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THE PACIFIC SALMON COMMISSION  
JOINT CHUM TECHNICAL COMMITTEE REPORT  
REPORT TCCHUM (87)-4  
FINAL 1985 POST SEASON SUMMARY REPORT

August 1987

## INTRODUCTION

This Joint Chum Salmon Technical Committee report presents the appropriate information for 1985 chum salmon and associated fisheries in southern British Columbia and Washington, as required in Annex IV of Chapter 6 of the Pacific Salmon Treaty. Detailed information on these chum salmon and their associated fisheries are to be found in the Canadian and American agency reports appended to this report.

Although Annex IV of the Pacific Salmon Treaty (Treaty) called for the parties to develop Chum salmon fishery regimes for the 1985 season, the Commissioners of the Treaty directed the appropriate Washington and British Columbia chum salmon managers to develop the 1985 management regimes independently of the Treaty process. The Commissioners requested that, for 1985 only, the two countries should continue the agency to agency process that had served as the cooperative management framework in recent years; however, the Commissioners felt that the 1985 regimes should comply with the intent of the Treaty.

The following summarizes the final submissions of the two countries on the 1985 chum salmon returns. The submissions of the two countries are appended to this report.

### I. Run Sizes

#### a. Southern British Columbia

The two areas of concern to the Treaty are those waters inside of Vancouver Island from Johnstone Strait to the southern portion of Vancouver Island (Inside) and those waters off the west coast of Vancouver Island (West Coast).

##### Inside Chum Salmon

The size of the run of chum salmon expected to return through Johnstone Strait was 2,468,000, of which 1,495,000 were to be produced from Inside wild spawning areas, 873,000 were from Inside enhancement facilities and 100,000 were of Puget Sound origin. The size of the Fraser River component of the total chum run was 767,000, of which 502,000 would be produced from wild spawning areas and 265,000 were from enhancement facilities. The remaining wild spawning areas in the Inside area were expected to produce 993,000 chum salmon, while the remaining enhanced return, the majority of which originate from the mid Vancouver Island (Qualicum) area, was 608,000.

The postseason run size of chum salmon returning to Inside waters and including U.S. origin chum salmon returning through Johnstone Strait, as reconstructed from final catch and escapement data, was 3,767,800. The total return of chum salmon originating from the Fraser River was estimated to be 1,494,000, including estimated catches in U.S. and Nitinat commercial fisheries.

### West Coast Chum Salmon

The expected return of Nitinat hatchery chum salmon was 394,000. The return of chum salmon of wild Nitinat origin was not expected to produce a harvestable surplus.

The postseason estimate of the run size of chum salmon of Nitinat origin was 1,376,000, including chum of hatchery and wild origin.

#### b. United States

The two areas of concern to the Treaty are those waters from the Canada/U.S. border to outer Juan de Fuca Strait (Puget Sound) and the waters along the outer coast of Washington State (Washington Coast).

#### Puget Sound Chum

The total size of the run expected to return to Washington State waters was 950,000, a very high prediction for an odd year return, of which 625,000 were from wild spawning areas and 325,000 were from enhancement facilities. The stocks that were expected to contribute the largest returns were: Nooksack/Samish (205,000); south Puget Sound (275,000); and Hood Canal (253,000).

The postseason run size, as estimated from run reconstruction, was 1,453,000, a 53% increase over the preseason forecast. Both hatchery and wild stocks showed increases in returns, with the only large stock that performed poorer than expected being the Nooksack/Samish.

#### Washington Coast Chum

On the Washington coast, chum salmon return in significant numbers to Grays Harbor and Willapa Bay. In addition, a small return of hatchery origin chum salmon occurs in the Quinault River. The total size of the run of chum salmon expected in 1985 was 182,000, of which 157,300 were from wild spawning areas and 24,700 were from enhancement facilities.

The actual return, as estimated by run reconstruction, was 142,500.

## II. Management of Fisheries

### a. Southern British Columbia

#### Inside Fisheries

Management of the chum salmon fisheries in Inside waters includes stock assessment, harvest control and allocation of catch.

Stock assessment requires the use of commercial evaluation fishing or test fishing information to determine stock abundance and composition to determine if directed commercial fisheries can occur in Johnstone Strait, the Fraser River and, by Treaty annex,

in U.S. areas 7 and 7A. In Johnstone Strait, evaluation fishing in the third week of September and test fishing from that time onward were used to provide run size estimates. The mid Vancouver Island (Qualicum) fishery is managed as a terminal fishery. In order to ensure that no more than 10% of the anticipated catch in that area would be of passing Fraser River chum, genetic stock identification data was used to determine stock composition.

The control over the commercial harvesting of chum salmon in these waters is a variable harvest rate strategy directly tied to the size of the run passing through Johnstone Strait. This control strategy was designed to permit limited fishing while rebuilding the stocks.

Catch allocations were to provide for the needs of the Indian food fishery, the U.S. interceptions in Areas 7 and 7A and between the gill and seine net fleets in the Southern British Columbia fishery areas.

#### West Coast Fisheries

The management of the Nitinat area fishery was planned to achieve the necessary escapements to the wild spawning grounds and the hatchery. In addition, management plans were: to conduct fisheries at appropriate times and areas to ensure fleet safety and high product quality; to achieve domestic catch allocations by gear type; and to quantify the incidence of interception of passing stocks.

#### b. United States

Management of the U.S. fisheries directed at chum salmon in the Strait of Juan de Fuca (areas 4B, 5, and 6c), San Juan Islands (Area 7) and Point Roberts (Area 7A) was governed by the following objectives.

In the Strait of Juan de Fuca, the objective was to maintain the existing treaty Indian fisheries at historic effort levels. This fishery is directed primarily at Puget Sound stocks.

In areas 7 and 7A, the initial objective was to conduct fisheries at a level that would limit the catch of Fraser River chum to a level equal to that expected in Canadian Fisheries in Johnstone Strait and the Fraser River (areas 12, 13 and 29). As a result of inseason discussion between U.S. and Canadian managers, the U.S. revised its catch ceiling for the fishery in areas 7 and 7A to limit the harvest of Fraser chum to 28% of the total anticipated catch of Fraser chum in directed Inside commercial fisheries in the two countries. An additional objective of the U.S. management in area 7 and 7A was to regulate the harvests between treaty and non-treaty fishermen to achieve equal sharing of Canadian origin chum taken in all U.S. catch areas.

### III. Review and Evaluation of Fisheries

#### a. Southern British Columbia

Chum salmon fisheries occurred in the Johnstone Strait (areas 11 to 13), mid Vancouver Island (Qualicum, Area 14),

Fraser River (Area 29) and Nitinat (Area 21) areas. With the exception of the fisheries within the Fraser River, these fisheries harvest U.S. origin chum incidentally during harvests directed at Canadian origin chum. Fisheries occurring within the Fraser River do not intercept U.S. origin chum salmon.

The Johnstone Strait gill and seine net fisheries directed at chum salmon occurred on September 19 and October 6. The catch, including early September incidental catches, totaled 516,300. The majority of the catch (77%) occurred during the single one day fishery in October. The mid Vancouver Island gill net fishery began in early October and continued weekly for four weeks. Catches, including a gill and seine net "clean up" fishery in late November, totaled 526,600 with 60% of the catch occurring in the later fishery. Fisheries in early October and late November in the Fraser River took 84% of the 52,500 total gill net catch in the Fraser area. Nitinat fisheries commenced on October 9 and continued weekly until October 27. Fishing times alternated between gill and seine nets and a total catch of 1,609,000 was reported. This was the highest catch on record for the Nitinat area.

The catch for all four of the Southern British Columbia fisheries totaled 2,705,000. The total catch was significantly higher than was expected and was primarily due to the record high catches occurring at Nitinat.

#### b. United States

The major fisheries intercepting Canadian origin chum salmon in the United States are in the Strait of Juan de Fuca (areas 4B,5,6C), San Juan Islands (Area 7) and Point Roberts (Area 7A) areas. A significant proportion of the chum catch in these fisheries is currently believed to be of Canadian origin.

Gill net fisheries in areas 4B, 5, and 6C continued from August to December with the majority of the catch (97%) occurring in October. A total of 48,300 chum were caught by treaty Indians in these areas, which represents a substantial increase from the preseason expected catch of 15,000 to 20,000. Fisheries directed at Chum salmon in areas 7 and 7A commenced in mid October and alternated between non-treaty and treaty fisheries for approximately two weeks. The catch among all gear types ( gill, reef and purse seine nets) in Area 7, and for gill and purse seine nets in Area 7A totaled 71,700 and 93,100 respectively.

Harvest from areas 7 and 7A totaled 164,800 which represents and increase over the expected catch of 117,000. This increase was partially a result of an unexpectedly high late season catch in Area 7A.

### IV. Escapements

#### a. Southern British Columbia

##### Inside Chum

Total fall chum salmon escapements was 2,483,900

the highest since 1950. The wild spawning escapement of 2,088,000 was 187% higher than the 1980-84 average wild escapement and achieved 86% of the identified overall spawning ground capacity. Notable increases in escapements occurred in the mid and southern Vancouver Island, Howe Sound and Fraser River areas. The Fraser River and mid Vancouver Island areas accounted for 54% of the total fall chum escapement.

Inside summer chum salmon, which are incidentally caught in July and August fisheries in Johnstone Strait, are typically low in abundance and escapements were less than 1% of the fall escapements.

#### West Coast Chum

The Nitinat total escapement of chum salmon was 247,000 of which 225,000 spawned in the wild spawning areas. This escapement exceeded the 1980-84 average of 55,000 and the escapement goal of 125,000.

#### b. United States

##### Puget Sound Chum

The Puget Sound chum salmon escapement of 496,389 was the highest odd year escapement recorded since the start of the data base in 1968. Substantial escapement increases occurred for the normal timed stocks in four of the six regions. The Hood Canal, South Sound and the Stillaguamish/Snohomish systems accounted for approximately 80% of the normal timed chum escapement. Early timed chum escapements remained in low abundance, except for the South Sound stocks which achieved escapements 48% above the goal of 7,200.

##### Washington Coast Chum

The chum escapement in Willapa Bay totaled 52,700, well above the goal of 35,500. Grays Harbor escapement was 31,300, also well above the goal by over 10,000 chum. Escapement for the Quinault River, where hatchery contributions enhance the run, totaled 3,800 chum, which is a significant increase over the 1984 escapement.

#### V. Review of Genetic Stock Identification Programmes

The British Columbia Inside chum salmon fisheries areas sampled for GSI data included Johnstone Strait (Area 12) test fisheries, mid Vancouver Island (Qualicum, Area 14) test and commercial fisheries, Pender Harbour (Area 16) test fishery, Nanaimo (Area 17) test fishery, Cowichan (Area 18) test fishery and Roberts Bank (Area 29) test fishery.

The Johnstone Strait and mid Vancouver Island programmes

were comparable with previous years activities with the exception of larger sample sizes from Johnstone Straits. The Strait of Georgia samplings were of limited duration.

The sampling on the West Coast waters included the Juan de Fuca (Area 20) test fishery, the Nitinat (Area 21) commercial fishery and the Nootka (Area 26) test fishery.

This was the first year of sampling in Area 20 and of increased sampling in the Nitinat area.

Results of the GSI programme in Southern British Columbia are presented in report TCCHUM (87) 2.

The GSI sampling in U.S. waters included the San Juan Islands (Area 7) test fishery at one site and the Point Roberts (Area 7A) and Strait of Juan de Fuca (Area 5) commercial fisheries.

The Area 7 test fishery sampling was reduced from the level of the previous two years, whereas the Area 7A sampling had not been done previously and the Area 5 sampling was the beginning of a new program.

Results of the GSI programme in Washington State are presented in report TCCHUM (87) 2.

FINAL 1985 POST SEASON SUMMARY REPORT ON  
CHUM SALMON  
CANADIAN AGENCY REPORT

## Canadian Chum Salmon 1985.

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## Introduction

The treaty between the governments of Canada and the United States of America concerning Pacific salmon desired to cooperate in the management, research and enhancement of Pacific salmon stocks. To this end, and within the structure of the treaty, the following reports the current and available information on the southern British Columbia chum fisheries for the year 1985. This report discusses various aspects of the chum salmon present in British Columbian waters between Vancouver Island and the mainland (Inside chum) and off the west coast of Vancouver Island (West Coast chum).

## Inside Chum

### I. Conservation and Harvest Management Requirements

Inside chum salmon were managed to ensure that future production to the fishing industry could be maximized. Maximum future production should be realized through conservation of wild stocks and through enhancement of selected stocks.

In past years, chum escapements to inside streams have averaged less than half the number required to provide maximum production. In 1983, the Department of Fisheries and Oceans (DFO) initiated a conservation plan, known as the clockwork management strategy and, in 1985, Canada signed a salmon conservation treaty with the United States of America (US). In general, these two actions were aimed at conservation of chum salmon. The following describes the 1985 clockwork and treaty conservation and harvest management strategies for inside chum and specifically discusses the Fraser River and mid Vancouver Island stocks in relation to these plans.

#### i. Clockwork harvest strategy

This strategy, developed during the period 1982 to 1984, consists of a harvest management plan and defined stock assessment rules for use in the management regime for Inside chum salmon. The primary objective of the clockwork strategy is to rebuild wild chum salmon stocks to optimum escapement levels by limiting the total harvest rate. The harvest rate is calculated based on the combined catches from Johnstone Strait, the Fraser River and the US areas 7 and 7A. The optimum escapement objective for wild Inside chum is 2.5 million spawners. Other objectives within this strategy were to:

- a. achieve the rebuilding objective within 12 to 15 years;
- b. reduce the number of years during which no commercial chum fishing is permitted; and
- c. consider wild stock production when establishing harvest management plans.

The harvest strategy selected to best achieve the above objectives was a variable rate harvest strategy, which included no directed commercial harvesting of chum salmon if the total run size, as determined in the Johnstone Strait area, was estimated to be below 2.6 million. The allowable harvest rates for the expected magnitudes of chum salmon run sizes were:

- a. below 2.6 million, up to a 10% incidental harvest rate;
- b. 2.6 to 3.3 million, maximum of 20% harvest rate;
- c. 3.3 to 4.9 million, maximum of 30% harvest rate; and
- d. over 4.9 million, maximum of 40% harvest rate.

These harvest rates were selected so that wild chum stocks would rebuild while still providing fishermen with limited opportunities to harvest chum salmon.

The clockwork strategy was developed to limit the harvest in a large area containing numerous mixed stocks. The strategy recognised that harvesting in some terminal areas would be required, particularly in areas of major enhancement.

## ii. Canada/US Treaty

The 1985 annex to the Treaty limited it's requirements for conservation and harvest of the other country's chum to general statements regarding information exchange. This limitation was in recognition of weak returns to Canadian and Puget Sound streams expected in 1985. The overall harvest management plan assumed that if the return was weak, Canada would limit the clockwork harvest rate to 10% , and the US would not have a directed chum fishery in the Point Roberts and San Juan Islands areas. The harvest plan further assumed that if a Canadian fishery was permitted then the US would permit a fishery in the Point Roberts and the San Juan Islands areas.

During the 1985 chum season, stock size estimates increased and Canada permitted a commercial fishery up to a harvest rate of 20 percent. Discussions between the US and Canada followed and the US agreed to limit their catch of Canadian origin chum salmon in Areas 7 and 7A to 95,000. This catch level was based on the desire of the US to harvest an 'historical' amount of chum in these areas.

## iii. Fraser River Chum

The chum produced from the Fraser River were of major importance during the discussions leading up to the development of the clockwork harvest strategy and the treaty chum annex. The Canadian clockwork plan was designed to conserve all inside chum; however, Fraser River chum conservation was a specific aspect of the clockwork harvest plan. Thus separate escapement goals, stock

size estimates, catch estimates, and fishing area limits for Fraser River chum were included in the clockwork. In 1985, the minimum acceptable escapement goal for Fraser River chum was set at 500,000.

The catch of Fraser River chum salmon in all fishing areas was an integral part of the clockwork plan. In some areas, separate catch estimates for Fraser River chum were assembled through genetic stock identification analyses. Specifically, Johnstone Strait fisheries were monitored to determine Fraser River run timing and abundance, while Strait of Georgia fisheries were monitored to determine fishing area and time restrictions which would reduce the catch of passing Fraser River chum. In addition, Fraser River fisheries were restricted to a similar number of openings as occurred in Johnstone Strait so that chum escapement could be increased.

The Pacific Salmon Commission (PSC) recognized the importance of Fraser River chum to the management of chum in the waters of both countries; however, in 1985, the agreement between Canada and the US was developed outside of the PSC. The 1985 agreement was designed to limit the estimated catch of Fraser River chum in the Point Roberts and San Juan Islands areas to 84,400. This catch limit was based on the perception that these two areas took 28% of the total catch of Fraser chum, historically.

#### iv. Mid Vancouver Island Chum

The chum produced in the mid Vancouver Island area are of importance because of the enhancement activities in this area. In 1985, the three enhancement facilities in this area were expected to produce 580,000 chum. Some of this return would be harvested within Johnstone Strait under the appropriate clockwork harvest rate; however, the majority of the catch was expected to occur in the mid Vancouver Island area. Terminal harvesting was directed at surplus enhanced chum; however, the conservation requirements of passing chum stocks was considered and limitations to harvest times and areas in the mid Vancouver Island fishery area were instigated. In 1985, the harvest constraint on passing chum harvest was limited to keeping the catch of Fraser River chum at less than 10 percent of the total catch in the area.

## II. Run Size Estimation

Run size estimates were required prior to the season in order to plan conservation actions, harvest constraints and domestic allocations. Run size estimates were required during the season in order to amend harvest plans to accommodate changes in conservation needs.

## i. Preseason

Prior to the 1985 salmon fishing season the estimated run size of Inside chum salmon, including wild and enhanced origin chum from three stock areas: Fraser River, mid Vancouver Island, and the remaining inside areas, was determined.

The wild run size forecast was determined from the application of past average returns per spawner, adjusted for observed variations, where appropriate, and average returns by age group to the appropriate spawning abundance for the stock. The 1985 preseason forecast wild run size for Fraser River chum was 502,000 while the wild run size for the remaining inside chum stocks, including mid Vancouver Island, was 993,000 for a total of 1,495,000 (Table 1).

The number of enhanced origin chum expected was determined through the application of average survival rates for each type of enhancement facility and the average returns by age group to the number of fry released by the facilities. The 1985 run size estimate for enhanced origin Fraser River chum was 265,000 while the mid Vancouver Island area was expected to produce 580,000 enhanced chum. In addition, there were 68,000 enhanced origin chum estimated to be returning to other areas including the Howe Sound, lower Vancouver Island, and Jervis Inlet areas. The total run size estimate for enhanced Inside chum salmon was 873,000 (Table 1).

The total inside chum run size was estimated at 2.4 million (1,495,000 wild and 873,000 enhanced). In addition, past data have shown that some US chum return to their spawning grounds through Johnstone Strait; however, because of a lack of predictive methods which would permit a specific estimate to be determined, the estimated run size of US chum forecast to enter Johnstone Strait was set at 100,000. This brought the total run size expected to return through Johnstone Strait to 2,468,000 chum (1,495,000 wild Canadian, 873,000 enhanced Canadian, and 100,000 US chum).

## ii. Inseason

The catch of chum salmon in a commercial fishery in the third week of September in Johnstone Strait is a reasonably accurate predictor of the magnitude of the run size. This predictor has shown an average error of 31.9 percent over the period of record (1969-84) and was the first inseason run size estimator within the clockwork harvest management plan.

The third week of September run size estimate was 2,620,000 chum (Table 2). This estimate increased the total stock size by 152,000 and increased the harvest rate allowable under the clockwork plan to 20 percent. Revision to the estimated run size

of Fraser River chum resulted in a new estimate of 814,000 as compared to the preseason estimate of 767,000. The US run size estimate remained constant throughout the season at 100,000. The mid Vancouver Island enhanced run size estimate was not revised, while the mid Vancouver Island and other Canadian Inside wild chum run sizes were adjusted upwards.

All subsequent inseason run size estimates were based on the upper Johnstone Strait test fishing results. The first estimate was available following two weeks of test fishing and indicated a total run size of 2,920,000 entering Johnstone Strait. This confirmed the presence of a stock which could be subjected to a 20 percent harvest rate. The Fraser River and other inside wild chum stock run size estimates were also increased based on this test fishing information (Table 2). The mid Vancouver Island enhanced run size and the US run size estimate were kept constant.

During the remainder of October, test fishing continued and inseason run size estimates were made on a weekly basis. At the end of October, test fishing indicated a total run size of 2,970,000 chum passing through Johnstone Strait (Table 2). The Fraser River run size was increased to 923,000 while the remaining wild chum run size was increased to 1,367,000. The enhanced mid Vancouver Island and the US run sizes were unchanged.

The Fraser River chum run size is estimated within Johnstone Strait and also within the Fraser River. The final inseason estimate available from Johnstone Strait test fishing was 923,000 Fraser River chum. Test fishing within the Fraser River provided additional weekly run size estimates until the test fishery was suspended in late November by freezing conditions. Table 2 summarizes the 1985 Fraser River run size estimates derived from in river test fishing. The final available run size estimate was 1,134,000 Fraser River chum.

### iii. Postseason

At the end of the season, catch in all Inside areas and gross escapements were summed to determine the estimated actual run size for all stocks. In addition, the total run size of Fraser River chum salmon was calculated by applying stock composition data derived from genetic stock identification (GSI) samples in selected areas.

The postseason run size estimate for the inside chum stock was 3,767,800 (2,483,900 gross escapement and 1,283,900 total of catch in Canadian Inside waters and catch of Canadian origin chum in US areas 7 and 7A). This estimate was 798,000 higher than the final inseason estimate of 2,970,000.

The Fraser River postseason run size estimate, excluding the catch of Fraser River chum in US and Canadian west coast of

Vancouver Island waters, was 1,231,500 (926,700 gross escapement and 304,800 catch in Canadian Inside waters). The Washington Department of Fisheries (WDF) estimated the catch of Fraser chum in US areas 7 and 7A at 124,500, while their estimated catch of Fraser chum in US Juan de Fuca Strait area was 15,400. The catch of Fraser chum in the Nitinat commercial fishery, estimated through analysis of GSI data, was 122,920. The inclusion of these catches in the Fraser River run size estimate yields a total run size of Fraser chum of 1,494,400 in 1985.

### III. Catch

Inside chum salmon are harvested by commercial, Indian food, and test fishermen and by biological samplers. In 1985, the preseason run size forecast indicated that commercial harvests would be severely limited and the bulk of the harvest would be taken by test and Indian fishermen. The total harvest of inside chum was to be limited to 10 percent of the total run size. Inseason run size information indicated a larger allowable harvest rate, i.e. 20 percent of the total run, and the commercial catch limit was raised. The catch by fishing group and area follows.

#### i. Commercial

Commercial catch of Inside chum in Canadian waters occurs in three main areas: Johnstone Strait, Strait of Georgia and the Fraser River.

The 1985 Johnstone Strait fishery (areas 11, 12 and 13), began in July and ended in mid October. During the July and August period the Johnstone Strait fishery was directed at harvesting sockeye and pink salmon; however, during those two months 114,000 chum salmon were harvested (Table 3). These chum are assumed to be comprised mainly of summer chum destined for streams in the Johnstone Strait and Canadian central coast areas.

In 1985, because of the presence of pink salmon, commercial harvesting was permitted in Johnstone Strait during the first two weeks of September and 68,858 chum salmon were caught. The clockwork management plan permits a directed commercial chum assessment fishery in the third week of September. The catch in this fishery was used to develop the first inseason run size estimate. This fishery caught 42,549 chum and the associated run size estimate was 2,920,000 (Table 3).

This run size indicated that a 20% harvest rate could be allowed and a further one day fishery could be permitted in Johnstone Strait. This further commercial fishery occurred in the second week of October and harvested 399,000 chum. The total catch in these two openings totaled 441,000 chum out of the total

catch allowable under the 20% harvest limit of 584,000. The balance of the allowable catch of 143,000 was required for harvests in other areas and the Johnstone Strait fishery was closed to commercial fishing for the balance of the 1985 season.

The Strait of Georgia fishery was limited to the mid Vancouver Island area (Area 14). This commercial fishery was directed at enhanced chum and the first opening occurred in the second week of October. Commercial fishing continued for the next three weeks and during the four weeks of fishing a total of 208,257 chum were caught (Table 3). Commercial harvesting was closed until the enhancement facilities and adjacent stream areas had received their escapement goals. At this time, a further commercial harvest was permitted and 317,964 chum were caught. This brought the total catch in the directed commercial chum fishing period to 526,221 and the mid Vancouver Island area was closed for the balance of the 1985 season.

The 1985 Fraser river commercial fishery began in July and harvesting from that time until the second week of October was directed at sockeye and/or pink salmon surpluses. Chum were first reported in the Fraser River commercial catch in August; however, the catch was low and a total of 3,243 were harvested up to the end of the first week of October (Table 3). In the second week of October a commercial fishery directed at harvesting a surplus of pink salmon caught 37,000 chum. Commercial fishing was then closed until late November when an opening, directed at a surplus of Fraser River enhanced chum, took 7,000 chum. The commercial catch of chum in the Fraser River then totaled 47,243 and the commercial fishery was closed for the balance of the 1985 season.

#### ii. Test and Sample

The abundance of chum salmon is monitored through test fishing programs in Johnstone Strait and the Fraser River. In addition, biological sampling for genetic stock identification is conducted in Johnstone Strait and in the mid Vancouver Island area.

The abundance of chum salmon in Johnstone Strait in 1985 was assessed, in part, through test fishing by two seine vessels in Area 12. The test fishing in Area 12 began in early September and continued until late October (Table 4). During that time the two vessels caught a total of 124,000 chum, the majority of which were released unharmed while the remainder were retained as payment for the operation of the seine vessels and for biological samples.

The Area 12 test fishing catches were utilized to determine relative weekly chum abundance and the magnitude of the total run entering Johnstone Strait. The weekly pattern of abundance indicates a peak of abundance in the first week of October (Table 4). The relationship between catch per unit effort in the

test fishery and the total run size was used weekly throughout October to determine the inseason estimates of the run size (Table 2). The final estimate for the 1985 season of 2,970,000 chum was determined in the last week of October after which test fishing was terminated.

Within the Strait of Georgia, biological data collection projects involving the capture of chum occurred in the mid Vancouver Island area and off the mouth of the Fraser River near Point Roberts. These sampling programs were initiated to determine stock composition in these areas. Sampling in the mid Vancouver Island area began in early October and continued into November. Sampling near Point Roberts began in late October and continued sporadically until late November. During this period 150 chum were caught and retained for analysis.

The remaining area to be test fished was the Fraser River. Within the river there were two test fisheries conducted, the first at Cottonwood in the lower river near Ladner, while the second operated in the upper commercial fishery area near Albion.

The chum test fishery at Cottonwood was used to determine the overall size of the run entering the Fraser River and to monitor daily abundance of the run. This daily test fishery began on October 1 and continued until late December. During this period a total of 4,836 chum were caught (Table 5). The first estimate of the size of the run entering the river was developed in late October and indicated that approximately 1,000,000 chum would be returning (Table 2). The remaining run size estimates are shown in Table 2. Table 5 shows two peaks of abundance at Cottonwood; the first in mid October and the second in mid November. The unusually cold weather in late November through to mid December precluded test fishing for the major portion of the last month of the test fishing period. This lack of data precluded the determination of further run size estimates from the Cottonwood test fishery.

The test fishery at Albion began on October 1 and continued until late December. During this period 7,596 chum were caught (Table 5). The timing of the run past Albion, as determined by the test fishery is shown in Table 5 and indicates a peak in late October and early November.

### iii. Indian

Native people within British Columbia are permitted to harvest chum salmon for their food fish needs. Indian food fish catches occur in Johnstone and Georgia straits and within streams flowing into these areas. The main stream system from which Indians harvest food fish is the Fraser River, however, there are stream harvests in other areas. The data for Johnstone and Georgia straits includes marine and stream catches.

In 1985, the Indian food fishery in Inside waters harvested 49,841 chum salmon, of which the food fishery in Johnstone Strait

harvested a total of 12,762 chum, the majority of which were taken in marine waters in October. In the Strait of Georgia there were 31,220 chum taken in the Indian food fishery. The majority of the Indian food fish caught in the Strait of Georgia are taken in stream estuaries or within the streams. The food fishery within the Fraser River took a total of 5859 chum. This was a well below average catch because of the presence of a large spawning escapement of pink salmon during October and a prolonged period of freezing conditions during late November and December.

#### IV. Escapement

Chum salmon which escape the commercial, test, sampling, and Indian fisheries form the gross escapement to inside chum salmon streams. This gross escapement is made up of chum which spawn in wild areas, those which are spawned in hatcheries, and those which are surplus to hatchery requirements and are removed from the spawning areas. Gross escapement estimates are used in reconstruction of the total run size in a given year.

##### i. Spawning

Some of the streams within the inside chum stock area contain summer run spawners. These are relatively minor stocks and because of their distinctively early run timing in Johnstone Strait, i.e. July to late August, are not included in the escapement goal for the fall chum run.

The stocks which are managed within the context of the clockwork plan and within the PST are the fall run chum. These chum enter Johnstone Strait during the September to November time period. The estimated number of fall chum spawning in wild spawning areas was 2,088,000; the highest escapement recorded since systematic records began in the late 1940's. Record high escapements were observed in the Fraser River (901,200) and Howe Sound/Sunshine coast (373,600) stock areas. The stated spawning escapement goals were reached in the Fraser River, Howe Sound, Southern Vancouver Island, and Jervis Inlet stock areas (Table 6).

The estimated number of fall chum in the wild spawning areas of Kingcome, Loughborough, Bute and Toba inlets and in Boundary Bay was lower than the average number observed during the 1980-84 period while other stock areas showed increases over their average escapements (Table 6).

Even though the fall chum spawning escapement in wild spawning areas was near the total spawning goal of 2,500,000 chum, there were only four of the fourteen stock areas which received adequate escapements.

## ii. Hatchery

The enhanced escapement areas are presently limited to the mid Vancouver Island and Fraser River areas. The enhancement facilities in both these areas received their spawning requirements. (Table 6). The chum returning to enhancement facilities within the Fraser River are, wherever possible, diverted to wild spawning areas to spawn.

## iii. Gross

The gross escapement in 1985 was estimated at 2,483,900 fall chum of which 2,088,000 spawned in wild or natural spawning areas. The remaining 396,000 were spawned in enhancement areas, facilities or were surplus to hatchery requirements (Table 6).

# V. Status of Treaty Requirements

## i. Overall Fishery Management

The treaty chum annex in 1985 did not request specific management constraints for Canadian commercial fisheries. Instead DFO and WDF developed an agreement, within the spirit of the treaty, which addressed management actions required by the United States. As Canadian commercial fishery management was continuing chum conservation through the clockwork harvest plan the United States agreed to share in this conservation by limiting its fishery in the San Juan Islands and Point Roberts areas.

In 1985, Canada's chum fishery management plans were developed domestically to reflect the requirement to conserve the inside chum stock according to the clockwork harvest plan. The inseason estimated stock size estimates dictated that Canada should manage to a 20 percent harvest rate on the total run. The last inseason estimate of total run size of 2,970,000 indicated that the appropriate total catch in the Canadian clockwork area fisheries (Johnstone Strait, Strait of Georgia and Fraser River) and the appropriate catch in the US fisheries in areas 7 and 7A should not exceed 590,000. At the end of commercial fishing the total catch in the appropriate areas was 772,600. This catch level was 183,000 higher than expected and the overall harvest rate was then estimated at 27 percent. The main areas which caught more than expected were the US areas 7 and 7A (actual catch of Canadian chum 139,000; expected catch of Canadian chum 96,000) and Johnstone Strait (actual catch 516,000; expected catch 400,000).

The total run size, reconstructed after the season, was approximately 3,770,000 chum salmon; significantly higher than that indicated during the season. The overall harvest rate within

the appropriate Canadian and US fisheries was 21 percent. The postseason estimated run size, if identified inseason, would have fallen within the 30 percent harvest rate range; however, the larger run size was not identified and therefore was harvested at a 20 percent rate. The chum salmon not harvested were allowed to spawn in wild spawning areas thereby increasing the rebuilding of the fall chum stock in inside waters. The most notable increases in escapement were in the streams entering the Strait of Georgia.

## ii. Stock Identification

Genetic stock identification was conducted in a number of areas in 1985. The majority of the GSI work concentrated on sampling of commercial fishery areas or commercial catches; however, there was also a small amount of spawning ground sampling.

The commercial fishery areas sampled in 1985 were upper Johnstone Strait (Area 12), mid Vancouver Island (Area 14), Malaspina Strait (Area 16), Nanaimo (Area 17), Cowichan (Area 18), Roberts Bank (Area 29), Juan de Fuca Strait (Area 20), and Nitinat (Area 21). The sampling in all areas, except some of the samples in Area 14 and all of the samples in Area 21, was from test fishing vessels. In Area 14 the remaining samples, and all samples in Area 21 were from chum caught in the commercial fishery. Table 7 summarizes the observed percentage in each of the samples which was identified as of Puget Sound origin chum for each of the areas sampled in 1985. Further details can be found in Joint Chum Technical Committee Report TCCHUM (87) 2.

The results indicate that the percentage of Puget Sound origin chum salmon in all sampled areas was generally low. The highest observed percentage of Puget Sound chum was 25.2 % in one of the samples from Juan de Fuca Strait (Area 20). Other relatively high point estimates were observed near Nanaimo (Area 17), (20.1%) and mid Vancouver Island (Area 14), (24.4%). The majority of the rest of the samples showed observed percentages of Puget Sound origin chum of less than 10 percent. The highest percentages came from areas which were not opened to commercial harvesting.

## West Coast Chum

### I. Conservation and Harvest Management Requirements

West coast chum return to a number of inlets on the west coast of Vancouver Island. For the purposes of the Canada/US treaty the main stock of concern originates from the Nitinat system and the commercial fisheries of concern are net harvests adjacent to Nitinat (Areas 21 and 22).

The chum returning to Nitinat are managed so that the wild spawning areas receive their target escapement of 125,000 and the hatchery obtains its required egg supply. Surpluses are harvested in commercial fisheries in Area 21, adjacent to the entrance to Nitinat lake. This commercial fishing area is used instead of fishing in the lake to increase the safety of fishing conditions for the fleet and to improve the quality of the catch. In addition, the commercial fishery for Nitinat chum is managed to share the catch between gill and seine net gear types.

An additional management objective in 1985 was to quantify the incidence of chum originating in other areas in the Nitinat commercial fishery. This quantification was required for Canada/US treaty information exchange and for domestic stock management purposes.

### II. Run Size Estimation

The only harvestable surplus expected in 1985 was originating from the hatchery. The wild run was not expected to produce any significant returns.

The run size expected was 394,000 of which 200,000 were available for harvest. The remainder were to be used to fill the target escapement for the wild spawning areas and to fill the egg take requirements of the hatchery.

There are no inseason estimates of run size made in the Nitinat area.

The postseason estimate of the run size returning to Nitinat in 1985 was reconstructed from adding escapement to the catch of west coast chum in the Area 21 fishery as determined by genetic stock identification. The estimated size of the run was 1,376,300.

### III. Catch

#### Commercial

The commercial chum salmon fishery in Area 21 was open over a period of four weeks in October, 1985. The first opening was used to determine the relative abundance of chum in the fishing

area and to limit the catch the area was opened for gill nets only; 17,000 chum were caught. Subsequent to this opening the escapement into Nitinat lake appeared to be approximately 100,000 and all further commercial openings were for gill and seine nets.

The second and third weeks of fishing in Area 21 harvested 678,000 and 843,000 chum, respectively. The final fishery opening harvested 72,000 chum and brought the seasonal total chum catch to 1,609,000, which includes Nitinat and passing stocks.

#### Test and Sample

There were three days of test fishing to monitor chum abundance in Area 21 in the period between the first and second openings. The catches in that test fishery were increasing and confirmed the presence of increasing numbers of chum in the area. A total of 431 samples for genetic stock identification were taken from the commercial catch in the first three fishing weeks. The above catches are included in the total commercial catch for the area.

#### Indian

There was no reported catch of chum salmon in the Indian food fishery in the Nitinat area.

#### IV. Escapement

The escapement to the wild spawning grounds of the Nitinat system was 225,000; significantly above the escapement goal of 125,000. In addition, there were 13,500 chum which swam into the hatchery for brood stock. Also, 6,000 chum were taken by seine net in Nitinat Lake and used for brood stock, while 2,500 chum were disposed of as surplus to hatchery needs. Therefore, the gross escapement to the Nitinat system was 247,000 chum.

#### V. Status of Treaty Requirements

There was no specific requirement within the Pacific Salmon Treaty to amend domestic management plans for the Nitinat area; however, the treaty required the exchange information on commercial fisheries that had the potential to intercept chum produced by the other country. To meet this information exchange requirement samples of the commercial fishery in the Nitinat area were taken. These samples were analysed to determine the pattern of genetically based stock characters and the proportions of the major stocks of concern were identified on a weekly basis.

The genetic stock identification analyses of samples taken in Area 21 indicated that Puget Sound origin chum salmon were present in the area and a range of 1.9 to 11.8% of the sampled fish were identified as Puget Sound chum (Table 7). For further

information refer to Joint Chum Technical Committee Report TCCHUM (87) 2.

Additional genetic stock identification information was taken from a commercial fishery at Nootka (Area 26) on the upper portion of the west coast of Vancouver Island and from a test fishery in Juan de Fuca Strait (Area 20). The single Nootka sample indicated 8.0 percent Puget Sound origin chum. The Juan de Fuca area was sampled over three weeks beginning in early October. The observed percentages of Puget Sound origin chum in the samples ranged from 6.1 to 25.2% (Table 7).

**Table 1. Preseason run size estimates by stock, 1985.**

=====		
Stock	Origin	Estimated run size
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<b>Canadian Inside Chum</b>		
-----		
Fraser River :	Wild	502,000
	Enhanced	265,000
	sub-total	767,000
Mid Vancouver Island :	Wild	133,000
	Enhanced	580,000
	sub-total	713,000
Other Stocks :	Wild	860,000
	Enhanced	28,000
	sub-total	888,000
Total Inside Stocks :	Wild	1,495,000
	Enhanced	873,000
		Canadian total 2,368,000
<b>American Chum</b>		
-----		
Puget Sound :		100,000
		American total 100000
		Grand total 2,468,000
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Table 2. Summary of the preseason run size estimate, inseason run size estimates developed from test fishing, and the postseason estimate, 1985.

Month & Week	Total	American	Canadian Total	Fraser	Mid Vancouver Island	Other Inside Canadian
Preseason	2,468,000	100,000	2,368,000	767,000	713,000	888,000
Inseason						
Johnstone Strait test fishery						
September						
3rd wk	2,620,000	100,000	2,520,000	814,000	727,000	979,000
October						
1st wk	2,920,000	100,000	2,820,000	907,000	753,000	1,160,000
2nd wk	2,980,000	100,000	2,880,000	926,000	759,000	1,195,000
3rd wk	2,970,000	100,000	2,870,000	923,000	758,000	1,189,000
Fraser River test fishery						
October						
4th wk	n/a	n/a	n/a	1,029,000	n/a	n/a
November						
1st wk	n/a	n/a	n/a	1,054,000	n/a	n/a
2nd wk	n/a	n/a	n/a	1,070,000	n/a	n/a
3rd wk	n/a	n/a	n/a	1,134,000	n/a	n/a
Postseason	3,767,800	n/a	n/a	1,231,500	n/a	n/a

**Table 3. Catch of chum salmon by statistical area for all commercial salmon gear types and including test fish landings, 1985.**

Period or Week ending	Statistical Areas						Total
	11	12	13	14	15-19	29	
07-Sep	1439	26891	3438	0	14	150	31932
14-Sep	951	28494	7645	39	7	1542	38678
21-Sep	151	33947	8451	152	8	598	43307
28-Sep	150	171	26	50	1	7	405
05-Oct	131	0	0	128	62	203	524
12-Oct	0	237136	161599	14476	0	37363	450574
19-Oct	1	4177	0	25571	0	1250	30999
26-Oct	0	0	0	86585	0	1621	88206
02-Nov	0	1446	70	81625	161	1310	84612
Nov. 3 to Nov.30	0	0	0	317964	54	7210	325228
Dec.1 to Dec.31	0	0	0	0	0	546	546
<b>Total</b>	<b>2823</b>	<b>332262</b>	<b>181229</b>	<b>526590</b>	<b>307</b>	<b>51800</b>	<b>1095011</b>
Prior to 31-Aug	57504	52298	4239	43	547	743	115374
<b>Grand total</b>	<b>60327</b>	<b>384560</b>	<b>185468</b>	<b>526633</b>	<b>854</b>	<b>52543</b>	<b>1210385</b>

Source: British Columbia Commercial Catch Statistics, 1985.

Table 4. Catch, effort and catch per unit effort in Johnstone Strait test fisheries, 1985.

Week ending	Catch	Effort (no. of sets)	Catch per Set
Area 12 test fishing			
vessel no. 1.			
07-Sep	127	18	7.1
14-Sep	528	18	29.3
21-Sep	291	18	16.2
28-Sep	10301	30	343.4
05-Oct	15532	30	517.7
12-Oct	10098	23	439.0
19-Oct	12157	30	405.2
26-Oct	5014	26	192.8
02-Nov	986	14	70.4
	-----	---	-----
sub total	55034	207	ave. 265.9
Area 12 test fishing			
vessel no. 2.			
28-Sep	6670	24	277.9
05-Oct	18605	30	620.2
12-Oct	12452	22	566.0
19-Oct	10958	27	405.9
26-Oct	18507	26	711.8
02-Nov	1777	8	222.1
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sub total	68969	137	ave. 503.4
Grand total	124003	344	

**Table 5. Total catch and weekly total catch per unit effort  
in Fraser River chum test fisheries in 1985.**

Week ending	Catch per unit effort	
	Cottonwood	Albion
05-Oct	15.21	16.66
12-Oct	56.21	43.34
19-Oct	58.89	67.95
26-Oct	46.95	116.95
02-Nov	50.15	83.30
09-Nov	55.70	101.64
16-Nov	92.79	36.67
23-Nov	36.73	43.95
30-Nov	3.64	0.00
07-Dec	3.39	24.33
14-Dec	5.79	20.93
21-Dec	6.03	30.57
Total	431.48	586.31
Total catch	4,836	7,596

note: rounding errors may be present.

Table 6. Number of inside chum spawning in wild areas, and number spawned or used by hatcheries, in 1985, compared to spawning capacity and to previous five year average.

Spawning Areas and Stock group	Capacity of Spawning Areas	1985 Estimate	1985 as percent of Capacity	1980 - 84 Average	1985 as percent of 1980 - 84 Ave.
<b>Wild Spawning Areas</b>					
Upper Vancouver Island	32,900	900	3%	140	643%
Kingcome Inlet	113,500	5,700	5%	10,920	52%
Bond to Knight Inlet	220,000	43,000	20%	39,380	109%
Johnstone Strait	137,000	78,400	57%	28,900	271%
Loughborough/Bute Inlet	150,000	117,900	79%	154,320	76%
Mid Vancouver Island	a				
Toba Inlet	136,000	11,600	9%	15,120	77%
Jervis Inlet	149,800	174,600	117%	92,540	189%
Lower Vancouver Island	147,400	95,700	65%	65,160	147%
Southern Vancouver Island	238,500	254,500	107%	142,760	178%
Howe Sound/Sunshine Coast	350,000	373,600	107%	147,680	253%
Burrard Inlet	50,000	30,600	61%	23,380	131%
Fraser River	700,000	901,200	129%	393,140	229%
Boundary Bay	5,000	300	6%	340	88%
<b>Wild Total</b>	<b>2,430,100</b>	<b>2,088,000</b>	<b>86%</b>	<b>1,113,780</b>	<b>187%</b>
<b>Enhanced Spawning Areas</b>					
Mid Vancouver Island	299,000	370,400	124%	241,400	153%
Fraser River	n/a	25,526	n/a	2,344	1089%
<b>Enhanced Total</b>	<b>299,000</b>	<b>395,926</b>	<b>132%</b>	<b>243,744</b>	<b>162%</b>
<b>Grand Total</b>	<b>2729100</b>	<b>2483926</b>	<b>91%</b>	<b>1357524</b>	<b>183%</b>

a. Included in enhanced spawning area section

Table 7. Percentage of sample estimated to be of Puget Sound origin, as estimated by genetic stock identification analyses, in Canadian fishery areas, 1985.

Period or Week ending	Area and Source of GSI Samples								
	Area 12 Test	Area 14 Commercial	Area 14 Test	Area 16 Test	Area 17 Test	Area 18 Test	Area 29 Test	Area 20 Test	Area 21 Commercial
Prior to 31-Aug	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
07-Sep	5.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
14-Sep	4.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
21-Sep	6.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
28-Sep	3.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
05-Oct	16.0%	n/a	n/a	n/a	n/a	n/a	n/a	6.3%	n/a
12-Oct	12.5%	0.1%	n/a	n/a	n/a	n/a	n/a	25.2%	4.5%
19-Oct	7.5%	5.9% 0.0%	24.4% 9.8% 5.0% 1.0%	n/a	n/a	n/a	n/a	6.1%	11.8%
26-Oct	9.4%	9.6% 1.7%	5.7% 17.1% 13.4%	n/a	9.9% 9.2% 6.1%	n/a	n/a	n/a	1.9%
02-Nov	7.6%	0.1%	7.9% 6.4%	11.0% 2.4%	20.1% 9.3%	n/a	n/a	n/a	n/a
09-Nov	n/a	n/a	n/a	n/a	n/a	10.1%	n/a	n/a	n/a
16-Nov	n/a	n/a	n/a	n/a	1.5% 2.7%	n/a	10.7%	n/a	n/a

note: Areas with more than one value in a week indicate more than one sample was obtained.

FINAL 1985 POST SEASON SUMMARY REPORT ON  
CHUM SALMON

UNITED STATES AGENCY REPORT

## REVIEW OF 1985 WASHINGTON CHUM SALMON FISHERIES

### I. INTRODUCTION

This report was prepared by the U.S. section of the joint chum technical committee formed under provisions of the Pacific Salmon Treaty. It provides a general overview of all 1985 chum salmon fisheries in Washington state and a more detailed review of those fisheries that intercept Canadian origin chum salmon.

The fisheries in Washington State waters that are believed to harvest significant numbers of Southern British Columbia origin chum salmon are those in the western Strait of Juan de Fuca (areas 4B,5,6C), the San Juan Islands (area 7) and Point Roberts (area 7A) (Figure 1). The majority of the harvest in areas 4B,5,6C is believed to be of U.S. origin; consequently, management objectives in these areas are based primarily on the needs of stocks originating in Puget Sound. The chum fishery in this area has been restricted in recent years to a limited effort treaty Indian gillnet fishery. The area 7/7A harvest is assumed to be composed primarily of chum salmon of Canadian origin and management in recent years has been geared towards meeting the needs of these stocks, particularly stocks from the Fraser River. Two additional U.S. fishing areas that could potentially contain chum salmon of Canadian origin are the eastern Strait of Juan de Fuca (area 6) and West Beach (area 6A). Both of these areas remained closed to directed chum fishing in 1985 and little or no chum catch occurred.

Other Puget Sound and Washington coastal fisheries are primarily terminal fisheries targeted on a specific stock or group of stocks, with little or no interception of non-target stocks. Available information does not indicate any significant interceptions of Canadian origin stocks by these fisheries.

### II. MIXED STOCK FISHERIES (Strait of Juan de Fuca, San Juan Islands and Point Roberts)

#### A. Management Strategy -

The basic management objective for Puget Sound mixed stock chum fisheries in 1985 was to comply with the Pacific Salmon Treaty, maintain the Treaty Indian fishery at the historic effort level in areas 4B,5,6C (fixed fishing schedule combined with gear type restrictions), and regulate the area 7/7A fishery as necessary for the conservation of Fraser River chum, commensurate with Canadian conservation actions. Consequently, Canadian stock status and fishing regime information was a prerequisite to establishing a U.S.

fishing regime in areas 7/7A. A joint U.S./Canada technical exchange on this subject took place in mid-September in anticipation of action by the Pacific Salmon Commission (PSC). However, at its September meeting, the PSC declined to address 1985 fishing regimes and requested the agencies to proceed as they had in recent years.

Policy level fisheries managers and technical staffs from the Washington Department of Fisheries (WDF) and the Puget Sound treaty Tribes met in early October and reviewed revised Canadian run size expectations and fishing regimes. An inseason run size update was available for the aggregated southern British Columbia "inside" chum return, and a one day commercial fishery had been scheduled by Canada in Johnstone Strait. This fishery was in addition to the full fleet test fishery already conducted in the same area. Because the Fraser River stock was the identified stock of concern in 1985, the decision was made to restrict the U.S. fishery impact on Fraser origin chum in areas 7/7A to the same impact level expected from Canadian directed commercial fisheries (areas 12,13 and 29). This proposed management strategy was then communicated to the Canadian Department of Fisheries and Oceans (DFO).

Canada estimated its 1985 commercial impact on Fraser chum would be approximately 60,000 fish. An equal impact in U.S. fisheries in areas 7/7A translated into a total catch ceiling of 83,600 chum for that fishery. Because of U.S. domestic allocation requirements, the areas 7/7A harvest ceiling was internally allocated with 39,100 for the treaty Indian fleet and 44,500 for the non-treaty fleet. These quotas were expected to result in approximately 10-12 days of fishing for the treaty Indian fleet and four days for the non-treaty fleet. The initial fishing schedule called for two days of treaty Indian fishing the week of October 13, and three days for the week of October 20. The non-treaty fishery was scheduled for two days the week of October 20. Additional fishing time was to be scheduled dependent upon observed catches from the first two weeks.

A response to the U.S. proposal was received from DFO in mid-October indicating that Canada did not believe the proposal was consistent with the intent of the Pacific Salmon Treaty because it would increase interceptions. DFO provided a technical analysis of the historical proportional impacts on Fraser chum by the two countries (Table 1). Based on the preseason expectation of abundance and Canadian harvests, a historical proportional impact approach would result in a lower U.S. fishery than originally proposed.

Policy level managers for WDF and the tribes met again on October 22 to review the Canadian response and technical analyses, they agreed to limit the U.S. fishery impact on Fraser origin chum to 28% of the total anticipated to be taken in directed commercial fisheries, based on Canadian

estimates of U.S. interceptions of Fraser origin chum from 1970 to 1984. A subsequent revised inseason estimate of the Canadian fishery impact indicated a Canadian harvest of Fraser chum of 217,000. Therefore, the U.S. harvest ceiling for Fraser chum in areas 7/7A was established at 84,400. This Fraser limit translated into a total harvest in areas 7/7A of 115,900 (48,900 treaty Indian; 67,000 non-treaty). This management strategy and harvest ceiling remained in effect for the remainder of the 1985 fishery with only minor adjustments to account for U.S. domestic allocations.

#### B. Fishery Review -

A weekly summary of 1985 chum harvests in the Strait of Juan de Fuca, San Juan Islands and Point Roberts, by area, fleet and gear type, is provided in Table 2. All fisheries in areas 7/7A prior to October 16 were directed at Fraser River sockeye and pink salmon and harvested only minor incidental numbers of chum salmon (1,409 total).

The treaty Indian fishery in areas 4B,5,6C was regulated as a constant five-day per week fishery, with a preseason harvest expectation of 10,000 chum. The fishery began with modest catch rates during the early portion of the chum management period. However, beginning with the week of October 6, catches climbed to record levels and continued abnormally high for a three week period. A review of landing statistics during the period of high catches indicates no significant increase in effort, but rather exceptionally high catch per landing rates. Clearly, the availability of chum salmon to this fishery was higher than in any other year in recent history. Whether this was due to increased abundance, changes in migration patterns, optimal fishing conditions, or a combination of reasons is unclear. Post-season, some Puget Sound runs exhibited increased abundance over preseason forecasts and overall Puget Sound chum abundance was higher than anticipated. Catch figures for the entire season give a total harvest of 48,279, which is nearly 5 times greater than the preseason expectation. The assumed stock contributions in this area are 40% Canadian origin and 60% U.S. origin.

The first chum fishery in areas 7/7A was a treaty Indian fishery on October 16 and 17. The expected catch, based on previous years with similar run strengths, was about 4,000 fish per day. This first fishery did exceptionally well with a total catch of 24,321; approximately half of the treaty Indian allocation.

Fisheries originally proposed for the week of October 20 were two days for non-Indians and three days for Indians. The Indian fishing schedule was reduced to two days and scheduled to follow the non-Indian fishery because the magnitude of the Indian catch the previous week had raised

concerns about achieving domestic allocation. The non-Indian fishery proceeded on October 21-23 and harvested 45,090 chum, which was consistent with historical catch rates, but lower than expected given the success of the Indian fleet the previous week. The Indian fishery on October 24-26 harvested 17,450 chum which was about as expected given their earlier success. Since total treaty Indian harvest at this point was close to the total treaty Indian allocation and harvests in the Strait of Juan de Fuca were unexpectedly high, no additional Indian fisheries were scheduled for areas 7/7A.

Given the high success rates observed in the treaty Indian fishery, and in fisheries in some other areas, a conservative schedule of one day of non-Indian fishing was adopted for the week of October 27. The expected harvest in this one day fishery was about 20,000 chum. Actual catches were very good, especially in the Point Roberts area, with a total of 74,112.

The season total catch in areas 7/7A was 164,770 which is 47,770 greater than the final harvest objective of 117,000. This resulted in an estimated impact on Fraser origin chum of approximately 128,600. The stock contribution estimates used in 1985 were 70% Canadian (80% of which are Fraser origin) and 30% U.S. in area 7, and 95% Canadian (100% of which are Fraser origin) and 5% U.S. in area 7A. The total estimated impact to Fraser chum in areas 7/7A was 44,200 fish greater than the 84,400 target. The reasons for the greater than anticipated impact on Fraser origin chum were the exceptionally high and unanticipated catches in the last non-Indian fishery, and an abnormal distribution of the catch between areas 7/7A. In setting the catch objective of 117,000, it was assumed that areas 7/7A catch would be distributed between these areas similar to the historical distribution. However, in 1985 fishing was particularly good at Point Roberts, where a higher proportion of the harvest is of Fraser River origin, and a higher than expected proportion of the catch was taken in that area.

### III. PUGET SOUND INSIDE FISHERIES

#### A. Preseason expectations -

The preparation of annual management plans, including preseason run size forecasts and management recommendations, are developed for Puget Sound according to the Puget Sound Salmon Management Plan (PSSMP). This plan lays out a specific schedule for WDF and the treaty Tribes to develop and exchange methodologies and recommendations on preseason forecasts, escapement goals and other aspects of preseason management planning. The results of this planning effort

are documented in a published report each season. A copy of the final 1985 preseason chum management report, entitled "1985 Puget Sound Chum Salmon Forecasts and Management Recommendations", is appended as Attachment I.

The 1985 Puget Sound origin preseason expected chum abundance was approximately 952,000 which is 220,000 greater than the previously observed highest odd year run size since 1968. Chum returns on odd years average only about half of those on even years. Recent odd year chum returns have averaged 650,000.

#### B. Fisheries Descriptions, Catches and Spawning Escapements-

Management of Puget Sound chum salmon fisheries attempts to achieve fixed spawner escapement goals for natural and/or hatchery returns to each production unit of Puget Sound. Domestic allocations are established for harvestable surpluses returning to six broad regions of origin (Figure 2). Although management within a specific region addresses the specific escapement objectives of one or more different stocks, for the purposes of this report, Puget Sound fishery descriptions are provided only as regional summaries, and are only a brief overview. Additional information on each stock is available through Puget Sound run reconstruction programs. Table 3 summarizes preseason forecasts, final inseason updates of abundance, final 1985 run sizes and escapements for each Puget Sound region of origin. These run size estimates do not include Canadian harvests of U.S. origin chum. Detailed information on harvests in each Puget Sound catch area are provided in Table 4.

Particularly noteworthy in 1985 were the unusually large catches taken in some areas of Puget Sound and Southern British Columbia. These large catches, particularly in some Canadian fisheries, significantly depressed the market price for chum salmon, negatively impacting Puget Sound inside terminal area fisheries. In some cases prices were too low to permit harvestable surpluses to be economically harvested. This combined with greater than expected abundance, resulted in overescapements in some areas.

#### Strait of Juan de Fuca Region

Strait of Juan de Fuca chum salmon consist of two run timings: early and normal. The early stocks returned in 1985 at only 6% of the forecast, with only 109 fish counted on the spawning grounds, and was the smallest early chum run on record. The normal-timed stocks returned to U.S. waters at a run strength of 8,300, which is 88% of the preseason forecast. Terminal fisheries were minor in nature and an increased effort was mounted to determine the extent and amount of spawning in individual streams.

### Nooksack/Samish Region

The actual return was 145,300, or only 71% of the preseason forecast of 205,200. Despite the lower than expected abundance, the run size substantially exceeded the escapement goal of 26,250 and significant commercial harvest occurred. Spawning escapement was substantially above the goal at 42,200.

### Skagit Region

The Skagit chum run returned at 114,900 fish, or 115% of the preseason forecast of 99,600. The inseason update of 162,200 indicated a run size nearly double the preseason forecast. This estimate was viewed as optimistic by the Tribal and State managers, and, by agreement, a conservative and consistent fishing pattern was established which allowed adequate escapement to occur. The final escapement estimate was 45,600 which exceeded the goal of 34,050.

### Stillaguamish/Snohomish Region

The total chum return of 238,100 was 223% of the preseason forecast of 107,000, and 178% of the inseason update of 133,900. This resulted in an escapement of 130,500, which is more than 80,000 fish in excess of the 49,950 goal.

### South Puget Sound Region

This region contains chum runs of early, normal and late timings. Returns of all three timing segments were substantially above the preseason forecasts and the inseason updates, with good numbers of fish escaping to the spawning grounds. The total early timed return was 19,500 which exceeded the preseason forecast of 17,300 and resulted in an escapement of 10,700, exceeding the escapement goal of 7,200. The normal timed return was 350,500 which exceeded the preseason forecast of 209,600. The spawning escapement of 122,300 was 47,950 fish in excess of the goal of 74,350. Particularly noteworthy was the large escapement of the Kennedy Creek stock (22,400), which was the subject of protective management actions in 1985. This was the highest recorded escapement in Kennedy Creek, exceeding the escapement goal of 14,500, and was a significant improvement over the 1975-84 average escapement of 6,000. The late timed run return of 62,300 resulted in a spawning escapement of 27,000, both slightly greater than the expected run size of 48,800 and the escapement goal of 23,100.

### Hood Canal Region

Hood Canal contains stocks of early and normal timed chum salmon. As was the case with South Puget Sound, both timing segments exceeded the preseason forecasts. Additionally, the normal timed segment was substantially larger than the inseason update. Final run sizes were 5,000 early chum and 509,000 normal chum, with escapements of 800 and 109,700 respectively. The early run component did not meet the desired spawning escapement level.

### Areas 6B and 9

Admiralty Inlet (areas 6B and 9) is a mixed stock fishing area in Puget Sound containing stocks primarily from three regions of origin: Hood Canal, South Puget Sound and Stillaguamish/Snohomish. Harvests occur in this area infrequently, and fisheries are not conducted unless inseason updates of abundance indicate harvestable chum from all three regions. A one day non-Indian fishery was conducted in this area in 1985, during the week of October 27th, that unexpectedly harvested 173,400 chum. This fishery complicated terminal area management, particularly in Hood Canal, by reducing the reliability of further terminal area run size updates in the three affected regions.

## IV. WASHINGTON COASTAL FISHERIES

The 1985 chum runs to Willapa Bay and Grays Harbor returned below the preseason forecast but above the recent 10-year average, and generally provided for a successful season. Catches were good and escapement goals were met. Other North Coastal rivers have only a few returning chum salmon and no significant catches, except for the Quinault River which has a small return of hatchery origin chum. Preseason forecasts, actual run sizes, catch and wild and hatchery escapement levels for Washington coastal stocks are provided in Table 5.

The Willapa Bay return, typically the largest coastal chum run, returned slightly below the preseason prediction. The catch of 23,700 consisted of a net catch of 23,400 and a river sport catch of 300. The total catch was below the 10-year average of 30,600. The wild escapement of 52,700 was above the escapement goal (35,400), and was well distributed throughout the spawning area. The escapement of 13,600 hatchery fish met all program goals, and allowed expansion of egg-box programs. The lower than average catch and higher than desired escapement levels resulted from two factors. The first was an inseason run size update which underestimated abundance and resulted in more fishery restrictions than necessary. The second was low effort later in

the fishery, probably affected by low prices for chum.

It is unclear why the Grays Harbor run returned below the predicted level. The catch of 13,550 consisted of 11,650 in the commercial fishery and approximately 1,900 in the river sport fishery. The river sport fishery on chum has been increasing in recent years. The wild escapement of 31,300 was above the goal of 21,000 for the same reasons given for the Willapa Bay run, plus a need to protect wild coho which are taken in significant numbers in the chum fishery and needed protection in 1985.

Chum salmon returning to the Quinault River are almost entirely of hatchery origin. The run was forecast to return at less than the desired escapement level of 3,800. The actual run size proved considerably stronger than expected and allowed for a harvest of 3,737, while still achieving an adequate spawning escapement of 3,797.

## V. STOCK COMPOSITION AND RUN RECONSTRUCTION

During 1985, Puget Sound genetic stock identification (GSI) studies of chum salmon focused on two major areas of activity: additional baseline samples were collected from numerous Puget Sound stocks (Table 6), and samples were collected from mixed stock area fisheries in northern Puget Sound and the Strait of Juan de Fuca (Table 7).

Sampling for baseline data was part of a major effort undertaken by WDF to re-examine and expand the genetic profiles characterizing each major spawning stock in Puget Sound. This sampling of stocks on the spawning grounds continued beyond 1985.

The mixed stock area sampling consisted of ten individual collections as follows: four from Area 5, one from Area 7A, and five from Area 7 (Table 7). In 1985, there were some problems with tissue sample quality which should be corrected in future sampling.

Estimated stock contribution within areas, in the mixed stock fishery, vary widely among weeks. Although this could be indicative of a true temporal variation in stock composition, it could also be a sampling artifact. In the future, fishery sampling should be modified to ensure representative sampling which will reflect the fishery as accurately as possible.

Investigators have been concerned that existing chum baseline data sets may not contain enough "diagnostic" variable loci to permit the desired degree of stock discrimination. The only way to address this problem would be to "re-baseline" all chum stocks which potentially contribute to the fisheries in question. This is a long term process and will delay the full implementation of

GSI-based management information systems. U.S. investigators (WDF) are currently working on collecting additional baseline information for Puget Sound stocks. An expanded GSI baseline for these stocks will likely not be available until late 1987.

Puget Sound run reconstruction is modeled using stock compositions for mixed stock areas as defined in Table 8. Sufficient GSI data have not been collected from Puget Sound mixed stock areas to warrant replacing existing stock composition estimates in 1985. Run reconstructions for individual Puget Sound stocks are available from the Washington Department of Fisheries.

Table 1. Historical Fraser River Chum Catches (compiled and provided by CDFO, October 1985).

Year	Canadian Catch	Canadian Percent	American Catch	American Percent	Grand Total
1970	401,000	86	63,845	14	464,845
1971	58,900	73	21,644	27	80,544
1972	710,800	72	274,486	28	985,286
1973	767,600	78	219,216	22	986,816
1974	188,500	54	159,711	46	348,211
1975	208,600	74	75,056	26	283,656
1976	494,900	70	213,671	30	708,571
1977	42,300	51	40,299	49	82,599
1978	663,900	69	299,515	31	963,415
1979	17,900	83	3,715	17	21,615
1980	389,400	59	269,254	41	658,654
1981	28,300	81	6,820	19	35,120
1982	338,200	85	62,003	15	400,203
1983	44,600	96	1,874	4	46,474
1984	11,500	91	1,191	9	12,691
Fishing Years Average	462,544	72	181,862	28	
Non-Fishing Years Average	33,917	79	12,590	21	
All Years Average	291,093	75	114,153	25	
1980-84 Average	162,400	82	68,228	18	
1985 Expected Catch by Canada in Directed Chum Fisheries			130,000		

TABLE 2. 1985 WEEKLY CHUM HARVEST IN THE STRAIT OF JUAN DE FUCA AND NORTH PUGET SOUND

## AREAS 4B, 5, 6C

	TREATY GILLNET	TREATY SEINE	TREATY TOTAL	NON TREATY GILLNET	NON TREATY SEINE	NON TREATY REEF NET	NON TREATY TOTAL	GRAND TOTAL
PRIOR TO CHUM HGHT.	1,156		1,156	10			10	1,166
9/29-10/5	2,633		2,633	0			0	2,633
10/6-10/12	11,357		11,357	0			0	11,357
10/13-10/19	22,849		22,849	0			0	22,849
10/20-10/26	8,911		8,911	0			0	8,911
10/27-11/2	896		896	0			0	896
11/3-11/9	465		465	0			0	465
11/10-11/16	2		2	0			0	2
TOTAL 4B, 5, 6C	48,269	0	48,269	10	0	0	10	48,279

AREAS 6 AND 7*	TREATY GILLNET	TREATY SEINE	TREATY TOTAL	NON TREATY GILLNET	NON TREATY SEINE	NON TREATY REEF NET	NON TREATY TOTAL	GRAND TOTAL
PRIOR TO CHUM HGHT.	55	884	939	132	177	20	329	1,268
10/13-10/19	4,647	7,772	12,419	0	0	845	845	13,264
10/20-10/26	6,376	2,600	8,976	13,332	18,600	215	32,147	41,123
10/27-11/2	218	151	369	7,752	6,207	139	14,098	14,467
11/3-11/9	11	122	133	0	0	0	0	133
11/10-10/16	37	1,373	1,410	0	0	0	0	1,410
TOTAL	11,344	12,902	24,246	21,216	24,984	1,219	47,419	71,665

AREA 7A	TREATY GILLNET	TREATY SEINE	TREATY TOTAL	NON TREATY GILLNET	NON TREATY SEINE	NON TREATY REEF NET	NON TREATY TOTAL	GRAND TOTAL
PRIOR TO CHUM HGHT.	7	14	21	31	89	0	120	141
10/13-10/19	5,860	6,042	11,902	0	0	0	0	11,902
10/20-10/26	5,666	2,808	8,474	9,682	3,261	0	12,943	21,417
10/27-11/2	92	64	156	22,663	36,826	0	59,489	59,645
TOTAL	11,625	8,928	20,553	32,376	40,176	0	72,552	93,105

AREAS 6,7 AND 7A TOTAL 22,969 21,830 44,799 53,592 65,160 1,219 119,971 164,770

\* INCLUDES ONLY 118 CHUM HARVESTED IN AREA 6.

\*\* INCLUDES 1,646 CHUM TAKEN IN TEST FISHERIES FOR G.S.I. SAMPLING.

08-Jul-87

Table 3. 1985 audit of Puget Sound chum salmon stocks: pre-terminal run sizes and spawning escapements.

Unit	Pre-season forecast	Final in-season update	Final run size	Escapement goal	Actual escapement
Strait of Juan de Fuca					
Early	1,900	1,900	112	1,800	109
Normal	9,400	9,600	8,271	7,300	7,570
Nooksack/Samish	205,200	164,200	145,254	26,250	42,185
Skagit	99,600	162,200	114,933	34,050	45,641
Stillaguamish/Snohomish	107,000	133,900	238,090	49,950	130,475
South Sound					
Early	17,300	16,123	19,522	7,200	10,652
Normal	209,550	266,800	350,514	74,350	122,329
Late	48,800	48,800	62,271	23,100	26,967
Hood Canal					
Early	4,300	6,151	5,040	1,800	779
Normal	249,000	389,800	508,989	69,100	109,682

Source: WDF and NWIFC, 1985 Puget Sound Chum Salmon Forecasts and Management Recommendations; WDF Stock Strength Calculation Summary, June 17, 1987.

Table 4.

## PUGET SOUND COMMERCIAL CHUM SALMON CATCHES, 1985 HARD DATA

AREA DESCRIPTION	NON-INDIAN				INDIAN					TOTAL
	GILL NET	PURSE SEINE	OTHER	SUBTOTAL	GILL NET	PURSE SEINE	TROLL	OTHER	SUBTOTAL	
PRE-TERMINAL										
4B (Tatoosh-Sail Rock)	1			1	895		6		901	902
5 (Clallam Bay)	9		26	35	47,174		1		47,175	47,210
6 (Partridge Bank)	7			7	111				111	118
6A (West Beach)				0					0	0
6C (Port Angeles)				0	200				200	200
SUBTOTAL	17	0	26	43	48,380	0	7	0	48,387	48,430
7 (San Juans)	21,214	24,984	1,219	47,419	11,233	12,901		1	24,135	71,554
7A (Point Roberts)	32,374	40,176		72,552	11,625	8,928			20,553	93,105
SUBTOTAL	53,592	65,160	1,219	119,971	22,858	21,829	0	1	44,688	164,659
6B (Discovery Bay)				0					0	0
9 (Admiralty Inlet)	11,088	162,315		173,403	11,359	8,381			19,740	193,143
SUBTOTAL	11,088	162,315	0	173,403	11,359	8,381	0	0	19,740	193,143
GRAND TOTAL: PRE-TERMINAL	64,697	227,475	1,245	293,417	82,597	30,210	7	1	112,815	406,232
TERMINAL										
Strait--										
6D (Dungeness Bay)				0	3				3	3
Strait Rivers	0		0	0	383				383	383
SUBTOTAL: Strait term.	0	0	0	0	386	0	0	0	386	386
7E (East Sound)	318	8		326					0	326
Nooksack/Sanish--										
7B (Bellingham Bay)	44,192	3,114		47,306	31,103	189			31,292	78,598
7C (Sanish Bay)	23			23	5				5	28
7D (Lummi Bay)	2			2					0	2
Nooksack River				0	18,527				18,527	18,527
Sanish River				0					0	0
SUBTOTAL: Nook./San. term.	44,217	3,114	0	47,331	49,635	189	0	0	49,824	97,155
Skagit--										
8 (Skagit Bay)	20,367	4,951		25,318	17,752				17,752	43,070
Skagit River				0	21,475				21,475	21,475
SUBTOTAL: Skagit term.	20,367	4,951	0	25,318	39,227	0	0	0	39,227	64,545
Stillaguamish/Snohomish--										
8A (Port Susan/Port Gardner)	1,860	1,376		3,236	46,101			20	46,121	49,357
8B (Tulalip Bay)				0	113				113	113
Stillaguamish River				0					0	0
Snohomish River				0	4,298				4,298	4,298
SUBTOTAL: Still./Snoh. term.	1,860	1,376	0	3,236	50,512	0	0	20	50,532	53,768
South Sound--										
10 (Seattle)	30,394	19,568		49,962	6,676	3,987			10,663	60,625
11 (East-West Passage)	5,731	15,813		21,544	4,058				4,058	25,602
SUBTOTAL	36,125	35,381	0	71,506	10,734	3,987	0	0	14,721	86,227
10A (Elliott Bay)				0	3,210				3,210	3,210
10E (East Kitsap)	2,196			2,196	6,782				6,782	8,978
11A (Commencement Bay)				0	245	1			246	246
13 (Nisqually Reach)				0	116			37	153	153
13A (Carr Inlet)	1,043			1,043	32,295			2,003	34,298	35,341
13C-K (South Sound Inlets)				0	25,666			296	25,962	25,962
SUBTOTAL S.S. marine ext. term.	3,239	0	0	3,239	68,314	1	0	2,336	70,651	73,890
SUBTOTAL S.S. marine term.	39,364	35,381	0	74,745	79,048	3,988	0	2,336	85,372	160,117
10G&F=10B (N. Lk. Wash. & Canal)				0	11				11	11
10C (S. Lk. Washington)				0					0	0
10D (Lake Sammamish)				0	2				2	2
Green-Duwamish River				0	1,143				1,143	1,143
Puyallup River				0	127				127	127
White River				0					0	0
Nisqually River				0	24,298				24,298	24,298
Misc. freshwater				0	1,627				1,627	1,627
SUBTOTAL: S.S. freshwater	0	0	0	0	27,208	0	0	0	27,208	27,208
SUBTOTAL: S.S. terminal	39,364	35,381	0	74,745	106,256	3,988	0	2,336	112,580	187,325
Hood Canal--										
12 (Upper H.C.)	16,342	56,163		72,505	110,089				110,089	182,594
12B (Central H.C.)	94			94	12,286				12,286	12,380
SUBTOTAL:	16,436	56,163	0	72,599	122,375	0	0	0	122,375	194,974
12A (Quilcene-Dabob Bays)	5			5	591			12	603	608
12C (Lower Hood Canal)	1,250	39,875		41,125	41,677			10	41,687	82,812
12D (SE Hood Canal)				0					0	0
9A (Port Gamble)				0	1,076				1,076	1,076
SUBTOTAL: H.C. marine ext. term.	1,255	39,875	0	41,130	43,344	0	0	22	43,366	84,496
SUBTOTAL: marine terminal	17,691	96,038	0	113,729	165,719	0	0	22	165,741	279,470
Skokomish River				0	15,407				15,407	15,407
Quilcene River				0	40				40	40
Misc. freshwater				0	313				313	313
SUBTOTAL: H.C. freshwater	0	0	0	0	15,760	0	0	0	15,760	15,760
SUBTOTAL: H.C. terminal	17,691	96,038	0	113,729	181,479	0	0	22	181,501	295,230
TOTAL: Terminal Marine	123,817	140,868	0	264,685	340,162	4,177	0	2,378	346,717	611,402
TOTAL: Terminal Freshwater	0	0	0	0	87,651	0	0	21,475	109,126	109,126
GRAND TOTAL TERMINAL	123,817	140,868	0	264,685	427,813	4,177	0	2,378	455,843	698,735
GRAND TOTAL PRE-TERMINAL	64,697	227,475	1,245	293,417	82,597	30,210	7	1	112,815	406,232
GRAND TOTAL COMMERCIAL	188,514	368,343	1,245	558,102	510,410	34,387	7	2,379	568,658	1,104,967

TABLE 5. 1985 WASHINGTON COASTAL CHUM RUN SIZES, CATCHES AND ESCAPEMENTS.

	Willapa Bay	Grays Harbor	Quinault R.
Preseason forecast	100,300	78,000	3,721
Actual run size	90,000	45,000	7,534
Catch	23,700	13,550	3,737
Wild esc. goal	35,500	21,000	N.A.
Wild escapement	52,700	31,300	N.A.
Hatchery esc. goal	N.A.	N.A.	3,800
Hatchery escapement	13,600	150	3,797

## 1985 Chum Samples for GSI Baseline

<u>Code</u>	<u>Locality</u>	<u>N</u>	<u>Collection Date</u>	<u>Run Time</u>
<u>North Puget Sound</u> (N=7 collections)				
A-45	Nooksack River (Kendall Ck)	100	13 Dec 85	N
A-46	Samish River SFH	100	26 Nov 85	N
A-41	Skagit River	100	1-7 Nov 85	N
A-47	NF Stillaguamish River	100	2-3 Dec 85	N
A-28	Jim Creek	100	13 Dec 85	N
A-49	Tulalip TFH	100	5-6 Dec 85	N
A-48	Skykomish Slough	100	9 Dec 85	N
<u>Straits</u> (N=3 collections)				
A-24	Deep Creek	100	16 Dec 85	N
A-37	Lower Elwah TFH	100	17-27 Dec 85	N
A-30	Lyre River	100	15-28 Dec 85	N
<u>Hood Canal</u> (N=11 collections)				
A-25	Big Quilcene NFH	100	11 Dec 85	N
A-23	Walcott NFH	100	9 Dec 85	N
A-42	Lilliwaup, Fulton, & Eagle Cks	94	26 Nov - 6 Dec 85	N
A-17	Hoodport SFH	100	8 Nov 85	N
A-22	Enatai TFH	100	2-6 Dec 85	N
A-14	McKernan & George Adams SFH	100	20 Nov 85	N
A-33	Vance Creek	101	4-18 Dec 85	N
A-31	Tahuya R. & Dewatto River	100	29 Nov - 1 Dec 85	N
A-40	Tahuya R. & Dewatto River	100	3-8 Jan 86	N (last 1/2 run)
A-51	Mission Ck, Tahuya R, Duckabush R, Union R, Lilliwaup Ck, & Hamma-Hamma R	59	3-16 Oct 85	EARLY
A-32	Big & Little Mission Creek	112	30 Oct - 1 Nov 85	EARLY
<u>South Puget Sound</u> (N=20 collections)				
A-16	Minter Creek	100	12 Nov 85	N
A-15	Coulter Creek SFH	100	7-10 Oct 85	EARLY
A-44	Sherwood Creek	100	6-11 Oct 85	EARLY
A-34	Sherwood, Rocky, & Coulter Ck	106	17-18 Nov 85	N
A-12	Johns Creek SFH	100	8-15 Oct 85	EARLY
A-26	Johns Creek stock at Elson TFH	100	27 Dec 85	LATE
A-36	Goldsborough & Shelton Creek	100	31 Dec 85 - 3 Jan 86	N
A-18	Mill Creek	124	12-14 Nov 85	N
A-35	Little Creek, Reitdorf Creek	101	5-8 Dec 85	N (last 1/2 run)
A-39	Skookum, Little Creek	100	12-15 Nov 85	N
A-38	Kennedy Creek	100	4-7 Nov 85	N
A-20	Kennedy Creek	100	19-20 Dec 85	N (last 1/2 run)
A-27	Elson TFH	100	10 Dec 85	N
A-19	Swift Creek & Perry Creek	100	16-20 Nov 85	N
A-43	Nisqually River	100	18 Dec 85-8 Jan 86	LATE (1st half)
A-50	Nisqually River	100	16-29 Jan 86	LATE (2nd half)
A-29	Chambers Creek SFH	100	7 Jan 86	LATE
A-13	Blackjack Creek	100	18-29 Oct 85	EARLY
A-11	Chico Creek	100	16 Nov 85	N
A-21	Gorst Creek	100	30 Dec 85	LATE

SFH = state fish hatchery    NFH = national fish hatchery    TFH = tribal fish hatchery

Table 7 1/

SAMPLE DETAILS FOR THE 1985 NORTH PUGET SOUND CHUM MIXED FISHERY

LOCATION	DATE	NUMBER OF FISH SAMPLED
Area 5	16 Oct 85	100
Area 5	17 Oct 85	100
Area 5	21 Oct 85	100
Area 5	22 Oct 85	100
Area 7A	17 Oct 85	155
Area 7	30 Oct 85	147
Area 7	8 Nov 85	120
Area 7	13 Nov 85	202
Area 7	16 Nov 85	200
Area 7	25 Nov 85	199
		---
TOTAL FOR ALL AREAS COMBINED		1,423

1/ Source: Nooksack Tribe

Table 8. Apportionment of 1985 preterminal chum salmon commercial net catches for Puget Sound run reconstruction.

Area(s)	Percent Puget Sound	Apportionment for Puget Sound Stocks
4B, 5, 6C	30 - Early 60 - Normal 100 - Late	All Puget Sound units by run strength.
6	30 - Early 60 - Normal 100 - Late	All Puget Sound units by run strength.
6A	50 - Early 95 - Normal 100 - Late	80% Skagit; 10% Nooksack/Samish; 10% all other Puget Sound units by run strength
7	25 - Early 30 - Normal 20 - Late	All Puget Sound units by run strength.
7A	5 - Early 5 - Normal 5 - Late	All Puget Sound units by run strength.

30-Jun-87



WASHINGTON  
Department of  
FISHERIES

NORTHERN  
PUGET SOUND COMMERCIAL SALMON  
MANAGEMENT AND CATCH REPORTING AREAS

115-97-000

ADOPTED 1984

NOT FOR USE IN NAVIGATION

NOTE: N. W. Kink-Alex Sr. BAY

W A N C O U V E R I

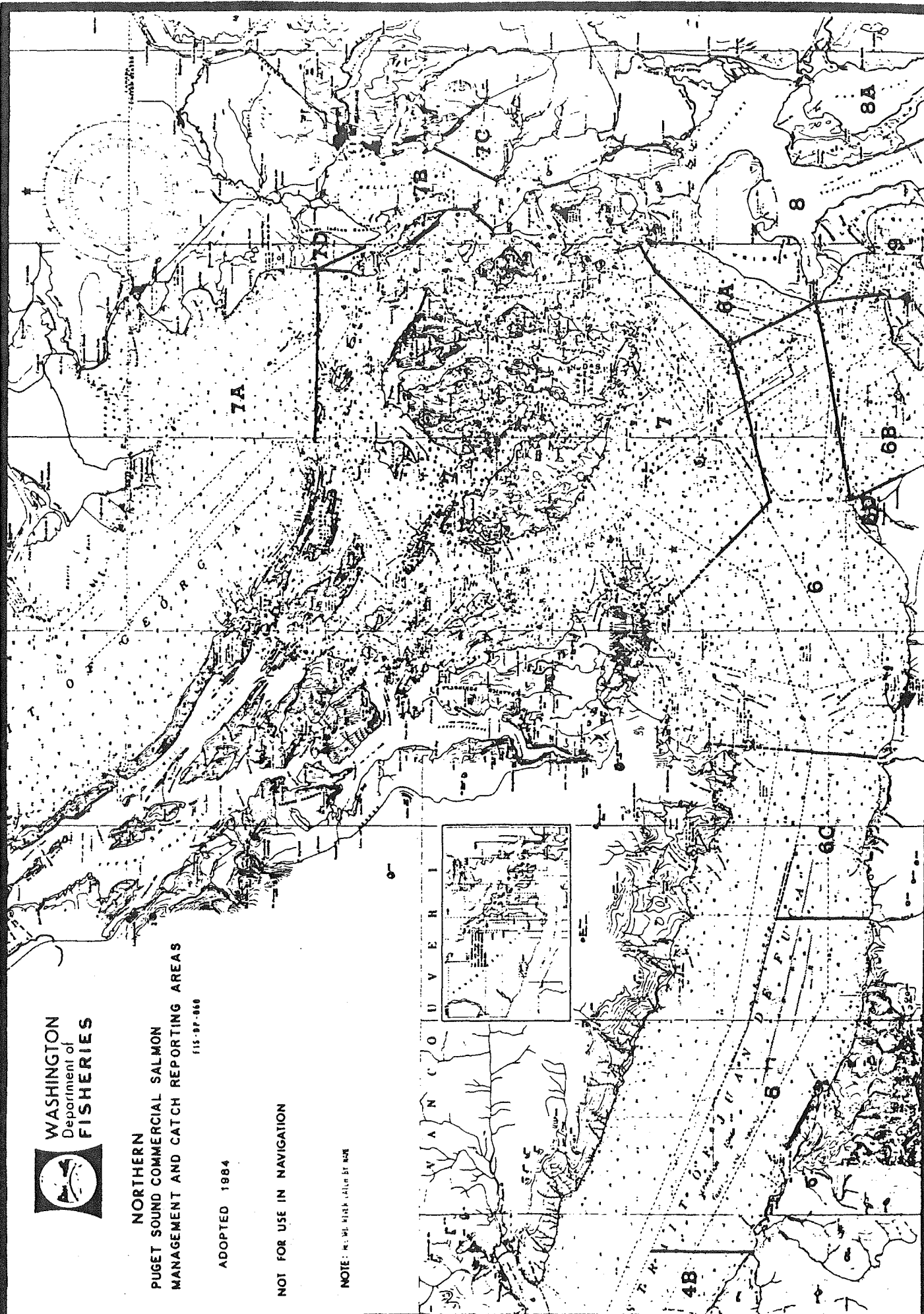
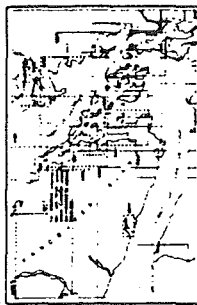
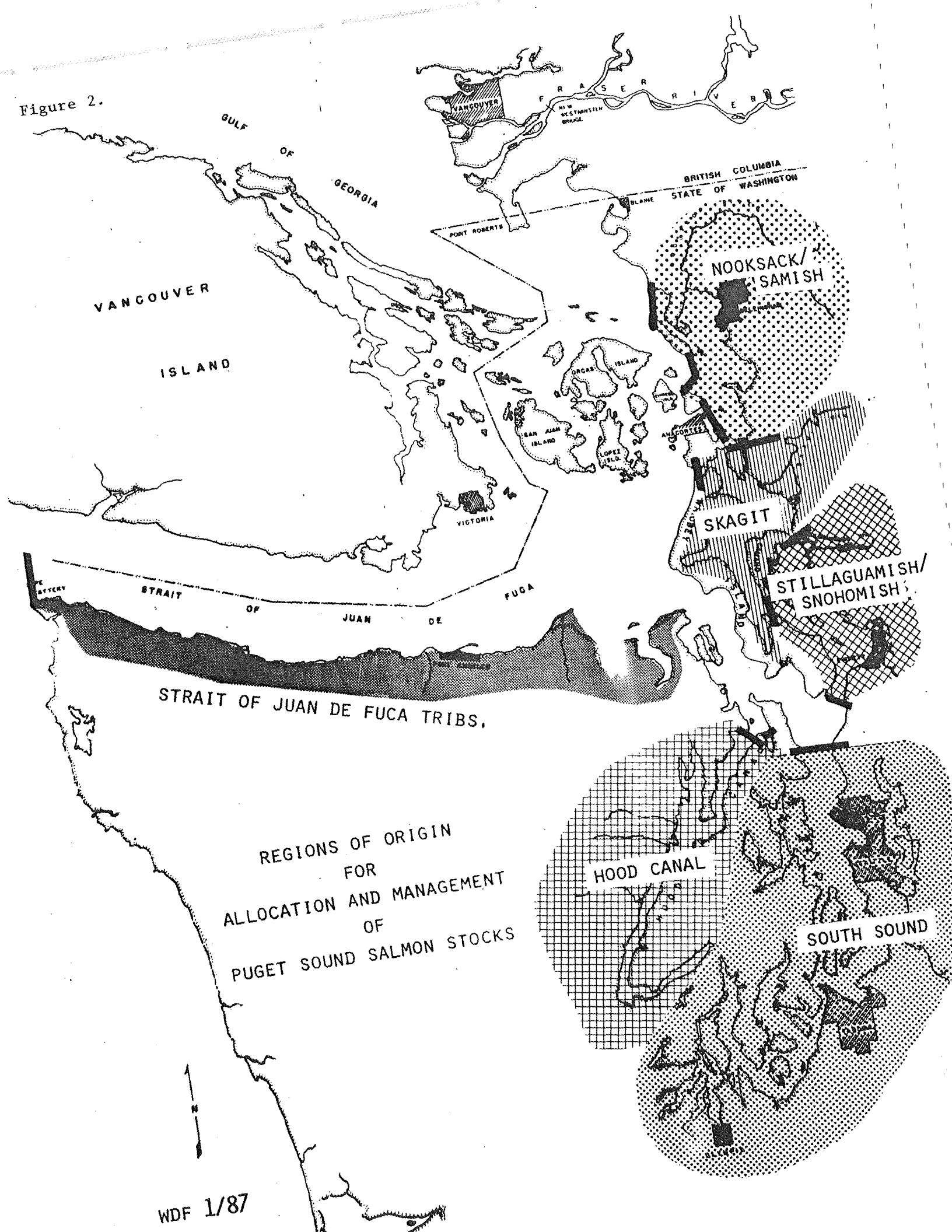


Figure 1.

Figure 2.



Attachment I

1985 PUGET SOUND CHUM SALMON FORECASTS  
AND MANAGEMENT RECOMMENDATIONS

Joint Report Prepared by:

Puget Sound Tribes  
Northwest Indian Fisheries Commission  
Washington Department of Fisheries

December, 1985

## INTRODUCTION

This report has been prepared by the staffs of the Washington Department of Fisheries, Puget Sound Tribes, and Northwest Indian Fisheries Commission to facilitate management of 1985 Puget Sound-origin chum salmon within Puget Sound. It reflects agreements on management planning except where indicated in brackets.

Predicted returns of chum salmon to Puget Sound (excluding troll, sport, some ceremonial and subsistence catches, and non-catch net mortality) are outlined in this report by stock. Desired escapements for hatchery and natural runs, allowable harvests, fishery management recommendations, test fishing needs, and prediction methods utilized are also included. A detailed breakdown of predicted returns, expected escapements, allowable harvests brood year escapement levels, and artificial production releases are presented in Appendix 1. In-season run size update methods will be detailed in a separate report. Anticipated test fishing details are included in the text.

Recommendations in this report apply primarily to net fisheries unless otherwise indicated. The Washington Department of Fisheries adopted 1985 Puget Sound recreational salmon fishery regulations prior to preparation of this report. Emergency regulation of recreational salmon fisheries that impact adult chum may be necessary if conservation or allocation problems are identified in-season. New catch areas were established in 1985;

Figures 1 and 2 show Puget Sound catch areas used for 1985 management.

#### GENERAL FISHERY MANAGEMENT RECOMMENDATIONS

Chum stocks returning to the Nooksack, Skagit, Stillaguamish and Snohomish Rivers, South Puget Sound (normal and late timed stocks), and Strait of Juan de Fuca (early and normal timed stocks, except Elwha River) will be managed on the basis of natural run escapement requirements. All remaining management units will be managed to achieve the allowable hatchery harvest. All Puget Sound chum regions of origin, will have at least some harvestable chum returning this year (Table 1), but some mixed-stock areas should remain closed to chum fishing to protect weak Canadian and/or Puget Sound stocks. Likewise, some terminal areas will not have directed chum fisheries. General management considerations for each of the numbered management/catch reporting areas and each of the rivers are given in Table 2. Detailed discussions of the management recommendations are provided in the regional sections of this report.



WASHINGTON  
Department of  
FISHERIES

NORTHERN  
PUGET SOUND COMMERCIAL SALMON  
MANAGEMENT AND CATCH REPORTING AREAS

FIS-DP-060

ADOPTED 1985

NOT FOR USE IN NAVIGATION

NOTE: RECORD RIVER CATCH BY NAME

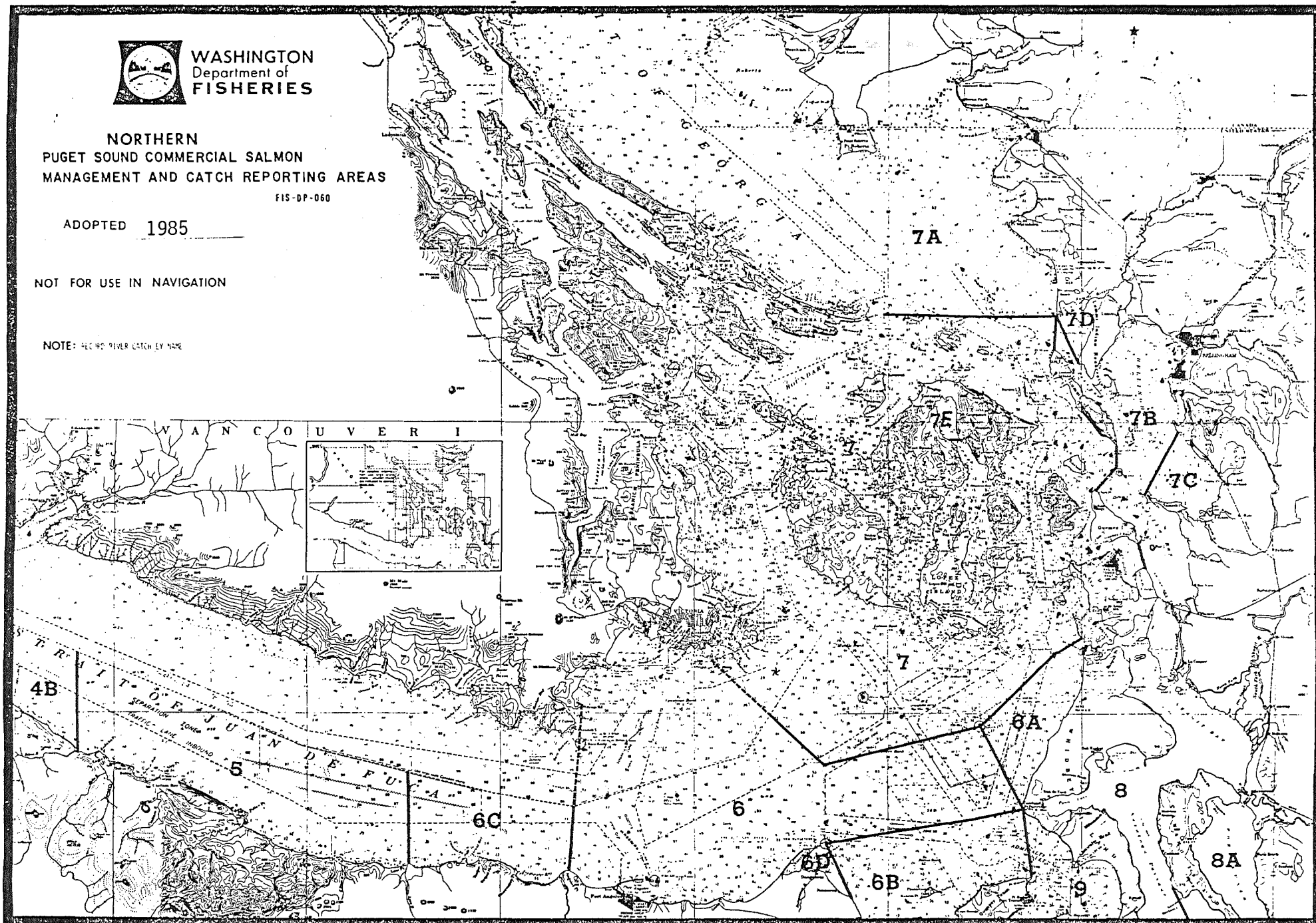


FIGURE 1

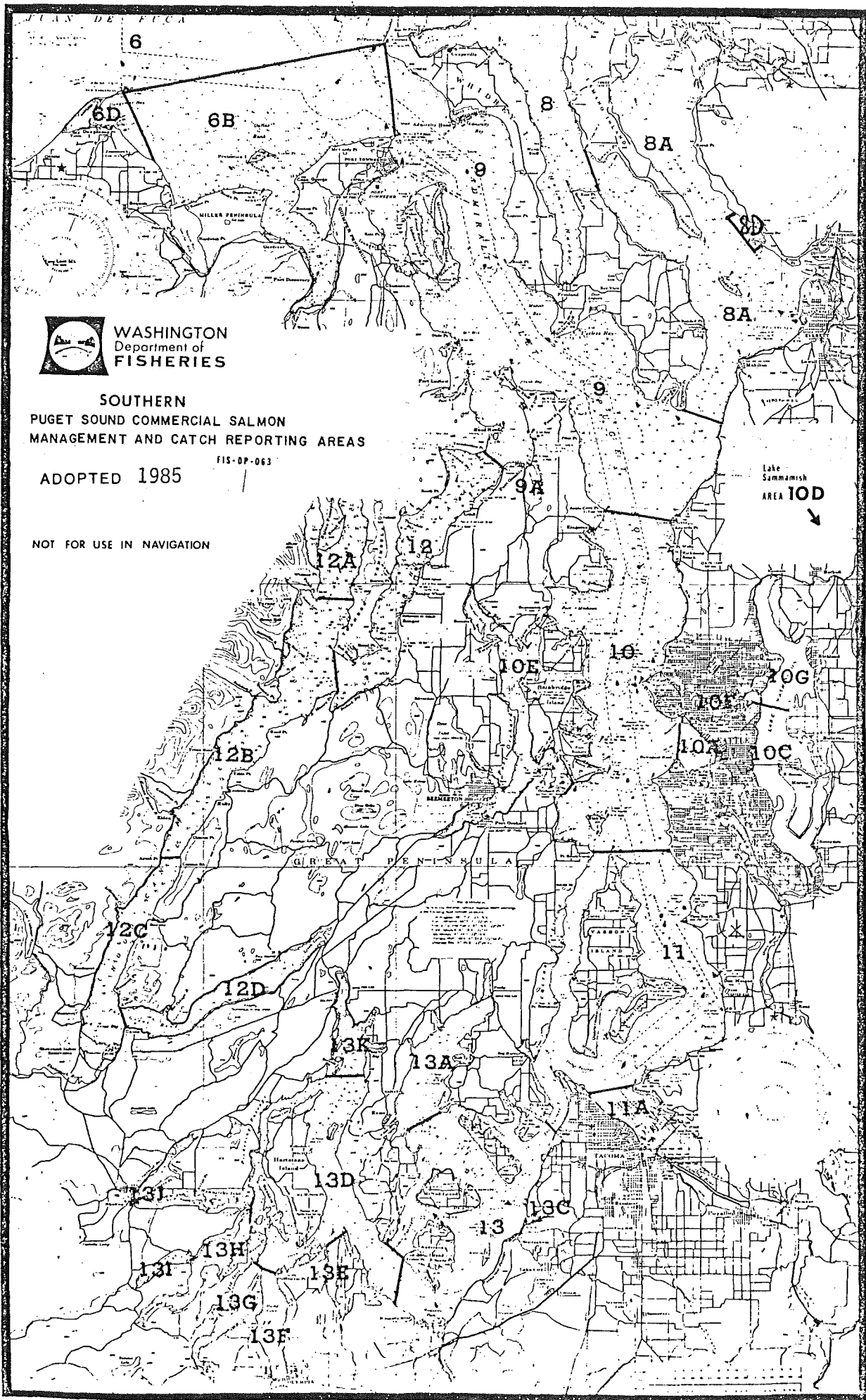


FIGURE 2

Table 1. Summary of predicted Puget Sound net fishery harvest Puget Sound-origin chum salmon in 1985.

<u>Region of Origin</u>	<u>Predicted harvest</u>
Strait of Juan de Fuca	
early chum	100 <u>1/</u>
normal chum	2,100 <u>1/</u>
Nooksack-Samish	178,950
Skagit	65,550
Stillaguamish-Snohomish	57,050
South Puget Sound	
early chum	10,100 <u>1/</u>
normal chum	135,200
late chum	25,700
Hood Canal	
early chum	2,500 <u>1/</u>
normal-late chum	179,900
<u>TOTAL</u>	<u>657,150</u>

1/ Expected incidental harvest only.

Preseason forecasts are provided primarily as a guide for the establishment of fishing schedules prior to obtaining in-season estimates (where available). It is recommended that harvests should be conservative prior to obtaining in-season estimates of abundance. Actual run size may deviate from a forecast because of statistical variability, unusual survival rates, or unanticipated fishing rates in interception fisheries.

Run size forecasts represent the run entering Area 4B and result from examination of numerous prediction methods. Detailed run forecasting methods are provided in Appendix 2.

Table 2. 1985 Chum salmon management recommendations for Puget Sound

AREA	MANAGEMENT PERIOD	RELATIVE HARVEST RATE	COMMENTS
4B, 5, 6C	September 29 through December 7	low	Puget Sound stocks predominate limited treaty gillnet harvest.
6, 6A	September 29 through December 7	none	Puget Sound stocks predominate limited treaty gillnet harvest.
6B (early-timed stocks)	September 15 through November 2	low	
(normal-timed stock)	October 13 through November 23	low	
(late-timed stocks)	November 17 through December 21	low	
6D	October 27 through December 7	low	
Dungeness River	November 17 through December 21	low	
Elwha River	November 24 through December 21	high	
Other tribs.	November 3 through November 30	none-moderate	
7	September 29 through December 7	see text	Canadian stocks predominate (see text).
7A	October 6 through November 16	see text	Canadian stocks predominate (see text).
7B, 7C, 7D, Nooksack R. below Marietta Bridge	October 27 through December 14	high	
Nooksack River above Marietta Bridge and Samish River	November 3 through January 15	moderate	Harvest rate dependent on that in marine waters.
8	October 27 through November 30	moderate	
Skagit River	see text	low-moderate	Harvest rate dependent on that in marine waters.
8A & Snohomish River	October 20 through November 30	moderate-high	Harvest rate dependent on that in marine waters. Higher rate allowable for Snohomish R. than for Stillaguamish River.

(continued)

Table 2. (continued)

AREA	MANAGEMENT PERIOD	RELATIVE HARVEST RATE	COMMENTS
8D	November 3 through December 28	none-low	
Stillaguamish	October 27 through December 7	low	
9	October 6 through November 23	none-moderate	Harvest based on status of South Sound, Hood Canal, and Stillaguamish/ Snohomish stock.
9A (early-normal)	November 10 through December 21	high	
10	October 13 through November 30	high	Fishery restrictions are required in the early part of the season to protect Kennedy Creek chum and the integrity of the inseason update.
(late-timed stocks	November 24 through January 11	none	
10A, Duwamish/Green R.	November 3 through November 30	none-low	
10E (early-timed stocks)	September 22 through October 12	none-moderate	No directed fishery anticipated in Sinclair Inlet, otherwise management based on coho needs.
(normal timed stocks)	October 13 through December 28	moderate	Harvest rate dependent on rate in Area 10.
11	October 13 through November 30	high	Same as Area 10 comments
(late-timed stocks)	November 24 through January 11	none	
11A	October 20 through December 14	none-low	
Puyallup River	October 27 through December 14	none-low	
12,12B (early-timed stks.)	August 18 through September 21	moderate	Chum harvest incidental to chinook and coho fisheries.
(early-normal)	October 20 through November 23	high	
(late-normal)	November 24 through December 7	none-low	
12A,12C,12D (early timed stocks)	August 25 through September 28	moderate-high	Chum harvest incidental to chinook and coho fisheries.
12A (early-normal)	October 13 through November 30	low	
(late-normal)	November 17 through December 21	see text	

(continued)

Table 2. (continued)

AREA	MANAGEMENT PERIOD	RELATIVE HARVEST RATE	COMMENTS
12C, 12D (early)	August 25 through September 28	moderate	Chum harvest incidental to coho fisheries
(early-normal)	October 27 through November 30	high	Chum harvest incidental to coho fisheries
12C (late-normal)	December 1 through December 21	none-low	
12A,12B,12C and 12D tribs. (early-timed stocks)	September 8 through October 19	none-moderate	Chum harvest incidental to coho fisheries.
12A tribs.(early-normal)	November 10 through December 21	low	Chum harvest incidental to coho fisheries.
(late-normal)	November 24 through December 21	low	
12B,12C,12D tribs. (early-normal)	November 10 through November 30	none	
12B tribs. Skokomish River (late-normal)	December 1 through January 4	low	
13, Nisqually River	October 13 through November 30	none-low	
13 (late-timed stocks)	December 1 through January 18	none	
Nisqually River (late-timed stocks)	December 1 through February 1	moderate-high	
13A (late-timed stocks)	October 20 through November 30 December 1 through January 18	high high	
13C (late-timed stocks)	October 13 through November 30 December 1 through January 18	none-low none	Unharvestable surplus due to steelhead needs.
13D (Dana, Pickering, Southern Case), 13E,13H-13J	October 13 through December 28	none-moderate	Harvest rate dependent on that in prior fisheries
13J (early-timed stocks)	September 22 through October 19	none-low	Beach seines only to minimize impact on early chum.

(continued)

Table 2. (continued)

AREA	MANAGEMENT PERIOD	RELATIVE HARVEST RATE	COMMENTS
13K (early-timed stocks)	September 22 through October 26	none-low	Beach seines only to minimize impact on early chum.
13F, 13G, 13D (Peale), 13K	November 10 through December 14	moderate	Harvest rate dependent on that in prior fisheries.
13J, 13K (late-timed stocks)	November 10 through December 28	moderate	

The management periods established in this report (Table 2) define the time interval during which regulatory actions are directed to meeting conservation and allocation needs of chum stocks taking into account catches (actual or expected) of chum made outside of the management periods. Since many runs extend over lengthy periods of time with small portions of the runs available at the extremes of the run timing, it is impractical to exercise directed management on these portions of runs while continuing harvests on other species and stocks. Fishing effort should be spread throughout the management periods to achieve escapement and catch from all segments of the run. Management periods should not be viewed as inflexible and, through agreement of the management agencies, may be adjusted in-season based on in-season estimates of run timing. The management periods have been adjusted to begin on Sunday and end on Saturday for convenience in regulating fisheries.

Forecasts in this report exclude average troll and sport catches, some ceremonial and subsistence catches, and non-catch mortalities and generally represent fish available for harvest by all U.S. net fisheries in Puget Sound. The allowable harvests of stocks originating from natural stock management areas are based on expected exploitation rates which will achieve the natural escapement goals. The allowable harvests of stocks originating from hatchery stock management areas are based on the exploitation

rates which will achieve the hatchery escapement goals. Regulation of the harvest in any specific area must include consideration of the stocks present and harvests of those stocks in other areas and incidental harvests which occur during fisheries for other species.

## REGIONAL MANAGEMENT RECOMMENDATIONS

### Strait of Juan de Fuca Tributaries

#### Early Chum

No directed early chum fisheries are scheduled on early chum returning to tributaries of Area 6B. These runs originate primarily from natural production in Snow Creek, Salmon Creek and Jimmy-Come-Lately Creek.

#### Management Periods

<u>Area</u>	<u>Dates</u>
Area 6B tribs.	September 15 - November 2

#### Predictions, Harvests, and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Area 6B trib.	1,900	1,800	0	1,300

The escapement goal for early chum salmon was developed by the Washington Department of Fisheries (WDF). It is the average of the three largest escapements in the years 1968-1977 multiplied by the average differential of the odd to even year run size.

The expected escapement of early chum to tributaries of Area 6B was calculated using the average pre-terminal interception rate observed in the period from 1980-1984.

#### Management Recommendations

No directed harvest is recommended for Discovery Bay stocks in order to minimize impact to the Snow Creek research program.

Sequim Bay stocks may have some harvestable surplus, however, the magnitude of that surplus is probably very small. No directed extreme terminal area fisheries are recommended.

#### Normal chum

##### Management Periods

<u>Area</u>	<u>Dates</u>
6D	October 27 - December 7
Dungeness River	November 17 - December 21
Elwha River	November 24 - December 21
Other tribs.	November 3 - November 30

#### Predictions, Harvests, and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Elwha River natural	1,500	800	700	900
Lower Elwha Htch.	1,500	800	700	700

Dungeness River natural	1,500	1,300	600	900
Hoko River natural	700	600	200	500
Pysht River natural	1,500	1,300	600	900
E. Twin River	300	300	0	200
W. Twin River	300	300	0	200
Lyre River	1,500	1,300	900	600
Deep Creek	300	300	200	100
Misc. Tribs. natural	<u>300</u>	<u>300</u>	<u>100</u>	<u>200</u>
Total	9,400	7,300	4,000	

#### Management Recommendations

The information available to estimate returning run sizes and the required escapement levels for natural stocks is very limited. Due to the uncertainty of the forecasts, no terminal area fisheries directed at the harvest of chum salmon are recommended. An incidental harvest of 2,100 chum is expected to occur during coho and winter steelhead fisheries.

#### Nooksack - Samish

The chum stocks in the Nooksack/Samish region originate primarily from natural production and are anticipated to provide a harvest of 178,950 fish. Management will be based on the exploitation rate necessary to achieve the natural escapement goal in the Nooksack River.

Management Periods

<u>Area</u>	<u>Dates</u>
Areas 7B, 7C, 7D and Nooksack River Below Marietta Bridge	October 27 - December 14
Nooksack River above Marietta Bridge and Samish River	November 3 - January 15

Predictions, Harvests and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Nooksack River				
natural	159,000	19,700	141,300	18,000
hatchery	2,000			1,700
Samish River				
natural	31,500	4,300	27,200	4,300
Misc. Streams				
natural	7,500	950	6,750	850
hatchery	200			
Lummi Ponds				
hatchery	<u>5,000</u>	<u>1,300</u>	<u>3,700</u>	<u>1,300</u>
Total	205,200	26,250	178,950	26,150

Management Recommendations

Harvests will be confined to Areas 7B, 7D and the Nooksack River. Area 7C will remain closed to provide additional protection to the Samish River stock. This closure is expected to result in achievement of the escapement goal. The return in 1985 is based on escapements of 58,700 in 1981 and 32,800 in 1982. There is a need to limit fisheries in northern Bellingham Bay (Nooksack River Flats) and the Nooksack River, downstream of Slater Bridge to 4 days per week to preserve the integrity of the in-river run size update currently in use.

Skagit

The chum stocks in the Skagit Region originate primarily from natural stocks. Management will be based on the exploitation rate necessary to achieve the natural escapement goal for the Skagit River.

Management Periods

<u>Area</u>	<u>Dates</u>
Area 8	Oct. 27 - Nov. 30
Skagit River Zone 1 (below Mt. Vernon Bridge)	Oct. 27 - Nov. 30
Skagit River Zone 2 (Mt. Vernon Bridge- Gilligan Creek)	Nov. 3 - Dec. 7
Skagit River Zone 3 (Gilligan Cr.-Hamilton Boat Launch)	Nov. 10 - End of spawning
Skagit River Zone 4 (Hamilton Boat Launch- Baker River)	Nov. 16 - end of spawning
Skagit River Zone 5 (upstream of Baker River)	Nov. 23 - end of spawning

Predictions, Harvests and Escapement

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Skagit River natural	99,500	34,000	65,500	<u>1/</u>
hatchery	<u>100</u>	<u>50</u>	<u>50</u>	
Total	99,600	34,050	65,550	

1/ According to the 1985 Skagit MOU, the escapement goal number should be 27,700. However technical staffs believe that a higher goal may be more appropriate in 1985 for purposes of investigating production at a higher escapement level. Therefore, the escapement goal will be 34,000 if the runsize entering Puget sound is greater than 75,000 and 33,000 if runsize entering Puget Sound is less than 75,000. An additional 600 fish would be added for brookstock collection purposes.

### Management Recommendations

Based on the pre-season forecast, it would appear that harvestable numbers exist. However, the main strength of the forecast comes from a large anticipated age 3 component from the 1982 brood and such forecasts have varied widely in accuracy in the past. Consequently it is recommended that directed fisheries be limited to those harvests necessary to obtain a good in-season update and to keep allocations in balance; at which time appropriate fisheries can be scheduled to take the remaining harvestable fish. Tribal fisheries will need to reserve 1,000 fish for harvest during steelhead fisheries if steelhead fisheries are conducted on a schedule similar to the recent past.

There will be test fisheries for chum 1 day per week in Skagit Bay and Skagit River. Sites may be as follows:

<u>Location</u>	<u>Number of Boats</u>
Skagit Bay	2 (1, treaty, 1 non-treaty)
Jetty Drift	1
Spud House	1
South Fork	1
Sedro Wooley Bridge	1
Loretta Creek Landing	1
Mill Creek	1

The purpose of these test fisheries will be to obtain information on run timing, abundance, species composition and mesh selectivity. Test fisheries will be conducted through November 16.

Stillaguamish-Snohomish

Management Periods

<u>Area</u>	<u>Dates</u>
8A and Snohomish River	October 20 - November 30
8D	November 3 - December 28
Stillaguamish River	October 27 - December 7

Predictions, Harvests, and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Stillaguamish River				
natural	35,500			(13,100)
hatchery	500	14,700	21,300	14,700
Snohomish River				
natural	66,500	33,700	32,800	(10,300)
hatchery	100	50	50	
Tulalip Hatchery	<u>4,400</u>	<u>1,500</u>	<u>2,900</u>	<u>1,500</u>
Total	107,000	49,950	57,050	see text

Management Recommendations

Terminal management, except in Area 8D, will be directed at the needs of natural stocks. Area 8D management will be directed at the needs of Tulalip Hatchery stocks. Area 8A management will be conducted to provide escapement of 17,800 into the Stillaguamish River (3,100 for river commercial harvest and 14,700 for escapements). Transfer of the Stillaguamish River harvest to Area 8A would increase the allowable Area 8A harvest by about a factor of three. The expected escapement of 32,900 to the Snohomish River results from management to meet

Stillaguamish escapement requirements. This level is in excess of observed natural escapements and previous escapement goals and should aid in the investigation of maximum sustained harvest escapement levels. This action applies to this run year only. The previously anticipated Snohomish native egg take/out plant by Tulalip will be suspended to allow the native fish to spawn naturally; native egg take/out plant will be conducted on the Stillaguamish River in addition to achieving the native spawning escapement goal. To achieve Stillaguamish enhancement and native spawning goals 14,700 chum are targeted for escapement (13,100 natural spawners and 1,600 enhancement spawners). One-half of one percent of the terminal run should be reserved for incidental harvest during marine steelhead fisheries and 100 should be reserved for harvest during Stillaguamish River steelhead fisheries.

### South Sound

#### Early Chum

#### Management Periods

<u>Area</u>	<u>Dates</u>
10E	September 22 - October 12
13J	September 22 - October 19
13K	September 22 - October 26

#### Predictions, Harvests, and Forecasts

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
East Kitsap natural	1,200	700	500	700
Hammersley Inlet natural	3,400	1,400	2,000	4,600
hatchery	6,300	2,550	3,750	1,400

Case Inlet				
natural	2,900	1,150	1,750	3,900
hatchery	<u>3,500</u>	<u>1,400</u>	<u>2,100</u>	<u>800</u>
Total	17,300	7,200	10,100	

#### Management Recommendations

Early-timed chum salmon returning to Sinclair Inlet within Area 10E are expected to have a harvestable surplus, most if not all of which will be taken incidentally during overlapping coho fisheries. Therefore, no directed fisheries for early chum should occur in Area 10E. That portion of Sinclair Inlet between a line projected due east from the Bremerton ferry terminal and a line projected from the Port Orchard Marina to the Bremerton Drydock should be closed for the duration of the early chum management period to protect milling fish. The remainder of Sinclair Inlet can remain open through the end of September to maximize chinook fishing opportunities while the rest of Area 10E (except milling area closures) should remain open to fisheries for coho and normal-timed chum.

Early chum returns to Hammersley Inlet (13J) and Case Inlet (13K) will be heavily impacted by terminal area coho fisheries, which are managed for full harvest of hatchery stocks. Concurrent with management for high harvest rates for coho in Area 13D, coho fisheries scheduled in Area 13J and 13K should be managed to minimize early chum incidental harvests. Fisheries in 13J and 13K should be restricted to beach seines only, requiring the release of all early chum salmon during the period of September 22 through October 26.

Normal Chum

Management Periods

<u>Area</u>	<u>Dates</u>
10	October 13 - November 30
10A, Duwamish/Green R.	November 3 - November 30
10E	October 13 - December 28
11	October 13 - November 30
11A	October 19 - December 14
Puyallup River	October 27 - December 14
13, Nisqually River	October 13 - November 30
13A	October 20 - November 30
13C	October 13 - November 30
13D (Dana, Pickering, Southern Case), 13E, 13H-13J	October 13 - December 31
13F, 13G, 13D (Peale), 13K	November 7 - December 12

Predictions, Harvests, and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Duwamish/Green River				
natural	few	few	0	not established
hatchery	1,200	700	500	1,200
Puyallup River				
natural	4,500	1,500	3,000	1,500
hatchery	1,100	300	800	0
East Kitsap				
natural	53,500	18,000	35,500	18,000
hatchery	8,100	2,800	5,300	2,800
Chambers Creek				
natural	500	100	400	<u>1/</u>
Henderson Inlet				
natural	1,100	600	500	600
Eld Inlet				
natural	26,500	14,500	12,000	14,500

Hammersley Inlet				
natural	25,800	13,500	12,300	13,500
hatchery	2,500	1,200	1,300	0
Case Inlet				
natural	2,700	1,500	1,200	1,500
Carr Inlet				
natural	2,700	550	2,150	1,500
hatchery	27,000	3,000	24,000	3,000
Nisqually River				
hatchery	550	0	550	0
Totten Inlet				
natural	8,300			11,500
hatchery	11,500	11,500	8,300	0
Skookum Inlet				
natural	15,500	1,500	14,000	1,500
hatchery	<u>16,500</u>	<u>3,100</u>	<u>13,400</u>	<u>1,500</u>
Total	209,550	74,350	135,200	

1/ Status of stock is undetermined.

#### Management Recommendations

The return of normal-timed chum to South Puget Sound will depend upon the interception rates in mixed stock areas. Fisheries in Area 10 and 11 should be conservative prior to obtaining an in-season estimate of abundance (the last week of October). Effort should also be light during the early part of the season to protect weak early components of the run. A one day full fleet evaluation fishery is expected the weeks of October 20 and 27, and a one boat purse seine test fishery at Apple Cove Point will be conducted one day per week throughout the normal chum management period. That portion of Area 10 northwest of a line from the flashing buoy at the entrance of Agate Passage to the flashing light at Indianola dock should remain closed through December 28 to protect chum salmon milling in front of the Suquamish Hatchery.

The Duwamish/Green native chum salmon run is severely depressed. However, existing data is not sufficient for estimating pre-season run sizes. Consequently no directed chum fisheries should occur in Area 10A and the Duwamish/Green River.

Based on the pre-season forecast, no directed chum fisheries should occur in Area 11A and the Puyallup River. All available harvest will likely be taken as incidental catch during coho and steelhead fisheries.

The normal timed Nisqually River chum production is entirely of hatchery origin. Any harvest will be taken incidental to directed coho fisheries. Fisheries in Area 13A will be based on the harvest rate appropriate for the Minter Creek Hatchery run. Fisheries should be limited only by the need to achieve the desired hatchery escapement. All normal timed chum to be taken in Area 13C are reserved for incidental harvest during coho fisheries.

Normal chum fisheries in Areas 13D-K should be scheduled to minimize interceptions of Kennedy Creek origin chum salmon due to the predicted low abundance of this stock this season. Harvest of Kennedy Creek chum should occur primarily as an incidental catch to coho fisheries in Area 13D (Pickering). Fisheries for chum in Totten Inlet should not occur during the period of October 13 through November 27. Chum fisheries in Pickering Passage and Dana Passage should be limited between October 13 and November 12 or until Kennedy Creek chum are estimated to have cleared these areas. Test fisheries will be conducted in Area 13D to collect run strength and species composition data during this period.

Harvests of other later-timed normal chum stocks can occur in 13D and the inlets of origin. Fisheries in these areas will be managed by application of harvest rates appropriate to meet natural stock escapement goals.

Fisheries for Elson Creek hatchery returns in Totten and Skookum Inlets should be managed at the natural stock harvest rate during the period of November 28 through December 12 or until natural escapement requirements are met. After December 12, native chum will have cleared the fishery (central 80% is 10/28-12/12) and appropriate harvest rates will be dependent upon escapements to Elson Creek Hatchery.

#### Late chum

#### Management Periods

<u>Area</u>	<u>Dates</u>
10,11	November 24 - January 8
13	December 1 - January 18
Nisqually River	December 1 - February 1
13A, 13C	December 1 - January 18
13J, 13K	November 10 - December 28
McAllister Creek	December 1 - February 2

#### Predictions, Harvests, and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Chambers Creek				
natural	3,100	3,100	0	1,300
hatchery	500	500	0	1,300
Nisqually River				
natural	42,000	18,000	24,000	18,000
hatchery	700	300	400	400
Carr Inlet				
hatchery	500	0	500	0
Misc. Streams				
natural				
McAllister	1,400	600	800	600
Red Salmon	600	600	0	250
Total	48,800	23,100	25,700	

South Puget Sound late chum are managed to achieve the full natural escapement goal. Fisheries should be restricted to the extreme terminal areas (i.e. McAllister Creek, Nisqually River and Carr Inlet). The returns to Chambers Bay are unharvestable due to the concurrent steelhead returns to the area. Fisheries in the Nisqually River should be managed to spread the harvest over the entire run timing and to provide suitable information for run size updating.

### Hood Canal

#### Early Chum

Early chum returning to Hood Canal are managed as a secondary stock. Natural production in areas 12A, 12B, 12C and 12D account for the majority of the run returning to Hood Canal.

#### Management Periods

<u>Area</u>	<u>Dates</u>
12, 12B	August 18 - September 21
12A, 12C, 12D	August 25 - September 28
Tributaries to areas 12A, 12B, 12C and 12D	September 8 - October 19

#### Predictions, Harvests, and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Area 12A tribs.	500	200	0	2,300
Area 12B tribs.	2,300	1,000	0	11,100
Area 12C tribs.	700	300	0	3,300
Area 12D tribs.	<u>800</u>	<u>300</u>	<u>0</u>	<u>3,300</u>
Total	4,300	1,800	0	20,000

#### Management Recommendations

The forecasted return of early chum to Hood Canal is less than the desired

level of escapement. However the early chum run will be managed as a secondary stock and no restrictions will be placed on non-selective gear during chinook or coho fisheries. Dipnets and other selective gear should be required to release chum salmon captured during the early chum management period. An expected incidental harvest of 2,500 chum will occur during directed coho fisheries.

#### Normal Chum

Two components of the normal chum run, early and late, are recognized in Hood Canal. The early-normal chum run consists primarily of hatchery stocks originating from the Hoodspout, George Adams, McKernan, and Little Boston hatcheries. Late-normal stocks are primarily of natural origin with some hatchery contribution from the Enetai Hatchery, Walcott Slough, and the Quilcene National Fish Hatchery.

#### Management Periods

##### Early-Normal Chum

<u>Area</u>	<u>Dates</u>
9A	November 10 - December 21
12, 12B	October 20 - November 23
12A	October 13 - November 16
12C, 12D	October 27 - November 30
Area 12A tribs.	November 10 - December 23
Other tribs.	November 10 - November 30

Late Normal Chum

<u>Area</u>	<u>Dates</u>
12, 12B	November 24 - December 7
12A	November 17 - December 21
12C	December 1 - December 21
Area 12A tribs.	November 24 - December 21
Area 12B Tribs,	December 1 - January 4
Skokomish River	

Predictions, Harvests and Escapements

<u>Production unit</u>	<u>Run size</u>	<u>Expected escapement</u>	<u>Harvestable number</u>	<u>Escapement goal</u>
Little Boston hatchery	19,000	200	18,800	0
Area 12 tribs.	1,000	200	800	1,100
Big Beef hatchery	1,400	300	1,000	0
Area 12A tribs. natural	2,400	1,400	1,000 <u>1/</u>	1,000
Quilcene National fish hatchery	7,000	3,200	3,800 <u>1/</u>	3,300
Walcott Slough	10,000	5,800	4,200	0
Area 12B tribs. natrl.augmtd.	12,800	9,000	3,800	10,100
Area 12C tribs. natrl.augmtd.	10,000	2,300	7,700	5,000
Hoodsport hatchery	88,500	20,800	67,700	23,500
Enetai Hatchery	15,000	7,700	7,300	1,900
Area 12D tribs. natrl.augmtd.	13,000	3,100	9,900	7,300
Skokomish River natural	13,400	6,600	6,800	7,500

George Adams/ McKernan Hatchery	<u>55,500</u>	<u>8,500</u>	<u>47,000</u>	<u>8,500</u>
Total	249,000	69,100	179,900	

1/ 1300 are available for harvest after 11/17 - Early normal mixed stock harvest total is 3,500.

The proportion of the escapement to be taken at the Hoodsport Hatchery versus George Adams/McKernan is the average of the relative run size to escapement ratios observed in the years 1982-1984. Natural stock escapement goals are those which would provide for the maximum sustainable harvest. These were estimated using the Ricker spawner recruit model described in the Forecasting Methods section of this report. The region-wide escapement requirement for natural stocks was apportioned to management units on the basis of the average escapement observed in the years 1979-1984.

The expected escapement values were computed using the run timing information in Appendix Table 1 and the appropriate rates of harvest. The expected escapement to the Little Boston Hatchery assumes a 95 percent rate of harvest in Port Gamble Bay.

#### Management Recommendations

In accordance with the Hood Canal Plan, fisheries during the early-normal management period in Areas 12, 12B, 12C and the Skokomish River will be managed to achieve the desired level of escapement at the Hoodsport, George Adams, and McKernan hatcheries. For 1985, the runs to be managed at rates appropriate for these hatcheries comprise 89 percent of the total return (Appendix Table 1). Fisheries in Area 9A will be managed to

attempt to harvest the entire run entering that area. Fisheries during the late-normal management period (in areas where later stocks are present) will be managed to achieve the desired level of natural escapement except in Area 12A, where the desired level of escapement at the Quilcene National Fish Hatchery will determine the appropriate rate of harvest. In order to afford the necessary protection to later timed runs of chum salmon, it is recommended that no fisheries should be conducted in pre-terminal areas after November 17.

Area closures will be needed in the vicinity of the Hoodspout and Enetai hatcheries to protect milling chum salmon needed for escapement

#### Canadian

##### Management Periods

###### Area

###### Date

7A

October 6 - November 16

##### Management Recommendations

The Canadian Department of Fisheries and Oceans report an expected return of British Columbia natural chum of 1,495,200, of which 501,800 are expected to be of Fraser River origin. The spawning escapement objective for the Fraser River is 700,000. Other southern B.C. natural runs are also expected to not meet their spawning objectives. Lower B.C. hatcheries have an expected return of 872,900 chum, with the majority returning to the mid-Vancouver Island area (Big Qualicum). Based on the pre-season forecast the only fishery anticipated on the

Fraser stock would be a one day full fleet evaluation fishery in Johnstone Strait. Under that condition no directed chum fishery would be warranted in Area 7A. However, if the total southern B.C. chum stock run size exceeds 2.6 million based on in-season evaluation then the Canadian government intends to conduct commercial fisheries in Johnstone Strait and/or the Fraser River. Management of Area 7A will be based on Canadian fishing actions in these areas.

#### Pre-terminal Areas

##### Normal Chum

##### Management Periods

<u>Area</u>	<u>Dates</u>
4B, 5, 6C	September 29 - December 7
6, 6A, 7	September 29 - December 7
6B, 9	October 13 - November 23

##### Management Recommendations

Fisheries in Areas 4B, 5, 6, 6C and 7 should be based on the status of both Canadian and Puget Sound origin stocks (see Canadian Region). Treaty Indian marine gill net fisheries are anticipated in Areas 4B, 5 and 6C.

Management in Area 6A should be based on the needs of Puget Sound origin stocks. A limited impact reef net fisheries is being considered for Area 7.

Fisheries in Areas 6B and 9 may be conducted if harvestable surpluses

are available from Hood Canal, South Puget Sound, and Stillaguamish-Snohomish regions. No fisheries should be scheduled until in-season runsize updates are available and demonstrate that harvestable numbers remain in all three regions.

Late Chum

Management Periods

<u>Area</u>	<u>Dates</u>
4B, 5, 6C	November 3 - December 14
6, 6A	November 10 - December 21
6B, 9	November 17 - December 21

Management Recommendations

No directed fisheries should occur in these areas due to co-mingled and steelhead stocks in need of protection.

Appendix Table 1. 1985 Puget Sound Chum Salmon forecasts, escapement goals and expected harvests.

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle year natural escapement	Artificial production (brood-pounds released)	Comments
<u>Strait of Juan de Fuca</u>						
<u>Early-timed stocks</u>						
Area 6B tribs.	1,900	1,800(1,300)	100	1980 = 4,866 1981 = 952 1982 = 2,003		Minor run associated with steelhead research facility. Run is currently being investigated as part of the chum key indicator analysis. No directed fishery should occur, only small incidental catches during coho fishing in mixed stock areas is expected.
<u>Normal-timed stocks</u>						
Elwha River						
natural	1,500	800(900)	700		1980 = 3,077	
hatchery	1,500	800(700)	700		1981 = 2,235 1982 = 529	
Dungeness River-natural	1,500	1,300(900)	600	see comments		Brood year escapements for Strait total natural run including Elwha (approx 20%) are as follows: 1980 = 11,289 1981 = 7,950 1982 = 2,650
Hoko River-natural	700	600(500)	200	see comments		
Pysht River	1,500	1,300(900)	600	see comments		
E. Twin River-natural	300	300(200)	0	see comments		
W. Twin River-natural	300	300(200)	0	see comments		
Lyre River-natural	1,500	1,300(600)	900	see comments		
Deep Creek-natural	300	300(100)	200	see comments		

(continued)

Appendix Table 1. (continued)

Appendix Table 1: (continued)

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood-pounds released)	Comments
Misc. tribs.-natural	300	300(200)	100	see comments		
Total	9,400	7,300(6,500)	4,000			
<u>Nooksack-Samish</u>						
Nooksack River-natural	159,000	19,700(18,000)	139,600	1980-23,915 1981-57,822 1982-32,780		Escapement includes 1,400 for natural stock enhancement (700 each for Lummi and Nooksack Tribes)
Nooksack River-hatchery	2,000	300(1,700)	1,700		1980- 329 1981-1,915 1982-2,062	Kendall, Rutsatch Slough, and numerous minor releases in small Nooksack tributaries.
Samish River-natural	31,500	4,300	27,200	1980- 329 1981-2,249 1982-8,010		Escapement includes 700 for broodstock program and 700 for cooperative egg box programs.
Misc. streams natural	7,500	950(850)	6,750	1980-1,301 1981-2,294 1982-2,835		Escapement includes 1,300 for cooperative programs.
hatchery	200				1980- 520 1981- 110 1982-1,206	Dakota, Whatcom, Chuckanut, Oyster, and Whitchal Creeks. Escapement represents rate approximate for natural fish.
Lummi Ponds-hatchery	5,000	1,300	3,700		1980-3,059 1981-5,326 1982-3,558	An additional 700 escapement from the Nooksack system is appropriate to contribute to natural stock enhancement and is included in the Nooksack River goal.

(continued)

Appendix Table 1.(continued)

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood-pounds released)	Comments
Total	205,200	26,250(26,150)	178,950			
<u>Skagit</u>						
Skagit River-natural	99,500	34,000 (see text)	65,500	1980- 19,425 1981- 16,939 1982-142,541		Escapement includes 300 for brood stock program, and 300 for egg boxes.
Skagit River-hatchery	100	50	50		1980- 52 1981- none 1982-982	Clark Creek
Total	99,600	34,050	65,550			
<u>Stillaguamish-Snohomish</u>						
Stillaguamish River-natural	35,500			1980 - 14,618 1981 - 7,775 1982 - 34,685		Escapement includes 1,300 for Stillaguamish natural stock enhancement and 200 for eggs boxes.
		14,700(13,100)	21,300			
Stillaguamish River-hatchery	500				1980 - 660 1981 - 420 1982 -1,216	Stillaguamish, Armstrong, Gortson, Ashton, and Jim Creeks. Escapement represents rate appropriate for Stillaguamish run.
Snohomish River-natural	66,500			1980 - 28,083 1981 - 13,550 1982 - 1,216		Escapement represents rate appropriate to Stillaguamish run. An additional 16,100 fish are harvestable after separation which accounts for 300 fish for brood stock program of Skykomish Hatchery and 700 fish for Tulalip natural stock enhancement program
		33,700 (see text)	32,900			
Snohomish River-hatchery	100	50	50		1980 - none 1981 - none 1982 - 1,280	Skykomish River

(continued)

Appendix Table 1. (continued)

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood-pounds released)	Comments
Tulalip Bay-hatchery	4,400	1,500	2,900		1980 - 5,333 1981 - 3,450 1982 - 45	Quilcene stocks. Escapement represents rate appropriate for natural run.
Total	107,000	49,950	57,050			
<u>Upper South Puget Sound</u>						
<u>Early-timed stocks</u>						
East Kitsap-natural	1,200	700	500	1980 - 1,291 1981 - 831 1982 - 900		Black Jack Creek
Subtotal	1,200	700	500			
<u>Normal-timed stocks</u>						
Duwamish River-natural	few	see text	few	few		
Duwamish River-hatchery	1,200	700(1,200)	500		1980 - 404 1981 - 158 1982 - 2,118	Crisp Creek
Puyallup River-natural	4,500	1,500	3,000	1980 - 2,615 1981 - 1,409 1982 - 1,121		
Puyallup River-hatchery	1,100	300(0)	800		1980 - 372 1981 - 255 1982 - 46	Puyallup Tribal Program
East Kitsap-natural	53,500	18,000	35,500	1980 - 33,628 1981 - 16,316 1982 - 10,236		

(continued)

Appendix Table 1. (continued)

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood pounds released)	Comments
East Kitsap-hatchery	8,100	2,800	5,300		1980 - 1,940 1981 - 1,829 1982 - 1,695	Donkey, Indianola, Dickerson, and Cowlings Creeks
Subtotal	68,400	23,300(23,500)	45,100			
Total Upper South Puget Sound	69,600	24,000(24,200)	45,600			
<u>Lower South Puget Sound</u>						
<u>Early-Timed Stocks</u>						
Hammersley Inlet-natural	3,400	1,400(4,600)	2,000	1980 - 2,464 1981 - 3,052 1982 - 1,513		
Hammersley Inlet-hatchery	6,300	2,550(1,400)	3,750		1980 - 1,430 1981 - 2,676 1982 - 6,080	Johns Creek. Hatchery fed fry releases.
Case Inlet-natural	2,900	1,150(3,900)	1,750	1980 - 3,798 1981 - 2,409 1982 - 1,675		
Case Inlet-hatchery	3,500	1,400( 800)	2,100		1980 - 5,162 1981 - 1,383 1982 - 3,281	Sherwood and Coulter Creeks
Subtotal	16,100	6,500(10,700)	9,600			
<u>Normal-timed stocks</u>						
Chambers Creek-natural	500	100	400	1980 - 22 1981 - 128 1982 - 109		

(continued)

Appendix Table 1. (continued)

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood-pounds released)	Comments
Henderson Inlet-natural	1,100	600	500	1980 - 55 1981 - 55 1982 - 55		
Eld Inlet-natural	26,500	14,500	12,000	1980 - 18,753 1981 - 6,364 1982 - 4,334		
Totten Inlet-natural	8,300			1980 - 7,714 1981 - 4,887		
		11,500	8,300	1982 - 4,152		
Totten Inlet-hatchery	11,500				1980 - 3,567 1981 - 6,344 1982 - 5,037	Kennedy Creek-11,600 Elson Creek
Skookum-natural	15,500	1,500	14,000			
Skookum-hatchery	16,500	3,100(1,500)	13,400			
Hammersley Inlet-natural	25,800	13,500	12,300	1980 - 20,046 1981 - 8,755 1982 - 8,676		
Hammersley Inlet-hatchery	2,500	1,200(0)	1,300		1980 - 4,462 1981 - 438 1982 - 937	Johns Creek and Cranberry Creek
Case Inlet-natural	2,700	1,500	1,200	1980 - 462 1981 - 2,921 1982 - 1,118		
Carr Inlet-natural	2,700	550(1,500)	2,150	1980 - 964 1981 - 1,274 1982 - 575		

(continued)

Appendix Table 1. (continued)

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood pounds released)	Comments
Carr Inlet-hatchery	27,000	3,000	24,000		1980 - 8,326 1981 - 5,760 1982 - 9,980	Minter Creek and Purdy Creek
Nisqually River-hatchery	550	0	550		1980 - 1,069 1981 - 255 1982 - 228	Nisqually Tribal Program
<b>Subtotal</b>	<b>141,150</b>	<b>51,050</b>	<b>90,100</b>			
<u>Late-timed stocks</u>						
Chambers Creek-natural	3,100	3,100(1,300)	0	1980 - 2,239 1981 - 1,686 1982 - 3,204		
Chambers Creek-hatchery	500	500(1,300)	0		1980 - 3,255 1981 - none 1982 - 620	
Nisqually River-natural	42,000	18,000	24,000	1980 - 38,083 1981 - 28,914 1982 - 25,773		
Nisqually River-hatchery	700	300(400)	400		1980 - 674 1982 - 320 1982 - 209	
Carr Inlet-hatchery	500	0	500		1980 - 4,918 1981 - none 1982 - 64	Minter Creek and Purdy Creek

(continued)

Appendix Table 1. (continued)

Production unit	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood-pounds released)	Comments
Misc. streams-natural				1980 - 693		Red Salmon and McAllister Creek, escapements are combined
McAllister	1,400	600	800	1981 - 726		
Red Salmon	600	600 (250)	0	1983 - 1,596		
Subtotal	48,800	23,100	25,700			
Total Lower South						
Puget Sound	206,050	80,650	125,400			
Grand Total						
South Sound	275,650	105,350	171,000			
<u>Hood Canal</u>						
<u>Early-timed stocks</u>						
Area 12A tribs.-natural	500	200(2,300)	300	1980 - 900 1981 - 401 1982 - 303		Each timed escapement represent the average escapement rate of the 1982 and 1983 return years. Coho management needs dictate harvest rate during early chum migration.
Area 12B tribs.-natural	2,300	1,000(11,100)	1,300	1980 - 3,275 1981 - 1,289 1982 - 2,596		
Area 12C tribs.-natural	700	300(3,300)	400	1980 - 479 1981 - 617 1982 - 162		
Area 12D tribs. natural	800	300(3,300)	500	1980 - 691 1981 - 574 1982 - 256		
Subtotal	4,300	1,800(20,000)	2,500			

Appendix Table 1.(continued)

Production	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood-pounds released)	Comments
<u>Normal-timed stock</u>						
Little Boston Hatchery	19,000	200(0)	18,800		1980 - 6,013 1981 - 5,534 1981 - 4,822	Port Gamble and Little Boston Creek release. Harvest rate same as that allowed in Area 9 for other stocks must occur in Area 9A
Area 12 tribs.-natural	1,000	200(1,100)	800	1980 - 443 1981 - 689 1981 - 507		
Big Beef	1,400	300(0)	1,100		1980 - 210 1981 - 802 1982 - 1,227	
Area 12A tribs.-natural	2,400	1,400(1,000)	1,000	1980 - 273 1981 - 462 1982 - 47		Harvest rate commensurate with that of Hoodspout chum. An additional 1,300 harvestable in Area 12A after 11/17.
Quilcene Nat'l Hatchery	7,000	3,200	3,800		1980 - 2,167 1981 - 2,511 1982 - 1,429	
Area 12B tribs.-augmented	12,000	9,000(10,000)	3,800	1980 -5,028 1981 -5,485 1982 -4,659	1980 - 1,926 1981 - 0 1982 - 1,682	
Walcott Slough-hatchery	10,000	5,800(0)	4,200		1980 - 2,732 1981 - 4,658 1982 - 7,343	U.S.F.W.S. Program. Harvest rate commensurate with that of Hoodspout chum. An additional 1300 Quilcene stock available in Big Quilcene River.

(continued)

Appendix Table 1 (continued)

Production	Predicted total return	Expected escapement (goal)	Expected harvest	Brood or cycle natural escapement	Artificial production (brood-pounds released)	Comments
Area 12C tribs.-augmented	10,000	2,300(5,000)	7,700	1980 - 2,314 1981 - 1,595 1982 - 1,945	1980 - 2,732 1981 - 0 1982 - 1,978	
Hoodspout Hatchery	88,500	20,800	67,700		1980 -44,336 1981 -23,589 1982 -32,058	Hood Canal Hatchery. Escapement based on scheduled egg take of 42.5 million and anticipated escapement of 7,000 to WDF Skokomish River facilities.
Enetai Hatchery	15,000	7,700(1,900)	7,300		1980 - 3,053 1981 - 4,985 1982 - 6,130	Tribal program (Quilcene stock).
Skokomish River-natural	13,400	6,600(7,500)	6,800	1980 - 3,873 1981 - 1,596 1982 - 4,601		
George Adams/ McKernan Hatchery	55,500	8,500	47,000		1980 -24,418 1981 -12,028 1982 -26,780	
Area 12D tribs.augmented	13,000	3,100(7,300)	9,900	1980 - 9,223 1981 - 4,428 1982 - 1,818	1980 - 2,093 1981 - 0 1982 - 1,010	
Subtotal	249,000	69,100(70,100)	179,900			
Total Hood Canal	253,300	70,900(90,100)	182,400			