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The 1985 Return of Odd Year Pink Salmon Stocks to the Johnstone Strait Study Area

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by

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A. P. Stefanson, L. Hop Wo and A. P. Gould. 1993. The 1985 return of odd year pink salmon stocks to the Johnstone Strait Study Area. Can. MS Rep. Fish. Aquat. Sci. 2195: 34 p.

Study Area pink salmon are harvested incidentally during Johnstone Strait fisheries targeting on Fraser River pink and sockeye salmon. The 1985 fishing season for commercial gillnets and seines opened July 14 and closed September 17. The total fishing days in Statistical Areas 12 and 13 were 25.0 for gillnets and 20.0 for seines.

The 1985 pink salmon commercial catch (net plus troll) in the Study Area consisted of passing Fraser stocks and of returning Study Area stocks, and totalled 6.0 million. This exceeded somewhat the expected total pink catch of 5.3 million. Total pink stock destined to the Study Area streams in 1985 was estimated at 2.1 million, considerably below the pre-season expectation of 3.4 million. Pink escapement to the Study Area was estimated at 0.92 million.

The 1985 sockeye salmon commercial catch (net plus troll) in the Study Area consisted of passing Fraser stocks and of returning Study Area stocks, and totalled 3.2 million. This exceeded considerably the expected total sockeye catch of 1.1 - 1.3 million. Total sockeye stock destined to the Study Area streams in 1985 was estimated at 91,500, compared to the expected 284,000. Sockeye escapement to the Study Area was estimated at 85,400.

Key words: pink salmon, sockeye salmon, Johnstone Strait Study Area, fishery, escapement.

RÉSUMÉ

Stefanson, A.P., L. Hop Wo, et A.P. Gould. 1993. Remontée du saumon rose dans la zone d'étude du détroit de Johnstone en 1985. Can. Manuscr. Rep. Fish. Aquat. Sci. 2195: 34 p.

Dans la zone d'étude, les prises fortuites de saumon rose sont enregistrées au cours de la saison de pêche du saumon rose et du saumon sockeye du Fraser, dans le détroit de Johnstone. La saison de 1985, pour ce qui est de la pêche au filet maillant et à la seine, a débuté le 14 juillet et s'est terminée le 17 septembre. Le nombre total de jours de pêche dans les zones statistiques 12 et 13 a été de 25 pour la pêche au filet maillant et de 20 pour la pêche à la seine.

En 1985, les prises commerciales de saumon rose, dans la zone d'étude, ont été constituées par le saumon de passage dans le Fraser et le saumon de retour dans la zone d'étude. Elles se sont chiffrées à 6 millions (nombre prévu : 5,3 millions). En 1985, on a estimé à 2,1 millions le nombre de saumons roses à destination des cours d'eau de la zone d'étude, chiffre considérablement inférieur aux prévisions de pré-saison (3,4 millions). Les échappées de saumon rose dans la zone d'étude ont été estimées à 0,92 million.

En 1985, les prises commerciales de saumon sockeye dans la zone d'étude ont été constituées par le saumon de passage dans le Fraser et le saumon de retour dans la zone d'étude. Elles se sont chiffrées à 3,2 millions (nombre prévu : entre 1,1 et 1,3 million). En 1985, on a estimé à 91 500 le nombre total de saumons sockeye à destination des cours d'eau de la zone d'étude, comparativement aux 284 000 prévus. Les échappées de sockeye dans la zone d'étude ont été estimées à 85 400.

Mots clés : saumon rose, saumon sockeye, zone d'étude du détroit de Johnstone, pêches, échappées.

INTRODUCTION

The status of odd year pink and sockeye salmon originating from the Johnstone-Georgia Strait Study Area has been reported biennially since 1963. These reports provide a review of catch and escapement data, proposed fishing patterns, and major regulatory decisions which govern the fisheries in the Study Area.

The Johnstone-Georgia Strait Study Area consists of the Johnstone Strait and that portion of the Strait of Georgia north of the Pacific Salmon Commission (PSC) Convention Area (Fig. 1). Of the 10 major sub-area pink stocks (Fig.2) returning to streams in the Study Area, four stocks destined to streams in the Johnstone Strait region, use the northern approach exclusively. The remaining six pink stocks destined to streams in the Strait of Georgia, use both the northern and southern (via Juan de Fuca Strait) routes.

Fraser River pink and sockeye stocks migrate with the Study Area pink stocks and return via both the northern and southern approach routes. The status of Fraser River stocks is reported by the Pacific Salmon Commission, and the strength of Fraser stocks is a major factor in the overall management of the Study Area.

This report details the strategies and decisions used to manage the Johnstone Strait commercial salmon net fisheries. Included is information on catches of the Study Area stocks and of those stocks intercepted in the Study Area en route to their natal streams.

In this report, all figures, tables and appendices are presented at the end of text.

STUDY AREA AND FISHERY DESCRIPTION

STUDY AREA

The Johnstone-Georgia Strait Study Area is divided into Statistical Areas (Fig. 1) which in turn are subdivided into sub-areas or management units (Fig. 3).

Approximately 60 streams contribute to the Study Area pink salmon production. Study Area pinks utilize both the northern and southern approach routes (see above) and migrate through Johnstone Strait from early July to mid-August. The Study Area also supports a small population of sockeye, with Nimpkish River being the most significant producer of the five sockeye-producing rivers in the area. Study Area sockeye migrate almost exclusively via the northern route and usually enter the Study Area in mid-May through early August.

FISHERY

The Johnstone Strait Study Area includes the largest interception fishery in British Columbia. The interception fishery in Statistical Areas 12 and 13 is managed primarily to harvest Fraser River pink and sockeye stocks, while the catch of Study Area pinks and sockeye is generally incidental to the Fraser catch. A similar migration route and overlapping run timing to passing Fraser River pink and sockeye stocks, makes the Study Area pink and sockeye salmon

highly vulnerable to harvesting. Minimal incidental catches of Study Area pinks may also occur in Sabine Channel (Area 16). In addition to their incidental harvesting, the Study Area pinks may be terminally caught in the Area 12 Mainland Inlets.

Fraser River sockeye are the primary factor in the development of management plans for the Study Area. The fishing plans are sometimes modified to protect the Study Area pink and sockeye stocks and reduce the incidental catches of chinook.

1985 MANAGEMENT APPROACH

DEVELOPMENT OF 1985 MANAGEMENT PLANS

This section provides an overview of the management procedures in developing pre-season fishing plans and implementing in-season management.

Pre-season stock expectations and fishing plans are developed by the local fisheries officers and management biologists. The catch goals are developed by "MAC" (Ministers Advisory Council) in accordance with the responsibilities outlined in the Canada/U.S. Treaty. Stock expectations and proposed fishing plans are then presented to the South Coast Advisory Board for review and discussion. After completion of the fishing plans, the package is presented to industry for comments, and published in the Pacific Region Commercial Fishing Guide.

In-season, fisheries officers and managers meet weekly to discuss fishing progress and patterns, and to forecast expectations. Detailed records on commercial catches, gear type and effort, catch distribution, stock diversion rates, stock identification and escapements are reviewed daily and provide a general picture of the multi-stock timing and size. Daily contact with the PSC throughout the season provides daily and weekly information on the Fraser River stock diversion rates, run size and timing, and escapements.

DATA SOURCES

Catch, escapement and stock identification data are the major tools used to assess salmon stocks. This information provides managers with the necessary knowledge to adjust and correct fishing plans so that sufficient harvest and escapements may be achieved.

Catch data are used primarily to compare the current year's fishing performance to historical catch rates. Test fishery catches provide information on stock abundance and timing, while test catch samples are used for stock identification. Catch rates, however, do not always reflect a true picture of in-season run strength. Consequently, other assessment methods are used.

Escapement information provides managers with the final estimates of returning stocks. To evaluate stock size and timing, escapement estimates to date are compared with those of previous years. Aerial flights are used to assess surplus harvestable pinks in the approaches to the Mainland Inlets and to estimate spawning escapements to the Study Area streams. Patrol vessels and crews provide similar information. This escapement information is valuable for the

assessment of in-season fishing plans.

Stock identification for pinks is based on the analysis of lengths, and for sockeye on the analysis of scales. This program identifies sub-stocks of Fraser River sockeye and the component of Fraser River pinks moving through Johnstone Strait each week. This information provides additional data for assessing individual stocks in a mixed-stock fishery. Due to the preliminary nature of this program, conclusive data are not available at this time.

MANAGEMENT OBJECTIVES AND CONSIDERATIONS

The return of pink salmon through Johnstone Strait in 1985 was expected to total 8.2 million. This would consist of 3.4 million Study Area pinks and 4.8 million Fraser River pinks. Sockeye stocks returning via Johnstone Strait were expected to total 2.2 million of which approximately 284,000 would be destined for the Study Area streams and the remaining 1.9 million for the Fraser River.

Due to similar and overlapping migration timing and approach patterns through Johnstone Strait by the Fraser and Study Area pink and sockeye stocks, the weaker Study Area stocks and the passing chinook stocks require special protection from overharvesting. Concurrently, sufficient exploitation is required for the stronger Fraser River stocks.

The Department of Fisheries and Oceans Regional management objectives, combined with those of the Minister's Advisory Council and Canada/U.S. Treaty recommendations, provided the protection and harvest considerations by:

1) Protecting the Nimpkish and other passing Study Area sockeye stocks through early-season closures above Lewis Point (Area 12) and subsequent closures in northern portions of Queen Charlotte Strait.

2) Minimizing the incidental harvest of chinook salmon (Canada/U.S. Treaty) by restricting specific harvest areas and limiting number of seine boat-days.

3) Directing fishing as much as possible on the surplus stocks by increasing harvest areas (Double Bay in Area 12) while minimizing harvest of depressed stocks (Mainland Inlets).

4) Closing specific areas ("Ribbon" boundary, bay boundaries, river mouth boundaries and approach areas) for the protection of weak Study Area pink salmon.

5) Managing net fisheries in accordance with the Canada/U.S. Treaty:

Fraser Sockeye U.S. - 26.96%
Fraser Pink U.S. - 32.73%

6) Allocating catch by gear and species in accordance with the Minister's Advisory Council's recommendations:

	GN	SN	TR
Sockeye	31.72%	66.27%	2.01%
Pinks	4.38%	61.70%	33.92%

7) Co-ordinating fishery openings with other area openings in an attempt to distribute gear and alleviate fleet congestion.

1985 PRE-SEASON EXPECTATIONS

STUDY AREA PINKS

The expected 1985 return of Study Area pinks was 3.4 million, based on the 1983 brood year escapement of 1.6 million pinks (the highest since 1975 but still below the optimum of 1.8 million). Of the expected 3.4 million return, approximately 1.8 million were the anticipated harvestable surplus, primarily to the Area 12 Mainland Inlets. The Area 12 pink stocks receiving surpluses were expected to be the Kakweiken and Glendale rivers. Harvesting would occur in the Gordon Channel, Tribune Channel and Lower Knight Inlet areas (Area 12). Stocks returning to Area 13 were to be cropped incidentally in the Johnstone Strait interception fishery.

STUDY AREA SOCKEYE

The expected 1985 return of Study Area sockeye was 284,000 fish of which 265,000 would consist of the Nimpkish stock and 18,500 of minor Study Area stocks. These numbers were based partly on the 1980 and 1981 brood year returns of Study Area sockeye when poor returns were observed. Nimpkish River, the main sockeye producer in the Study Area, also showed escapements of only 24,000 in 1980 and 60,000 in 1981. It was felt that minimal numbers of the Study Area sockeye would be caught in 1985 in the Johnstone Strait fishery due to the protection provided by closures in the upper portions of Area 12.

FRASER RIVER PINKS

Based on the PSC predictions, an overall total of 16.0 million pinks were expected to return to the Fraser River in 1985. Of this total, 4.8 million were expected to divert through Johnstone Strait, based on an anticipated diversion rate of 25-30%. Of this northern diversion, an expected 3.5 million pinks would be harvested in the Johnstone Strait fishery during mid-August to mid-September.

FRASER RIVER SOCKEYE

Based on the PSC predictions, an overall total of 9.0 million sockeye were expected to return to the Fraser River in 1985. Of this total, approximately 1.9 million were expected to divert through Johnstone Strait, based on an anticipated diversion rate of 20-25%. Of this northern diversion, an expected 1.1-1.3 million sockeye would be harvested in the Johnstone Strait fishery. This Fraser sockeye catch would likely peak in Johnstone Strait in late July and early August, with the Horsefly stock as the major catch component.

The 1985 pre-season expectations for pink and sockeye salmon in the Johnstone Strait Study Area are summarized below.

	EXPECTED (millions)		
STOCKS	Total Stock	Diversion via Johnstone Strait	Total Catch in Johnstone Strait Fishery
		PINKS	
Study Area	3.4	3.4	1.8
Fraser River	16.0	4.8	3.5
TOTAL		8.2	5.3
		SOCKEYE	
Study Area	0.28	0.28	Minimal
Fraser River	9.0	1.9	1.1 - 1.3
TOTAL		2.2	1.1 - 1 3

1985 PRE-SEASON FISHING PLANS

AREAS 11, 12, 13 AND 16

The weekly fishing plans for Areas 11, 12, 13 and 16 were developed to achieve a sufficient harvest of Fraser River pink and sockeye stocks, while protecting the Study Area pink and sockeye and limiting the incidental catches of chinook. In general, the proposed fishing plan attempted to harvest 70-75% of the Fraser pinks and 60-70% of the Fraser sockeye returning via Johnstone Strait.

The proposed 1985 fishing pattern for the Johnstone Strait Study Area (Statistical Areas 11,12, 13 and 16), is shown in Table 1. Briefly, Areas 12 and 13 were scheduled to open July 14,

while Areas 11 and 16 were to open two weeks later on July 28. Weekly openings for these Areas were scheduled into September, except for Area 16 where only four fishing weeks were allocated (to August 24). Weekly net openings per area were generally 2.5 days for gillnets and 2.0 days for seines. However in Area 16, gillnet and seine openings were to be the same, generally 2.0 days per week, while in Area 11 gillnets only were allocated.

THE 1985 FISHERY

WEEKLY FISHERY SUMMARY

Appendix 1 compares pre-season plans with in-season management actions, and details the rationale for modifications from the pre-season plans. Table 2 summarizes for each Statistical Area (11, 12 13 and 16) the weekly number of vessels and days fished. Tables 3 - 6 show for each of the above Areas the weekly salmon catches by species and gear. Table 7 summarizes for each of the pink and sockeye salmon, the weekly net, troll and total catches in the combined Areas 11, 12, 13 and 16. Figure 4 illustrates for these combined Areas the weekly trends in net catches of pinks and sockeye. A detailed in-season weekly account of the net fishery is given below.

July 14 - 20 (week 7/3)

The Johnstone Strait commercial fishery commenced in Areas 12 and 13 with openings of 2.5 days for gillnets and 2.0 days for seines. In Area 12, sub-areas 12-1, 12-3 to 5, 12-26 and 12-35 were opened; in Area 13, sub-areas 13-7 to 9 and 13-28 to 32 were opened. Areas 11 and 16 remained closed. Also, the upper portions of Area 12 remained closed for the protection of Nimpkish sockeye.

As a result of an earlier co-management meeting, sub-areas 12-26 and 12-35 were opened to assess pink stock strength in the Mainland Inlets. Catch monitoring during this fishery indicated that pink stock strength was lower than anticipated and that a substantial bi-catch of chum and chinook was being harvested. The combination of the low pink catch and the regional objective to minimize the incidental harvest of chinook resulted in a closure of these two sub-areas after 22 hours of fishing.

The effort and catch this week by both seines and gillnets was considered light for pinks and Fraser sockeye, and the fishery closed as scheduled.

July 21 - 27 (week 7/4)

This week the Johnstone Strait fishery in Areas 12 and 13 was again allocated 2.5 days for gillnets and 2.0 days for seines. Area allocations were also the same as in the previous week. Areas 11 and 16 remained closed. Aerial observations of the Area 12 Mainland Inlets failed to indicate a build-up of pink stock strength in the area.

During the fishery this week, sockeye catches were moderate on the first day, decreased, then picked up during the final hours indicating that stock strength was building. Based on the

Fraser River sockeye run timing, the catch this week was comprised of Chilco, late Stuart and Horsefly River stocks, and of minor runs.

Catch information at this time was still too incomplete to predict total stock size, hence the fishery closed as scheduled.

July 28 - August 3 (week 7/5)

The fishery opened this week in Areas 11, 12, 13 and 16. As in the previous week, gillnets were allocated 2.5 days and seines 2.0 days. Area 11 fishery was restricted to gillnets only operating in sub-areas 11-1 and 11-2 in order to harvest Fraser sockeye while at the same time limiting the access to local chum stocks. Sub-area 16-22 did not open as scheduled, in order to conserve chinook salmon. The fleet size in the Johnstone Strait district was moderate because Areas 16, 20 and 29 were also open and a large proportion of the total gear remained in the north (Statistical Areas 1-10).

Sockeye catches this week were higher than the pre-season expectations and remained so until the fishery closed. Stock identification data indicated that the passing sockeye stocks were comprised of 50% Horsefly and the remainder of Chilco, late Stuart and minor stocks. Indications were that the northern diversion rate of sockeye had increased slightly this week to approximately 30%. The Pacific Salmon Commission had also predicted, based on numerous indicators, that the peak of sockeye migration would pass through the Commission waters during the first week of August.

Pink catches this week continued to be light and, based on past timing information, the run was either late or of minimal size. Fishing effort in Area 16 was light, with moderate catches of sockeye.

No extensions were warranted this week and the fishery closed as scheduled.

August 4 - 10 (week 8/1)

The Johnstone Strait commercial net fishery opened this week in Areas 11, 12, 13 and 16. Gillnets opened for 2.5 days and seines for 2.0 days. Both gear types operated in all areas except that gillnets only operated in Area 11. Areas open this week were the same as in the previous week except that the Mainland portion of Queen Charlotte Strait in Area 12 was closed to provide a corridor for the Study Area pinks.

The fleet size in all areas remained moderate with the largest concentration of both seines and gillnets observed in Area 12 (Table 2). Sockeye net catch (in pieces) this week was comparable to that of last week but pink net catch was markedly higher (Fig. 4). Sockeye catches in Area 13 commenced with good strength but collapsed on the second day. The PSC information continued to indicate that the majority of passing sockeye were destined for the Horsefly system.

The harvest of pink salmon showed signs of improvement but still remained below this week's pre-season catch expectation. The "Ribbon" boundary was in effect for the conservation of chinook and Study Area pinks. In addition, the monitoring of the Area 12 Mainland Inlets

continued for signs of a possible harvestable surplus of pinks.

Moderate catches during this week's fishery did not warrant an extension and the fishery closed as scheduled.

August 11 - 17 (week 8/2)

As in the previous week, the Johnstone Strait commercial fishery opened this week in Areas 11 (GN only), 12, 13 and 16, with gillnets allocated 2.5 days and seines 2.0 days. Fishing took place in the same areas as in the previous week. Given that the size of the Fraser sockeye stock appeared larger than expected and that the chinook catch and effort were below the expected levels, a 24-hour extension was allocated for all designated gear in all areas. Gear effort in the Johnstone Strait district was again considered moderate probably due to continued good catches in all coastal fisheries.

Sockeye catches in Johnstone Strait this week were unexpectedly higher than anticipated, although the run strength declined on the 3rd day as the proportion (in pieces) of pinks increased. This decrease in sockeye catch suggested that the fishery extension was unwarranted in terms of pink conservation even though the Bates Pass and the "Ribbon" boundary closures were in effect. The PSC update on stock identification continued to indicate that the majority of passing sockeye were comprised of Horsefly, Chilco, late Stuart and Stellako stocks. In addition, the update confirmed that the Horsefly run consisted of two peaks and that, due to an unexpected increase in the northern diversion rate, the larger component of this stock had passed through Johnstone Strait. The PSC also estimated that the total Fraser sockeye stock for 1985 was 13 million, the highest for this cycle during the past 70 years.

Pink net catches this week were double those of the previous week and comprised approximately one third of the total weekly pink and sockeye catch (in pieces) (Fig. 4). The return of Study Area pinks continued at a lower rate than the pre-season expectation. However, the catch information to date was still too incomplete to predict the seasonal run size of pinks.

The overall catch in Area 11 was minimal this week due to high winds during the fishery. Also gear counts this week were not stable within the district due in part to poor weather conditions and shifts in fish availability.

The fishery closed August 14 for seines and August 15 for gillnets.

August 18 - 24 (week 8/3)

All four Statistical Areas were again opened this week, and the Johnstone Strait commercial fishery was allocated 2.5 days for gillnets and 2.0 days for seines. As in the past weeks, gillnets only fished in Area 11 where adverse weather conditions curtailed all fishing effort and reduced the catch. With the overall decline of sockeye catch, it was anticipated that Area 11 would be closed to net gear during the first week of September for the conservation of returning chum stocks.

The excellent sockeye catches in the Johnstone Strait district last week reflected the considerable seine effort in the area. Troll effort in Area 13 totalled 65 vessels, with the majority of these operating in the Discovery Passage area. In Sabine Channel (Area 16), both the seine and gillnet effort increased this week in anticipation of the seasonal end of sockeye run.

The total net catch of sockeye in the Johnstone Strait district this week was approximately half of previous week's catch (Fig. 4) but substantially greater in Area 16 - Sabine Channel (Table 6) due to increased sockeye run strength and fishing effort in that area.

Pink catch was markedly higher this week compared to the previous week (Fig. 4), but was still substantially below the pre-season expectation. A possible explanation was late timing of the Fraser pink stocks and/or a weaker return of the Study Area stocks. For the protection of returning pinks, the Bates Pass closure (Area 12) and a number of river mouth boundaries (Areas 12 and 13) were placed in effect, in addition to the "Ribbon" boundary already in effect in Areas 12 and 13. Monitoring of Area 12 Mainland Inlets continued. Pink escapements to the Study Area streams remained very weak and, as a result, the fishery closed as scheduled.

August 25 - 31 (week 8/4)

The gillnet and seine fishing times and area allocations for this week were the same as for the previous week, except that a portion of Area 12 (Bates Pass) was reopened. Both the gillnet and seine fishing effort were comparable with those of the previous week (Table 2) but varied in overall gear distribution. The absence of gillnet vessels in Area 11 reconfirmed the pre-season plan to close this area the following week to conserve chum stocks.

This week's catches of both pink and sockeye in Johnstone Strait were sporadic throughout the fishery with few exceptional catches reported. The sockeye catch (in pieces) was less than half that of the previous week (Fig. 4), confirming the end of the sockeye run. Over one million pinks were caught this week, although the fishery was considered moderate. At the close of the fishery, incidental catches of chinook increased in Area 13, as the major target fish (i.e. sockeye) declined in abundance. Aerial observations of Area 12 Mainland Inlets indicated that pink run strength increased in the Tribune Channel.

Continued steady catches of pinks in Areas 12, 13 and 16 could have warranted a 24-hour extension of the fishery. Instead, the managers agreed to provide an additional fishing day during the anticipated peak week in September. Consequently, the fishery closed as scheduled.

September 1 - 7 (week 9/1)

Gillnets opened for 2.5 days and seines for 2.0 days in Areas 12 and 13. Area 11 was closed for the protection of returning local chum stocks. Also Area 16 was closed because the Fraser sockeye migration was virtually over. A redistribution of gear was evident by the increase in seine effort in the upper Area 12 and a general southern movement of gillnets to Area 13 and the Fraser River .

Sockeye catches continued to decline. The net catch of pinks this week was nearly 1.8 million (Fig. 4), primarily of Fraser River origin, indicating that due to a higher than expected northern diversion rate, the peak migration of pinks had occurred. Sub-area 12-35 was opened to harvest surplus Kakweiken pinks, but both the catch and effort were minimal in that area. River mouth boundaries and the "Ribbon" boundary continued to be in effect for the protection of the weak local pink stocks. Chinook catches declined in both Areas 12 and 13 (Tables 4 and 5) but the annual total catch-to-date of chinook exceeded the previous year's catch (Table 10).

No decision was made to extend the fishery and it closed as scheduled.

September 8 - 14 (week 9/2)

The abundance of pinks in the Johnstone Strait district prompted managers to provide an additional fishing day this week, as was agreed earlier in week 8/4. Gillnets were allocated 2.5 days and seines 2.0 days. Areas 11 and 16 remained closed. Fishing effort in Areas 12 and 13 remained moderate, but the upper portions of Area 12 showed a slight increase in gillnet gear compared to previous week.

Sockeye catches continued to decline while pink catches were less than half the previous week's catch (Fig. 4). The significant drop in pink catches this week was due to a combination of an accelerated passage of late migrants through Johnstone Strait and poor fishing tides during the opening. An increase in chum catches this week signalled the beginning of Fraser River and Study Area chum returns.

A continued decline in pink and sockeye catches on the second day of the fishery prompted the managers to close as scheduled. The scheduled fishery for the next week was designated as a fall chum stock assessment fishery.

ESCAPEMENT

STUDY AREA PINKS

The annual escapements of major Study Area odd-year pink stocks are presented in Table 8 (1951-1985 data), and are listed by individual streams in Appendix 2 (1961-1985 data). The total 1985 pink escapement was estimated at 919,900, significantly below the pre-season expectation of 1.6 million and considerably below the escapements for the last two cycle years. The majority (75%) of this year's pink escapement originated from the Bond-Knight inlets. The exceptional return to this area was to the Kakweiken River where an escapement of 500,000 pinks (Appendix 2) was well in excess of the expected optimum return of 300,000. The Wakeman River, located in Kingcome Inlet, also showed a noteworthy return of 105,000 spawners, exceeding the estimated optimum of 35,000. Pink escapements to specific streams in the Upper Vancouver Island and the Mid-Vancouver Island areas showed some improvement over previous years, while those stocks returning to the Loughborough-Bute, Toba and Jervis inlets, and the Howe Sound and Burrard Inlet, remained weak.

STUDY AREA SOCKEYE

The annual escapements of Study Area sockeye stocks are presented in Table 9 (1950-1985 data). The total 1985 sockeye escapement was estimated at 85,400. This was slightly above the pre-season expectation of 79,000 but well below the 1974 escapement of 169,000. The Nimpkish stock, the largest component of the Study Area sockeye returns, totalled 75,000 fish in 1985 (88% of the Study Area total), showing a slight increase over previous years. Sockeye escapements to the remaining Study Area systems (Fulmore, Heydon and Phillips rivers and Sakinaw Lake) remained at critically low levels.

POST-SEASON REVIEW

The projected 1985 return of stocks destined to Study Area streams and migrating through Johnstone Strait was 3.4 million pinks and 0.28 million sockeye. The projected 1985 return of Fraser River stocks migrating through Johnstone Strait was 4.8 million pinks and 1.9 million sockeye. The proposed fishing regulations were developed in an attempt to harvest surplus Study Area pinks and surplus Fraser River pinks and sockeye. In addition to the harvest, the regulations would protect the weak Study Area pink and sockeye stocks, and reduce the incidental catches of chinook.

The 1985 commercial net fishery in Johnstone Strait targeting on Fraser River pink and sockeye stocks, opened in Areas 12 and 13 for eleven weeks, starting July 14 and closed September 17 (Table 1, Appendix 1). Areas 11 and 16 opened for five weeks only, starting July 28 and closed August 28. In Areas 12 and 13, gillnets opened for a total of 25.0 days and seines for a total of 20.0 days (Table 2). In Area 16 gillnets opened for a total of 13.5 days and seines for a total of 11.0 days, while in Area 11 gillnets only opened for a total of 13.5 days. Actual fishing plans followed closely the proposed fishing plans (Appendix 1).

Total (net plus troll) catches for the combined Areas 11, 12, 13 and 16 were 6.0 million pinks and 3.2 million sockeye (Table 7). These numbers exceeded the expected total pink catch (5.3 million) and sockeye catch (1.1-1.3 million). Sockeye catches peaked in mid-August and pink catches peaked approximately two weeks later (Fig. 4). Gear distribution remained fairly stable throughout the entire fishery (Table 2) due to better than average fisheries taking place concurrently on the North Coast and in Area 20.

Chinook catches were monitored closely during the fishery by computer-entered sales slip records in an attempt to identify problem areas and thereby reduce the overall incidental catch. Chinook net catch in 1985 totalled 38,000 which was higher than in previous years (Table 10).

Escapement of pinks to the Study Area totalled 919,900 and was considerably below the escapement for the last two cycle years. The majority (75%) of pink escapement originated from the Bond-Knight inlets. Escapement of sockeye to Nimpkish River totalled 75,000, showing a slight increase over previous years.

Based on the catch and escapement data, the total pink stock destined to Study Area in 1985 streams was estimated at 2.1 million, considerably below the pre-season expectation of 3.4 million. Similarly, the total sockeye stock destined to Study Area streams was estimated at 91,500, compared to the expected 284,000.

ACKNOWLEDGEMENTS

The authors wish to thank the Fishery Officers and the District Supervisor involved in the management of the Johnstone Strait fisheries in 1985. Thanks are also extended to Tracy Cone for preparing graphs and compiling tables. Alice Fedorenko reviewed and prepared the manuscript for publication under contract No. PPS 2-124; Alf Stefanson was the Scientific Authority.

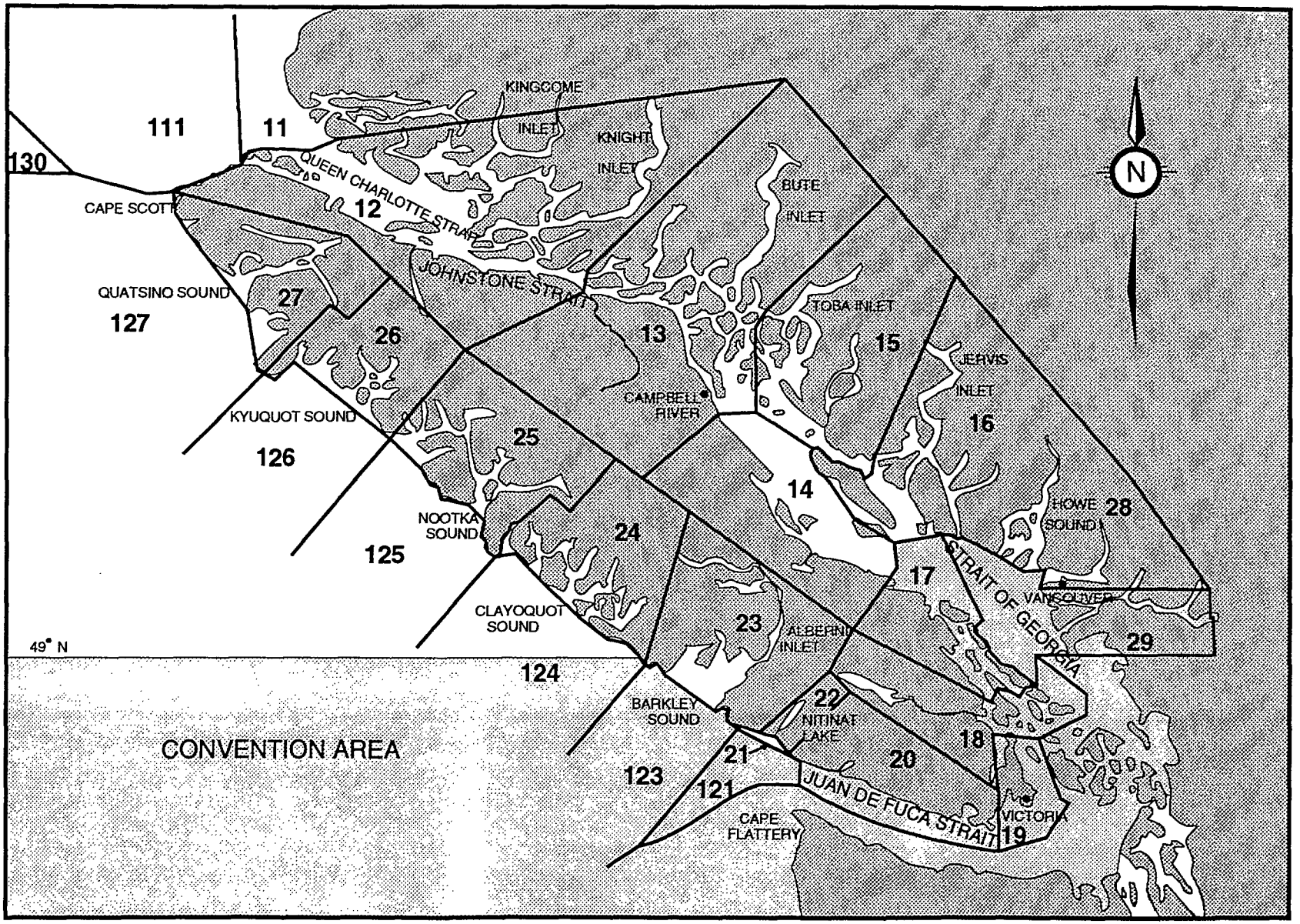

Fig. 1. Statistical Area map of southern British Columbia and adjacent waters.

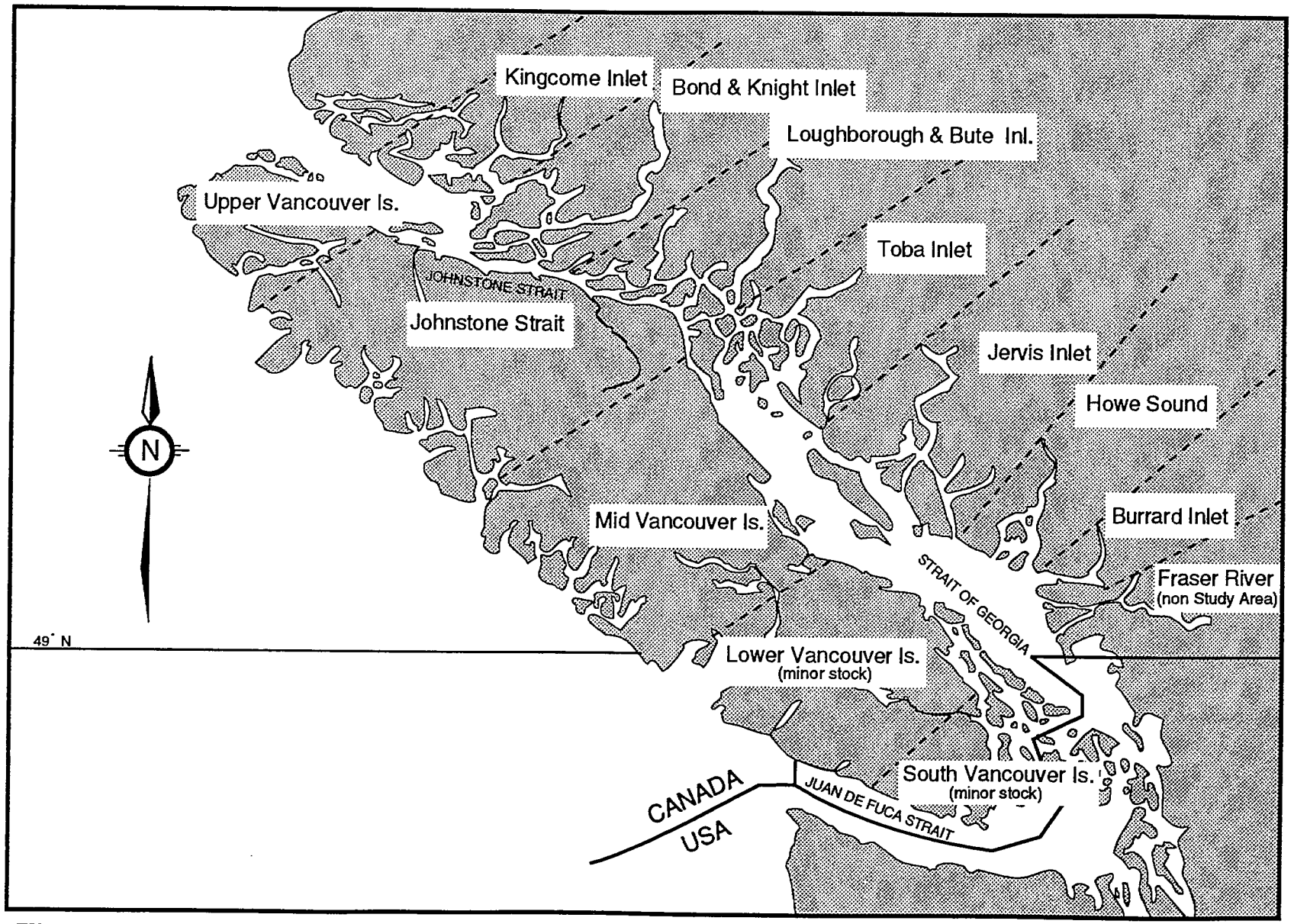

Fig. 2. Johnstone Strait Study Area showing major pink salmon stock groups.

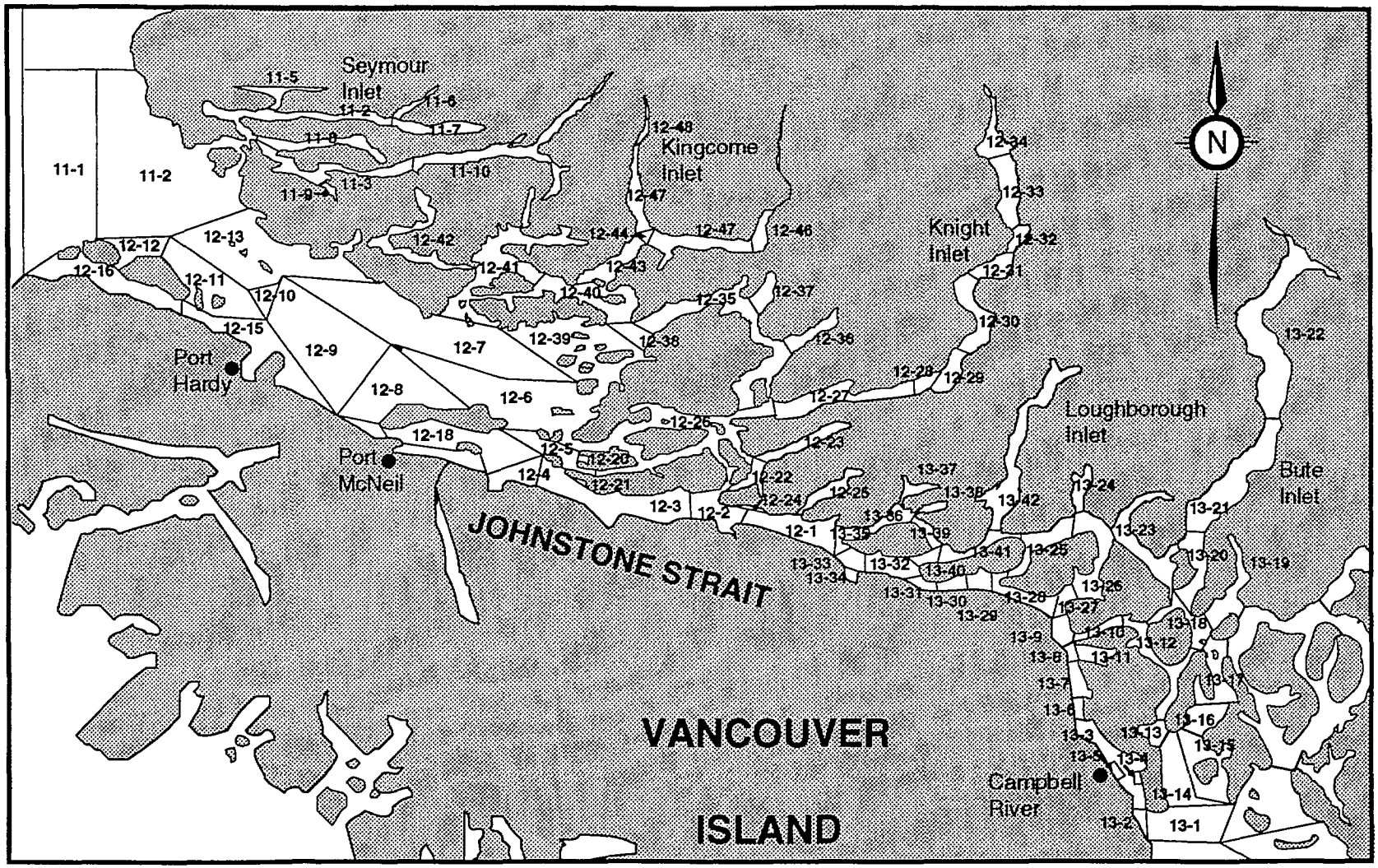

Fig. 3. Statistical sub-area map of Johnstone Strait.

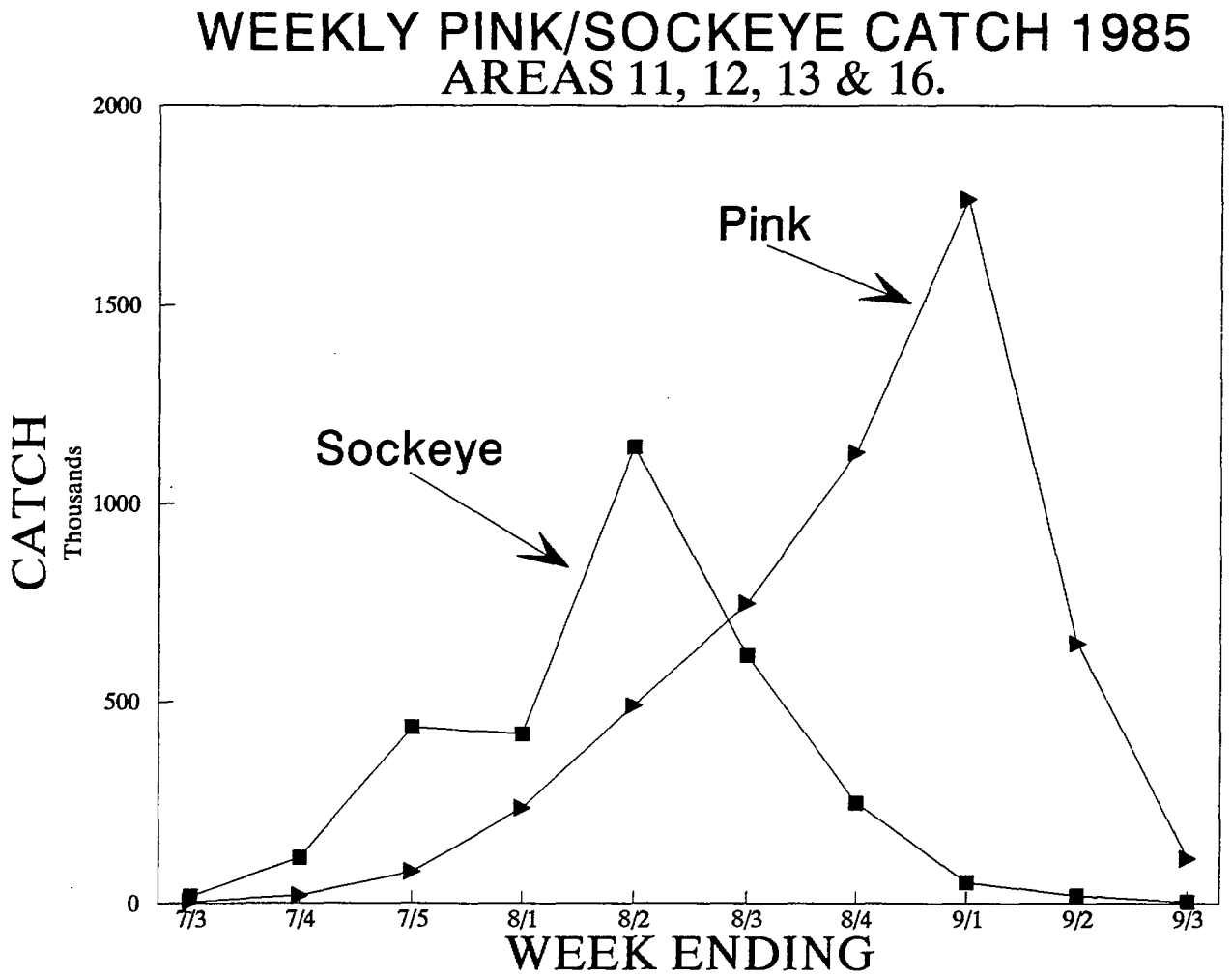

Fig. 4. Weekly net catches of pink and sockeye salmon in combined Areas 11, 12, 13 and 16 for 1985.

Table 1. Proposed fishing pattern for the Johnstone Strait Study Area, 1985. *

WEEK		DAYS OPEN PER AREA GN	SN	**AREA 11**** sub-areas (GN only)	**AREA 12** sub-areas (GN, SN)	**AREA 13** sub-areas (GN, SN)	**AREA 16***** sub-areas (GN, SN)
7/3	Jul 14-20	2.5	2.0	Closed——	(1, 3-5, 35)	(7-9, 28-32)	Closed---
7/4	Jul 21-27	2.5	2.0	Closed-----	(1, 3-5, 26, 35)	(7-9, 28-32)	Closed---
7/5	Jul 28-Aug 3	2.5	2.0	(1, 2- portion)	(1, 3-13, 26, 35)	(7-9, 28-32)	(19 - 22)
8/1	Aug 4-10	2.5	2.0	(1, 2- portion)	(1, 3-4, 5-portion, 8-11, 26, 35)	(7-9, 28-32)	(19 - 22)
8/2	Aug 11-17	2.5	2.0	(1, 2- portion)	(1, 3-4, 5-portion, 8-11, 26, 35)	(7-9, 28-32)	(19 - 22)
8/3	Aug 18-24	2.5	2.0	(1, 2- portion)	(1, 3-4, 5-portion, 8-12, 26, 35)	(7-9, 28-32)	(19 - 22)
8/4	Aug 25-31	3.5	3.0	(1, 2- portion)	(1-13)	(7-9, 28-32)	Closed---
9/1	Sep 1-7	2.5	2.0	(1, 2-portion)	(1-13)	(7-9, 28-32)	Closed---
9/2	Sep 8-14	1.5	1.0	(1, 2-portion)	(1-13)	(7-9, 28-32)	Closed---
9/3	Sep 15-21	1.5	1.0	(1, 2-portion)	(1-13)	(7-9, 28-32)	Closed---

* Proposed sub-area openings are shown in brackets.
Starting time for all openings is Sunday, 1800 h.
Note that for Areas 11, 12, and 13, gillnet fishing times are an additional 12 hours over seine fishing times, ending 0600 hours the following morning. Also for Areas 11, 12 and 13, possible extension on pink harvest during week 8/3 (August 18-24).

** Area 11 - gillnet fishing only.

*** Area 16 - weekly openings for gillnets are the same as for seines, i.e. generally 2.0 days per week.

(cont'd)

Table 1 (cont'd). Comments regarding openings per Area and week.

AREA 11	
To Jul 27	- Closed.
Jul 28-Sep 21	- Sub-area 11-1 and portion of 11-2 seaward of Secretary Point - Pine Island - Apex of 11-2 Cape Caution line. For gillnets only.
Sep 22	- Closed for the balance of the season.
AREA 12	
To Jul 13	- Closed.
Jul 14-20	- "Ribbon" Boundary in effect south of Cracroft Point.
Jul 21-27	- "Ribbon" Boundary in effect south of Cracroft Point.
Jul 28-Aug 3	- "Ribbon" Boundary in effect south of Cracroft Point.
Aug 4-24	- Portion of sub-area 12-5 (open inside a line from Donegal Head to Kelp Point on Hanson Island and a line from the most westerly Point of Hanson Island to Donegal Head). "Ribbon" Boundary in effect south of a boundary sign at the east end of Big Bay, Hanson Island.
Aug 25-Sep 7	- "Ribbon" Boundary in effect south of Cracroft Point.
Sep 8-14	- "Ribbon" Boundary in effect south of Cracroft Point.
Sep 15-21	- "Ribbon" Boundary will not be in effect this week.
Sep 22	- Further fishing dependent on strength of returning chum stocks.
AREA 13	
To Jul 13	- Closed.
Jul 14-20	- "Ribbon" Boundary in effect.
Jul 21-Sep 7	- "Ribbon" Boundary in effect.
Sep 8-14	- "Ribbon" Boundary in effect.
Sep 15-21	- "Ribbon" Boundary not in effect this week.
Sep 22	- Further fishing dependent on strength of returning chum stocks.
AREA 16	
To Jul 27	- Closed.
Jul 28-Aug 24	- Fall bunt size in effect.
Aug 25	- Closed for the balance of season.

Table 2. Weekly number of vessels and days fished in Areas 11, 12, 13 and 16 to September 21, 1985.

	AREA 11		AREA 12				AREA 13				AREA 16			
	Vessels	Days	Vessels		Days	Open	Vessels		Days	Open	Vessels		Days	Open
WEEK ENDING	GN	GN	GN	SN	GN	SN	GN	SN	GN	SN	GN	SN	GN	SN
7/3 Jul. 20	Closed		13	45	2.5	2.0	13	20	2.5	2.0	Closed	Closed		
7/4 Jul. 27	Closed		84	90	2.5	2.0	9	25	2.5	2.0	Closed	Closed		
7/5 Aug. 03	38	2.5	352	130	2.5	2.0	11	27	2.5	2.0	17	4	2.5	2.0
8/1 Aug. 10	96	2.5	241	145	2.5	2.0	12	38	2.5	2.0	28	9	2.5	2.0
8/2 Aug. 17	5	3.5	239	108	3.5	3.0	15	54	3.5	3.0	32	8	3.5	3.0
8/3 Aug. 24	0	2.5	189	165	2.5	2.0	20	80	2.5	2.0	76	37	2.5	2.0
8/4 Aug. 31	0	2.5	160	168	2.5	2.0	37	55	2.5	2.0	80	18	2.5	2.0
9/1 Sept. 07	Closed		104	219	2.5	2.0	47	70	2.5	2.0	Closed	Closed		
9/2 Sept. 14	Closed		150	192	2.5	2.0	39	93	2.5	2.0	Closed	Closed		
9/3 Sept. 21	Closed		152	181	1.5	1.0	25	86	1.5	1.0	Closed	Closed		
9/4 Sept. 28														
SUB–TOTAL		13.5			25.0	20.0			25.0	20.0			13.5	11.0

Note: One fishing day is equivalent to a 24 hour opening.

Table 3. Weekly salmon catches by species and gear in Area 11, 1985.

DATE	WEEK	# OF VESSELS		SOCKEYE			COHO			PINK			CHUM			CHINOOK		
		GILLNET	SEINE	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL
TO JUL 13						1,190			20,084			258			5,067			3,231
JUL 14–20	7/3	CLOSED	CLOSED			913			7,727			1,386			3,825			752
JUL 21–27	7/4	CLOSED	CLOSED			3,308			14,026			14,768			15,319			819
JUL 28– 3	7/5	38	0	33,150	0	3,216	664	0	8,310	2,504	0	31,120	1,099	0	15,524	315	0	1,264
AUG 4–10	8/1	96	0	58,263	0	10,964	882	0	9,746	7,937	0	75,705	2,740	0	5,714	274	0	936
AUG 11–17	8/2	5	0	2,263	0	6,760	85	0	2,486	908	0	29,383	85	0	3,170	21	0	267
AUG 18–24	8/3	0	0		0	4,109	0	0	2,420	0	0	72,460	0	0	1,937	0	0	459
AUG 25–31	8/4	0	0	159	0	2,416	2	0	4,652	1,097	0	171,192	5	0	3,019	8	0	489
SEP 1– 7	9/1					653			1,128			110,132			1,439			408
SEP 8–14	9/2					332			1,599			26,879			951			458
SEP 15–21	9/3					2			157			1,379			151			79
SEP 22–28	9/4								220			3,231			150			66
SEP 29– 5	10/1					31			44			10,459			131			14
OCT 6–12	10/2																	
OCT 13–19	10/3					1			1			11			1			
OCT 20–26	10/4					2						4						
OCT 27– 2	10/5								9			52						
TOTAL				93,835	0	33,897	1,633	0	72,609	12,446	0	548,419	3,929	0	56,398	618	0	9,242

From B.C. Catch Statistics.

Table 4. Weekly salmon catches by species and gear in Area 12, 1985.

		# OF VESSELS		SOCKEYE			COHO			PINK			CHUM			CHINOOK		
DATE	WEEK	GILLNET	SEINE	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL
TO JUL 13				1,753	435	354	12	5	2,506	50	53	97	24	2	231	11	13	1,120
JUL 14–20	7/3	13	45	1,929	8,451	89	332	1,349	345	149	1,793	34	127	829	6	124	1,424	376
JUL 21–27	7/4	84	90	18,735	72,571	57	583	2,103	114	1,114	14,647	71	204	1,166	8	260	1,241	101
JUL 28– 3	7/5	352	130	106,494	218,554	3,188	4,460	7,092	1,172	8,034	58,902	5,835	3,206	2,265	563	895	2,262	514
AUG 4–10	8/1	241	145	49,117	213,233	2,806	3,937	9,331	1,274	11,968	197,769	4,876	2,493	10,339	169	310	1,458	271
AUG 11–17	8/2	239	108	118,999	661,845	1,762	3,530	6,005	520	26,105	377,414	2,819	3,868	7,505	208	931	3,815	132
AUG 18–24	8/3	189	165	59,889	290,575	2,559	4,451	6,412	603	36,169	538,994	17,389	3,649	5,436	117	819	5,284	390
AUG 25–31	8/4	160	168	21,847	116,513	5,861	2,979	9,627	889	45,776	784,902	22,217	1,857	7,707	319	450	5,099	363
SEP 1– 7	9/1	104	219	4,206	29,616	451	4,354	18,291	331	58,437	1,313,454	40,445	2,359	24,094	438	244	2,313	148
SEP 8–14	9/2	150	192	1,747	10,845	198	2,844	13,273	466	15,821	439,044	21,059	4,702	23,419	373	264	1,741	105
SEP 15–21	9/3	152	181	308	1,185	42	2,377	12,063	136	2,114	63,494	5,128	5,306	28,578	63	169	323	36
SEP 22–28	9/4								22				171					4
SEP 28– 5	10/1																	
OCT 6–12	10/2	284	237	3	6		1,039	1,367		54	355		33,645	203,491		186	314	
OCT 13–19	10/3							4			1			4,177				
OCT 20–26	10/4																	
OCT 27– 2	10/5													1,446				
TOTAL				385,027	1,623,829	17,367	30,898	86,922	8,378	205,791	3,790,822	119,970	61,611	320,454	2,495	4,663	25,287	3,560

From B.C. Catch Statistics.

Table 5. Weekly salmon catches by species and gear in Area 13, 1985.

		# OF VESSELS		SOCKEYE			COHO			PINK			CHUM			CHINOOK		
DATE	WEEK	GILLNET	SEINE	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL
TO JUL 13						19			10,056			585			9			10,457
JUL 14–20	7/3	13	20	236	3,903	45	216	726	6,663	17	216	1,877	7	59	598	56	489	164
JUL 21–27	7/4	9	25	1,340	19,161	1,291	116	1,166	8,238	37	2,047	297	8	46	6	63	824	119
JUL 28– 3	7/5	11	27	4,168	44,732	6,151	76	965	715	95	7,351	1,815	11	154	8	72	1,025	889
AUG 4–10	8/1	12	38	2,625	81,668	6,309	430	1,657	810	255	15,849	978	12	255	8	114	763	1,128
AUG 11–17	8/2	15	54	7,368	300,641	7,102	66	1,058	1,190	636	80,252	5,429	31	284	24	61	1,843	2,316
AUG 18–24	8/3	20	80	6,892	145,857	12,151	251	1,554	1,801	2,202	139,250	16,326	67	627	46	138	3,033	2,302
AUG 25–31	8/4	37	55	5,252	52,341	5,534	347	1,874	1,524	5,286	240,703	25,137	172	1,686	121	120	2,023	1,486
SEP 1– 7	9/1	47	70	1,091	15,473	1,795	613	5,374	266	4,932	389,560	38,558	259	2,957	222	179	977	180
SEP 8–14	9/2	39	93	264	5,275	630	385	6,871	431	2,445	191,295	24,580	998	6,447	200	33	494	83
SEP 15–21	9/3	25	86	40	797	97	245	2,762	111	207	43,723	4,109	735	7,657	59	27	259	35
SEP 22–28	9/4								425						26			
SEP 28– 5	10/1																	
OCT 6–12	10/2	187	184	1	10		280	805		30	567		9,500	152,099		22	140	
OCT 13–19	10/3																	
OCT 20–26	10/4																	
OCT 27– 2	10/5													70				
TOTAL				29,277	669,858	41,124	3,025	24,812	32,230	16,142	1,110,813	119,691	11,800	172,341	1,327	885	11,870	19,159

From B.C. Catch Statistics.

Table 6. Weekly salmon catches by species and gear in Area 16, 1985.

		# OF VESSELS		SOCKEYE			COHO			PINK			CHUM			CHINOOK		
DATE	WEEK	GILLNET	SEINE	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL	GILLNET	SEINE	TROLL
TO JUL 13									117									80
JUL 14–20	7/3	CLOSED	CLOSED						1,230			18						
JUL 21–27	7/4	CLOSED	CLOSED			41			1,408			16						
JUL 28– 3	7/5	17	4	6,552	22,029	76	83	347	23	76	416	6	1	47		120	370	21
AUG 4–10	8/1	28	9	2,091	11,532	205	127	660	232	81	252	7		2		42	309	86
AUG 11–17	8/2	32	8	21,099	31,144	326	1,152	876	796	1,209	3,541	238	20	8	17	647	431	337
AUG 18–24	8/3	76	37	34,969	79,263	683	2,070	2,183	235	3,154	29,157	965	102	91	1	1,089	1,066	136
AUG 25–31	8/4	80	18	34,584	15,874	558	1,515	636	222	19,486	32,541	1,464	195	60		896	442	221
SEP 1– 7	9/1					266			210			3,596			13			348
SEP 8–14	9/2					172			30			2,580			6			37
SEP 15–21	9/3					3			174			103			7			2
SEP 22–28	9/4								435			8			1			27
SEP 28– 5	10/1								225						22			
OCT 6–12	10/2																	
OCT 13–19	10/3																	
OCT 20–26	10/4																	
OCT 27– 2	10/5																	
TOTAL				99,295	159,842	2,330	4,947	4,702	5,337	24,006	65,907	9,001	318	208	67	2,794	2,618	1,295

From B.C. Catch Statistics.

Table 7. Weekly net, troll and total catches of sockeye and pink salmon in combined Areas 11, 12, 13 and 16 to September 21, 1985.

		SOCKEYE			PINK		
DATE	WEEK	NET	TROLL	TOTAL	NET	TROLL	TOTAL
TO JUL 13		2,188	1,563	3,751	103	940	1,043
JUL 14–20	7/3	15,709	1,047	16,756	2,175	3,315	5,490
JUL 21–27	7/4	111,807	4,697	116,504	17,845	15,152	32,997
JUL 28– 3	7/5	435,679	12,631	448,310	77,378	38,776	116,154
AUG 4–10	8/1	418,529	20,284	438,813	234,111	81,566	315,677
AUG 11–17	8/2	1,143,359	15,950	1,159,309	490,065	37,869	527,934
AUG 18–24	8/3	617,445	19,502	636,947	748,926	107,140	856,066
AUG 25–31	8/4	246,570	14,369	260,939	1,129,791	220,010	1,349,801
SEP 1– 7	9/1	50,386	3,165	53,551	1,766,383	192,731	1,959,114
SEP 8–14	9/2	18,131	1,332	19,463	648,605	75,098	723,703
SEP 15–21	9/3	2,330	144	2,474	109,538	10,719	120,257
SEP 22–28	9/4						
SUB–TOTAL		3,062,133	94,684	3,156,817	5,224,920	783,316	6,008,236

From B.C. Catch Statistics.

Table 8. Odd year pink escapements (in thousands) of major stocks to the Johnstone Strait Study Area, in comparison to optimum escapements, 1951 - 1985.

Stock/System	Optimum Escapement	1985	1983	1981	1979	1977	1975	1973	1971	61-69	51-59
Upper Vancouver Is	61.4	36.5	15.9	0.4	0.3	2.2	7.7	17.2	6.2	15.5	37.0
Johnstone Strait	89.3	21.5	26.8	16.3	7.0	6.3	98.2	71.9	76.6	73.0	57.9
Mid Vancouver Is	24.3	16.8	25.8	29.0	24.7	12.8	42.9	9.6	3.8	12.3	93.4
Kingcome Inlet	42.9	115.5	160.0	190.0	22.3	50.0	49.5	100.7	707.7	29.7	36.6
Bond to Knight	536.5	687.6	1,152.5	661.4	157.1	104.6	987.6	523.0	395.3	147.0	153.4
Loughborough/Bute	177.2	25.8	195.5	110.3	29.3	44.3	249.1	240.7	95.5	81.4	89.4
Toba Inlet	88.5	1.6	0.8	11.6	8.7	11.2	24.8	26.5	37.9	38.4	107.6
Jervis Inlet	256.4	3.2	7.1	29.6	13.7	26.0	27.4	10.8	47.7	117.4	118.6
Howe Sound	422.5	1.3	1.6	14.0	4.8	3.1	43.6	138.1	24.1	253.1	116.9
Burrard Inlet	100.0	10.2	25.1	41.5	22.5	22.1	35.4	35.2	35.2	63.9	87.3
GRAND TOTAL	1,798.9	919.9	1,611.0	1,104.2	290.3	282.6	1,566.1	1,173.7	1,430.0	831.7	898.0

Table 9. Sockeye salmon escapments (In thousands) to streams In the Johnstone Strait Study Area, 1950–1985.

YEAR	NIMPKISH	FULMORE	HEYDON	PHILLIPS	SAKINAW	TOTAL
1950	100.0	3.5	3.5	3.5	3.5	114.0
1951	100.0	1.5	7.5	15.0	3.5	127.5
1952	100.0	0.7	1.5	3.5	7.5	113.2
1953	100.0	3.5	0.2	0.4	1.1	105.2
1954	75.0	1.5	0.2	3.5	4.1	84.3
1955	75.0	1.5	1.5	1.5	5.0	84.5
1956	75.0	0.7	0.7	1.5	2.1	80.0
1957	130.0	7.5	7.5	7.5	4.3	156.8
1958	75.0	1.5	0.1	3.5	4.3	84.4
1959	75.0	0.2	0.2	3.5	13.0	91.9
1960	75.0	1.5	NO	0.7	4.5	81.7
1961	75.0	3.5	0.4	1.5	0.7	81.1
1962	100.0	1.5	0.4	1.5	3.5	106.9
1963	150.0	1.5	0.4	3.5	7.5	162.9
1964	100.0	3.5	0.2	3.5	3.5	110.7
1965	30.0	3.5	0.2	3.5	0.7	37.9
1966	120.0	1.5	7.5	3.5	3.5	136.0
1967	100.0	0.7	3.5	1.5	6.0	111.7
1968	35.0	0.4	3.5	3.5	14.0	56.4
1969	100.0	1.5	3.5	1.5	1.2	107.7
1970	50.0	3.5	7.5	0.7	5.0	66.7
1971	75.0	7.5	4.5	3.5	8.0	98.5
1972	60.0	7.5	3.5	4.5	4.5	80.0
1973	100.0	10.0	3.5	3.5	1.5	118.5
1974	150.0	7.0	3.5	2.5	6.0	169.0
1975	40.0	6.0	3.5	1.5	16.0	67.0
1976	35.0	5.0	3.5	3.5	6.0	53.0
1977	15.0	1.5	3.5	1.5	1.2	22.7
1978	8.5	0.1	3.0	1.5	4.0	17.1
1979	20.0	0.5	2.0	1.5	11.0	35.0
1980	24.0	0.1	2.0	2.5	2.8	31.4
1981	60.0	0.8	4.5	5.0	3.0	73.3
1982	60.0	1.5	1.0	10.0	3.4	75.9
1983	70.0	1.5	NO	10.0	1.6	83.1
1984	50.5	NO	1.0	1.5	1.1	54.1
1985	75.0	1.0	NO	7.1	2.3	85.4
AVERAGE						
50–59	90.5	2.2	2.3	4.3	4.8	104.2
60–69	88.5	1.9	2.0	2.4	4.5	99.3
70–79	55.4	4.9	3.8	2.4	6.3	72.8
80–85	56.6	0.8	1.4	6.0	2.4	67.2

Abbreviations used: NO = None Observed.

Table 10. Weekly cumulative net catches of chinook adults in combined Areas 11, 12 and 13 for 1982 – 1985.

WEEK ENDING	1985			1984			1983			1982		
	GN	SN	TOTAL 0	GN	SN	TOTAL	GN	SN	TOTAL	GN	SN	TOTAL
TO 6–2	0	0	0	0	0	0	0	0	0	0	0	0
6–3	0	0	0	0	0	0	0	0	0	0	0	0
6–4	0	13	13	0	0	0	0	0	0	1	0	1
7–1	0	13	13	0	0	0	0	0	0	1	0	1
7–2	11	13	24	0	0	0	137	7	144	103	1,174	1,277
7–3	157	1,639	1,796	459	510	969	232	997	1,229	237	2,631	2,868
7–4	465	3,468	3,933	656	1,687	2,343	381	1,881	2,262	657	4,421	5,078
7–5	1,636	6,392	8,028	1,017	3,346	4,363	966	3,474	4,440	1,442	7,426	8,868
8–1	2,217	8,365	10,582	1,666	5,361	7,027	1,374	5,915	7,289	1,856	8,268	10,124
8–2	3,064	13,564	16,628	2,809	7,914	10,723	1,961	9,077	11,038	2,276	12,462	14,738
8–3	3,836	21,103	24,939	3,652	12,631	16,283	2,348	11,677	14,025	2,974	15,780	18,754
8–4	4,343	27,532	31,875	3,906	13,487	17,393	3,118	18,223	21,341	3,446	18,808	22,254
9–1	4,722	30,421	35,143	3,906	13,532	17,438	3,261	20,954	24,215	4,518	20,829	25,347
9–2	4,905	32,027	36,932	3,907	13,558	17,465	3,356	22,269	25,625	4,906	21,513	26,419
9–3	5,088	32,560	37,648	4,043	14,280	18,323	3,562	23,816	27,378	5,118	22,293	27,411
9–4	5,088	32,560	37,648	4,043	14,314	18,357	3,772	24,574	28,346	5,389	22,446	27,835
10–1	5,088	32,560	37,648	4,043	14,314	18,357	3,772	24,574	28,346	5,870	22,876	28,746
10–2	5,287	32,759	38,046	4,043	14,314	18,357	3,772	24,574	28,346	6,254	23,005	29,259
10–3	5,287	32,759	38,046	4,043	14,315	18,358	3,772	24,574	28,346	6,374	23,065	29,439
10–4	5,287	32,759	38,046	4,043	14,315	18,358	3,772	24,574	28,346	6,487	23,092	29,579
10–5	5,287	32,759	38,046	4,043	14,315	18,358	3,772	24,574	28,346	6,487	23,092	29,579
11–1	5,287	32,759	38,046	4,043	14,315	18,358	3,772	24,574	28,346	6,487	23,092	29,579

From: B.C. Catch Statistics.

Appendix 1 . Weekly net fishing season: pre-season plans, in-season management and rationale, Areas 11, 12, 13 and 16, 1985.

Date	Pre-season fishing plan by Area (sub-area)	Pre-season rationale	In-season management changes from pre-season	Rationale for alteration of pre-season plans
Jul 14-20 (wk 7/3)	GN - 2.5 days SN - 2.0 days			
	Area 11 - Closed.	Area 11 closed for protection of Nimpkish sockeye and due to limited Fraser sockeye availability.		
	Area 12 (1, 3-5, 35) - Opened.	Area 12 upper portion (above Lewis Pt.) closed for protection of Nimpkish sockeye. Area 12 (35-mainland) opened to harvest early Study Area pink stocks. Balance of areas opened to harvest Fraser sockeye. Ribbon boundary in effect. Adam River closed.	Area 12 (26) - Opened. Area 12 (26, 35) - Closed July 15, 1600 h.	Co-management group indicated early pinks available in Area 12 (26). Future management decisions should reflect the fact that there are not sufficient stocks available for harvest during the early season in the mainland. Pink catches were less than 25% of the total catch, with substantial chinook and chum bi-catch.
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 - Closed.			
Jul 21-27 (wk 7/4)	GN - 2.5 days SN - 2.0 days			
	Area 11 - Closed.			
	Area 12 (1, 3-5, 26, 35) - Opened.		Area 12 (26, 35) - Closed.	Previous week's fishery did not indicate a fishable surplus. Confirmed with aerial flight (July 21).
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 - Closed.			

Appendix 1 (cont'd).

Date	Pre-season fishing plan by Area (sub-area)	Pre-season rationale	In-season management changes from pre-season	Rationale for alteration of pre-season plans
Jul 28-Aug 3 (wk 7/5)	GN - 2.5 days SN - 2.0 days			
	Area 11 (1 , 2-portion), GN only - Opened.	Open to harvest Fraser sockeye while limiting access to local chum stocks in Seymour/Belize.		
	Area 12 (1, 3-13, 26, 35) - Opened.	Open upper Area 12 to harvest Fraser sockeye (Nimpkish sockeye inside boundaries).	Area 12 (7, 13, 26, 35) remain closed.	Mainland pinks in approach areas and in mainland appear poor from aerial and patrol-boat assessments.
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 (19-22) - Opened.	Area 16 open to harvest Fraser River sockeye.	Area 16(22) - Closed.	The Crescent Bay (Upper Texada Island) in Area 16 closed for conservation of chinook stocks.
Aug 4-10 (wk 8/1)	GN - 2.5 days SN - 2.0 days			
	Area 11 (1 , 2-portion), GN only - Opened.			
	Area 12 (1, 3-5 - portion of Double Bay, 8-11, 26, 35) - Opened.	Mainland portion of Queen Charlotte Strait and Bates Pass areas closed to provide corridor for Study Area pinks. Double Bay area (12-5) reduced in area.	Area 12 (26, 35) - Closed.	As above.
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 (19-22) - Opened.		Area 16 (22) - Closed.	As above.

Appendix 1 (cont'd).

Date	Pre-season fishing plan by Area (sub-area)	Pre-season rationale	In-season management changes from pre-season	Rationale for alteration of pre-season plans
Aug 11-17 (wk 8/2)	GN - 2.5 days SN - 2.0 days		GN - 3.5 days SN - 3.0 days	All areas extended by one fishing day because Fraser sockeye catches and stock size larger than expected. Also, chinook effort below expectations.
	Area 11 (1 , 2-portion) , GN only - Opened.			
	Area 12 (1, 3-5 - portion, 8-11, 26, 35) - Opened.		Area 12 (26, 35) - Closed.	As above.
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 (19-22) - Opened.		Area 16 (22) - Closed.	As above.
Aug 18-24 (wk 8/3)	GN - 2.5 days SN - 2.0 days			
	Area 11 (1 , 2-portion), GN only - Opened.			
	Area 12 (1, 3-5 - portion, 8-12, 26, 35) - Opened.	Area 12 (12) Bates Pass scheduled to open as Study Area pinks have cleared upper portion of Area 12.	Area 12 (12, 26, 35) - Closed.	Area 12 (12) - Bates Pass - closed to ensure passage of late Study Area pinks (Mainland Inlets late runs). Area 12 (26, 35) - as above.
	Area 13 (7-9, 28-32) - Opened.		Area 13 (30) portion of Bear River boundary expanded.	Provide sanctuary area for odd year Bear/Quinsam pink salmon.
	Area 16 (19-22) - Opened.		Area 16 (22) - Closed.	

Appendix 1 (cont'd).

Date	Pre-season fishing plan by Area (sub-area)	Pre-season rationale	In-season management changes from pre-season	Rationale for alteration of pre-season plans
Aug 25-31 (wk 8/4)	GN - 3.5 days SN - 3.0 days		GN - 2.5 days SN - 2.0 days	Additional fishing day to be provided later. Timing of Fraser pinks indicated the migration peak would occur in subsequent week(s).
	Area 11 (1 , 2-portion), GN only - Opened.			
	Area 12 (1-13) - Opened.	All Area 12 fishing areas opened as Study Area pinks passed fishing areas. Mainland Inlets - Area 12 (26, 35) - Closed.	Area 12 (2, 7, 13) remain closed.	Adam River pinks remain in estuary due to low water. Mainland approach areas remain closed for late pink migration.
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 - Closed.	Fraser sockeye migration over and Area 16 is not a Fraser pink harvesting area.	Area 16 (19-21) remain open.	Harvest of late migration Fraser sockeye.
Sep 1-7 (wk 9/1)	GN - 2.5 days SN - 2.0 days			
	Area 11 (1 , 2-portion), GN only - Opened.		Area 11 - Closed.	Area 11 closed to protect local chum stocks and because Fraser sockeye migration ceased.
	Area 12 (1-13) - Opened.		Area 12 (2, 7, 13) - Closed.	Area 12 (2, 7, 13) as above.
			Area 12 (35) - Opened.	Area 12 (35) opened to harvest surplus Kakweiken pinks.
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 - Closed.	Area 16 closed because Fraser sockeye migration virtually over.		

Appendix 1 (cont'd).

Date	Pre-season fishing plan by Area (sub-area)	Pre-season rationale	In-season management changes from pre-season	Rationale for alteration of pre-season plans
Sep 8-14 (wk 9/2)	GN - 1.5 days SN - 1.0 days	Reduced fishing days for conservation of early Fraser River chum.	GN - 2.5 days SN - 2.0 days	Announced one additional fishing day prior to opening to provide for further Fraser River harvesting.
	Area 11 (1 , 2-portion), GN only - Opened.		Area 11 - Closed.	Area 11 as above.
	Area 12 (1-13) - Opened.		Area 12 (2, 7, 13) - Closed.	Area 12 (2, 7, 13) as above.
			Area 12 (18) - Opened.	Provide increased harvesting area for Fraser River pinks.
	Area 13 (7-9, 28-32) - Opened.		Area 13 (10) - Opened.	Okisolio Channel opened to provide additional harvest area for Fraser River pinks. Mainland Area 13 pinks behind boundaries.
	Area 16 - Closed.			
Sep 15 - 21 (wk 9/3)	GN - 1.5 days SN - 1.0 days			The scheduled fishery for this week was designated as a fall chum stock assessment fishery.
	Area 11 (1 , 2-portion), GN only - Opened.		Area 11 - Closed.	
	Area 12 (1-13) - Opened.			
	Area 13 (7-9, 28-32) - Opened.			
	Area 16 - Closed.			

Appendix 2. Pink salmon escapements to streams and sub-areas in the Johnstone Strait Study Area, 1961 -1985 (odd years).

Sub-area / river	1985	1983	1981	1979	1977	1975	1973	1971	61-69 AVERAGE
UPPER VANCOUVER IS.									
Cluxewe R.	3.5	0.5	0.0	0.1	0.0	2.1	1.8	0.4	2.3
Keogh R.	32.7	15.0	UN	0.2	2.1	2.5	7.0	3.5	8.5
Nahwitti R.	0.0	N/O	–	0.0	N/O	0.1	N/O	0.2	0.5
Quatse R.	0.2	0.1	N/O	0.0	N/O	0.3	1.0	1.5	1.0
Shushartie R.	N/O	0.1	–	N/O	N/O	N/O	N/O	0.2	2.3
Songhees R.	0.0	0.1	–	N/O	N/O	N/O	0.0	N/O	0.1
Strandby R.	N/O	0.1	–	0.0	N/O	0.4	0.4	0.0	0.5
Tsulquate R.	0.1	0.0	0.4	0.0	0.0	2.3	7.0	0.4	0.3
MISC.	–	–	–	–	–	–	–	–	
TOTAL	36.5	15.9	0.4	0.3	2.2	7.7	17.2	8.2	15.5
JOHNSTONE STRAIT									
Adam R.	20.0	15.0	10.0	5.0	4.0	70.0	60.0	50.0	53.0
Kokish R.	N/O	NO	–	0.7	0.0	0.2	0.3	0.0	0.7
Nimpkish R.	UN	0.1	UN	0.0	0.1	0.6	N/O	4.0	1.2
Menzies Cr.	N/O	0.0	N/O	N/O	N/O	0.0	UN	N/O	0.0
Mohun Cr.	N/O	0.0	0.0	0.0	0.0	N/O	N/O	N/O	0.0
Salmon R.	1.5	10.0	6.0	1.2	1.5	25.0	7.5	15.0	16.0
Tsitika R.	0.0	0.1	UN	0.1	0.2	2.0	4.0	7.5	1.6
MISC.	0.0	1.6	0.3	0.0	0.5	0.4	0.1	0.1	0.5
TOTAL	21.5	28.8	18.3	7.0	8.3	98.2	71.9	76.6	73.0
MID-VANCOUVER IS.									
Campbell R.	0.4	1.5	2.0	2.0	0.2	1.5	3.5	0.8	0.4
Englishman R.	N/O	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Oyster R.	0.2	0.2	0.1	0.4	0.2	0.9	1.2	1.4	1.4
Puntledge R.	1.0	1.7	5.4	8.0	4.0	0.4	0.7	0.3	3.6
Quinsam R.	13.9	20.9	15.8	7.1	4.5	30.0	0.8	0.4	2.5
Quinsam Hatchery	16.7	8.0	5.7	2.5					0.0
Tsolum R.	1.0	1.2	5.1	7.0	3.8	10.0	3.4	0.8	4.3
MISC.	0.4	0.3	0.5	0.3	0.0	0.0	0.1	0.1	0.1
TOTAL	18.8	25.8	29.0	24.7	12.8	42.9	9.6	3.8	12.3
Quinsam River and hatchery data from 1978 onward supplied by Quinsam hatchery staff. Hatchery escapement is included for years 1983 and 1985 and may include experimental pinks collected for the Pacific Biological Station.									
KINGCOME INLET									
Embly R.	0.1	N/O	0.0	N/O	0.0	0.0	0.1	0.2	0.0
Kingcome R.	9.9	10.0	8.0	0.3	25.0	9.0	20.0	7.5	3.6
Wakeman R.	105.0	150.0	184.0	22.0	25.0	40.0	80.0	700.0	25.5
MISC	0.6	–	0.0	–	–	0.5	0.6	0.0	0.6
TOTAL	115.5	180.0	190.0	22.3	50.0	49.5	100.7	707.7	29.7
BOND TO KNIGHT									
Ahnuati R.	13.0	9.0	7.0	5.0	4.0	20.0	3.0	3.5	12.5
Ahta Valley Cr.	–	N/O	2.0	0.1	0.1	0.2	1.2	3.5	1.9
Fraser Cr. (Gilford)	N/O	N/O	–	0.0	0.0	0.0	0.0	N/O	0.1
Glendale R.	140.0	300.0	20.0	21.0	16.0	150.0	200.0	150.0	75.0
Hoyea Cr.	0.2	2.2	0.8	0.3	1.0	7.5	1.5	0.8	0.2
Kakweiken R.	500.0	800.0	600.0	100.0	75.0	800.0	300.0	220.0	45.0
Klinaklini R.	0.2	0.2	0.0	0.0	NO	0.1	0.1	0.8	2.0
Kwalatte R.	2.8	2.3	1.0	N/O	0.1	0.0	0.0	0.0	0.3
Lull Cr.	2.0	2.6	0.3	0.2	0.4	1.6	1.6	1.5	0.0
Viner R.	0.1	1.0	0.2	0.5	N/O	0.1	0.3	0.0	0.9
Waterfall (Ahta R.)	28.0	35.0	30.0	30.0	8.0	8.0	15.0	15.0	8.7
MISC	1.3	0.3	0.1	0.0	0.0	0.1	0.3	0.2	0.3
TOTAL	687.6	1152.5	681.4	157.1	104.6	987.6	523.0	395.3	147.0

Appendix 2 (cont'd).

Sub–area / river	1985	1983	1981	1979	1977	1975	1973	1971	61–69 AVERAGE
LOUGHBOROUGH TO BUTE									
Apple R.	1.5	50.0	5.0	3.0	5.0	35.0	50.0	35.0	15.3
Cumsack Cr.	–	0.0	N/O	N/O	N/O	N/O	N/O	N/O	
Eva Cr. (Teaquahan)	–	N/O	N/O	N/O	N/O	N/O	N/O	N/O	1.5
Fulmore R.	N/O	N/O	0.0	0.0	0.0	0.0	0.0	0.0	
Granite Cr.	0.0	0.2	0.0	0.0	N/O	N/O	N/O	N/O	0.0
Gray Cr.	0.0	0.1	N/O	N/O	0.0	1.5	N/O	N/O	0.3
Heydon Cr.	0.1	0.1	0.0	N/O	0.0	0.4	0.4	3.5	0.9
Homathko R.	N/O	0.0	0.0	N/O	N/O	N/O	0.1	N/O	0.0
Kanish Cr.	N/O	0.0	0.0	0.0	N/O	N/O	UN	N/O	0.0
Orford R.	1.5	2.5	35.0	12.0	3.5	25.0	100.0	15.0	20.7
Phillips R.	21.0	100.0	70.0	12.0	35.0	175.0	75.0	35.0	34.7
Read Cr.	N/O	0.0	0.1	0.2	0.2	0.2	0.2	N/O	0.2
Stafford R.	0.6	20.0	N/O	0.3	0.4	4.5	7.5	3.5	4.4
Southgate R.	N/O	2.5	N/O	N/O	N/O	4.0	N/O	N/O	1.5
MISC.	1.1	20.1	0.2	1.8	0.1	3.5	7.5	3.5	1.9
TOTAL	25.8	195.5	110.3	29.3	44.3	249.1	240.7	95.5	81.4
TOBA INLET									
Brem R.	N/O	0.1	0.1	0.6	0.2	1.0	6.0	6.0	3.0
Klite R.	0.1	0.2	5.0	1.0	0.0	8.0	8.0	12.0	7.2
Quatam R.	1.5	0.2	5.5	4.0	5.0	3.5	1.5	0.8	2.3
Toba R.	0.0	0.0	0.0	UN	N/O	8.0	8.0	6.0	13.7
MISC.	–	0.3	1.0	3.1	6.0	4.3	3.0	13.2	12.2
TOTAL	1.6	0.8	11.6	8.7	11.2	24.8	26.5	37.9	38.4
JERVIS INLET									
Brittain R.	0.3	0.1	0.9	0.1	0.1	0.1	0.3	0.1	1.9
Deserted R.	0.0	0.2	7.0	4.5	10.0	12.0	5.0	25.0	6.6
Lang Cr.	0.3	0.2	0.0	0.1	0.0	N/O	N/O	0.1	0.4
Skwawka R.	N/O	4.8	20.0	8.0	14.0	12.0	5.0	20.0	102.8
Vancouver R.	2.5	1.8	1.5	0.1	1.0	0.2	0.5	1.0	1.7
Tzoonie R.	N/O	0.0	N/O	0.4	0.3	0.1	0.0	1.5	3.2
MISC.	0.1	0.0	0.2	0.6	0.6	3.1	–	–	0.9
TOTAL	3.2	7.1	29.6	13.7	26.0	27.4	10.8	47.7	117.4
HOWE SOUND									
Ashlu R.	0.0	0.1	0.0	0.0	0.1	1.5	5.5	5.0	4.4
Cheakamus R.	0.1	0.1	3.0	0.4	0.8	3.5	25.0	2.2	194.7
Mamaquan R.	0.1	0.3	1.5	0.8	0.8	3.5	35.0	1.5	23.9
Squamish R.	1.0	1.0	9.0	3.5	1.5	35.0	70.0	15.0	30.0
MISC.	0.1	0.2	0.5	0.1	0.1	0.1	2.6	0.4	0.1
TOTAL	1.3	1.6	14.0	4.8	3.1	43.6	138.1	24.1	253.1
BURRARD INLET									
Indian R.	10.0	24.0	40.0	22.0	22.0	35.0	35.0	35.0	63.6
MISC.	0.2	1.1	1.5	0.5	0.1	0.4	0.2	0.2	0.3
TOTAL	10.2	25.1	41.5	22.5	22.1	35.4	35.2	35.2	63.9

Abbreviations used : N/O = None Observed, UN = Unknown.