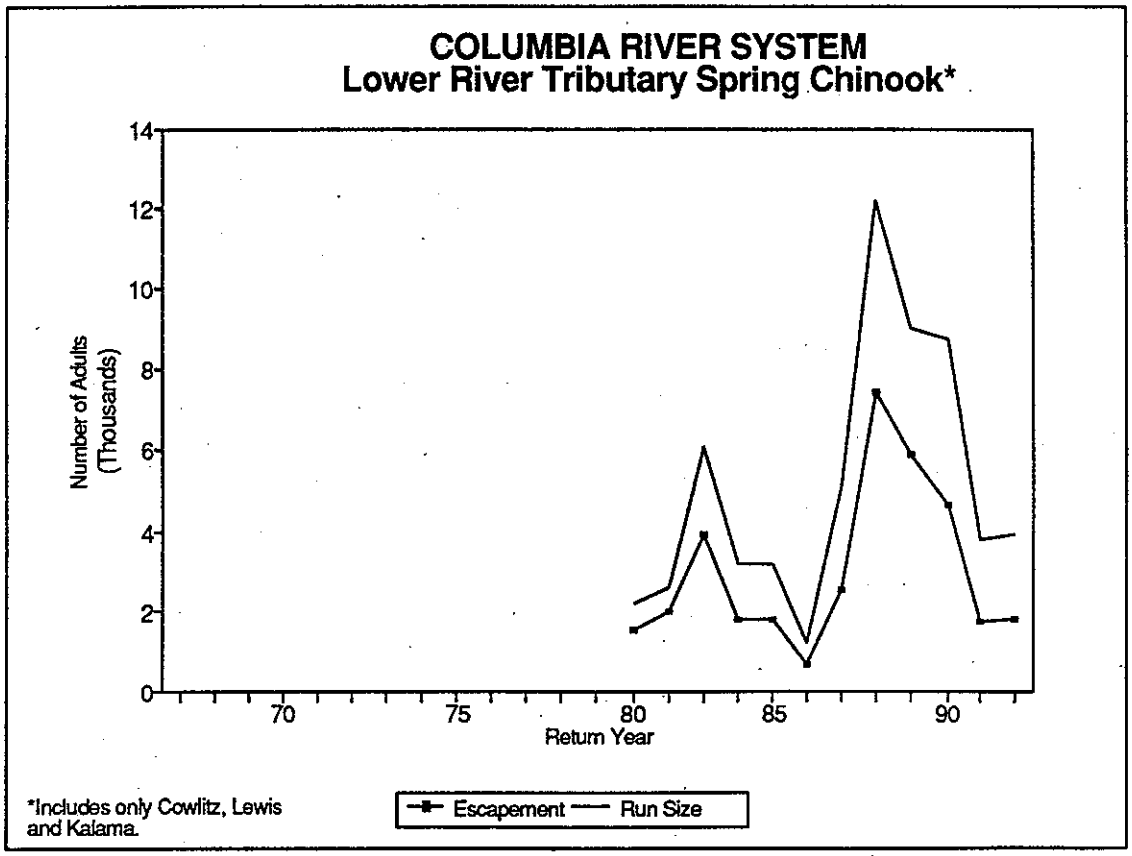
COLUMBIA RIVER STOCK REPORTS

OVERVIEW -- LOWER COLUMBIA SPRING CHINOOK STOCKS

COWLITZ
KALAMA
LEWIS

STOCK DEFINITION AND ORIGIN

Lower Columbia River spring chinook are those stocks located downstream of Bonneville Dam, including stocks in the Cowlitz, Kalama and Lewis rivers. The current populations in these rivers are of mixed origin. Genetically, these three stocks are similar and can be separated from upper Columbia River stocks. These stocks were designated on the basis of geographic distribution. Return migration through the lower Columbia occurs from late January to May. Tributary migration occurs from March through July, while spawning extends from late August through early October.



STOCK STATUS

Cowlitz, Kalama, and Lewis River spring chinook stocks are considered healthy based on escapement trend analysis. In-river fishery contribution includes the winter gill net fishery in the lower Columbia in February and March, and recreational fisheries in the mainstem Columbia, primarily in March, and in the tributaries primarily in April, May and June.

LOWER COLUMBIA -- COWLITZ SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

Historically, spawning surveys indicated all spawning in the Cowlitz occurred above Mayfield. Washington Department of Fisheries (1951) indicated spawning in the Cowlitz occurred above Packwood and in the Cispus River between Iron and East Canyon creeks. In the Tilton River, Thompson and Rothfus (1969) indicated spring chinook were reported in 1945, but subsequent spawning in the Tilton River has not been observed for years. From 1974 through 1980, an average of 2,838 spring chinook adults from Cowlitz Hatchery were trucked above Mayfield into the Tilton and upper Cowlitz rivers to provide sport fishing opportunity and natural production. An average of 260 adult spring chinook were planted in the Tilton River from 1975 through 1978 and none thereafter. Between 1981-1991, no spring chinook have been planted above Mayfield because of possible risk of IHN virus contamination of water supply at the Cowlitz Salmon Hatchery. Since the completion of Mayfield Dam river mile (RM 52.0) in 1963 and the Cowlitz Salmon Hatchery (RM 50.0) in 1967, the majority of the historical natural spawning habitat has been blocked. Currently, heaviest natural spawning occurs in the 8.0 mile stretch between the Cowlitz Salmon and Trout Hatcheries. Minor numbers of naturally spawning chinook are observed below Blue Creek.

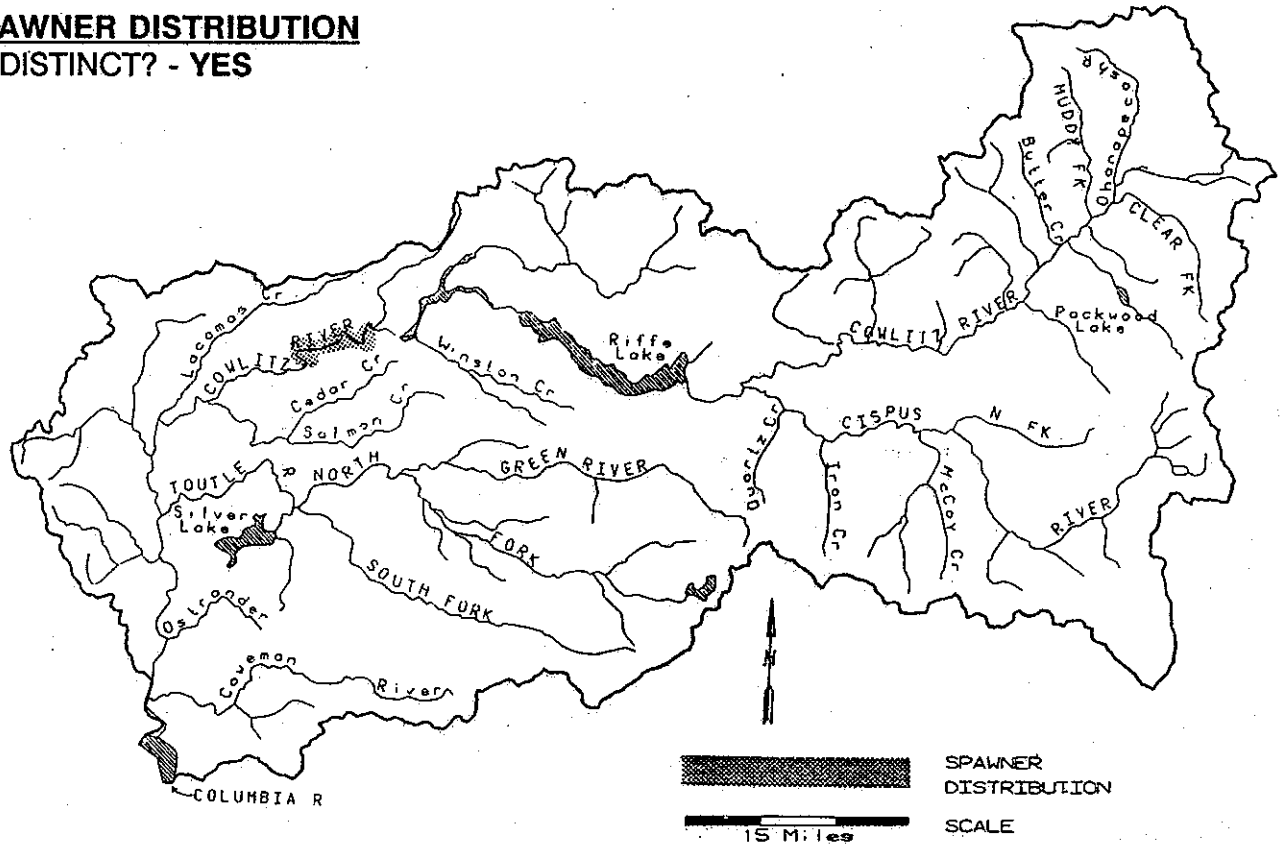
Cowlitz River spring chinook migrate through the lower Columbia River from late January to May. Tributary migration occurs primarily in March through June. Spawning extends from September to early October with peak activity in mid-September. Age ranges from two-year-old mini-jacks to six-year-old adults with four-year-olds usually the dominant age class. Genetically, Cowlitz River spring chinook are most similar to Kalama and Lewis River stock spring chinook, and can be separated from other Columbia River spring chinook.

Spring chinook are native to the Cowlitz River. Cowlitz River escapement in the early 1950s was estimated to be about 10,400 with the Cispus River (8,100), upper reaches of the Toutle River (400), Tilton River (200), and upper Cowlitz (1,700) the major spawning populations. On the Cowlitz River between 1962 through 1966, an average of 8,720 adult and 1,208 jack spring chinook were counted at Mayfield Dam. Brood stock for the sub-basin has been Cowlitz stock collected via hatchery rack returns except for two 1967 brood Willamette stock releases of 331,200 fingerlings in 1968 and 668,100 yearlings in 1969. The Willamette stock juveniles were in questionable health throughout the rearing period and survived poorly based on returns of a yearling fin-clip group.

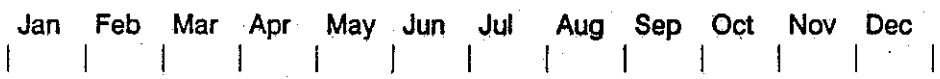
STOCK DEFINITION PROFILE for Cowlitz Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

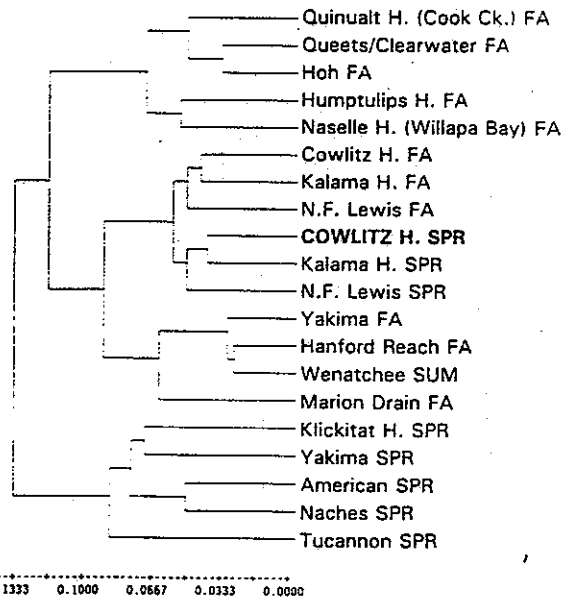


	DISTINCT
TERMINAL RUN	**NO**
RIVER ENTRY	**NO**
SPAWNING	**YES**

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - No genetic data exist for the natural spawner population in the Cowlitz River. However, Cowlitz Hatchery spring chinook sampled in 1982 and 1987 showed no differences between years in their genetic characteristics and were combined into one data set. This Cowlitz Hatchery spring stock was significantly different from all other chinook stocks examined ($p < .05$).

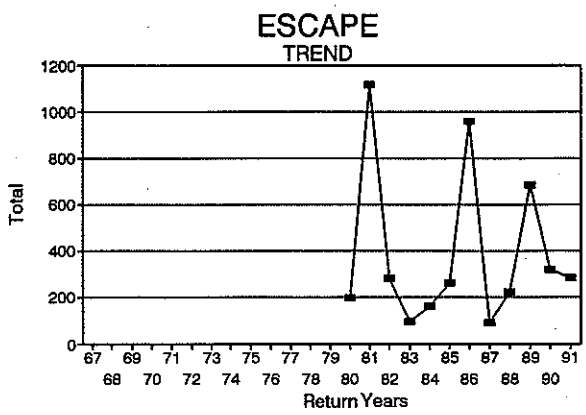


STOCK STATUS PROFILE for Cowlitz Spring Chinook

STOCK ASSESSMENT

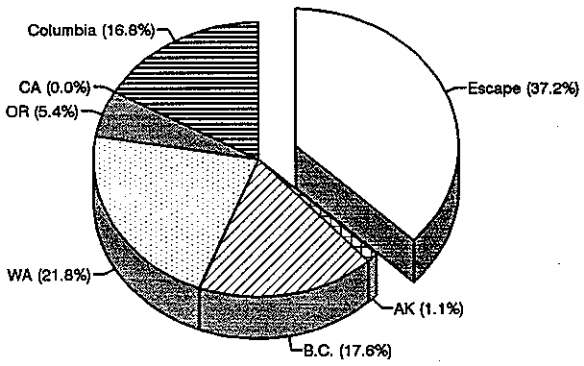
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	197			
81	1116			
82	279			
83	95			
84	161			
85	261			
86	959			
87	90			
88	221			
89	684			
90	320			
91	284			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 84-85 Brood



Based on 1984-85 brood Cowlitz Hatchery tag codes 63-35-05/12 and 63-38-33/35.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Genetic

STOCK STATUS
Healthy

SCREENING CRITERIA

The Cowlitz River spring chinook natural spawners are a mixed stock of composite production. A native population of spring chinook was in existence on the Cowlitz River prior to the construction of the old salmon hatchery near Clear Fork. Mixing of stocks very likely began to occur when hatchery supplementation was initiated in 1967 at the new salmon hatchery below Mayfield Dam. Primary production is from hatchery releases.

STOCK STATUS

The Cowlitz River naturally spawning spring chinook is healthy based on escapement trend and show no signs of drastic decline. Natural spawn escapement from 1980-1991 has averaged 389 with a low of 90 in 1987 and a peak of 1,116 in 1981. Escapement estimates are derived from expansion of peak redd counts. Data quality is good, although the database covers only the period since 1980.

LOWER COLUMBIA -- KALAMA SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

Historically, few spring chinook were found in the Kalama sub-basin (WDF 1951). Spring chinook were established at Kalama Falls Hatchery after its completion in 1959. Presently, the run is considered a hatchery stock. Spring chinook are distributed primarily below Kalama Falls Hatchery, although some have been passed upstream in large return years. Most of the spawning in the Kalama River occurs between the upper Kalama Falls Hatchery (RM 36.8) and the Lower Kalama Hatchery (RM 10.5).

There's no hatchery (upper Fallert Creek Falls, only Kalama Falls hatchery @ lower Kalama Falls.

Spring chinook in the sub-basin are an introduced stock and are managed as a hatchery stock. Consequently, relatively few are needed for spawning escapement. Spawning in the lower 10.0 miles of the river is hampered by sedimentation and temperature problems commonly associated with logging and lack of spawning habitat. Spring chinook are released upstream to spawn naturally only in surplus years and are blocked at RM 36.8 by a natural barrier. Also, the historic small run-size might suggest a overall habitat constraint.

Kalama River spring chinook migrate through the lower Columbia River from late January through May, with the majority of the run migrating from mid-March to mid-May. Adults generally enter the Kalama River from March through July. Spawning extends from mid-August to early October with peak activity in September. Kalama River spring chinook age composition ranges from two-year-old mini-jacks to six-year-old adults with four-year-olds and five-year-olds usually the dominant age class. Genetically, Kalama River spring chinook are the same as Cowlitz and Lewis River origin spring chinook and can be separated genetically from other Columbia River spring chinook stocks.

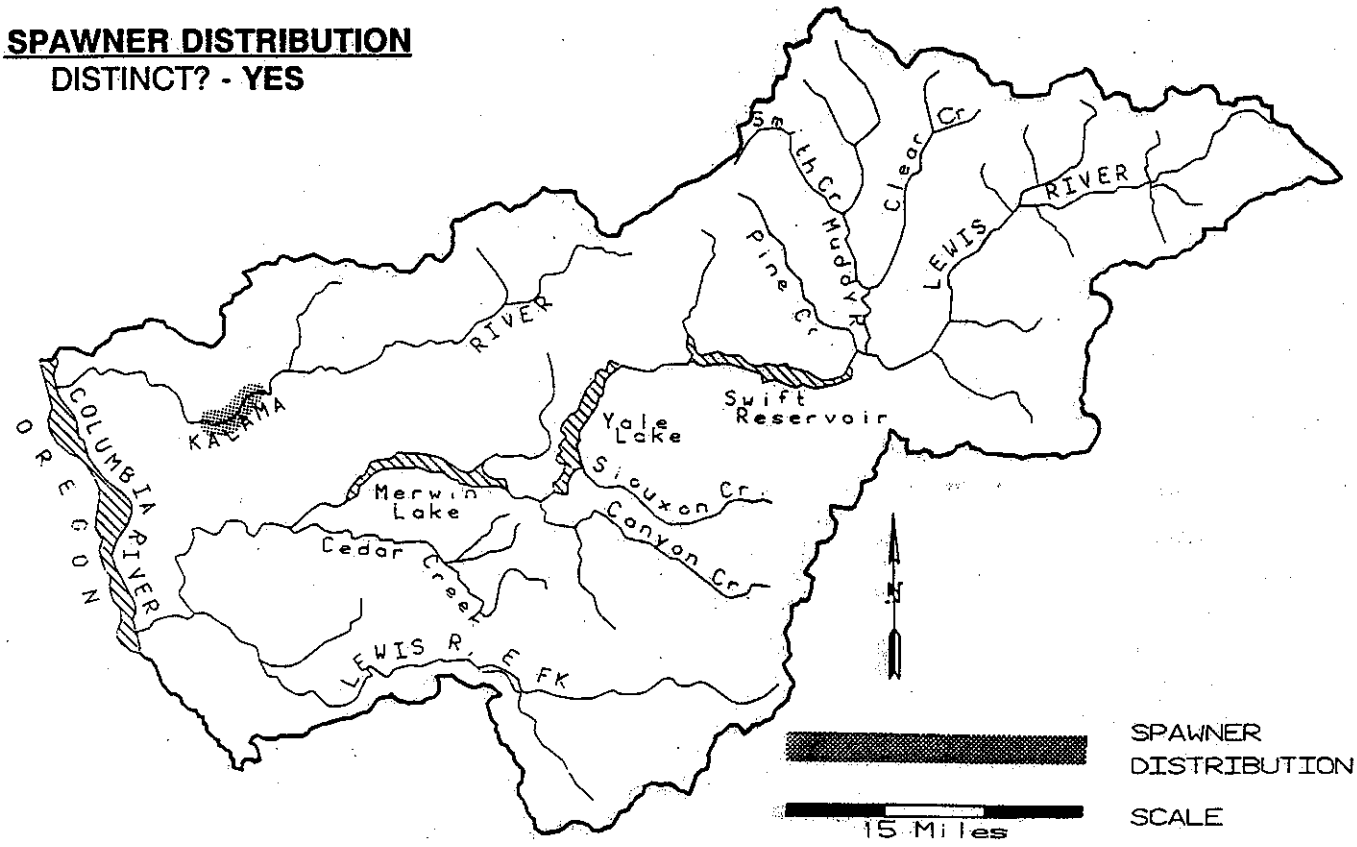
The Kalama River spring chinook are managed as a hatchery stock. The Lower Kalama Hatchery (RM 4.0) was constructed in 1895 and the Kalama Falls Hatchery (RM 10.0) was constructed in 1959. By the 1950s only remnant populations (escapements fewer than 100 fish) existed in the Kalama River. Spring chinook were established at Kalama Falls Hatchery after is completion in 1959. Brood stock for the Kalama hatchery programs originated from a variety of sources including Eagle Creek, Willamette, Cowlitz, and Little White Salmon rivers. Current brood stock source is from rack returns.

The Kalama River spring chinook natural spawners are a mixed stock of composite production. Spring chinook are historically native to the Kalama River. Mixing of stocks very likely began to occur when hatchery supplementation was initiated.

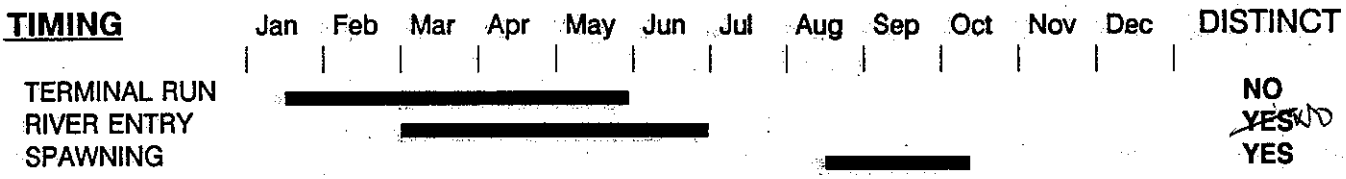
STOCK DEFINITION PROFILE for Kalama Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



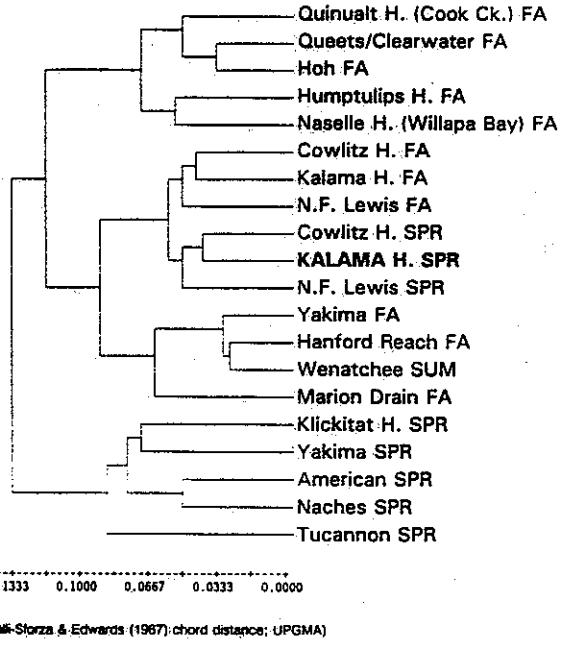
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - No genetic data exist for the natural spawner population in the Kalama River. However, Kalama Hatchery spring chinook sampled in 1982 and 1990 showed no differences between years in their genetic characteristics and they were combined into one data set. This Kalama Hatchery spring stock was significantly different from all other chinook stocks examined ($p < .05$).

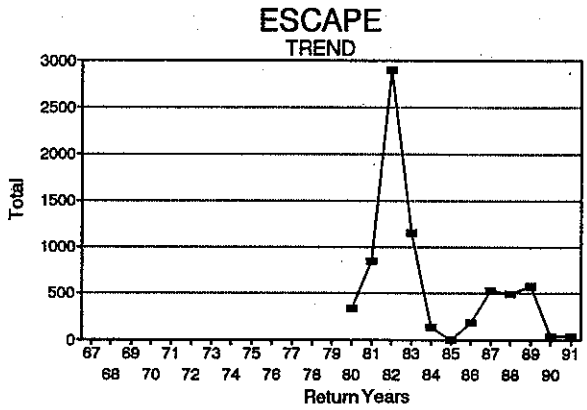


STOCK STATUS PROFILE for Kalama Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	340			
81	848			
82	2892			
83	1150			
84	134			
85	0			
86	181			
87	527			
88	496			
89	584			
90	34			
91	34			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

STOCK STATUS

The Kalama River spring chinook natural stock status is healthy based on escapement trend but shows signs of short-term severe decline. The Kalama River natural spring chinook escapement from 1980-1991 averaged 602 with a low of zero in 1985 and a peak of 2,892 in 1982. Primary production is from hatchery releases.

LOWER COLUMBIA -- LEWIS SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

The Lewis River enters the Columbia River at RM 88.0. At one time an indigenous stock of spring chinook existed in the Lewis River, but with the construction of Merwin Dam (RM 19.0) in 1931, the majority of the spawning reaches became inaccessible and the stock subsequently declined. Early attempts to save the stock through hatchery production failed. In the Lewis River, spring chinook eggs were collected for hatchery production in 1926 and 1927 and from 1931-1941 except for 1936. By 1950, only a remnant population existed in the river, spawning primarily in the waters immediately below Merwin Dam and Cedar Creek. Nearly all of the spawning on the Lewis River occurs in a 4.0 mile reach from Merwin Dam downstream to the Lewis River Hatchery. Few if any spring chinook return to the East Fork Lewis River (RM 3.0), the primary tributary.

Lewis River spring chinook migrate through the lower Columbia River from late January through May. Tributary migration occurs March through June. Spawning extends from late August to early October with peak activity in mid-September. Age ranges from two-year-old mini-jacks to six-year-old adults. The adult run is primarily composed of four-year-old and five-year-old fish with a minor number of six-year-olds. Genetically, Lewis River spring chinook are most similar to Kalama, and Cowlitz River stock spring chinook and can be separated genetically from other Columbia River spring chinook stocks.

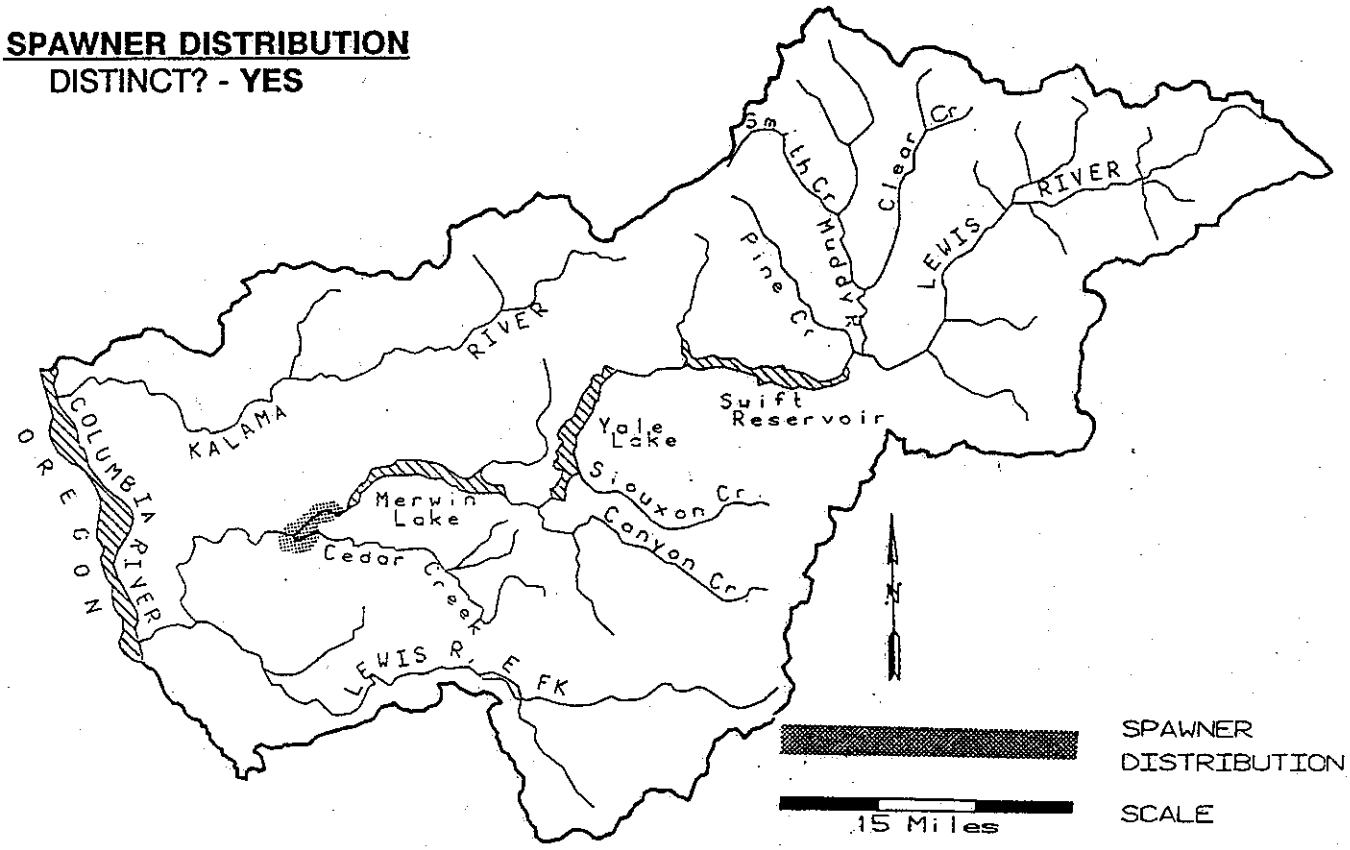
Lewis River spring chinook stock sources and hatchery production levels have changed frequently since the initial release of Cowlitz fingerlings in 1972. Since then, releases have been made from both the Speelyai and the Lewis River hatcheries. Brood stock for the Lewis hatchery programs originated from a variety of sources including Cowlitz, Kalama, Carson, Klickitat, and Willamette stock. The stocks used now include Cowlitz and Kalama, along with instation returns to the Lewis River. Local stock is collected by voluntary returns to Lewis River Hatchery or fish trapped at Merwin Dam. Only occasional hatchery releases have been made into the East Fork Lewis River

The Lewis River spring chinook natural spawners are a mixed stock of composite production. Spring chinook are historically native to the Lewis River. Mixing of stocks very likely began to occur when hatchery supplementation was initiated.

STOCK DEFINITION PROFILE for Lewis Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



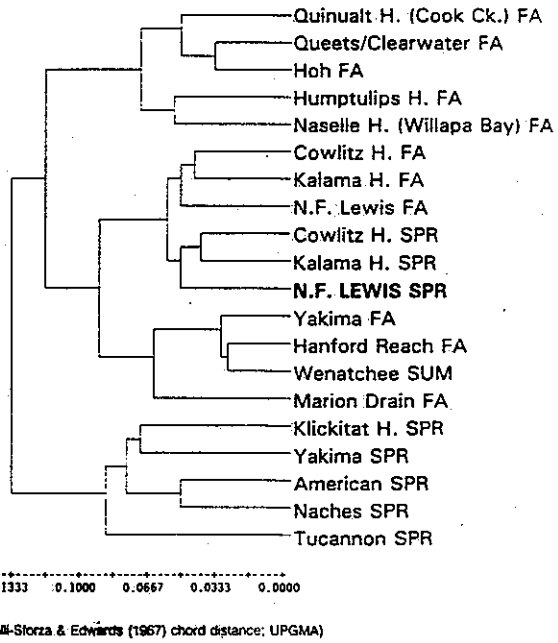
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - The genetic characteristics of NF Lewis River spring chinook sampled in 1988 were significantly different from those pf all other chinook stocks examined, including other lower Columbia spring-run stocks ($p < .05$).

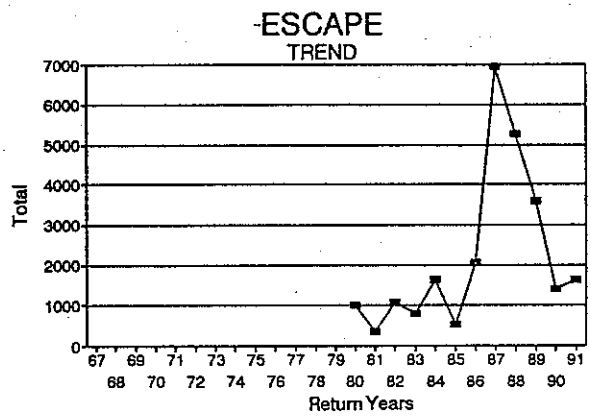


STOCK STATUS PROFILE for Lewis Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	1002			
81	345			
82	1081			
83	801			
84	1653			
85	530			
86	2055			
87	6939			
88	5277			
89	3594			
90	1419			
91	1632			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

STOCK STATUS

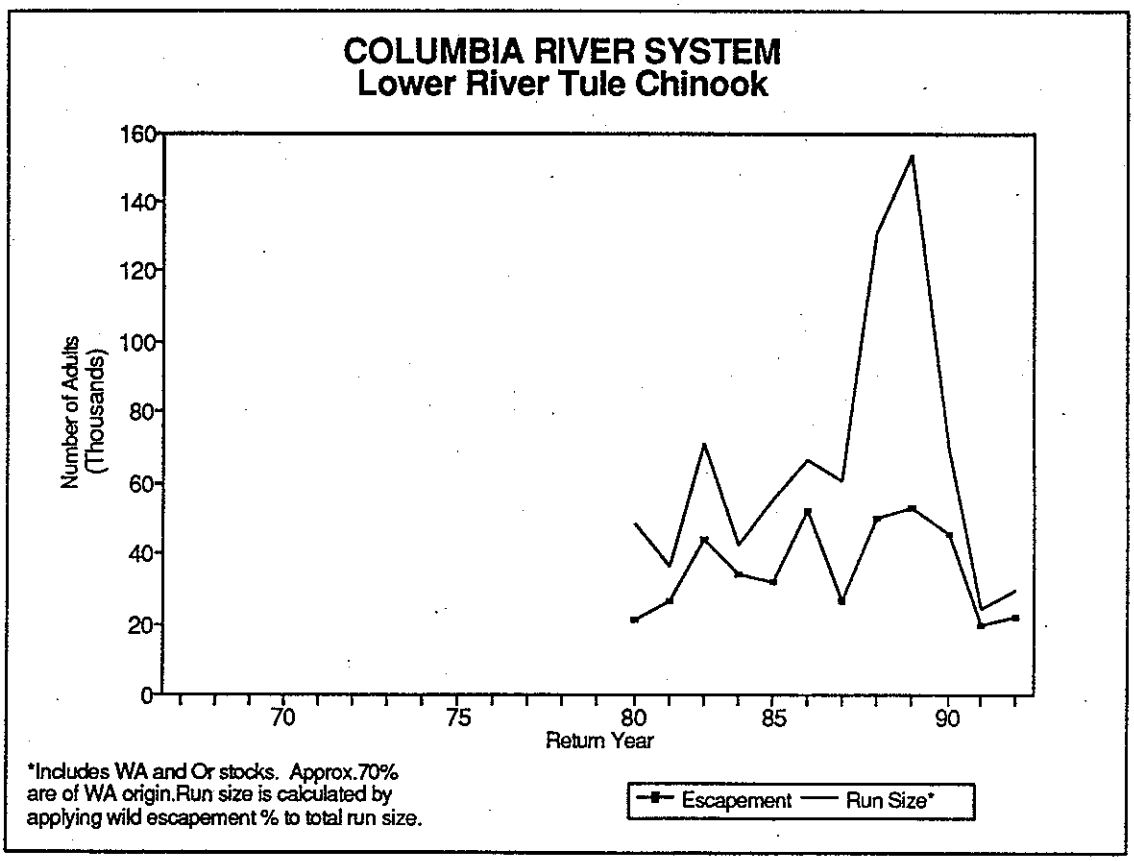
The Lewis River naturally spawning spring chinook is healthy based on escapement trend. Natural spawn escapement from 1980-1991 has averaged 2,194 with a low of 345 in 1981 and a peak of 6,939 in 1987. Spring chinook population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. Because of the inefficiency of the trap at Lewis River Hatchery, a significant proportion of the return spawns naturally in the river. The database quality is good.

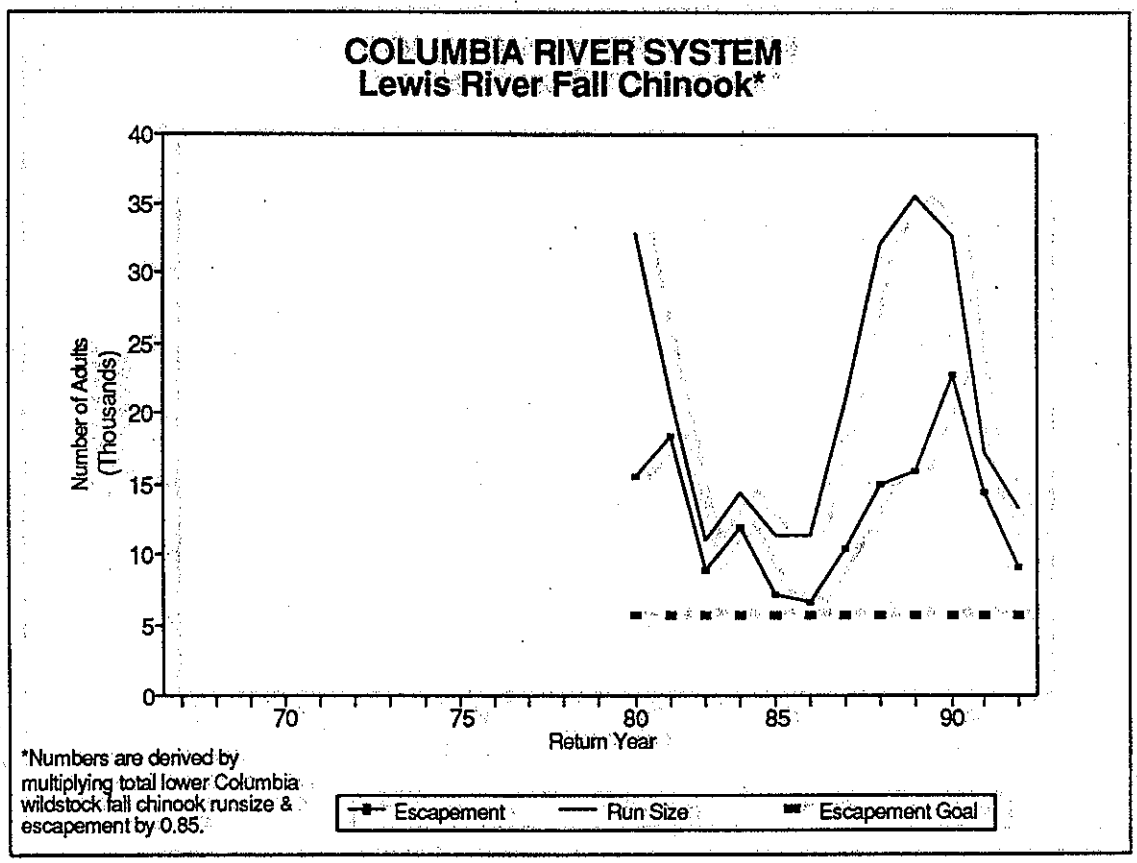
OVERVIEW -- LOWER COLUMBIA FALL CHINOOK STOCKS

GRAYS RIVER	COWEEMAN
SKAMOKAWA CREEK	SOUTH FORK TOUTLE
ELOCHOMAN	GREEN (TOUTLE)
MILL CREEK	KALAMA
ABERNATHY CREEK	LEWIS
GERMANY CREEK	EAST FORK LEWIS
COWLITZ	WASHOUGAL

STOCK DEFINITION AND ORIGIN

Lower Columbia fall chinook, located downstream of Bonneville Dam, consist of 14 stocks. These can be further divided into two general groups; the tule early spawning stocks with strong local hatchery influence mostly of mixed origin and Lewis River wild stock a native bright late spawning stock with little hatchery influence. Return migration through the lower Columbia extends from August through November. Spawning timing is generally October for early stock and November for late stock.





STOCK STATUS

Columbia fall chinook stocks contribute heavily to the coastal fisheries of Alaska, British Columbia, and Washington. Columbia fisheries supported by these stocks include the lower Columbia gill net fishery and the popular Buoy 10 sport fishery. Later, as the fish move into their rivers of origin, concentrated sport fisheries occur in most larger tributaries. Of the 14 lower Columbia stocks, 12 are considered healthy and Toutle stocks, both from the Toutle sub-basin, are depressed.

LOWER COLUMBIA -- GRAYS RIVER FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. The majority of Grays River fall chinook spawn in the area from Grays River Salmon Hatchery (West Fork) to the Covered Bridge on the mainstem, a distance of approximately 3.6 miles. There does not appear to be any unique temporal distribution (spawning from late September to mid-November) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The Grays River fall chinook natural spawners are a mixed stock of composite production. Fall chinook are historically native to the Grays River. Mixing of stocks very likely began to occur when hatchery supplementation was initiated in 1947. Straying lower river hatchery (primarily Grays River) coded-wire tagged fall chinook, have been recovered from the Grays River. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

Evidence suggests few natural fall chinook juveniles are produced. Few 1978 brood natural fall chinook juveniles were captured during seining in the Grays River during the spring 1979 (Bluestein, 1979).

STOCK STATUS

The Grays River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 745 with a low return of 147 in 1967 and a peak of 2,685 in 1978.

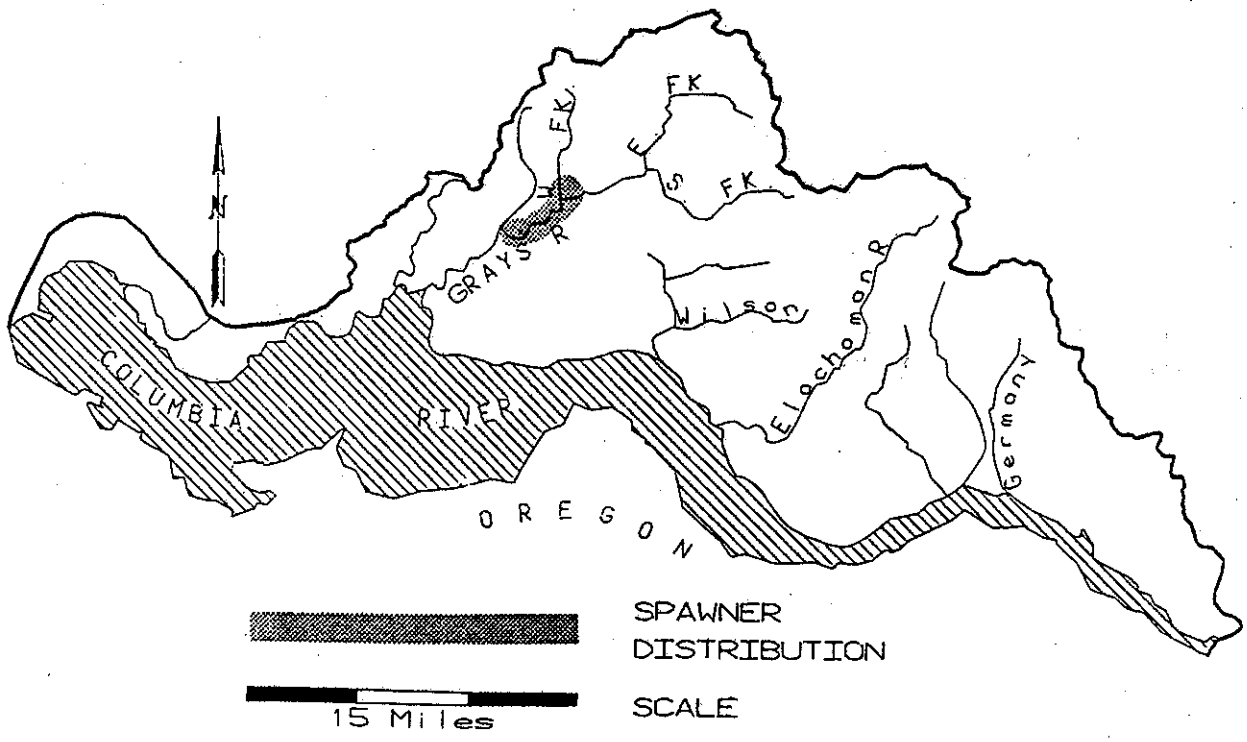
Fall chinook population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good.

The Grays River fall chinook natural spawn escapements of 278 and 200 fish in 1990 and 1991, respectively, are below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. The magnitude of straying lower river hatchery fall chinook may also create fluctuations in Grays River fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Grays River Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

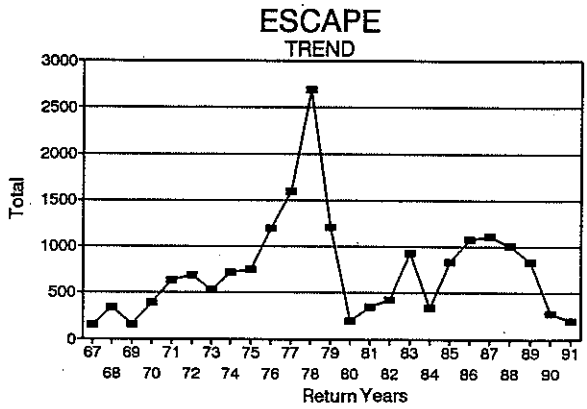
DISTINCT? - **NO**

STOCK STATUS PROFILE for Grays R Fall Chinook

STOCK ASSESSMENT

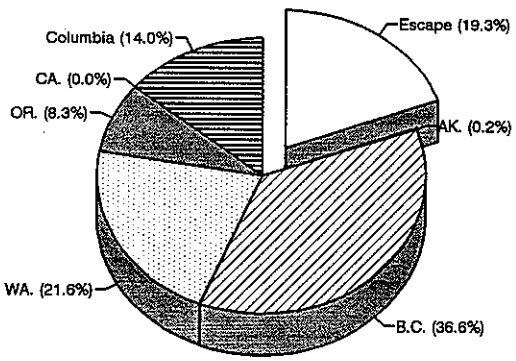
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67	147			
68	347			
69	156			
70	390			
71	635			
72	688			
73	530			
74	717			
75	751			
76	1192			
77	1590			
78	2685			
79	1206			
80	197			
81	351			
82	422			
83	927			
84	340			
85	838			
86	1074			
87	1113			
88	1010			
89	831			
90	278			
91	200			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1985 Brood)



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on Grays River Hatchery tag code 63-36-32 from the 1985 brood.

LOWER COLUMBIA -- SKAMOKAWA CREEK FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. Skamokawa Creek fall chinook spawn in the area from Standard and McDonald creeks to Wilson Creek, a distance of approximately 4.5 miles. There does not appear to be any unique temporal distribution (spawning from September to October) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The Skamokawa Creek fall chinook natural spawners are a mixed stock of composite production. Fall chinook may not have been originally found in Skamokawa Creek. Straying lower river hatchery coded-wire tagged fall chinook from a number of Oregon and Washington hatcheries have been recovered from Skamokawa Creek. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

Evidence suggests few natural fall chinook juveniles are produced. McIsaac (1976) estimated the number of natural juvenile fall chinook that migrated from Skamokawa Creek in 1976 was 6,109 fish from 5,446 natural spawners in 1975.

STOCK STATUS

The Skamokawa Creek fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 2,038 with a low return of 184 in 1980 and a peak of 5,596 in 1985.

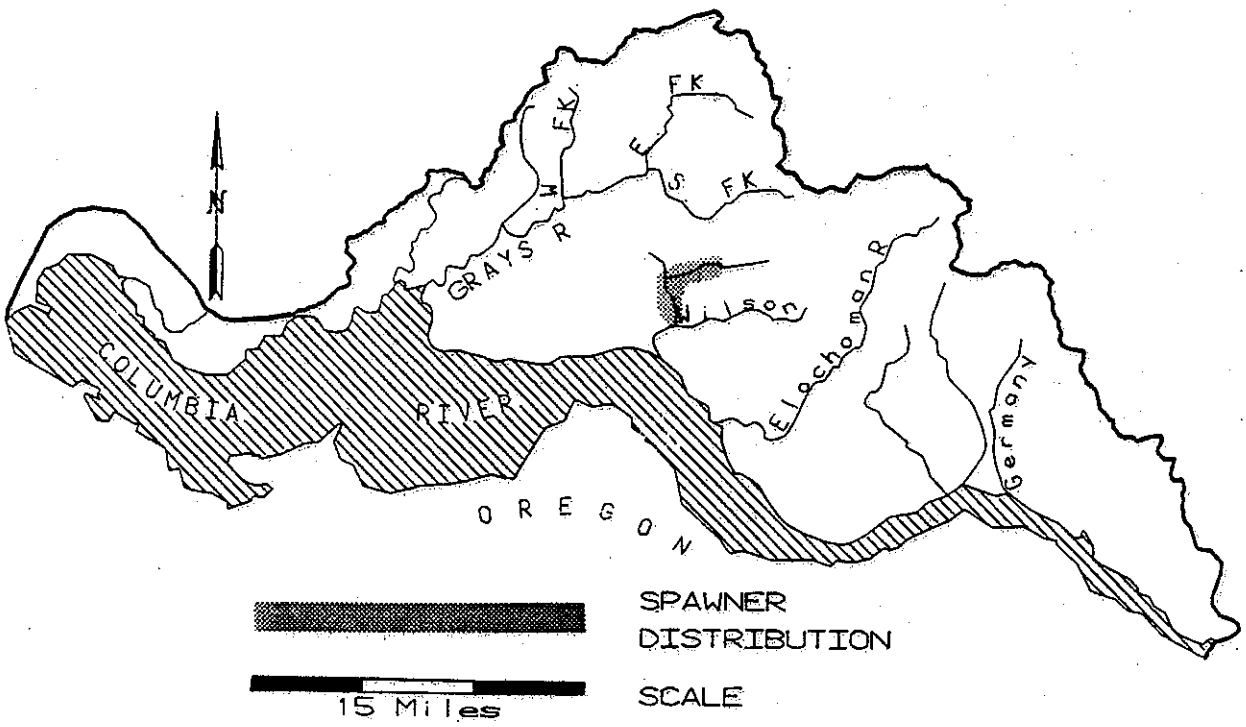
Fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good except before 1974. The Skamokawa Creek fall chinook natural spawn escapements from 1967-1973 are the same as for the estimated 1974 natural spawn escapement.

The Skamokawa Creek chinook natural spawn escapements since 1986 are below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. The magnitude of straying lower Columbia River hatchery fall chinook may also create fluctuations in Skamokawa Creek fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Skamokawa Creek Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

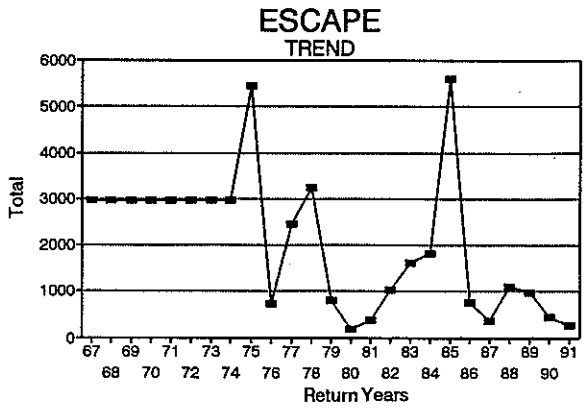
DISTINCT? - **NO**

STOCK STATUS PROFILE for Skamokawa Cr Fall Chinook

STOCK ASSESSMENT

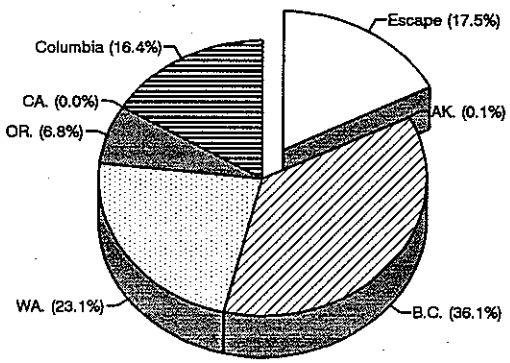
DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67	2969			
68	2969			
69	2969			
70	2969			
71	2969			
72	2969			
73	2969			
74	2969			
75	5446			
76	723			
77	2462			
78	3246			
79	796			
80	184			
81	386			
82	1035			
83	1611			
84	1813			
85	5596			
86	756			
87	356			
88	1090			
89	980			
90	451			
91	269			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1985-86 brood



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on average of Grays and Elokomin tag codes 63-36-32, 63-34-58 from the 1985-86 broods.

LOWER COLUMBIA -- ELOCHOMAN FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. Elochoman River fall chinook spawn in the area from the Elokomin Salmon Hatchery downstream to the Foster Risk Road Bridge, a distance of approximately 6.0 miles. A substantial number of fall chinook also spawn downstream from the weir near RM 4.0. There does not appear to be any unique temporal distribution (spawning from late September to mid-November) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks. However, the Elochoman River fall chinook natural escapement is usually comprised of a larger percentage of two-year-old and three-year-old fish than Elokomin Hatchery returns which may be attributable to trapping efficiency.

The Elochoman River fall chinook natural spawners are a mixed stock of composite production. Tule fall chinook are historically native to the Elochoman River. Brood stock for the Elokomin Hatchery are collected at a weir located near tidewater and the remaining fish escape or are released upstream to spawn naturally. Straying lower river hatchery coded-wire tagged fall chinook, including the recently introduced Rogue River Bright (RRB) stock from Big Creek Hatchery and South Fork Klaskanine Pond in Oregon, in addition to tule stock primarily from Grays River have been recovered from the Elochoman River. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

STOCK STATUS

The Elochoman River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 680 with a low return of 64 in 1980 and a peak of 2,458 in 1987.

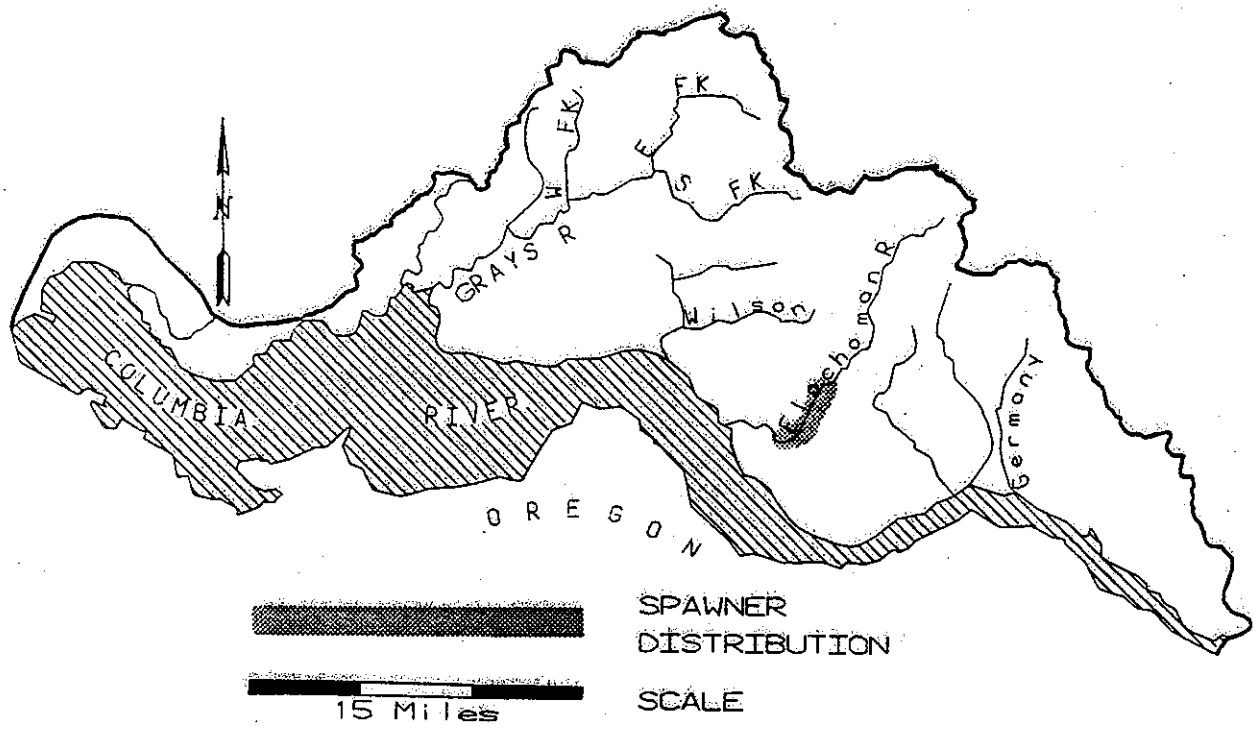
The fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good.

The Elochoman River fall chinook natural spawn escapements since 1989 are below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. Brood stock trapping efficiency may also create fluctuations in Elochoman River fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Elochoman Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

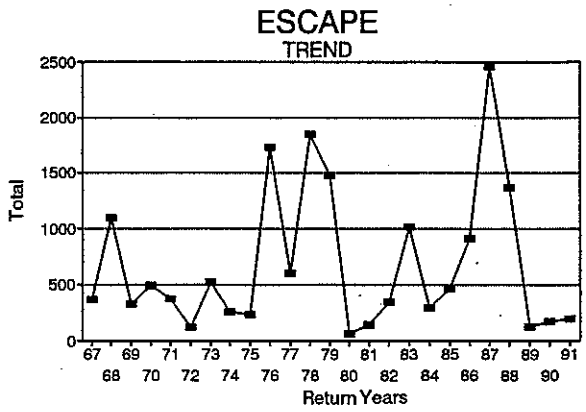
DISTINCT? - **NO**

STOCK STATUS PROFILE for Elochoman Fall Chinook

STOCK ASSESSMENT

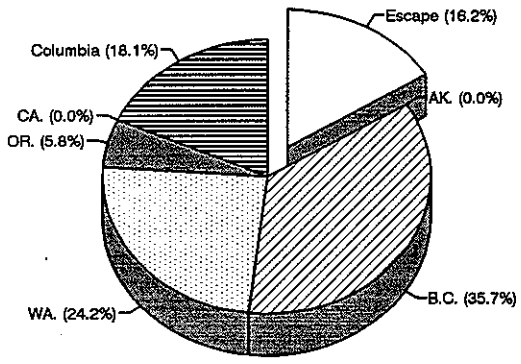
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67	363			
68	1096			
69	324			
70	495			
71	375			
72	116			
73	521			
74	253			
75	234			
76	1734			
77	604			
78	1846			
79	1478			
80	64			
81	138			
82	340			
83	1016			
84	294			
85	464			
86	918			
87	2458			
88	1370			
89	122			
90	174			
91	196			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1985 Brood)



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on Elochoman Hatchery tag code 63-34-58 from the 1985 brood.

LOWER COLUMBIA -- MILL CREEK FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. Mill Creek fall chinook spawn in the area from Mill Creek Bridge downstream to the mouth, a distance of approximately 2.0 miles. There does not appear to be any unique temporal distribution (spawning from September to October) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The Mill Creek fall chinook natural spawners are a mixed stock of composite production. Fall chinook may not have been originally found in Mill Creek. Straying lower river hatchery coded-wire tagged fall chinook from a number of Oregon and Washington hatcheries have been recovered from Mill Creek. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

STOCK STATUS

The Mill Creek fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1984-1991 averaged 566 with a low return of 2 in 1985 and a peak of 1,867 in 1987.

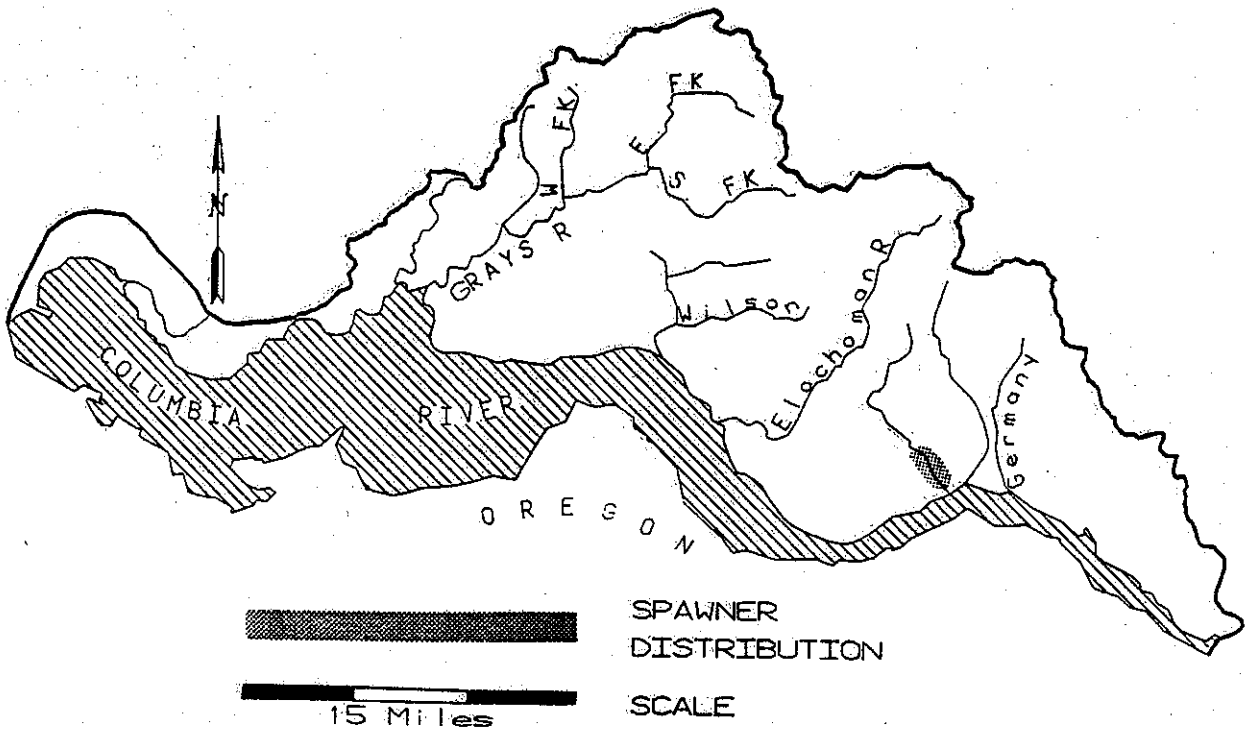
Fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally fair. However, natural spawn escapements estimates before 1984 are unavailable.

The Mill Creek fall chinook natural spawn escapements since 1990 are below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. The magnitude of straying lower Columbia River hatchery fall chinook may also create the severe fluctuations in Mill Creek fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Mill Creek Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

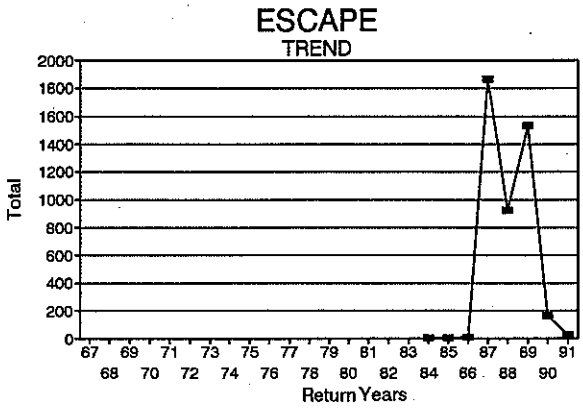
DISTINCT? - **NO**

STOCK STATUS PROFILE for Mill Cr Fall Chinook

STOCK ASSESSMENT

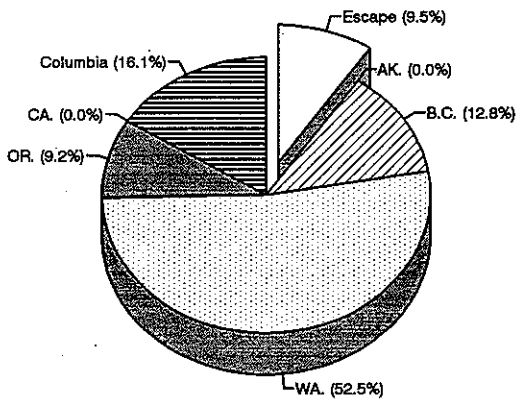
DATA QUALITY------> Fair

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	3			
85	2			
86	8			
87	1867			
88	927			
89	1534			
90	162			
91	23			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1976 Brood



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on Abernathy Hatchery tag codes 05-01-17/63, 05-02-16/63 from 1977 brood.

LOWER COLUMBIA -- ABERNATHY CREEK FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution as well as biological characteristics. Abernathy Creek fall chinook spawn in the area from the Abernathy Creek National Fish Hatchery downstream to the mouth, a distance of approximately 3.0 miles. The dominant age classes are three-year-olds and four-year-olds. Few five-year-olds are found from Abernathy Creek natural spawners. Mini-jacks, sexually mature one-year-old males, have been found in both Abernathy and Germany creeks. There does not appear to be any unique temporal distribution (spawning from late September to mid-November) to clearly separate them from other lower Columbia River fall chinook stocks.

The Abernathy Creek fall chinook natural spawners are a mixed stock of composite production. Fall chinook may not have been originally found in Abernathy Creek. Straying lower river hatchery coded-wire tagged fall chinook from a number of Oregon and Washington hatcheries, including the recently introduced Rogue River Bright (RRB) stock from Big Creek Hatchery and South Fork Klaskanine Pond in Oregon, in addition to tule stock from lower river hatcheries (primarily Abernathy, Grays River, and Elokomin) have been recovered from Abernathy Creek. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

STOCK STATUS

The Abernathy Creek fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1981-1991 averaged 1,616 with a low return of 316 in 1990 and a peak of 3,917 in 1987.

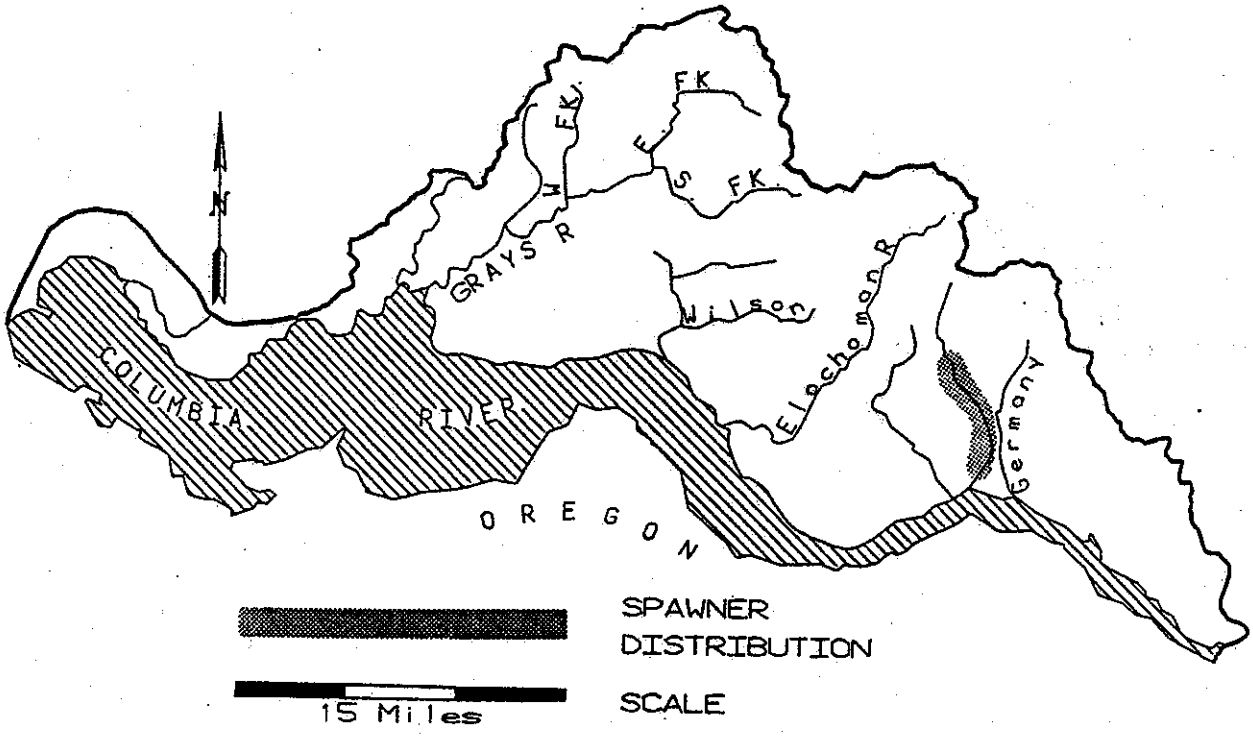
Fall chinook natural spawning population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good. However, natural spawn escapements estimates before 1981 are unavailable.

Abernathy Creek natural spawn escapements between 1988-1990 were below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. The magnitude of straying lower Columbia River hatchery fall chinook may also create fluctuations in Abernathy Creek fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Abernathy Creek Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

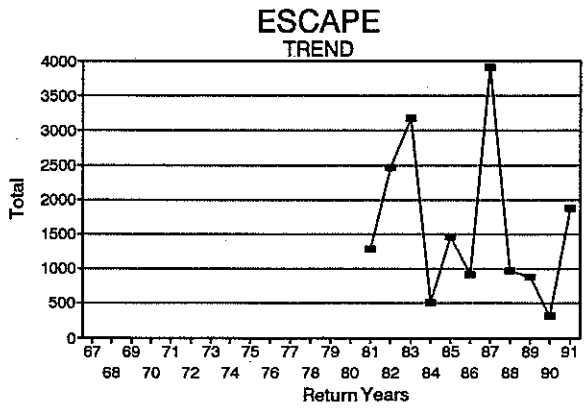
DISTINCT? - **YES**, based on age structure. One-year-old mini-jacks have been found in Abernathy Creek.

STOCK STATUS PROFILE for Abernathy Cr Fall Chinook

STOCK ASSESSMENT

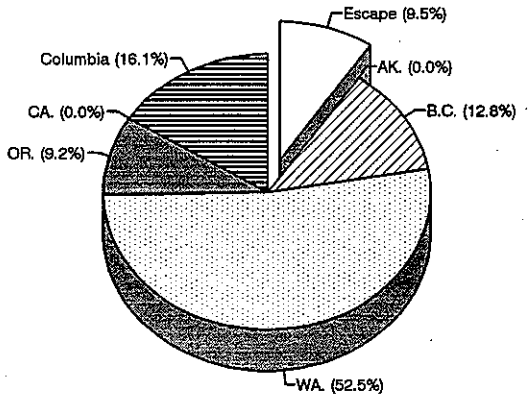
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81	1287			
82	2466			
83	3177			
84	509			
85	1464			
86	915			
87	3917			
88	972			
89	881			
90	316			
91	1877			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1977 Brood



Based on Abernathy Hatchery tag codes 05-01-17/63, 05-02-16/63 from the 1977 brood.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Spawning, Genetic

STOCK STATUS
Healthy

SCREENING CRITERIA

LOWER COLUMBIA -- GERMANY CREEK FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. Germany Creek fall chinook spawn in the area from the mouth to 3.5 miles upstream. There does not appear to be any unique temporal distribution (spawning from September to October) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks. Mini-jacks, sexually mature one-year-old males, have been found in both Germany and Abernathy creeks.

The Germany Creek fall chinook natural spawners are a mixed stock of composite production. Fall chinook may not have been originally found in Germany Creek. Straying lower river hatchery coded-wire tagged fall chinook from a number of Oregon and Washington hatcheries (including Abernathy National Fish Hatchery) have been recovered from Germany Creek. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

STOCK STATUS

The Germany Creek fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1982-1991 averaged 364 with a low return of 57 in 1986 and a peak of 1,234 in 1988.

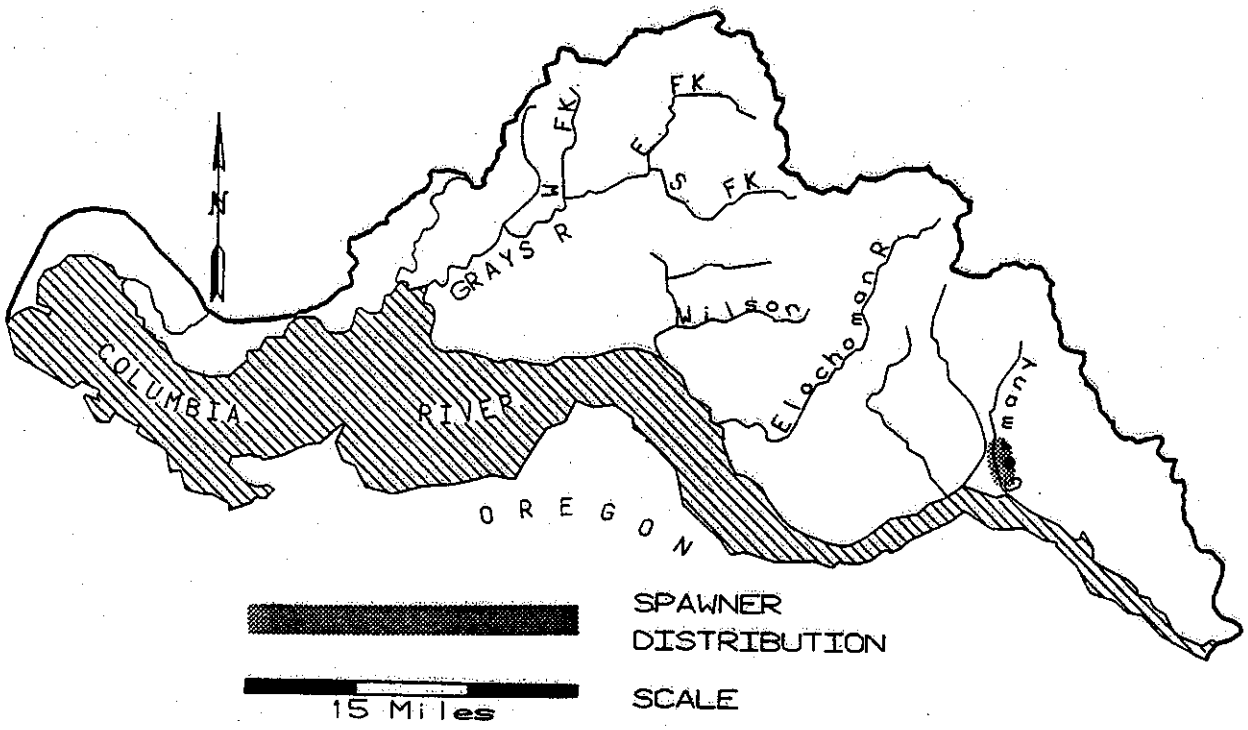
Fall chinook population estimates were obtained by expanding annual peak fish counts by respective expansion factors. The database quality is generally good. However, natural spawn escapements estimates before 1982 are unavailable.

The Germany Creek fall chinook natural spawn escapements since 1990 are below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. The magnitude of straying lower Columbia River hatchery fall chinook may also create fluctuations in Germany Creek fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Germany Creek Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

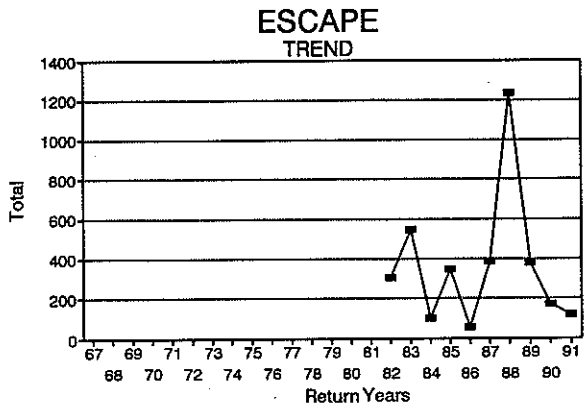
DISTINCT? - **NO**

STOCK STATUS PROFILE for Germany Cr Fall Chinook

STOCK ASSESSMENT

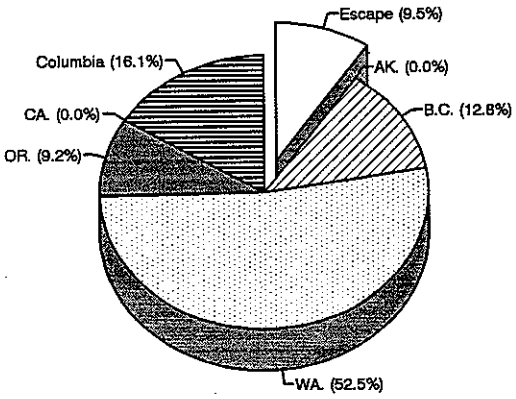
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82	304			
83	548			
84	102			
85	349			
86	57			
87	384			
88	1234			
89	377			
90	172			
91	117			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1977 Brood



Based on Abernathy Hatchery tag codes 05-01-17/63, 05-02-16/63 from the 1977 brood.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

LOWER COLUMBIA -- COWLITZ FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time and geographic distribution. Cowlitz River fall chinook spawn in the area from the Cowlitz River Salmon Hatchery to the Kelso Bridge, a distance of approximately 45.0 miles. Upper Cowlitz River major tributaries, such as the Ohanapecosh and Tilton rivers, were blocked to anadromous migration following the construction of Mayfield Dam in 1963. Natural spawning occurs in the Cowlitz River slightly later and over a broader time period (September to December) than other lower Columbia River fall chinook stocks. There does not appear to be any unique biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The Cowlitz River fall chinook natural spawners are a mixed stock of composite production. Fall chinook were reported to be historically native to the Cowlitz River sub-basin. The Cowlitz River Salmon Hatchery was completed in 1967 to mitigate for upstream habitat losses. Straying lower river hatchery and other natural/wild coded-wire tagged fall chinook have been recovered from the Cowlitz River. Devore (1987) estimated that the majority of the 1980 brood fall chinook that spawned naturally in the Cowlitz River were of Cowlitz River Salmon Hatchery origin. North Fork Lewis River wild fall chinook coded-wire tags have also been recovered during Cowlitz River spawning ground surveys. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

STOCK STATUS

The Cowlitz River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 6,778 with a low return of 2,450 in 1968 and a peak of 23,345 in 1971.

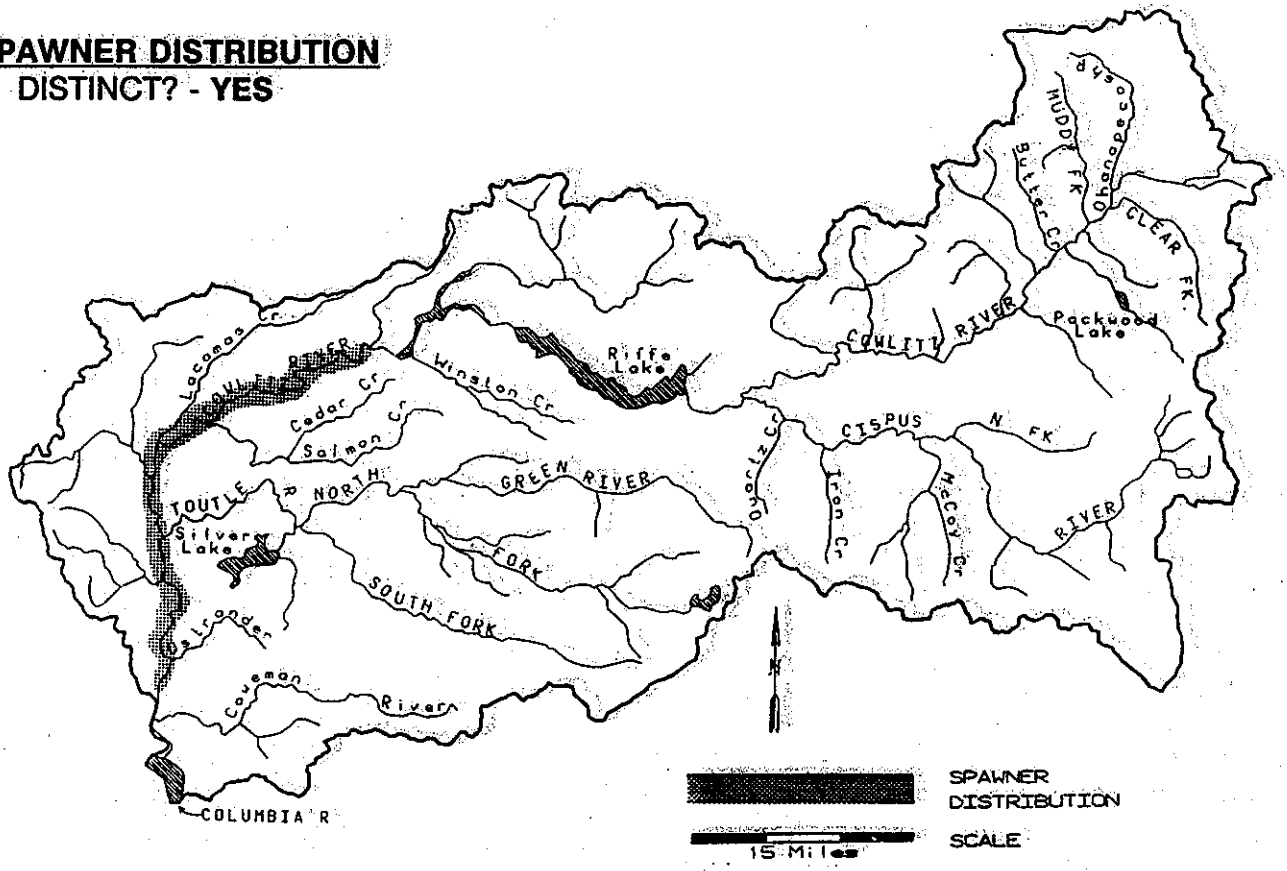
Fall chinook natural spawning population estimates are obtained by expanding annual peak index area redd counts by respective expansion factors. The database quality is generally good.

The Cowlitz River fall chinook natural spawn escapements since 1990 were below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. The magnitude of straying lower Columbia River hatchery fall chinook may also create fluctuations in the Cowlitz River fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Cowlitz Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



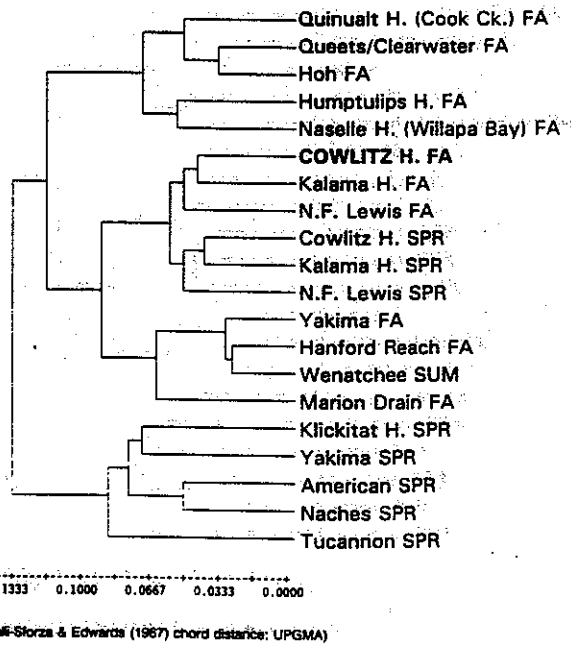
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - No genetic data exist for the natural spawner population in the Cowlitz River. However, Cowlitz Hatchery fall chinook sampled in 1981, 1982, and 1988 showed no differences between years in their genetic characteristics and were combined into one data set. This Cowlitz Hatchery fall stock was significantly different from all other chinook stocks examined ($p < .05$).

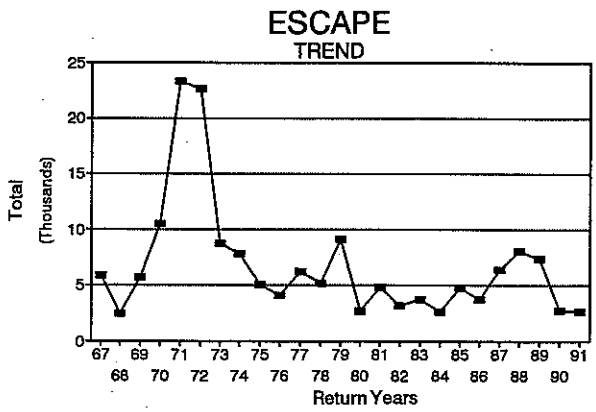


STOCK STATUS PROFILE for Cowlitz Fall Chinook

STOCK ASSESSMENT

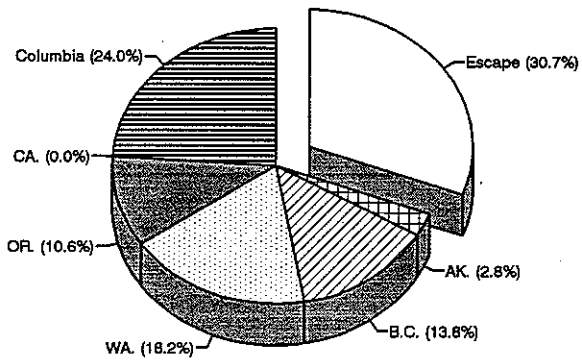
DATA QUALITY------> Very Good

Return Years	ESCAPE Total			
67	5900			
68	2450			
69	5680			
70	10550			
71	23345			
72	22610			
73	8740			
74	7800			
75	5070			
76	4050			
77	6210			
78	5190			
79	9190			
80	2690			
81	4820			
82	3150			
83	3695			
84	2606			
85	4800			
86	3711			
87	6390			
88	7990			
89	7375			
90	2750			
91	2680			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1985-86 Brood



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on Cowlitz Hatchery tag codes 63-41-08, 63-41-26 from 1985-86 broods.

LOWER COLUMBIA -- COWEEMAN FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. Coweeman River fall chinook spawn in the area from Mulholland Creek downstream to the Jeep Club Bridge, a distance of approximately 6.0 miles. There does not appear to be any unique temporal distribution (spawning from September to October) or biological characteristics to clearly separate this stock from other lower Columbia River fall chinook stocks.

The Coweeman River fall chinook natural spawners are a mixed stock of composite production. Fall chinook were reported native to the Coweeman River. The Washington Department of Fisheries (1951) estimated escapement of fall chinook in the Coweeman River at 5,000 fish. The Coweeman River received plants of fall chinook from at least 1951 to 1979. Since 1967, stocks included Spring Creek, Washougal, and Toutle. Few straying lower river hatchery coded-wire tagged fall chinook have been recovered from the Coweeman River. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

STOCK STATUS

The Coweeman River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 182 with a low return of 38 in 1981 and a peak of 1,108 in 1988.

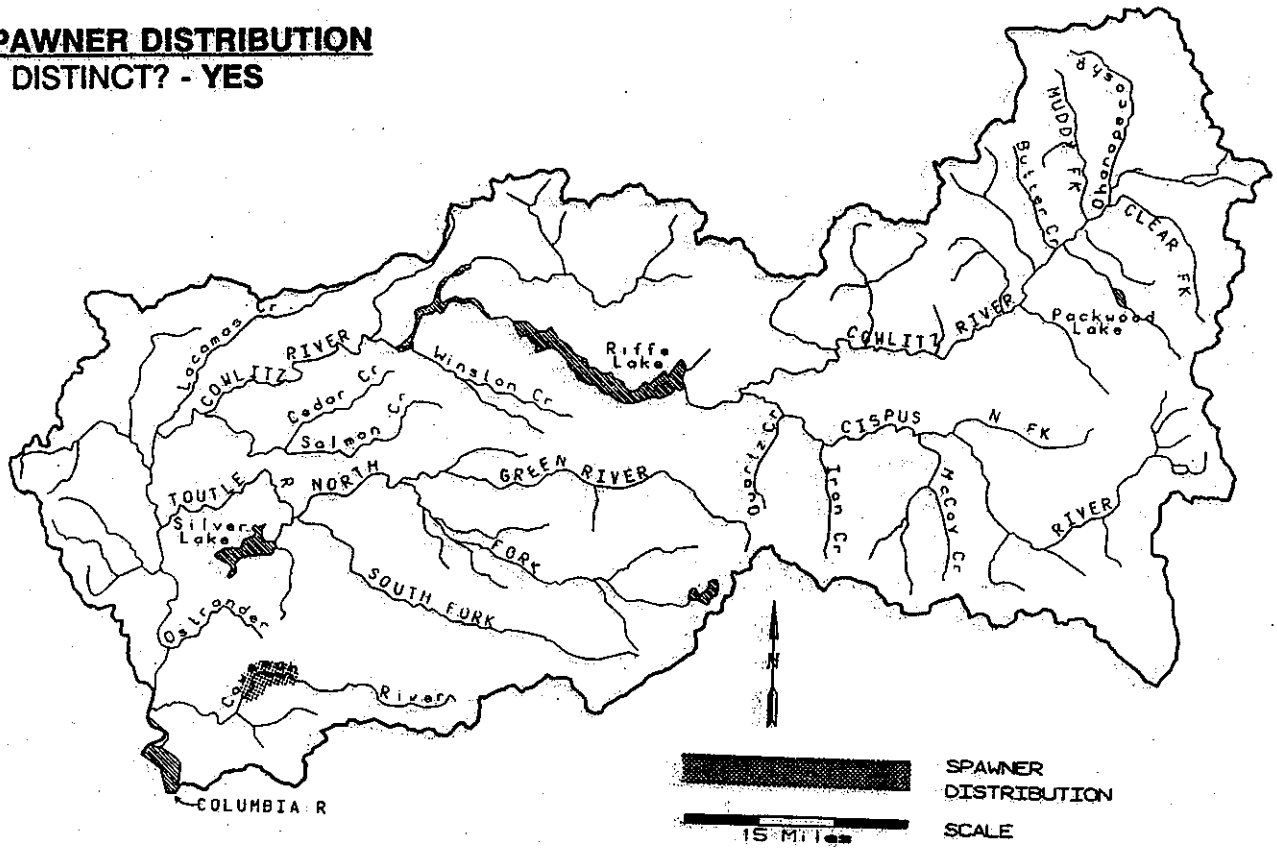
The fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good.

The Coweeman River fall chinook natural spawn escapements between 1973-1987 were all below average. However, fall chinook natural escapements since 1988 have averaged 586 fish annually.

STOCK DEFINITION PROFILE for Coweeman Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

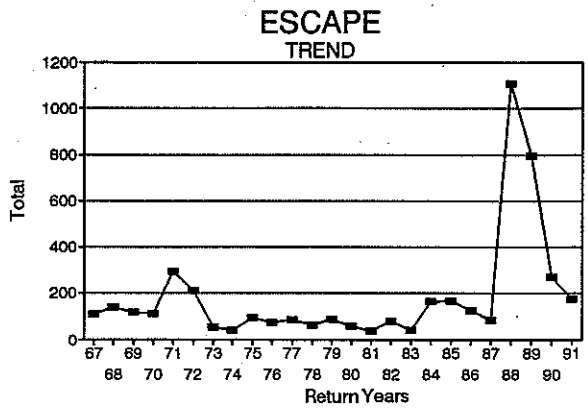
DISTINCT? - **NO**

STOCK STATUS PROFILE for Coweeman Fall Chinook

STOCK ASSESSMENT

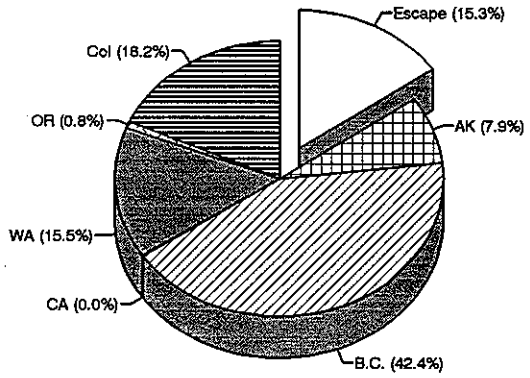
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67	108			
68	140			
69	118			
70	111			
71	296			
72	212			
73	54			
74	42			
75	94			
76	74			
77	86			
78	62			
79	88			
80	56			
81	38			
82	79			
83	40			
84	164			
85	168			
86	124			
87	86			
88	1108			
89	794			
90	268			
91	174			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1976-77 brood



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on Toutle Hatchery tag codes 63-16-40, 63-17-63 from the 1976-77 broods.

LOWER COLUMBIA -- SOUTH FORK TOUTLE FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. South Fork Toutle River fall chinook spawn in the area from the 4700 Bridge downstream to the confluence with the mainstem Toutle River, a distance of approximately 2.6 miles. From 1964 through 1979, fall chinook spawned in the mainstem, South Fork, and North Fork Toutle, plus the lower Green River downstream from the hatchery. Spawning areas in the mainstem and North Fork Toutle and Green rivers were destroyed by the eruption of Mount St. Helens in 1980. The South Fork Toutle River was less affected. There does not appear to be any unique temporal distribution (spawning from September to October) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The South Fork Toutle River fall chinook stock are from an unknown origin and composite production. Fall chinook were reported historically native to the Toutle River. The Toutle River has been stocked since at least 1951 (WDW, 1990). The Toutle River fall chinook have been managed as a hatchery stock since the eruption.

STOCK STATUS

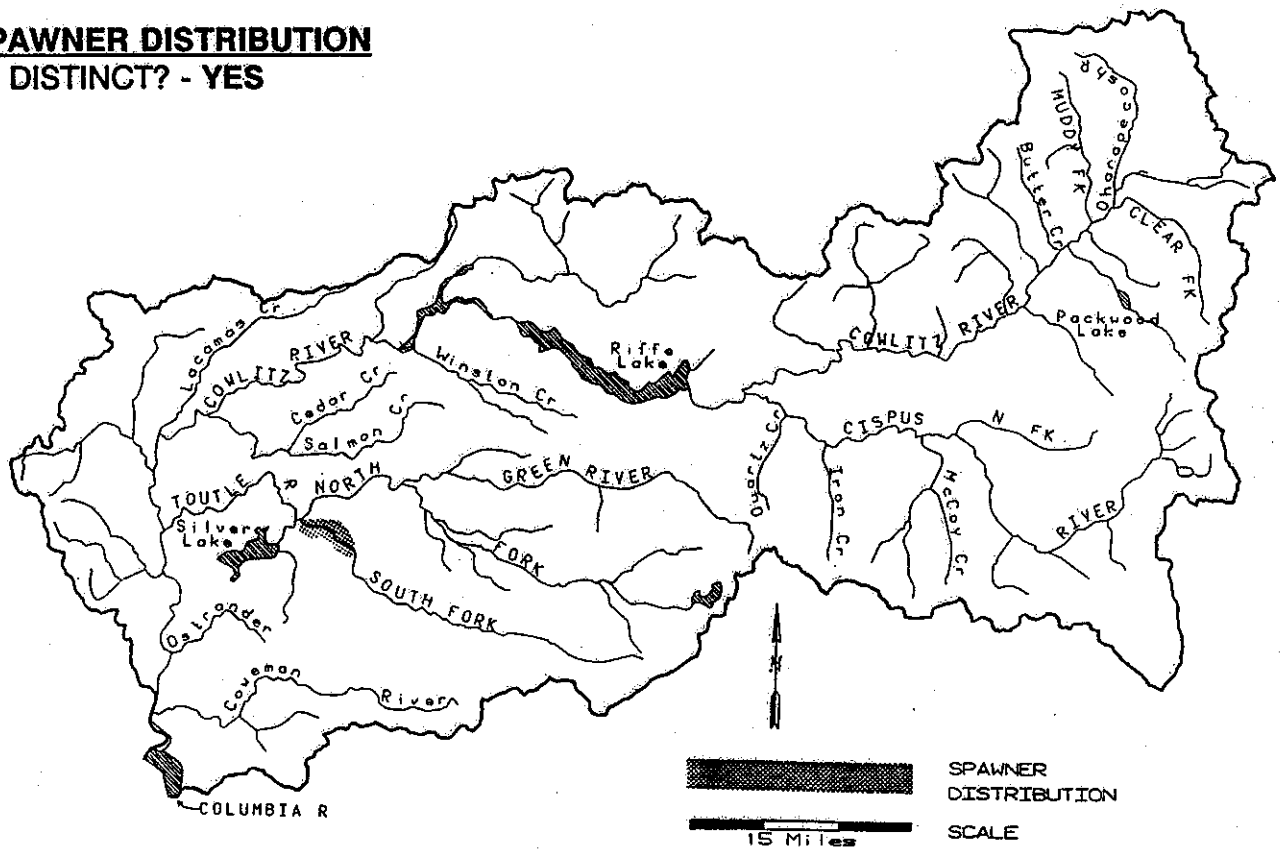
The South Fork Toutle River fall chinook natural spawn stock status is currently depressed and shows signs of a long-term negative trend in escapement, though recent data is very sparse. Pre-eruption natural spawn escapements from 1967-1979 averaged 257 fish. In 1971 escapement return was at a peak of 578 fish. Post-eruption natural escapements in 1980 and 1981 were zero and 81 fish, respectively. Spawning ground counts resumed again in 1991. The fall chinook natural spawn escapement in 1991 was 33 fish.

The fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally fair. Regular spawning ground index counts were discontinued for the Toutle River following the eruption, except for limited observations in the South Fork and the Toutle River Hatchery area of the Green River.

STOCK DEFINITION PROFILE for South Fork Toutle Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

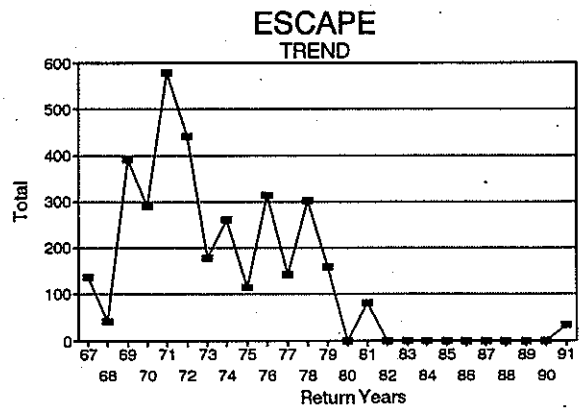
STOCK STATUS PROFILE for SF Toutle Fall Chinook

STOCK ASSESSMENT

DATA QUALITY------> Fair

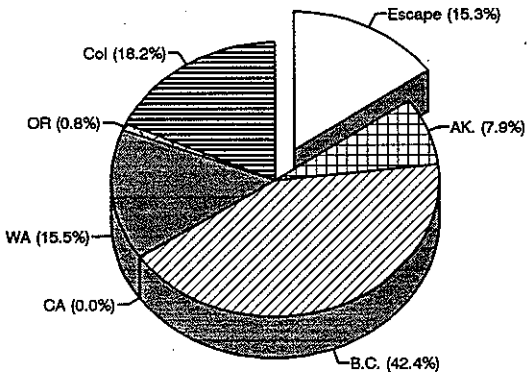
Return Years	ESCAPE Total
67	136
68	42
69	390
70	289
71	578
72	440
73	178
74	261
75	114
76	313
77	143
78	302
79	158
80	0
81	81
82	0
83	0
84	0
85	0
86	0
87	0
88	0
89	0
90	0
91	33

not surveyed – Mt. St. Helens – May 18, 1980
WRD (Wolf)
No Data



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1976-77 Brood



Based on Toutle Hatchery tag codes 63-16-40, 63-17-63 from 1976-77 brood.

STOCK SUMMARY

STOCK ORIGIN
Unknown

PRODUCTION TYPE

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Long Term Negative Trend

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat limiters include peak winter flows, spawning gravel quality and stability and stream temperatures during upstream migration and spawning. All are affected by extensive logging in this watershed. Riparian zone structure and function have also been simplified. This river suffered substantial damage as a result of the eruption of Mount St. Helens in 1980. Sedimentation from mudflows has largely flushed out of the watershed. However, because of the eruption and near complete denudation of the watershed due to the eruption and pre and post eruption logging, the basin is in a hydrologically immature state and as such is subject to higher than natural peak winter flows which can cause bed and bank scour and channel shifting to the detriment of egg and fry survival. Upstream adult and outmigrant juvenile survival is affected by high stream temperatures, high post eruption turbidity and channel shifting in the mainstem Toutle River and in the Cowlitz River by high post eruption turbidity coupled with loss of nearshore shallow water habitat and riparian vegetation due to post-eruption dredging, diking and bank protection works.

Harvest Management -- Specific South Fork Toutle River origin fall chinook harvest in mixed stock fisheries cannot be accurately measured because supplementation releases have been generally untagged and no attempts have been made to coded-wire tag the natural production.

South Fork Toutle River origin fall chinook are considered part of the Columbia River Lower River Hatchery (LRH) stock for harvest management purposes. In addition to the South Fork Toutle River, some natural LRH production exists in several Washington and Oregon Columbia River tributaries. Overall, hatchery production is the dominant LRH stock component. Since the Mount St. Helens eruption, South Fork Toutle River fall chinook natural spawn escapement comprises only a small fraction of the total LRH returns; therefore there may be little harvest of south Fork Toutle River origin fish.

The escapement goal of LRH stock fall chinook is stated in the Columbia River Fish Management Plan (CRFMP) as brood stock necessary to meet hatchery program production requirements. This requirement has been defined as 34,530 adult fall chinook returning to Washington and Oregon Columbia River hatcheries. No escapement goals have been established for South Fork Toutle River fall chinook natural escapement.

The Columbia River Fish Management Plan (CRFMP) restores runs and allocates harvest of fish in the Columbia River and was agreed to by the Parties; United States, Oregon, Washington and four treaty tribes (Yakima, Warm Springs, Umatilla, and Nez Perce). Since 1988, management of the Columbia River fish runs and fisheries has been principally based on the CRFMP.

During 1985-1990, annual fishing regimes for fall chinook were negotiated and agreed to by the parties to the CRFMP and described within the "Ocean/In-river Management Agreement" each year.

Ocean Harvest -- LRH stock fall chinook are one of the major contributors to chinook fisheries on the British Columbia and Washington coasts. According to 1976 brood coded-wire tagged lower river hatchery releases (including Toutle Hatchery), approximately 54% and 21% of the overall LRH stock harvest occurs from the British Columbia and Washington commercial and recreational fisheries, respectively.

Columbia River Harvest -- Between 1980-1991, LRH adult fall chinook average return to the Columbia river was 142,000 fish. During the same period, an average of nearly 56,000 LRH adult fall chinook were harvested in the Columbia River commercial fisheries. Approximately 39% of the total LRH stock adult returns to the Columbia River were harvested in the commercial fisheries. Overall, LRH stock fall chinook are one of the most significant contributors to the lower Columbia River gill net fishery.

Between 1980-1991, LRH stock adult fall chinook Columbia River mainstem and tributary sport harvest averaged 10,100 fish. Beginning in 1982, the mainstem sport catches include the estuary recreational (Buoy 10) fishery. The South Fork Toutle River has been closed to chinook sport angling since the Mount St. Helens eruption.

Hatchery -- The Toutle Hatchery site is located along the Green River about 23.0 miles east of Castle Rock, Washington. It is situated in a hilly location approximately 2,150 feet above sea level. The hatchery began operating in 1956 but was destroyed in the 1980 eruption of Mount St. Helens.

Two large rearing ponds (Beaver Slough Rearing Ponds) near the hatchery site were only slightly damaged. These ponds were cleaned and have been operating since 1985. Six raceways (80' X 20') have been dredged out and placed into temporary operation to evaluate water quality for summer rearing. The facility is currently staffed with 2.5 FTEs. Water rights for the Toutle Hatchery total 58 cfs from the Green River.

Current production: 2,500,000 fall chinook and 1,100,000 Type S coho.

Hatchery operational impacts negligible. No hatchery releases of fall chinook into this system.

LAST TEN YEARS SALMON RELEASES INTO THE COWLITZ BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3109493	8123720	0	204000	6613123
1983	3389000	5902800	0	0	9162399
1984	5755300	7494200	320	0	9872200
1985	3611900	5878723	5798500	1546000	3536600
1986	2974200	9122000	21400	1162250	11102400
1987	3648100	13891400	800	333350	10178100
1988	4714500	14557300	0	686200	7987600
1989	5785000	13217700	50000	214300	6932582
1990	2609892	12693800	52980	805600	9020800
1991	2772345	13808900	16856	740300	5190045
MEAN	3836973	10469054	848694	711500	7959585

LOWER COLUMBIA -- GREEN (TOUTLE) FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of geographic distribution. Green River fall chinook spawn in the area from the Toutle River Hatchery downstream to the mouth, a distance of approximately 0.6 miles. Spawning areas in the Green River were destroyed by the eruption of Mount St. Helens in 1980. There does not appear to be any unique temporal distribution (spawning from September to October) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The Green River fall chinook natural stock are from unknown origin and composite production. Fall chinook are historically native to the Toutle River. The Toutle River Hatchery on the Green River began collecting brood stock again in 1990. Surplus fish were released upstream from the hatchery to spawn naturally. Hatchery brood stock sources used since the eruption of Mount St. Helens has been from a mixture of lower Columbia River hatchery sources including Grays River, Big Creek, Kalama, and Washougal.

STOCK STATUS

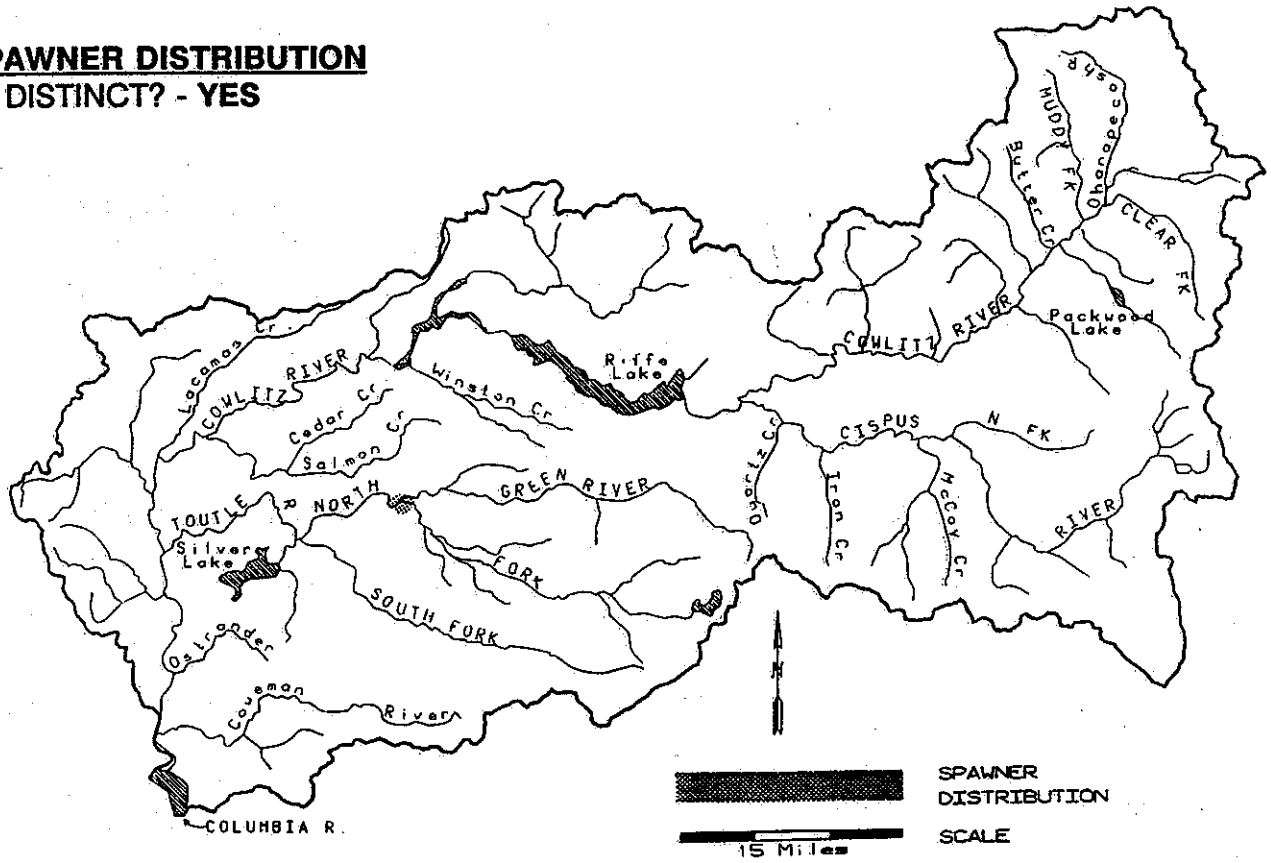
The Green River fall chinook natural stock status is currently depressed and shows signs of a long-term negative escapement trend though recent data is very sparse. Pre-eruption natural spawn escapements from 1967-1979 averaged 3,025 fish. Post-eruption natural spawn escapements in 1980 and 1981 were zero and 10 fish, respectively. Peak escapement counts were reported in 1972 at 6,654 fish. Spawning ground counts resumed again in 1990. The natural spawn escapement was estimated to be 123 and 126 fish in 1990 and 1991, respectively.

The fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database is generally fair. Regular spawning ground index counts were discontinued for the Toutle River following the eruption except for limited observations in the Toutle River Hatchery area of the Green River and in the South Fork.

STOCK DEFINITION PROFILE for Green River (Toutle) Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

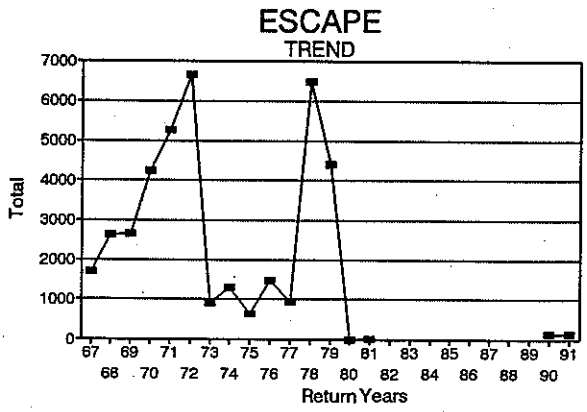
STOCK STATUS PROFILE for Green (Toutle) Fall Chinook

STOCK ASSESSMENT

DATA QUALITY------> Fair

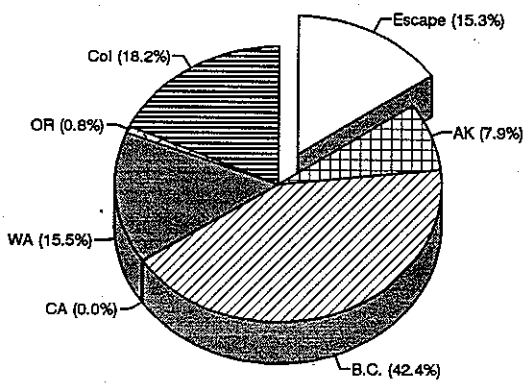
Return Years	ESCAPE Total
67	1701
68	2640
69	2650
70	4244
71	5268
72	6654
73	908
74	1292
75	634
76	1480
77	948
78	6488
79	4418
80	0
81	10
82	
83	
84	
85	
86	
87	
88	
89	
90	123
91	126

mt St. Helens



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1976-77 Brood



Based on Toutle Hatchery tag codes 63-16-40, 63-17-63 from 1976-77 brood.

STOCK SUMMARY

STOCK ORIGIN
Unknown

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Long Term Negative Trend

FACTORS AFFECTING PRODUCTION

Habitat -- See South Fork Toutle - Fall Chinook. The Green River experienced backwater mud flow impacts in the reach utilized by this stock as the North Fork Toutle Mount St Helens eruption mudflow passed the mouth of the Green. Volcanic ash deposited in the Green River watershed has, for the most part, flushed or stabilized. This reach is slowly recovering from eruption impacts, however it is still unstable since the majority of the watershed is hydrologically immature and prone to unnaturally high winter peak flows.

Harvest Management -- Specific Green River origin fall chinook harvest in mixed stock fisheries cannot be accurately measured because supplementation releases have been generally untagged and no attempts have been made to coded-wire tag the natural production.

Green River origin fall chinook are considered part of the Columbia River Lower river Hatchery (LRH) stock for harvest management purposes. In addition to the Green River, some natural LRH production exists in several Washington and Oregon Columbia River tributaries. Overall, hatchery production is the dominant LRH stock component. Since the Mount St. Helens eruption, Green River fall chinook natural spawn escapement comprises only a small fraction of the total LRH returns; therefore there may be little harvest of Green River origin fish.

The escapement goal of LRH stock fall chinook is stated in the Columbia River Fish Management Plan (CRFMP) as brood stock necessary to meet hatchery program production requirements. This requirement has been defined as 34,530 adult fall chinook returning to Washington and Oregon Columbia River hatcheries. No escapement goals have been established for Green River fall chinook natural escapement.

The Columbia River Fish Management Plan (CRFMP) restores runs and allocates harvest of fish in the Columbia River and was agreed to by the Parties; United States, Oregon, Washington, and four treaty tribes (Yakima, Warm Springs, Umatilla, and Nez Perce). Since 1988, management of the Columbia River fish runs and fisheries has been principally based on the CRFMP.

During 1985-1991, annual fishing regimes for fall chinook were negotiated and agreed to by the parties to the CRFMP and described within the "Ocean/In-river Management Agreement" each year.

Ocean Harvest -- LRH stock fall chinook are one of the major contributors to chinook fisheries on the British Columbia and Washington coasts. According to 1976 brood coded-wire tagged lower river hatchery releases (including Toutle Hatchery), approximately 54% and 21% of the overall LRH stock harvest occurs from the British Columbia and Washington commercial and recreational fisheries, respectively.

Columbia River Harvest -- Between 1980-1991, LRH adult fall chinook average return to the Columbia River was 142,000 fish. During the same period, an average of nearly 56,000 LRH adult fall chinook were harvested in the Columbia River commercial fisheries. Approximately 39% of the total LRH stock adult returns to the Columbia River were harvested in the commercial fisheries. Overall, LRH stock fall chinook are one of the most significant contributors to the lower Columbia River gill net fishery.

Between 1980-1992, LRH stock adult fall chinook Columbia River mainstem and tributary sport harvest averaged 10,100 fish. Beginning in 1982, the mainstem sport catches include the estuary recreational (Buoy 10) fishery. The Green River has been closed to chinook sport angling since the Mount St. Helens eruption.

Hatchery -- The Toutle Hatchery site is located along the Green River about 23.0 miles east of Castle Rock, Washington. It is situated in a hilly location approximately 2,150 feet above sea level. The hatchery began operating in 1956 but was destroyed in the 1980 eruption of Mount St. Helens.

Two large rearing ponds (Beaver Slough Rearing Ponds) near the hatchery site were only slightly damaged. These ponds were cleaned and have been operating since 1985. Six raceways (80' X 20') have been dredged out and placed into temporary operation to evaluate water quality for summer rearing. The facility is currently staffed with 2.5 FTEs. Water rights for the Toutle Hatchery total 58 cfs from the Green River.

Current production: 2,500,000 fall chinook and 1,100,000 Type S coho.

Hatchery operational impacts not determined. Weir at hatchery site blocks upstream passage of returning hatchery releases.

LAST TEN YEARS SALMON RELEASES INTO THE COWLITZ BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3109493	8123720	0	204000	6613123
1983	3389000	5902800	0	0	9162399
1984	5755300	7494200	320	0	9872200
1985	3611900	5878723	5798500	1546000	3536600
1986	2974200	9122000	21400	1162250	11102400
1987	3648100	13891400	800	333350	10178100
1988	4714500	14557300	0	686200	7987600
1989	5785000	13217700	50000	214300	6932582
1990	2609892	12693800	52980	805600	9020800
1991	2772345	13808900	16856	740300	5190045
MEAN	3836973	10469054	848694	711500	7959585

LOWER COLUMBIA -- KALAMA FALL CHINOOK

STOCK DEFINITION AND STATUS

This stock was designated on the basis of geographic distribution. Kalama River fall chinook spawn in the area from Italian Creek downstream to the I-5 Bridge, a distance of approximately 8.7 miles. Fall chinook upstream migration is terminated at Kalama Falls Hatchery unless surplus fish are released upstream from the hatchery. There does not appear to be any unique temporal distribution (spawning from late September to November) or biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The Kalama River fall chinook spawners are a mixed stock of composite production. Historically, fall chinook in the Kalama River sub-basin were present. Fall chinook have been planted into the Kalama River sub-basin since 1895 when the Lower Kalama Hatchery was completed. Currently, brood stock for the Kalama hatcheries is collected at a temporary rack installed upstream from tidewater near the Modrow Bridge at RM 3 and the remaining fish escape or are released upstream to spawn naturally. Improvements to the rack greatly increased brood stock trapping efficiency for the 1990 return year (Hymer, 1991). Straying lower river and other natural/wild coded-wire tagged fall chinook have been recovered from the Kalama River. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

Pettit (1990) estimated the number of natural juvenile fall chinook that migrated from the Kalama River in 1989 was between 522,312 and 964,439 fish from 24,549 natural spawners in 1988.

STOCK STATUS

The Kalama River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 6,448 with a low return of 1,259 in 1985 and a peak of 24,549 in 1988.

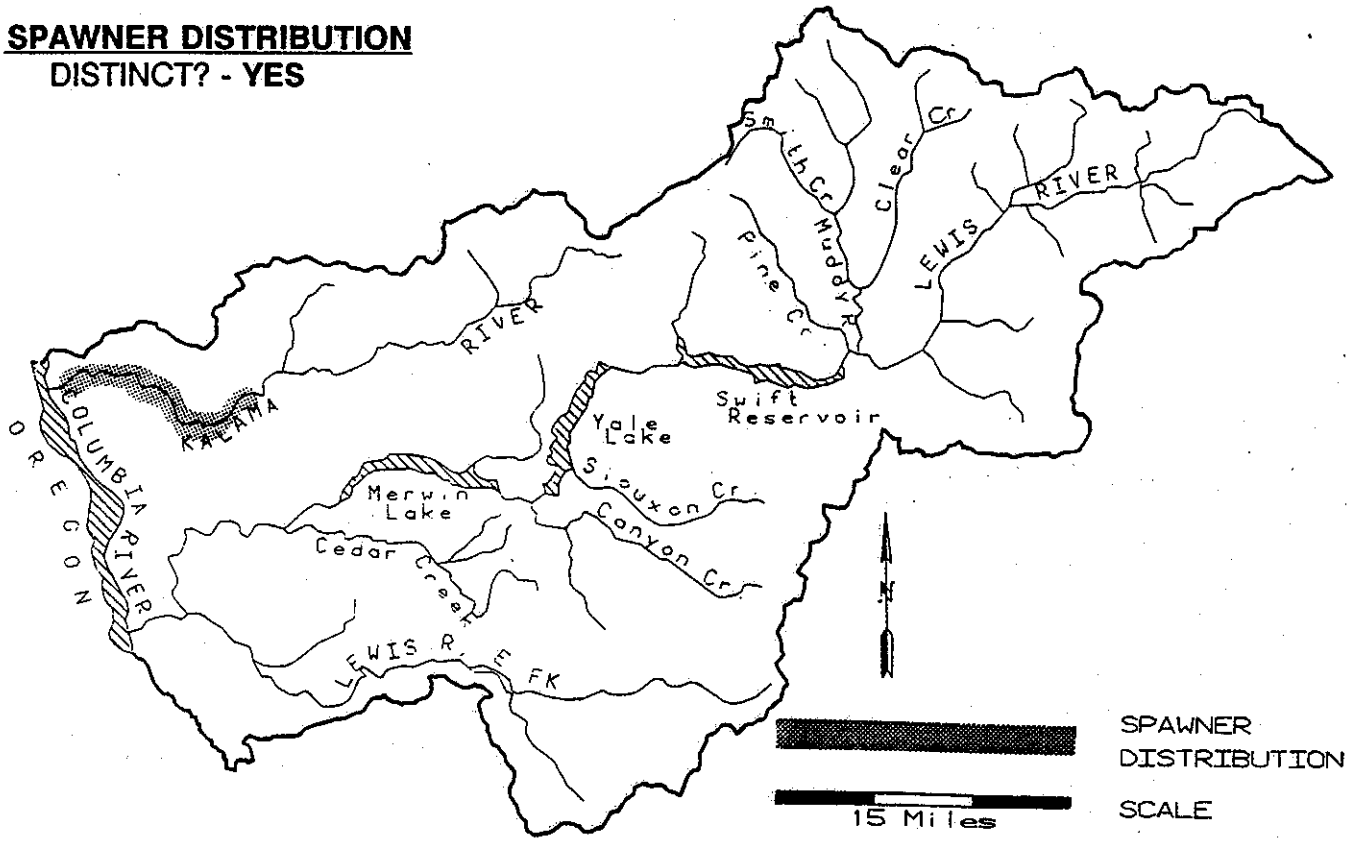
The fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good.

The Kalama River fall chinook natural spawn escapements since 1989 are below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for other lower Columbia River stocks. Brood stock trapping efficiency may also create fluctuations in Kalama River fall chinook natural spawn escapements.

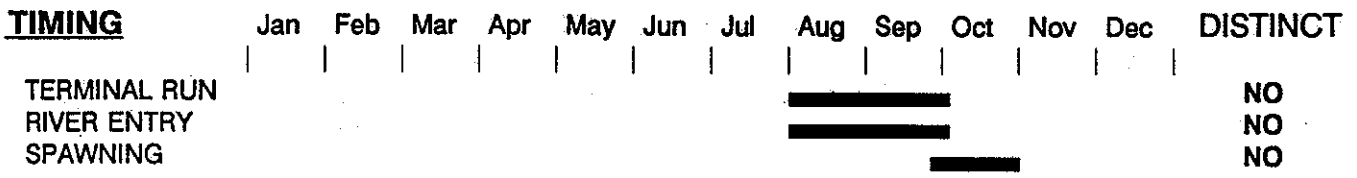
STOCK DEFINITION PROFILE for Kalama Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



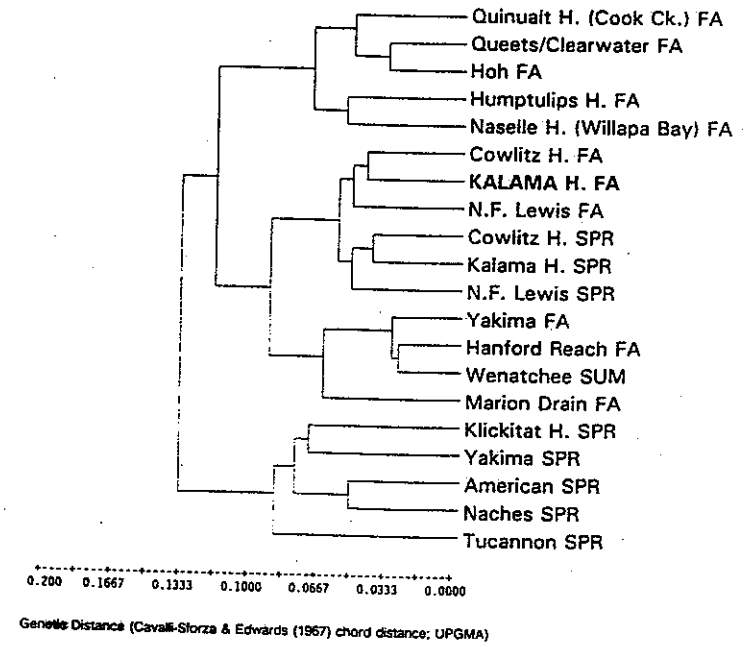
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - No genetic data exist for the natural spawner population in the Kalama River. However, Kalama Hatchery fall chinook sampled in 1982, 1988 and 1989 showed no differences between years in their genetic characteristics and were combined into one data set. This Kalama Hatchery fall stock was significantly different from all other chinook stocks examined ($p < .05$).

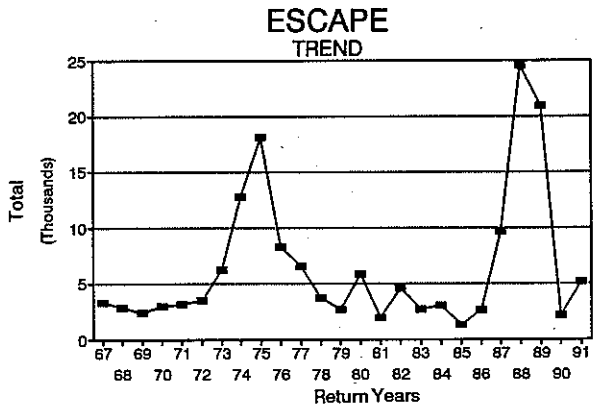


STOCK STATUS PROFILE for Kalama Fall Chinook

STOCK ASSESSMENT

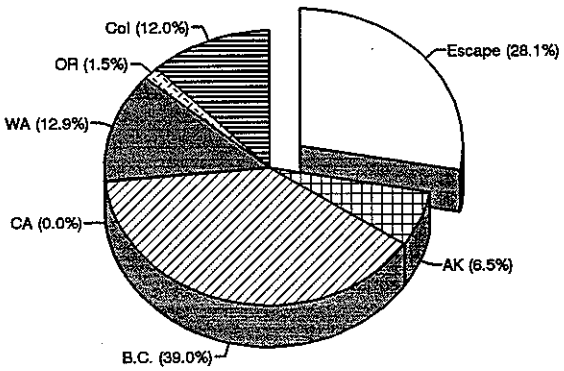
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67	3308			
68	2893			
69	2381			
70	2976			
71	3165			
72	3465			
73	6262			
74	12834			
75	18123			
76	8352			
77	6549			
78	3711			
79	2731			
80	5850			
81	1917			
82	4595			
83	2722			
84	3043			
85	1259			
86	2601			
87	9651			
88	24549			
89	20945			
90	2157			
91	5152			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1976-77



Based on Kalama Falls Hatchery tag codes 63-16-39, 63-17-46/47 from 1976-77 brood.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

LOWER COLUMBIA -- LEWIS FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time and geographic distribution as well as difference in biological characteristics. Lewis River fall chinook spawn in the area from Merwin Dam downstream to the Lewis River Salmon Hatchery, a distance of approximately 4.0 miles. Natural spawning occurs in the Lewis River from October to January. However, live adult fall chinook and redds were found in the ocean fisheries, Lewis River fall chinook have a more northerly distribution than other lower columbia fall chinook.

text missing

The Lewis River fall chinook natural spawners are a native stock of wild production. A native population of fall chinook was in existence on the Lewis River prior to the construction of the Lewis River Hatchery in 1930. The stock of fall chinook in the Lewis River system has maintained a significant population with negligible hatchery influences, unlike any other lower Columbia River stock (McIsaac, 1979). No fall chinook have been planted in the Lewis River since 1985. However, straying lower river hatchery coded-wire tagged fall chinook have been recovered from the Lewis River.

The WDF conducted a study to determine the affects of various spring flows on the rearing juvenile fall chinook production in the Lewis River downstream of Merwin Dam. In a subsequent 1991 report to the Federal Energy Regulatory Commission. The WDF estimated that the number of natural juvenile fall chinook that migrated from the Lewis River from 1977-1979 and 1982-1987 was range from a low of 1,540,000 in 1986 to a peak of 4,650,000 in 1983.

Other than Hanford Reach, the Lewis River is the only other Columbia River area where wild juvenile fall chinook are currently captured, coded-wire tagged, and released.

STOCK STATUS

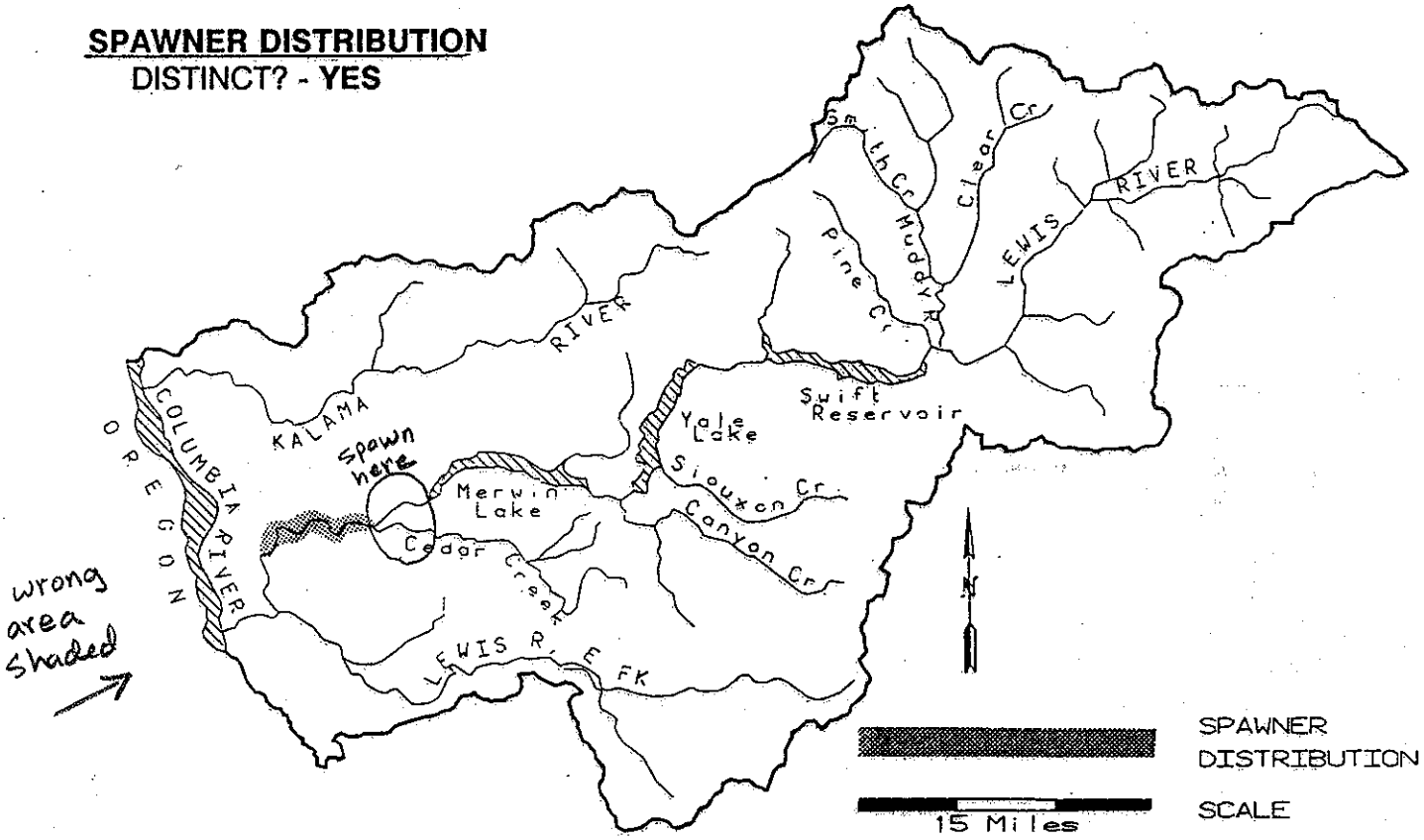
The Lewis River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 12,976 with a low return of 4,199 in 1976 and a peak of 22,977 in 1989.

Fall chinook natural spawning population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally very good.

STOCK DEFINITION PROFILE for Lewis Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



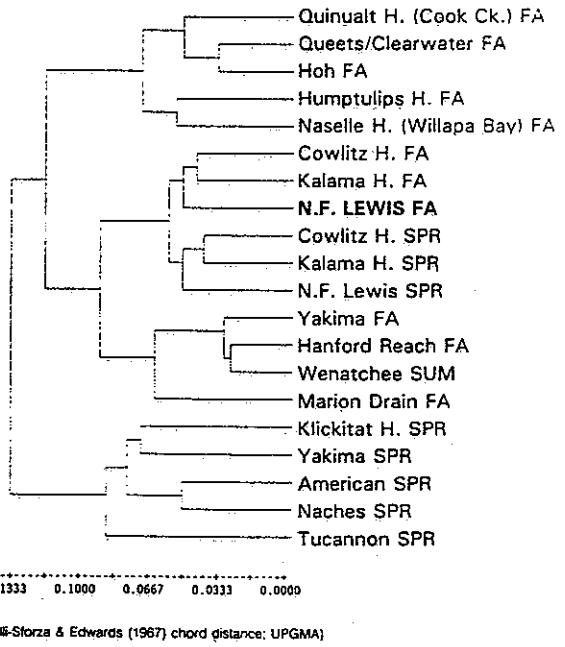
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - The genetic characteristics of NF Lewis fall chinook sampled in 1990 were significantly different from those of all other chinook stocks examined, including other lower Columbia fall-run stocks ($p < .05$).

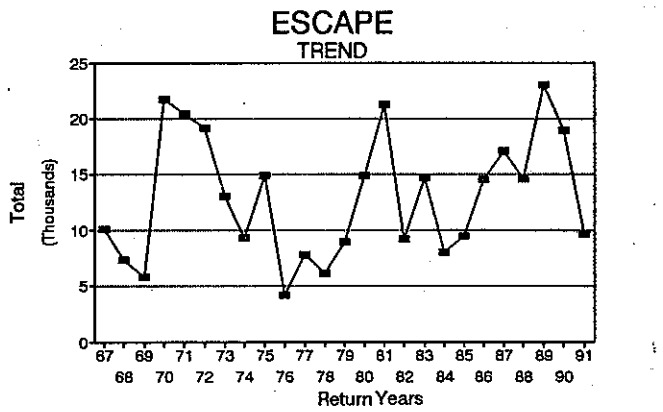


STOCK STATUS PROFILE for Lewis Fall Chinook

STOCK ASSESSMENT

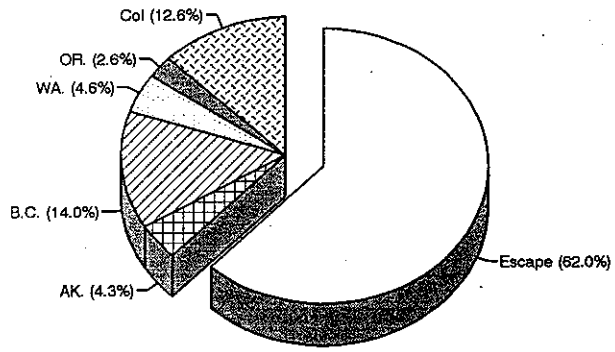
DATA QUALITY------> Very Good

Return Years	ESCAPE Total			
67	10084			
68	7344			
69	5774			
70	21726			
71	20409			
72	19198			
73	13029			
74	9320			
75	14904			
76	4199			
77	7779			
78	6129			
79	8954			
80	14919			
81	21276			
82	9207			
83	14756			
84	8079			
85	9475			
86	14561			
87	17080			
88	14653			
89	22977			
90	18946			
91	9634			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1985-86 Brood



Tag codes 63-41-51, 63-38-21 from 1985-86 broods.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Genetic

STOCK STATUS
Healthy

SCREENING CRITERIA

The Lewis River has a large enough escapement to sustain the naturally spawning population. A maximum sustained yield (MSY) spawning escapement estimate of 5,700 adult spawners has been recommended by McIssac (1990). Only in 1976 did the Lewis River natural spawn population fall below the MSY.

Based on hydropower mitigation studies conducted by WDF and PacifiCorp., the most important factor for maintaining the health of the wild fall chinook population in the Lewis River is adequate flow requirements during the spawning and rearing periods.

LOWER COLUMBIA -- EAST FORK LEWIS FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning timing and geographic distribution. East Fork Lewis River fall chinook spawn in the area from Lewisville Park downstream to Daybreak Park, a distance of approximately 4.2 miles. In the East Fork Lewis River, two distinct spawning segments are evident. The early segment spawns in October while the late segment spawns November through January. There does not appear to be any unique biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks, although it is believed that the early segment is similar to lower Columbia hatchery stocks while the later stock is more similar to the Lewis River stock.

The East Fork Lewis River fall chinook natural spawners are a native stock of wild production. Few straying lower river hatchery coded-wire tagged fall chinook have been recovered from the East Fork Lewis River. There are no salmon hatcheries located on the East Fork Lewis River.

STOCK STATUS

The East Fork Lewis River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 598 with a low return of 157 in 1987 and a peak of 2,354 in 1971.

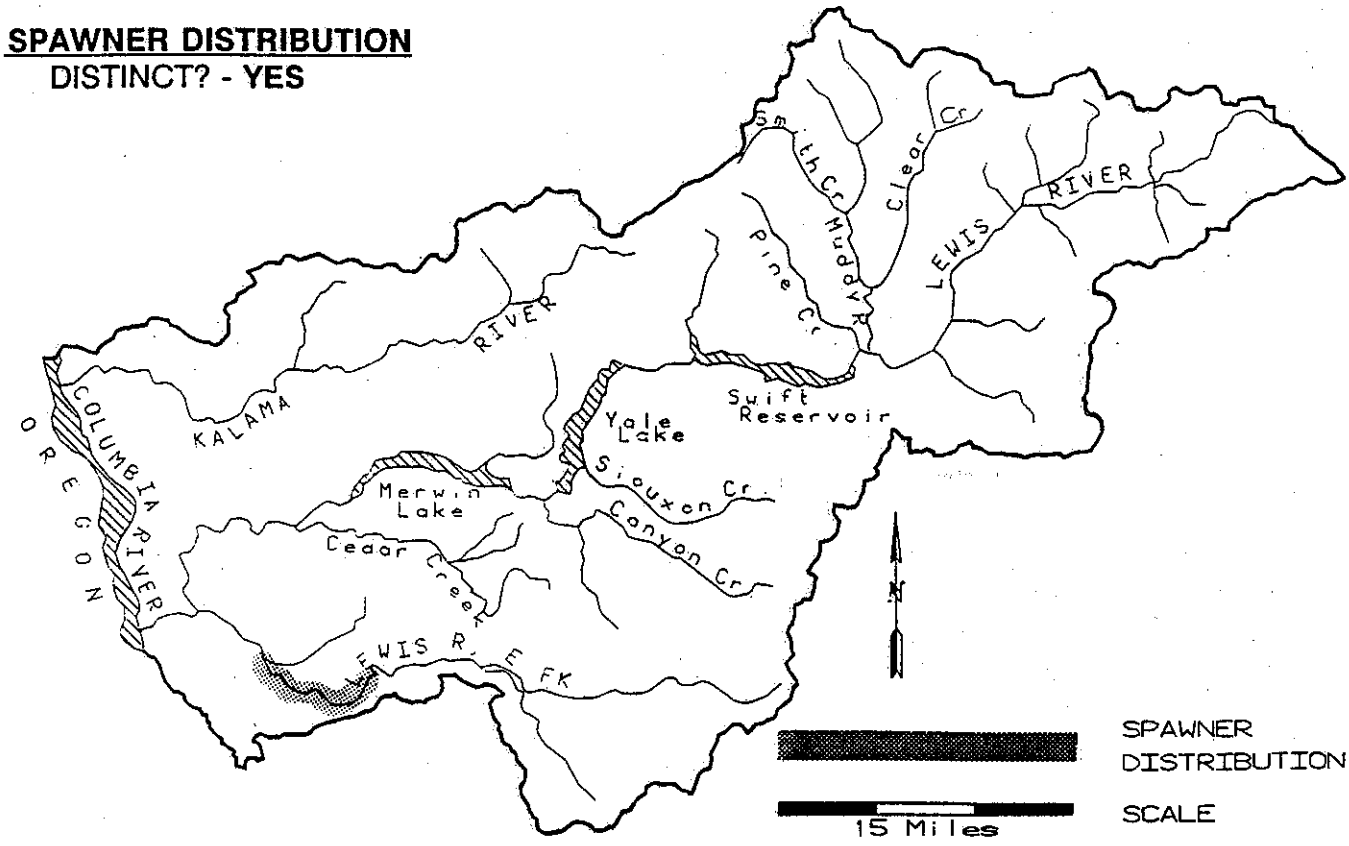
The fall chinook population estimates were obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good.

The East Fork Lewis River fall chinook natural spawn escapements since 1989 were below average but are probably natural fluctuations based on comparison with other lower river stocks.

STOCK DEFINITION PROFILE for East Fork Lewis Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

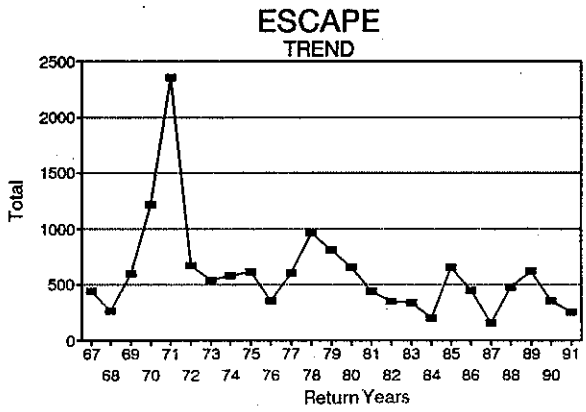
DISTINCT? - NO

STOCK STATUS PROFILE for EF Lewis Fall Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Total			
67	442			
68	265			
69	599			
70	1217			
71	2354			
72	668			
73	538			
74	576			
75	618			
76	353			
77	604			
78	968			
79	814			
80	652			
81	438			
82	346			
83	334			
84	200			
85	653			
86	445			
87	157			
88	476			
89	622			
90	352			
91	250			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing

STOCK STATUS
Healthy

SCREENING CRITERIA

LOWER COLUMBIA -- WASHOUGAL FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time and geographic distribution. Washougal River fall chinook spawn in the area from Salmon Falls downstream to the Wildlife Access, a distance of approximately 4.0 miles. Natural spawning occurs in the Washougal River slightly later (October to November) than other lower Columbia River tule fall chinook stocks. There does not appear to be any unique biological characteristics to clearly separate them from other lower Columbia River fall chinook stocks.

The Washougal River fall chinook natural spawners are a mixed stock of composite production. Fall chinook were reported native to the Washougal River sub-basin, but a distinct stock may no longer exist. Straying lower river hatchery (primarily Washougal) coded-wire tagged fall chinook have been recovered from the Washougal River.

The number of natural juvenile fall chinook that migrated from the Washougal River in 1980 was estimated to be 5,000,000 fish (Fiscus, 1980). However, Devore (1984) estimated that the majority of the fall chinook that returned in 1983 (including the 1979 brood) were of Washougal Hatchery origin. However, the 1979 brood natural juvenile fall chinook migrated before the Washougal Hatchery releases and may have been severely impacted by the Mount St. Helens eruption.

STOCK STATUS

The Washougal River fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements from 1967-1991 averaged 1,832 with a low return of 70 in 1969 and a peak of 4,578 in 1989.

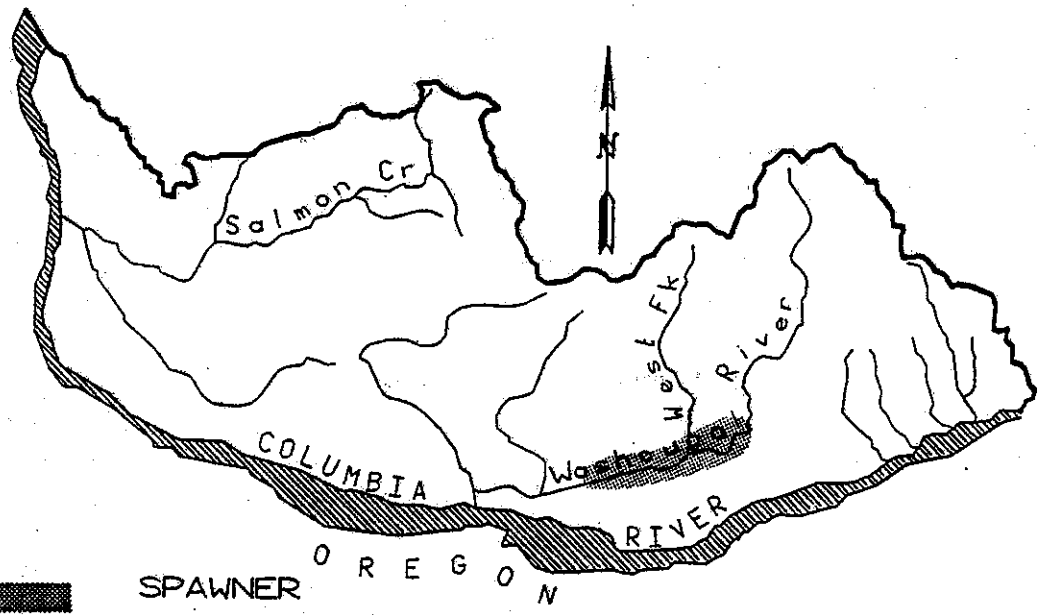
Fall chinook natural spawning population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally very good.

The Washougal River fall chinook natural spawn escapements between 1967-1970 averaged 120 fish. Since 1971, the natural escapement has averaged 2,157 fish. The magnitude of straying lower Columbia River hatchery fall chinook may create fluctuations in the Washougal River fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Washougal Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

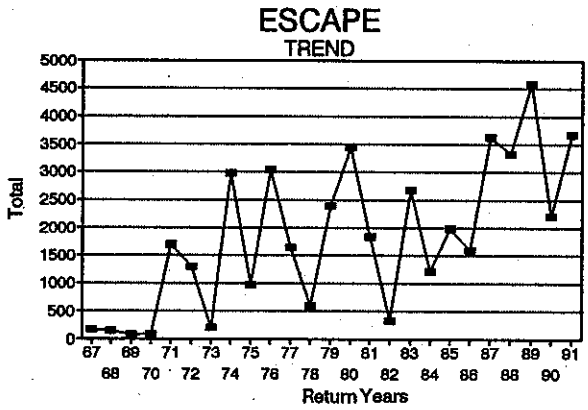
DISTINCT? - **NO**

STOCK STATUS PROFILE for Washougal Fall Chinook

STOCK ASSESSMENT

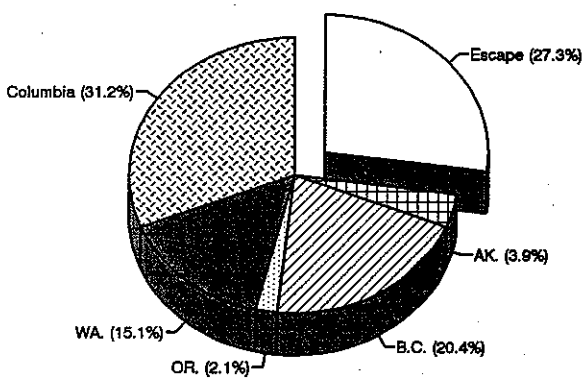
DATA QUALITY------> Very Good

Return Years	ESCAPE Total			
67	170			
68	153			
69	70			
70	85			
71	1700			
72	1300			
73	203			
74	2977			
75	982			
76	3037			
77	1652			
78	593			
79	2388			
80	3437			
81	1841			
82	330			
83	2677			
84	1217			
85	1983			
86	1589			
87	3625			
88	3328			
89	4578			
90	2205			
91	3673			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1985-86 Brood



Tag codes 63-41-50, 63-38-27 from 1985-86 broods.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing

STOCK STATUS
Healthy

SCREENING CRITERIA

OVERVIEW -- LOWER COLUMBIA FALL CHUM STOCKS

GRAYS RIVER
HAMILTON CREEK
HARDY CREEK

STOCK DEFINITION AND ORIGIN

Once widespread in the lower Columbia River, chum salmon production today in the Columbia River is concentrated in the Grays River system near the mouth of the Columbia and near Bonneville Dam in Hardy and Hamilton creeks. Minor numbers cross Bonneville Dam in some years. Chum are native. Some non-native stock introductions have been attempted with apparently no success. Chum enter the Columbia, mainly in October and November, and spawn in November and December. These three chum stocks were designated on the basis of geographical distribution. Genetic evaluation is currently underway with sample analysis from the 1992 return.

STOCK STATUS

No targeted commercial or sport fisheries occur on chum in the mainstem Columbia. A limited sport fishery operates in the Grays River. Chum are incidentally harvested in the Columbia during the late coho gill net fishery. Stock status, based on long term escapement trend, is depressed for the Grays River and Hamilton Creek basins but healthy for the Hardy Creek basin. Annual estimates of total run-size and escapement are not available, however a rough estimate of run-size range would be from a "few thousand" up to 10,000 fish.

LOWER COLUMBIA -- GRAYS RIVER FALL CHUM

STOCK DEFINITION AND ORIGIN

Chum salmon production throughout the Columbia River drainage has drastically declined from former abundance levels. Many lower Columbia tributaries once produced chum. Currently, significant chum natural production is limited to three areas: Grays River, Hardy Creek and Hamilton Creek. Grays River stock was designated on the basis of geographic distribution. Grays River chum spawn in the mainstem Grays River from approximately 0.5 mile upstream of the West Fork downstream to the Covered Bridge, a distance of approximately 4.0 miles. Tributary spawning occurs in the West Fork (RM 13), Crazy Johnson (RM 13.3) and Gorley Creek (RM 12). Spawning timing (November and December) or known biological characteristics cannot be used to separate Grays River chum from other lower Columbia River chum stocks. Genetic evaluation of Columbia River chum is currently underway.

This stock is native to the Grays system. There have been several attempts to augment natural chum production with releases from Grays River hatchery. Releases have included juveniles resulting from small numbers of adults trapped at Grays Hatchery, and fish of Hood Canal and Japanese origin. Hatchery releases have failed to produce significant adult returns.

STOCK STATUS

Grays River chum stock status is considered depressed due to a long-term negative trend in spawning ground escapement counts. Annual spawning ground surveys are conducted. Average multi-year fish per mile values from 1944 to 1991 were calculated. These data show a sharp decline in spawning escapement beginning in about 1960. Average fish per mile values ranged from 78 to 693 fish. Early data quality is fair while more recent data is of good quality.

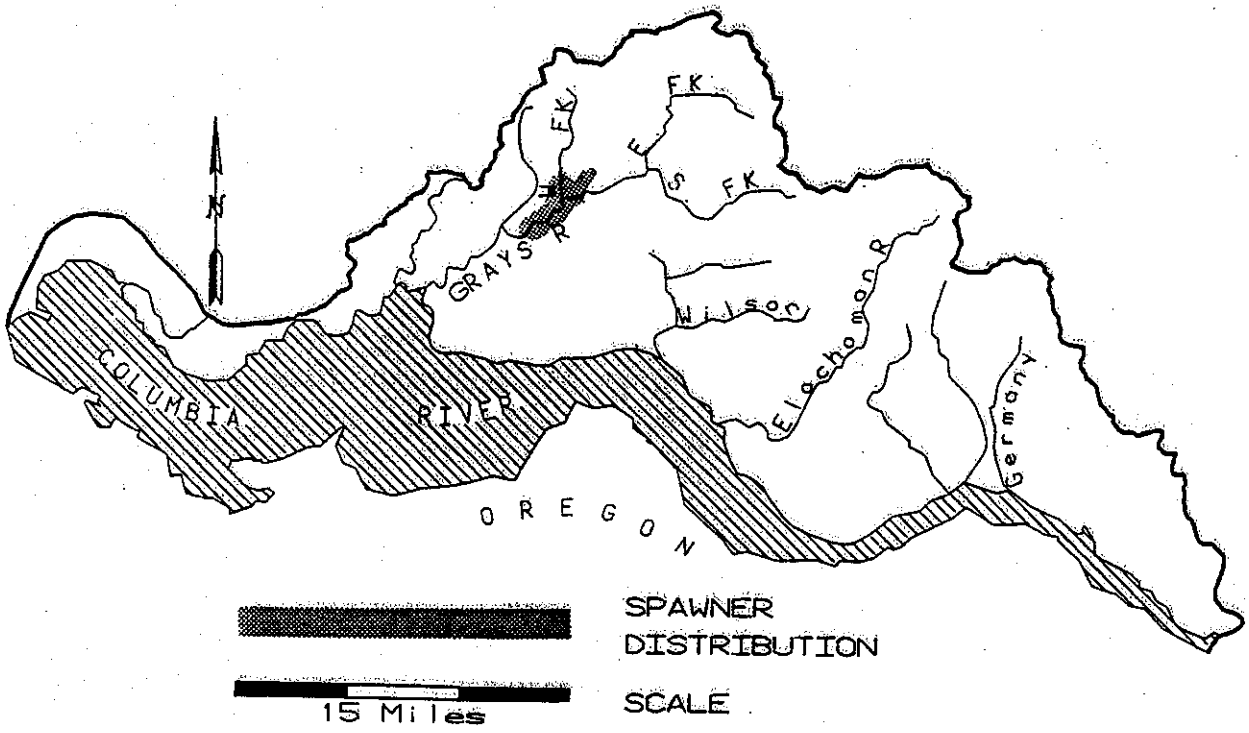
FACTORS AFFECTING PRODUCTION

Habitat -- Natural habitat limiters for this stock include gravel quality and stability and availability of good quality nearshore mainstem freshwater and marine habitat. This watershed has been ravaged by logging road construction and subsequent timber harvest since the 1960s, only recently has the rate of road building and harvest subsided. This has led to numerous road and harvest unit slope failures creating tremendous sedimentation and instability of spawning riffles. Chum salmon able to access spring fed tributaries fare best in this watershed. However,

STOCK DEFINITION PROFILE for Grays River Chum

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

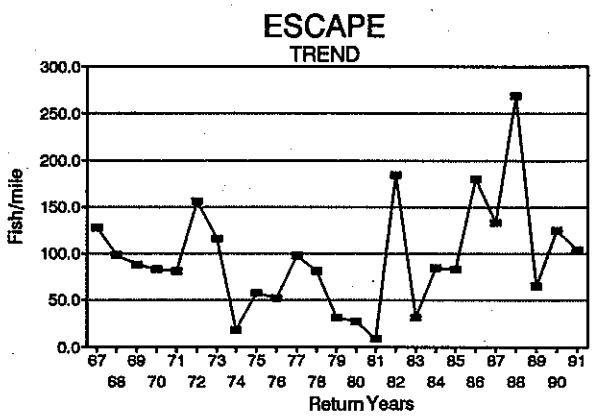
DISTINCT? - **NO**

STOCK STATUS PROFILE for Grays R Chum

STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Fish/mile
67	128.0
68	99.0
69	88.0
70	83.0
71	81.0
72	156.0
73	116.0
74	19.0
75	58.0
76	52.0
77	98.0
78	81.0
79	31.0
80	27.0
81	9.0
82	184.0
83	32.0
84	85.0
85	84.0
86	180.0
87	133.0
88	269.0
89	65.0
90	125.0
91	104.0



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

access into the springs can be impeded due to bedload buildup in the main channel. The lower 6.0 miles of the river is contained within dikes. This may exacerbate the bedload build-up. The dikes probably blocked access to productive side channels. The lower Columbia River and estuary is in fair condition.

Harvest Management -- It is known that chum salmon are not generally harvested in ocean commercial or recreational fisheries. The Columbia River gill net fishery, however, has a long history of chum harvest. Chum landings in 1928 totalled 697,000 fish. By 1942 landings had dropped to 425,000 and by 1955 landings had diminished to 10,000 fish. Since 1965, landings have averaged less than 2,000 fish annually. Currently chum landings occur incidentally to targeted coho in the late fall gill net fishery, primarily after mid-October. Juvenile chum have not been marked or tagged therefore it is not possible to determine the contribution of Grays River chum to the gill net harvest. In general, it has been estimated that a gill net harvest rate of 35-50% may occur. Only minor recreational harvest of chum occurs in tributary recreational fisheries.

Hatchery -- Grays River Hatchery is located at about RM 2.0 of the West Fork Grays River, a lower Columbia River tributary. WDF acquired the land where the hatchery is sited from the Weyerhauser Corporation. The buildings and hatchery facilities are owned by the federal government. Weyco Pond was operated as a satellite facility in the past, but is currently not used. The facility is staffed with 3.5 FTEs.

The facility includes ten raceways, one earthen rearing pond, and one concrete adult-holding ponds (also used for juvenile rearing). Water rights total about 50 cfs from three sources: the West Fork Grays River, an unnamed stream and wells. Most of the water is supplied by gravity flow down the West Fork Grays River. During the summer and fall months, virtually the entire river flow is diverted for hatchery use. The hatchery is currently operating at maximum production (based on deliverable water).

Current production includes 1,200,000 fall chinook and 350,000 yearling coho. Grays River also serves as a support facility for the Toutle Hatchery.

Hatchery operational impacts have not been determined. It is possible that predation of chum juveniles by hatchery smolts is occurring in this river system.

LAST TEN YEARS SALMON RELEASES INTO THE GRAYS - ELOCHOMAN BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	CHUM	COHO	TYPE-S COHO	TYPE-N COHO
1982	196000	2713266	10445625	0	821100	65250	934688	2864256
1983	361500	1608798	27879647	6692557	385317	7725	622400	3492105
1984	0	0	23608569	9294100	30875	832	405600	3632500
1985	37477	630660	11232581	185399	197652	611241	2632797	2910700
1986	35894	531200	11073952	472211	453549	0	2866568	1841200
1987	35273	313055	7843395	0	245000	152500	1909600	3161318
1988	0	197010	10719500	0	100000	1920600	746600	0
1989	0	2168057	13632575	0	161000	266400	1273750	1814200
1990	0	0	10579425	0	363000	176600	828175	2034763
1991	0	436024	8348264	0	847598	11600	882200	1271450
MEAN	133229	1074759	13536353	4161067	360509	356972	1310238	2558055

LOWER COLUMBIA -- HARDY CREEK FALL CHUM

STOCK DEFINITION AND ORIGIN

Chum salmon production throughout the Columbia River drainage has drastically declined from former abundance levels. Many lower Columbia tributaries once produced chum. Currently, significant chum natural production is limited to Grays River, Hardy Creek and Hamilton Creek.

Hardy Creek chum stock was designated on the basis of geographic distribution. Hardy Creek is a small Columbia River tributary located 4.0 miles downstream of Bonneville Dam. Chum spawn in the lower 1.5 miles of the stream. Historically the area was located on a cattle ranch which has now been incorporated into a National Wildlife Refuge. Habitat work including fencing and revegation were completed in the area. Hardy Creek chum are native to the system. Spawning occurs from late November through early January. Biological or genetic characteristics are not known to be unique. However, genetic evaluation of Columbia River chum is currently underway. No hatchery introductions have been made into the system.

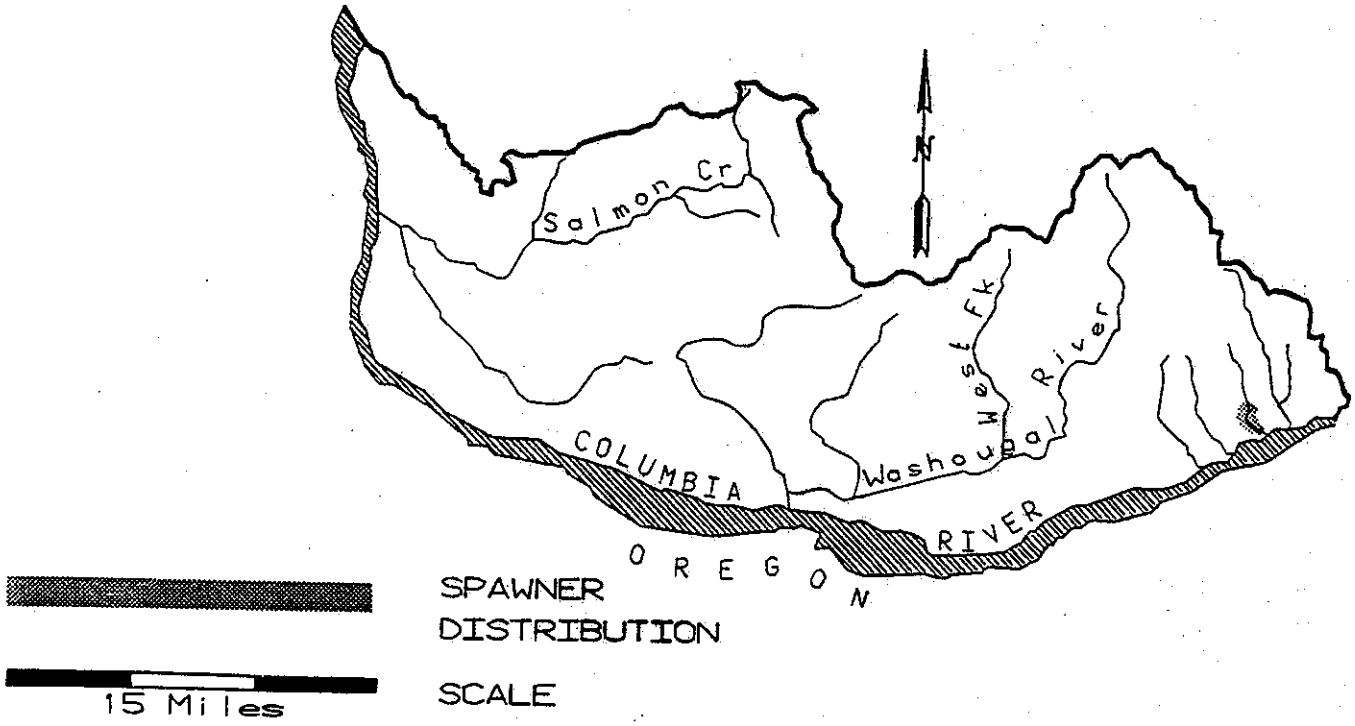
STOCK STATUS

Hardy Creek chum status is considered to be healthy. Spawning ground counts since the late 1950s indicate stable production. Average annual fish per mile values range from 67 to 130. Data quality is good.

STOCK DEFINITION PROFILE for Hardy Creek Chum

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

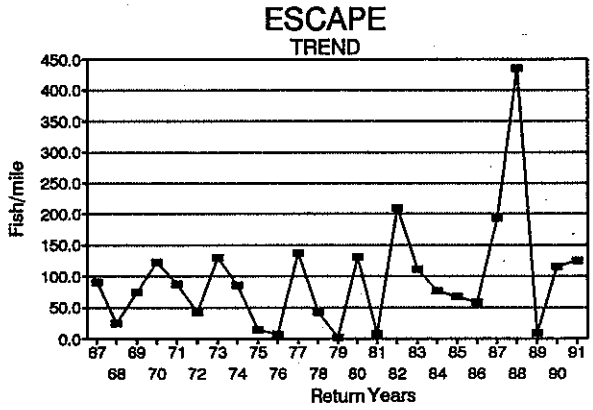
DISTINCT? - **NO**

STOCK STATUS PROFILE for Hardy Cr Chum

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Fish/mile			
67	91.0			
68	24.0			
69	74.0			
70	123.0			
71	88.0			
72	42.0			
73	130.0			
74	86.0			
75	14.0			
76	6.0			
77	137.0			
78	42.0			
79	1.0			
80	131.0			
81	7.0			
82	210.0			
83	112.0			
84	76.0			
85	67.0			
86	58.0			
87	193.0			
88	436.0			
89	9.0			
90	116.0			
91	125.0			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

LOWER COLUMBIA -- HAMILTON CREEK FALL CHUM

STOCK DEFINITION AND ORIGIN

Chum salmon production throughout the Columbia River drainage has drastically declined from former abundance levels. Many lower Columbia tributaries once produced chum. Currently, significant chum natural production is limited to Grays River, Hardy Creek and Hamilton Creek.

Hamilton Creek chum stock was designated on the basis of geographic distribution. Hamilton Creek is a small Columbia River tributary located 3.0 miles downstream of Bonneville Dam. Chum spawn from the Highway 14 bridge downstream about 1.0 mile in mainstem Hamilton Creek and in a small spring fed tributary known as Spring Channel. Habitat improvement work including re-channeling, gravel replacement and revegation have been conducted in Spring Channel. Hardy Creek chum are native to the system. Eyed eggs of non-local origin were introduced into Spring Channel with no apparent increase in adult production. Spawning occurs from late November through early January. Biological or genetic evaluation of Columbia River chum is currently underway.

STOCK STATUS

Hamilton Creek chum are considered to be depressed due to a long-term negative trend in a spawning ground escapement counts. Annual spawning ground surveys are conducted. Average annual fish per mile values calculated in mostly ten year intervals from 1944 to 1991 indicated a long-term negative trend and a short-term severe decline. Escapement data quality is good.

FACTORS AFFECTING PRODUCTION

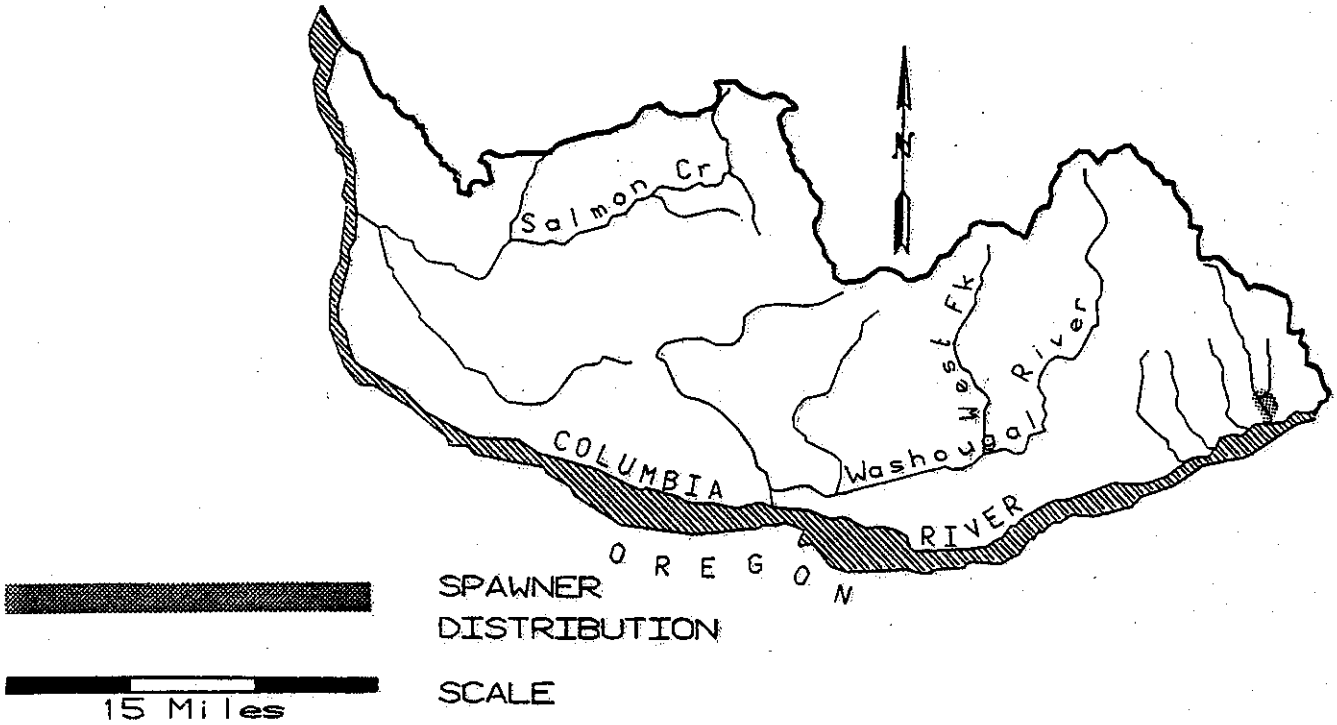
Habitat -- Natural habitat limiters for this stock include gravel quality and stability and availability of good quality nearshore mainstem freshwater and marine habitat.

Bedload instability has been a problem in Hamilton Creek as has gravel quality. Recent rehabilitation work has had some success in addressing these issues. Production may also be limited due to industrial pollution near Portland and in the Longview-Kelso area. Wetlands and nearshore habitats utilized by outmigrant chum salmon have largely been destroyed or damaged through dredge spoil placement. Other nearshore habitats have been lost through diking, bulkheading and dock construction.

STOCK DEFINITION PROFILE for Hamilton Creek Chum

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

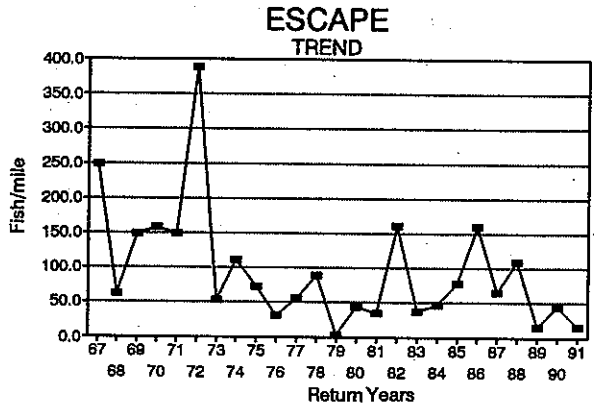
DISTINCT? - **NO**

STOCK STATUS PROFILE for Hamilton Cr Chum

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Fish/mile			
67	248.0			
68	63.0			
69	149.0			
70	158.0			
71	149.0			
72	389.0			
73	53.0			
74	111.0			
75	72.0			
76	31.0			
77	56.0			
78	89.0			
79	3.0			
80	44.0			
81	35.0			
82	161.0			
83	37.0			
84	47.0			
85	78.0			
86	160.0			
87	65.0			
88	109.0			
89	15.0			
90	45.0			
91	15.0			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
LT Neg Trend, ST Severe Decl'n

Harvest Management -- It is known that chum salmon are not generally harvested in ocean commercial or recreational fisheries. The Columbia River gill net fishery, however, has a long history of chum harvest. From 1928 to 1955 gill net landings declined from 697,000 to 10,000 fish. Since 1965 landings have averaged less than 2,000 fish annually. Currently chum are caught incidentally to targeted coho in the late fall gill net fishery, primarily after mid-October. Since 1959, all gill net fisheries have ended by mid-November. Juvenile chum have not been marked or tagged therefore it is not possible to determine the contribution of Grays River chum to the gill net harvest. In general, it has been estimated that a gill net harvest rate of 10-50% may occur. Hamilton Creek is closed to recreational salmon fishing.

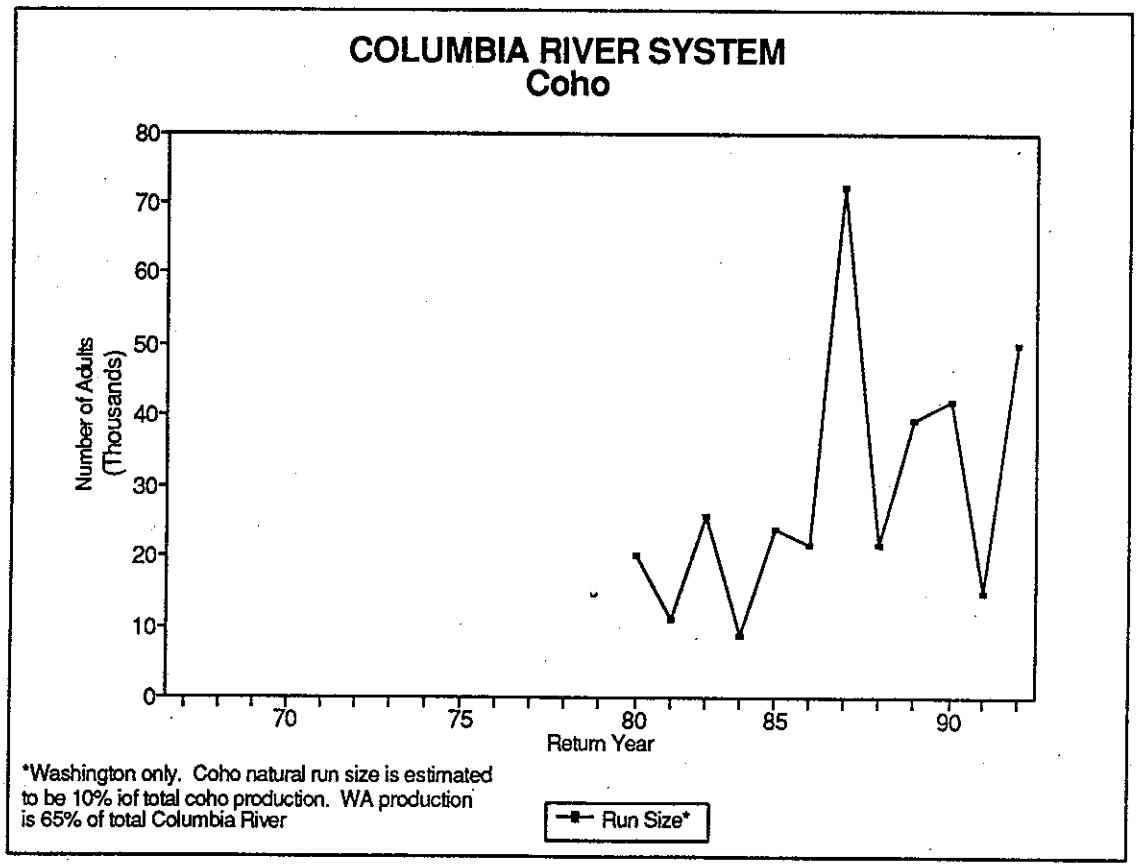
Hatchery -- Hatchery operational impacts have not been determined. There are no hatchery fish planted in these creeks.

OVERVIEW -- LOWER COLUMBIA COHO STOCKS

GRAYS RIVER	SF TOUTLE
SKAMOKAWA CREEK	GREEN (TOUTLE)
ELOCHOMAN	KALAMA
MILL CREEK	LEWIS
ABERNATHY CREEK	EAST FORK LEWIS
GERMANY CREEK	SALMON CREEK
COWLITZ	WASHOUGAL
COWEEMAN	BONNEVILLE TRIBS.
TOUTLE	

STOCK DEFINITION AND ORIGIN

Natural coho production occurs primarily downstream of Bonneville. Additionally, some minor production occurs in the lower Klickitat River above Bonneville. A total of 17 coho stocks based on geographic isolation have been determined. Run-timing through the Columbia River ranges from August through December with



spawning timing from October through February. Coho historically are native to the Columbia River, although widespread transfers of stocks with hatchery practices has produced a widely mixed stock. None of the seventeen stocks are believed to be genetically different from the hatchery production.

STOCK STATUS

Columbia River coho production supports large sport and commercial fisheries. The popular Buoy 10 coho fishery in late summer and early fall at the mouth of the Columbia is supported primarily by coho. The Columbia River gill net fishery harvests coho from September through early November with the late fishery targeting on coho. Successful tributary sport coho fisheries take place in large tributaries. Overall annual harvest varies greatly as a result of wide run-size fluctuations.

Approximately 10% of Columbia River coho production is estimated to be of natural origin. Little individual stock assessment data is available for natural coho production.

Natural coho production is considered to be depressed in all areas.

LOWER COLUMBIA -- GRAYS RIVER COHO

STOCK DEFINITION AND ORIGIN

The Grays River originates in the southeast Pacific County and flows southwest through Wahkiakum County to its confluence with the Columbia River at RM 21.0. The lower 6.0 miles of the river are a slough subject to tidal influence. The next 6.0 miles flow through a wide, flat valley before entering the steep foothills. Most of the upper watershed flows through steep narrow canyons in the rugged Willapa Hills. The entire basin encompasses 124 square miles.

Typically, coho begin to enter the Grays River in early September and continue entering the sub-basin through February. Spawning occurs from mid-October through February. Coho are thought to spawn in all available tributaries, though current escapement levels are unknown. Coho return as two-year-old jacks and three-year-old adults.

U.S. Fish and Wildlife Service surveys in 1936 and 1937 indicated coho were present in all accessible tributaries of the Grays River, but no population estimates were made. Portions of the watershed were being logged, and splash dams, log and debris jams, and logging through the streams had probably already adversely affected fish production. Under the Columbia River Fisheries Development Program, some of these problems were addressed on an ad hoc basis and production was extended by removing natural and man-made barriers. In 1951, Washington Department of Fisheries estimated coho escapement at 2,500 fish.

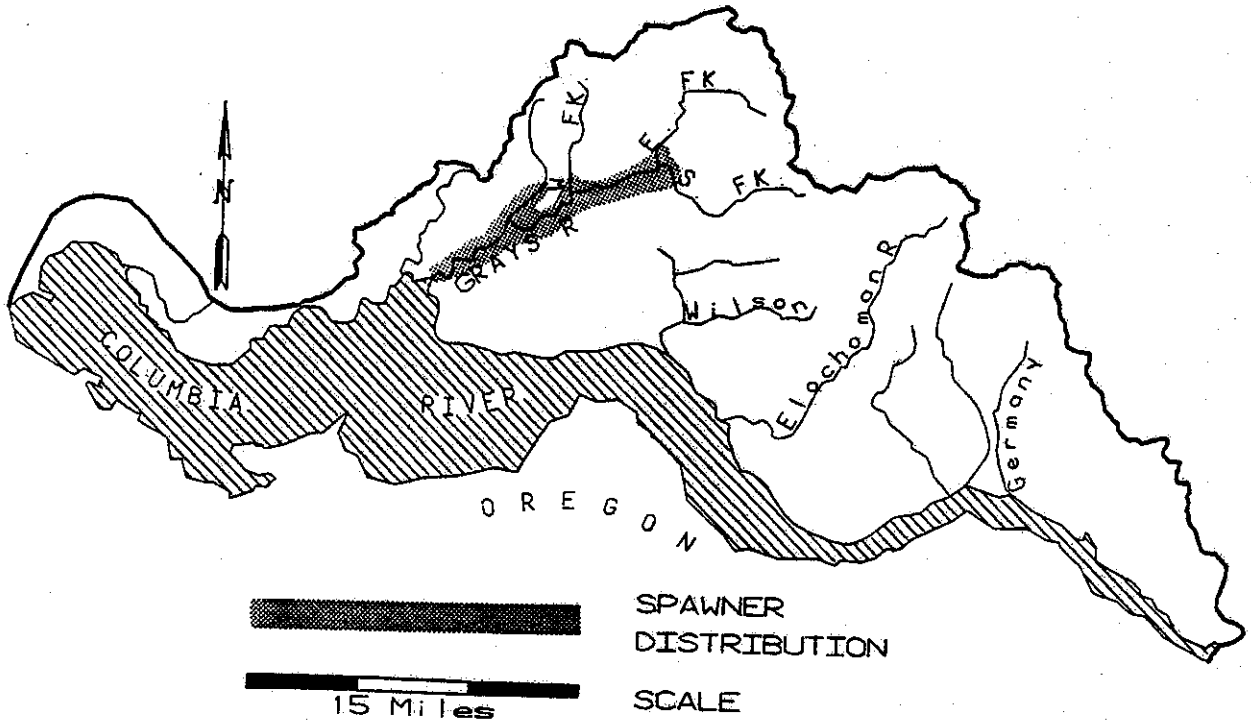
A hatchery was built on the West Fork Grays River in 1960 and subsequent harvest management for hatchery productivity in the region has been a significant factor affecting natural production. A number of tributaries of the Grays River have good coho production potential. Among these are Hull, Fossil, and Mitchell creeks, and the West, East, North, and South Forks of the Grays River (WDF, 1973). The dominant spawning timing of natural production probably follows hatchery production timing which are early coho with October and November spawning timing.

Hatchery coho fry and fingerlings have been planted in the sub-basin since at least 1965. Brood stock is collected via hatchery rack returns. Grays River natural spawners are a mixed stock of composite production. Mixing of stocks very likely began to occur with the first releases.

STOCK DEFINITION PROFILE for Grays River Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Grays R Coho

STOCK ASSESSMENT

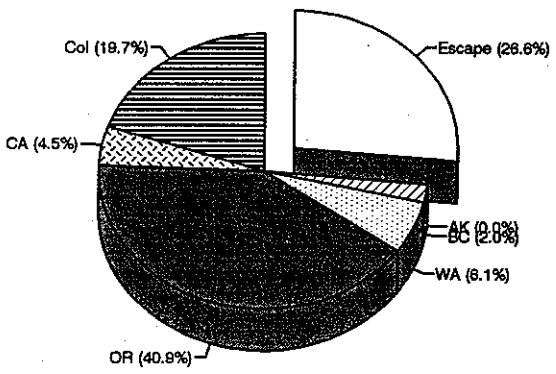
DATA QUALITY------> NOT AVAILABLE

Return 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

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-1988)



Based on Grays River Hatchery 1982, 1984, 1985 brood early coho tags 63-30-11, 63-35-31/36, 63-42-47/52

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The Grays River coho stock status is depressed based on chronically low production. Natural Spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential. Low production may indicate habitat constraint.

FACTORS AFFECTING PRODUCTION

Habitat -- In addition, most of the tributaries accessible to coho in this watershed have been heavily impacted by logging. Many have suffered complete sluice-outs where the streambeds have been scoured to bedrock leaving little pool habitat. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Much of the sediment derived from these sluiceouts remains in the lower gradient reaches of the tributaries and in the mainstem Grays River. Channel instability is common. Availability of overwinter habitat is compromised by diking in the lower river. Estuarine habitat is adequate.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement where relatively few fish are needed which can result in underescapement of natural spawning fish.

Tributary harvest - Tributary harvest of Grays River sub-basin coho occurs in the sport fishery. Adult coho harvest from the Grays River during October and November has averaged 94 from 1978 through 1986 with a low of 7 in 1983 to a high of 177 in 1984.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and may continue into early November.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunity in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Grays River Hatchery early coho based on coded-wire tag recoveries of 1982, 1984, and the 1985 brood revealed that most of the ocean catch occurred in Oregon (40.95%) and Washington (6.11%) followed by California (4.55%), British Columbia (2.05%), and Alaska (0.02%). Columbia River fisheries accounted for an additional 19.75% of the total harvest. Escapement was 26.59% overall.

Hatchery -- Hatchery operational impacts not determined. Weir blocks upstream passage in West Fork except in high water.

LAST TEN YEARS SALMON RELEASES INTO THE GRAYS - ELOCHOMAN BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	CHUM	COHO	TYPE-S COHO	TYPE-N COHO
1982	196000	2713266	10445625	0	821100	65250	934688	2864256
1983	361500	1608798	27879647	6692557	385317	7725	622400	3492105
1984	0	0	23608569	9294100	30875	832	405600	3632500
1985	37477	630660	11232581	185399	197652	611241	2632797	2910700
1986	35894	531200	11073952	472211	453549	0	2866568	1841200
1987	35273	313055	7843395	0	245000	152500	1909600	3161318
1988	0	197010	10719500	0	100000	1920600	746600	0
1989	0	2168057	13632575	0	161000	266400	1273750	1814200
1990	0	0	10579425	0	363000	176600	828175	2034763
1991	0	436024	8348264	0	847598	11600	882200	1271450
MEAN	133229	1074759	13536353	4161067	360509	356972	1310238	2558055

LOWER COLUMBIA -- SKAMOKAWA CREEK COHO

STOCK DEFINITION AND ORIGIN

Skamokawa Creek originates in the Willapa Hills (southwest Lewis County and northeast Cowlitz County), and flows in a generally southwest direction into Wahkiakum County meeting the Columbia River at RM 33.3.

Native populations of coho were present in all lower Columbia River tributaries historically. Under the Columbia River Development program in the 1950s salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap brood stock in many areas. Over time brood stock, eggs or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

Coho enter the Columbia River beginning in August and continue through December or January with the peak in September and October. Tributary spawning extends from October through at least February with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group generally spawns from October through early November and the late group from late November through December. Most Columbia River basin streams probably support populations exhibiting a full range of spawn timing. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery as natural spawning coho populations are a mixed of composite production. Coho in the Skamokawa Creek basin spawn in the mainstem Skamokawa Creek, Wilson Creek, Left Fork, Quartz Creek, and Standard and McDonald creeks.

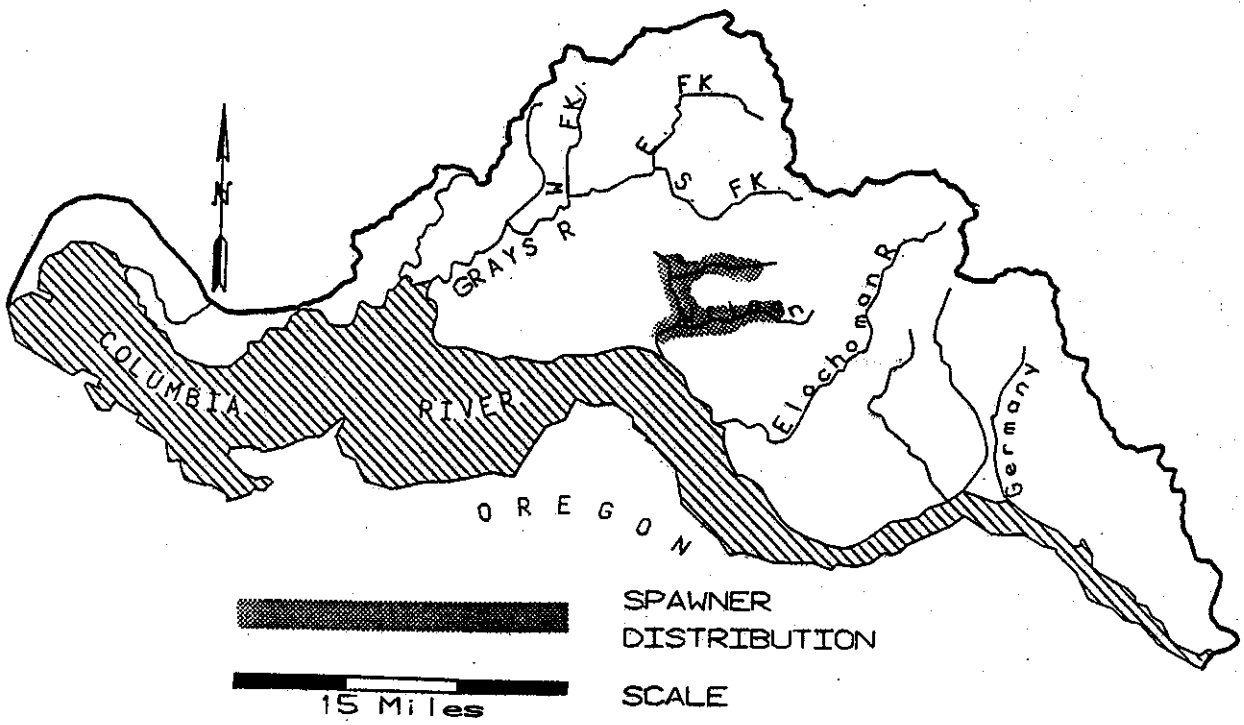
STOCK STATUS

The Skamokawa Creek coho stock status is depressed based on chronically low production. Natural Spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production minor.

STOCK DEFINITION PROFILE for Skamokawa Creek Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Skamokawa Cr Coho

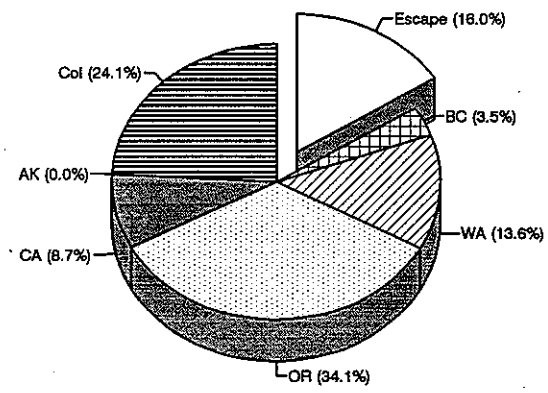
STOCK ASSESSMENT

DATA QUALITY-----> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1990-1991)



Based on Elochoman River Hatchery 1988 brood early coho tag code 63-11-28

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging in the upper reaches has resulted in numerous slope failures and sluice outs of this stream and its tributaries. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Much of the sediment derived from these sluiceouts remains in the lower gradient reaches of the tributaries and in the mainstem. Agricultural uses have affected riparian vegetation and bank stability. Diking in the lower reaches probably precluded access to overwinter habitat. Columbia River habitat conditions are adequate.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed which can result in underescapement of natural spawning fish.

Tributary harvest - Lower Skamokawa Creek has been open since August of 1982 to the sport fishery but there has been very little effort or no harvest.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of coho based on coded-wire tag recoveries of the 1988 brood early coho from the Elochoman River Hatchery (adjacent basin to Skamokawa) revealed that most of the ocean catch occurred in Oregon (35.54%) and Washington (14.12%) followed by California (9.06%) and British Columbia (3.60%). Columbia River fisheries accounted for an additional 25.12% of the total harvest.

A harvest profile of coho based on coded-wire tag recoveries of the 1988 brood late coho from the Elochoman River Hatchery revealed that most of the ocean catch occurred in Washington (16.53%) and Oregon (14.84%) followed by British Columbia (6.37%) and California (0.35%). Columbia River fisheries accounted for an additional 45.42% of the total harvest.

Hatchery -- Hatchery operational impacts negligible.

LAST TEN YEARS SALMON RELEASES INTO THE GRAYS - ELOCHOMAN BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	CHUM	COHO	TYPE-S COHO	TYPE-N COHO
1982	196000	2713266	10445625	0	821100	65250	934688	2864256
1983	361500	1608798	27879647	6692557	385317	7725	622400	3492105
1984	0	0	23608569	9294100	30875	832	405600	3632500
1985	37477	630660	11232581	185399	197652	611241	2632797	2910700
1986	35894	531200	11073952	472211	453549	0	2866568	1841200
1987	35273	313055	7843395	0	245000	152500	1909600	3161318
1988	0	197010	10719500	0	100000	1920600	746600	0
1989	0	2168057	13632575	0	161000	266400	1273750	1814200
1990	0	0	10579425	0	363000	176600	828175	2034763
1991	0	436024	8348264	0	847598	11600	882200	1271450
MEAN	133229	1074759	13536353	4161067	360509	356972	1310238	2558055

LOWER COLUMBIA -- ELOCHOMAN RIVER COHO

STOCK DEFINITION AND ORIGIN

The Elochoman River originates in the Willapa Hills (southwest Lewis County and northeast Cowlitz County), and flows in a generally southwest direction into Wahkiakum County meeting the Columbia River at RM 38.0. Elochoman Hatchery is located at RM 9.0, approximately 7.0 miles northwest of Cathlamet.

Typically, coho begin entering the Elochoman River in early September and continue entering the sub-basin through February. Spawning occurs from mid-October through March. Coho are thought to spawn in all available tributaries, though escapement levels are unknown. Coho return as two-year-old jacks and three-year-old adults.

U.S. Fish and Wildlife Service surveys in 1936 and 1937 indicated coho were present in all accessible tributaries of the Elochoman River, but no population estimates were made. At this time portions of the watershed were being logged and splash dams, log and debris jams, and logging through the streams was detrimental to fish production. Under the Columbia River Fisheries Development Program some of these problems were addressed on an ad hoc basis and production was further expanded by removing natural and man-made barriers to migration.

A hatchery was built on the Elochoman River in 1953 and subsequent harvest management for hatchery productivity in the region has been a significant factor affecting natural production. Unpublished information suggests coho spawn in most accessible tributaries. Escapement levels are not known since no directed surveys are done. The hatchery dam on the main river shunts all coho into the hatchery holding pond until the egg-take requirements are met, after which the ladder is opened to the river and fish are allowed to proceed upstream. A number of tributaries have good coho production potential; Duck Creek, Beaver Creek, Clear Creek, the West Fork, North Fork, and East Fork.

Hatchery coho have been planted in the sub-basin since at least 1965. Brood stock is collected via hatchery rack returns. Elochoman River natural spawners are a hybrid stock. Mixing of stocks very likely began to occur with the first releases.

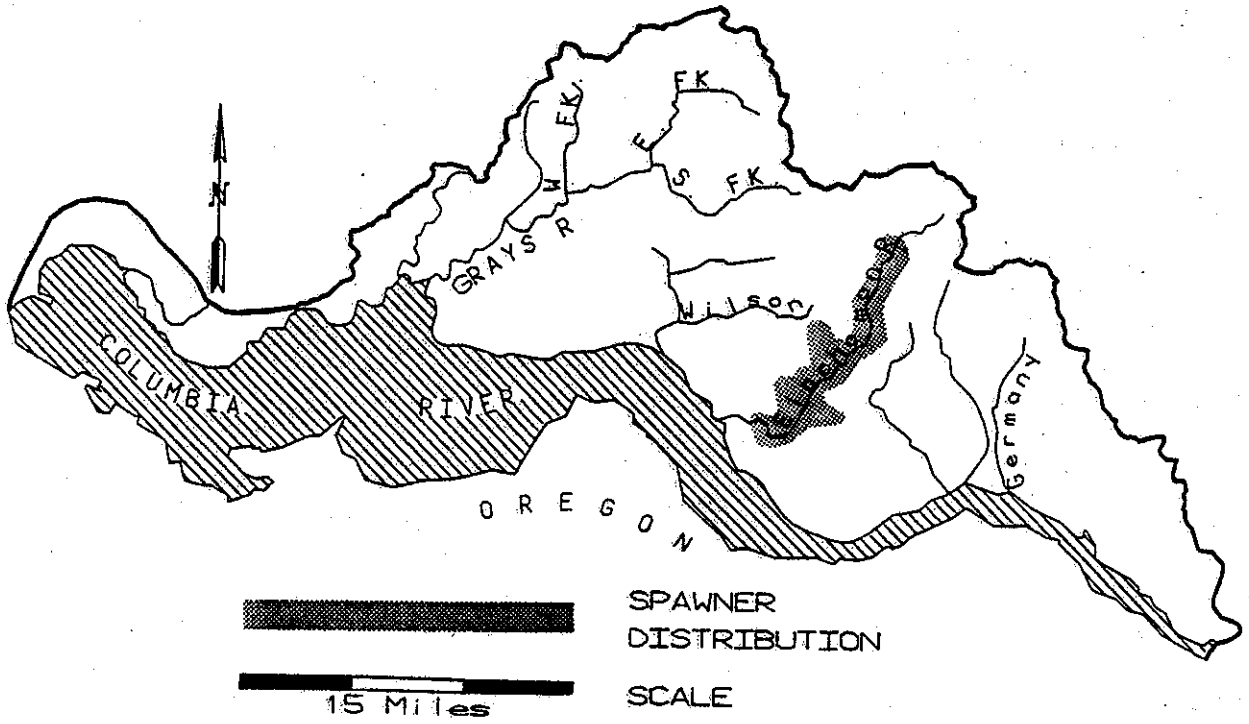
STOCK STATUS

The Elochoman River coho stock status is depressed. Natural Spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential.

STOCK DEFINITION PROFILE for Elochoman Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Elochoman Coho

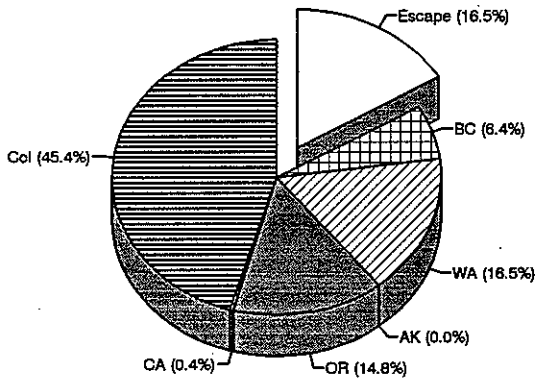
STOCK ASSESSMENT

DATA QUALITY-----> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1985-86)



Based on Elochoman River Hatchery 1983 brood late coho tag codes 63-32-53 and 63-32-54

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging in the upper reaches has resulted in numerous slope failures and sluice-outs of this stream and its tributaries. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Much of the sediment derived from these sluiceouts remains in the lower gradient reaches of the tributaries and in the mainstem. Agricultural uses have affected riparian vegetation and bank stability. Diking in the lower reaches probably precluded access to overwinter habitat. Columbia River habitat conditions are adequate.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed which can result in underescapement of natural spawning fish.

Tributary harvest - Tributary harvest of Elochoman River sub-basin coho occurs in the sport fishery. Adult coho harvest from the Elochoman River during October and November has averaged 1,183 from 1981 through 1988 with a low of 94 in 1987 to a high of 2,626 in 1982.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Elochoman River Hatchery early coho based on coded-wire tag recoveries of the 1988 brood revealed that most of the ocean catch occurred in Oregon (34.14%) and Washington (13.56%) followed by California (8.70%) and British Columbia (3.46%). Columbia River fisheries accounted for an additional 24.13% of the total harvest. Escapement was 16.00% overall.

A harvest profile of Elochoman River Hatchery late coho based on coded-wire tag recoveries of the 1983 brood revealed that most of the ocean catch occurred in Washington (16.53%) and Oregon (14.84%) followed by British Columbia (6.37%) and California (0.35%). Columbia River fisheries accounted for an additional 45.42% of the total harvest. Escapement was 16.48% overall.

Hatchery -- Hatchery operational impacts negligible. Weir blocks upstream passage except in high water. Coho are routinely passed upstream.

LAST TEN YEARS SALMON RELEASES INTO THE GRAYS - ELOCHOMAN BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	CHUM	COHO	TYPE-S COHO	TYPE-N COHO
1982	196000	2713266	10445625	0	821100	65250	934688	2864256
1983	361500	1608798	27879647	6692557	385317	7725	622400	3492105
1984	0	0	23608569	9294100	30875	832	405600	3632500
1985	37477	630660	11232581	185399	197652	611241	2632797	2910700
1986	35894	531200	11073952	472211	453549	0	2866568	1841200
1987	35273	313055	7843395	0	245000	152500	1909600	3161318
1988	0	197010	10719500	0	100000	1920600	746600	0
1989	0	2168057	13632575	0	161000	266400	1273750	1814200
1990	0	0	10579425	0	363000	176600	828175	2034763
1991	0	436024	8348264	0	847598	11600	882200	1271450
MEAN	133229	1074759	13536353	4161067	360509	356972	1310238	2558055

LOWER COLUMBIA -- MILL CREEK COHO

STOCK DEFINITION AND ORIGIN

Mill Creek is a small stream about 6.0 miles long entering the Columbia River 53.0 miles above the mouth, just below Oak Point, Washington. The stream enters the Columbia River through a quarter-mile long slough.

Native populations of coho were historically present in all lower Columbia River tributaries. Under the Columbia River Development program in the 1950s, salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap broodstock in many areas. Over time, broodstock, eggs or juvenile coho, were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

Coho enter the Columbia River beginning in August and continue through December or January, with the peak in September and October. Tributary spawning extends from October through at least February with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group is generally October through early November spawning and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. Mill Creek coho are a mixed stock of composite production.

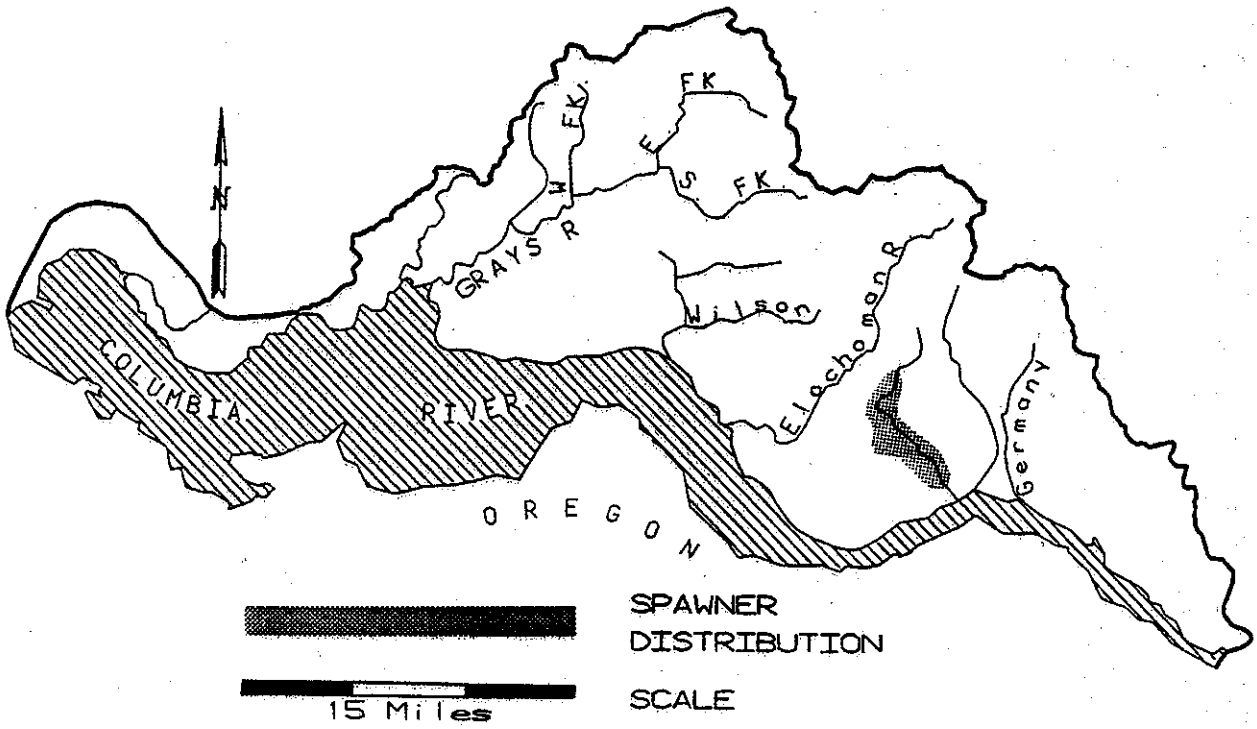
STOCK STATUS

The Mill Creek coho stock status is depressed based on chronically low production. Natural Spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production minor.

STOCK DEFINITION PROFILE for Mill Creek Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Mill Cr Coho

STOCK ASSESSMENT

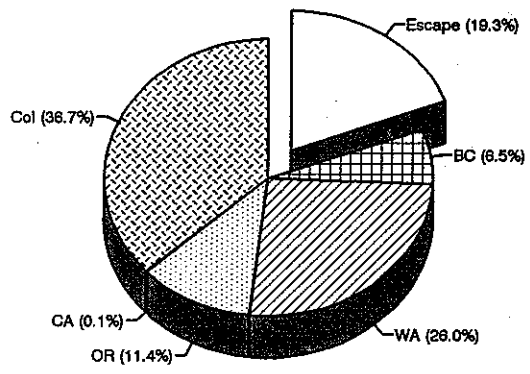
DATA QUALITY-----> NOT AVAILABLE

Return 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

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-1985)



Based on Cowlitz River Hatchery 1982 brood late coho tag codes 63-29-12 through 63-29-41

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging in the upper reaches has affected winter peak flows.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, probably resulting in underescapement of natural spawning fish.

Tributary harvest - There is no salmon sport fishery in Mill Creek.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of coho based on coded-wire tag recoveries of 1988 brood early coho from the Toutle Hatchery revealed that most of the ocean catch occurred in Oregon (31.27%) and Washington (17.64%) followed by California (9.40%), and British Columbia (2.42%). Columbia River fisheries accounted for an additional 16.29% of the total harvest.

A harvest profile of coho based on coded-wire tag recoveries of 1982 brood late coho from the Cowlitz River Hatchery revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts negligible.

LOWER COLUMBIA -- ABERNATHY CREEK COHO

STOCK DEFINITION AND ORIGIN

Abernathy Creek enters the Columbia River about 54.0 miles above the mouth. The stream flows for 13.0 miles through a logged-off mountainous region. Abernathy Hatchery is located at RM 3.5.

Native populations of coho were historically present in all lower Columbia River tributaries. Under the Columbia River Development program in the 1950s, salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap broodstock in many areas. Over time, broodstock, eggs, or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

Coho enter the Columbia River beginning in August and continue through December or January with the peak in September and October. Tributary spawning extends from October through at least February, with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group is generally October through early November spawning and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. Abernathy Creek Coho are a mixed stock of composite production.

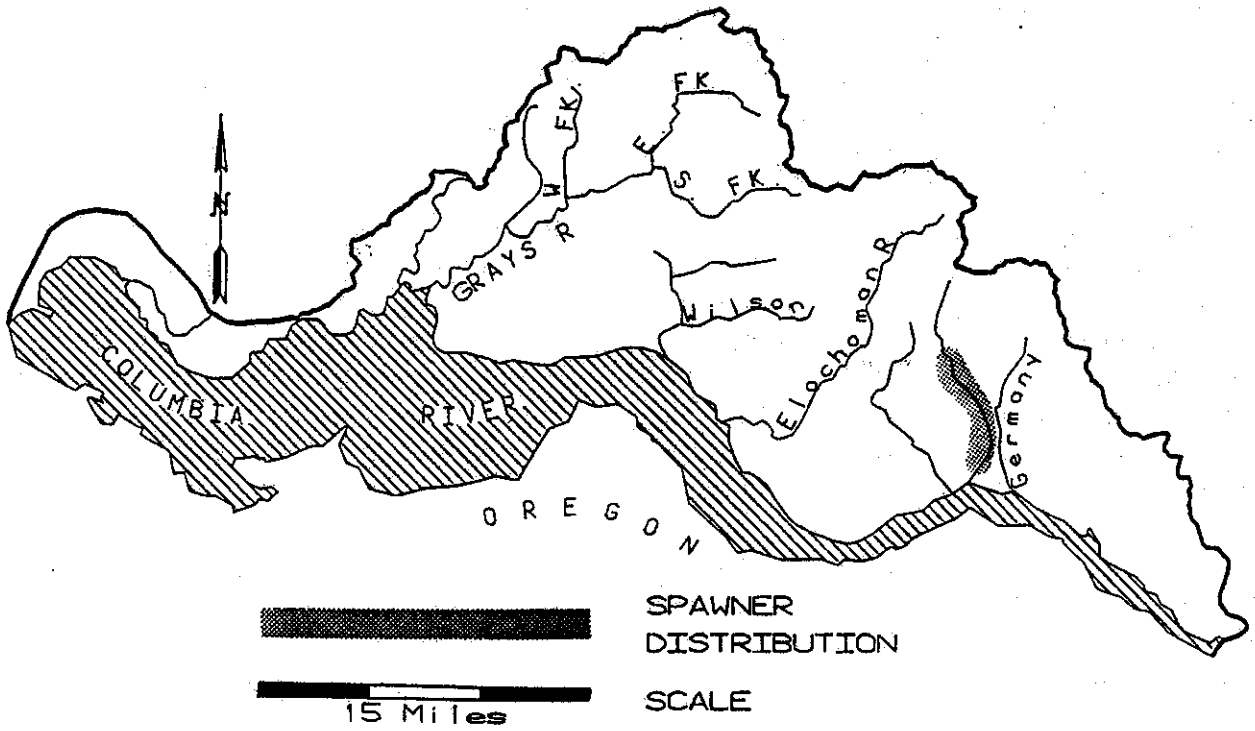
STOCK STATUS

The Abernathy Creek coho stock status is depressed based on chronically low production. Natural spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production minor.

STOCK DEFINITION PROFILE for Abernathy Creek Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

STOCK STATUS PROFILE for Abernathy Cr Coho

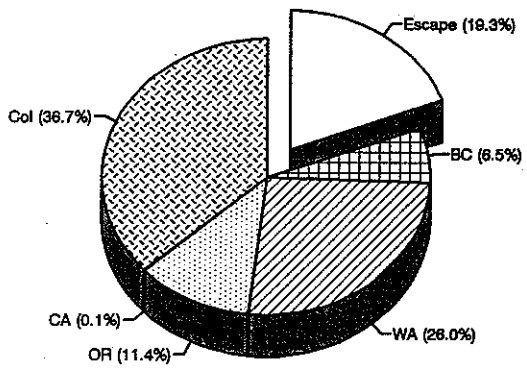
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-1985)



Based on Cowlitz River Hatchery 1982 brood late coho tag codes 63-29-12 through 63-29-41

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Genetic

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging in the upper reaches has resulted in numerous slope failures and sluice outs of this stream and its tributaries. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Much of the sediment derived from these sluiceouts remains in the lower gradient reaches of the tributaries and in the mainstem. Columbia River habitat conditions are adequate.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, which can result in underescapement of natural spawning fish.

Tributary harvest - There is no salmon sport fishery in Abernathy Creek.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of coho based on coded-wire tag recoveries of 1988 brood early coho from the Toutle Hatchery revealed that most of the ocean catch occurred in Oregon (31.27%) and Washington (17.64%) followed by California (9.40%) and British Columbia (2.42%). Columbia River fisheries accounted for an additional 16.29% of the total harvest.

A harvest profile of coho based on coded-wire tag recoveries of 1982 brood late coho from the Cowlitz River Hatchery revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts not determined.

LOWER COLUMBIA -- GERMANY CREEK COHO

STOCK DEFINITION AND ORIGIN

Germany Creek enters the Columbia River 56.0 miles above the mouth, just below the town of Stella, Washington. The stream is 14.0 miles long and has a moderate gradient in the lower sections, becoming steeper above.

Native populations of coho were present in all lower Columbia River tributaries historically. Under the Columbia River Development program in the 1950s, salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap broodstock in many areas. Over time, broodstock, eggs, or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

Coho enter the Columbia River beginning in August and continue through December or January with the peak in September and October. Tributary spawning extends from October through at least February with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group is generally October through early November spawning and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. Germany Creek Coho are a mixed stock of composite production.

STOCK STATUS

The Germany Creek coho stock status is depressed based on chronically low production. Natural Spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production minor.

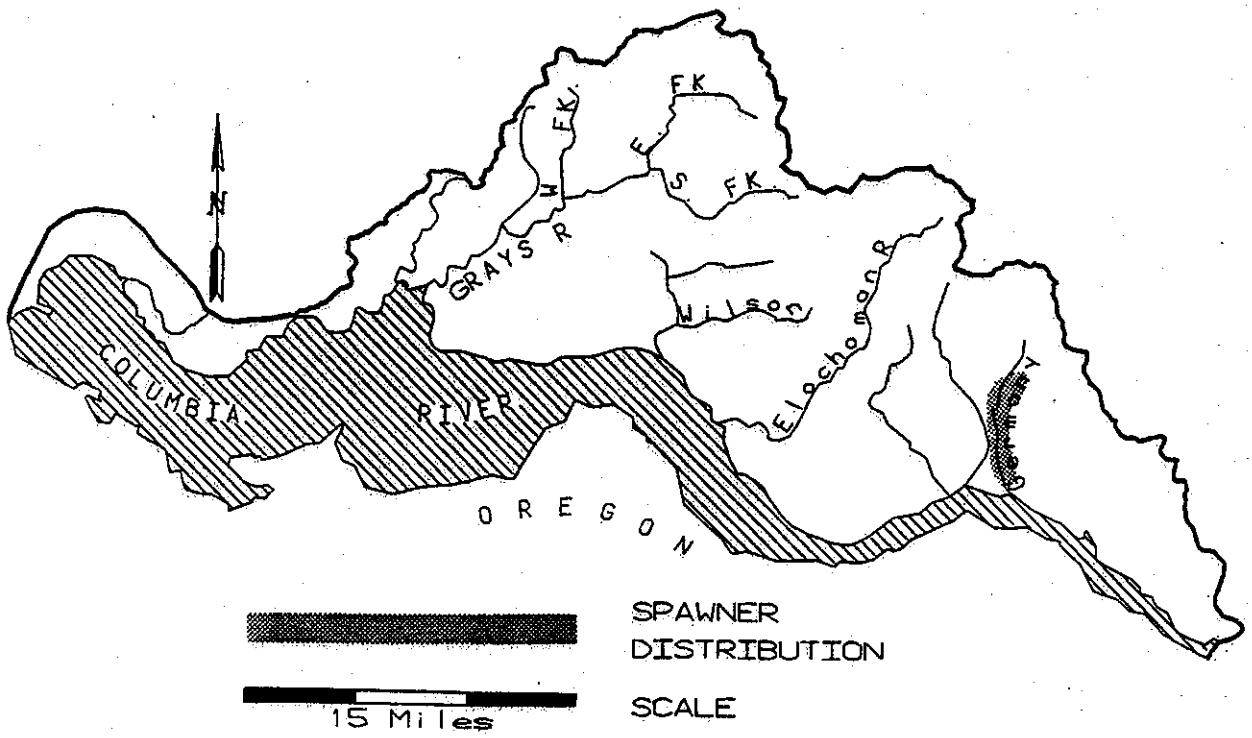
FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging in the upper reaches has resulted in numerous slope failures and sluice-outs of this

STOCK DEFINITION PROFILE for Germany Creek Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Germany Cr Coho

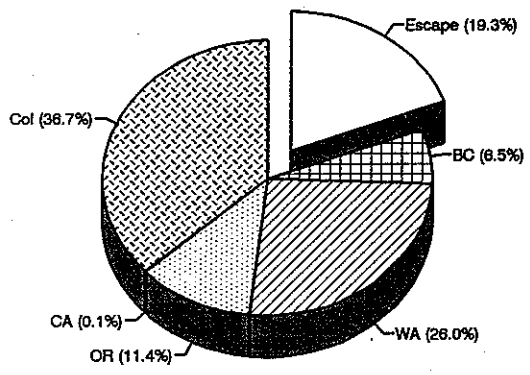
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-1985)



Based on Cowlitz River Hatchery 1982 brood late coho tag codes 63-29-12 through 63-29-41

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

stream and its tributaries. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Much of the sediment derived from these sluiceouts remains in the lower gradient reaches of the tributaries and in the mainstem. Columbia River habitat conditions are adequate.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, which can result in underescapement of natural spawning fish.

Tributary harvest - There is no salmon sport fishery in Germany Creek.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of coho based on coded-wire tag recoveries of 1988 brood early coho from the Toutle Hatchery revealed that most of the ocean catch occurred in Oregon (31.27%) and Washington (17.64%) followed by California (9.40%) and British Columbia (2.42%). Columbia River fisheries accounted for an additional 16.29% of the total harvest.

A harvest profile of coho based on coded-wire tag recoveries of 1982 brood late coho from the Cowlitz River Hatchery revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts negligible.

LOWER COLUMBIA -- COWLITZ COHO

STOCK DEFINITION AND ORIGIN

The Cowlitz River originates from the slopes and foothills of Mount Rainier and Mount Adams and the drainage encompasses 2,408 square miles. Coho were historically abundant and were probably present throughout the watershed. Washington Department of Fisheries (1951) estimated that coho escapement was about 32,500 fish. Since the completion of Mayfield Dam (RM 52.0) in 1963 and the Cowlitz Salmon Hatchery (RM 50.0) in 1967, the majority of the historical natural spawning habitat was blocked. Currently, natural spawning coho are found in most areas accessible to coho, especially in Olequa Creek that enters the Cowlitz River at RM 25.0. Smaller numbers of coho have been found in Lacamas, Brights, Ostrander, Blue, Otter, Mill, Arkansas, Foster, Stillwater, Campbell, and Hill creeks.

Typically, the late coho runs destined for the Cowlitz River sub-basin begin entering the Columbia River in mid-to-late September with mid-October considered the main migratory period. Tributary entry is late October through December. Spawning occurs from late October into January. Late coho (Type N) tend to be more northerly distributed in the ocean than the early (Type S) coho. Coho return as two-year-old jacks and three-year-old adults.

Presently, most coho in the Cowlitz River sub-basin are of hatchery origin. Devore (1987) accounted for the 1982 brood hatchery release and concluded wild/natural production was minor. Of 4,635 naturally spawning fish in the Cowlitz River sub-basin in 1985, an estimated 91.0% were thought to have originated from hatchery smolt releases. Hatchery fingerling releases could account for the additional natural spawning fish.

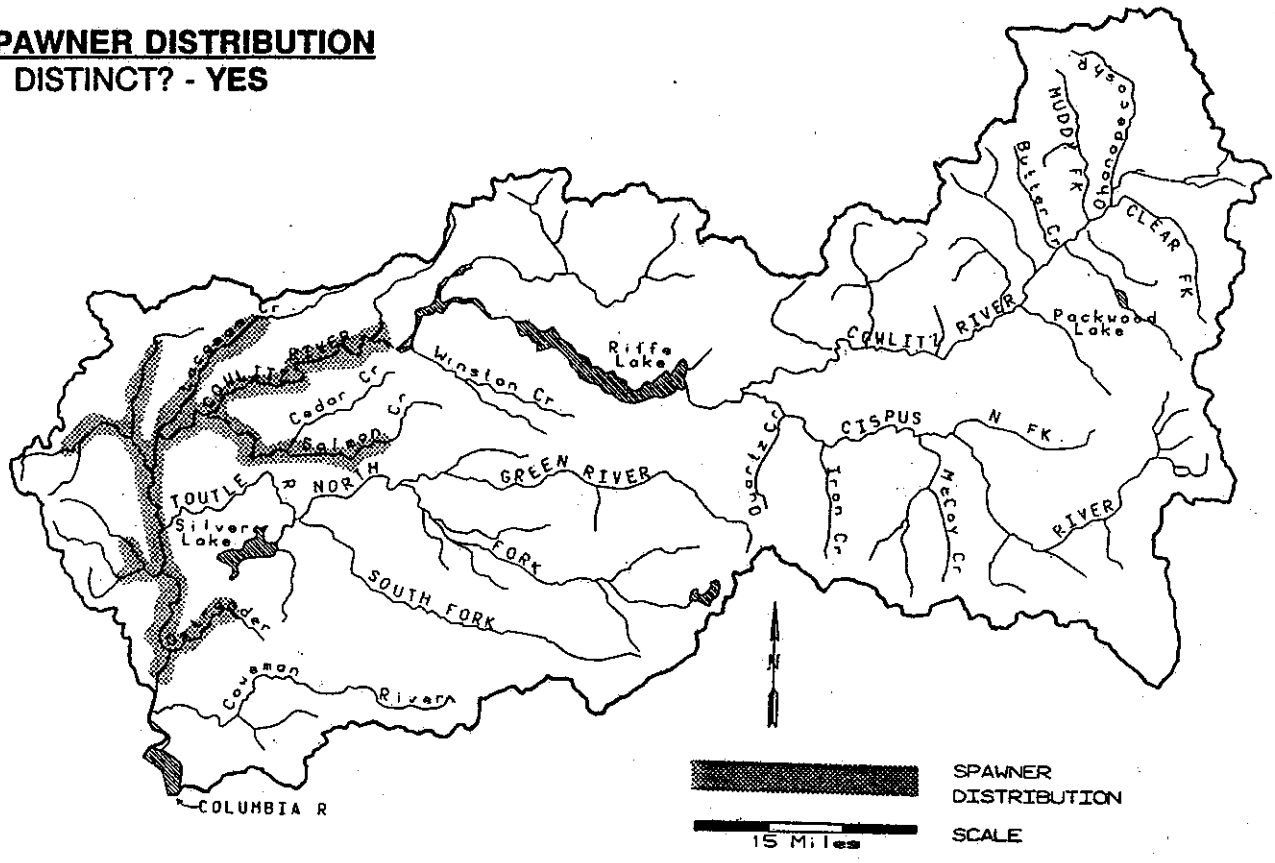
Hatchery coho have been planted in the sub-basin since at least 1915 when the Tilton River Hatchery operated downstream of Morton until 1921. Currently, brood stock is collected via hatchery rack returns. Cowlitz River coho natural spawners are a mixed stock of composite production. Mixing of stocks very likely began to occur as far back as 1915, with the first releases.

Late stock coho (Type N) are informally considered synonymous with Cowlitz River stock coho. Columbia River late stock hatchery programs were developed utilizing the Cowlitz River stock, their derivatives, or native late runs.

STOCK DEFINITION PROFILE for Cowlitz Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

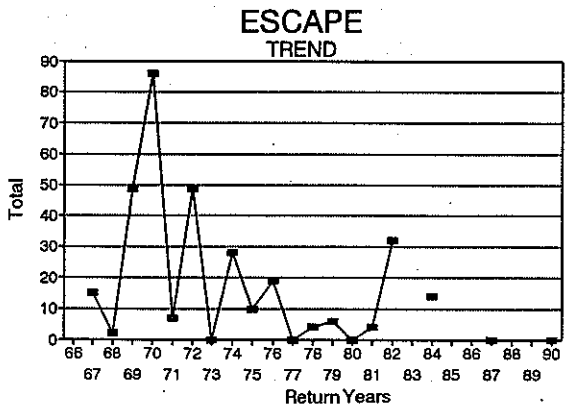
DISTINCT? - **NO**

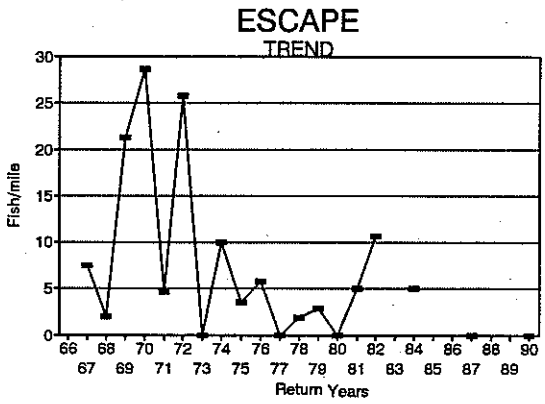
STOCK STATUS PROFILE for Cowlitz Coho

STOCK ASSESSMENT

DATA QUALITY------> Good

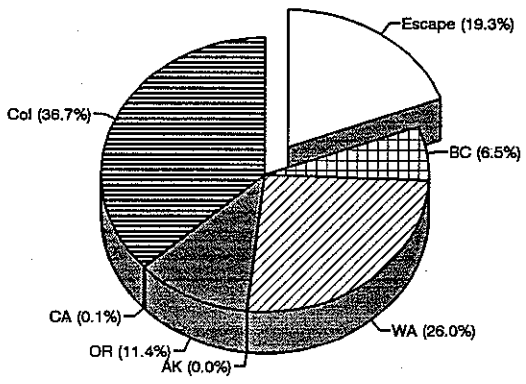
Return Years	ESCAPE Total	ESCAPE Fish/mile		
66				
67	15	7.5		
68	2	2.0		
69	49	21.3		
70	86	28.7		
71	7	4.7		
72	49	25.8		
73	0	0.0		
74	28	10.0		
75	10	3.6		
76	19	5.8		
77	0	0.0		
78	4	1.9		
79	6	2.9		
80	0	0.0		
81	4	5.0		
82	32	10.7		
83				
84	14	5.0		
85				
86				
87	0	0.0		
88				
89				
90	0	0.0		





AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-85)



Based on 1982 brood Cowlitz Hatchery late coho codes 63-29-12/41.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Genetic

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The Cowlitz River late coho stock status is depressed based on a long-term decline in escapement. Surveys conducted in Olequa Creek (including forks) show a range of zero to 40 fish/mile during 1952-1990. An average of 2.0 miles were surveyed annually; therefore, the average was 11 fish/mile.

The overall data base quality is good. However, Olequa Creek spawning ground surveys were conducted in only three of the past eight years.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Land use activities, primarily logging and secondarily agriculture have affected all these habitat conditions. The lower reaches of Arkansas Creek were severely damaged by the Mount St. Helens eruption and mudflow as was the lower Cowlitz River. Smolt survival may be affected by urban and industrial pollution near the Longview and Kelso. Dredging and bank protection works, along with loss of overwinter habitat may affect these stocks. Olequa, Stillwater and Campbell Creeks are still fair to good quality coho streams.

Harvest Management -- Coho in the Columbia River are managed primarily as a hatchery stock and relatively few hatchery fish are needed for hatchery escapement. Harvest rates outside the sub-basin can be high during years of large hatchery abundance. Natural spawning escapement is not very significant in most years. However, natural spawning of large numbers of hatchery fish does occur in some areas.

Tributary harvest - Tributary harvest of Cowlitz River sub-basin late coho occurs in the sport fishery. Adult coho harvest from the Cowlitz River during October and November has averaged 1,494 from 1986 through 1990 with a low of 583 in 1987 to a high of 2,431 in 1986. There is no sport fishery in Olequa Creek.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October. In-river commercial and sport harvest rates have averaged 65% between 1970 and 1991 with a low of 7% in 1983 and a high of 81% in 1986.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE COWLITZ BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3109493	8123720	0	204000	6613123
1983	3389000	5902800	0	0	9162399
1984	5755300	7494200	320	0	9872200
1985	3611900	5878723	5798500	1546000	3536600
1986	2974200	9122000	21400	1162250	11102400
1987	3648100	13891400	800	333350	10178100
1988	4714500	14557300	0	686200	7987600
1989	5785000	13217700	50000	214300	6932582
1990	2609892	12693800	52980	805600	9020800
1991	2772345	13808900	16856	740300	5190045
MEAN	3836973	10469054	848694	711500	7959585

LOWER COLUMBIA -- COWEEMAN COHO

STOCK DEFINITION AND ORIGIN

The Coweeman River is 33.0 miles long and enters the Cowlitz River 1.0 mile above the mouth on the left bank. The lower 4.0 miles of river, flowing through diked lowlands, is usually turbid, and since the bottom consists of mud and sand there is little available spawning area. The stream flows for the next 11.0 miles through a rather narrow valley that is canyon-like at intervals. The most extensive spawning areas are in the 8.0 mile section below the confluence of Mulholland Creek.

Native populations of coho were historically present in all lower Columbia River tributaries. Under the Columbia River Development program in the 1950s salmon hatchery construction was expanded on the lower Columbia River tributaries, and hatcheries began to trap broodstock in many areas. Over time, broodstock, eggs, or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

Coho enter the Columbia River beginning in August and continue through December or January with the peak in September and October. Tributary spawning extends from October through at least February, with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group is generally October through early November spawning and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. Coweeman River coho are a mixed stock of composite production. A number of tributaries of the Coweeman River have good coho production potential. Among these are Goble, Mulholland, and Baird creeks.

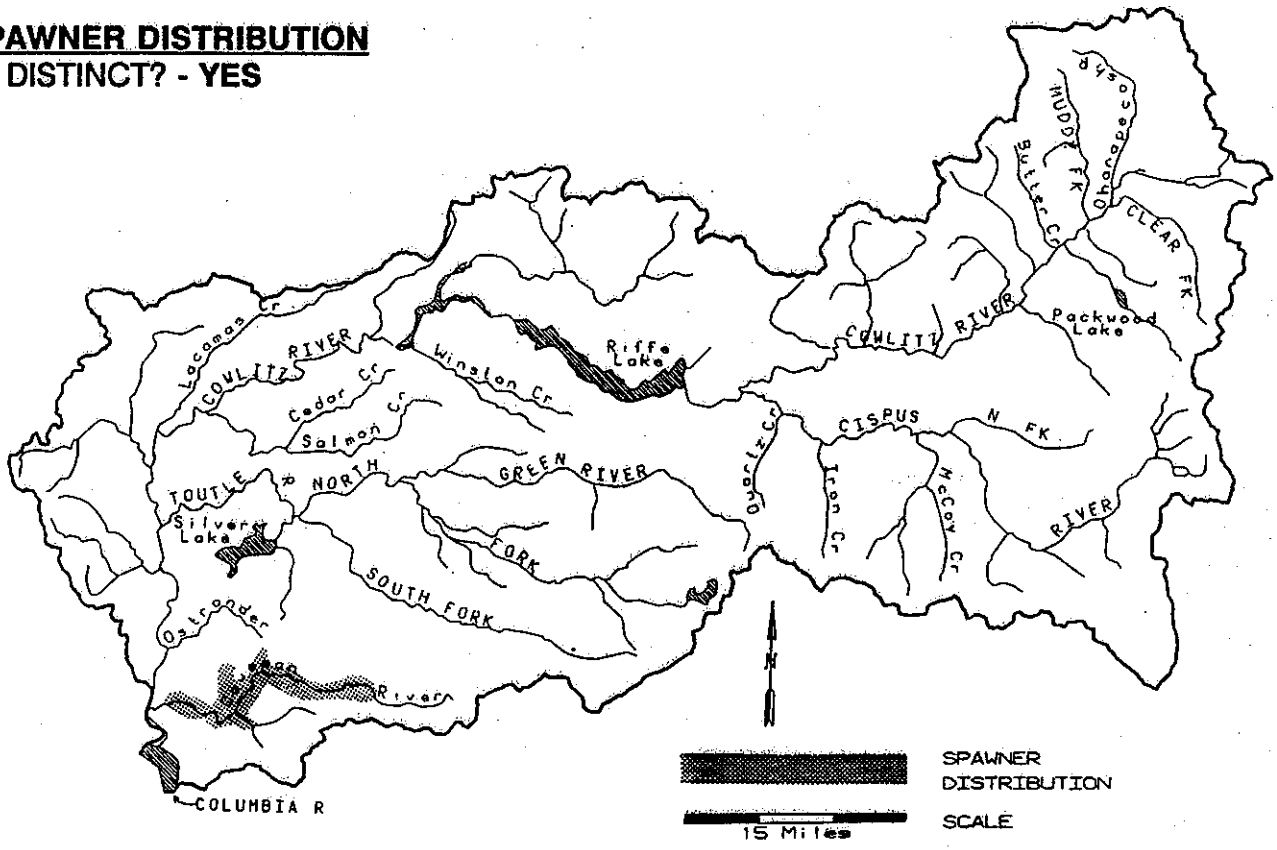
STOCK STATUS

The Coweeman River coho stock status is depressed based on escapement trend. Natural Spawning is presumed (through unpublished information) to be quite low, and subsequent juvenile below stream potential.

STOCK DEFINITION PROFILE for Coweeman Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Coweeman Coho

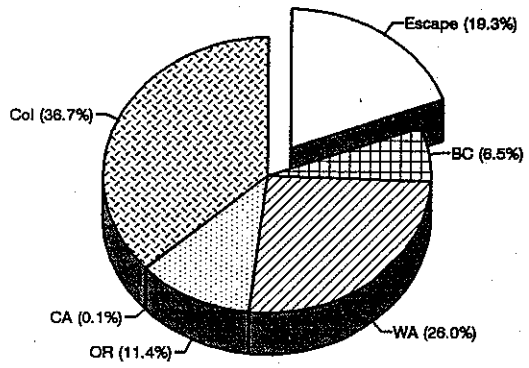
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-1985)



Based on Cowlitz River hatchery 1982 brood late coho tag codes 63-29-12 through 63-29-41

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging in the upper reaches has resulted in some slope failures and sluice-outs of this stream and its tributaries. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Much of the sediment derived from these sluice-outs remains in the lower gradient reaches of the tributaries and in the mainstem. The lower reaches of the river through the city of Kelso are contained within dikes which has precluded access to overwinter habitats. Smolt outmigration survival may be affected by urban and industrial pollution in the Columbia River. Nearshore habitats have been affected by navigational dredging and wetland fills with dredge spoils.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, which can result in underescapement of natural spawning fish.

Tributary harvest - The Coweeman River is only open to the jack salmon fishery.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Toutle River Hatchery early coho, based on coded-wire tag recoveries of the 1988 brood early coho, revealed that most of the ocean catch occurred in Oregon (31.27%) and Washington (17.64%) followed by California (9.40%) and British Columbia (4.05%). Columbia River fisheries accounted for an additional 22.99% of the total harvest. Escapement was 16.29% overall.

A harvest profile of Cowlitz River Hatchery late coho, based on coded-wire tag recoveries of the 1982 brood late coho, revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest. Escapement was 19.25% overall.

Hatchery -- Hatchery operational impacts negligible.

LAST TEN YEARS SALMON RELEASES INTO THE COWLITZ BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3109493	8123720	0	204000	6613123
1983	3389000	5902800	0	0	9162399
1984	5755300	7494200	320	0	9872200
1985	3611900	5878723	5798500	1546000	3536600
1986	2974200	9122000	21400	1162250	11102400
1987	3648100	13891400	800	333350	10178100
1988	4714500	14557300	0	686200	7987600
1989	5785000	13217700	50000	214300	6932582
1990	2609892	12693800	52980	805600	9020800
1991	2772345	13808900	16856	740300	5190045
MEAN	3836973	10469054	848694	711500	7959585

LOWER COLUMBIA -- TOUTLE COHO

STOCK DEFINITION AND ORIGIN

The Toutle River is approximately 17.0 miles long and enters the Cowlitz River at RM 20.0. Natural spawning occurs in Toutle River and all accessible tributaries. However, with the eruption of Mount St. Helens in 1980, a major portion of the spawning habitat in the Toutle River was destroyed.

Toutle River coho were historically abundant and were probably present throughout the watershed. Run-size of natural fish for 1972 through 1979 was estimated at 1,662 fish, based on average rack returns (14,406) representing 78% of the total and 9% being of natural origin, as on the Cowlitz River. Coho returns to the Toutle River are presently rebuilding after the 1980 volcanic eruption. Seeding the watershed with hatchery fingerlings began in 1983 and continues to date. Run-size of natural coho in the watershed is largely unknown, but is likely small.

Native populations of coho were historically present in all lower Columbia River tributaries. Under the Columbia River Development program in the 1950s, salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap broodstock in many areas. Over time, broodstock, eggs, or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

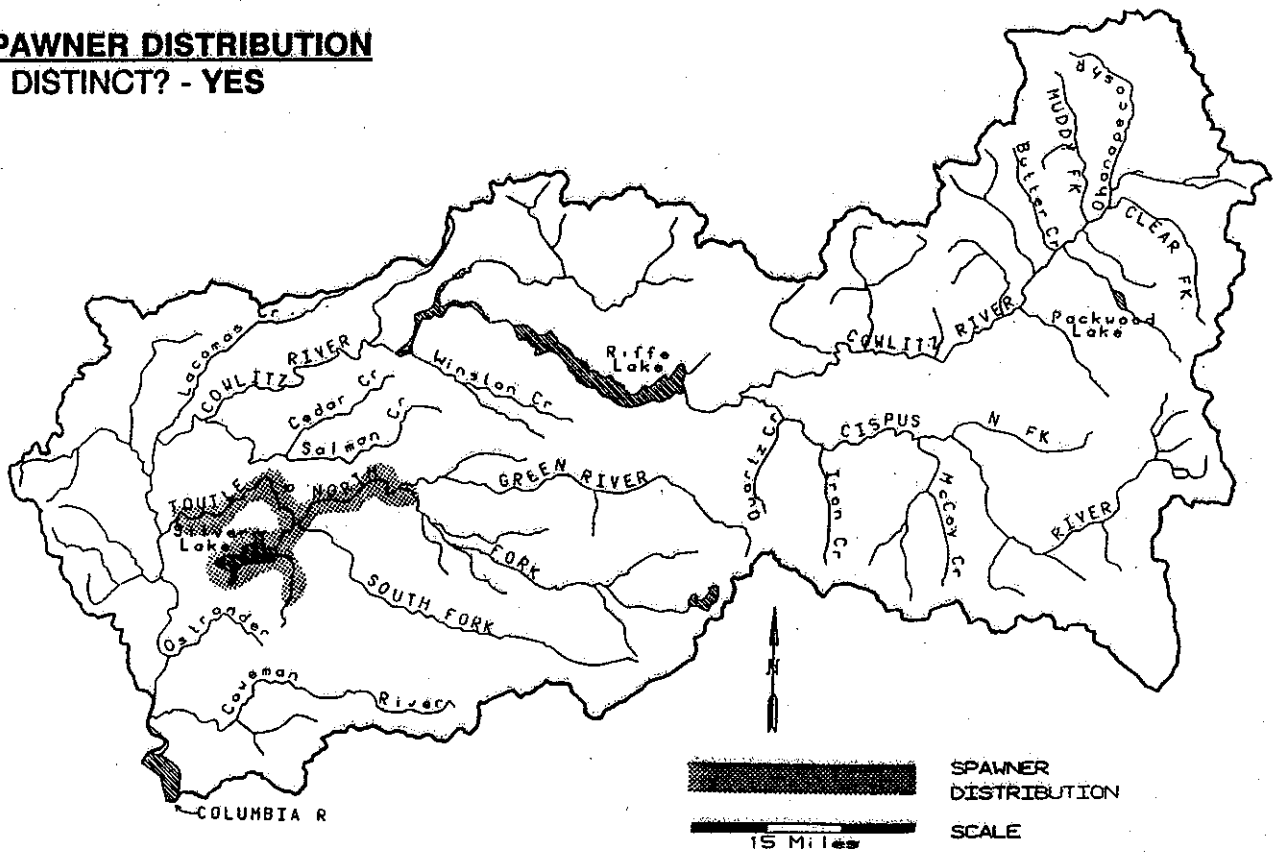
Coho enter the Columbia River beginning in August and continue through December or January with the peak in September and October. Tributary spawning extends from October through at least February with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group is generally October through early November spawning and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. Toutle River Coho are a mixed stock of composite production. The Toutle Hatchery on the Green River cultures early coho which have been planted throughout the basin. A number of tributaries in the Toutle River have good coho production potential. Among these are Stankey and Outlet Creek.

STOCK DEFINITION PROFILE for Toutle Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Toutle Coho

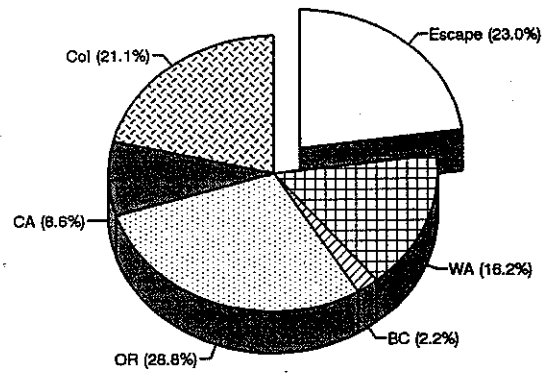
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1990-1991)



Based on Toutle River Hatchery 1988 brood early coho tag code 63-01-41

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The Toutle River coho stock status is depressed based on chronically low production. Natural spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging in the upper reaches has affected all these habitat conditions. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Most upriver mainstem and tributary habitat was also destroyed as a result of the eruption of Mount St. Helens. Subsequent recovery efforts including timber salvage and sediment removal further exacerbated this natural disaster. Access to the river and its tributaries above the mouth of the Green is impeded by a large sediment retention dam. A trap and haul facility is provided. Tributaries to Spirit Lake were completely obliterated by mudflow debris several hundred feet deep in places. A major tributary, Alder Creek was inundated by backwater and sediment in the sediment retention dam settling area. Mainstem Toutle tributaries are affected to a lesser extent by the eruption and by land uses such as agriculture and logging. Rehabilitation efforts mainly to improve access into or to provide off-channel overwinter habitat have been generally successful. Mainstem Toutle River, Cowlitz River, and Columbia River conditions are described in South Fork Toutle - Fall Chinook.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, which can result in underescapement of natural spawning fish.

Tributary harvest - Due to the eruption of Mount St. Helens in 1980 and concerns for hatchery escapement, the sport fishery was closed in 1982 and has not been reopened since.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish, primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Toutle River Hatchery early coho based on coded-wire tag recoveries of the 1988 brood early coho revealed that most of the ocean catch occurred in Oregon (28.75%) and Washington (16.22%) followed by California (8.64%) and British Columbia (2.23%). Columbia River fisheries accounted for an additional 21.14% of the total harvest. Escapement was 23.02% overall.

A harvest profile of Cowlitz River Hatchery coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest. Escapement was 19.25% overall.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE COWLITZ BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3109493	8123720	0	204000	6613123
1983	3389000	5902800	0	0	9162399
1984	5755300	7494200	320	0	9872200
1985	3611900	5878723	5798500	1546000	3536600
1986	2974200	9122000	21400	1162250	11102400
1987	3648100	13891400	800	333350	10178100
1988	4714500	14557300	0	686200	7987600
1989	5785000	13217700	50000	214300	6932582
1990	2609892	12693800	52980	805600	9020800
1991	2772345	13808900	16856	740300	5190045
MEAN	3836973	10469054	848694	711500	7959585

LOWER COLUMBIA -- SOUTH FORK TOUTLE COHO

STOCK DEFINITION AND ORIGIN

The South Fork Toutle River is approximately 32.0 miles long and enters the Toutle River at RM 17.0. The Toutle River enters the Cowlitz River at RM 20.0. Spawning occurs in The South Fork Toutle River and all accessible tributaries. With the eruption of Mount St. Helens in 1980, some of the spawning habitat in the South Fork Toutle River was destroyed.

Native populations of coho were historically present in all lower Columbia River tributaries. Under the Columbia River Development program in the 1950s, salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap broodstock in many areas. Over time, brood stock, eggs, or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

Coho enter the Columbia River beginning in August and continue through December or January with the peak in September and October. Tributary spawning extends from October through at least February, with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group is generally October through early November spawning, and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. South Fork Toutle River Coho are a mixed stock of composite production. The Toutle Hatchery on the Green River cultures early coho and have been planted throughout the basin. A number of tributaries in the South Fork Toutle River have good coho production potential. Among these are Johnson, Studebaker, Disappointment, and Herrington creeks.

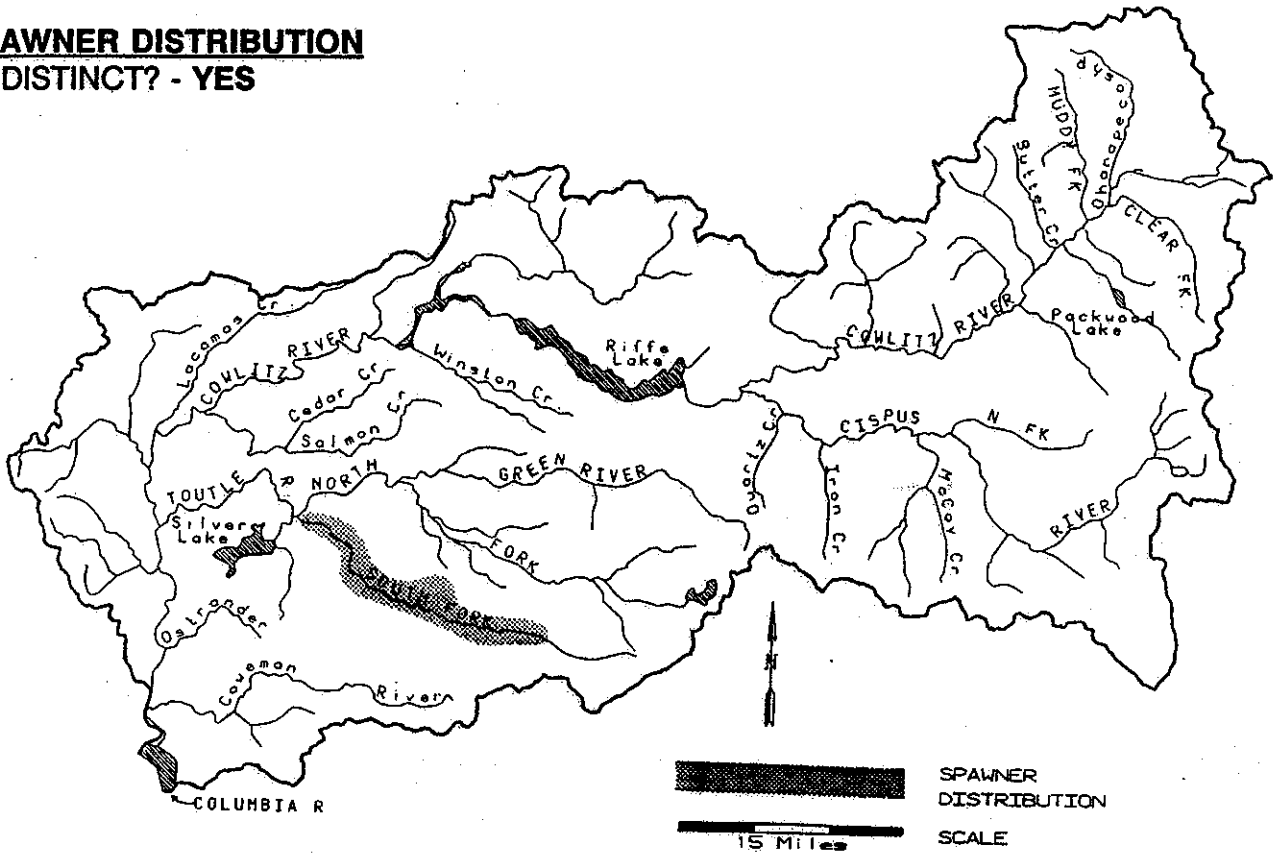
STOCK STATUS

The South Fork Toutle River coho stock status is depressed based on chronically low production. Natural Spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential.

STOCK DEFINITION PROFILE for South Fork Toutle River Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for SF Toutle Coho

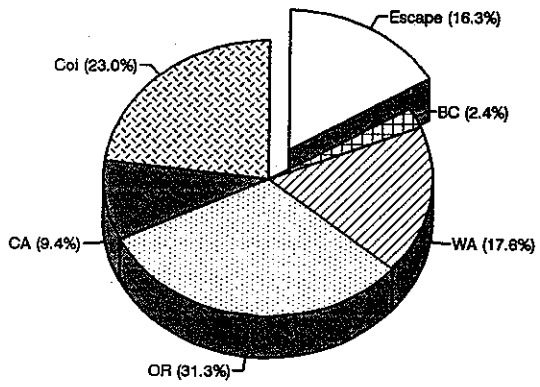
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1990-1991)



Based on Toutle River Hatchery 1988 brood early coho tag code 63-01-41

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- See South Fork Toutle - Fall Chinook. Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. In addition to mainstem impacts, its tributaries have been extensively logged. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Some off-channel, overwinter habitat work has been completed. Mainstem Toutle River, Cowlitz River, and Columbia River conditions are described in South Fork Toutle - Fall Chinook.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, which can result in underescapement of natural spawning fish.

Tributary harvest - Currently, there is no salmon sport fishery in the South Fork Toutle River.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish, primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Toutle River Hatchery early coho based on coded-wire tag recoveries of the 1988 brood early coho revealed that most of the ocean catch occurred in Oregon (28.75%) and Washington (16.22%) followed by California (8.64%) and British Columbia (2.23%). Columbia River fisheries accounted for an additional 21.14% of the total harvest. Escapement was 23.02% overall.

A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest. Escapement was 19.25% overall.

Hatchery -- Hatchery operational impacts negligible.

LAST TEN YEARS SALMON RELEASES INTO THE COWLITZ BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3109493	8123720	0	204000	6613123
1983	3389000	5902800	0	0	9162399
1984	5755300	7494200	320	0	9872200
1985	3611900	5878723	5798500	1546000	3536600
1986	2974200	9122000	21400	1162250	11102400
1987	3648100	13891400	800	333350	10178100
1988	4714500	14557300	0	686200	7987600
1989	5785000	13217700	50000	214300	6932582
1990	2609892	12693800	52980	805600	9020800
1991	2772345	13808900	16856	740300	5190045
MEAN	3836973	10469054	848694	711500	7959585

LOWER COLUMBIA -- GREEN (TOUTLE) COHO

STOCK DEFINITION AND ORIGIN

The Green River is approximately 37.0 miles long and enters the North Fork Toutle River at RM 11.3. The Toutle River enters the Cowlitz River at RM 20.0. Natural spawning occurs in the Green River and all accessible tributaries. With the eruption of Mount St. Helens in 1980, some of the spawning habitat in the lower Green River was destroyed.

Native populations of coho were historically present in all lower Columbia River tributaries. Under the Columbia River Development program in the 1950s, salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap broodstock in many areas. Over time, broodstock, eggs, or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

Coho enter the Columbia River beginning in August and continue through December or January, with the peak in September and October. Tributary spawning extends from October through at least February with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early group is generally October through early November spawning, and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery.. Green River Coho are a mixed stock of composite production. The Toutle Hatchery on the Green River cultures early coho which have been planted throughout the basin. The lower 20.0 miles of the Green River and a number of tributaries have good coho production potential. Among these are Devils Creek, Elk Creek, and Schultz Creek.

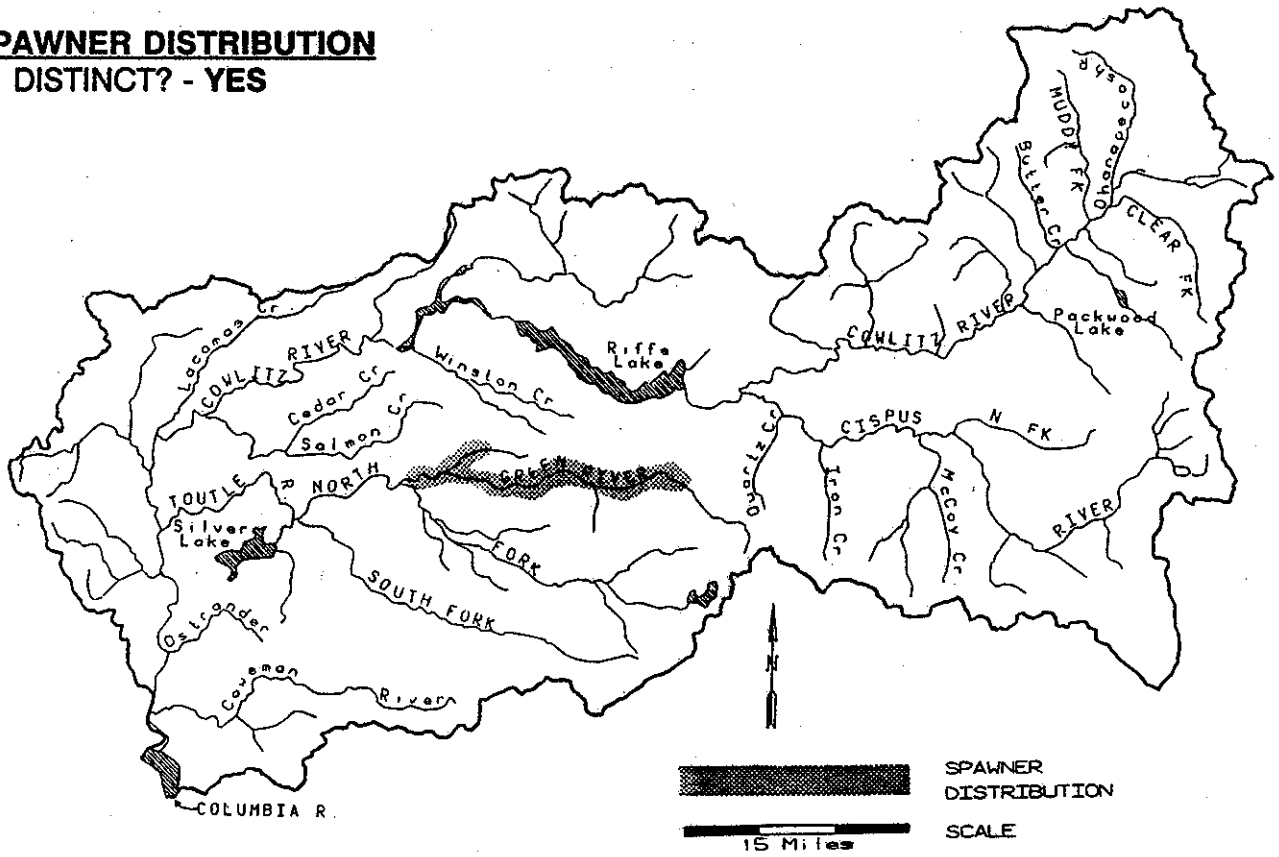
STOCK STATUS

The Green River coho stock status is depressed based on chronically low production. Natural spawning is presumed (through unpublished information) to be quite low, and subsequent juvenile production below stream potential.

STOCK DEFINITION PROFILE for Green R (Toutle) Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Green (Toutle) Coho

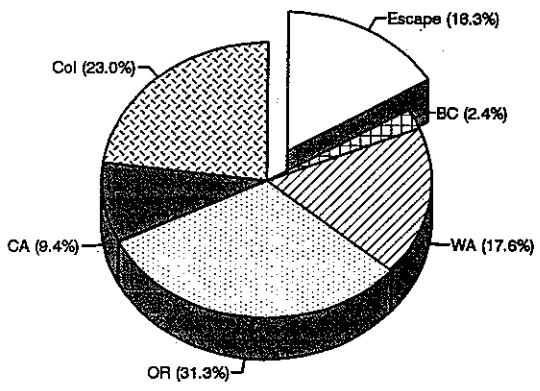
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1990-1991)



Based on Toutle River Hatchery 1988 brood early coho tag code 63-01-41

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- See Green - Fall Chinook. Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. In addition, tributaries have been extensively logged. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Elk Creek, the best stream in the Green for coho production has had passage provided at a falls near its mouth. Mainstem Toutle River, Cowlitz River, and Columbia River conditions are described in South Fork Toutle - Fall Chinook.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed which can result in underescapement of natural spawning fish.

Tributary harvest - Due to the eruption of Mount St. Helens in 1980 and concerns for hatchery escapement, the sport fishery was closed from 1981 to 1988. The sport fishery in the Green River was reopened in 1989 but harvest of adult coho has been minimal.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish, primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Toutle River Hatchery early coho based on coded-wire tag recoveries of the 1988 brood early coho revealed that most of the ocean catch occurred in Oregon (28.75%) and Washington (16.22%) followed by California (8.64%) and British Columbia (2.23%). Columbia River fisheries accounted for an additional 21.14% of the total harvest. Escapement was 23.02% overall.

A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (28.75%) and Oregon (16.22%) followed by British Columbia (8.64%) and California (2.23%). Columbia River fisheries accounted for an additional 21.14% of the total harvest. Escapement was 23.02% overall.

Hatchery -- Hatchery operational impacts not determined. Weir blocks passage except during high water. Coho are routinely passed upstream.

LAST TEN YEARS SALMON RELEASES INTO THE COWLITZ BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3109493	8123720	0	204000	6613123
1983	3389000	5902800	0	0	9162399
1984	5755300	7494200	320	0	9872200
1985	3611900	5878723	5798500	1546000	3536600
1986	2974200	9122000	21400	1162250	11102400
1987	3648100	13891400	800	333350	10178100
1988	4714500	14557300	0	686200	7987600
1989	5785000	13217700	50000	214300	6932582
1990	2609892	12693800	52980	805600	9020800
1991	2772345	13808900	16856	740300	5190045
MEAN	3836973	10469054	848694	711500	7959585

LOWER COLUMBIA -- KALAMA COHO

STOCK DEFINITION AND ORIGIN

The Kalama sub-basin begins on the southwest slopes of Mount St. Helens and flows 44.5 miles west-southwest to enter the Columbia River at RM 73.0. Drainage is about 205 square miles and headwaters begin in Skamania County, although the majority of the basin is in Cowlitz County. There are two hatcheries in the sub-basin that produce coho. The lower Kalama Hatchery at RM 4.3 and Kalama Falls Hatchery at RM 10.0.

Typically, coho begin entering the Kalama River in early September and continue entering the sub-basin through February. Spawning occurs from mid-October through February. Coho are thought to spawn in all available tributaries, though escapement figures are unknown. Coho return as two-year-old jacks and three-year-old adults.

A native population of coho was noted to be in existence in the Kalama River in 1951 by the Washington Department of Fisheries. The native population was estimated to be about 3,000 fish. Both early-returning and late-returning fish were present (WDW, 1990). Hatchery coho have been planted in the sub-basin since 1942 from the Lower Kalama Salmon Hatchery. Brood stock is collected via hatchery rack returns. Kalama River natural spawners are a mixed stock of composite production. Mixing of stocks very likely began to occur with the first releases.

The Lower Kalama Hatchery was completed in 1895 and subsequent harvest management for hatchery productivity in the region has been a dominating factor affecting natural production. The Kalama River Hatchery (RM 10.0) was completed in 1959. Unpublished information suggests coho spawn in most accessible tributaries. Escapement figures are not known since no directed surveys are done. In 1936 a fish ladder was built at the Kalama falls and by 1951 coho were observed above the falls but numbers are unknown and distribution is probably throughout the watershed. A number of tributaries provide good coho production potential including Fallert Creek, Little Kalama River, and Arnold Creek.

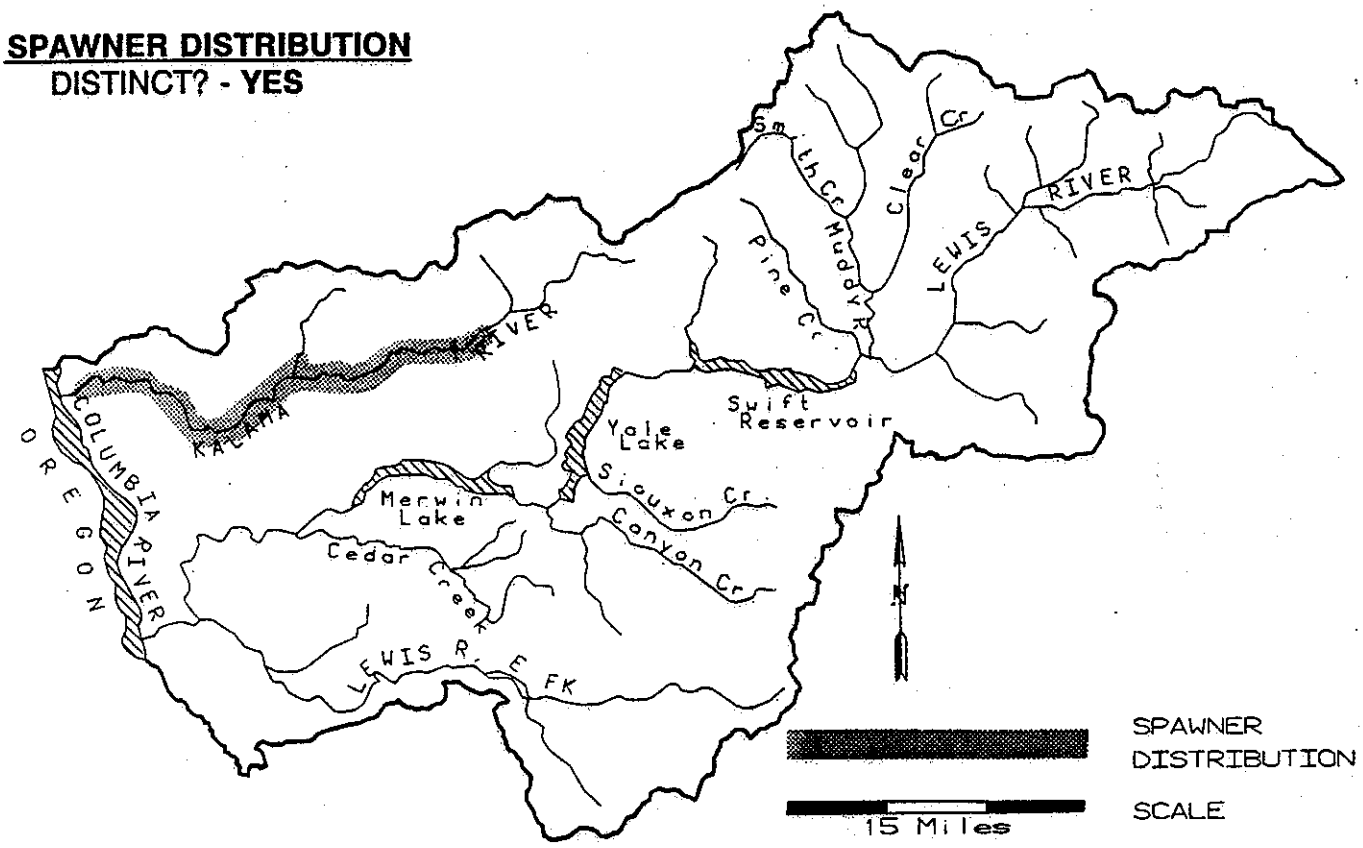
STOCK STATUS

The Kalama River coho stock status is depressed based on chronically low production. Natural spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential.

STOCK DEFINITION PROFILE for Kalama Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Kalama Coho

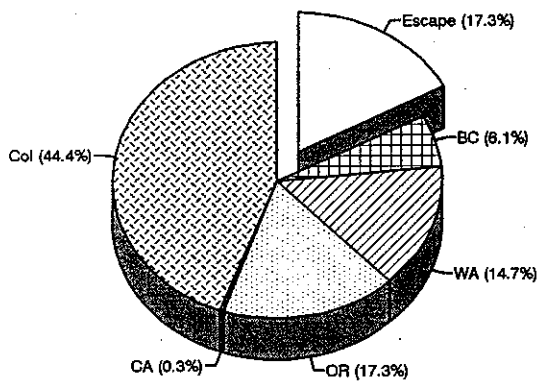
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1985-1986)



Based on Kalama Falls Hatchery 1983 brood late coho tag codes 63-31-56 and 63-31-57

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- See Kalama - Spring Chinook. Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. In addition tributaries have been extensively logged. Riparian zone vegetation is simple and in early successional stages. Summer stream temperatures are elevated as a result. Instream stable large woody debris is lacking and future recruitment trees are infrequent. Smolt outmigration survival may be affected by urban and industrial pollution in the Columbia River. Nearshore habitats have been affected by navigational dredging and wetland fills with dredge spoils.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed which can result in underescapement of natural spawning fish.

Tributary harvest - Tributary harvest of Kalama River sub-basin coho occurs in the sport fishery. Adult coho harvest from the Kalama River during October and November has averaged 1,272 from 1979 through 1986 with a low of 294 in 1985 to a high of 5,525 in 1980.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish, primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Kalama River Hatchery early coho based on coded-wire tag recoveries of the 1988 brood revealed that most of the ocean catch occurred in Oregon (29.92%) and Washington (17.31%) followed by California (9.79%) and British Columbia (1.88%). Columbia River fisheries accounted for an additional 19.39% of the total harvest. Escapement was 21.71% overall.

A harvest profile of Kalama River Hatchery late coho based on coded-wire tag recoveries of the 1983 brood revealed that most of the ocean catch occurred in Oregon (17.26%) and Washington (14.68%) followed by British Columbia (6.09% and California (0.29%). Columbia River fisheries accounted for an additional 44.37% of the total harvest. Escapement was 17.31% overall.

Hatchery -- Hatchery operational impacts not determined. Weir in lower river blocks upstream passage of early returning coho. A portion of these fish are routinely passed upstream. Fish trap in middle river also impedes upstream passage, but these fish are also passed upstream.

LOWER COLUMBIA -- LEWIS COHO

STOCK DEFINITION AND ORIGIN

The Lewis River headwaters arise from the southern flanks of Mount Adams and Mount St. Helens. The mainstem of the river, also known as the North Fork Lewis River, flows southwesterly from its source in Skamania County through three impoundments, Merwin Lake at RM 19.0, Yale Lake (RM 34.0) and Swift Creek Reservoir (RM 48.0). A major tributary, East Fork Lewis River, enters the mainstem at RM 3.0. From this point the Lewis River continues west, entering the Columbia River at RM 88.0. Lewis River Hatchery is located at RM 12.0. Speelyai Hatchery is located at Speelyai Bay on Merwin Reservoir.

The Lewis River historically has had excellent runs of coho salmon. Before the construction of Merwin Dam in 1931, coho spawned in the headwater tributaries Pine Creek (RM 59.0) and those of the Muddy River (RM 60.0), including Clearwater and Clear creeks. Despite the blockage of the river by the dam, coho continued to return in good numbers, in part due to the successful hatchery program started in 1930. In 1949, Bryant described the Lewis River as one of the most important producers of coho in the Columbia basin. In 1951, the Washington Department of Fisheries estimated coho escapement to the river to be about 15,000 fish, with 10,000 entering the North Fork and 5,000 entering the East Fork. After Merwin Dam was built, but before Yale Dam was constructed, coho returning to the North Fork were trapped immediately below the dam and released into the reservoir to utilize upstream habitat. Coho currently spawn in the mainstem Lewis River from Merwin Dam downstream and in the following tributaries: Ross Creek, Cedar Creek, North and South Forks Chelatchie Creek, Johnson Creek, and Colvin Creek.

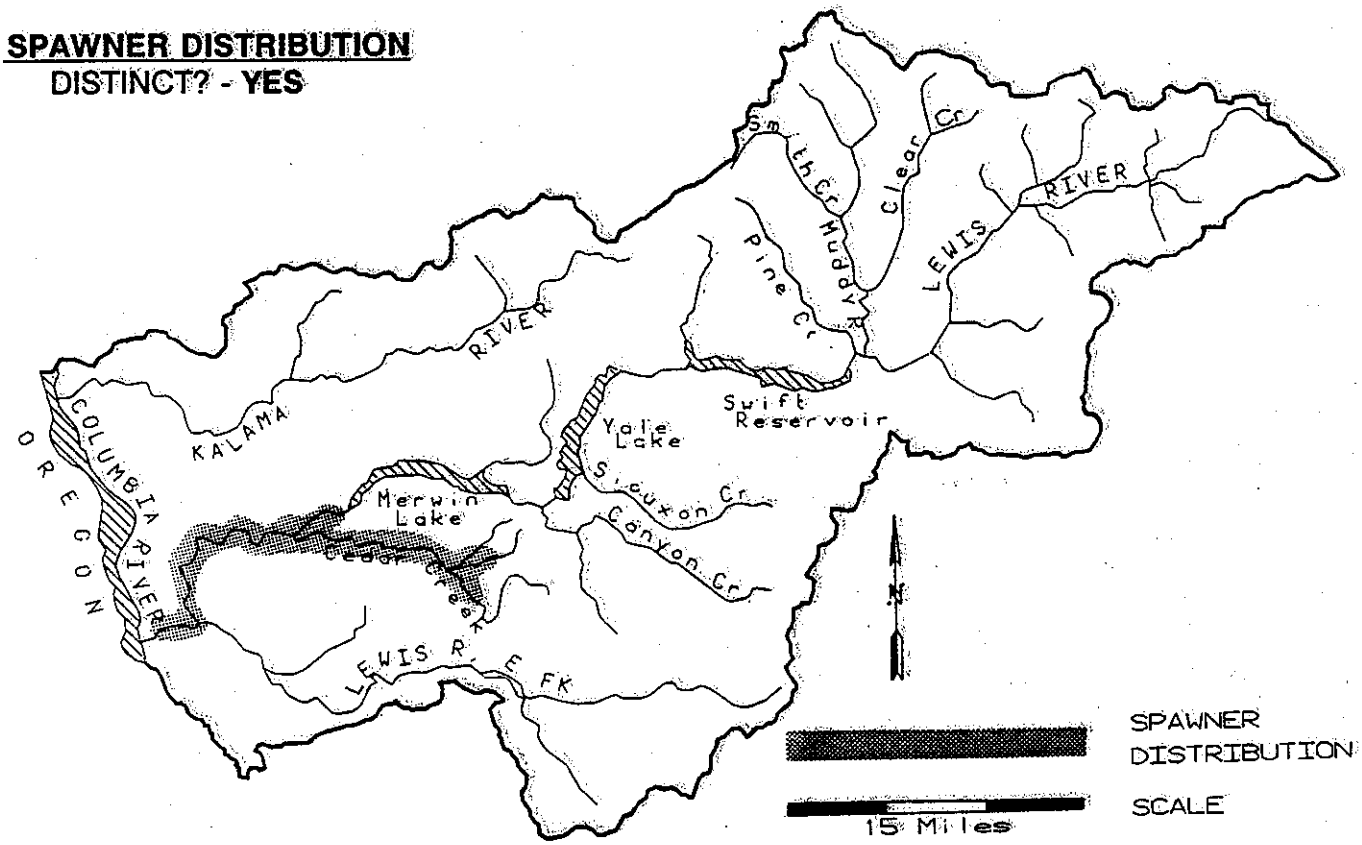
Typically, coho run begins entering the Columbia River in August and continues through December or January with the peak in September and October. Tributary spawning extends from October through at least February, with a peak in October through December. Coho return as two-year-old jacks and three-year-old adults.

Native populations of coho were historically present in the Lewis River. Presently, coho returning to the Lewis River are managed on a hatchery stock basis. Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early

STOCK DEFINITION PROFILE for Lewis Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

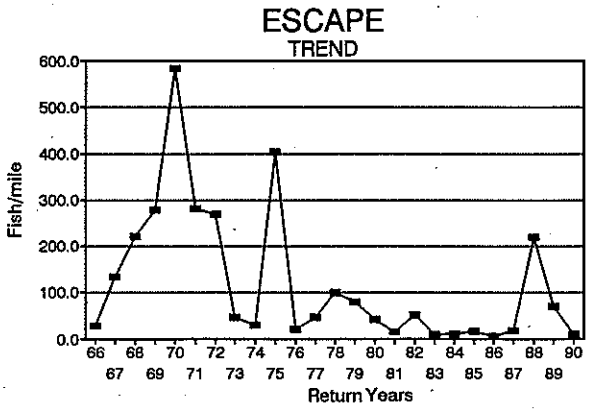
DISTINCT? - **NO**

STOCK STATUS PROFILE for Lewis Coho

STOCK ASSESSMENT

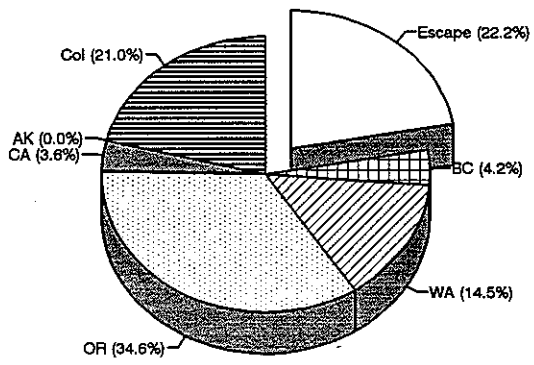
DATA QUALITY------> Good

Return Years	ESCAPE Fish/mile			
66	28.0			
67	133.0			
68	221.0			
69	279.0			
70	584.0			
71	281.0			
72	268.0			
73	46.0			
74	29.0			
75	404.0			
76	21.0			
77	47.0			
78	100.0			
79	80.0			
80	43.0			
81	15.0			
82	52.0			
83	8.0			
84	10.0			
85	17.0			
86	5.0			
87	18.0			
88	220.0			
89	70.0			
90	9.0			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1987-1989)



Based on Lewis River Hatchery 1985-1986 brood early coho tag codes 63-37-01, 63-37-02, 63-44-50

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

group is generally October through early November spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. Lewis River Coho are a mixed stock of composite production. Mixing of stocks very likely began to occur when hatchery supplantation started.

STOCK STATUS

The Lewis River coho stock status is depressed based on a long-term decline in escapement. Spawning ground index surveys are conducted in the North and South Fork Chelatchie Creek, Johnson Creek, and Cedar Creek from 1944-1990 has averaged 85 fish/mile with a low of 1 fish/mile in 1952 and a peak of 584 fish/mile in 1970. An average of 4.4 miles were surveyed annually. Data is lacking from 1947 to 1950 but overall the data quality is good.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging and agriculture affect these habitat conditions. In addition, diking, channelization, and gravel removal in the lower river may affect juvenile survival. Smolt outmigration survival may be affected by urban and industrial pollution in the Columbia River. Nearshore habitats have been affected by navigational dredging and wetland fills with dredge spoils.

Harvest Management -- Coho in the Columbia River are managed primarily as a hatchery stock and relatively few hatchery fish are needed for hatchery escapement. Harvest rates outside the sub-basin can be high during years of large hatchery abundance. Natural spawning escapement is not very significant in most years. However, natural spawning of large numbers of hatchery fish does occur in some areas.

Tributary harvest - Lewis River sport fishery occurs from Merwin Dam downstream but is concentrated at the mouth of Cedar Creek. There is no fishery in Cedar or Chelatchie creeks. Adult coho harvest in the Lewis River during October and November has averaged 2,738 during 1986 through 1990 with a low of 827 in 1987 to a peak of 3,940 in 1986.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the catch in the Buoy 10 catch is comprised of early stock coho primarily because the fishery peaks mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Lewis River Hatchery early coho based on coded-wire tag recoveries of the 1985-1986 brood early coho revealed that most of the ocean catch occurred in Oregon (34.56%) and Washington (14.46%) followed by British Columbia harvest (4.18%) and California (3.55%). Columbia River fisheries accounted for an additional 21.01% of the total harvest. Escapement was 22.24% overall.

A harvest profile of Cowlitz River Hatchery late Coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE LEWIS BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	1016941	10701238	0	2414746	4760118
1983	0	2618200	0	1273320	4231210
1984	1202600	4623575	0	1336623	4219700
1985	1641800	8003620	0	2843900	6810756
1986	1451080	9052384	4720	2597000	6844600
1987	1077690	7068900	0	1904909	7729800
1988	1025700	8388700	0	2156350	4981400
1989	1036000	6320010	0	3381840	10758600
1990	482812	6380363	0	2961150	4670170
1991	1820692	6742380	0	2548428	5667900
MEAN	1195035	6989937	4720	2341827	6067425

LOWER COLUMBIA -- EAST FORK LEWIS COHO

STOCK DEFINITION AND ORIGIN

The Lewis River headwaters arise from the southern flanks of Mount Adams and Mount St. Helens. The mainstem of the river, also known as the North Fork Lewis River flows southwesterly from its source in Skamania County through three impoundments, Merwin Lake at RM 19.0, Yale Lake (RM 34.0) and Swift Creek Reservoir (RM 48.0). A major tributary, East Fork Lewis River, enters the mainstem at RM 3. From this point the Lewis River continues west, entering the Columbia River at RM 88.0. Lewis River Hatchery is located at RM 12.0. Speelyai Hatchery is located at Speelyai Bay on Merwin Reservoir. Johnson Creek and Cedar Creek enter the North Fork Lewis River at RM 15.0 and RM 12.0, respectively. Both the North and South Forks Chelatchie Creek are tributaries of Cedar Creek.

The Lewis River historically has had excellent runs of coho salmon. Before the construction of Merwin Dam in 1931, coho spawned in the headwater tributaries Pine Creek (RM 59.0) and those of the Muddy River (RM 60.0), including Clearwater and Clear creeks. Despite the blockage of the river by the dam, coho continued to return in good numbers, in part due to the successful hatchery program started in 1930. In 1949, Bryant described the Lewis River as one of the most important producers of coho in the Columbia basin. In 1951, the Washington Department of Fisheries estimated coho escapement to the river to be about 15,000 fish, with 10,000 entering the North Fork and 5,000 entering the East Fork. After Merwin Dam was built, but before Yale Dam was constructed, coho returning to the North Fork were trapped immediately below the dam and released into the reservoir to utilize upstream habitat.

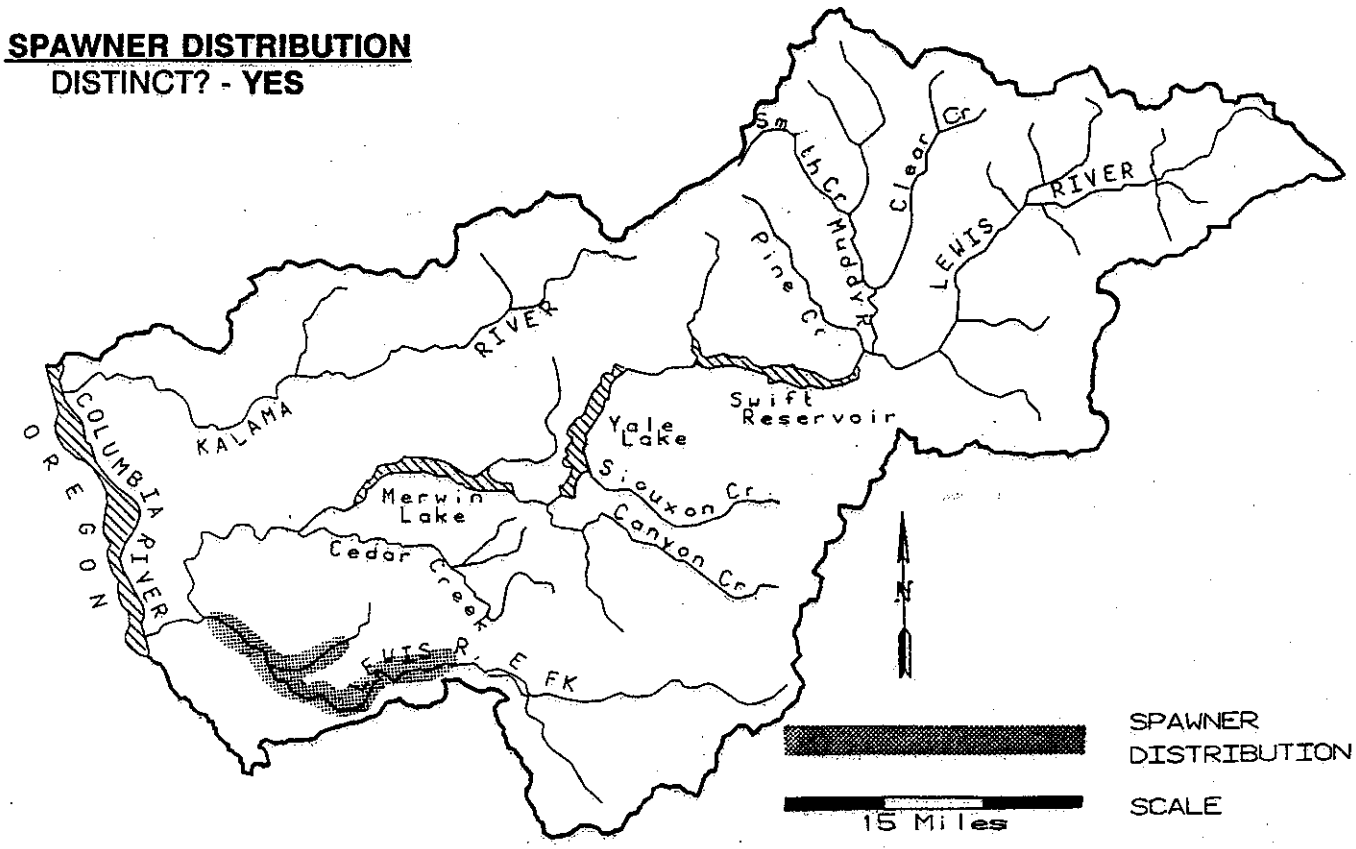
Typically, the early coho run begins entering the Columbia River in August to mid-October with September considered the main migratory period in the mainstem Columbia River. Tributary entry is late September through October. Spawning will extend from October through early November. Coho return as two-year-old jacks and three-year-old adults.

Native populations of coho were historically present in the Lewis River. Presently, early stock coho returning to the Lewis River are managed on a hatchery stock basis. Early stock coho (Type-S) are informally considered synonymous with Toutle River stock coho. Early stock hatchery programs were developed utilizing Toutle River stock, their derivatives, or native early runs. Early coho used in most of the current programs are presumably a blend of all of these.

STOCK DEFINITION PROFILE for East Fork Lewis Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for EF Lewis Coho

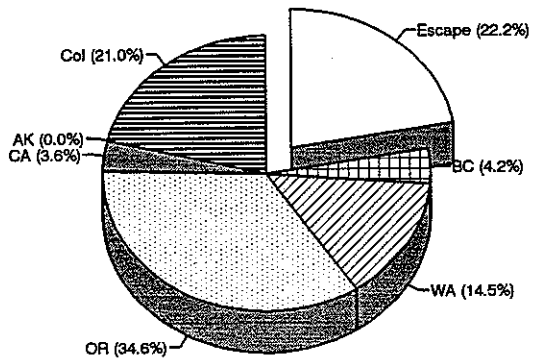
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1987-1989)



Based on Lewis River Hatchery 1985-86 brood early coho tag codes 63-37-01, 63-37-02, and 63-44-50

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

The Lewis River early stock coho are a hybrid stock. A native population of early coho was in existence in the Lewis River prior to the construction of the salmon hatcheries. Mixing of stocks very likely began to occur when hatchery supplementation was initiated.

STOCK STATUS

The Lewis River early coho stock status is healthy. Surveys conducted in the North and South Fork Chelatchie Creek, Johnson Creek, and Cedar Creek from 1944-1990 has averaged 85 fish/mile with a low of 1 fish/mile in 1952 and a peak of 584 fish/mile in 1970. An average of 4.4 miles were surveyed annually. Data is lacking from 1947 to 1950 but overall the data quality is good.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Logging and agriculture affect these habitat conditions. In addition, diking, channelization, and gravel removal in the lower river may affect juvenile survival. Smolt outmigration survival may be affected by urban and industrial pollution in the Columbia River. Nearshore habitats have been affected by navigational dredging and wetland fills with dredge spoils.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, which can result in underescapement of natural spawning fish.

Tributary harvest - Tributary harvest of East Fork Lewis sub-basin coho occurs in the sport fishery. Adult coho harvest from the East Fork has averaged 40 from 1982 through 1989, excluding 1987 and 1988, with a low of 12 in 1989 to a high of 91 in 1982.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of coho based on coded-wire tag recoveries of 1985, and 1986 brood early coho from the Lewis River Hatchery revealed that most of the ocean catch occurred in Oregon (34.56%) and Washington (14.46%), followed by British Columbia (4.18%) and California (3.55%). Columbia River fisheries accounted for an additional 21.01% of the total harvest.

A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho, revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%), followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts negligible.

LAST TEN YEARS SALMON RELEASES INTO THE LEWIS BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	1016941	10701238	0	2414746	4760118
1983	0	2618200	0	1273320	4231210
1984	1202600	4623575	0	1336623	4219700
1985	1641800	8003620	0	2843900	6810756
1986	1451080	9052384	4720	2597000	6844600
1987	1077690	7068900	0	1904909	7729800
1988	1025700	8388700	0	2156350	4981400
1989	1036000	6320010	0	3381840	10758600
1990	482812	6380363	0	2961150	4670170
1991	1820692	6742380	0	2548428	5667900
MEAN	1195035	6989937	4720	2341827	6067425

LOWER COLUMBIA -- SALMON CREEK COHO

STOCK DEFINITION AND ORIGIN

The Salmon Creek basin is centrally located in Clark County in southwest Washington. The watershed drains from the west slope of the Cascade Range into Lake River, which enters the Columbia River at RM 87.6. Salmon Creek is a low gradient stream averaging 0.24% for the lower 22.0 miles of its 26.4 mile length. The upper drainage is steeper gradient with small narrow valleys, while most of the basin drains the flat alluvial plain of central Clark County.

The Salmon Creek basin has been significantly altered from its natural condition. Decades of agricultural and urban development have substantially depleted salmonid fish runs and habitat. This has long been recognized by the Washington Department of Wildlife and Washington Department of Fisheries and substantiated by historical records indicating a steady decline in fish populations.

Native populations of coho were present in all lower Columbia River tributaries historically. Under the Columbia River Development program in the 1950s, salmon hatchery construction was expanded on the lower Columbia River tributaries and hatcheries began to trap broodstock in many areas. Over time, broodstock, eggs, or juvenile coho were transferred throughout the lower Columbia River stations and also to areas above Bonneville Dam. Hatchery off-station planting of juvenile coho was commonplace throughout the lower Columbia tributaries. Most significant streams have received coho plantings. The result is a widely mixed coho stock.

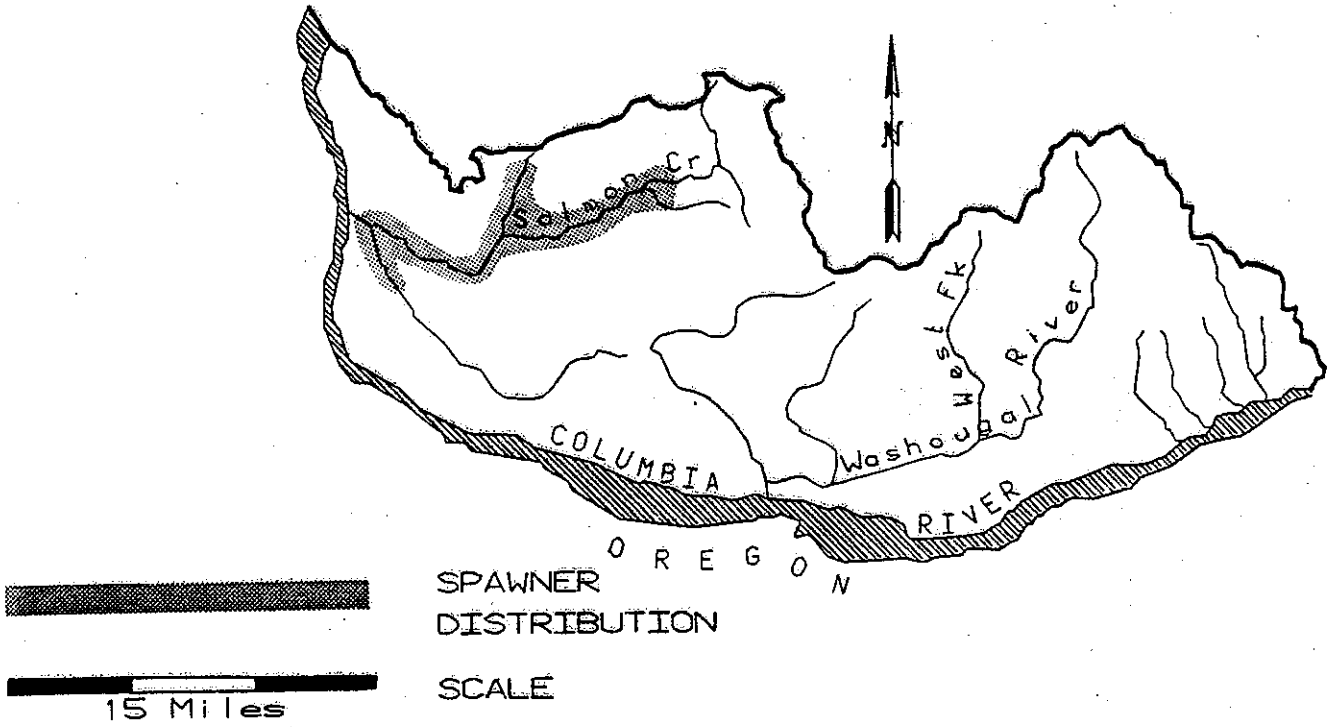
Coho enter the Columbia River beginning in August and continue through December or January with the peak in September and October. Tributary spawning extends from October through at least February with a peak in October through December.

Hatchery culture has attempted to stratify coho production into two groups, "early" and "late" coho, to meet harvest management requirements. The early is generally October the early November spawning and the late group is generally late November and December spawning. Most all Columbia River basins probably still support a complete time range of coho from early to late spawners. However, the dominant group in a particular basin probably follows the dominant timed group which is cultured in a nearby hatchery. Salmon Creek coho are a mixed stock of composite production. A number of tributaries in the basin provide good coho production potential including: upper Morgan Creek, Rock Creek, Cougar Creek, Suds Creek, and Tenny Creek.

STOCK DEFINITION PROFILE for Salmon Creek Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Salmon Cr Coho

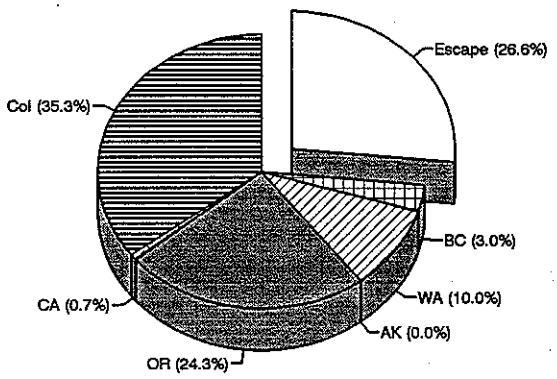
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1985-1987)



Based on Washougal River Hatchery 1983, 1984 brood early coho tag codes 63-31-32/35 and 63-35-15/19

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The Salmon Creek coho stock status is depressed based on chronically low production. Natural spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. This stream has been severely affected by agricultural practices and by suburban and urban development. Fish kills from manure spills are not uncommon. Stream hydrology has been altered by addition of impervious surfaces, affecting peak winter flows and low summer flows. Wetland losses have been acute. Urban water run-off affects water quality. Disturbance and poaching is a problem in this water shed. Smolt outmigration survival may be affected by urban and industrial pollution in the Columbia River. Nearshore habitats have been affected by navigational dredging and wetland fills with dredge spoils.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed which can result in underescapement of natural spawning fish.

Tributary harvest - Tributary harvest of Salmon Creek sub-basin coho has been limited to jacks. There is no adult fishery in the sub-basin.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of coho based on coded-wire tag recoveries of 1983, and 1984 brood early coho from the Washougal River Hatchery revealed that most of the ocean catch occurred in Oregon (24.33%) and Washington (10.01%) followed by British Columbia (3.04%) and California (0.68%). Columbia River fisheries accounted for an additional 35.32% of the total harvest.

A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts negligible.

LOWER COLUMBIA -- WASHOUGAL COHO

STOCK DEFINITION AND ORIGIN

The Washougal River originates in Skamania County and flows southwesterly through Clark County to its confluence with the Columbia River at RM 121 at the town of Camas. The lower 2.0 miles are in the Columbia River valley. The next 11.0 miles flow through a narrow, shallow valley before entering a narrow, deep canyon extending into the Yacolt Burn. The entire basin encompasses 240 square miles. The Washougal sub-basin has one hatchery located at RM 16.0.

Typically, coho begin entering the Washougal River in early September and continue entering the sub-basin through February. Spawning occurs from mid-October through February. Coho are thought to spawn in all available tributaries though escapement figures are unknown. Coho return as two-year-old jacks and three-year-old adults.

By the time fish surveys were conducted on the Washougal River, serious habitat damage had already occurred. Deforestation due to the Yacolt Burn resulted in severe floods and erosion. In 1947, the Cotterell Power Company removed the last of three small hydroelectric dams which were considered low water barriers to fish migration (WDF, 1990). In 1951, the Washington Department of Fisheries estimated minimum coho escapement at 3,000 fish. Coho spawn mainly below falls in the Little Washougal River, Winkler Creek, and the West Fork Washougal.

The Washougal Hatchery was built in 1958 and is a major producer of coho. Hatchery coho have been planted in the sub-basin since at least 1967. Washougal River natural spawners are a mixed stock of composite production. Mixing of stocks very likely began to occur with the first releases.

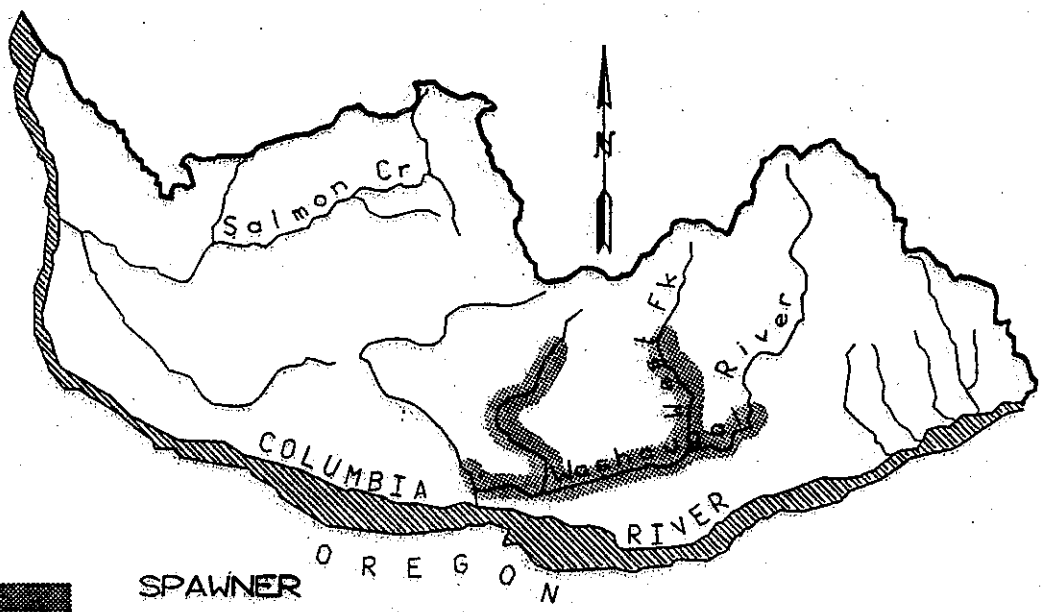
STOCK STATUS

The Washougal River coho stock status is depressed based on chronically low production. Natural spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential.

STOCK DEFINITION PROFILE for Washougal 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								■	■	■	■		**NO**
RIVER ENTRY									■	■	■	■	**NO**
SPAWNING	■	■								■	■	■	**NO**

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Washougal Coho

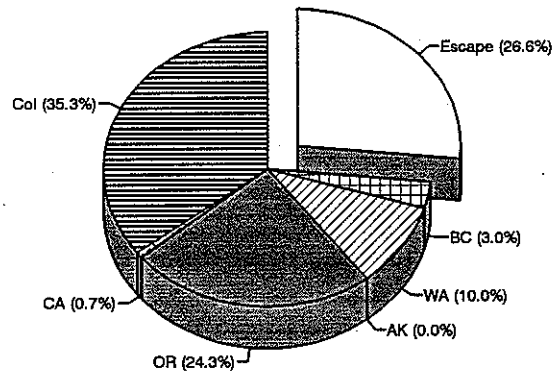
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-1985)



Based on Washougal Hatchery 1983-84 brood early coho tag codes 63-31-32/35 and 63-35-15/19.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Tributaries to the Washougal have been affected by logging, agriculture and suburban development. Mainstem habitat quality has been affected by residential and summer homes. Smolt outmigration survival may be affected by urban and industrial pollution in the Columbia River. Nearshore habitats have been affected by navigational dredging and wetland fills with dredge spoils.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed which can result in underescapement of natural spawning fish.

Tributary harvest - Tributary harvest of Washougal River sub-basin coho occurs in the sport fishery. Adult coho harvest from the Washougal River during October and November has averaged 924 from 1979 through 1986 with a low of 172 in 1983 to a high of 2,629 in 1986.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Washougal River Hatchery early coho based on coded-wire tag recoveries of the 1983 and 1984 brood revealed that most of the ocean catch occurred in Oregon (24.33%) and Washington (10.01%) followed by British Columbia (3.04%) and California (0.68%). Columbia River fisheries accounted for an additional 35.32% of the total harvest. Escapement was 26.63% overall.

A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts not determined. Weir blocks upstream passage, but very little habitat exists above weir.

LAST TEN YEARS SALMON RELEASES INTO THE SALMON - WASHOUGAL BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO	SOCKEYE
1982	0	6738081	0	1346710	1942240	0
1983	0	6715300	0	1308100	2703003	0
1984	38673	6216488	0	1062570	2305630	20731
1985	50490	6061750	0	1539760	2198900	55406
1986	34648	6163000	0	1075300	2412000	49963
1987	0	6207000	0	91282	733368	0
1988	0	6505300	0	0	1244600	0
1989	0	8145700	0	268000	756000	0
1990	0	7346000	24500	0	1885050	0
1991	0	7625500	32500	0	1854200	0
MEAN	41270	6772412	28500	955960	1803499	42033

LOWER COLUMBIA -- BONNEVILLE TRIBS. COHO

STOCK DEFINITION AND ORIGIN

Late stock coho spawn in several lower Columbia River tributaries. The following is a list of where the tributaries enter the Columbia River:

Duncan Creek at RM 140.0
Hardy Creek at RM 141.0
Hamilton Creek at RM 142.0. Greenleaf Creek enters Hamilton Creek at mile 1.4.

There are no hatcheries on these tributaries. The nearest late coho hatchery is on the Washougal River at RM 118.0.

Typically late coho begin entering the Columbia River in mid to late September and continue through mid-December with peak migration in mid-October. Entry into the tributaries primarily occurs in October and November. Spawning begins in November and can continue through mid-January.

Late coho spawning in the Columbia River tributaries are a mixed stock of composite production. Washougal Hatchery late coho fingerlings were released into Duncan and Greenleaf creeks in 1983. There are no records of hatchery releases into Hardy and Hamilton creeks between 1968-1987.

Ocean distribution of late stock coho shows they primarily migrate north from the Columbia River. Late spawning coho from the lower Columbia River tributaries are similar to other Columbia River late coho stocks.

STOCK STATUS

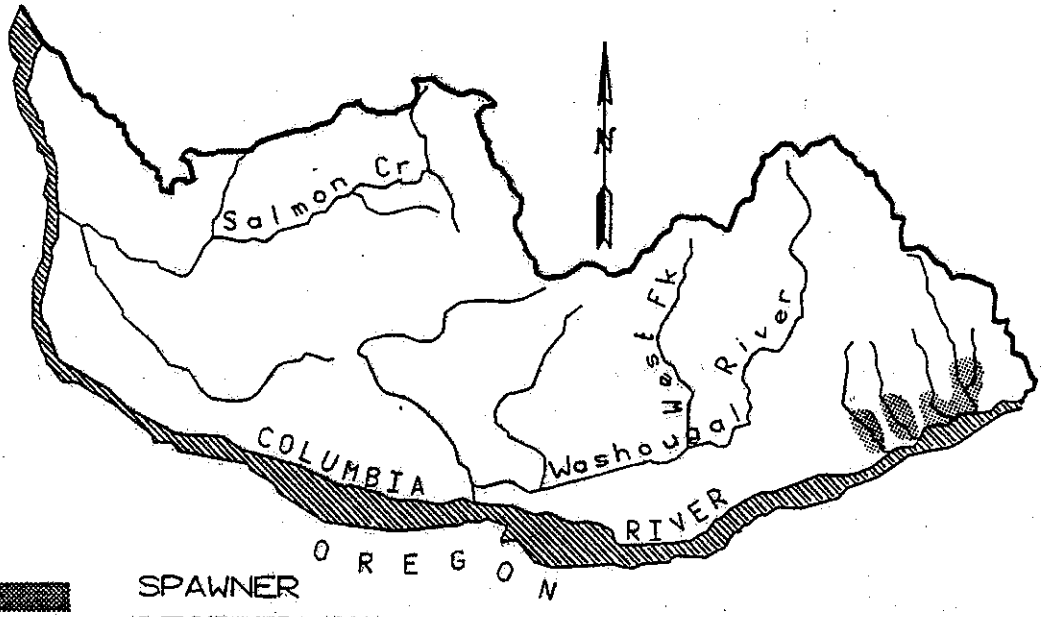
Combined data for Duncan, Hardy, Hamilton and Greenleaf creeks goes back as far as 1945 (although no fish were observed in that year). The average fish per mile for years when surveys occurred was 15 with a low of one in several years and a high of 185 in 1952.

Data quality is good but surveys have been inconsistent over the years. The stocks are depressed based on a long-term decline in escapement.

STOCK DEFINITION PROFILE for Bonneville Tribs Coho

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									■	■	■	■	NO
RIVER ENTRY											■	■	NO
SPAWNING	■										■	■	YES

BIOLOGICAL CHARACTERISTICS

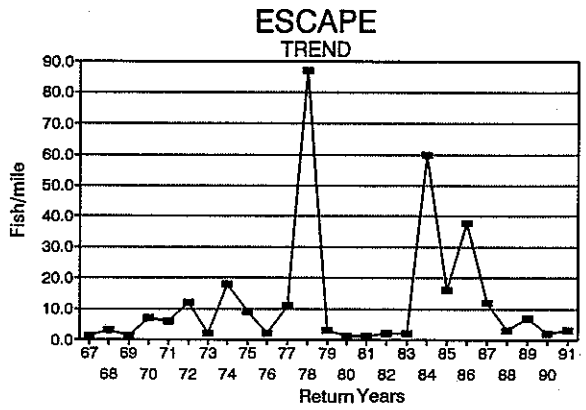
DISTINCT? - **NO**

STOCK STATUS PROFILE for Bonneville Tribs Coho

STOCK ASSESSMENT

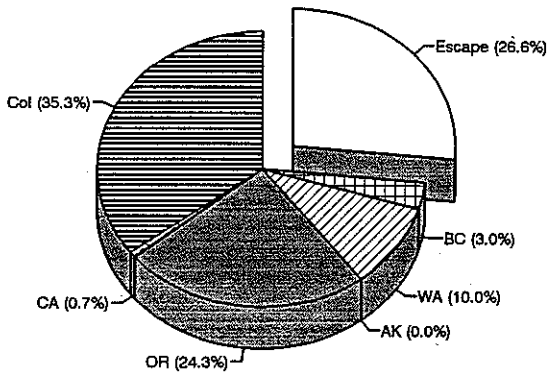
DATA QUALITY------> NOT AVAILABLE

Return Years	ESCAPE Fish/mile			
67	1.0			
68	3.0			
69	1.0			
70	7.0			
71	6.0			
72	12.0			
73	2.0			
74	18.0			
75	9.0			
76	2.0			
77	11.0			
78	87.0			
79	3.0			
80	1.0			
81	1.0			
82	2.0			
83	2.0			
84	60.0			
85	16.0			
86	38.0			
87	12.0			
88	3.0			
89	7.0			
90	2.0			
91	3.0			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1985-1987)



Based on Washougal River Hatchery 1983-1984 brood early coho tag codes 63-31-32/35 and 63-35-15/19

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Duncan Creek production is substantially limited by a residential dam and lake at its confluence with the Columbia River. Fish passage is achieved only by lowering the lake to near empty in order to allow passage over the dam. Summer production from the lake is probably lost to the Columbia during the drawdown. Above the lake the stream gains gradient very quickly and pool habitat is sparse. The stream has a high bedload transport which affects egg and fry survival. Hardy Creek is affected by past agricultural practices, however planned inclusion of the lower creek into a wildlife refuge will allow some natural recovery. Rehabilitation may also be feasible, absent the grazing impacts. See Hamilton Creek - Chum for habitat condition in that stream. Hamilton Creek also suffers from summer low flow and high stream temperature. Mainstem survival is affected by poor water quality and loss of nearshore habitat in the mainstem Columbia River.

Harvest Management -- Coho in the Columbia River are managed primarily as a hatchery stock. Relatively few hatchery fish are needed for hatchery escapement and because of harvest rates outside of the sub-basin, natural spawning escapement is not very significant. However, natural spawning of large numbers of hatchery fish does occur in some areas.

Tributary harvest - There are no fisheries in Duncan, Hardy, Hamilton, or Greenleaf creeks. Harvest of those fish occurs only in the mainstem Columbia River and in the ocean.

Columbia River harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October. In-river commercial and sport harvest rates have averaged 65% between 1970 and 1991 with a low of 7.0% percent in 1983 and a high of 81% in 1986.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August. However, significant numbers of late coho are harvested in some years.

Ocean harvest - A harvest profile of Washougal River Hatchery early coho based on coded-wire tag recoveries of the 1983 and 1984 brood early coho revealed that most of the ocean catch occurred in Oregon (24.33%) and Washington (10.01%) followed by British Columbia (3.04%) and California (0.68%). Columbia River fisheries accounted for an additional 35.32% of the total harvest.

A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%) followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- No hatchery releases in these creeks.

OVERVIEW -- LOWER COLUMBIA SUMMER AND WINTER STEELHEAD STOCKS

SUMMER:

KALAMA
EAST FORK LEWIS
NORTH FORK LEWIS
MAINSTEM WASHOUGAL
WEST (NORTH) FORK WASHOUGAL

WINTER:

GRAYS RIVER
SKAMOKAWA CREEK
ELOCHOMAN
MILL CREEK
ABERNATHY CREEK
GERMANY CREEK
COWLITZ
COWEEMAN
MAINSTEM/NORTH FORK TOUTLE
GREEN (TOUTLE)
SOUTH FORK TOUTLE
KALAMA
MAINSTEM/NORTH FORK LEWIS
EAST FORK LEWIS
SALMON CREEK
MAINSTEM WASHOUGAL
WEST (NORTH) FORK WASHOUGAL
HAMILTON CREEK

STOCK DEFINITION AND ORIGIN

In the Lower Columbia River, five summer steelhead stocks and eighteen winter steelhead stocks have been identified. Wild summer steelhead in the Kalama River, East Fork Lewis River, North Fork Lewis River, mainstem Washougal River, and West (North) Fork Washougal River are distinct stocks. Wild summer steelhead in each stock are native, except the Kalama summer stock is a mixture of native and non-native stocks. Wild winter steelhead in the Grays River, Skamokawa Creek, Elochoman River, Mill Creek, Abernathy Creek, Germany Creek, Cowlitz River, Coweeman River, mainstem/North Fork Toutle River, South Fork Toutle River, Green River (Toutle), Kalama River, mainstem/North Fork Lewis River, East Fork Lewis River, Salmon Creek, mainstem Washougal River, West (North) Fork Washougal River, and Hamilton Creek are distinct stocks. Wild 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. 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 (December through April) in the Lower Columbia River.

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

LOWER COLUMBIA -- KALAMA SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Kalama River and tributaries are a distinct stock based on the geographical isolation of the spawning population and are produced by commingled native and non-native parents and/or by mating between native and non-native fish (hybridization).

The type of electrophoretic data needed to differentiate the summer steelhead stock in the Kalama River from other summer stocks in the Columbia River region or throughout the range of steelhead has not been collected. Electrophoretic data has been collected during WDW research studies focused on comparing the natural reproductive successes of hatchery and wild summer steelhead.

Run-timing is generally from early June through October and spawn-timing is generally from mid-January through April for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed.

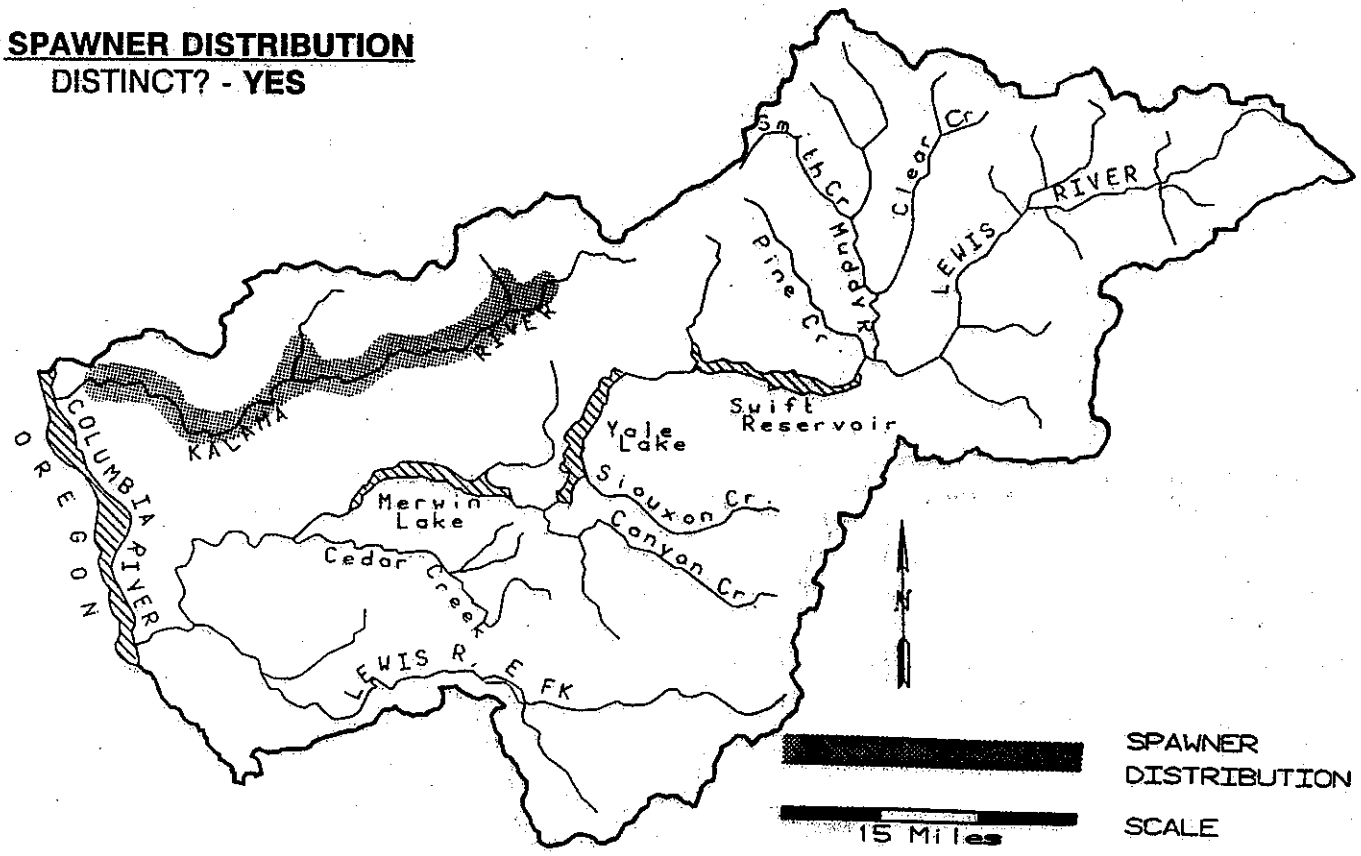
Stock status is based upon "adjusted trap count" data collected during monitoring of steelhead adult abundance at the Kalama Falls Salmon Hatchery (KFH) by WDW's Kalama River Research personnel. Adult returns of summer and winter steelhead are enumerated on a weekly basis. Adjusted trap counts are numbers of adults passed through the fishway at KFH adjusted to account for repeat passage of individual fish, corrections (based on scale analysis) of field determination of hatchery and wild origin, and inclusion of steelhead of unknown racial identity.

The adjusted trap counts ranged from 188 to 764 wild summer steelhead during the 1976 through 1985 seasons and from 333 to 646 wild summer steelhead during the 1986 through 1990 seasons. The escapement goal is 1,000 wild summer steelhead.

STOCK DEFINITION PROFILE for Kalama Summer Steelhead

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? - UNKNOWN

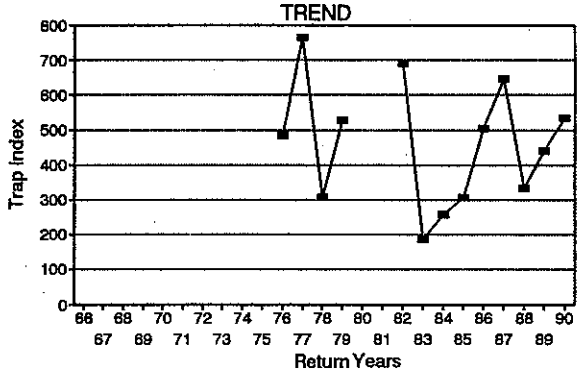
STOCK STATUS PROFILE for Kalama Summer Steelhead

STOCK ASSESSMENT

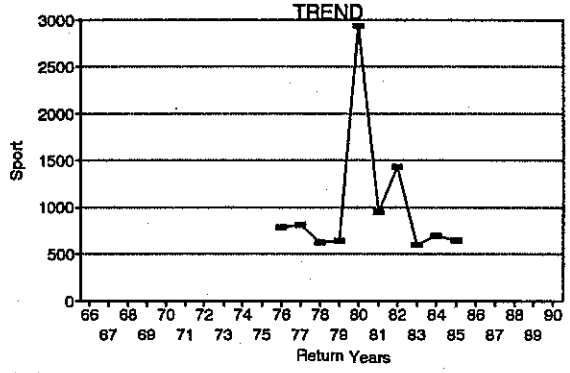
DATA QUALITY------> Good

Return Years	RUNSIZE Trap index	HARVEST Sport		
66				
67				
68				
69				
70				
71				
72				
73				
74				
75				
76	484	784		
77	764	812		
78	307	626		
79	527	639		
80		2936		
81		949		
82	690	1433		
83	188	602		
84	257	690		
85	307	643		
86	505			
87	646			
88	333			
89	440			
90	534			

RUNSIZE
TREND



HARVEST
TREND



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

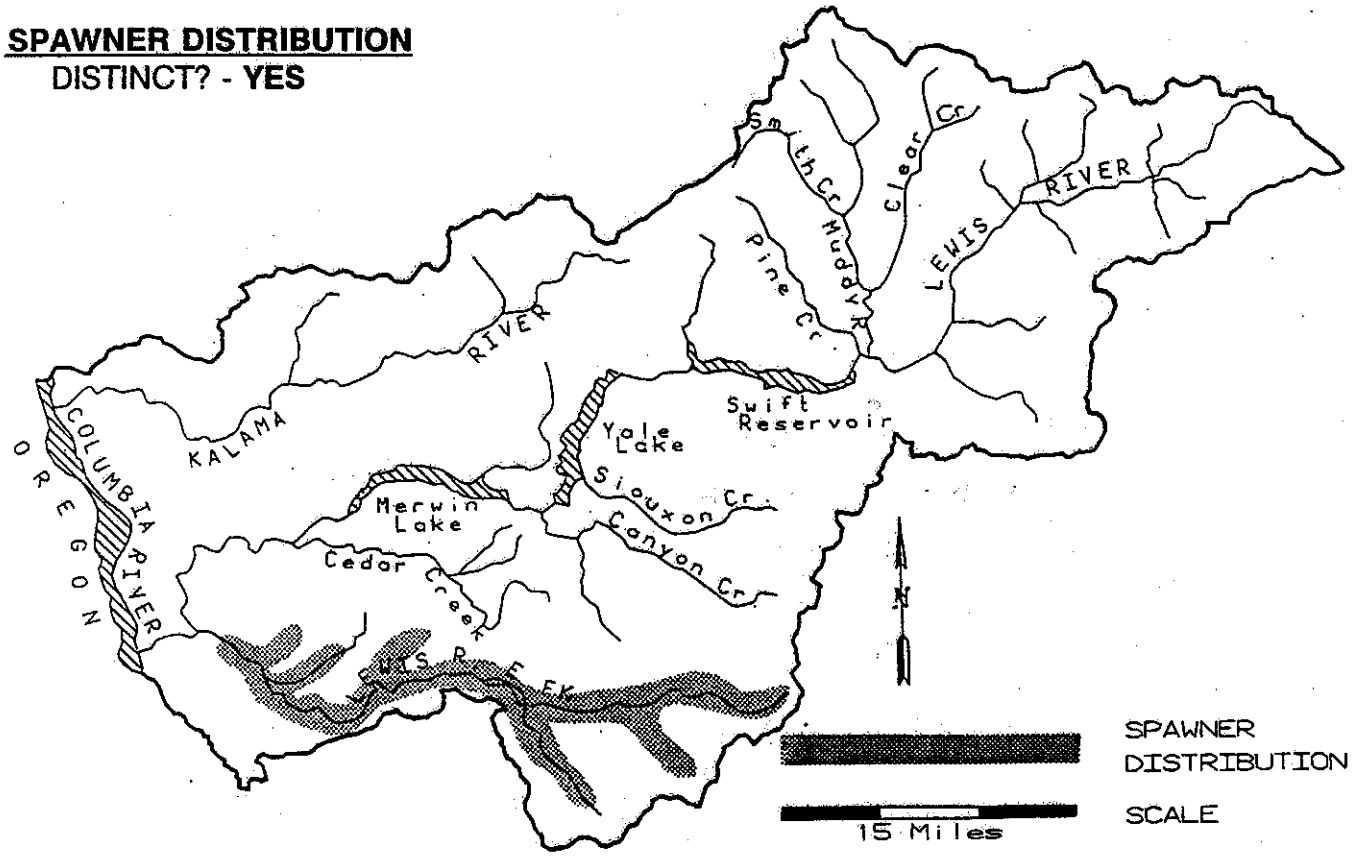
STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK DEFINITION PROFILE for EF Lewis Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for EF Lewis Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY-----> Poor

Return Years	NO DATA			
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				

Escapement Goal=814

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation due to urbanization of the watershed affects production.

Harvest Management -- There is no commercial fishery that targets on this stock although incidental catch of wild steelhead may occur in lower Columbia River fall gill net fisheries. The river has had wild summer steelhead release regulations since 1986 to protect the stock from sport harvest. Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- There is concern about the genetic impact of potential interbreeding between hatchery and wild summer steelhead.

LOWER COLUMBIA -- NORTH FORK LEWIS SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the North Fork Lewis River, Cedar Creek, and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild summer steelhead stocks in the lower Columbia River area, run-timing is generally from May through November and spawn-timing is generally from early March to late May or early June.

The North Fork Lewis River has been planted with hatchery summer steelhead since 1964 and hatchery winter steelhead since 1954. Progeny from Elochoman, Chambers Creek, Cowlitz, and Skamania hatchery brood stocks have been planted.

Construction of Merwin Dam in 1929 blocked anadromous fish passage to most of the usable spawning and rearing habitat in the watershed.

STOCK STATUS

The status of the stock is Depressed.

The wild Lewis River stock has certainly been impacted by the reduction of accessible spawning and rearing habitat due to the construction of hydroelectric dams. Approximately 80% of the spawning and rearing area are presently not accessible to steelhead.

The wild stock is chronically low in abundance and rated as Depressed due to the loss of access to available habitat upstream of hydroelectric dams.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1986 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986 summer steelhead season.

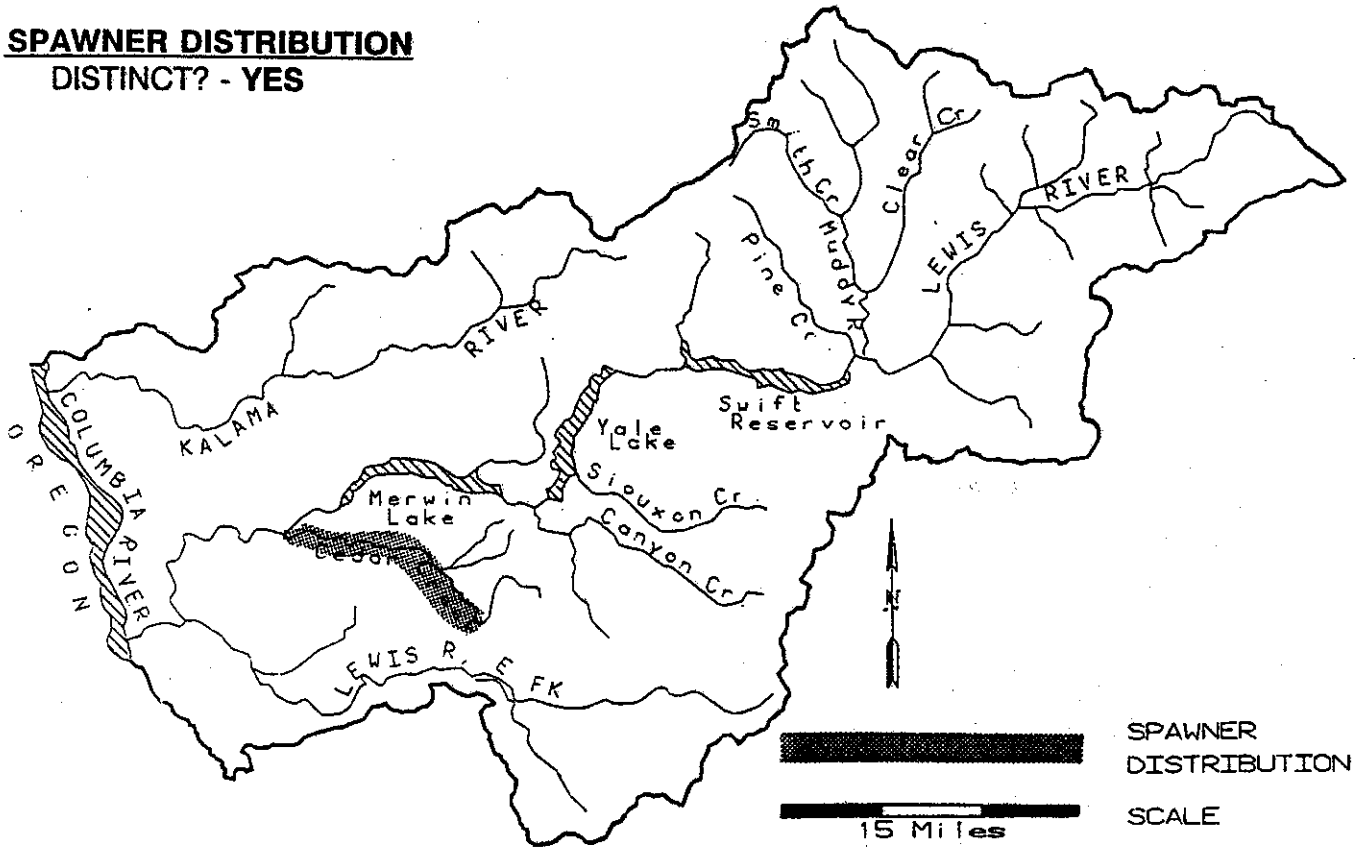
FACTORS AFFECTING PRODUCTION

Habitat -- Construction of Merwin Dam in 1929 blocked anadromous fish passage to most of the usable spawning and rearing habitat in the watershed. Habitat degradation due to urbanization of the watershed affects production.

STOCK DEFINITION PROFILE for NF Lewis Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for NF Lewis Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

Harvest Management -- There is no commercial fishery that targets on this stock although incidental catch of wild steelhead may occur in lower Columbia River fall gill net fisheries. The river has had wild summer steelhead release regulations since 1986 to protect the stock from sport harvest.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- There is concern about the genetic impact of potential interbreeding between hatchery and wild summer steelhead.

LOWER COLUMBIA -- MAINSTEM WASHOUGAL SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the mainstem Washougal River and tributaries are native and a distinct stock based on the geographical isolation of the spawning population. Run-timing (May through November) and spawn-timing (early March to early June) are similar to other wild summer steelhead stocks in the lower Columbia River area.

Skamania Hatchery is located on the lower end of the West (North) Fork and has been stocking hatchery steelhead into the river system since the late 1950s. Interbreeding with these fish may have occurred, but has not been measured.

STOCK STATUS

The status of the stock is Unknown.

Total spawning escapement of the stock has not been measured for any year. Limited spawner surveys and snorkel surveys of summering adults indicate low numbers of adult steelhead but not enough data is available to assess the status of the stock. The escapement goal for mainstem Washougal River summer steelhead is 1,210 wild adults.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1986 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986 summer steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Slow recovery of degraded freshwater habitat and recent changes in marine habitat conditions affect production.

Harvest Management -- There is no commercial fishery that targets on this stock although incidental catch of wild steelhead may occur in lower Columbia River fall gill net fisheries. The river has had wild summer steelhead release regulations since 1986 to protect this stock from sport harvest.

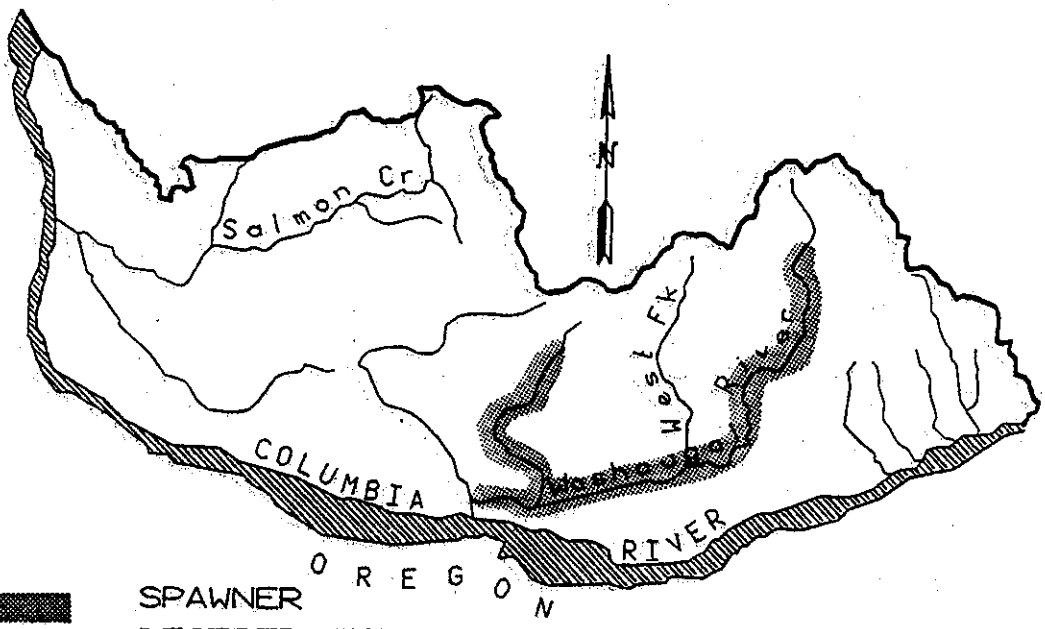
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- There is concern about the genetic impact of potential interbreeding between wild and hatchery summer steelhead.

STOCK DEFINITION PROFILE for Mainstem Washougal Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Mainstem Washougal Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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				

Escapement Goal=1210

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

LOWER COLUMBIA -- WEST (NORTH) FORK WASHOUGAL SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the West (North) Fork Washougal River are native and a distinct stock based on the geographical isolation of the spawning population. The West (North) Fork stock spawns in the mainstem and tributaries of the West (North) Fork. Run-timing (May through November) and spawn-timing (early March to early June) are similar to other wild summer steelhead stocks in the lower Columbia River area.

Skamania Hatchery is located on the lower end of the West (North) Fork and has been stocking hatchery steelhead into the river system since the late 1950s. Interbreeding with these fish may have occurred, but has not been measured.

STOCK STATUS

The status of the stock is Unknown.

Total spawning escapement of the stock has not been measured for any year. Limited spawner surveys and snorkel surveys of summering adults indicate low numbers of adult steelhead.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1986 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986 summer steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Slow recovery of degraded freshwater habitat and recent changes in marine habitat conditions affects production.

Harvest Management -- There is no commercial fishery that targets on this stock although incidental catch of wild steelhead may occur in lower Columbia River fall gill net fisheries. The river has had wild summer steelhead release regulations since 1986 to protect these stocks.

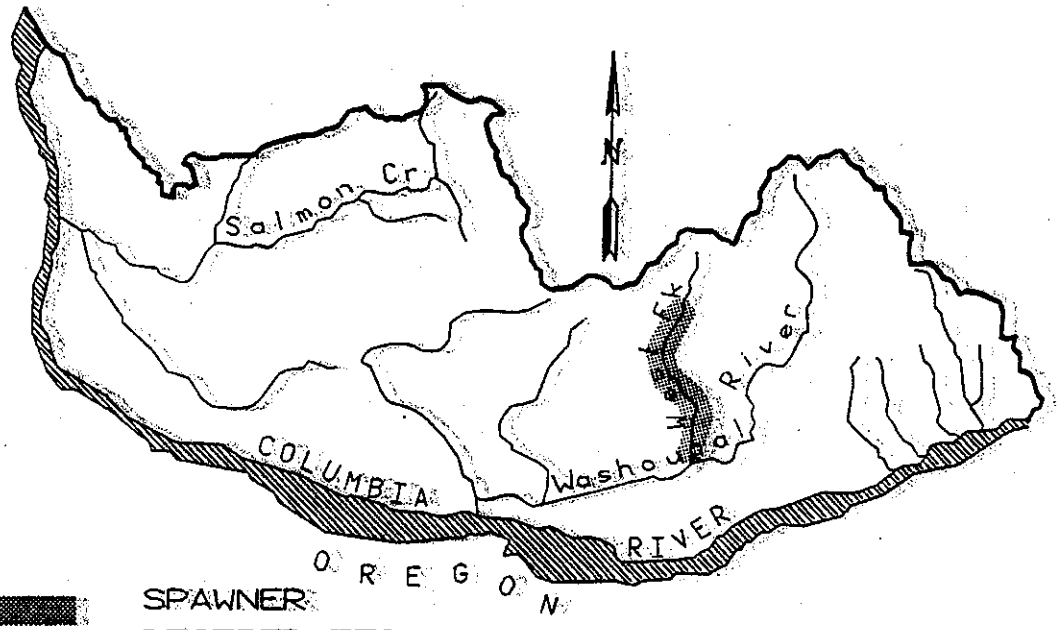
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- There is concern about the genetic impact of potential interbreeding between wild and hatchery summer steelhead.

STOCK DEFINITION PROFILE for WF (NF) Washougal Summer 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					■	■	■	■	■	■	■		**NO**
SPAWNING			■	■	■								**NO**

BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for WF(NF) Washougal Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

LOWER COLUMBIA -- GRAYS RIVER WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Grays River, its forks, and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Little is known about the genetic composition of the stock.

The Grays River has been planted with hatchery winter steelhead since 1957. Elochoman River, Chambers Creek, and Cowlitz River brood stocks have been utilized.

STOCK STATUS

The status of the stock is Depressed.

Stock status is based on chronically low spawner escapements.

Spawner escapements of 716 in 1991 and 1,224 in 1992 were under the MSH escapement goal of 1,486 wild steelhead.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1986 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Severe habitat degradation has occurred due to past logging.

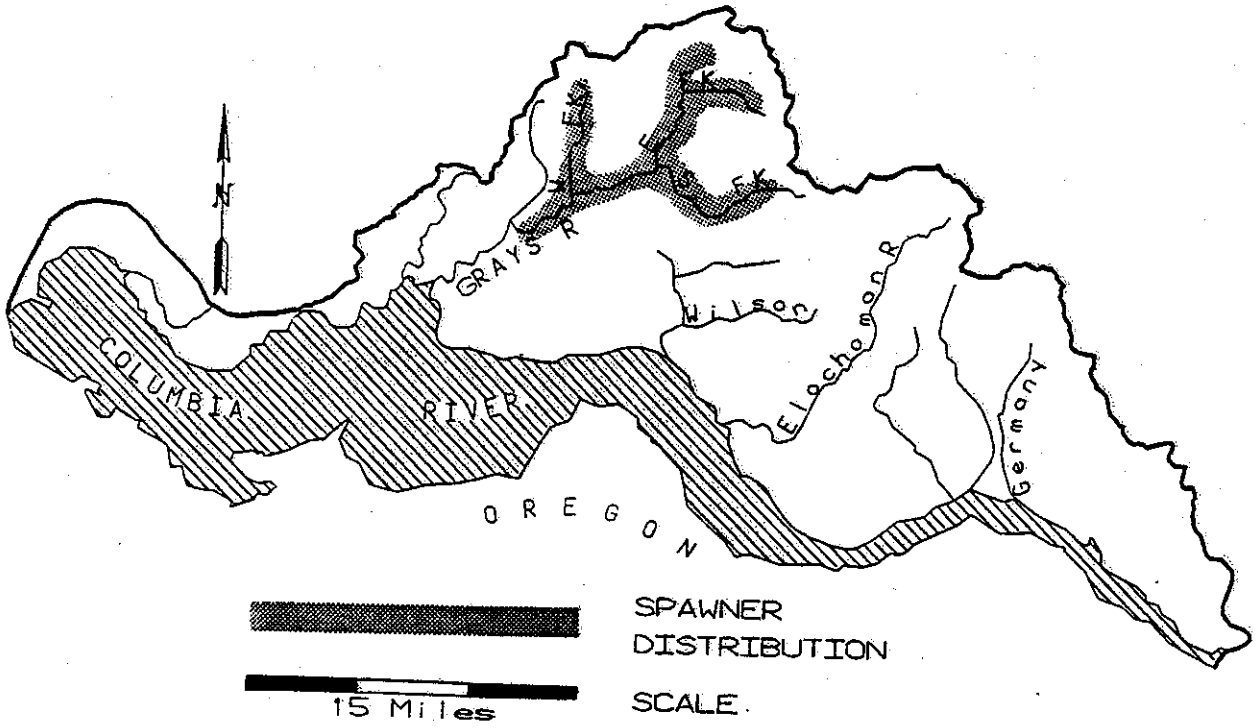
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. Restrictive seasons were initiated in 1981 followed by "wild release" regulations in 1986 to protect wild steelhead from sport harvest.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

STOCK DEFINITION PROFILE for Grays R Winter Steelhead

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? - UNKNOWN

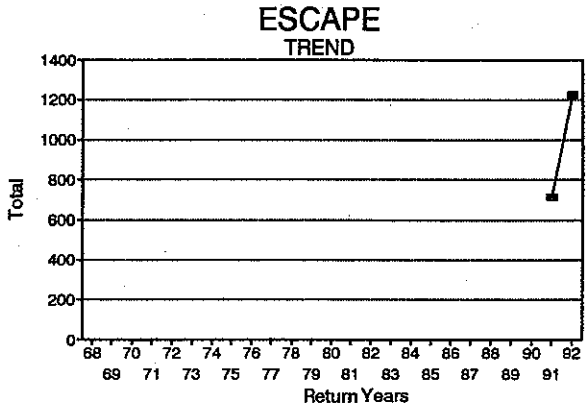
STOCK STATUS PROFILE for Grays R Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91	716			
92	1224			

Escapement Goal=1486



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

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

LOWER COLUMBIA -- SKAMOKAWA CREEK WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in Skamokawa Creek and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Skamokawa Creek has been planted with hatchery winter steelhead since 1966. Progeny from Elochoman River, Chambers Creek, and Cowlitz River brood stock have been utilized.

STOCK STATUS

The status of the stock is Unknown.

Spawning escapement was first measured in 1992 and the escapement of 304 wild steelhead exceeded the escapement goal of 227 fish, but there is not enough data to assess the status of the stock.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1986 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation has occurred due to past and present logging, cattle grazing in the lower basin, and water withdrawals.

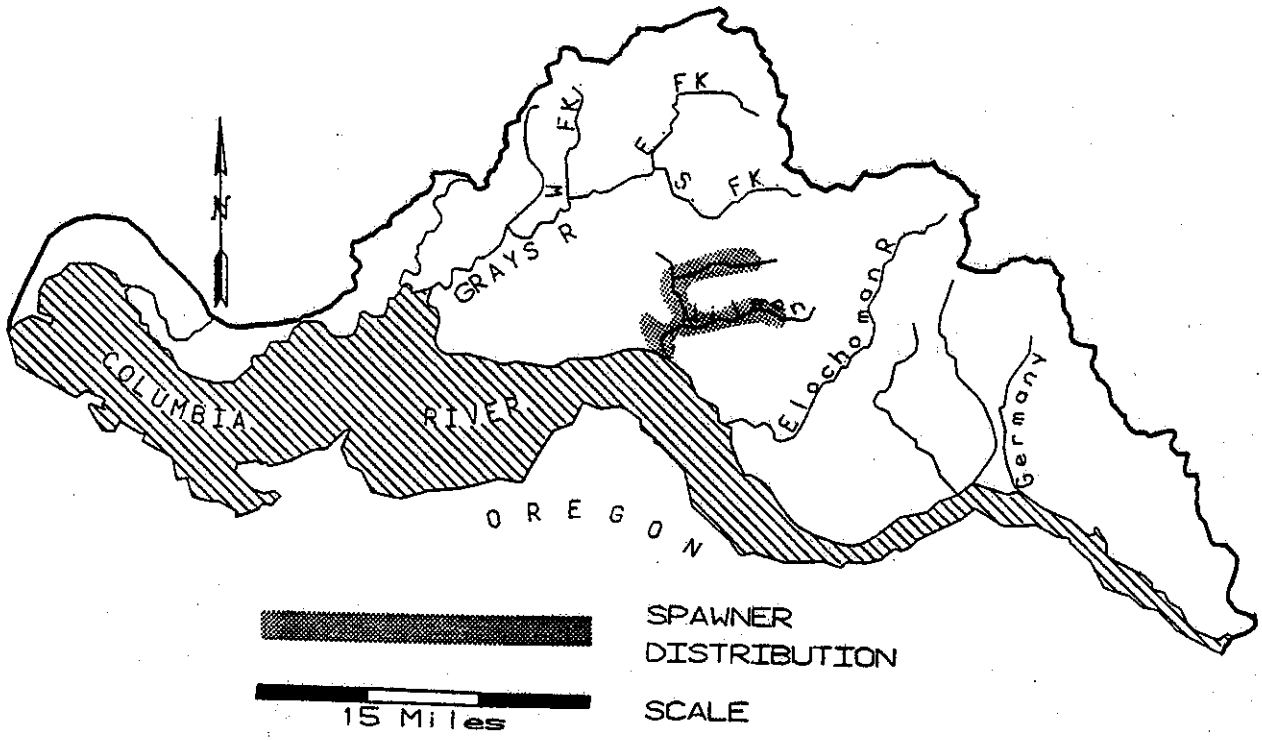
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. "Wild release" regulations were initiated in 1986 to protect wild steelhead from sport harvest.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

STOCK DEFINITION PROFILE for Skamokawa Cr Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Skamokawa Cr Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Total			
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	304			

Escapement Goal=227

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

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

LOWER COLUMBIA -- ELOCHOMAN WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Elochoman River and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

The Elochoman River has been planted with hatchery winter steelhead since 1955. Progeny from Elochoman River, Chambers Creek, and Cowlitz River brood stock have been utilized.

STOCK STATUS

The status of the stock is Depressed.

Stock status is based on chronically low spawner escapements.

Spawning escapements of 166 in 1991 and 278 in 1992 were under the MSH escapement goal of 626 wild steelhead.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1986 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Severe habitat degradation has occurred due to past and present logging.

Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. "Wild release" regulations were initiated in 1986 to protect wild steelhead from sport harvest.

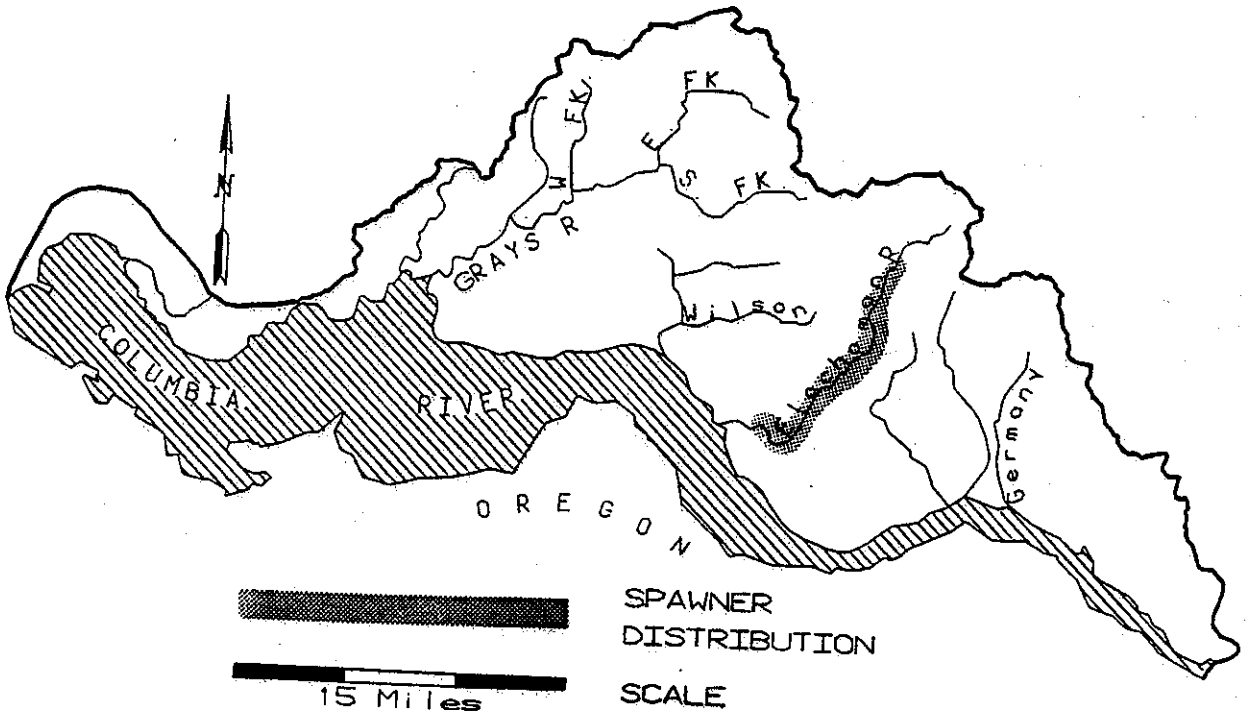
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

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

STOCK DEFINITION PROFILE for Elochoman Winter Steelhead

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? - UNKNOWN

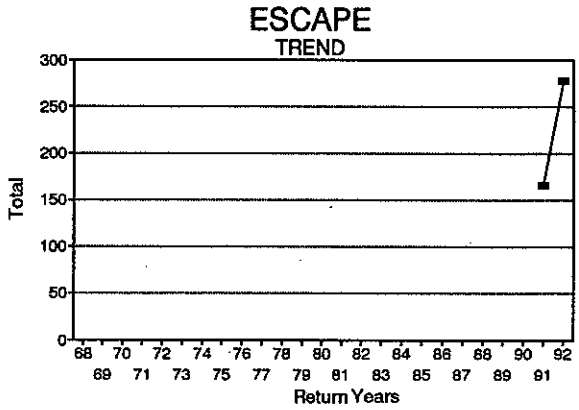
STOCK STATUS PROFILE for Elochoman Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91	166			
92	278			

Escapement Goal=626



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

LOWER COLUMBIA -- MILL CREEK WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in Mill Creek are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Mill Creek has rarely been planted with hatchery winter steelhead. Progeny from Elochoman River, Chambers Creek, and Cowlitz River brood stock have been utilized.

STOCK STATUS

The status of the stock is Depressed.

Although no spawning escapement estimates are available, the Mill Creek stock is assumed to be chronically depressed. Mill Creek and Abernathy Creek drainages are in close proximity and of similar size. A case could be made that since the Abernathy winter steelhead stock has been underescaped for the past two years and is Depressed, Mill Creek winter steelhead are also below desired escapement and are Depressed.

Wild sport harvest cannot be used to assess stock status because wild steelhead release regulations have been in effect since 1990 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation has occurred due to past and present logging and urbanization of the lower drainage.

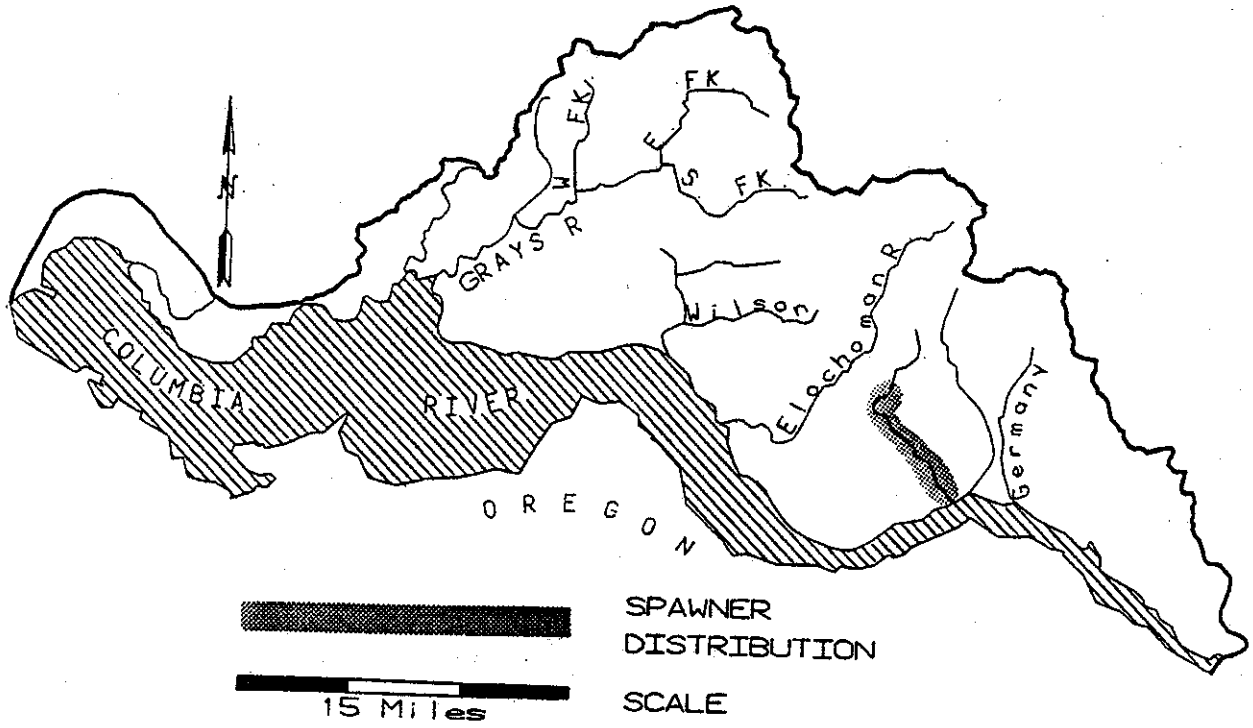
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. To protect wild stocks, the March portion of the sport harvest season was closed in 1981 and "wild release" regulations for steelhead were initiated in 1990.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

STOCK DEFINITION PROFILE for Mill Cr Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Mill Cr 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	10			
88	19			
89	9			
90	25			
91				
92				

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

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

LOWER COLUMBIA -- ABERNATHY CREEK WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in Abernathy Creek are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Abernathy Creek has been planted with hatchery winter steelhead since 1961. Progeny from Elochoman River, Chambers Creek, and Cowlitz River brood stock have been utilized.

STOCK STATUS

The status of the stock is Depressed.

Spawner escapements of 280 wild winter steelhead in 1991 and 246 wild winter steelhead in 1992 were under the MSH escapement goal of 306 wild steelhead.

Wild sport harvest cannot be used to assess stock status because wild steelhead release regulations have been in effect since 1990 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation has occurred due to past and present logging and urbanization of the lower drainage.

Harvest Management --There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. To protect wild stocks, the March portion of the sport harvest season was closed in 1981 and "wild release" regulations for steelhead were initiated in 1990.

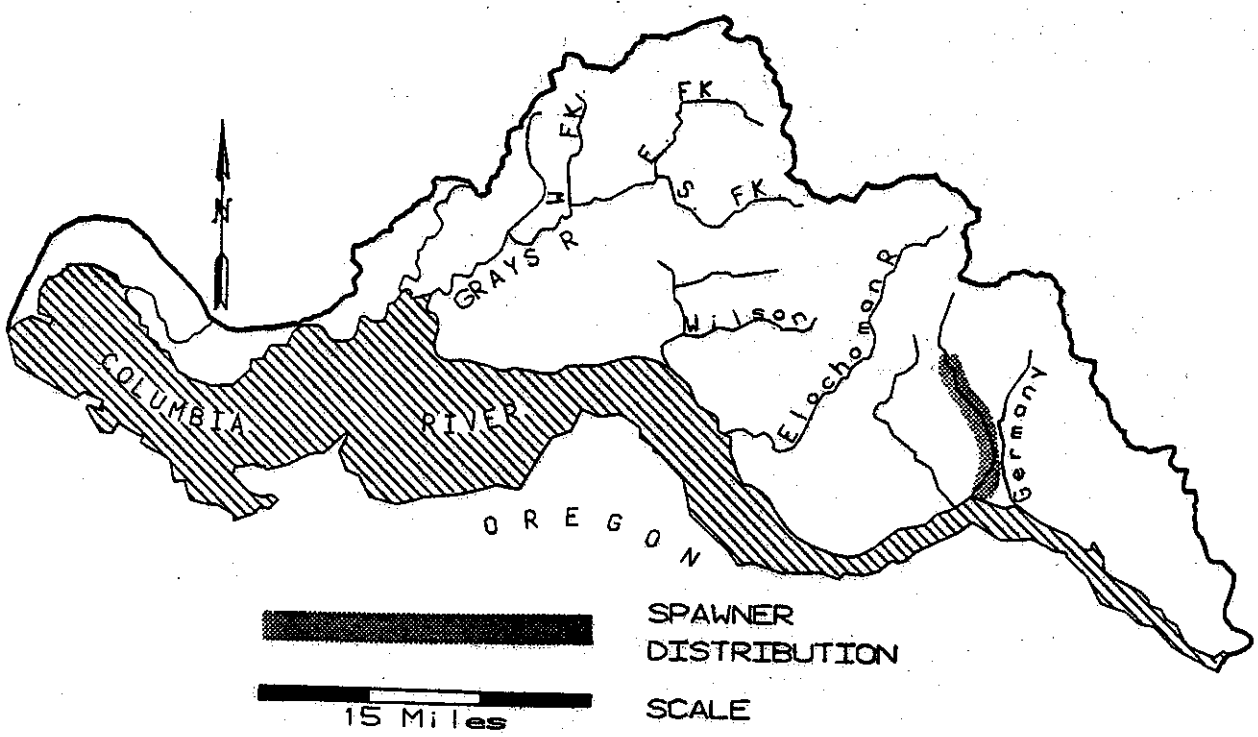
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

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

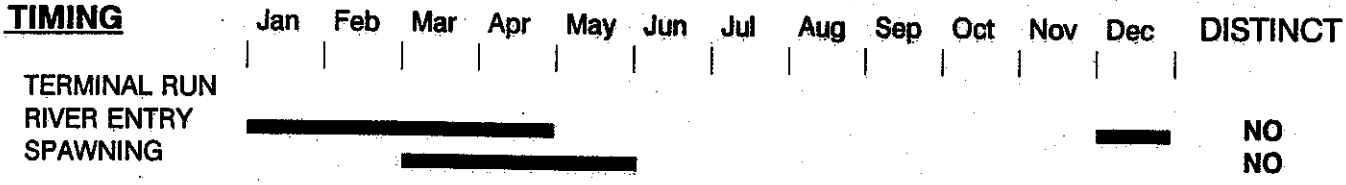
STOCK DEFINITION PROFILE for Abernathy Cr Winter Steelhead

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

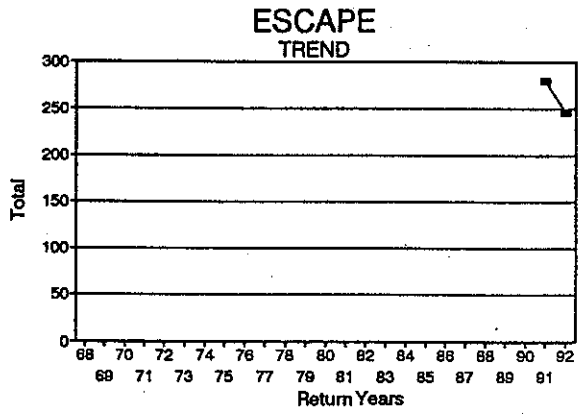
STOCK STATUS PROFILE for Abernathy Cr Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87		46		
88				
89				
90		49		
91	280			
92	246			

Escapement Goal=306



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

LOWER COLUMBIA -- GERMANY CREEK WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in Germany Creek are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Germany Creek has been planted with hatchery winter steelhead since 1961. Progeny from Elochoman River, Chambers Creek, and Cowlitz River brood stock have been utilized.

STOCK STATUS

The status of the stock is Depressed.

Although no spawning escapement estimates are available, the Germany Creek stock is assumed to be chronically depressed. Germany Creek and Abernathy Creek drainages are in close proximity and of similar size. A case could be made that since the Abernathy winter steelhead stock has been underescaped for the past two years and is Depressed, Germany Creek winter steelhead are also below desired escapement and are Depressed.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1990 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation has occurred due to past and present logging and urbanization of the lower drainage.

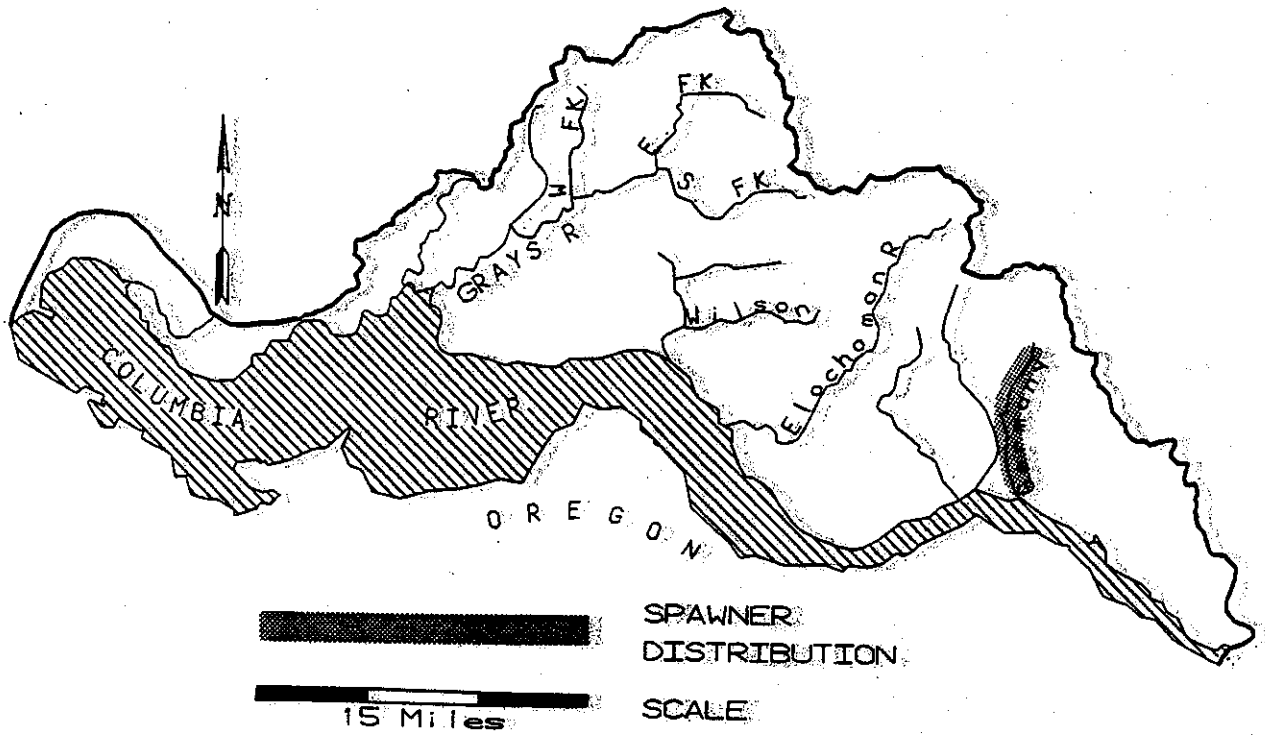
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. To protect wild stocks, the March portion of the sport harvest season was closed in 1981 and "wild release" regulations for steelhead were initiated in 1990.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

STOCK DEFINITION PROFILE for Germany Cr Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Germany Cr 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	45			
88				
89				
90	31			
91	0			
92	2			

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

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

LOWER COLUMBIA -- COWLITZ WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Cowlitz River, Ostrander Creek, Salmon Creek, and tributaries are produced by commingled native and hatchery parents and/or by mating between native and non-native fish (hybridization) and are classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

The Cowlitz River has been planted with hatchery fish since 1957; both Chambers Creek and Cowlitz steelhead have been utilized.

STOCK STATUS

The status of the stock is Depressed.

The wild Cowlitz stock has certainly been impacted by the reduction of accessible spawning and rearing habitat due to the construction of hydroelectric dams. Approximately 80% of the spawning and rearing area are presently not accessible to steelhead and the stock is chronically low in abundance.

Hatchery steelhead smolts have not been marked in the past and no estimates of wild harvest are available. Spawning escapement surveys have not been conducted.

With incorporation of fish screens into Cowlitz Falls Dam to collect downstream smolts, WDW plans to reintroduce steelhead into the upper Cowlitz drainage. Restoration of the steelhead population upstream of Cowlitz River Falls Dam should provide an estimated 6,000 to 7,000 wild adult steelhead.

FACTORS AFFECTING PRODUCTION

Habitat -- The primary limiting factor is lack of suitable spawning and rearing habitat due to construction of Mayfield Dam in 1963.

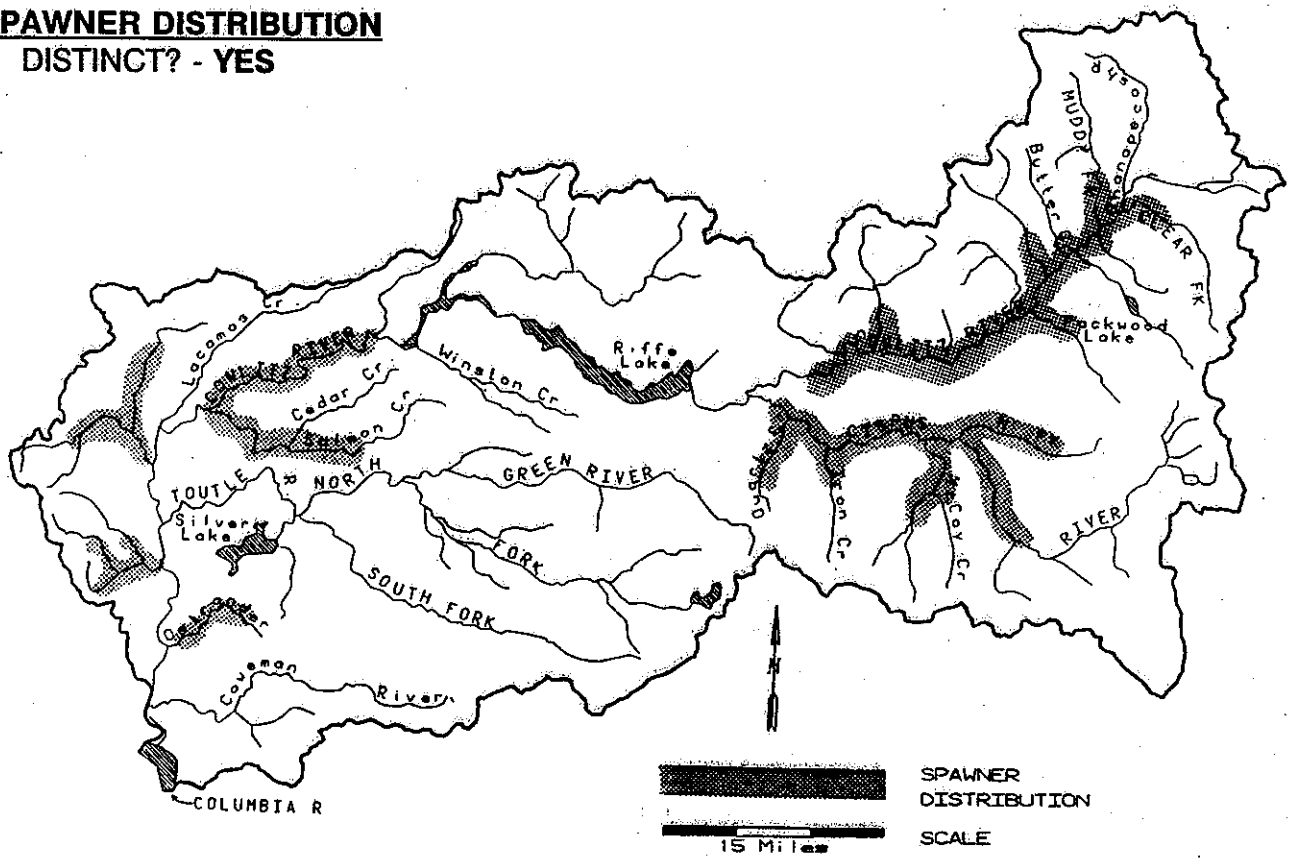
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. There have been no wild steelhead release regulations in effect in the sport fishery.

Hatchery -- The majority of winter steelhead spawning in the Cowlitz River are hatchery fish and it is likely they produce most of the current wild stock.

STOCK DEFINITION PROFILE for Cowlitz Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Cowlitz Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

LOWER COLUMBIA -- COWEEMAN WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Coweeman River and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Coweeman River has been planted with hatchery winter steelhead since 1957. Progeny from Elochoman River, Chambers Creek, and Cowlitz River brood stock have been utilized.

STOCK STATUS

The status of the stock is Depressed based on chronically low spawner escapement.

Spawning escapements were estimated from 1987 through 1990 and the escapement goal of 1,064 wild steelhead was exceeded only during 1988.

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation has occurred due to past and present logging.

Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. "Wild release" regulations for steelhead were initiated in 1990 to protect wild winter steelhead from sport harvest.

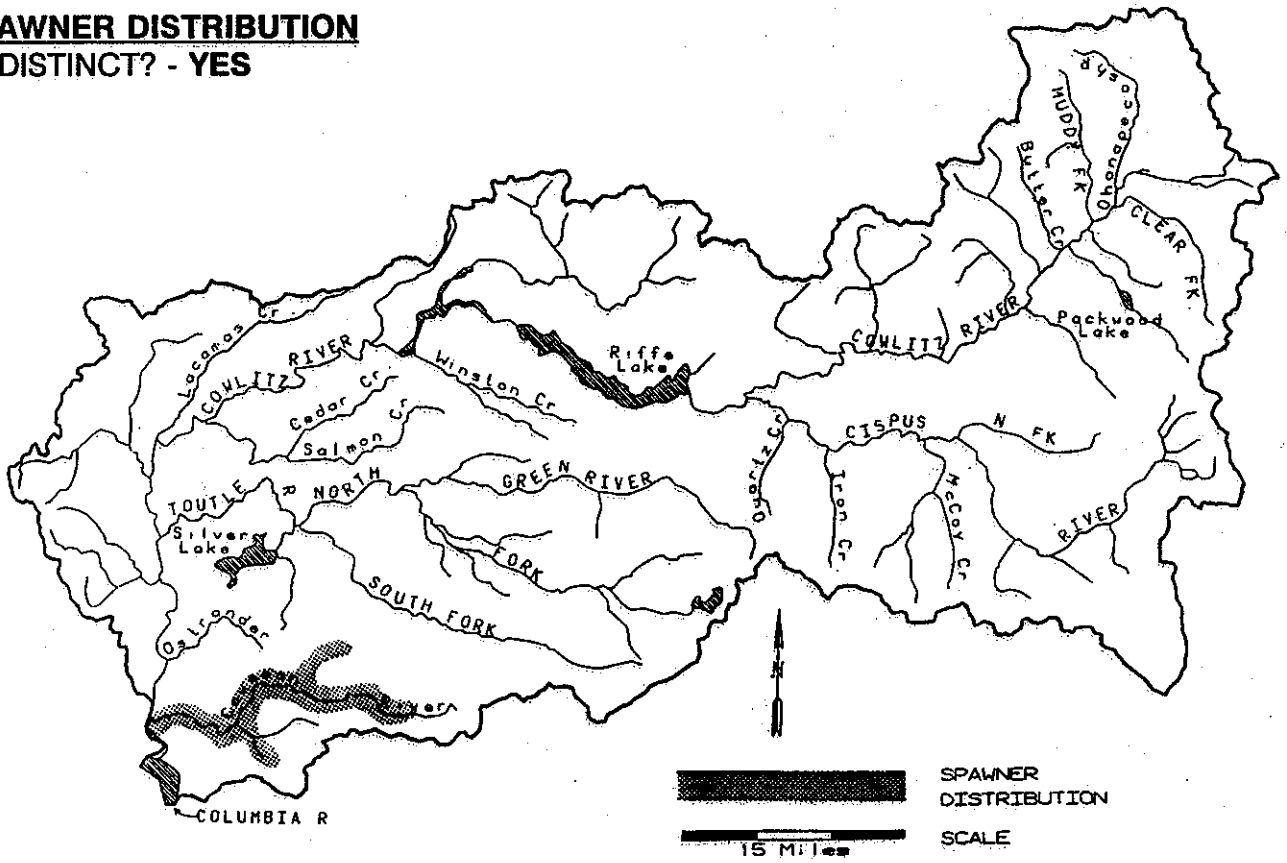
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

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

STOCK DEFINITION PROFILE for Coweeman Winter Steelhead

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? - UNKNOWN

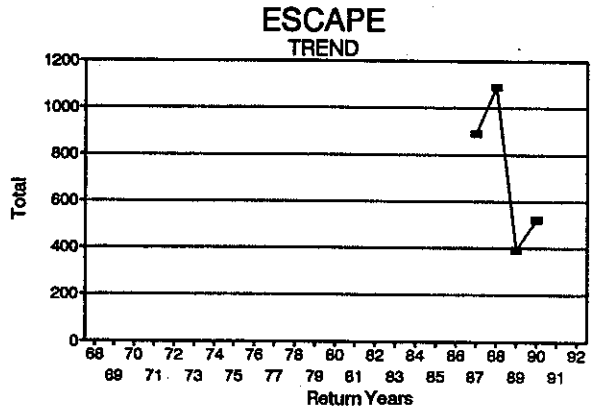
STOCK STATUS PROFILE for Coweeman Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY-----> Poor

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87	889	252		
88	1088			
89	392			
90	522	119		
91				
92				

Escapement Goal=1064



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

LOWER COLUMBIA -- MAINSTEM/NORTH FORK TOUTLE WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the mainstem Toutle River, Green River, and North Fork Toutle River, and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

The mainstem/North Fork Toutle River has been planted with hatchery winter steelhead since 1953. Progeny from Elochoman River, Chambers Creek, and Cowlitz River brood stock have been utilized.

So why is the stock considered native? See Sthd. GDU document

STOCK STATUS

The status of the stock is Depressed.

Progeny of wild brood stock collected and spawned in 1988, returned in 1992 providing a jump start to rebuilding steelhead stocks. As habitat continues to recover from the 1980 eruption, steelhead numbers should improve.

Returns to the North Fork Toutle Fish Collection Facility ranged from a low of 18 steelhead in 1989 to a peak of 322 in 1992. Steelhead numbers are chronically low and will likely remain depressed until mainstem spawning and rearing habitat in the North Fork improves.

FACTORS AFFECTING PRODUCTION

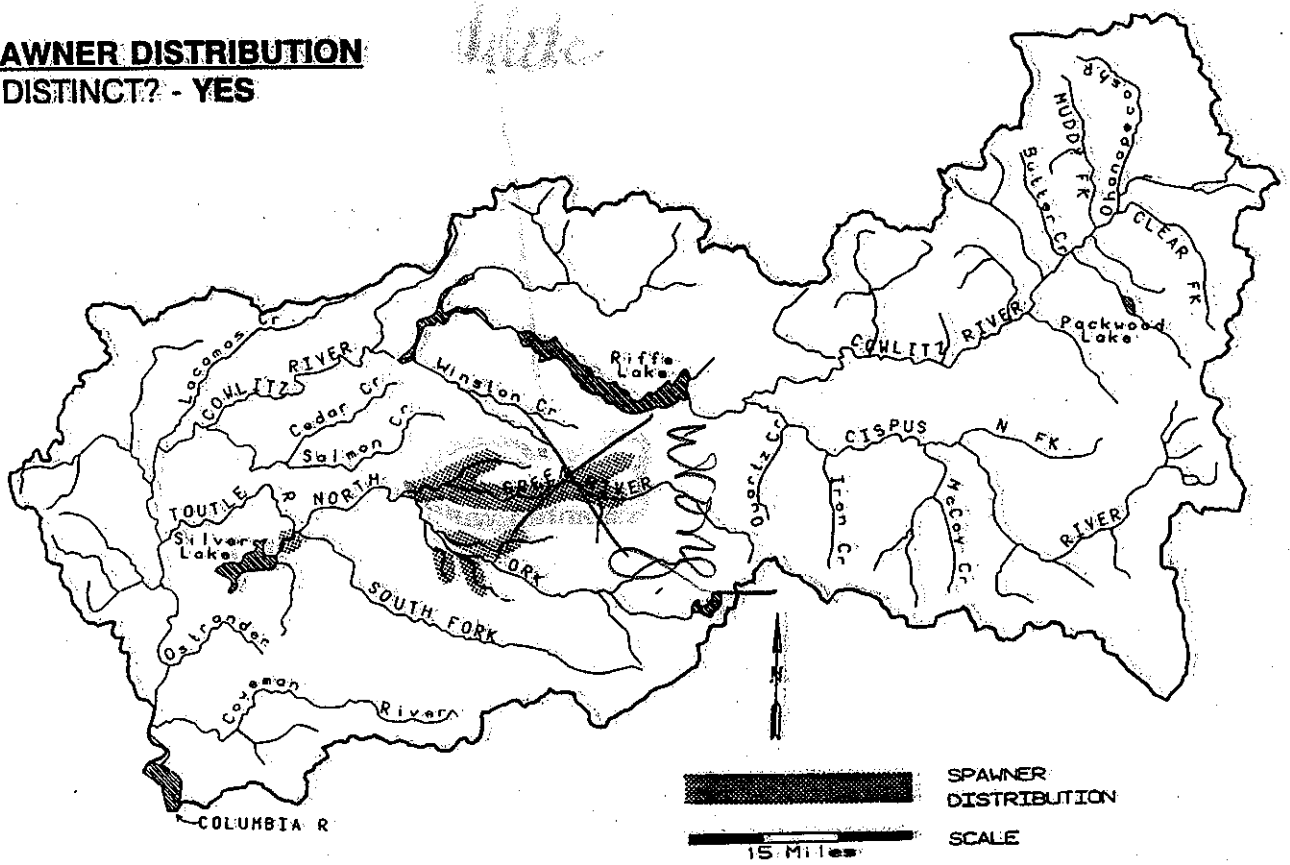
Habitat -- The primary limiting factor is severe habitat degradation due to 1980 eruption of Mount St. Helens. Heavy sediment loads persist with no spawning habitat available in mainstem areas. Water temperatures have been elevated due to denudation of the upper watershed.

Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. The North Fork Toutle has been closed to winter steelhead harvest since 1980.

STOCK DEFINITION PROFILE for Mainstem/NF Toutle Winter Steelhead

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

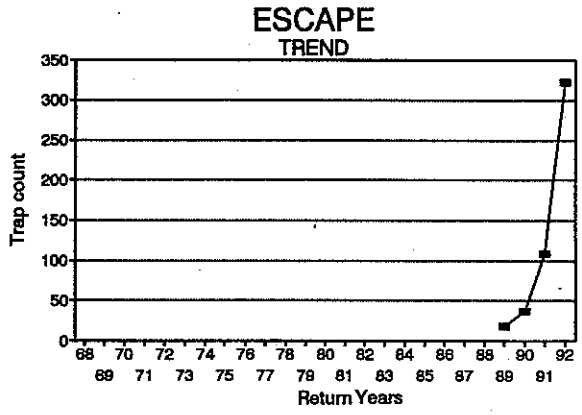
DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for Mainstem/NF Toutle Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Trap count			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	18			
90	36			
91	108			
92	322			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

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

LOWER COLUMBIA -- GREEN (TOUTLE) WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Green River (a Toutle River tributary) and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

STOCK STATUS

The status of the stock is Depressed based on spawner escapement.

Spawner escapement has ranged from 44 to 775 wild winter steelhead between 1985 and 1992. Spawner escapement is exhibiting a short-term severe decline.

FACTORS AFFECTING PRODUCTION

Habitat -- The primary limiting factor is severe habitat degradation due to 1980 eruption of Mount St. Helens. Water temperatures have been elevated due to denudation of the upper watershed.

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 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 harvest of steelhead in authorized and unauthorized high seas drift net fisheries.

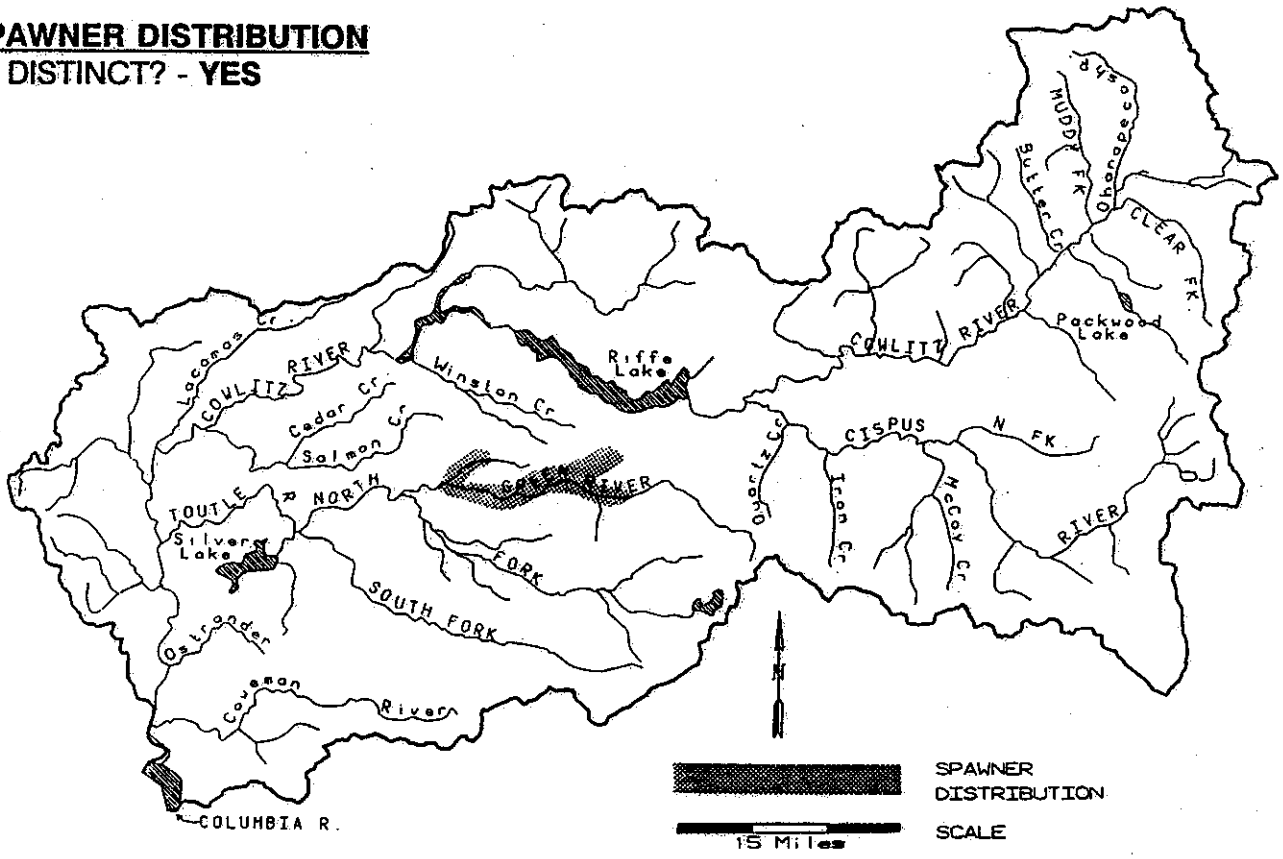
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. The Green River has been closed to winter steelhead harvest since 1981.

Hatchery -- Aside from several small fry plants after the 1980 eruption of Mount St. Helens, no hatchery winter steelhead have been stocked into the Green River.

STOCK DEFINITION PROFILE for Green (Toutle) Winter Steelhead

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

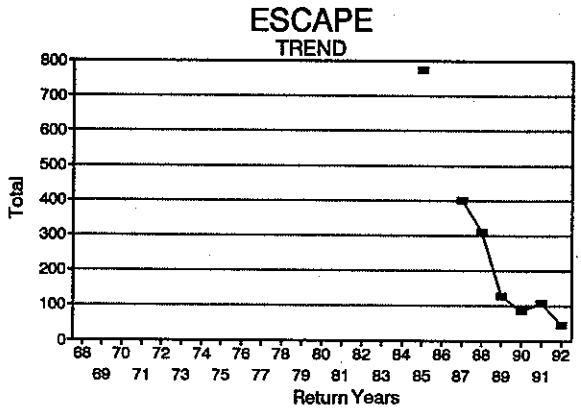
DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for Green (Toutle) Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85	775			
86				
87	402			
88	310			
89	128			
90	86			
91	108			
92	44			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Short Term Severe Decline

LOWER COLUMBIA -- SOUTH FORK TOUTLE WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the South Fork Toutle River and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Aside from several small fry plants after the 1980 eruption of Mount St. Helens, no hatchery winter steelhead have been stocked into the South Fork Toutle.

STOCK STATUS

The status of the stock is Healthy.

Spawning escapement in the South Fork has been monitored since 1984. The escapement goal of 1,058 was exceeded in most years.

There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. The South Fork Toutle was closed to winter steelhead harvest in 1981, then reopened in 1987 for limited harvest. Fishing was limited to Fridays and Saturdays only with a one fish catch limit.

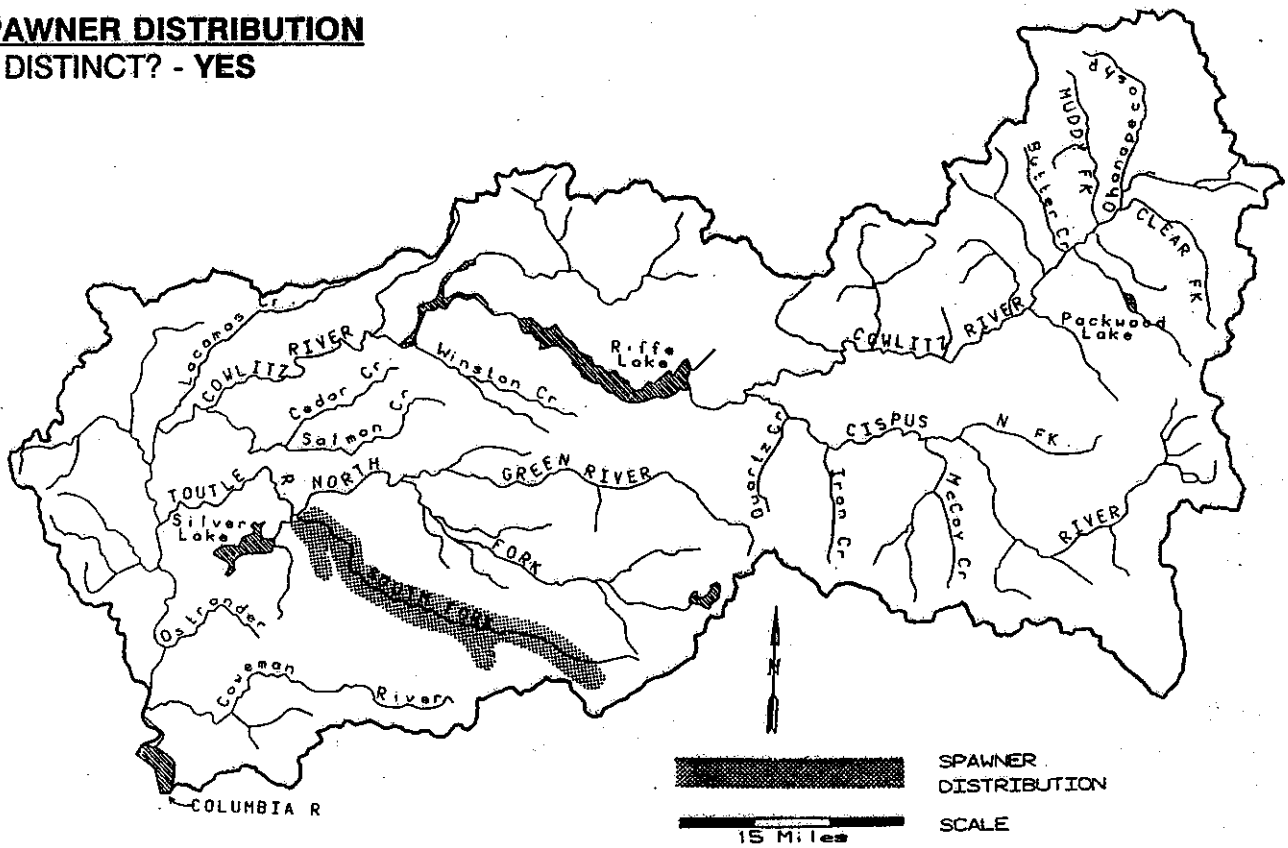
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

The primary limiting factor is severe habitat degradation due to 1980 eruption of Mount St. Helens. Heavy sediment loads persist especially from glacial melt during warm summer months. Temperatures have been elevated due to denudation of the upper watershed.

STOCK DEFINITION PROFILE for SF Toutle Winter Steelhead

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? - UNKNOWN

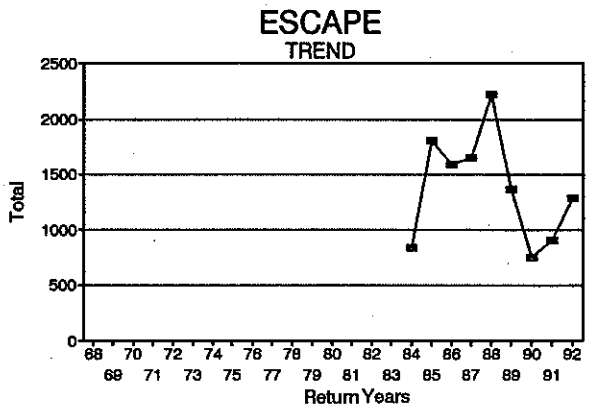
STOCK STATUS PROFILE for SF Toutle Winter Steelhead

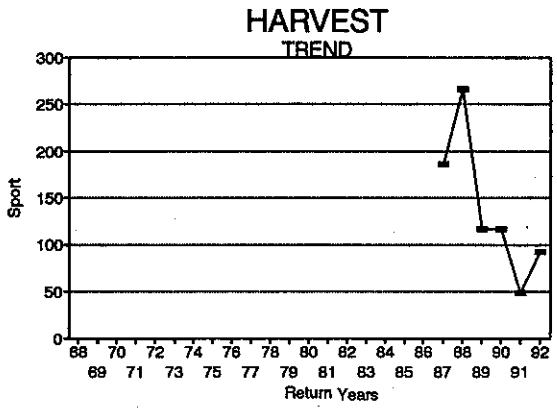
STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Total	HARVEST Sport		
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	838			
85	1807			
86	1595			
87	1650	186		
88	2222	266		
89	1371	117		
90	752	117		
91	904	49		
92	1290	93		

Escapement Goal=1058





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

LOWER COLUMBIA -- KALAMA WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

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

The type of electrophoretic data needed to differentiate the winter steelhead stock in the Kalama River from other steelhead stocks in the Columbia River region or throughout the range of steelhead has not been collected. Electrophoretic data has been collected during WDW research studies focused on comparing the natural reproductive successes of hatchery and wild winter steelhead.

Run-timing is generally from November through April and spawn-timing is from early January to late May or early June.

STOCK STATUS

The status of the stock is Healthy.

Stock status is based on wild steelhead spawner escapement. Spawner escapement has ranged from 451 to 2,492 wild winter steelhead during the 1976-1977 through 1991-1992 return years and has exceeded or been close to the escapement goal of 1,000 fish in most years. Spawner escapement exhibited a short-term decline to 531 fish in 1989 and 451 fish in 1990, but escapement increased to 1,163 fish in 1991 and 2,492 fish in 1992.

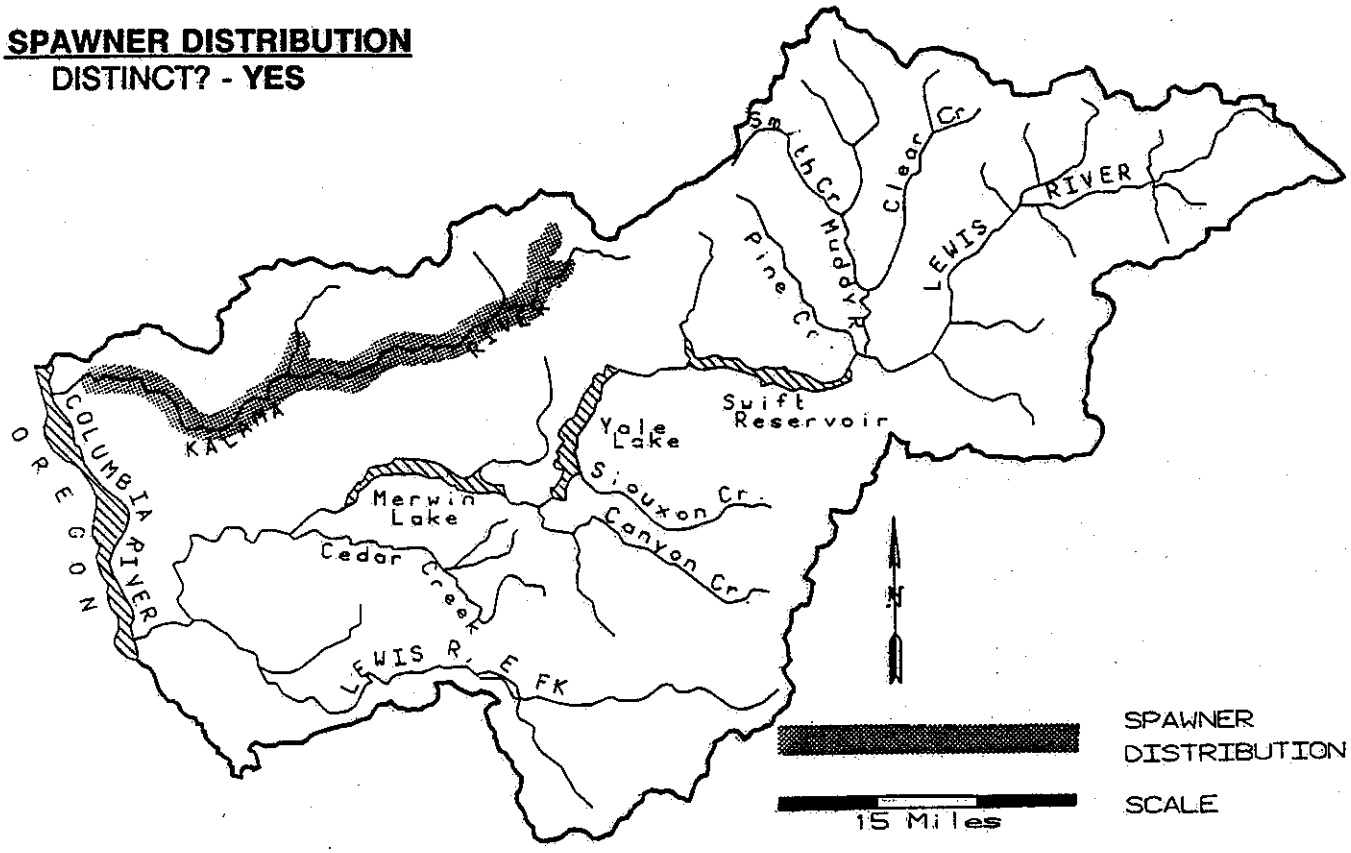
Trends in population abundance are also available from "adjusted trap count" data collected during monitoring of steelhead numbers at the Kalama Falls Salmon Hatchery (KFH) by WDW's Kalama River Research personnel. Adult returns of summer and winter steelhead are enumerated on a weekly basis. Adjusted trap counts are numbers of adults passed through the fishway at KFH adjusted to account for repeat passage of individual fish, corrections (based on scale analysis) of field determination of hatchery and wild origin, and inclusion of steelhead of unknown racial identity.

The adjusted trap counts ranged from 415 to 928 wild winter steelhead during the 1977 through 1986 seasons and from 391 to 1,009 wild winter steelhead during the 1987 through 1991 seasons.

STOCK DEFINITION PROFILE for Kalama Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Kalama Winter Steelhead

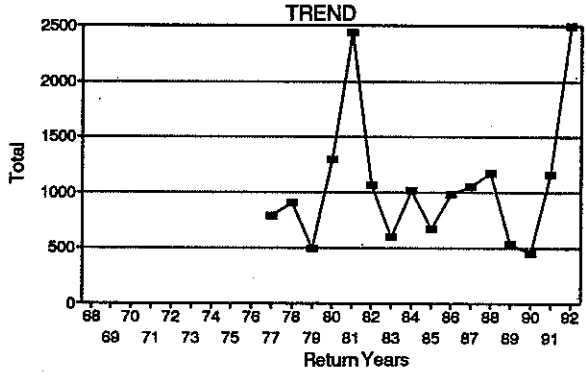
STOCK ASSESSMENT

DATA QUALITY------> Good

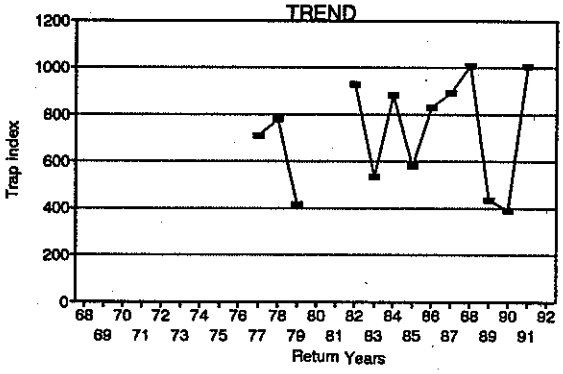
Return Years	ESCAPE Total	RUNSIZE Trap index	HARVEST Sport	
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	785	709		
78	904	780		
79	496	415		
80	1295			
81	2438			
82	1066	928		
83	600	533		
84	1022	881		
85	669	581		
86	982	830		
87	1054	893	162	
88	1176	1009	640	
89	531	436	609	
90	451	391	482	
91	1163	1006	0	
92	2492		12	

Escapement Goal=1000

ESCAPE
TREND



RUNSIZE
TREND



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation has occurred due to past and present logging.

Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in the lower Columbia spring chinook salmon gill net fishery. This stock has been managed with wild steelhead release regulations since 1990 to protect the wild stock from sport harvest.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- Potential impacts due to releases of hatchery winter steelhead smolts need to be considered. When hatchery fish interbreed with wild fish, they can reduce the reproductive potential of the resulting wild population. Hatchery winter steelhead currently comprise from 40% to 50% of the total winter spawning escapement. More information is needed, but interbreeding between hatchery and wild winter steelhead in the Kalama River at existing levels may reduce the long-term reproductive potential of the wild stock.

Hatchery steelhead smolts originating from WDW Beaver Creek Hatchery have been stocked in the Kalama River system. There is some contribution to natural production from hatchery steelhead spawning in the wild.

LOWER COLUMBIA -- MAINSTEM/NORTH FORK LEWIS WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the mainstem Lewis River and North Fork Lewis River and their tributaries, especially Cedar Creek, are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

The North Fork Lewis has been planted with hatchery winter steelhead since 1958. Construction of Merwin Dam in 1929 blocked anadromous passage to most of the usable spawning and rearing habitat in the watershed. Most natural steelhead production in the North Fork Lewis occurs in Cedar Creek which is limited in habitat.

STOCK STATUS

The status of the stock is Depressed.

The wild Lewis River stock has certainly been impacted by the reduction of accessible spawning and rearing habitat due to the construction of hydroelectric dams. Approximately 80% of the spawning and rearing area are presently not accessible to steelhead.

The wild stock is chronically low in abundance and rated as Depressed due to the loss of access to available habitat upstream of hydroelectric dams.

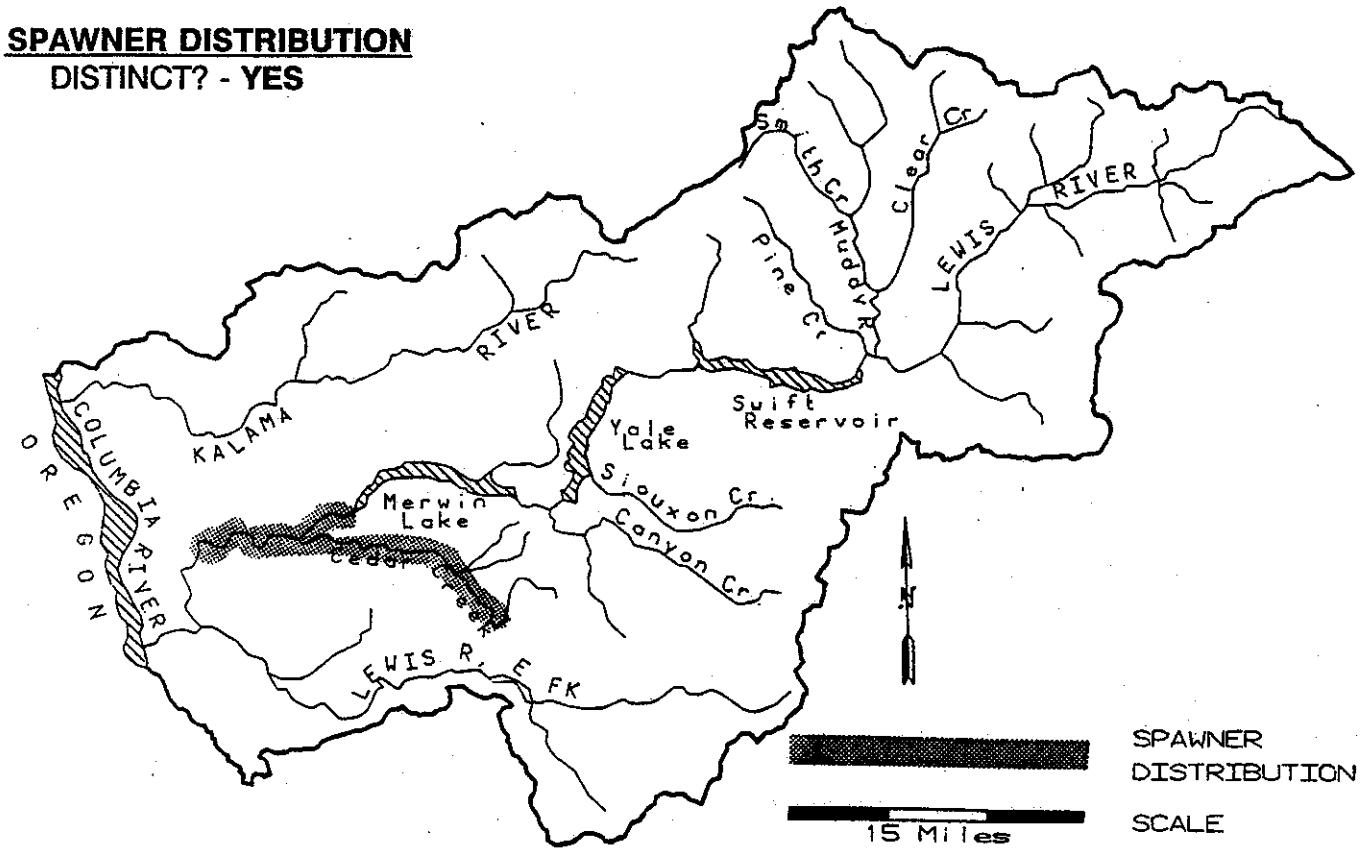
The escapement goal for this stock is 698 wild winter steelhead. No spawner escapement estimates are available.

Sport harvest of wild winter steelhead is only available between 1987 and 1991 because hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season. There has been a short-term decline in wild sport harvest and the stock would be rated as Depressed for the area downstream of the dam.

STOCK DEFINITION PROFILE for Mainstem/NF Lewis Winter Steelhead

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

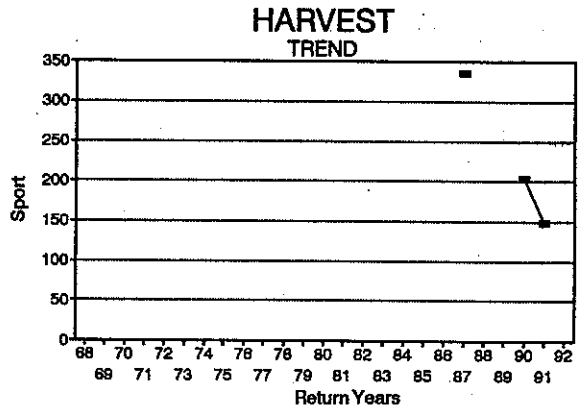
DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for Mainstem/NF Lewis 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	335			
88				
89				
90	204			
91	148			
92				



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Construction of Merwin Dam in 1929 blocked anadromous passage to most of the usable spawning and rearing habitat in the watershed.

The short-term decline for this stock is primarily due to recent changes in ocean survival.

Habitat degradation due to urbanization of the watershed affects production.

Harvest Management -- The entire Lewis River system has been under year around wild steelhead release regulations since February 10, 1992 due to possible interception of the East Fork Lewis River wild winter steelhead stock.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

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

LOWER COLUMBIA -- EAST FORK LEWIS WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the East Fork Lewis River and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

The East Fork Lewis River has been planted with hatchery winter steelhead since 1954 and hatchery summer steelhead since 1964. Progeny from Elochoman, Chambers Creek, Cowlitz, and Skamania hatchery brood stocks have been planted.

STOCK STATUS

The status of the stock is Depressed.

A short-term severe decline in the number of spawning wild adults has been measured in an index in the lower river. This index area has been surveyed by helicopter through the spawning season annually since 1986.

Spawning escapements ranged from 72 to 282 wild winter steelhead from 1986 through 1992 and were below the MSH escapement goal of 204 wild steelhead in the index area for five of the last seven years. Escapements the last four years have ranged from 72 to 140 wild winter steelhead and have been well below the MSH goal.

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat degradation due to urbanization of watershed affects production.

Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in the lower Columbia spring chinook salmon gill net fishery. The river has been managed with wild steelhead release regulations year-around since February 10, 1992.

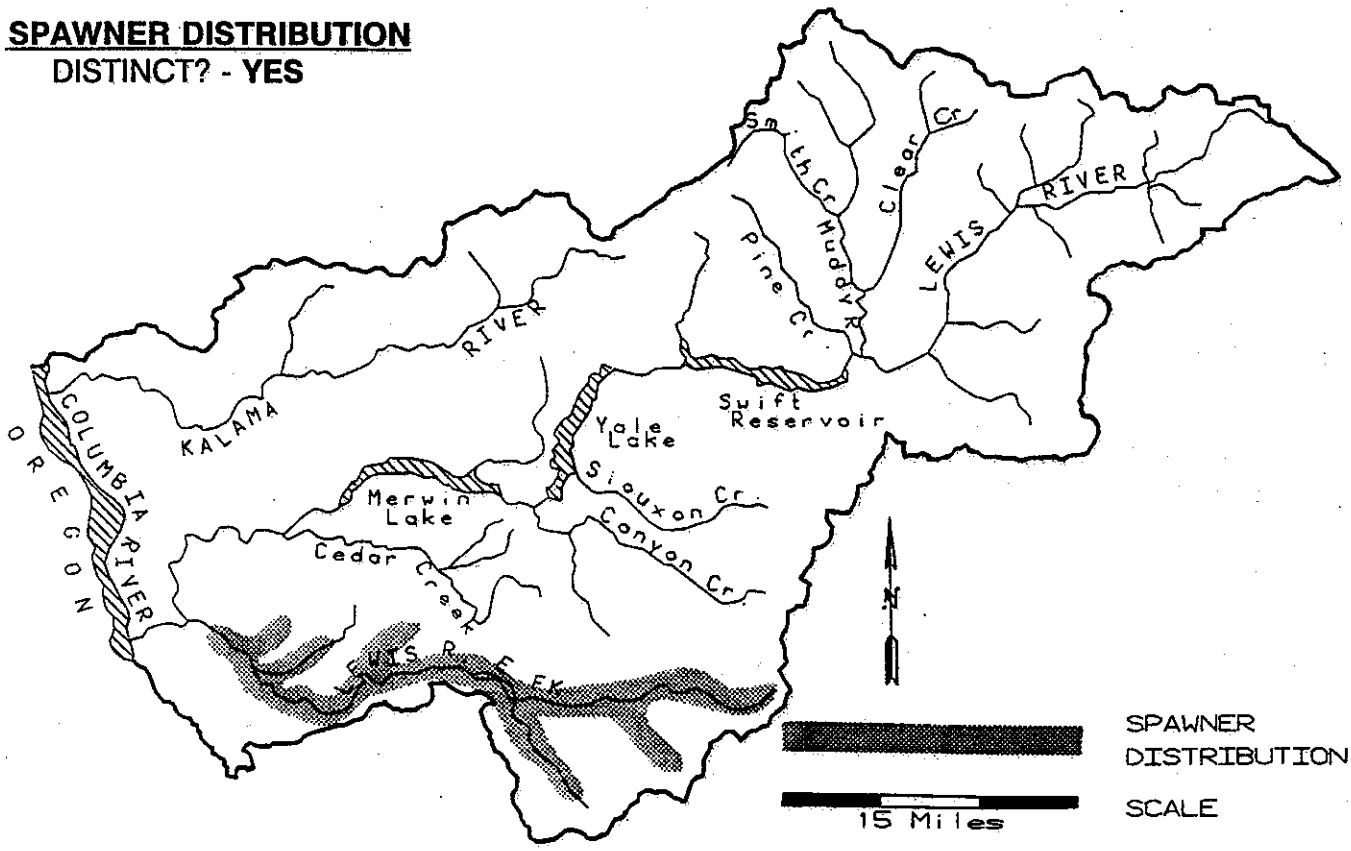
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

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

STOCK DEFINITION PROFILE for EF Lewis Winter Steelhead

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? - UNKNOWN

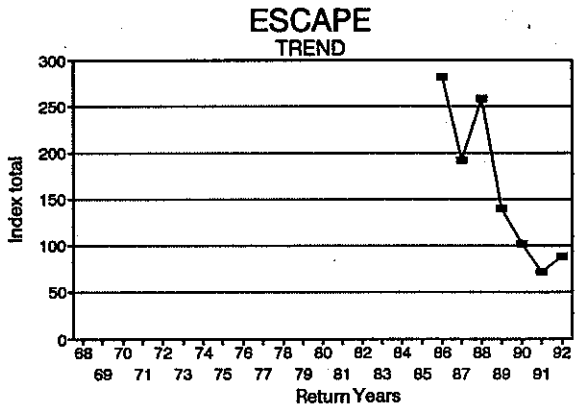
STOCK STATUS PROFILE for EF Lewis Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY-----> Good

Return Years	ESCAPE Index total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86	282			
87	192			
88	258			
89	140			
90	102			
91	72			
92	88			

Escapement Goal In Index=204



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Short Term Severe Decline

LOWER COLUMBIA -- SALMON CREEK WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in Salmon Creek and tributaries are native to the drainage and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Salmon Creek has been planted with hatchery winter steelhead since 1957. Progeny from Elochoman, Chambers Creek, Cowlitz, and Skamania hatchery brood stocks have been planted.

STOCK STATUS

The stock status is Depressed based on chronically low spawner escapement in the watershed and a drop in sport harvest. It is also believed a change in fitness may have occurred as evidenced by an early spawn-timing when compared to other wild winter stocks.

The spawner escapement goal is 400 wild winter steelhead for this stock. Only one year of complete spawner surveys has been done for wild steelhead. This was done in 1989 and only 80 adults were estimated to have spawned. Also the spawn-timing was early for native winter steelhead when compared to other stocks in other systems in the region. When limited, periodic surveys were done in 1987, 1990, and 1992, few or no redds were found where there should have been many.

FACTORS AFFECTING PRODUCTION

Habitat -- The watershed's habitat is highly degraded due to urbanization. Water quality conditions can become severe and detrimental for successful spawning and rearing of wild steelhead.

Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. Starting with the 1992 season, Salmon Creek is managed with wild steelhead release regulations for the sport fishery.

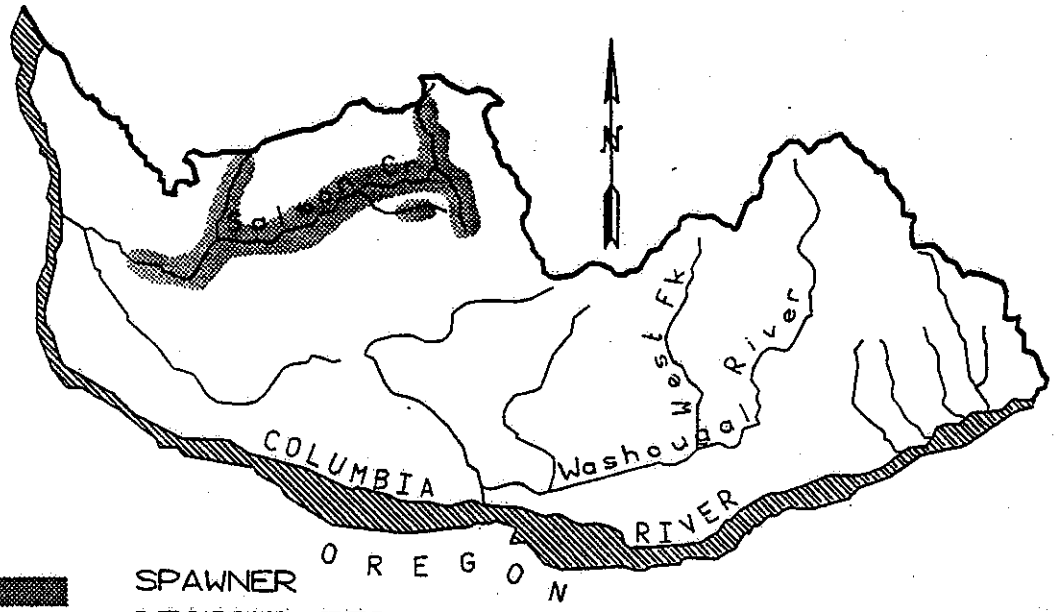
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

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

STOCK DEFINITION PROFILE for Salmon Cr Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Salmon Cr 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	33			
88				
89				
90	2			
91	0			
92				

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

LOWER COLUMBIA -- MAINSTEM WASHOUGAL WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the mainstem Washougal River and tributaries are native to the system and are a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Skamania Hatchery is located on the lower end of the West (North) Fork and has been stocking hatchery steelhead into the river system since the late 1950s. Interbreeding with these fish is thought to be very low due to a difference in spawn-timing.

STOCK STATUS

The status of the stock is Unknown.

The spawner escapement goal is 841 wild winter steelhead for this stock. Two years of helicopter survey data have been collected on the mainstem Washougal and very few redds per kilometer have been observed. This is especially evident when compared to rivers where escapement is met or exceeded. There is not, however, enough escapement data to assess the status of the stock.

Wild sport harvest cannot be used to assess the status of the stock because wild steelhead release regulations have been in effect since 1991 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Slow recovery of degraded freshwater habitat and recent changes in marine habitat conditions affect production.

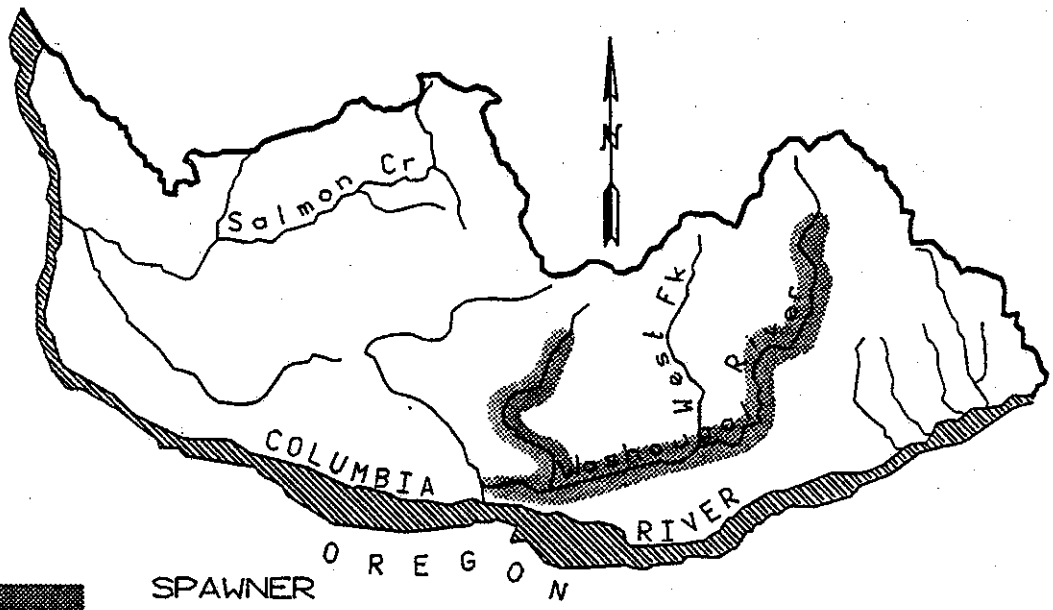
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. Wild release regulations have been in effect on the mainstem Washougal since 1991 to protect wild stock from sport harvest.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

STOCK DEFINITION PROFILE for Mainstem Washougal Winter Steelhead

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

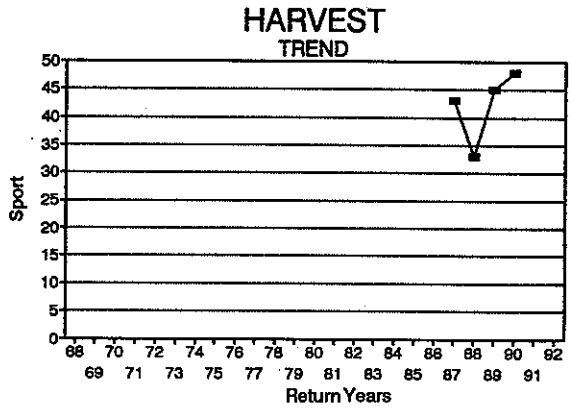
DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for Mainstem Washougal 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	43			
88	33			
89	45			
90	48			
91				
92				



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

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

LOWER COLUMBIA -- WEST (NORTH) FORK WASHOUGAL WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the West (North) Fork Washougal River are native to the system and are a distinct stock based on the geographical isolation of the spawning population. The West (North) Fork stock spawn in the mainstem and tributaries of the West (North) Fork. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Skamania Hatchery is located on the lower end of the West (North) Fork and has been stocking hatchery steelhead into the river system since the late 1950s. Interbreeding with these fish is thought to be very low due to a difference in spawn-timing.

STOCK STATUS

The status of the stock is Unknown.

Two years of helicopter survey data have been collected on the mainstem Washougal and very few redds per kilometer have been observed. This is especially evident when compared to rivers where escapement is met or exceeded. There is not, however, enough escapement data to assess the status of the stock.

Wild sport harvest cannot be used to assess the status of the stock because wild steelhead release regulations have been in effect since 1991 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Slow recovery of degraded freshwater habitat and recent changes in marine habitat conditions affect production.

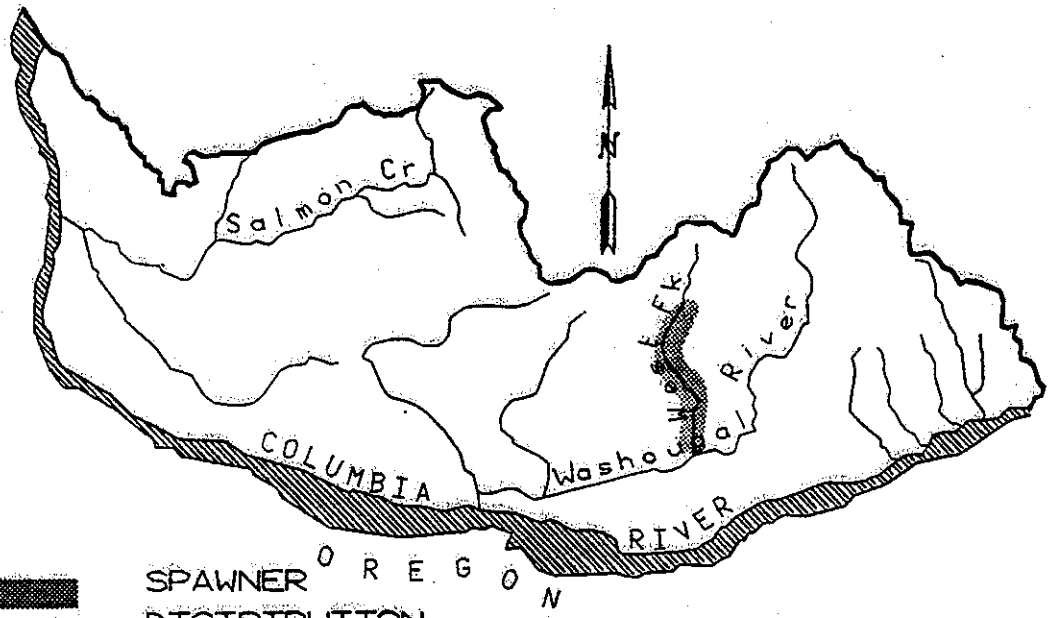
Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in the lower Columbia spring chinook salmon gill net fishery. The West (North) Fork Washougal has been managed with wild steelhead release regulations year around since 1992 to protect wild fish from sport harvest.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

STOCK DEFINITION PROFILE for WF (NF) Washougal Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for WF(NF) Washougal Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

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

LOWER COLUMBIA -- HAMILTON CREEK WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in Hamilton Creek and tributaries are native and classified as a distinct stock based on the geographical isolation of the spawning population. Similar to other wild winter steelhead stocks in the lower Columbia River area, run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June.

Hamilton Creek has received plants of hatchery winter steelhead since at least 1958 from Skamania and Beaver Creek hatcheries. Plants have not been done every year but have been done low in the system.

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.

Wild sport harvest cannot be used to assess stock status because wild steelhead release regulations have been in effect since 1992 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-1987 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Habitat within the watershed is in good shape at this time and the system contains excellent steelhead habitat that is fairly remote.

Harvest Management -- There is no tribal or directed commercial fishery on this stock although incidental catch of wild steelhead occurs in lower Columbia spring chinook salmon gill net fishery. Starting with the 1992 season, Hamilton Creek is under wild steelhead release regulations to protect wild steelhead from sport harvest.

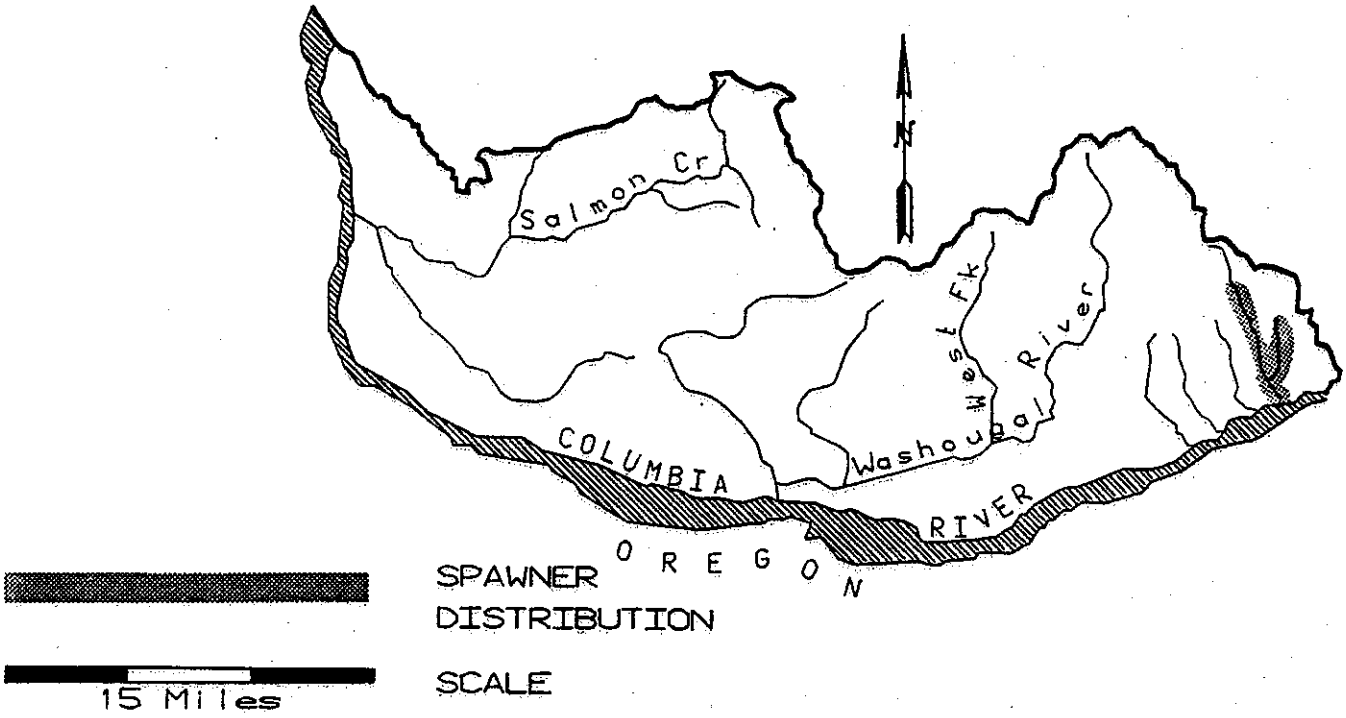
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

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

STOCK DEFINITION PROFILE for Hamilton Cr Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Hamilton Cr 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	25			
88	20			
89	17			
90	24			
91	4			
92	6			

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

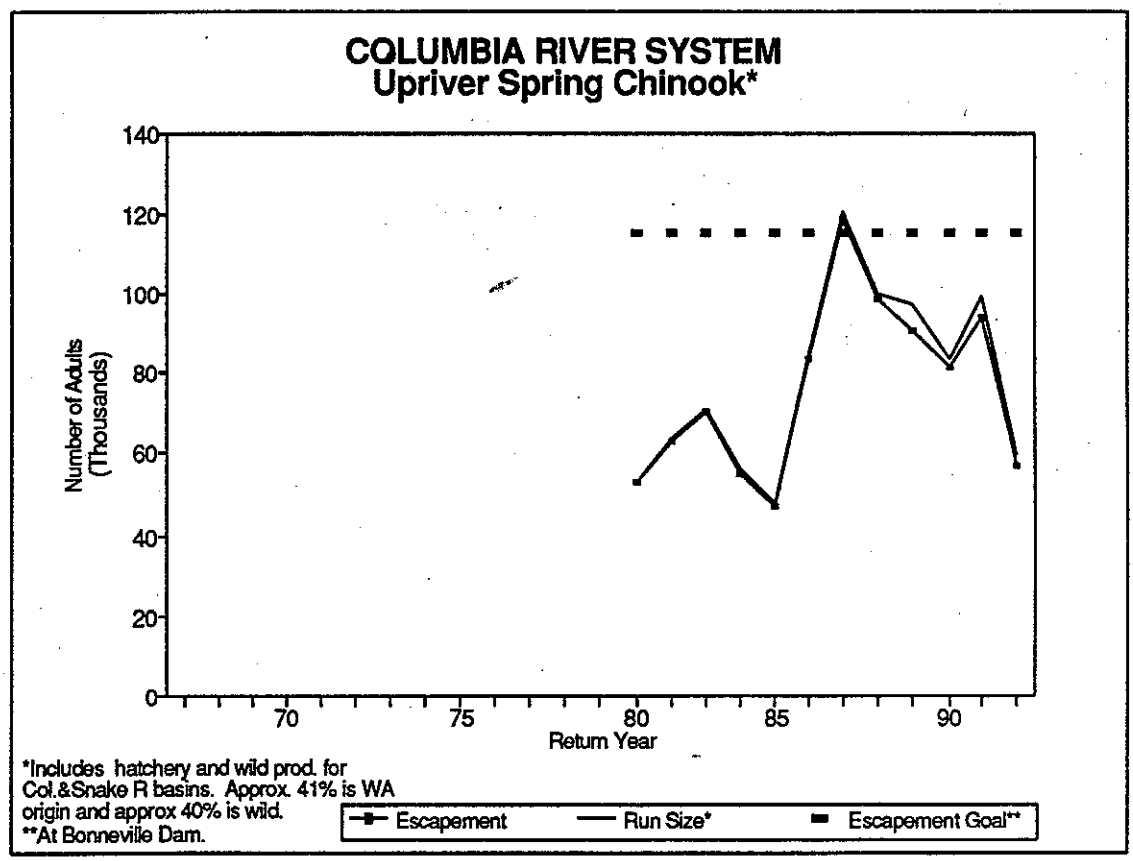
SCREENING CRITERIA

OVERVIEW -- UPPER COLUMBIA SPRING CHINOOK STOCKS

WIND	NASON CREEK
KLICKITAT	LITTLE WENATCHEE
TUCANNON	WHITE RIVER (WENATCHEE)
ASOTIN CREEK	ENTIAT
UPPER YAKIMA	METHOW
NACHES	TWISP
AMERICAN	CHEWUCH (CHEWACK)
CHIWAWA	LOST RIVER

STOCK DEFINITION AND ORIGIN

The Columbia River upriver spring chinook run is comprised of stocks from three geographically separate production areas: the Columbia River tributaries between Bonneville Dam and the Snake River (mid-Columbia River), the Snake River Basin,



and the Columbia River Basin above the mouth of the Snake River (upper Columbia River). The mid-Columbia stocks include the Wind River, Klickitat River, and streams of the Yakima basin including the Upper Yakima, Naches, and American rivers. The Snake River basin stocks are located in the Tucannon River and Asotin Creek. Upper Columbia stocks are those of the Wenatchee basin: Chiwawa River, Nason Creek, Little Wenatchee River and White River, the Entiat River and stocks of the Methow basin including the Methow, Chewuch, Lost, and Twisp rivers.

Upriver spring chinook migrate through the Columbia and Snake rivers from March through June. Spawning timing ranges from August through September. All spring chinook are of native origin with the exception of the Wind River where spring chinook were introduced. Since the 1970s, overall hatchery production has increased and has probably had an increasing influence on natural spawning stocks.

Genetically, upriver spring chinook are similar and as a group can be separated from lower Columbia River spring chinook. The basis for stock separations in this report is primarily geographic (spawning areas).

STOCK STATUS

Upriver spring chinook, as a group, are protected, and harvest management impacts are specifically limited by guidelines in the Columbia River Fish Management Plan (CRFMP). Snake River spring chinook, a component of the upriver spring chinook run, have been listed as "threatened" under the Endangered Species Act. Currently, no mainstem Columbia River or Snake River directed commercial or sport fisheries occur on upriver spring chinook. Ocean harvest is estimated to be minor. The CRFMP allows an incidental harvest by mainstem Columbia sport and commercial fisheries and tribal ceremonial and subsistence fisheries. Directed sport and tribal fisheries occur in some individual basins primarily on hatchery stocks.

The management goal for upriver spring chinook at Bonneville Dam is 115,000 adults. Since 1978, the goal has only been achieved once, in 1986. Of the 16 upriver spring chinook stocks, 15 are depressed and one, Asotin Creek on the Snake River, is considered critical.

UPPER COLUMBIA -- WIND SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

Historically, Shipherd Falls at RM 2.1 is a series of falls approximately 40 feet high that blocked spring chinook migration. Fulton (1968) indicated spring chinook spawning habitat was absent below the falls and a native run did not exist. In 1955, agencies of the Columbia River Fishery Development Program began an effort to introduce spring chinook to the Wind River. The program consisted of: (1) construction of a ladder at Shipherd Falls, (2) transfer of adult spring chinook to Carson National Fish Hatchery, and (3) rearing and releasing juvenile spring chinook into the Columbia River. In 1956, Shipherd Falls was laddered, permitting salmon access to the upper areas. The principal spawning area in the Wind River is from the mouth of Paradise Creek at RM 25.0 downstream approximately 10.0 miles.

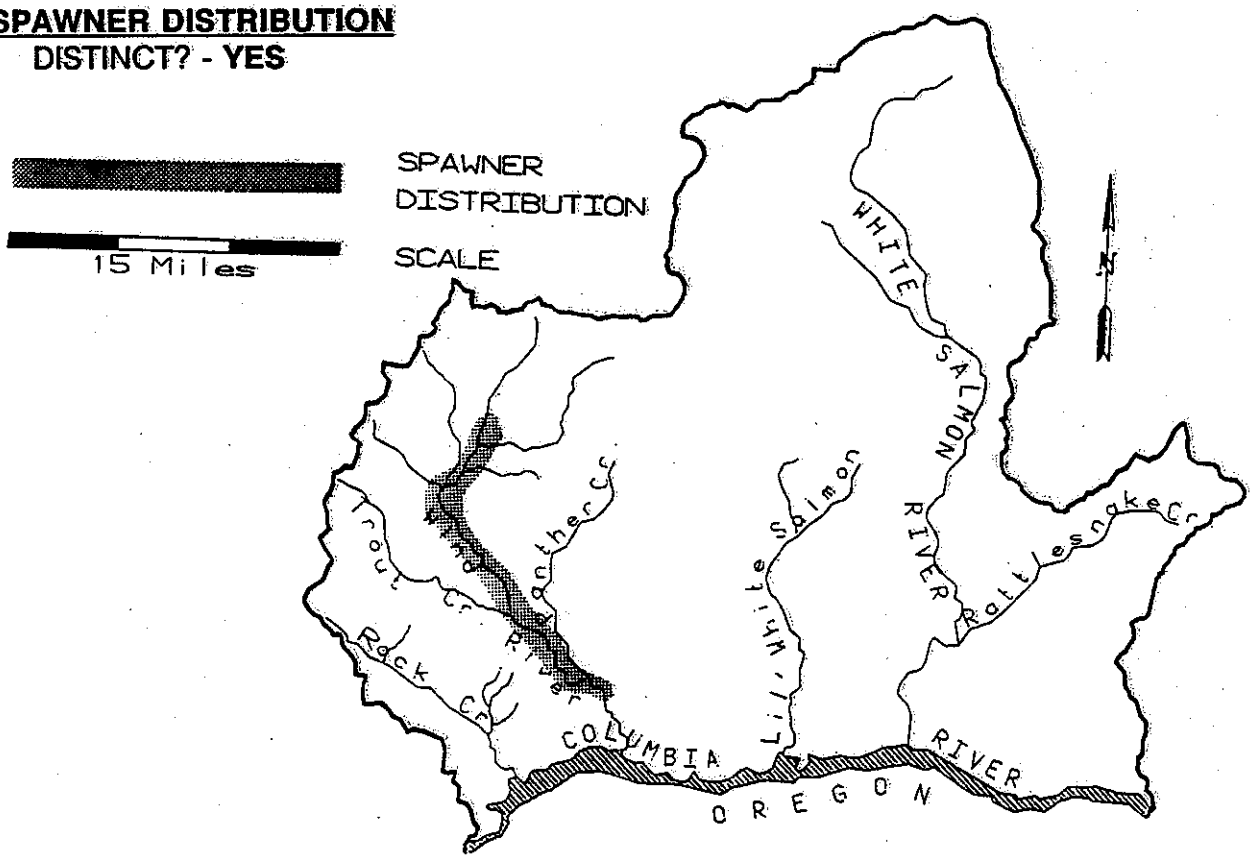
Spring chinook destined for areas upstream of Bonneville Dam begin entering the Columbia River in large numbers in mid-March, generally after the lower Columbia River winter gill net season. Counts peak at Bonneville Dam usually between April 20 and April 28, but can be earlier during abnormally low flow years or later during high run-off. Adults return to the Wind River from late March through June. Spawning occurs from early August through mid-September. The peak of natural spawning in the Wind River occurs during the latter part of August. Wind River spring chinook age composition ranges from three-year-old jacks to six-year-old adults with four-year-olds or five-year-olds usually the dominant age classes. Genetically, Wind River spring chinook are most similar to Wenatchee, Leavenworth, and Winthrop stock spring chinook, and can be distinguished from other Columbia River spring chinook stocks.

Spring chinook were introduced in the Wind River. Carson National Fish Hatchery was constructed in 1938. Several early attempts were made to introduce spring chinook into the Wind River. From 1938-1940 between 91,700 to 96,500 fish were released. The first three groups of fish were eggs from spring chinook taken from the Clackamas River in Oregon. Incubation and rearing of all groups was at Carson Hatchery. Apparently those efforts were not successful, as no fish were observed returning as adults. In 1945, an experimental transfer of 35,382 eggs from the Salmon River in Idaho was used to determine the feasibility of a full production program which was scheduled to begin in 1951. The 7,600 fingerlings released in 1953 were from eggs provided by a Willamette River hatchery operated by the Fish Commission of Oregon. However, attempts were again unsuccessful. The program eventually began in 1958 and 1959 using spring chinook collected at Bonneville Dam for brood stock. The release of 1,016,500 yearlings in 1960 and 260,700 yearlings in 1961 provided the basis for establishment of a permanent program at Carson Hatchery. Primary production in the Wind River is from hatchery releases.

STOCK DEFINITION PROFILE for Wind River Spring 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

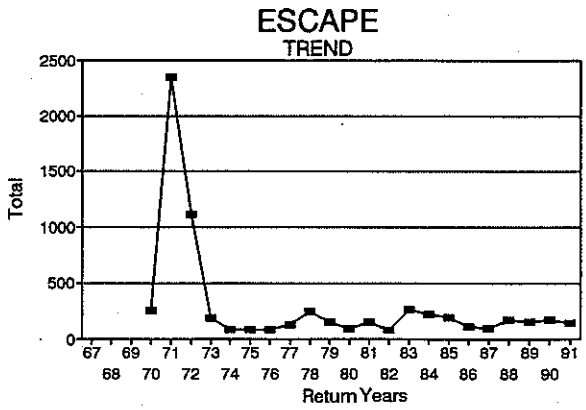
DISTINCT? - **NO**

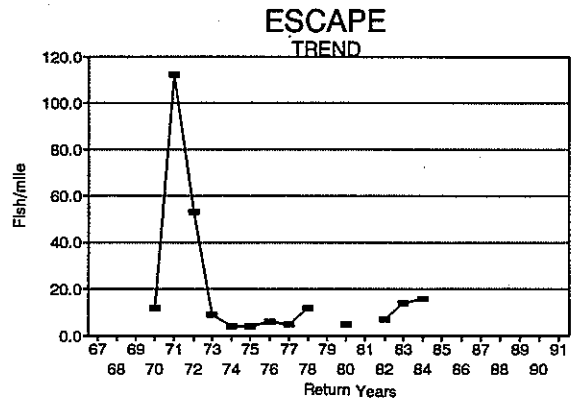
STOCK STATUS PROFILE for Wind R Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

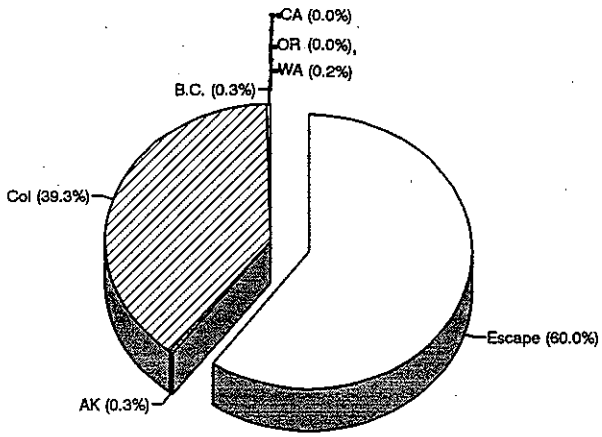
Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70	252	12.0		
71	2352	112.0		
72	1113	53.0		
73	189	9.0		
74	84	4.0		
75	84	4.0		
76	84	6.0		
77	126	5.0		
78	245	12.0		
79	154			
80	92	5.0		
81	155			
82	80	7.0		
83	266	14.0		
84	220	16.0		
85	192			
86	111			
87	98			
88	173			
89	157			
90	173			
91	141			





AVERAGE RUNSIZE DISTRIBUTION

YEARS 1985 Brood



Based on Carson Hatchery tag codes 05-18-13/30 from the 1985 brood.

STOCK SUMMARY

STOCK ORIGIN
Non-native

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The Wind River spring chinook natural spawning escapement from 1970-1990 averaged 305 with a low of 80 in 1982 and a high of 2,352 in 1971. Most of the fish in the Wind River return to the hatchery or are harvested below the hatchery. The average fish per mile from 1970-1984 was 20.5 with a range of four fish per mile in 1974 and 1975 and a high of 112 fish per mile in 1971. The average number of miles surveyed during this time was 9.2.

FACTORS AFFECTING PRODUCTION

Habitat -- See Wind - Fall chinook. Passage is impeded at Shipherd Falls and at the Trout Creek Dam.

Mainstem survival is affected by passage at Bonneville Dam and by Columbia River pollution and habitat alterations.

Harvest Management -- Columbia River upriver spring chinook originate from hatchery and natural production areas upstream of Bonneville Dam. The run is comprised of races destined for the upper Columbia system above McNary Dam, the Snake River system, and middle Columbia tributaries between Bonneville and McNary dams. Interim management goals for upriver adult spring chinook are 115,000 fish passing Bonneville Dam and 35,000 (25,000 wild/natural) fish passing Lower Granite Dam.

Wind River Harvest - The United States vs. Oregon management plan stipulates that non-treaty fisheries on upriver spring chinook runs between 112% and 125% of the interim management goal at Bonneville Dam (115,000 fish), shall occur in the tributaries. Treaty fisheries on runs of this same magnitude may occur either in the tributaries or the mainstem. Harvest on runs less than 112% of the interim management goal will occur incidentally in ocean and lower river fisheries for the non-treaty share and will occur as mainstem ceremonial and subsistence fisheries for the treaty share.

Wind River spring chinook are managed for hatchery escapement. When the hatchery is expected to achieve its escapement goal, the Washington Department of Fisheries and Yakima Indian Nation develop a harvest plan for sharing the harvestable surplus between the recreational fishery and Yakima tribal members. A tribal "in-lieu" fishing site, set aside in compensation for tribal fishing grounds inundated by the Bonneville Dam reservoir, occupies land on the west bank at the mouth of the Wind River. Wind River spring chinook tribal harvest from 1987 and 1990 return years was nine and 29 fish, respectively. In 1991, however, tribal harvest increased to 920 due mainly to increased awareness of fishing opportunity by the tribe.

The recreational fishery occurs downstream of Shipherd Falls, primarily at the mouth of the river. Tribal harvest occurs in the area just below the hatchery and at the mouth of the Wind River. In some years, only certain days of the week were open to sport fishing and harvest was negligible.

Columbia River Harvest - Prior to 1975, upriver spring chinook contributed large catches to April-May mainstem commercial gill net and sport fisheries. Since 1975, April-May fisheries in the mainstem have been limited. The 1977 commercial season was the last April-May fishery to be allowed in the mainstem. The Columbia River Fish Management Plan (CRFMP) provides that on runs between 50,000 and 112% of the interim Bonneville Dam goal of 115,000, the mainstem harvest below Bonneville Dam is limited to the 1983-1985 average (4.1%) and in no event exceed 5.0% of the upriver run; and treaty platform and gill net ceremonial and subsistence (C&S) fisheries in Zone 6 are limited to 7% of the run.

Since 1975 (except 1977), no fisheries targeting on upriver stocks have occurred on the lower river. During this period the only upriver fish caught were taken incidental to February-April fisheries targeting on lower river runs. Catches of upriver spring chinook during 1938-1973 averaged about 55% of the runs, through directed commercial and sport harvest. Total commercial, sport, and C&S catches during 1974-1991 averaged about 10% of upriver spring chinook runs. The Wind River origin spring chinook from 1980-1990 has on average contributed 6.1% of the upriver run.

Ocean Harvest - Information on ocean distribution and catch rates of Columbia River spring chinook has been limited by low CWT recoveries in marine fisheries. GSI sampling in Washington coastal and Strait of Juan de Fuca fisheries 1986-1989 indicate annual treaty and non-treaty catches of zero to 2,346 upriver spring chinook landed in these fisheries, and an average of 1,020 fish per year. In April 1988, the Upriver Spring Chinook Task Force reported that, "Current CWT and GSI information indicates upriver spring chinook are impacted by ocean fisheries at a lower rate than any other Columbia River chinook race."

The catch distribution of Carson Hatchery spring chinook based on coded-wire tag (CWT) recoveries and the genetic stock identification (GSI) method indicated that ocean harvest is relatively minor. Survival of coded wire tagged yearlings from Carson Hatchery has consistently been poor (<0.1%), but the few recoveries that do occur are primarily in freshwater as recreational catch, incidental harvest during commercial fisheries, and hatchery escapement. Based on genetic stock identification methodology, of the 73,200 chinook salmon caught in the May 1982 troll fishery off Washington, approximately 1,700 were upper Columbia River spring chinook.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE WIND - WHITE SALMON BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3771604	28668757	0	2519871	0	499857
1983	3174504	24812109	1070249	417829	3423094	514757
1984	5825827	23651097	831687	2566534	0	499900
1985	4411839	31485363	0	1745372	0	21400
1986	5221770	11873733	968267	5511854	0	500500
1987	5938194	14597238	328258	2634704	0	405600
1988	7168618	13727582	0	4760667	0	0
1989	4413335	18931140	1456852	0	1877199	0
1990	5154559	13700350	0	3984416	0	0
1991	4362792	17640908	4029158	2573323	0	0
MEAN	4944304	19908828	1447412	2968286	2650147	407002

UPPER COLUMBIA -- KLICKITAT SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

Spring chinook once spawned in the West Fork of the Klickitat River which enters the mainstem at RM 63.0, just below Castille Falls. The gradient in the West Fork although, does not appear to be ideal for spawning and rearing of this species. In 1960 through 1962, obstructions were blasted and fishways constructed at Castille Falls (RM 64.0) to allow the introduction of anadromous runs to the upper Klickitat River. Spring chinook redds have been observed in the mainstem from the hatchery as far upstream as RM 84.0. However, the largest number of redds ever counted above Castille Falls was just 13 in 1971. The naturally produced run spawns in the area from Parott's Bridge (RM 49.0) upstream to about McCormick Meadows (RM 80.0). The primary spawning area is from Soda Ford (RM 60.7) upstream to Castile Falls, a distance of approximately 4.0 miles. Spring chinook probably also spawn in the mainstem downstream from the hatchery. Surveys below the hatchery in 1989 and 1990 showed two redds and one redd respectively.

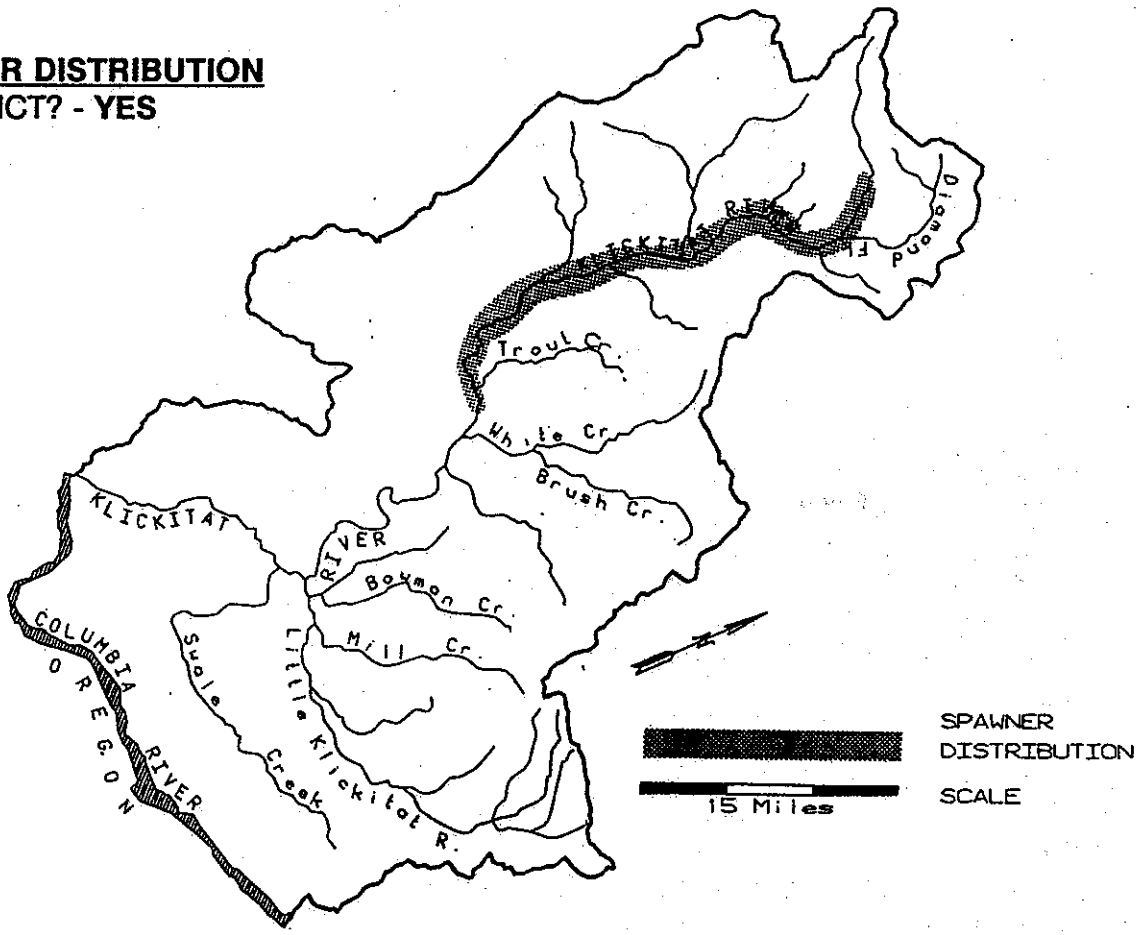
Klickitat River spring chinook enter the Columbia River primarily in March and April, generally after the lower Columbia River winter gill net season. Spring chinook destined for areas upstream of Bonneville Dam usually peak at the dam between April 20 and April 28 but can be earlier during abnormally low flow years or later during high run-off. Migration into the Klickitat River reaches a peak in May and June. Spawning activity peaks in late August and early September. The Klickitat River spring chinook age composition ranges from two-year-old mini-jacks to six-year-old adults with four-year-olds usually the dominant age class.

Prior to 1920, there were reports of large runs of spring chinook and a significant Indian fishery at Lyle Falls (RM 2.0). The history of hatchery production begins with the first release of 11,900 yearlings of unknown stock origin in 1950. Spring chinook were trapped from 1952 through 1959 or later at the upper fishway (Falls #5). Klickitat Hatchery has occasionally released non-local stock spring chinook of Carson, Willamette, and Cowlitz origin. Klickitat stock are hybrids. There is probably some pure native production that still occurs, especially in the upper areas, but it is primarily a mix of wild and hatchery fish. Genetically, the Klickitat spring chinook are similar to the Yakima sub-basin spring chinook and can be separated from other Columbia River spring chinook. Carson stock fish were released into the Klickitat River in 1987 to supplement the Klickitat stock and were 100% marked to differentiate them.

STOCK DEFINITION PROFILE for Klickitat Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



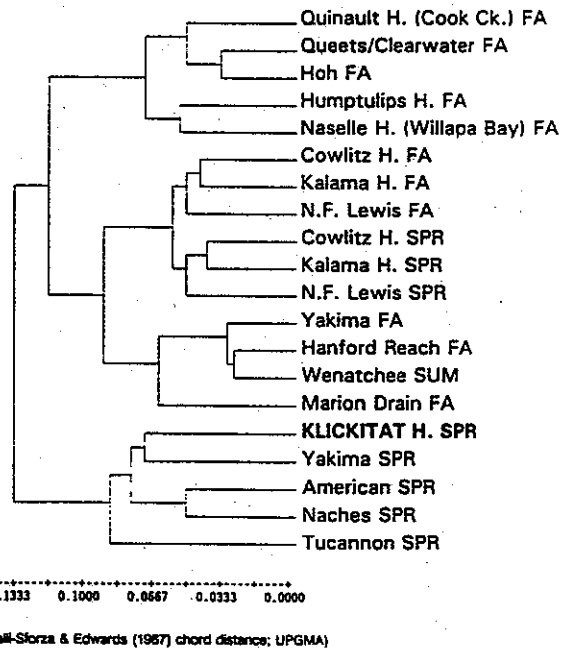
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - No genetic data exist for the natural spawner population in the Klickitat River. However, Klickitat Hatchery spring chinook sampled in 1989 and 1990 showed no differences between years in their genetic characteristics and were combined into one data set. This hatchery spring chinook stock was different from all other chinook stocks examined (**p** <0.05).

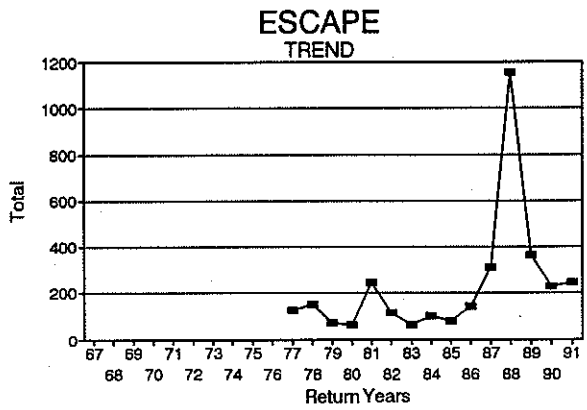


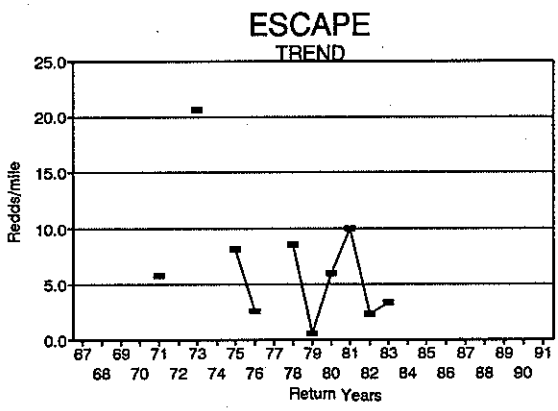
STOCK STATUS PROFILE for Klickitat Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

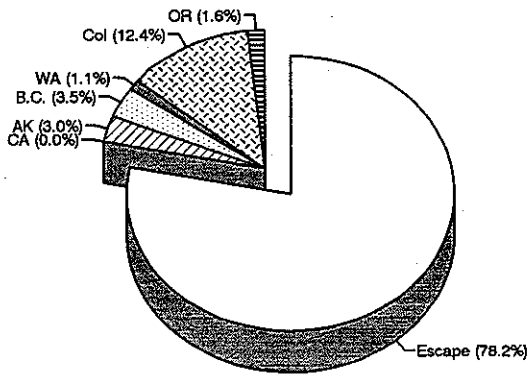
Return Years	ESCAPE Total	ESCAPE Redds/mile		
67				
68				
69				
70				
71		5.8		
72				
73		20.6		
74				
75		8.1		
76		2.6		
77	126			
78	150	8.6		
79	70	0.6		
80	63	6.0		
81	245	10.0		
82	113	2.3		
83	63	3.3		
84	102			
85	79			
86	142			
87	312			
88	1153			
89	363			
90	231			
91	245			





AVERAGE RUNSIZE DISTRIBUTION

YEARS 1976 Brood



Based on Klickitat Hatchery tag codes 63-16-01, 63-16-02 from 1976 brood.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Biological

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The Klickitat River spring chinook stock is chronically depressed. The Klickitat River natural spring chinook escapement from 1977-1991 averaged 230 with a low adult return of 63 in 1980 and 1983, and a peak of 1,153 in 1988. Redd counts were made beginning in 1971 and divided into two basic areas; above and below Castle Falls. Above Castille Falls the average redds per mile from 1971-1984 was 0.22, ranging from zero in 1976, 1981, and 1982 to 0.72 in 1971. Below Castille Falls the average redds per mile from 1971-1984 was 5.91, ranging from 0.57 in 1979 to 20.63 in 1973. Data quality is good.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality. Both are affected by logging in the watershed. Agricultural uses and impacts in the watershed include irrigation withdrawals (adult migration delays, losses from inadequate screening), grazing (high stream temperatures due to loss of riparian vegetation for shade, loss of source of instream large woody debris; bank trampling and bank erosion). Sedimentation from Big Muddy Creek affects Klickitat River gravel quality. Mainstem survival is affected by passage at Bonneville Dam and by Columbia river pollution and habitat alterations.

Harvest Management -- Columbia River upriver spring chinook originate from hatchery and natural production areas upstream of Bonneville Dam. The run is comprised of races destined for the upper Columbia system above McNary Dam, the Snake River system, and middle Columbia tributaries between Bonneville and McNary dams. Interim management goals for upriver adult spring chinook are 115,000 fish passing Bonneville Dam and 35,000 (25,000 wild/natural) fish passing Lower Granite Dam.

Klickitat River Harvest - Treaty Indian and sport harvests of spring chinook occur in the Klickitat sub-basin. Each season's regulations are developed through consultation between the Washington Department of Fisheries and the Yakima Indian Nation. The Washington Department of Fisheries and the Yakima Indian Nation attempt to achieve and equitable sharing of harvestable spring chinook across all co-managed tributaries. The harvestable surplus within any tributary or tributaries may not necessarily be shared equally as long as the treaty and non-treaty harvest totals for all tributaries are equitable.

Harvest of spring chinook in the Klickitat sub-basin is currently managed to provide adequate escapement to Klickitat Hatchery. The fisheries in recent years have tended to be conservative due in part to difficulties in forecasting the run. The fisheries occur in the Klickitat River 40.0 miles downstream from the hatchery. Escapement past the fishery is unknown until adults reach the hatchery a month

later. General non-treaty angling regulations are published annually by the Washington Department of Fisheries and are subject to inseason emergency action, if necessary.

The treaty dip net fishery is conducted by the Yakima Indian Nation near Fishway #5 (RM 2.2). Tribal harvest of spring chinook in the Klickitat sub-basin in recent years, 1980-1991, averaged 805 with a low catch of 61 in 1980 and a peak of 1,542 in 1990. The exploitation rate in these years has ranged from 2.4% in 1980 to 53.6% in 1985. Since 1980, the mean exploitation rate has been 28.0%.

Sport harvest in the Klickitat sub-basin from 1977-1991 averaged 275 with two lows in 1977 and 1980 of 9 and 11. The largest sport harvest in this time frame occurred in 1989 with a catch of 928, but this includes 769 Carson stock fish.

The initial management plans for the Klickitat Hatchery stated that its purpose was to supplement natural production and rebuild natural runs by outplanting fingerlings in the Klickitat River and its tributaries. Klickitat Hatchery planting records from 1977-1990 show that all spring chinook smolts were released on-station. Fingerlings have been released both on and off-station and from spring water into cold river water with no acclimation due to rearing constraints. Due to limited hatchery rearing space, excess spring chinook are released as fingerlings and therefore not held for as long as desired for optimum survival in the river. For this reason, releases of fry and fingerlings have probably not contributed significantly to adult returns. After approximately 40 years of supplementation, natural production is at a low level based on redd counts. With the release of hatchery spring chinook, spawning of hatchery strays with wild fish may have significantly lowered average fitness within the naturally spawning population.

On the basis of spring chinook redd counts since 1960, the fishways at Castille Falls have never been effective. Little evidence of salmon or steelhead migration above the falls since construction was completed exists. This may be partly because the fishways have not been well maintained. The limited Mitchell Act funding available may still be insufficient for proper maintenance.

Columbia River Harvest - Prior to 1975, upriver spring chinook contributed large catches to April-May mainstem commercial gill net and sport fisheries. Since 1975, April-May fisheries in the mainstem have been limited. The 1977 commercial season was the last April-May fishery to be allowed in the mainstem. The Columbia River Fish Management Plan provides that on runs between 50,000 and 112% of the interim Bonneville Dam goal of 115,000, the mainstem harvest below Bonneville Dam is limited to the 1983-1985 average (4.1%) and in no event exceed 5.0% of the upriver run; and treaty platform and gill net ceremonial and subsistence (C&S) fisheries in Zone 6 are limited to 7% of the run.

Since 1975 (except 1977), no fisheries targeting on upriver stocks have occurred on the lower river. During this period the only upriver fish caught were taken incidental to February-April fisheries targeting on lower river runs. Catches of upriver spring chinook during 1938-1973 averaged about 55% of the runs, through directed commercial and sport harvest. Total commercial, sport, and C&S catches during 1974-1991 averaged about 10% of upriver spring chinook runs. The Klickitat River origin spring chinook from 1980-1991 has on average contributed 4.0% of the upriver run.

Ocean Harvest - A harvest profile of Klickitat Hatchery spring chinook based on coded wire tag recoveries of 1976 brood yearling releases revealed that most of the ocean catch occurred in Alaska (14.2%) and British Columbia (24.8%). Washington ocean harvest was 6.4% and Oregon ocean harvest was 9.7% overall.

Information on ocean distribution and catch rates of Columbia River spring chinook has been limited by low CWT recoveries in marine fisheries. GSI sampling in Washington coastal and Strait of Juan de Fuca fisheries 1986-1989 indicates annual treaty and non-treaty catches of zero to 2,346 upriver spring chinook landed in these fisheries, and an average of 1,020 fish per year. In April 1988, the Upriver Spring Chinook Task Force reported that, "Current CWT and GSI information indicates upriver spring chinook are impacted by ocean fisheries at a lower rate than any other Columbia River chinook race." If the catch profile of Klickitat River spring chinook mirrors other upper Columbia River stocks, then the ocean harvest is minor.

Hatchery -- Klickitat Hatchery is located in a remote area on the Klickitat River at RM 25.0, near the town of Glenwood, Washington. The facility includes a hatchery building, 22 raceways, an adult holding pond and 3 rearing/release ponds.

Water rights total 63 cfs from four sources: Indian Ford Springs, an unnamed spring, Wonder Springs and the Klickitat River. The facility is staffed with 6.0 FTE's.

Current production: 600,000 spring chinook, 4,000,000 fall chinook and 1,350,000 Type N coho.

Hatchery operational impacts have not been determined. Klickitat stock is supplemented by hatchery production. Carson stock was introduced in the 1970s and has been supplemented with imports until 1990 when imports were stopped. The barrier at the hatchery is passable to upstream migrating fish. Fry plants will be made into the upper watershed when excess fry are available. Currently, research is being done to improve survival of the Klickitat stock.

LAST TEN YEARS SALMON RELEASES INTO THE KLICKITAT BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	TYPE-S COHO	TYPE-N COHO
1982	1759802	3679620	0	1653687
1983	1354800	4864600	0	1447153
1984	2079200	1195800	799300	540000
1985	872600	123100	2515388	0
1986	629900	4202500	0	1117424
1987	669600	4805100	1121372	2944259
1988	1031900	4467700	0	3799101
1989	1751563	4604500	0	4166900
1990	922800	4212900	0	4174037
1991	839900	5183300	0	2817600
MEAN	1191207	3733912	1478687	2517796

UPPER COLUMBIA -- TUCANNON SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was classified as distinct based on geographic isolation and on biological and genetic characteristics.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Tributary entry is May-June with spawning in late August to mid-September, primarily upstream of Tucannon Hatchery at RM 38.0.

Tucannon River spring chinook are a native stock of wild production. Because of its geographic isolation, this run probably has not been impacted by strays from other production areas. As part of the Lower Snake River Compensation Plan, a hatchery mitigation program has used local wild stock for brood stock since 1985. Tucannon River spring chinook are depressed based on chronically low escapement.

STOCK STATUS

Escapement to the basin is 100 to 300 spring chinook annually. Run-sizes in the mid-1900s averaged 2,400 spring chinook. Historical run-size information was from peak period redd count surveys in the index area upstream of Tucannon Hatchery. Index area redd counts have usually numbered from 25 to 75 since the 1960s. The trend since 1960 is for a very slight decline in redd counts. In 1992, wild Snake River spring, summer, and fall chinook were listed as threatened under the Endangered Species Act. Management and recovery of Tucannon River spring chinook will be under the Endangered Species Act process. Tucannon River spring chinook should be considered depressed, and a stock of concern.

FACTORS AFFECTING PRODUCTION

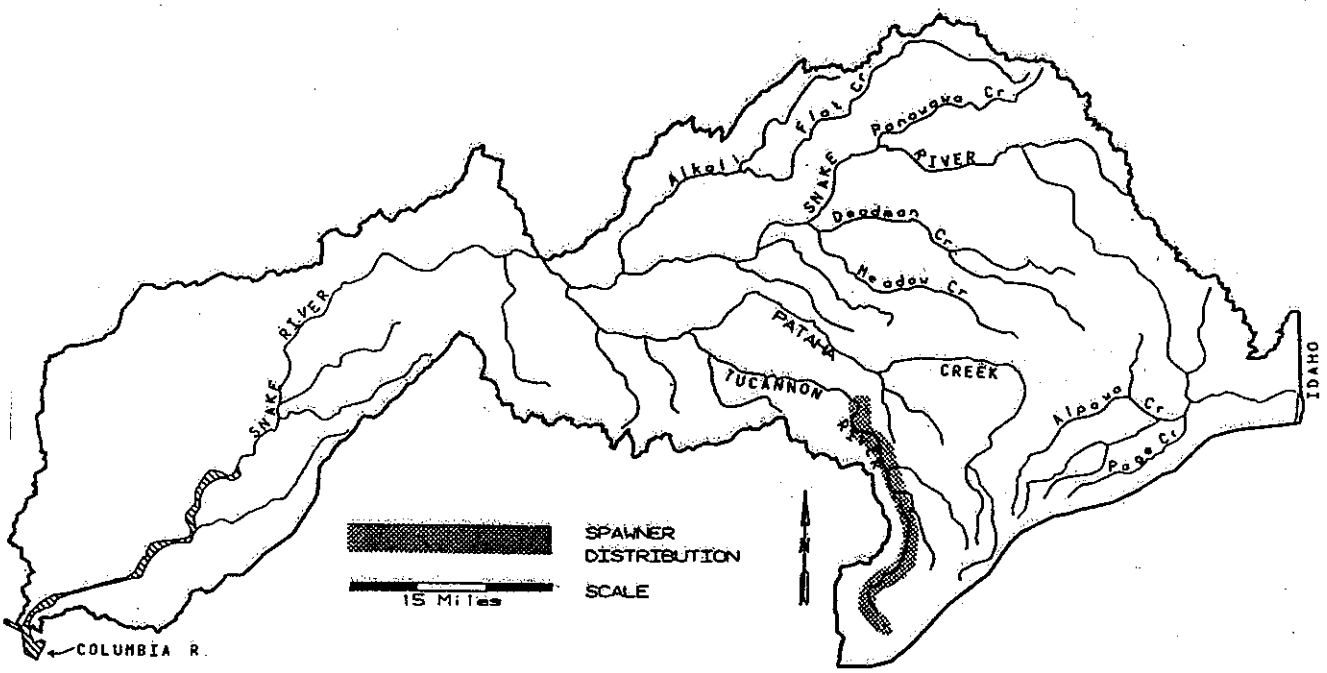
Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion and inadequate screening limit production. Below river mile 32, instream and riparian habitats have been degraded by agricultural and logging practices. Summer temperatures in the lower river have been critically high. Passage at Starbuck Dam limits access to the upper river.

Mainstem mortalities are attributable to two Snake River Dams and four Columbia River dams.

STOCK DEFINITION PROFILE for Tucannon Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



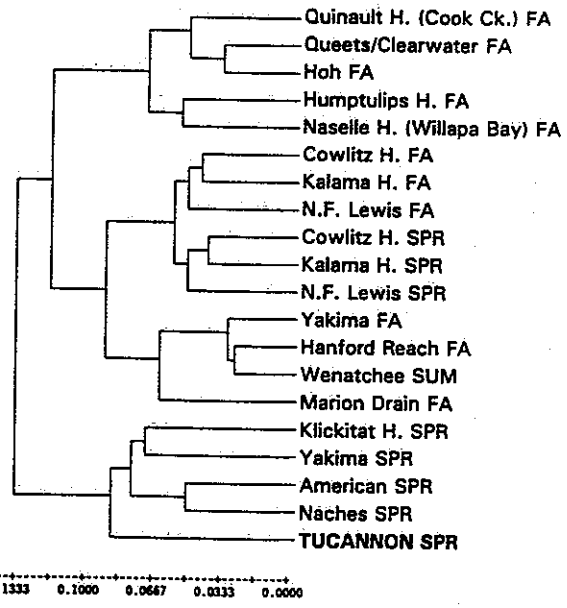
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Tucannon spring chinook spawners sampled every year between 1985 and 1990 were not significantly different in their genetic characteristics between years and were combined into one data set. This spring chinook stock was significantly different from all other chinook stocks examined ($p<0.05$).

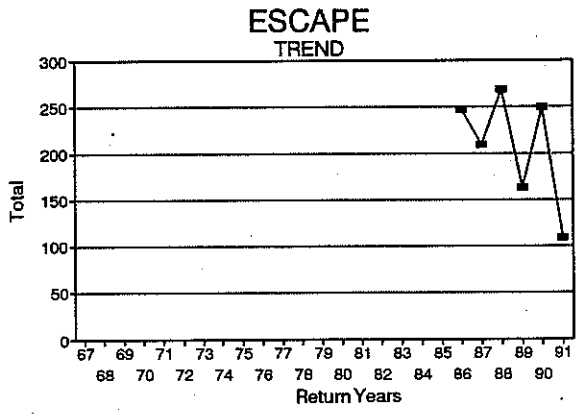


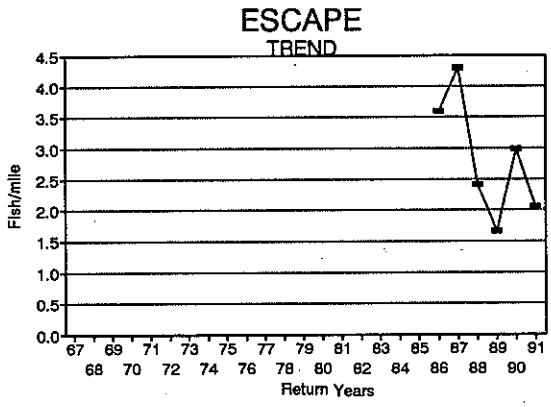
STOCK STATUS PROFILE for Tucannon Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Very Good

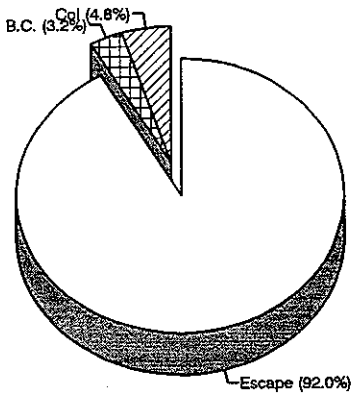
Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86	247	3.6		
87	209	4.3		
88	269	2.4		
89	163	1.7		
90	249	3.0		
91	109	2.1		





AVERAGE RUNSIZE DISTRIBUTION

YEARS 1986 Brood



Based on 1986 brood Tucannon tag code 63-41-48.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Depressed

SCREENING CRITERIA
ST Neg Decl'n, Chronically Low

Harvest Management -- Harvest is not the limiting factor for Tucannon spring chinook based on CWT recoveries of this stock. Harvest rate for all fisheries was consistently less than 10% for 1986-1988 brood tag groups from Tucannon Hatchery. Fishery recoveries of any kind were minimal. Most occurred in troll fisheries or mainstem Columbia treaty ceremonial fisheries. There is no tributary sport fishery. Prior to the start of the hatchery program in 1985, a low-level subsistence fishery by the Umatilla and Nez Perce tribes caught less than 25 fish annually.

Hatchery -- Hatchery operational impacts have not been determined. The relationship of hatchery stock derived from wild spawners and wild stock is currently being studied through a supplementation program. A Japanese style weir is installed on the river to block upstream passage. Sufficient brood of wild origin only are used for the hatchery program, the remainder are passed upstream for natural spawning.

LAST TEN YEARS SALMON RELEASES INTO THE MIDDLE SNAKE BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK
1982	0	628880
1983	0	406560
1984	0	99526
1985	0	0
1986	164286	0
1987	12922	0
1988	153725	0
1989	152165	0
1990	145146	0
1991	99057	221
MEAN	121217	283797

UPPER COLUMBIA -- ASOTIN CREEK SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation. Little is known of this population of spring chinook.

If run-timing is similar to other upriver Columbia spring chinook, then migration into the Columbia River begins in late March to early April. Tributary entry is May-June with spawning in late August to late September.

Asotin Creek spring chinook are a native stock of wild production. Because of its geographic isolation, this run probably has not been impacted by strays from other production areas.

STOCK STATUS

This stock is in danger of extinction and may number less than 50 fish. The run has declined to a point that its present existence is questionable. Sporadic redd counts have numbered zero to five annually since 1986. The best evidence of production is the presence of small numbers of juvenile chinook in the north and south forks of Asotin Creek.

FACTORS AFFECTING PRODUCTION

Habitat -- See Asotin Creek - Summer steelhead

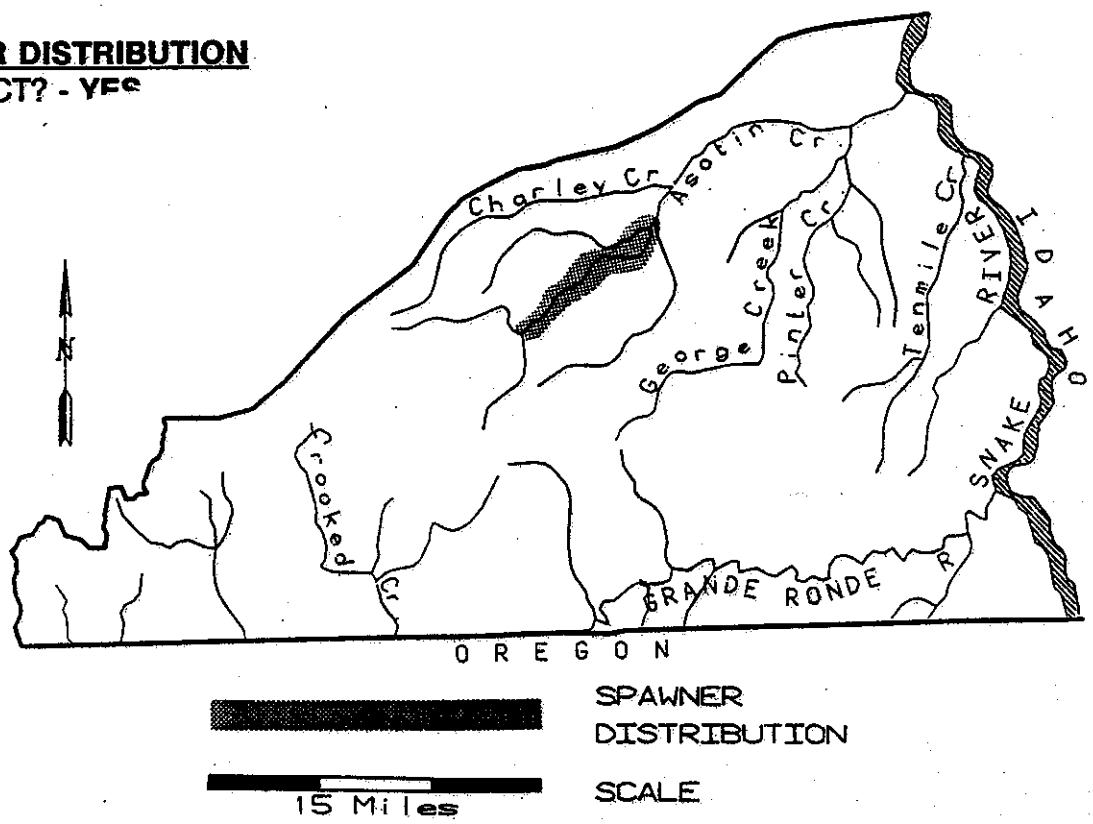
Harvest Management -- Harvest is not a limiting factor for this minor stock if it has an ocean distribution and run-timing similar to other upriver spring chinook in the Columbia River. A small tribal subsistence catch has occurred historically in Asotin Creek.

Hatchery -- Hatchery operational impacts not determined.

STOCK DEFINITION PROFILE for Asotin Creek Spring 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

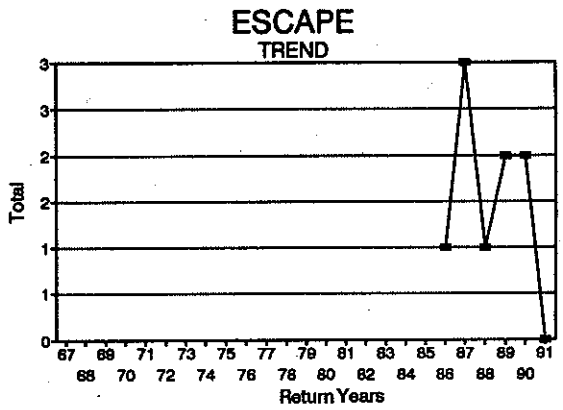
DISTINCT? - **NO**

STOCK STATUS PROFILE for Asotin Cr Spring Chinook

STOCK ASSESSMENT

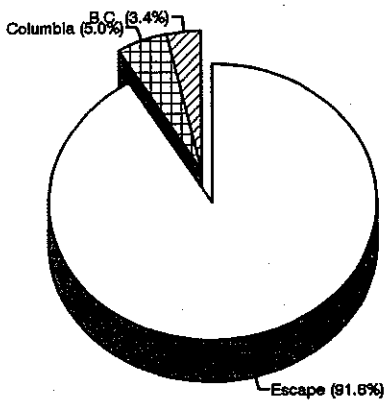
DATA QUALITY------> Poor

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86	1			
87	3			
88	1			
89	2			
90	2			
91	0			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1986 Brood



Based on Tucannon tag code 63-41-48, 1986 brood.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Biological

STOCK STATUS
Critical

SCREENING CRITERIA
LT Neg Trend, Chronically Low

UPPER COLUMBIA -- UPPER YAKIMA SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

The historic spawning areas of spring chinook included the Yakima River above the city of Ellensburg, the Cle Elum River below Lake Cle Elum, the Tieton River (including North and South forks), Rattlesnake Creek and the Bumping, Little Naches and American rivers. Significant spawning still occurs in these areas, especially in the Yakima above Ellensburg, the upper Naches and the American. Exceptions are the Tieton system, which is now inaccessible above Rimrock Dam and is affected by reservoir operations below, and the Yakima River above Easton Dam, which was inaccessible until a new ladder was completed in 1989. Many of the larger tributaries were also used in historic times. Spawning tributaries that may have been important historically, but are seldom or never used now include: Cooper, Waptus and Cle Elum rivers above Cle Elum Dam, Teanaway River, Taneum, Swauk, and Manastash creeks, Wenas Creek, Tieton River, Cowiche, Ahtamum, and Logy creeks.

The Yakima basin spring chinook population is composed of three segments, the Naches substock, the American substock, and the upper Yakima substock. Spawning occurs in the upper Yakima River later than the Naches and American River system. The upper Yakima is generally defined as the area from Ellensburg-midway (RM 152.2) to Easton Dam (RM 202.5) where approximately 65% of the spawning in the mainstem occurs. Genetically, the Yakima and Naches stocks are similar. The majority of spawning on the upper Yakima occurs during the last 20 days of September. Spawning begins on the colder water areas and progresses to the warmer locations. The upper Yakima River spring chinook age composition ranges from two-year-old mini jacks to five-year-old adults with the majority of the spawning population being four-year-olds.

Spring chinook are indigenous to the Yakima River and are almost exclusively maintained from natural production, though non-local stock hatchery releases have occurred. Hatchery releases began in 1959 with Klickitat stock spring chinook being released into the upper Yakima River. Releases since then have included Icicle, Ringold, Cowlitz, and Carson stock spring chinook. No spring chinook hatcheries exist in the sub-basin.

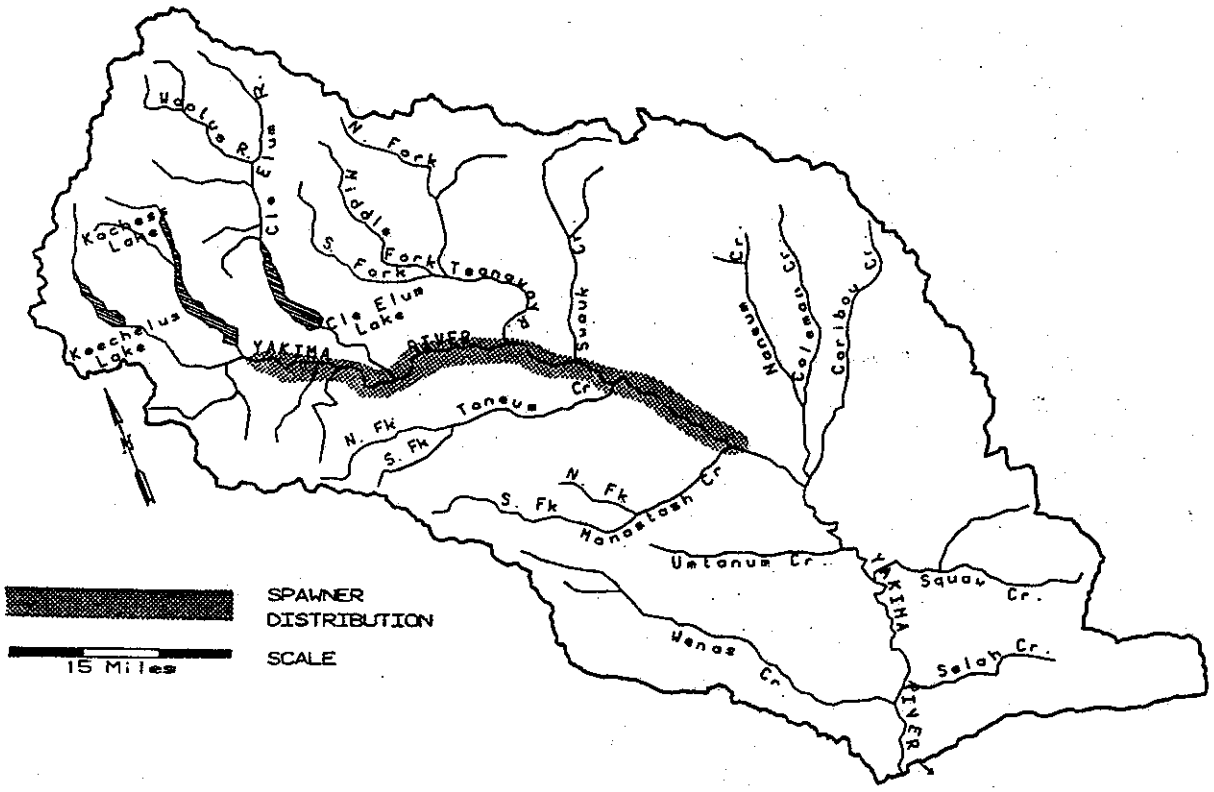
STOCK STATUS

The Yakima River natural stock status shows signs of short-term declines. The upper Yakima River spring chinook redd counts from 1960-1992 averaged 14.6 redds per mile with a low count of 1.6 redds per mile in 1966 and 1970 and a peak of 46.0 redds per mile in 1992. Data quality is good. Surveys have been conducted since 1960 and have covered about the same area.

STOCK DEFINITION PROFILE for Upper Yakima Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



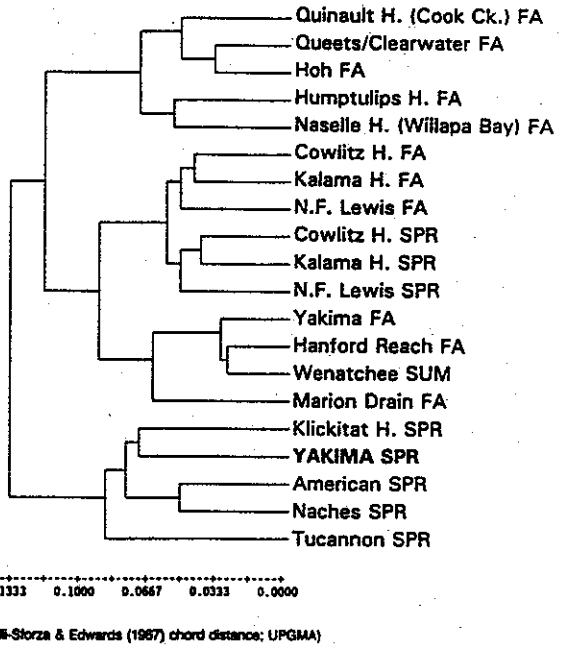
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Spring chinook sampled in the upper Yakima basin in 1986, 1989 and 1990 showed no differences between years in their genetic characteristics and were combined into one data set. This spring chinook stock was significantly different from all other chinook stocks examined ($p < 0.05$).

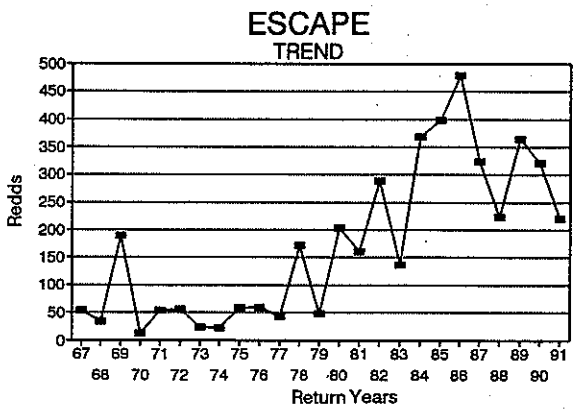


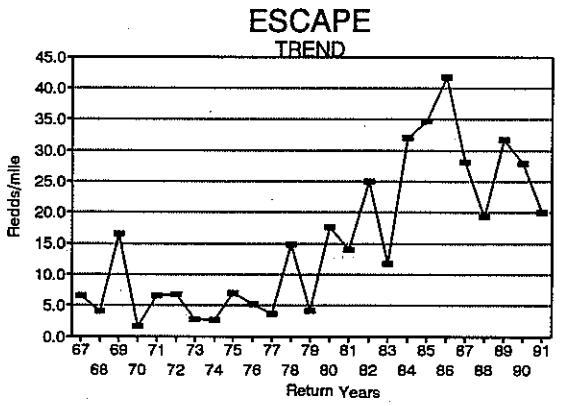
STOCK STATUS PROFILE for Upper Yakima Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Redds	ESCAPE Redds/mile		
67	54	6.6		
68	34	4.1		
69	190	16.5		
70	13	1.6		
71	54	6.6		
72	56	6.8		
73	23	2.8		
74	22	2.7		
75	58	7.1		
76	60	5.2		
77	43	3.7		
78	171	14.9		
79	48	4.2		
80	204	17.7		
81	161	14.0		
82	288	25.0		
83	136	11.8		
84	368	32.0		
85	399	34.7		
86	479	41.7		
87	323	28.1		
88	223	19.4		
89	365	31.7		
90	321	27.9		
91	220	20.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality. Both are affected by logging in the watershed. Well-developed agricultural uses and impacts in the watershed include irrigation withdrawals (adult migration delays at several dams plus flow barriers in bypass reaches, losses from inadequate screening, and losses from redd stranding due to artificially fluctuating flows), irrigation return flows (sedimentation and turbidity, elevated temperatures and chemical pollution), grazing (high stream temperatures due to loss of riparian vegetation for shade, loss of source of instream large woody debris; bank trampling and bank erosion). Bank protection and channel alterations to protect summer homes in the upper watershed affect channel stability, quality of riparian vegetation and complexity and size of instream woody debris. Timber harvest has been extensive in recent years.

Mainstem survival is affected by passage at four dams and by Columbia River pollution and habitat alterations.

Harvest Management -- Specific Yakima River origin spring chinook harvest cannot be accurately measured because supplementation releases have been generally untagged and no attempts have been made to coded-wire tag the natural production.

Yakima River spring chinook are a component of the Columbia River upriver spring chinook run originating from hatchery and natural production areas upstream of Bonneville Dam. The run is comprised of races destined for the upper Columbia system above McNary Dam, the Snake River system, and middle Columbia tributaries between Bonneville and McNary dams. Interim management goals for upriver adult spring chinook are 115,000 fish passing Bonneville Dam and 35,000 (25,000 wild/natural) fish passing Lower Granite Dam.

Yakima River Harvest - In the Yakima sub-basin in recent years, the spring chinook fishery has been limited to a tribal subsistence fishery at Horn Rapids Dam, Prosser Dam, Sunnyside Dam, and Wapato Dam. Fisheries resource managers from the Yakima Indian Nation currently seek to limit exploitation in the tribal fishery to 25% or less, and to restrict harvest as may be necessary to ensure current escapement exceeds that of the broodyear.

The fishery in the Yakima River harvests all three substocks, because the fishery is in the lower Yakima, below the upper Yakima spawning grounds and the Naches River turnoff. Seasons for subsistence fishing by tribal members for spring chinook are set by the Yakima Tribal Council after consultation with tribal fisheries staff and the Washington Department of Fisheries. Tribal harvest of spring chinook in

the Yakima Basin from 1957-1991, excluding 1976-1979, averaged 2,009 with a low of 32 in 1991 and a peak of 7,913 in 1957.

Some factors that improve the prognosis for the Yakima sub-basin are the implementation of the United States-Canada Pacific Salmon Treaty of 1985 and the adoption of the Columbia River Fish Management Plan (CRFMP) in 1988 by the United States, the states of Washington and Oregon, and the Warm Springs, Nez perce, Umatilla, and Yakima tribes (United States vs. Oregon, No. 68-513). The CRFMP plan was approved by the Federal court in October 1988. The Pacific Salmon Treaty is intended to rebuild naturally spawning chinook stocks, as measured by a number of "indicator stocks" including Yakima sub-basin spring chinook, by 1998. Since 1988, management of the Columbia River fish runs and fisheries has been principally based on the CRFMP.

Columbia River Harvest - Prior to 1975, upriver spring chinook contributed large catches to April-May mainstem commercial gill net and sport fisheries. Since 1975, April-May fisheries in the mainstem have been limited. The 1977 commercial season was the last April-May fishery to be allowed in the mainstem. The CRFMP provides that on runs between 50,000 and 112% of the interim Bonneville Dam goal of 115,000, the mainstem harvest below Bonneville Dam is limited to the 1983-1985 average (4.1%) and in no event exceed 5.0% of the upriver run; and treaty platform and gill net ceremonial and subsistence (C&S) fisheries in Zone 6 are limited to 7% of the run.

Treaty C&S fishing above Bonneville Dam has averaged 4.8% of upriver runs. Since 1975 (except 1977) no fisheries targeting on upriver stocks have occurred in the lower river. During this period the only upriver fish caught were taken incidental to February-April fisheries targeting on lower river runs. Catches of upriver spring chinook during 1938-1973 averaged about 55% of the runs through directed commercial and sport harvest. Total commercial, sport, and C&S catches during 1974-1991 averaged about 10% of upriver spring chinook runs. The Yakima River origin spring chinook from 1980-1991 has on average contributed 4.4% of the upriver run.

Ocean Harvest - An ocean catch distribution profile is not available for Yakima Basin spring chinook due to the low number of CWT spring chinook released into the Yakima River. Information on ocean distribution and catch rates of Columbia River spring chinook has been limited by low CWT recoveries in marine fisheries. GSI sampling in Washington coastal and Strait of Juan de Fuca fisheries 1986-1989 indicate annual treaty and non-treaty catches of zero to 2,346 upriver spring chinook landed in these fisheries, and an average of 1,020 fish per year. In April 1988, the Upriver Spring Chinook Task Force reported that, "Current CWT and GSI information indicates upriver spring chinook are impacted by ocean fisheries at a lower rate than any other Columbia River chinook race." If the catch profile of

Yakima spring chinook mirrors other upper Columbia River stocks, then the ocean harvest is minor.

Hatchery -- Hatchery impacts have not been determined. A large scale supplementation program is in the planning stage.

LAST TEN YEARS SALMON RELEASES INTO THE YAKIMA (BELOW NACHES R)

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	COHO	TYPE-S COHO	SOCKEYE
1982	401714	0	0	53820	0	0
1983	97012	323796	0	0	0	0
1984	356483	0	510639	0	0	0
1985	417195	1004137	788966	0	0	0
1986	174715	0	1690319	101300	0	0
1987	23750	1017845	0	438308	0	0
1988	0	749367	835129	0	200000	0
1989	0	0	1976914	0	30000	3246
1990	0	1020078	980055	0	0	0
1991	0	0	1631745	0	0	0
MEAN	245145	823045	1201967	197809	115000	3246

LAST TEN YEARS SALMON RELEASES INTO THE YAKIMA (ABOVE NACHES R)

REL. YEAR	SPRING CHINOOK	UP-BRIGHT CHINOOK	COHO	SUMMER COHO	TYPE-S COHO	SOCKEYE
1982	0	0	0	0	0	0
1983	97012	0	19424	0	0	0
1984	0	0	0	0	0	0
1985	7800	0	0	0	260690	0
1986	0	0	0	0	0	0
1987	215126	0	298705	0	0	0
1988	0	246012	0	0	0	24329
1989	0	0	0	0	0	94946
1990	0	0	0	0	0	110275
1991	0	0	0	0	0	132438
MEAN	106646	246012	159065	0	260690	90497

UPPER COLUMBIA -- NACHES SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

The historic spawning areas of spring chinook included the Yakima River above the city of Ellensburg, the Cle Elum River below Lake Cle Elum, the Tieton River (including North and South forks), Rattlesnake Creek and the Bumping, Little Naches and American rivers. Significant spawning still occurs in these areas, especially in the Yakima above Ellensburg, the upper Naches and the American. Exceptions are the Tieton system, which is now inaccessible above Rimrock Dam and is affected by reservoir operations below, and the Yakima River above Easton Dam, which was inaccessible until a new ladder was completed in 1989. Many of the larger tributaries were also used in historic times. Spawning tributaries that may have been important historically, but are seldom or never used now include: Cooper, Waptus and Cle Elum rivers above Cle Elum Dam, Teanaway River, Taneum, Swauk, and Manastash creeks, Wenas Creek, Tieton River, Cowiche, Ahtamum, and Logy creeks.

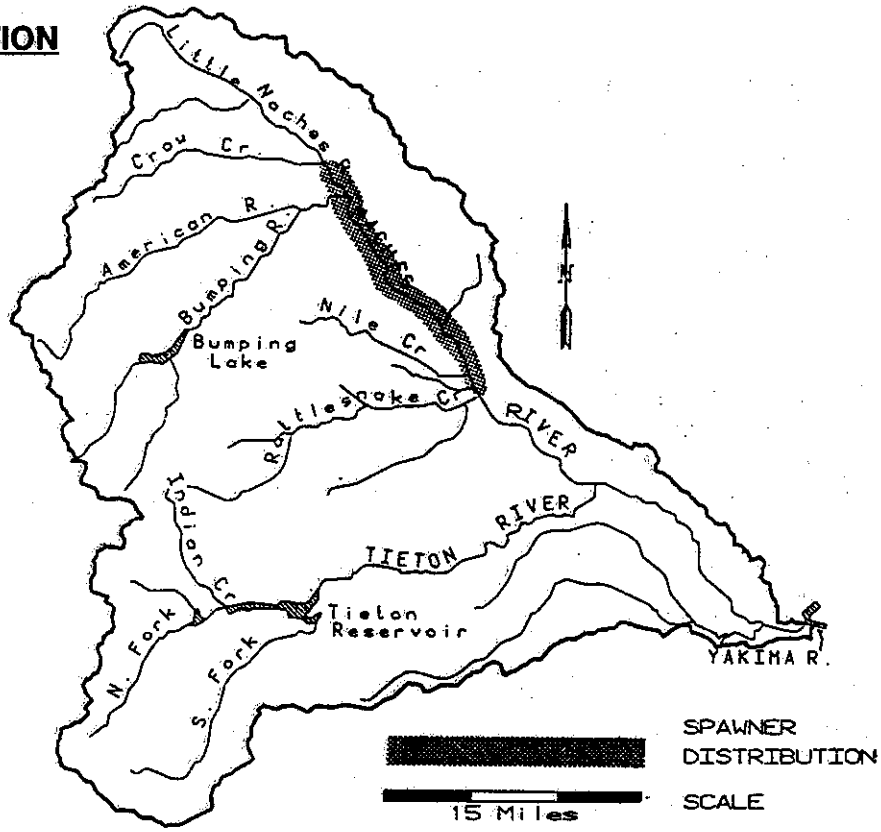
Spawning occurs in the Naches system earlier than in the upper Yakima. In the Naches system redds are first observed in the American River in early August. Peak of spawning occurs in late August or early September in the Naches system. Spawning begins on the colder water areas and progresses to the warmer locations. The Naches River spring chinook age composition ranges from two-year-old mini jacks to five-year-old adults with the majority of the spawning population being five-year-olds. Unlike the upper Yakima, Naches fish are predominately five-year-old fish. Genetically, the Naches and upper Yakima stocks are similar and can be separated from other upper Columbia spring chinook.

Spring chinook are indigenous to the Naches River. Hatchery releases were made in the Naches in 1973 and 1977. Releases have included Klickitat, Ringold, Leavenworth, and Carson stock spring chinook. Releases were made in 1976-1984 in Nile Springs; a tributary of the Naches River below the American. Despite the introduction of hatchery fish, this stock should still be considered native. Hatchery releases were mostly minor, the largest release of yearlings was approximately 100,000 in 1982. Releases have included fish from Klickitat, Cowlitz, Ringold, Leavenworth, and Carson hatcheries.

STOCK DEFINITION PROFILE for Naches Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



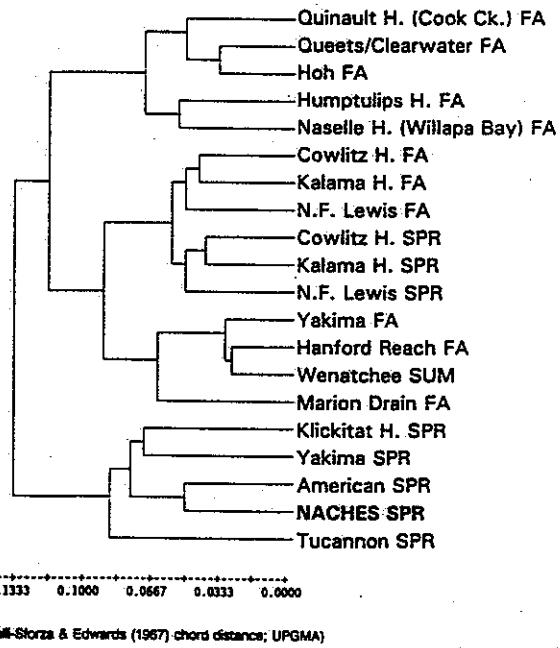
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - The genetic characteristics of Naches spring chinook (including Little Naches R. spawners) sampled in 1989 and 1990 were not significantly different between years and were combined into one data set. This spring chinook stock was significantly different from all other chinook stocks examined ($p<0.05$).

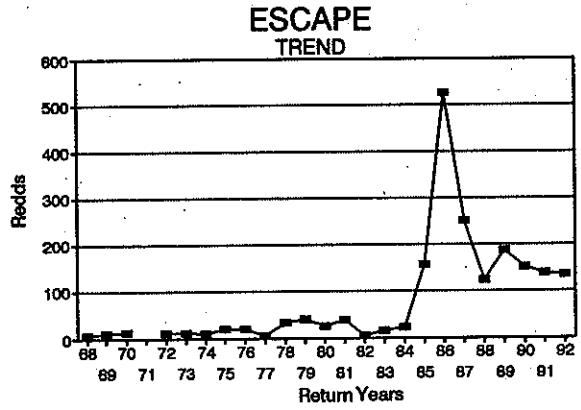


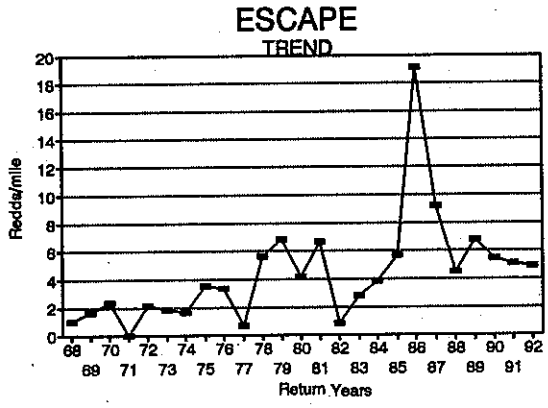
STOCK STATUS PROFILE for Naches Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Redds	ESCAPE Redds/mile		
68	6	1.0		
69	10	1.7		
70	14	2.3		
71		0.0		
72	13	2.2		
73	11	1.8		
74	10	1.7		
75	21	3.5		
76	20	3.3		
77	4	0.7		
78	34	5.7		
79	41	6.8		
80	25	4.2		
81	40	6.7		
82	5	0.8		
83	17	2.8		
84	23	3.8		
85	157	5.7		
86	526	19.1		
87	252	9.2		
88	124	4.5		
89	187	6.8		
90	152	5.5		
91	139	5.1		
92	134	4.9		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The Naches River stock status is currently depressed. The Naches River spring chinook redd counts from 1960-1991 averaged 4.1 redds per mile with a low count of 0.7 redds per mile in 1967 and 1977 and a peak of 19.1 redds per mile in 1986. Redd counts from 1985-1992 covering 27.5 miles averaged 7.6 redds per mile with a low of 4.5 redds per mile in 1988 and a high of 19.1 redds per mile in 1986. Data quality is good.

FACTORS AFFECTING PRODUCTION

Habitat -- See Upper Yakima Spring Chinook. The Naches and Little Naches River watersheds have similar perturbations, both natural and man-caused. The Little Naches River watershed has been particularly hard hit by timber harvest. The channel is deficient in large woody debris and spawning beds have been affected by sedimentation from logging activities.

In addition to passage problems on the Yakima River, mainstem survival is affected by passage at four dams and by Columbia River pollution and habitat alterations.

Harvest Management -- Specific Naches River origin spring chinook harvest cannot be accurately measured because supplementation releases have been generally untagged and no attempts have been made to coded-wire tag the natural production.

Yakima River spring chinook are a component of the Columbia River upriver spring chinook run originating from hatchery and natural production areas upstream of Bonneville Dam. The run is comprised of races destined for the upper Columbia system above McNary Dam, the Snake River system, and middle Columbia tributaries between Bonneville and McNary dams. Interim management goals for upriver adult spring chinook are 115,000 fish passing Bonneville Dam and 35,000 (25,000 wild/natural) fish passing Lower Granite Dam.

Yakima River Harvest - In the Yakima sub-basin in recent years, the spring chinook fishery has been limited to a tribal subsistence fishery at Horn Rapids, Prosser, Sunnyside, and Wapato dams. Fisheries resource managers from the Yakima Indian Nation currently seek to limit exploitation in the tribal fishery to 25% or less, and to restrict harvest as may be necessary to ensure current escapement exceeds that of the broodyear.

The fishery in the Yakima River harvests all three substocks, because the fishery is in the lower Yakima, below the upper Yakima spawning grounds and the Naches River turnoff. Seasons for subsistence fishing by tribal members for spring chinook are set by the Yakima Tribal Council after consultation with tribal fisheries staff

and the Washington Department of Fisheries. Tribal harvest of spring chinook in the Yakima Basin from 1957-1991 excluding 1976-1979 averaged 2,009 with a low of 32 in 1991 and a peak of 7,913 in 1957.

Some factors that improve the prognosis for the Yakima sub-basin are the implementation of the United States-Canada Pacific Salmon Treaty of 1985 and the adoption of the Columbia River Fish Management Plan (CRFMP) in 1988 by the United States, the states of Washington and Oregon, and the Warm Springs, Nez perce, Umatilla, and Yakima tribes (United States vs. Oregon, No. 68-513). The CRFMP approved by the federal court in October 1988. The Pacific Salmon Treaty is intended to rebuild naturally spawning chinook stocks, as measured by a number of "indicator stocks" including Yakima sub-basin spring chinook, by 1998. Since 1988, management of the Columbia River fish runs and fisheries has been principally based on the CRFMP.

Columbia River Harvest - Prior to 1975, upriver spring chinook contributed large catches to April-May mainstem commercial gill net and sport fisheries. Since 1975, April-May fisheries in the mainstem have been limited. The 1977 commercial season was the last April-May fishery to be allowed in the mainstem. The CRFMP provides that on runs between 50,000 and 112% of the interim Bonneville Dam goal of 115,000, the mainstem harvest below Bonneville Dam is limited to the 1983-1985 average (4.1%) and in no event exceed 5.0% of the upriver run; and treaty platform and gill net ceremonial and subsistence (C&S) fisheries in Zone 6 are limited to 7% of the run.

Treaty C&S fishing above Bonneville Dam has averaged 4.8% of upriver runs. Since 1975 (except 1977), no fisheries targeting on upriver stocks have occurred in the lower river. During this period the only upriver fish caught were taken incidental to February-April fisheries targeting on lower river runs. Catches of upriver spring chinook during 1938-1973 averaged about 55% of the runs, through directed commercial and sport harvest. Total commercial, sport, and C&S catches during 1974-1991 averaged about 10% of upriver spring chinook runs. The Yakima River origin spring chinook from 1980-1991 has on average contributed 4.4% of the upriver run.

Ocean Harvest - An ocean catch distribution profile is not available for Yakima Basin spring chinook due to the low number of CWT spring chinook released into the Yakima River. Information on ocean distribution and catch rates of Columbia River spring chinook has been limited by low CWT recoveries in marine fisheries. GSI sampling in Washington coastal and Strait of Juan de Fuca fisheries 1986-1989 indicate annual treaty and non-treaty catches of zero to 2,346 upriver spring chinook landed in these fisheries, and an average of 1,020 fish per year. In April 1988, the Upriver Spring Chinook Task Force reported that, "Current CWT and GSI information indicates upriver spring chinook are impacted by ocean fisheries at a

lower rate than any other Columbia River chinook race." If the catch profile of Yakima spring chinook mirrors other upper Columbia River stocks, then the ocean harvest is minor.

Hatchery -- Hatchery impacts have not been determined. A large scale supplementation program is in the planning stage.

LAST TEN YEARS SALMON RELEASES INTO THE NACHES BASIN

REL. YEAR	SPRING CHINOOK	COHO	TYPE-S COHO
1982	100050	0	0
1983	194264	0	0
1984	29636	0	0
1985	0	84000	0
1986	0	0	0
1987	0	0	52107
1988	0	0	0
1989	0	0	0
1990	0	0	0
1991	0	0	0
MEAN	107983	84000	52107

UPPER COLUMBIA -- AMERICAN SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

The historic spawning areas of spring chinook include the Yakima River above the city of Ellensburg, the Cle Elum River below Lake Cle Elum, the Tieton River (including North and South forks), Rattlesnake Creek and the Bumping, Little Naches and American rivers. Significant spawning still occurs in these areas, especially in the Yakima above Ellensburg, the upper Naches and the American. Exceptions are the Tieton system, which is now inaccessible above Rimrock Dam and is affected by reservoir operations below, and the Yakima River above Easton Dam, which was inaccessible until a new ladder was completed in 1989. Many of the larger tributaries were also used in historic times. Spawning tributaries that may have been important historically, but are seldom or never used now include: Cooper, Waptus and Cle Elum rivers above Cle Elum Dam, Teanaway River, Taneum, Swauk, and Manastash creeks, Wenas Creek, Tieton River, Cowiche, Ahtamum, and Logy creeks.

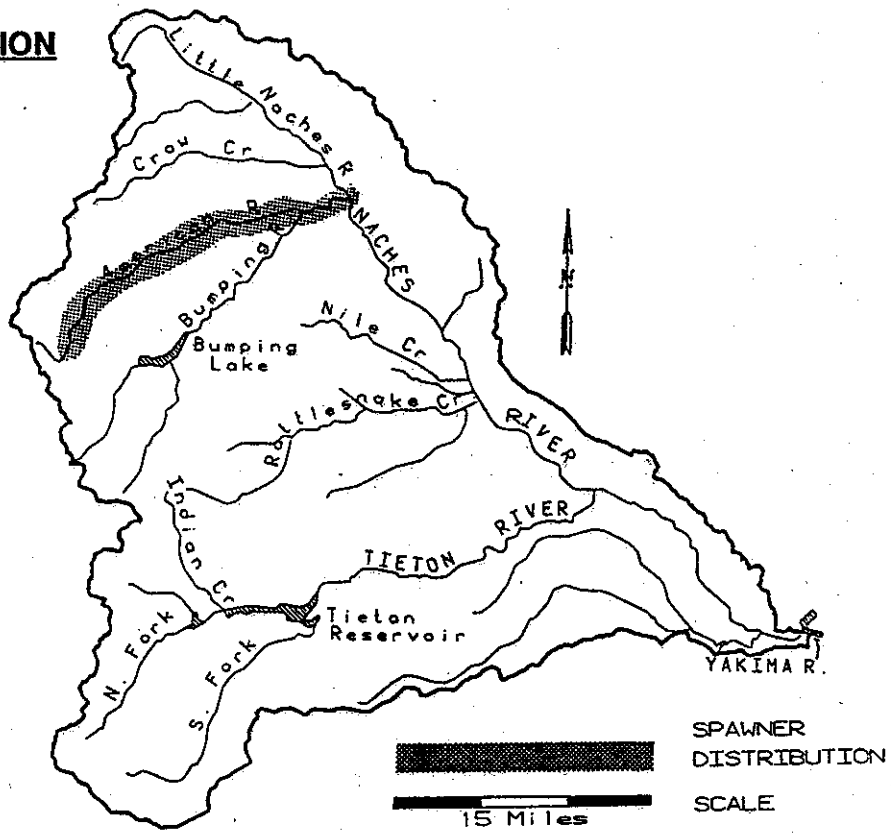
The Yakima basin spring chinook population is composed of three segments, the Naches substock, the American substock, and the upper Yakima substock. The American River enters the Bumping River at RM 3.5. The Bumping River enters the Naches at RM 44.6. In the American River, spawning typically begins in late July and peaks in the second week of August. The American River spring chinook age composition ranges from two-year-old mini jacks to five-year-old adults with the majority of the spawning population being five-year-olds. In general, spawning in the American River precedes spawning in the rest of the Naches system by about four weeks. Spawning in the Naches system exclusive of the American precedes spawning in the upper Yakima and Cle Elum rivers by about two weeks. Genetically, American River spring chinook are distinct from Naches, Yakima, and all other Columbia River spring chinook.

Spring chinook are indigenous to the American River and are almost exclusively maintained from natural production, though non-local stock hatchery releases have occurred. In 1973, 162,400 fingerling spring chinook of Klickitat origin were released into the American River. American River spring chinook are native to the sub-basin. Although one release of hatchery spring chinook occurred in the American River, the genetic integrity is still maintained.

STOCK DEFINITION PROFILE for American River Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



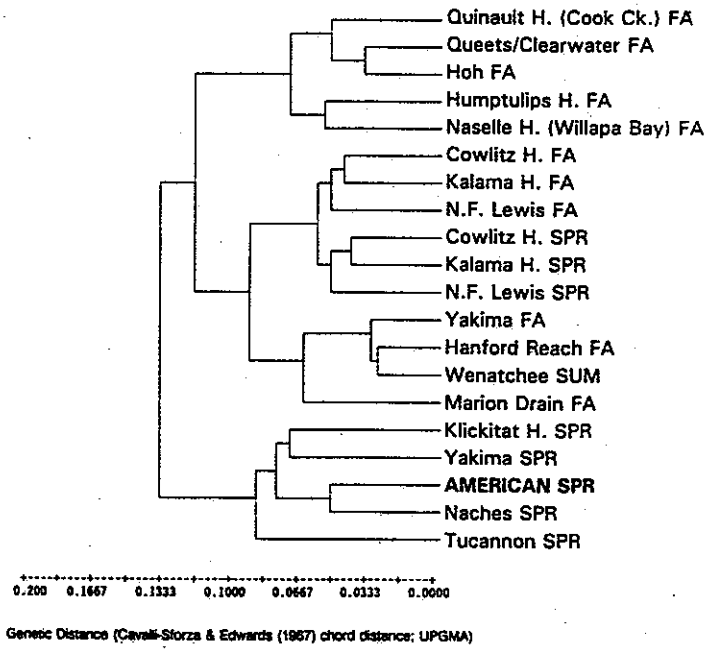
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **Yes**

GENETICS - The genetic characteristics of American River spring chinook sampled in 1986, 1989 and 1990 showed significant differences between years. This may be due to small numbers of spawners. However, these spring chinook have unique characteristice, and whether data were combined between years or not, were significantly different from all other chinook stocks examined ($p<0.05$).

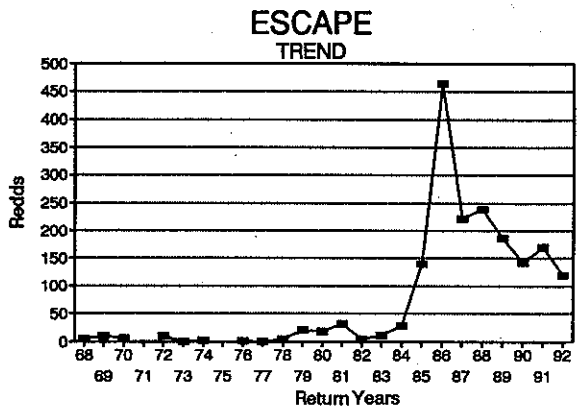


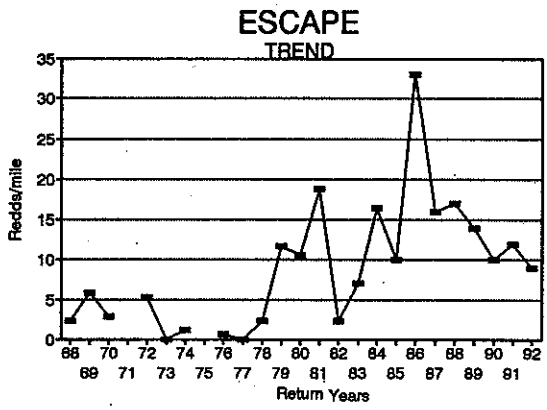
STOCK STATUS PROFILE for American Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Redds	ESCAPE Redds/mile		
68	4	2.4		
69	10	5.9		
70	5	2.9		
71				
72	9	5.3		
73	0	0.0		
74	2	1.2		
75				
76	1	0.6		
77	0	0.0		
78	4	2.4		
79	20	11.8		
80	18	10.6		
81	32	18.8		
82	4	2.4		
83	12	7.1		
84	28	16.5		
85	141	10.0		
86	464	33.0		
87	222	16.0		
88	239	17.0		
89	187	14.0		
90	143	10.0		
91	170	12.0		
92	120	9.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The American River stock status is currently depressed. The American River spring chinook redd counts from 1960-1991 averaged 10.4 redds per mile with a low count of zero redds per mile in 1973 and 1977 and a peak of 37.1 redds per mile in 1963. From 1985-1992 with 13.9 miles of surveys the average redds per mile was 15.1, with a low of 9 redds per mile in 1992 and a high of 33 redds per mile in 1986.

FACTORS AFFECTING PRODUCTION

Habitat -- The American River proper is in good to excellent condition. Most of the impacts to this stock beyond the natural vagaries of stream flow are man-caused, primarily related to irrigation withdrawal in the Naches and Yakima rivers.

Mainstem survival is affected by passage at four dams and by Columbia River pollution and habitat alterations.

Harvest Management -- Specific American River origin spring chinook harvest cannot be accurately measured because supplementation releases have been generally untagged and no attempts have been made to coded-wire tag the natural production.

Yakima River spring chinook are a component of the Columbia River upriver spring chinook run originating from hatchery and natural production areas upstream of Bonneville Dam. The run is comprised of races destined for the upper Columbia system above McNary Dam, the Snake River system, and middle Columbia tributaries between Bonneville and McNary dams. Interim management goals for upriver adult spring chinook are 115,000 fish passing Bonneville Dam and 35,000 (25,000 wild/natural) fish passing Lower Granite Dam.

Yakima River Harvest - In the Yakima sub-basin in recent years, the spring chinook fishery has been limited to a tribal subsistence fishery at Horn Rapids Dam, Prosser Dam, Sunnyside Dam, and Wapato Dam. Fisheries resource managers from the Yakima Indian Nation currently seek to limit exploitation in the tribal fishery to 25% or less, and to restrict harvest as may be necessary to ensure current escapement exceeds that of the broodyear.

The fishery in the Yakima River harvests all three substocks, because the fishery is in the lower Yakima, below the upper Yakima spawning grounds and the Naches River turnoff. Seasons for subsistence fishing by tribal members for spring chinook are set by the Yakima Tribal Council after consultation with tribal fisheries staff and the Washington Department of Fisheries. Tribal harvest of spring chinook in

the Yakima Basin from 1957-1991, excluding 1976-1979, averaged 2,009 with a low of 32 in 1991 and a peak of 7,913 in 1957.

Some factors that improve the prognosis for the Yakima sub-basin are the implementation of the United States-Canada Pacific Salmon Treaty of 1985 and the adoption of the Columbia River Fish Management Plan (CRFMP) in 1988 by the United States, the states of Washington and Oregon, and the Warm Springs, Nez perce, Umatilla, and Yakima tribes (United States vs. Oregon, No. 68-513). The CRFMP approved by the federal court in October 1988. The Pacific Salmon Treaty is intended to rebuild naturally spawning chinook stocks, as measured by a number of "indicator stocks" including Yakima sub-basin spring chinook, by 1998. Since 1988, management of the Columbia River fish runs and fisheries has been principally based on the CRFMP.

Columbia River Harvest - Prior to 1975, upriver spring chinook contributed large catches to April-May mainstem commercial gill net and sport fisheries. Since 1975, April-May fisheries in the mainstem have been limited. The 1977 commercial season was the last April-May fishery to be allowed in the mainstem. The CRFMP provides that on runs between 50,000 and 112% of the interim Bonneville Dam goal of 115,000, the mainstem harvest below Bonneville Dam is limited to the 1983-1985 average (4.1%) and in no event exceed 5.0% of the upriver run; and treaty platform and gill net ceremonial and subsistence (C&S) fisheries in Zone 6 are limited to 7% of the run.

Treaty C&S fishing above Bonneville Dam has averaged 4.8% of upriver runs. Since 1975 (except 1977), no fisheries targeting on upriver stocks have occurred in the lower river. During this period the only upriver fish caught were taken incidental to February-April fisheries targeting on lower river runs. Catches of upriver spring chinook during 1938-1973 averaged about 55% of the runs, through directed commercial and sport harvest. Total commercial, sport, and C&S catches during 1974-1991 averaged about 10% of upriver spring chinook runs. The Yakima River origin spring chinook from 1980-1991 has on average contributed 4.4% of the upriver run.

Ocean Harvest - An ocean catch distribution profile is not available for Yakima Basin spring chinook due to the low number of CWT spring chinook released into the Yakima River. Information on ocean distribution and catch rates of Columbia River spring chinook has been limited by low CWT recoveries in marine fisheries. GSI sampling in Washington coastal and Strait of Juan de Fuca fisheries 1986-1989 indicate annual treaty and non-treaty catches of zero to 2,346 upriver spring chinook landed in these fisheries, and an average of 1,020 fish per year. In April 1988, the Upriver Spring Chinook Task Force reported that, "Current CWT and GSI information indicates upriver spring chinook are impacted by ocean fisheries at a lower rate than any other Columbia River chinook race." If the catch profile of

Yakima spring chinook mirrors other upper Columbia River stocks, then the ocean harvest is minor.

Hatchery -- Hatchery impacts have not been determined. A large scale supplementation program is in the planning stage.

LAST TEN YEARS SALMON RELEASES INTO THE YAKIMA (BELOW NACHES R)

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	COHO	TYPE-S COHO	SOCKEYE
1982	401714	0	0	53820	0	0
1983	97012	323796	0	0	0	0
1984	356483	0	510639	0	0	0
1985	417195	1004137	788966	0	0	0
1986	174715	0	1690319	101300	0	0
1987	23750	1017845	0	438308	0	0
1988	0	749367	835129	0	200000	0
1989	0	0	1976914	0	30000	3246
1990	0	1020078	980055	0	0	0
1991	0	0	1631745	0	0	0
MEAN	245145	823045	1201967	197809	115000	3246

LAST TEN YEARS SALMON RELEASES INTO THE YAKIMA (ABOVE NACHES R)

REL. YEAR	SPRING CHINOOK	UP-BRIGHT CHINOOK	COHO	SUMMER COHO	TYPE-S COHO	SOCKEYE
1982	0	0	0	0	0	0
1983	97012	0	19424	0	0	0
1984	0	0	0	0	0	0
1985	7800	0	0	0	260690	0
1986	0	0	0	0	0	0
1987	215126	0	298705	0	0	0
1988	0	246012	0	0	0	24329
1989	0	0	0	0	0	94946
1990	0	0	0	0	0	110275
1991	0	0	0	0	0	132438
MEAN	106646	246012	159065	0	260690	90497

UPPER COLUMBIA -- CHIWAWA SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation within the Wenatchee River watershed. Natural production of spring chinook also occurs in three other tributaries: Nason Creek, Little Wenatchee River, and White River. There are no obvious distinguishing differences in the runs to each tributary other than spatial separation. Genetic analysis of chinook from the White River, Chiwawa River and Nason Creek has recently been completed. Chinook spawners were sampled from the Chiwawa in 1989, 1990 and 1992, and these were combined ($N=133$) for analysis. Chiwawa River spring chinook were not significantly different ($P>.05$) genetically from Nason Creek chinook. Chiwawa and Nason were significantly different ($P<.05$) from White River and from Leavenworth Hatchery spring chinook.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Tributary entry is May to August and may be delayed by a hydrological block in Tumwater Canyon of the Wenatchee River. Spawning begins in early August, peaks in mid-to-late August, and is completed by mid-September.

Endemic runs of spring chinook in the Wenatchee basin were initially reduced by mill dams and irrigation diversions by the early 1900s. Current populations may have some common ancestry resulting from the Grand Coulee Fish Maintenance Project, which began in 1939-1941. Salmon destined for above Grand Coulee Dam were trapped at Rock Island Dam and held for spawning at three federal hatcheries in the upper Columbia River. One of these, Leavenworth National Fish Hatchery is on Icicle Creek, a Wenatchee tributary. Early programs at Leavenworth NFH reared a wide variety of salmon species including spring chinook. Currently, salmon production at Leavenworth Hatchery is limited to spring chinook of mixed non-local stock ancestry. Natural production is probably not influenced by this hatchery program since Icicle Creek is well downstream of Chiwawa River.

Chiwawa spring chinook are a native stock of wild production. A new supplementation/mitigation program funded by Chelan Public Utility District is treating the tributary groups as distinct from each other.

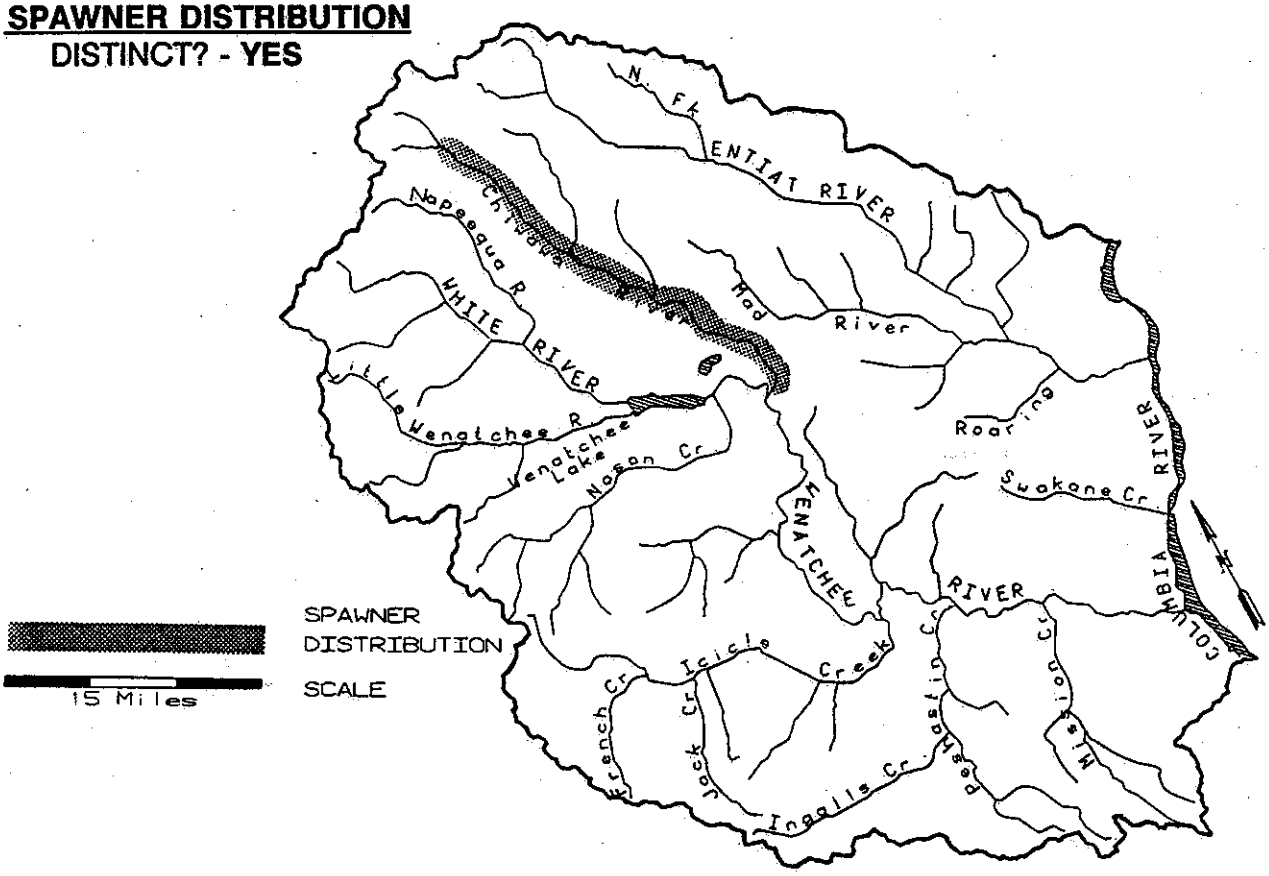
STOCK STATUS

A maximum estimate of natural production in the Wenatchee basin can be obtained by subtracting Leavenworth NFH spring chinook from the difference in counts at Rock Island and Rocky Reach dams. Using this method, turn-off into the basin has ranged from 1,000 to 10,000 natural origin spring chinook since the 1960s.

STOCK DEFINITION PROFILE for Chiwawa Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



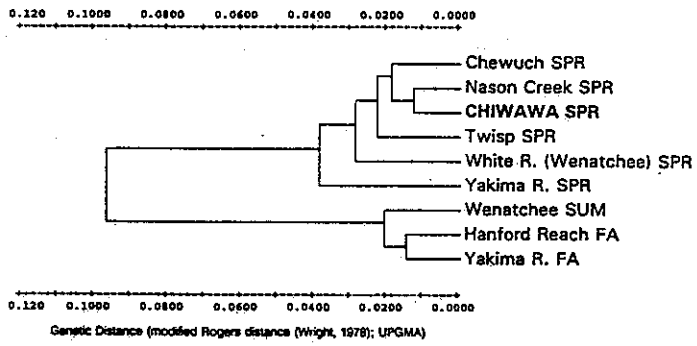
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

GENETICS - Spring chinook sampled from the Chiwawa from 1989 through 1992 were combined for analysis. The genetic characteristics of these Chiwawa chinook were not significantly different ($p > .05$) from Nason Creek spring chinook. However, both of these stocks were distinct compared to other upper Columbia stocks examined. Results will be available during 1993.

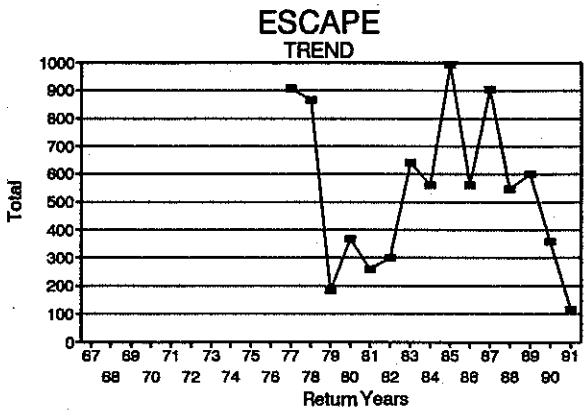


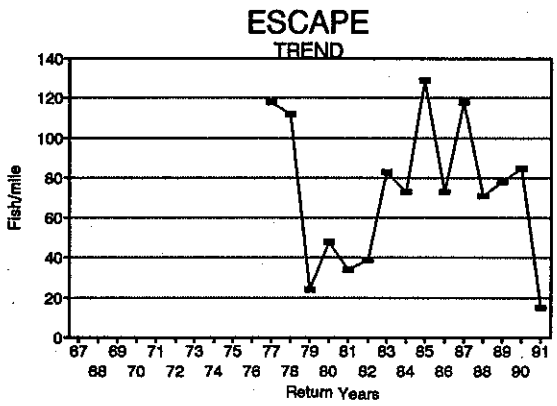
STOCK STATUS PROFILE for Chiwawa Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	908	118.0		
78	865	112.0		
79	183	24.0		
80	369	48.0		
81	260	34.0		
82	301	39.0		
83	642	83.0		
84	561	73.0		
85	992	129.0		
86	561	73.0		
87	905	118.0		
88	549	71.0		
89	601	78.0		
90	357	85.0		
91	118	15.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

Escapement into each of the tributaries can be extrapolated by applying index area redd count proportions to the basin turn-off. Reliable redd counts have been taken since the early 1960s and have typically totaled 300 to 600 in the entire basin. About 45% of the production occurs in Chiwawa River, 35% in Nason Creek, and 10% in each of the White and Little Wenatchee rivers.

Spring chinook within the entire Wenatchee basin have experienced a long-term downward trend. However, Chiwawa River runs have shown no consistent trends. Chiwawa River spring chinook are a depressed stock based on chronically low production.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality. The primary man-caused limiter is passage problems at Dryden and Tumwater dams on the Wenatchee River and mortalities at seven mainstem Columbia River dams. Flow diversions and screen inefficiency also affect this stock.

Harvest Management -- Harvest is probably not the limiting factor on production. Few upper Columbia spring chinook are harvested in ocean and freshwater fisheries. Assuming Chiwawa River wild spring chinook have fishery contributions similar to other upper Columbia spring chinook, then total exploitation is probably less than 20% annually. There are no targeted fisheries on the wild run in the Wenatchee or Chiwawa rivers. A target fishery on Leavenworth hatchery spring chinook occurs in Icicle Creek and in the mainstem Wenatchee immediately downstream of the Icicle mouth. Harvest on the wild run is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam are limited to 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- The Rock Island Hatchery Complex consists of a central hatchery (Eastbank) and five satellite rearing facilities. The five satellite facilities are located on four different rivers (Wenatchee, Chiwawa, Methow, Similkameen) and Lake Wenatchee. The Eastbank facility is located on the mainstem Columbia River just above Rocky Reach Dam, approximately 10.0 miles north of East Wenatchee, Washington. The hatchery was built to mitigate for smolt losses at Rock Island Dam and serves as the hub for the five satellite facilities. The hatchery began operation in 1989. Hatchery funding is provided by Chelan County PUD. The facility is jointly operated by WDF and the Washington Department of Wildlife. WDF provides 5.5 FTE's and WDW provides 2 FTE's.

The facility consists of two (15 ft x 120 ft) adult salmon holding ponds, eight (10 ft x 100 ft) raceways, and five (20 ft x 185 ft) raceways. There is one (10 ft x 70 ft) adult steelhead holding pond and two (1/2-acre) steelhead rearing ponds. A hatchery building houses shallow troughs and numerous double stacks of vertical incubators.

Four deep aquifer wells provide up to 53 cfs of water at a relatively constant temperature. The hatchery has chillers to cool the incubation water and retard egg and alevin development. Satellite facilities associated with Eastbank Hatchery include the Lake Wenatchee net pens, and the Chiwawa (33 cfs), Dryden (16 cfs), Similkameen (21 cfs) and Methow (15 cfs) rearing ponds. As an aggregate, these facilities are supplied with approximately 85 cfs of river water.

The Chiwawa/Lake Wenatchee complex has a rearing site located on the Chiwawa River approximately 1.0 mile upstream of the confluence with the Wenatchee River. The hatchery has an office, two large rearing ponds, a removable, picket diffuser weir and trap. The facility rears spring chinook only. The facility has two water sources: the Chiwawa River (21 cfs, pumped) or the Wenatchee River (12 cfs, pumped). The latter water source is used only in December when ice forms in the Chiwawa River. In addition to rearing spring chinook, sockeye juveniles are reared in 6 floating net cages on Lake Wenatchee. Two additional floating cages are used for holding adult sockeye until spawning. These two cages are kept separate from the remaining six cages to prevent disease transmittal. The remaining six cages are used for rearing juvenile sockeye until their release into Lake Wenatchee in the fall. This facility is staffed with 2.75 FTE's.

The Dryden rearing facility consists of a large hypolon-lined rearing pond located adjacent to the Wenatchee River near Dryden, Washington. It is used to acclimate Wenatchee summer chinook. The water supply (16 cfs) originates from an irrigation canal that takes water from the Wenatchee River at Dryden Dam. The intake is located less than 1.0 miles upstream of the pond. There are no buildings at this site.

The Similkameen rearing facility is located on the Similkameen River near Oroville, Washington. This facility has an office, small shop and large rearing pond used for rearing Okanogan summer chinook. The water supply (21 cfs) is pumped from the Similkameen River. An aeration system was recently installed to supply oxygen to the pond during periods when water flow is shut off due to ice formation or toxic spills in the river. The facility is staffed with 1.75 FTE's.

The Methow facility consists of a large hypolon-lined rearing pond located on the Methow River near Twisp, Washington. There is also a small office on site. This facility is used to acclimate Methow summer chinook. Water (15 cfs) is pumped from the Methow River.

Current production:

Chiwawa:	672,000 Chiwawa spring chinook
Dryden:	864,000 Wenatchee summer chinook
Lk. Wenatchee:	300,000 Lk. Wenatchee sockeye
Methow:	400,000 Wells summer chinook
Similkameen:	576,000 Wells summer chinook

Hatchery operational impacts have not been determined. Fish used for hatchery releases are derived from wild stock trapped at hatchery or from fish gaffed from spawning grounds. A Japanese style weir was issued to trap adults, but it has been largely ineffectual in preventing fish from moving upstream.

LAST TEN YEARS SALMON RELEASES INTO THE WENATCHEE BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	SOCKEYE
1982	1878286	0	0
1983	1906488	0	0
1984	3915633	0	0
1985	2252798	0	0
1986	2447642	0	0
1987	3259768	0	0
1988	1624585	0	0
1989	4662048	0	0
1990	2421503	0	260400
1991	2759841	720000	372102
MEAN	2712859	720000	316251

UPPER COLUMBIA -- NASON CREEK SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation within the Wenatchee River watershed. Natural production of spring chinook also occurs in three other tributaries: Chiwawa River, Little Wenatchee River, and White River. There are no obvious distinguishing differences in the runs to each tributary other than spatial separation. Genetic analysis of chinook from the White River, Chiwawa River and Nason Creek has recently been completed. Chinook spawners were sampled from Nason Creek in 1989 and 1992, and these were combined ($N = 71$) for analysis. Nason spring chinook were not significantly different ($P > .05$) genetically from Chiwawa River chinook. Nason and Chiwawa were significantly different ($P < .05$) from White River and from Leavenworth Hatchery spring chinook.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Tributary entry is May to August and may be delayed by a hydrological block in Tumwater Canyon of the Wenatchee River. Spawning begins in early August, peaks in mid- to late August, and is completed by mid-September.

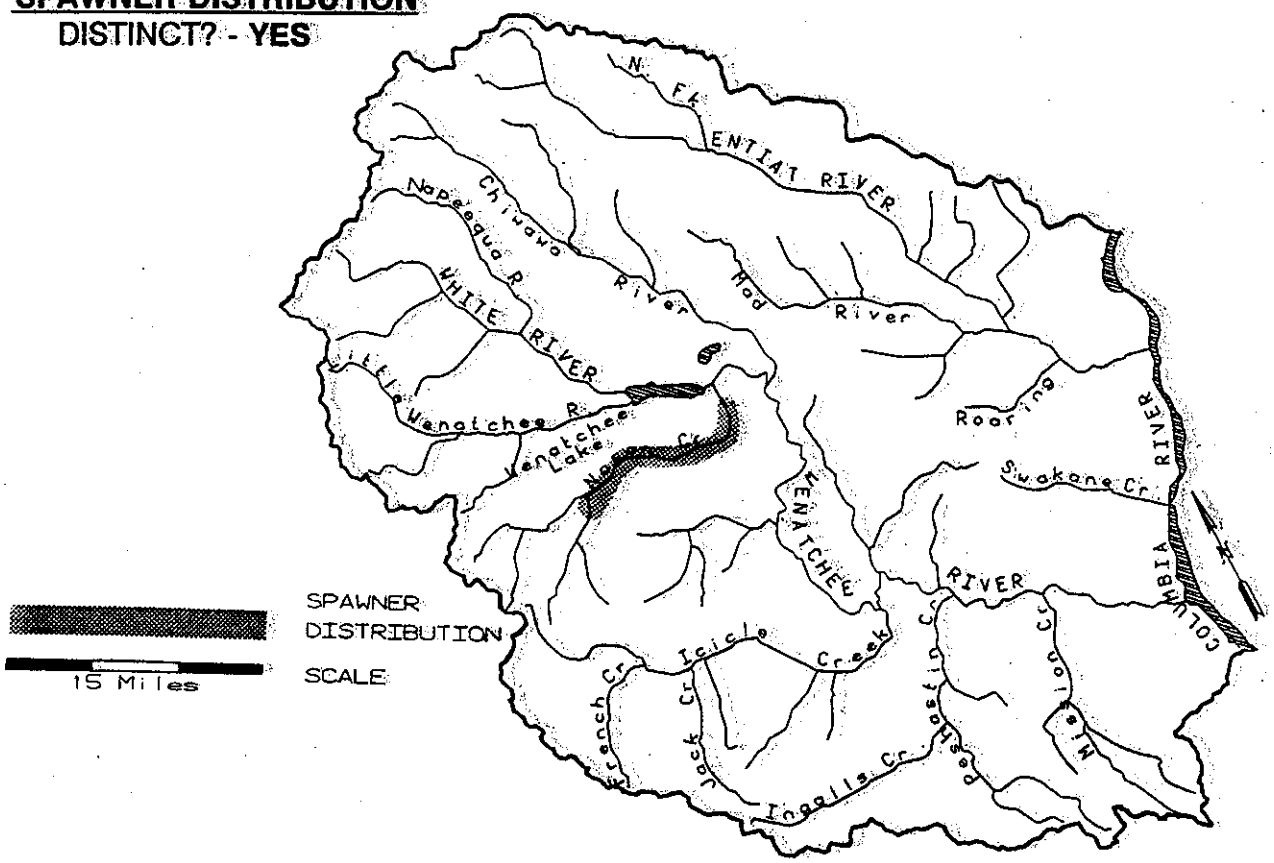
Endemic runs of spring chinook in the Wenatchee basin were initially reduced by mill dams and irrigation diversions by the early 1900s. Current populations may have some common ancestry resulting from the Grand Coulee Fish Maintenance Project which began in 1939-1941. Salmon destined for above Grand Coulee Dam were trapped at Rock Island Dam and held for spawning at three federal hatcheries in the upper Columbia River. One of these, Leavenworth National Fish Hatchery is on Icicle Creek, a Wenatchee tributary. Early programs at Leavenworth NFH reared a wide variety of salmon species including spring chinook. Currently, salmon production at Leavenworth Hatchery is limited to spring chinook of mixed non-local stock ancestry. Natural production is probably not influenced by this hatchery program since Icicle Creek is well downstream of Nason Creek.

Nason Creek spring chinook are a native stock of wild production. A new supplementation/mitigation program funded by Chelan Public Utility District is treating the tributary groups as distinct from each other. No supplementation is scheduled for Nason Creek.

STOCK DEFINITION PROFILE for Nason Creek Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



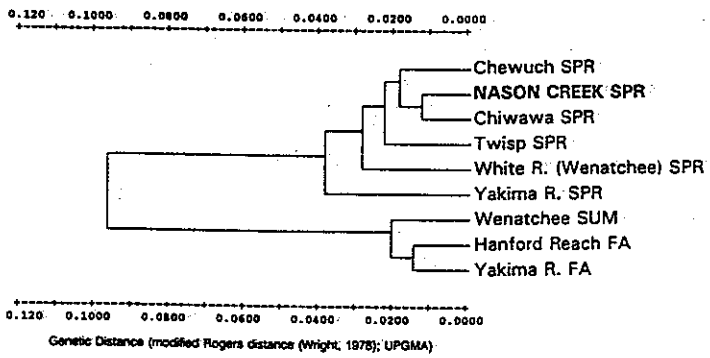
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

GENETICS - Spring chinook sampled from Nason Creek in 1989 and 1992 were combined for analysis. The genetic characteristics of the Nason chinook were not significantly different ($p > .05$) from Chiwawa spring chinook. However, both of these stocks were distinct compared to other upper Columbia stocks examined.

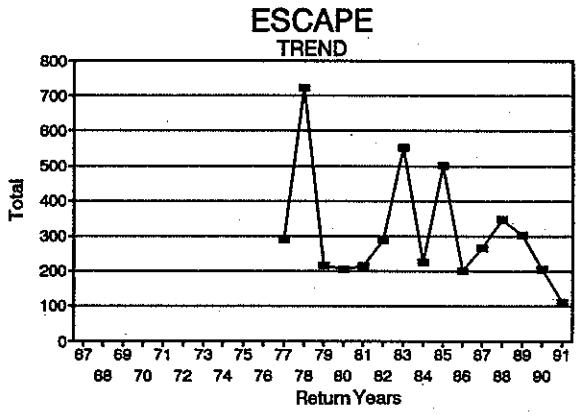


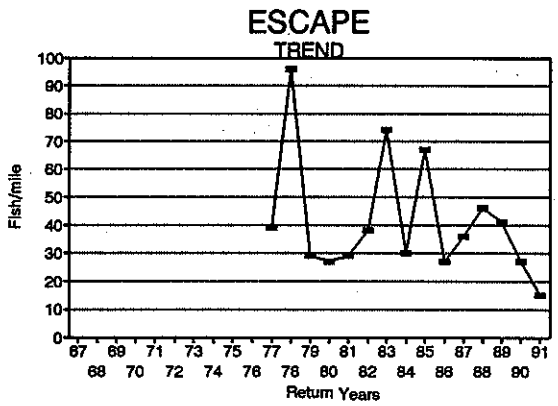
STOCK STATUS PROFILE for Nason Cr Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	291	39.0		
78	722	96.0		
79	217	29.0		
80	205	27.0		
81	214	29.0		
82	288	38.0		
83	552	74.0		
84	226	30.0		
85	502	67.0		
86	202	27.0		
87	267	36.0		
88	347	46.0		
89	304	41.0		
90	205	27.0		
91	112	15.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

A maximum estimate of natural production in the Wenatchee basin can be obtained by subtracting Leavenworth NFH spring chinook from the difference in counts at Rock Island and Rocky Reach dams. Using this method, turn-off into the basin has ranged from 1,000 to 10,000 natural origin spring chinook since the 1960s. Escapement into each of the tributaries can be extrapolated by applying index area redd count proportions to the basin turn-off. Reliable redd counts have been taken since the early 1960s and have typically totaled 300 to 600 in the entire basin. About 45% of the production occurs in Chiwawa River, 35% in Nason Creek, and 10% in each of the White and Little Wenatchee rivers.

Spring chinook within the entire Wenatchee basin have experienced a long-term downward trend. Most of this decrease in runs has occurred in Nason Creek based on redd counts. Nason Creek spring chinook are a depressed stock based on chronically low production.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality. The primary man-caused limiter is passage problems at Dryden and Tumwater dams on the Wenatchee River and mortalities at seven mainstem Columbia River dams. Flow diversions and screen inefficiency also affect this stock. Logging may affect peak winter flows and gravel quality on spawning riffles.

Harvest Management -- Harvest is probably not the limiting factor on production. Few upper Columbia spring chinook are harvested in ocean and freshwater fisheries. Assuming Nason Creek spring chinook have fishery contributions similar to other upper Columbia spring chinook, then total exploitation is probably less than 15% annually. There are no targeted fisheries on the wild run in the Wenatchee River or Nason Creek. A target fishery on Leavenworth hatchery spring chinook occurs in Icicle Creek and in the mainstem Wenatchee immediately downstream of the Icicle mouth. Harvest on the wild run is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam are limited to 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE WENATCHEE BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	SOCKEYE
1982	1878286	0	0
1983	1906488	0	0
1984	3915633	0	0
1985	2252798	0	0
1986	2447642	0	0
1987	3259768	0	0
1988	1624585	0	0
1989	4662048	0	0
1990	2421503	0	260400
1991	2759841	720000	372102
MEAN	2712859	720000	316251

UPPER COLUMBIA -- LITTLE WENATCHEE SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation within the Wenatchee River watershed. Natural production of spring chinook also occurs in three other tributaries: Chiwawa River, White River, and Nason Creek. There is no obvious distinguishing differences in the runs to each tributary other than spatial separation. It is unclear whether each tributary population may be a separate stock. A baseline genetics profile is being compiled from spring chinook within the Wenatchee basin.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Tributary entry is May to August and may be delayed by a hydrological block in Tumwater Canyon of the Wenatchee River. Spawning begins in early August, peaks in mid- to late August, and is completed by mid-September.

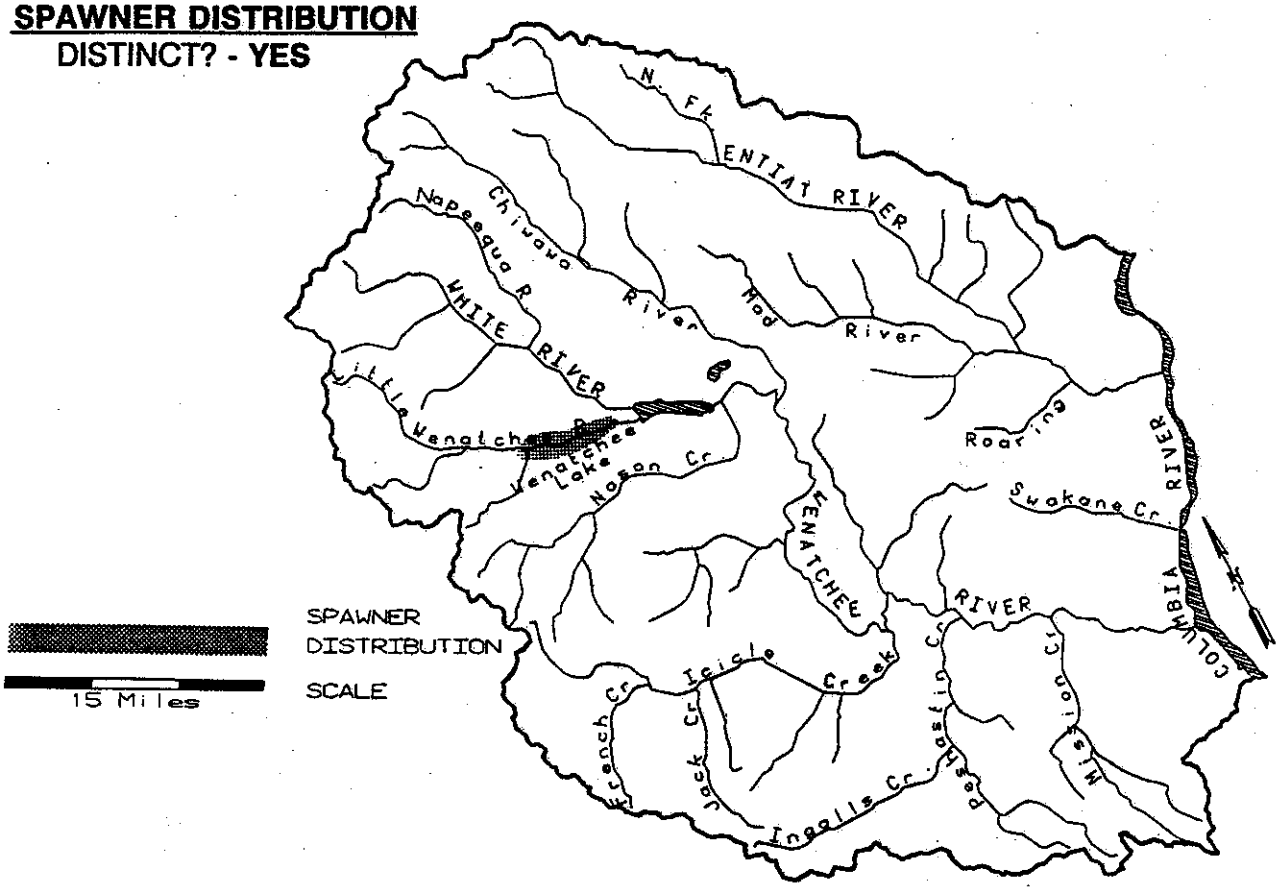
Endemic runs of spring chinook in the Wenatchee basin were initially reduced by mill dams and irrigation diversions by the early 1900s. Current populations may have some common ancestry resulting from the Grand Coulee Fish Maintenance Project which began in 1939-1941. Salmon destined for above Grand Coulee Dam were trapped at Rock Island Dam and held for spawning at three federal hatcheries in the upper Columbia River. One of these, Leavenworth National Fish Hatchery is on Icicle Creek, a Wenatchee tributary. Early programs at Leavenworth NFH reared a wide variety of salmon species including spring chinook. Currently, salmon production at Leavenworth Hatchery is limited to spring chinook of mixed non-local stock ancestry. Natural production is probably not influenced by this hatchery program since Icicle Creek is well downstream of Little Wenatchee River.

Little Wenatchee River spring chinook are a native stock of wild production. A new supplementation/mitigation program funded by Chelan Public Utility District is treating the tributary groups as distinct from each other. No supplementation is scheduled for Little Wenatchee River.

STOCK DEFINITION PROFILE for Little Wenatchee Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

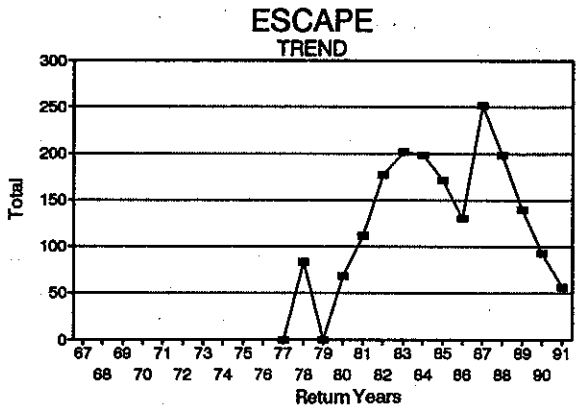
DISTINCT? - **UNKNOWN**

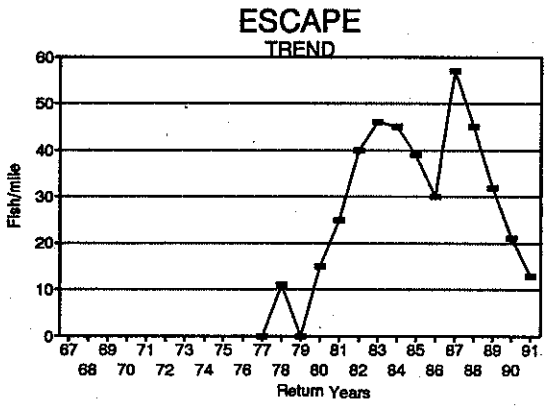
STOCK STATUS PROFILE for Little Wenatchee Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	0	0.0		
78	84	11.0		
79	0	0.0		
80	68	15.0		
81	112	25.0		
82	177	40.0		
83	202	46.0		
84	198	45.0		
85	171	39.0		
86	130	30.0		
87	251	57.0		
88	198	45.0		
89	140	32.0		
90	93	21.0		
91	56	13.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Bio-Unknown

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

A maximum estimate of natural production in the Wenatchee basin can be obtained by subtracting Leavenworth NFH spring chinook from the difference in counts at Rock Island and Rocky Reach dams. Using this method, turn-off into the basin has ranged from 1,000 to 10,000 natural origin spring chinook since the 1960s. Escapement into each of the tributaries can be extrapolated by applying index area redd count proportions to the basin turn-off. Reliable redd counts have been taken since the early 1960s and have typically totaled 300 to 600 in the entire basin. About 45% of the production occurs in Chiwawa River, 35% in Nason Creek, and 10% in each of the White and Little Wenatchee rivers.

Spring chinook within the entire Wenatchee basin have experienced a long-term downward trend. Production within the Little Wenatchee River shows no long-term trend and has remained at a low level. Little Wenatchee River spring chinook are depressed based on a short-term severe decline in escapement.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality. The primary man-caused limiter is passage problems at Dryden and Tumwater dams on the Wenatchee River and mortalities at seven mainstem Columbia River dams. Flow diversions and screen inefficiency also affect this stock. Lake shore development may affect nearshore riparian habitat, water quality and quantity.

Harvest Management -- Harvest is probably not the limiting factor on production. Few upper Columbia spring chinook are harvested in ocean and freshwater fisheries. Assuming Little Wenatchee River spring chinook have fishery contributions similar to other upper Columbia spring chinook, then total exploitation is probably less than 15% annually. There are no targeted fisheries on the wild run in the mainstem Wenatchee or Little Wenatchee rivers. A target fishery on Leavenworth hatchery spring chinook occurs in Icicle Creek and in the mainstem Wenatchee immediately downstream of the Icicle mouth. Harvest on the wild run is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam are limited to 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- The Rock Island Hatchery Complex consists of a central hatchery (Eastbank) and five satellite rearing facilities. The five satellite facilities are located on four different rivers (Wenatchee, Chiwawa, Methow, Similkameen) and Lake

Wenatchee. The Eastbank facility is located on the mainstem Columbia River just above Rocky Reach Dam, approximately 10.0 miles north of East Wenatchee. The hatchery was built to mitigate for smolt losses at Rock Island Dam and serves as the hub for the five satellite facilities. The hatchery began operation in 1989. Hatchery funding is provided by Chelan County PUD. The facility is jointly operated by WDF and the Washington Department of Wildlife. WDF provides 5.5 FTE's and WDW provides 2 FTE's.

The facility consists of two (15 ft x 120 ft) adult salmon holding ponds, eight (10 ft x 100 ft) raceways, and five (20 ft x 185 ft) raceways. There is one (10 ft x 70 ft) adult steelhead holding pond and two (1/2-acre) steelhead rearing ponds. A hatchery building houses shallow troughs and numerous double stacks of vertical incubators.

Four deep aquifer wells provide up to 53 cfs of water at a relatively constant temperature. The hatchery has chillers to cool the incubation water and retard egg and alevin development. Satellite facilities associated with Eastbank Hatchery include the Lake Wenatchee net pens, and the Chiwawa (33 cfs), Dryden (16 cfs), Similkameen (21 cfs) and Methow (15 cfs) rearing ponds. As an aggregate these facilities are supplied with approximately 85 cfs of river water.

The Chiwawa/Lake Wenatchee complex has a rearing site located on the Chiwawa River approximately 1.0 mile upstream of the confluence with the Wenatchee River. The hatchery has an office, two large rearing ponds, a removable, picket diffuser weir and trap. The facility rears spring chinook only. The facility has two water sources: the Chiwawa River (21 cfs, pumped) or the Wenatchee River (12 cfs, pumped). The latter water source is used only in December when ice forms in the Chiwawa River. In addition to rearing spring chinook, sockeye juveniles are reared in six floating net cages on Lake Wenatchee. Two additional floating cages are used for holding adult sockeye until spawning. These two cages are kept separate from the remaining six cages to prevent disease transmittal. The remaining six cages are used for rearing juvenile sockeye until their release into Lake Wenatchee in the fall. This facility is staffed with 2.75 FTE's.

The Dryden rearing facility consists of a large hypolon-lined rearing pond located adjacent to the Wenatchee River near Dryden, Washington. It is used to acclimate Wenatchee summer chinook. The water supply (16 cfs) originates from an irrigation canal that takes water from the Wenatchee River at Dryden Dam. The intake is located less than 1.0 mile upstream of the pond. There are no buildings at this site.

The Similkameen rearing facility is located on the Similkameen River near Oroville, Washington. This facility has an office, small shop and large rearing pond used for rearing Okanogan summer chinook. The water supply (21 cfs) is pumped from the

Similkameen River. An aeration system was recently installed to supply oxygen to the pond during periods when water flow is shut off due to ice formation or toxic spills in the river. The facility is staffed with 1.75 FTE's.

The Methow facility consists of a large hypolon-lined rearing pond located on the Methow River near Twisp, Washington. There is also a small office on site. This facility is used to acclimate Methow summer chinook. Water (15 cfs) is pumped from the Methow River.

Current production:

Chiwawa:	672,000 Chiwawa spring chinook
Dryden:	864,000 Wenatchee summer chinook
Lk. Wenatchee:	300,000 Lk. Wenatchee sockeye
Methow:	400,000 Wells summer chinook
Similkameen:	576,000 Wells summer chinook

LAST TEN YEARS SALMON RELEASES INTO THE WENATCHEE BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	SOCKEYE
1982	1878286	0	0
1983	1906488	0	0
1984	3915633	0	0
1985	2252798	0	0
1986	2447642	0	0
1987	3259768	0	0
1988	1624585	0	0
1989	4662048	0	0
1990	2421503	0	260400
1991	2759841	720000	372102
MEAN	2712859	720000	316251

UPPER COLUMBIA -- WHITE RIVER (WENATCHEE) SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on genetic characteristics and geographic isolation within the Wenatchee River watershed. Natural production of spring chinook also occurs in three other tributaries: Chiwawa River, Little Wenatchee River, and Nason Creek. There are no obvious distinguishing differences in the runs to each tributary other than spatial separation. Genetic analysis of chinook from the White River, Chiwawa River, and Nason Creek has recently been completed. Chinook spawners were sampled from the White in 1989, 1991, and 1992, and these were combined ($N=113$) for analysis. White River spring chinook were significantly different ($P<.05$) genetically from Chiwawa, Nason, and Leavenworth Hatchery spring chinook.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Tributary entry is May to August and may be delayed by a hydrological block in Tumwater Canyon of the Wenatchee River. Spawning begins in early August, peaks in mid- to late August, and is completed by mid-September.

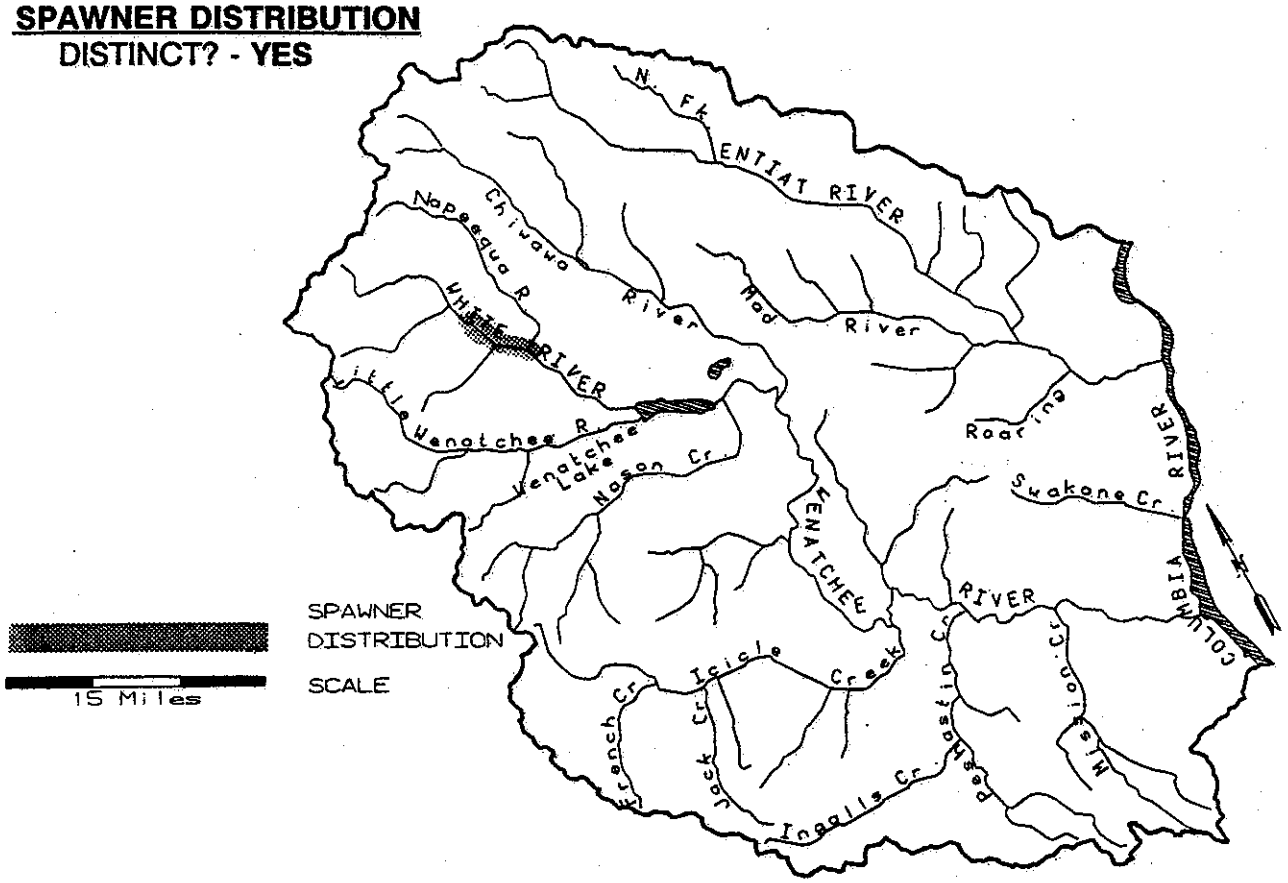
Endemic runs of spring chinook in the Wenatchee basin were initially reduced by mill dams and irrigation diversions by the early 1900s. Current populations may have some common ancestry resulting from the Grand Coulee Fish Maintenance Project which began in 1939-1941. Salmon destined for above Grand Coulee Dam were trapped at Rock Island Dam and held for spawning at three federal hatcheries in the upper Columbia River. One of these, Leavenworth National Fish Hatchery, is on Icicle Creek, a Wenatchee tributary. Early programs at Leavenworth NFH reared a wide variety of salmon species including spring chinook. Currently, salmon production at Leavenworth Hatchery is limited to spring chinook of mixed non-local stock ancestry. Natural production is probably not influenced by this hatchery program since Icicle Creek is well downstream of White River.

White River spring chinook should be considered a native type stock. A new supplementation/mitigation program funded by Chelan Public Utility District is treating the tributary groups as distinct from each other. No supplementation is scheduled for White River.

STOCK DEFINITION PROFILE for White R (Wenatchee) Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



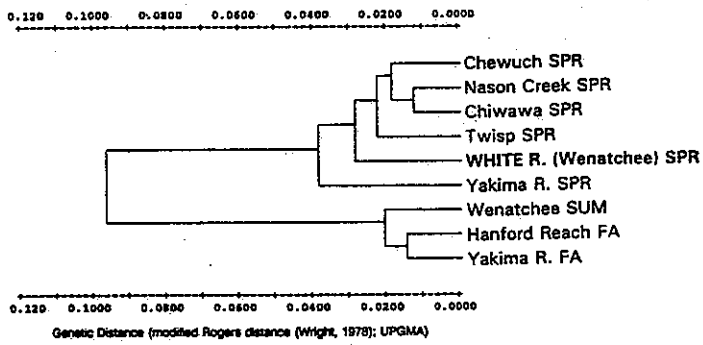
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Spring chinook sampled from the White in 1989, 1991 and 1992 were combined for analysis. The genetic characteristics of these White R. chinook were significantly different ($p < .05$) from those of other Columbia chinook stocks examined, including other spring-run wild and hatchery stocks.

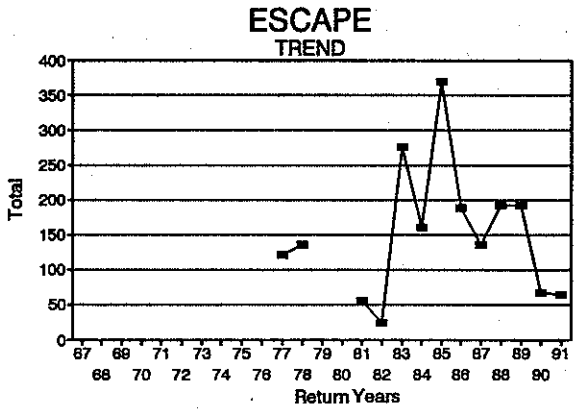


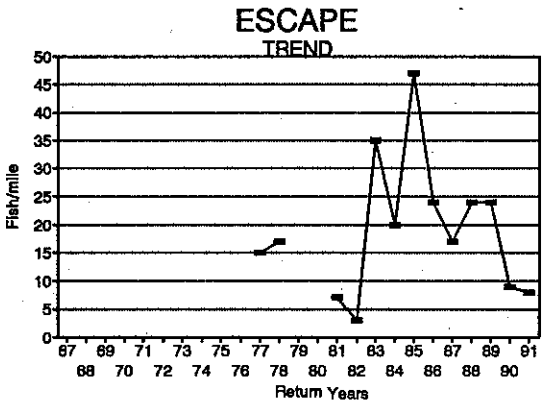
STOCK STATUS PROFILE for White (Wenatchee) Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	121	15.0		
78	136	17.0		
79				
80				
81	56	7.0		
82	24	3.0		
83	276	35.0		
84	161	20.0		
85	369	47.0		
86	189	24.0		
87	136	17.0		
88	192	24.0		
89	192	24.0		
90	68	9.0		
91	65	8.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Bio Unknown

STOCK STATUS
Depressed

SCREENING CRITERIA
ST Severe Decl'n, Chronic Low

STOCK STATUS

A maximum estimate of natural production in the Wenatchee basin can be obtained by subtracting Leavenworth NFH spring chinook from the difference in counts at Rock Island and Rocky Reach dams. Using this method, turn-off into the basin has ranged from 1,000 to 10,000 natural origin spring chinook since the 1960s. Escapement into each of the tributaries can be extrapolated by applying index area redd count proportions to the basin turn-off. Reliable redd counts have been taken since the early 1960s and have typically totaled 300 to 600 in the entire basin. About 45% of the production occurs in Chiwawa River, 35% in Nason Creek, and 10% in each of the White and Little Wenatchee rivers.

Spring chinook within the entire Wenatchee basin have experienced a long-term downward trend. Production within the White River shows no long-term trend and has remained at a low level. White River spring chinook should be considered depressed and a stock of concern.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality. The primary man-caused limiter is passage problems at Dryden and Tumwater dams on the Wenatchee River and mortalities at seven mainstem Columbia River dams. Flow diversions and screen inefficiency also affect this stock.

Harvest Management -- Harvest is probably not the limiting factor on production. Few upper Columbia spring chinook are harvested in ocean and freshwater fisheries. Assuming White River spring chinook have fishery contributions similar to other upper Columbia spring chinook, then total exploitation is probably less than 15% annually. There are no targeted fisheries on the wild run in the Wenatchee or White rivers. A target fishery on Leavenworth hatchery spring chinook occurs in Icicle Creek and in the mainstem Wenatchee immediately downstream of the Icicle mouth. Harvest on the wild run is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam are limited to 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE WENATCHEE BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK	SOCKEYE
1982	1878286	0	0
1983	1906488	0	0
1984	3915633	0	0
1985	2252798	0	0
1986	2447642	0	0
1987	3259768	0	0
1988	1624585	0	0
1989	4662048	0	0
1990	2421503	0	260400
1991	2759841	720000	372102
MEAN	2712859	720000	316251

UPPER COLUMBIA -- ENTIAT SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation. Biological information is sparse.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Timing of entry into the Entiat River is May and June with peak spawning in late August and early September. The natural stock spawns about 15.0 miles upstream of Entiat National Fish Hatchery where spring chinook of non-local ancestry are produced.

The current population is probably a mixture of native and hatchery stock(s) and descendants of fish transferred during the Grand Coulee Fish Maintenance Project. Entiat River spring chinook are a native stock of wild production.

STOCK STATUS

Run-size information is limited to mainstem Columbia Dam counts and annual index area redd counts. The natural run numbers 100 to 500 spring chinook. Escapement to Entiat National Fish Hatchery is 500 to 700 fish. Redd counts have been conducted since the early 1960s and have shown a downward trend. In the 1960-1970s, an average of 162 redds were counted in the index area compared to an average of 78 during 1980-1992. The three lowest redd counts since 1962 have occurred within the last five years (1989, 1991, 1992). Hatchery returns have been relatively stable. Entiat River spring chinook are depressed based on chronically low production.

FACTORS AFFECTING PRODUCTION

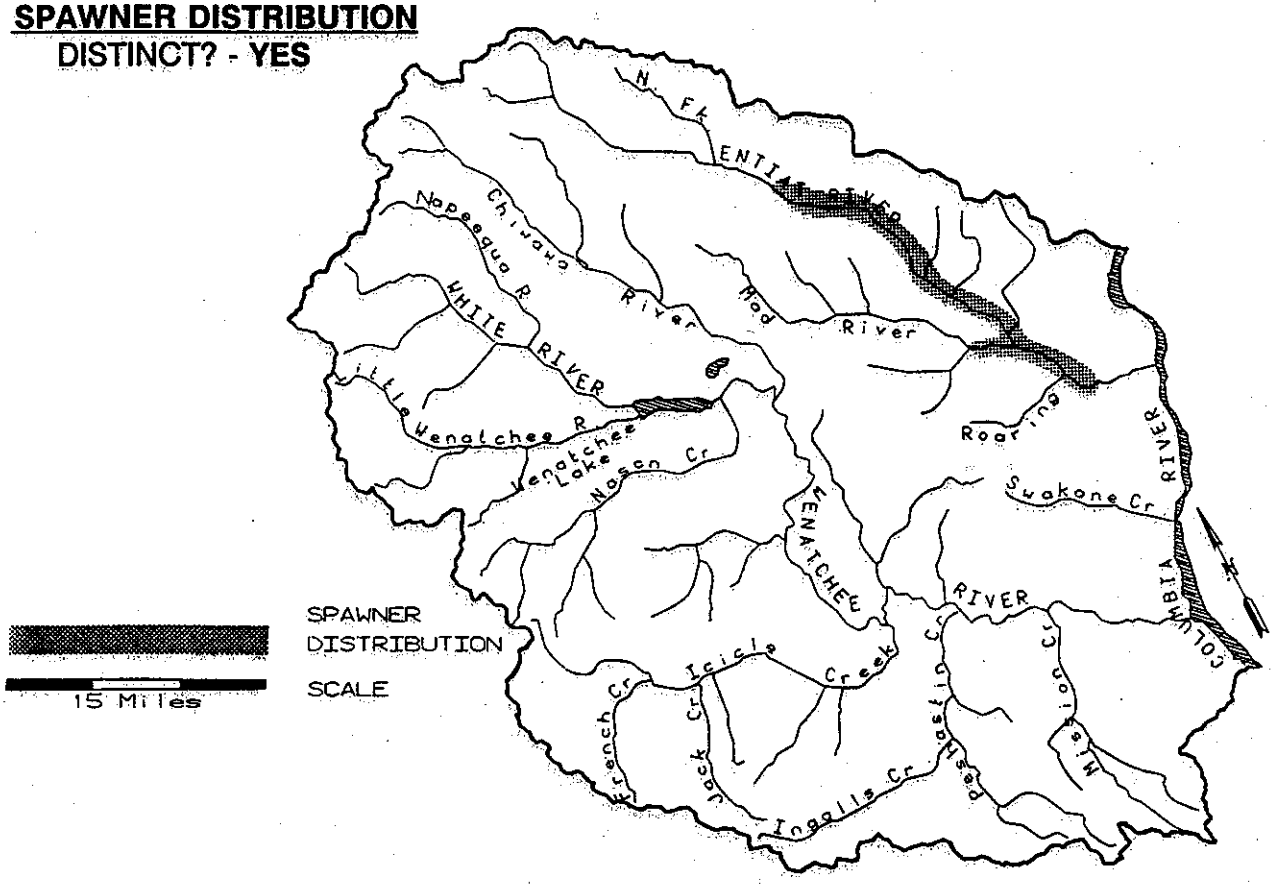
Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion and inadequate screening limit production. See also Entiat River - Summer Steelhead.

Mainstem Columbia River impacts are attributable to mortalities at eight dams and lower river impacts described elsewhere.

STOCK DEFINITION PROFILE for Entiat Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

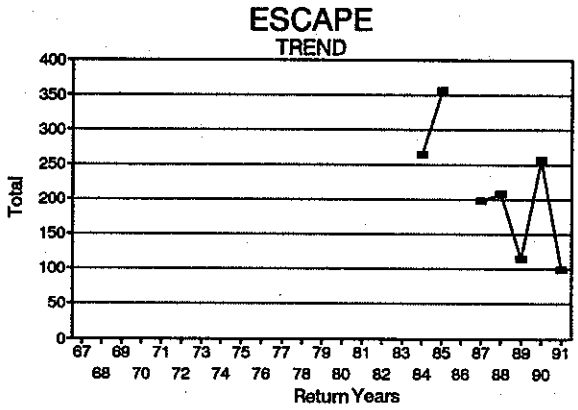
DISTINCT? - **UNKNOWN**

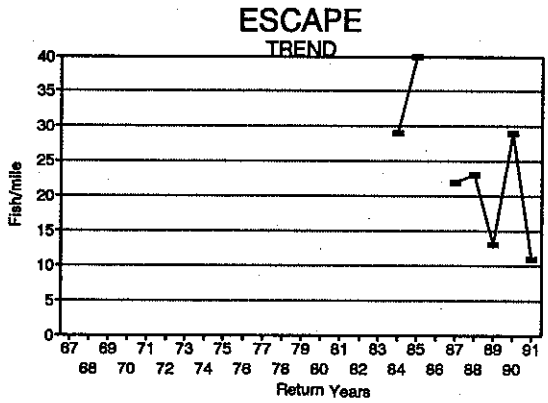
STOCK STATUS PROFILE for Entiat Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	264	29.0		
85	357	40.0		
86				
87	198	22.0		
88	208	23.0		
89	115	13.0		
90	257	29.0		
91	99	11.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN

Native MIXED

PRODUCTION TYPE

Wild COMPOSITE

STOCK DISTINCTION

Distribution

STOCK STATUS

Depressed

SCREENING CRITERIA

Chronically Low

Harvest Management -- Production is probably not limited by harvest. Few upper Columbia spring chinook are harvested in ocean and freshwater fisheries. Assuming Entiat spring chinook have fishery contributions similar to other upper Columbia spring chinook, then less than 20% of the run is caught annually. There is no recreational or tribal fishery in the Entiat River. Harvest is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam should not have exceeded 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE ENTIAT BASIN

REL. YEAR	SPRING CHINOOK
1982	997841
1983	955970
1984	795458
1985	894600
1986	835090
1987	925000
1988	1137700
1989	907408
1990	585800
1991	1196653
MEAN	923152

UPPER COLUMBIA -- METHOW SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation. Biological information is limited. A genetic profile of spring chinook within the Methow River basin is being compiled.

Spring chinook are produced naturally and at two hatcheries. Winthrop National Fish Hatchery is on the mainstem Methow near the town of Winthrop. Close by, the recently completed Methow Hatchery began spring chinook production using local stocks in 1992. Natural production occurs in the mainstem Methow as well as in three tributaries: Chewuch, Lost, and Twisp rivers. It is unknown whether these areas produce four distinct stocks. Spawning has also been observed in some smaller tributaries including Early Winters, Gold, Lake, and Wolf creeks. Methow Hatchery will treat the Chewuch and Twisp supplementation programs as though the production were from separate stocks.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Entry into the Methow basin is in May and June with spawning in August and early September.

Natural stocks may be influenced to a small degree by hatchery production. Endemic spring chinook runs were largely eliminated by a hydro and irrigation dam near the mouth of the Methow River in the early 1900s. Current populations are probably a mixture of native and hatchery stock(s) and descendants of fish transferred during the Grand Coulee Fish Maintenance Project. Methow River spring chinook are a native stock of composite production.

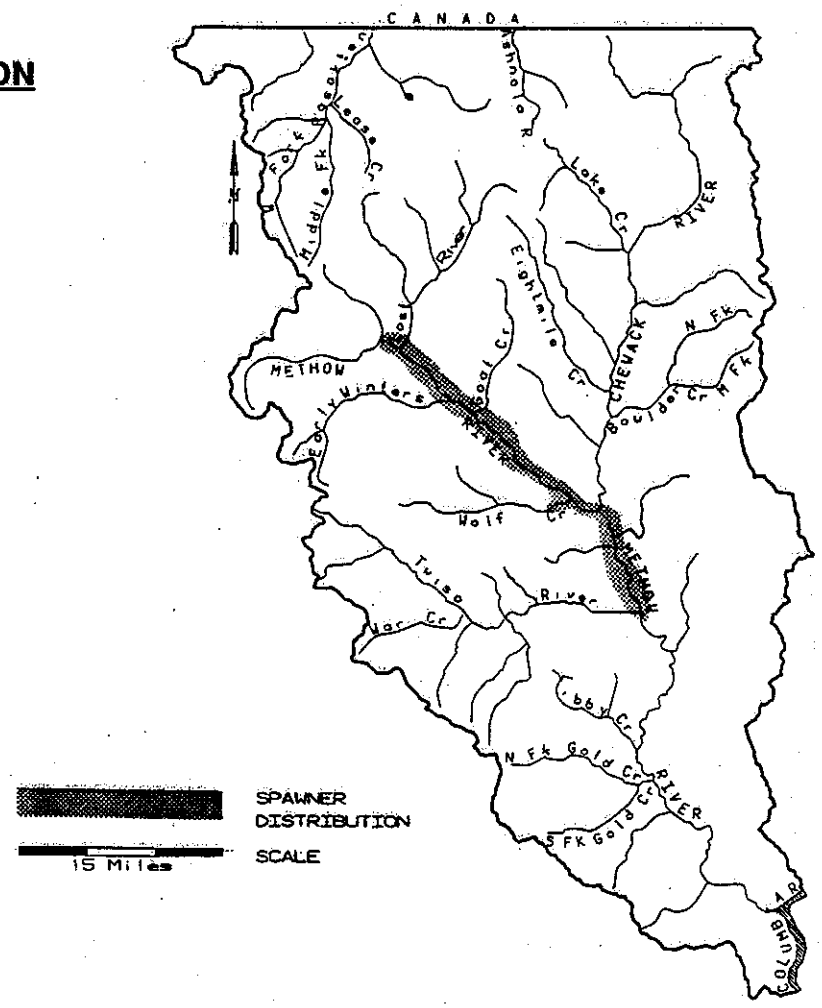
STOCK STATUS

Based on 30 years of redd counts, production from the mainstem Methow River is declining. Index area redd counts for the mainstem Methow averaged 97 annually in 1962-1979 and declined to an average of 53 per year during 1980-1991. Production from the mainstem Methow is similar to the runs from the Twisp and Chewuch rivers. Run-sizes in recent years have ranged from 200 to 600 spring chinook. Escapements to Winthrop National Fish Hatchery have generally been 200 to 600 annually. Methow River spring chinook are depressed based on a long-term negative trend in escapement.

STOCK DEFINITION PROFILE for Methow Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

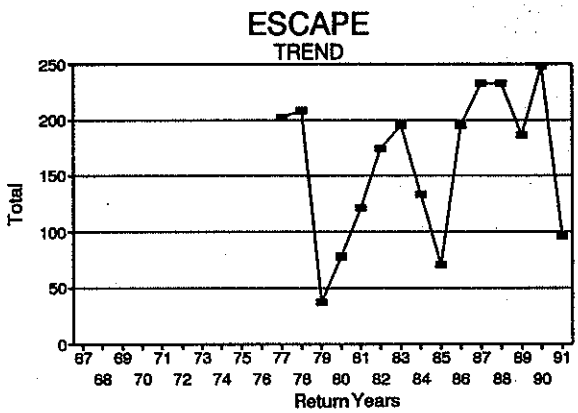
DISTINCT? - NO

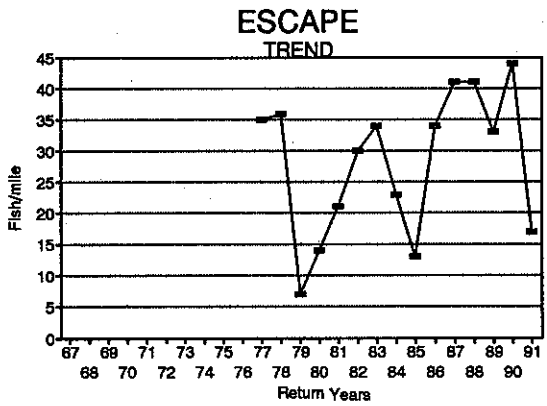
STOCK STATUS PROFILE for Methow Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	202	35.0		
78	208	36.0		
79	37	7.0		
80	78	14.0		
81	121	21.0		
82	174	30.0		
83	195	34.0		
84	133	23.0		
85	71	13.0		
86	195	34.0		
87	233	41.0		
88	233	41.0		
89	186	33.0		
90	248	44.0		
91	96	17.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
LT Severe Decl'n, Chronic Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion and inadequate screening limit production. Instream and riparian habitats have been degraded by agricultural and logging practices.

Mainstem Columbia River impacts are attributable to mortalities at nine dams and lower river impacts described elsewhere.

Harvest Management -- Production is probably not limited by harvest. Few upper Columbia origin spring chinook are harvested in ocean and freshwater fisheries. Assuming Methow spring chinook have fishery contributions similar to other upper Columbia spring chinook, then less than 20% of the run is caught annually. There is no recreational or tribal fishery in the Methow River. Harvest is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam should not have exceeded 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- The Rock Island Hatchery Complex consists of a central hatchery (Eastbank) and five satellite rearing facilities. The five satellite facilities are located on four different rivers (Wenatchee, Chiwawa, Methow, Similkameen) and Lake Wenatchee. The Eastbank facility is located on the mainstem Columbia River just above Rocky Reach Dam, approximately 10.0 miles north of East Wenatchee, Washington. The hatchery was built to mitigate for smolt losses at Rock Island Dam and serves as the hub for the five satellite facilities. The hatchery began operation in 1989. Hatchery funding is provided by Chelan County PUD. The facility is jointly operated by WDF and the Washington Department of Wildlife. WDF provides 5.5 FTE's and WDW provides 2 FTE's.

The facility consists of two (15 ft x 120 ft) adult salmon holding ponds, eight (10 ft x 100 ft) raceways, and five (20 ft x 185 ft) raceways. There is one (10 ft x 70 ft) adult steelhead holding pond and two (1/2-acre) steelhead rearing ponds. A hatchery building houses shallow troughs and numerous double stacks of vertical incubators.

Four deep aquifer wells provide up to 53 cfs of water at a relatively constant temperature. The hatchery has chillers to cool the incubation water and retard egg and alevin development. Satellite facilities associated with Eastbank Hatchery include the Lake Wenatchee net pens, and the Chiwawa (33 cfs), Dryden (16 cfs),

Similkameen (21 cfs) and Methow (15 cfs) rearing ponds. As an aggregate these facilities are supplied with approximately 85 cfs of river water.

The Chiwawa/Lake Wenatchee complex has a rearing site located on the Chiwawa River approximately 1.0 mile upstream of the confluence with the Wenatchee River. The hatchery has an office, two large rearing ponds, a removable, picket diffuser weir and trap. The facility rears spring chinook only. The facility has two water sources: the Chiwawa River (21 cfs, pumped) or the Wenatchee River (12 cfs, pumped). The latter water source is used only in December when ice forms in the Chiwawa River. In addition to rearing spring chinook, sockeye juveniles are reared in six floating net cages on Lake Wenatchee. Two additional floating cages are used for holding adult sockeye until spawning. These two cages are kept separate from the remaining six cages to prevent disease transmittal. The remaining six cages are used for rearing juvenile sockeye until their release into Lake Wenatchee in the fall. This facility is staffed with 2.75 FTE's.

The Dryden rearing facility consists of a large hypolon-lined rearing pond located adjacent to the Wenatchee River near Dryden, Washington. It is used to acclimate Wenatchee summer chinook. The water supply (16 cfs) originates from an irrigation canal that takes water from the Wenatchee River at Dryden Dam. The intake is located less than 1.0 mile upstream of the pond. There are no buildings at this site.

The Similkameen rearing facility is located on the Similkameen River near Oroville, Washington. This facility has an office, small shop and large rearing pond used for rearing Okanogan summer chinook. The water supply (21 cfs) is pumped from the Similkameen River. An aeration system was recently installed to supply oxygen to the pond during periods when water flow is shut off due to ice formation or toxic spills in the river. The facility is staffed with 1.75 FTE's.

The Methow facility consists of a large hypolon-lined rearing pond located on the Methow River near Twisp, Washington. There is also a small office on site. This facility is used to acclimate Methow summer chinook. Water (15 cfs) is pumped from the Methow River.

Current production:

Chiwawa:	672,000 Chiwawa spring chinook
Dryden:	864,000 Wenatchee summer chinook
Lk. Wenatchee:	300,000 Lk. Wenatchee sockeye
Methow:	400,000 Wells summer chinook
Similkameen:	576,000 Wells summer chinook

LAST TEN YEARS SALMON RELEASES INTO THE METHOW BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK
1982	712700	268100
1983	1316708	0
1984	903181	0
1985	1167600	0
1986	1062794	0
1987	1069293	212732
1988	1090200	0
1989	1115734	0
1990	1121395	0
1991	1637820	420000
MEAN	1119743	300277

UPPER COLUMBIA -- TWISP SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation. Biological information is limited. Genetic profiles of spring chinook within the Methow River basin are being compiled. Natural production occurs in the mainstem Methow as well as in three tributaries: Chewuch, Lost, and Twisp rivers. Chinook spawners were sampled from the Twisp ($N=59$) and the Chewuch ($N=47$) in 1992 for genetic analysis. The Twisp chinook were significantly different ($P<.05$) in their genetic characteristics from the Chewuch spawners. Both the Twisp and the Chewuch were genetically distinct from Winthrop Hatchery spring chinook and from spring chinook stocks in the Wenatchee system.

Twisp River spring chinook are also produced at the just completed Methow Hatchery. Production of non-local stock ancestry occurs at Winthrop National Fish Hatchery on the mainstem Methow near the town of Winthrop. The Methow Hatchery began spring chinook production using Chewuch and Twisp brood stock in 1992. Methow Hatchery will treat the Chewuch and Twisp supplementation programs as though the production were from separate stocks.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Entry into the Methow basin is in May and June with spawning in August and early September.

Natural stocks may be influenced to a small degree by hatchery production. Endemic spring chinook runs were largely eliminated by a hydro and irrigation dam near the mouth of the Methow River in the early 1900s. The current population is probably a mixture of native and hatchery stock(s) and descendants of fish transferred during the Grand Coulee Fish Maintenance Project. Twisp River spring chinook are a native stock of wild production.

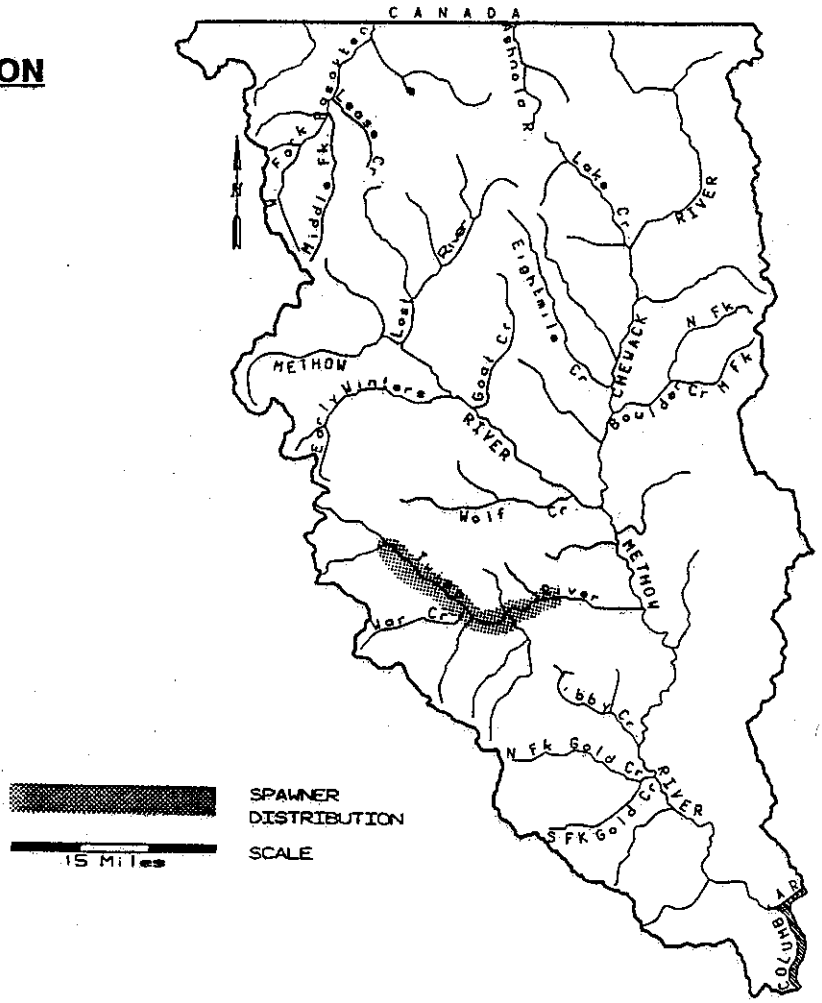
STOCK STATUS

Natural production from the Twisp River shows a downward trend over the last 30 years. During 1962-1979, index area redd counts averaged 158 annually compared to an average of 60 during 1970-1991. Production from the Twisp River is similar to the runs in the mainstem Methow and Chewuch River. Run-sizes in recent years have ranged from 200 to 600 spring chinook. Twisp River spring chinook are depressed based on a short term severe decline in escapement.

STOCK DEFINITION PROFILE for Twisp Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



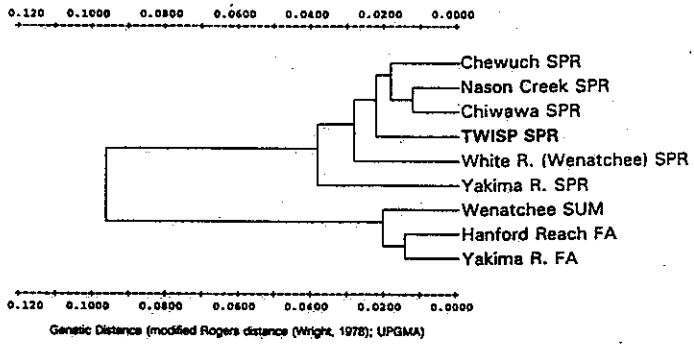
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - The genetic characteristics of Twisp spring chinook sampled in 1992 were significantly different ($p < .05$) from those of other upper Columbia chinook stocks examined, including other spring-run wild and hatchery stocks.

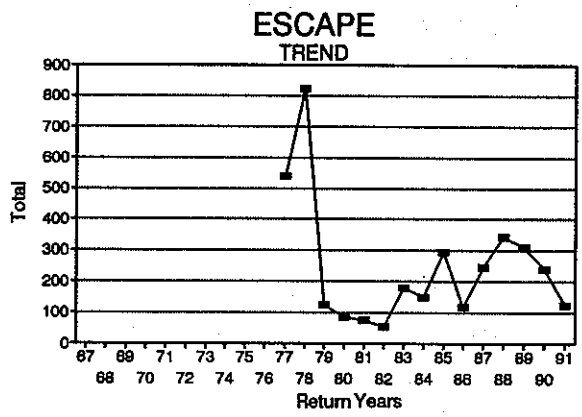


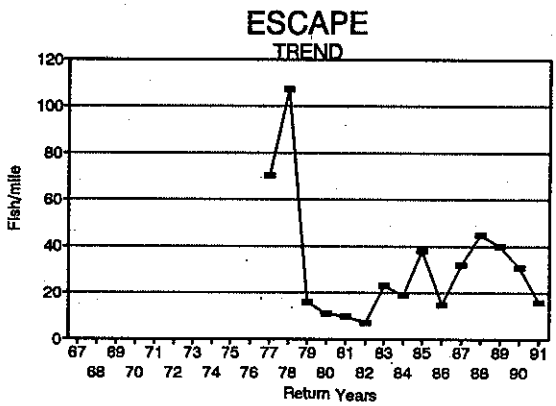
STOCK STATUS PROFILE for Twisp Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	539	70.0		
78	822	107.0		
79	124	16.0		
80	84	11.0		
81	74	10.0		
82	53	7.0		
83	180	23.0		
84	149	19.0		
85	295	38.0		
86	118	15.0		
87	245	32.0		
88	344	45.0		
89	310	40.0		
90	239	31.0		
91	124	16.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
ST Severe Decl'n, Chronic Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion and inadequate screening limit production. Instream and riparian habitats have been degraded by agricultural and logging practices.

Mainstem Columbia River impacts are attributable to mortalities at nine dams and lower river impacts described elsewhere.

Harvest Management -- Production is probably not limited by harvest. Few upper Columbia origin spring chinook are harvested in ocean and freshwater fisheries. Assuming Twisp River spring chinook have fishery contributions similar to other upper Columbia spring chinook, then less than 15% of the run is caught annually. There is no recreational or tribal fishery in the Methow or Twisp rivers. Harvest is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam are limited to 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- Hatchery operational impacts have not been determined. Fish used for supplementation project are from wild stock captured or gaffed from river.

LAST TEN YEARS SALMON RELEASES INTO THE METHOW BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK
1982	712700	268100
1983	1316708	0
1984	903181	0
1985	1167600	0
1986	1062794	0
1987	1069293	212732
1988	1090200	0
1989	1115734	0
1990	1121395	0
1991	1637820	420000
MEAN	1119743	300277

UPPER COLUMBIA -- CHEWUCH (CHEWACK) SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation. Biological information is limited. Genetic profiles of spring chinook within the Methow River basin are being compiled. Natural production occurs in the mainstem Methow as well as in three tributaries: Chewuch, Lost, and Twisp rivers. Chinook spawners were sampled from the Chewuch (N=47) and the Twisp (N=59) in 1992 for genetic analysis. The Chewuch chinook were significantly different ($P<.05$) in their genetic characteristics from the Twisp spawners. Both the Chewuch and the Twisp were genetically distinct from Winthrop Hatchery spring chinook and from spring chinook stocks in the Wenatchee system. No genetic stock identification data is available for the other two production areas.

Chewuch River spring chinook are also produced at the recently completed Methow Hatchery. Additional production of non-local stock occurs at Winthrop National Fish Hatchery on the mainstem Methow near the town of Winthrop. The Methow Hatchery began spring chinook production using Chewuch brood stock in 1992. Methow Hatchery will treat the Chewuch and Twisp supplementation programs as though the production were from separate stocks.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Entry into the Methow basin is in May and June with spawning in August and early September.

Natural stocks may be influenced to a small degree by hatchery production. Endemic spring chinook runs were largely eliminated by a hydro and irrigation dam near the mouth of the Methow River in the early 1900s. The current population is probably a mixture of native and hatchery stock(s) and descendants of fish transferred during the Grand Coulee Fish Maintenance Project. Chewuch River spring chinook are a native stock of wild production.

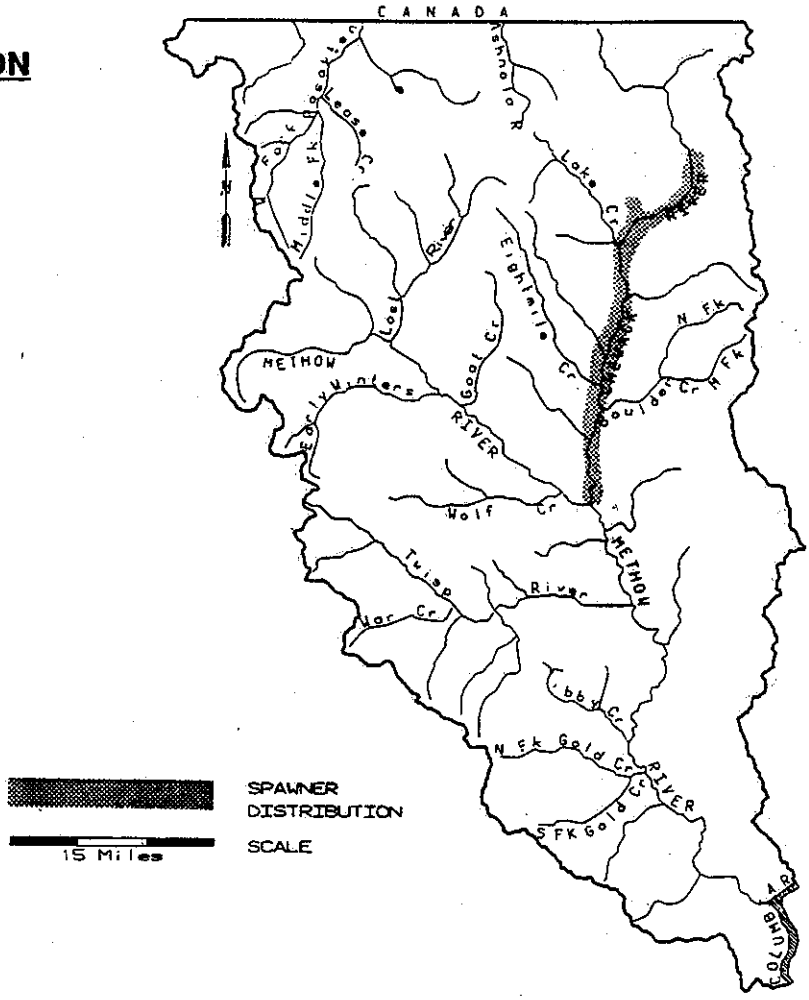
STOCK STATUS

Based on a variable history of redd count surveying, production from the Chewuch River shows no long-term trend over the last 30 years. Production from the Chewuch River is similar to the runs from the Chewuch River is similar to the run from the mainstem Methow and Twisp River. Run-sizes in recent years have ranged from 200 to 600 spring chinook. Chewuch River spring chinook are depressed based on a short-term decline in escapement.

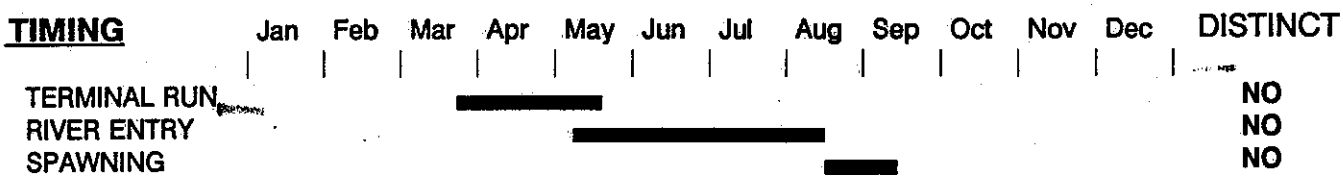
STOCK DEFINITION PROFILE for Chewuch (Chewack) Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



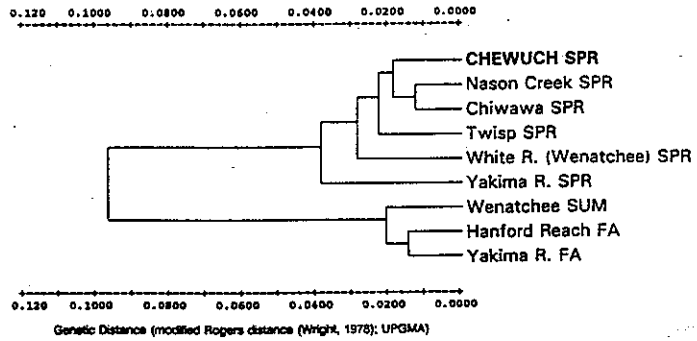
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - The genetic characteristics of Chewuch spring chinook sampled in 1992 were significantly different ($p < .05$) from those of other upper Columbia chinook stocks examined, including other spring-run wild and hatchery stocks. Results should be available during 1993.

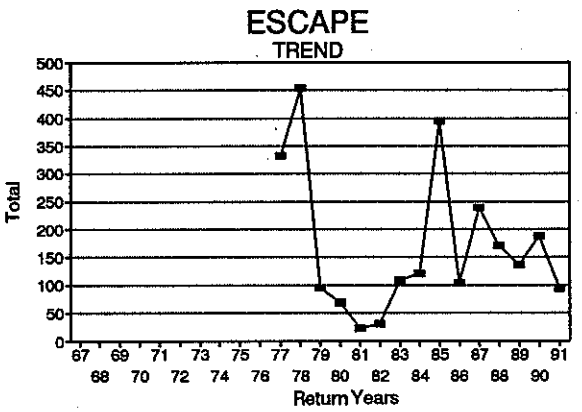


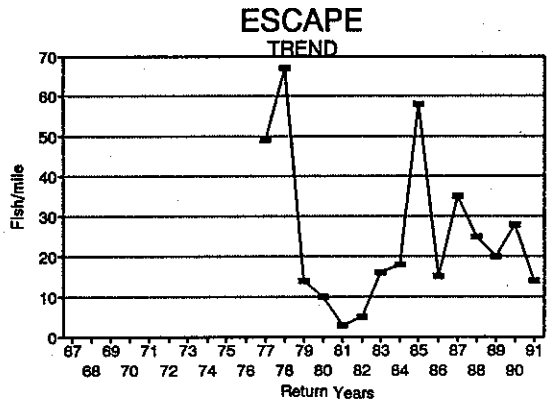
STOCK STATUS PROFILE for Chewuch R (Chewack) Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	332	49.0		
78	453	67.0		
79	96	14.0		
80	68	10.0		
81	22	3.0		
82	31	5.0		
83	109	16.0		
84	121	18.0		
85	394	58.0		
86	105	15.0		
87	239	35.0		
88	171	25.0		
89	136	20.0		
90	189	28.0		
91	93	14.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
ST Severe Decl'n, Chronic Low

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition, flow diversion and inadequate screening limit production. Instream and riparian habitats have been degraded by agricultural and logging practices.

Mainstem Columbia River impacts are attributable to mortalities at nine dams and lower river impacts described elsewhere.

Harvest Management -- Production is probably not limited by harvest. Few upper Columbia origin spring chinook are harvested in ocean and freshwater fisheries. Assuming Chewuch River spring chinook have fishery contributions similar to other upper Columbia spring chinook, then less than 15% of the run is caught annually. There is no recreational or tribal fishery in the Methow or Chewuch rivers. Harvest is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam are limited to 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- Hatchery operational impacts have not been determined. Fish used for hatchery releases are derived from wild stock trapped at weir or from fish gaffed from the spawning grounds.

LAST TEN YEARS SALMON RELEASES INTO THE METHOW BASIN

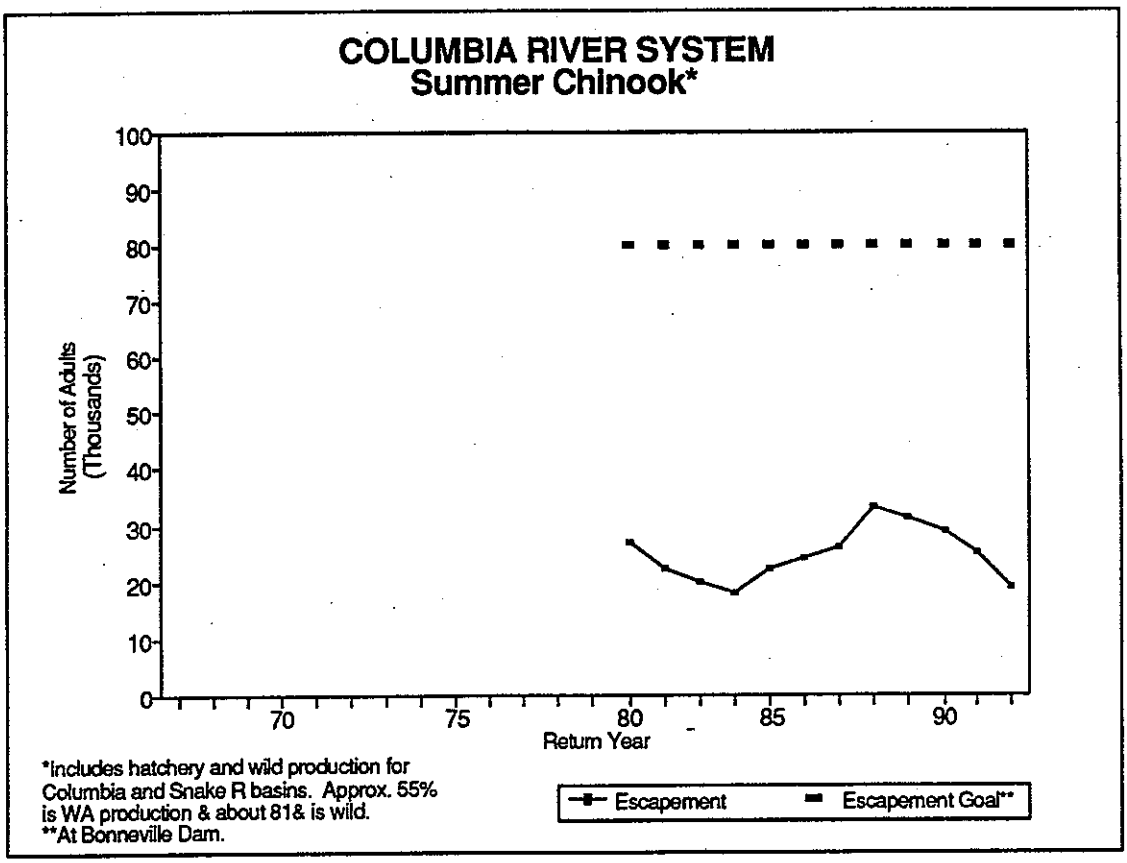
REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK
1982	712700	268100
1983	1316708	0
1984	903181	0
1985	1167600	0
1986	1062794	0
1987	1069293	212732
1988	1090200	0
1989	1115734	0
1990	1121395	0
1991	1637820	420000
MEAN	1119743	300277

OVERVIEW -- UPPER COLUMBIA SUMMER CHINOOK STOCKS

WENATCHEE
METHOW
OKANOGAN

STOCK DEFINITION AND ORIGIN

Summer chinook are produced in upper Columbia tributaries including the Wenatchee, Methow, and Okanogan rivers. Snake River summer chinook of Idaho origin are listed as "threatened" under the Endangered Species Act and are not included in this report. These stocks are just a remnant of historical summer chinook production, a significant portion of which was once produced upstream of Grand Coulee Dam which is a block to migration. The origin of these three tributary summer chinook stocks is a mixture of native remnant summer chinook and transfers from the Grand Coulee Fish Maintenance Project began in 1939.



Salmon destined for upstream of Grand Coulee Dam were collected at Rock Island Dam and transferred to Leavenworth National Fish Hatchery and released in upper Columbia tributaries.

Summer chinook migrate through the Columbia mainly in June, and July. Spawning extends from late September through early November.

Wenatchee, Methow and Okanogan River summer chinook stock designations were made on the basis of geographical isolation. Genetic profiles have shown minor differences between summer and fall chinook in the upper Columbia. Additional analysis is occurring to determine whether tributary populations are different from each other.

STOCK STATUS

Columbia River commercial fisheries once relied on summer chinook as their primary target species. However, since their decline, no target commercial fisheries have occurred since 1964. The Columbia River Fish Management Plan allows for a small percentage of the run to be harvested incidentally during sockeye, steelhead and shad commercial fisheries and for the treaty Indian subsistence fishery. No targeted sport fisheries occur on these stocks. The Methow and Okanogan River stocks are considered depressed based on negative escapement trends. The Wenatchee stock however is considered healthy due to relatively stable escapement level.

UPPER COLUMBIA -- LOST RIVER SPRING CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation. Biological information is limited. A genetic profile of spring chinook within the Methow River basin is being compiled. Natural production occurs in the mainstem Methow as well as in three tributaries: Chewuch, Lost, and Twisp rivers. It is unknown whether these areas produce four distinct stocks.

Lost River spring chinook are naturally produced. The nearest hatchery production occurs at Winthrop National Fish Hatchery and Methow Hatchery on the mainstem Methow near the town of Winthrop. The Methow Hatchery began spring chinook production using Chewuch and Twisp brood stock in 1992.

Run-timing is similar to other upriver Columbia spring chinook. Migration into the Columbia River begins in late March to early April. Entry into the Methow basin is in May and June with spawning in August and early September.

Natural stocks may be influenced to a small degree by hatchery production. Endemic spring chinook runs were largely eliminated by a hydro and irrigation dam near the mouth of the Methow River in the early 1900s. The current population is probably a mixture of native and hatchery stock(s) and descendants of fish transferred during the Grand Coulee Fish Maintenance Project. Lost River spring chinook are a native stock of wild production.

STOCK STATUS

Based on a variable history of redd count surveying, production from the Lost River shows a gradual downward trend over the last 30 years. Production from the Lost River is about 25% of that in mainstem Methow, Chewuch, or Twisp rivers. Run-sizes in recent years have ranged from 50 to 150 spring chinook. Lost River spring chinook are depressed based on chronically low escapement.

FACTORS AFFECTING PRODUCTION

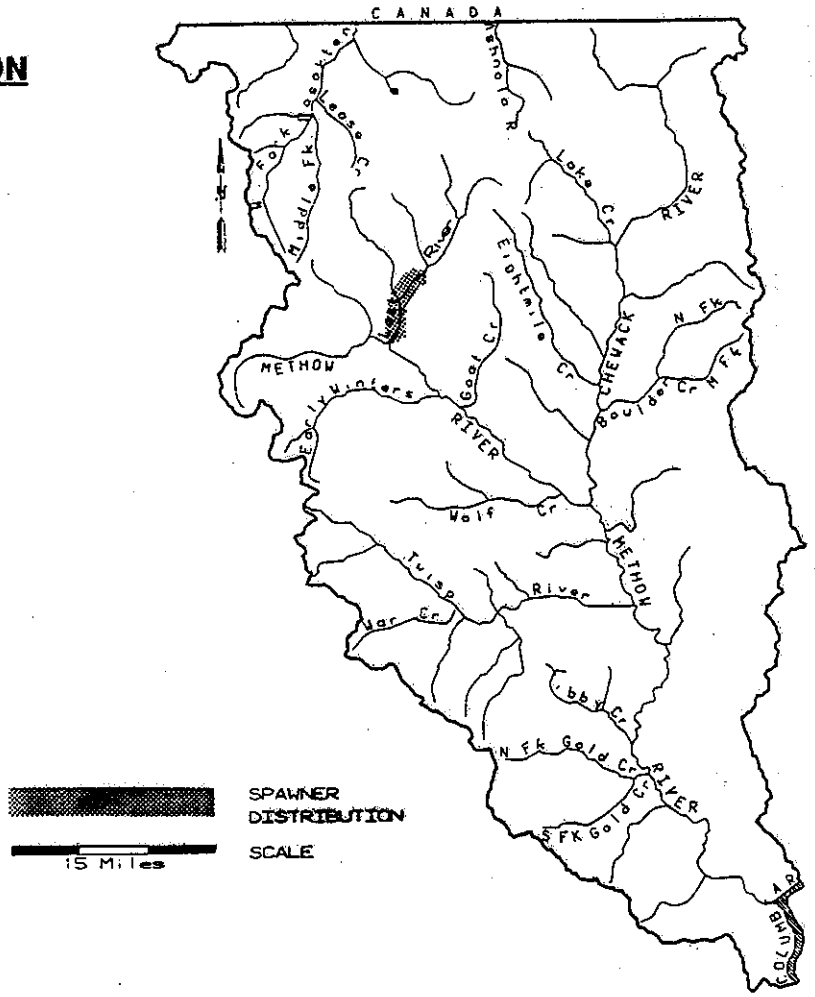
Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition, flow diversion and inadequate screening limit production. Instream and riparian habitats have been degraded by agricultural and logging practices.

Mainstem Columbia River impacts are attributable to mortalities at nine dams and lower river impacts described elsewhere.

STOCK DEFINITION PROFILE for Lost River Spring Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

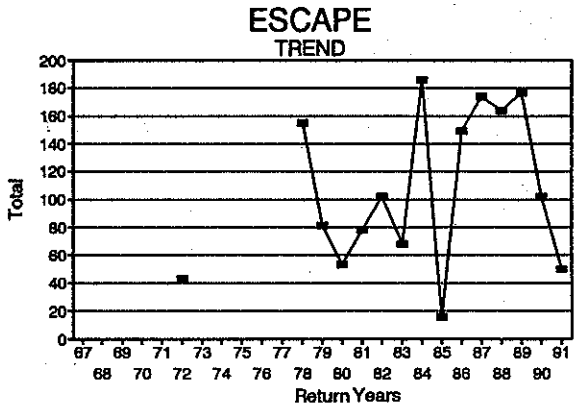
DISTINCT? - NO

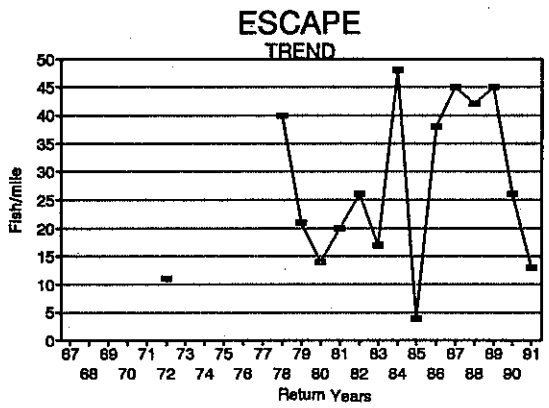
STOCK STATUS PROFILE for Lost R (Methow Basin) Spring Chinook

STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72	43	11.0		
73				
74				
75				
76				
77				
78	155	40.0		
79	81	21.0		
80	53	14.0		
81	78	20.0		
82	102	26.0		
83	68	17.0		
84	186	48.0		
85	16	4.0		
86	149	38.0		
87	174	45.0		
88	164	42.0		
89	177	45.0		
90	102	26.0		
91	50	13.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

Harvest Management -- Production is probably not limited by harvest. Few upper Columbia origin spring chinook are harvested in ocean and freshwater fisheries. Assuming Lost River spring chinook have fishery contributions similar to other upper Columbia spring chinook, then less than 15% of the run is caught annually. There is no recreational or tribal fishery in the Methow or Lost rivers. Harvest is limited to incidental catches in the ocean fisheries and to mainstem Columbia sport, commercial, and tribal fisheries. Harvest levels in the mainstem Columbia are outlined in the state-tribal agreement called the Columbia River Fish Management Plan. According to this plan, harvest rates on recent runs of spring chinook passing Bonneville Dam are limited to 4.1% in the non-treaty fisheries and 7% in the treaty ceremonial and subsistence fishery.

Hatchery -- Hatchery operational impacts have not been determined.

LAST TEN YEARS SALMON RELEASES INTO THE METHOW BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK
1982	712700	268100
1983	1316708	0
1984	903181	0
1985	1167600	0
1986	1062794	0
1987	1069293	212732
1988	1090200	0
1989	1115734	0
1990	1121395	0
1991	1637820	420000
MEAN	1119743	300277

UPPER COLUMBIA -- WENATCHEE SUMMER CHINOOK

STOCK DEFINITION AND ORIGIN

Wenatchee River summer chinook have been designated as distinct based on geographical isolation. Genetic profiles have shown minor differences between summer and fall chinook in the upper Columbia River. Additional tissue samples are being collected to test if the summer chinook in the upper Columbia tributaries are distinct from each other.

Migration into the Columbia River begins in early to mid-June. Summer chinook enter the Wenatchee River beginning in late June. Spawning begins in late September and reaches a peak in early to mid-October. Most of the spawning occurs within 8.0 miles of Leavenworth.

This natural run is considered to be a mixture of native remnant summer chinook and transfers of upper Columbia River stock summer chinook during the Grand Coulee Fish Maintenance Project which began in 1939. Salmon destined for above Grand Coulee Dam were collected at Rock Island Dam and transferred to Leavenworth National Fish Hatchery for rearing and release. Production at Leavenworth was discontinued in the early 1960s. Hatchery production of Wenatchee summer chinook was reestablished in 1989 at Eastbank Hatchery and Dryden Acclimation Pond. Wenatchee River summer chinook are a mixed stock of wild production.

STOCK STATUS

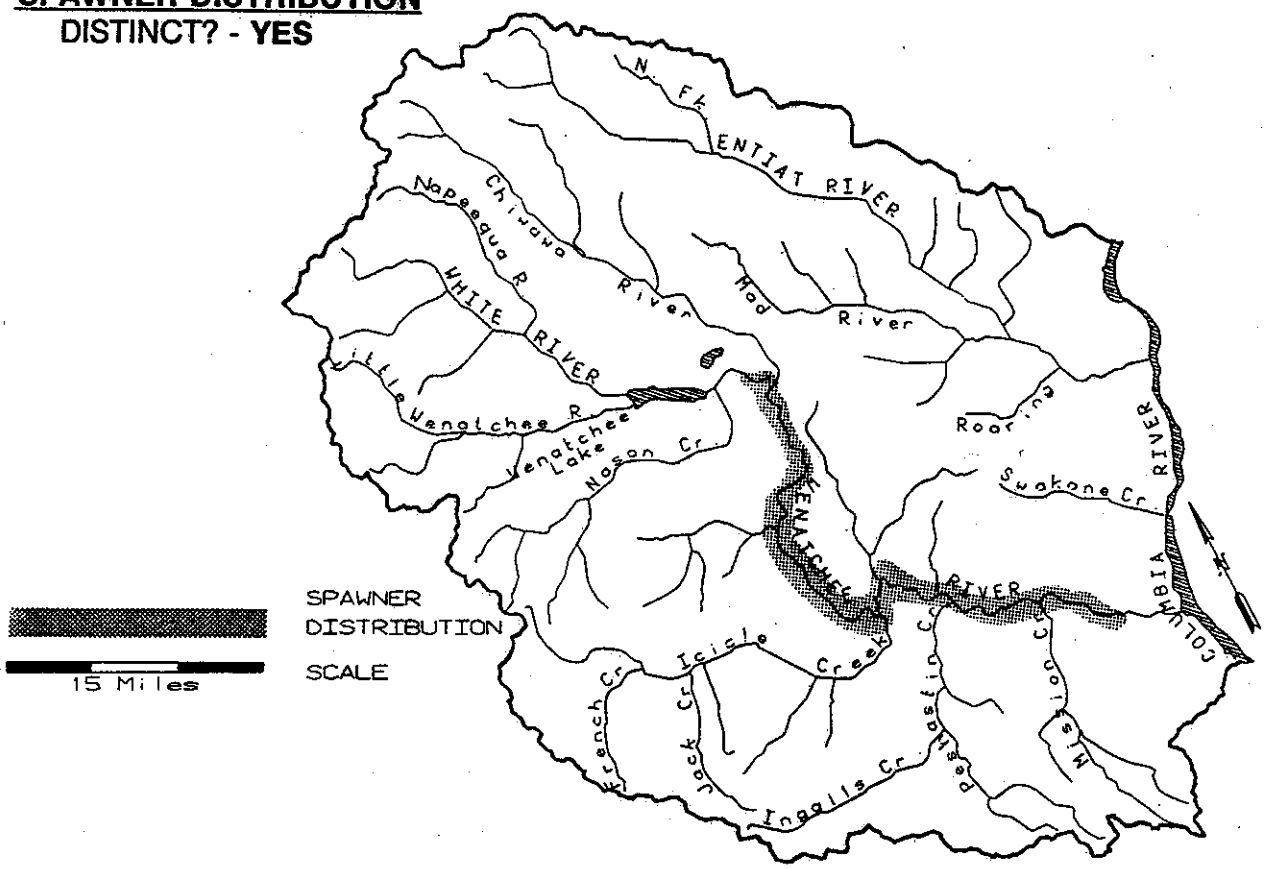
The run of summer chinook in the Wenatchee River averages nearly 9,000 adults based on the difference in Rock Island and Rocky Reach Dam counts. This population is the largest run of summer chinook in the Columbia River. This run is one of the largest naturally produced chinook populations in the Columbia Basin. Only the fall chinook runs in the Hanford Reach and the Lewis River are larger.

The returns to the Wenatchee River varies between 5,000 to 13,000 adults annually but shows no trend. Average run-size is about 8,000 adults. Aerial counts within the 40.0 mile spawning reach averaged about 1,100 redds in 1960-1979 and about 1,300 redds in 1980-1991. The Wenatchee River summer chinook natural stock status is healthy based on escapement.

STOCK DEFINITION PROFILE for Wenatchee Summer Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



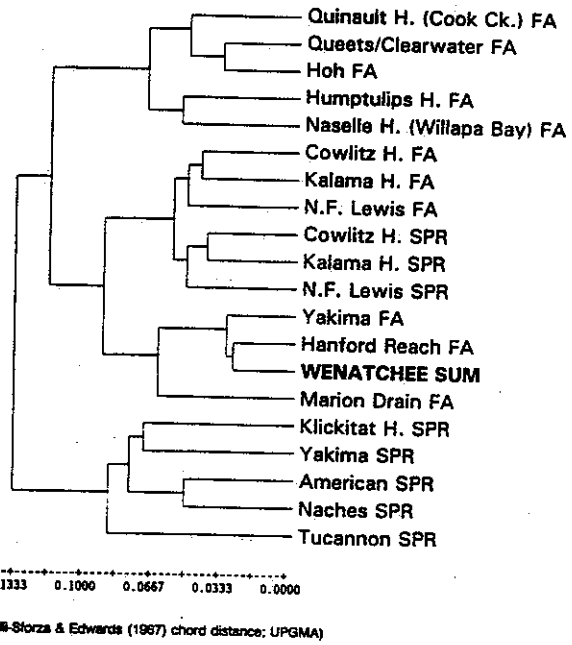
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Wenatchee summer chinook sampled in 1985, 1988, 1989, and 1990 showed no differences between years in their genetic characteristics and were combined in to one data set. This summer-run stock was significantly different from other chinook stocks examined ($p<0.05$).

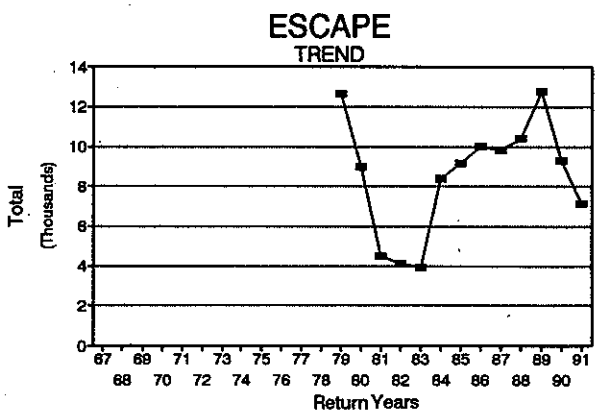


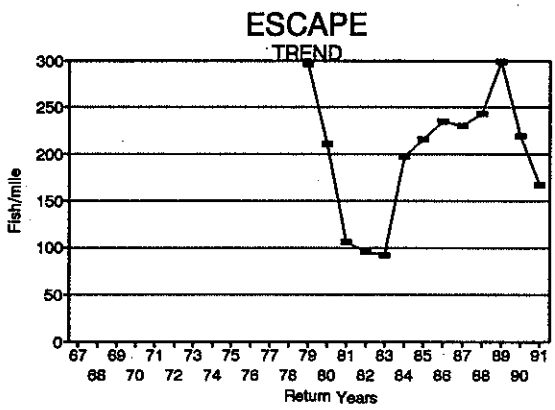
STOCK STATUS PROFILE for Wenatchee Summer Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79	12623	296.0		
80	8995	211.0		
81	4515	106.0		
82	4113	96.0		
83	3937	92.0		
84	8420	197.0		
85	9185	215.0		
86	10021	235.0		
87	9831	230.0		
88	10389	243.0		
89	12764	299.0		
90	9343	219.0		
91	7144	167.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

UPPER COLUMBIA -- METHOW SUMMER CHINOOK

STOCK DEFINITION AND ORIGIN

This stock is distinct based on geographical isolation. Biological information on this stock is minimal. A baseline genetics profile is being compiled for Methow River summer chinook. Other studies have shown only minor differences between summer and fall chinook in the upper Columbia River.

Migration into the Columbia River begins in mid- to late June. Summer chinook enter Methow River beginning in mid- to late July. Spawning occurs from late September to early November with a peak in mid-October.

This natural run is considered to be a mixture of strays from Wells Dam Hatchery and descendants of remnant native summer chinook and stocks transferred during the Grand Coulee Fish Maintenance Project. A small dam near the mouth of Methow River at Pateros reduced or eliminated many of the anadromous salmonids in the early 1900s. Winthrop National Fish Hatchery has intermittently released summer chinook from brood stock collected at Wells Dam and Leavenworth National Fish Hatchery. As part of the Rock Island Settlement Agreement with Chelan PUD, additional hatchery production of summer chinook began with 1989 brood stock collections at Wells Dam. Yearling smolts are released from the acclimation pond on the Methow River after incubation and partial rearing at Eastbank Hatchery near Rocky Reach Dam. Because of the varied history of stock ancestry, Methow River summer chinook are a mixed stock of wild production.

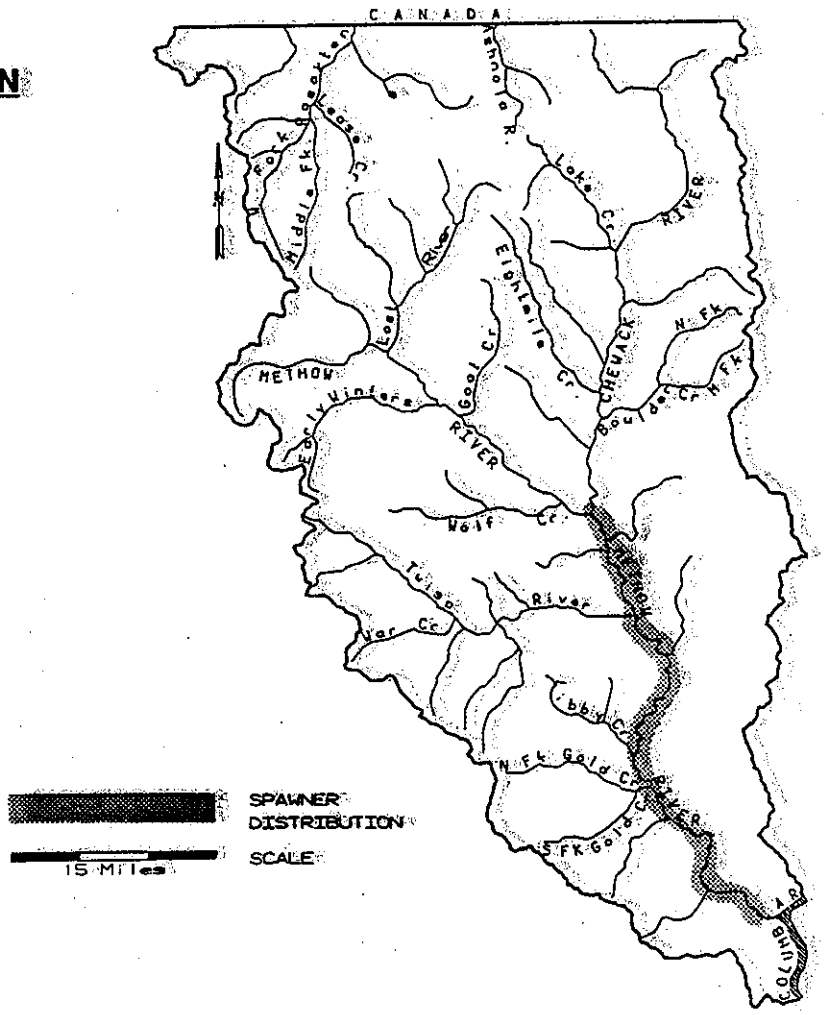
STOCK STATUS

The run of summer chinook into the Methow River has declined dramatically since 1967. Redd counts during 1980-1991 averaged only 36% of the total in 1967-1979. Since 1980 run-sizes have ranged from 400 to 1,500 adults based on redd count expansions. Average run is about 1,000 adult summer chinook. Counts of summer chinook at Wells Dam were record lows in 1991 and 1992. Summer chinook passing Wells Dam are destined for the Methow and Okanogan basins. Methow River summer chinook are depressed based on a short term severe decline and a long-term negative trend in escapement.

STOCK DEFINITION PROFILE for Methow Summer Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **UNKNOWN**

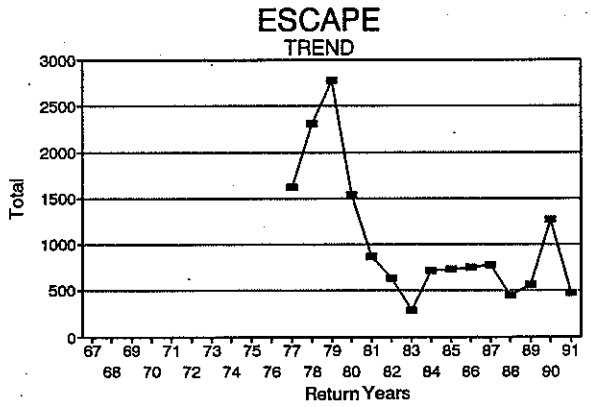
GENETICS - A small number of summer chinook were sampled from the Methow in 1991 and 1992 for genetic analysis. Total sample size is probably too small at this time to analyze genetic characteristics and relationships.

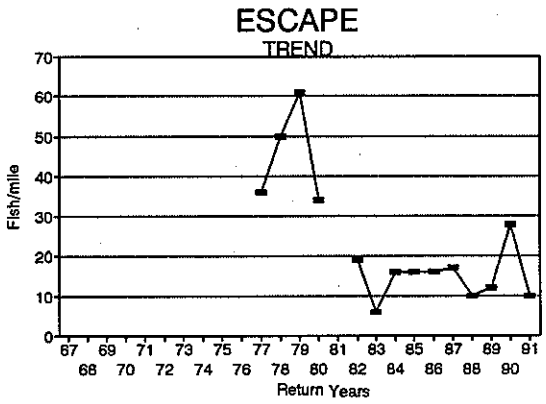
STOCK STATUS PROFILE for Methow Summer Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

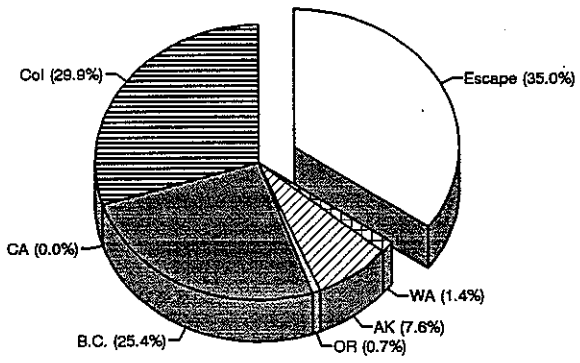
Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	1628	36.0		
78	2310	50.0		
79	2775	61.0		
80	1538	34.0		
81	868			
82	632	19.0		
83	288	6.0		
84	722	16.0		
85	732	16.0		
86	753	16.0		
87	778	17.0		
88	440	10.0		
89	561	12.0		
90	1268	28.0		
91	474	10.0		





AVERAGE RUNSIZE DISTRIBUTION

YEARS (84/85 Brood)



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
LT Neg Tr, ST Sev Dec, Chr Low

Based on 1984/84 brood Wells Hatchery tag codes 63-32-19/20 and 63-34-61.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition, flow diversion and inadequate screening limit production. Instream and riparian habitats have been degraded by agricultural and logging practices.

Mainstem Columbia River impacts are attributable to mortalities at nine dams and lower river impacts described elsewhere.

Harvest Management -- Harvest is probably not a limiting factor on production of Methow River summer chinook. Harvest in freshwater is negligible. There has not been a target commercial season since 1965. Average annual incidental catch of all stocks of summer chinook, 1979-1988 is 900 adults in all the mainstem fisheries including treaty ceremonial and subsistence. Since 1989 the total annual catch has been about 100 adults. Harvest rate information in the ocean fisheries is based on intermittent releases of CWT groups from Wells Salmon Hatchery. This data suggest that summer chinook are harvested at a higher rate than upriver spring chinook but lower than fall chinook.

Hatchery -- Methow Hatchery is located on the Methow River, a few miles upstream from Winthrop, Washington. The facility is funded by Douglas County PUD and is staffed with 3.5 FTEs. The hatchery has satellite facilities located on the Twisp and Chewuch rivers.

Rearing units consists of 24 start tanks, 20 raceways, and an acclimation pond. Three of the raceways also serve as adult holding ponds. The hatchery uses both well water and river water to incubate and rear spring chinook. Current production: 250,000 Methow spring chinook, 250,000 Chewuch spring chinook and 250,000 Twisp spring chinook.

The Rock Island Hatchery Complex consists of a central hatchery (Eastbank) and five satellite rearing facilities. The five satellite facilities are located on four different rivers (Wenatchee, Chiwawa, Methow, Similkameen) and Lake Wenatchee. The Eastbank facility is located on the mainstem Columbia River just above Rocky Reach Dam, approximately 10.0 miles north of East Wenatchee, Washington. The hatchery was built to mitigate for smolt losses at Rock Island Dam and serves as the hub for the five satellite facilities. The hatchery began operation in 1989. Hatchery funding is provided by Chelan County PUD. The facility is jointly operated by WDF and the Washington Department of Wildlife. WDF provides 5.5 FTE's and WDW provides 2 FTE's.

The facility consists of two (15 ft x 120 ft) adult salmon holding ponds, eight (10 ft x 100 ft) raceways, and five (20 ft x 185 ft) raceways. There is one (10 ft x 70 ft) adult steelhead holding pond and two (1/2-acre) steelhead rearing ponds. A hatchery building houses shallow troughs and numerous double stacks of vertical incubators.

Four deep aquifer wells provide up to 53 cfs of water at a relatively constant temperature. The hatchery has chillers to cool the incubation water and retard egg and alevin development. Satellite facilities associated with Eastbank Hatchery include the Lake Wenatchee net pens, and the Chiwawa (33 cfs), Dryden (16 cfs), Similkameen (21 cfs) and Methow (15 cfs) rearing ponds. As an aggregate these facilities are supplied with approximately 85 cfs of river water.

The Chiwawa/Lake Wenatchee complex has a rearing site located on the Chiwawa River approximately 1.0 mile upstream of the confluence with the Wenatchee River. The hatchery has an office, two large rearing ponds, a removable, picket diffuser weir and trap. The facility rears spring chinook only. The facility has two water sources: the Chiwawa River (21 cfs, pumped) or the Wenatchee River (12 cfs, pumped). The latter water source is used only in December when ice forms in the Chiwawa River. In addition to rearing spring chinook, sockeye juveniles are reared in 6 floating net cages on Lake Wenatchee. Two additional floating cages are used for holding adult sockeye until spawning. These two cages are kept separate from the remaining six cages to prevent disease transmittal. The remaining six cages are used for rearing juvenile sockeye until their release into Lake Wenatchee in the fall. This facility is staffed with 2.75 FTE's.

The Dryden rearing facility consists of a large hypolon-lined rearing pond located adjacent to the Wenatchee River near Dryden, Washington. It is used to acclimate Wenatchee summer chinook. The water supply (16 cfs) originates from an irrigation canal that takes water from the Wenatchee River at Dryden Dam. The intake is located less than 1.0 mile upstream of the pond. There are no buildings at this site.

The Similkameen rearing facility is located on the Similkameen River near Oroville, Washington. This facility has an office, small shop and large rearing pond used for rearing Okanogan summer chinook. The water supply (21 cfs) is pumped from the Similkameen River. An aeration system was recently installed to supply oxygen to the pond during periods when water flow is shut off due to ice formation or toxic spills in the river. The facility is staffed with 1.75 FTE's.

The Methow facility consists of a large hypolon-lined rearing pond located on the Methow River near Twisp, Washington. There is also a small office on site. This facility is used to acclimate Methow summer chinook. Water (15 cfs) is pumped from the Methow River.

Current production:

Chiwawa:	672,000 Chiwawa spring chinook
Dryden:	864,000 Wenatchee summer chinook
Lk. Wenatchee:	300,000 Lk. Wenatchee sockeye
Methow:	400,000 Wells summer chinook
Similkameen:	576,000 Wells summer chinook

Hatchery operational impacts have not been determined. Fish used for supplementation project are trapped at Wells Dam, and may not necessarily be of Methow origin.

LAST TEN YEARS SALMON RELEASES INTO THE METHOW BASIN

REL. YEAR	SPRING CHINOOK	SUMMER CHINOOK
1982	712700	268100
1983	1316708	0
1984	903181	0
1985	1167600	0
1986	1062794	0
1987	1069293	212732
1988	1090200	0
1989	1115734	0
1990	1121395	0
1991	1637820	420000
MEAN	1119743	300277

UPPER COLUMBIA -- OKANOGAN SUMMER CHINOOK

STOCK DEFINITION AND ORIGIN

This stock is distinct based on geographical isolation. Biological information on this stock is minimal. A baseline genetics profile is being compiled but some studies have shown only minor genetic differences in summer and fall chinook in the upper Columbia River. It is unknown whether the population that spawns in the mainstem Okanogan is distinct from those that spawn in the Similkameen River, tributary to the Okanogan River.

Migration into the Columbia River begins in mid- to late June. Movement into the Okanogan River depends on water temperature. Entry may begin in mid- to late July but can be delayed until the river cools in late August and September. Some summer chinook are believed to move upstream to cooler water at the tailrace of Chief Joseph Dam. Spawning occurs from early October to mid-November with a peak in mid- October.

Okanogan River summer chinook are a native stock of wild production. This natural run may have had only minimal influence by hatchery programs in the upper Columbia River. Some strays from Wells Dam Hatchery may use this basin but at a reduced level relative to Methow River. Wells Dam Hatchery brood stock are a mixture of Okanogan and Methow river origin fish. As part of the Rock Island Settlement Agreement with Chelan PUD, additional hatchery production of summer chinook began with 1989 brood stock collections at Wells Dam. Yearling smolts are released from the acclimation pond on the Similkameen River after incubation and partial rearing at Eastbank Salmon Hatchery.

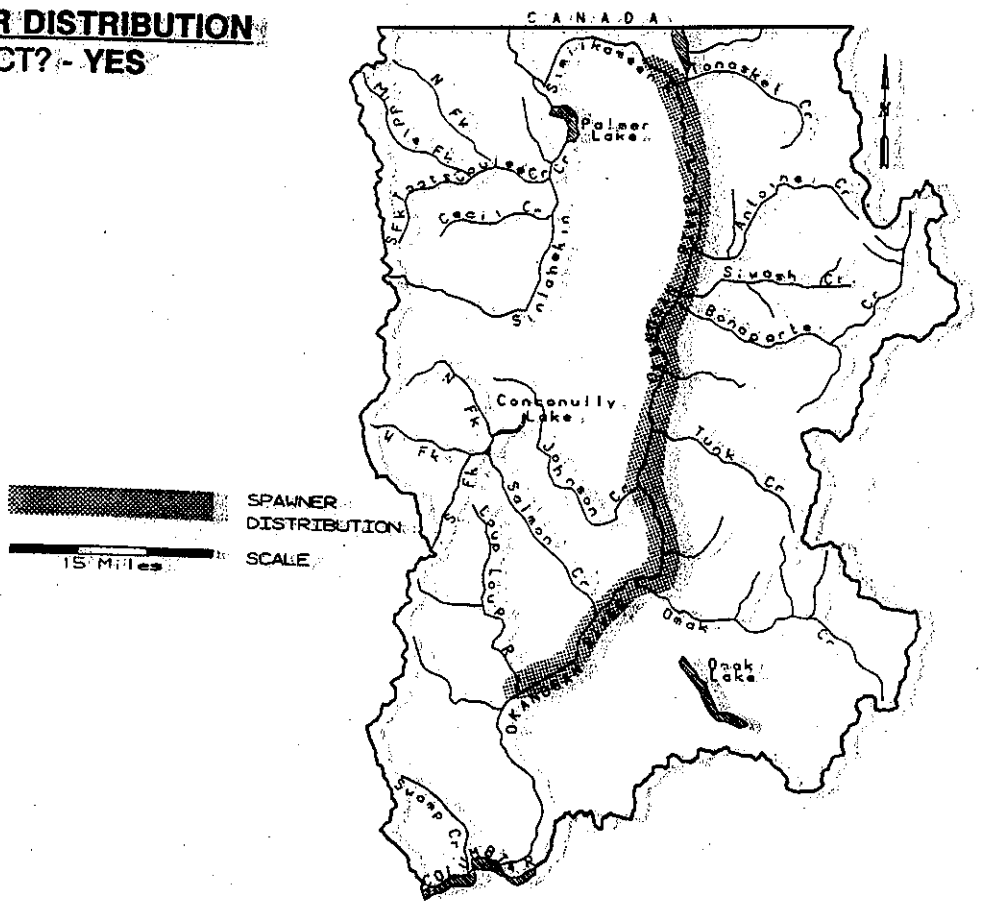
STOCK STATUS

Okanogan summer chinook have declined by about 25% since 1967 based on redd count data. The decline is in the mainstem Okanogan component and occurred primarily in the mid-1970s. Recent run-sizes have typically ranged from 500 to 1,500 adults with the Similkameen River producing about 65% of the total average return of about 1,100 adults. Returns to the Okanogan River in 1991 and 1992 were near the previous record low counts. Okanogan River summer chinook are depressed based on a short-term severe decline in escapement.

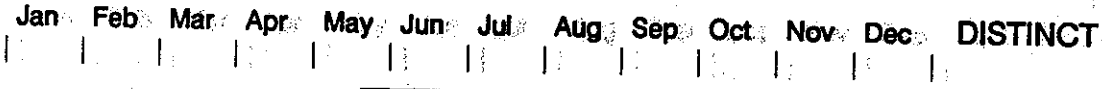
STOCK DEFINITION PROFILE for Okanogan Summer Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING



	DISTINCT
TERMINAL RUN	NO
RIVER ENTRY	NO
SPAWNING	NO

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **UNKNOWN**

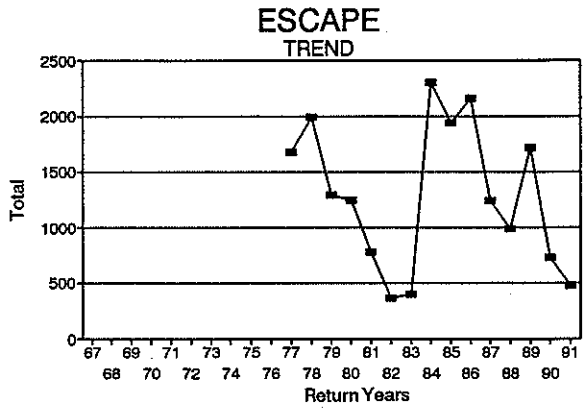
GENETICS - Summer chinook from the Similkameen (Okanogan trib) were sampled in 1991 and 1992. The two samples will be combined for analysis of genetic characteristics and relationships. Results will be available during 1993.

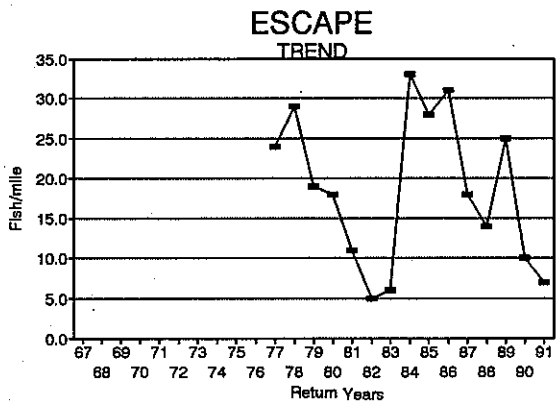
STOCK STATUS PROFILE for Okanogan Summer Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

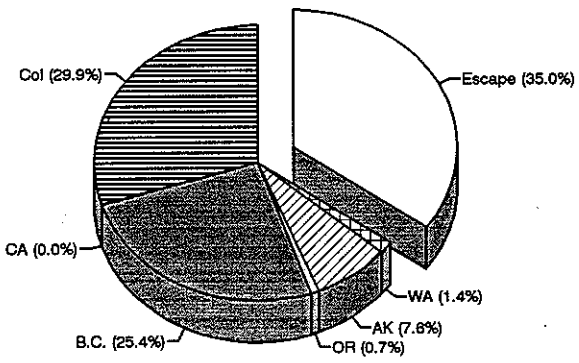
Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	1680	24.0		
78	1996	29.0		
79	1293	19.0		
80	1252	18.0		
81	778	11.0		
82	363	5.0		
83	400	6.0		
84	2300	33.0		
85	1941	28.0		
86	2158	31.0		
87	1246	18.0		
88	989	14.0		
89	1717	25.0		
90	729	10.0		
91	481	7.0		





AVERAGE RUNSIZE DISTRIBUTION

YEARS (84/85 Brood)



STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
ST Severe Decl'n, Chronic Low

Based on 1984-85 brood Wells Hatchery tag codes 63-32-19/20 and 63-34-61.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion and inadequate screening limit production. Instream and riparian habitats have been degraded by agricultural and logging practices. Fish access to a substantial portion of the Similkameen River is blocked at Enloe Dam. In addition, the Similkameen River introduces inordinate amounts of sediments to the Okanogan River. The sediments are derived from agricultural and mining disturbances, primarily in Canada. Adult migration and survival is affected by high summer stream temperatures in the Okanogan.

Mainstem Columbia River impacts are attributable to mortalities at nine dams and lower river impacts described elsewhere.

Harvest Management -- Harvest is probably not a limiting factor on production of Okanogan River summer chinook. Harvest in freshwater is minor. There has not been a target commercial season since 1965. Average annual incidental catch of all stocks of summer chinook, 1979-1988, is 900 adults in all the mainstem fisheries including treaty ceremonial and subsistence. Since 1989, the total annual catch has been about 100 adults. A Colville tribal fishery at the base of Chief Joseph Dam harvests a mixture of chinook and sockeye salmon. The catch in this fishery has averaged about 400 chinook and 100 sockeye during the last 10 years. Some of this catch could contain Okanogan River origin fish. Harvest rate information in the ocean fisheries is based on intermittent releases of CWT groups from Wells Salmon Hatchery. This data suggest that summer chinook are harvested at a higher rate than upriver spring chinook but lower than fall run fish.

Hatchery -- Hatchery operational impacts have not been determined. Fish used for supplementation project are trapped at Wells Dam, and may not necessarily be of Okanogan origin.

LAST TEN YEARS SALMON RELEASES INTO THE OKANOGAN BASIN

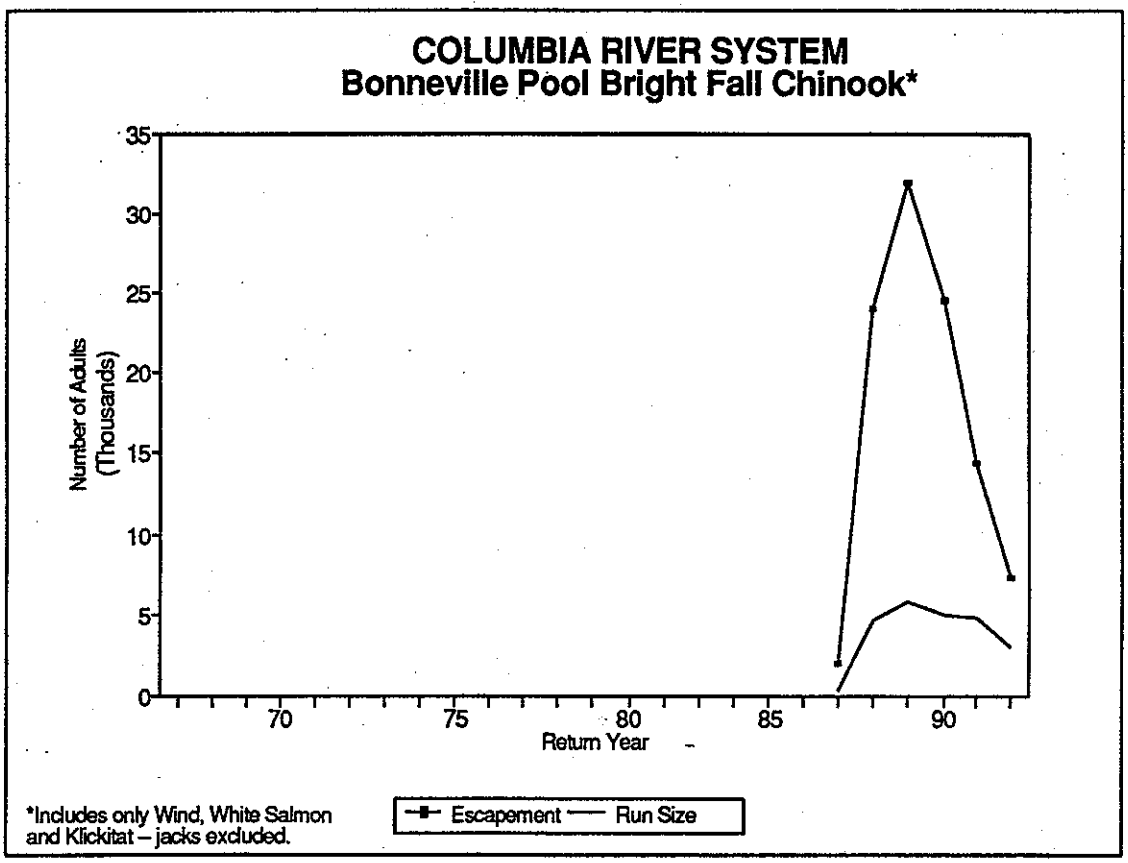
REL. YEAR	SUMMER CHINOOK
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	0
1989	0
1990	0
1991	352600
MEAN	352600

OVERVIEW -- UPPER COLUMBIA FALL CHINOOK STOCKS

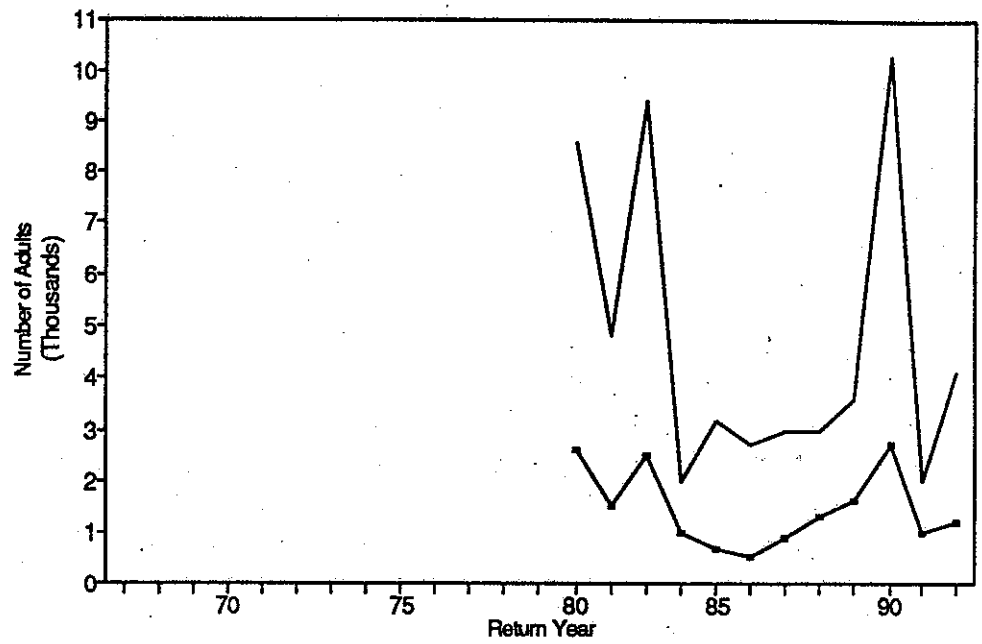
WIND - TULE
WIND - BRIGHTS
WHITE SALMON RIVER - TULE
WHITE SALMON RIVER - BRIGHTS
KLICKITAT - TULE
KLICKITAT - BRIGHTS
SNAKE
YAKIMA - BRIGHTS
MARION DRAIN
HANFORD REACH
LAKE CHELAN

STOCK DEFINITION AND ORIGIN

Upper Columbia fall chinook are stocks destined for areas upstream of Bonneville Dam. These stocks can generally be divided into three groups including the Bonneville Pool tule group, mid-Columbia bright group originating between Bonneville and McNary dams and the upriver bright stock group destined primarily for areas upstream of McNary Dam. The mid-Columbia brights originated from trapping of upriver brights at Bonneville Dam and hatchery egg transfers from



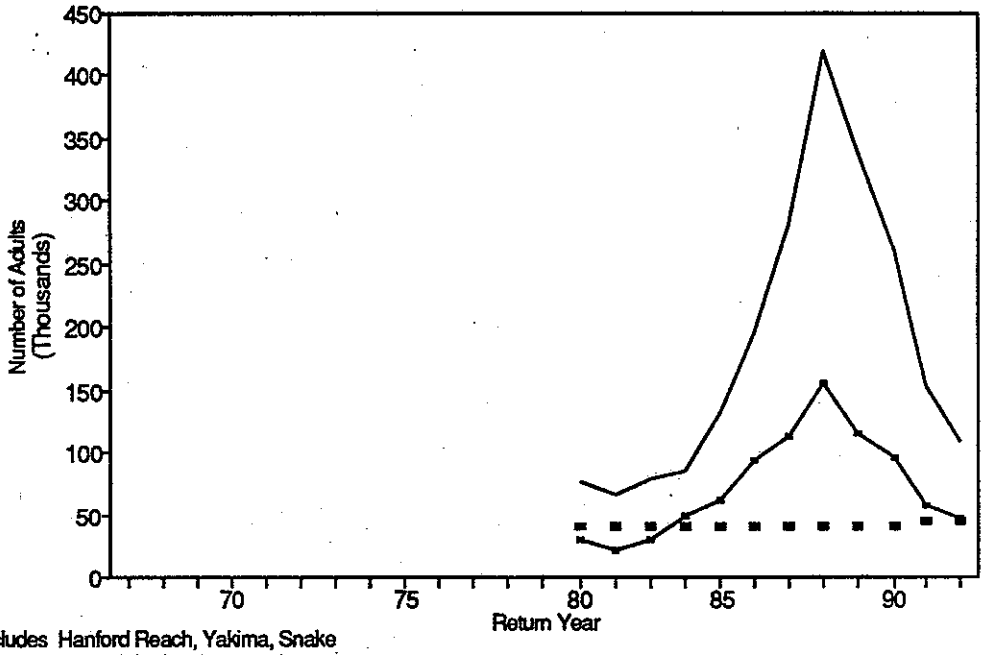
COLUMBIA RIVER SYSTEM
Bonneville Pool Tule Fall Chinook*



*Includes only Wind, White Salmon and Klickitat.

Escapement — Run Size

COLUMBIA RIVER SYSTEM
Upriver Bright Fall Chinook*



*Includes Hanford Reach, Yakima, Snake & Deschutes R wild & hatchery stocks.
**McNary Dam count.
***At McNary Dam.

Escapement** — Run Size — Escapement Goal***

above McNary Dam. The mid-Columbia bright group is not considered a distinct stock that is separated from the upper bright stock. However, it is regarded as a separate management unit.

The Bonneville Pool tule stocks are an October spawning group with strong local hatchery influence originating from the Wind, White Salmon, and Klickitat rivers. These stocks are of mixed origin.

The mid-Columbia River bright group consists of November spawning fish originating from the Wind, White Salmon and Klickitat rivers. These fish are of unknown, mixed and non-native origins respectively.

Originating from the area upstream of McNary Dam are the upriver bright fall chinook group of late spawning fish. This group includes the Snake River, Yakima River, Marion Drain and Hanford Reach stocks. The Snake River, Marion Drain and Hanford Reach stocks are of native origin. The Yakima stock is of unknown origin.

STOCK STATUS

Columbia River fall chinook stocks contribute heavily to the coastal fisheries of Alaska, British Columbia and Washington. In-river fisheries supported by these stocks include commercial non-treaty and treaty fall net fisheries and sport fisheries such as the popular Buoy 10 fishery in August and September and the Hanford Reach sport fishery in September and October and numerous tributary sport fisheries. Of the 10 stocks identified seven are healthy and three are depressed which includes the Snake River fall chinook which have been listed as threatened under the Endangered Species Act. Stocks upstream of McNary are currently managed to achieve an escapement goal of 45,000 adults at McNary Dam and also to minimize impacts on Snake River wild fall chinook.

UPPER COLUMBIA -- WIND - TULE FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time, geographic distribution as well as biological characteristics. There are two distinct spawning populations in the Wind River. Both tule and mid-Columbia bright fall chinook spawn in the area from Shipherd Falls at RM 2.0 downstream to the mouth. Tule fall chinook spawn earlier than the mid-Columbia bright fall chinook in the Wind River. Tule fall chinook spawn from September to October. The Wind River tule fall chinook age composition ranges from two-year-old jacks to four-year-old adults. Unlike the mid-Columbia brights, five-year-olds are uncommon.

The Wind River tule fall chinook natural spawners are a mixed hybrid stock. Tule fall chinook were native to the Wind River though the run may have been confined below Shipherd Falls until the falls were laddered in 1956 to permit salmon access to the upper areas. The State of Washington established a salmon hatchery near the mouth of the Wind River from 1899 until 1938. The hatchery was solely for the purpose of production stock taken from the Wind River. In 1937, Carson National Fish Hatchery was constructed on Tyee Springs at RM 18.0 and began fall chinook production. In the 1940s and early 1950s, operation of the racks at the mouth of the Wind River provided a means for counting spawning escapement and egg collection. Over time, the Carson National Fish Hatchery switched to spring chinook production. The last hatchery release of fall chinook in the Wind River was in 1976. However, straying hatchery (primarily Spring Creek) coded-wire tagged fall chinook have been recovered in the Wind River. The overall results of straying fall chinook and egg transfers between hatcheries is the development of a widely mixed stock.

STOCK STATUS

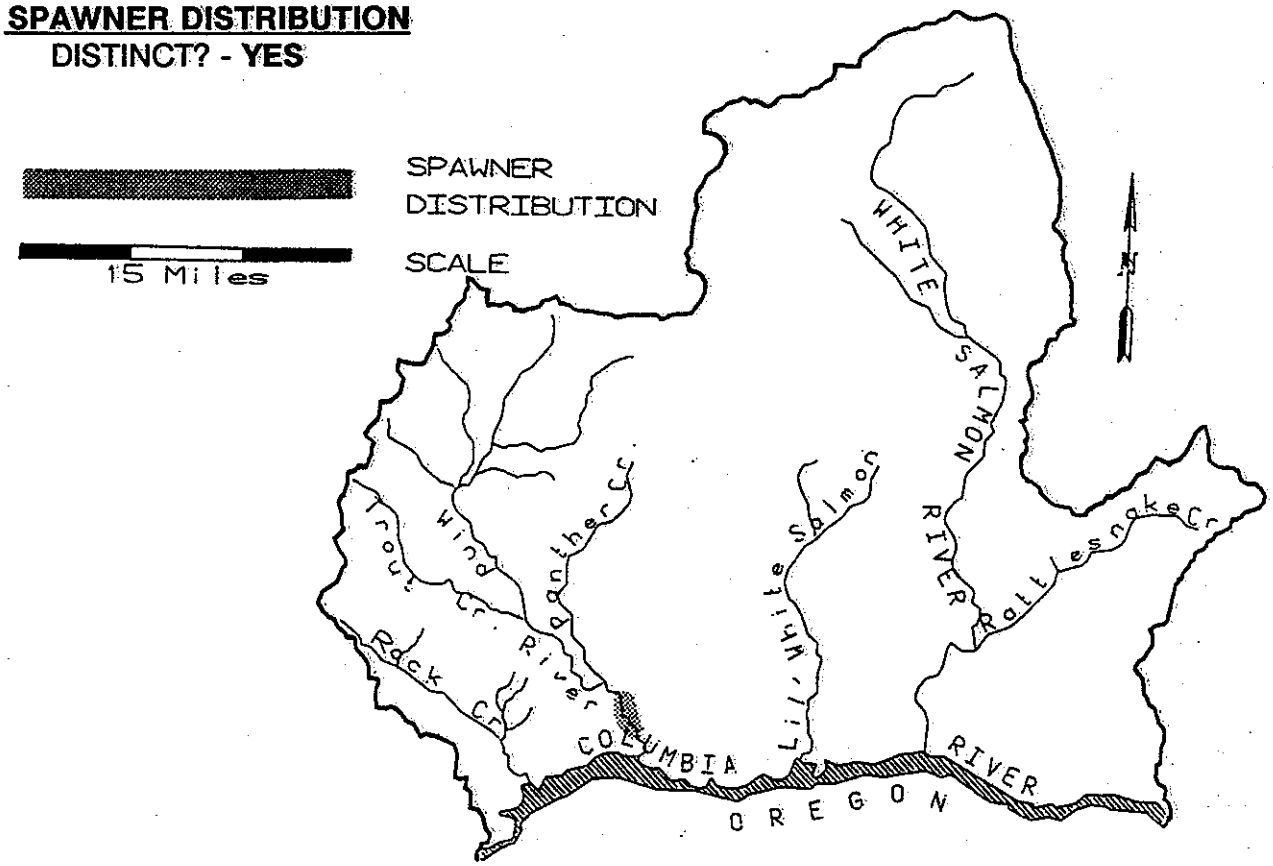
The Wind River tule chinook natural spawn stock status is currently depressed and shows signs of both short and long-term negative escapement trends. Natural spawn escapements from 1964-1991 averaged 558 fish. Escapements were at a record low 11 fish in 1990. Since 1979 (except in 1987 and 1988), tule fall chinook natural escapements have been below average.

Fall chinook natural spawning population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good.

STOCK DEFINITION PROFILE for Wind River Tule Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

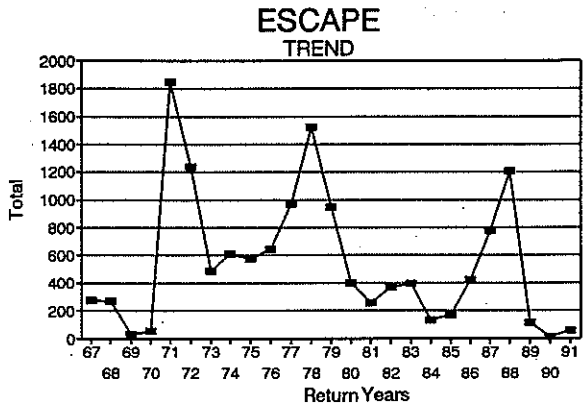
DISTINCT? - **YES,** based on age structure and spawning timing.

STOCK STATUS PROFILE for Wind R Tule Fall Chinook

STOCK ASSESSMENT

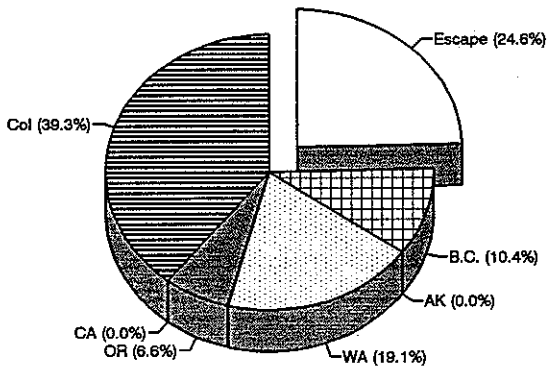
DATA QUALITY------> Good

Return Years	ESCAPE Total			
67	274			
68	267			
69	29			
70	54			
71	1845			
72	1235			
73	487			
74	610			
75	574			
76	646			
77	971			
78	1527			
79	946			
80	401			
81	256			
82	365			
83	395			
84	134			
85	170			
86	422			
87	776			
88	1206			
89	112			
90	11			
91	58			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1986 Brood)



Based on 1986 brood Spring Creek Hatchery tag code 05-18-55.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Depressed

SCREENING CRITERIA
LT Neg Trend, ST Severe Decl'n

Historical data suggests that low Wind River tule fall chinook returns can be followed by high returns. Nearly record low returns in 1969 and 1970 were followed by record high returns of 1,845 fish in 1971. The magnitude of straying other Columbia River hatchery tule fall chinook may also create fluctuations in Wind River fall chinook natural spawn escapements.

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter flows and spawning gravel quality. Both are affected to a certain extent by logging in the watershed. Mainstem survival is affected by passage at Bonneville Dam and by Columbia river pollution and habitat alterations.

Harvest Management -- Specific Wind River origin tule fall chinook harvest in mixed stock fisheries cannot be accurately measured because supplementation releases have been generally untagged and no attempts have been made to coded-wire tag the natural production. However, Wind River origin tule fall chinook are considered part of the Columbia River Bonneville Pool Hatchery (BPH) stock for harvest management purposes. In addition to the Wind River, some natural BPH production exists in the Big White Salmon and Klickitat rivers in Washington and Hood River in Oregon. Currently, BPH fall chinook are produced primarily by artificial propagation at Spring Creek Hatchery and until recently Klickitat and Little White Salmon hatcheries.

The escapement goal of BPH stock fall chinook is stated in the Columbia River Fish Management Plan (CRFMP) as brood stock necessary to meet hatchery program production requirements. This requirement has been defined as 8,200 (4,800 females) adult fall chinook returning to Spring Creek Hatchery. No escapement goals have been established for Wind River tule fall chinook.

The Columbia River Fish Management Plan (CRMP) is intended to restore runs and allocates harvest of fish in the Columbia River and was agreed to by the Parties; United States, Oregon, Washington, and four treaty tribes (Yakima, Warm Springs, Umatilla, and Nez Perce). Since 1988, management of the Columbia River fish runs and fisheries has been principally based on the CRFMP.

During 1985-1990, annual fishing regimes for upriver fall chinook were negotiated and agreed to by the parties to the CRFMP and described within the "Ocean/In-river Management Agreement" each year. Fishing regimes were based on allocation of total catch of upriver fall chinook available for harvest (in Bonneville Dam equivalents).

Ocean Harvest - BPH stock fall chinook are one of the major contributors to chinook fisheries on the British Columbia and Washington coasts. According to

1971 and 1972 brood coded-wire tagged Spring Creek Hatchery releases, approximately 28% and 38% of the overall BPH stock harvest occurs from the British Columbia and Washington commercial and recreational fisheries, respectively. Ocean catch of BPH stock fall chinook during 1986-1990 has ranged from 2,200 to 5,800 for the treaty fishery and 4,000 to 14,600 for the non-treaty fishery.

The poor BPH stock returns has been the most consistent factor in limiting chinook ocean harvest in the PFMC ocean areas since 1984.

Columbia River Harvest - Between 1970-1991, BPH adult fall chinook average return to the Columbia River was 78,500 fish including fish that migrated past Bonneville Dam but were not accounted in subsequent fisheries or escapement. During the same period, Wind River tule fall chinook natural spawn escapements averaged 600 adults, or less than 1% of the total BPH adult return.

Between 1970-1991, an average of 22,400 and 22,800 BPH adult fall chinook were harvested in commercial treaty and non-treaty fisheries, respectively. Approximately 60% of the total BPH stock adult returns to the Columbia River were harvested in treaty and non-treaty commercial fisheries.

Between 1970-1991, BPH stock adult fall chinook non-treaty mainstem and tributary sport harvest averaged 600 fish. Beginning in 1982, the mainstem sport catches include the estuary recreational (Buoy 10) fishery. In 1991, BPH stock comprised 25% of the Buoy 10 sport chinook catch. Recreational harvest of BPH stock upstream from the Megler-Astoria Bridge is usually negligible. The Wind River sport fishery downstream from the between 1977-1986 averaged eight adult and one jack fall chinook. The overall Wind River sub-basin sport harvest rate was 1.6%.

Hatchery -- Hatchery operational impacts have not been determined.

LAST TEN YEARS SALMON RELEASES INTO THE WIND - WHITE SALMON BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3771604	28668757	0	2519871	0	499857
1983	3174504	24812109	1070249	417829	3423094	514757
1984	5825827	23651097	831687	2566534	0	499900
1985	4411839	31485363	0	1745372	0	21400
1986	5221770	11873733	968267	5511854	0	500500
1987	5938194	14597238	328258	2634704	0	405600
1988	7168618	13727582	0	4760667	0	0
1989	4413335	18931140	1456852	0	1877199	0
1990	5154559	13700350	0	3984416	0	0
1991	4362792	17640908	4029158	2573323	0	0
MEAN	4944304	19908828	1447412	2968286	2650147	407002

UPPER COLUMBIA -- WIND - BRIGHT FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time, geographic distribution as well as biological characteristics and genetic composition. There are two distinct spawning populations in the Wind River. Both mid-Columbia bright and tule fall chinook spawn in the area from Shipherd Falls at RM 2.0 downstream to the mouth. Mid-Columbia bright fall chinook spawn later than the tule fall chinook in the Wind River. Mid-Columbia bright fall chinook spawn from October to November. The Wind River mid-Columbia bright fall chinook age composition ranges from two year-old jacks to six-year-old adults. Unlike the tule fall chinook, five-year-old mid-Columbia brights are common and some six-year-olds are found.

The Wind River mid-Columbia bright fall chinook natural spawners are from unknown origin. Mid-Columbia bright fall chinook have not been planted in the Wind River sub-basin. However, straying hatchery (primarily Little White Salmon National Fish Hatchery) coded-wire tagged fall chinook have been recovered in the Wind River. The recent discovery of the Wind River mid-Columbia bright stock coincides with the introduced mid-Columbia bright fall chinook production from several nearby hatcheries; therefore, the Wind River mid-Columbia bright fall chinook are likely hatchery strays.

The mid-Columbia bright fall chinook introduced at several hatcheries came from several different sources. Consequently, the genetic composition of this stock may be quite mixed.

STOCK STATUS

The Wind River mid-Columbia bright fall chinook natural spawn status is generally considered healthy although the database is very limited. Natural spawn escapements from 1988-1991 averaged 1,044 fish with a low return of 487 in 1990 and a peak of 1,845 in 1988.

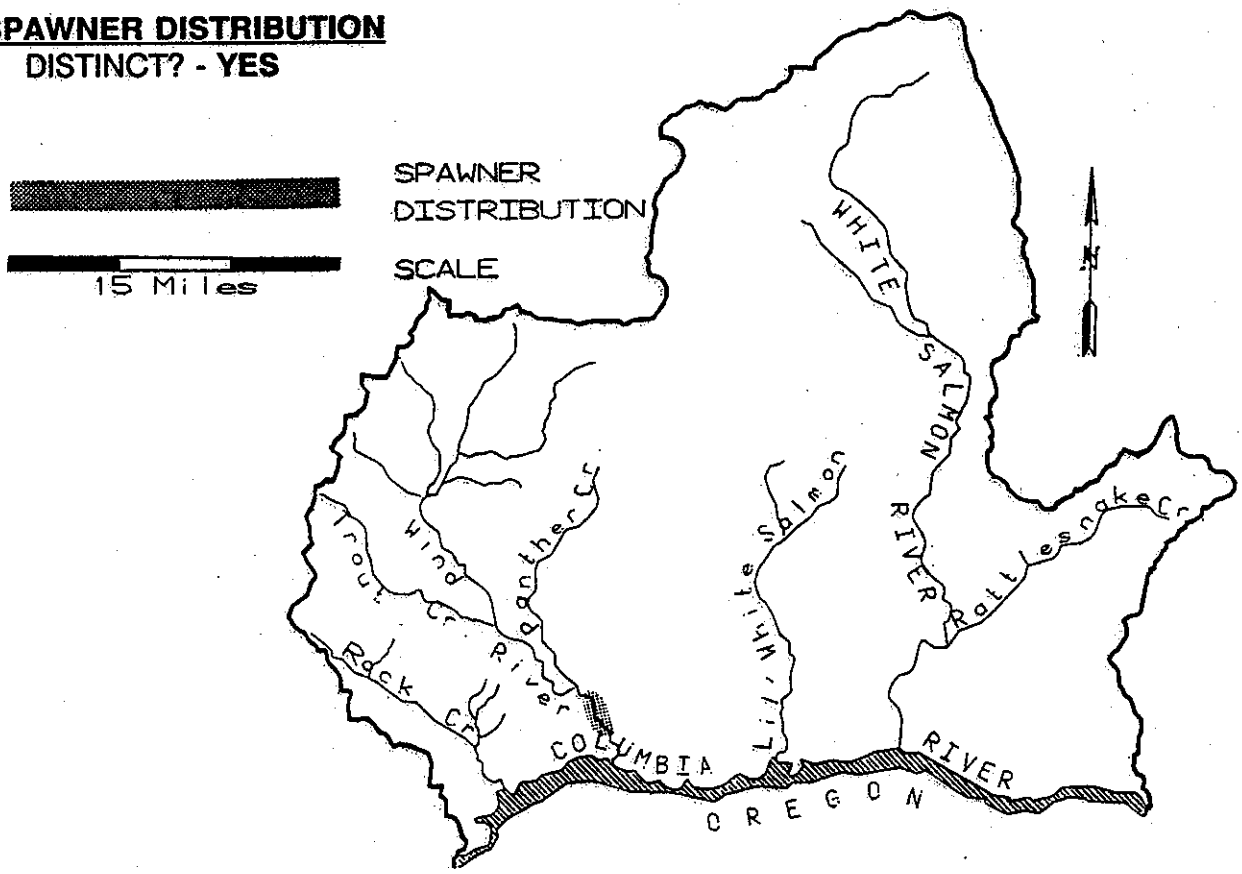
Fall chinook natural spawning population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally fair; however, this stock was only recently discovered in 1988.

The Wind River mid-Columbia bright fall chinook natural spawn escapements since 1989 have been below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for Columbia River upriver bright stocks. The magnitude of straying from other Columbia River hatchery upriver fall chinook may also create fluctuations in Wind River fall chinook natural spawn escapements.

STOCK DEFINITION PROFILE for Wind River Bright Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

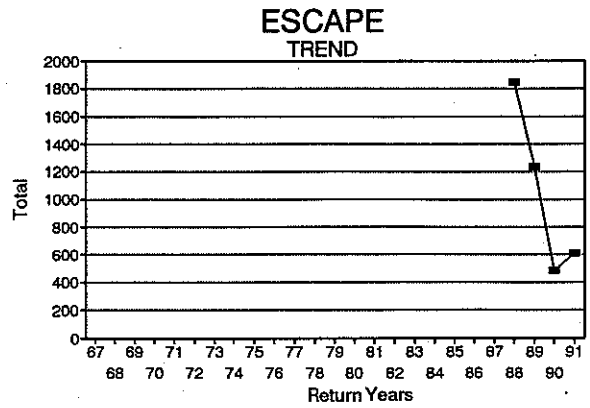
DISTINCT? - **YES,** based on age structure and spawning timing.

STOCK STATUS PROFILE for Wind R Bright Fall Chinook

STOCK ASSESSMENT

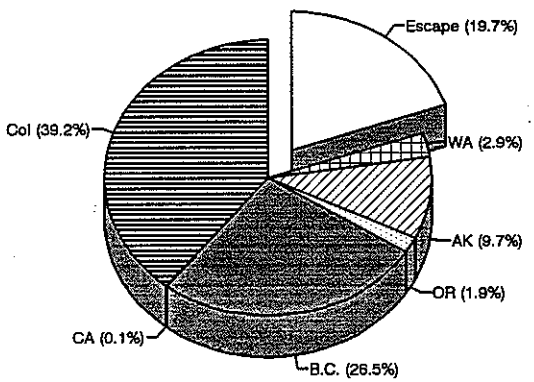
DATA QUALITY------> Fair

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	1845			
89	1235			
90	487			
91	610			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984 Brood)



STOCK SUMMARY

STOCK ORIGIN
Unknown

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on 1984 brood Little White Salmon Hatchery tag codes 05-12-50/57.

UPPER COLUMBIA -- WHITE SALMON RIVER - TULE FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time and geographic distribution as well as differences in biological characteristics. There are two distinct spawning populations in the White Salmon River; tule fall chinook and mid-Columbia bright fall chinook. Natural spawning for both is confined from Condit Dam located at RM 3.0 to the mouth. Tule fall chinook spawn earlier than the mid-Columbia bright fall chinook. Tule fall chinook spawn from September to October. The tule fall chinook age composition ranges from two-year-old jacks to four-year-old adults. Unlike the mid-Columbia brights, five- year-olds are uncommon. A common characteristic of tule fall chinook from Bonneville Dam upstream are the large size jacks and three-year-olds.

The White Salmon River tule fall chinook natural spawners are a hybrid stock. These fish were native to the White Salmon River though the run may have been confined below the falls at RM 16.3. Condit Dam was built in 1912 at RM 3.0 and blocked upstream migration of anadromous fish. Two attempts to ladder the dam failed. In 1901, tule fall chinook brood stock was taken from the Big White Salmon and were transferred to facilities on Spring Creek. In 1986 and 1987, tule fall chinook returns were trapped at a weir on the White Salmon River and the eggs transferred to Spring Creek Hatchery for incubation and rearing. Rearing ponds on the White Salmon River at RM 1.5 were used to rear fall chinook fingerlings through 1984. However, poor adult returns resulted in the discontinuation of this program. Stray hatchery (primarily Spring Creek) code-wire tagged fall chinook have been recovered from the White Salmon River.

STOCK STATUS

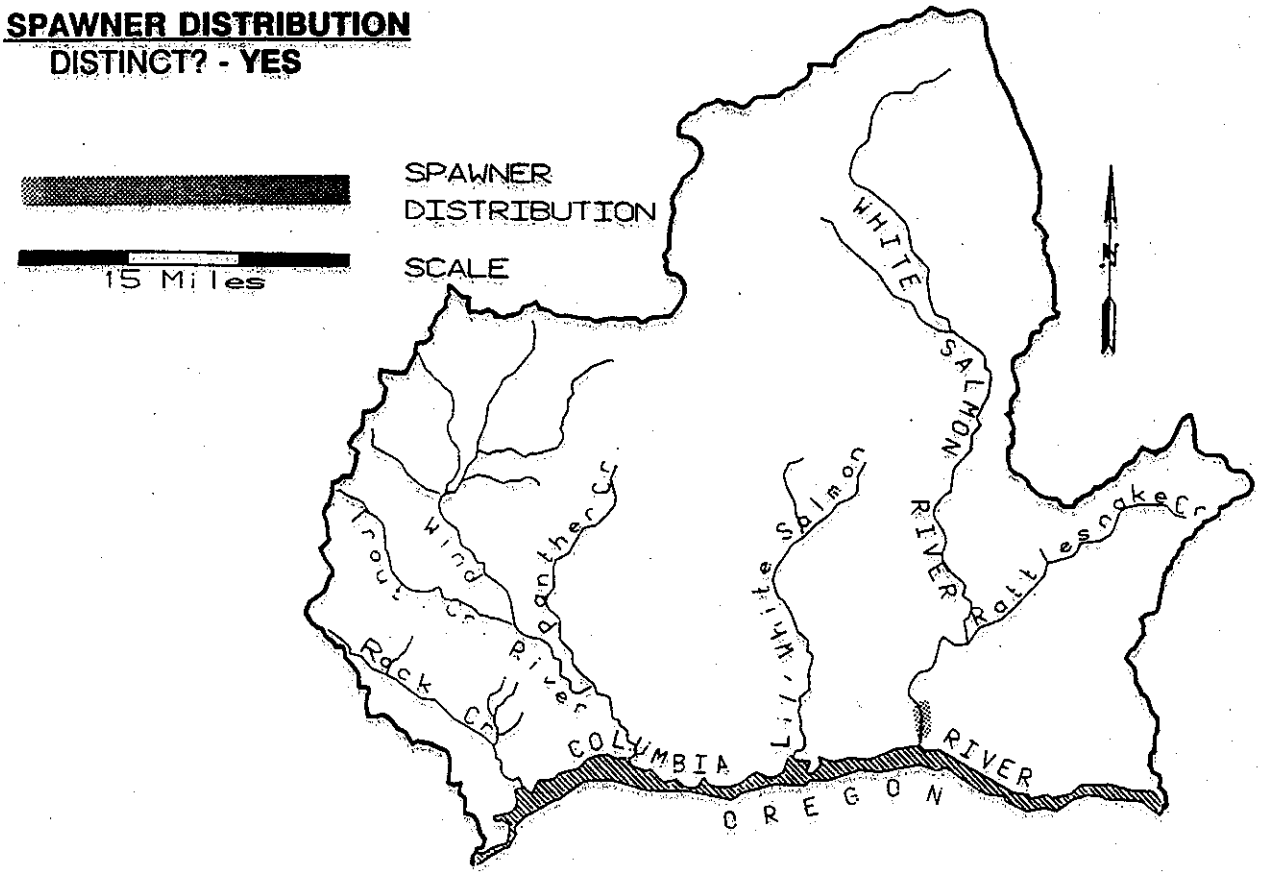
The White Salmon River natural spawn stock status is currently depressed and shows signs of both short and long-term negative escapement trends. Natural spawn escapements from 1965-1991 averaged 931 fish with a low return of 75 in 1991 and a peak of 3,205 in 1966. Since 1983, tule fall chinook natural escapement has been less than 400 fish/year.

Fall chinook population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good.

STOCK DEFINITION PROFILE for White Salmon Tule Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

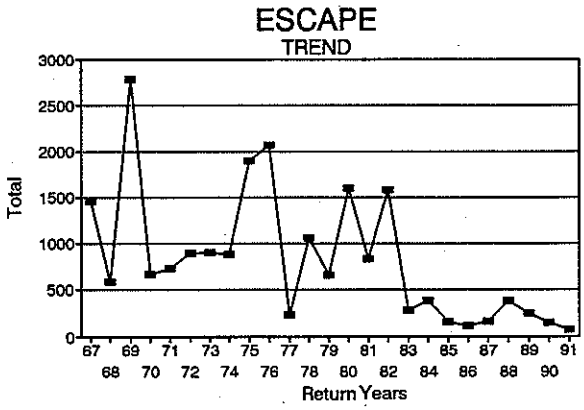
DISTINCT? - **YES,** based on age structure and spawining timing.

STOCK STATUS PROFILE for White Salmon R Tule Fall Chinook

STOCK ASSESSMENT

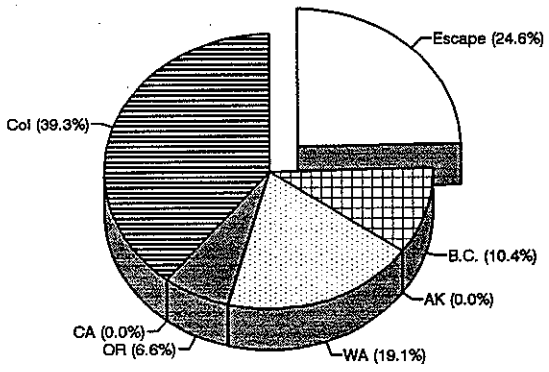
DATA QUALITY-----> Good

Return Years	ESCAPE Total
67	1455
68	586
69	2787
70	667
71	729
72	896
73	904
74	882
75	1899
76	2063
77	231
78	1063
79	662
80	1598
81	839
82	1579
83	280
84	393
85	153
86	116
87	161
88	382
89	243
90	145
91	75



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1986 Brood)



Based on 1986 brood Spring Creek Hatchery tag code 05-18-55.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Depressed

SCREENING CRITERIA
LT Neg Trend, ST Severe Decl'n

FACTORS AFFECTING PRODUCTION

Habitat -- Natural limiters include peak winter flows and spawning gravel quality and quantity. Condit Dam at RM 3.3 presents a total blockage to anadromous fish. Lack of gravel recruitment has affected gravel size and deposition.

Mainstem survival is affected by passage at Bonneville Dam and by Columbia River pollution and habitat alterations.

Harvest Management -- Specific White Salmon River origin tule fall chinook harvest in mixed stock fisheries cannot be accurately measured because supplementation releases have been generally untagged and no attempts have been made to coded-wire tag the natural production. However, Big White Salmon origin tule fall chinook are considered part of the Columbia River Bonneville Pool Hatchery (BPH) stock for harvest management purposes. In addition to the White Salmon River, some natural BPH production exists in the Wind and Klickitat rivers in Washington and Hood River in Oregon. Currently, BPH fall chinook are produced primarily by artificial propagation at Spring Creek Hatchery and until recently Klickitat and Little White Salmon hatcheries.

The escapement goal of BPH stock fall chinook is stated in the Columbia River Fish Management Plan (CRFMP) as brood stock necessary to meet hatchery program production requirements. This requirement has been defined as 8,200 (4,800 females) adult fall chinook returning to Spring Creek Hatchery. No escapement goals have been established for White Salmon tule fall chinook.

The Columbia River Fish Management Plan (CRMP) restores runs and allocates harvest of fish in the Columbia River and was agreed to by the Parties; United States, Oregon, Washington, and four treaty tribes (Yakima, Warm Springs, Umatilla, and Nez Perce). Since 1988, management of the Columbia River fish runs and fisheries has been principally based on the CRFMP.

During 1985-1990, annual fishing regimes for upriver fall chinook were negotiated and agreed to by the parties to the CRFMP and described within the "Ocean/In-river Management Agreement" each year. Fishing regimes were based on allocation of total catch of upriver fall chinook available for harvest (in Bonneville Dam equivalents).

Ocean Harvest - BPH stock fall chinook are one of the major contributors to chinook fisheries on the British Columbia and Washington coasts. According to 1971 and 1972 brood coded-wire tagged Spring Creek Hatchery releases, approximately 28% and 38% of the overall BPH stock harvest occurs from the British Columbia and Washington commercial and recreational fisheries, respectively. Ocean catch of BPH stock fall chinook during 1986-1990 has ranged

from 2,200 to 5,800 for the treaty fishery and 4,000 to 14,600 for the non-treaty fishery.

The poor BPH stock returns has been the most consistent factor in limiting chinook ocean harvest in the PFMC ocean areas since 1984.

Columbia River Harvest - Between 1970-1991, BPH adult fall chinook average return to the Columbia River was 78,500 fish including fish that migrated past Bonneville Dam but were not accounted in subsequent fisheries or escapement. During the same period, White Salmon River tule natural spawn escapements averaged 680 adults, or less than 1% of the total BPH adult return.

Between 1970 - 1991, an average of 22,400 and 22,800 BPH adult fall chinook were harvested in commercial treaty and non-treaty fisheries, respectively. Approximately 60% of the total BPH stock adult returns to the Columbia River were harvested in treaty and non-treaty commercial fisheries.

Between 1970-1991, BPH stock adult fall chinook non-treaty mainstem and tributary sport harvest averaged 600 fish. Beginning in 1982, the mainstem sport catches include the estuary recreational (Buoy 10) fishery. In 1991, BPH stock comprised 25% of the Buoy 10 sport chinook catch. Recreational harvest of BPH stock upstream from the Megler-Astoria Bridge is usually negligible. The year round White Salmon River sport fishery downstream from Condit Dam between 1977-1987 averaged 43 adult and five jack fall chinook. The White Salmon sub-basin sport harvest rate was 8.5% between 1977-1987.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE WIND - WHITE SALMON BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK	UP-BRIGHT CHINOOK	COHO	TYPE-S COHO	TYPE-N COHO
1982	3771604	28668757	0	2519871	0	499857
1983	3174504	24812109	1070249	417829	3423094	514757
1984	5825827	23651097	831687	2566534	0	499900
1985	4411839	31485363	0	1745372	0	21400
1986	5221770	11873733	968267	5511854	0	500500
1987	5938194	14597238	328258	2634704	0	405600
1988	7168618	13727582	0	4760667	0	0
1989	4413335	18931140	1456852	0	1877199	0
1990	5154559	13700350	0	3984416	0	0
1991	4362792	17640908	4029158	2573323	0	0
MEAN	4944304	19908828	1447412	2968286	2650147	407002

UPPER COLUMBIA -- WHITE SALMON RIVER BRIGHT FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time, geographic distribution as well as biological characteristics and genetic composition. There are two distinct spawning populations in the White Salmon River. Both mid-Columbia bright and tule fall chinook natural spawning is confined from Condit Dam located at RM 3.0 downstream to the mouth. Mid-Columbia bright fall chinook spawn later than the tule fall chinook in the White Salmon River. Mid-Columbia bright fall chinook spawn from October to November. The White Salmon River mid-Columbia bright fall chinook age composition ranges from two- year-old jacks to six-year-old adults. Unlike the tule fall chinook, five-year-old mid-Columbia brights are common and some six-year-olds are found.

The White Salmon River mid-Columbia bright fall chinook natural spawners are a hybrid stock. Upriver bright fall chinook have not been planted in the White Salmon River sub-basin. However, straying hatchery (primarily Little White Salmon National Fish Hatchery) coded-wire tagged fall chinook have been recovered in the White Salmon River. The recent discovery of the White Salmon River mid-Columbia brights coincides with the introduced mid-Columbia bright fall chinook production from several nearby hatcheries; therefore, the White Salmon River upriver bright fall chinook are likely hatchery strays. However, Hymer (1991) reports that 41% of the late spawning fall chinook in the White Salmon River in 1989 were either mid-Columbia upriver bright hatchery strays or were naturally produced fish.

The upriver bright fall chinook introduced at several hatcheries came from several different sources. Consequently, the genetic composition of this stock may be quite mixed.

STOCK STATUS

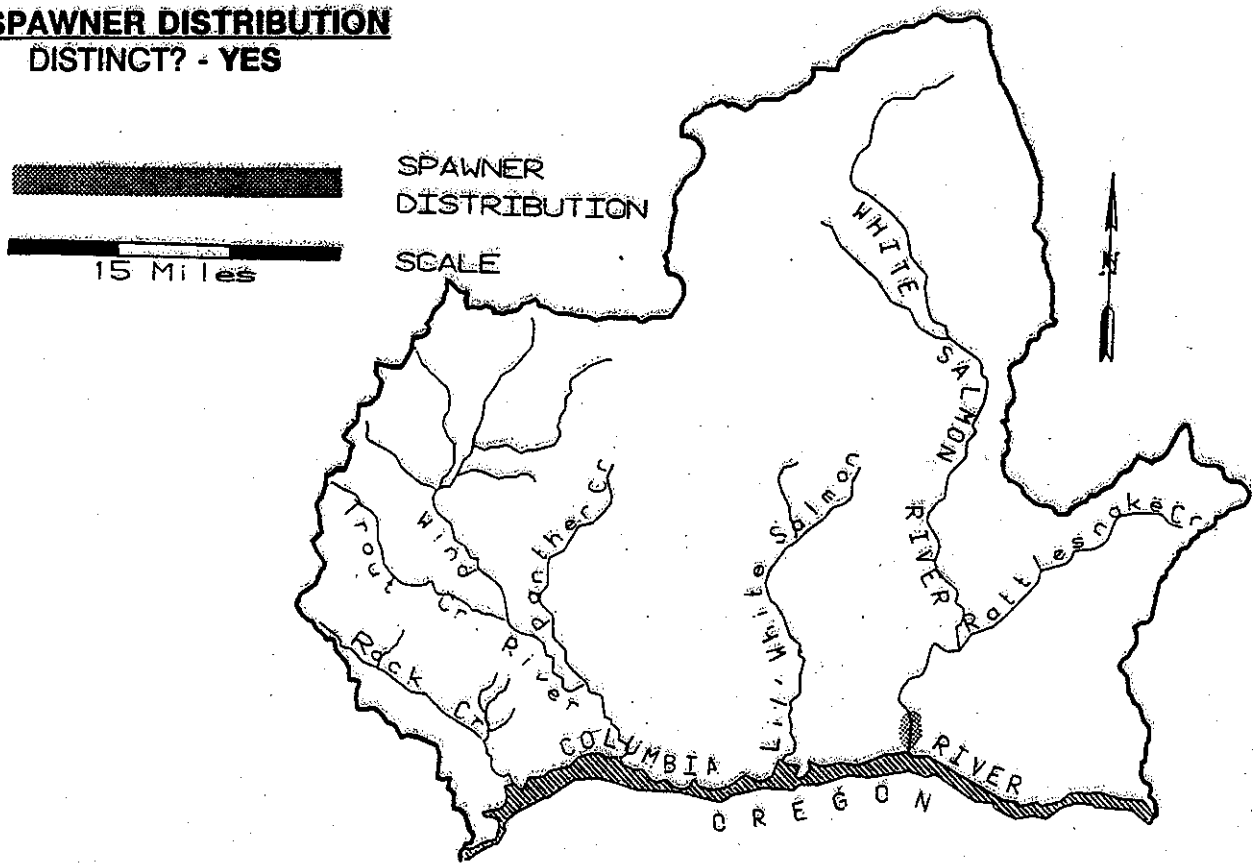
The White Salmon River mid-Columbia bright chinook natural spawn status is currently healthy though the database is limited. Natural spawn escapements from 1988-1991 averaged 1,535 fish with a low return of 966 in 1991 and a peak of 2,997 in 1988.

Fall chinook natural spawning population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally very good, despite the fact that this stock was only recently discovered in 1988.

STOCK DEFINITION PROFILE for White Salmon Bright Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

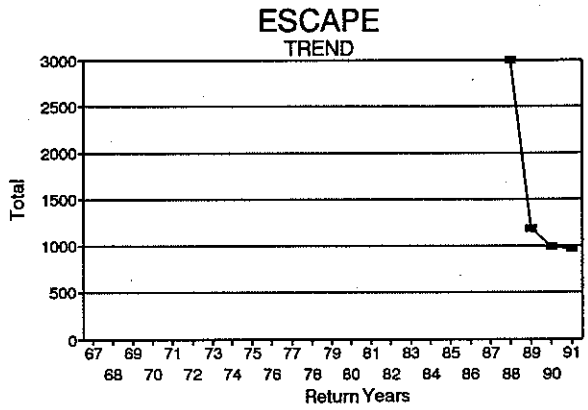
DISTINCT? - **YES**, based on age structure and spawning timing.

STOCK STATUS PROFILE for White Salmon R Bright Fall Chinook

STOCK ASSESSMENT

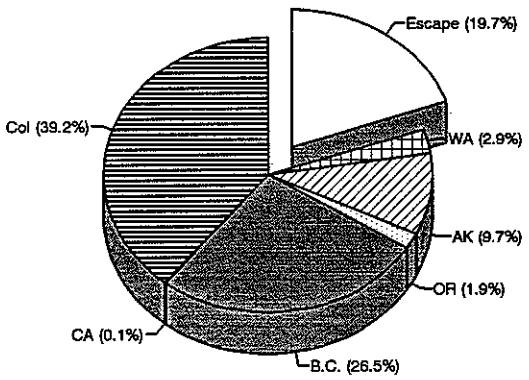
DATA QUALITY-----> Very Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	2997			
89	1182			
90	994			
91	966			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984 Brood)



STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Healthy

SCREENING CRITERIA

Based on 1984 brood Little White Salmon Hatchery tag codes 05-12-50/57.

The White Salmon River mid-Columbia bright fall chinook natural spawn escapements since 1988 have been below average but are probably a result of natural fluctuations based on comparable smaller natural spawn escapements for Columbia River upriver bright stocks. The magnitude of straying other Columbia River hatchery mid-Columbia bright fall chinook may also create fluctuations in White Salmon River fall chinook natural spawn escapements.

UPPER COLUMBIA -- KLICKITAT - TULE FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time and geographic distribution as well as differences in genetic composition. There are two distinct spawning populations in the Klickitat River. Both tule and mid-Columbia bright fall chinook spawn in the area from the Klickitat River Salmon Hatchery downstream to the Twin Bridges, a distance of approximately 25.9 miles. Tule fall chinook spawn earlier than the mid-Columbia bright fall chinook. Tule fall chinook spawn from September to October. The tule fall chinook age composition ranges from two-year-old jacks to five-year-old adults. Unlike most tule fall chinook found upstream from Bonneville Dam, Klickitat River tule fall chinook natural spawners are comprised of a substantial number of five- year-olds.

The Klickitat River tule fall chinook natural spawners are a hybrid stock. Prior to the first hatchery plants of fall chinook in 1946, fall chinook were not found in the Klickitat River sub-basin. The usual explanation for this is that Lyle Falls at RM 2.0 was impassable to chinook during the low water conditions that generally prevail in late summer and early fall (Bryant, 1949).

Escapements to Klickitat Hatchery were usually insufficient to meet egg-take goals because most of the fish naturally spawned downstream from the hatchery. Lower river hatchery stocks released into the Klickitat River from 1971 through 1980 included Cowlitz, Toutle, Kalama, Washougal, Bonneville, Cascade, and Ringold. Hatchery releases of tule fall chinook ceased in 1986; however, several age classes have been observed during recent tule fall chinook spawning ground surveys.

STOCK STATUS

The Klickitat River natural spawn stock status is currently healthy. Natural spawn escapements from 1964-1991 (except 1988) averaged 2,943 fish with a low return of 54 in 1985 and a peak of 15,333 in 1964.

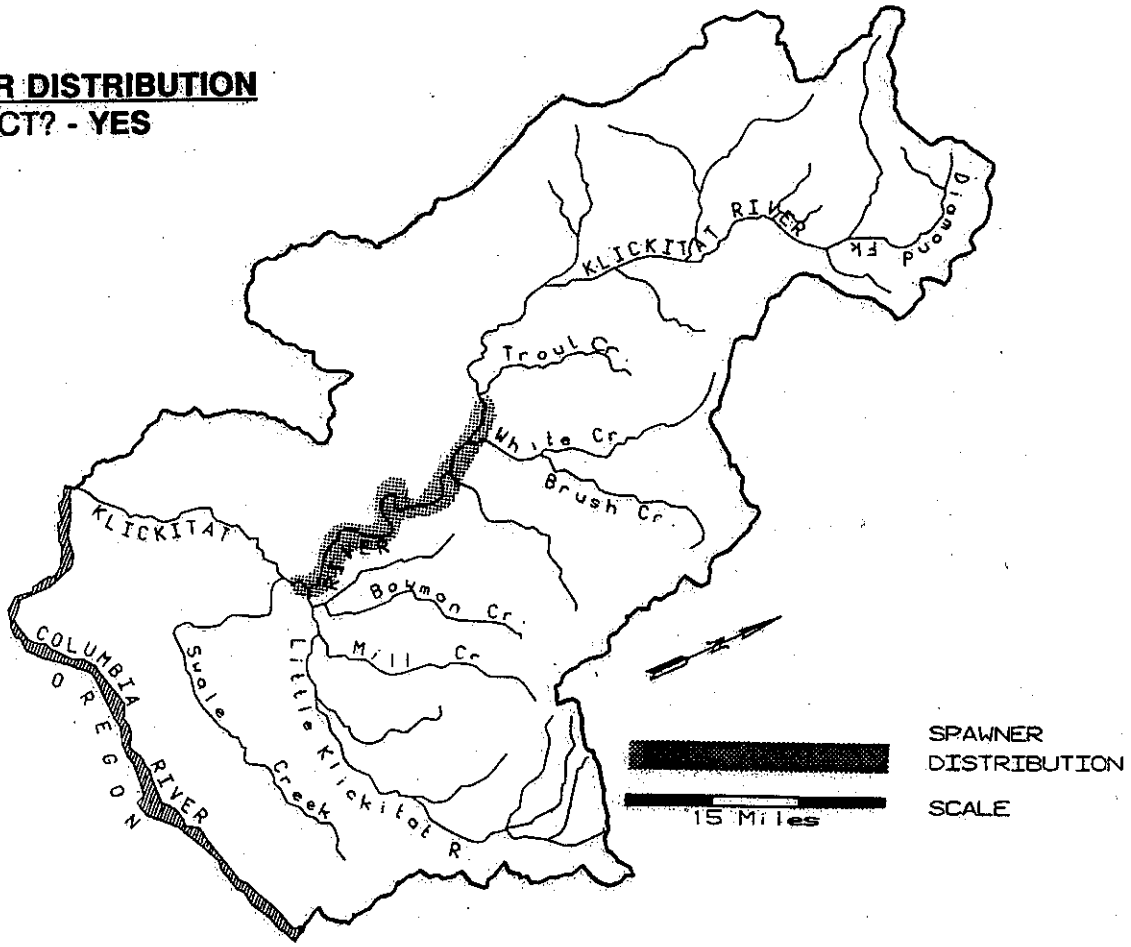
Fall chinook population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. No surveys were conducted in 1988 due to poor water visibility. The database quality is generally good.

Since 1969, tule fall chinook natural spawn escapement has been below average. However, since the last hatchery plants in 1986, Klickitat River tule fall chinook natural escapement has remained relatively stable with an average of 1,085 fish. The natural spawn estimate of 2,339 fish in 1989 was the highest since 1969.

STOCK DEFINITION PROFILE for Klickitat Tule Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES,** based on age structure and spawning timing.

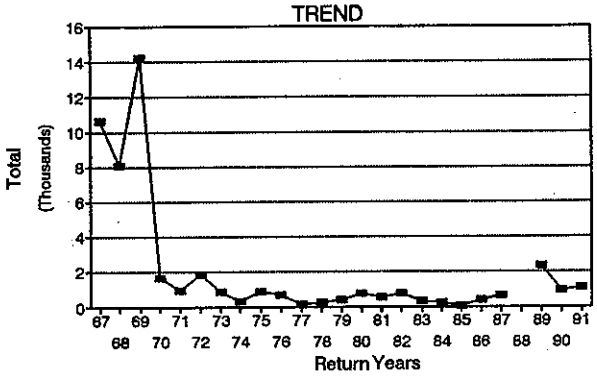
STOCK STATUS PROFILE for Klickitat Tule Fall Chinook

STOCK ASSESSMENT

DATA QUALITY------> Good

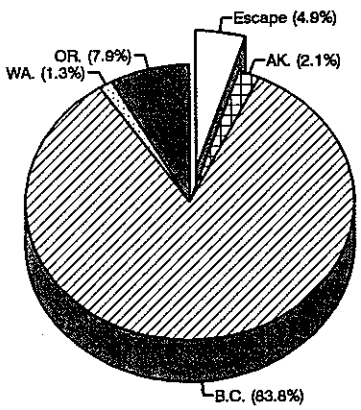
Return Years	ESCAPE Total			
67	10626			
68	8107			
69	14230			
70	1701			
71	911			
72	1889			
73	858			
74	295			
75	858			
76	683			
77	134			
78	241			
79	402			
80	770			
81	558			
82	764			
83	348			
84	230			
85	54			
86	415			
87	664			
88				
89	2339			
90	919			
91	1086			

ESCAPE
TREND



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1986 Brood



Tag code 63-33-15 from the 1986 brood.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Healthy

SCREENING CRITERIA

UPPER COLUMBIA -- KLICKITAT - BRIGHT FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time and geographic distribution as well as differences in genetic composition. There are two distinct spawning populations in the Klickitat River. Both mid-Columbia bright and tule fall chinook spawn in the area from the Klickitat River Salmon Hatchery downstream to the Twin Bridges, a distance of approximately 25.9 miles. Mid-Columbia bright fall chinook spawn later than the tule fall chinook in the Klickitat River. Mid-Columbia bright fall chinook spawn from October to November.

The Klickitat River mid-Columbia bright fall chinook natural spawners are an introduced stock. Since 1987, fall chinook egg transfers to Klickitat Hatchery have been of upriver bright stock from Priest Rapids and Bonneville hatcheries. Consequently, the genetic characteristics of this stock may be quite mixed.

The current hatchery program sets an on-station release goal of 4 million upriver bright smolts; however few fish have returned to Klickitat Hatchery. Stray Klickitat Hatchery mid-Columbia bright coded-wire tagged fall chinook have been recovered from the Klickitat River. The recent discovery of the Klickitat River mid-Columbia bright natural spawners coincides with the mid-Columbia bright production from Klickitat Hatchery; therefore, the Klickitat River mid-Columbia bright natural spawners are likely hatchery strays.

STOCK STATUS

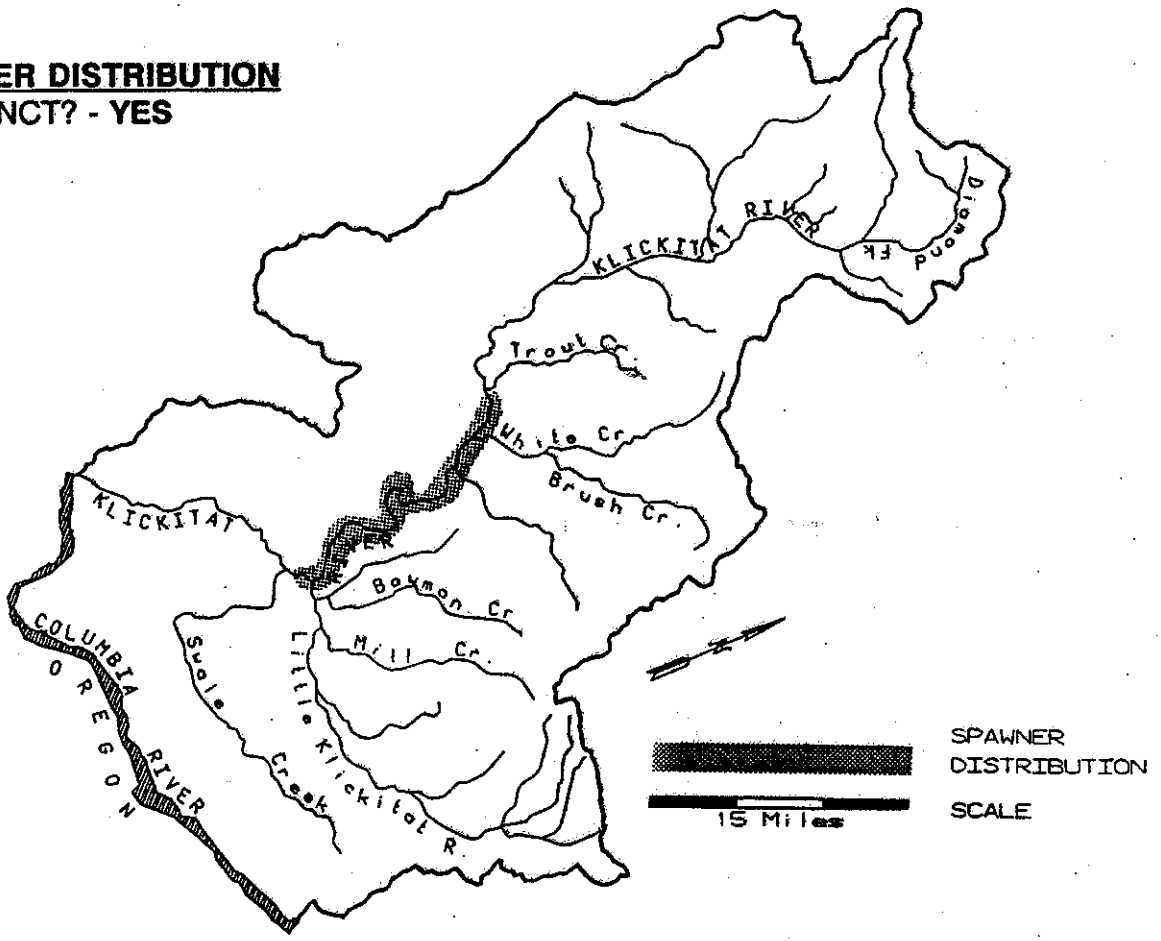
The Klickitat River upriver bright fall chinook natural spawn status is healthy, although the database is very limited. Natural spawn escapements from 1989-1991 were 253, 2,975, and 1,823 fish, respectively.

Fall chinook population estimates are obtained by expanding annual peak index area fish counts by respective expansion factors. The database quality is generally good but limited. This stock was only recently discovered in 1989.

STOCK DEFINITION PROFILE for Klickitat Bright Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

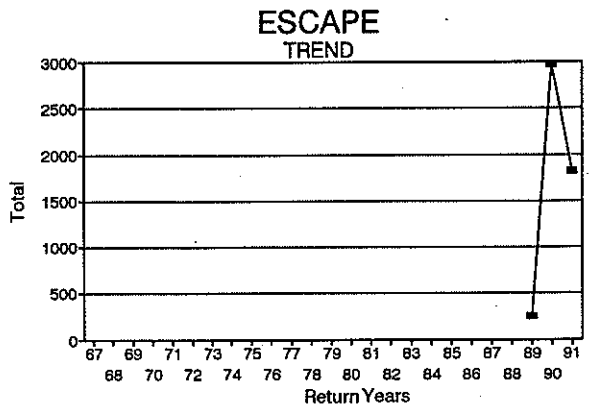
DISTINCT? - **YES,** based on age structure and spawning timing.

STOCK STATUS PROFILE for Klickitat Bright Fall Chinook

STOCK ASSESSMENT

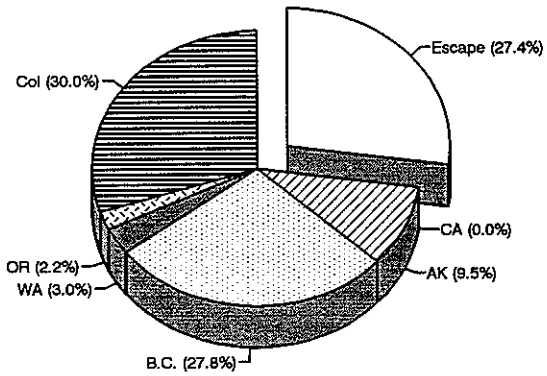
DATA QUALITY-----> Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	253			
90	2975			
91	1823			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1986 Brood)



Based on Klickitat River Hatchery tag code 63-33-15 from the 1986 brood.

STOCK SUMMARY

STOCK ORIGIN
Non-native

PRODUCTION TYPE
Cultured

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Healthy

SCREENING CRITERIA

UPPER COLUMBIA -- SNAKE FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock has been classified as distinct based on geographic isolation and genetic differences. Lyons Ferry Hatchery fall chinook which originated from fall chinook collected at Ice Harbor Dam have been shown to be genetically distinct from populations in the mainstem Columbia River and other tributaries. Most of the natural spawning occurs immediately below Hells Canyon (Oregon-Idaho). The remainder of the spawning occurs in lower reaches of some Washington tributaries (e.g. Tucannon, Palouse, Grande Ronde rivers) and in the mainstem Snake River primarily upstream of Asotin, Washington. Insufficient samples have been collected from natural spawning fall chinook in the Snake River basin to distinguish whether there are separate stocks within the Snake River system.

Entry into the Columbia River begins in August with peak counts in early September at Bonneville Dam and mid- to late September at Lower Granite Dam (the uppermost passable dam on the mainstem). Spawning occurs from mid-October to late December.

Snake River fall chinook should be considered a native stock with limited influence by strays from other basins. In recent years, non-Snake River origin tagged fall chinook have been collected at Ice Harbor Dam and Lower Granite Dam. Hatchery practices in other basins have been altered to reduce the incidence of straying into the Snake basin and extra efforts are being made to sort out these stray fall chinook to reduce stock hybridization.

STOCK STATUS

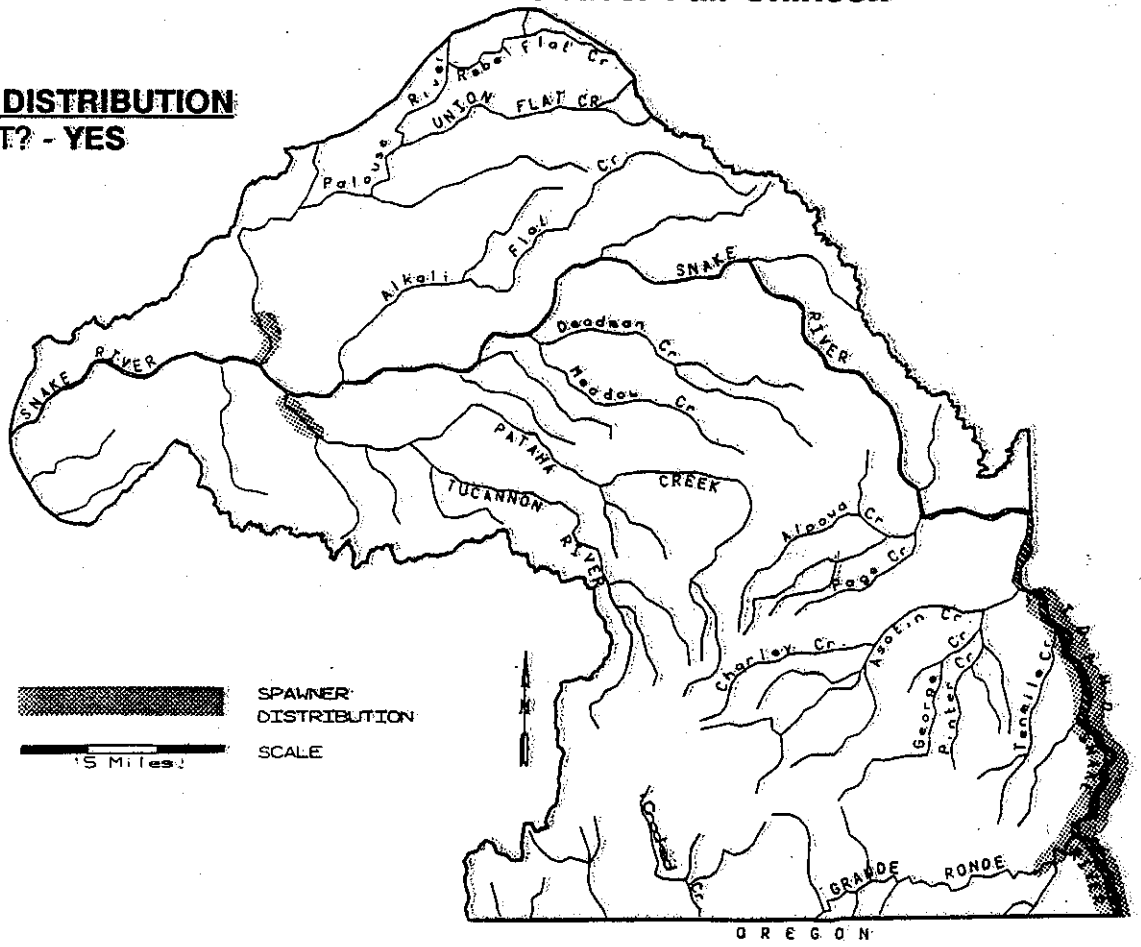
Snake River fall chinook along with spring/summer chinook were officially listed in April, 1992 as threatened under the Endangered Species Act. Management and recovery of these chinook stocks will follow the process outlined in the act and will be overseen by the National Marine Fisheries Service.

The natural run in the Snake River is a remnant of a formerly large native run that returned about 41,000 fall chinook in 1957-1960. Construction and completion of Brownlee Dam (1958), Oxbow Dam (1961), and Hells Canyon Dam (1967) flooded spawning reaches and blocked passage. Adult fall chinook counts at Lower Granite Dam have been fewer than 1,000 since 1975.

STOCK DEFINITION PROFILE for Snake River Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

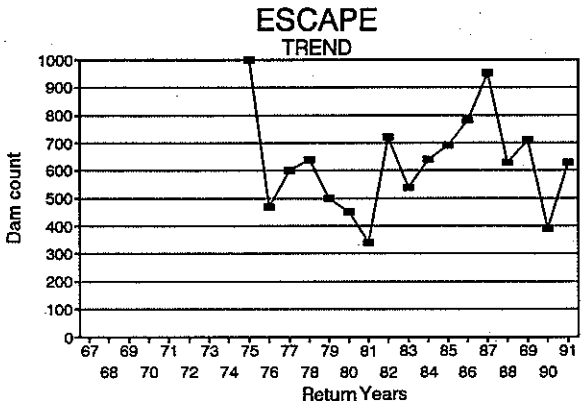
GENETICS - Genetic data from past years has shown Snake R. fall chinook to be distinct from all other stocks in the Columbia and Snake basins. Since 1988, broodstock samples have included strays into the Lyons Ferry hatchery, making these samples different from previous ones and similar to upper Columbia fall chinook stocks. Work began in 1990 to collect data from Snake R. wild spawning fall chinook for analysis. So far, sample size is too small to draw any conclusions.

STOCK STATUS PROFILE for Snake Fall Chinook

STOCK ASSESSMENT

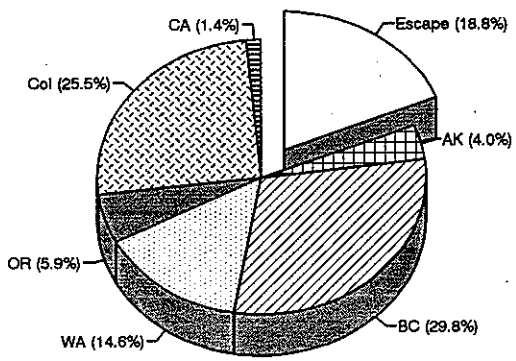
DATA QUALITY------> Very Good

Return Years	ESCAPE Dam count			
67				
68				
69				
70				
71				
72				
73				
74				
75	1000			
76	470			
77	600			
78	640			
79	500			
80	450			
81	340			
82	720			
83	540			
84	640			
85	690			
86	780			
87	950			
88	630			
89	710			
90	390			
91	630			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1987-1991)



Based on Lyons Ferry Hatchery 1985, 1986 brood fall chinook tag codes 63-42-59 and 63-36-42

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Genetic

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Fall chinook are present in the mainstem Snake River and in the lower reaches of the Tucannon, Palouse, and Grande Ronde rivers.

Snake Mainstem - Production is limited by the absence of free-flowing river in the Snake River between the mainstem dams. There is evidence of spawning at the Lower Monumental Dam tailrace, and suspected similar spawning behavior at Lower Granite Dam.

Mainstem mortalities are attributable to two Snake River Dams and four Columbia River dams.

Tucannon River - Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion and inadequate screening limit production. Below RM 32, instream and riparian habitats have been degraded by agricultural and logging practices. Summer temperatures in the lower river have been critically high. Lack of adequate fish passage at Starbuck Dam (RM 5.7) limits access to the upper river.

Mainstem mortalities are attributable to two Snake River Dams and four Columbia River dams.

Palouse River - Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion, high stream temperatures, and excessive streambed sedimentation as a result of agricultural erosion limit production. Palouse Falls, at about RM 6.0 is an anadromous fish barrier.

Mainstem mortalities are attributable to two Snake River Dams and four Columbia River dams.

Grande Ronde River - Natural limiters include peak winter and spring flows and spawning gravel quality and stability. In addition flow diversion and inadequate screening limit production. Riparian habitat has been severely degraded by land use activities such as grazing, crop production, and timber harvest.

Mainstem mortalities are attributable to four Snake River Dams and four Columbia River dams.

Harvest Management -- Fall chinook are subjected to the highest fishing pressure of all chinook stocks and appear to be spread out from southern Oregon to Alaska. Consequently, they are caught in troll and sport fisheries off Oregon, Washington, British Columbia, and Alaska. Based on tagged Lyons Ferry Hatchery production, the primary catch occurs in the Canadian troll fishery. Freshwater harvest occurs

almost exclusively in non-treaty and treaty gill net fisheries downstream of McNary Dam. Freshwater gill net fisheries are being structured to reduce the harvest of Snake River wild chinook while targeting net fisheries on surplus stocks. The escapement goal at McNary Dam was increased in 1990 to 45,000 adults from 40,000 fish to provide greater spawning escapement. During 1986-1990, an average of 49% of the Snake River wild fall chinook entering the Columbia River were harvested. In 1991, the harvest rate was 37%.

Hatchery -- Hatchery operational impacts not determined. Genetic analysis of hatchery stock indicates this stock is more closely related to indigenous stock than naturally spawning component.

LAST TEN YEARS SALMON RELEASES INTO THE LOWER SNAKE BASIN

REL. YEAR	FALL CHINOOK
1982	0
1983	0
1984	0
1985	1189692
1986	2320835
1987	1060971
1988	4981287
1989	2258466
1990	3480110
1991	224439
MEAN	2216543

LAST TEN YEARS SALMON RELEASES INTO THE MIDDLE SNAKE BASIN

REL. YEAR	SPRING CHINOOK	FALL CHINOOK
1982	0	628880
1983	0	406560
1984	0	99526
1985	0	0
1986	164286	0
1987	12922	0
1988	153725	0
1989	152165	0
1990	145146	0
1991	99057	221
MEAN	121217	283797

UPPER COLUMBIA -- YAKIMA - BRIGHT FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time, geographic distribution as well as biological characteristics and genetic composition. There are two distinct spawning populations in the Yakima River. One segment spawns in the lower 32.0 miles of the mainstem; the other utilizes the 17.0 mile long Marion Drain. Yakima River fall chinook spawn from October to November. Skin coloration of spawners suggest that Yakima River fall chinook are an upriver bright substock.

The Yakima River fall chinook natural spawners are of unknown origin. Historically, releases in the sub-basin have come from a number of sources including Klickitat, Priest Rapids, Spring Creek and the Little White Salmon hatcheries. An average of 1.8 million non-native upriver bright fall chinook smolts were released in the Yakima River sub-basin between 1985 and 1991. Net pens have also been used in the sub-basin. In addition, stray hatchery (primarily Umatilla River) coded-wire tagged fall chinook have been recovered from the Yakima River. In 1992 releases were scaled back to approximately 131,000 due to concerns about the potential genetic influence on the Marion Drain population.

STOCK STATUS

The Yakima River fall chinook natural spawn stock status is generally unknown. Natural spawn escapements from 1983-1991 averaged 2,014 fish with a low return of 757 in 1988 and a peak of 4,440 in 1984. This status is based on short-term escapement trend analysis. Current habitat production potential was not considered.

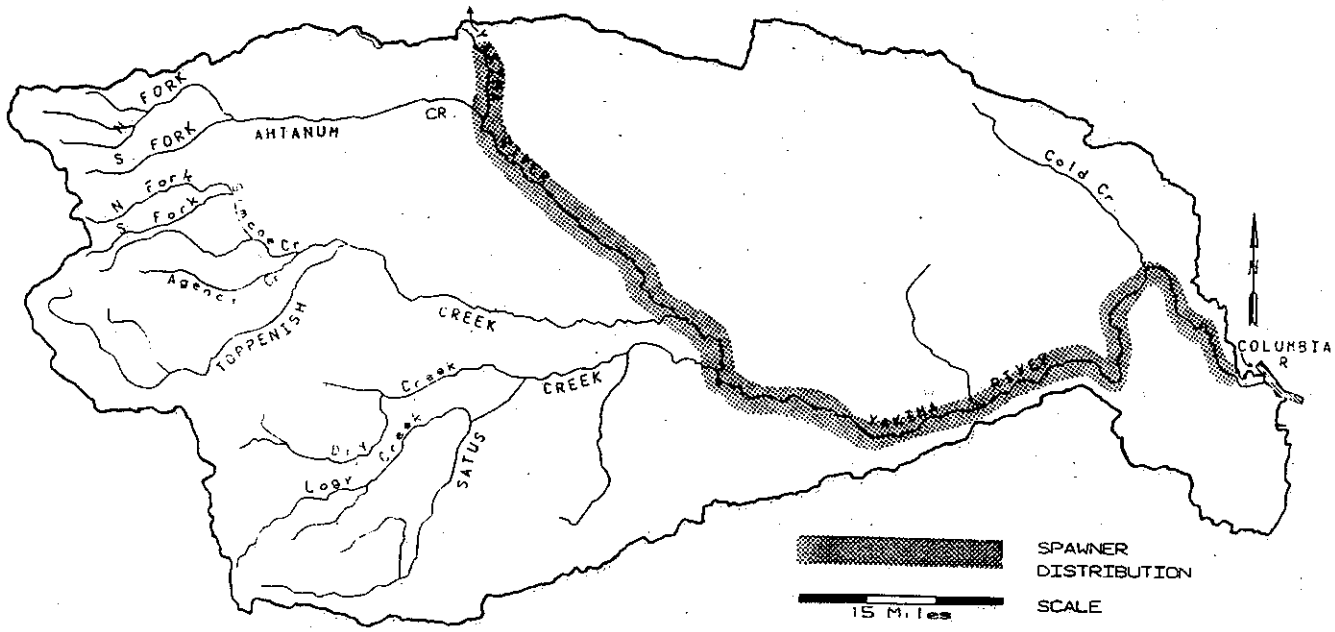
Fall chinook natural spawning population estimates are obtained by estimating the number of spawners above and below Prosser Dam. Overall, knowledge of the Yakima River fall chinook is almost totally restricted to the above-Prosser population and little is known even there. The 1983-1988 escapement estimates are from the Yakima River Sub-basin Plan.

The Yakima River fall chinook natural spawn escapements vary widely. The variations may be attributed to artificial supplementation. However, with the 1987 fall chinook return it was determined that only 3.9% of the Prosser count was of fish of hatchery origin. Combining this determination with the fact that poor Yakima River hatchery smolt survival has been documented results in the current belief that most returning fish are from natural production. The magnitude of

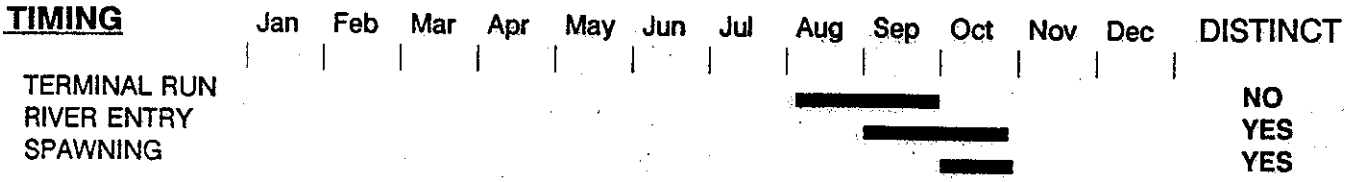
STOCK DEFINITION PROFILE for Yakima Bright Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT? - YES



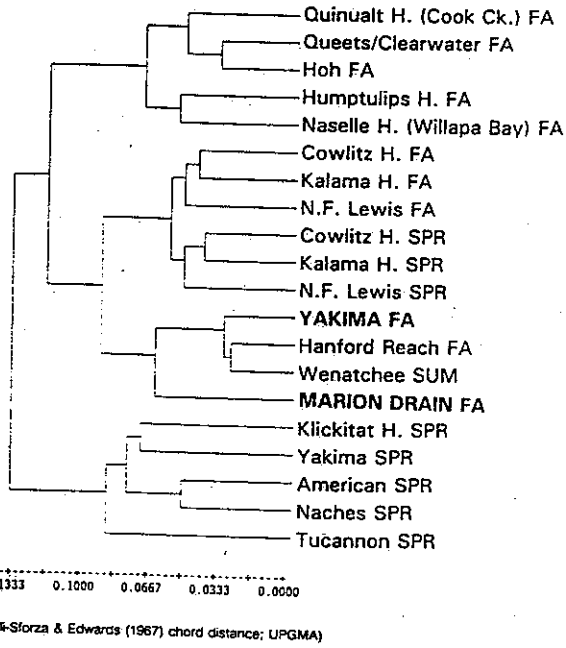
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Genetic data exist for two fall stocks in the Yakima basin. Mainstem spawners, sampled in 1990, and Marion Drain spawners, sampled in 1989 and 1990 were significantly different ($p < 0.05$) from each other and also from all other chinook stocks examined. The Yakima mainstem fall chinook do share some genetic similarities with mid- and upper-Columbia fall stocks.

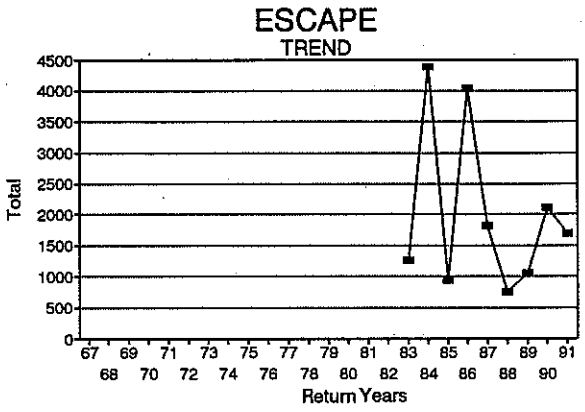


STOCK STATUS PROFILE for Yakima Bright Fall Chinook

STOCK ASSESSMENT

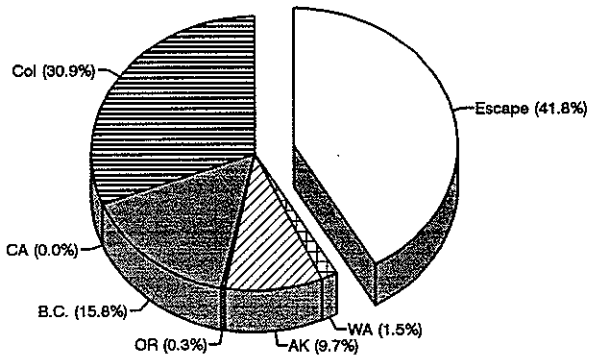
DATA QUALITY------> Fair

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83	1267			
84	4400			
85	943			
86	4047			
87	1813			
88	757			
89	1047			
90	2112			
91	1698			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1986 Brood)



Based on Hanford Reach wild fall chinook tag code 63-41-52 from the 1986 brood.

STOCK SUMMARY

STOCK ORIGIN
Unknown

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Distribution, Timing, Genetic

STOCK STATUS
Healthy

SCREENING CRITERIA

straying of other Columbia River hatchery upriver fall chinook may also create fluctuations in Yakima River fall chinook natural spawn escapements. Overall, the upriver bright (URB) stock returning to the Columbia River upstream from McNary Dam has been declining in recent years and may be a result of natural fluctuations.

The goal of the fall chinook portion of the Yakima Production Project is to increase natural production. The U.S. vs. Oregon Columbia River Fish Management Plan includes a fall chinook supplementation goal for the Yakima River.

UPPER COLUMBIA -- MARION DRAIN FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time, geographic distribution as well as biological characteristics and genetic composition. There are two distinct spawning populations in the Yakima River. One segment spawns in the lower 32.0 miles of the mainstem; the other utilizes the 17.0 mile long Marion Drain located near Toppenish Creek above Prosser. Marion Drain fall chinook spawn from October to November.

Toppenish Creek is connected to Marion Drain via a canal that provides water to the Satus Pump Station (and) more water is diverted south than is used by this pump station, the surplus is returned to the Yakima River via Toppenish Creek. On October 15 each year, the Satus Pump Station stops withdrawing water and flows increase dramatically in the Marion Drain. From traps that have been placed in the Marion Drain and Toppenish Creek, fish appear to react to the dramatic increase in water and start ascending Marion Drain and Toppenish Creek within 24 hours. Fish have been trapped heading for the Marion Drain spawning ground as early as September 21 and as late as November 15 with the peak being October 16.

The source stock for Marion Drain fall chinook is thought to be tule fall chinook from Klickitat Hatchery (138,360 fall chinook from Klickitat Hatchery of lower Kalama Hatchery stock were released in 5/76). However, the spawning timing would suggest that most returning fish are actually upriver bright (late) fall chinook similar to those in the mainstem Yakima River. Also, data collected to date indicate that the Marion Drain fish are genetically distinct from those in the mainstem Yakima. The actual genetic differences are small, but these two groups differ as much as any groups of fall chinook in the upper Columbia. The mainstem fish are genetically very similar to the hatchery fish that have been released in large numbers into the basin, whereas the Marion Drain fish are similar to the Snake River and Deschutes River fall chinook (WDF).

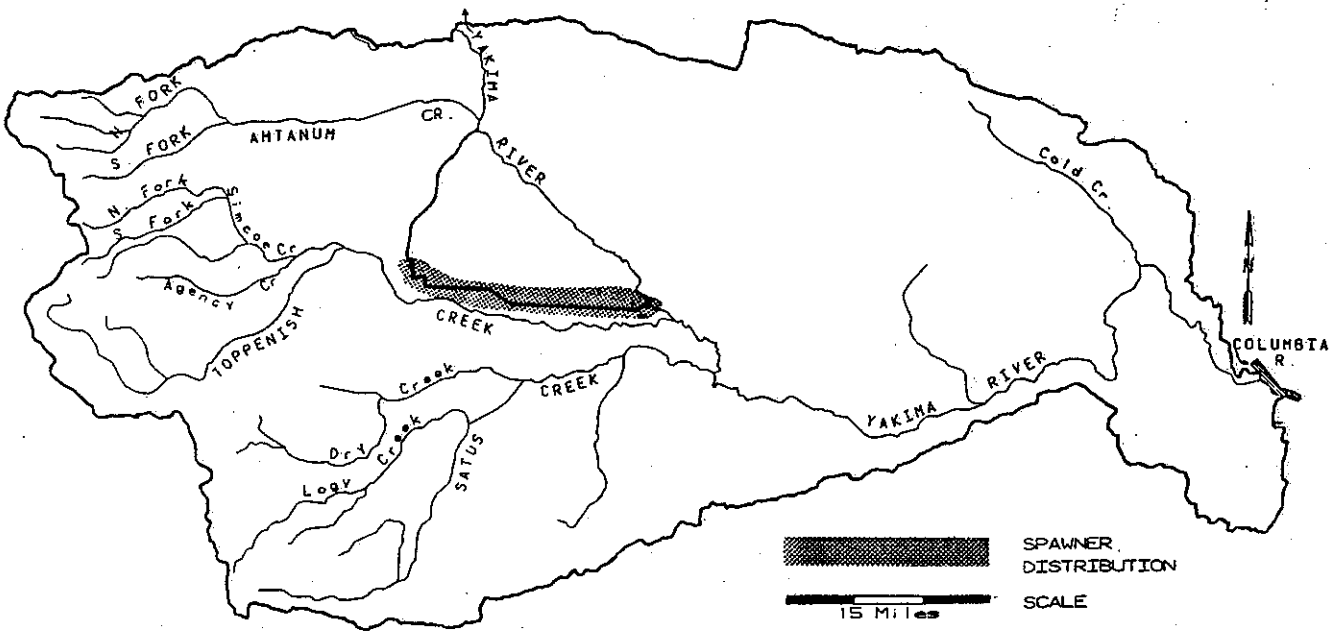
STOCK STATUS

The Marion Drain fall chinook natural spawn stock status is healthy. Redd counts from 1983-1992 excluding 1990 (when no survey was conducted) averaged 73 redds with a low count of 12 in 1988 and a peak count of 117 in 1986. Current habitat production potential was not considered. The healthy stock status of Marion Drain fall chinook was based on the last nine years of redd counts.

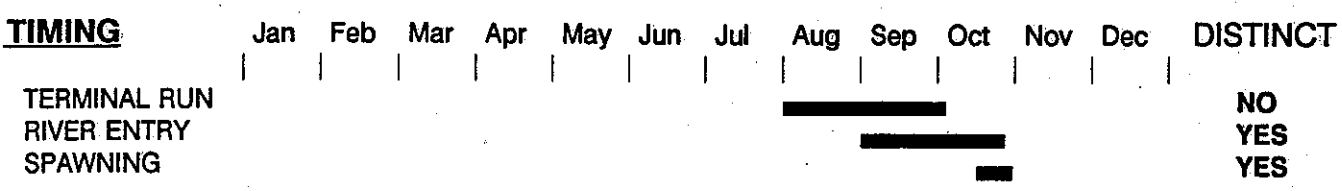
STOCK DEFINITION PROFILE for Marion Drain Fall Chinook

SPAWNER DISTRIBUTION

DISTINCT



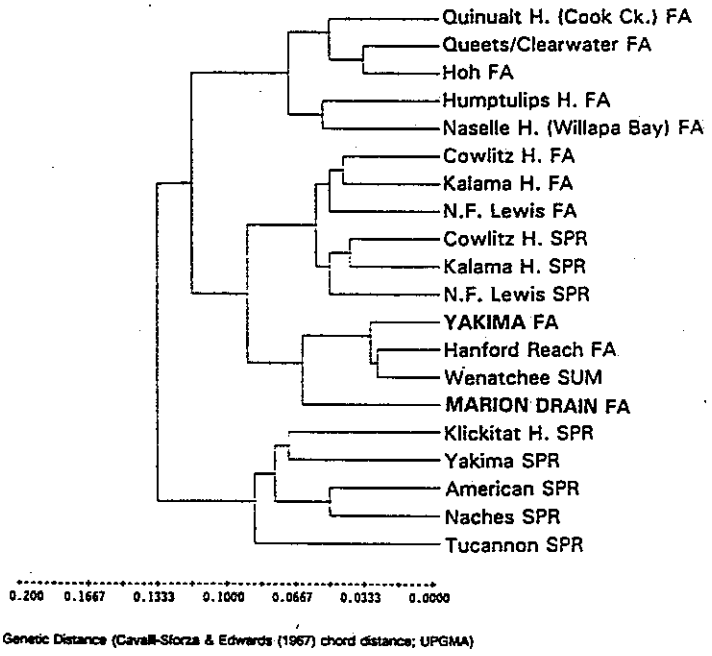
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Genetic data exist for two fall stocks in the Yakima basin. Mainstem spawners, sampled in 1990, and Marion Drain spawners, sampled in 1989 and 1990 were significantly different ($p < 0.05$) from each other and also from all other chinook stocks examined. The Yakima mainstem fall chinook do share some genetic similarities with mid- and upper-Columbia fall stocks.

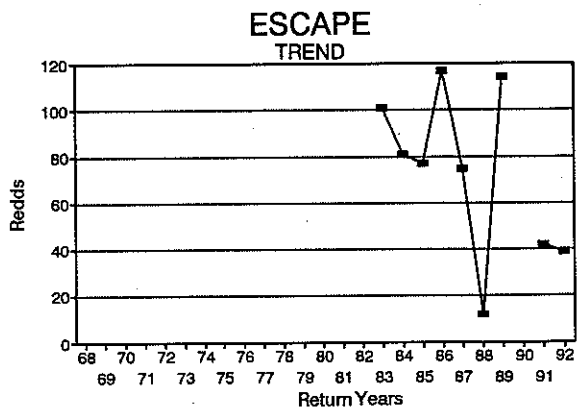


STOCK STATUS PROFILE for Marion Drain Fall Chinook

STOCK ASSESSMENT

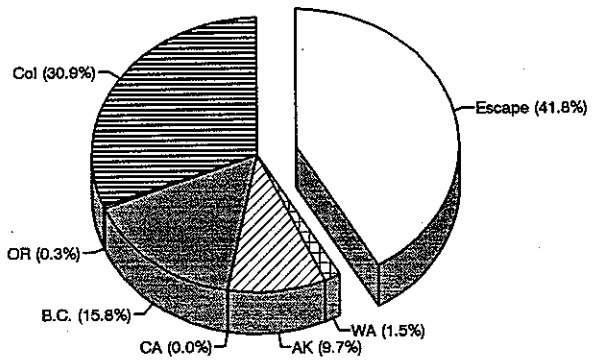
DATA QUALITY------> Fair

Return Years	ESCAPE Redds			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83	101			
84	81			
85	77			
86	117			
87	75			
88	12			
89	114			
90				
91	42			
92	39			



AVERAGE RUNSIZE DISTRIBUTION

YEARS (1988-1991)



Based on the Hanford Reach 1986 brood wild fall chinook tag code 63-41-52

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Genetic

STOCK STATUS
Healthy

SCREENING CRITERIA

UPPER COLUMBIA -- HANFORD REACH FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock was designated on the basis of spawning time, geographic distribution as well as biological characteristics and genetic composition. Hanford Reach fall chinook spawn from late October to early December in the area from Priest Rapids Dam to the Tri-Cities, a distance of approximately 45.0 miles. A substantial percentage of the spawning population are two-year-old jacks which may be attributable to the size selectivity of downstream commercial gill net fisheries. The upriver bright run from the Hanford Reach has been characterized electrophoretically and is genetically distinct from four other major runs of upriver bright fall chinook in the Columbia and Snake rivers.

The Hanford Reach natural spawners are a native stock of wild production. However, stray hatchery (including Priest Rapids) coded-wire tagged fall chinook have been recovered from the Hanford Reach.

Other than the North Fork of the Lewis River, Hanford Reach is the only other Columbia River area where wild juvenile fall chinook are currently captured, coded-wire tagged, and released.

STOCK STATUS

The Hanford Reach fall chinook natural spawn stock status is healthy based on escapement trend. Natural spawn escapements (including jacks and adults) from 1983-1991 averaged 95,690 fish with a low return of 50,773 in 1991 and a peak of 164,254 in 1986.

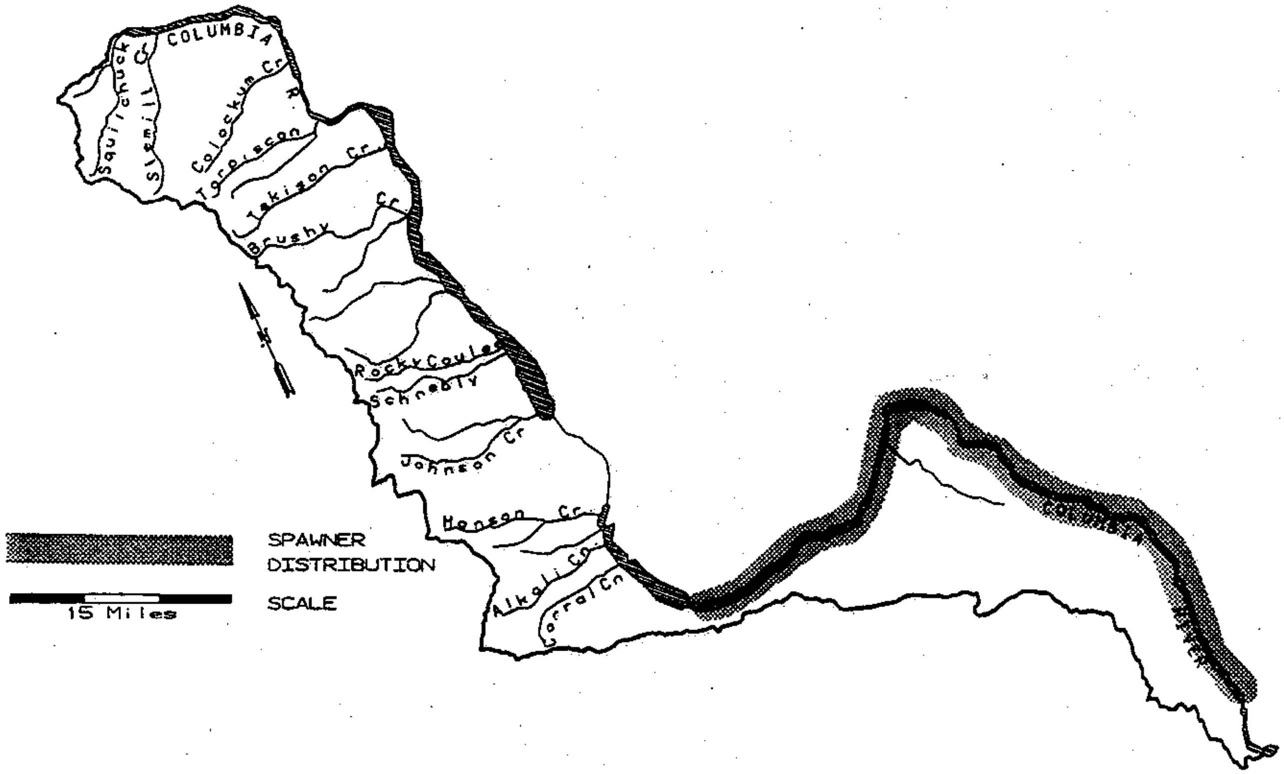
The Hanford Reach is one of the most important and largest natural production areas for chinook in the entire Columbia Basin. An escapement goal of 45,000 fall chinook passing McNary Dam for natural spawn and hatchery escapements and the Hanford Reach sport fishery have been adopted. That goal has been met each year from 1983-1991.

Hanford Reach fall chinook natural spawning population estimates are usually obtained by subtracting the Priest Rapids Dam count, the return to Priest Rapids Hatchery, the Hanford Reach sport catch, the Yakima River return, and the Ice Harbor Dam count from the McNary Dam count. The database quality is generally very good.

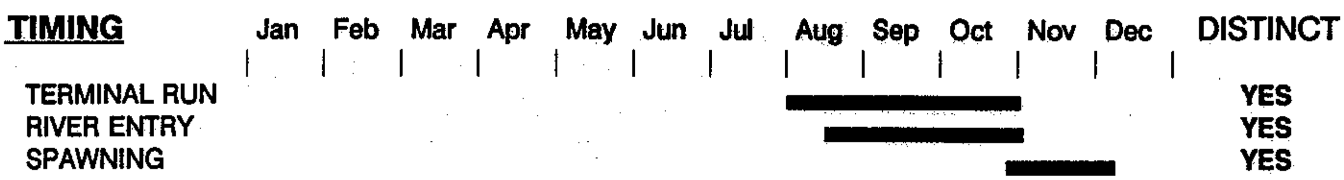
The Hanford Reach fall chinook natural spawn escapements since 1989 are below average but are probably a result of natural fluctuations.

STOCK DEFINITION PROFILE for Hanford Reach Fall Chinook

SPAWNER DISTRIBUTION
DISTINCT? - **YES**

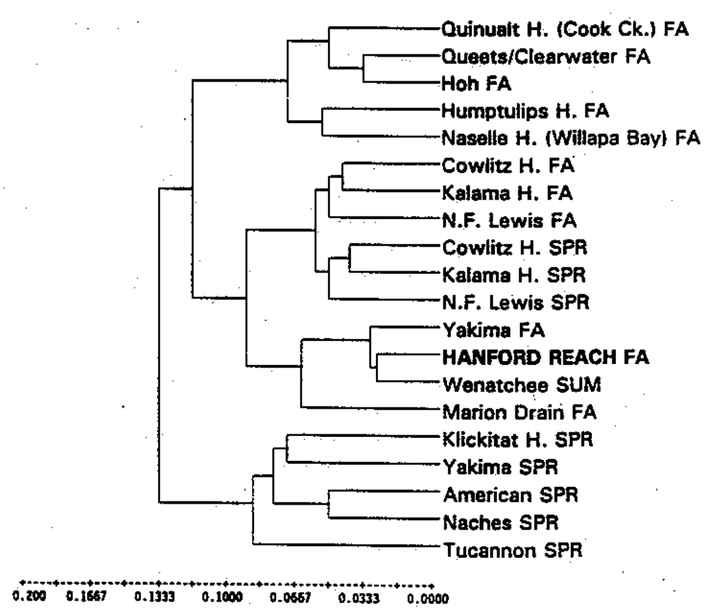


TIMING



BIOLOGICAL CHARACTERISTICS
DISTINCT? - **YES**

GENETICS - Hanford Reach fall chinook sampled in 1982 and 1990 showed no differences between years in their genetic characteristics and were combined into one data set. This upper Columbia fall stock was significantly different from all other chinook stocks examined (**p**<0.05.



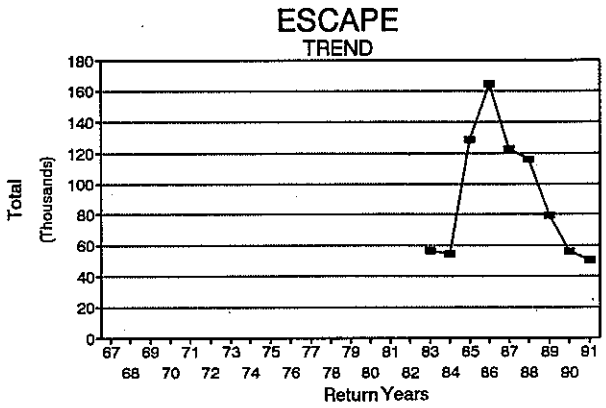
Genetic Distance (Cavalli-Sforza & Edwards (1967) chord distance; UPGMA)

STOCK STATUS PROFILE for Hanford Reach Fall Chinook

STOCK ASSESSMENT

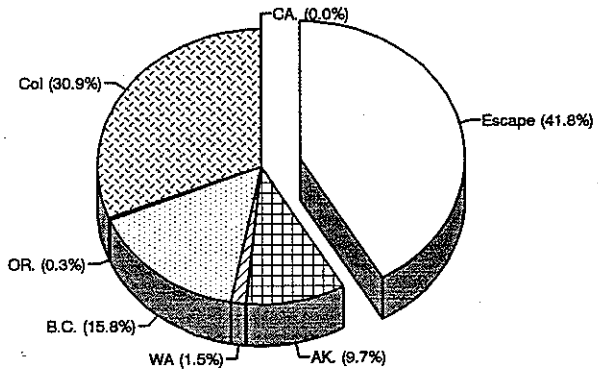
DATA QUALITY------> Very Good

Return Years	ESCAPE Total			
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83	56608			
84	54377			
85	128584			
86	164254			
87	122835			
88	116169			
89	79410			
90	56204			
91	50773			



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1986 Brood



Tag codes 63-41-52 from the 1986 brood.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution, Timing, Bio.

STOCK STATUS
Healthy

SCREENING CRITERIA

UPPER COLUMBIA -- LAKE CHELAN FALL CHINOOK

STOCK DEFINITION AND ORIGIN

This stock is distinct based on geographical isolation. Biological information is sparse. Mature fish are three to five years old and weigh 7-15 lbs. Occasionally, chinook over 20 lbs. are landed.

Migration up-lake occurs in July and August with entry into the Stehekin River basin in September. A few spawning chinook are observed in October in Company Creek, a tributary of Stehekin River. Spawning surveys have been unable to identify where most of the production occurs.

A naturally sustaining population has developed from a mixture of hatchery stocks in 1974-1978. Original releases were from a variety of Columbia River and Puget Sound fall chinook stocks. A cooperative net-pen program was established in 1989-1990 and will supplement the natural production. Lake Chelan fall chinook should be considered an introduced stock.

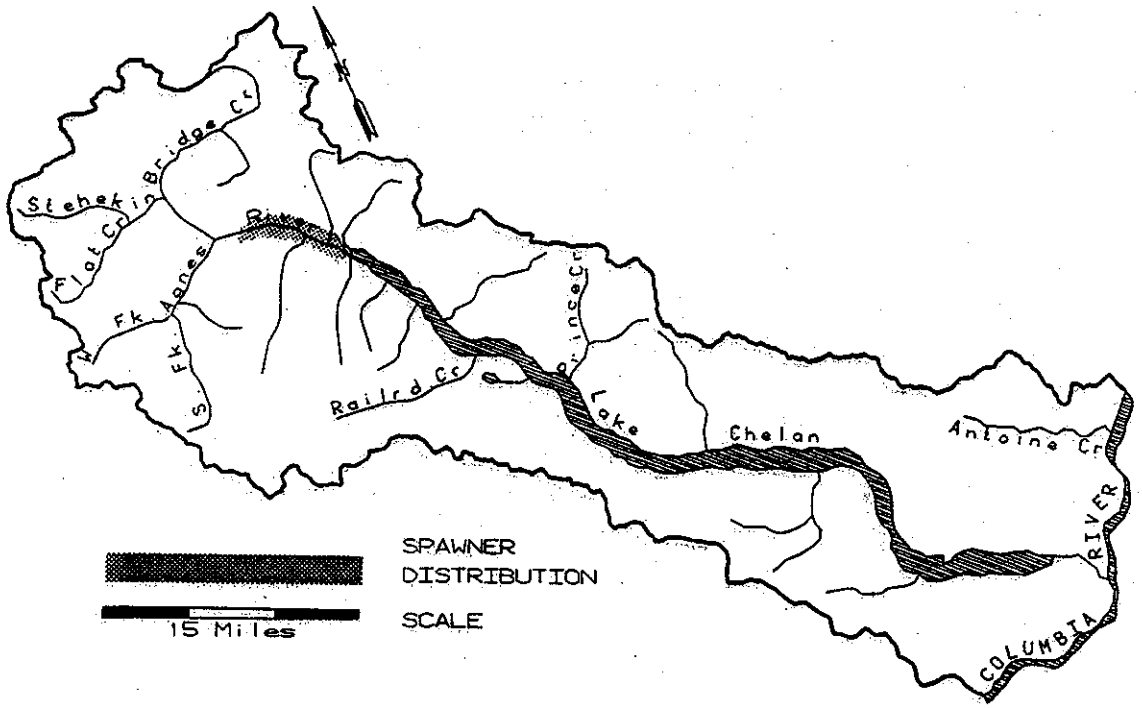
STOCK STATUS

Escapement is unknown. Little information is available, but population is adequate to support a local fishery for landlocked chinook. Lake Chelan fall chinook should be considered a healthy stock.

STOCK DEFINITION PROFILE for Lake Chelan Fall 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

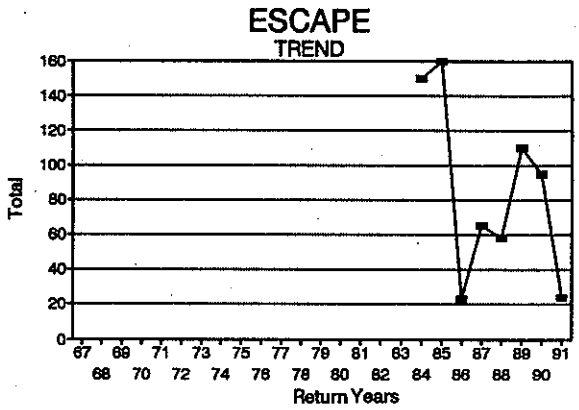
DISTINCT? - **UNKNOWN**

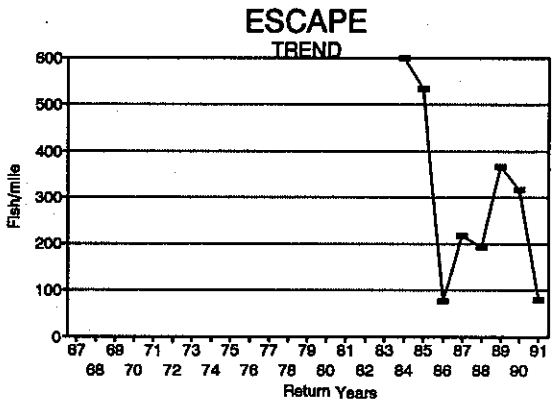
STOCK STATUS PROFILE for Lk Chelan Fall Chinook

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	150	600.0		
85	160	533.0		
86	23	77.0		
87	65	217.0		
88	58	193.0		
89	110	367.0		
90	95	317.0		
91	24	80.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Non-native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

OVERVIEW -- UPPER COLUMBIA COHO STOCKS

KLICKITAT RIVER

STOCK DEFINITION AND ORIGIN

Natural coho production occurs primarily downstream of Bonneville Dam. Additionally, some minor production occurs in the lower Klickitat River above Bonneville. A total of 18 coho stocks based on geographic isolation have been determined. Run-timing through the Columbia River ranges from August through December with spawning timing from October through February. Coho historically are native to the Columbia River, although widespread transfers of stocks with hatchery practices has produced a widely mixed stock.

STOCK STATUS

Columbia River coho production supports large sport and commercial fisheries. The popular Buoy 10 coho fishery in late summer and early fall at the mouth of the Columbia is supported primarily by coho. The Columbia River gill net fishery harvests coho from September through early November with the late fishery targeting on coho. Successful tributary sport coho fisheries take place in large tributaries. Overall annual harvest varies greatly as a result of wide run-size fluctuations.

Approximately 10% of Columbia River coho production is estimated to be of natural origin. Little individual stock assessment data is available for natural coho production.

Natural coho production is considered to be depressed in all areas.

UPPER COLUMBIA -- KLICKITAT COHO

STOCK DEFINITION AND ORIGIN

The Klickitat River sub-basin, located on the east slope of the Cascade Range in south-central Washington comprised 1,350 square miles in Klickitat and Yakima counties and drains into the Columbia River at RM 180.0. The basin trends north-south toward the Columbia River and is bounded by Mount Adams on the west, Goat Rocks to the north, and the Simcoe Mountains on the east. The Yakima Indian Reservation comprised a large portion of the upper Klickitat River sub-basin. The Klickitat Hatchery is located at RM 42.0.

Coho are not believed to be native to the Klickitat. Lyle Falls (RM 2.2) was laddered in 1952 which improved anadromous fish passage into Klickitat River. In 1960 through 1962, obstructions were blasted and fishways constructed at Castile Falls (RM 64.0) to allow the introduction of anadromous runs to the upper Klickitat River (YIN). Although only limited surveys have been conducted, Washington Department of Wildlife reported juvenile coho in Summit Creek (YIN) and Washington Department of Fisheries has observed large numbers of coho spawning in Dofner Creek near the mouth of the Klickitat River (WDF 1981).

Typically, coho begin entering the Klickitat River in early September and continue entering the sub-basin through February. Spawning occurs from mid-October through February. Coho are thought to spawn in all available tributaries though escapement figures are unknown. Coho return as two-year-old jacks and three-year-old adults.

It appears that most returning coho do not migrate past the fishways at Lyle Falls. This likely limits most natural production to the lower 2.0 miles of the mainstem Klickitat River and Dofner Creek, a tributary. Coded-wire tagged Klickitat coho have also been recovered from two nearby Columbia River tributaries, Jewett and Major creeks. The Klickitat Hatchery was completed in 1952, with reports of 29 adults returning that same year, apparently from earlier releases (YIN). The Columbia River Management Plan calls for 2.5 million late coho smolts from Washougal Hatchery or other sources to be released in the Klickitat River (YIN). These plants began in 1988 in addition to the existing Klickitat Hatchery program. Klickitat River natural spawners are a hybrid stock. Mixing of stocks very likely began to occur with the first releases.

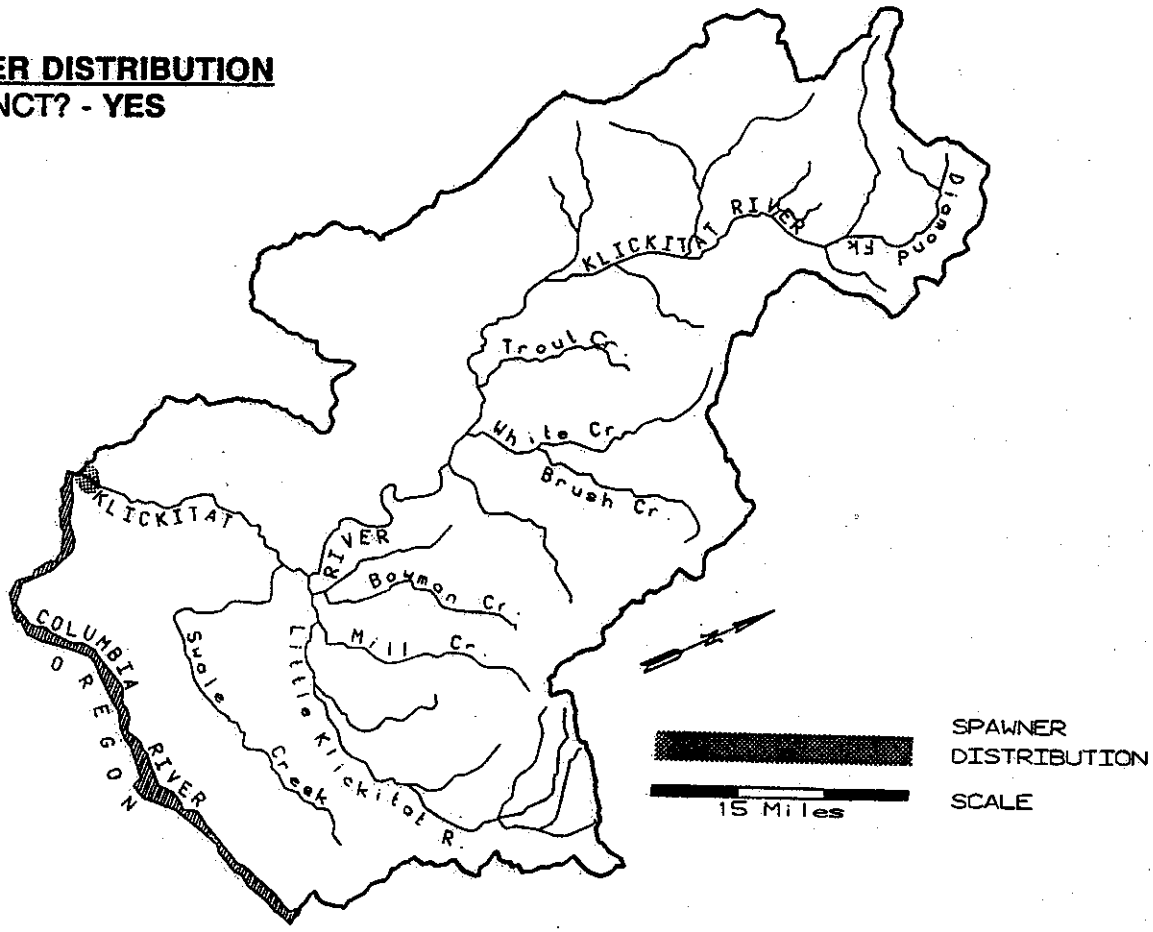
STOCK STATUS

The Klickitat River coho stock status is depressed. Natural spawning is presumed (through unpublished information) to be quite low and subsequent juvenile production below stream potential.

STOCK DEFINITION PROFILE for Klickitat Coho

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **NO**

STOCK STATUS PROFILE for Klickitat Coho

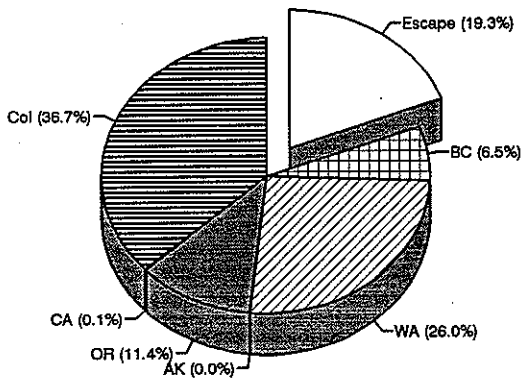
STOCK ASSESSMENT

DATA QUALITY------> NOT AVAILABLE

Return 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				

AVERAGE RUNSIZE DISTRIBUTION

YEARS (1984-1985)



Based on Cowlitz River Hatchery 1982 brood late coho tag codes 63-29-12 through 63-29-41

STOCK SUMMARY

STOCK ORIGIN
Non-native

PRODUCTION TYPE
Cultured

STOCK DISTINCTION
Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- See Klickitat - Spring Chinook. Natural limiters for this stock include summer low flows and high stream temperatures, gravel quality and quantity, and overwinter survival. Summer low flows are an acute problem for this stock. Survival is compromised by passage conditions at Bonneville Dam. Smolt outmigration survival may be affected by urban and industrial pollution in the Columbia River. Nearshore habitats have been affected by navigational dredging and wetland fills with dredge spoils.

Harvest Management -- High harvest rates are thought to be a limiting factor of natural coho production. Coho in the Columbia River are managed primarily as a hatchery stock. Primary harvest occurs outside of the sub-basin in ocean and Columbia River sport and commercial fisheries. Harvest rates are based on hatchery escapement needs where relatively few fish are needed, which can result in underescapement of natural spawning fish.

Tributary Harvest - Tributary harvest of Klickitat River sub-basin coho occurs in the sport and tribal fishery. The Klickitat River tributary sport catch estimated between 1980-1988 return years averaged 506 adult coho, ranging from a low of 50 in 1980 to a high of 1,624 in 1983 based on catch records and limited actual sampling data. The Klickitat commercial Indian harvest estimates from 1986 through 1990 return years averaged 7,860 adults with a low of 200 in 1987 and a peak of 23,000 in 1986 (CRFMP, 1991).

Columbia River Harvest - Gill netting to harvest surplus hatchery coho occurs in the lower Columbia River downstream from Bonneville Dam. The fishery usually begins in late September and continues into early November. The catch of late stock coho occurs beginning in mid-October.

Primary recreational harvest of coho in the Columbia River occurs in the estuary between Buoy 10 and the Astoria-Megler Bridge near Astoria, Oregon. The Buoy 10 fishery continues to be a major focal point in terms of recreational fishing opportunities in the Columbia River. The majority of the Buoy 10 coho catch is comprised of early stock fish primarily because the fishery peaks in mid-August; however, significant numbers of late coho are harvested in some years.

Ocean Harvest - A harvest profile of Cowlitz River Hatchery late coho based on coded-wire tag recoveries of the 1982 brood late coho revealed that most of the ocean catch occurred in Washington (25.95%) and Oregon (11.42%), followed by British Columbia (6.52%) and California (0.14%). Columbia River fisheries accounted for an additional 36.72% of the total harvest.

Hatchery -- Hatchery operational impacts not determined.

LAST TEN YEARS SALMON RELEASES INTO THE KLICKITAT BASIN

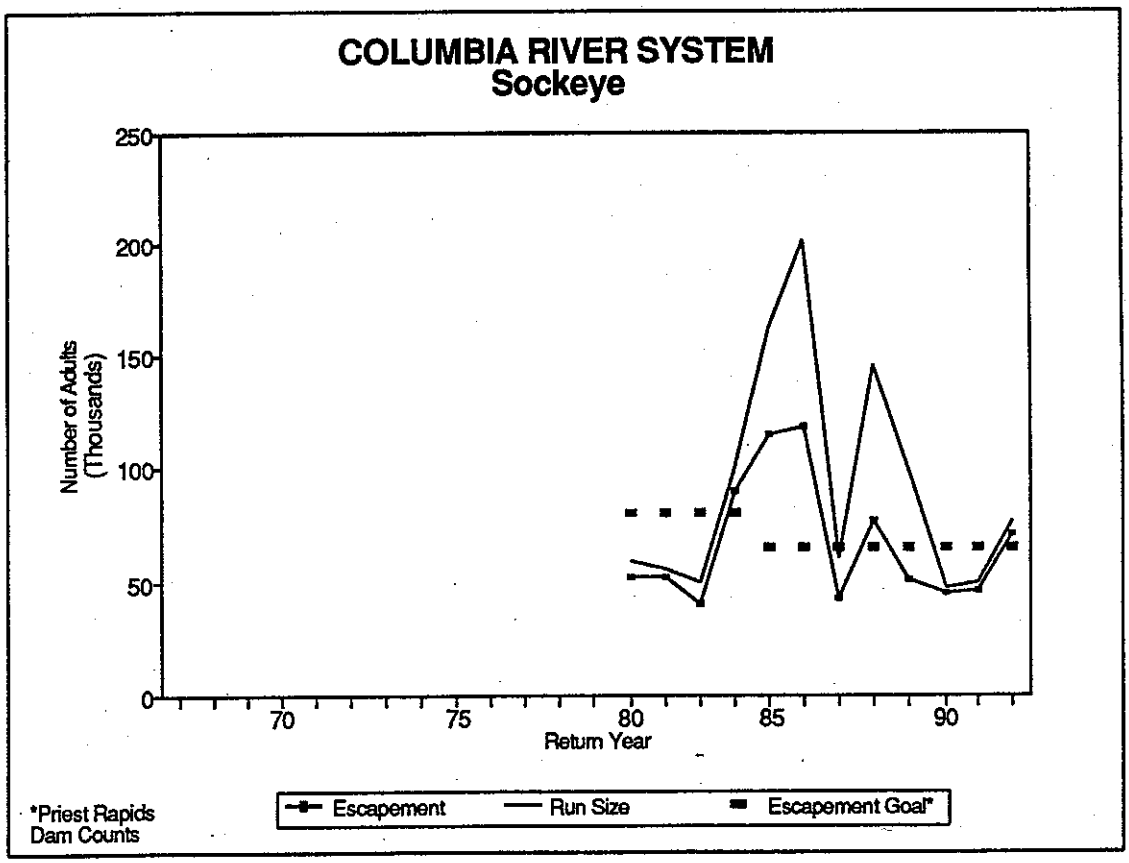
REL. YEAR	SPRING CHINOOK	FALL CHINOOK	TYPE-S COHO	TYPE-N COHO
1982	1759802	3679620	0	1653687
1983	1354800	4864600	0	1447153
1984	2079200	1195800	799300	540000
1985	872600	123100	2515388	0
1986	629900	4202500	0	1117424
1987	669600	4805100	1121372	2944259
1988	1031900	4467700	0	3799101
1989	1751563	4604500	0	4166900
1990	922800	4212900	0	4174037
1991	839900	5183300	0	2817600
MEAN	1191207	3733912	1478687	2517796

OVERVIEW -- UPPER COLUMBIA SOCKEYE STOCKS

WENATCHEE
OKANOGAN

STOCK DEFINITION AND ORIGIN

Sockeye were once widespread and abundant in the Columbia River system, including the upper Columbia area now blocked by Grand Coulee Dam. Presently, two stocks remain: Wenatchee River sockeye and Okanogan River sockeye. Snake River sockeye of Idaho origin listed as "endangered" under the Endangered Species Act are not included in this report. The Wenatchee population is considered a mixture of native stock and descendants of transfers during the Grand Coulee Dam Fish Maintenance Project which began in 1939-1941. The Okanogan River stock is closer to native stock due to a lack of hatchery influence. Historically, 2.4 million Quinault River sockeye were released into Lake Wenatchee and some



sockeye hatchery production occurred at Leavenworth Hatchery through 1968. Beginning in 1990, juvenile sockeye of Wenatchee River origin were released from net pens in Lake Wenatchee as a mitigation effort. Migration through the Columbia River is mainly in June and July and spawning timing is September and October.

STOCK STATUS

The mainstem Columbia River sockeye run-size has not been sufficient in recent years to provide for commercial net fisheries. The last significant commercial fishery occurred in 1988. No mainstem Columbia sport harvest is allowed. Treaty Indian ceremonial and subsistence harvest is allowed under the Columbia River Fish Management Plan based on a percentage of run-size. The management goal at Priest Rapids Dam is 65,000 sockeye. The Wenatchee River run-size has exceeded the escapement goal of 23,000 in recent years to provide for a sport fishery in Lake Wenatchee. Only a very minor tribal subsistence harvest occurs on the Okanogan River.

Both Wenatchee and Okanogan River sockeye are considered healthy at this time.

UPPER COLUMBIA -- WENATCHEE SOCKEYE

STOCK DEFINITION AND ORIGIN

This stock is distinct based on geographical isolation, biological characteristics, and genetic differences with Okanogan River sockeye. Wenatchee River sockeye mature primarily as age-4 fish with lesser numbers of age-5 adults. Most stay one year in the cool infertile oligotrophic waters of Lake Wenatchee before migrating to the ocean as three to four inch smolts.

Adult migration into the Columbia River begins in mid-June and peaks in early July, slightly ahead by five to ten days of younger Okanogan sockeye. Entry into Lake Wenatchee occurs in late July to early August. Spawning begins in mid-September in the Little Wenatchee, White, and Napeequa rivers.

Sockeye are endemic to the Wenatchee basin but were drastically depleted by irrigation diversions and overfishing in the early 1900s. The current population is a mixture of native sockeye and descendants of transfers during the Grand Coulee Dam Fish Maintenance Project which began in 1939-1941. Sockeye destined for the upper Columbia River were collected at Rock Island Dam, reared at Leavenworth National Fish Hatchery, then released into Icicle Creek or Lake Wenatchee. Additionally, 2.4 million Quinault River sockeye were released into Lake Wenatchee as part of the project. Sockeye production at Leavenworth Hatchery was discontinued in 1969. Thereafter, no hatchery production occurred until 1990 when juvenile sockeye from Wenatchee origin adults were released from net-pens in Lake Wenatchee. Wenatchee River sockeye Wenatchee River sockeye are a mixed stock of wild production.

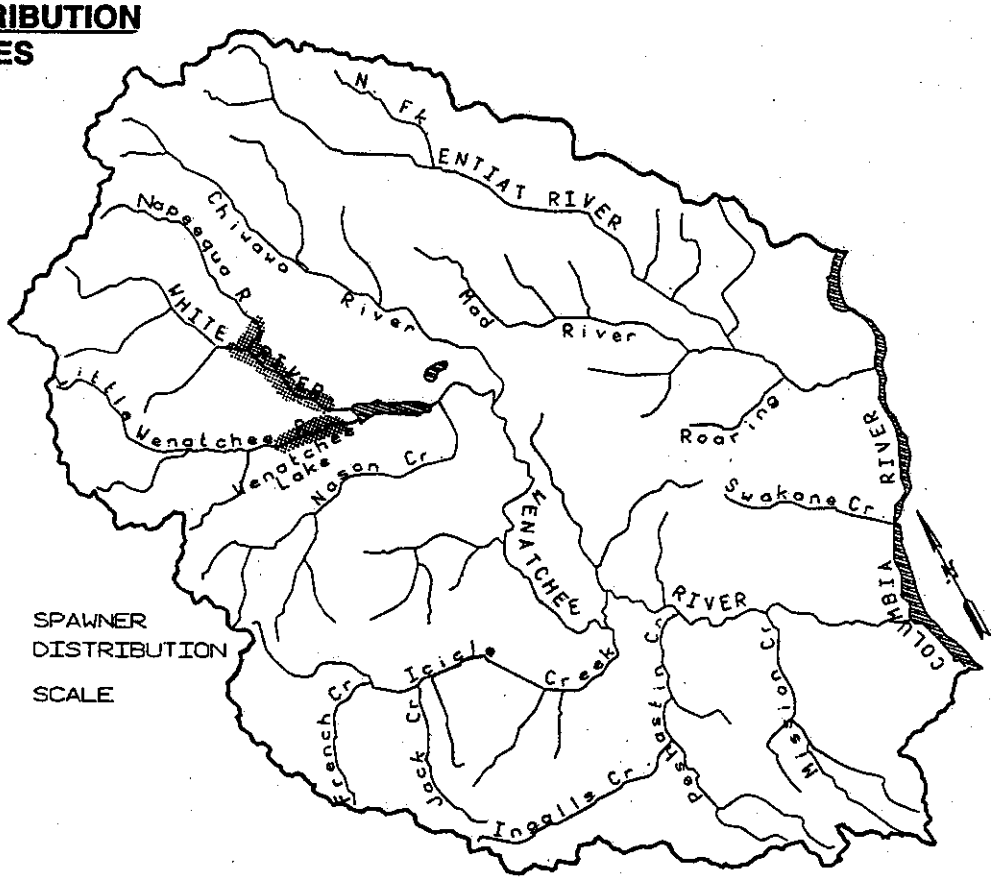
STOCK STATUS

About 50% of the current run of sockeye in the Columbia River is produced in the Wenatchee River. Since 1977, escapement to the Wenatchee River has averaged about 30,000 sockeye and ranged from 7,000 to 65,000 based on the difference in fish counts at Rock Island and Rocky Reach dams. As is common for sockeye, run-sizes have varied considerably but show no long-term trend. Spawning escapement goal is 23,000. This goal has been exceeded in recent years and has provided an opportunity for a growing recreational fishery. Recreational fisheries have occurred in 1984, 1985, 1987, 1990, 1991, and 1992. The Wenatchee River sockeye natural stock status is healthy based on escapement.

STOCK DEFINITION PROFILE for Wenatchee Sockeye

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



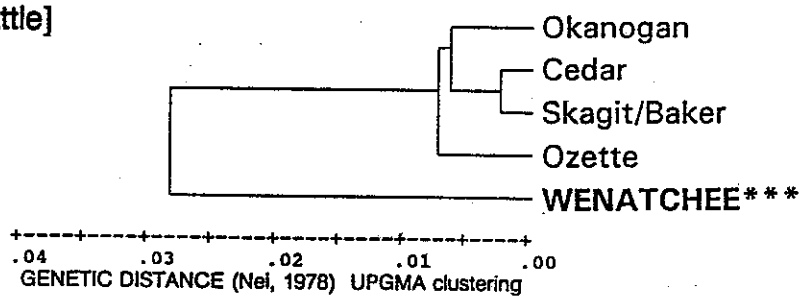
TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Stock is significantly different from all other Washington stocks (one collection from Lake Wenatchee, N=80; 30-locus G-tests: $p<0.001$).
[Source of information: NMFS -Seattle]

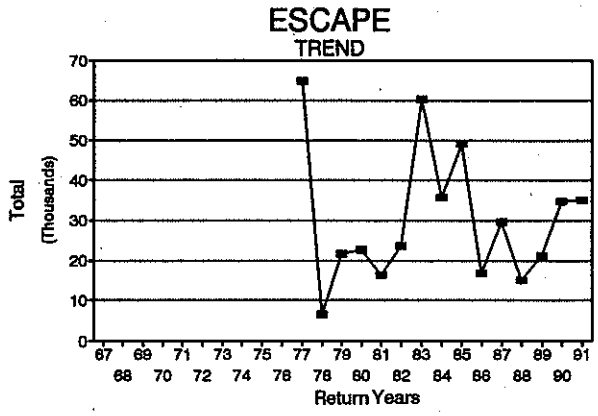


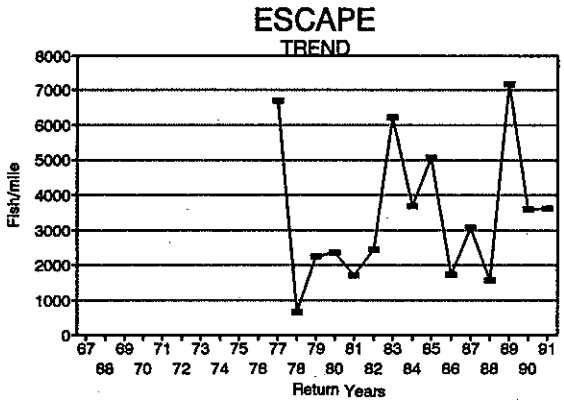
STOCK STATUS PROFILE for Wenatchee Sockeye

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	64700	6700.0		
78	6500	670.0		
79	21700	2240.0		
80	22800	2350.0		
81	16500	1700.0		
82	23700	2440.0		
83	60300	6220.0		
84	35800	3690.0		
85	49100	5060.0		
86	16900	1740.0		
87	29636	3060.0		
88	15100	1560.0		
89	21200	7190.0		
90	34900	3600.0		
91	35100	3620.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

UPPER COLUMBIA -- OKANOGAN SOCKEYE

STOCK DEFINITION AND ORIGIN

This stock is distinct based on geographical isolation, biological characteristics, and genetic differences with Wenatchee River sockeye. Okanogan River sockeye mature primarily as age-4 fish with lesser numbers of age-3 adults and a few age-5 fish. Most stay one year in the warmer fertile eutrophic waters of Lake Osooyoos before migrating to the ocean as three to four inch smolts. Spawning occurs upstream of Lake Osooyoos in the Okanogan River in the vicinity of Oliver, British Columbia.

Entry into the Columbia River begins in mid- to late June, and peaks in early July. Scale age information at Bonneville Dam shows that age-3 Okanogan River sockeye are five to ten days later than older Wenatchee stock. Migration up the Okanogan River can be delayed until September by lethally warm water during mid-summer. Some sockeye move upstream to the tailrace of Chief Joseph Dam where the Colville Confederated Tribes conduct a subsistence hook and line fishery. Peak of spawning is in the latter two weeks of October, about one month after the peak in the Wenatchee tributaries.

Sockeye are endemic to the Okanogan River basin. Nursery lake acreage was reduced to 5,700 acres in Lake Osooyoos following the blockage in 1915 to Okanogan Lake (86,000 acres) and in 1921 to Skaha Lake (5,000 acres). As part of the Grand Coulee Dam Fish Maintenance Project, juvenile sockeye were released sporadically during the 1940-1950s into Lake Osooyoos. Brood stock for these releases were collected either at Rock Island Dam during the initial years of the project or at traps on the Wenatchee, Entiat, and Methow rivers during the latter years. There have not been any hatchery releases of sockeye into the Okanogan River since the 1950s. Okanogan River sockeye are considered a native stock because of the reduced influence of hatchery transfers and the apparent specialized adaptation of the population to atypical nursery lake conditions. Okanogan River sockeye are a native stock of wild production.

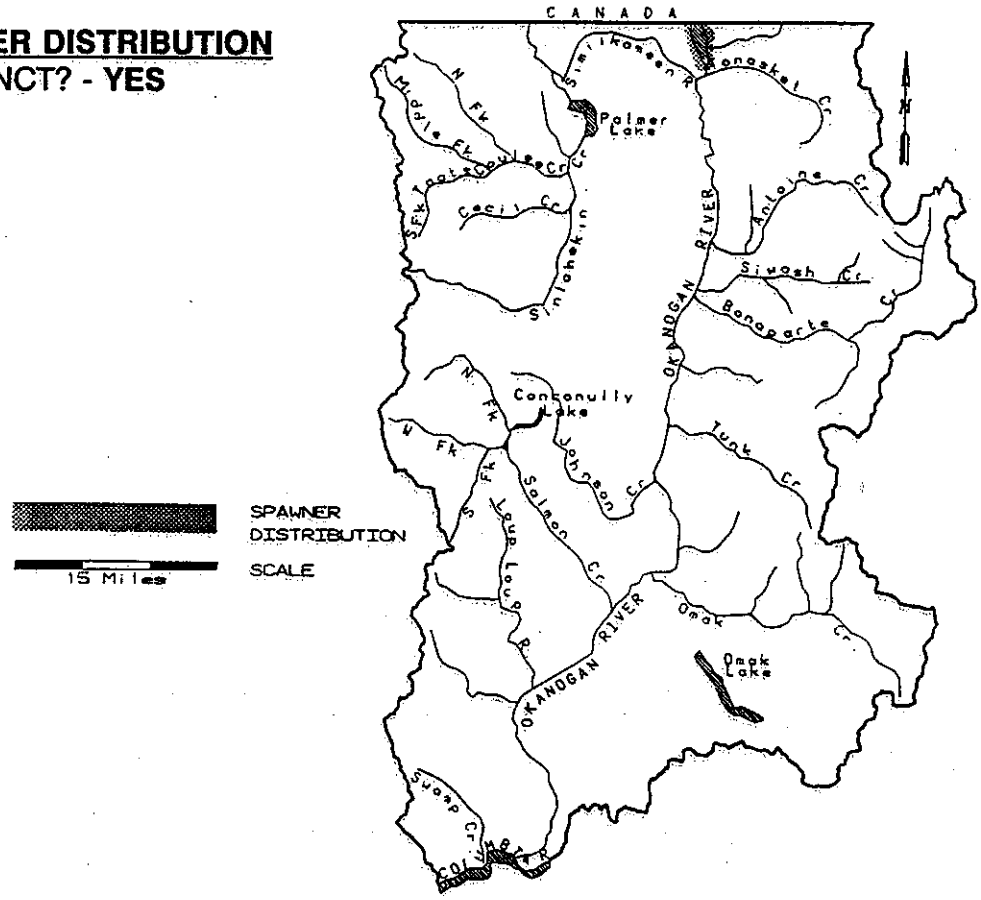
STOCK STATUS

Okanogan River sockeye represent about half of the total population of sockeye in the Columbia River. During 1977-1991, escapement over Wells Dam to the Okanogan River has averaged about 30,000 sockeye with a range of 8,000 to 73,000. Population has experienced dramatic fluctuations in abundance but shows no consistent trend over the last 15 years. However, crude estimates of prior runs show that Okanogan River sockeye have declined since the 1950s. Okanogan River sockeye natural stock status is healthy based on escapement.

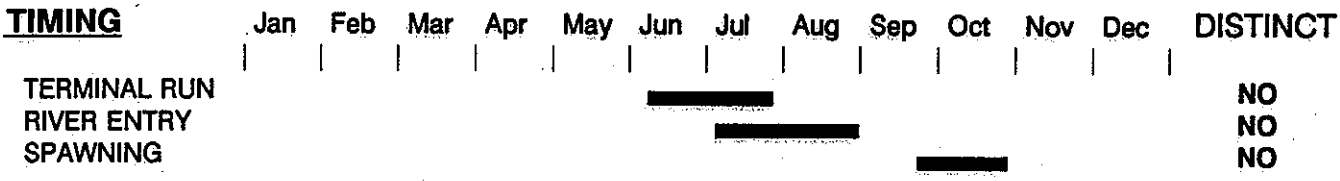
STOCK DEFINITION PROFILE for Okanogan Sockeye

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



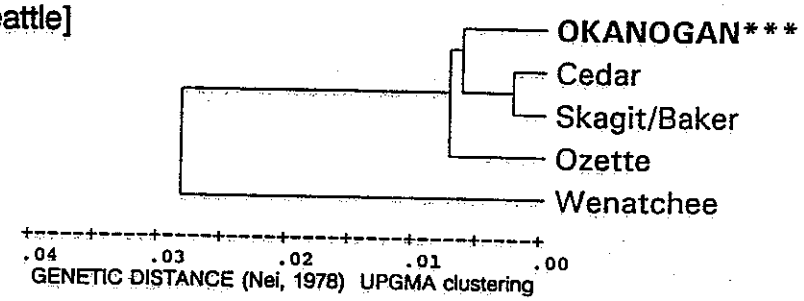
TIMING



BIOLOGICAL CHARACTERISTICS

DISTINCT? - **YES**

GENETICS - Stock is significantly different from all other Washington stocks (collection from Lake Okanogan, N=63; 30-locus G-tests: **p**<0.001).
[Source of information: NMFS -Seattle]

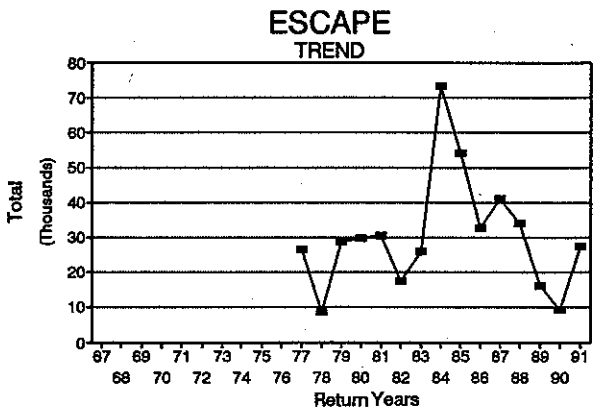


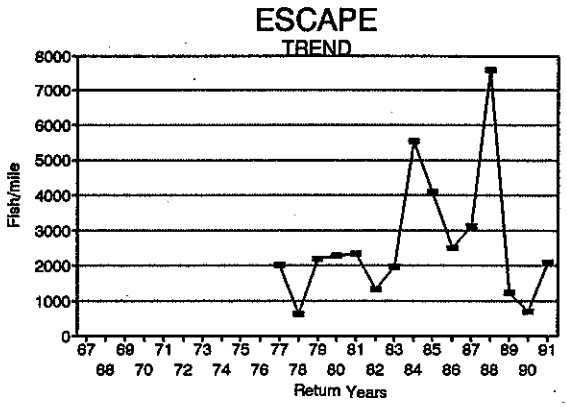
STOCK STATUS PROFILE for Okanogan Sockeye

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Total	ESCAPE Fish/mile		
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77	26600	2020.0		
78	8700	620.0		
79	28700	2170.0		
80	29900	2270.0		
81	30600	2320.0		
82	17400	1320.0		
83	26000	1970.0		
84	73300	5550.0		
85	54100	4100.0		
86	32900	2490.0		
87	41100	3110.0		
88	34100	7580.0		
89	16200	1230.0		
90	9300	700.0		
91	27400	2080.0		





AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Distribution

STOCK STATUS
Healthy

SCREENING CRITERIA

OVERVIEW - UPPER COLUMBIA SUMMER AND WINTER STEELHEAD STOCKS

SUMMER:

MAINSTEM WIND
PANTHER CREEK (WIND)
TROUT CREEK (WIND)
WHITE SALMON RIVER
KLICKITAT
ROCK CREEK
WALLA WALLA
TOUCHET
TUCANNON
ASOTIN CREEK
GRANDE RONDE
YAKIMA
WENATCHEE
ENTIAT
METHOW/OKANOGAN

WINTER:

WIND
WHITE SALMON RIVER
KLICKITAT

STOCK DEFINITION AND ORIGIN

In the Upper Columbia River, fifteen summer steelhead stocks and three winter steelhead stocks have been identified. Wild summer steelhead in the mainstem Wind River, Panther Creek (Wind), Trout Creek (Wind), White Salmon River, Klickitat River, Rock Creek, Walla Walla River, Touchet River, Tucannon River, Asotin Creek, Grande Ronde River, mainstem Yakima River, Wenatchee River, Entiat River, Methow River/Okanogan River are distinct stocks. Wild summer steelhead in the six stocks from the mainstem Wind River through Rock Creek plus the Yakima River are native while the nine summer steelhead stocks from the Walla Walla River through the Methow/Okanogan River are a mixture of native and non-native stocks. Wild winter steelhead in the Wind River, White Salmon River, and Klickitat River are distinct stocks 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 geographical isolation 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 is distinct from run-timing of the winter steelhead stocks in the Upper Columbia River.

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

UPPER COLUMBIA -- MAINSTEM WIND RIVER SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Wind River are believed to be at least three distinct stocks based on the geographical isolation of spawning adults into three drainages: mainstem Wind, Trout Creek, and Panther Creek. Genetic differences have not been determined.

The mainstem Wind River stock is native to the drainage. Run-timing is generally from May through November and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed based on chronically low spawner escapements since 1985.

An escapement goal of 957 wild steelhead has been established since 1985, but spawner escapements have ranged from 98 to 464 steelhead.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1981 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986 summer steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Marine conditions and fisheries, habitat loss due to logging, and passage mortality associated with Bonneville Dam affect production.

Harvest Management -- There is no tribal fishery that targets on this stock, although a significant number of wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery. Wild steelhead release regulations have been in effect since 1981 on the Wind River to protect the wild stock from harvest.

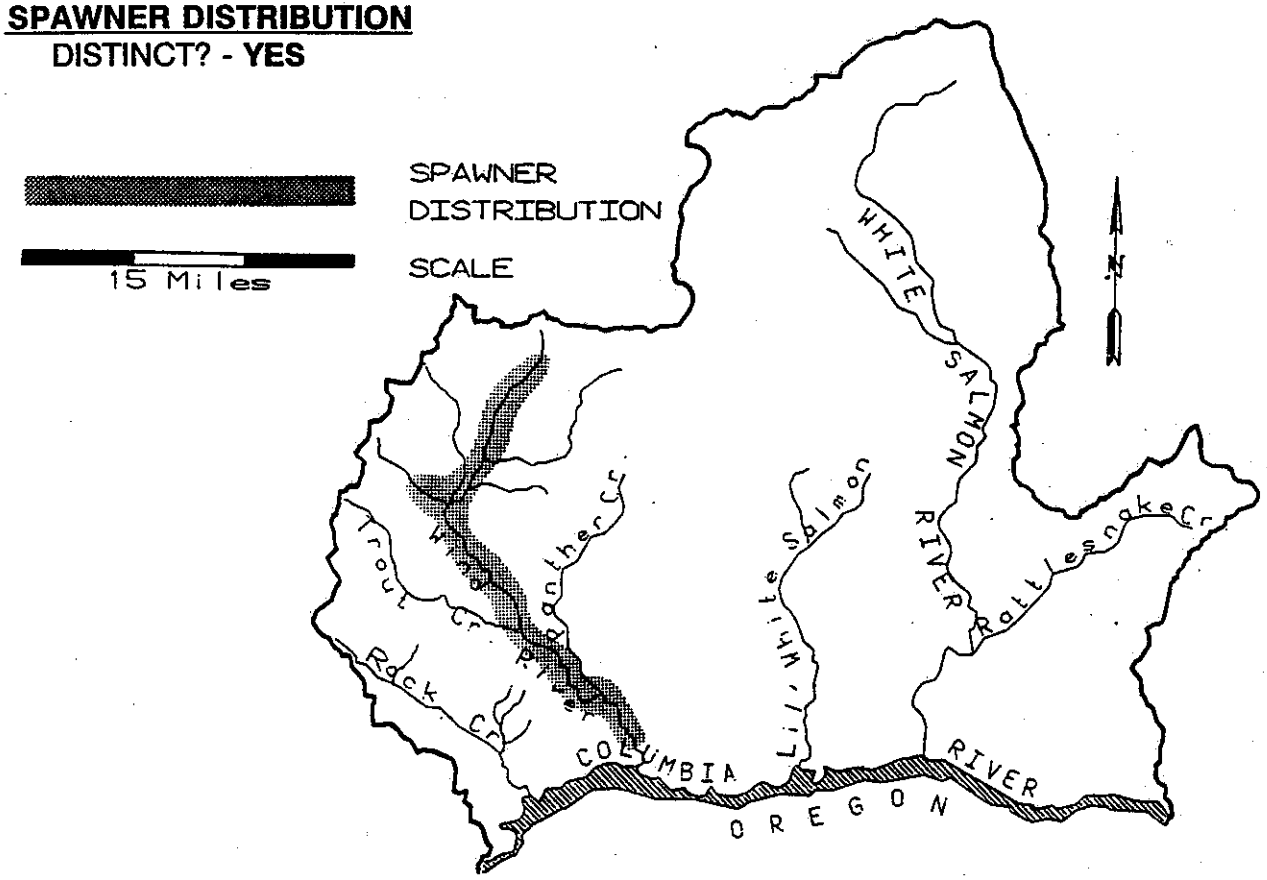
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- The mainstem Wind has been planted with hatchery summer steelhead starting in 1957. There is a concern about genetic impacts of potential interbreeding with hatchery and wild summer steelhead. No change in the spawn-timing of wild steelhead has been observed.

STOCK DEFINITION PROFILE for Mainstem Wind R Summer Steelhead

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? - UNKNOWN

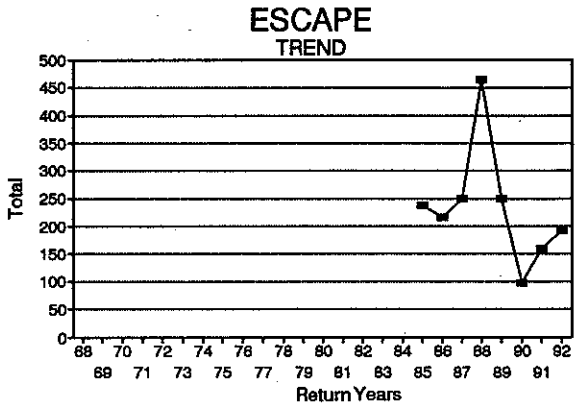
STOCK STATUS PROFILE for Mainstem Wind R Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85	238			
86	216			
87	250			
88	464			
89	250			
90	98			
91	159			
92	192			

Escapement Goal=957



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

UPPER COLUMBIA -- PANTHER CREEK (WIND) SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Wind River are believed to be at least three distinct stocks based on the geographical isolation of spawning adults into three drainages: mainstem Wind, Trout Creek, and Panther Creek. Genetic differences are also assumed between the three stocks, but have not been measured.

The Panther Creek stock is native to the drainage. Run-timing is generally from May through November and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed based on chronically low spawner escapements since 1985.

An escapement goal of 242 wild steelhead has been established since 1985, but the spawner escapements have ranged from 26 to 114 wild steelhead.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1981 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986 summer steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Marine conditions and fisheries affect production. Freshwater habitat has been impacted by land use (forest management) activities. There is substantial passage mortality associated with Bonneville Dam.

Harvest Management -- There is no tribal fishery that targets on this stock, although a significant number of wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery. Wild steelhead release regulations have been in effect since 1981 on the Wind River to protect the wild stock from harvest.

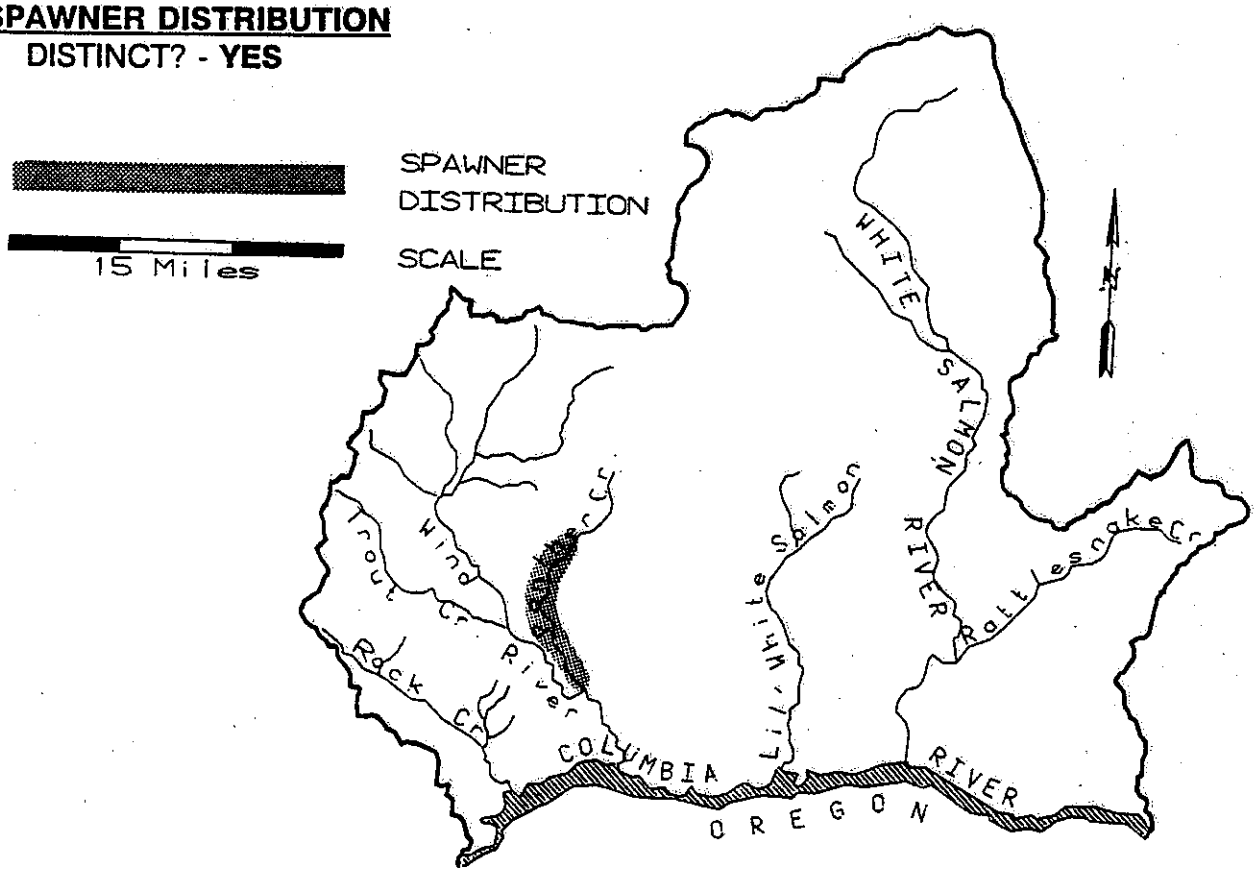
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- There is concern about the genetic impact of potential interbreeding between hatchery and wild summer steelhead.

STOCK DEFINITION PROFILE for Panther Cr (Wind) Summer Steelhead

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? - UNKNOWN

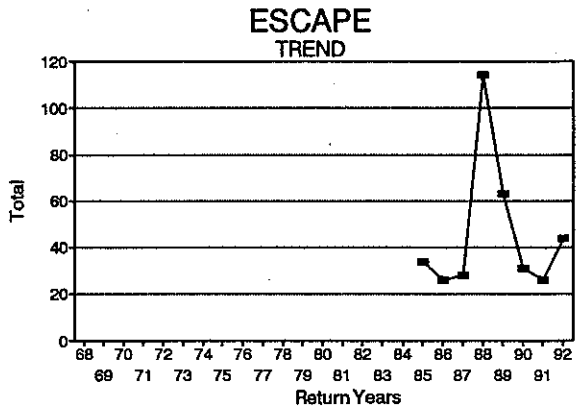
STOCK STATUS PROFILE for Panther Cr (Wind) Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85	34			
86	26			
87	28			
88	114			
89	63			
90	31			
91	26			
92	44			

Escapement Goal=242



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

UPPER COLUMBIA -- TROUT CREEK (WIND) SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Wind River are believed to be at least three distinct stocks based on the geographical isolation of spawning adults into three drainages: mainstem Wind, Trout Creek, and Panther Creek. Genetic differences are also assumed between the three stocks, but have not been measured.

The Trout Creek stock is native to the drainage. Run-timing is generally from May through November and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed based on chronically low spawner escapements since 1985.

An escapement goal of 358 wild steelhead has been established since 1985, but spawner escapement has ranged from 51 to 330 wild steelhead.

Wild sport harvest is not available because wild steelhead release regulations have been in effect since 1981 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986 summer steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Marine conditions and fisheries, habitat loss due to logging, and passage mortality associated with Bonneville Dam affect production.

Harvest Management -- There is no tribal fishery that targets on this stock, although a significant number of wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery. Wild steelhead release regulations have been in effect since 1981 on the Wind River to protect the wild stock from harvest.

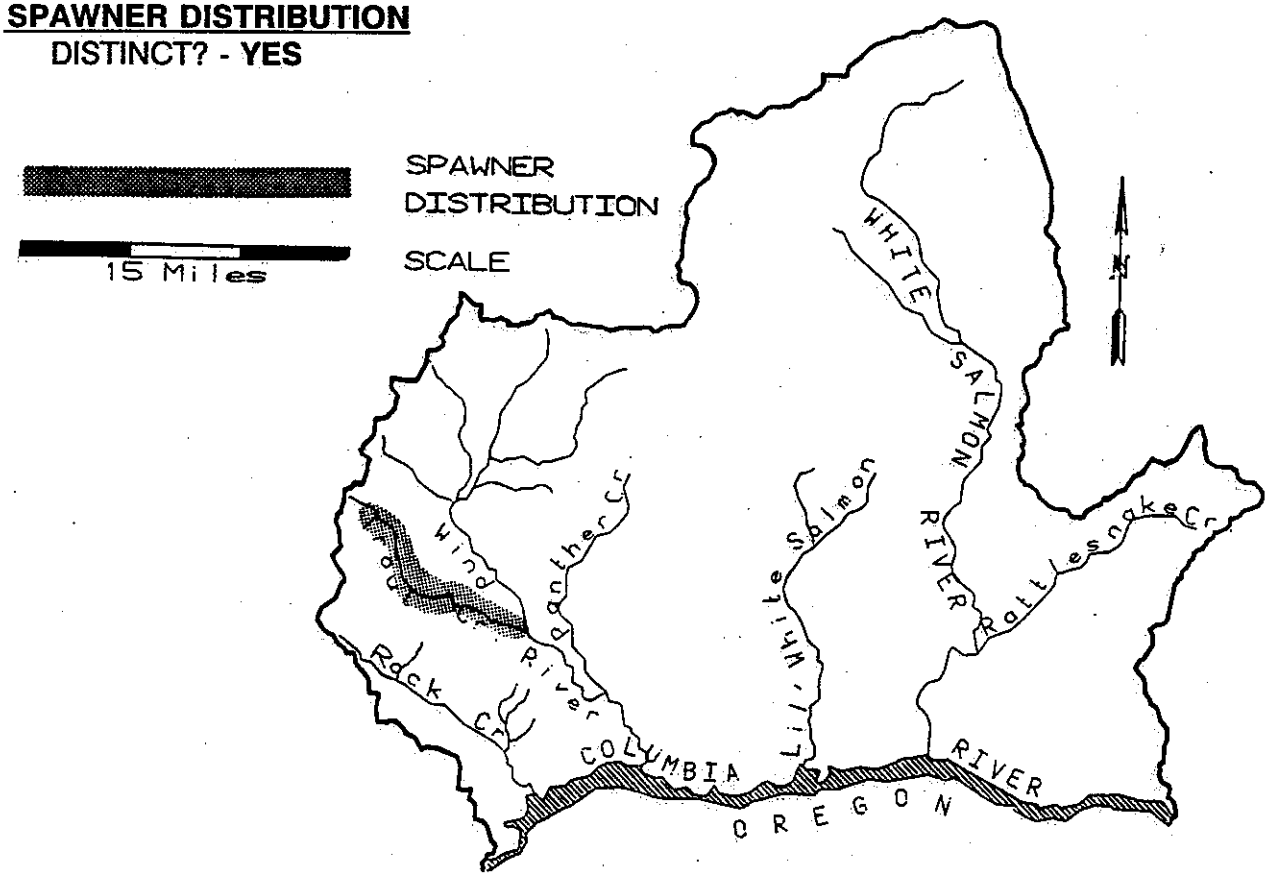
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- There is concern about the genetic impact of potential interbreeding between hatchery and wild summer steelhead. Trap counts conducted in 1992 at Trout Creek indicate almost no movement of hatchery steelhead into the drainage.

STOCK DEFINITION PROFILE for Trout Cr (Wind) Summer Steelhead

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

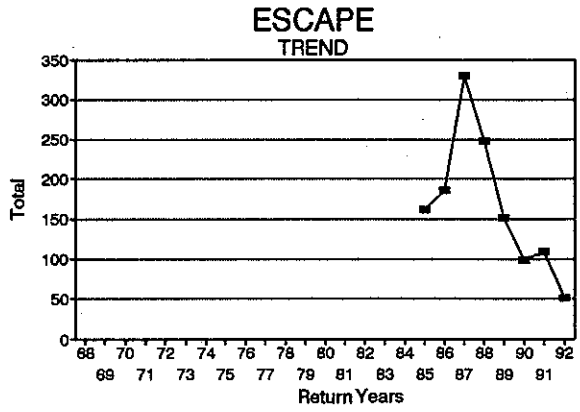
DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for Trout Cr (Wind) Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Fair

Return Years	ESCAPE Total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85	162			
86	186			
87	330			
88	248			
89	151			
90	99			
91	109			
92	51			



Escapement Goal=358

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

UPPER COLUMBIA -- WHITE SALMON RIVER SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the White Salmon River were originally native. It is uncertain whether a stock exists that has not hybridized with hatchery steelhead planted or strayed into the river.

Due to the construction of Condit Dam in 1913, only the 3.3 miles of river below the dam are accessible to anadromous fish. Of this 3.3 miles, only a small part is suitable for steelhead spawning. This has made it extremely hard for White Salmon wild winter steelhead stocks to be reproductively isolated. Run-timing is generally from May through November and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

Work is ongoing at this time to collect tissue samples from adult and juvenile steelhead in the White Salmon to determine the genetic characteristics of the steelhead living and rearing there. This work is being done by Pacific Corp (the owners of Condit Dam) and the Washington Department of Wildlife.

STOCK STATUS

The status of this stock is Depressed.

The wild White Salmon River steelhead stock has certainly been impacted by the reduction of accessible spawning and rearing habitat due to the construction of hydroelectric dams. Approximately 70% of the spawning and rearing habitat are presently not accessible to steelhead.

The steelhead stock is chronically low in abundance and rated as Depressed due to the loss of access to available habitat upstream of Condit Dam.

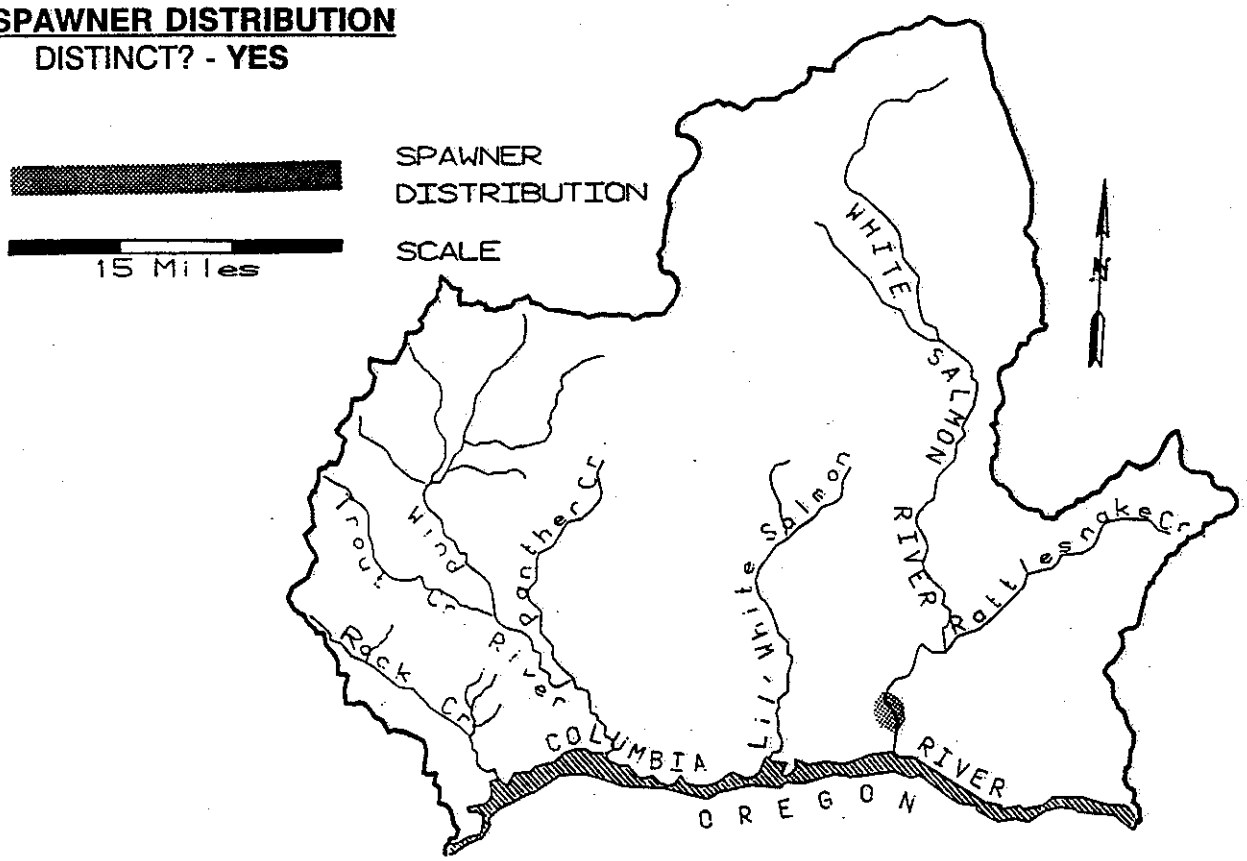
Based on work from the subbasin plan for the White Salmon River, the area downstream of Condit Dam is estimated to contain habitat suitable enough to produce a wild fish run-size of only 50 adults.

Spawner surveys were started in 1992 to document spawn-timing and whether the fish spawning were hatchery or wild, winter or summer steelhead. This will be continued in 1993.

STOCK DEFINITION PROFILE for White Salmon R Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for White Salmon R Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Unknown

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Unknown

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Due to the construction of Condit Dam in 1913, only the 3.3 miles of river downstream of the dam are accessible to anadromous fish. Of this 3.3 miles, only a small part is suitable for steelhead spawning.

Harvest Management -- There is no tribal fishery that targets on this stock, although wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery. Wild summer steelhead have been protected from sport harvest with wild steelhead release regulations since 1986.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- It is uncertain whether this is a separate stock or a hybridized stock.

UPPER COLUMBIA -- KLICKITAT SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Klickitat River, Swale Creek, Little Klickitat River, White Creek, Trout Creek, and tributaries are native to the system and a distinct stock based on the geographical isolation of the spawning population from other stocks in the Columbia River system.

Run-timing is generally from May through November and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

Little is known about the genetic composition of the stock. Genetic analysis of the wild steelhead in the Klickitat system is ongoing. Tissue samples from juvenile and adult steelhead have been collected by Yakima Tribal biologists, WDW biologists, and volunteers from several fishing clubs. Electrophoretic analysis and comparison with other steelhead stocks is being done by the Washington Department of Fisheries Genetics Lab.

STOCK STATUS

The status of the stock is Unknown. Limited spawner survey work that has been done and has shown very low utilization of the spawning habitat.

Anglers also report low catches of wild steelhead in the Klickitat. Wild steelhead release regulations have been in effect since 1986 to try and rebuild spawning escapement.

FACTORS AFFECTING PRODUCTION

Habitat -- Freshwater habitat has been impacted by land use (forest management) activities. There is substantial mortality associated with passage of juveniles and adults over Bonneville Dam.

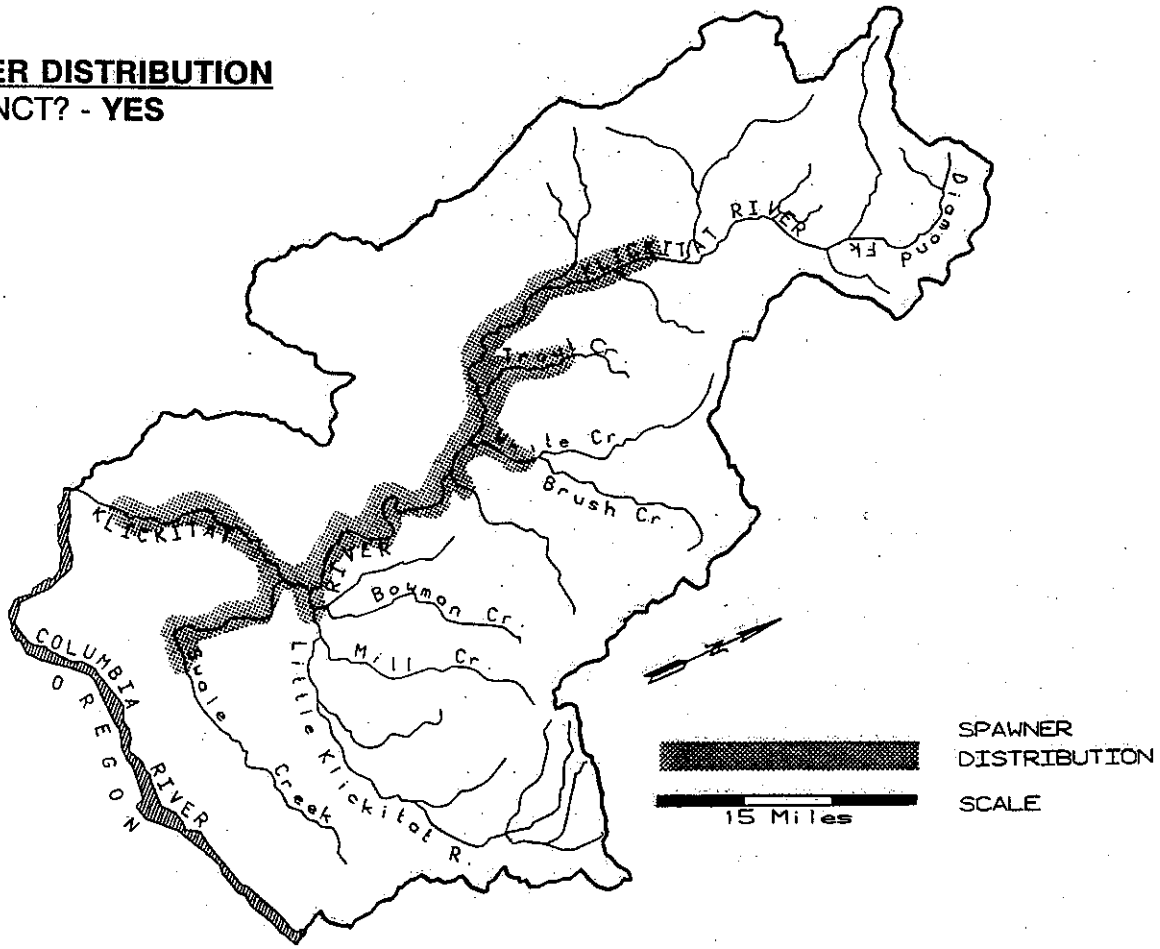
Harvest Management -- There is no tribal fishery that targets on this stock, although wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery. This stock has been managed with wild steelhead release regulations to protect the wild stock from sport harvest since 1986.

Hatchery -- The Klickitat mainstem has been planted with hatchery summer steelhead from Skamania stock since 1960 on a yearly basis. There is concern about the genetic impact of potential interbreeding between this stock and wild summer steelhead.

STOCK DEFINITION PROFILE for Klickitat Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Klickitat Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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				

Escapement Goal=2965

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

UPPER COLUMBIA -- ROCK CREEK SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in Rock Creek, Squaw Creek, Quartz Creek, and tributaries are native and classified as a distinct stock based on the geographical isolation of the spawning population. Run-timing is generally from May through November and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

Rock Creek enters the John Day Pool about 11 miles upstream of John Day Dam.

The Washington Department of Wildlife area fish biologist knows of no record of plants of steelhead into the Rock Creek drainage. Straying of other Columbia River hatchery stocks is thought to occur and was observed during 1988 spawner surveys.

STOCK STATUS

The status of this stock is Unknown.

Limited spawner surveys have been done and have shown spawning taking place in the upper watershed. Evidence of straying of hatchery steelhead has been observed in the lower end above the John Day pool. Spawning of hatchery fish has been observed in the lower creek during April 1988. These are probably strays from the upper Columbia tributaries. Of special note is that wild fish have to wait for fall/winter rains so they can enter the creek to spawn. Wild fish spend the summer in the mainstem Columbia where they are vulnerable to harvest and potentially severe habitat conditions.

No angler harvest information is available from steelhead permit cards for Rock Creek.

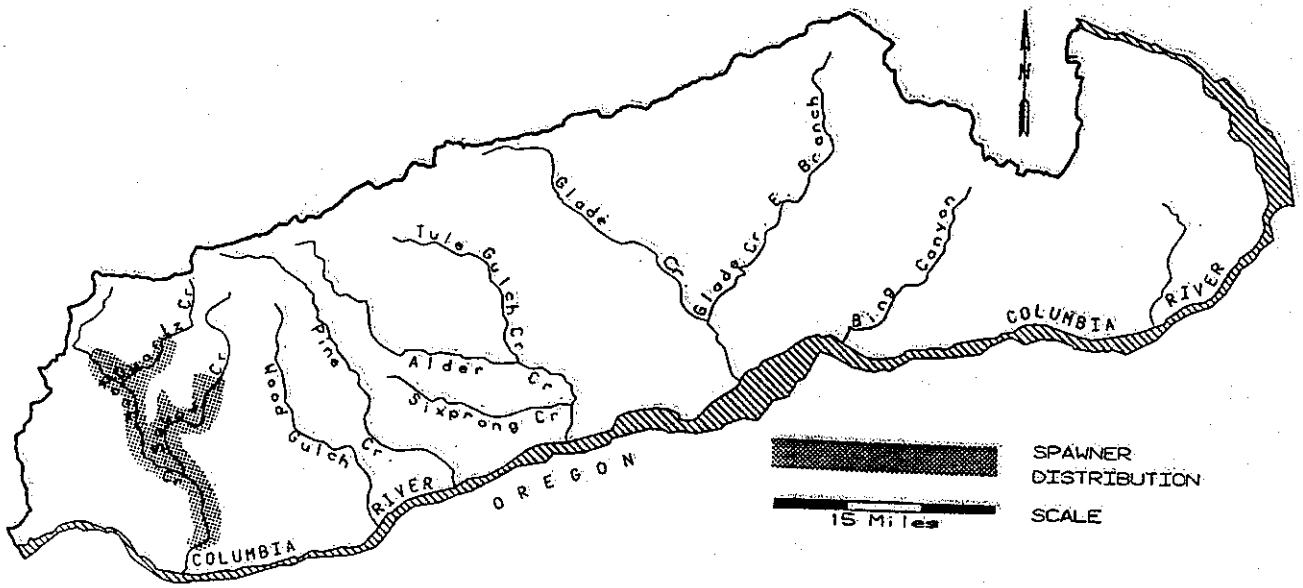
FACTORS AFFECTING PRODUCTION

Habitat -- Mortality associated with passage through mainstem dams, marine survival, low water, and high temperatures in creek for juvenile steelhead during the summer affect production.

STOCK DEFINITION PROFILE for Rock Cr Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Rock Cr Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

Harvest Management -- There is no tribal fishery that targets on this stock, although wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery.

Hatchery -- There is concern about the genetic impact of potential interbreeding between hatchery and wild summer steelhead.

UPPER COLUMBIA -- WALLA WALLA SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Walla Walla River, Mill Creek, Dry Creek, and tributaries are defined as distinct based on the geographical isolation of the spawning population. The Walla Walla River is formed by four major tributary systems: The North and South Forks of the Walla Walla that lie completely within Oregon; Mill Creek watershed which runs through portions of both Oregon and Washington but which heads in Washington; and the Touchet River with its tributaries which lie completely within Washington. Many smaller tributaries contain unknown populations of steelhead which are presumed to contribute to the Walla Walla (see map) stock. While most of the better spawning habitat within the Walla Walla is in Oregon, the small isolated populations within Washington are probably very similar to fish in the upper (Oregon) watershed and should be managed as one stock which exists in two states. There has been no genetic characterization of the Walla Walla stock of fish.

The origin of the stock is mixed. Hybridization with hatchery reared returning adults has probably occurred since 1984, however, the degree of hybridization is unknown.

Run-timing is generally from mid-October through March and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed.

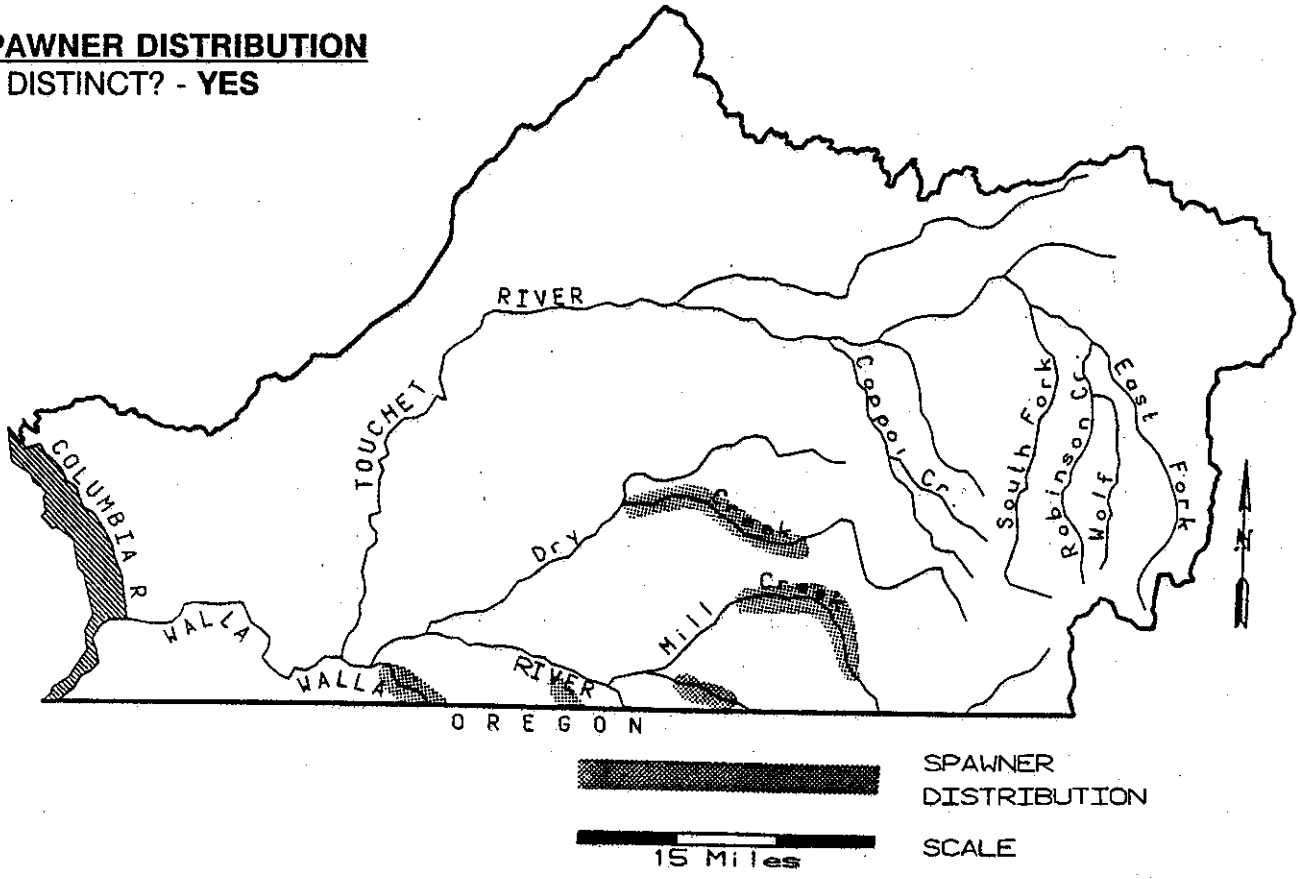
Chronic depression of the stock because of four Columbia River hydroelectric dams, and long-term habitat degradation and water withdrawal within the Washington portion of the river, keep population levels below potential. Short-term severe declines can also be experienced due to drought and dramatic climatic events. No long-term spawning ground surveys are conducted on the Walla Walla, so estimates of escapement are unavailable.

There is currently no supplementation program to enhance wild returns. A future brood stock development program for the North East Oregon Hatchery may begin in the next five years.

STOCK DEFINITION PROFILE for Walla Walla Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Walla Walla Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY-----> Poor

Return Years	NO DATA			
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 IS 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 Walla Walla River in Washington is characterized by low gradient valleys with highly erodible fine soils intermixed with medium to large gravels. Intensive agriculture within the valley utilizes most of the available surface water as well as shallow and deep well aquifers. The stream channel is unstable and receives large quantities of fine sediment and gravels. Gravel mining to maintain stream channel capacity is common. These factors in combination with very warm summer temperatures greatly limits the available habitat that can be used by steelhead. Low flows in the fall restrict steelhead from entering the river until November or December in many years. Hatchery fish have shown a willingness to bypass the river, but it is unknown whether wild fish exhibit the same behavior. Juvenile and adult mortality associated with the four Lower Columbia River dams causes significant mortality at both life stages and will continue to negate small habitat improvements within the basin unless migration survival can be improved.

Several irrigation diversions in the basin can substantially restrict passage of adults at low flows, however there have been efforts in recent years to improve passage.

Harvest Management -- The Columbia River Zone 6 Treaty Indian Net and Ceremonial and Subsistence Fisheries are limited to an incidental harvest not to exceed 15% of the estimated wild A-run of summer steelhead passing Bonneville Dam. We expect the harvest of wild Walla Walla River fish to be of this magnitude based on the harvest rate of hatchery coded wire tagged fish.

There are currently no sport fisheries in the Columbia or Snake rivers that allow the harvest of wild fish. The Walla Walla River sport fishery has been building for several years. Thousands of angler days of effort are expended each year to harvest between 800 - 1,800 hatchery steelhead annually. This effort also catches wild fish which must be released. Some hook/release mortality of wild fish does occur but it is currently unknown what percentage of the population is affected. A substantial fishery for steelhead occurs on the Columbia below the Walla Walla which is likely to handle wild fish. Again, the level of post release mortality from the fishery is unknown.

Hatchery -- The Walla Walla River is included under the Lower Snake River Compensation Plan program despite its being a Columbia River tributary. An average 151,500 smolts have been released into this river over the last ten years. A mixture of stocks have been used from both the Columbia and Snake rivers. It is likely that hybridization with wild fish has occurred although to what degree is uncertain. Oregon Department of Fish and Wildlife creel checks of the upper river have found few hatchery fish contributing to their sport fishery on the wild population. Coded wire tag releases from the Walla Walla and Touchet rivers have shown many fish caught in the sport fishery, but many being caught or observed in the Snake River as well. We believe that most returning hatchery adults either enter the Washington sport fishery, spawn in the mainstem or tributaries, or bypass the river and stray to other locations.

No significant trapping of wild fish currently occurs in the basin. A plan exists to develop a wild origin hatchery brood stock for the Walla Walla basin jointly with Oregon.

UPPER COLUMBIA -- TOUCHET SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Touchet River, its forks, Coppoi Creek, Robinson Creek, Wolf Creek, and tributaries are a distinct stock based on the geographical isolation of the spawning population. The Touchet River is a major tributary to the Walla Walla River, entering at river mile 21.6. Tagged hatchery reared fish released in the Touchet River near Dayton do not contribute significantly to the Walla Walla River sport fishery above the Touchet River; wild fish are believed to exhibit the same behavior. Fish enter the Touchet in early December depending on river flow conditions. Much of the lower river is inaccessible, but fish are believed to over-winter throughout the entire river. Fish begin actively moving again in late February and spawn from March through early May. There has been no genetic characterization of fish from any of the Walla Walla basin streams.

The origin of the stock is mixed. Hybridization with hatchery fish is likely to have occurred since 1984 with adults returning from LSRCP smolt releases. Predominately Wells and Lyons Ferry stocks of fish have been used in these releases.

STOCK STATUS

The status of the stock is Depressed.

Chronic depression of the run because of four Columbia River hydroelectric dams, and long-term habitat degradation and water withdrawal keep population levels below potential. Short-term severe declines can also be experienced due to drought and dramatic climatic events.

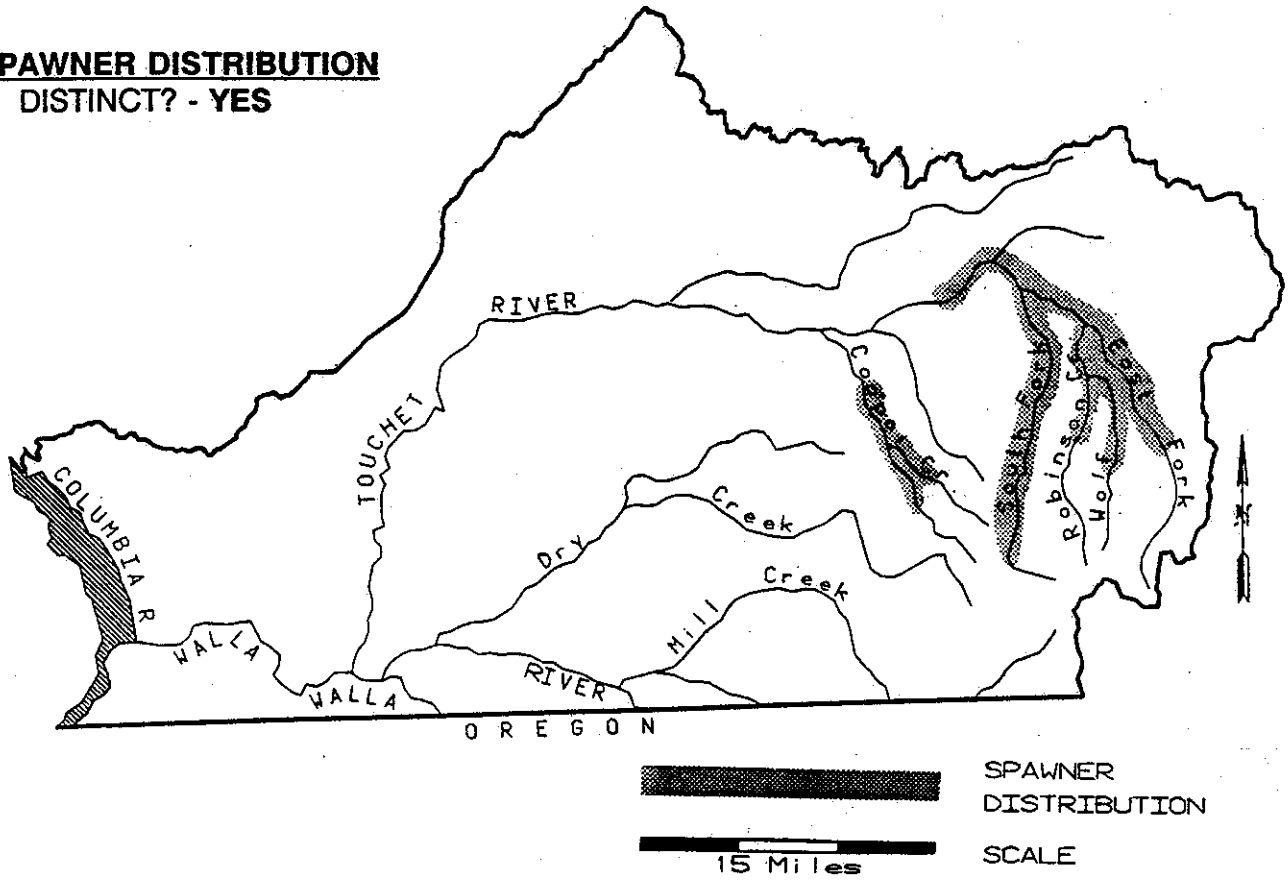
Long-term index area spawning ground surveys are conducted on the Touchet River but their reliability is highly variable and dependent on weather and river flow conditions. Estimates of escapement are thus highly variable but range between 44 and 221 fish in index areas for the last five years. The escapement goal is 600 wild steelhead.

No supplementation has occurred on the Touchet, however the ongoing LSRCP hatchery program releases hatchery origin smolts annually. A trapping project on the Touchet near Dayton is scheduled to begin in spring 1993 to help estimate the wild escapement in the system. A decision to develop a wild origin brood stock from Touchet fish will be made in the next three years.

STOCK DEFINITION PROFILE for Touchet Summer Steelhead

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

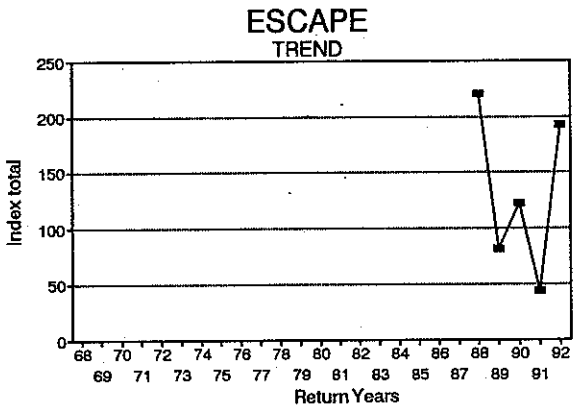
DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for Touchet Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	ESCAPE Index total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	221			
89	82			
90	122			
91	44			
92	193			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS 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 -- Juvenile and adult survival of steelhead emigrating from and returning to the Touchet River is compromised by four Lower Snake River dams and four Columbia River dams. Mortality associated with these structures is a major factor in keeping escapement below goal.

Logging, road construction, agriculture, and cattle grazing continue to negatively impact the quality of available habitat. Highly erodible soils and dramatic weather events in some years prevent many portions of the river from developing the complex habitat necessary for salmonids to thrive. Flood during the 1960s and 1970s caused much damage and the construction of many miles of dikes which prevent the natural development of habitat types within the stream. A water storage/recreation reservoir was proposed for a portion of the upper watershed which receives heavy spawning use. The reservoir has been indefinitely postponed due to poor cost/benefits.

Harvest Management -- The Columbia River Zone 6 Treaty Indian Net and Ceremonial and Subsistence Fisheries are limited to an incidental harvest not to exceed 15% of the estimated wild A-run of summer steelhead passing Bonneville Dam. We expect the harvest of Touchet River fish to be of this magnitude based on the harvest rate of hatchery coded wire tagged fish.

There are currently no sport fisheries in the Columbia or Snake rivers that allow the harvest of wild fish. The Touchet River sport fishery has remained steady or increased only slightly for several years. There are 3,000 - 6,000 angler hours of effort expended annually to catch an average of 315 fish. This effort also catches wild fish which must be released. Some hook/release mortality of wild fish does occur, but it is currently unknown what percentage of the population is affected. A substantial fishery for steelhead occurs on the Columbia below the Walla Walla which is likely to handle Touchet River wild fish. Again, the level of post release mortality from the fishery is unknown.

Hatchery -- Hatchery releases of smolts under the LSRCP program averaged 135,200 fish annually for the last ten years. All the fish are acclimated at the pond in Dayton prior to release. Residualism of smolts in the Touchet has been excessively high in the last two years. Estimates of residualism ranged from 9% to 31% for various study groups. Some competition for food and space could be occurring between these and wild juveniles. Predation may also be occurring on smaller wild fish, however the extent of this behavior is unknown.

UPPER COLUMBIA -- TUCANNON SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Tucannon River, Pataha Creek, and tributaries are a distinct stock based on the geographical isolation of the spawning population. There has also been several genetic characterizations of the stock done by researchers since 1980. There is not clear agreement whether electrophoretic differences between the Tucannon population of summer steelhead and other Snake River populations are sufficient for it to be considered an ESU (evolutionarily significant unit).

The origin of the stock is mixed. Hybridization with releases of various hatchery reared stocks of Snake River steelhead from Lyons Ferry Hatchery and Tucannon Hatchery is likely to have occurred at various levels since 1979.

Run-timing is generally from mid-October through March and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed.

Stock status is based on chronically low spawner escapement. Estimated spawning escapement has ranged from 37 to 315 wild steelhead and is less than 50% of the escapement goal of 600 wild steelhead for six of the last seven years. The reliability of estimates varies greatly between year because of weather and river flow conditions. Juvenile rearing densities have remained steady or increased slightly since 1981, but it is uncertain whether stable juvenile densities may be the result of increased hatchery steelhead spawning.

No supplementation is ongoing, however a brood stock development program has begun to improve the quality and compatibility of returning hatchery reared adult steelhead into the system.

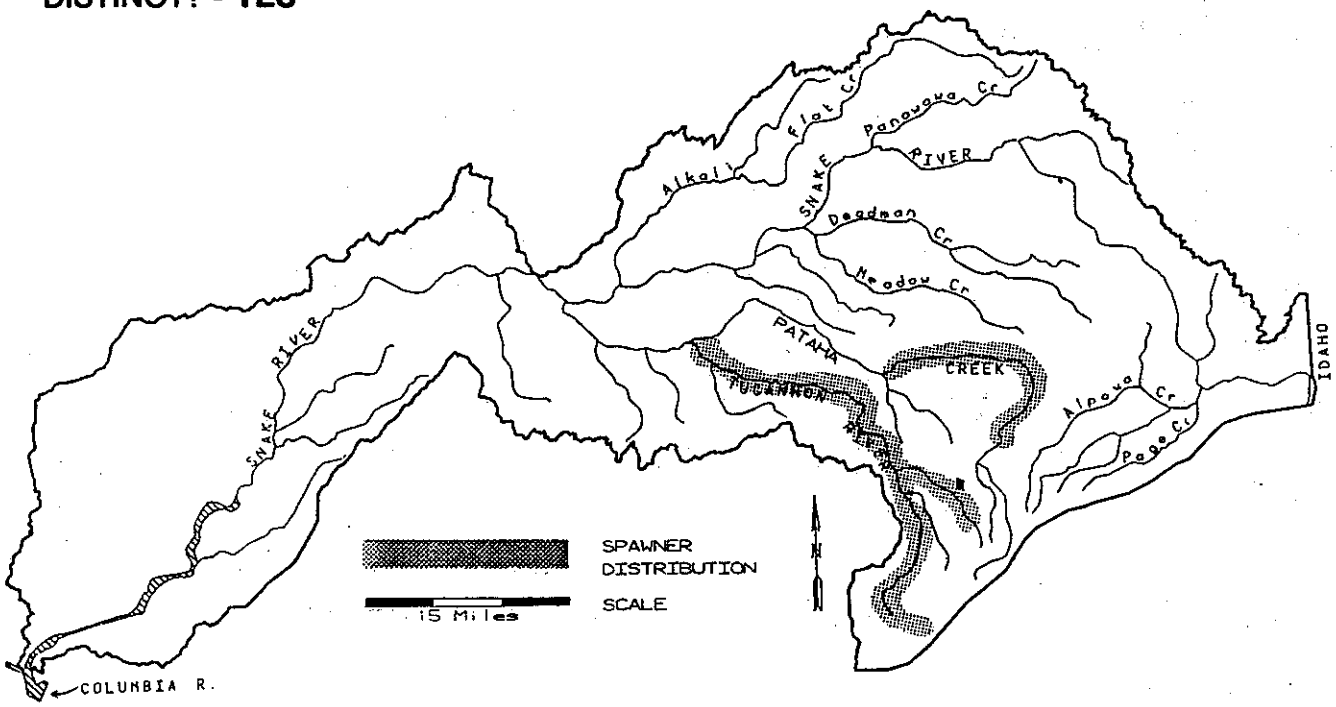
FACTORS AFFECTING PRODUCTION

Habitat -- Juvenile and adult survival of steelhead emigrating from and returning to the Tucannon River is compromised by four Lower Snake River dams and four Columbia River dams. Mortality associated with these structures is a major factor in keeping escapement below goal.

STOCK DEFINITION PROFILE for Tucannon Summer Steelhead

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? - YES

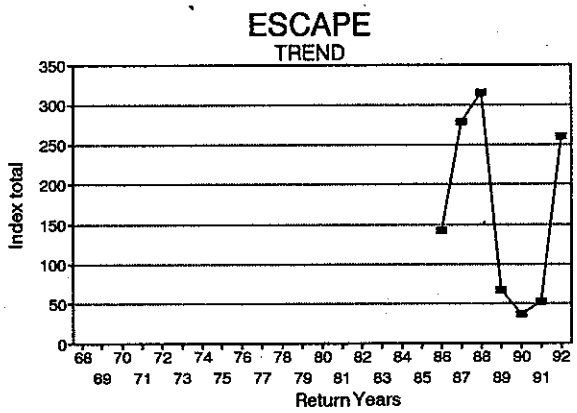
GENETICS - Tucannon River summer steelhead have been characterized genetically in two studies in the last 12 years and are currently part of an ongoing supplementation monitoring study. They are recognizably distinct.

STOCK STATUS PROFILE for Tucannon Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Index total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86	143			
87	279			
88	315			
89	68			
90	37			
91	53			
92	260			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

In general, the habitat quality within the Tucannon River is good, however dramatic flood events in the 1960s and 1970s radically altered the instream habitat. Large woody debris is slowly re-entering the system and increasing the complexity of habitat to the benefit of salmonids. Logging, road construction, agriculture, and cattle grazing continue to negatively impact the quality of available habitat. Because of increasing stability of flood damaged areas, with time and the expected benefits of increased habitat protection within the Tucannon because of the presence of threatened spring Chinook salmon, overall habitat quality could improve in the future.

Harvest Management -- There are currently no sport fisheries in the Columbia or Snake rivers that allow the harvest of wild fish. Some hook/release mortality of wild fish does occur, but it is currently unknown what percentage of the population is affected.

The Columbia River Zone 6 Treaty Indian Net and Ceremonial and Subsistence Fisheries are limited to an incidental harvest not to exceed 15% of the estimated wild A-run of summer steelhead passing Bonneville Dam. Tag recoveries from hatchery reared fish released into the Tucannon from LFH have been estimated at 15 - 16% of the total return. Based on these figures, we expect the harvest of wild Tucannon fish to be similar.

Hatchery -- The Tucannon River was one of the areas described as impacted by construction of the Lower Snake River hydroelectric dams. Mitigation for the damage was negotiated through the Lower Snake River Compensation Plan (LSRCP). As a result of this agreement, 160,000 steelhead smolts are reared annually at Lyons Ferry Hatchery for release into the Tucannon. These smolts are returning to contribute about 300 fish annually to the sport fishery and an estimated 300-400 fish escapement to spawn. Until 1991, no wild fish were removed for hatchery purposes. A floating weir at the hatchery (RM 35.5) used for trapping Chinook salmon and steelhead may be impeding passage of some wild fish into the upper 15 miles of the watershed.

UPPER COLUMBIA -- ASOTIN CREEK SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in Asotin Creek, Charley Creek, and tributaries are a distinct stock based on the geographical isolation of the spawning population. Some genetic characterization work was done in the 1980s but is incomplete and too small to determine genetic distinctness from other upper Snake River tributary populations.

The origin of the stock is mixed. Hybridization is likely to have occurred between 1984-1988 when returning adults from hatchery planted smolts were observed spawning in large numbers. No steelhead have been released in the upper watershed since 1986 although many are released at the mouth of Asotin Creek and may escape into the stream to spawn.

Run-timing is generally from mid-October through March and spawn-timing is generally from early March through May for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed.

Juvenile emigration and adult escapement must occur through eight Snake and Columbia River dams which has kept the estimated spawning escapement less than or equal to only 50% of the goal of 160 wild steelhead for the last four years. Juvenile density has remained stable or increased slightly since 1981. It is uncertain whether this stability is due to stable wild escapement over those years or to increased hatchery fish escapement.

No supplementation program is currently active in Asotin Creek.

FACTORS AFFECTING PRODUCTION

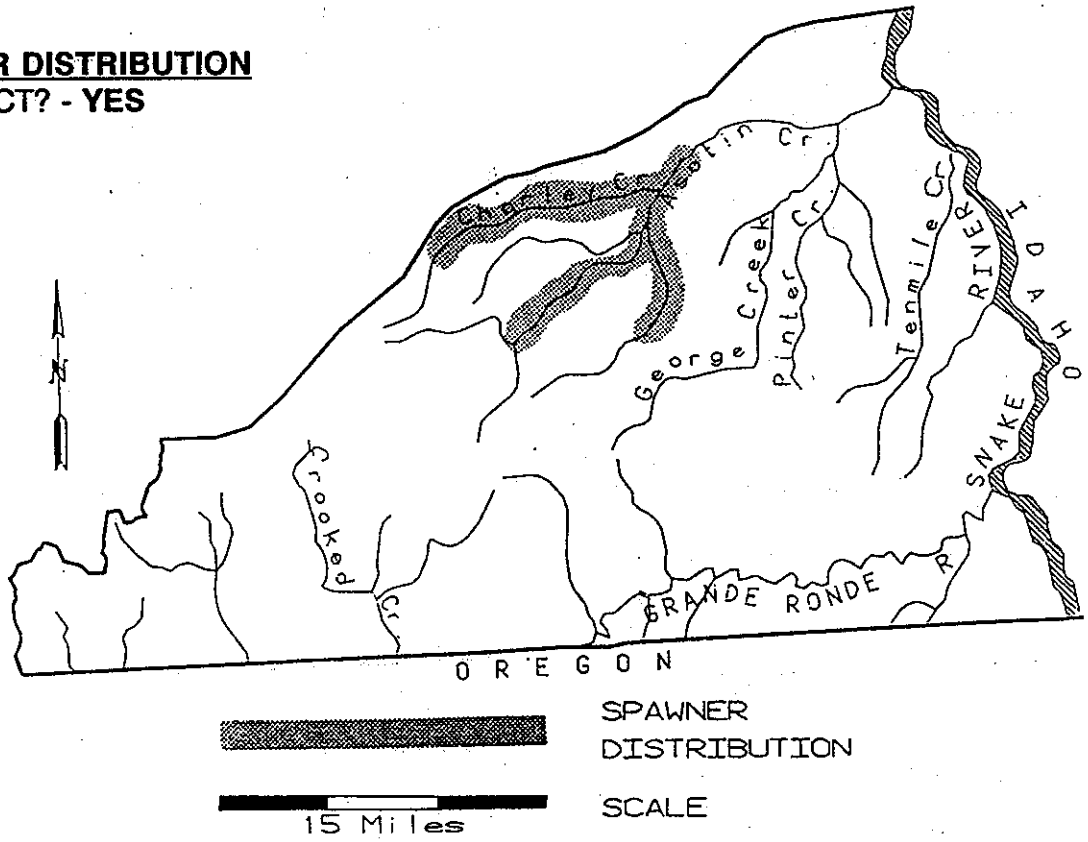
Habitat -- Juvenile and adult survival of steelhead emigrating from and returning to Asotin Creek is compromised by four Lower Snake River dams and four Columbia River dams. Mortality associated with these structures is a major factor in keeping escapement below its capability. Without improvements to passage survival at the dams, it is unlikely that significant increases in the wild population will occur.

In general, the habitat quality within Asotin Creek is fair. Dramatic flood events in the 1960s and 1970s radically altered the instream habitat. Large woody debris is slowly re-entering the system and increasing the complexity of habitat to the benefit of salmonids. Logging, road construction, agriculture, and cattle

STOCK DEFINITION PROFILE for Asotin Cr Summer Steelhead

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? - UNKNOWN

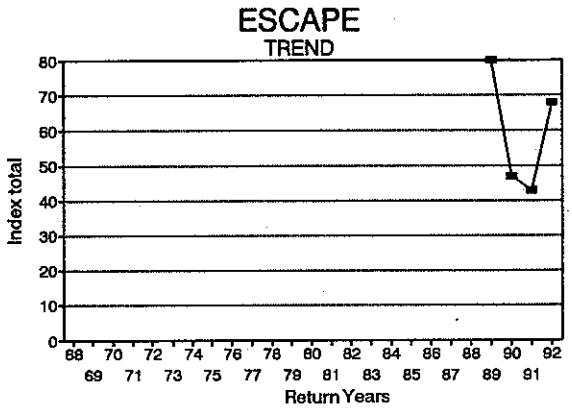
GENETICS - Some genetic characterization has been done. Similarities exist between Asotin Creek summer steelhead and Grande Ronde and Salmon River A-run summer steelhead.

STOCK STATUS PROFILE for Asotin Cr Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Good

Return Years	ESCAPE Index total			
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	80			
90	47			
91	43			
92	68			



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

NO INFORMATION IS AVAILABLE FOR ASOTIN CREEK STEELHEAD CONTRIBUTION TO DOWN RIVER NON-SELECTIVE FISHERIES

grazing continue to negatively impact the quality of available habitat. There may be some benefits of increased habitat protection within the drainage because of the presence of threatened spring Chinook salmon.

Harvest Management -- There are currently no sport fisheries in the Columbia or Snake rivers that allow the harvest of wild fish. Some hook/release mortality of wild fish does occur, but it is currently unknown what percentage of the population is affected.

The Columbia River Zone 6 Treaty Indian Net and Ceremonial and Subsistence Fisheries are limited to an incidental harvest not to exceed 15% of the estimated wild A-run of summer steelhead passing Bonneville Dam. We expect the harvest of wild Asotin Creek fish to be of this magnitude based on the harvest rate of hatchery coded wire tagged fish.

Hatchery -- Steelhead were trapped in Asotin Creek in the 1950s and early 1960s to help develop the then Washington Game Department's summer steelhead hatchery program. In the 1970s, Asotin Creek was recognized as one of Washington's tributaries which had been damaged by construction of the four lower Snake dams. The LSRCP mitigation plan included production to replace the lost fish from Asotin Creek. Hatchery origin steelhead of Wells and Wallowa stocks were released high into the system from 1983 through 1986. All hatchery releases have occurred near the mouth since 1987 with a measurable drop in escaping hatchery adults to the spawning grounds.

UPPER COLUMBIA -- GRANDE RONDE SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Grande Ronde River and tributaries are a distinct stock based on the geographical isolation of the spawning population. Available genetic information is not definitive for this stock of fish. Grande Ronde wild steelhead are some of the earliest fish entering the upper Snake Rive drainage area. Fish arrive at the mouth by mid August and frequently begin entering the fishery before the first September. Spawning occurs from early March through May and is scattered throughout the basin in very small to large tributaries. It is not currently known whether there is any significant differences within the population based on this scattered spawning distribution. Fish spawning in the Wenah River may be a different stock but there is currently no information upon which to base a decision.

The origin of the stock is mixed. Hybridization with Wallowa stock summer steelhead used in LSRCP production for the Grande Ronde is likely to have occurred since 1983.

STOCK STATUS

The status of the stock is Depressed.

No spawning ground surveys are done on a regular basis that allow an assessment of escapement over time, however, juvenile emigration and adult escapement must occur through eight Snake and Columbia River dams.

No supplementation program is currently active in the Grande Ronde River. A large production of hatchery smolts is released from a conditioning pond on Cottonwood Creek annually. Adult returns from the releases support an active fishery and contribute to the spawning population. Hatchery fish are trapped at Cottonwood Creek to be used as brood stock, but all wild fish are allowed to escape and spawn naturally.

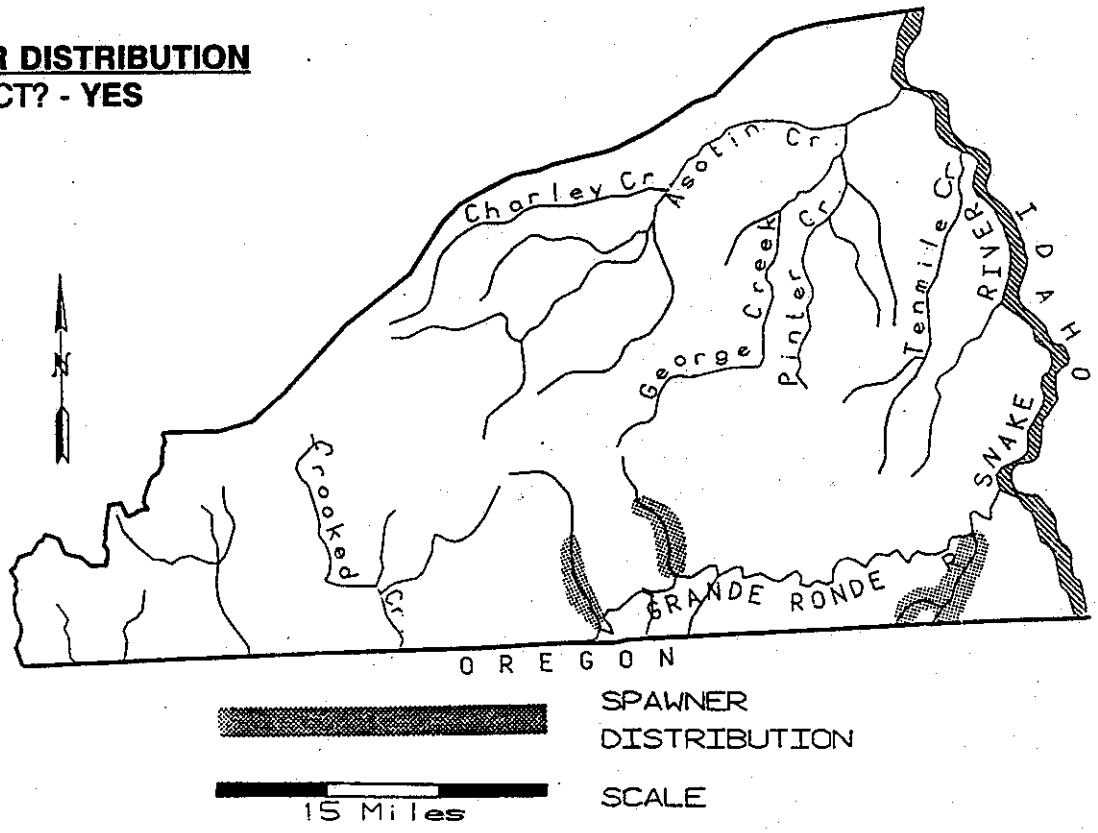
FACTORS AFFECTING PRODUCTION

Habitat -- Juvenile and adult survival of steelhead emigrating from and returning to the Grande Ronde basin is compromised by four Lower Snake River dams and four Columbia River dams. Mortality associated with these structures is a major factor in keeping escapement below its capability. Without improvements to passage survival at the dams, it is unlikely that significant increases in the wild population will occur. Also, forest management practices and agriculture contribute to water quality problems which may limit the ability of the watershed to respond with increased production to any increased escapement.

STOCK DEFINITION PROFILE for Grande Ronde Summer Steelhead

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? - UNKNOWN

GENETICS - Some genetic characterization has been done. Similarities exist between Grande Ronde summer steelhead and Asotin Creek and Salmon River A-run summer steelhead.

STOCK STATUS PROFILE for Grande Ronde Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Composite

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

Harvest Management -- The Columbia River Zone 6 Treaty Indian Net and Ceremonial and Subsistence Fisheries are limited to an incidental harvest not to exceed 15% of the estimated wild A-run of summer steelhead passing Bonneville Dam. We expect the harvest of wild Grande Ronde River fish may be less than for other stocks of fish because their early run-timing may make them less available to the fishery.

There are currently no sport fisheries in the Columbia or Snake rivers that allow the harvest of wild fish. The Snake and Grande Ronde River sport fisheries have been building for several years. Thousands of angler days of effort are expended each year to harvest between 9,000-18,000 hatchery steelhead. This effort also catches wild fish which must be released. Some hook/release mortality of wild fish does occur but it is currently unknown what percentage of the population is affected.

Hatchery -- Hatchery releases of steelhead smolts averages 250,000 fish annually into the Washington portion of the river. Oregon releases between 1,000,000 and 1,250,000 smolts annually into the upper Grande Ronde River and tributaries. Coded wire tag recoveries by ODFW and WDW have shown harvest rates on returning adults of from 35% to 60% for Washington's releases and from 75% to 90% harvest on Oregon's fish. Many of the fish escaping the sport fisheries are trapped at facilities and prevented from spawning. Some fish do enter the spawning population and could be expected to hybridize readily with wild fish because of the close genetic similarities with them.

UPPER COLUMBIA -- YAKIMA SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Yakima River and tributaries are a distinct stock based on the geographical isolation of the spawning population. Historically, steelhead were found in all reaches of the mainstem Yakima River and its tributaries (estimated run-size of 100,000) (Smoker, 1956). Preliminary radio-telemetry studies conducted in the Yakima River subbasin by the National Marine Fisheries Service (NMFS) identified five distinct steelhead spawning populations. These were Satus Creek, Toppenish Creek, Naches River, the mainstem Yakima River between Wapato and Roza Dams, and the mainstem Yakima River upstream of Roza Dam (NMFS, 1992). Electrophoretic studies conducted by the Washington Department of Fisheries (WDF) indicate that Satus Creek steelhead are distinct from other steelhead in the basin, but it is unclear whether Naches and upper Yakima steelhead are genetically distinct (WDF, 1992).

Run-timing is generally from September through May and spawn-timing is generally from mid-February through May for wild summer steelhead in this stock.

The wild steelhead run is native. Interbreeding with introduced Skamania and Wells hatchery stocks may have occurred. Between 1986 and 1990 only natural wild Yakima River stocks were used in hatchery production for supplementing wild native stocks (Northwest Power Planning Council, 1990).

Age and size composition of wild summer steelhead adults is 52% one-salt (average fork length = 60.5 cm) and 48% two-salt (average fork length = 71.5 cm). The sex ratio is 67% females and 33% males. Fecundity averages 4,858 eggs/female for one-salts and 7,119 eggs/female for two-salts.

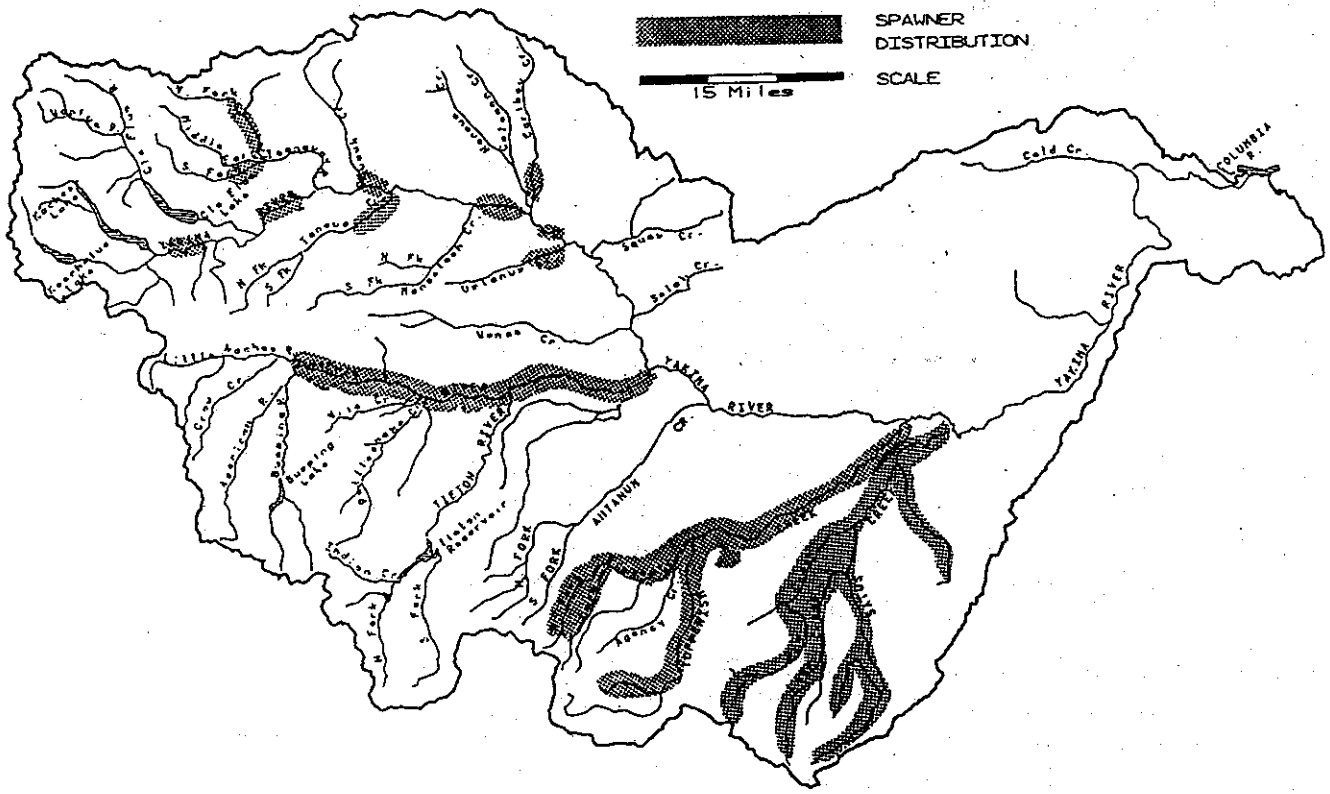
Fry emergence occurs from May through June in the lower subbasin and from June through August in the upper subbasin. Juvenile (smolt) outmigration occurs from April through June, peaking in early May.

Survival rates are about 8% from egg-to-headwater smolt and about 2.1% from headwater smolt-to-adult (1983 and 1984 brood years) (Northwest Power Planning Council, 1990).

STOCK DEFINITION PROFILE for Yakima Summer Steelhead

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? - UNKNOWN

GENETICS - Preliminary radio-telemetry studies suggest that five distinct stocks exist: Satus Creek, Toppenish Creek, Naches River, mainstem Yakima River between Wapato and Roza Dams, and the mainstem Yakima River upstream of Roza Dam. Electrophoretic studies indicate that Satus Creek steelhead are distinct from other steelhead in the basin, but it is unclear whether Naches and upper Yakima River steelhead are genetically distinct.

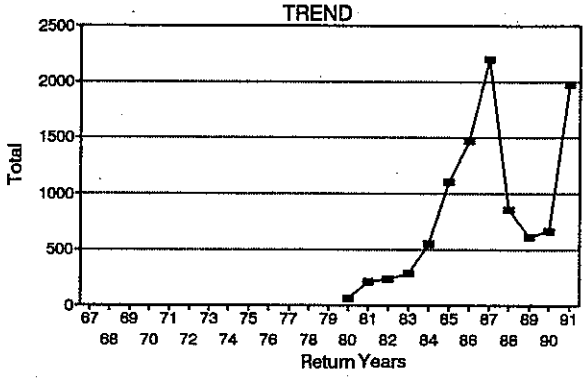
STOCK STATUS PROFILE for Yakima Summer Steelhead

STOCK ASSESSMENT

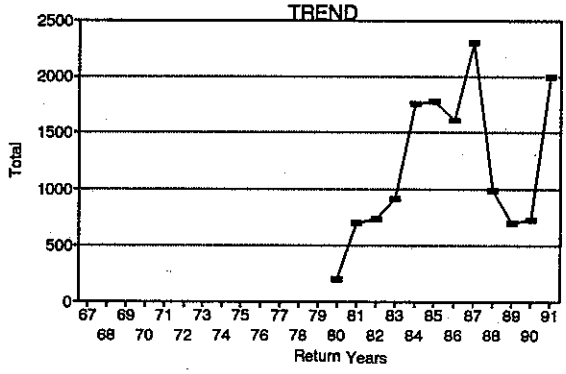
DATA QUALITY------> Fair

Return Years	ESCAPE Total	RUNSIZE Total	HARVEST Sport	HARVEST Net
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80	64	204	140	
81	210	699	484	5
82	230	734	483	21
83	286	911	603	22
84	550	1755	1185	20
85	1104	1781	563	19
86	1472	1617	35	5
87	2198	2303	25	0
88	856	990	0	0
89	613	703	0	2
90	666	727	0	39
91	1973	1997	24	0

ESCAPE
TREND

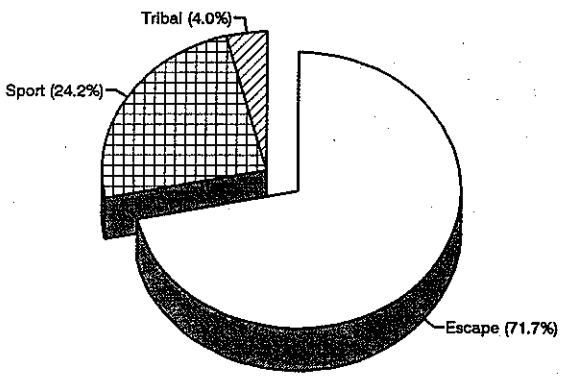


RUNSIZE
TREND



AVERAGE RUNSIZE DISTRIBUTION

YEARS 1986-1991



STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

STOCK STATUS

The status of wild Yakima River steelhead is Depressed based on fish passage counts at Prosser Dam and sport/tribal harvest estimates.

Wild steelhead escapement has been below the 2,000 fish escapement goal for 11 of the past 12 years. Escapement has ranged from 64 in 1980 to 2,198 in 1987 (average 852, 1980 to 1991).

It does not appear that hatchery steelhead from past production practices has been able to supplement the wild steelhead population. This is the result of high mortality/residualism of wild brood stock origin hatchery smolts and harvest of the few returning hatchery adults. Returning hatchery fish from 1986 through 1991 range from 8% to 13% of the adult population, so wild fish made up 87% to 92% of the run.

Smolt capacity, as determined by the Northwest Power Planning Council's (NPCC) smolt production model was estimated at 508,861 smolts. This estimate does not reflect areas in the subbasin (Little Naches, upper Toppenish, and the Yakima River above Roza Dam) which have recently been made accessible to steelhead (NPCC, 1990). Smolt production, as measured by outmigrating smolts counted at Prosser Dam, for the period of 1983 through 1991 ranged from a high of 112,180 in 1986 to a low of 38,333 in 1991. Recent smolt counts have declined by over 50% from levels recorded in the mid-1980s.

Production estimates for the Yakima River stocks are 50% in the Satus Creek drainage, 10% in the Naches River drainage, and 40% in the mainstem Yakima River drainage (20% in the Yakima between Roza and Wapato Dams and 20% in the Yakima below Wapato Dam) (NPPC, 1990).

FACTORS AFFECTING PRODUCTION

Habitat -- The principal factors limiting steelhead production within the Yakima subbasin are irrigation diversions which are poorly or totally unscreened, large irrigation withdrawals, low instream flows reducing rearing habitat and impeding fish passage, degraded riparian and instream habitat from urbanization and livestock grazing, and excessive water temperatures (NPPC, 1990). All of these factors contribute to poor water quality, particularly in the lower Yakima River subbasin.

The lower Yakima River serves as the principal transportation reach for all steelhead utilizing the upper drainage. Habitat limiting factors become greatly magnified in this section of the river, creating unfavorable passage conditions for returning adults and smolt out-migrants and lethal conditions for juvenile rearing.

Steelhead distribution is limited in the upper Yakima and many tributaries due to impassable barriers for spawning adults. Most of these barriers consist of large unscreened irrigation diversions. Known barriers or diversions exist on Manastash Creek, Taneum Creek, Big Creek, Cowiche Creek, Ahtanum Creek, Simcoe Creek, North Fork Simcoe Creek, the Wilson/Naneum drainage, Swauk Creek, and Reecer Creek (NPPC, 1990).

A major factor responsible for the Depressed status of Yakima steelhead stocks has been the construction of four mainstem Columbia River hydroelectric dams downstream of the Yakima.

Depressed run-sizes may also be attributed to: (1) Columbia-wide trends in the run-size of summer steelhead, reflecting oceanic mortality; and (2) declining smolt outmigrations and reduced smolt-to-smolt survival, reflecting the impact of a six year drought in the Yakima subbasin (NPPC, 1990). Major floods in 1990 will effect wild run-sizes for several years.

Harvest Management -- Reduction in catch limits from two to one fish and prohibition of wild stock sport harvest in the Yakima subbasin began in 1984 and 1986, respectively. These regulation changes permitted larger escapements. However, the regulation change has not caused a sufficient increase in wild steelhead stocks to meet escapement goals. Some hook/release mortality of wild fish does occur but it is currently unknown what percentage of the population is affected.

Yakima River steelhead also contribute to treaty commercial and non-treaty recreational fisheries in the mainstem Columbia River. Harvest rates on Yakima River steelhead in mainstem fisheries have been about 15% for wild fish and 20% for hatchery fish which does not include drop-out rate (NPPC, 1990). The harvest of wild summer steelhead in the mixed stock Columbia River fishery continues to impact the wild Yakima River stocks.

Hatchery -- Yakima subbasin steelhead have been supplemented with annual smolt releases ranging from 15,900 to 141,780 fish since 1961. Stocks included Wells (through 1971); Skamania (1972 through 1986); and from 1987-1991, hatchery reared natural Yakima steelhead (NPPC, 1990). The number of wild steelhead taken for brood stock was 95 (1985), 105 (1986), 80 (1987), 134 (1988), 88 (1989), and 22 (1990). The only hatchery releases planned for the Yakima River through 1995 are species interaction study fish (33,000 smolts annually). After

that, the Yakima fisheries production project will be online. Wild stock supplementation is the focus of that project. Before 1975, most releases were made in the Yakima River above Roza Dam and occasionally in Naches tributaries and Ahtanum Creek. From 1975 through 1985, releases were made solely at the Nelson Springs raceway on Buckskin Creek, a tributary of the Naches. Since 1987, hatchery reared natural Yakima smolts have primarily been released into Naches tributaries, although in the last two years a few releases were made at Horn Rapids Dam on the Yakima River and into the North Fork Teanaway River above Roza Dam. Toppenish Creek also received approximately 50,000 hatchery reared natural Yakima steelhead smolts in 1989. Non-native steelhead have never been released into Satus Creek. Based on smolt counts at Prosser Dam on the Yakima River, approximately 75% of hatchery released smolts do not make it out of the subbasin (NPPC, 1990).

The genetic integrity of the Yakima run has probably not been significantly altered by non-native introduced stocks. The reproductive failure of most of the fish released before 1975 was assured when they were released above Roza Dam. Until 1987, the ladder at Roza Dam was not operating during the fall and winter, when most of the spawning migration occurs.

UPPER COLUMBIA -- WENATCHEE SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Wenatchee River, Mission Creek, Peshastin Creek, Icicle Creek, Nason Creek, Little Wenatchee River, White River, Chiwawa River, and tributaries are a distinct stock based on the geographical isolation of the spawning population and on the historical occurrence of native summer steelhead preceding Columbia River basin development. These wild steelhead enter the Columbia River from June through August (A-run), arriving at the Wenatchee basin from mid-July through April. Peak run entry from the Columbia River into the Wenatchee system is usually September and October, but significant numbers will move again as water temperatures warm from late February through March. Spawning is believed similar to other stocks of the mid-Columbia River, beginning in late March and continuing through June and even into July in cold headwater tributaries. Peak spawning is probably in late May.

The original Wenatchee wild summer steelhead stock is native, although interbreeding has certainly occurred with Priest Rapids and Wells hatchery stocks and the origin is classified as a mixed stock. From 1939 through 1943 all adult steelhead bound for the upper Columbia system were trapped at Rock Island Dam and distributed into the Methow, Wenatchee and Entiat River systems. Thus, Wenatchee River wild summer steelhead were mixed with other steelhead stocks of the upper Columbia River.

STOCK STATUS

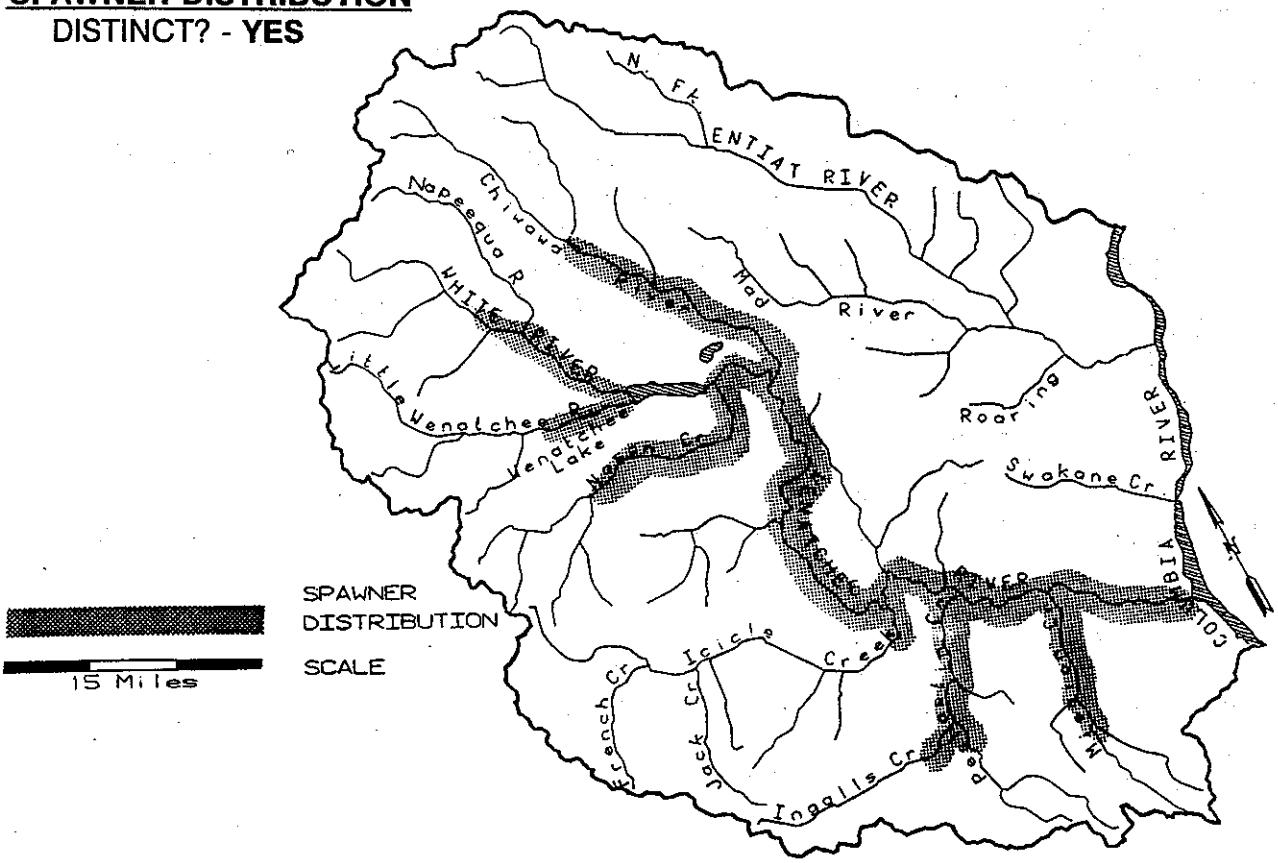
The status of the stock is Depressed.

There was a short 5-year "natural" high survival rate from 1983 through 1987 over the 30-year record available. Restricting sport harvest to hatchery fish since 1986 has increased relative escapement significantly. Adult replacement ratios are normally only about 0.3:1.0 at estimated full seeding levels and 1.5% smolt-to-adult survival rates. Wenatchee River run-sizes are calculated by subtracting Rocky Reach Dam passage from Rock Island Dam passage and factoring out the projected sport harvest (if any) in the Columbia River (permit area 049) between these two hydro projects. Escapement estimates are the difference between calculated run-size and estimated harvest in the Wenatchee subbasin. Escapement of Priest Rapids and Wells hatchery stock steelhead into the Wenatchee basin has supplemented (and mixed) the usual wild stock escapement shortfalls. The escapement goal is 3,000 wild stock summer steelhead in the Wenatchee system. Estimated subbasin production capacity is 62,167 wild summer steelhead smolts.

STOCK DEFINITION PROFILE for Wenatchee Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Wenatchee Summer Steelhead

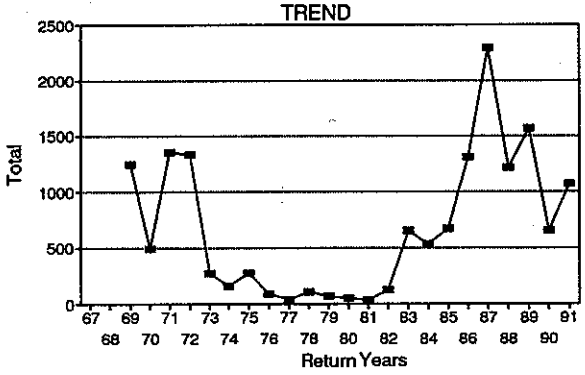
STOCK ASSESSMENT

DATA QUALITY------> Poor

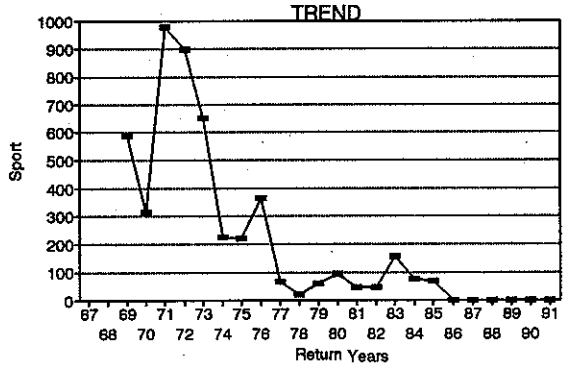
Return Years	ESCAPE Total	HARVEST Sport	RUNSIZE Total	
67				
68				
69	1250	588	1838	
70	495	316	811	
71	1358	978	2336	
72	1331	898	2229	
73	274	651	925	
74	159	225	384	
75	275	221	496	
76	92	364	456	
77	36	67	103	
78	104	19	123	
79	69	61	130	
80	50	94	144	
81	30	46	76	
82	125	46	171	
83	651	157	808	
84	533	75	608	
85	671	68	739	
86	1310	0	1310	
87	2291	0	2291	
88	1217	0	1217	
89	1573	0	1573	
90	655	0	655	
91	1072	0	1072	

Escapement Goal=3000

ESCAPE
TREND



HARVEST
TREND



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

NO SPORT HARVEST ON WILD STOCK SINCE 1985

FACTORS AFFECTING PRODUCTION

Habitat -- The overriding habitat factor which is responsible for chronic wild steelhead stock depression has been the construction of seven mainstem Columbia River hydroelectric dams downstream of the Wenatchee. Each of the seven projects causes direct mortality to smolts and adults, causes detrimental delays in migrations, and promotes predation mortality by altering the natural Columbia River fluvial characteristics. PUD funded hatchery production has effectively mitigated for lost wild steelhead recreational opportunity in terms of adult summer steelhead available for harvest, but efforts to solve passage, delay, and predation mortalities at Columbia River dams have so far been largely unsuccessful.

Despite agricultural development and forest management activities in Chelan County the overall habitat quality of the Wenatchee River Basin remains relatively good. There are notable watershed instability problems in the Mission Creek drainage, as well as low flow problems in the lower mainstem Wenatchee, Peshastin Creek, Icicle Creek, and Chumstick Creek. Occasional severe flooding, as occurred in November 1990, shows detrimental effects on survival of steelhead (and salmon) juveniles and pre-smolts. The 1990 floods exceeded the 100-year frequency discharge, and will affect subsequent wild run-sizes for the 1992 through 1997 cycles (the estimated 1992 wild/hatchery adult ratio at Priest Rapids Dam was only half of the preceding 5 years).

Harvest Management -- Even though recreational harvest of wild summer steelhead has been prohibited throughout the Columbia River Basin since 1986, commercial harvest continues in the lower mainstem (Zone 6) as a result of US v Oregon court-approved management. Wild summer steelhead are impacted directly at up to 15% of the A-run, with current rates at about 12%. Regardless of court-approved commercial fishery impacts, recreational fisheries for wild Wenatchee River summer steelhead will remain closed until survival rates yield wild stock run-sizes exceeding the escapement goal for four consecutive years. Some hook/release mortality of wild fish does occur in sport fisheries and some loss occurs due to gill net drop-out mortality, but it is currently unknown what percentage of the population is affected.

Hatchery -- In addition to the redistribution of several stocks trapped at Rock Island Dam from 1939 through 1943, the Wenatchee River has been recipient of hatchery steelhead stocking as early as 1933, when the first small hatchery fry were released. Hatchery stocking was haphazard until formal PUD mitigation programs came into effect in 1963. Since 1965 the Chelan PUD Hatchery at Chelan Falls has released an average of 155,000 summer steelhead smolts into the Wenatchee basin as a result of the Rocky Reach Mitigation Agreement. WDW has provided up to 150,000 eyed eggs to the USFWS hatchery at Leavenworth for rearing some 100,000 smolts since the mid-1980s, but rearing temperatures and

other problems have precluded consistent production at that federal facility. Finally, the Rock Island Dam Mitigation Agreement provides the Wenatchee River with another 180,000 steelhead smolts, reared at the Eastbank Hatchery. Concurrent with declining wild steelhead runs and increasing hatchery steelhead runs has been a dependency on hatchery origin adults contributing to spawning escapement. Only in the last several years, since 1987, has this trend been reversed with an increase in the proportion of wild stock in the overall escapement. Even though hatchery stocks used appear to adequately represent locally adapted stocks common upstream of Priest Rapids Dam, large scale interbreeding is certain, resulting in the contemporary mixed wild stock.

UPPER COLUMBIA -- ENTIAT SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Entiat River, Mad River, and tributaries are a distinct stock based on the geographical isolation of the spawning population and on the historical occurrence of native summer steelhead preceding Columbia River basin development. These wild steelhead enter the Columbia River from June through August (A-run), arriving at the Entiat basin from September through April. Peak run entry from the Columbia River into the Entiat system is usually October and November, but significant numbers will move again as water temperatures warm from late February through March. Spawning is believed similar to other stocks of the mid-Columbia River, beginning in late March and continuing through June and even into July in cold headwater tributaries. Peak spawning is probably in late May.

The original Entiat wild summer steelhead stock is native, although interbreeding has certainly occurred with Priest Rapids and Wells hatchery stocks and the origin is classified as a mixed stock. From 1939 through 1943 all adult steelhead bound for the upper Columbia system were trapped at Rock Island Dam and distributed into the Methow, Wenatchee and Entiat River systems. Thus, Entiat River wild summer steelhead were mixed with other steelhead stocks of the upper Columbia River.

STOCK STATUS

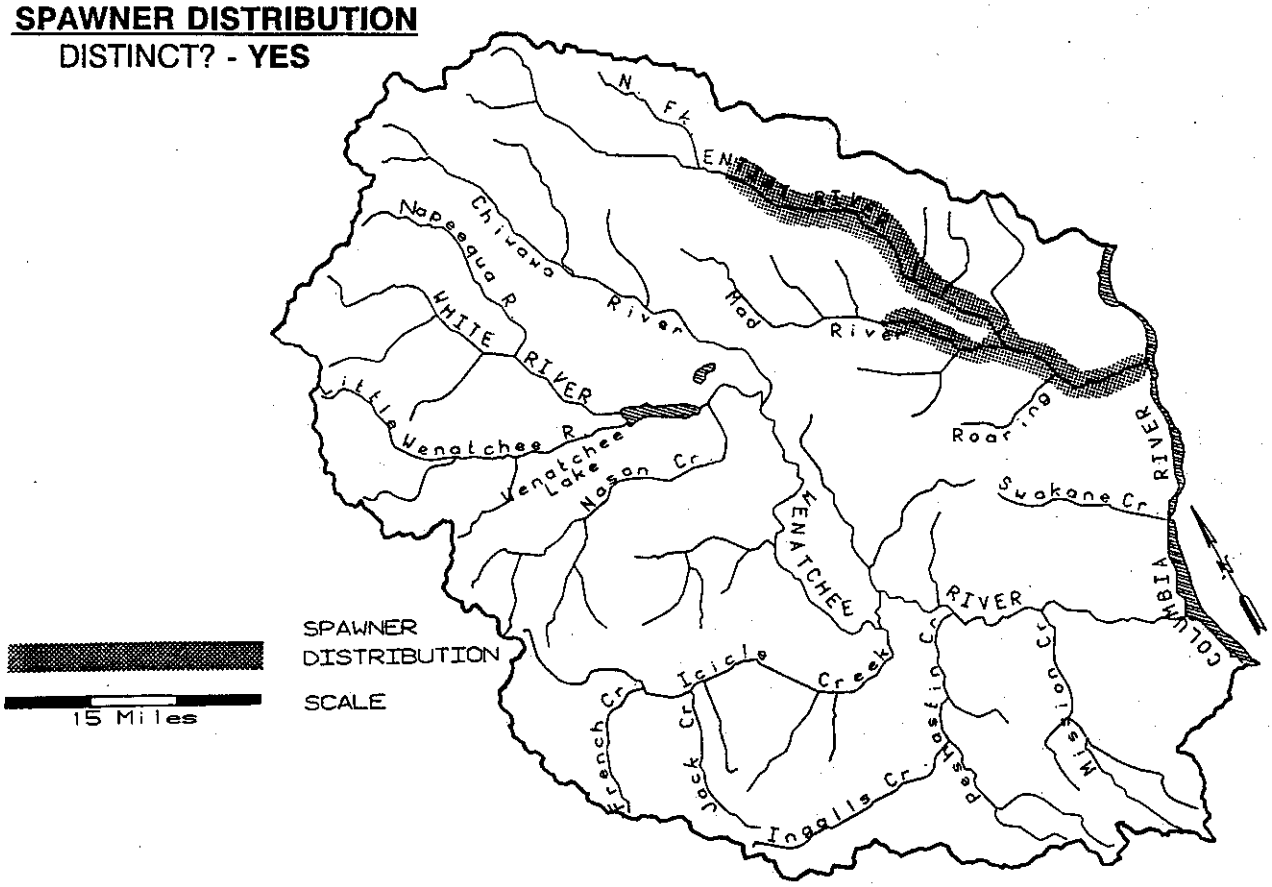
The status of the stock is Depressed.

Stock status is based on a comparison of the sport harvest of hatchery and wild steelhead between the Entiat and Wenatchee River basins. Restricting sport harvest to hatchery fish since 1986 has increased relative escapement significantly. Adult replacement ratios are normally only about 0.25:1.0 at estimated full seeding levels and 1.2% smolt-to-adult survival rates. There are currently no estimates of run-sizes to the Entiat River system. Dam counts are often so confounded and misleading as to be useless for quantitative estimates at Entiat. Escapement of Priest Rapids and Wells hatchery stock steelhead into the Entiat basin has supplemented (and mixed) the usual wild stock escapement shortfalls. The interim escapement goal is 500 wild stock summer steelhead in the Entiat system. Estimated subbasin production capacity is 12,739 wild summer steelhead smolts.

STOCK DEFINITION PROFILE for Entiat Summer Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Entiat Summer Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return 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				

Escapement Goal=500

AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

UNKNOWN - NO DATA AVAILABLE

FACTORS AFFECTING PRODUCTION

Habitat -- The overriding habitat factor which is responsible for chronic wild steelhead stock depression has been the construction of eight mainstem Columbia River hydroelectric dams downstream of the Entiat. Each of the eight projects causes direct mortality to smolts and adults, causes detrimental delays in migrations, and promotes predation mortality by altering the natural Columbia River fluvial characteristics. PUD funded hatchery production has effectively mitigated for lost wild steelhead recreational opportunity in terms of adult summer steelhead available for harvest, but efforts to solve passage, delay, and predation mortalities at Columbia River dams have so far been largely unsuccessful.

Despite agricultural development, forest management activities, and a past history of wildfires in the drainage the overall water quality of the Entiat River Basin remains fair. There are notable watershed instability problems in the drainage, primarily the result of large forest fires which denuded thousands of acres. Streambed compaction from fine granitic sand originating from burned out tributary basins is common, and is slow to recover. The Entiat River channel suffers from historical splashdam activities and past channelization following flood events. Most of the mainstem is nothing more than one long riffle because of these habitat transgressions.

Harvest Management -- Even though recreational harvest of wild summer steelhead has been prohibited throughout the Columbia River Basin since 1986, commercial harvest continues in the lower mainstem (Zone 6) as a result of US v Oregon court-approved management. Wild summer steelhead are impacted directly at up to 15% of the A-run, with current rates at about 12%. Regardless of court-approved commercial fishery impacts, recreational fisheries for wild Entiat River summer steelhead will remain closed until survival rates yield wild stock run-sizes exceeding the escapement goal for four consecutive years. Some hook/release mortality of wild fish does occur in sport fisheries and some loss occurs due to gill net drop-out mortality, but it is currently unknown what percentage of the population is affected.

Hatchery -- In addition to the redistribution of several stocks trapped at Rock Island Dam from 1939 through 1943, the Entiat River has been recipient of hatchery steelhead stocking as early as 1933, when the first small hatchery fry were released. Hatchery stocking was haphazard until formal PUD mitigation programs came into effect in 1963. Since 1965 the Chelan PUD Hatchery at Chelan Falls has released an average of 40,000 summer steelhead smolts into the Entiat basin as a result of the Rocky Reach Mitigation Agreement. Concurrent with declining wild steelhead runs and increasing hatchery steelhead runs has been a dependency on hatchery origin adults contributing to spawning escapement. Only in the last several years, since 1987, has this trend been reversed with an increase in the

proportion of wild stock in the overall escapement. Even though hatchery stocks used appear to adequately represent locally adapted stocks common upstream of Priest Rapids Dam, large scale interbreeding is certain, resulting in the contemporary mixed wild stock.

UPPER COLUMBIA -- METHOW/OKANOGAN SUMMER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild summer steelhead in the Methow River, Gold Creek, Twisp River, Chewack River, Wolf Creek, Early Winters Creek, Lost River, Okanogan River, and tributaries are a distinct stock based on the geographical isolation of the spawning population. Mid-Columbia River steelhead spawn in various tributary streams, which is the basis for identifying each as a distinct stock. Stock identification studies, however, have not shown genetic uniqueness yet. Perhaps habitat similarities among tributaries precluded genetic divergence. More likely, forced introgression occurred via admixtures of local stocks used in brood stocks developed when stocks were largely domesticated following hydroelectric development in the 1960s. Mid-Columbia steelhead are also polymorphic, and the dwarf, headwater form may remain in freshwater throughout its life cycle.

Run-timing is generally from July through mid-June and spawn-timing is generally from early March to mid-July for wild summer steelhead in this stock.

STOCK STATUS

The status of the stock is Depressed.

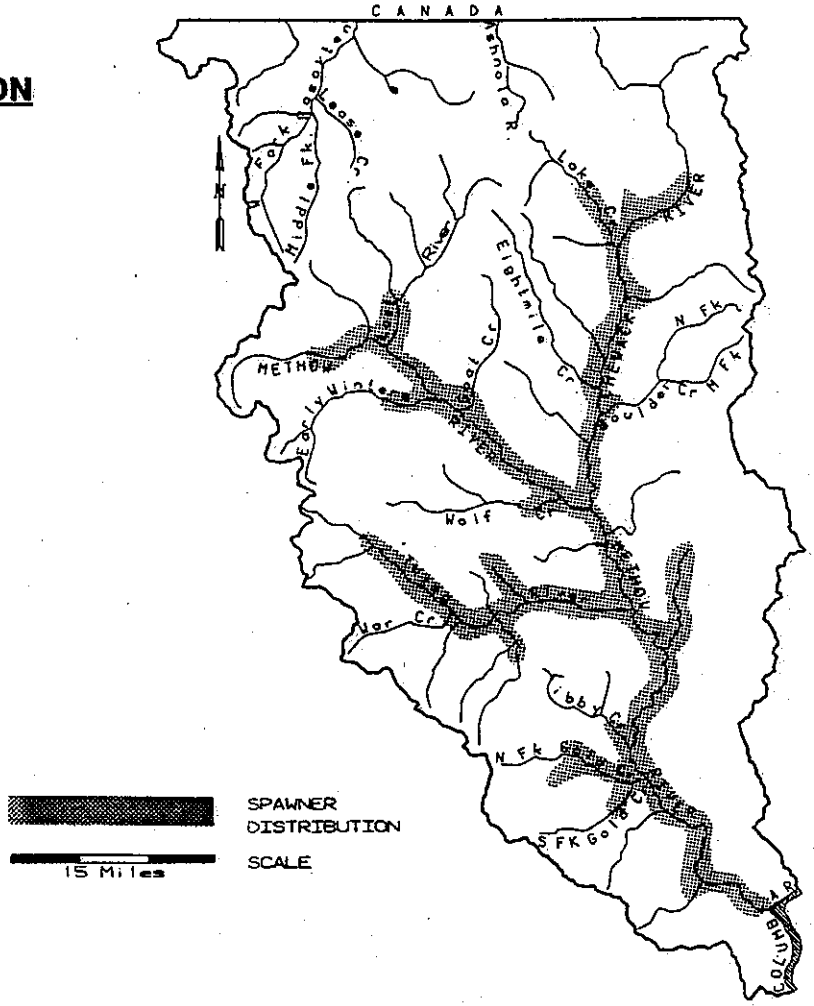
In the Methow River, prior to hydroelectric development, 2,212 spawners (MSY) produced 7,234 adult recruits. Since 1987, runs have averaged only 608 wild fish at MSH or larger escapements, justifying the classification of Depressed. Conversely, hatchery supplementation has been highly successful in the mid-Columbia and wild smolt recruitment approximates predevelopment MSH level by hatchery spawners making up the wild spawner shortfall. It seems that wild and hatchery origin fish are equally fit and interchangeable, and status, arguably, could be upgraded from Depressed to Healthy. Prudence, however, cautions that genetic risks are associated with hatchery supplementation.

Steelhead were never abundant in the Okanogan River due to natural habitat limitations. Only 12 steelhead were reported caught in 1955-1956; run-size was estimated at 50 fish. About 51.8% of the run that year was harvested by downriver commercial fisheries, for a total run of 97 fish. Assuming an equal loss of production from the loss of Salmon Creek since 1916, run-size prior to hydroelectric development roughly was 200 fish. Since 1987, only about seven wild fish on average have returned annually. There is a strong possibility that the original stock is extinct, except perhaps for resident morphs (rainbow trout) in

STOCK DEFINITION PROFILE for Methow/Okanogan Summer Steelhead

SPAWNER DISTRIBUTION

DISTINCT? - **YES**



This stock is also present in small numbers in the Okanogan River system.

TIMING

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

BIOLOGICAL CHARACTERISTICS

DISTINCT? - UNKNOWN

STOCK STATUS PROFILE for Methow/Okanogan Summer Steelhead

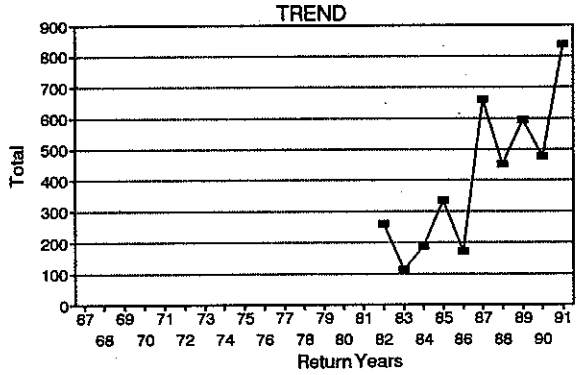
STOCK ASSESSMENT

DATA QUALITY------> Fair

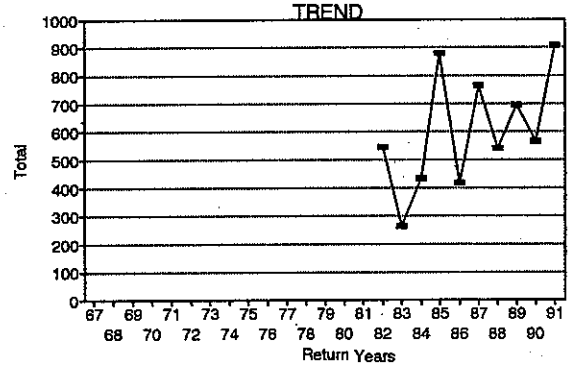
Return Years	ESCAPE Total	RUNSIZE Total	HARVEST Sport	HARVEST Broodstock
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82	261	545	238	38
83	114	263	137	9
84	188	434	225	17
85	335	880	482	32
86	172	418	202	20
87	660	765	0	75
88	452	541	0	70
89	593	695	0	95
90	476	567	0	91
91	837	907	0	70

Escapement Goal=2300

ESCAPE
TREND



RUNSIZE
TREND



AVERAGE RUNSIZE DISTRIBUTION

DATA IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Mixed

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

Salmon and Omak creeks. When hatchery production was suspended from 1974 to 1982, the average sport harvest dropped to only about 4 fish per year and recent tagging studies indicate that these fish were strays from the Methow River.

FACTORS AFFECTING PRODUCTION

Habitat -- By far the most limiting factor is passage-related loss at mainstem Columbia River dams, which account for about 94% of man-caused mortalities (83% for smolts and 11% for adults). With the loss of production from Salmon Creek since 1916, natural production in the Okanogan River has been reduced to very low levels. Salmon Creek probably produced as many steelhead as the rest of the Okanogan River system before irrigation withdrawal dried its lower reach. A few steelhead were lost when access to Omak Creek was obstructed.

Harvest Management -- Even though recreational harvest of wild summer steelhead has been prohibited throughout the Columbia River Basin since 1986, commercial harvest continues in the lower mainstem (Zone 6) as a result of US v Oregon court-approved management. Wild summer steelhead are impacted directly at up to 15% of the A-run, with current rates at about 12%. Regardless of court-approved commercial fishery impacts, recreational fisheries for wild Methow/Okanogan River summer steelhead will remain closed until survival rates yield wild stock run-sizes exceeding the escapement goal for four consecutive years. Some hook/release mortality of wild fish does occur in sport fisheries and some loss occurs due to gill net drop-out mortality, but it is currently unknown what percentage of the population is affected.

Hatchery -- Smolt production began at Wells Hatchery in 1969. Since 1987 an average of 491,996 smolts have been released into the Methow River, or about ten times the predevelopment MSY smolt capacity. During this period hatchery spawners have outnumbered wild spawners 3.8 to one. Although some isolating factors (time and perhaps space) occur, inbreeding swamping of the wild genome by hatchery spawners is numerically assured. However, even though 22 generations of domestication have passed, fitness of the stock remains high. A comparison of survival (smolt-to-adult) of hatchery smolts versus wild smolts showed that differences were not significant 1987-1989. Return rates of Wells Hatchery smolts released above nine mainstem dams have equalled rates for wild smolts in Snow Creek, a coastal stream not greatly impacted by man. Further, recruitment from current smolt production reconciles well with the predevelopment level when accepted estimates of passage mortality are factored in. Finally, the Methow became the top summer steelhead fishery in the state of Washington for a time during the mid-1980s -- a paradoxical distinction for a river 500 miles from the sea upstream of nine dams. Considering massive hatchery supplementation in the Okanogan River since 1982 (192,101 smolts on average) in relation to wild escapement of less than ten spawners, genetically the wild stock is extinct since

broodfish are dominated by Methow River fish. That wild (natural) production of smolts is probably at carrying capacity is the result of progeny produced from hatchery spawners which are particularly fit.

Reasons why this stock remains so viable are attributed to:

(1) The nonselective collection of brood fish from many locally adapted sources.

(2) Some hatchery steelhead residualize for a year before going to sea, and the most desirable genotypes for this life history phase emerge from natural selection in fresh water as well as salt water.

(3) Protection of wild steelhead from sport harvest in recent years has increased the proportion of wild fish and their genetic contribution in returning runs.

(4) Polymorphism is an agent of genetic diversity, and that portion of the gene bank held by headwater rainbow trout pays dividends when some become anadromous.

Although most of the Methow drainage remains in pristine condition, man-caused limitations have become so debilitating that without substantial hatchery supplementation the wild stock could not hope to sustain itself at more than a hundred fish. Considering natural limitations together with man-caused perturbations, viable steelhead runs in the Okanogan River are only possible through hatchery supplementation with smolts. Prudence however, cautions that genetic risks are associated with hatchery supplementation.

UPPER COLUMBIA -- WIND WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Wind River, Trout Creek, and tributaries are a distinct stock based on the geographical isolation of the spawning population and are native to the system. Run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June for wild winter steelhead in this stock.

Little is known about the genetic composition of the stock.

STOCK STATUS

The status of the stock is Unknown.

Very little is known about this stock except that it is a small population.

An escapement goal for this stock has not been established. While summer steelhead spawner escapement has been measured from 1985 to 1992, no winter steelhead escapements have been estimated. All spawner escapement estimates of wild steelhead have been low.

Wild sport harvest can not be used to assess stock status because wild steelhead release regulations have been in effect since 1991 and hatchery and wild sport harvest were not reported separately on steelhead permit cards until the 1986-87 winter steelhead season.

FACTORS AFFECTING PRODUCTION

Habitat -- Marine conditions and fisheries, habitat loss due to logging, and fish passage mortality associated with Bonneville Dam affect production.

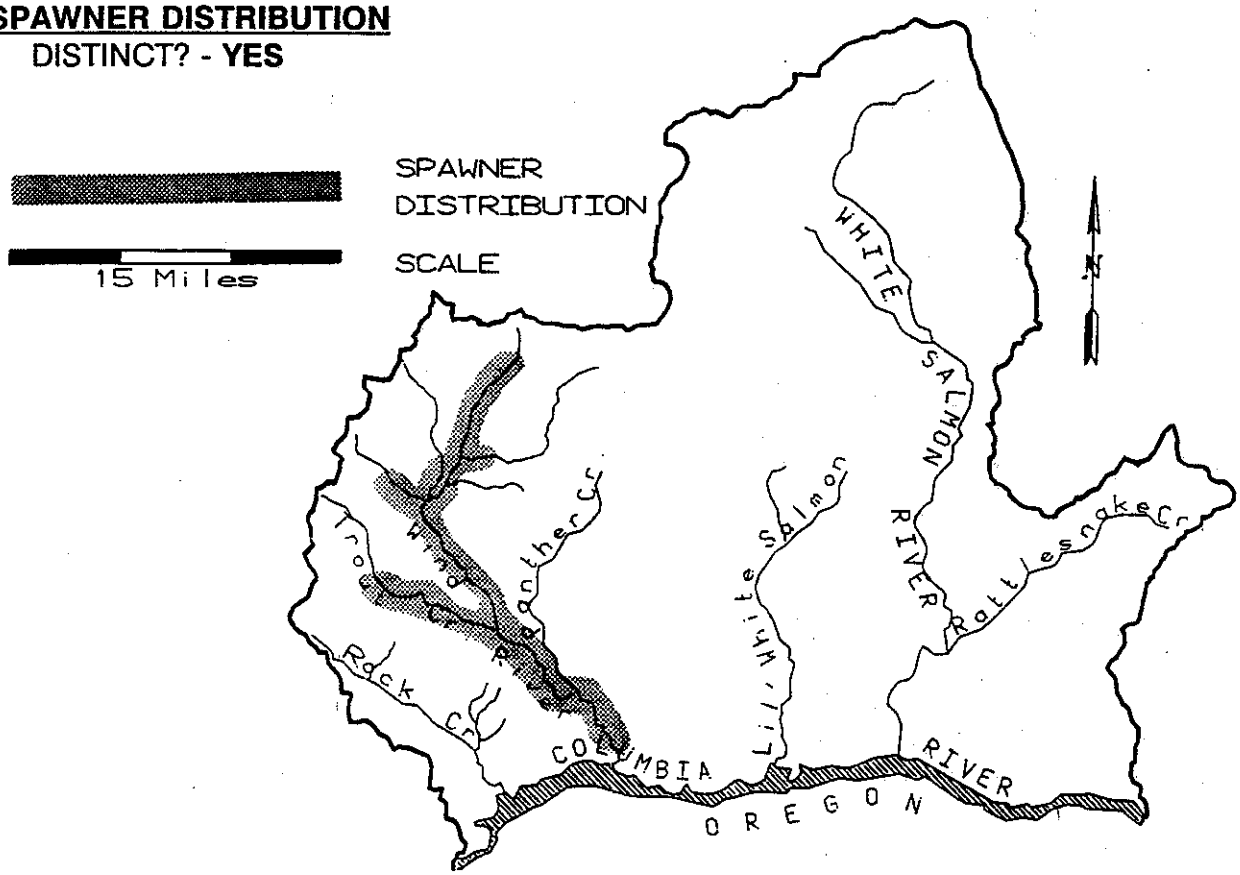
Harvest Management -- There is no tribal fishery that targets on this stock, although wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery. Wild steelhead release regulations have been implemented for sport fishing in the Wind River during the winter months since 1991 to protect the wild stock. Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- Hatchery plants of Chambers Creek winter steelhead took place in the late 1950s and early 1960s and some interbreeding may have taken place, but it is assumed to be minimal.

STOCK DEFINITION PROFILE for Wind R Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Wind R Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

UPPER COLUMBIA -- WHITE SALMON RIVER WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead were originally native in the White Salmon River, but it is uncertain whether a stock exists that has not hybridized with hatchery steelhead planted or strayed into the river. Run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June for wild winter steelhead in this stock.

Due to the construction of Condit Dam in 1913, only the 3.3 miles of river below the dam are accessible to anadromous fish. Of this 3.3 miles, only a small part is suitable for steelhead spawning. This has made it extremely hard for White Salmon wild winter steelhead stocks to be reproductively isolated.

Work is ongoing at this time to collect tissue samples from adult and juvenile steelhead in the White Salmon to determine the genetic characteristics of the steelhead living and rearing there. This work is being done by Pacific Corp (the owners of Condit Dam) and the Washington Department of Wildlife.

STOCK STATUS

The status of this stock is Depressed.

The wild White Salmon River steelhead stock has certainly been impacted by the reduction of accessible spawning and rearing habitat due to the construction of hydroelectric dams. Approximately 70% of the spawning and rearing habitat are presently not accessible to steelhead.

Based on work from the subbasin plan for the White Salmon River, the area downstream of Condit Dam is estimated to contain habitat suitable enough to produce a wild fish run-size of only 50 adults.

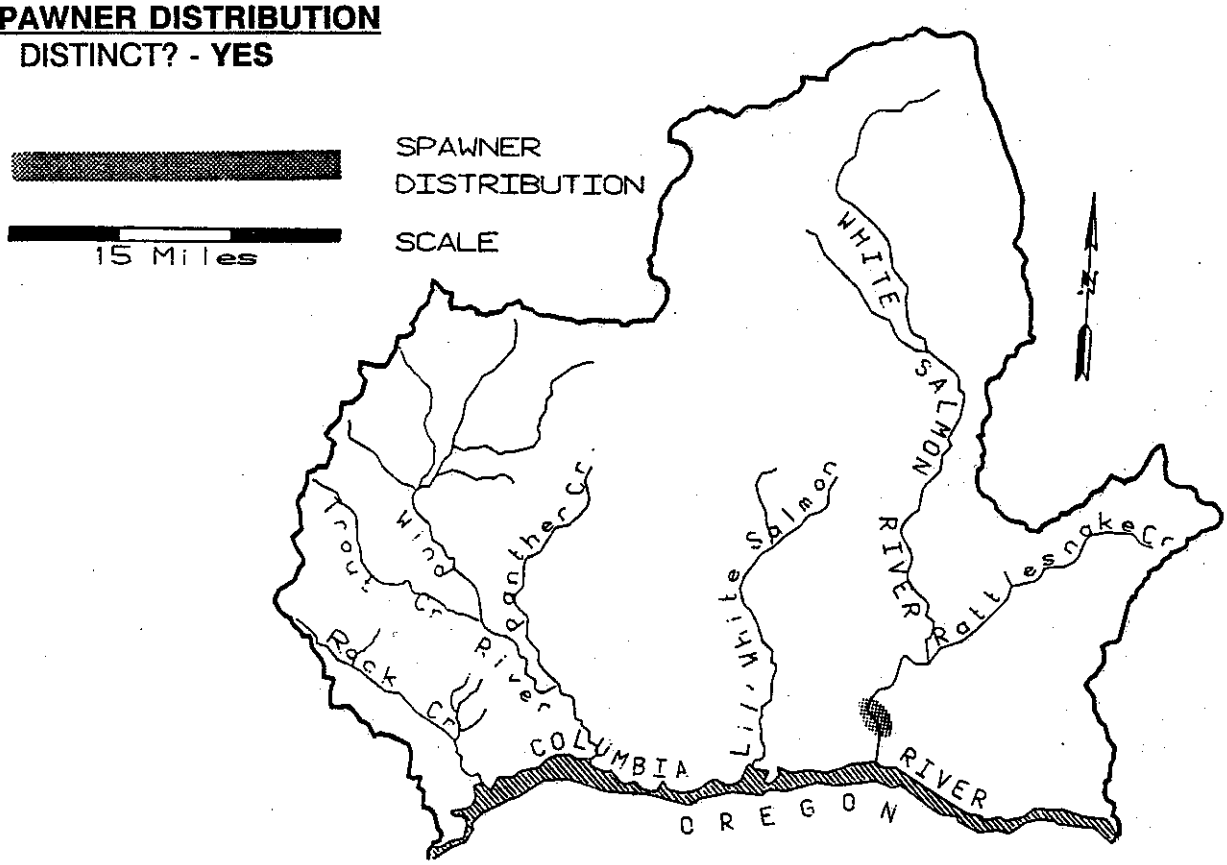
The steelhead stock is chronically low in abundance and rated as Depressed due to the loss of access to available habitat upstream of Condit Dam.

Spawner surveys were started in 1992 to document spawn-timing and whether the fish spawning were hatchery or wild, winter or summer steelhead. This will be continued in 1993.

STOCK DEFINITION PROFILE for White Salmon R Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for White Salmon R Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY-----> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Unknown

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Unknown

STOCK STATUS
Depressed

SCREENING CRITERIA
Chronically Low

FACTORS AFFECTING PRODUCTION

Habitat -- Due to the construction of Condit Dam in 1913, only the 3.3 miles of river downstream of the dam are accessible to anadromous fish. Of this 3.3 miles, only a small part is suitable for steelhead spawning.

Harvest Management -- There is no tribal fishery that targets on this stock, although wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery. Wild winter steelhead have been protected from sport harvest with wild steelhead release regulations since 1986.

Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- It is uncertain whether a stock exists that has not hybridized with hatchery steelhead planted or strayed into the river.

UPPER COLUMBIA -- KLICKITAT WINTER STEELHEAD

STOCK DEFINITION AND ORIGIN

Wild winter steelhead in the Klickitat River, Swale Creek, Little Klickitat River, White Creek, Trout Creek, and tributaries are native and a distinct stock based on the geographical isolation of the spawning population from other stocks in the Columbia River system. Run-timing is generally from December through April and spawn-timing is generally from early March to late May or early June for wild winter steelhead in this stock.

Little is known about the genetic composition of the stock.

Genetic analysis of the wild steelhead in the Klickitat system is ongoing. Tissue samples from juvenile and adult steelhead have been collected by Yakima Tribal biologists, WDW biologists, and volunteers from several fishing clubs. Electrophoretic analysis and comparison with other steelhead stocks is being done by the Washington Department of Fisheries Genetics Lab. This work will update the status of this stock.

STOCK STATUS

The status of the stock is Unknown.

Very little is documented about this stock. Wild run-size is thought to be small. Poor visibility hampers assessment of spawner escapement.

FACTORS AFFECTING PRODUCTION

Habitat -- Freshwater habitat has been impacted by land use (forest management) activities. There is considerable mortality associated with passage of juveniles and adults at Bonneville Dam.

Harvest Management -- The sport fishery is closed during the winter steelhead season. A tribal dip net fishery in the Klickitat River targets this stock. In addition, wild steelhead are incidentally harvested in the Columbia River Zone 6 tribal gill net fishery.

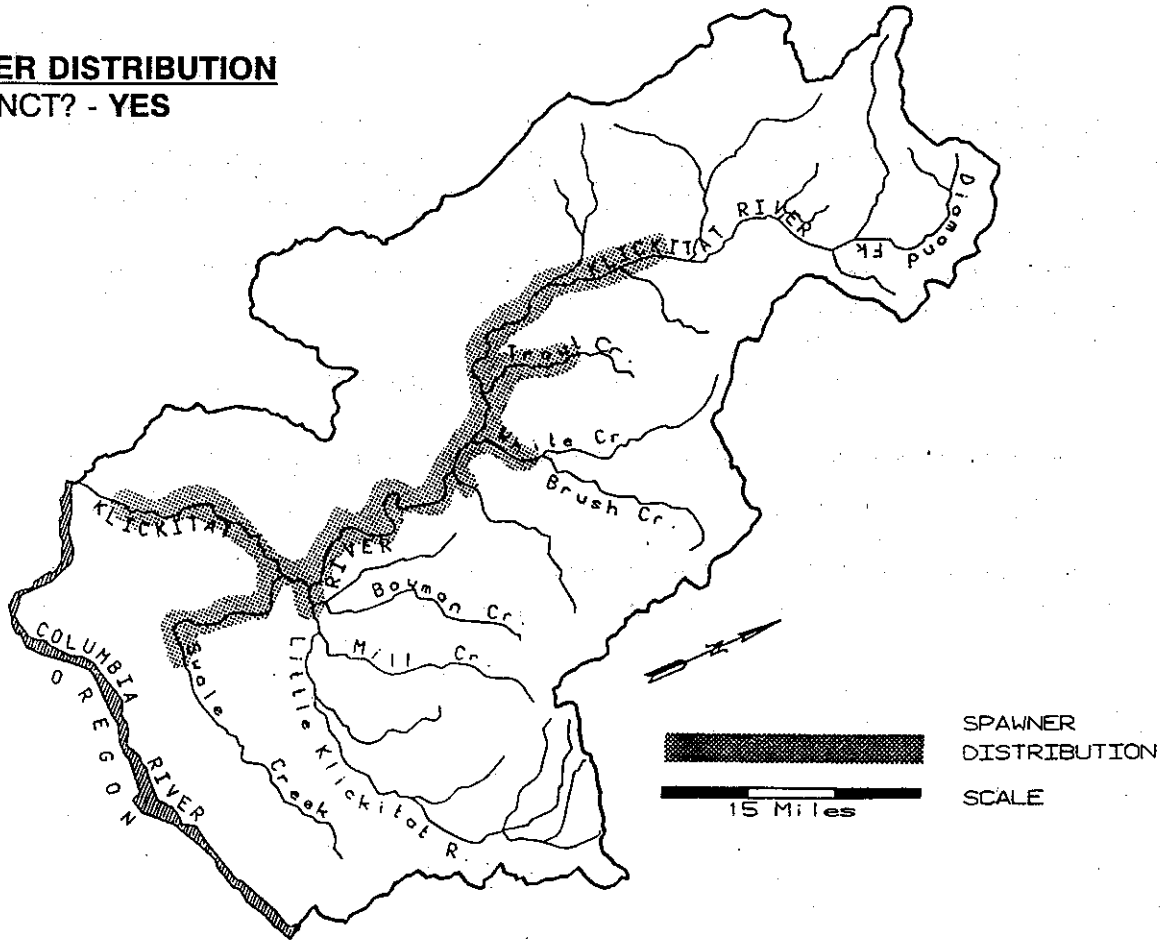
Predation on migrating wild steelhead smolts and returning wild adults may also affect production.

Hatchery -- While hatchery steelhead smolts have been stocked in this and nearby streams, there is little contribution to the wild winter steelhead stock from hatchery fish spawning in the wild. There are likely survival complications for juvenile steelhead associated with very large plants of hatchery juvenile salmon.

STOCK DEFINITION PROFILE for Klickitat Winter Steelhead

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? - UNKNOWN

STOCK STATUS PROFILE for Klickitat Winter Steelhead

STOCK ASSESSMENT

DATA QUALITY------> Poor

Return Years	NO DATA			
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 IS NOT AVAILABLE.

STOCK SUMMARY

STOCK ORIGIN
Native

PRODUCTION TYPE
Wild

STOCK DISTINCTION
Spawning Distribution

STOCK STATUS
Unknown

SCREENING CRITERIA

LITERATURE CITED

Allen, R. L. 1970. Wells summer chinook salmon spawning channel. Annual Report. Washington Department of Fisheries.

Allen, R. L. and T. K. Meekin. 1973. Columbia River sockeye salmon study. Progress Report. Washington Department of fisheries.

Allen, R. L., B. D. Turner and J. E. Moore. 1968. Wells summer chinook salmon spawning channel. Annual Report. Washington Department of Fisheries.

Allen, R. L., B. D. Turner and J. E. Moore. 1969. Wells summer chinook salmon spawning channel. Annual Report. Washington Department of Fisheries.

Allen, R. L., B. D. Turner and J. E. Moore. 1971. Wells summer chinook salmon spawning channel. Annual Report. Washington Department of Fisheries.

Anas, R. E. and J. R. Gauley. 1956. Blueback Salmon, Oncorhynchus nerka, age and length at seaward migration past Bonneville Dam. United States Fish and Wildlife Service. Special scientific report, Fisheries, 185.

Bisson, P., J. Neilsen, and J. Ward. 1988. Summer production of coho salmon stocked in the Mt. St. Helens streams 3 - 6 years after the 1980 eruption. Transactions of the American Fisheries Society 117:322-335.

Bjornn, T.C., and R.R. Ringe. 1988. Fall chinook trapping at Ice Harbor Dam in 1987. Completion Report, Cooperative Agreement 14-16-0009-1559, Research Work Order Number 15 to U.S. Fish and Wildlife Service.

Bluestein, N. 1979. Memorandum, Washington Department of Fisheries, 12/11/79.

Bottom, D. L., Jones, K. K., and M. R. Herring. 1984. Fishes of the Columbia River estuary. Final Report on the Fish Work Unit. Columbia River Estuary Data Development Program. Astoria, OR.

Bryant, F. G. 1949. A survey of the Columbia River and it's tributaries with special reference to its fishery resources. U. S. Fish and Wildlife Service, Spec. Sci. Rep. 62.

Busack, C., C. Knudsen, A. Marshall, S. Phelps, and D. Seiler. 1991 WDF Yakima hatchery experimental design. Annual Report to BPA, Contract DE-B179 89BP00102. August 1991.

Chaney, E. and L. E. Perry. 1976. Columbia River Basin salmon and steelhead analysis. Summary report of the Pacific Northwest Regional Commission.

Cooper R. and T. H. Johnson. 1992. Trends in steelhead abundance in Washington and along the Pacific Coast of North America. Washington Department of Wildlife, Fisheries Management Division. Report No. 92-20. 90 p.

Dawley, E. R. Ledgerwood, T. Blahm, and J. Jensen. 1982. Migrational characteristics of juvenile salmonids entering the Columbia River estuary in 1981. National Marine Fisheries Service.

Devore, J. 1984. 1983 Washougal River natural spawning fall chinook population estimate. Washington Department of Fisheries Memorandum.

Devore, J. 1987. Cowlitz River Salmon Investigation Program; Analysis of the 1983 - 1985 Cowlitz runs of fall chinook and coho salmon. Washington Department of Fisheries Progress Report #254.

Easterbrooks, J. 1980. Salmon Production evaluation for the Cowlitz River system upstream of the Cowlitz Falls Dam site. Washington Department of Fisheries.

Fast, D., J. Hubble, M. Kohn, B. Watson. 1989. Yakima River spring chinook enhancement study. Yakima Indian Nation, Fisheries Resource Management, Toppenish Washington. BPA contract DE-AI79-83BP39461.

Fast, D., J. Hubble, M. Kohn, B. Watson. 1991 Yakima River spring chinook enhancement study. Yakima Indian Nation, Fisheries Resource Management, Toppenish Washington. BPA contract DE-AI79-83BP39461.

Fast, D., J. Hubble and B Watson. 1986. Yakima River spring chinook enhancement study. Yakima Indian Nation, Fisheries Resource Management, Toppenish, Washington. Annual Report to BPA, Contract 82-16.

Fiscus, 1980. Hugh Fiscus to Clint Stockley. Washougal River juvenile chinook observations. Washington Department of Fisheries memo. July 8, 1990.

Fryer, J. K., C. E. Pearson and M. Schwartzberg. 1991 Identification of Columbia Basin sockeye salmon stocks based on scale pattern analyses, 1992. Technical Report 92-2. Columbia River Inter-Tribal Fish Commission.

Fryer, J. K. and M. Schwartzberg. 1990 Identification of Columbia Basin sockeye salmon stocks based on scale pattern analyses, 1991. Technical Report 91-2. Columbia River Inter-Tribal Fish Commission.

Fulton, L.A. 1968. Spawning areas and abundance of chinook salmon (Oncorhynchus tshawytscha) in the Columbia River basin--past and present. United States Fish and Wildlife Service. Special Scientific Report. Fisheries No. 571.

Hager, R. and C. Hopley. 1981. A comparison of the effect of adult return timing of Cowlitz and Toutle Hatchery coho on catch and escapement. Washington Department of Fisheries. Technical Report No. 58.

Hart, J. L. 1973. Pacific fishes of Canada. Fisheries Research Board of Canada, Bulletin 180, Ottawa, Canada.

Hatch, D. R., A. Wand and M. Schwartzberg. 1992. Wenatchee River salmon escapement estimates using video tape technology in 1991. Columbia River Inter-Tribal Fish Commission Technical Report #92-3. March 12, 1992.

Hjort, R. C. and C. B. Schreck. 1982. Phenotypic differences among stocks of hatchery and wild coho salmon, Oncorhynchus kisutch, in Oregon, Washington, and California. Fishery Bulletin, Vol. 80., No. 1.

Howell, P. J., K. Jones, D. Scarnecchia, L. LaVoy, W. Kendra, and D. Ortmann. 1985. Stock assessment of Columbia River anadromous salmonids, volumes I & II. Final report of Oregon Department of Fish and Wildlife, Washington Department of Fisheries, Washington Department of Game, and Idaho Department of Fish and Game (Project 83-335, Contract DE-AI79-84BP12737) to Bonneville Power Administration, Portland, Oregon.

Hulett, P.L. and S.A. Leider 1989. Genetic interactions of hatchery and wild steelhead trout: Findings and implications of research at Kalama River, Washington. Pages 76-82 in: Wild Trout IV Symposium (Yellowstone National Park, Wyoming, September 18-19, 1989.)

Hymer, 1991. Estimating the population size of natural spawning bright fall chinook in the Big White Salmon River, 1989. Washington Department of Fisheries, Columbia River Lab, Progress Report #91-20.

Hymer, 1991. Washington Columbia River and tributary stream survey sampling results, 1990. Washington Department of Fisheries. Columbia River Lab Progress Report #91-24.

Johnson, R., G. Fiscus, and C. Morrill. 1976. Memorandum. Washington Department of Fisheries. 4/13/76.

King, S. 1987. Columbia River salmon hatchery returns, 1972 - 1986. Oregon Department of Fish and Wildlife, Columbia River Management.

LeFleur, C., and R. Pettit. 1991. Run size forecast for adult spring chinook salmon in Washington tributaries above Bonneville Dam, 1991. Washington Department of Fisheries, Columbia River Laboratory Progress Report # 91-5.

Mains, E.M., and J.M. Smith. 1955. Determination of the normal stream distribution, size, time, and current preferences of downstream migrating salmon and steelhead trout in the Columbia and Snake Rivers. Contract report DA 35026-ENG-20507, U.S. Army Engineer District, Walla Walla, Washington.

Major, R. L. and J. L. Mighell. 1969. Egg to migrant survival of spring chinook salmon (Oncorhynchus tshawytscha) in Yakima River, Washington. Fisheries Bulletin 67 (2).

May, B., and F. M. Utter. 1974. Biochemical genetic variation of the genus Oncorhynchus in Pacific Northwest populations: A progress report and program summary. Interim report of contractual work to washington Department of Fisheries.

McIsaac, D. M. 1976. Memorandum from Don McIssac to Dick Laramie, Washington Department of Fisheries, June 25, 1976.

McIssac, D. M. 1979. Memorandum, Washington Department of Fisheries. February 23, 1979.

McIssac, D. M. 1980. Memorandum, Washington Department of Fisheries. February 24, 1980.

McIsaac, D. M. 1990. Factors affecting the abundance of 1977-79 brood wild fall chinook salmon in the North Fork Lewis River, Washington. University of Washington dissertation.

McIssac, D. and H. Fiscus. 1979. Memo from Don McIssac and Hugh Fiscus to Dick Laramie, Washington Department of Fisheries, February 1, 1979.

Milner, G. B. D. J. Teel and F. M. Utter. 1983. Genetic stock identification study. National Marine Fisheries Service.

Mongillo, P. and L. Falconer. 1980. Yakima fisheries enhancement study. Final Report. Washington Department of Game.

Mullan, J. 1982. Spring chinook salmon program, Leavenworth, Entiat and Winthrop hatcheries. Administrative Report. United States Fish and Wildlife Service.

Mullan, J. 1984. Memorandum, United States Fish and Wildlife Service. January 23, 1984.

National Marine Fisheries Service (NMFS). 1992. Yakima River Fisheries Program Radio-Telemetry Studies. Unpublished data presented by L. Steuhrenberg, G. Swan, and E. Hockersmith at the Yakima/Klickitat Fisheries Project, 1992 Project Annual Review. November 19-20, 1992. Yakima, Washington.

Nelson, W. R. and J. Bodle. 1988. Ninety years of salmon culture at Little White Salmon National Fish Hatchery. (Unpubl.)

Norman, G. 1984. Memorandum, Washington Department of Fisheries. April 18, 1984.

Norman, G. 1987. Memo from Guy Norman to Lee Blankenship, Washington Department of Fisheries. October 26, 1987. Washington Department of Fisheries. 1990. Lewis River Sub-basin., Salmon, and Steelhead Production Plan.

Northwest Power Planning Council. 1986. Compilation of information on salmon and steelhead losses in the Columbia River basin.

Northwest Power Planning Council. 1990. Yakima River Sub-basin Salmon and Steelhead Production Plan. Prepared by the Confederated Tribes and Bands of the Yakima Indian Nation, Toppenish, Washington; and Washington Departments of Fisheries and Department of Wildlife, Olympia, Washington; for the Northwest Power Planning Council and Agencies and Indian Tribes of the Columbia Basin Fish and Wildlife Authority. 282 pp. + Supplements 1 and 2.

Northwest Power Planning Council. 1991. Presence/absence data base. Duanne Anderson. Portland, Oregon.

Oregon Department Fish and Wildlife and the Washington Department of Fisheries. 1989. Columbia River fish runs and fisheries, 1960 - 1988.

Pettit, R. 1990. Fall Chinook Juvenile Test Seining on the Kalama River, 1989. Washington Department of Fisheries, Columbia River Lab. Progress Report #90-21.

Pettit, R. 1992. Escapement estimates for spring chinook in Washington tributaries above Bonneville Dam, 1970-1991. Washington Department of Fisheries Columbia River Laboratory Progress Report # 92-18.

Reimers, P. E. and R. E. Loeffel. 1967. The length of residence of juvenile fall chinook salmon in selected Columbia River tributaries. Fish Commission of Oregon Research Briefs 13:5-19.

Schreck, C.B., H.W. Li, R.C. Hjort, and C.S. Sharpe. 1986. Stock identification of Columbia River chinook salmon and steelhead trout. Final Report. Oregon Cooperative Fisheries Unit, Oregon State University (Project 83-451, Agreement DE-A179-83 BP 13499) to Bonneville Power Administration, Portland, Oregon.

Schreck, C. G., H. W. Li, R. C. Hjort and S. B. Yamada. 1984. Stock identification of Columbia River chinook salmon and steelhead trout. Annual Progress Report. Oregon Cooperative Fishery Research Unit.

Seidel, P., R. Bugert, P. LaRiviere, D. Marbach, S. Martin, L. Ross. 1987 Annual Report. Lyons Ferry Evaluation Program, to U.S. Fish and Wildlife Service. Cooperative Agreement 14-16-0001-87512, Washington Department of Fisheries, Olympia Washington.

Seidel, P. and S. Mathews. 1977. 1972 Brood Toutle River coho time/size at release study. College of Fisheries, University of Washington.

Smoker, W.A. 1956. Evaluation of the Potential Salmon and Steelhead Production of the Yakima River to the Commercial and Recreational Fisheries. Report to the Washington department of Fisheries. 19 pp.

Stober, Q. 1986. Reintroduction of anadromous fish runs to the Tilton and upper Cowlitz Rivers. University of Washington, Fisheries Research Institute.

Stockley, C. 1979. Washington Department of Fisheries, letter to Robert Tuck, Yakima Indian Nation, August 24, 1979.

TAC (Technical Advisory Committee). 1983. Report to Columbia River Management Plan Renegotiation Committee concerning hatchery reprogramming.

TAC (Technical Advisory Committee). 1984. Report to Columbia River Management Plan Renegotiation Committee concerning hatchery reprogramming.

Technical Advisory Committee. 1991. 1991 All Species Review, Columbia River Fish.

Thompson, J. and L. Rothfus. 1969. Biological observations of salmonids passing Mayfield Dam. Washington Department of Fisheries.

Tipping, J. 1988. Riffe and Mayfield Reservoirs fishery evaluation, 1985 - 87. Washington Department of Wildlife. #88-1.

Vreeland, R. R. 1984. Evaluation of the contribution of chinook salmon reared at Columbia River hatcheries to the Pacific salmon fisheries. Annual Report. National Marine Fisheries Service.

Washington Department of Fisheries. 1951. Lower Columbia River fisheries development program. Cowlitz area, Washington. Washington Department of Fisheries and U.S. Fish and Wildlife.

Washington Department of Fisheries and U. S. Fish and Wildlife Service. 1951. Lower Columbia River fisheries development program. Planning Reports - preliminary draft.

Washington Department of Fisheries. 1951. Lower Columbia River fisheries development program. Grays River area, Washington. Washington Department of Fisheries and U. S. Fish and Wildlife Service.

Washington Department of Fisheries. 1960. 1959 annual report.

Washington Department of Fisheries. 1973. Fisheries Resources in Southwest Washington. Review Draft.

Washington Department of Fisheries. 1984. Salmon Culture Division. Unpublished.

Washington Department of Fisheries. 1990. Elochoman River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries. 1990. Grays River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries. 1990. Mid-Columbia River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries. 1990. Snake River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries. 1990. Tucannon River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries. 1990. Washougal River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries. 1990. Wenatchee River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries. 1990. Columbia Basin System Planning, Yakima sub-basin Production Plan.

Washington Department of Wildlife. 1990. Cowlitz River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Wildlife. 1990. Kalama River Sub-basin, Salmon and Steelhead Production Conroy, F. 1977. Washington Department of Fisheries, correspondence, 3/16/77.

Washington Department of Wildlife. 1990. Little White Salmon River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Wildlife. 1990. Wind River Sub-basin, Salmon and Steelhead Production Plan.

Washington Department of Fisheries, Oregon Department of Fish and Wildlife. 1991. Status Report, Columbia River Fish Runs and Fisheries, 1960 - 1990.

Washington Department of Fisheries (WDF). 1992. YKFP Sub-stock Identification Research. Unpublished data presented by C. Busack at the Yakima/Klickitat Fisheries Project, 1992 Project Annual Review. November 19-20, 1992. Yakima, Washington.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory. Mar. 1993. 212 p.

Wasserman, L. and J. Hubble. 1984. Yakima River spring chinook enhancement study. 1983 Annual Report. Technical Report No. 84-1.

Yakima basin preliminary information report. undated.

Yakima Hatchery experimental design annual report 1990. BPA Project #89-082.

Yakima Indian Nation. 1990. Klickitat River Sub-basin, Salmon and Steelhead Production Plan Management Plan.

Yakima Indian Nation. 1990. Yakima River sub-basin production plan 1990. Columbia Basin System Planning.

Yakima/Klickitat Fisheries Project. 1992. Pre-draft project status report for the Yakima/Klickitat fisheries project.

Yakima/Klickitat Production Facility Appendix. undated.

Yakima/Klickitat production project preliminary design report, Appendix A. Report to the Bonneville Power Administration, March, 1990.

Zimmer, P. D., R. J. Wahle, and E. M. Maltzeff. 1963. Spring chinook salmon transplantation study 1955 - 1961. United States Fish and Wildlife Service Progress Report, Special Scientific Report, Fisheries #443.

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.

BRIGHT CHINOOK -- A race of Columbia River fall chinook characterized by late maturation and spawning, bright skin color and deep red flesh color during freshwater migration.

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.

COMPOSITE STOCK -- A stock sustained by both wild and artificial production.

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.

ENDANGERED SPECIES ACT (ESA) -- A 1973 Act of Congress that mandated that endangered and threatened species of fish, wildlife, and plants be protected and restored.

ESCAPEMENT -- Those fish that have survived all fisheries and will make up a spawning population.

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.

FTE -- Full time employee.

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.

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.

LOCUS (LOCI) -- The site of a specific gene on a chromosome. Often used to refer to a gene and its alleles.

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.

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 broodstock programs).

NMFS -- National Marine Fisheries Service.

NON-NATIVE STOCK -- A stock that has become established outside of its original range.

PRODUCTION TYPE -- The method of spawning and rearing that produced the fish that constitute a stock.

RM -- River mile.

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.

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.

TREND -- The directional change in a time series data set.

TULE CHINOOK -- A race of Columbia River fall chinook characterized by early maturation and spawning, dark skin color and pale flesh color during freshwater migration.

UNKNOWN STOCK -- This description is applied to stocks where there is insufficient information to identify stock origin or stock status with confidence.

WDF -- Washington Department of Fisheries.

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).