Scientific Excellence • Resource Protection & Conservation • Benefits for Canadians
Excellence scientifique • Protection et conservation des ressources • Bénéfices aux Canadiens

Strait of Georgia Sport Fishery Creel Survey Statistics for Salmon and Groundfish, 1987

T.F. Shardlow and L.D. Collicutt

Department of Fisheries and Oceans
3225 Stephenson Point Road
Nanaimo, British Columbia
V9T 1K3

December 1989

Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2035

Fisheries and Oceans Pêches et Océans

Canada

Canadian Manuscript Report of Fisheries and Aquatic Sciences

Manuscript reports contain scientific and technical information that contributes to existing knowledge but which deals with national or regional problems. Distribution is restricted to institutions or individuals located in particular regions of Canada. However, no restriction is placed on subject matter, and the series reflects the broad interests and policies of the Department of Fisheries and Oceans, namely, fisheries and aquatic sciences.

Manuscript reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in *Aquatic Sciences and Fisheries Abstracts* and indexed in the Department's annual index to scientific and technical publications.

Numbers 1–900 in this series were issued as Manuscript Reports (Biological Series) of the Biological Board of Canada, and subsequent to 1937 when the name of the Board was changed by Act of Parliament, as Manuscript Reports (Biological Series) of the Fisheries Research Board of Canada. Numbers 901–1425 were issued as Manuscript Reports of the Fisheries Research Board of Canada. Numbers 1426–1550 were issued as Department of Fisheries and the Environment, Fisheries and Marine Service Manuscript Reports. The current series name was changed with report number 1551.

Manuscript reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page. Out-of-stock reports will be supplied for a fee by commercial agents.

Rapport manuscrit canadien des sciences halieutiques et aquatiques

Les rapports manuscrits contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles, mais qui traitent de problèmes nationaux ou régionaux. La distribution en est limitée aux organismes et aux personnes de régions particulières du Canada. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques du ministère des Pêches et des Océans, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports manuscrits peuvent être cités comme des publications complètes. Le titre exact paraît au-dessus du résumé de chaque rapport. Les rapports manuscrits sont résumés dans la revue *Résumés des sciences aquatiques et halieutiques*, et ils sont classés dans l'index annuel des publications scientifiques et techniques du Ministère.

Les numéros 1 à 900 de cette série ont été publiés à titre de manuscrits (série biologique) de l'Office de biologie du Canada, et après le changement de la désignation de cet organisme par décret du Parlement, en 1937, ont été classés comme manuscrits (série biologique) de l'Office des recherches sur les pêcheries du Canada. Les numéros 901 à 1425 ont été publiés à titre de rapports manuscrits de l'Office des recherches sur les pêcheries du Canada. Les numéros 1426 à 1550 sont parus à titre de rapports manuscrits du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 1551.

Les rapports manuscrits sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Canadian Manuscript Report of

Fisheries and Aquatic Sciences 2035

December 1989

STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEY STATISTICS FOR SALMON AND GROUNDFISH, 1987

by

T. F. Shardlow and L. D. Collicutt

Department of Fisheries and Oceans

3225 Stephenson Point Road

Nanaimo, British Columbia

V9T 1K3

Cat. No. Fs 97-4/2035E ISSN 0706-6473

Correct citation for this publication:

Shardlow, T. F. and L. D. Collicutt. 1989. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1987. Can. MS Rep. Fish. Aquat. Sci. 2035 : 62 p.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABSTRACT

Shardlow, T. F. and L. D. Collicutt. 1989. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1987. Can. MS Rep. Fish. Aquat. Sci. 2035 : 62 p.

Catch and effort statistics for the Strait of Georgia tidal sport fishery are presented for each month in 1987. The statistics were derived by combining the data from over 36,000 interviews and 69 aerial surveys. Estimates were provided for the number of sport fishing boat trips and the catches of chinook, coho, pink, sockeye and chum salmon along with rockfish, lingcod, dogfish and other finfish. Also given are numbers of marked (adipose fin-clipped) and unmarked chinook and coho examined during the creel survey, and the age composition and length distribution of chinook catches. The appendix includes all catch and effort statistics for each combination of month and Statistical Area.

Keywords: salmon, groundfish, creel survey, sport fishing, catch, effort, age composition, length distribution.

RÉSUMÉ

Shardlow, T. F. and L. D. Collicutt. 1989. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1987. Can. MS Rep. Fish. Aquat. Sci. 2035 : 62 p.

Les statistiques relatives aux prises et a l'effort de pêche de la pêche sportive de la zone tidale du détroit de Géorgie sont présentées pour chaque mois de 1987. Ces valeurs ont été obtenues en réunissant les données de plus de 36,000 entrevues et 69 relevés aériens. On y trouve les estimations du nombre de sorties des bateaux de pêche sportive et des prises de saumons quinnat, coho, rose, rouge et kéta en plus de celles de scorpènes, d'ophiodon, d'aiguillat et d'autres poissons. Le nombre de saumons quinnat et coho marqués (coupe de la nageoire adipeuse) et non marqués examinés au cours des relevés des prises et la composition par âges et la distribution par longueur des prises de saumon quinnat sont aussi présentés. On trouve aussi en appendice toutes les statistiques relatives aux prises et à l'effort de pêche pour chaque mois et combination de zones statistiques.

Mots clés: saumon, poisson de fond, releve des prises, pêche sportive, prises, effort de pêche, composition par âges, distribution par longueur.

1.0 INTRODUCTION

This report documents the 1987 catch and effort statistics for the Strait of Georgia sport fishery and discusses methodology for collecting these data. During the 1970s, the sport fishery grew to be the largest harvester of chinook and coho salmon in the Strait of Georgia. Figure 1 and Table 1 show historical catch statistics for the Strait of Georgia sport fishery for the period 1960-1987. Prior to 1980, fisheries managers recognized the need for accurate catch statistics. In 1980, the Strait of Georgia Creel Survey Program was initiated to meet the need for accurate and timely sport catch statistics primarily for chinook and coho. Since then, the objectives of the Creel Survey Program have been expanded to provide accurate estimates of all major sport-caught finfish, and age and length composition of chinook catches. This report is one of a series of Strait of Georgia Creel Survey Reports which document annual creel survey activities and estimation procedures, and provide official published Strait of Georgia tidal sport fishery catch statistics.

In 1987 the creel survey gathered a comprehensive set of annual sport fishing data for Strait of Georgia. There were no project interruptions, and interview and overflight data were collected on a continuous basis throughout the year.

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

2.0 METHODS

The Strait of Georgia Creel Survey is comprised of two independent surveys: angler interviews and aerial overflights. Angler interviews provide data on sport fishing catch per unit effort (CPE) and daily activity patterns. Aerial overflights provide estimates of the total sport fishing effort in the study area at the time of the aerial survey. These data are combined to provide monthly estimates of total sport fishing effort and total catch of salmon and groundfish in the sport fishery. In its simplest form, the estimated total catch is calculated by multiplying estimated total effort by catch per unit effort.

The design of the Strait of Georgia Creel Survey conducted in 1987 was similar to that used in past years. Sampling was conducted during each month of the year and estimates were produced for 10 time periods. January and February data were grouped together, as were November and December data because of reduced fishing activity and sampling in these winter months. Mid-week days and weekend days were considered independently because sport fishing activity is known to be quite different between the two types of days. The Strait of Georgia study area was also stratified by geographic

region. Catch and effort statistics were produced for each of the 10 Statistical Areas within the Strait of Georgia (Areas 13 - 19A, 19 B+, 28 and 29, Fig. 2); Statistical Area 19 B+ includes the portion of Area 20 east of Sheringham Point (see Appendix C for a complete description of the study area). Data collection, entry and preliminary processing were conducted by LGL Ltd. Environmental Research Associates. Estimation of catch and effort statistics was conducted by the Department of Fisheries and Oceans.

2.1 FIELD SURVEYS

2.11 Angler Interviews

Sport fishermen were interviewed at the end of their fishing trip to determine time spent fishing, locations fished and catch of each species on the trip. Demographic information was also collected during each interview. Figure 3 shows the interview form used in 1987.

Interviewers trained in fish identification inspected each boating party's catch. Unlike other methods of collecting sport fishery information, such as mail-in or telephone surveys, there was little memory-related recall bias, non-response bias, and fish identification concern with this approach to determining sport fishery catch. Landed chinook and coho were checked for a missing adipose fin which indicates the presence of a coded wire tag embedded in the fish nose cartilage. In addition, scale samples for age determination and measurements for nose-fork length were taken during every sampling shift in the winter and every other shift in the summer. Five scales were removed from the INPFC (International North Pacific Fisheries Commission) preferred area of each biosampled chinook (Mosher 1968).

The interviews were conducted at 31 landing sites (boat ramps, marinas, or resorts, Fig. 2) representative of sport fishing activity in each Statistical Area. The number of sites selected in each area was dictated by targets of desired precision and number of surveyors available. For each area - day type - work block stratum, sampling shifts at a site were chosen on a near random basis from the total number of shifts available. For definition of the above terms (day type, work block, shift) see Appendix A.

2.12 Aerial Overflights

Aerial surveys, conducted from float planes travelling along pre-defined routes, allowed observers to count vessels actively sport fishing throughout the Strait of Georgia. Planes flew at an altitude of 500-700 feet to facilitate a broad range of vision and still allow easy identification of vessel characteristics. Each plane carried three observers, two on the right side and one on the left, and each observer counted sport fishing boats to his/her side of the flight path. Figure 2 shows the flight path used in 1987. The winter (October - April) flight path was slightly reduced to correspond with lower winter effort.

The flight path and time of departure were designed to cover major concentrations of sport fishing activity at peak periods. Whenever possible, the route was flown to keep most of the sport fishing boats to the right side to allow averaging of the two right side counts. To maximize precision, flying times during which fishing effort was rapidly changing were avoided. The number of overflights each month was governed by targets of desired precision and the expected number of interviews from the given number of sampling shifts (English et al. 1986). The days for overflights during a month were randomly selected for each day type.

2.2 DATA ANALYSIS

Data analysis included calculation of catch and effort statistics, calculation of variance of total fishing effort and total catch, estimation of marked chinook and coho salmon, and estimation of age composition of chinook catch. Appendix A details the methods and equations used in the above data analysis.

3.0 RESULTS

3.1 DISTRIBUTION OF SAMPLING EFFORT

Table 2 shows the number of creel survey fishing interviews conducted by month and Statistical Area in 1987, and the number of monthly overflights. A total of 36,530 interviews (30,122 fishing interviews) and 69 overflights were conducted in 1987. The monthly distribution of interviews reflected the monthly distribution of fishing effort (number of boat trips, Table 3) (Fig. 4). Interview effort was reduced during winter months, especially for Statistical Areas 13, 14 and 15 in the northern portion of Strait of Georgia (Table 2). The total fishing interviews represented 5.1% of the estimated total fishing effort for the entire study area (589,731 boat trips, Table 3) and ranged in each Statistical Area from a low of 1.5% of the estimated fishing effort in Area 18 to a high of 10.2% in Area 19B+ (Tables 2 and 4).

3.2 SPORT FISHING EFFORT AND CATCH

The 1987 Strait of Georgia sport fishing effort and catch statistics are summarized for each species by month in Table 3 and by Statistical Area in Table 4. Appendix B shows the fishing effort and catch statistics for each combination of month and Statistical Area.

Sport fishermen made 589,731 boat trips during 1987, which is similar to the effort recorded for this fishery in 1986 (Table 1). The fishing effort followed the same general seasonal pattern as seen in previous years (Fig. 5). Effort levels climbed steadily from April, peaked in August, and declined rapidly in September and October.

The total finfish sport catch in the Strait of Georgia in 1987 was estimated at 1,134,695 pieces (including steelhead and cutthroat trout, Table 3) and consisted of 76% salmon and 24% groundfish. An additional 1,068,027 salmon of mixed species were released by anglers (Appendix B-8). The two main catch groups are discussed below.

3.21 Salmon

Salmon sport catches in the Strait of Georgia in 1987 totalled 865,068 pieces (Tables 3 and 4) and consisted of 74% coho, 14% chinook, 10% pink salmon, 1% sockeye and 0.4% chum salmon.

Chinook sport catches showed a continued decline in 1987, with anglers taking 121,081 fish (Tables 3 and 4) compared to 181,896 in 1986 and 234,838 in 1985 (Fig. 1, Table 1). The June, July and August catches were much reduced from the previous years' average for those months (Fig. 6).

Seasonal catch efficiency for chinook showed reduced levels in 1987 compared to previous years, with catch per boat trip remaining low from May through December (Fig. 7, Table 5). The decline in chinook catch and the reduced catch efficiency were probably a result of low abundance of this species.

Unlike previous years when the highest chinook catch was taken in Area 13, the highest catches in 1987 came from Area 19B+ (21% of total) and Areas 13, 14 and 17, each with 17% of total (Table 4, Fig. 8). In some months, other Statistical Areas dominated the catch (Appendix B-3). During the summer months (May - September) in 1987, 67% of the landed chinook were taken in the northern region of Strait of Georgia - Statistical Areas 13 to 17. This is less than the proportion usually caught in the north during summer which means the southern area contributed more to the total catch than usual. In the winter months (January - April, October - December), 66% of the chinook catch came from the southern region - Statistical Areas 18, 19, 28 and 29. During November and December, many of the chinook came from Victoria/Sooke waters in Statistical Area 19B+.

The 1987 coho catch of 641,572 pieces (Tables 3 and 4) represents a slight increase from 1986 (Fig. 1, Table 1). Coho catches in 1987 showed an average seasonal timing with the catch peaking in July (Fig. 9). Coho catch success in 1987 reached a high of 1.6 fish per boat trip in July, then declined through August (Fig. 10, Table 5). As in previous years, the highest coho catches were taken in Area 14 (31% of total) and Area 13 (30%) (Table 4, Fig. 8).

In 1987, Strait of Georgia anglers caught approximately 90,000 pink salmon (Table 3). Significant pink catches were expected in 1987 because pink salmon returns to Strait of Georgia rivers (primarily the Fraser River) are much greater in odd numbered compared to even numbered years. As in the 1985 cycle year, the highest catches were taken in Area 19B+ (58%), but in 1987 large pink catches were also recorded in Area 13 (26%, Table 4).

The landings of other salmon consisted of an estimated 8,867 sockeye and 3,544 chum salmon (Table 3). A large portion of the sockeye catch (60%) was taken in Area 19B+ during July to September (Appendix B-5), while majority of the chum salmon (72%) were caught in Area 18, mostly in November and December (Appendix B-6). The latter catch was attributed to chum runs returning to local rivers.

In addition to the above salmon species, an estimated 1,961 steelhead, cutthroat trout and unidentified salmon were caught in the Strait of Georgia in 1987, bringing the total salmonid catch to 867,029 pieces (Appendix B-7).

The average number of total salmon caught during each boat trip in 1987 was 1.5 (Table 5). This represents the second highest catch success for salmon during the 1981 to 1987 period; the highest value was 1.7 salmon per boat trip reported in 1985 (Shardlow and Collicutt 1989b).

In 1987, as in previous years, more salmon were landed in Area 13 than in any other Statistical Area, but Area 14 showed a higher effort level (Table 4, Fig. 11). Boaters fishing in Area 13 had an average catch of 2.0 salmon per trip, the highest for any area. Area 14, as in the recent past, recorded the greatest number of salmon hooked and released (227,103), with Area 13 next at 205,652 pieces (Appendix B-8). These two areas have major coho fisheries characterized by the release of many sub-legal coho.

3.22 Groundfish

While salmon accounted for the majority of the total finfish sport catch in the Strait of Georgia in 1987, the groundfish catch of 267,666 pieces made up 24% of the overall catch (Tables 3 and 4). The species composition of the groundfish catch, based on the Table 4 data, was as follows:

Groundfish species	Catch	% Of total groundfish catch	Major catch Area
Rockfish (*Sebastes* spp.)	136,270	51%	14, 17, 19B+
Lingcod (*Ophiodon elongatus*)	65,789	25%	13
Dogfish (*Squalus acanthias*)	4,110	2%	14, 17
Other finfish (Appendix D)	61,497	23%	18
Total	267,666	100%	

The majority of the groundfish catch was taken in the summer months, reflecting the seasonal change in fishing effort (Table 3, Fig. 4). Catch by Statistical Area for rockfish was highest in Areas 14, 17 and 19B+, each contributing 16% to 17% to the total (Table 4). Lingcod were caught mainly in Area 13 (36% of total), while the largest dogfish catch came from Areas 14 and 17 each contributing 15% to the total (Table 4). Area 18 produced the largest catch of other finfish (29%).

Rockfish species were identified for the entire survey area again in 1987 (Table 6). Applying the identification results to the 1987 rockfish catch estimates (Table 7) showed the following species dominance:

Rockfish species	Catch	% Of total rockfish catch	Major catch Area
Quillback	47,893	35%	16
Copper	25,754	19%	17, 18
Yelloweye	14,562	11%	14
Black	5,538	4%	19 B+
Other	42,523	31%	13, 19B+
Total	136,270	100%	

The above "other" rockfish category consisted of tiger, yellowtail, china, canary and unidentified species.

The catch success (CPE) for rockfish was relatively constant throughout the year and averaged 0.2 fish per boat trip, while the catch success for lingcod was 0.1 fish per boat trip (Table 5). The catch success for all non-salmon species averaged 0.5 fish per boat trip and was also relatively constant throughout the year. Catch success for total finfish during 1987 was 1.9 fish per boat trip (Table 5), slightly above the 1.8 value recorded in 1986.

3.3 BIOLOGICAL DATA

3.31 Proportion and Catch of Marked Chinook and Coho

In 1987, 6,539 chinook and 28,757 coho were examined for adipose fin clip marks. Tables 8 and 9 show the observed numbers of marked chinook and coho respectively, by month and region. Data were presented by region since some Statistical Areas had insufficient numbers of fish examined for marks in some months, and those data were included with other Areas. Three regions were defined: the North Gulf represented by Areas 13-16; the South Gulf represented by Areas 17, 18, 28, 29 and the Saanich Inlet portion of Area 19 (Area 19A); and Victoria region represented by the remainder of Area 19 (Area 19B+) (Fig. 2).

Among chinook examined for marks, 3.9% had adipose fin clips. The largest observed proportion of chinook marks was in the North Gulf catch (0.058) and the lowest proportion in the Victoria catch (0.023) (Table 8). Among coho examined for marks, 6.8% had adipose fin clips. The largest observed proportion of coho marks was in the South Gulf catch (0.083), and the lowest proportion in the Victoria catch (0.050) (Table 9). The above

distribution of tags by area is consistent with the 1986 distribution pattern (Shardlow and Collicutt 1989c). Monthly catch estimates of marked chinook and coho are shown by region in Tables 10 and 11 respectively. The seasonal recovery pattern of marked chinook and coho salmon was generally similar to that observed in previous years (Shardlow and Collicutt 1989a, b and c).

3.32 Catch-At-Age for Chinook

During 1987, 1,383 chinook biosamples were collected for age and length analysis. Table 12 shows the monthly number and percent age composition of chinook sampled for age. These data are summarized graphically in Figure 12. The monthly age proportions were applied to the estimated monthly chinook catches to provide breakdown by age group (Table 13). In 1987, the majority of chinook sport catch in the Strait of Georgia consisted of age 3 fish (62.1%), followed by age 4 (25.0%), age 2 (7.8%) and age 5 or older (5.2%).

The catch breakdown by age is compared below for years 1983 to 1987:

Catch year	% Age composition of chinook 2	3	4	5+	Reference
1983	57.1	25.5	14.2	3.1	Shardlow et al. (1989)
1984	21.6	67.3	9.4	1.7	Shardlow and Collicutt (1989a)
1985	6.6	70.8	20.6	2.0	Shardlow and Collicutt (1989b)
1986	10.9	44.9	40.4	3.8	Shardlow and Collicutt (1989c)
1987	7.8	62.1	25.0	5.2	This report.

The 1987 catch breakdown by age group was similar to that for 1985 and 1986 in that the age 2 component was a smaller fraction of the catch than in previous years. Age 3 catch declined steadily from 166,240 in 1985 (Shardlow and Collicutt 1989b) to 75,155 in 1987 (Table 13). This decline would be expected, given the low catch of age 2 chinook the previous year. Low annual recruitments of age 2 fish over the previous three years combined to produce the lowest chinook catch in 20 years (Table 1).

Figure 12 and Table 12 show a shift in the age composition of sampled chinook and hence of chinook catch, between the first nine months and the remainder of the year. From January to September the catch was dominated by age 3 fish. In October the age 2 group strengthened considerably, and together the age 2 and 3 classes became the dominant age groups for the remainder of the year. The reduction from previous years of age 2 chinook in

July to December catches was likely the result of poor age 2 recruitment to the sport fishery. Age 2 chinook generally reach the minimum legal size limit of 45 cm in July (Argue et al. 1983).

3.33 Mean Length-At-Age for Chinook

Table 14 shows the monthly mean nose-fork length at age for the 1,383 chinook for which both length and age data were available. Figure 13 shows the length frequency distribution based on all the measured chinook (1,798 aged and unaged fish). The largest portion of measured chinook (551 fish or 31% of the total sample) was in the 55-64 cm length category. This is consistent with the large catch proportion of age 3 fish (Table 13) which were found to have an annual mean length of 60.6 cm (Table 14). Of the total chinook measured in 1987, 3% were sub-legal in size (less than 45 cm) and these were landed mostly in June and July. The largest chinook sampled (160 cm) was landed at Tyee Spit in Area 13 on August 12, 1987, and was 5 years old.

4.0 SUMMARY

A sport fishery creel survey was conducted in the Strait of Georgia in 1987 in order to estimate the catches of all the important recreational finfish species and the total sport fishing boat trips. The number of chinook and coho salmon with adipose fin clips were also estimated. These data are presented by month and Statistical Area. Monthly age and length compositions of chinook catch are also shown.

In 1987, a total of 36,530 boating parties were interviewed at 44 landing locations in the Strait of Georgia creel survey area. The 30,122 fishing interviews conducted represents approximately 5% of the total number of boat trips conducted by sport fishermen in the Strait of Georgia in 1987. A total of 69 overflights were also conducted to take "snapshot" counts of fishing effort.

In 1987, sport fishermen made an estimated 589,731 boat trips in the Strait of Georgia and landed an estimated total finfish catch of 1,135,000 pieces of which 76% were salmon and 24% were groundfish. The 865,000 landed salmon consisted of 642,000 coho, 121,000 chinook, 90,000 pink salmon, 9,000 sockeye and 4,000 chum salmon. An additional 1,068,000 salmon of mixed species were released by anglers.

The 268,000 landed groundfish consisted of 136,000 rockfish, 66,000 lingcod, 4,000 dogfish and 61,000 other finfish. Rockfish catches were identified as quillback (35% of rockfish catch), copper (19%), yelloweye (11%), and black (4%); the remaining 31% of the rockfish catch consisted of tiger, yellowtail, china, canary and unidentified species.

Catch success per boat trip averaged 1.5 salmon (all species) and 0.5 groundfish.

Among salmon examined for marks, 3.9% of chinook and 6.8% of coho had adipose fin clips. The majority of chinook sport catch in 1987 consisted of age 3 fish (62.1%), followed by age 4 (25.0%), age 2 (7.8%) and age 5 or older (5.2%). Of the total chinook measured in 1987, 3% were sub-legal in size (less than 45 cm).

5.0 ACKNOWLEDGMENTS

The authors wish to thank Tom Hoyt and Carmen McConnell of the South Coast Division for their valuable contributions. We acknowledge the substantial efforts of the staff of LGL Limited environmental research associates, particularly Karl English, Jill Peterson and Mike Blazecka in collecting and providing data summaries. We are grateful to private marina and boat ramp owners for their valuable assistance and cooperation as well as the many thousand anglers who participated in the survey. We also thank Alice Fedorenko for editing the report and preparing it for publication and the DFO Word Processing Unit for typing the drafts.

6.0 LITERATURE CITED

Argue, A. W., R. Hilborn, R. M. Peterman, M. J. Staley, C. J. Walters and R. Yorgue. 1983. The Strait of Georgia chinook and coho fishery. Bull. Can. J. Fish. Aquat. Sci. 21¹: 91 p.

Argue, A. W., M. P. Shepard, T. F. Shardlow and A. D. Anderson. 1987. Review of salmon troll fisheries in southern British Columbia. Can. Tech. Rep. Fish. Aquat. Sci. 1502 : 150 p.

DPA Consulting Ltd. 1982. Georgia Strait sport fishing creel survey 1980-81. Final Report, prepared for Department of Fisheries and Oceans, Pacific Region by DPA Consulting Limited, Vancouver B.C.78p.

English, K. K., T. F. Shardlow and T. M. Webb. 1986. Assessment of Strait of Georgia sport fishing statistics, sport fishing regulations and trends in chinook catch using creel survey data. Can. Tech. Rep. Fish. Aquat. Sci. 1375 : 54 p.

Gilbert, C. H. and W. H. Rich. 1927. Investigations concerning the red-salmon runs to the Karluk River, Alaska. U.S. Bur. Fish. Bull. 43(2): 1-69.

Mosher, K. H. 1968. Photographic atlas of sockeye salmon scales. U.S. Fish and Wildl. Sci. Fish. Bull. 67(2): 243-280.

Shardlow, T. F., K. K. English and L. D. Collicutt. MS 1989. Strait of Georgia Creel Survey Sport Fishery Statistics, 1980-1982. Can. MS Rep. Fish. Sci. (In prep).

Shardlow, T. F., K. K. English, T. Hoyt, G. E. Gillespie and T. A. Calvin. 1989. Strait of Georgia Creel Survey sport fishery statistics, 1983. Can. MS Fish. Aquat. Sci. 1872 : 53 p.

Shardlow, T. F. and L. D. Collicutt. 1989a. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1984. Can. MS Rep. Fish. Aquat. Sci. 2032 : 61 p.

Shardlow, T. F. and L. D. Collicutt. 1989b. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1985. Can. MS Rep. Fish. Aquat. Sci. 2033 : 60 p.

Shardlow, T. F. and L. D. Collicutt. 1989c. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1986. Can. MS Rep. Fish. Aquat. Sci. 2034 : 61 p.

FIGURES

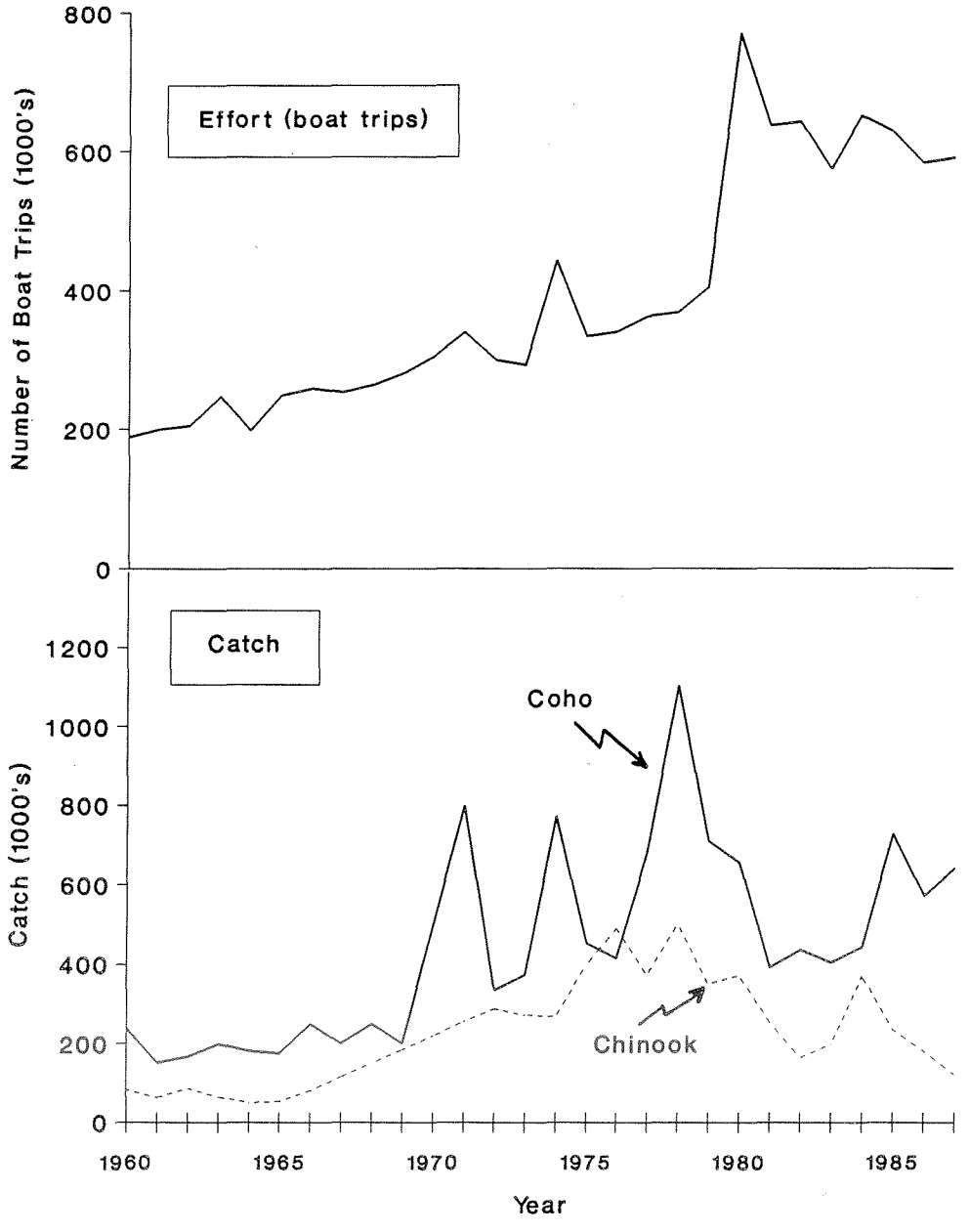
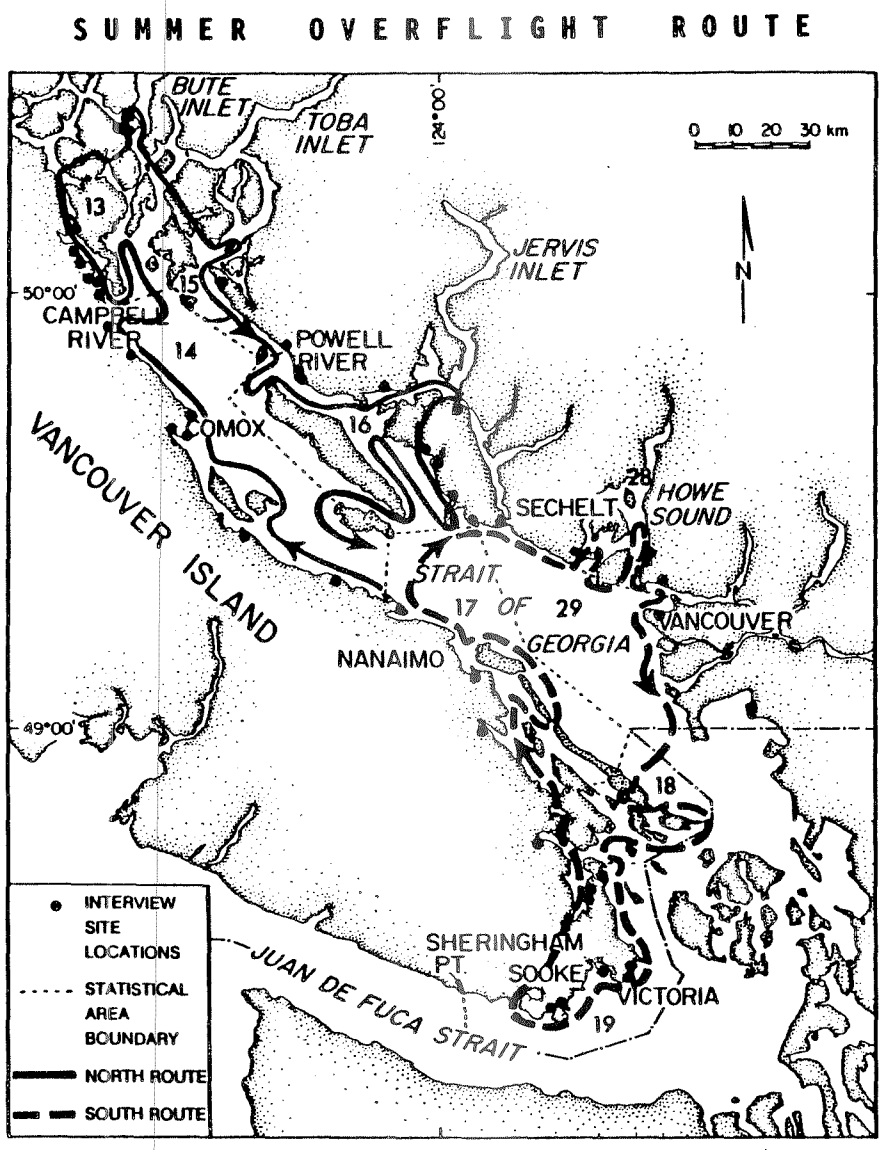


Figure 1. Tidal effort statistics and sport catches of coho and chinook salmon for the Strait of Georgia, 1960 - 1987.



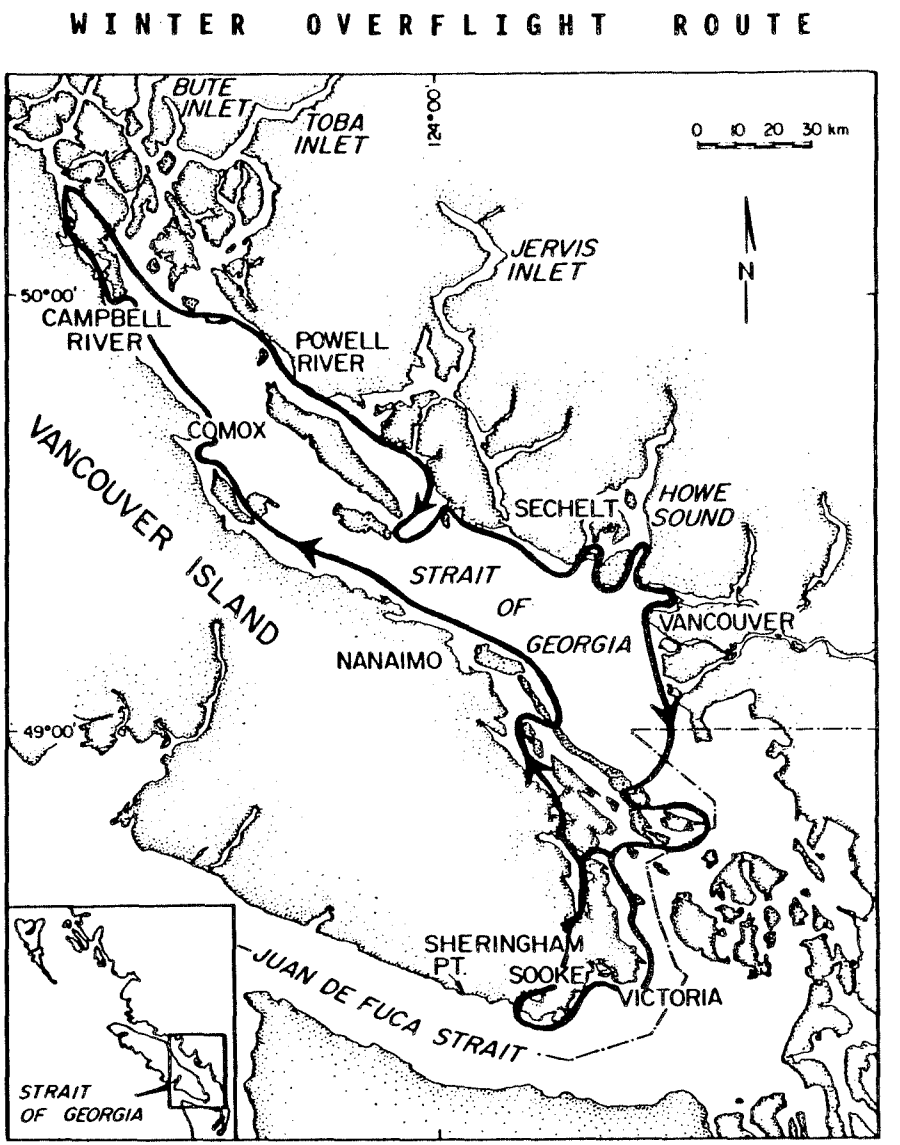


Figure 2. Interview site locations, and summer and winter overflight routes, Strait of Georgia, 1987.

STRAIT OF GEORGIA SPORT FISHING CREEL SURVEY N° 41352

Landing Area: _____/_____ Statistical Area: _____

Interviewer: _____/_____ Date: ___/___/___ (YR/MO/DAY) Time of interview ____:____ AM PM

PRESENT BOAT TRIP COMPLETED

1. Total number of individuals in party: ☐

Assessment Code ☐
0 = Complete Form
1 = Marks Incomplete
3 = Not Visually Inspected
4 = Refusal

2. Time of landing: ____:____ AM PM Time block: ☐

3. Was your party sport fishing on this trip: YES NO

4. Guided: YES NO

5. Residences of party: B.C. ☐ Rest of Canada ☐ Other ☐

6. Length of boat trip: ☐ HRS.

7. Times lines were in the water: (EXCLUDE time not fishing)

AM			PM	
☐ (1) before 7:00	☐ (5) 10:00-10:59	☐ (9) 2:00-2:59		☐ (13) 6:00-6:59
☐ (2) 7:00-7:59	☐ (6) 11:00-11:59	☐ (10) 3:00-3:59		☐ (14) 7:00-7:59
☐ (3) 8:00-8:59	☐ (7) 12:00-12:59	☐ (11) 4:00-4:59		☐ 15) 8:00-8:59
☐ (4) 9:00-9:59	☐ (8) 1:00- 1:59	☐ (12) 5:00-5:59		☐ (16) 9:00-plus

8. Average number of lines in the water for TOTAL boat party: ☐

9. CATCH SUMMARY

Total catch for trip: ☐

Total time fishing: ☐ HRS.

	1ST SUB AREA	2ND SUB AREA	3RD SUB AREA
GO TO MAP:			
KEPT:			
RELEASED:			
TIME:	HRS.	HRS.	HRS.

MARKS

	ADIPOSE MISSING	UNMARKED
CHINOOK	☐	☐
COHO	☐	☐

10. How much fishing time was directed at each of the following?

CO ☐ CN ☐ SM ☐ LC ☐ RF ☐

GF ☐ SF ☐ OTHER ☐

11. Catch to date by interviewee (since April 1):

COHO	CHINOOK	LINGCOD	ROCKFISH
☐	☐	☐	☐

Figure 3. Sample of 1987 interview form.

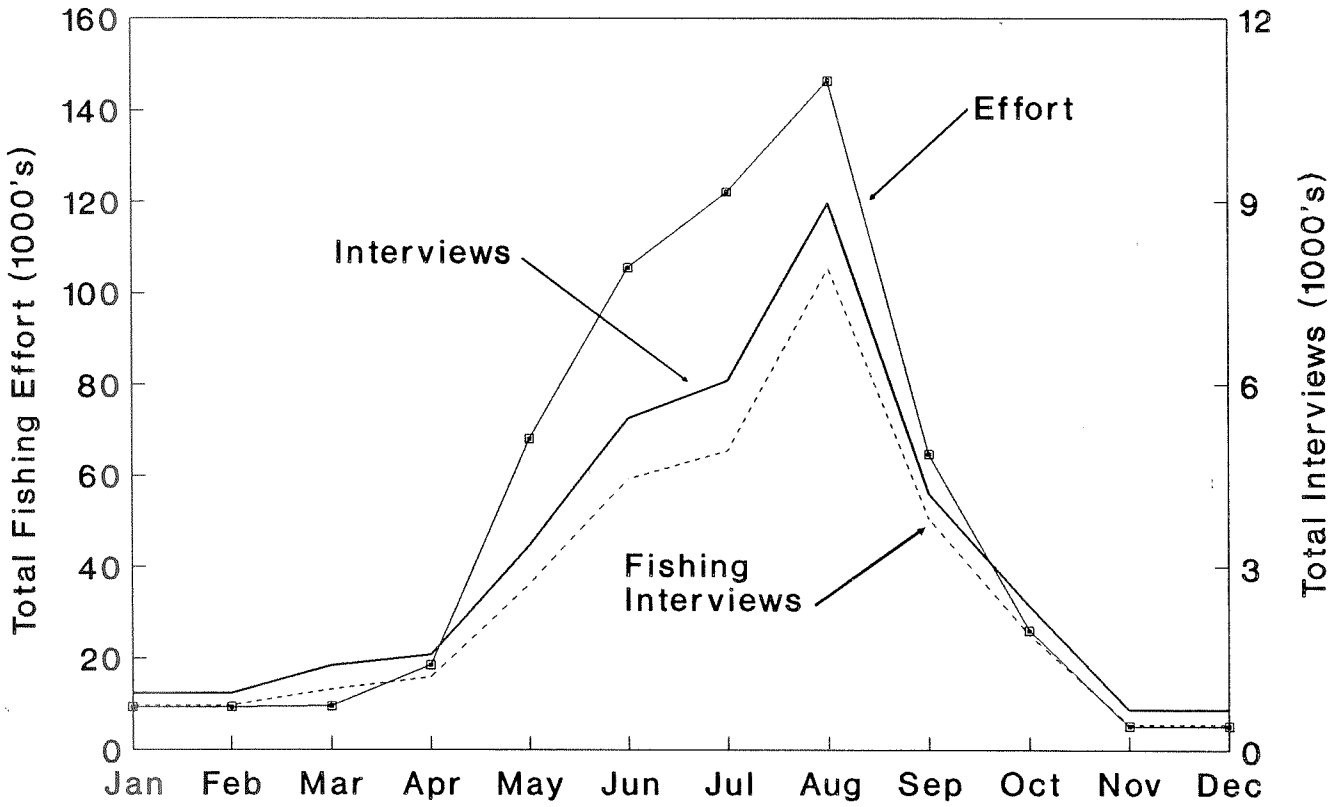


Figure 4. Comparison of monthly total fishing effort, monthly total interviews and monthly total fishing interviews, Strait of Georgia, 1987.

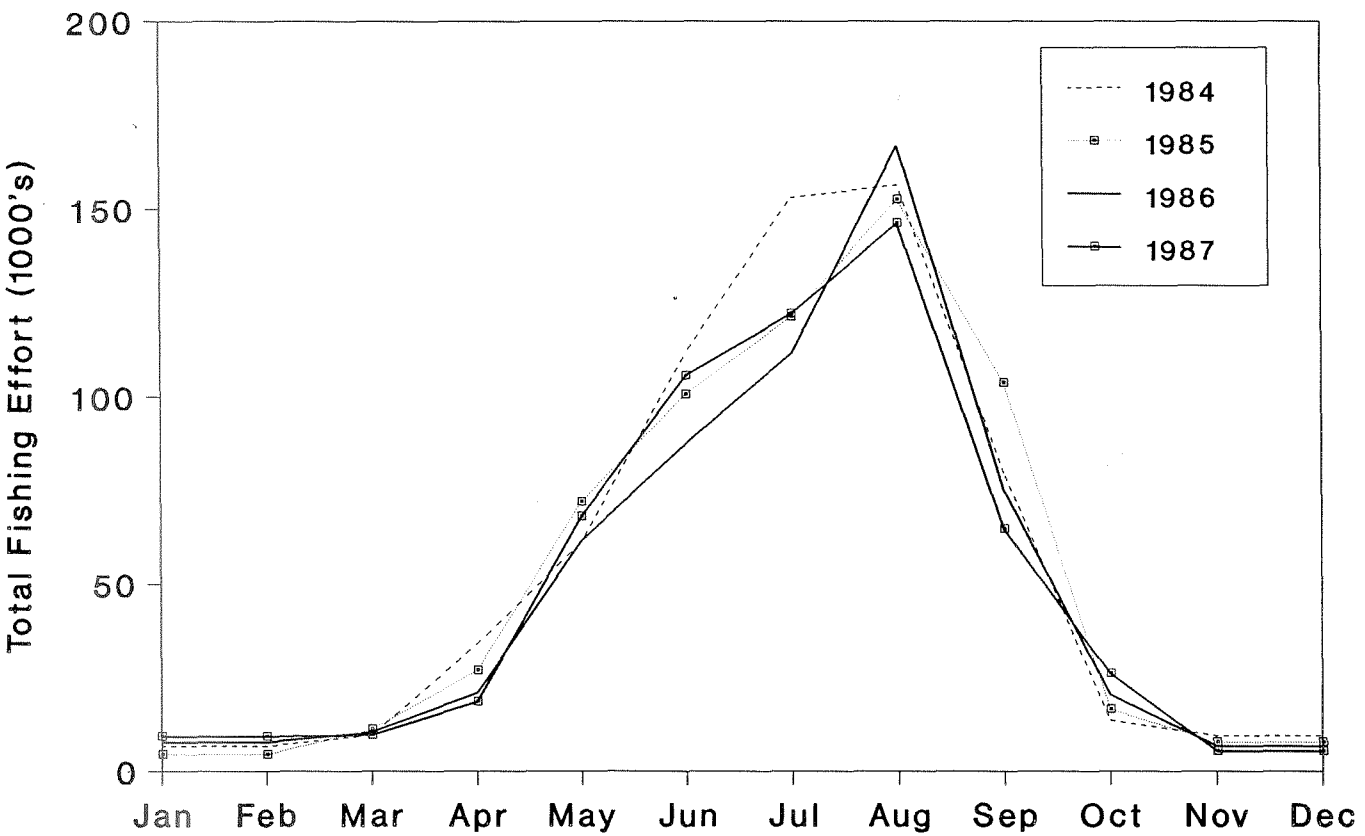


Figure 5. Monthly fishing effort estimates (number of boat trips) for the Strait of Georgia sport fishery, 1984 - 1987.

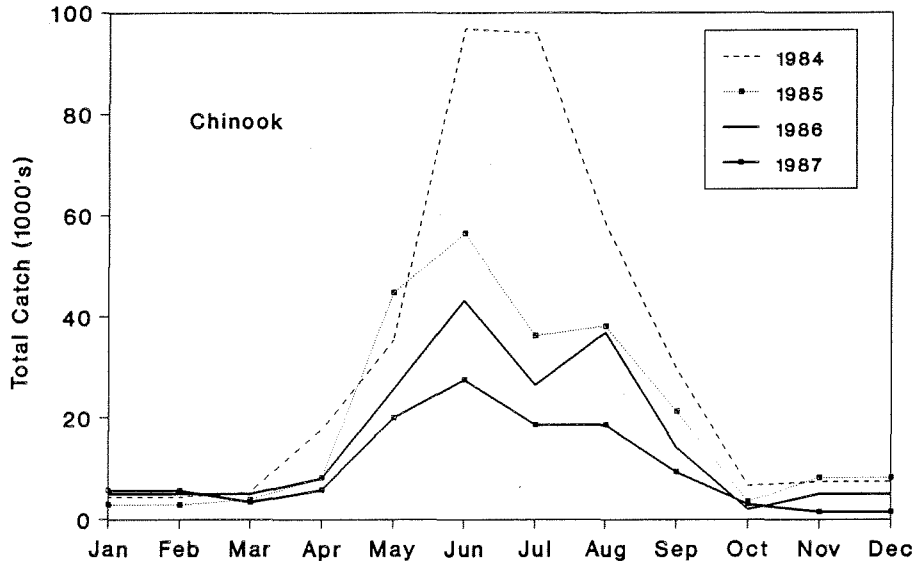


Figure 6. Monthly chinook catch for the Strait of Georgia sport fishery, 1984 - 1987.

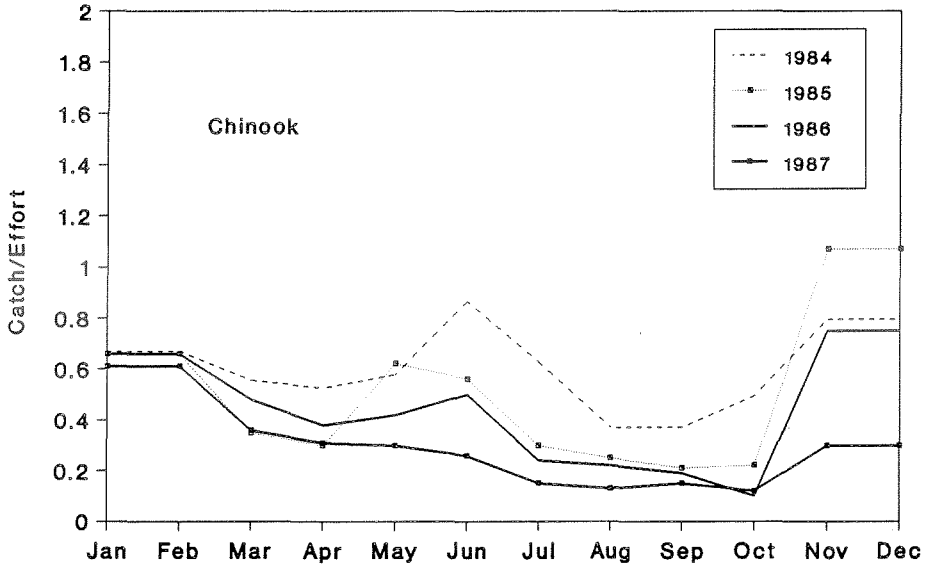


Figure 7. Monthly chinook catch per boat trip for the Strait of Georgia sport fishery, 1984 - 1987.

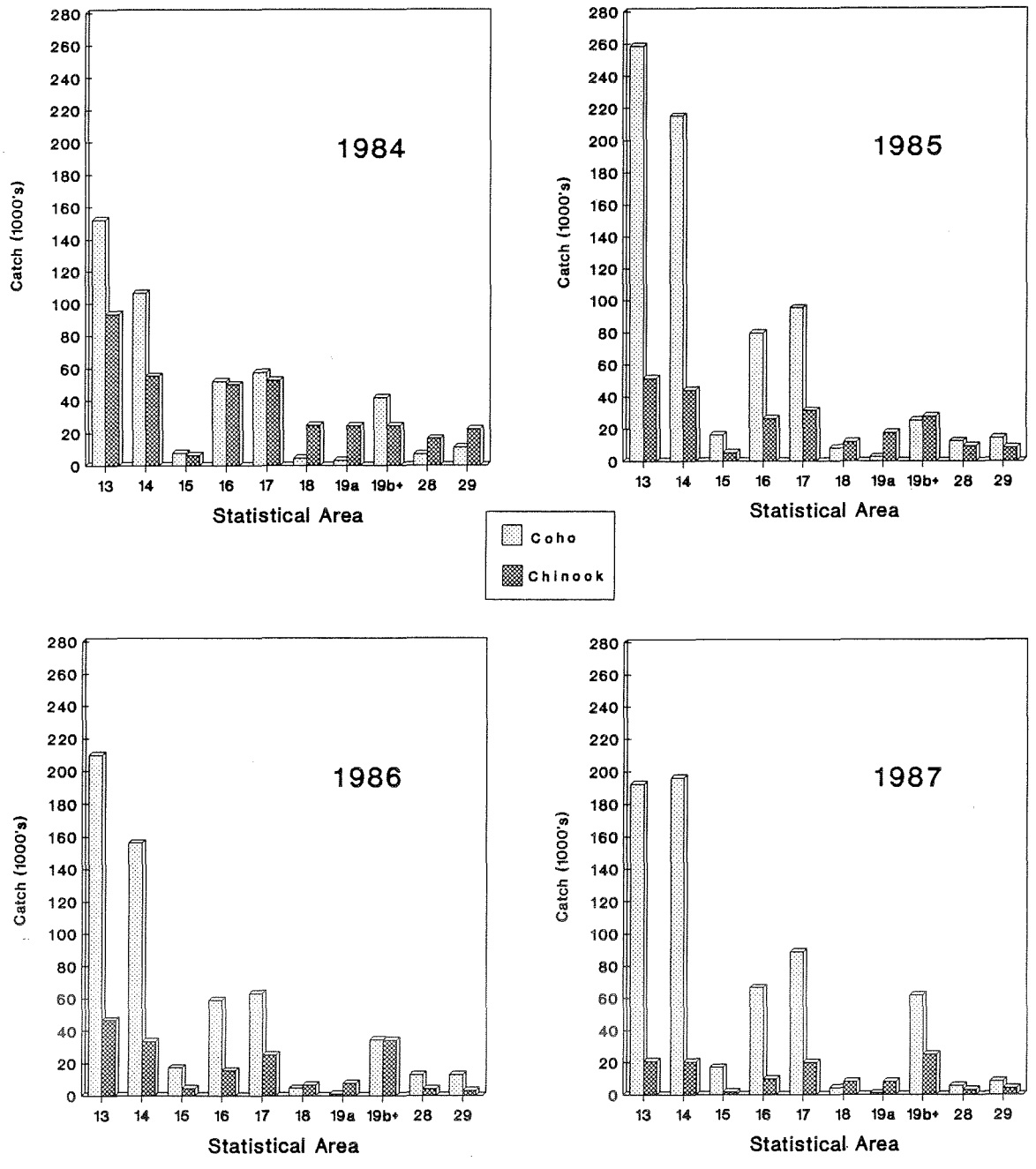


Figure 8. Annual sport catches of chinook and coho salmon by Statistical Area in the Strait of Georgia, 1984 - 1987.

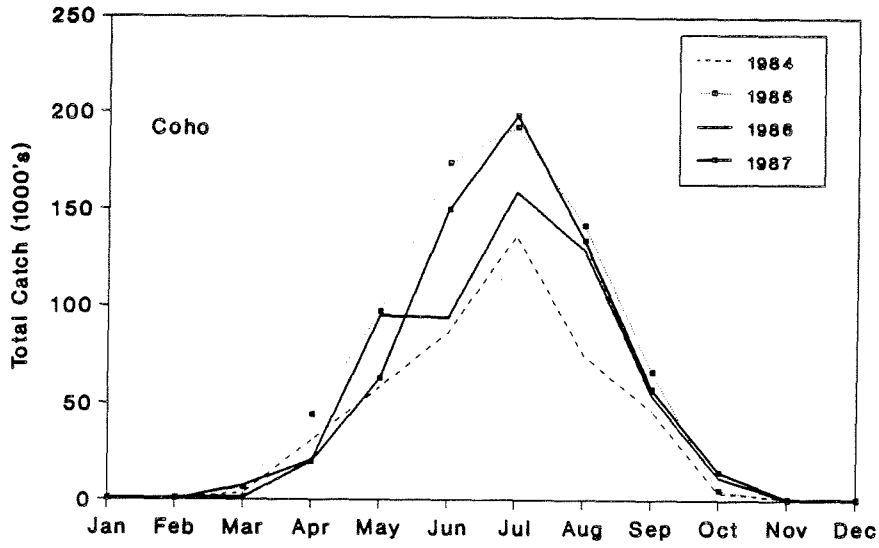


Figure 9. Monthly coho catch for the Strait of Georgia sport fishery, 1984 - 1987.

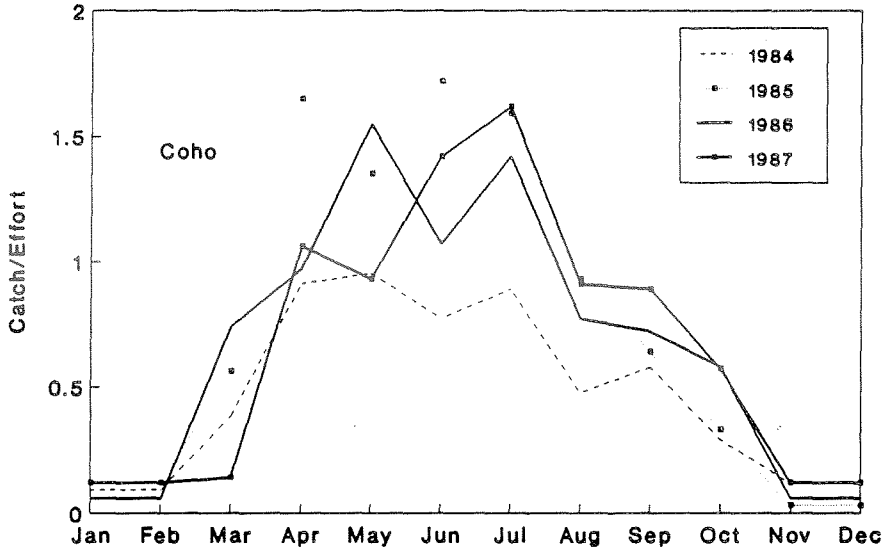


Figure 10. Monthly coho catch per boat trip for the Strait of Georgia sport fishery, 1984 - 1987.

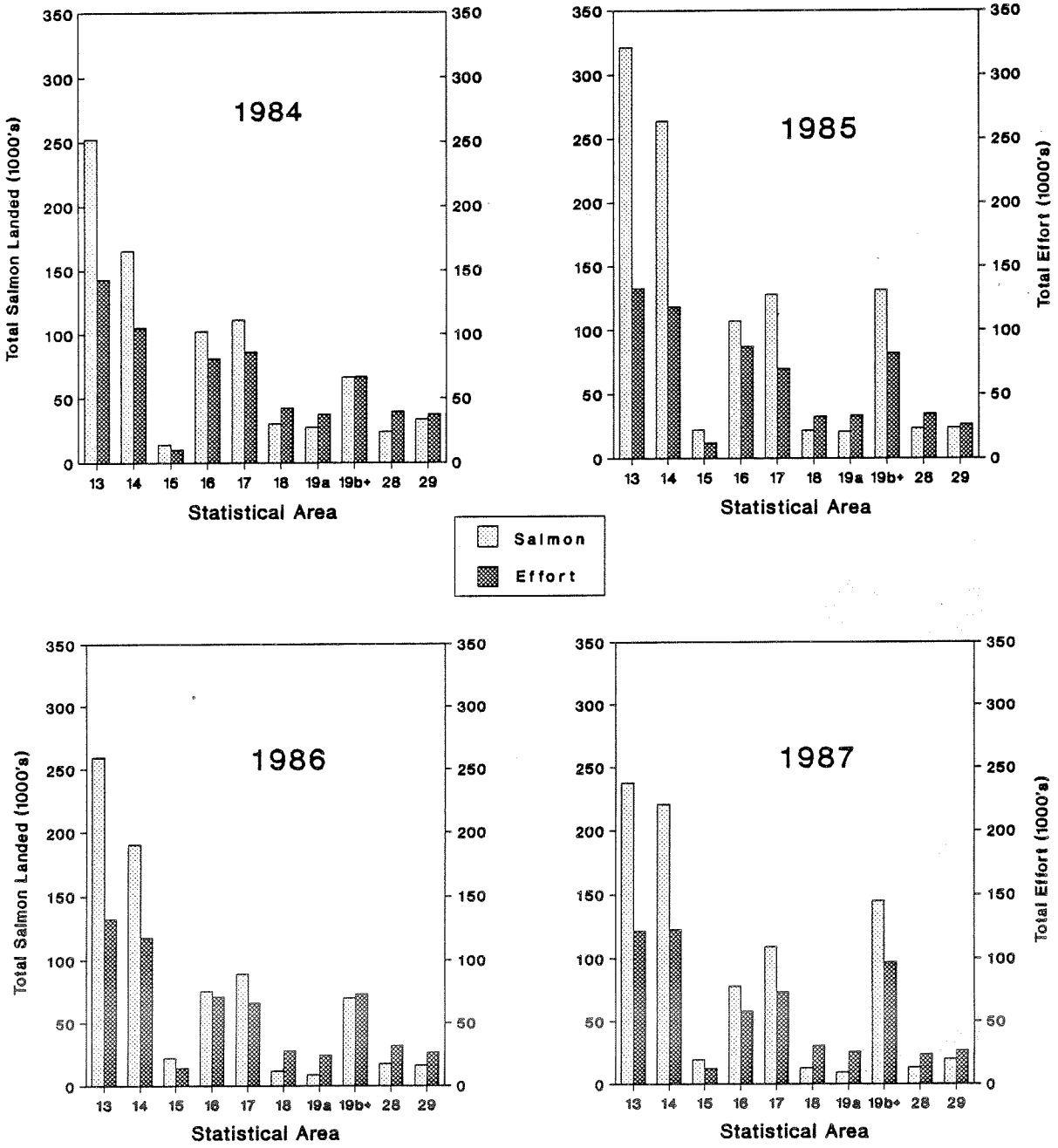


Figure 11. Total salmon landed and total fishing effort expended by Statistical Area in the Strait of Georgia sport fishery, 1984 - 1987.

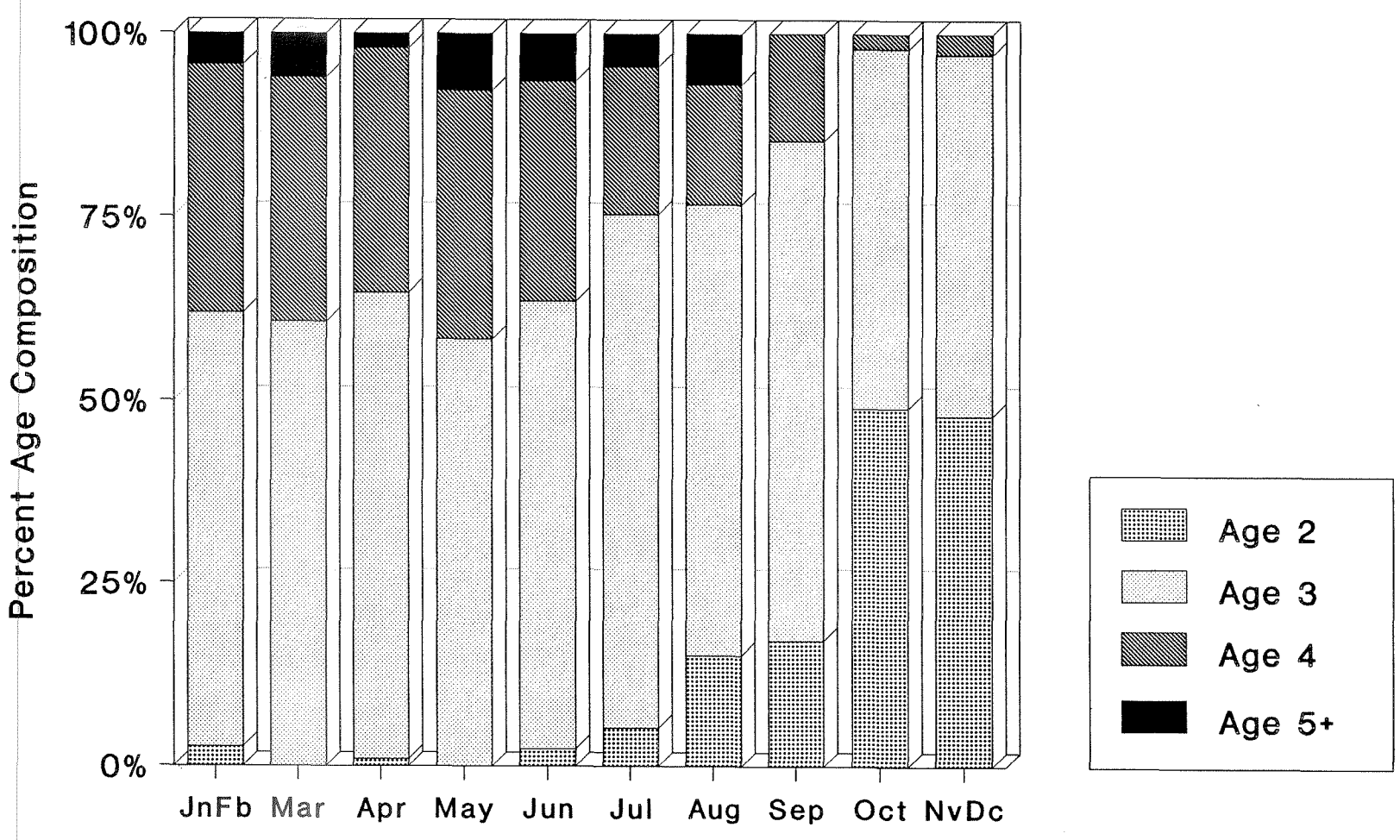


Figure 12. Monthly percent age composition of chinook salmon sampled in the Strait of Georgia Creel Survey, 1987.

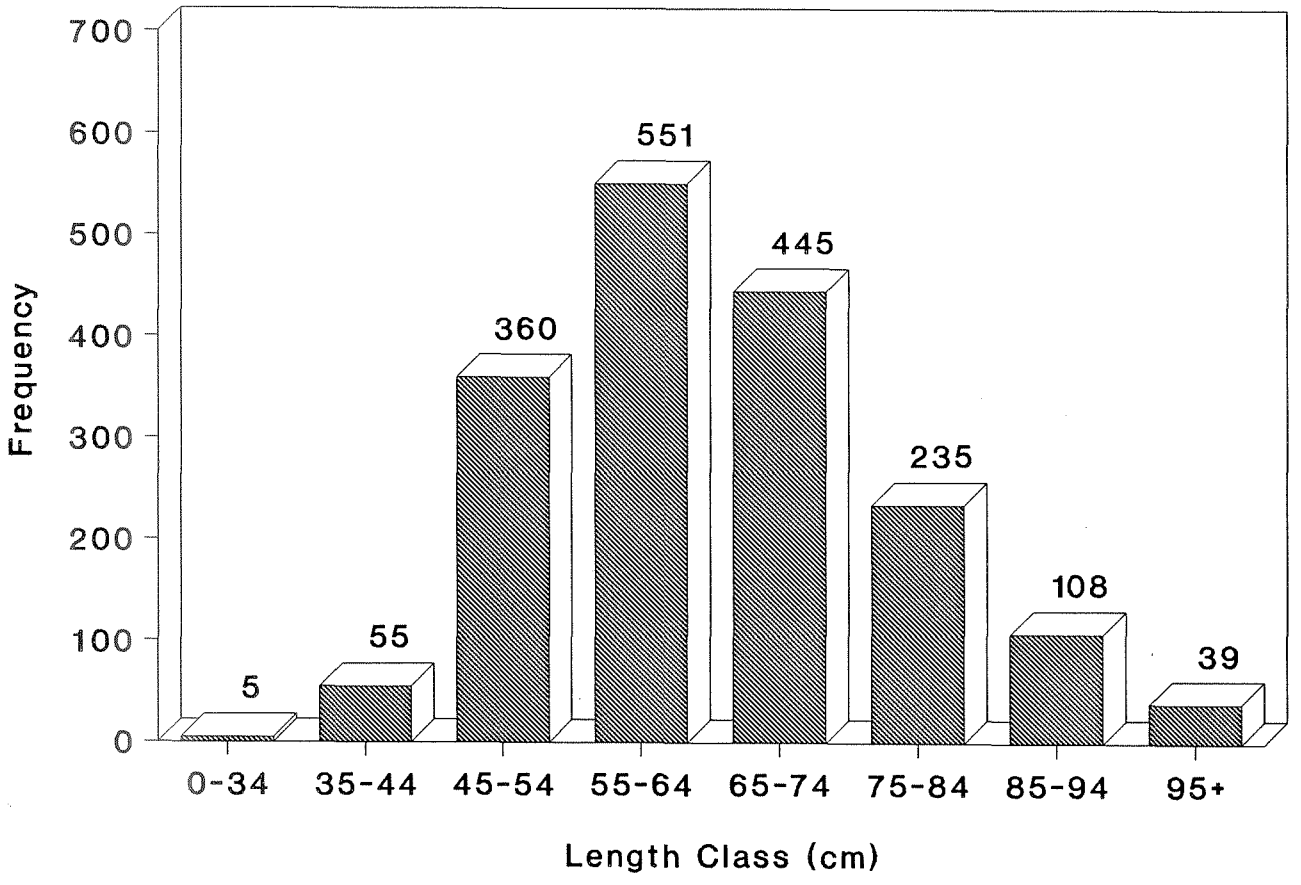


Figure 13. Length frequency distribution of chinook salmon sampled in the Strait of Georgia Creel Survey, 1987.

TABLES

Table 1. Tidal effort statistics and sport catches of coho chinook salmon for the Strait of Georgia, 1960 - 1987.*

Year	Effort (boat trips)	Catch	
		Coho	Chinook
1960	189,150	238,000	83,000
1961	199,935	152,000	63,000
1962	205,547	167,000	86,000
1963	247,590	199,000	65,000
1964	198,120	182,000	51,000
1965	250,020	175,000	53,000
1966	259,100	249,000	80,000
1967	254,500	200,000	115,000
1968	265,030	250,000	150,000
1969	281,475	200,000	185,000
1970	306,255	500,000	220,000
1971	341,123	800,000	255,000
1972	300,349	335,000	287,000
1973	293,141	373,000	272,000
1974	443,441	772,000	269,000
1975	334,490	454,000	398,000
1976	340,729	415,000	490,000
1977	363,350	682,000	372,000
1978	369,035	1,103,000	500,000
1979	404,710	708,735	350,000
1980	769,000	655,000	371,000
1981	637,000	391,200	253,300
1982	642,200	436,090	163,793
1983	574,257	404,031	198,433
1984	651,090	443,590	369,445
1985	628,513	728,197	234,838
1986	582,946	571,980	181,896
1987	589,731	641,572	121,081

* Source: Coho catch statistics: 1960-1978 from Argue et al. (1983), 1979 from R. Kadowaki (pers. comm.), 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al.(1989), 1984 to 1986 from Shardlow and Collicutt (1989a,b and c).
Chinook catch statistics: 1960-1977 from Argue et al. (1983), 1978 and 1979 from B. Riddell (pers. comm.) following the methods of Argue et al. (1983), 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al.(1989), 1984 to 1986 from Shardlow and Collicutt (1989a,b and c).
Effort statistics: 1960-1979 from annual published and unpublished Fisheries Officer statistics, 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al.(1989), 1984 to 1986 from Shardlow and Collicutt (1989a,b and c).

Table 2. Number of fishing interviews by month and Statistical Area, Strait of Georgia, 1987.

Month	Statistical Area										Total	Over-flights
	13	14	15	16	17	18	19A	19B+	28	29		
Jan+Feb	18	70	0	94	171	33	130	710	122	105	1,453	4
Mar	22	69	0	87	174	18	33	446	101	40	990	4
Apr	19	164	0	104	316	21	52	374	110	33	1,193	4
May	293	462	0	492	418	51	168	421	317	92	2,714	7
Jun	745	1,021	133	562	433	51	168	937	275	121	4,446	10
Jul	1,336	887	60	599	413	57	185	1,029	261	84	4,911	12
Aug	2,282	570	55	649	354	88	342	2,868	378	315	7,901	9
Sep	734	288	0	271	233	74	199	1,603	95	290	3,787	8
Oct	67	112	0	120	148	54	224	928	127	106	1,886	6
Nov+Dec	4	30	0	64	47	18	69	53[illegible]	56	14	841	5
Total	5,520	3,673	248	3,042	2,707	465	1,570	9,855	1,842	1,200	30,122	69

Table 3. Fishing effort and catch by species and month, Strait of Georgia, 1987.

Month		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod	Dog-Fish	Other Finfish	Total Finfish
Jan+Feb	Estimate	18,556	2,313	11,269	0	0	0	3,140	53 *	133	4,919	21,827
	S.E.	1,910	549	1,482	0	0	0	567	41	67	2,047	2,649
Mar	Estimate	9,532	1,373	3,431	0	0	0	2,041	170 *	113	11,354	18,482
	S.E.	1,076	261	763	0	0	0	319	63	58	3,959	4,054
Apr	Estimate	18,497	19,674	5,788	0	0	0	4,666	3,800	69	1,848	35,845
	S.E.	1,209	1,358	595	0	0	0	664	989	28	386	1,941
May	Estimate	67,970	62,881	20,066	37	0	0	20,746	10,776	306	11,232	126,044
	S.E.	4,129	7,175	1,801	21	0	0	1,775	995	86	3,375	8,382
Jun	Estimate	105,494	149,765	27,630	840	91	19	21,124	12,336	1,220	5,980	219,005
	S.E.	5,529	11,699	2,052	214	53	13	1,714	1,138	419	746	12,087
Jul	Estimate	122,106	198,359	18,689	5,858	595	105	30,840	12,722	640	7,920	275,728
	S.E.	6,805	15,162	1,323	755	137	48	2,841	1,558	131	1,004	15,613
Aug	Estimate	146,363	133,614	18,596	57,508	5,874	357	33,652	14,091	1,122	8,336	273,150
	S.E.	5,984	6,749	1,082	3,342	410	76	3,844	1,261	265	1,414	8,746
Sep	Estimate	64,617	57,456	9,370	25,590	1,931	201	10,269	7,027	453	3,784	116,081
	S.E.	2,656	3,197	610	1,719	276	50	725	609	141	807	3,898
Oct	Estimate	26,065	14,909	3,081	171	376	353	7,029	3,254	54	3,565	32,792
	S.E.	1,924	2,052	418	61	129	89	723	457	23	997	2,478
Nov+Dec	Estimate	10,531	1,228	3,161	0	0	2509	2,763	1,560 *	0	2,559	13,780
	S.E.	1,000	257	356	0	0	1795	521	989	0	1,068	2,409
Total	Estimate	589,731	641,572	121,081	90,004	8,867	3,544	136,270	65,789	4,110	61,497	1,132,734 **
	S.E.	12,156	21,920	3,766	3,840	532	1,800	5,579	2,974	547	6,144	24,310

* A total closure for lingcod was in effect from January 1 to April 15, and November 15 to December 31. Reported figures most likely represent illegal catches by anglers.

** In addition, an estimated 1,961 steelhead, cutthroat trout and unidentified salmon were caught by sport fishermen.

Table 4. Fishing effort and catch by species and Statistical Area, Strait of Georgia, 1987.

Statistical Area		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod	Dog-Fish	Other Finfish	Total Finfish
13	Estimate	121,369	192,373	20,661	23,246	1,154	272	16,362	23,493	511	4,544	282,616
	S.E.	5,756	11,819	1,216	1,571	145	54	1,305	1,924	129	426	12,217
14	Estimate	122,735	196,252	20,371	3,821	91	88	22,697	10,288	629	8,167	262,404
	S.E.	8,361	16,620	2,056	747	33	39	3,828	1,745	245	1,593	17,358
15	Estimate	12,104	17,070	1,835	275	0	4	2,969	1,432	94	597	24,276
	S.E.	825	1,560	161	47	0	3	357	196	55	81	1,624
16	Estimate	57,804	66,432	9,841	612	48	194	20,594	8,100	399	5,976	112,196
	S.E.	2,020	3,787	688	127	26	68	1,402	615	149	901	4,244
17	Estimate	73,109	88,617	19,980	445	22	20	22,988	6,916	629	7,929	147,546
	S.E.	3,397	5,699	1,628	165	11	10	2,546	847	357	2,739	7,070
18	Estimate	30,377	4,162	8,067	240	56	2536	14,886	3,029	477	17,758	51,211
	S.E.	1,445	338	917	67	22	1794	1,702	483	199	4,769	5,486
19A	Estimate	25,555	965	8,084	37	0	106	5,814	820	125	1,647	17,598
	S.E.	1,988	193	910	24	0	76	806	168	86	502	1,345
19B+	Estimate	96,604	61,559	24,878	52,413	5,332	137	22,092	10,140	158	10,448	187,157
	S.E.	4,057	3,738	1,791	3,264	426	42	1,468	819	40	1,872	5,861
28	Estimate	23,439	5,641	3,179	3,408	767	74	4,222	794	586	2,461	21,132
	S.E.	1,552	710	309	496	141	31	592	139	110	389	1,183
29	Estimate	26,635	8,501	4,185	5,507	1,397	113	3,646	777	502	1,970	26,598
	S.E.	1,876	838	594	874	241	39	377	115	95	258	1,452
Total	Estimate	589,731	641,572	121,081	90,004	8,867	3,544	136,270	65,789	4,110	61,497	1,132,734 *
	S.E.	12,156	21,920	3,766	3,839	532	1,799	5,579	2,974	547	6,145	24,310

* In addition, an estimated 1,961 steelhead, cutthroat trout and unidentified salmon were caught by sport fishermen.

Table 5. Monthly catch success (catch per boat trip) by species, Strait of Georgia, 1987.

Month	Coho	Chinook	Total ** Salmon	Rock-Fish	Lingcod	Total Non-Salmon	All Finfish
Jan+Feb	0.12	0.61	0.73	0.17	0.00	0.44	1.18
Mar	0.14	0.36	0.50	0.21	0.02	1.43	1.94
Apr	1.06	0.31	1.38	0.25	0.21	0.56	1.94
May	0.93	0.30	1.22	0.31	0.16	0.63	1.85
Jun	1.42	0.26	1.69	0.20	0.12	0.39	2.08
Jul	1.62	0.15	1.83	0.25	0.10	0.43	2.26
Aug	0.91	0.13	1.48	0.23	0.10	0.39	1.87
Sep	0.89	0.15	1.46	0.16	0.11	0.33	1.80
Oct	0.57	0.12	0.72	0.27	0.12	0.53	1.26
Nov+Dec	0.12	0.30	0.66	0.26	0.15	0.65	1.31
Total	1.09	0.21	1.47	0.23	0.11	0.45	1.92

* Calculated using Table 3 data.

** Includes coho, chinook, pink, chum and sockeye.

Table 6. Identification of rockfish by species in each Statistical Area, Strait of Georgia, 1987.

Species	Statistical Area										Total Sample
	13	14	15	16	17	18	19A	19B+	28	29	
Quillback (Sebastes maliger)	150	160	0	561	255	88	261	553	213	24	2,265
Copper (S. caurinus)	142	57	0	127	150	117	73	302	104	20	1,092
Yelloweye (S. ruberrimus)	54	119	3	119	103	0	22	65	29	0	514
Black (S. melanops)	5	12	0	28	2	1	5	377	15	0	445
Tiger (S. nigrocinctus)	3	2	0	12	9	0	4	7	2	0	39
Yellowtail (S. flavidus)	0	1	0	0	1	1	0	25	0	0	28
China (S. nebulosus)	0	1	0	7	0	0	0	48	0	0	56
Canary (S. pinniger)	3	7	0	7	14	0	0	46	57	4	138
Unidentified	331	95	34	201	127	91	73	672	135	21	1,780
Total sample	688	454	37	1,062	661	298	438	2,095	555	69	6,357

Table 7. Estimated catch of rockfish by species and Statistical Area, Strait of Georgia, 1987. *

Species		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Quillback	Catch	3,567	7,999	0	10,879	8,868	4,396	3,465	5,831	1,620	1,268	47,893
	S.D.	384	1,444	0	805	1,075	640	500	442	244	248	2,239
Copper	Catch	3,377	2,850	0	2,463	5,217	5,845	969	3,185	791	1,057	25,754
	S.D.	370	599	0	265	690	791	170	271	132	228	1,356
Yelloweye	Catch	1,284	5,949	241	2,308	3,582	0	292	685	221	0	14,562
	S.D.	197	1,110	137	254	514	0	73	95	51	0	1,279
Black	Catch	119	600	0	543	70	50	66	3,976	114	0	5,538
	S.D.	54	201	0	108	50	51	31	323	33	0	408
Other **	Catch	8,015	5,299	2,728	4,401	5,251	4,595	1,022	8,415	1,476	1,321	42,523
	S.D.	1,173	3,307	330	1,082	2,141	1,363	604	1,331	519	169	4,740
Total	Catch	16,362	22,697	2,969	20,594	22,988	14,886	5,814	22,092	4,222	3,646	136,270
	S.D.	1,305	3,828	357	1,402	2,546	1,702	806	1,468	592	377	5,579

* Calculated using data from Table 6 and Appendix B-9.

** Other includes tiger, yellowtail, china, canary and unidentified rockfish.

Table 8. Monthly number of marked chinook observed by region, Strait of Georgia, 1987.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Obs *	9	5	19	33
	Insp **	142	192	598	932
Mar	Obs	1	3	5	9
	Insp	64	82	232	378
Apr	Obs	5	8	0	13
	Insp	86	195	188	469
May	Obs	23	16	2	41
	Insp	243	396	64	703
Jun	Obs	28	3	3	34
	Insp	534	200	252	986
Jul	Obs	26	11	0	37
	Insp	393	220	150	763
Aug	Obs	29	6	12	47
	Insp	524	180	333	1,037
Sep	Obs	6	6	7	19
	Insp	152	163	225	540
Oct	Obs	2	2	2	6
	Insp	51	51	146	248
Nov+Dec	Obs	1	1	11	13
	Insp	49	11	423	483
Total	Obs	130	61	61	252
	Insp	2,238	1,690	2,611	6,539
Proportion of marks		0.058	0.036	0.023	0.039

* Obs - marks observed.

** Insp - fish inspected.

Table 9. Monthly number of marked coho observed by region, Strait of Georgia, 1987.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Obs *	5	2	4	11
	Insp **	39	75	80	194
Mar	Obs	7	10	6	23
	Insp	94	110	24	228
Apr	Obs	42	61	1	104
	Insp	542	1,049	17	1,608
May	Obs	123	103	0	226
	Insp	1,277	954	3	2,234
Jun	Obs	285	61	7	353
	Insp	4,261	751	293	5,305
Jul	Obs	403	47	59	509
	Insp	5,450	730	1,036	7,216
Aug	Obs	296	69	64	429
	Insp	4,739	587	1,164	6,490
Sep	Obs	78	38	136	252
	Insp	1,265	323	2,373	3,961
Oct	Obs	5	8	24	37
	Insp	143	198	1,039	1,380
Nov+Dec	Obs	1	1	3	5
	Insp	12	29	100	141
Total	Obs	1,245	400	304	1,949
	Insp	17,822	4,806	6,129	28,757
Proportion of marks		0.070	0.083	0.050	0.068

* Obs - marks observed.

** Insp - fish inspected.

Table 10. Monthly estimated catch of marked chinook by region, Strait of Georgia, 1987. *

Month		North Gulf	South Gulf	Victoria	Total
Jan+Feb	Catch	102	103	181	386
	S.D.	43	51	56	87
Mar	Catch	6	40	42	88
	S.D.	6	24	26	36
Apr	Catch	27	136	0	163
	S.D.	12	50	0	51
May	Catch	796	435	27	1,258
	S.D.	211	115	20	241
Jun	Catch	802	112	58	972
	S.D.	164	68	35	181
Jul	Catch	590	399	0	989
	S.D.	127	127	0	180
Aug	Catch	662	136	92	890
	S.D.	131	56	28	145
Sep	Catch	144	137	62	343
	S.D.	60	58	24	87
Oct	Catch	37	32	18	87
	S.D.	29	23	14	40
Nov+Dec	Catch	23	29	45	97
	S.D.	24	31	14	42
Total	Catch	3,189	1,559	525	5,273
	S.D.	334	218	85	408

* Calculated using data from Table 8 and Appendix B-3.

Table 11. Monthly estimated catch of marked coho by region, Strait of Georgia, 1987. *

Month		North Gulf	South Gulf	Victoria	Total
Jan+Feb	Catch	50	28	43	121
	S.D.	37	24	25	51
Mar	Catch	20	80	57	157
	S.D.	10	31	43	54
Apr	Catch	367	858	11	1,236
	S.D.	81	125	12	149
May	Catch	4,397	1,857	0	6,254
	S.D.	733	371	0	822
Jun	Catch	8,739	843	208	9,790
	S.D.	911	165	97	931
Jul	Catch	11,130	2,170	805	14,105
	S.D.	1,199	407	137	1,274
Aug	Catch	6,752	1,974	479	9,205
	S.D.	559	283	70	630
Sep	Catch	1,790	1,101	1,093	3,984
	S.D.	256	213	121	354
Oct	Catch	86	129	214	429
	S.D.	40	48	64	89
Nov+Dec	Catch	28	19	10	57
	S.D.	31	21	6	38
Total	Catch	33,359	9,059	2,920	45,338
	S.D.	1,787	690	233	1,930

* Calculated using data from Table 9 and Appendix B-2.

Table 12. Monthly number and percent age composition of chinook sampled for age in the Strait of Georgia Creel Survey, 1987 (n gives sample size).

Month	Age 2		Age 3		Age 4		Age 5+		Total Sample
	n	%	n	%	n	%	n	%	
Jan+Feb	6	2.6%	137	59.3%	78	33.8%	10	4.3%	231
Mar	0	0.0%	71	60.7%	39	33.3%	7	6.0%	117
Apr	1	1.0%	65	63.7%	34	33.3%	2	2.0%	102
May	0	0.0%	128	58.4%	74	33.8%	17	7.8%	219
Jun	5	2.3%	133	61.3%	65	30.0%	14	6.5%	217
Jul	7	5.2%	94	70.1%	27	20.1%	6	4.5%	134
Aug	24	15.1%	98	61.6%	26	16.4%	11	6.9%	159
Sep	14	17.1%	56	68.3%	12	14.6%	0	0.0%	82
Oct	25	49.0%	25	49.0%	1	2.0%	0	0.0%	51
Nov+Dec	34	47.9%	35	49.3%	2	2.8%	0	0.0%	71
Total	116	-	842	-	358	-	67	-	1,383
Overall age composition of catch *	-	7.8%	-	62.1%	-	25.0%	-	5.2%	-

* Overall age composition of estimated catch based on data from Table 13.

Table 13. Monthly estimated catch at age of chinook in the Strait of Georgia, 1987. *

Month		Age 2	Age 3	Age 4	Age 5+	Total **
Jan+Feb	Catch	293	6,683	3,805	488	11,269
	S.D.	125	954	613	165	1,153
Mar	Catch	0	2,082	1,144	205	3,431
	S.D.	0	490	297	90	580
Apr	Catch	57	3,688	1,929	113	5,787
	S.D.	57	470	336	81	586
May	Catch	0	11,728	6,780	1,558	20,066
	S.D.	0	1,249	886	390	1,580
Jun	Catch	637	16,935	8,276	1,783	27,631
	S.D.	286	1,556	1,058	481	1,963
Jul	Catch	976	13,110	3,766	837	18,689
	S.D.	367	1,188	702	340	1,468
Aug	Catch	2,807	11,462	3,041	1,287	18,597
	S.D.	554	981	574	382	1,321
Sep	Catch	1,600	6,399	1,371	0	9,370
	S.D.	404	638	377	0	844
Oct	Catch	1,510	1,510	60	0	3,080
	S.D.	299	299	61	0	427
Nov+Dec	Catch	1,514	1,558	89	0	3,161
	S.D.	254	258	63	0	367
Total	Catch	9,394	75,155	30,261	6,271	121,081
	S.D.	927	2,879	1,858	829	3,770 ++
Overall age composition		7.8%	62.1%	25.0%	5.2%	100.0%

* Calculated by applying to total monthly chinook catch the monthly age proportions from Table 12.

** Monthly total catch from Table 3.

++ S.E.

Table 14. Monthly mean nose–fork length (L) at age of chinook sampled in the Strait of Georgia Creel Survey, 1987 (n gives sample size).

Month	Age 2		Age 3		Age 4		Age 5		Age 6		Total Sample
	L (cm)	n	L (cm)	n	L (cm)	n	L (cm)	n	L (cm)	n	
Jan+Feb	51.3	6	54.8	137	65.1	78	77.8	10	-	0	231
Mar	-	0	53.2	71	68.2	39	77.1	7	-	0	117
Apr	40.0	1	56.3	65	69.6	34	79.5	2	-	0	102
May	-	0	60.0	128	71.7	74	86.6	16	107.0	1	219
Jun	52.0	5	63.0	133	77.6	65	86.8	14	-	0	217
Jul	43.3	7	65.3	94	81.8	27	88.4	5	99.0	1	134
Aug	46.6	24	67.0	98	85.1	26	102.9	10	118.0	1	159
Sep	48.7	14	66.1	56	88.6	12	-	0	-	0	82
Oct	49.1	25	61.0	25	75.0	1	-	0	-	0	51
Nov+Dec	52.3	34	61.0	35	70.0	2	-	0	-	0	71
Total	49.3	116	60.6	842	73.0	358	86.7	64	108.0	3	1,383

APPENDICES

APPENDIX A

METHODS AND EQUATIONS USED IN ANALYSIS OF CATCH AND EFFORT STATISTICS FOR THE STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEYS, 1983-1987[1].

[1]Adapted from:

Shardlow, T. F., K. K. English, T. Hoyt, G. E. Gillespie and T. A. Calvin. 1989. Strait of Georgia Creel Survey sport fishery statistics, 1983. Can. MS Rep. Fish. Aquat. Sci. 1872 : 53 p.

METHODS AND EQUATIONS USED IN ANALYSIS OF CATCH AND EFFORT STATISTICS FOR THE STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEYS, 1983 - 1987.

The description of terms, variables and subscripts used in the data analysis is given in Table A-1.

Calculation of Catch and Effort Statistics

To estimate the monthly catch and effort, three components had to be calculated from that month's data:

(1) the weighted mean daily fishing pattern from interview data,
(2) the weighted mean catch per unit effort from interview data and
(3) the mean sport count from overflight data.

The equations used to estimate the means and variances for all catch and effort statistics are shown below. For April which had only overflight data, the interview data from preceding and following months were combined to estimate the mean daily fishing activity pattern and catch per unit effort. The catch and effort estimates for April are referred to as indirect estimates.

Weighting factors used to estimate the daily fishing activity pattern and mean catch per unit effort were calculated using the equations derived from DPA Consulting Ltd. (1982).

The data obtained from each shift were multiplied by the following weighting factor (W1) to expand for all possible stints at each site. The formula reads:

$$W1_{dij} = \frac{N_d}{n_{dij}} \qquad (1)$$

where N_d is the total number of days of type d in that month and n_{dij} is the number of times the jth work block at the ith site was sampled on type d days.

The interviews aggregrated by work block were multiplied by the weighting factor W2 to expand for all boats that landed in each work block. The formula reads:

$$W2_{dijk} = \frac{L_{dijk}}{I_{dijk}} \qquad (2)$$

where L_{dijk} is the number of boats landed and I_{dijk} is the number of boats interviewed on the kth stint in the jth work block at the ith site on a day type d.

Therefore, the following equations can be used to calculate an unbiased estimate of the total monthly catch ($\hat{C}_{dgr}$), fishing trips ($\hat{T}_{dg}$) and fishing activity in time block $\hat{A}_{dgt}$ for each day type (d) where g is a set of landing sites (i). These formulas read:

Table A-1. Description of terms, variables and subscripts used in this report.

DESCRIPTION OF TERMS

Shift/Stint - Represents a combination of a day type and landing site which was sampled on a single day. i.e. one sampling stint performed by an interviewer.

Work block - Represents one of four possible periods at a particular site of a given day type.

Work Block 1 is before 11 AM
Work Block 2 is 11 AM - 3 PM
Work Block 3 is 3 PM - 7 PM
Work Block 4 is after 7 PM

Day type - There are two possible day types: weekdays and weekends; holidays are considered to be weekend days.

Time block - Each day is divided into 16 time blocks which are:
1) before 7 AM
2) 7:00 - 7:59 AM
3) 8:00 - 8:59 AM
.
.
.
15) 8:00 - 8:59 PM
16) after 9 PM

DESCRIPTION OF VARIABLES

A	-	Number of boats actively fishing
B	-	Number of boats observed on a flight
C	-	Catch
C'	-	Catch of marked salmon
CPE	-	Catch per boat trip
E	-	Effort (estimated total number of boat trips)
I	-	Number of boats interviewed and found to have been fishing
L	-	Number of boats landing
n	-	Number sampled
N	-	Population size from which n samples were observed
P	-	Proportion
T	-	Number of boat trips
V	-	Number found to be marked
W1	-	Weighting factor to expand for all possible stints at each site
W2	-	Weighting factor to expand for all boats that landed in each work block

DESCRIPTION OF SUBSCRIPTS

a	-	age
g	-	a set of landing sites
d	-	day type
i	-	site
j	-	work block
k	-	stint
l	-	landing time block
m	-	month
q	-	the next boat landing at site i and upon interviewing, found to have been fishing(q ranges from 1 to n)
r	-	species
s	-	sub-Statistical Area
t	-	time block
u	-	flight
x	-	region
y	-	annual

$$\hat{C}_{dgr} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} C_{dijklqr} \right) \right] \qquad (3)$$

$$\hat{T}_{dg} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} \right) \right] \qquad (4)$$

$$\hat{A}_{dgt} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} A_{dijkqt} \right) \right] \qquad (5)$$

where C_{dijkqr} is the catch of species r by the qth fishing party, and A_{dijkqt} can equal 0 or 1, thereby indicating whether the qth fishing party was actively fishing in time block t. Thus, the mean monthly catch per unit effort (CPE_{dgr}) measured in terms of numbers of fish kept per completed boat trip, and proportion of daily fishing effort active during the hour of the aerial survey (P_{dgt}) can be calculated with the following equations:

$$CPE_{dgr} = \frac{\hat{C}_{dgr}}{\hat{T}_{dg}} \qquad (6)$$

$$P_{dgt} = \frac{\hat{A}_{dgt}}{\hat{T}_{dg}} \qquad (7)$$

where CPE_{dgr} and P_{dgt} are calculated for each day type (d) and group of landing sites (g). The groups of landing sites reflect geographic areas with similar catch rates and/or activity patterns.

The estimated mean number of boats fishing during the hour of the sport boat count by overflight was calculated for each sub-Statistical Area using the following equation:

$$\bar{B}_{dst} = \frac{\sum_u B_{dstu}}{n_{ds}} \qquad (8)$$

where B_{dstu} is the number of boats observed fishing on flight u at time t, in sub-Statistical Area s for day type d.

The mean sport boat count at the time of the overflight ($\bar{B}_{dst}$) and proportion of daily fishing effort active during the hour of the overflight (P_{dgt}) were used in the following equation to calculate the total fishing effort for sub-Statistical Area s on day type d:

$$E_{ds} = \bar{B}_{dst} \frac{1}{P_{dgt}} N_d \qquad (9)$$

where N_d is the number of type d days in the month. Interview data for the sub-Statistical Areas fished (s) by anglers landing at each of the sites (i) within a landing group (g) were used to select the proportions (P_{dgt}) that are appropriate for each mean boat count ($\bar{B}_{dst}$).

The estimate for total effort by sub-Statistical Area and day type (E_{ds}) and the weighted catch per boat trip for a group of landing sites by day type, area and species (CPE_{dgr}) were used to calculate total catch for each species (r) and each sub-Statistical Area (s).

$$C_{sr} = \sum_{d} (E_{ds} \, CPE_{dgr}) \qquad (10)$$

The interview data were also used to select the catch per effort estimates (CPE_{dgr}) that should be applied to the effort estimate (E_{ds}) for a specific sub-Statistical Area (s).

Variance of Total Fishing Effort

The variance for estimates of total fishing effort has two components:

(1) the variance in aerial sport boat counts:

$$S^2_{B_{dst}} = \frac{\sum_u B^2_{dstu} - \frac{\left(\sum_u B_{dstu}\right)^2}{n_{ds}}}{n_{ds}(n_{ds}-1)} \left[\frac{N_d - n_{ds}}{N_d - 1}\right] \qquad (11)$$

where B_{dstu} is the aerial sport boat count at time t during an aerial survey u on a type d day in sub-area s; n_{ds} is the number of aerial surveys in which boats were counted on type d days, in sub-Statistical Area s; and N_d is the total number of type d days in the month.

(2) the variance in the proportion of boats fishing during the hours of the aerial boat counts:

$$S^2_{P_{dgt}} = \frac{P_{dgt}(1-P_{dgt})}{I_{dg}} \qquad (12)$$

where P_{dgt} is the mean proportion of boats fishing for a group of landing sites g during the hour of the aerial boat count t on type d days, and I_{dg} is the total number of sport fishing boats interviewed. The above formula assumes P_{dgt} is unbiased and normally distributed where the number of interviews is large.

The variances for boat counts ($S^2_{B_{dst}}$) and proportion of boats fishing ($S^2_{P_{dgt}}$) were combined in the following equation to calculate variance for effort:

$$S^2_{E_{ds}} = N^2_d \left(\frac{B^2_{dst}}{P^2_{dgt}}\right)\left(\frac{S^2_{B_{dst}}}{B^2_{dst}} + \frac{S^2_{P_{dgt}}}{P^2_{dgt}}\right) \qquad (13)$$

where $S^2_{E_{ds}}$ is the variance for total effort on type d days in sub-area s, and the formula is the standard formula for the variance of a ratio of two independent random variables.

Variance of Total Catch

The variance for estimates of total catch had two components: (1) the variance for total effort (presented above), and (2) the variance for catch per boat trip.

The variance for catch per boat trip($S^2_{CPE_{dgr}}$) was calculated using the following equation:

$$S^2_{CPE_{dgr}} = \frac{SS_{CPE_{dgr}} - \frac{\left(S_{CPE_{dgr}}\right)^2}{I_{dg}}}{I_{dg}\left(I_{dg}-1\right)} \qquad (14)$$

where $SS_{CPE_{dgr}}$ is the weighted sum of squares for CPE_{dgr}, and $S_{CPE_{dgr}}$ is the weighted sum for CPE_{dgr}, such that the sum of the weighting factors used to estimate CPE_{dgr} was equal to the number of interviewed boat trips (I_{dg}).

The variance for total effort and the variance in the catch per boat trip for the appropriately grouped landing sites were combined in the following equation to calculate variance for total catch:

$$S^2_{C_{sr}} = \sum_d \left(E^2_{ds} S^2_{CPE_{dgr}} + CPE^2_{dgr} S^2_{E_{ds}} + S^2_{CPE_{dgr}} S^2_{E_{ds}} \right) \qquad (15)$$

which is the standard formula for the variance of the product of two independent random variables, and where $S^2_{C_{sr}}$ is the variance for total number of species r in sub-Statistical Area s.

Estimation of Marked Chinook and Coho Salmon

Incidence of marked (adipose-clipped) chinook and coho was recorded in each interview. The proportion of marks observed for each region, month and species (P_{xmr}) was calculated as:

$$P_{xmr} = \frac{V_{xmr}}{n_{xmr}} \qquad (16)$$

where V is the number of marked fish observed and n is the number of fish inspected by region(x), month(m) and species (r).

The variance of each proportion was calculated as:

$$S^2_{P_{xmr}} = \frac{P_{xmr}(1 - P_{xmr})}{n_{xmr}} \qquad (17)$$

Monthly catch estimates of marked salmon were calculated as:

$$C'_{xmr} = P_{xmr} C_{xmr} \qquad (18)$$

where C_{xmr} is the estimated catch of species r in region x and month m.

The variance of the marked catch estimates was calculated as:

$$S^2_{C'_{xmr}} = P^2_{xmr} S^2_{C_{xmr}} + C^2_{xmr} S^2_{P_{xmr}} + S^2_{C_{xmr}} S^2_{P_{xmr}} \qquad (19)$$

where $S^2_{C_{xmr}}$ is the variance of the catch estimate of species r in region x and month m.

The estimated annual proportions of marked salmon caught in each region (weighted by the corresponding regional annual catch estimates) were calculated as:

$$P_{xry} = \frac{C'_{xry}}{C_{xry}} \qquad (20)$$

where

$$C'_{xry} = \sum_{m} C'_{xmr} \quad \text{and} \quad C_{xry} = \sum_{m} C_{xmr} \qquad (21)$$

The variance of the annual proportions was calculated as:

$$S^2_{P_{xry}} = \left(\frac{C'_{xry}}{C_{xry}}\right)^2 \left[\frac{S^2_{C'_{xry}}}{(C'_{xry})^2} + \frac{S^2_{C_{xry}}}{(C_{xry})^2}\right] \qquad (22)$$

where $S^2_{C_{xry}}$ is the variance of the annual estimated catch of species r in region x.

Estimation of Age Composition of Chinook Catch

Scale samples and length measurements were taken in a subsampling program during the interview process. Ages used in this report represent total age of the fish (including both freshwater and oceanic life) according to the Gilbert-Rich (1927) recording convention.

The proportion of chinook at each age and month (P_{am}) was calculated as:

$$P_{am} = \frac{a_m}{n_m} \qquad (23)$$

where a_m represents the number of fish observed at age a during month m, and n_m is the total number of fish biosampled in that month.

The variance of each proportion was calculated as:

$$S^2_{am} = \frac{P_{am}(1 - P_{am})}{n_m} \qquad (24)$$

The catch at age of chinook in each month was calculated as:

$$C_{am} = P_{am} C_m \qquad (25)$$

where C_m is the estimated catch of chinook salmon in a given month m.

The variance of the catch at age estimate was calculated as:

$$S^2_{C_{am}} = P^2_{am} S^2_{C_m} + C^2_m S^2_{P_{am}} + S^2_{C_m} S^2_{P_{am}} \qquad (26)$$

where $S^2_{C_m}$ is the variance of the monthly catch estimate C_m.

The annual catch at age was calculated as:

$$C_{ay} = \sum_m C_{am} \qquad (27)$$

with a variance

$$S^2_{C_{ay}} = \sum_m S^2_{C_{am}} \qquad (28)$$

The annual proportion at age (weighted by monthly catch) was calculated as:

$$P_{ay} = \frac{C_{ay}}{C_y} \qquad (29)$$

with a variance

$$S^2_{P_{ay}} = \left(\frac{C_{ay}}{C_y}\right)^2 \left[\frac{S^2_{C_{ay}}}{(C_{ay})^2} + \frac{S^2_{C_y}}{(C_y)^2}\right] \qquad (30)$$

APPENDIX B

CATCH AND EFFORT STATISTICS BY MONTH AND STATISTICAL AREA FOR STRAIT OF GEORGIA, 1987.

APPENDIX B-1. STRAIT OF GEORGIA FISHING EFFORT (NO. BOAT TRIPS), 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Estimate	439	1,094	63	1,954	2,774	1,728	976	6,646	1,433	1,449	18,556
	S.E.	173	296	23	444	824	501	308	1,462	130	393	1,910
March	Estimate	421	405	88	524	1,802	951	450	3,645	890	356	9,532
	S.E.	61	61	37	116	253	174	451	898	113	140	1,076
April	Estimate	1,532	1,446	197	1,394	4,495	1,748	1,376	4,502	1,246	561	18,497
	S.E.	500	221	43	232	317	330	546	544	539	115	1,209
May	Estimate	10,716	15,472	1,966	8,132	10,961	3,222	5,291	6,087	2,185	3,938	67,970
	S.E.	1,594	3,122	362	680	1,404	394	968	645	294	779	4,130
June	Estimate	24,855	30,381	1,674	9,867	10,956	3,594	3,388	16,728	2,819	1,232	105,494
	S.E.	3,092	3,371	264	898	1,051	402	971	2,439	767	174	5,530
July	Estimate	32,489	27,367	3,909	12,046	17,581	5,204	3,170	13,170	3,727	3,443	122,106
	S.E.	3,668	4,857	632	1,174	2,229	713	564	1,002	618	560	6,806
August	Estimate	34,502	33,349	3,023	15,513	13,831	6,384	5,360	21,541	6,531	6,329	146,363
	S.E.	2,138	4,894	231	778	1,286	489	726	1,672	839	848	5,985
September	Estimate	13,701	10,429	672	5,065	6,655	3,932	2,634	12,861	3,128	5,540	64,617
	S.E.	1,586	1,008	126	480	850	409	657	845	499	997	2,656
October	Estimate	1,849	2,241	220	1,758	2,554	2,006	2,359	8,936	863	3,279	26,065
	S.E.	441	282	44	461	288	234	389	1,505	136	801	1,924
Nov+Dec	Estimate	865	551	292	1,551	1,500	1,608	551	2,488	617	508	10,531
	S.E.	126	151	83	351	443	643	225	287	250	164	1,000
Total	Estimate	121,369	122,735	12,104	57,804	73,109	30,377	25,555	96,604	23,439	26,635	589,731
	S.E.	5,756	8,361	826	2,021	3,398	1,446	1,989	4,058	1,553	1,876	12,157

APPENDIX B-2. STRAIT OF GEORGIA COHO CATCH SUMMARY, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	387	0	0	994	0	74	858	0	0	2,313
	S.E.	0	218	0	0	434	0	55	250	0	0	549
March	Catch	0	249	0	13	867	0	18	226	0	0	1,373
	S.E.	0	90	0	10	199	0	22	142	0	0	262
April	Catch	0	3,225	204	1,307	14,743	5	4	186	0	0	19,674
	S.E.	0	653	43	385	1,124	4	5	79	0	0	1,359
May	Catch	7,498	26,765	2,473	8,910	16,809	22	43	31	36	294	62,881
	S.E.	1,403	6,231	467	1,137	3,030	13	31	18	15	72	7,176
June	Catch	47,296	70,109	2,895	10,360	9,953	97	41	8,727	76	211	149,765
	S.E.	7,795	8,139	486	1,457	1,574	29	48	2,241	46	68	11,699
July	Catch	65,576	55,850	8,506	20,583	28,192	3,184	123	14,134	715	1,496	198,359
	S.E.	7,483	12,052	1,384	2,669	4,101	293	61	1,599	281	279	15,163
August	Catch	53,285	31,609	2,371	20,841	9,884	507	137	8,716	3,163	3,101	133,614
	S.E.	3,868	4,966	223	1,801	1,244	135	51	686	573	520	6,749
September	Catch	18,191	6,219	505	4,112	5,194	17	94	19,068	1,530	2,526	57,456
	S.E.	2,446	815	109	635	929	17	74	1,390	305	517	3,197
October	Catch	527	1,644	116	168	1,571	330	288	9,271	121	873	14,909
	S.E.	178	323	35	69	272	95	96	1,975	42	279	2,053
Nov+Dec	Catch	0	195	0	138	410	0	143	342	0	0	1,228
	S.E.	0	93	0	93	185	0	99	68	0	0	257
Total	Catch	192,373	196,252	17,070	66,432	88,617	4,162	965	61,559	5,641	8,501	641,572
	S.E.	11,820	16,620	1,560	3,788	5,700	338	194	3,738	710	839	21,921

APPENDIX B-3. STRAIT OF GEORGIA CHINOOK CATCH SUMMARY, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	43	726	47	798	1,519	1,385	209	5,708	481	353	11,269
	S.E.	33	332	17	229	502	566	120	1,187	98	174	1,483
March	Catch	98	99	29	149	609	290	18	1,955	132	52	3,431
	S.E.	38	30	8	37	118	102	16	743	47	25	764
April	Catch	13	128	114	203	1,936	628	507	2,025	168	66	5,788
	S.E.	12	25	28	59	204	192	286	417	120	23	595
May	Catch	1,869	4,394	264	1,887	2,698	1,292	2,843	878	1,415	2,526	20,066
	S.E.	350	1,382	59	284	551	263	636	166	198	534	1,802
June	Catch	5,143	6,990	373	2,780	4,260	2,061	614	4,881	340	188	27,630
	S.E.	758	1,069	88	382	1,099	553	210	876	122	38	2,052
July	Catch	5,049	2,493	292	1,080	6,275	422	1,145	1,803	48	82	18,689
	S.E.	637	592	56	169	875	123	340	259	28	22	1,324
August	Catch	6,273	3,553	392	1,751	1,232	818	1,681	2,552	174	170	18,596
	S.E.	507	799	47	210	181	164	309	268	46	45	1,083
September	Catch	1,902	1,337	65	334	933	869	859	2,004	399	668	9,370
	S.E.	285	243	22	69	150	221	261	211	111	177	611
October	Catch	0	538	36	361	290	228	203	1,337	13	75	3,081
	S.E.	0	123	9	269	65	83	65	265	8	41	418
Nov+Dec	Catch	271	113	223	498	228	74	5	1,735	9	5	3,161
	S.E.	192	54	89	202	96	35	6	165	11	6	355
Total	Catch	20,661	20,371	1,835	9,841	19,980	8,067	8,084	24,878	3,179	4,185	121,081
	S.E.	1,217	2,057	162	689	1,629	917	910	1,792	309	595	3,768

APPENDIX B-4. STRAIT OF GEORGIA PINK CATCH SUMMARY, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	28	9	0	0	0	0	0	0	0	0	37
	S.E.	20	9	0	0	0	0	0	0	0	0	22
June	Catch	107	299	11	17	20	0	0	386	0	0	840
	S.E.	56	94	6	13	11	0	0	184	0	0	215
July	Catch	1,805	510	118	19	105	0	0	3,270	0	31	5,858
	S.E.	521	227	36	15	48	0	0	493	0	16	755
August	Catch	14,230	1,971	125	391	296	154	31	37,455	1,623	1,232	57,508
	S.E.	1,138	607	30	95	158	53	23	3,052	326	216	3,342
September	Catch	7,012	1,032	19	181	23	81	6	11,242	1,785	4,209	25,590
	S.E.	948	360	7	83	9	42	8	1,031	374	847	1,720
October	Catch	64	0	2	4	1	5	0	60	0	35	171
	S.E.	46	0	2	3	1	3	0	32	0	26	62
Nov+Dec	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
Total	Catch	23,246	3,821	275	612	445	240	37	52,413	3,408	5,507	90,004
	S.E.	1,572	747	48	128	166	68	24	3,264	496	875	3,840

APPENDIX B-5. STRAIT OF GEORGIA SOCKEYE CATCH SUMMARY, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
June	Catch	85	6	0	0	0	0	0	0	0	0	91
	S.E.	53	6	0	0	0	0	0	0	0	0	53
July	Catch	69	0	0	0	0	0	0	526	0	0	595
	S.E.	39	0	0	0	0	0	0	132	0	0	138
August	Catch	855	33	1	16	1	23	0	4,328	361	256	5,874
	S.E.	111	19	1	15	1	18	0	379	92	55	410
September	Catch	81	52	0	32	0	0	0	478	397	891	1,931
	S.E.	25	27	0	22	1	0	0	143	107	207	277
October	Catch	64	0	0	0	21	33	0	0	9	249	376
	S.E.	62	0	0	0	11	14	0	0	9	112	130
Nov+Dec	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
Total	Catch	1,154	91	1	48	22	56	0	5,332	767	1,396	8,867
	S.E.	145	34	1	27	11	23	0	426	141	242	532

APPENDIX B-6. STRAIT OF GEORGIA CHUM CATCH SUMMARY, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
June	Catch	0	4	0	15	0	0	0	0	0	0	19
	S.E.	0	5	0	13	0	0	0	0	0	0	14
July	Catch	18	24	0	55	6	0	0	0	0	2	105
	S.E.	10	27	0	38	8	0	0	0	0	2	48
August	Catch	200	32	0	90	5	0	0	16	10	4	357
	S.E.	48	26	0	51	4	0	0	9	12	4	76
September	Catch	26	0	3	5	9	0	0	8	58	92	201
	S.E.	16	0	3	3	5	0	0	9	29	37	51
October	Catch	28	0	1	3	0	180	15	105	6	15	353
	S.E.	18	0	0	3	0	76	14	39	6	12	89
Nov+Dec	Catch	0	28	0	26	0	2,356	91	8	0	0	2,509
	S.E.	0	13	0	23	0	1,793	75	11	0	0	1,795
Total	Catch	272	88	4	194	20	2,536	106	137	74	113	3,544
	S.E.	55	40	3	69	10	1,795	76	42	32	39	1,800

APPENDIX B-7. STRAIT OF GEORGIA CATCH SUMMARY FOR TOTAL SALMONIDS, 1987. *

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	43	1,114	49	805	2,516	1,385	283	6,617	481	353	13,646
	S.E.	33	513	18	231	904	566	156	1,368	98	174	1,842
March	Catch	98	350	29	163	1,477	290	37	2,184	132	52	4,812
	S.E.	38	99	8	45	279	102	28	851	47	25	911
April	Catch	13	3,353	346	1,600	16,682	634	512	2,212	168	66	25,586
	S.E.	12	658	66	402	1,240	192	287	447	120	23	1,572
May	Catch	9,403	31,178	2,738	10,800	19,512	1,316	2,887	910	1,452	2,821	83,017
	S.E.	1,627	7,424	514	1,259	3,199	265	639	169	204	553	8,408
June	Catch	52,673	77,436	3,283	13,179	14,241	2,159	665	13,998	418	403	178,455
	S.E.	8,238	9,003	550	1,678	2,017	554	226	3,001	151	88	12,865
July	Catch	72,530	58,912	8,920	21,744	34,652	3,606	1,268	19,799	765	1,611	223,807
	S.E.	8,270	12,596	1,443	2,773	4,890	317	363	2,101	287	280	16,295
August	Catch	74,886	37,356	2,956	23,381	11,460	1,505	1,850	53,306	5,385	4,809	216,894
	S.E.	5,095	6,001	264	1,908	1,351	228	335	4,247	816	723	9,322
September	Catch	27,225	8,691	609	4,849	6,169	968	960	32,831	4,171	8,413	94,886
	S.E.	3,444	1,048	132	695	1,027	226	286	2,417	750	1,557	4,845
October	Catch	734	2,187	162	547	1,891	779	508	10,791	154	1,255	19,008
	S.E.	236	406	42	283	318	163	131	2,222	47	377	2,351
Nov+Dec	Catch	271	340	223	663	641	2,431	240	2,095	9	5	6,918
	S.E.	192	129	89	231	256	1,795	140	182	11	6	1,859
Total	Catch	237,876	220,917	19,315	77,731	109,241	15,073	9,210	144,743	13,135	19,788	867,029
	S.E.	13,297	18,244	1,658	4,070	6,610	2,049	964	6,715	1,185	1,874	25,056

* Includes coho, chinook, pink, chum, sockeye, steelhead and cutthroat trout.

APPENDIX B-8. STRAIT OF GEORGIA CATCH SUMMARY FOR RELEASED SALMON, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	733	3	84	2,056	748	617	9,574	204	129	14,148
	S.E.	0	390	1	47	940	335	225	2,008	54	75	2,289
March	Catch	0	54	0	32	326	195	55	2,279	29	21	2,991
	S.E.	0	24	0	23	67	90	38	922	17	15	930
April	Catch	0	497	86	373	2,889	382	372	2,699	110	42	7,450
	S.E.	0	146	30	200	288	138	220	673	25	9	816
May	Catch	1,082	3,449	289	385	2,463	188	1,460	112	189	306	9,923
	S.E.	282	1,040	92	88	532	97	393	48	57	107	1,281
June	Catch	2,732	5,099	221	3,258	1,939	51	294	2,140	302	174	16,210
	S.E.	496	1,010	49	1,477	581	33	147	873	280	99	2,159
July	Catch	36,750	42,756	6,153	13,138	31,180	1,817	1,030	21,360	5,127	3,839	163,150
	S.E.	5,250	7,729	1,225	2,422	5,620	616	343	3,162	1,621	942	11,843
August	Catch	117,340	116,651	10,032	56,363	51,420	7,891	5,514	96,565	12,693	15,949	490,418
	S.E.	8,820	18,967	821	5,076	5,931	1,480	936	7,049	1,680	2,387	23,673
September	Catch	41,408	44,607	2,738	27,586	34,042	4,288	4,396	88,493	5,288	9,614	262,460
	S.E.	5,395	5,541	561	3,629	4,875	758	1,292	6,596	974	1,723	12,113
October	Catch	5,563	12,512	1,368	6,626	14,507	5,711	5,606	23,652	1,975	8,578	86,098
	S.E.	1,549	2,227	326	3,024	2,084	1,465	1,128	4,904	459	2,628	7,452
Nov+Dec	Catch	777	745	339	1,233	2,988	1,617	1,488	5,236	367	389	15,179
	S.E.	516	255	139	409	991	1,195	754	472	221	182	1,950
Total	Catch	205,652	227,103	21,229	109,078	143,810	22,888	20,832	252,110	26,284	39,041	1,068,027
	S.E.	11,724	21,389	1,621	7,506	9,871	2,621	2,186	11,557	2,597	4,065	30,329

APPENDIX B-9. STRAIT OF GEORGIA ROCKFISH CATCH SUMMARY, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	68	10	1	108	576	650	85	1,460	25	157	3,140
	S.E.	83	10	0	107	291	300	38	351	13	59	567
March	Catch	154	55	3	164	322	115	13	1,080	112	23	2,041
	S.E.	82	34	1	53	86	61	13	275	64	17	319
April	Catch	513	47	8	284	829	716	14	1,752	351	152	4,666
	S.E.	366	14	8	80	121	213	9	378	307	58	664
May	Catch	2,526	1,555	439	2,830	5,052	2,084	834	4,334	399	693	20,746
	S.E.	462	365	190	409	1,221	493	345	838	99	196	1,776
June	Catch	1,923	2,674	151	5,190	2,892	3,096	655	3,356	784	403	21,124
	S.E.	371	504	34	856	608	915	287	662	283	86	1,715
July	Catch	6,087	7,309	1,101	3,960	4,213	3,399	941	2,029	874	927	30,840
	S.E.	1,021	2,099	264	531	722	1,133	269	550	236	192	2,841
August	Catch	3,359	9,993	841	5,819	5,434	2,016	652	3,601	1,113	824	33,652
	S.E.	320	3,132	114	795	1,947	384	198	371	277	187	3,845
September	Catch	1,633	665	271	1,503	2,447	991	509	1,964	160	126	10,269
	S.E.	241	168	79	260	383	255	240	299	80	36	726
October	Catch	99	353	114	217	837	1,360	1,650	1,976	208	215	7,029
	S.E.	48	152	32	85	198	312	453	360	85	104	723
Nov+Dec	Catch	0	36	40	519	386	459	461	540	196	126	2,763
	S.E.	0	23	24	240	139	290	269	123	130	75	522
Total	Catch	16,362	22,697	2,969	20,594	22,988	14,886	5,814	22,092	4,222	3,646	136,270
	S.E.	1,305	3,828	358	1,403	2,546	1,702	806	1,468	593	378	5,589

APPENDIX B-10. STRAIT OF GEORGIA LINGCOD CATCH SUMMARY, 1987.

Month		Statistical Area										Total
		13	14	15	16	17	18	19A	19B+	28	29	
Jan+Feb	Catch	0	0	0	0	0	0	0	33	13	7	53 *
	S.E.	0	0	0	0	0	0	0	40	10	7	42
March	Catch	0	0	0	13	0	0	0	89	65	3	170 *
	S.E.	0	0	0	10	0	0	0	48	40	4	63
April	Catch	1,754	8	0	0	133	764	0	1,005	74	62	3,800
	S.E.	958	2	0	0	29	160	0	178	35	32	989
May	Catch	3,398	1,183	84	1,864	1,555	411	53	1,867	120	241	10,776
	S.E.	621	373	29	302	495	116	59	327	29	65	995
June	Catch	3,047	1,665	143	1,995	2,177	614	112	2,362	133	88	12,336
	S.E.	522	296	32	276	608	333	74	609	42	17	1,139
July	Catch	4,815	3,305	697	1,143	1,217	213	137	701	254	240	12,722
	S.E.	772	1,292	181	175	245	74	69	127	96	69	1,559
August	Catch	5,156	3,039	437	2,664	648	212	151	1,635	68	81	14,091
	S.E.	530	1,039	59	410	112	71	59	192	31	39	1,262
September	Catch	3,532	941	51	409	599	404	181	884	5	21	7,027
	S.E.	474	263	16	114	121	118	87	167	5	11	609
October	Catch	858	137	20	12	383	214	146	1,460	13	11	3,254
	S.E.	337	47	9	7	93	67	54	277	12	12	457
Nov+Dec	Catch	933	10	0	0	204	197	40	104	49	23	1,560 *
	S.E.	955	10	0	0	82	235	28	35	59	34	990
Total	Catch	23,493	10,288	1,432	8,100	6,916	3,029	820	10,140	794	777	65,789
	S.E.	1,924	1,746	196	616	847	484	169	820	139	115	2,975

* A total closure for lingcod was in effect from January 1 to April 15, and November 15 to December 31, 1987; see Table 3 footnote.

APPENDIX B-11. STRAIT OF GEORGIA DOGFISH CATCH SUMMARY, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	48	55	0	0	0	18	12	133
	S.E.	0	0	0	52	33	0	0	0	18	20	67
March	Catch	102	0	0	0	0	0	0	11	0	0	113
	S.E.	58	0	0	0	0	0	0	9	0	0	59
April	Catch	0	0	0	0	0	0	0	0	49	20	69
	S.E.	0	0	0	0	0	0	0	0	27	10	29
May	Catch	39	91	0	22	0	0	0	0	62	92	306
	S.E.	25	62	0	17	0	0	0	0	26	46	87
June	Catch	200	46	0	97	543	236	45	19	22	12	1,220
	S.E.	102	31	1	78	356	170	51	11	8	6	419
July	Catch	107	145	8	2	0	0	0	45	172	161	640
	S.E.	40	85	8	2	0	0	0	27	61	62	131
August	Catch	48	300	86	117	0	70	80	52	216	153	1,122
	S.E.	26	215	55	77	0	39	70	19	78	45	266
September	Catch	15	47	0	113	31	171	0	31	15	30	453
	S.E.	12	44	0	86	17	97	0	18	12	20	142
October	Catch	0	0	0	0	0	0	0	0	32	22	54
	S.E.	0	0	0	0	0	0	0	0	19	13	23
Nov+Dec	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
Total	Catch	511	629	94	399	629	477	125	158	586	502	4,110
	S.E.	130	245	56	150	358	200	87	40	110	95	548

APPENDIX B-12. STRAIT OF GEORGIA CATCH SUMMARY FOR OTHER FINFISH, 1987.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	228	19	1,571	121	1,784	28	874	138	156	4,919
	S.E.	0	109	8	717	112	1,800	24	622	109	120	2,048
March	Catch	50	5	0	27	278	8,813	55	2,054	49	23	11,354
	S.E.	37	5	0	21	97	3,704	67	1,394	25	17	3,960
April	Catch	13	31	7	139	215	135	218	798	219	73	1,848
	S.E.	12	10	4	83	55	54	283	171	161	28	386
May	Catch	655	589	218	648	5,002	2,636	22	910	209	343	11,232
	S.E.	207	287	60	134	2,709	1,955	22	274	52	100	3,376
June	Catch	582	1,461	49	667	457	793	134	1,290	395	152	5,980
	S.E.	165	313	19	154	170	506	83	312	134	36	747
July	Catch	1,137	1,599	172	1,203	718	1,040	25	928	651	447	7,920
	S.E.	231	352	44	292	186	752	26	273	229	127	1,004
August	Catch	1,228	2,953	73	633	597	702	176	948	572	454	8,336
	S.E.	152	1,317	15	245	246	219	79	181	159	107	1,415
September	Catch	879	1,110	23	309	210	501	195	536	0	21	3,784
	S.E.	183	696	9	95	71	266	127	182	0	11	808
October	Catch	0	123	14	158	101	194	741	1,967	64	203	3,565
	S.E.	0	39	9	113	49	55	366	913	28	88	998
Nov+Dec	Catch	0	68	22	621	230	1,160	53	143	164	98	2,559
	S.E.	0	37	16	288	102	1,011	55	42	117	69	1,068
Total	Catch	4,544	8,167	597	5,976	7,929	17,758	1,647	10,448	2,461	1,970	61,497
	S.E.	426	1,593	81	902	2,740	4,770	503	1,873	389	259	6,146

APPENDIX C. STRAIT OF GEORGIA CREEL SURVEY STUDY AREA.

The Strait of Georgia Creel Survey study area includes those waters of Juan de Fuca Strait and the Strait of Georgia bounded in the south by a line from Sheringham Pt. on Vancouver Island due south to an intersection with the International Boundary and along the International Boundary to the B.C. Mainland coast at Blaine (Boundary Bay) and in the north by the following 3 boundary lines:

1) in discovery passage from Granite Pt. on Quadra Island to the stream mouth west of Moriarity Pt. on Vancouver Island.

2) in Okisollo Channel from Granite Pt. on Quadra Island due north to Sonora Island.

3) in Cordero Channel from Burnt Bluff on the mainland 214° passing west of Dent Island to Sonora Island.

The area for which the Strait of Georgia Creel Survey statistics apply includes the above listed administrative area with the exception of the following areas:

1) Bute Inlet above a line from Lawrence Pt. running across the inlet. This area coincides with management units 13-21 and 13-22.

2) Waters of Pryce Channel, Waddington Channel, Pendrell Sound, Homfray Channel and Toba Inlet bounded by a line drawn from Horace Head on East Redonda Island at the south end of Waddington Channel to the northern point of Roscoe Bay on West Redonda Island and a line drawn within Homfray Channel from Price Pt. on the eastern shore of the channel by a line drawn from George Head at the easterly entrance of Ramsay Arm to Sutil Pt. on Cortes Island.

3) Hotham Sound above a line drawn from Elephant Point on the western shore of the Sound to the southern point of Granville Bay on the eastern shore of the Sound.

4) Jervis Inlet above a line drawn within Prince of Whales Reach from the mouth of Treat Creek on the east shore across the Reach to the summit (1625') at the head of Goliath Bay.

5) Sechelt Inlet including Narrows Inlet and Salmon Inlet above a line drawn within Skookumchuck Narrows from the "dog-leg" point southeast of the Egmont Pt. 224° across the Narrows to Sechelt Peninsula.

APPENDIX D. SPECIES COMMONLY INCLUDED WITH OTHER FINFISH.

Pacific Herring
Pacific Cod
Pacific Tomcod
Walleye Pollock
Pacific Hake
Perches - any perch, seaperch or surfperch
Greenlings
Flounders - Pacific Halibut, any flounder or sole