Strait of Georgia Sport Fishery Creel Survey Statistics for Salmon and Groundfish, 1992

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1995

STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEY

STATISTICS FOR SALMON AND GROUNDFISH, 1992

by

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ABSTRACT

Collicutt, L.D. and T.F. Shardlow. 1995. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1992. Can. Manuscr. Rep. Fish. Aquat. Sci. 2221: 73 p.

Catch and effort statistics for the Strait of Georgia tidal sport fishery are presented for each month in 1992. The statistics were derived by combining the data from 29,000 interviews and 53 aerial surveys. Anglers conducted an estimated 468,000 boat trips and kept 596,000 coho, 117,000 chinook, 19,000 pink, 7,000 sockeye and 6,000 chum salmon, as well as 136,000 rockfish and 6,000 lingcod. Among salmon examined for marks, 6.1% of chinook and 3.4% of coho had adipose fin clips. The chinook catch consisted of 7% age 2 fish, 58% age 3 fish, 30% age 4 and 5% age 5 and older fish. The length frequency distributions of the chinook, coho and lingcod catches are also given.

Key words: salmon, groundfish, creel survey, sport fishing, catch, effort, age composition, length distribution, Strait of Georgia.

RÉSUMÉ

Collicutt, L.D. et T.F. Shardlow. 1995. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1992. Can. Manuscr. Rep. Fish. Aquat. Sci. 2221: 73 p.

Ce rapport présente des statistiques sur les prises et l'effort de pêche sportive côtière dans le détroit de Georgia pour chaque mois de 1992. Ces statisques combinent les données recueillies au cours de 29,000 entrevues et de 53 relevés aériens. Les pêcheurs à la ligne ont effectué environ 468,000 sorties et ont ramené 596,000 saumons cohos, 117,000 saumons quinnats, 19,000 saumons roses, 7,000 saumons rouges et 6,000 saumons kétas ainsi que 136,000 sébastes et 6,000 morues-lingues. Parmi les saumons examinés, 6.1% des saumons quinnats et 3.4% des saumons cohos étaient marqués (nageoire adipeuse coupée). 58% des prises de saumons quinnats étaient âgées de 3 ans, 30% de 4 ans, 5% de 5 ans ou plus et 7% de 2 ans. Le rapport présente également la distribution de fréquence des longueurs des prises de saumons quinnats et cohos et de morues-lingues.

Mots-clefs: saumon, poisson de fond, enquête auprès des pêcheurs, pêche sportive, prises, effort de pêche, composition par âge, distribution des longueurs, détroit de Georgia.

1.0 INTRODUCTION

This report documents the 1992 catch and effort statistics for the Strait of Georgia sport fishery and presents the methodology for collecting these data. It is one of a series of annual reports documenting the activities of the creel survey and providing official Strait of Georgia tidal sport fishery catch statistics. A list of previous reports in this series may be found in Appendix E. In this report all figures, tables and appendices are located at the end of text.

1.1 BACKGROUND

The Strait of Georgia creel survey study area (see Appendix C for a complete description) comprises over 5,900 km^2 (2,300 square miles) of water surface area and has in excess of 2,400 km (1,500 miles) of shoreline. From its southern end near Victoria, the area extends about 290 km (180 miles) north-west to the Campbell River area. At its greatest width this area is about 32 km (20 miles) wide. Two major population centers, Vancouver and Victoria, and many smaller centers, such as Nanaimo and Campbell River, are located within the study area. Over 500 boat launch ramps, marinas and public wharves, as well as thousands of private boat launching facilities, provide access to this area.

The recreational fishery is active throughout the year but over 85% of the effort occurs in the summer months of May to September. It has become a major tourist attraction and a dominant economic force in some communities during the summer.

The size of vessel, method of fishing and terminal tackle vary widely depending on location and time of year. Vessels range from 4 m (12') car-top boats to yachts more than 17 m (50') in length, although most boats would be in the 5 m to 8 m (16' to 24') range. Popular fishing methods include trolling, mooching, bucktailing and stripcasting.

The most sought after species in the Strait of Georgia recreational fishery are the coho (Oncorhynchus kisutch) and chinook (O. tshawytscha) salmon, but in recent years, significant fisheries directed at pink (O. gorbuscha) and sockeye (O. nerka) salmon have developed in certain areas.

Over the past 3 decades the recreational fishery in this area has undergone dramatic changes. Prior to 1960, the numbers of chinook and coho taken by the commercial troll fleet were almost double those taken by sport fishermen. In recent years, however, the situation has reversed with the sport fishery taking more than triple the commercial harvest of chinook and coho. The recreational fishery is now the primary harvester of chinook and coho in the Strait of Georgia. Effort in the recreational fishery

has increased from about 200,000 boat trips in the early 1960s to about 600,000 boat trips in recent years. Although annual coho catches have varied widely, an increase from about 200,000 pieces in the 1960s to over 600,000 pieces in 1990 was recorded. The extremely low 1991 coho catch of 157,000 was a departure from this trend. In contrast, the chinook catch climbed through the 1960s but then declined steadily from a peak in the mid-1970s of over 400,000 pieces to its present level of just over 100,000 pieces.

From 1956 to 1976, estimates of catch and effort in the sport fishery published by the Department of Fisheries and Oceans (DFO) were based on subjective assessments completed by Fishery Officers and on small scale creel surveys. The general lack of statistical rigor and consistency associated with these methods of catch estimation, as well as the rapid growth of the recreational fishery, led to the initiation of the Strait of Georgia Creel Survey Pilot Program in 1980 (DPA 1982). The survey has been run continuously (with minor interruptions) since then. Although many details, such as sampling locations and times, are updated continuously to reflect changes in the fishery, the basic design of the survey remains similar to the pilot project conducted in 1980.

Creel survey data are used for a variety of management and reporting purposes. Catch and effort information is also used by local groups (both inside and outside DFO) to monitor the fishery in their area. Creel survey information is also used to predict the effect of regulation changes and to measure the success of conservation actions imposed. The adipose mark information collected during the survey is supplied to the Mark Recovery Program (Kuhn et al. 1988) and used in combination with other data for exploitation rate and stock distribution analyses.

1.2 OBJECTIVES

The specific objectives of the 1992 Strait of Georgia creel survey were:

1. To estimate the sport angler effort and catch of chinook, coho, pink, sockeye and chum salmon, rockfish, lingcod and other finfish by month for Statistical Areas 13 through 19, 28 and 29; and to estimate the number of chinook and coho released by anglers.

2. To estimate the mark rate for adipose clipped chinook and coho in the catch.

3. To estimate the age composition and mean length-at-age for chinook, and the length frequency for chinook, coho and lingcod.

4. To estimate the species composition of the rockfish catch.

2.0 METHODS

2.1 STUDY DESIGN

The design of the Strait of Georgia Creel Survey conducted in 1992 was similar to that used by DPA Consulting Ltd. (1982) with some modifications to the data analyzed, sampling intensity, flight routes and data processing. The study 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 the estimated total effort by catch per unit effort.

The fishery was stratified according to the following criteria:

1. Month. The survey operated during all months of the year, but 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 during these months.

2. Geographic area. Catch and effort estimates were produced for Statistical Areas 13 through 19, 28 and 29. Statistical Area 19 was split into Area 19A (Saanich Inlet) and Area 19B+ (the rest of Area 19 and that portion of Area 20 east of Sheringham Point, see Fig. C-1 in Appendix C).

3. Day type. Weekend and mid-week days were considered independently because sport fishing activity is known to differ for the two types of days.

4. Time of day. Sampling shifts (one shift is a set number of consecutive hours of interviewing anglers at one site by one creel surveyor) were conducted during set time periods. From March to October sampling was conducted during either an early shift (approximately 0700 to 1500 hours) or a late day shift (approximately 1500 to 2300 hours). During the winter months of January, February, November and December only one shift timing was used (approximately 1000 to 1700 hours).

5. Guided verses unguided anglers. Certain sites are known to have primarily guided fishing effort. Unpublished data from previous surveys in this series confirm that the CPE from guided boats differs markedly from unguided boats, so data from these two types of boat trips were considered independently.

In each region, various landing sites were chosen as locations for surveyors to conduct interviews. Site selection was based on 4 criteria: representativeness, traffic volume, site accessibility and adequate observation points. Discussions with local fishermen, marina operators and Fisheries Officers, and data from previous surveys were used to choose sites that were representative of the local sport fishing activity (i.e. sites which were used by a wide cross-section of anglers). Sites with expected traffic volumes of more than 15 boats per day in the summer were considered as possible sampling locations. Expected traffic volumes for sites were compiled from previous surveys or from discussions with marina operators or local Fisheries Officers.

Site accessability refers to whether an interviewer can easily reach a site by car or ferry during the defined shift hours. Only sites with good accessability were selected. As a result, landing sites on most of the islands in the Strait of Georgia were excluded from the survey. This was not expected to be a major factor, however, since most of the fishing that occurs in these areas is from boats launching from an accessible site. The final criterion, adequate observation points, was essential for interviewers to obtain an accurate count of all boats returning to a landing site. At some large marinas, where the number of access points made it impossible to see all boats returning, the facility was defined and sampled as two separate sites.

Allocation of sampling effort among months followed the same general pattern as fishing effort, that is, more effort was allocated during the summer when fishing effort is at its highest. Allocation of sampling effort among regions (groups of Statistical Areas) also followed fishing effort patterns. Within each month, each chosen site was allocated between 6 and 10 shifts. These shifts were divided equally among weekend and mid-week days, and early and late daily time periods.

Data collection, entry and preliminary processing were conducted by LGL Ltd. environmental research associates. Estimation of the catch and effort statistics was conducted by the Department of Fisheries and Oceans.

2.2 DATA COLLECTION

2.2.1 Angler Interviews

Surveyors were stationed at access points for scheduled shifts to interview anglers as they returned from fishing. The number of boats returning to a site during a shift, as well as the number of interviews attempted and completed, were recorded on a tally sheet. For each boating party landing, the following information was recorded on an interview form (Fig. 3):

1.   Total number of anglers in the boat.
2.   Time of landing.

3.   Whether the party had been sport fishing.
4.   Whether the party was guided.
5.   Residency of anglers.
6.   Time during which fishing lines were in the water.
7.   Average number of lines in the water.
8.   Total number and species of kept and released fish for each of 3 sub-Statistical Areas.
9.   Number of hours spent fishing in each sub-Statistical Area.
10. Number of marked and unmarked chinook and coho in the catch.
11. Number of hours directed at each species.

Interviewers, trained in fish identification, inspected each boating party's 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 of nose-fork length were taken during every sampling shift. Five scales were removed from the INPFC (International North Pacific Fisheries Commission) preferred area of each biosampled chinook (Mosher 1968).

In 1992, interviews were conducted each month at a maximum of 42 of the 50 designated landing sites (boat ramps, marinas, or resorts, Appendix C) representative of the sport fishing activity in the survey 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.

2.2.2 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 150-210 m (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 paths used in 1992. The winter (October - April) flight path was slightly reduced to correspond with the 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 budget constraints, targets of desired precision and by the expected number of interviews from a given number of sampling shifts (English et al. 1986). The days for overflights during

a month were randomly selected for each day type.

2.3 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, estimation of age and length composition of chinook catch, and estimation of length frequency distribution of coho and lingcod 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 interviews conducted by month and Statistical Area with anglers who had been actively fishing in 1992, and the number of monthly overflights. A total of 35,428 interviews, of which 29,420 involved actively fishing anglers, and 53 overflights were conducted in 1992. Figure 4 shows that the monthly distribution of interviews involving actively fishing anglers generally reflected the monthly distribution of fishing effort (number of boat trips, Table 3). 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 interviews represent 7.6% of the estimated total fishing effort for the entire study area (467,559 boat trips, Table 3). The interviews involving actively fishing anglers represent 6.3% of the total fishing effort and ranged in each Statistical Area from a low of 1.5% of the estimated fishing effort in Area 18 to a high of 9.3% in Area 19+ (Tables 2 and 4).

3.2 SPORT FISHING EFFORT AND CATCH

The 1992 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 by species for each combination of month and Statistical Area.

Anglers made 467,559 boat trips during 1992 which is lower than the average fishing effort in recent years (Fig. 1, Table 1). Although the fishing effort in 1992 was slightly higher than in 1991, the general trend in decreasing effort since 1988 continues. The fishing effort followed the same general seasonal pattern as seen in previous years (Table 3, Fig. 5). Effort levels climbed steadily from April, peaked in July and August, and declined rapidly in September and October.

The overall finfish sport catch in the Strait of Georgia was estimated at 920,243 pieces (including steelhead and cutthroat trout, Table 3) and consisted of 81% salmon and 19% groundfish. An additional 417,401 salmon of mixed species were released by anglers (Appendix B-8). Salmon and groundfish catches are discussed below.

3.2.1 Salmon

Salmon sport catches in the Strait of Georgia in 1992 totalled 743,889 pieces (Tables 3 and 4) and consisted of 80% coho, 16% chinook, 3% pink salmon, 1% sockeye and less than 1% chum salmon.

In 1992, anglers kept 116,579 chinook (Tables 3 and 4), compared to 115,519 in 1991 and 111,914 in 1990 (Fig. 1, Table 1). Monthly chinook catches peaked in June and then declined steadily (Fig. 6, Table 3). Seasonal catch efficiency for chinook averaged 0.25 fish per boat trip overall and peaked in May at 0.40 and in the winter months at 0.74 fish per boat trip (Fig. 7, Table 5). Catch patterns were similar to those in recent years.

Chinook regulations in place during 1992 in the Victoria area (Cadboro Point to Sheringham Point near Sooke) included a size limit of 45 cm and an annual bag limit of 20 fish. In the remaining portion of the Strait of Georgia, the size limit was 62 cm and anglers were restricted to 15 chinook per year. There were no regulation changes in 1992. See Appendix C for a definition of the study area.

The spacial distribution of chinook catch followed a similar pattern to previous years except for Area 16. The highest catches were taken in Area 13 (23% of total), Area 14 (20%), Area 16 (19%) and Area 19B+ (18%) (Table 4, Fig. 8). In contrast to previous years, Area 16 replaced Area 19B+ in the 3 highest chinook catch areas. In 1992, 85% of the chinook landed during the summer months (May - September) were taken in the northern region of Strait of Georgia - Statistical Areas 13 to 17. The opposite was true in the winter months (January - April, October - December) when 60% of the winter catch came from the southern region - Statistical Areas 18, 19, 28 and 29 (Appendix B-3). During November and December, nearly all of the chinook catch came from Victoria/Sooke waters in Statistical Area 19B+ (Appendix B-3).

The 1992 coho catch was 595,553 pieces (Tables 3 and 4). Monthly coho catches peaked in June which is similar to recent years (Fig. 9). Coho catch success reached a high of only 2.67 fish per boat trip in April (Fig. 10, Table 5). The highest coho catches were taken in Area 14 (29% of total), Area 19B+ (20%) and Area 13 (18%) (Table 4, Fig. 8).

In 1992, Strait of Georgia anglers caught 19,085 pink salmon (Table 3). Significant pink catches were not expected in 1992 because pink salmon returns to the Strait of Georgia rivers (primarily the Fraser River) are much higher in odd numbered compared

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to even numbered years. The highest catches were taken in Area 13 (88% of total) (Table 4).

The landings of other salmon consisted of an estimated 6,745 sockeye and 5,927 chum salmon (Table 3). A large portion of the annual sockeye catch (62% of total) was taken in Areas 19B+, 28 and 29 during July and August (Appendix B-5).

In addition to the above salmon species, an estimated 675 steelhead, cutthroat trout and unidentified salmon were caught in the Strait of Georgia in 1992, bringing the total salmonid catch to 744,564 pieces (Appendix B-7).

The average number of salmon caught during each boat trip in 1992 was 1.59 (Table 5). As seen below, this value is lower than the range of averages seen in recent years.

Year	Catch Success	Reference
1987	1.47	Shardlow and Collicutt (1989 d)
1988	1.86	Shardlow and Collicutt (1989 e)
1989	1.28	Collicutt and Shardlow (1990)
1990	1.45	Collicutt and Shardlow (1992)
1991	1.18	Collicutt and Shardlow (1995)
1992	1.59	This report

In 1992, Areas 13 and 14 showed the highest effort expended and the most salmon landed (Fig. 11, Table 4). Boaters fishing in Areas 13 and 14 had an average catch of 1.9 and 1.6 salmon per trip, respectively (Table 4). Area 14 recorded the greatest number of salmon hooked and released (115,350) with Area 13 next at 96,898 (Appendix B-8).

3.2.2 Groundfish

While salmon accounted for the majority of the total finfish sport catch in the Strait of Georgia in 1992, the groundfish catch of 175,679 pieces made up 19% 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.)	135,763	77%	16
Lingcod (Ophiodon elongatus)	5,968	3%	13
Dogfish (Squalus acanthias)	1,802	1%	19A
Other finfish (Appendix D)	32,146	18%	19B+
Total	175,679	100%	

The majority of the groundfish catch was taken in the summer months (Table 3), reflecting the high fishing effort in the summer (Fig. 4). Catch by Statistical Area for rockfish was highest in Area 16 (32% of total, Table 4). Lingcod, as in previous years, were caught in greatest numbers in Area 13 (28% of total), while the largest dogfish catch came from Area 19A (22% of total, Table 4). Area 19B+ produced the largest catch of other finfish (34%).

Rockfish species were identified for the entire survey area again in 1992 (Table 6). Applying the identification results to the 1992 rockfish catch estimates by area (Table 4) showed the catch by species and Area (Table 7). The results are summarized below.

Rockfish Species	Catch	% of Rockfish Catch	Major Catch Area
Quillback	28,486	21%	16
Copper	12,318	9%	17
Yelloweye	4,472	3%	16
Black	194	<1%	13
Other	90,923	67%	16
Total	173,383	100%	

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

The catch success (CPE) for rockfish was relatively constant throughout the year and averaged 0.29 fish per boat trip, while the catch success for lingcod was 0.01 fish per boat trip (Table 5). The catch success for all non-salmon species and for total finfish during 1992 was 0.38 and 1.97 fish per boat trip, respectively (Table 5).

3.3 BIOLOGICAL DATA

3.3.1 Proportion and Catch of Marked Chinook and Coho

In 1991, 8,676 chinook and 35,870 coho were examined for adipose fin-clip marks. Tables 8 and 9 show for chinook and coho, respectively, the number of marks observed and the total fish inspected by month and region. The 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, as well as Saanich Inlet portion of Area 19 (Area 19A); and the Victoria region represented by the remainder of Area 19 (Area 19B+) (see Fig. C-1 in Appendix C).

Among chinook examined for marks, 6.1% had adipose fin clips. The largest observed proportion of chinook marks was in the North Gulf catch (0.081) and the lowest proportion in the Victoria catch (0.026) (Table 8). Among coho examined for marks, 3.4% had adipose fin clips. The largest observed proportion of coho marks was in the South Gulf catch (0.039), followed closely by the North Gulf at 0.038; the lowest proportion was in the Victoria region catch (0.019) (Table 9). 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 1989 e; Collicutt and Shardlow 1990, 1992, 1995).

3.3.2 Catch-At-Age for Chinook

During 1992, 4,983 chinook biological samples were collected for age and length analysis. Of this total 4,399 fish were aged. Table 12 shows the monthly number and percent age composition of chinook sampled for age. All ages shown in this report represent the total age (freshwater plus saltwater age). The age data are summarized graphically in Figure 12. The monthly age proportions were applied to the estimated monthly chinook catches to provide a breakdown by age group (Table 13).

In 1992, the chinook sport catch in the Strait of Georgia consisted primarily of age 3 fish (58.4%), followed by age 4 fish (29.6%), age 2 fish (6.5%) and age 5 or older fish (5.4%). The age composition during 1992 is compared to previous years below.

Catch Year	% Age Composition of Chinook				Reference
	2	3	4	5+	
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 (1989 a)
1985	6.6	70.8	20.6	2.0	Shardlow and Collicutt (1989 b)
1986	10.9	44.9	40.4	3.8	Shardlow and Collicutt (1989 c)
1987	7.8	62.1	25.0	5.2	Shardlow and Collicutt (1989 d)
1988	26.4	35.3	35.4	2.8	Shardlow and Collicutt (1989 e)
1989	3.1	83.3	10.5	3.1	Collicutt and Shardlow (1990)
1990	7.5	36.4	53.9	2.2	Collicutt and Shardlow (1992)
1991	5.4	66.4	21.6	6.6	Collicutt and Shardlow (1995)
1992	6.5	58.4	29.6	5.4	This report

Figure 12 and Table 12 show little shift in the age composition of sampled chinook, and hence of chinook catch, as the year progressed. Age 3 fish remained the dominant component of the catch throughout the year. Age 4 fish made up a significant part of the catch until October when the proportion of age 2 fish increased sharply.

3.3.3 Mean Length-At-Age for Chinook

Table 14 shows the monthly mean nose-fork length at age for the 4,399 chinook for which both length and age data were available. Figure 13 shows the length frequency distribution for all the measured chinook (4,983 aged and unaged fish). The largest portion of measured chinook (2,014 fish or 40% of the total sample) was in the 62-71 cm length category (the basis for using these size categories was the 62 cm size limit). This is consistent with the large catch of age 3 fish (Table 13) which were found to have an annual mean length of 69.4 cm (Table 14). The largest chinook sampled (115 cm) was a 4-year old fish landed at Discovery Marina in Statistical Area 13 on August 22, 1992.

As shown below, the proportion of chinook kept which were sub-legal in size (less than 45 cm in the Victoria area and less than 62 cm in the Strait of Georgia) declined or remained stable in 1992. This proportion was at its highest level following the introduction of the 62 cm size limit in 1989 (Collicutt and Shardlow 1990).

	% Sub-legal Chinook	
Year	Victoria	Strait of Georgia
1989	2%	20%
1990	1%	10%
1991	<1%	7%
1992	2%	2%

3.3.4 Length Frequency Distribution for Coho

Figure 14 shows the length frequency distribution for the 19,602 coho sampled in 1992. As in previous years, the largest proportion of measured coho (13,566 fish or 69% of the total sample) was in the 50-59 cm length class. In the 1989 report (Collicutt and Shardlow 1990), an overall decline from 1986 to 1989 in the mean size of landed coho was noted. This trend does not appear to have continued in later years, as shown below.

Year	Mean Length (cm)	Sample Size
1986	53.4	5,354
1987	50.5	4,997
1988	50.0	13,000
1989	49.6	6,883
1990	51.4	8,959
1991	54.2	2,281
1992	53.2	19,602

3.3.5 Length Frequency Distribution for Lingcod

Figure 15 presents the length frequency distribution for lingcod sampled in 1992. The largest proportion of measured lingcod (39 fish or 34% of the total sample) was in the 65-74 cm length class. In previous years (1985 to 1990), the highest proportion of measured fish was in the 50-59 cm length class (Collicutt and Shardlow 1992). The recent increase in the size of landed lingcod is likely due to the 65 cm minimum size limit introduced in 1991. Note that the size class categories have been changed, beginning in this report, to correspond to the new minimum size limit. Of the 116 lingcod measured in 1992, 49 fish (42%) were sub-legal (less than 65 cm).

4.0 SUMMARY

A sport fishery creel survey was conducted in the Strait of Georgia in 1992 in order to estimate the catches of all the important recreational finfish species and the total sport fishing boat trips. The numbers of chinook and coho salmon with adipose fin clips were also estimated. These data are presented by month and Statistical Area. The age composition of chinook and the length frequency distributions of chinook, coho and lingcod are also shown.

In 1992, sport fishermen made an estimated 468,000 boat trips in the Strait of Georgia. A total of 35,000 boating parties, of which 29,000 were actively fishing, were interviewed at a monthly maximum of 42 landing sites in the Strait of Georgia Creel Survey area. This sampling represents approximately 8% of the total number of boat trips conducted by sport fishermen in the Strait of Georgia in 1991. A total of 53 overflights were also conducted to take "snapshot" counts of fishing effort.

In 1992, sport fishermen in the Strait of Georgia landed an estimated total finfish catch of 920,000 pieces of which 81% were salmon and 19% were groundfish. The 744,000 landed salmon consisted of 596,000 coho, 117,000 chinook, 19,000 pink salmon, 7,000 sockeye and 6,000 chum salmon. An additional 417,000 salmon of mixed species were released by anglers. Catch success per boat trip averaged 1.6 salmon (all species) and 0.4 groundfish.

The 176,000 landed groundfish consisted of 136,000 rockfish, 6,000 lingcod, 2,000 dogfish and 32,000 other finfish. Rockfish catches were identified as quillback (21% of rockfish catch), copper (9%), yelloweye (3%) and black (less than 1%); the remaining 67% of the rockfish catch consisted of tiger, yellowtail, china, canary and unidentified species.

Among salmon examined for marks, 6.1% of chinook and 3.4% of coho had adipose fin clips. The majority of chinook sport catch in 1992 consisted of age 3 fish (58.4%), followed by age 4 (29.6%), age 2 (6.5%) and age 5+ (5.4%). Of the total chinook measured in 1992, the largest portion was in the 62-71 cm size class. Of the total chinook measured, 2% were sub-legal in size (less than 45 cm) in the Victoria area and 2% were sub-legal in size (less than 62 cm) in the remaining portion of the Strait of Georgia. Of the coho and lingcod sampled for length, the largest proportion was in the 50-59 cm and 65-74 cm size classes, respectively.

5.0 ACKNOWLEDGMENTS

We would like to thank the creel survey staff of LGL Ltd., particularly Karl English and Gary Searing, and private marina and boat ramp owners for their valuable assistance and cooperation. Thanks also to Alice Fedorenko who reviewed and edited the final copy, and finally thanks to the many thousands of anglers who participated voluntarily in the survey.

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FIGURES
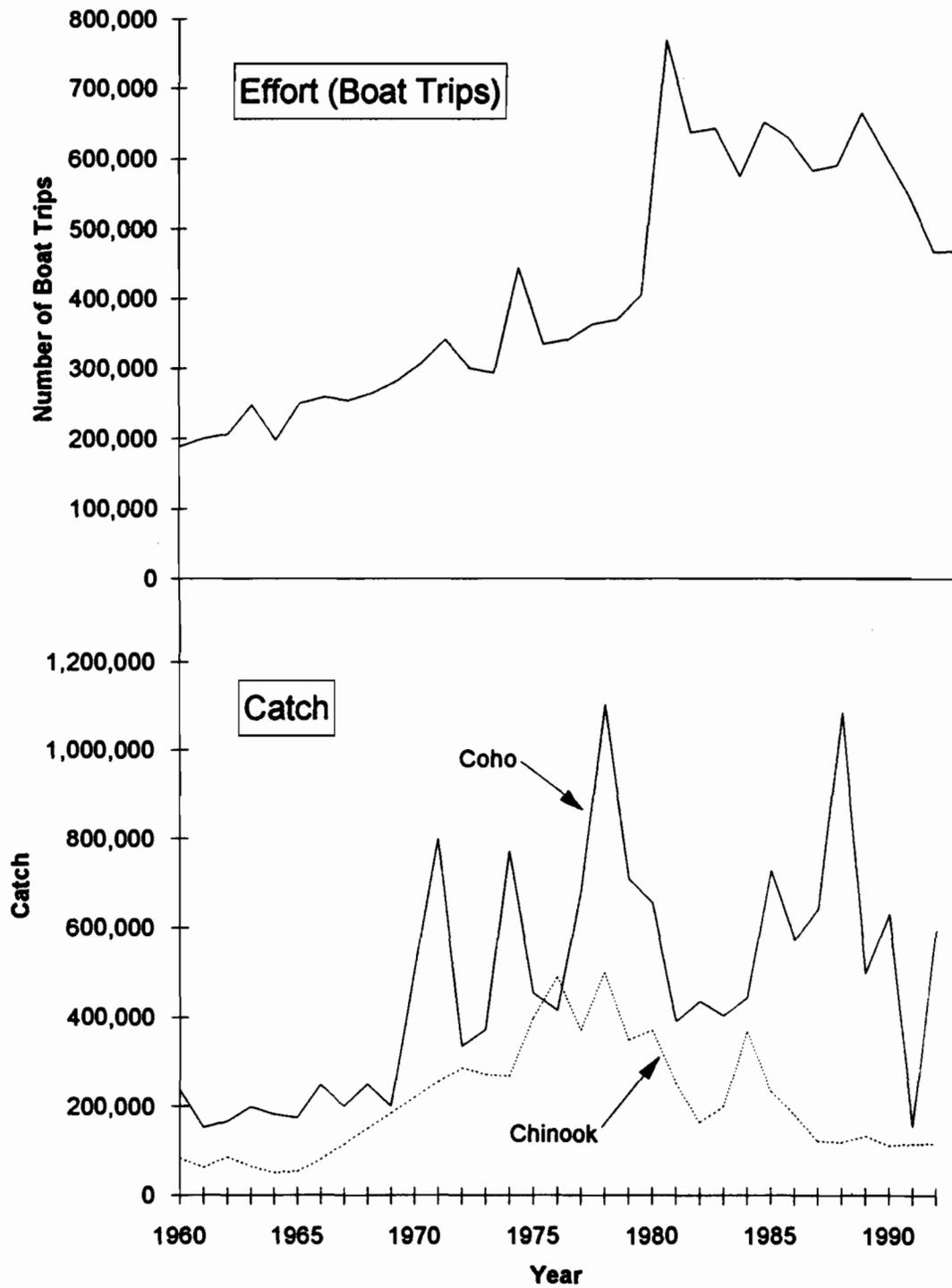
Figure 1. Tidal effort statistics and sport catches of coho and chinook salmon for the Strait of Georgia, 1960-1992.

SUMMER OVERFLIGHT ROUTE
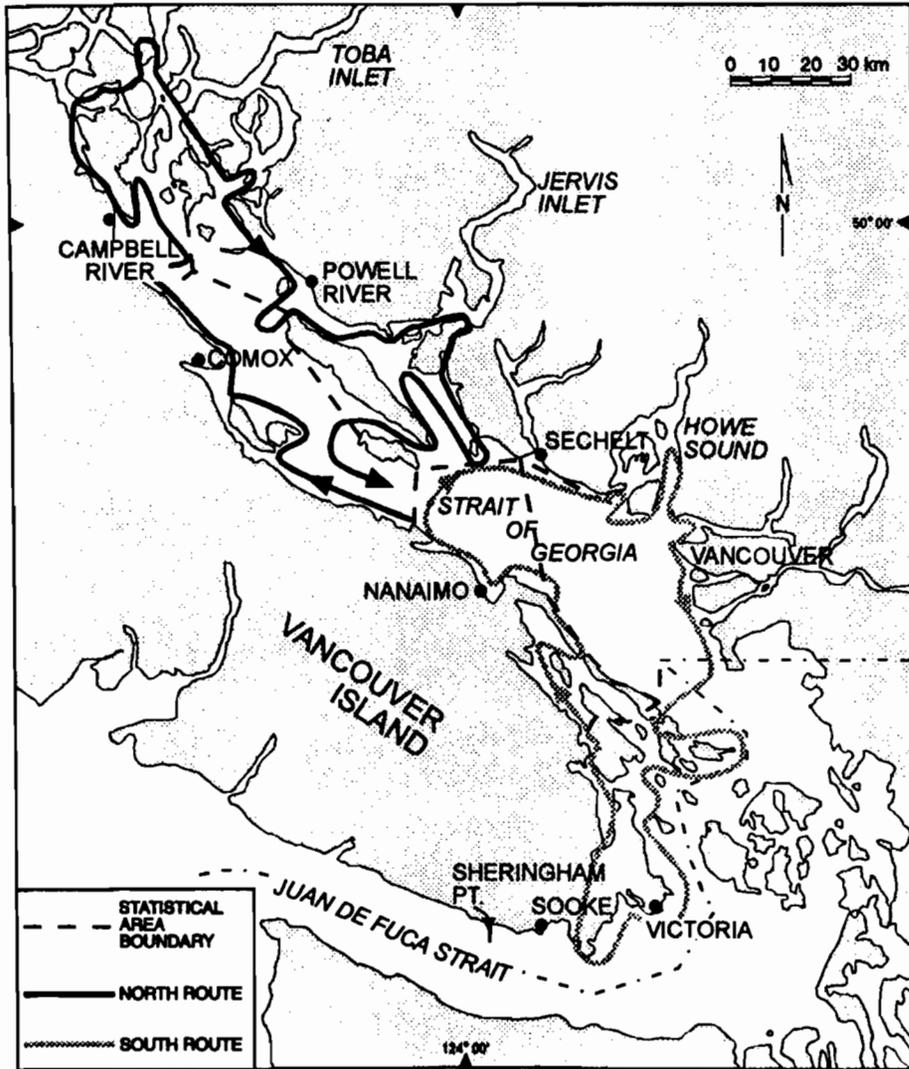
WINTER OVERFLIGHT ROUTE
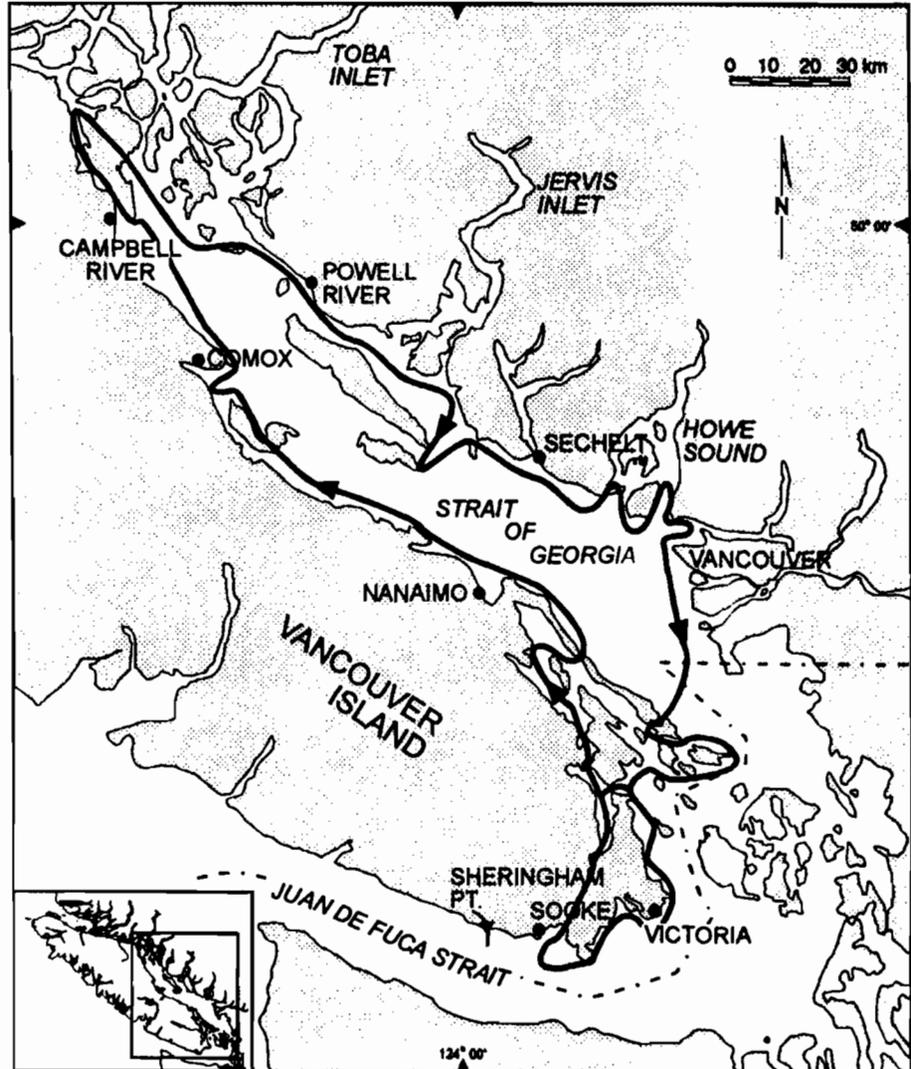
Figure 2.   Summer and winter overflight routes, Strait of Georgia, 1992.

GEORGIA STRAIT SPORT FISHING CREEL SURVEY   No. 99999

Landing Site: _____ / _____   Statistical Area: _____

Interviewer: _____ / _____   Date: ____ / ____ / ____ Time of interview ____ : ____ AM PM
                                                              YR.   MO.   DAY

PRESENT BOAT TRIP COMPLETED

1. Total number of individuals in party: [____]

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.

Assessment Code [____]
0 = Complete Form
1 = Marks Incomplete
3 = Not Visually Inspected
4 = Refusal

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

☐ 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
STATISTICAL SUB AREA:			
KEPT:			
RELEASED:			
TIME:	HRS.	HRS.	HRS.
SPECIFIC GEOGRAPHICAL LOCATION:			

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 [____]

	COHO	CHINOOK	LINGCOD	ROCKFISH
11. Catch to date by interviewee (since April 1):	[____]	[____]	[____]	[____]

99999

Figure 3. Sample of 1992 interview form.
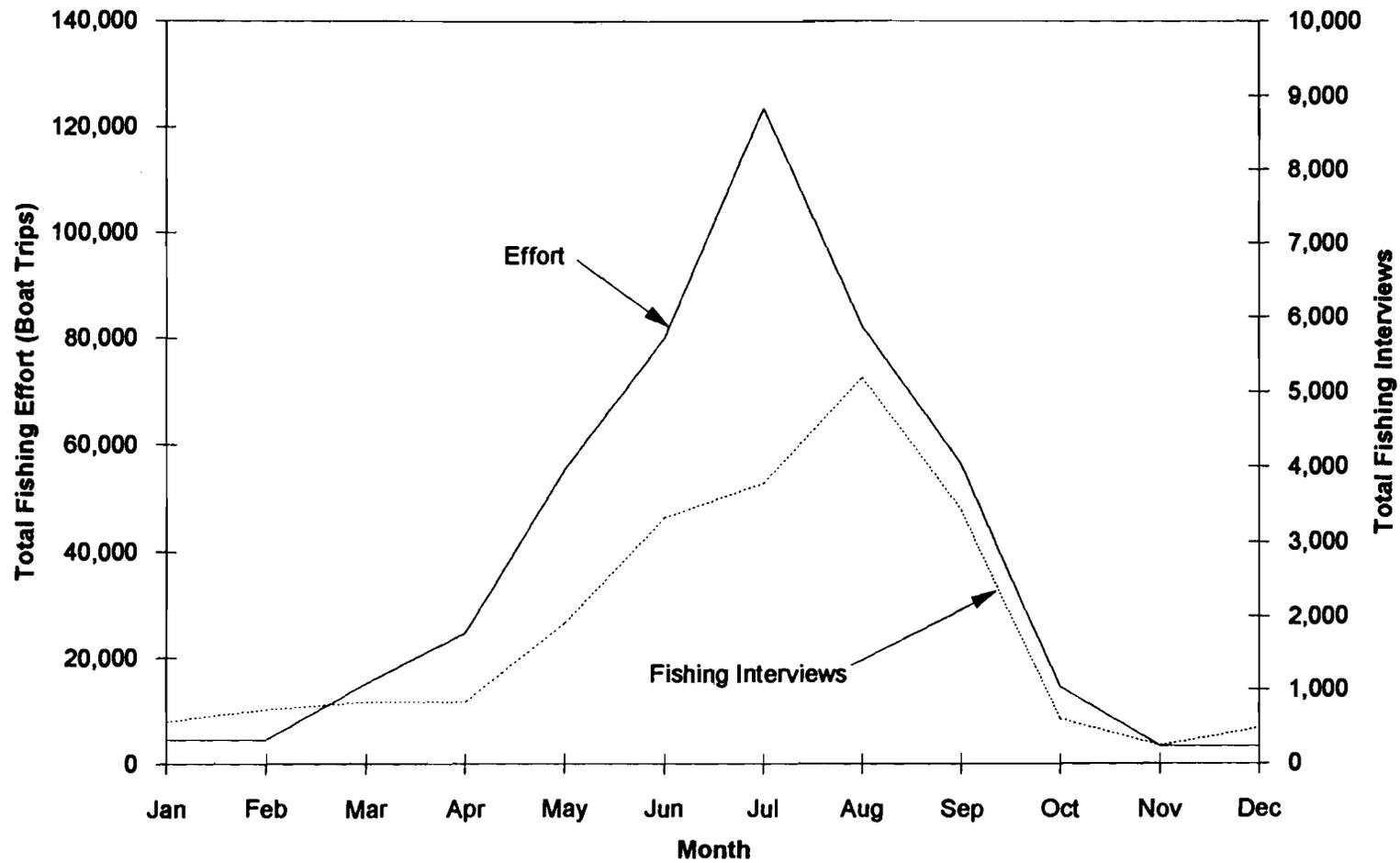
Figure 4. Comparison of monthly total fishing effort and monthly total fishing interviews, Strait of Georgia, 1992.
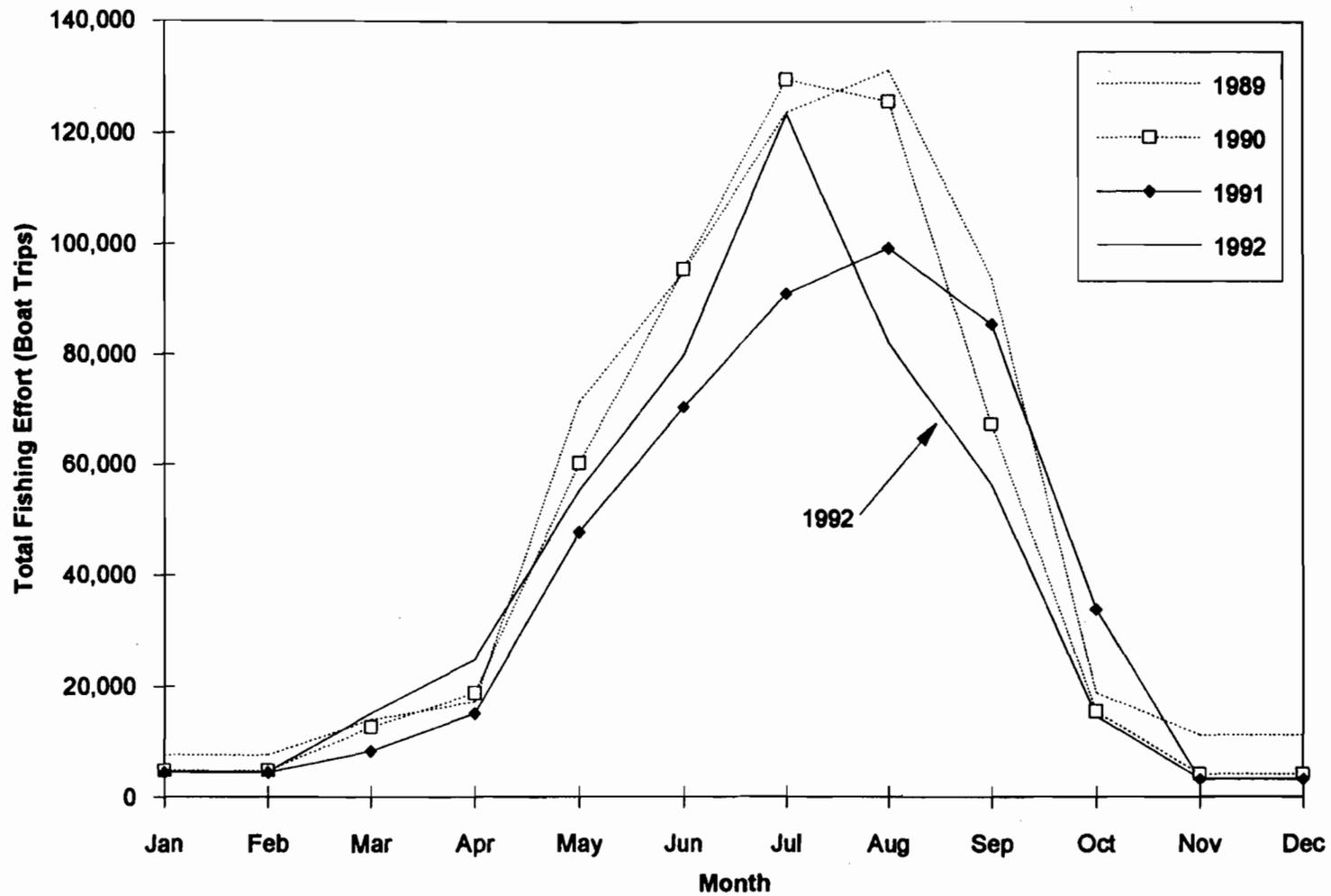
Figure 5. Monthly fishing effort estimates (number of boat trips) for the Strait of Georgia sport fishery, 1989-1992.
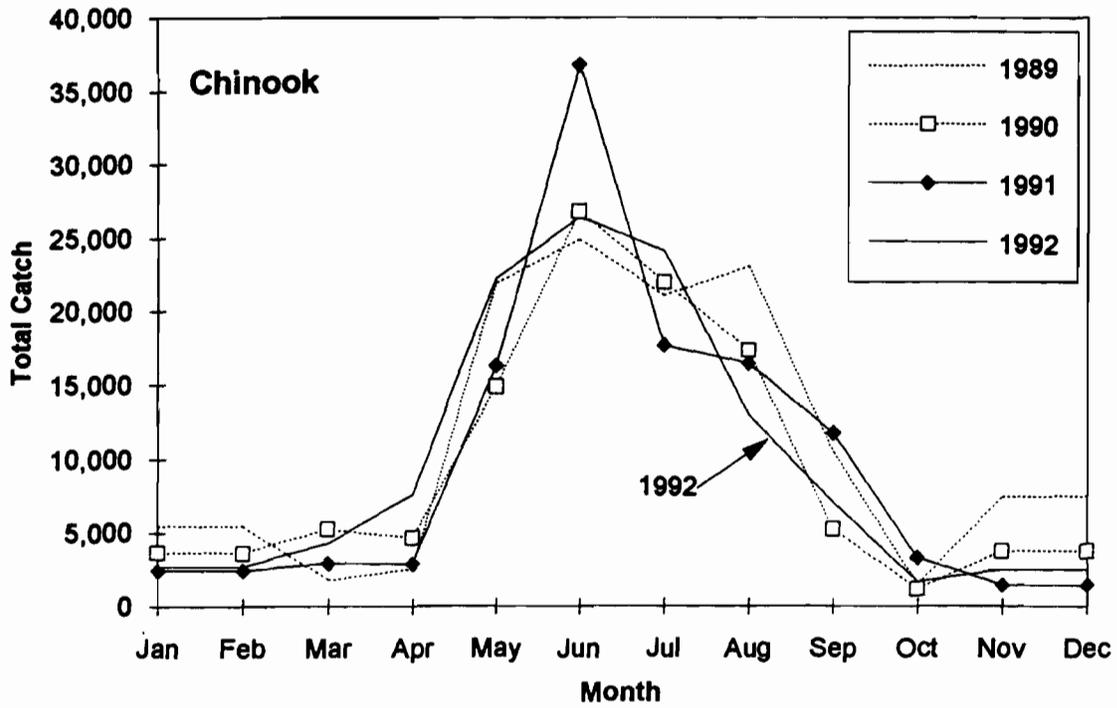
Figure 6. Monthly chinook catch for the Strait of Georgia
sport fishery, 1989-1992.
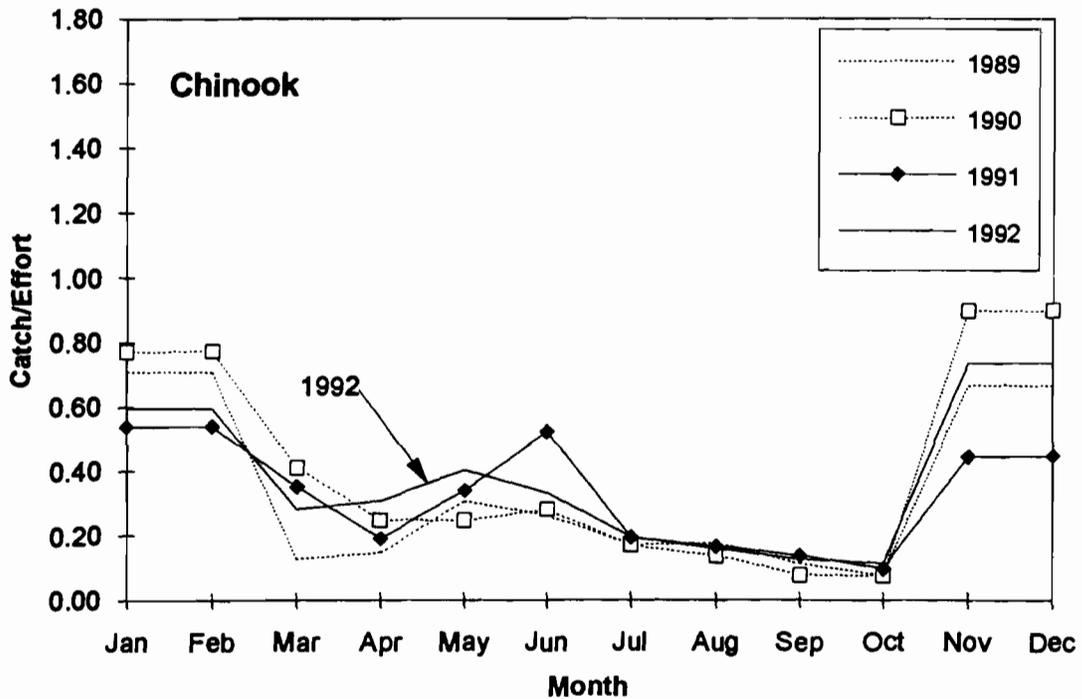
Figure 7. Monthly chinook catch per boat trip for the Strait of Georgia
sport fishery, 1989-1992.
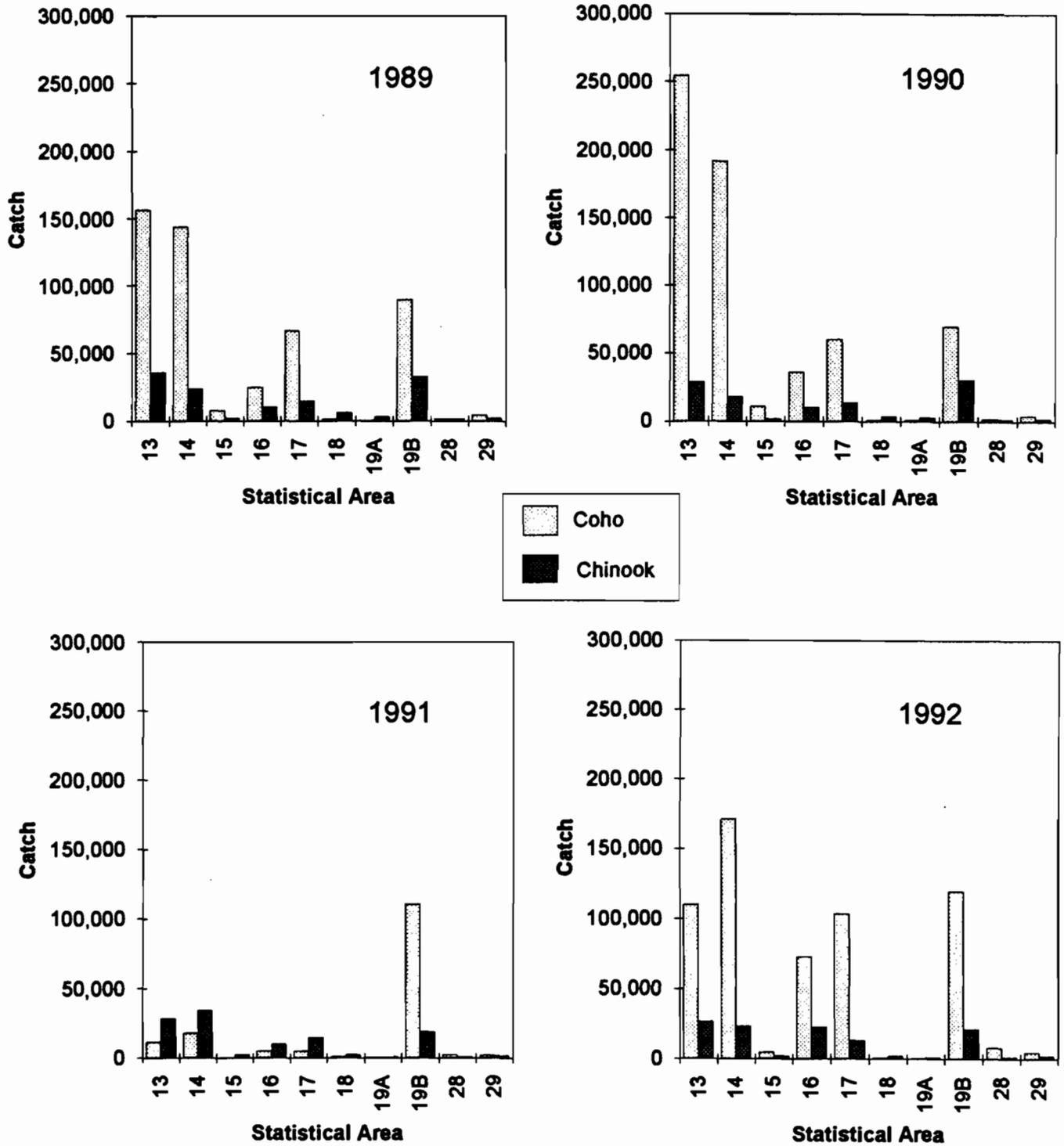
Figure 8.   Annual sport catches of chinook and coho salmon by Statistical
Area in the Strait of Georgia, 1989-1992.
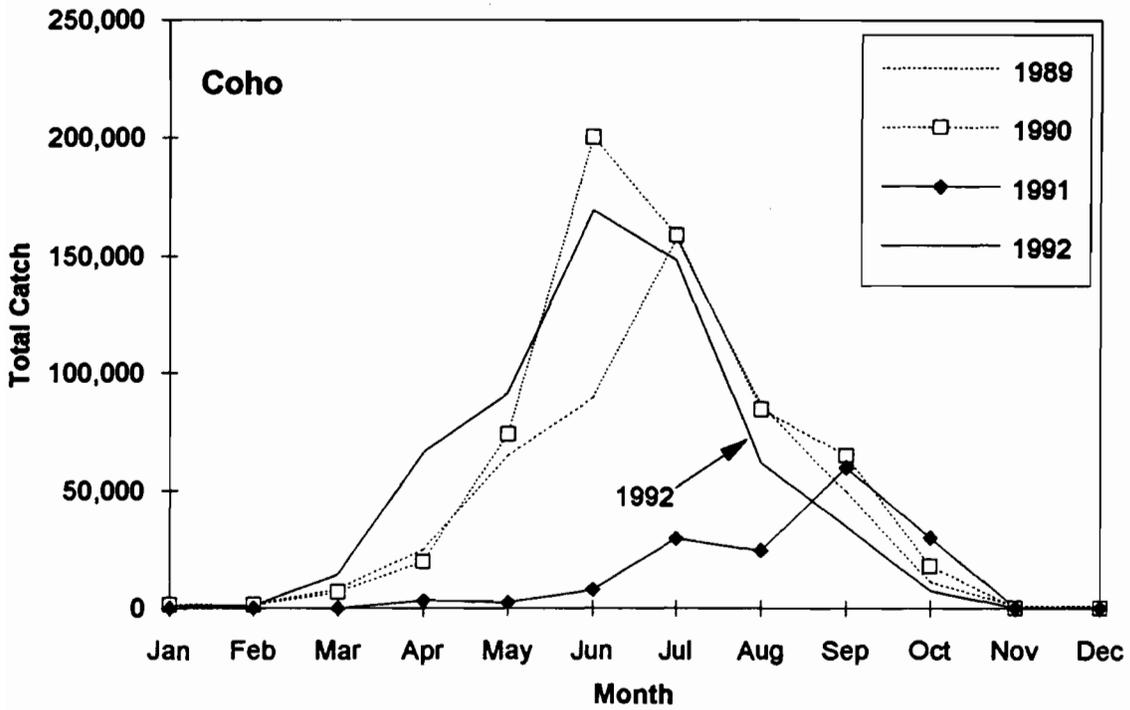
Figure 9.   Monthly coho catch for the Strait of Georgia
             sport fishery, 1989-1992.
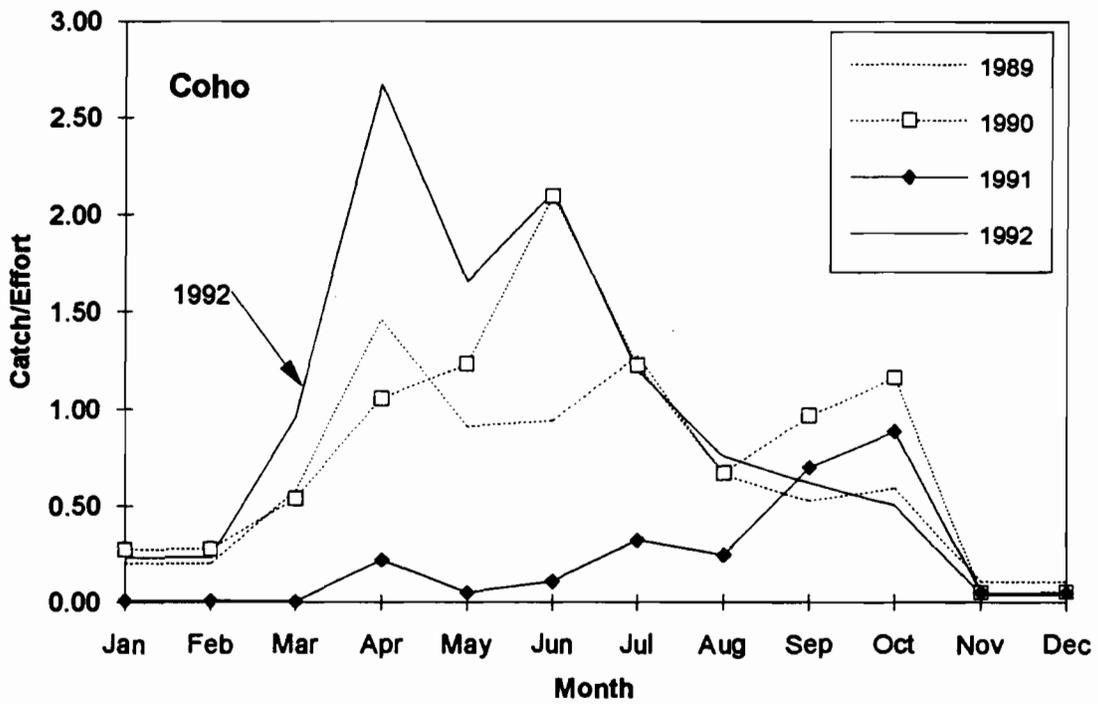
Figure 10.   Monthly coho catch per boat trip for the Strait of Georgia
             sport fishery, 1989-1992.
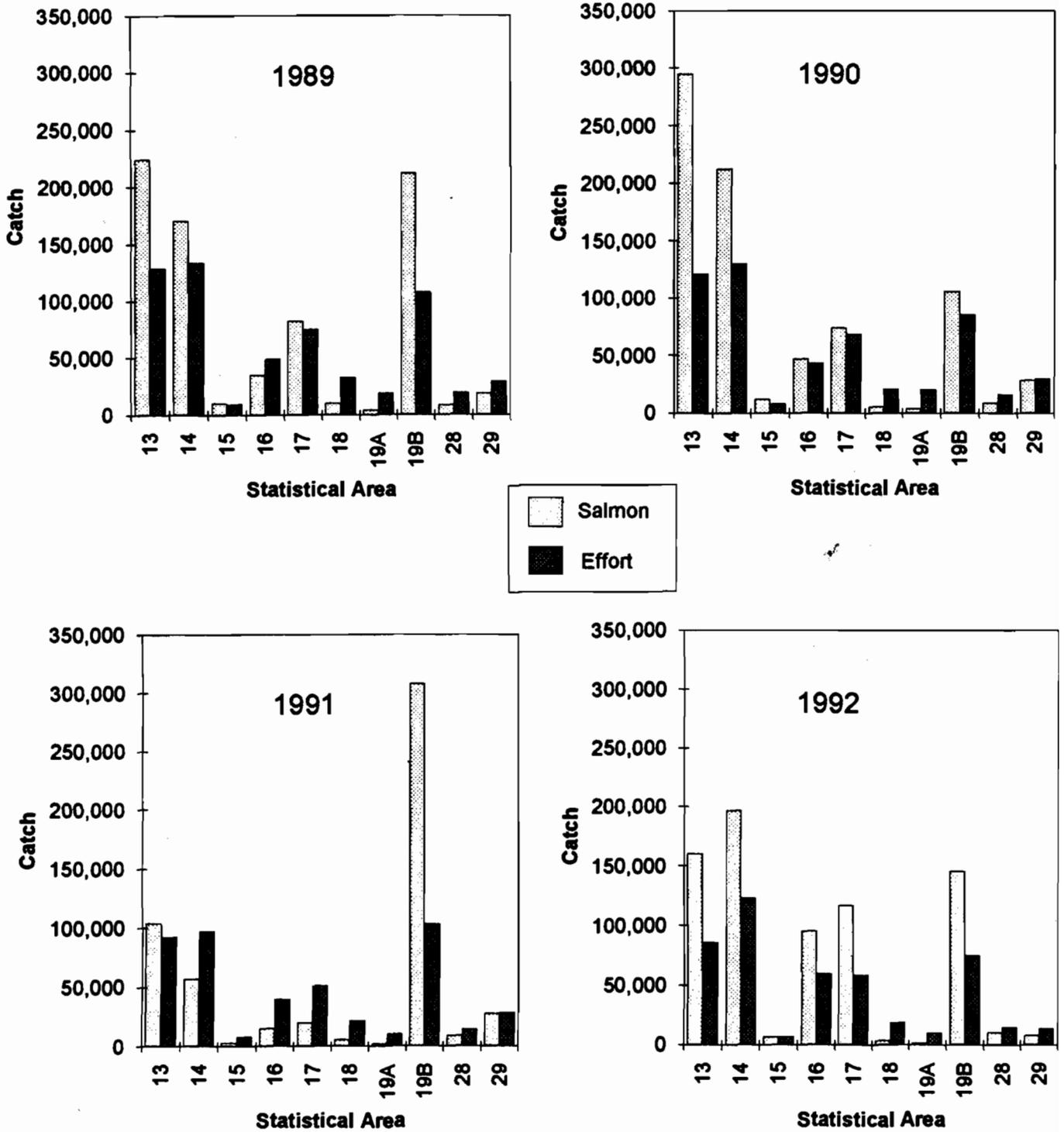
Figure 11. Total salmon landed and total fishing effort expended by Statistical Area in the Strait of Georgia sport fishery, 1989-1992.
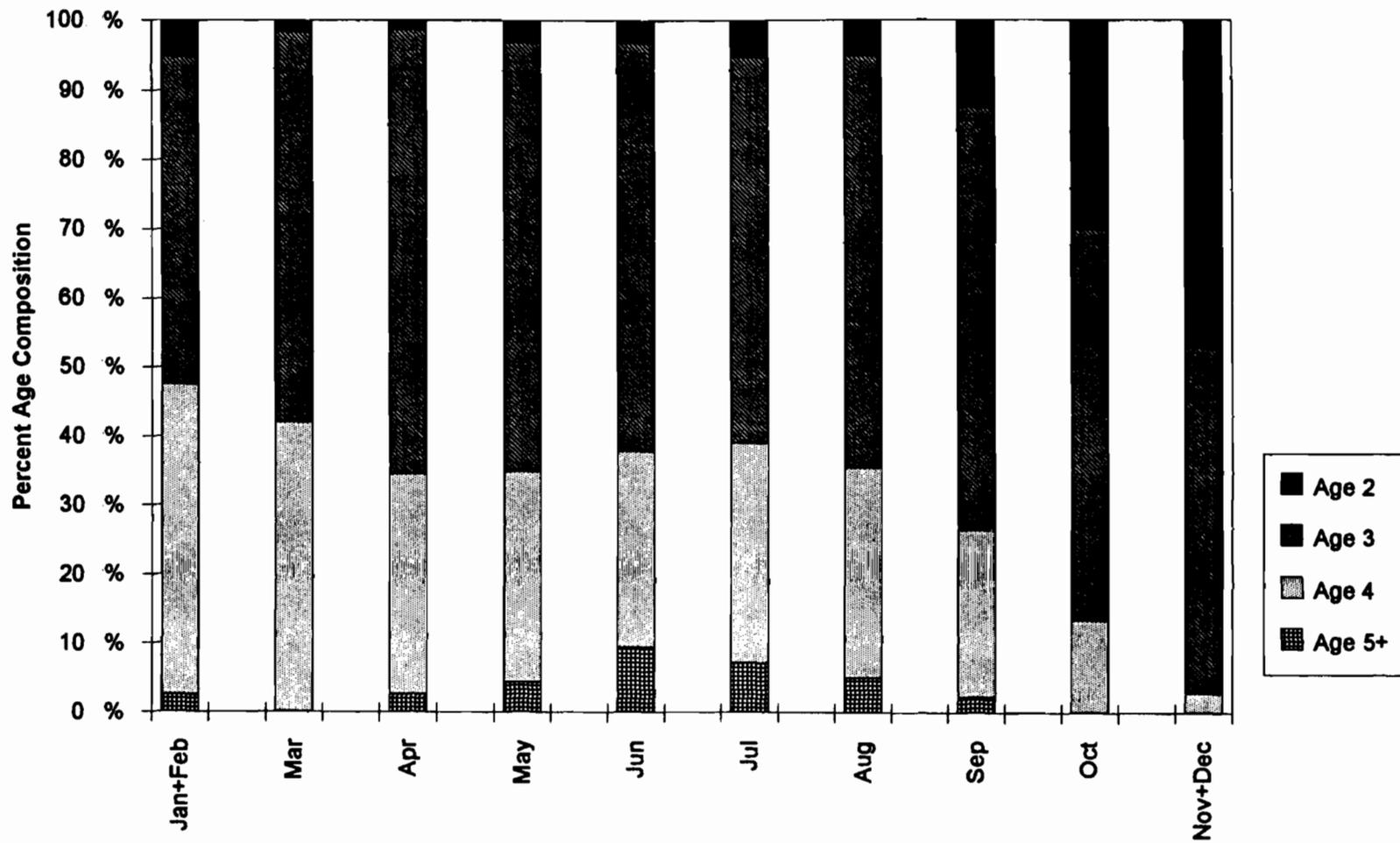
Figure 12.   Monthly percent age composition of chinook salmon sampled in the Strait of Georgia Creel Survey, 1992.
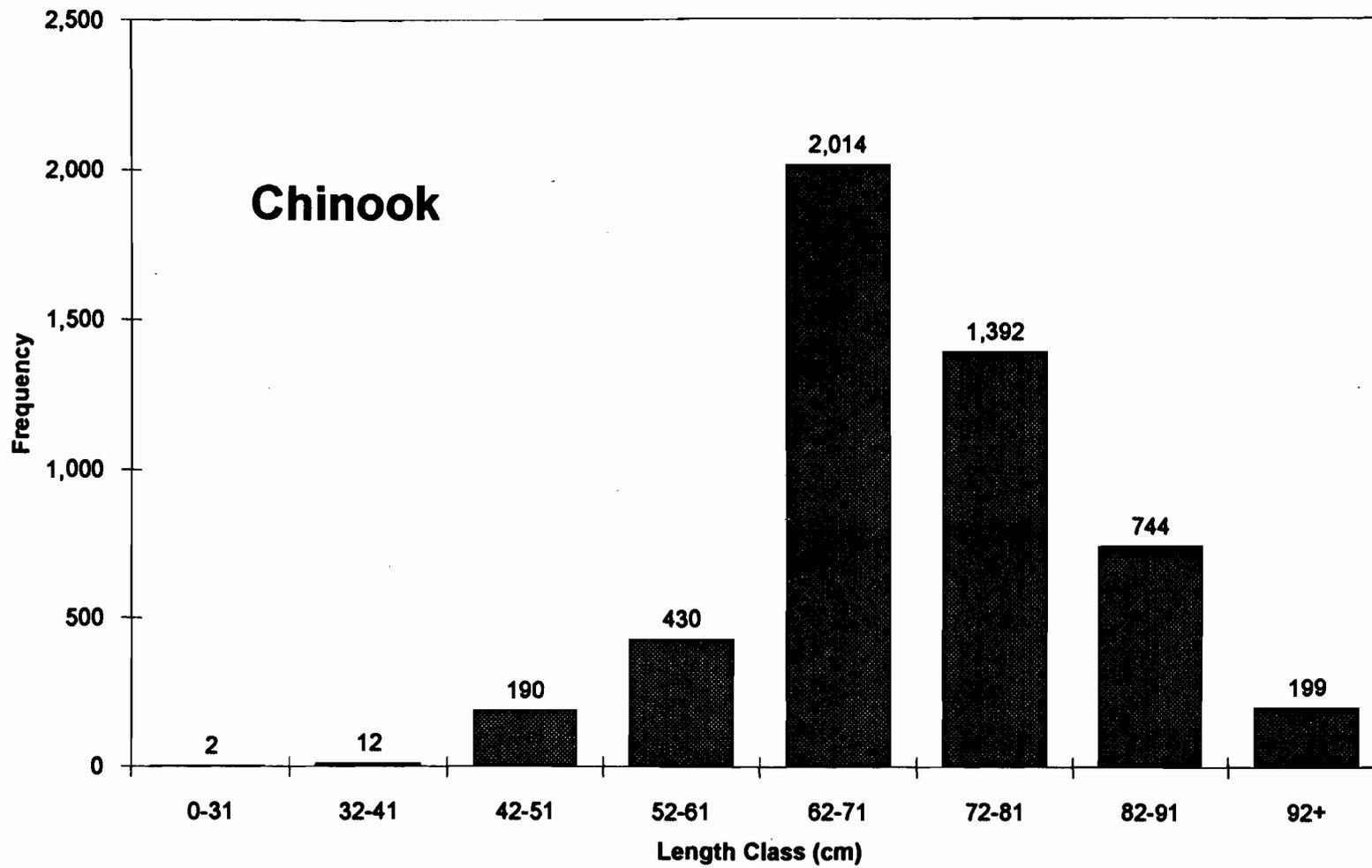
Figure 13. Length frequency distribution of chinook salmon sampled in the Strait of Georgia Creel Survey, 1992.
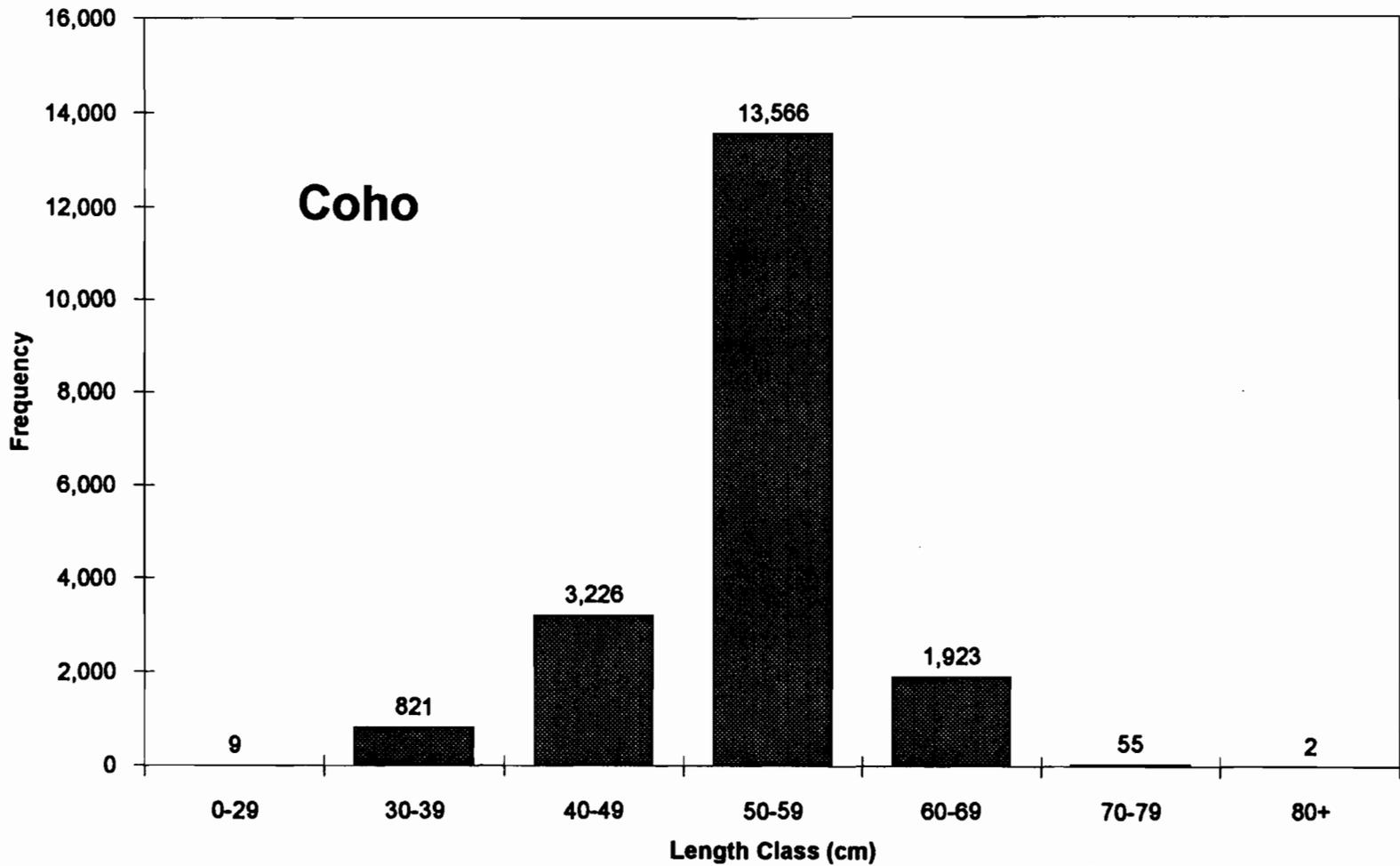
Figure 14. Length frequency distribution of coho salmon sampled in the Strait of Georgia Creel Survey, 1992.
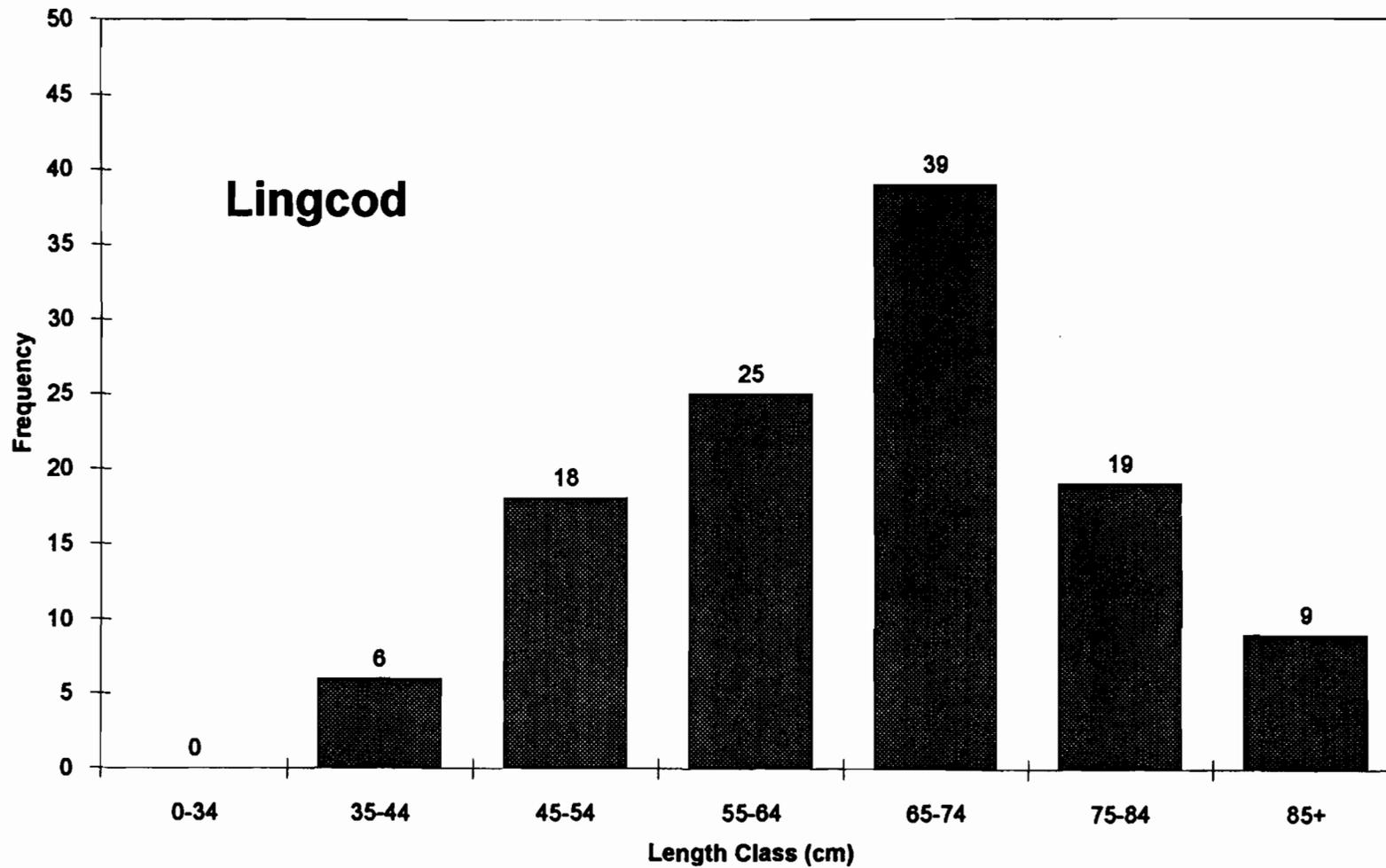
Figure 15. Length frequency distribution of lingcod sampled in the Strait of Georgia Creel Survey, 1992.

TABLES

Table 1. Tidal effort statistics and sport catches of coho and chinook salmon for the Strait of Georgia, 1960 -1992.*

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
1988	664,517	1,084,790	119,117
1989	603,331	497,223	132,846
1990	543,368	630,032	111,914
1991	466,749	157,111	115,519
1992	467,559	595,553	116,579

* SOURCE: Coho catch statistics: 1960-1978 from Argue et al. (1983); 1979 from R.Kadowaki (pers. comm.); 1980-1982 from unpublished creel survey data; 1983-1991 from Annual Reports (Appendix E).

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 unpublished creel survey data; 1983-1991 from Annual Reports (Appendix E).

Effort statistics: 1960-1979 from annual published and unpublished Fisheries Officer statistics; 1980-1982 from unpublished creel survey data; 1983-1991 Annual Reports (Appendix E).

** Effort prior to 1980 (the start of the creel survey) may not represent boat trips.

Table 2. Number of fishing interviews by month and Statistical Area, and number of overflights by month, Strait of Georgia, 1992.

	Statistical Area											
Month	13	14	15	16	17	18	19A	19B+	28	29	Total	Overflights
Jan+Feb	127	26	0	269	148	24	20	518	45	26	1,203	4
Mar	53	140	0	321	226	16	14	504	65	24	1,363	4
Apr	101	170	0	244	377	10	5	290	72	14	1,283	4
May	212	521	35	678	645	18	55	388	272	85	2,909	5
Jun	1,926	1,632	74	747	762	32	71	1,265	173	90	6,772	7
Jul	1,964	1,187	30	704	488	37	55	1,478	207	372	6,522	8
Aug	2,090	1,108	38	515	577	67	24	1,161	163	373	6,116	7
Sep	281	345	33	184	257	26	18	524	63	127	1,858	5
Oct	23	13	0	76	66	31	8	227	46	13	503	5
Nov+Dec	60	7	0	151	27	19	20	570	30	7	891	4
Total	6,837	5,149	210	3,889	3,573	280	290	6,925	1,136	1,131	29,420	53

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Table 3. Fishing effort and catch by species and month, Strait of Georgia, 1992.

Month		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod	Dog-Fish	Other Finfish+	Total Finfish
Jan+Feb	Estimate	9,094	2,117	5,408	0	0	0	2,496	30 *	0	373	10,424
	S.E.	1,280	551	1,575	0	0	0	868	15	0	123	1,885
Mar	Estimate	15,137	14,418	4,256	0	0	0	4,449	0 *	0	1,627	24,750
	S.E.	1,110	2,070	439	0	0	0	746	0	0	504	2,300
Apr	Estimate	24,766	66,170	7,618	2	0	0	3,321	22 *	0	787	77,920
	S.E.	3,557	14,497	1,512	2	0	0	554	12	0	289	14,589
May	Estimate	55,251	91,276	22,247	66	0	0	21,619	113 *	29	1,250	136,600
	S.E.	6,124	14,966	3,247	35	0	0	4,940	41	29	338	16,095
Jun	Estimate	79,958	169,136	26,419	346	134	0	24,758	1,648	604	3,719	226,764
	S.E.	5,158	16,803	1,771	122	47	0	2,839	417	400	836	17,163
Jul	Estimate	123,560	148,081	24,083	6,413	1,787	12	41,212	1,292	476	6,786	230,142
	S.E.	31,249	27,010	3,257	932	257	9	4,649	182	147	907	27,633
Aug	Estimate	82,213	61,962	12,962	11,107	4,442	307	21,630	1,219	166	12,313	126,108
	S.E.	4,323	4,153	876	1,446	476	149	1,628	148	54	1,804	5,127
Sep	Estimate	56,340	34,834	7,014	1,143	382	524	11,799	1,439	402	2,254	59,791
	S.E.	5,397	4,922	957	368	121	192	1,537	283	143	589	5,304
Oct	Estimate	14,547	7,297	1,652	8	0	4,536	3,140	203 *	98	1,569	18,503
	S.E.	1,791	2,441	492	5	0	1,463	1,245	109	40	411	3,174
Nov+Dec	Estimate	6,693	262	4,920	0	0	548	1,339	2 *	27	1,468	8,566
	S.E.	719	74	887	0	0	235	376	1	12	1,125	1,431
Total	Estimate	467,559	595,553	116,579	19,085	6,745	5,927	135,763	5,968	1,802	32,146	919,568 **
	S.E.	33,282	38,705	5,653	1,764	557	1,501	7,899	569	455	2,651	40,068

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

** In addition, an estimated 675 steelhead, cutthroat trout, and unidentified salmon were caught by sport fishermen.

+ See Appendix D for list of species.

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Table 4. Fishing effort and catch by species and Statistical Area, Strait of Georgia, 1992.

Statistical Area		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod	Dog-Fish	Other Finfish *	Total Finfish
13	Estimate	85,927	110,108	26,772	16,762	2,202	3,986	14,859	1,647	180	1,977	178,493
	S.E.	4,506	7,564	1,522	1,638	343	1,350	1,214	245	45	227	8,108
14	Estimate	123,418	171,301	23,534	1,396	23	73	13,927	468	163	1,310	212,195
	S.E.	31,816	31,357	3,789	617	14	35	3,715	153	59	382	31,812
15	Estimate	7,383	4,579	2,067	17	0	0	1,265	24	10	307	8,269
	S.E.	664	604	260	13	0	0	243	11	8	118	711
16	Estimate	59,755	72,505	22,689	462	0	0	43,586	1,026	355	2,370	142,993
	S.E.	3,965	6,240	2,236	201	0	0	5,563	213	139	414	8,670
17	Estimate	58,266	103,410	13,223	141	6	2	17,959	1,121	237	2,828	138,927
	S.E.	5,456	18,145	2,364	40	5	3	2,427	403	112	581	18,473
18	Estimate	18,734	764	2,323	18	0	549	9,559	210	183	1,134	14,740
	S.E.	1,158	315	379	16	0	235	1,900	65	91	283	2,000
19A	Estimate	10,028	446	1,240	0	0	19	4,161	87	389	5,202	11,544
	S.E.	1,912	182	320	0	0	25	1,509	60	390	1,940	2,517
19B+	Estimate	74,851	119,732	21,090	200	2,985	1,252	16,473	848	25	11,086	173,691
	S.E.	4,541	9,353	2,007	62	370	610	1,616	125	18	1,277	9,812
28	Estimate	15,287	7,916	1,457	37	860	26	7,213	303	103	2,887	20,802
	S.E.	1,196	1,061	210	19	174	18	865	75	44	499	1,485
29	Estimate	13,910	4,792	2,184	52	669	20	6,761	234	157	3,045	17,914
	S.E.	1,453	543	555	29	156	24	991	55	83	761	1,483
Total	Estimate	467,559	595,553	116,579	19,085	6,745	5,927	135,763	5,968	1,802	32,146	919,568 **
	S.E.	33,282	38,705	5,653	1,764	557	1,501	7,899	569	455	2,651	40,071

* See Appendix D for list of species.

** In addition, an estimated 675 steelhead, cutthroat trout, and unidentified salmon were caught by sport fishermen.

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Table 5. Monthly catch success (catch per boat trip) by species, Strait of Georgia, 1992.

Month	Chinook	Coho	Total ** Salmon	Rock- Fish	Lingcod	Total Non- Salmon	All Finfish
Jan+Feb	0.59	0.23	0.83	0.27	0.00	0.32	1.15
Mar	0.28	0.95	1.23	0.29	0.00	0.40	1.64
Apr	0.31	2.67	2.98	0.13	0.00	0.17	3.15
May	0.40	1.65	2.06	0.39	0.00	0.42	2.47
Jun	0.33	2.12	2.45	0.31	0.02	0.38	2.84
Jul	0.19	1.20	1.46	0.33	0.01	0.40	1.86
Aug	0.16	0.75	1.10	0.26	0.01	0.43	1.53
Sep	0.12	0.62	0.78	0.21	0.03	0.28	1.06
Oct	0.11	0.50	0.93	0.22	0.01	0.34	1.27
Nov+Dec	0.74	0.04	0.86	0.20	0.00	0.42	1.28
Total	0.25	1.27	1.59	0.29	0.01	0.38	1.97

* 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, 1992.

Species	Statistical Area										Total Sample
	13	14	15	16	17	18	19A	19B+	28	29	
Quillback (Sebastes maliger)	456	198	41	370	80	3	6	37	13	0	1,204
Copper (S. caurinus)	187	85	1	79	134	11	0	13	0	0	510
Yelloweye (S. ruberrimus)	4	17	5	81	32	0	2	22	1	0	164
Black (S. melanops)	1	0	0	0	3	0	0	24	0	0	28
Tiger (S. nigrocinctus)	0	0	0	0	0	1	0	0	0	0	1
Yellowtail (S. flavidus)	1	0	0	4	0	0	0	0	0	0	5
China (S. nebulosus)	0	0	0	46	0	0	0	0	6	0	52
Canary (S. pinniger)	0	0	3	0	4	0	2	5	0	0	14
Unidentified	362	196	17	710	463	91	146	1,405	859	156	4,405
Total sample	1,011	496	67	1,290	716	106	156	1,506	879	156	6,383

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Table 7. Estimated catch of rockfish by species and Statistical Area, Strait of Georgia, 1992. *

Species		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Quillback	Catch	6,702	5,560	774	12,501	2,007	271	160	405	107	0	28,486
	S.D.	595	1,517	167	1,689	345	166	90	77	32	0	2,387
Copper	Catch	2,748	2,387	19	2,669	3,361	992	0	142	0	0	12,318
	S.D.	289	682	19	450	525	350	0	42	0	0	1,073
Yelloweye	Catch	59	477	94	2,737	803	0	53	241	8	0	4,472
	S.D.	30	173	45	458	177	0	44	56	8	0	529
Black	Catch	123	0	0	0	0	0	0	56	15	0	194
	S.D.	62	0	0	0	0	0	0	28	11	0	69
Other **	Catch	5,227	5,503	378	25,679	11,789	8,296	3,948	15,629	7,083	6,761	90,293
	S.D.	1,016	3,318	169	5,261	2,338	1,860	1,506	1,612	864	991	7,434
Total	Catch	14,859	13,927	1,265	43,586	17,959	9,559	4,161	16,473	7,213	6,761	135,763
	S.D.	1,214	3,715	243	5,563	2,427	1,900	1,509	1,616	865	991	7,899

* Calculated using data from Tables 4 and 6.
** Other includes tiger, yellowtail, china, canary and unidentified rockfish.

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Table 8. Monthly number of marked chinook observed and total chinook inspected by region, Strait of Georgia, 1992.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Obs *	19	2	5	26
	Insp **	208	41	544	793
Mar	Obs	16	5	5	26
	Insp	201	37	206	444
Apr	Obs	19	14	3	36
	Insp	200	114	36	350
May	Obs	58	27	6	91
	Insp	728	403	62	1,193
Jun	Obs	118	14	8	140
	Insp	1470	213	273	1,956
Jul	Obs	84	5	4	93
	Insp	917	93	220	1,230
Aug	Obs	42	4	5	51
	Insp	737	68	124	929
Sep	Obs	9	1	2	12
	Insp	119	28	51	198
Oct	Obs	2	0	0	2
	Insp	15	11	32	58
Nov+Dec	Obs	15	1	40	56
	Insp	111	6	1408	1,525
Total	Obs	382	73	78	533
	Insp	4,706	1,014	2,956	8,676
Proportion of marks		0.081	0.072	0.026	0.061

* Obs - marks observed.
** Insp - fish inspected.

Table 9. Monthly number of marked coho observed and total coho inspected by region, Strait of Georgia, 1992.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Obs *	2	1	0	3
	Insp **	46	117	24	187
Mar	Obs	13	16	1	30
	Insp	359	477	84	920
Apr	Obs	27	68	0	95
	Insp	990	1823	8	2,821
May	Obs	61	66	0	127
	Insp	1632	1963	7	3,602
Jun	Obs	368	35	31	434
	Insp	10545	785	1829	13,159
Jul	Obs	216	33	70	319
	Insp	4487	543	3773	8,803
Aug	Obs	98	22	36	156
	Insp	2664	385	1616	4,665
Sep	Obs	20	3	12	35
	Insp	606	88	698	1,392
Oct	Obs	1	0	4	5
	Insp	17	10	234	261
Nov+Dec	Obs	0	0	0	0
	Insp	20	16	24	60
Total	Obs	806	244	154	1,204
	Insp	21,366	6,207	8,297	35,870
Proportion of marks		0.038	0.039	0.019	0.034

* Obs - marks observed.
** Insp - fish inspected.

Table 10. Monthly estimated catch of marked chinook by region, Strait of Georgia, 1992. *

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Catch	130	32	31	193
	S.D.	52	24	20	61
Mar	Catch	76	60	69	205
	S.D.	22	28	32	48
Apr	Catch	442	315	33	790
	S.D.	162	119	20	202
May	Catch	1,088	536	56	1,680
	S.D.	232	183	30	297
Jun	Catch	1,504	303	90	1,897
	S.D.	182	90	36	206
Jul	Catch	1,752	99	57	1,908
	S.D.	348	46	29	353
Aug	Catch	589	67	60	716
	S.D.	100	35	28	110
Sep	Catch	406	28	34	468
	S.D.	148	29	28	153
Oct	Catch	65	0	0	65
	S.D.	56	0	0	56
Nov+Dec	Catch	43	8	129	180
	S.D.	16	9	32	37
Total	Catch	6,095	1,448	559	8,102
	S.D.	522	248	87	585

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

Table 11. Monthly estimated catch of marked coho by region, Strait of Georgia, 1992. *

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Catch	36	8	0	44
	S.D.	35	9	0	36
Mar	Catch	228	242	11	481
	S.D.	69	88	12	113
Apr	Catch	647	1,579	0	2,226
	S.D.	185	545	0	575
May	Catch	2,060	1,215	0	3,275
	S.D.	434	424	0	607
Jun	Catch	4,513	554	464	5,531
	S.D.	601	108	124	623
Jul	Catch	4,225	616	931	5,772
	S.D.	1,308	131	146	1,323
Aug	Catch	1,235	324	506	2,065
	S.D.	155	76	111	205
Sep	Catch	678	70	210	958
	S.D.	179	43	93	206
Oct	Catch	76	0	98	174
	S.D.	81	0	67	105
Nov+Dec	Catch	0	0	0	0
	S.D.	0	0	0	0
Total	Catch	13,698	4,608	2,220	20,526
	S.D.	1,537	722	250	1,716

* 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, 1992 (n gives sample size).

Month	Age 2		Age 3		Age 4		Age 5+		Total Sample
	n	%	n	%	n	%	n	%	
Jan+Feb	6	5.2%	55	47.4%	52	44.8%	3	2.6%	116
Mar	3	1.7%	102	56.4%	76	42.0%	0	0.0%	181
Apr	3	1.3%	147	64.2%	73	31.9%	6	2.6%	229
May	15	3.1%	296	62.1%	145	30.4%	21	4.4%	477
Jun	37	3.1%	700	59.1%	336	28.4%	111	9.4%	1,184
Jul	45	5.3%	473	55.7%	270	31.8%	61	7.2%	849
Aug	33	5.1%	386	59.5%	197	30.4%	33	5.1%	649
Sep	16	12.4%	79	61.2%	31	24.0%	3	2.3%	129
Oct	9	30.0%	17	56.7%	4	13.3%	0	0.0%	30
Nov+Dec	262	47.2%	277	49.9%	16	2.9%	0	0.0%	555
Total	429	-	2,532	-	1,200	-	238	-	4,399
Overall age composition of catch *	-	6.5%	-	58.4%	-	29.6%	-	5.4%	-

* 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, 1992. *

Month		Age 2	Age 3	Age 4	Age 5+	Total **
Jan+Feb	Catch	280	2,564	2,424	140	5,408
	S.D.	142	791	752	92	1,575 ++
Mar	Catch	71	2,398	1,787	0	4,256
	S.D.	41	293	242	0	439 ++
Apr	Catch	100	4,890	2,428	200	7,618
	S.D.	62	1,001	538	91	1,512 ++
May	Catch	700	13,805	6,763	979	22,247
	S.D.	207	2,076	1,095	255	3,247 ++
Jun	Catch	826	15,619	7,497	2,477	26,419
	S.D.	145	1,113	611	279	1,771 ++
Jul	Catch	1,276	13,417	7,659	1,730	24,083
	S.D.	254	1,861	1,106	318	3,257 ++
Aug	Catch	659	7,709	3,935	659	12,962
	S.D.	121	578	355	121	876 ++
Sep	Catch	870	4,295	1,686	163	7,014
	S.D.	237	660	352	97	957 ++
Oct	Catch	496	936	220	0	1,652
	S.D.	206	319	125	0	492 ++
Nov+Dec	Catch	2,323	2,456	142	0	4,920
	S.D.	432	455	44	0	887 ++
Total	Catch	7,599	68,091	34,541	6,348	116,579
	S.D.	674	3,436	1,994	534	5,653 ++
Overall age composition		6.5%	58.4%	29.6%	5.4%	100.0%

* Calculated by applying to the total monthly chinook catch the monthly age proportions from Table 12.
** Monthly total catch and S.E. 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, 1992 (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	61.2	6	63.6	55	69.0	52	86.5	2	91.0	1	116
Mar	63.3	3	65.7	102	71.0	76	0.0	0	0.0	0	181
Apr	64.3	3	67.0	147	72.3	73	74.0	6	0.0	0	229
May	67.6	15	68.2	296	76.7	145	85.5	17	91.0	4	477
Jun	68.0	37	70.8	700	79.2	336	83.1	99	94.3	12	1,184
Jul	62.4	45	71.7	473	81.9	270	88.1	54	94.4	7	849
Aug	61.0	33	72.2	386	84.1	197	88.5	31	93.0	2	649
Sep	54.7	16	70.6	79	84.7	31	98.0	3	0.0	0	129
Oct	55.2	9	69.7	17	74.8	4	0.0	0	0.0	0	30
Nov+Dec	54.3	262	62.5	277	66.0	16	0.0	0	0.0	0	555
Total	57.6	429	69.4	2,532	78.9	1,200	85.4	212	93.6	26	4,399

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APPENDICES

APPENDIX A

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

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[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.

APPENDIX A. METHODS AND EQUATIONS USED IN ANALYSIS OF CATCH AND EFFORT STATISTICS FOR THE STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEY.

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 a 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.

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:

$$W1_{dij} = \frac{N_d}{n_{dij}}$$

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

$$W2_{dijk} = \frac{L_{dijk}}{l_{dijk}}$$

(2)

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
$\overset{\cdot}{C}$ — 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

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

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:

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

(3)

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

(4)

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

(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:

$$CPE_{dgr} = \frac{\hat{C}_{dgr}}{\hat{T}_{dg}}$$

(6)

$$P_{dgt} = \frac{\hat{A}_{dgt}}{\hat{T}_{dg}}$$

(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:

$$\overline{B}_{dst} = \frac{\sum_u B_{sdtu}}{n_{ds}}$$

(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 ($\overline{B}_{dst}$) 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:

$$E_{ds} = \overline{B}_{dst} \frac{1}{P_{dgt}} N_d$$

(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 ($\overline{B}_{dst}$).

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):

$$C_{sr} = \sum_d (E_{ds} CPE_{dgr})$$

(10)

The interview data were also used to select the catch per effort estimates (CPE_{dgr}) that should be applied to the effort estimates (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:

$$S^2{}_{B_{dst}} = \frac{\sum\limits_{u} B^2{}_{dstu} - \dfrac{\left(\sum\limits_{u} B_{dstu}\right)^2}{n_{ds}}}{n_{ds}(n_{ds}-1)}\left[\frac{N_d - N_{ds}}{N_d - 1}\right] \tag{11}$$

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 months.

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

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

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:

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

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 ($S^2{}_{CPE_{dg}}$) was calculated using the following equation:

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

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

The 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:

$$C'_{xmr} = P_{xmr} C_{xmr}$$

(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:

$$S^2_{C'_{xmr}} = P^2_{xmr} S^2_{C_{xmr}} + C^2_{xmr} S^2_{P_{xmr}} + S^2_{C_{xmr}} S^2_{P_{xmr}}$$

(19)

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

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

$$P_{xry} = \frac{C'_{xry}}{C_{xry}}$$

(20)

where

$$C'_{xry} = \sum_m C'_{xmr} \quad and \quad C_{xry} = \sum_m C_{xmr}$$

(21)

The variance of the annual proportions was calculated as:

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

(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 sub-sampling 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:

$$P_{am} = \frac{a_m}{n_m} \tag{23}$$

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

The variance of each proportion was calculated as:

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

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

$$C_{am} = P_{am}C_m \tag{25}$$

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:

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

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

The annual catch at age was calculated as:

$$C_{ay} = \sum_m C_{am} \tag{27}$$

with a variance:

$$S^2{}_{Cay} = \sum_m S^2{}_{Cam}$$

(28)

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

$$P_{ay} = \frac{C_{ay}}{C_y}$$

(29)

with a variance:

$$S^2{}_{Pay} = \left(\frac{C_{ay}}{C_y}\right)^2 \left[\frac{S^2{}_{Cay}}{(C_{ay})^2} + \frac{S^2{}_{Cy}}{(C_y)^2}\right]$$

(30)

APPENDIX B

CATCH AND EFFORT STATISTICS BY MONTH AND STATISTICAL AREA

FOR THE STRAIT OF GEORGIA, 1992.

APPENDIX B-1. STRAIT OF GEORGIA FISHING EFFORT (NO. BOAT TRIPS), 1992.

Month						Statistical Area						
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Estimate	1,123	475	34	1,352	691	1,035	374	3,098	522	390	9,094
	S.E.	536	262	23	419	215	223	58	964	252	119	1,280
March	Estimate	1,646	1,097	116	1,817	3,490	773	419	5,024	399	356	15,137
	S.E.	251	178	54	191	832	144	100	595	134	47	1,110
April	Estimate	2,014	4,509	367	3,760	8,494	666	746	2,598	457	1,155	24,766
	S.E.	208	1,981	140	741	2,721	248	276	230	151	706	3,557
May	Estimate	5,077	13,154	661	12,017	15,500	1,920	819	3,454	1,078	1,571	55,251
	S.E.	1,098	2,966	281	3,115	4,018	314	360	965	345	543	6,124
June	Estimate	14,170	25,239	1,148	8,702	9,694	2,223	1,939	12,281	1,703	2,859	79,958
	S.E.	1,992	4,031	226	866	840	403	457	2,006	353	602	5,158
July	Estimate	25,410	45,595	1,952	14,150	7,088	3,290	1,400	17,571	5,216	1,888	123,560
	S.E.	1,812	31,079	294	1,406	1,346	417	471	1,548	744	325	31,249
August	Estimate	23,792	16,832	1,116	9,409	5,034	3,026	2,742	13,696	3,593	2,973	82,213
	S.E.	2,274	2,398	282	1,005	764	415	1,637	1,608	467	661	4,323
September	Estimate	10,106	14,681	1,826	7,009	6,401	2,065	1,051	9,539	1,712	1,950	56,340
	S.E.	2,481	3,379	345	1,186	1,464	645	553	2,546	545	619	5,397
October	Estimate	2,153	1,692	68	1,190	1,520	1,738	338	4,660	454	734	14,547
	S.E.	347	370	24	304	478	317	143	1,576	102	113	1,791
Nov+Dec	Estimate	436	144	95	349	354	1,998	200	2,930	153	34	6,693
	S.E.	71	72	51	146	115	290	17	618	54	25	719
Total	Estimate	85,927	123,418	7,383	59,755	58,266	18,734	10,028	74,851	15,287	13,910	467,559
	S.E.	4,506	31,816	664	3,965	5,456	1,158	1,912	4,541	1,196	1,453	33,282

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APPENDIX B-2. STRAIT OF GEORGIA COHO CATCH SUMMARY, 1992.

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
						Statistical Area						
Jan+Feb	Catch	29	784	0	24	650	0	224	353	44	9	2,117
	S.E.	49	450	0	17	228	0	148	147	49	10	551
March	Catch	561	1,242	2	4,491	7,201	3	0	911	2	5	14,418
	S.E.	263	330	2	716	1,879	4	0	252	4	6	2,070
April	Catch	2,145	12,516	156	8,899	42,159	37	59	132	30	37	66,170
	S.E.	584	4,329	100	2,413	13,610	73	84	46	33	47	14,497
May	Catch	5,313	35,493	65	14,234	35,879	0	0	47	64	181	91,276
	S.E.	1,466	8,048	30	4,349	11,753	0	0	30	27	80	14,966
June	Catch	41,540	70,529	829	16,417	10,902	348	0	27,385	344	842	169,136
	S.E.	6,330	14,349	174	2,386	1,211	277	0	5,389	106	220	16,803
July	Catch	32,777	35,227	1,640	18,130	3,811	42	0	50,163	4,842	1,449	148,081
	S.E.	2,601	26,234	269	2,496	791	29	0	5,157	987	273	27,010
August	Catch	17,282	8,274	563	7,465	1,353	104	0	22,709	2,277	1,935	61,962
	S.E.	1,862	1,405	200	1,017	283	48	0	3,222	345	390	4,153
September	Catch	9,518	6,981	1,307	2,741	1,331	146	22	12,223	286	279	34,834
	S.E.	2,060	1,820	459	854	344	111	32	3,946	126	102	4,922
October	Catch	943	255	6	85	124	84	0	5,718	27	55	7,297
	S.E.	333	215	6	57	66	38	0	2,407	17	22	2,441
Nov+Dec	Catch	0	0	11	19	0	0	141	91	0	0	262
	S.E.	0	0	7	20	0	0	54	47	0	0	74
Total	Catch	110,108	171,301	4,579	72,505	103,410	764	446	119,732	7,916	4,792	595,553
	S.E.	7,564	31,357	604	6,240	18,145	315	182	9,353	1,061	543	38,705

APPENDIX B-3. STRAIT OF GEORGIA CHINOOK CATCH SUMMARY, 1992.

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
					Statistical Area							
Jan+Feb	Catch	830	97	14	487	80	300	71	3,328	132	69	5,408
	S.E.	409	45	10	218	30	105	44	1,498	81	28	1,575
March	Catch	403	173	71	304	255	41	55	2,861	49	44	4,256
	S.E.	131	44	39	68	70	16	46	399	23	12	439
April	Catch	1,885	1,659	224	884	1,284	180	117	399	317	669	7,618
	S.E.	378	1,251	80	273	437	95	167	75	119	500	1,512
May	Catch	1,935	6,110	330	5,287	6,922	143	191	581	294	454	22,247
	S.E.	507	1,447	136	1,746	2,242	52	128	203	96	166	3,247
June	Catch	5,600	5,500	372	7,265	2,727	562	427	3,079	293	594	26,419
	S.E.	722	823	77	1,080	533	296	168	577	95	152	1,771
July	Catch	8,603	5,783	234	4,503	1,009	391	109	3,117	221	113	24,083
	S.E.	728	3,088	54	573	234	109	70	371	52	34	3,257
August	Catch	5,423	2,760	210	1,940	485	374	156	1,486	60	68	12,962
	S.E.	590	458	60	330	108	103	126	241	20	19	876
September	Catch	1,914	1,213	557	1,685	348	93	79	867	91	167	7,014
	S.E.	575	476	167	461	109	61	69	302	42	71	957
October	Catch	0	239	15	232	113	232	0	821	0	0	1,652
	S.E.	0	215	6	72	58	82	0	425	0	0	492
Nov+Dec	Catch	179	0	40	102	0	7	35	4,551	0	6	4,920
	S.E.	47	0	25	72	0	6	20	882	0	6	887
Total	Catch	26,772	23,534	2,067	22,689	13,223	2,323	1,240	21,090	1,457	2,184	116,579
	S.E.	1,522	3,789	260	2,236	2,364	379	320	2,007	210	555	5,653

APPENDIX B-4. STRAIT OF GEORGIA PINK CATCH SUMMARY, 1992.

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
						Statistical Area						
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	1	1	0	0	0	0	0	0	2
	S.E.	0	0	1	2	0	0	0	0	0	0	2
May	Catch	57	9	0	0	0	0	0	0	0	0	66
	S.E.	32	14	0	0	0	0	0	0	0	0	35
June	Catch	80	214	3	3	46	0	0	0	0	0	346
	S.E.	23	118	2	3	18	0	0	0	0	0	122
July	Catch	5,729	485	0	1	29	0	0	169	0	0	6,413
	S.E.	757	541	0	1	18	0	0	58	0	0	932
August	Catch	10,331	476	2	142	45	18	0	31	34	28	11,107
	S.E.	1,434	157	3	89	22	16	0	21	19	15	1,446
September	Catch	565	212	11	315	21	0	0	0	0	19	1,143
	S.E.	230	222	12	180	21	0	0	0	0	24	368
October	Catch	0	0	0	0	0	0	0	0	3	5	8
	S.E.	0	0	0	0	0	0	0	0	3	4	5
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	16,762	1,396	17	462	141	18	0	200	37	52	19,085
	S.E.	1,638	617	13	201	40	16	0	62	19	29	1,764

APPENDIX B-5. STRAIT OF GEORGIA SOCKEYE CATCH SUMMARY, 1992.

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	8	0	0	0	0	0	0	126	0	0	134
	S.E.	9	0	0	0	0	0	0	46	0	0	47
July	Catch	237	0	0	0	6	0	0	1,463	65	16	1,787
	S.E.	57	0	0	0	5	0	0	247	40	7	257
August	Catch	1,802	23	0	0	0	0	0	1,340	704	573	4,442
	S.E.	327	14	0	0	0	0	0	268	160	150	476
September	Catch	155	0	0	0	0	0	0	56	91	80	382
	S.E.	87	0	0	0	0	0	0	45	57	43	121
October	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
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	2,202	23	0	0	6	0	0	2,985	860	669	6,745
	S.E.	343	14	0	0	5	0	0	370	174	156	557

APPENDIX B-6. STRAIT OF GEORGIA CHUM CATCH SUMMARY, 1992.

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
						Statistical Area						
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	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
July	Catch	0	12	0	0	0	0	0	0	0	0	12
	S.E.	0	9	0	0	0	0	0	0	0	0	9
August	Catch	296	11	0	0	0	0	0	0	0	0	307
	S.E.	149	9	0	0	0	0	0	0	0	0	149
September	Catch	143	0	0	0	0	0	0	381	0	0	524
	S.E.	56	0	0	0	0	0	0	184	0	0	192
October	Catch	3,547	50	0	0	2	36	19	836	26	20	4,536
	S.E.	1,341	33	0	0	3	26	25	581	18	24	1,463
Nov+Dec	Catch	0	0	0	0	0	513	0	35	0	0	548
	S.E.	0	0	0	0	0	233	0	27	0	0	235
Total	Catch	3,986	73	0	0	2	549	19	1,252	26	20	5,927
	S.E.	1,350	35	0	0	3	235	25	610	18	24	1,501

APPENDIX B-7. STRAIT OF GEORGIA CATCH SUMMARY FOR TOTAL SALMONIDS, 1992. *

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
						Statistical Area						
Jan+Feb	Catch	860	924	14	510	728	300	295	3,681	177	78	7,567
	S.E.	424	460	10	219	253	105	157	1,506	115	34	1,680
March	Catch	964	1,413	73	4,795	7,460	44	55	3,771	51	49	18,675
	S.E.	300	345	40	721	1,926	16	46	533	24	13	2,174
April	Catch	4,029	14,172	381	9,786	43,444	217	176	532	347	707	73,791
	S.E.	699	4,777	172	2,434	14,013	140	251	99	131	509	15,033
May	Catch	7,306	41,613	393	19,521	42,803	143	191	628	358	635	113,591
	S.E.	1,881	9,011	163	5,518	13,918	52	128	216	107	222	17,580
June	Catch	47,230	76,247	1,205	23,686	13,678	910	427	30,665	638	1,437	196,123
	S.E.	6,999	15,005	244	3,171	1,560	405	168	5,958	167	330	17,959
July	Catch	47,375	41,522	1,876	22,634	4,859	433	109	54,916	5,127	1,580	180,431
	S.E.	3,654	29,311	304	2,867	996	115	70	5,559	1,017	291	30,230
August	Catch	35,135	11,552	776	9,546	1,885	497	156	25,566	3,089	2,615	90,817
	S.E.	3,899	1,866	245	1,276	377	120	126	3,620	434	525	5,841
September	Catch	12,293	8,407	1,874	4,741	1,700	239	101	13,525	467	545	43,892
	S.E.	2,719	2,333	570	1,211	421	128	80	4,366	179	178	5,827
October	Catch	4,807	545	26	371	237	352	19	7,374	85	131	13,947
	S.E.	1,392	431	11	115	104	104	25	3,241	41	53	3,559
Nov+Dec	Catch	179	0	51	120	0	520	177	4,677	0	6	5,730
	S.E.	47	0	30	85	0	233	71	921	0	6	958
Total	Catch	160,178	196,395	6,669	95,710	116,794	3,655	1,706	145,335	10,339	7,783	744,564
	S.E.	9,548	34,608	772	7,637	19,940	554	409	10,608	1,152	902	43,134

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

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APPENDIX B-8. STRAIT OF GEORGIA SUMMARY FOR RELEASED SALMON, 1992.

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
												Statistical Area
Jan+Feb	Catch	816	340	46	1,224	427	378	495	3,566	99	65	7,456
	S.E.	419	185	31	776	143	113	192	1,017	59	75	1,388
March	Catch	1,156	692	155	2,595	2,108	33	364	1,664	117	95	8,979
	S.E.	406	163	86	426	528	13	201	252	68	35	877
April	Catch	1,908	4,964	632	2,651	4,697	54	59	146	366	821	16,298
	S.E.	326	2,561	278	616	1,790	35	84	44	168	748	3,305
May	Catch	3,453	8,390	248	2,801	10,593	593	831	165	315	494	27,883
	S.E.	872	1,917	106	891	3,965	369	516	72	98	196	4,628
June	Catch	6,566	16,624	399	4,926	5,767	1,119	464	8,768	984	1,362	46,979
	S.E.	976	3,639	84	772	835	453	209	1,806	382	396	4,394
July	Catch	20,045	36,269	1,620	9,617	4,207	775	891	30,204	1,087	402	105,117
	S.E.	1,702	21,705	300	1,219	832	235	548	3,151	247	88	22,060
August	Catch	39,752	29,444	1,030	10,630	7,066	1,284	909	16,522	381	438	107,456
	S.E.	4,541	4,156	289	1,565	1,270	283	622	2,186	91	97	6,878
September	Catch	16,894	17,597	2,538	9,174	8,909	1,570	557	8,135	605	1,071	67,050
	S.E.	3,907	4,954	691	2,522	2,165	858	356	2,281	298	446	7,595
October	Catch	6,145	1,030	156	2,159	1,305	777	154	5,588	247	218	17,779
	S.E.	1,928	484	64	638	453	268	143	2,112	140	193	3,029
Nov+Dec	Catch	163	0	86	243	97	2,961	473	8,368	11	2	12,404
	S.E.	37	0	51	148	54	1,107	177	1,375	7	3	1,782
Total	Catch	96,898	115,350	6,910	46,020	45,176	9,544	5,197	83,126	4,212	4,968	417,401
	S.E.	6,683	23,167	873	3,644	5,208	1,589	1,123	5,534	608	1,007	25,658

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APPENDIX B-9. STRAIT OF GEORGIA ROCKFISH CATCH SUMMARY, 1992.

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
						Statistical Area						
Jan+Feb	Catch	265	1	2	15	196	455	257	1,294	10	1	2,496
	S.E.	156	1	0	13	75	256	257	769	11	1	868
March	Catch	1,044	37	14	53	700	346	41	2,106	59	49	4,449
	S.E.	339	18	8	16	320	120	50	564	52	30	746
April	Catch	149	250	21	167	794	256	0	1,589	37	58	3,321
	S.E.	93	172	15	91	397	139	0	284	21	47	554
May	Catch	797	479	77	11,900	2,787	2,140	326	1,732	559	822	21,619
	S.E.	317	162	31	4,613	1,072	1,157	209	543	247	328	4,940
June	Catch	1,666	1,770	272	6,788	5,284	2,098	114	2,163	1,757	2,846	24,758
	S.E.	287	531	70	1,463	1,743	1,221	75	500	452	751	2,839
July	Catch	4,756	7,384	519	17,044	2,564	1,750	1,374	2,978	2,132	711	41,212
	S.E.	607	3,597	206	2,508	612	518	743	723	454	229	4,649
August	Catch	3,343	3,201	162	6,087	2,104	524	390	2,535	1,818	1,466	21,630
	S.E.	456	616	79	1,031	428	165	330	527	458	434	1,628
September	Catch	2,170	801	190	1,464	3,146	868	471	1,549	590	550	11,799
	S.E.	629	383	64	405	934	431	486	494	238	236	1,537
October	Catch	550	4	4	55	104	631	1,148	190	196	258	3,140
	S.E.	413	4	3	29	56	285	1,123	126	76	102	1,245
Nov+Dec	Catch	119	0	4	13	280	491	40	337	55	0	1,339
	S.E.	37	0	3	8	76	344	21	120	34	0	376
Total	Catch	14,859	13,927	1,265	43,586	17,959	9,559	4,161	16,473	7,213	6,761	135,763
	S.E.	1,214	3,715	243	5,563	2,427	1,900	1,509	1,616	865	991	7,899

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APPENDIX B-10. STRAIT OF GEORGIA LINGCOD CATCH SUMMARY, 1992.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	12	0	0	0	0	13	0	5	0	0	30 *
	S.E.	11	0	0	0	0	8	0	4	0	0	15
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	17	5	0	0	0	0	0	0	0	0	22 *
	S.E.	10	7	0	0	0	0	0	0	0	0	12
May	Catch	30	4	0	0	0	10	0	39	13	17	113 *
	S.E.	18	7	0	0	0	7	0	32	11	12	41
June	Catch	141	161	6	187	831	4	50	178	43	47	1,648
	S.E.	37	85	3	76	393	5	37	50	24	29	417
July	Catch	432	179	0	137	42	118	0	270	84	30	1,292
	S.E.	78	118	0	62	25	44	0	68	44	11	182
August	Catch	428	57	18	233	46	16	0	255	93	73	1,219
	S.E.	80	29	11	83	21	11	0	67	37	33	148
September	Catch	449	62	0	469	202	49	37	54	62	55	1,439
	S.E.	187	36	0	170	82	45	47	43	40	26	283
October	Catch	138	0	0	0	0	0	0	46	7	12	203 *
	S.E.	103	0	0	0	0	0	0	34	8	10	109
Nov+Dec	Catch	0	0	0	0	0	0	0	1	1	0	2 *
	S.E.	0	0	0	0	0	0	0	1	0	0	1
Total	Catch	1,647	468	24	1,026	1,121	210	87	848	303	234	5,968
	S.E.	245	153	11	213	403	65	60	125	75	55	569

* A total closure for lingcod was in effect from January 1 to May 31, and October 1 to December 31,1992; see Table 3 footnote.

APPENDIX B-11. STRAIT OF GEORGIA DOGFISH CATCH SUMMARY, 1992.

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
						Statistical Area						
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	15	14	29
	S.E.	0	0	0	0	0	0	0	0	23	17	29
June	Catch	93	28	7	7	0	0	367	0	29	73	604
	S.E.	33	17	7	7	0	0	390	0	24	76	400
July	Catch	25	24	3	76	160	148	0	17	19	4	476
	S.E.	13	19	3	44	104	87	0	17	19	2	147
August	Catch	62	90	0	0	0	0	0	0	8	6	166
	S.E.	27	46	0	0	0	0	0	0	7	4	54
September	Catch	0	21	0	272	77	0	0	0	8	24	402
	S.E.	0	26	0	132	42	0	0	0	11	19	143
October	Catch	0	0	0	0	0	34	0	4	24	36	98
	S.E.	0	0	0	0	0	28	0	5	18	22	40
Nov+Dec	Catch	0	0	0	0	0	1	22	4	0	0	27
	S.E.	0	0	0	0	0	1	11	4	0	0	12
Total	Catch	180	163	10	355	237	183	389	25	103	157	1,802
	S.E.	45	59	8	139	112	91	390	18	44	83	455

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APPENDIX B-12. STRAIT OF GEORGIA CATCH SUMMARY FOR OTHER FINFISH, 1992. [*]

Month		13	14	15	16	17	18	19A	19B+	28	29	Total
							Statistical Area					
Jan+Feb	Catch	0	0	2	2	51	139	0	172	4	3	373
	S.E.	0	0	0	1	37	102	0	58	3	6	123
March	Catch	0	282	2	8	810	147	0	373	3	2	1,627
	S.E.	0	289	2	4	363	113	0	161	4	2	504
April	Catch	25	124	17	79	262	10	0	270	0	0	787
	S.E.	18	161	11	52	219	10	0	81	0	0	289
May	Catch	108	68	4	71	274	136	124	235	114	116	1,250
	S.E.	77	43	4	63	201	121	95	139	107	86	338
June	Catch	302	161	17	21	297	72	567	403	660	1,219	3,719
	S.E.	122	68	7	10	171	71	402	135	236	640	836
July	Catch	580	370	208	1,074	280	235	971	2,525	432	111	6,786
	S.E.	98	148	115	299	116	111	667	447	133	34	907
August	Catch	743	269	8	798	649	113	2,106	5,643	1,123	861	12,313
	S.E.	114	86	8	253	261	81	1,359	1,016	349	307	1,804
September	Catch	208	36	33	205	173	90	22	1,141	181	165	2,254
	S.E.	88	26	20	92	70	104	32	546	87	84	589
October	Catch	0	0	7	92	25	192	149	268	306	530	1,569
	S.E.	0	0	5	52	28	87	200	161	183	241	411
Nov+Dec	Catch	11	0	9	20	7	0	1,263	56	64	38	1,468
	S.E.	6	0	7	20	3	0	1,123	47	35	44	1,125
Total	Catch	1,977	1,310	307	2,370	2,828	1,134	5,202	11,086	2,887	3,045	32,146
	S.E.	227	382	118	414	581	283	1,940	1,277	499	761	2,651

[*] See Appendix D for list of species.

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APPENDIX C.   STRAIT OF GEORGIA CREEL SURVEY STUDY AREA.

The Strait of Georgia Creel Survey study area and landing site locations used in 1992 are shown in Figure C-1. The 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 Moriarty 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.

Statistical Areas

The Strait of Georgia Creel Survey produces sport fishery data for 10 catch areas (Figure C-1). Statistical Areas 13 - 18, 28 and 29 match the Pacific Fishery Management Areas. Statistical Area 19A is defined as Saanich Inlet and includes Management Subareas 19-7 to 19-12. Statistical Area 19B+ includes the rest of Area 19 and that portion of Area 20 east of Sheringham Point (Management Subarea 20-5).
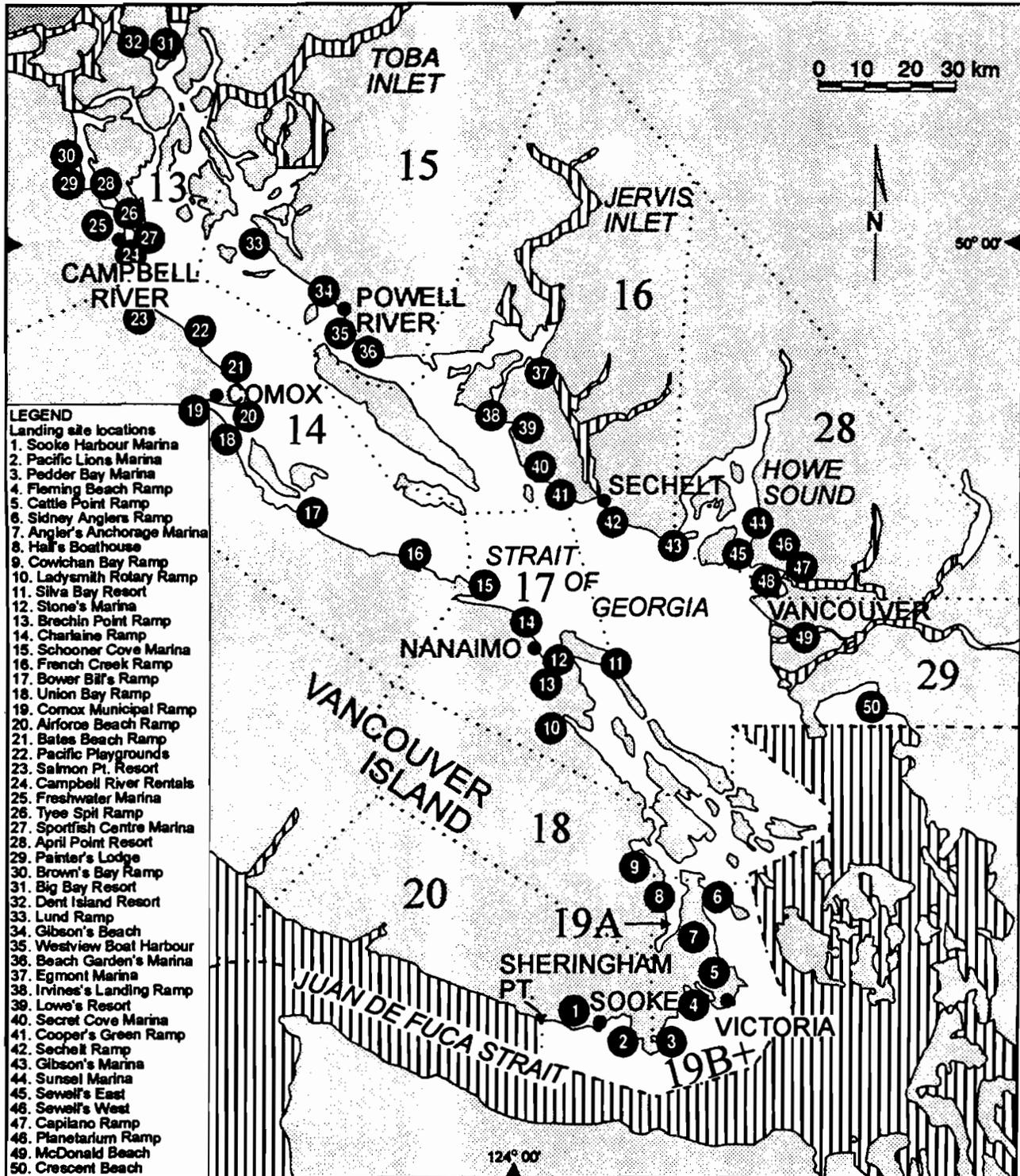
LEGEND
Landing site locations
1. Sooke Harbour Marina
2. Pacific Lions Marina
3. Pedder Bay Marina
4. Fleming Beach Ramp
5. Cattle Point Ramp
6. Sidney Anglers Ramp
7. Angler's Anchorage Marina
8. Hall's Boathouse
9. Cowichan Bay Ramp
10. Ladysmith Rotary Ramp
11. Silva Bay Resort
12. Stone's Marina
13. Brechin Point Ramp
14. Charlaine Ramp
15. Schooner Cove Marina
16. French Creek Ramp
17. Bower Bill's Ramp
18. Union Bay Ramp
19. Comox Municipal Ramp
20. Airforce Beach Ramp
21. Bates Beach Ramp
22. Pacific Playgrounds
23. Salmon Pt. Resort
24. Campbell River Rentals
25. Freshwater Marina
26. Tyee Spit Ramp
27. Sportfish Centre Marina
28. April Point Resort
29. Painter's Lodge
30. Brown's Bay Ramp
31. Big Bay Resort
32. Dent Island Resort
33. Lund Ramp
34. Gibson's Beach
35. Westview Boat Harbour
36. Beach Garden's Marina
37. Egmont Marina
38. Irvines's Landing Ramp
39. Lowe's Resort
40. Secret Cove Marina
41. Cooper's Green Ramp
42. Sechelt Ramp
43. Gibson's Marina
44. Sunsel Marina
45. Sewell's East
46. Sewell's West
47. Capilano Ramp
48. Planetarium Ramp
49. McDonald Beach
50. Crescent Beach

Figure C-1. Strait of Georgia Creel Survey study area and landing site locations;
hatched areas are not included in the survey area.

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

APPENDIX E. PREVIOUS STRAIT OF GEORGIA CREEL SURVEY REPORTS.

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. Manuscr. Rep. Fish. Aquat. Sci. 1872 : 53 p.

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

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

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

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

Shardlow, T.F. and L.D. Collicutt. 1989 e. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1988. Can. Manuscr. Rep. Fish. Aquat. Sci. 2036 : 63 p.

Collicutt, L.D. and T.F. Shardlow. 1990. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1989. Can. Manuscr. Rep. Fish. Aquatic Sci. 2087 : 75 p.

Collicutt, L.D. and T.F. Shardlow. 1992. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1990. Can. Manuscr. Rep. Fish. Aquatic Sci. 2109 : 76 p.

Collicutt, L.D. and T.F. Shardlow. 1995. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1991. Can. Manuscr. Rep. Fish. Aquatic Sci. 2137 : 75 p.