

TCCHINOOK 8705

October 23, 1987

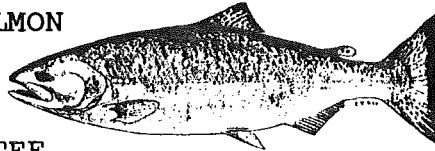
THE PACIFIC SALMON COMMISSION  
JOINT CHINOOK TECHNICAL COMMITTEE REPORT

REPORT TCCHINOOK (87)-5

CHINOOK TECHNICAL COMMITTEE REPORT TO  
THE NOVEMBER, 1987 MEETING OF THE  
PACIFIC SALMON COMMISSION

October 23, 1987

JOINT CHINOOK SALMON



TECHNICAL COMMITTEE

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October 23, 1987

TO: Mr. W. C. Shinnars, Chairman, PSC  
FROM: Brian Riddell and Michael Fraidenburg  
SUBJECT: Results of Chinook Technical Committee Meeting

The Joint Chinook Technical Committee met during the week of October 19-23, 1987 to address PSC instructions as described in Mr. C.W. Shinnars letters of July 29 and October 21, 1987 and the 1987 Chinook annex to the Pacific Salmon Treaty. In partial response to these instructions, we have prepared the attached report which contains consensus statements on the following topics.

- "CLARIFICATION OF PASS-THROUGH COMMITMENTS". This statement presents some background on this issue and identifies four general approaches for implementing and monitoring pass-through commitments.
- "INCIDENTAL FISHING MORTALITIES OF CHINOOK SALMON IN FISHERIES OF CONCERN TO THE PACIFIC SALMON COMMISSION". This statement presents the results of our review of agency reports, numbers of mortalities, a status report on our assessment activities and three recommendations for PSC consideration.
- "PRELIMINARY REVIEW OF 1987 FISHERIES AND ESCAPEMENTS". This statement presents an initial summary of fishery and stock status through 1987.
- "MATRIX OF DATA AVAILABILITY". This statement outlines data availability as it relates to PSC discussions on procedural reform.
- "PROGRESS REPORT ON ASSESSMENT OF REBUILDING OF TRANSBOUNDARY CHINOOK SALMON STOCKS".
- "PROGRESS REPORT ON CHINOOK STOCK IDENTIFICATION IN JUAN de FUCA STRAIT, NORTHERN PUGET SOUND AND GEORGIA STRAIT"

We wish to have the Pacific Salmon Commission consider as the Committee's 1986 annual report our document numbered TCCHINOOK 8704 (dated February 26, 1987, as revised on February 28, 1987). This document remains our consensus assessment on rebuilding through 1986. Please note that catch and escapement figures have been updated in the 1987 preliminary catch and escapement statement developed at this meeting.

The Analytical Methods subcommittee of the Chinook Technical Committee is planning to meet November 4-6, 1987 in Vancouver to

continue model development work for evaluating the impact of incidental mortalities on the rebuilding program. We are requesting PSC authorization for this meeting.

The full Chinook Committee is planning to meet December 7-11, 1987, in Vancouver, to continue addressing our assignments for 1988 management planning. We are requesting authorization for this meeting.

## LISTING OF DOCUMENTS

Letter of Transmittal

Chapter 1 - Preliminary review of 1987 Fisheries and Escapements

Chapter 2 - Incidental Fishing Mortalities of Chinook Salmon in Fisheries of Concern to the Pacific Salmon Commission

Chapter 3 - Clarification of Pass-through Commitments

Chapter 4 - Data Matrix

Chapter 5 - Progress Report on Assessment of Rebuilding of Transboundary Chinook Salmon Stocks

Chapter 6 - Progress Report on Chinook Stock Identification in Juan de Fuca Strait, Northern Puget Sound and Georgia Strait

List of Attendees

## CHAPTER 1

### PRELIMINARY REVIEW OF 1987 FISHERIES AND ESCAPEMENTS

#### TABLE OF CONTENTS

	Page
Executive Summary and Committee Concerns . . . . .	3
Preliminary 1987 Chinook Salmon Catch in Ceilinged Fisheries. . .	4
Review of Fisheries With Harvest Ceilings . . . . .	4
Review of Other Fisheries . . . . .	6
Preliminary Review of 1987 Chinook Escapement . . . . .	11
List of Technical Reports . . . . .	16

#### LIST OF TABLES

TABLE 1.	Preliminary 1987 Chinook Catches, Compared with 1984 - 1986 . . . . .	10
TABLE 2.	Summary of the Escapement of Escapement Indicator Stocks 1985 through 1987 . . . . .	14

## EXECUTIVE SUMMARY COMMITTEE CONCERNS

The purpose of this report is to present the preliminary information on estimates of 1987 chinook salmon catches, a brief overview of 1987 fisheries and available escapement information.

Preliminary 1987 catch statistics reported for ceilinged fisheries are fairly close to the PSC ceilings. The major exception is the Georgia Strait troll and sport fisheries, which were well below the ceiling. The low catches in the Georgia Strait troll and sport fisheries, occurred despite normal effort levels and therefore are cause for major concern regarding the rebuilding of the Georgia Strait stocks. Target catch levels in Alaska and northern B.C. troll fisheries were attained during very short seasons.

Preliminary information indicates that coastwide spawning patterns are continuing to show a variable rate of response to the rebuilding program. In the case of lower Georgia Strait stocks, the declining trend in escapements may not yet have stopped.

In PSC document TCCHINOOK 87-4, the CTC indicated in our assessment of the rebuilding program for the Lower Strait of Georgia chinook stock, that the potential of being able to rebuild this stock by 1998 was critically dependant upon three assumptions:

- i) that survival of the 1985 - 87 broodyears for the natural chinook stocks in Southern B.C. would improve to base period averages; and
- ii) that survival of chinooks released from Strait of Georgia hatcheries will not be reduced through density dependent mechanisms resulting from the substantial increases in numbers released; and
- iii) that 25% reduction in harvest rates in net fisheries would be accomplished.

Low total abundance of chinooks in the Georgia Strait and poor recruitment of age 2 chinooks to the sport fishery (sampling thru Sept. 1987) indicate survival of hatchery and wild stocks has been poor. Consequently, the Committee is concerned that assumptions (i) and (ii) above are not appropriate. Further conservation actions would therefore be required to rebuild this stock by 1998.

## PRELIMINARY 1987 CHINOOK SALMON CATCHES IN CEILINGED FISHERIES

Preliminary estimates of 1987 catch for each fishery managed under a harvest ceiling established by the Treaty are provided in the following table. These data are very preliminary and can be expected to change as fish ticket data replace in-season projections, errors are detected and corrected, and as the final landings are included in the catch. Conclusions drawn from these data are, therefore, tentative. Please consult Table 1 for a summary of available coastwide catch statistics.

(Compiled with information available as of 10/21/87)  
(THOUSAND FISH)

AREA AND FISHERY	CEILING	CATCH	DIFFERENCE	
			#'s	%
SE Alaska (T,N,S) a/ b/	279	279.7	0.7	+0.3
North/Central B.C. (T,N,S)	263	274.6	11.6	+4.4
West Coast Vancouver I. (T)	360	384.7	24.7	+6.9
Georgia Strait (T,S)	275	171.1	-103.9	-37.8

a/ T=Troll; N=Net; S=Sport

b/ 263,000 base plus 16,000 hatchery add-on.

Catches in all fisheries of interest to the PSC are documented in Table 1.

## REVIEW OF FISHERIES WITH HARVEST CEILINGS

### S.E. Alaska Fisheries

The preliminary 1987 catch by all Southeast Alaska fisheries was 279,700 chinook salmon. This exceeded by 700 fish or 0.3 percent the total 1987 all-gear catch ceiling of 279,000 which consisted of 263,000 base catch ceiling plus an Alaska hatchery add-on of 16,000 chinook. Chinook catch by gear type was troll - 242,300 (86.6%); net - 15,400 (5.5%); recreational - 22,000 (7.9%). The troll chinook harvest occurred as follows: winter season - 28,400 (12%); June experimental hatchery - 4,400 (2%); summer season - 209,500 (86%). At 23 days, the 1987 summer troll chinook season (June 20 - July 12) was the shortest on record. Five outer coastal areas of high chinook abundance were closed July 4 - 12 to slow the chinook catch rate, however a July 13 closure was still necessary. Chinook non-retention during the remainder of the summer troll season, July 13 - August 2 and August 13 - September 20, was monitored by onboard observers. Incidental chinook catches by net fisheries declined in 1987 primarily due to reduction of purse seine fishing time for pink salmon conservation. Chinook non-retention during the early portion of the purse seine fishery and as a result of the 28 inch size limit was monitored through port sampling and a logbook program. Chinook salmon catches in recreational fisheries were similar to recent years. Transboundary chinook catches are included in the all gear catch statistics. There was no change in fishery regimes as a result of expiration of the Transboundary Chapter.

### Canadian Fisheries

The minimum size limit for troll fisheries in all areas except Georgia Strait was increased from 26" to 28". Catch statistics for commercial fisheries represent sales slip data accumulated through October 16, 1987. Final catch statistics are anticipated to be 3 to 8% higher.

### North/Central British Columbia

The 1987 chinook catch ceiling for the combined North/Central B.C. fisheries (troll, net and sport) was 263,000. Chinook catch was 274,600.

**Troll:** The troll fishery opened for all species on July 1 and was managed by closing portions of the west coast of the Queen Charlotte Islands and of areas 6, 7 and 10 when weekly target ("red line") levels were exceeded. Red line areas closed for all species on August 18, with the entire north/central troll fishery closing for the retention of chinook on August 30 and for all species on September 8. Chinook nonretention fisheries totaled 9 days in north/central areas not managed through red line closures; nonretention periods were not sampled for catch-release rates. Chinook catch was 233,200.

**Commercial Net:** Net fisheries north of Vancouver Island harvested chinook incidentally during fisheries directed at sockeye, pink and chum. Most net fisheries were curtailed due to poor sockeye returns; however, increased fishing time in areas 3 and 4 occurred due to above average pink returns. Chinook catch was 29,200.

**Ocean Sport:** Most ocean sport fisheries north of Vancouver Island were evaluated by field staff, except the Area 4 (Prince Rupert area) fishery which was evaluated by a creel survey. Chinook catch was 12,200.

### West Coast Vancouver Island Troll

The 1987 catch ceiling for this fishery was 360,000. The fishery opened for chinook on July 1 and was managed through area closures to Swiftsure (off Juan de Fuca Strait) and Big (off Barkley Sound) banks intended to slow the catch. The fishery was closed for the retention of chinook on August 16 and for all species on August 23. Chinook nonretention fisheries totaled 7 days; nonretention periods were not sampled for catch-release rates. Chinook catch was 384,700.

### Georgia Strait

The 1987 combined catch ceiling for the Strait of Georgia (troll and sport) was 275,000. Chinook catch, based upon accumulated sales slips for troll fisheries and a projected catch for the sport fishery through December, was 171,100.

**Troll:** The troll fishery opened for chinook on July 1 and continued through September 30. Chinook nonretention fisheries did not occur in 1987. The chinook catch was 41,100.

**Sport:** Annual chinook catch, as measured by the Strait of Georgia Creel Survey, is projected to be 130,000. Sport effort in Georgia Strait was projected to be similar to recent years.

### REVIEW OF OTHER FISHERIES

Available catch statistics for fisheries not managed under PSC harvest ceilings are presented in Table 1. The 1987 statistics are preliminary. We have prepared the narratives below to describe the general 1987 fishery status for the major non-ceilinged fisheries of concern to PSC chinook management.

#### British Columbia

##### **Commercial Net Fisheries**

**Transboundary Rivers:** Commercial gill net catch of chinook in the Canadian portions of the Transboundary rivers totaled: 1) Taku River - 131 chinook adults and 57 jacks; 2) Stikine River - 950 chinook adults and 253 jacks; 3) Alsek River - 452 chinook adults.

**Johnstone Strait:** The 1987 chinook catch of 14,300 was the lowest since 1957.

**Georgia Strait/Fraser River:** The 1987 chinook catch was 9,900, most of which occurred in the Fraser River. The Fraser River catch was the lowest on record.

**Juan de Fuca:** The 1987 chinook catch of 6,100 was the lowest since 1983.

**Barkley Sound:** The 1987 chinook catch of 200 occurred entirely as incidental catch the sockeye fishery.

##### **Sport Fisheries**

**Tidal:** A number of tidal sport fisheries occur on the west coast of Vancouver Island and in upper Johnstone Strait; however, only the fishery off the west coast of Vancouver Island (primarily Barkley Sound) was assessed for catch. The 1987 chinook catch for Barkley Sound (July through September), estimated by a creel survey, was 31,800.

Non-tidal: Nontidal sport fisheries exist in most major B.C. rivers, including the Skeena, Nass, Kitimat, Bella Coola, Somass and Fraser rivers and various streams on the east coast of Vancouver Island. In northern B.C. rivers (areas 1-10), the 1987 chinook catch was estimated by field staff at 5,000. Most of this catch occurred in the Skeena and Atnarko rivers. In the Fraser River, chinook fisheries occurred in eight areas (Bowron, Quesnel, Bridge, Clearwater, Shuswap, South Thompson, Vedder-Chilliwack and Lower Fraser rivers). Chinook catch, estimated by creel surveys, was 2,700 chinook adults and 2,000 jacks. Catch estimates are unavailable for other non-tidal sport fisheries.

### **British Columbia Native Food Fisheries**

Transboundary Rivers: The 1987 chinook catch in the Stikine River was 1,292 adults and 190 jacks. Catch data are currently unavailable for other transboundary rivers.

North/Central B.C.: The 1987 chinook catch in the north/central area was 19,100, well below the 1986 level of 26,600.

Somass River: The 1987 chinook catch in the Somass River was 13,300, a decrease from the 1986 level of 19,800.

Fraser River: The 1987 chinook catch in the Fraser River (to October 4) was 13,700, less than the 1986 level of 15,600.

Other Areas: Fisheries occur in several rivers draining into the Strait of Georgia. Catches for 1987 are currently unavailable; however, fisheries along the east coast of Vancouver Island were small due to measures to conserve chinooks returning to these areas. Food fish needs were provided in catch of other species.

### **Puget Sound**

Sport and commercial net fisheries in Puget Sound continued to be restricted to protect depressed spring chinook stocks. With several exceptions, Puget Sound summer/fall type chinook are generally healthy and support terminal fisheries. Commercial net catch declined again in 1987, to 158,000 from 229,000 in 1986 and from 204,000 in 1985. Several additional restrictions were placed upon the Puget Sound sport fishery in 1987. The sport fishery in the Strait of Juan de Fuca was closed on Fridays from July - September and a 2 fish bag limit was instituted. The bag limit was also reduced to 2 fish in areas 7 and 9. The remaining Puget Sound fisheries were managed in the same general manner as in the last several years. Sport catch data for 1987 are not available at this time.

### Washington Coast

The northern Washington coastal stocks from the Quillayute, Hoh and Queets Rivers are managed on the basis of escapement floors and terminal exploitation rates. With the exception of the Quillayute spring/summer run, these coastal stocks are not of immediate conservation concern. No directed commercial fisheries were conducted on fall chinook stocks from Grays Harbor. Grays Harbor spring chinook remain a problem; the only terminal harvest of this stock was a small quantity taken by Indian net fisheries on the Chehalis Reservation. This fall's drought may have substantial negative impacts on this stock.

### Columbia River

The 1987 Columbia River net fisheries are estimated to have harvested approximately 456,000 chinook, as compared to 283,000 in 1986. To date, the freshwater sport fishery, including the buoy 10 fishery, has harvested approximately 65,000 chinook as compared to a season total of 62,000 in 1986. A lower river winter gillnet fishery, targeting on surplus lower river spring stocks, harvested 11,500 chinook. There were no directed commercial fisheries on depressed upper Columbia River spring or summer chinook stocks in 1987. There were tribal ceremonial and subsistence fisheries on these runs which harvested about 6,300 upriver spring chinook. Commercial chinook fisheries were directed primarily at lower river fall stocks and upriver bright fall stocks. Fall commercial seasons were structured to maximize harvest of surplus upriver brights and lower river tule (hatchery) stocks while providing protection for the depressed Spring Creek Hatchery stock. The spring chinook fishery was targeted on surplus lower river hatchery stocks, while the fall chinook sport fisheries primarily harvested surplus upriver brights and lower river tule stocks.

### Ocean Fisheries North of Cape Falcon

Ocean chinook fisheries off the Washington coast and the Oregon coast, north of Cape Falcon, were managed primarily for Columbia River chinook stocks. Far northerly migrating chinook stocks are taken incidentally to harvests directed at Columbia River Tule stocks in this area. In 1987, ocean troll and recreational fisheries were managed under established quotas in response to concerns for continuing depressed Columbia River fall tule chinooks destined for Spring Creek Hatchery. Four ocean quota fisheries were established north of Cape Falcon for the 1987 season. The total ocean troll harvest was 83,700 chinook. Washington landings were 75,500 chinook while Oregon landings north of Cape Falcon were 8,200 chinook. Ocean recreational fisheries north of Cape Falcon landed 44,400 chinook. These fisheries were also limited by quotas similar to the troll quotas in that area. Washington and North of Falcon Oregon recreational landings were 40,400 and 4,000, respectively.

#### Ocean Fisheries From Cape Falcon To Cape Blanco

Ocean fisheries between Cape Falcon and Cape Blanco (i.e., Central Oregon Coast) harvest a mixture of stocks including those originating south of this area such as Rogue, Klamath and Sacramento river stocks along with stocks originating in this area, such as Umpqua and north coastal far-north migrating stocks as well as Columbia River stocks. Small terminal river mouth ocean fisheries and inriver recreational fisheries target on far-north migrating stocks as these mature fish return to spawn (see Table 1). The general season catches for ocean troll and recreational fisheries for the area are estimated by ODFW to be composed of less than 10 percent of far-north migrating stocks.

TABLE 1. PRELIMINARY 1987 CHINOOK CATCHES FROM STOCKS CONTRIBUTING TO U.S./CANADA SALMON TREATY AREAS, COMPARED WITH 1984 - 1986 (numbers of fish in 1,000's).

23-Oct-87 - PRELIMINARY DATA

AREA	TROLL				NET				SPORT				TOTAL					
	1987	1986	1985	1984	1987	1986	1985	1984	1987	1986	1985	1984	1987	1986	1985	1984		
S.E. ALASKA	a/	242	236	217	236	15	22	36	32	22	21	25	22	279	279	278	290	
BRITISH COLUMBIA						b/				c/								
North/Cent. Coast		233	202	215	254	29	47	51	36	12	12	9	20	274	261	275	310	
W. Vanc. Island		385	342	358	460	0.2	3.3	11	44	d/	32	13	14	44	417	358	383	548
Georgia Strait/Fraser		41	44	52	88	10	32	31	20	e/	130	182	235	369	181	258	318	477
Johnstone Strait		0	4	5	9	14	18	38	18	10	10	10	10	24	32	53	37	
Juan de Fuca Strait		0	0	0.4	0.3	6	18	17	6	e/				6	18	17	6	
sub-total		659	592	630	811	60	118	148	124	184	217	268	443	903	927	1,046	1,378	
WASHINGTON										f/								
Strait	g/	40	30	13	16	12	17	13	12	h/	N/A	69	44	48	52	116	70	76
San Juans		0	0	0	0	28	34	33	32	h/	N/A	17	13	26	28	51	46	58
Other PS		0	0	0	0	121	140	185	181	h/	N/A	88	110	125	121	228	295	306
Coast		76	46	48	12	34	15	25	16	40	24	31	16	150	85	104	44	
sub-total		116	76	61	28	195	206	256	241	40	198	198	215	235	404	454	456	
COLUMBIA RIVER		-	-	-	-	i/	456	283	151	128	j/	65	66	48	56	521	349	184
OREGON																		
N. Cape Falcon		5	6	5	9	-	-	-	-	4	2	4	0	9	8	9	9	
Central Coast	k/	N/A	2	3	3	-	-	-	-	N/A	35	30	29	N/A	37	33	32	
sub-total		N/A	8	8	12	-	-	-	-	N/A	37	34	29	N/A	45	42	41	
GRAND TOTAL		1022	912	916	1087	726	629	591	525	315	539	573	765	2,063	2,080	2,080	2,377	

a/ Southeast Alaska troll chinook catches shown for Oct. 1- Sept. 30 catch counting year.

b/ British Columbia net catches includes only fish over 5 lb. round weight. Native food fishery catches are not included.

c/ Sport catches are for tidal waters only, catch updates will be provided as available.

d/ Estimates of tidal sport catches are from creel surveys in Barkley Sound only.  
Survey times and areas may vary from year to year.

e/ Georgia Strait sport catches include Juan de Fuca Strait sport catches. 1986 estimate includes projected catch through remainder of year.

f/ Sport catches include both marine and freshwater catches, but only adults in freshwater.

g/ Area 48 troll catches outside of the PFMC management period are included in the Juan de Fuca Strait total.

h/ Adjusted for punch card bias by multiplying punch card estimate by 0.833

This bias adjustment methodology is currently under review and may result in future adjustment to these numbers.

i/ Columbia River net catches include Oregon, Washington and treaty catches, but not treaty ceremonial.

j/ Columbia River sport catches are for adults only and include Washington, Oregon and Idaho anglers.

k/ Includes only terminal ocean troll and estuary inriver sport catches from Cape Falcon to Cape Blanco.  
1986 inriver sport projections based on estimates from 1985 actual data. 1987 data not available.

## PRELIMINARY REVIEW OF 1987 CHINOOK ESCAPEMENTS

Some fall running chinook stocks are still spawning at this time. Consequently, only a brief preliminary escapement overview can be presented (see Table 2). We have prepared the following brief narratives to summarize the information which is currently available. This information should be considered preliminary and subject to change. In those areas in which the depressed stocks continue to decline or are not responding as expected to the rebuilding program, additional analyses will be conducted during the fall and early winter, with a set of recommendations to be developed in January by the CTC.

### S.E. Alaska

Natural chinook salmon escapements to Southeast Alaska and transboundary rivers in 1987 were generally similar to 1986. Preliminary estimates indicate a total 1987 escapement of 50,700 chinook salmon compared to 46,100 in 1986. Escapements increased in 4 of the 11 indicator systems and declined in 7. However, percentage changes were less than +/- 10% of 1986 levels in 6 of the 11 systems. Consistent with recent years, escapements to southern and central systems continued to show greatest improvements relative to the 1975-80 base period while northern systems improved less.

### Transboundary Rivers

Chinook escapements in 1987 increased over 1986 in two of the six transboundary rivers and declined in four. Percent changes by system were: +415% in the Chilkat River, +116% in the Stikine River, -4% in the Alsek River, -26% in the Taku River, -7% in the Unuk River and -43% in the Chickamin River.

### British Columbia

Estimates of 1987 chinook escapement are incomplete; however, most available data indicate a decline relative to 1986. Escapement to the Skeena and Nass systems is down to 65,500. Escapement to the upper and middle Fraser and Thompson River systems declined from 1986 levels by 18%, 21% and 41% (incomplete), respectively. Escapement estimates for other stocks are currently unavailable.

### Puget Sound

Spawning escapement data are not yet available.

### Washington Coast

Spawning escapement data are not yet available.

### Columbia River

Columbia River stocks continued to show a mixed response to rebuilding efforts. Escapement needs for lower river spring chinook stocks (Willamette and Cowlitz) were met. The Bonneville Dam count of 98,600 upriver spring chinook adults declined from the 118,200 count in 1986, in contrast to the previous upward trend. The 120,000 adult goal at Bonneville Dam is a combined goal for hatchery and wild stocks of which approximately 70% were wild at the time of goal development. Data are currently being analyzed to segregate wild from hatchery stocks for the 1987 run. Although a 1987 estimate of the wild upriver spring chinook run is not yet available, it is clear that the wild component remains depressed.

The 1987 return of 33,000 adult summer chinook was a 26% increase from the 1986 return of 26,200 and the largest since 1978. While the trend of increasing escapements continues, this stock still remains seriously depressed compared to its 85,000 escapement goal.

The upriver bright fall chinook adult count at McNary Dam is expected to exceed 150,000 fish compared to last year's count of 113,200 and the escapement goal of 40,000 adults. Sport fisheries and a limited tribal commercial gillnet fishery in the area above McNary Dam are expected to harvest a little of this surplus with catches similar to last years'; 5,000 and 1,000, respectively. The upriver bright fall chinook stock has demonstrated dramatic rebuilding in the last few years compared to the record low return in 1981.

The 1987 return to Spring Creek Hatchery, including tule fall chinook trapped at Bonneville Dam as supplemental broodstock, totaled only 1,950 adults compared to 3,300 in 1986 and the escapement goal of 8,200 adults. It is believed that the major reason for the very poor return of the Spring Creek tule stock in 1987 was an epizootic of bacterial gill disease at the hatchery in the 1984 brood. Escapements to Spring Creek Hatchery return primarily as three year old fish. The BGD epizootic necessitated the premature release of all the tule stock for the 1984 brood at a very small size and in very poor health. In addition, annual installation of screens to divert smolt outmigrants away from the turbines and into the bypass system at Bonneville Dam was not completed in time to benefit the prematurely released smolts.

When it became clear in the late return time frame that the Spring Creek escapement was going to be much less than anticipated throughout the conduct of the fisheries, the decision was made to bring in Abernathy and Bonneville hatchery females to mate with Spring Creek males. The Abernathy and Bonneville stocks were judged to be the most similar to the Spring Creek stock from a genetic standpoint, and both of these stocks had received a large influx of Spring Creek stock for their own broodstock in the recent past. Mating these females with Spring Creek males was a further effort to maintain the integrity of the Spring Creek stock as much as possible. The Abernathy-Spring

Creek cross and the Bonneville-Spring Creek cross will be coded wire tagged along with the original Spring Creek stock to compare survival between the three groups. Total egg take, including those from Abernathy and Bonneville hatcheries, was approximately 13.4 million compared to the 12.2 million taken in 1986.

Lower river hatchery tule chinook returned to the Columbia River in record numbers in 1987. Large surpluses were recorded at nearly all Washington and Oregon hatchery facilities.

#### Oregon Coast

Ocean escapement estimates of Oregon coastal north-migrating chinook stocks are not available at this time. Early indications (mid-October) of estuary and lower river sport fisheries indicate above average levels of abundance. An increasing occurrence of older age fish (e.g., age 4 and 5) has been observed in 1986-87 in river sport fisheries.

Presently, there is great concern over the near absence of measurable rainfall since late spring. Coastal river water levels are the lowest in more than a decade with many of the coastal systems experiencing drought conditions. Many fish are holding in the lower reaches of these systems and may sustain increased mortality due to fishing (above recent year averages) and also be susceptible to significant levels of pre-spawning mortality.

Table 2. Summary of the escapement of Escapement Indicator Stocks,  
1985 thru 1987. (1987 data is very preliminary).

October 23, 1987

Production Unit	Stock Type	Avg. Esc. Base 1/	Esc. Goal	1985 Esc.	1986 Esc.	1987 Esc.	1986-87 % Base	1986-87 % Goal
Southeast Alaska								
Situk	Spring	1,557	2,100	1,521	2,067	1,884	127	94
King Salmon	Spring	95	250	146	249	228	251	95
Andrews Creek	Spring	371	750	510	1,131	1,042	293	145
Blossom	Spring	165	1,300	1,134	2,045	2,158	1274	162
Keta	Spring	407	800	998	1,104	1,229	286	146
Transboundary Rivers Not Addressed in Treaty Annexes								
Chilkat (U.S.)	Spring	213	2,000	625	170	875	246	26
Unuk (U.S.)	Spring	1,283	2,900	1,862	3,402	3,157	256	113
Chickamin (U.S.)	Spring	344	1,400	1,531	2,683	1,560	616	152
Transboundary Rivers Addressed in Treaty Annexes								
Alsek (U.S.)	Spring	4,501	5,000	2,227	4,231	4,086	92	83
Alsek (Canada)	Spring	5,780	12,500	2,900	5,400	5,200	92	42
Taku (U.S.)	Spring	7,978	25,600	10,851	12,178	8,951	132	41
Taku (Canada)	Spring	9,967	30,000	13,600	15,200	11,200	132	44
Stikine (U.S.)	Spring	6,224	13,700	10,227	8,026	17,318	204	92
Stikine (Canada)	Spring	8,283	25,000	13,600	10,700	23,000	203	67
Canada								
North Coast	Spr/Summer	27,361	72,300	63,300	78,000	65,500	262	99
Central Coast	Summer	19,415	45,200	30,219	44,510	N/A	N/A	N/A
Fraser	Spr/Summer	43,480	93,700	91,242	119,964	N/A	N/A	N/A
U. Georgia Str. 2/	Fall	11,655	23,300	10,435	25,856	N/A	N/A	N/A
L. Georgia Str.	Fall	16,667	33,300	15,456	8,170	N/A	N/A	N/A
Lower Fraser	Fall	83,750	175,000	106,000	162,393	N/A	N/A	N/A
WCVI	Fall	48,103	91,700	48,135	46,976	N/A	N/A	N/A
Puget Sound								
Skagit	Spring	1,217	3,000	3,265	1,995	N/A	N/A	N/A
Skagit	Summer	13,265	14,900	16,298	18,127	N/A	N/A	N/A
Stillaguamish	Summer	817	2,000	1,409	1,230	N/A	N/A	N/A
Snohomish	Summer	5,028	5,250	6,342	4,443	N/A	N/A	N/A
Green	Fall	5,723	5,800	2,908	4,792	N/A	N/A	N/A
Dungeness 3/	Spring	N/A	N/A	N/A	195	N/A	N/A	N/A
Nooksack 3/	Spring	N/A	4,000	N/A	N/A	N/A	N/A	N/A
White 3/	Spring	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Skokomish 3/	Spring	N/A	N/A	N/A	0	N/A	N/A	N/A
Hoko 3/	Fall	N/A	850	N/A	800	N/A	N/A	N/A
Dungeness 3/	Fall	N/A	400	N/A	39	N/A	N/A	N/A

Table 2. Summary of the escapement of Escapement Indicator Stocks,  
1985 thru 1987. (1987 data is very preliminary) Cont'd.

Production Unit	Stock Type	Avg. Esc. Base 1/	Esc. Goal	1985 Esc.	1986 Esc.	1987 Esc.	1986-87 % Base	1986-87 % Goal
Washington Coast								
Hoh	Spr/Summer	1,325	NA 4/	1,000	1,500	N/A	N/A	NA 4/
Queets	Spring	925	NA 4/	700	900	N/A	N/A	NA 4/
Grays Harbor	Spring	450	1,400	1,150	1,800	N/A	N/A	64
Grays Harbor	Fall	8,575	14,600	9,400	10,500	N/A	N/A	36
Quillayute	Summer	1,250	NA 4/	600	600	N/A	N/A	NA 4/
Quillayute	Fall	5,850	NA 4/	6,100	10,000	N/A	N/A	NA 4/
Hoh	Fall	2,875	NA 4/	1,700	5,000	N/A	N/A	NA 4/
Queets	Fall	3,875	NA 4/	3,900	7,900	N/A	N/A	NA 4/
Columbia River								
Upper River 5/	Spring	28,955	84,000	28,254	38,973	N/A	N/A	N/A
Willamette	Spring	33,450	30,000	34,500	39,200	52,800	138	153
Upper River	Summer	24,275	85,000	23,400	25,900	33,043	121	35
Lewis River 5/	Fall	11,801	10,000	7,500	14,500	N/A	N/A	N/A
Upriver Bright 6/	Fall	28,325	40,000	93,300	113,200	148,300	462	327
Oregon Coast								
Aggregate Index 7/	Fall	83	N/A	117	97	N/A	N/A	N/A

- 1/ Base period for Alaskan and Transboundary stocks 1975-80; base for all other stocks 1979-82.
- 2/ Increased 1986 escapement estimate for Upper Georgia Strait reflects unusual survey condition.
- 3/ Little or no comparative data are available for these stocks.
- 4/ Stocks managed on the basis of floor minimum and fixed harvest rates.
- 5/ Only includes naturally spawning component.
- 6/ The count reported for 1987 is only through October 15 at McNary Dam.
- 7/ Oregon coastal north-migrating chinook stocks are presently assessed via standard spawning escapement surveys and expressed as an overall aggregate count of average adult spawners per mile. This index represents standard surveys on 10 of the approximately 20 systems supporting this stock group.

LIST OF REPORTS PREPARED BY OR PRESENTED TO THE CHINOOK TECHNICAL COMMITTEE FOR USE DURING THE 1986 PSC MANAGEMENT CYCLE.

LIST OF TECHNICAL REPORTS

1. Preliminary review of 1986 Fisheries (TCCHINOOK 86-2, 11/86)
2. Preliminary Review of 1986 Fisheries (TCCHINOOK 87-1, 2/2/87)
3. Assessing Progress Towards Rebuilding Depressed Chinook Stocks (TCCHINOOK 87-2, 2/11/87)
4. Data Report of the Chinook Technical Committee on Unaccounted for sources of Fishing Associated Mortalities of Chinook Salmon in Westcoast Salmon Fisheries (TCCHINOOK 87-3, 2/1/87)
5. 1986 Summary Report (TCCHINOOK 87-4, 2/26/87 - revised 2/28/87)

LIST OF AGENCY REPORTS

A. DOCUMENTS PERTAINING TO THE REBUILDING OF DEPRESSED NATURALLY SPAWNING CHINOOK STOCKS.

1. Summary of Chinook Escapement and Harvest Rate Indicator Stocks for the Oregon Coast (ODFW, memo of 1/13/87)
2. Southeast Alaska Regional Summary - Identification of Indicator Stocks and Assessment of Rebuilding of Natural Chinook Salmon Stocks (ADFG, 2/5/87)
3. Summary of Chinook Escapement and Harvest Rate Indicator Stocks for Puget Sound and the Washington Coast (NWIFC/WDF, et. al. 2/9/87)
4. Review of Natural Chinook Salmon Escapement Trends in Transboundary Rivers of Northern British Columbia and Southeast Alaska (CDFO/ADFG, 2/12/87)
5. Regional Summary for Columbia River Chinook Indicator Stocks (CRITFC, 5/22/87)

B. DOCUMENTS PERTAINING TO INCIDENTAL MORTALITY.

1. Data Report on Unaccounted for Sources of Fishing Associated Mortalities of Chinook Salmon in B.C. Fisheries ((1977-1986) CDN. 1/87)
2. Mortality Rates of Sublegal and Legal Sized Chinook Salmon Associated with Incidental Catch During Chinook only Troll Closures (NMFS, 2/4/87)

3. Evaluation of Chinook Pass-Through and Evaluation of Associated Harvests in Washington and Oregon Fisheries Without PSC Harvest Ceilings (WDF et. al., 2/11/87)
4. Supplement to the Canadian Report on Unaccounted for Sources of Fishing Associated Mortalities: Pass through Related Information (CDN., 2/19/87)
5. Preliminary Summary of Chinook Salmon Hook and Release in the 1986 Southeast Alaska Troll Fishery (ADFG, 2/19/87)  
(Substitute document provided to the CTC 10/87)  
Observations on Chinook Salmon Hook and Release in the 1986 Southeast Alaska Troll Fishery (ADFG, June 1987)
6. Associated Fishing Induced Mortalities of Chinook Salmon in Southeast Alaska (ADFG/NMFS, 2/21/87)
7. Observations on Chinook Salmon Non-Retention in the 1986 Southeast Alaska Purse Seine Fishery (ADFG, 2/21/87)

#### C. DOCUMENTS PERTAINING TO CATCH AND STOCK COMPOSITION.

1. 1976 to 1985 Puget Sound Chinook Net Catch with Regard to Pacific Salmon Treaty Obligations (Progress Report No. 251, WDF, 1/87)
2. Georgia Strait Chinook Stock Composition: A GSI Simulation Analysis (NMFS/WDF, 2/87)
3. Washington Chinook Fishery Stock Composition Estimates. Results from Genetic Stock Identification Studies in Selected Washington State Fisheries (U.S. - CTC, 2/8/87)
4. History of Chinook and Coho Salmon Catch in Washington State Fisheries Operating in Puget Sound and Juan de Fuca Strait (WDF, 2/8/87)
5. Historical Catch of Chinook Salmon in Juan de Fuca Strait and the Strait of Georgia (1953 - 1986), and Associated information on Stock Composition of the Catch (CDFO, 2/18/87)

#### D. MISCELLANEOUS DOCUMENTS.

1. Preliminary Review of 1986 Chinook Salmon Hatchery Add-on for Southeast Alaska Fisheries and Projected Add-on for 1987 (ADFG, 5/18/87)

# CHAPTER 2

## INCIDENTAL FISHING MORTALITIES OF CHINOOK SALMON IN FISHERIES OF CONCERN TO THE PACIFIC SALMON COMMISSION

	Page
Introduction . . . . .	1
Conclusions . . . . .	2
Discussion . . . . .	3
Recommendations . . . . .	4
Figure 1. Fishery level impacts . . . . .	10
Figure 2. Fate of surviving or saved fish . . . . .	11
(*) Table 1. Estimated catch and associated incidental mortality in west coast salmon fisheries impacting chinook salmon along the Pacific coast . . . . .	12
(*) Table 2. Qualitative summary of catch and incidental non-catch mortality. Quality of information available on incidental mortalities and an assessment of the impact of various sources of incidental mortalities are indicated . . . . .	12a
Appendix A. Regional Synopsis . . . . .	13
Southeast Alaska . . . . .	14
British Columbia . . . . .	15
Puget Sound . . . . .	17
Oregon and Washington Ocean . . . . .	18
Columbia River . . . . .	20
List of Documents Reviewed . . . . .	21
Appendix B. Table 1. Summary of immediate mortality in association with hook and line fisheries . . .	23
Table 2. Summary of delayed mortality in association with hook and line fisheries . . .	25
References for Tables 1 and 2 . . . . .	27
(*) Up-dates of Tables previously distributed in TCCHINOOK 87-04.	

## CHAPTER 2

### INCIDENTAL FISHING MORTALITIES OF CHINOOK SALMON IN FISHERIES OF CONCERN TO THE PACIFIC SALMON COMMISSION

#### INTRODUCTION

The total mortality of chinook salmon caused by fishing activities is not completely accounted for in catch statistics. With the exception of the Pacific Fisheries Management Council, the incidental mortality of chinook salmon during salmon fishing has generally been considered a background cost of fishing, and, until recently, has commanded little attention. However, the Pacific Salmon Treaty (Anon. 1986) recognized that accurate determination of chinook production and effective rebuilding of depressed chinook stocks requires that all sources of fishing mortality be accounted for.

In March, 1987 the Pacific Salmon Commission instructed the Chinook Technical Committee to:

- a. Complete a technical review of agency reports on associated mortalities;
- b. Complete an evaluation of all sources of associated fishing mortalities coastwide in all marine and freshwater fisheries as requested by the Commission in March 1986;
- c. Develop technical procedures and standardize methodologies to quantify the magnitude of associated fishing mortalities, including savings of fish, and assess their impacts upon the rebuilding program, including pass-through commitments;
- d. Estimate the magnitude of all quantifiable sources of associated mortalities, estimate their impact on the rebuilding schedule and recommend management actions that will achieve the objectives of the chinook rebuilding program, taking into account the effects of all fishing mortalities.

This report presents the Committee's consideration of items (a) and (b) above, to the extent that information is available, and estimates the magnitude of all quantifiable sources of incidental mortalities. The Committee recommends later in this report that consideration of standardized methodologies for sampling surveys (c) be deferred until levels of commitments to these surveys are established. Survey designs and priorities for information collected will vary with the resources provided. The Committee has addressed other aspects of (c) in a discussion paper clarifying the pass-through provision and is assessing the impact of incidental mortalities on rebuilding (d) by revising the U.S./Canada Chinook Rebuilding model (the chinook model). A final report on an evaluation of all fishing mortalities on the chinook rebuilding schedule will be submitted later. The modeling evaluations are incomplete at this time.

## CONCLUSIONS

### Magnitude of Incidental Mortality Loss:

Information available from agency reports indicate that the coastwide magnitude of incidental fishing mortality for all sizes of fish is likely to be in the range of 30 to 50 percent of the reported catch. This figure is based upon moderate mortality rates applied to a conservative estimate that the number of chinook salmon subject to incidental mortality, estimated to be 1 to 1.5 times the reported catch (see Discussion, Table 1). Although a large portion of this incidental catch is young fish, this still represents a significant source of mortality.

### Inadequacy of Available Data to Complete Coastwide Assessment of Changes in Incidental Mortality Losses:

The Committee could not conclude whether total incidental mortalities had changed since the base period. There were two principal reasons. First, all quantitative estimates of incidental mortality during the base period were obtained by extrapolation or inference from data collected from only a few of the years. Second, even qualitative interpretations of change within fisheries were equivocal because of differing interpretations of the data and significant changes in abundance, and fishing effort and locations. However, the reduction in incidental mortalities proportional to reductions in reported catch, as assumed in the chinook model which projected the rebuilding schedule, probably has not occurred. Chinook non-retention fisheries have increased the catch-and-release of older age fish and size limit changes have increased the portion of a cohort below recruitment size. These are new sources of incidental mortalities.

### Inability To Complete Direct Assessment of Impacts of Incidental Mortalities on Rebuilding Based on Information Contained In Agency Reports:

The information required for this evaluation was not provided in the Agency reports. Information requirements for direct assessment of impacts of incidental mortalities upon rebuilding are substantially more detailed than for estimation of the magnitude of incidental mortality losses. That level of detail is not generally available. The Committee is, however, in the process of revising the U.S./Canada chinook model to more realistically assess the effects of incidental mortality on the rebuilding program. This will provide the Commission with a tool to indirectly estimate the sensitivity of the rebuilding schedule to incidental mortalities.

## DISCUSSION

### Review of Agency Reports:

A summary of the Committee's findings with respect to the agency reports on incidental mortality provided in 1986 is presented below. Executive summaries of each agency report are attached for convenience (Appendix A).

The agencies evaluated in a good faith effort the magnitude of incidental mortalities in their respective jurisdictions. Despite this effort, we identified five common problems that preclude accurate and precise estimation of the past and current level of incidental mortality:

- (1) Uncertainty (both in precision and accuracy) in agency estimates of key parameters makes many of them equivocal. This uncertainty stems from differences in procedures employed for data collection, substantial variability observed even within narrowly defined times, areas and gear and from few observations.
- (2) Extrapolation of estimates to unsampled times, areas and gears was common despite the fact that such inferences may introduce bias. Extrapolation is fraught with problems because changes in regulations, abundance, etcetera affect the number of fish encountered. This problem was particularly prevalent in establishing base period levels for comparative changes since Treaty ratification and was done even though significant changes in fisheries and stock abundance were noted.
- (3) No information was provided on stock-specific impacts. Data provided by agencies focused on the magnitude of incidental mortality on aggregate populations exploited by various fisheries. Without data on the stock, age and maturity of the fish killed, impacts on depressed stocks can not be directly quantified (see Figures 1 and 2).
- (4) Information was not consistently available for all fisheries coastwide. Sporadic reporting, both between and within fisheries and time periods was evident. A cautious interpretation of the available data is warranted. Incomplete and inconsistent reporting can result in biased interpretations that fuel controversy.
- (5) Impacts of regulatory actions, such as time/area closures and gear restrictions, are neither readily quantifiable nor verifiable.

Agency estimates of the magnitude and possible changes in the level of incidental mortality are summarized in Table 1. In regard to this table, note that: catch statistics for all fish

sold, regardless of size (i.e. under and over five pounds), are included; legal size fish released include those released during non-retention fisheries or those released when daily limits for sport caught fish are exceeded, and unobserved encounters are those which are caught but escape unobserved. The large number of blanks in Table 1 demonstrate that much of the information necessary to complete a quantitative assessment of incidental mortalities in all fisheries coastwide, as requested by the Commission, is not available. Consequently, the Committee has provided a qualitative assessment of the probable changes in incidental mortalities in Table 2. In both of these tables, comparisons of levels of incidental mortality are made in relation to the base period applied in the chinook model because data from these years were used in the chinook model to estimate harvest rate reductions that would be required in order to rebuild depressed stocks by 1998.

#### Estimation of the magnitude of incidental mortality loss:

Estimation of the magnitude of incidental mortality depend upon two factors: (1) the number of fish encountered; and (2) the mortality rate to apply to those encounters.

#### Encounter Rates:

The number of encounters is a function of three variables: (1) the vulnerability of fish to the gear (catchability); (2) the amount of effort exerted, and; (3) abundance. Catchability varies depending upon gear size and/or type, size limits, fishing location, weather, etc.

The variation in encounter rates caused by the interaction of the above variables, makes the application of encounter rates, observed for specific fishing situations, areas, or times, to other fisheries questionable. Accurate and precise quantitative data that would permit comparison of the magnitude of encounter rates between time periods and fisheries are generally not available. However, encounter rates can be observed and are, therefore, quantifiable if required. The dynamic nature of fisheries and the natural environment simply indicate that accurate and precise estimation of encounter rates will require extensive sampling to characterize a fishery or to reliably compare between fisheries or years.

#### Mortality Rates:

If the number of encounters is known, incidental mortality can be estimated by multiplying by an appropriate mortality rate. Identifying the range of scientific opinion within the Committee concerning appropriate mortality rates may help in formulating management decisions. Depending on the status of the rebuilding program and the level of risk deemed appropriate, different values of mortality rate within the specified range may be viewed

as appropriate. However, within the range of mortality rates presented, accurate estimation of incidental mortality losses in a particular fishery is probably more dependent upon the estimation of the number of chinook encountered than upon differences of opinion about which mortality rate to apply.

Estimates of immediate mortality (fish that are dead when landed) in troll fisheries range from 2.5 to 10.8% while estimates of total mortality range between 10 and 70% (Appendix B). The Committee reached a consensus opinion that the total mortality rate of chinook salmon caught and released in commercial troll fisheries lies within the range 20% to 30%. This range includes both those fish that are dead when landed and those that are released alive but subsequently die. Differences in scientific opinion among the committee members result from the relative merit placed on individual studies, the relative importance of the factors that contribute to outcomes from various studies, and each member's personal experience. The Committee has not discussed an appropriate range for sport fisheries and to-date has assumed the same rates as for commercial troll fisheries.

For purse seine fisheries, the Committee concluded that total incidental mortality rates probably range from a minimum of about 50% upwards to 100%. The best available estimate of immediate mortality comes from on-board observer programs such as Van Alen and Seibel (1986, 1987). These studies indicate that immediate mortality varies considerably between areas and years. An unweighted average of immediate mortality rates for all observations in the Van Alen and Seibel studies is 52.1 percent. Literature estimates of delayed mortality associated with the capture and subsequent release of chinook salmon in purse seine fisheries was not available. However, general observations of condition (Van Alen and Seibel 1986, 1987) indicate that of the fish released alive, about 43 percent showed obvious injuries. In addition to obvious injury, additional losses are expected due to physiological stresses. Mortality rates for incidental encounters in gillnet fisheries have not been discussed.

Factors affecting the incidental mortality rate in purse seine fisheries include: (1) size of the fish involved (large fish may suffer higher mortality), (2) the number of fish in a haul (chinook and other species), (3) the method of hauling and emptying the bundt, (4) the method of release and, (5) weather conditions.

#### Assessing the Impact of Incidental Mortality on Rebuilding:

The previous discussion identifies the information required to estimate the magnitude of incidental fishing mortality. Additional information required to directly estimate the impact of these losses on rebuilding (Figures 1 and 2). Information on stock, age, and sex composition in fisheries, and stock specific data on maturity schedules, migration paths, and exploitation

patterns are required, but are not generally available. A quantitative assessment of impacts of incidental mortality on rebuilding is not possible given the information presented in the agency reports.

The magnitude of estimated losses indicates that incidental mortality may well influence chinook rebuilding. In order to provide the Commission with an assessment of the potential impact on rebuilding, a theoretical approach is under development. The 1984 model deals with incidental fishing mortalities rather simply by assuming that losses are directly proportional to reductions in reported catch. This treatment likely underestimates the impacts of incidental mortalities and does not adequately account for regulatory changes (e.g. non-retention restrictions; size limit changes; closures of areas of high chinook incidence, etc.) since the base period.

The Committee is revising the 1984 model to more realistically reflect the magnitude of incidental mortality and to better assess the impact upon rebuilding. Results of that assessment will be reported at a later date. Present data limitations will preclude direct validation of most of the simulation modeling results.

Upon completion of the Committee's assessment of the relative impacts of incidental mortality losses on rebuilding, additional information will be available to the Commission concerning the significance of incidental mortalities. At that time, the Commission will be better able to determine what, if any, adjustments to fishing regimes may be required to successfully conclude the coastwide chinook conservation program.

Research and Monitoring: Several constraints have been identified that limit our ability to evaluate the impact of all sources of incidental mortalities on rebuilding:

- methodology to monitor some types of incidental mortality in actual fisheries (e.g., gill net drop outs).
- a lack of mortality rate estimates for some types of encounters (e.g., seine).
- an inability to identify depressed stocks from those which are not depressed in mixed stock fisheries.
- an inability to estimate the probability (by time and area) of a "saved" fish escaping through intervening fisheries to spawn.

The agency reports considered the magnitude and changes in incidental mortality within specific fisheries. However, as chinook stocks rebuild, Commission concerns will focus more on individual stocks which are not keeping pace, rather than on fisheries. The information needed to address individual

depressed stock concerns is substantially more detailed than for estimation of the magnitude of incidental mortalities for fisheries.

Limited fiscal resources for basic research and fishery monitoring also impose practical constraints on future impact analysis. For instance, variation in parameters such as number of fish caught, age and stock composition is large within an operational fleet. The highly variable nature of these parameters requires that large numbers of samples (e.g., observer days) need to be obtained to accurately and precisely characterize the fleet's performance. While basic research is needed to better estimate incidental mortality impacts on rebuilding of depressed stock, the complexity of the issues involved suggests that research will be expensive. However, information important to the assessment of incidental mortalities for certain significant fisheries could be readily obtained and evaluated given adequate resources. The information needed is: the number and characteristics of fish caught and released in troll, seine and recreational fisheries, and the magnitude of sales slip reporting bias. Furthermore, the methodology employed can also be better standardized among agencies so that results are more comparable.

#### Need to Clarify Objectives For Incidental Mortality Concerns:

There is a need to clarify the issues and objectives actually involved in determining the importance of incidental mortality and to prioritize the efforts of the Committee and agencies. The topic of incidental fishing mortality frequently arises in three contexts. The issues, not listed in any particular order, are:

- in the context of wise or best use of the available resource, the desire is to minimize wastage and maximize productive utilization of the available resource;
- in the context of perceptions of fairness, losses caused by regulations in one jurisdiction can affect both spawning escapements and catches in other jurisdictions;
- in the context of impacts on coastwide rebuilding, achievement of rebuilding depressed stocks by 1998 may depend, in part, upon the magnitude of incidental mortality.

#### RECOMMENDATIONS

The substantial magnitude of losses, due to incidental

fishing mortality of 30 to 50 percent of the reported catch, presents the opportunity to initiate a positive program to address the underlying issues of the Parties. However, devoting further effort of the Committee to attempt to precisely quantify changes in incidental mortality losses resulting from agency management since the base period will be unproductive.

#### Minimize Incidental Mortality Losses

The most practical and productive approach to address incidental mortality is to minimize such losses so as to achieve maximum productive utilization of the available abundance. Costs of studying how to accomplish this could be partially recoverable from increased yields. Successfully meeting this objective should assist in solving the remaining two issues of fairness and rebuilding.

In particular, research and management programs to develop ways of minimizing incidental mortality losses should be designed in cooperation with the industry. Also, educational programs should be developed and expanded to disseminate information on methods of minimizing incidental mortalities.

#### Initiate Necessary Research For Addressing Depressed Stock Concerns

In anticipation of the increasingly stock specific nature of the rebuilding program the agencies should attempt to locate areas of incidental mortalities particularly on depressed stocks. These studies would be consistent with the objective to maximize yield if management actions in specific time-area strata could benefit a particular stock in a manner disproportionate to its total abundance. If specific options are not identifiable then alternative actions could be evaluated; for example, decreased terminal harvest or supplemental production through enhancement.

General minimization of incidental mortality losses for individual fisheries should not be relied upon as the only means of addressing concerns for specific depressed stocks. Such reliance could cause excessive disruption of fisheries, could require extensive new resources, and may not be successful in the absence of other regulatory measures. At some point, the benefits to be gained for a specific stock through control of incidental mortality will be small (i.e., may be diluted through time) and the costs of controlling incidental mortality may be excessive, either through disruption to fisheries and/or research costs.

### Institute Monitoring Programs

Data needed by the Committee to estimate the magnitude of incidental mortality were not available. Further, the commitments to monitor fisheries were not realized. If the Commission desires to evaluate the magnitude of total incidental mortalities, then monitoring programs need to be initiated. Attention should be particularly directed towards initiating adequate observer, creel census and other agreed programs in all troll and recreational fisheries, and where applicable, purse seine fisheries. Development of standard approaches need not be addressed until agreement is reached on the scope of the program. First however, the Parties should agree to a level of activity to be directed to data collection for estimating the magnitude of chinook encounters and the biological characteristics of those chinook.

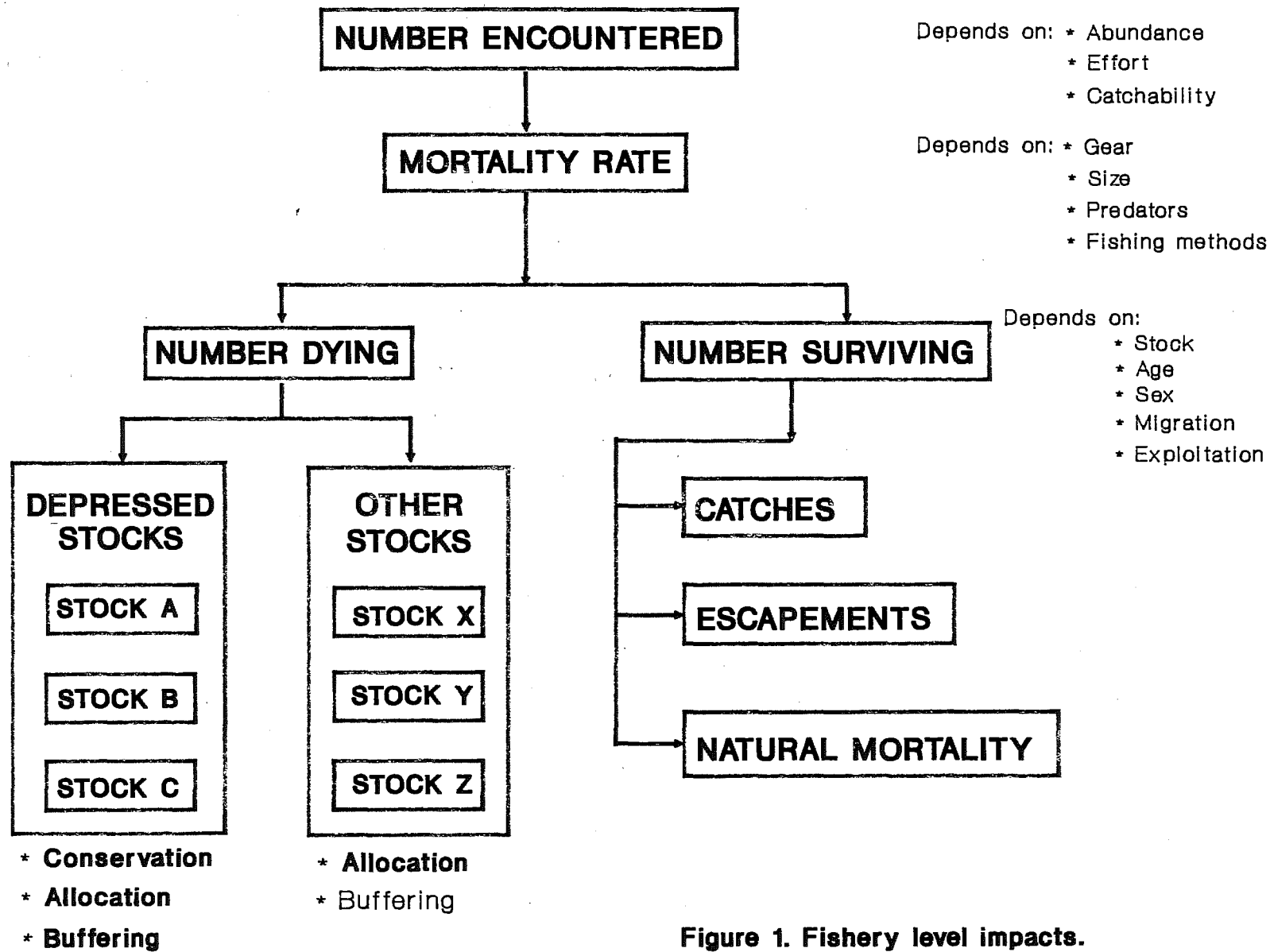


Figure 1. Fishery level impacts.

FIGURE 2.

## FATE OF SURVIVING OR SAVED FISH

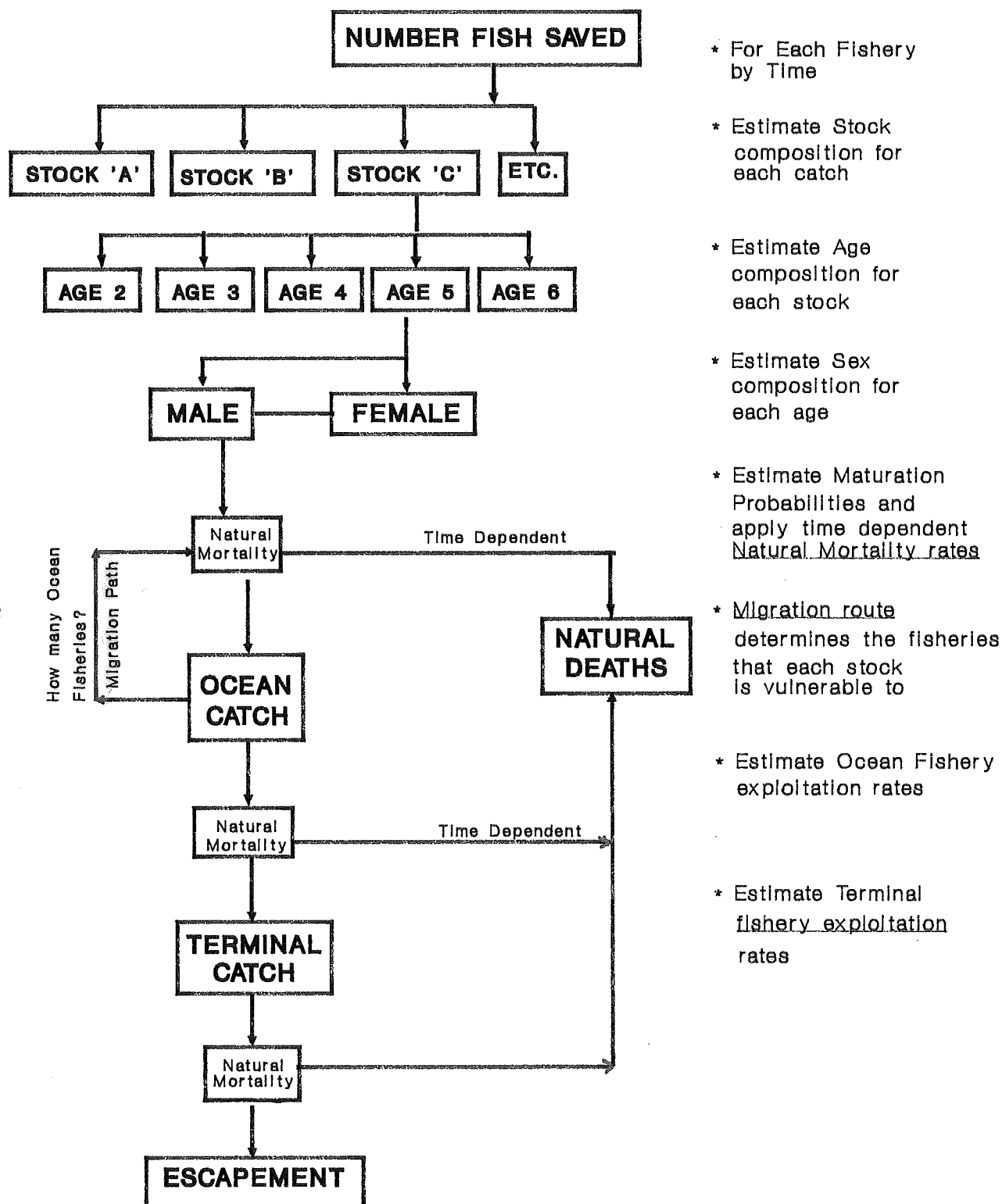


Table 1. Estimated catch and associated incidental mortality in west coast salmon fisheries impacting chinook salmon along the Pacific west coast. Blanks in the table indicate that quantitative estimates are not available. BP = base period (1977-1982). NA = not available.

AREA	PERIOD	TROLL				SPORT				GILLNET				SEINE			
		RELEASED				RELEASED				RELEASED				RELEASED			
		-----				-----				-----				-----			
		KEPT	SUB LEGAL	LEGAL	NON RPT.	KEPT	SUB LEGAL	LEGAL	NON RPT.	KEPT	SUB LEGAL	LEGAL	NON RPT.	KEPT	SUB LEGAL	LEGAL	NON RPT.
-----																	
S.E.ALASKA: f/																	
	BP	298,257	301,000	17,888		17,754				12,154				13,912		0	
	1983-84	247,049	190,920	81,000		21,599				8,666				17,179		0	
	1985-86	211,308	169,867	91,125		22,304				10,853				18,227		18,206	
NORTHERN																	
B.C.:																	
	BP	252,225	174,566	0		14,230		4,210		44,268 g/		10,100		43,900		33,100	
	1983-84	265,794	270,710	0		11,660		5,364		25,126		6,300		22,400		22,400	
	1985-86	208,272	200,757	0		11,030		4,291		44,636		9,500		27,050		36,700	
WEST CST.a/																	
VAN. IS.:																	
	BP	500,327	478,960	0		NA		NA		32,744 g/		8,600		10,700		31,300	
	1983-84	422,838	442,590	0		35,600		NA		56,557		3,510		2,700		11,100	
	1985-86	345,825	368,680	0		13,800		NA		26,050		7,185		13,020		34,085	
GEORGIA a/																	
ST.:	BP	236,000	297,200	0		332,400	332,400	4,540 f/		70,385 g/		7,600		31,600		16,700	
	1983-84	96,800	78,100	0		283,900	283,900	4,620		42,140		11,750		20,400		21,900	
	1985-86	50,900	53,600	8,800		208,600	208,600	5,520		50,050		4,050		25,200		4,800	
PUGET SD.:																	
	BP	13,300				211,000				173,300				50,500	146,480c/		
	1983-84	19,000				187,000				158,500				41,000	102,502c/		
	1985-86	23,000				149,000b/				169,000				35,500	101,510b/c/		

Table 1. con't

AREA	PERIOD	TROLL				SPORT				GILLNET				SEINE			
		RELEASED				RELEASED				RELEASED				RELEASED			
		-----		-----		-----		-----		-----		-----		-----		-----	
		SUB	NON	SUB	NON	SUB	NON	SUB	NON	SUB	NON	SUB	NON	SUB	NON	SUB	NON
		KEPT	LEGAL	LEGAL	RPT.	KEPT	LEGAL	LEGAL	RPT.	KEPT	LEGAL	LEGAL	RPT.	KEPT	LEGAL	LEGAL	RPT.
-----																	
WEST CST.e/																	
WASHINGTON:																	
	BP	149,100				109,400				41,100							
	1983-84	36,800				29,300				15,800							
	1985-86	49,700				27,300				26,600							
COLUMBIA																	
R.:	BP									169,400							
	1983-84					37,600d/				92,800							
	1985-86					49,100d/				213,200							
						53,900d/											
-----																	

a/ Georgia Strait area includes catch in the Johnstone Strait net fisheries and West Coast catch area includes the net fisheries of Jaun de Fuca

b/ 1985 only; 1986 not yet available

c/ Areas 7/7A & 8-13; these are overestimates

d/ Mainstem Columbia River plus tributary spring chinook catches for Willamette, Cowlitz, Kalama and Lewis Rivers.

e/ Includes catches north of Cape Falcon, Oregon.

f/ Fraser River non-tidal sport catch (1977-79 average (no information 1980-83, 1984-85 estimates only partial Sept-Dec).

g/ Includes native food fish catch estimates.

h/ Catch for inside areas of Barkley Sound only, catch from all creel census for August through September.

Table 2. Qualitative summary of catch and incidental non-catch mortality. Quality of information available on incidental mortalities and an assessment of the impact of various sources of incidental mortalities are indicated. Qualifiers in each cell are: REL = reliable data; ? = uncertain data quality; NONE = no data; and N/A indicates the topic is not appropriate to the gear or situation. Trend indicates the direction of change (UP, DOWN, of NCH) or that the direction of change is unknown (UKN). Data in this table was provided by responsible management agencies.

AREA	PERIOD	TROLL					SPORT					GILLNET					SEINE				
		RELEASED					RELEASED					RELEASED					RELEASED				
		-----					-----					-----					-----				
		KEPT	SUB LEGAL	LEGAL	NON RPT.	UNOBS	KEPT	SUB LEGAL	LEGAL	NON RPT.	UNOBS	KEPT	SUB LEGAL	LEGAL	NON RPT.	UNOBS	KEPT	SUB LEGAL	LEGAL	NON RPT.	UNOBS
-----																					
S.E.ALASKA:																					
	DATA QUALITY	REL	REL	REL	NONE	NONE	REL	Uncer.	Uncer.	NONE	NONE	REL	N/A	N/A	NONE	NONE	REL	?	REL	?	NONE
	TREND	DOWN	DOWN	UP	UKN	UKN	UP	UP	UP	UKN	UKN	DOWN			UKN	UKN	UP	UKN	UP	UP	UKN
NORTHERN																					
B.C.:																					
	DATA QUALITY	REL	REL	N/A	NONE	NONE	?	NONE	NONE	NONE	REL/?	REL	N/A	N/A	NONE	NONE	REL	NONE	N/A	?	NONE
	TREND	DOWN	DOWN		UKN	UKN	UP	UKN	UKN	UKN	NCH	DOWN			UKN	UKN	DOWN	UKN		NCH	UKN
WEST CST. a/																					
VAN. IS.:																					
	DATA QUALITY	REL	REL	N/A	NONE	NONE	?	NONE	NONE	NONE	NONE	REL	N/A	N/A	NONE	NONE	REL	NONE	N/A	?	NONE
	TREND	DOWN	DOWN		UKN	UKN	UP	UKN	UKN	UKN	UKN	DOWN			UKN	UKN	DOWN	UKN		NCH	UKN
GEORGIA ST a/																					
	DATA QUALITY	REL	?	REL	NONE	NONE	REL	NONE	NONE	NONE	REL/?	REL	N/A	N/A	NONE	NONE	REL	NONE	N/A	?	NONE
	TREND	DOWN	DOWN	UP	UKN	UKN	DOWN	UP	UKN	UKN	UP c/	DOWN			UKN	UKN	DOWN	UKN		NCH	UKN
PUGET SD.:																					
	DATA QUALITY	REL	?	?	NONE	NONE	REL	?	NONE	NONE	NONE	REL	N/A	N/A	NONE	NONE	REL	REL	N/A	NONE	NONE
	TREND	UP	UP	UP	UKN	UKN	DOWN	DOWN	UKN	UKN	UKN	NCH			UKN	UKN	DOWN	DOWN		UKN	UKN

Table 2. Cont'd.

		TROLL					SPORT					GILLNET					SEINE				
AREA	PERIOD	RELEASED					RELEASED					RELEASED					RELEASED				
		-----					-----					-----					-----				
		SUB		NON			SUB		NON			SUB		NON			SUB		NON		
		KEPT	LEGAL	LEGAL	RPT.	UNOBS	KEPT	LEGAL	LEGAL	RPT.	UNOBS	KEPT	LEGAL	LEGAL	RPT.	UNOBS	KEPT	LEGAL	LEGAL	RPT.	UNOBS
-----																					
WEST CST. b/ WASHINGTON:																					
	DATA QUALITY	REL	?	?	NONE	NONE	REL	?	?	NONE	NONE	REL	N/A	N/A	NONE	NONE	N/A	N/A	N/A	N/A	N/A
	TREND	DOWN	DOWN	DOWN	UKN	UKN	DOWN	DOWN	DOWN	UKN	UKN	DOWN			UKN	UKN					
COLUMBIA RIVER																					
	DATA QUALITY	N/A	N/A	N/A	N/A	N/A	REL	?	?	NONE	NONE	REL	N/A	N/A	NONE	NONE	N/A	N/A	N/A	N/A	N/A
	TREND						UP	UP	UP	UKN	UKN	UP			UKN	UP					
-----																					

a/ Georgia Strait catch area includes net fisheries in Johnstone Strait and the West Coast catch area includes net fisheries in Juan de Fuca.

b/ Includes catches north of Cape Falcon, Oregon.

c/ Evaluation of trend is 'up' because of closures on adult chinook in Fraser River 1980-84, recent catches include increasing numbers of hatchery fish.

APPENDIX A  
REGIONAL SYNOPSIS

CONTENTS

Southeast Alaska .....	14
Seine Fishery .....	14
Troll Fishery .....	14
Recreational Fishery .....	14
British Columbia .....	15
Net Fisheries .....	15
Hook and Line Fisheries .....	16
Puget Sound .....	17
Seine Fishery .....	17
Gillnet Fishery .....	18
Recreational Fishery .....	18
Troll Fishery .....	18
Oregon & Washington Ocean .....	18
Columbia River .....	20
Gillnet Fishery .....	20
Recreational Fishery .....	20
List of Documents Reviewed .....	21

## SOUTHEAST ALASKA

Seine Fishery: Catch and release regulations in the purse seine fishery were readopted by the Alaska Board of Fisheries beginning in 1985. During the 1985 season, approximately 11,106 chinook salmon were encountered during the non-retention portion of the season. During the 1986 season, 18,206 chinook salmon were encountered. By multiplying these estimates by the upper and lower bound of the likely mortality rates ( 0.50 to 0.90) the magnitude of this associated mortality was estimated to be from 5,553 to 9,995 in 1985, and from 9,103 to 16,385 in 1986. Because non-retention regulations were not in effect during the period 1977 to 1982, (except for a 28 inch size limit in 1977 and 1978) associated mortality of this type and magnitude was not included in the base period years.

Troll Fishery: In the troll fishery, a fewer number of days were fished in 1985 and 1986, as compared to 1977 - 1982. This reduction in effort probably reduced the number of sub-legal size chinook salmon caught and released. A reduction of about 44 percent is indicated. By multiplying the differences in the number of fish encountered between the periods by the range of mortalities (0.20 to 0.30) the estimated reduction in number of dead sub-legal size fish is between 26,226 and 39,340. Log book data obtained through the Alaska Trollers Association also indicated a similar percentage reduction in the number caught and released. Catch and release regulations for legal size chinook salmon were adopted for the troll fishery by the Alaska Board of Fisheries beginning in 1981. These regulations were implemented after chinook salmon catch limits had been reached and surplus production for other species was available for harvest. Available data indicate that in 1985 and 1986, an average of about 73 thousand more legal size chinook salmon were caught and released than during the base period years. The estimated number of legal size fish that may have died from these encounters ranges from 14,647 to 21,971.

Recreational Fishery Creel survey data are insufficient to make accurate and precise comparisons of recent year's catch and release of sub-legal size chinook salmon with base period years. A rough approximation of the direction and magnitude was made by presuming that abundance has been constant and computing the change in effort. The mean effort during the base period was 250,260 angler days. In 1985, the effort was 349,767 angler days (data for 1986 are not available yet). A 39.8 percent increase in angler days is indicated and this increased effort probably increased the number of sub-legal size chinook salmon that were hooked and released.

## BRITISH COLUMBIA

Quantitative estimates of incidental mortalities on chinook salmon during salmon fishing in British Columbia are only available for the troll fisheries (catch and release type impacts) and for the non-reported catch of small chinooks in seine fisheries (retained and discarded type impacts). The catch in nets of chinooks under 5 pounds is available annually but this data is not accounted for in statistics presented to the Pacific Salmon Commission. Estimated numbers of chinooks caught and released in recreational fisheries are considered unreliable because provision of this data is voluntary in interviews or logbooks and the accuracy of species identification in these reports is uncertain. Only qualitative assessments of changes in other sources of mortalities, such as gillnet drop-out or sorting of catch by sport fishermen, can be presented. When quantitative estimates of incidental catches can be developed the calculations only estimate the number of chinooks encountered (eg. numbers of fish caught and released). In most cases, the mortality rate applied will be constant and will, therefore, not influence any interpretation about changes in the direction and/or levels of mortalities since implementation of the Treaty.

### Net Fisheries

Chinook salmon are only caught incidentally in net fisheries directed on other species. Extensive regulatory changes have been implemented since 1977 to reduce this incidental catch. The most pronounced changes have been a general reduction in days open and the 1984 closure of the last net fishery directly harvesting a natural chinook stock (an early season gillnet fishery in area 8). In northern B.C. (areas 1- 10), days open to fishing by gillnets and seines averaged 22% less days between 1983-1986 but was only reduced by 8% in 1985-1986. Reductions in southern B.C. (areas 11-29) averaged 23% during 1985-1986. Reductions in days open have not, however, always resulted in a direct reduction in cumulative fishing effort due to increased fisheries on sockeye (1985) and pink and chum (1986). In northern B.C., the average number of boat days in the 1985 and 1986 seine fisheries increased 20% relative to the base period but in the gillnet fishery it decreased 12%. In southern B.C., seine effort was reduced in 1985 and 1986 but gillnet effort directed at harvesting sockeye increased by 20% in areas outside the Fraser River.

In terms of catch, the catch of chinooks under 5 pounds during 1985 and 1986 northern net fisheries averaged a 7% increase relative to the base period but the catch of chinooks over 5 pounds decreased by 31%. Catch of chinooks under and over 5 pounds in southern B.C. nets was reduced 22% and 15% respectively relative to the base period.

Information on non-reported catch of small chinooks in seine fisheries has recently been developed. Sampling of landed catch

in order to recover coded-wire tagged chinook and coho salmon has revealed that a significant number of small chinooks are not recorded as chinook in catch statistics. Preliminary analysis of data from 1980-82 fisheries suggest that catch of chinooks under 5 pounds may be underestimated by 15 to 40 per cent depending on the fishery and year of catch.

### Hook and Line Fisheries

Numbers of chinook shaken by the outside troll fishery (area 1-11,21-27) are estimated to have been reduced by 23% from the base period. This level of reduction is the net result of reduced fishing time (approx. 60% reduction in days open) but increased fishing effort per day. The estimated number of chinook caught and released in the outside troll fishery average 536,000 during 1985 and 1986 (1.03:1.0 ratio with chinooks retained). This ratio is an increase from 0.87:1.0 in the 1977-82 base period but is attributable to unusually intense fishing during 1985 in Area 21, an area of high shaker abundance. The only occurrence during 1985 and 1986 of a chinook non-retention fishery was a 5 day period at the end of the 1985 west coast of Vancouver Island fishery. This fishery was not sampled for encounter rates.

Extensive changes to the Strait of Georgia troll fishery have occurred since the base period; including reduced fishing effort through area licensing, increased size limits in 1983 and 1986, reduced seasons, and extensive periods of chinook non-retention. These changes substantially complicated the assessment of changes and resulted in uncertainty about the degree of change that has occurred. The estimated reduction in numbers of chinook hooked and released (including sublegal and legal during non-retention periods) is 64% (range 39-89%) from the base period. The lower bound of the range was the reduction based on chinook hooked and released per day and the upper bound was based on the number of shakers per keeper. The only years with sampling information are 1983 and 1984. Since these years are after several regulation changes, extrapolating back to 1977 is of uncertain validity. A large portion of the reduction in numbers of chinook shaken is likely attributable to the two-area troll licensing implemented in 1981. This regulation reduced the total number of troll days in the Strait of Georgia by 40% immediately following implementation (1981-83 average compared to the 1977-80 average cumulative number of troll days). Many of the chinooks shaken in 1983 and 1984 were likely, however, to have been retained during the base period because of the smaller size limit. Further, the size limit increased again in 1986 suggesting that an alternative evaluation of change since the base period could involve the 1986 information only. There is no measurable difference between this value and the previous value. The average number of chinooks caught and released during 1985 and 1986 troll fisheries (during chinook retention and non-retention periods) was 62,400. Chinooks hooked and released per

chinook retained during the 85/86 fisheries was a 1.22:1.0 ratio; compared to an estimated range for the base period of 1.96:1.0 (based on chinooks shaken per chinook kept) to 0.56:1.0 (based on chinooks shaken per day trolling). The numbers of chinook shakers encountered has decreased since the base period but whether there is a higher encounter rate with shakers now than there was during the base period is highly uncertain based on the available data.

Other sources of non-reported impacts (such as catch and escape, or losses due to predators) occur in B.C. troll fisheries, but estimates of their magnitudes are not available.

Regulation changes in the sport fishery have probably increased the numbers of chinook shaken but there has been a trade-off between increasing numbers of shakers and reduced levels of catch. The net effect of changes in the sport fishery is probably positive (i.e. reduced total impact) but several counter balancing factors are involved in changes in these fisheries. Unfortunately, the lack of data for portions of the base period prohibits associating much confidence with the suggested direction of change. Our best estimate of the number of chinook shakers per keeper in the largest Canadian recreational fishery (the Strait of Georgia sport fishery) is a 1:1 ratio. The likelihood of a non-reporting bias suggests that this ratio should be considered a minimum value but this bias could be off-set by mis-identification of species shaken if the number of coho shaken exceeds the number of chinooks.

#### PUGET SOUND

The evaluation of Puget Sound associated mortality impacts has been confined to presentation of general management trends throughout Puget Sound and, where available, estimates of harvests. These estimates have not been "converted" to mortality estimates since assumed constant rates would be applied to the catch figures presented here thereby not changing the trends associated with the individual fisheries.

Seine Fishery: Associated impacts of Puget Sound purse seine fisheries were directly evaluated by estimating incidental harvests and potential impacts on juvenile chinooks (Shepard, 1987). This analysis indicates that the incidental harvest of chinook salmon in purse seines has been relatively stable between 1976 and 1985. Major, directed purse sein harvests have not occurred since 1978 and these fisheries are not likely to be scheduled in the future. There has been a small average (1977-82) incidental average catch of about 800 chinook in eastern Juan de Fuca Strait (Catch Areas 6 and 6A). The trend in this area has been declining. In northern Puget Sound (San Juan and Point Roberts; Catch Areas 7 and 7A) the average incidental catch has been about 32,000 and the overall trend is also declining. In southern Puget Sound (Catch Areas 8-13) the 1977-82 average

incidental catch was approximately 2,500 fish and the 1984-85 average was about 3,500.

An attempt was made to estimate juvenile chinook harvests by purse seines. The available data for making these estimates was quite limited. Consequently, the exact impacts to juvenile chinook remain unknown. However, throughout the analysis conservative choices were made such that the estimates presented below should represent overestimates of the real juvenile harvest. With this qualification in mind the analysis indicates that the juvenile chinook catches in the San Juan - Point Roberts Area may have averaged (1977-82) as high as approximately 101,000. Over the last decade the trend has been declining with the 1984-85 average at about 38,000. In the southern Puget Sound area (Catch Areas 8 to 13) the 1977-82 average may have been as high as 46,000 juvenile chinook. The 1984-85 average was approximately 55,000.

Gill Net Fishery: Combined directed and incidental gill net harvests of chinook in Puget Sound have been stable over the last decade. Chinook gill net fisheries in Puget Sound are targeted upon mature adults returning to spawn. During these fisheries juveniles chinook are not heavily harvested due to mesh size restrictions which allow most juvenile chinook to pass through the nests. Gill net fisheries for coho and chum salmon with smaller mesh nets does occur but the bulk of the harvest occurring in terminal areas targeting on health chinook runs and where larger mesh regulations apply. In mixed-stock areas, where the incidental problem would be greatest, the total harvest has ranged from approximately 22,000 to 52,000 in a year. The general trend has been declining over the last decade. It was not possible to assess juvenile chinook impacts in gill net fisheries.

Recreational Fishery: The overall trend in Puget Sound recreational fishery chinook harvests and total fishing effort has been decreasing since 1977 (Geist, 1987). No direct data were available to estimate incidental catches associated with these landed catches. These catch and effort trends indicates a declining associated mortality trend if an assumption of stable encounter rates can be made.

Troll Fishery: The Puget Sound troll fishery occurs in Juan de Fuca Strait. There has been an increasing harvest trend in this fishery in recent years and a shift of fishing patterns to more inside areas.

#### OREGON AND WASHINGTON OCEAN

Non-Treaty troll fishery effort and chinook salmon catch north of Cape Falcon, Oregon have declined significantly in recent years in response to management actions to limit catches of depressed Bonneville Pool hatchery fall chinook salmon stocks and depressed Washington coastal coho salmon stocks. The 1985 -

1986 average chinook salmon catch of 36,600 was only 23% of the base period average catch of 162,100 fish. Troll effort has declined from a base period average of about 36,000 vessel days to a 1985 - 1986 average of only 6,300 vessel days. The 77% reduction from base level catch has significantly reduced incidental mortality from release of sublegal chinook salmon assuming no significant shift in the ratio of sublegal to legal encounter rates over time.

A similar pattern for sport and commercial fisheries north of Cape Falcon, Oregon has occurred in recent years. The 1985 - 1986 average chinook salmon catch of 27,300 fish was only 25% of the base period average chinook catch of 109,400 fish. Recreational effort declined from a base level of about 393,000 angler days to a 1985 - 1986 average of only 138,100 angler days. Again, the 75% reduction from the base level catch has significantly reduced incidental mortality from the release of sublegal chinook salmon.

## COLUMBIA RIVER

Gill Net Fishery: Columbia River Gillnet catches during the base period (1977-1982) averaged 169,400 chinook salmon, with the bulk of the catch occurring during the fall. The 1983 - 1984 average catch declined to 92,800 fish in response to management protection provided for depressed returns for upriver bright fall chinook salmon in 1983 and depressed returns of Bonneville Pool hatchery fall chinook salmon in 1983 and 1984. The 1985 - 1986 average catch increased significantly to 213,200 fish as management strategies to target on surplus upriver brights were implemented. No estimates for unobserved encounters (i.e. net dropout) have been made, but with the increased effort and landings of 1985 -1986, it is likely that this source of incidental mortality has increased somewhat from the base period.

Recreational Fishery: Columbia River sport catch during the base period averaged 37,600 chinook salmon. The 1983 - 1984 average chinook salmon catch increased by 31 % to 49,100 fish, and the 1985 - 1986 average sport catch increased by another 10% to 53,900 fish. The recent sport catch increases are primarily attributable to increased catches of lower river hatchery and upriver bright fall chinook salmon in Buoy 10 fisheries and the initiation of an upriver bright fall chinook salmon fishery in the area above McNary Dam. Since jacks have been legal in the sport catch except in the Buoy 10 area, release of sublegal chinook salmon for the bulk of the fishery (i.e. the area above the Astoria - Megler Bridge) probably has not been a significant factor contributing to incidental mortality for most years. The expanding sport fishery in the Buoy 10 area, with a 24 inch minimum size limit and several limited periods of chinook salmon non-retention in recent years, is probably a small source of increased incidental mortality from the base period level.

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## APPENDIX B

### SUMMARY OF MORTALITIES IN ASSOCIATION WITH HOOK AND LINE FISHERIES

	Page
Table 1. Summary of immediate mortality in association with hook and line fisheries . . . . .	23
Table 2. Summary of delayed mortality in association with hook and line fisheries . . . . .	25
References for Tables 1 and 2 . . . . .	27

Appendix B Table 1. Summary of immediate mortality in association with hook and line fisheries.

CITATION	LOCATION	SAMPLE DATE	FISH SIZE	SAMPLE SIZE	NUMBER MORTS	MORT RATE	COMMENTS
Butler & Loeffel(1972)	Oregon Coast	1959 to 1968	<26in	2107	141	6.8%	Immed. mort., chin; troll; barbed & barbless
Butler & Loeffel(1972)	Oregon Coast	1959 to 1968		2092	201	10.4%	Immed. mort., chin; barbed vs. barbless hooks; anesthetized & held 0-3 hr (most only 30 min.)
Hollett, in Wright(1970)	Dixon Entrance	1967 & 1968		2417	97	4%	Immed. mort., chin; troll;
Parker & Kirkness (1956)	SE AK	1950 to 1952		461	96	21%	chin; length-freq. & age comp data avail.
Haw (1963)	Puget Sound	1960	7.5-24in ave.= 14.5in	348	2	0.6%	Immed. mort. troll; chin treble and single hooks
Van Hyning (1951)	Oregon coast	1948 & 1949	<27in	393	10	2.5%	Immed. Mort.;chin; no holding; Legal=27in.
Wright(1970)	Juan de Fuca Strait	1968	90% <26in (of these, 60% were <20in)	389	13	3.3%	ocean-sport min. size is 20 in; immed. mort. no holding; chin.
Jensen(1969) in Wright(1970)	Crescent City	June 1969	<26in	572	28	4.9%	Immed. mort. chin.
Lasater & Haw(1961)	Puget Sound	1960 Apr- May	11-20in ave.= 15.9in	185	1	0.5%	Immed. mort.; coho treble & single hooks; no recaps of fish hooked in gills
Van Hyning (1951)	Oregon Coast	1948 & 1949		794	15	1.9%	Immed. mort.; troll no holding; coho
Wright(1970)	Juan de Fuca Strait	1968	11-30in ave.=20in 30% <20in	664	40	6.0%	20in min. size for comm.troll & ocean-sport in Wash., 1969 Immed. mort.; coho
Jensen(1969) in Wright(1970)	Crescent City		100% <25in	158	11	7.0%	min. size=25in Calif. Immed. mort.; coho

Appendix B Table 1. (cont.). Summary of immediate mortality in association with hook and line fisheries.

CITATION	LOCATION	SAMPLE DATE	FISH SIZE	SAMPLE SIZE	NUMBER MORTS	MORT RATE	COMMENTS
Loeffel(1961)	Col. R. June to Cannon Beach	1961		1539	277	18.5% 99%CI= (15,22%)	Immed. mort.; troll; held in tank 2-6 hr; coho
Hollett, in Wright(1970)	Browning Entrance; Aug. Dixon 1967-Entrance; 1968 Hecate Strait			2777	500	18.0%	Dept. Fish & Forest. Immed. mort. coho
Hollett, in Wright(1970)	Dixon Entrance & 1968	1967		537	52	10%	Immed. mort.; size differences and gear selectivity not accounted for.
Milne & Ball(1956)	Nanaimo Vanc. Is.	1954	15-24in	67	12	18%;barbed	Immed. mort.; troll; held 1-6 hr after tagging; Note: small sample sizes.
		1954	8-16in	18	8	44%;barbed or barbless	
Davis, Kelley & Seibel(1986)	SE AK	1985	<28in	791	223		troll; chin; more sm. fish appeared to drown from being dragged than lg. fish.
		July-Sept	>28in	373	49		
Stohr & Fraidenburg (1986)							Delphi study; troll chin troll coho sport chin sport coho
						30 - 40%	
						30 - 30%	
						27.5 - 35%	
						30 - 35%	
Wertheimer (prelim.)	SE AK			506	sublegal	10%	Dead on arr.; troll chin.
					legal	3.7%	

Appendix B Table 2. Summary of delayed mortality in association with hook and line fisheries.

CITATION	LOCATION	SAMPLE DATE	SAMPLE SIZE	FISH SIZE	NUMBER MORTS	MORT RATE	COMMENTS
Heyamoto (1963)	Col. R. (n.side)	1957 May-Aug	22chin 64coho	82%<26in 8% <22in	5	23% (?)	mort. implied; troll; spoons, plugs, flashers, barbed; Petersen tags; holding tanks; Legal size: chin: 26" coho:22"
	Col. R. (s.side)		61chin coho	82% <26in 17% <22in			
Parker, Black & Larkin (1959)	Gulf of Alaska	1958	100coho			33.6-52.2% ave. 43.7% (95% conf.)	fish anesthetized at release; unsatisfactory; questionable results on mortalities; 60 fish released immediately, 40 fish held 9 hr.
Parker & Black (1959)	Cape Fair- weather	late Aug. 1957	chin			71% 95%CI: (40-86%)	troll; spoons; barbed
Milne & Ball (1958)	Vancouv. Is.	May 9 - June 22 Dec.12-20	289coho chin	16-24in. 10-27in. ave.=12in.		17.6%-coho 19.8%-chin	troll; barbless hooks; spoons; barbless hooks resulted in reduced catch/release morts. by 1/2 that of barbed hooks; Petersen & spaghetti tags; held 1 hr after tagging;
Bergman(1960) in Wright(1970)	Col. R.- Grays Harbor	Mar- Apr. 1959 &1960	841chin		76	9.0%	tagging; anesthetized
Reed, in Wright(1970)	Oregon coast		962 coho		barbless	8.2%	coho held in tank;
			983 coho		barbed	12.4%	troll; barbed vs. barbless study
Reed, in Wright(1970)	Oregon Coast	1967 & 1968	918chin	<26in	barbless	6.4%	troll;
		"	901chin	<26in	barbed	7.9%	

Appendix B Table 2. (cont.). Summary of delayed mortality in association with hook and line fisheries.

CITATION	LOCATION	SAMPLE DATE	SAMPLE SIZE	FISH SIZE	NUMBER MORTS	MORT RATE	COMMENTS
Milne & Ball(1956)	Nanaimo Vanc. Is.	1954 july	55coho	15-24in	16	29%	Delayed mort. (approx. 1 mo)
		1954 sept	10coho	8-16in	2	11%	
Wertheimer (1987 draft)	S.E. Alaska	Oct 1986	506 chin				
			108 legal		10	16.8%	
			398 subleg.		54	14.5%	
Wertheimer (1987 draft)			sublegal			17.7%	
(recomputation of Butler & Loeffel 1972)			legal			8.0%	
Butler & Loeffel(1972)	Oregon Coast	1959 to 1968	2079chin				
			1941coho				

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## CHAPTER 3

### CLARIFICATION OF PASS-THROUGH COMMITMENTS October 22, 1987

#### INTRODUCTION

The Chinook Technical Committee reviewed the topic of "Pass-through" as requested by the Commission. Brian Riddell's memo of September 28, 1987 to Wayne Shinnars was used to initiate discussion. The Committee submits this consensus report on "pass-through."

#### TREATY WORDING

The Chinook rebuilding program consists of two basic management elements: (1) PSC-established catch ceilings for a number of fisheries or combinations of fisheries; and (2) commitments to manage all other fisheries "so that the bulk of depressed stocks preserved by the conservation program ... principally accrue to the spawning escapement."

The objective of the conservation program is to rebuild depressed stocks by 1998. The objective of the pass-through provision is to establish the management intent that savings of depressed stocks resulting from catch ceilings on some fisheries would be transferred to spawning escapements and not merely to increased harvests by other fisheries.

#### POINTS OF CLARIFICATION

##### Inability to Quantify Treaty Language

The treaty language pertaining to "pass-through" cannot be readily quantified due to ambiguity pertaining to the words "bulk" and "principally". The Technical Committee's capacity to evaluate pass-through has been hindered by these ambiguities.

##### Application to Depressed Stocks

The pass through provision only applies to depressed stocks. Once stocks are rebuilt, pass-through obligations are no longer relevant.

##### Scope of Commitment

Pass through commitments should be applied to all depressed stocks addressed by the coastwide conservation program, including both those originally identified and those that may be identified at a later date.

### Technical Committee's Concept of Pass-Through

During pre-Treaty negotiations, the bilateral, ad-hoc Chinook Technical Team developed a computer simulation model to provide information regarding the effects of alternative fisheries management regimes for rebuilding depressed chinook stocks. Results of this model were used in establishing the chinook conservation program.

From a technical perspective at the time of treaty negotiations, pass-through was modeled as harvest rate limitations on non-ceilinged fisheries. Fisheries which were not directly constrained by catch ceilings were assumed to continue to operate under base-period (the time period used to provide input into the model) harvest rates unless otherwise specified. The only exception to the base harvest rate assumption for the non-ceilinged fisheries was that Canadian net fisheries would be managed so as to achieve a 25% reduction from base-period harvest rates. Any fish returning to terminal areas in excess of spawning escapement goals were modeled to accrue to terminal catches since the stocks were considered to be rebuilt.

Model projections were intended to provide a means of evaluating alternatives for development of agreed fishing regimes. However, it was assumed that the regimes initially established might, and probably would, require modification as actual responses of natural chinook escapements were observed. The ultimate measure of the appropriateness of the regimes was to rebuild depressed chinook stocks by 1998.

### IMPLEMENTATION OF PASS THROUGH

#### Fishery:Stock Dichotomy

While the objective of the pass-through provision is to rebuild depressed chinook stocks, actual implementation occurs at the fishery level. This situation creates a complex problem of evaluating compliance with pass-through obligations.

Quantification of savings of depressed stocks requires knowledge of how many fish from each depressed stock are "saved" by a fishery operating under a catch ceiling and how many of these would be expected to escape capture by other fisheries and natural mortality. Stock-specific abundance and annual spatial distribution of stocks are generally not known. At the earliest pass-through on a stock basis cannot be evaluated until brood year returns are completed. Partial evaluation of pass-through can be made in some terminal fisheries where stock-specific catch and escapement data are available.

Rigid interpretation of pass-through to imply that obligations apply on a fishery-by-fishery basis would eliminate the capacity of each jurisdiction to exercise flexibility in

distributing the burden of meeting pass-through obligations among its fisheries in accordance with its own regulatory processes. Regulation changes to cope with increasing abundance of chinook, harvest opportunities on other species, or non-depressed stocks, etcetera, may alter the impact of a fishery due to impacts on stock composition of the catch, reproductive potential of stocks, or non-accounted mortalities. These changes may relate to ceiling and non-ceiling fisheries and could influence pass-through. Harvest opportunities on healthy stocks may limit the ability of a jurisdiction to achieve harvest rate limits consistent with pass-through obligations on a fishery-by-fishery basis. Under a fishery-by-fishery interpretation of pass-through obligations, a jurisdiction may not be allowed to compensate by adjustment in its other fisheries. The cumulative impact of fisheries within a management jurisdiction on depressed stocks should be considered in evaluating compliance with pass-through obligations.

#### OPTIONS FOR FISHERIES REGULATION FOR PASS-THROUGH

There are four general approaches for operationally implementing or monitoring pass-through obligations for fisheries: harvest rates; harvest ceilings; minimization; and indirect management. Application of a particular approach to a specific fishery would depend upon the stock mixtures and information systems involved for that fishery. Assessment of compliance with general pass-through obligations would require evaluation of the cumulative impacts of these fishery management measures on depressed chinook stocks using several pieces of information, such as harvest rates, escapements, effort, or catch:escapement ratios. In some fisheries, inferences about pass-through will have to be made from indirect data such as catch and effort statistics, season structure, or observed responses in escapement.

##### Approach 1: Harvest Rates

###### Condition:

Estimated population size and catch by stock are available

###### Technical Evaluation Criteria:

Cumulative exploitation rate on depressed stocks by all pass through fisheries does not exceed levels observed during some base period (e.g. the one used for model calibration).

###### Technical Advantages:

Direct measure. In terminal areas, statistical models (e.g. run reconstruction) maybe used in the absence of coded-wire-tag data.

### Technical Disadvantages:

Requires population estimates and CWT data which may not be available for all depressed stocks.

Assumes that catch reflects total fishing mortality or that adjustments for total mortalities can be reliably made. Changes in regulations from base period can substantially affect induced mortality, and hence affect pass-through.

More sources of variability in harvest rate estimation than in catch ceiling approach.

### Discussion

In this circumstance, one direct measure of pass-through success can be computed as a time-series of harvest rate estimates. For example, this may be appropriate especially for terminal or near-terminal areas where there is relatively complete population data and fisheries are of a selective nature. This may also be appropriate for mixed-stock fisheries when coded-wire-tag data are available for estimating an index of harvest rate.

The stock-specific harvest rate evaluations used by the Chinook Technical Committee to monitor harvest on indicator stocks have significant limitations in the evaluation of compliance to pass-through. The harvest rate in a fishery is the catch divided by the total abundance in a fishing area. The Committee has tried to use average, age-specific harvest rates on indicator stocks as an index of a fishery's total harvest rate. However, two limitations to these analyses are recognized. First, the limited number of indicator stocks may result in the average being an insensitive measure of changes in harvest rates for other stocks. Second, annual variation in harvest rates on stocks may be due to factors other than management actions (e.g. changes in spatial/temporal distribution of a stock due to environmental conditions or variation in accuracy of escapement estimates).

The other practical aspect is that in many fisheries subject to pass-through provisions, chinook harvest is incidental. Consequently harvest rates on commingled chinook are affected by the run strength of the target species (often of cyclic nature). Harvest rate evaluations are best interpreted as trends in the harvest on a stock in a fishery and should be considered over a number of years to account for variation in distributions and/or fishery intensity on other species.

Use of this approach would require the development of procedures to evaluate cumulative impacts of all fisheries within a jurisdiction on depressed stocks.

## Approach 2: Harvest Ceilings

### Condition:

Estimated population size and catch by stock not available.

### Technical Criteria:

The catch of depressed stocks does not increase over levels observed during the base period.

### Technical Advantages:

Easy to implement and reduces harvest rates as abundance increases.

### Technical Disadvantages:

Not responsive to population fluctuations.

Indirect measure, may not be able to determine the proportion of "savings" that pass through.

Assumes that catch reflects total fishing mortality or that adjustments for total mortalities can be reliably made. Changes in regulations from base period can substantially affect induced mortality, and hence affect pass-through.

### Discussion:

Pass-through could be implemented through the establishment of unilateral catch ceilings for all fisheries not specifically constrained by the PSC. This measure would meet pass-through obligations where populations were stable or increasing, and may be especially appropriate in select stock fisheries where depressed stocks predominate the catch. However, where populations may decrease or naturally fluctuate, or where fisheries are directed at commingled stocks, the catch ceilings would not be effective as pass-through provisions. Further, catch ceilings are potentially disruptive to mixed-stock fisheries. In the case of fisheries not targeting on chinook, rigid adherence to catch ceilings could result in significant losses of harvest opportunity for target species.

### Approach 3: Minimization

#### Condition:

Estimated population size, catch by stock not available, data availability very limited, and fishery not managed directly for chinook.

#### Technical Evaluation Criteria:

Regulations enacted do not increase targeted impacts on depressed chinook stocks. Evaluations will be subjective, qualitative and inferential, based on such data as effort, chinook:target species ratios, or catch:escapement ratios.

#### Technical Advantages:

Easy to implement.

#### Technical Disadvantages:

Difficult to evaluate other than by inference.

#### Discussion:

In fisheries managed to harvest more abundant species, opportunities to meet pass-through obligations may be limited to conservation actions such as time/area closures, gear limitations, and effort restrictions that would reduce or minimize impacts of a fishery on depressed chinook stocks. Chinook catch levels or harvest rates may increase despite efforts to minimize chinook impacts.

#### Approach 4: Indirect Management

##### Condition:

Estimated population size, catch by stock not available,  
data availability very limited.

##### Technical Evaluation Criteria:

Regulations enacted are intended to control harvest rates on depressed stocks through indirect means, such as season structure or effort limitations. Evaluations will be subjective, qualitative and inferential, based on such data as effort, season length, or catch:escapement ratios.

##### Technical Advantages:

Easy to implement.

##### Technical Disadvantages:

Difficult to evaluate other than by subjective inference.

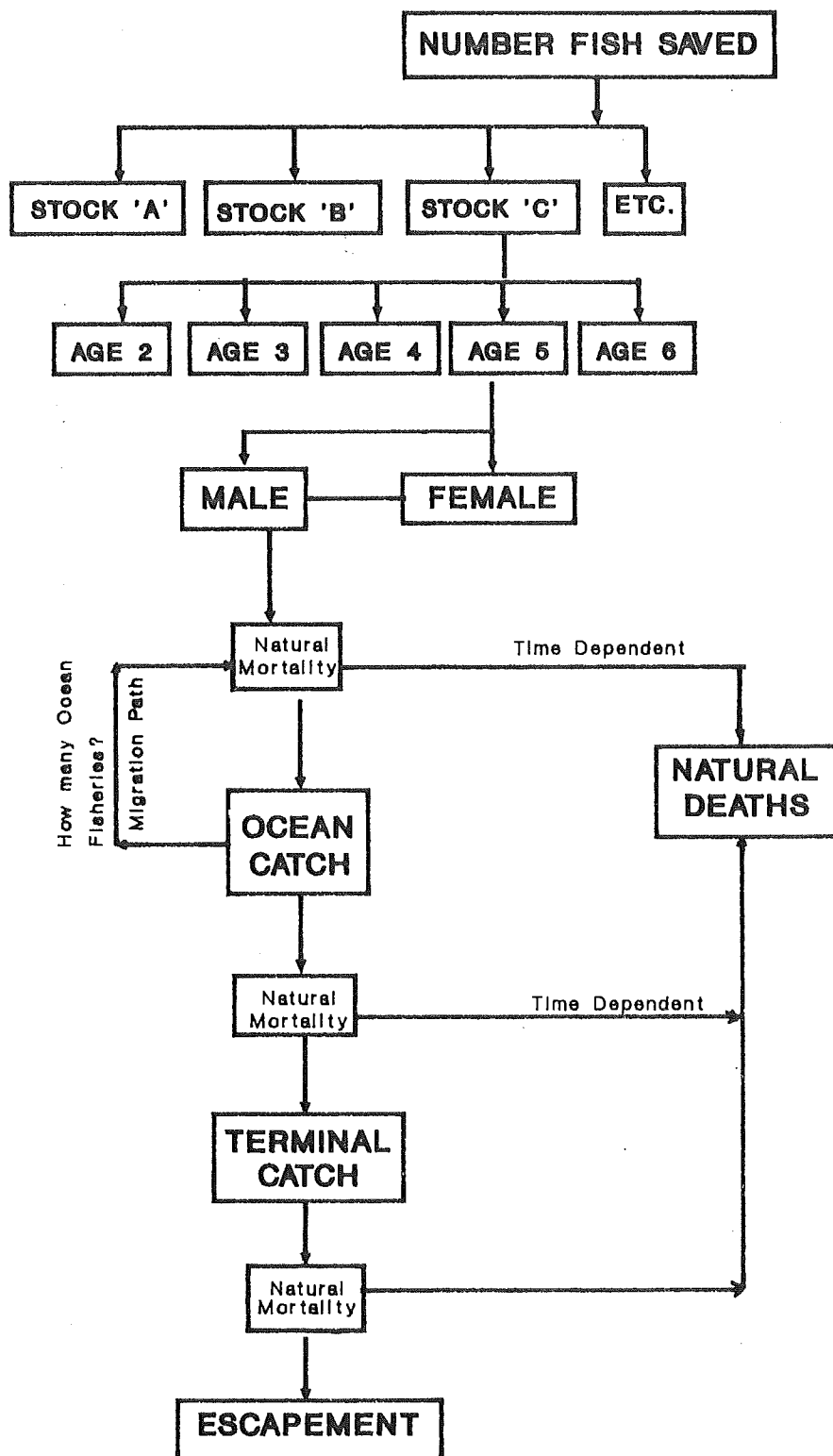
##### Discussion:

Pass-through obligations can be implemented through management measures such as time/area closures, gear limitations, and effort restrictions that would reduce or minimize impacts of a fishery on depressed stocks. Chinook catch levels or harvest rates may increase despite efforts to minimize chinook impacts.

#### SUMMARY

A management jurisdiction will likely attempt to meet its pass-through commitments by implementing one or more of the approaches identified above for its relevant fisheries. The appropriate options will depend on the stock mixture in the fishery, the information systems available, and the degree of management latitude permitted in distributing the pass-through obligation among its fisheries. Evaluation of pass-through will require each jurisdiction to provide information necessary for assessment. However, evaluation of pass-through should be anticipated to involve several types of data depending upon the fisheries involved and will likely involve judgments as to whether a jurisdiction has met its obligations.

# FATE OF SURVIVING OR SAVED FISH



- For Each Fishery by Time

- Estimate Stock composition for each catch

- Estimate Age composition for each stock

- Estimate Sex composition for each age

- Estimate Maturation Probabilities and apply time dependent Natural Mortality rates

- Migration route determines the fisheries that each stock is vulnerable to

- Estimate Ocean Fishery exploitation rates

- Estimate Terminal fishery exploitation rates

## CHAPTER 4. DATA MATRIX

### SUMMARY TABLE

Date: 10/22/87

CHINOOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

AGENCY: Chinook Technical Committee

CONTACT: Mike or Brian

PHONE:

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER  
"DEC", ETC.

#### EXPECTED DATES FOR DOCUMENTS

	-----PSC-----		
	VERY PRLM	PRELIM	FINAL
TECHNICAL COMMITTEE ANALYSIS	*****		
*****			
STOCK STATUS	Nov	Mar+1	May+1
REBUILDING ASSESSMENT	Apr+1	May+1	Jun+1
HARVEST RATE	Apr+1	May+1	Jun+1
INDUCED MORTALITY	?	?	?
PASS THROUGH	Apr+1	May+1	Jun+1

#### DATA AVAILABILITY

The October 21, 1987 assignments to the Committee included a request to...

"...to design a matrix showing time of availability of each category of data for each fishery - re procedural reform."

The affected management agencies represented on the Committee compiled a detailed summary of their agency's current data provision schedules. These are included in this section. From these agency statements the Committee has compiled the above summary of our ability to produce various work products relative to the proposed new PSC schedule.

If the PSC, in discussing procedural reform, wishes to consider earlier data provisions the Committee can further discuss this possibility.

Date: 10/22/87

CHINOOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

AGENCY: ADF&G  
CONTACT: Mel Seibel

PHONE: (907)-465-4250

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER  
"DEC", ETC.

```
=====
                                ENTER DATE EXPECTED TO BE AVAILABLE
                                -----AGENCY-----
                                VERY PRLM  PRELIM  FINAL /1
                                *****
SEASON & REGULATIONS           Oct      Nov      Jan+1

CATCH BY FISHERY (#'S)         Oct      Nov      Mar+1
    STOCK COMPOSITION          Jan+1    Mar+1    Jun+1
    (as available)

CATCH BY STOCK (TERMINAL/NET)
    SPRING STOCKS              Oct      Nov      Jan+1
    SUMMER STOCKS              N/A      N/A      N/A
    FALL STOCKS                N/A      N/A      N/A

BIOLOGICAL SAMPLING
    CATCH                      Jan+1    Mar+1    Jun+1
    ESCAPEMENT                 Jan+1    Mar+1    Jun+1

CODED-WIRE TAG DATA
    FISHERY RECOVERIES         Nov      Jan+1    Mar+1
    ESCAPEMENT RECOVERIES      Nov      Jan+1    Mar+1
    EXPANSION FACTORS          Nov      Jan+1    Mar+1
    RELEASES                   Nov      Jan+1    Jan+1
    (in year of release)

ENHANCEMENT ACTIVITIES
    RELEASES                   Nov      Jan+1    Jan+1
    PLANNED CHANGES           Aug-2    Aug-2    Aug-2
    (as they occur-not scheduled?)

                                WILD STOCKS
                                -----AGENCY-----
                                VERY PRLM  PRELIM  FINAL
                                *****
SPANNING ESCAPEMENT
    SPRING STOCKS              Sep      Oct      Nov
    SUMMER STOCKS              N/A      N/A      N/A
    FALL STOCKS                N/A      N/A      N/A

                                HATCHERY STOCKS
                                -----AGENCY-----
                                VERY PRLM  PRELIM  FINAL
                                *****
ABUNDANCE FORECASTS (Fall Stocks)  Jan      Feb      Mar
*****
```

Notes: 1/ Subject to minor changes in case more fish tickets are discovered.

Date: 10/22/87

CHINOOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

AGENCY: Canada Dept of Fisheries and Oceans  
CONTACT: Brian Riddell PHONE: (604)-756-7145

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER  
"DEC", ETC.

ENTER DATE EXPECTED TO BE AVAILABLE						
-----AGENCY-----						
VERY PRLM PRELIM FINAL						
*****						
SEASON & REGULATIONS (North BC)	Dec	Mar	May			
(South BC)	Mar	Apr	May			
CATCH BY FISHERY (#'S)	Sept	Dec	Jun+1	/1		
STOCK COMPOSITION		Feb+1	Jun+1			
(as available)						
CATCH BY STOCK (TERMINAL/NET)						
SPRING STOCKS	/2	Nov	Jun+1			
SUMMER STOCKS	/2	Nov	Jun+1			
FALL STOCKS	/2	Nov	Jun+1			
BIOLOGICAL SAMPLING	North B.C.			South B.C.		
	=====			=====		
COMMERCIAL CATCH	Sept	Nov	Jun+1	Dec	Mar+1	Jun+1
SPORT CATCH	N/A	N/A	N/A	Dec	-	Jun+1
ESCAPEMENT (Wild)	Oct	Nov	Dec	Dec	Feb+1	Jun+1
ESCAPEMENT (Hatchery)	Oct	Jan+1	Mar+1-Aug+1	Dec	-	Mar+1-Aug+1
CODED-WIRE TAG DATA						
FISHERY RECOVERIES	July	Jan+1	Mar+1			
ESCAPEMENT RECOVERIES	Dec	Feb+1	Mar+1			
EXPANSION FACTORS	July	Dec	Jun+1			
RELEASES	July	-	Dec			
ENHANCEMENT ACTIVITIES (Total Production)						
RELEASES	Jul	-	Dec	(PMFC deadlines)		
PLANNED CHANGES	Mar-1	-	Aug-1	(Production targets)		
WILD STOCKS			HATCHERY STOCKS			
-----AGENCY-----						
VERY PRLM PRELIM FINAL						
*****						
SPAWNING ESCAPEMENT						
SPRING STOCKS	Sep	-	Feb+1			
SUMMER STOCKS	Oct	-	Feb+1			
FALL STOCKS	Dec	-	Feb+1	Nov	-	Feb+1
HATCHERY RETURN FORECASTS	N/A	N/A	N/A	Oct-1	Mar	
*****						

Notes: 1/ June+1 is assumed to be the date of final saleslip information.  
2/ In-season estimates from hails and ISCMP.

Date: 10/22/87

CHINOOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER  
"DEC", ETC.

AGENCY: Washington Dept of Fisheries  
CONTACT: Kurt Reidinger PHONE: (206)-753-6614

=====

ENTER DATE EXPECTED TO BE AVAILABLE

-----AGENCY-----

VERY PRLM PRELIM FINAL  
\*\*\*\*\*

Wash. Ocean

VERY PRLM PRELIM FINAL  
\*\*\*\*\*

Puget Sound

SEASON & REGULATIONS

	Mar	Mar	Apr	/8	/8	/8
Troll						
Net	N/A	N/A	N/A	Jun	Jun	Mar+1
Sport	Feb	Feb	Mar	Jan	Jan	Mar

CATCH BY FISHERY (#'S)

	/1	Oct	Jul+1	/8	/8	/8
Troll						
Net	N/A	N/A	N/A	Oct	Feb+1	Jul+1
Sport	/1	Oct	Dec	Sep+1	Sep+1	Sep+1

STOCK COMPOSITION

	Dec	Jan+1	Jul+1 /6	Apr+1	Apr+1	Apr+1 /7

CATCH BY STOCK (TERMINAL/NET) /5

BIOLOGICAL SAMPLING

	Nov	Dec	Dec+2(?)	/8	/8	/8
Troll						
Net	N/A	N/A	N/A	Feb+1	Feb+1	Jul+1
Sport	Nov	Dec	Dec	Feb+1	Sep+1	Sep+1

ESCAPEMENT /2

CODED-WIRE TAG DATA

	Nov	Dec	Sep+1	/8	/8	/8
Troll						
Net (to Oct 31)	N/A	N/A	N/A	Dec	Jan+1	N/A
Net (complete)	N/A	N/A	N/A	Feb+1	Jun+1	Sep+1
Sport (to Oct 31)	N/A	N/A	N/A	Dec	Jan+1	N/A
Sport (complete)	Nov	Dec	Sep+1	Feb+1	Apr+1	Sep+1

ESCAPEMENT RECOVERIES

	Feb+1	-	Sep+1	Feb+1	-	Sep+1
Hatchery Rack						
Spawning Brnd & Misc	Mar+1	-	Sep+1	Mar+1	-	Sep+1

EXPANSION FACTORS /3

	Jan+1	Jan+1	Mar+1	Jan+1	Jan+1	Mar+1
RELEASES						

ENHANCEMENT ACTIVITIES

	Jan+1	Jan+1	Jun+1	Jan+1	Jan+1	Jun+1
RELEASES						
PLANNED CHANGES /4						

ABUNDANCE FORECASTS (all stocks)

	Dec-1	Feb	Mar	Dec-1	Jan	Mar

WASH COAST WILD STOCKS

PUGET SOUND WILD STOCKS

HATCHERY STOCKS

SPAWNING ESCAPEMENT

	VERY PRLM	PRELIM	FINAL	VERY PRLM	PRELIM	FINAL	VP	PRELIM	FINAL
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
SPRING STOCKS	Oct	Oct	Dec	Oct	Nov	Jan+1	Sep	Oct	Feb+1
SUMMER STOCKS	Oct	Oct	Dec	Nov	Dec	Feb+1	Oct	Nov	Feb+1
FALL STOCKS	Oct	Oct	Dec	Nov	Dec	Feb+1	Oct	Nov	Feb+1

\*\*\*\*\*

Notes: 1/ In-season catch estimates provided throughout fishing season.

- 2/ No reporting schedule provided for biological data from escapments.
- 3/ No reporting schedule provided for for this category.
- 4/ Planning activities are occurring on an on-going basis.
- 5/ No reporting schedule provided for this category.
- 6/ Stock composition estimate through GSI method.
- 7/ Stock composition estimate through reconstruction method.
- 8/ Juan de Fuca troll is included in Wash. Coast schedule (?confirm??).

Date: 10/22/87

CHINDOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER

AGENCY: Washington Coast Tribal (Terminal areas only)  
CONTACT: Larry Lestelle PHONE: (206)-276-8211

=====

ENTER DATE EXPECTED TO BE AVAILABLE

-----AGENCY-----

VERY PRM PRELIM FINAL

\*\*\*\*\*

SEASON & REGULATIONS /1

Spring/Summer runs	-	-	May
Fall runs	-	-	July

CATCH BY FISHERY (#'S)	Jan+1	Jan+1	Jan+1
STOCK COMPOSITION	Jan+1	Jan+1	Jan+1
(where avail)			

CATCH BY STOCK (TERMINAL/NET)

SPRING STOCKS	Jul	Jan+1	Jan+1
SUMMER STOCKS	Sep	Jan+1	Jan+1
FALL STOCKS	Jan+1	Jan+1	Jan+1

BIOLOGICAL SAMPLING

CATCH

Spring/Summer runs	-	-	Dec
Fall runs	-	-	Mar+1

ESCAPEMENT

Spring/Summer runs	-	-	Dec
Fall runs	-	-	Mar+1

CODED-WIRE TAG DATA

FISHERY RECOVERIES	Dec	Feb+1	Mar+1
ESCAPEMENT RECOVERIES	Jan+1	-	Mar+1
EXPANSION FACTORS	Jan+1	-	Jan+1
RELEASES	Nov-1	-	Nov-1

ENHANCEMENT ACTIVITIES

RELEASES	Nov-1	-	Nov-1
PLANNED CHANGES	Jan-1	-	Jan-1

WILD STOCKS

-----AGENCY-----

VERY PRM PRELIM FINAL

\*\*\*\*\*

SPAWNING ESCAPEMENT

SPRING STOCKS	Dec	Feb+1	Feb+1
SUMMER STOCKS	Dec	Feb+1	Feb+1
FALL STOCKS	Dec	Feb+1	Feb+1

HATCHERY STOCKS

-----AGENCY-----

VERY PRM PRELIM FINAL

\*\*\*\*\*

Dec	Feb+1	Feb+1
Dec	Feb+1	Feb+1
Dec	Feb+1	Feb+1

ABUNDANCE FORECASTS Feb-1 Mar-1 Mar-1

=====

Notes: 1/ Post-season reporting date is Jan+1.

CHINOOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER  
"DEC", ETC.

```

-----AGENCY-----
VERY PRM  PRELIM    FINAL
*****

```

April      April      May

Nov	Dec	Apr+1
Dec	Feb+1	May+1

SPRING STOCKS	N/A	N/A	N/A
SUMMER STOCKS	N/A	N/A	N/A
FALL STOCKS	N/A	N/A	N/A

CATCH	Nov	Dec	Jan+1
ESCAPEMENT	Jan+1	Feb+1	Sept+1

FISHERY RECOVERIES	Dec	Jan+1	May+1
ESCAPEMENT RECOVERIES	Mar+1	Apr+1	Sept+1
EXPANSION FACTORS (Ocn Fisheries)	Dec	Jan+1	May+1
RELEASES(Oct/Nov Rel)	Jan+1	Feb+1	June+1

RELEASES	N/A	N/A	N/A
PLANNED CHANGES	N/A	N/A	N/A

-----AGENCY-----  
 VERY PRM PRELIM FINAL

*****		
DATE	DESCRIPTION	AMOUNT
Feb+1	Mar+1	Aug+1

AGENCY PRELIM FINAL

[illegible]

Date: 10/22/87

CHINDOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

AGENCY: Columbia River  
CONTACT: Mike Matylewich

PHONE: (503)-238-0667

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER  
"DEC", ETC.

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=====
                                ENTER DATE EXPECTED TO BE AVAILABLE
                                -----AGENCY-----
                                VERY PRLM  PRELIM   FINAL
                                *****
SEASON & REGULATIONS           Oct      Nov      Dec

CATCH BY FISHERY (#'S)         Dec      Feb+1   Jun+1
    STOCK COMPOSITION          Jan+1   Feb+1   Jun+1
        (where avail)

CATCH BY STOCK (TERMINAL/NET)
    SPRING STOCKS              Sep      Dec     Jan+1
    SUMMER STOCKS              Nov      Dec     Jan+1
    FALL STOCKS                Jan+1   Feb+1   Jun+1

BIOLOGICAL SAMPLING
    CATCH                      Dec      Feb+1   Jun+1
    ESCAPEMENT                 Dec      Feb+1   Jun+1

CODED-WIRE TAG DATA
    FISHERY RECOVERIES         Jan+1   Feb+1   Jun+1
    ESCAPEMENT RECOVERIES      Jan+1   Feb+1   Jun+1
    EXPANSION FACTORS          Jan+1   Feb+1   Jun+1
    RELEASES                   July     Sept    Jan+1

ENHANCEMENT ACTIVITIES
    RELEASES                   Jul      Sept    Jan+1
    PLANNED CHANGES           Nov      Jan+1   Jun+1

                                WILD STOCKS
                                -----AGENCY-----
                                VERY PRLM  PRELIM   FINAL
                                *****
SPANNING ESCAPEMENT           Nov      Dec     Jan+1
    SPRING STOCKS              Nov      Dec     Jan+1
    SUMMER STOCKS              Dec     Feb+1   Jun+1
    FALL STOCKS

                                HATCHERY STOCKS
                                -----AGENCY-----
                                VERY PRLM  PRELIM   FINAL
                                *****
                                Oct      Dec     Jan+1
                                Nov      Dec     Jan+1
                                Dec     Feb+1   Jun+1

ABUNDANCE FORECASTS (Fall Stocks)  Dec-1   Feb     Jun      Dec-1   Feb     Jun
*****
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Date: 10/22/87

CHINOOK TECHNICAL COMMITTEE SCHEDULE FOR DATA AND INFORMATION  
AVAILABILITY FOR THE PACIFIC SALMON COMMISSION

AGENCY: Idaho Dept of Fish and Game

CONTACT: Dexter Pitman

PHONE: (208)-334-3791

NOTE: ENTER DATES BY MONTH & YEAR. E.G. IF  
\*\*\*\*\* CWT DATA AVAILABLE IN MARCH AFTER FISHING  
SEASON, ENTER "MAR+1"; IF CATCH DATA AVAIL  
IN DECEMBER OF THE FISHING SEASON, ENTER  
"DEC", ETC.

```
=====
                        ENTER DATE EXPECTED TO BE AVAILABLE
                        -----AGENCY-----
                        VERY PRLM  PRELIM  FINAL
                        *****
SEASON & REGULATIONS           Mar      May      July

CATCH BY FISHERY (#'S)         N/A      N/A      N/A
    STOCK COMPOSITION          N/A      N/A      N/A

CATCH BY STOCK (TERMINAL/NET)
    SPRING STOCKS              -        July    Oct
    SUMMER STOCKS              -        Aug     Nov
    FALL STOCKS                -        Oct     Nov

BIOLOGICAL SAMPLING
    CATCH                      June      Aug      Oct
    ESCAPEMENT (Hatch)         Jan+1    Feb+1    Sept+1
    ESCAPEMENT (Wild)          Sept     Nov      Jan+1

CODED-WIRE TAG DATA
    FISHERY RECOVERIES         -        Sept     Nov
    ESCAPEMENT RECOVERIES      -        Oct      Dec
    EXPANSION FACTORS /1       -        TBD      TBD
    RELEASES                   Feb      June      Aug

ENHANCEMENT ACTIVITIES
    RELEASES                   Mar      June      Aug
    PLANNED CHANGES           -        Aug      Feb+1

                                WILD STOCKS
                                -----AGENCY-----
                                VERY PRLM  PRELIM  FINAL
                                *****
SPAWNING ESCAPEMENT
    SPRING STOCKS              -        May      Dec
    SUMMER STOCKS              -        Aug      Dec
    FALL STOCKS                -        Nov      Dec

                                HATCHERY STOCKS
                                -----AGENCY-----
                                VERY PRLM  PRELIM  FINAL
                                *****
ABUNDANCE FORECASTS (Stock Depend)  -    (May-Nov) (Jul-Nov)    Feb (May-Nov) (July-Nov)
=====
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Notes: /1 TBD: To be developed as CWT returns become available and analysis process developed.

CHAPTER 5

PROGRESS REPORT ON  
ASSESSMENT OF REBUILDING OF  
TRANSBOUNDARY CHINOOK SALMON STOCKS

In its March 1987 report, the Commission directed the Parties to submit a report by December 1987 including:

- (a) joint recommendations for chinook salmon escapement goals in the Transboundary rivers;
- (b) given the goals recommended in (a), a jointly accepted assessment of progress toward rebuilding chinook stocks in these Transboundary rivers based on escapement data available through 1987, and the likelihood of achievement of these goals by 1995;
- (c) cooperatively developed management options to be identified by December 1987 and initiated in 1988 and following seasons to ensure rebuilding of chinook stocks in the transboundary rivers which are identified in (b) as requiring further management actions.

Basic catch and escapement information, including preliminary 1987 escapement data, has been exchanged and is currently being reviewed. Analysis of data has been started to determine the appropriateness of current escapement goals and potential needs for revision. A joint meeting to discuss this analysis will be held during the November Commission meeting. Following review of escapement goals, assessment of progress toward rebuilding will be conducted, and management options will be identified for stocks requiring further actions. It is expected that the joint report will be completed by mid- to late December 1987.

CHAPTER 6

PROGRESS REPORT ON  
CHINOOK STOCK IDENTIFICATION IN  
JUAN de FUCA STRAIT, NORTHERN PUGET SOUND AND GEORGIA STRAIT

In response to this annex assignment the Canadian Department of Fisheries and Oceans and the Washington Department of Fisheries developed a joint genetic stock identification project in this area. Due to fiscal constraints and competing priorities the focus of this 1987 fishery sampling was on directed or key fisheries in this area. Current laboratory schedules indicate that a preliminary report on 1987 results should be available in January, 1988.

ATTENDEES TO THE OCTOBER MEETING OF THE CTC

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