# CONTRIBUTION OF ALASKAN AND CANADIAN SOCKEYE SALMON STOCKS TO CATCHES IN SOUTHEAST ALASKA PURSE SEINE AND GILL NET FISHERIES, DISTRICTS 101-108, 1989, BASED ON ANALYSIS OF SCALE PATTERNS

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## INTRODUCTION

Commercial net fisheries in southern Southeast Alaska harvest mixed stocks of sockeye salmon (*Oncorhynchus nerka*) that originate from lakes, rivers and streams in Southeast Alaska and northern British Columbia (Rich and Morton 1930; Verhoeven 1952; Norenberg 1959; Logan 1967; Simpson 1968; Hoffman et al. 1983, 1984). The Alaska sockeye originate primarily from numerous relatively low or moderately productive Alaskan systems in the immediate vicinity (Figure 1). The Canadian sockeye originate principally from the Nass and Skeena Rivers. The Nass and Skeena Rivers lie entirely within British Columbia and flow into Chatham Sound just south of the Alaska border (Figure 2). Transboundary Stikine River sockeye, including Tahltan Lake stocks, are typically found in identifiable numbers only in Districts 106 and 108 and contribute relatively minor numbers of fish to area catches. In some years south-migrating stocks of sockeye salmon, thought to be predominately bound for the Fraser River in southern British Columbia, may be caught in the District 104 purse seine fishery located along the outer coast just north of the Alaska-Canada border. Contributions of these south-migrating stocks are estimated separately in years when they are present in identifiable numbers. Rarely, a few sockeye salmon returning to northern Southeast Alaska and to systems as distant as Prince William Sound, Alaska, or Washington State may also be taken but their numbers are so few that separate contribution estimates of these stocks are not feasible.

The purpose of this study is to determine the national origin of major sockeye stocks contributing to the Alaskan commercial purse seine and gill net fishery catches in Districts 101 through 108 (Figure 3). Reliable estimates of the relative Alaskan and Canadian stock compositions of sockeye salmon harvested in Southeast Alaska waters are valuable for implementation of the U.S./Canada Pacific Salmon Treaty. This information is useful for evaluating interceptions and calculating productivity, as well as for determining migratory timing and entry patterns. National equity, or benefits equal to production, requires that accurate rates of interceptions of one nation's stocks by the other nation's fisheries be determined. Proportionate cutpoint discrimination is used to estimate the national origin of sockeye stocks taken in southern Southeast Alaskan fisheries. Where finer stock contribution estimates are desired linear discriminant function analysis of scale patterns may be used to distinguish the stock groups. Significant and persistent differences between sockeye salmon stock groups originating in Alaska and Canada continue to be documented in the patterns of growth during freshwater and early marine life history (Marshall et al. 1984; Oliver et al. 1983, 1984; Oliver and Walls 1985; Oliver and Jensen 1986; Oliver and McGregor 1986; Oliver et al. 1987; Oliver et al 1987; Oliver 1988; Oliver and Farrington 1989). Most sockeye salmon from Alaskan stocks grow slower during their lacustrine residence which results in scales with smaller freshwater growth zones and fewer circuli than scales from Canadian stocks. Persistent differences in the number and spacing of circuli in the spring "plus growth" and first marine zones also exist between Alaskan and Canadian stock groups. These differences in growth allow easy and accurate separation of Canadian and Alaskan stocks (Oliver et al. 1983, Marshall et al. 1984, 1986). While the differences in scale patterns between Alaskan and Canadian stock groups

is much greater than the differences within these groups, further separation of Canadian component stocks is possible.

The reader is referred to Rowse et al. (1990) for detailed information on the abundance, age, sex, and length composition of 1989 Southeast Alaska sockeye salmon catches and escapements. For detailed analyses of transboundary Stikine sockeye catches in Districts 106, 108, and the Canadian Stikine River fisheries see Jensen and Frank (1990). For analyses of transboundary Taku sockeye catches in District 111 and Canadian Taku River fisheries see McGregor et al. (1989).

## METHODS

### *Numbers of Fish Caught*

We obtained documentation of the hours open, number of boats fishing, and number of fish harvested by gear type, district, and week from the ADF&G, Division of Commercial Fisheries, fish-ticket data base INGRES program. Catches were summarized by "statistical week". Statistical weeks, hereafter referred to as "weeks", began on Sunday at 12:01 A.M. and ended the following Saturday at midnight. These statistical weeks were numbered sequentially beginning with the first Sunday of the calendar year.

### *Scale Collection and Processing*

Commercial gill net and purse seine landings of sockeye salmon in southern Southeast Alaska were sampled for scales by ADF&G, Commercial Fisheries Division employees at fish processing facilities in Petersburg, Ketchikan, Craig, Steamboat Bay, and Wrangell. Some sampling was also conducted at smaller buying stations and aboard tenders or individual fishing vessels. Gender was determined and recorded for each fish sampled. Mid-eye to fork-of-tail length was recorded for 25% of the fish sampled.

Efforts were made to sample landings as representatively as possible. Fish were sampled at random from deliveries at all major ports of landing and from multiple vessels and tenders. Deliveries with fish of mixed gear types, districts, or weeks were not sampled.

One scale from each fish was taken from up to 600 sockeye salmon caught in each district for each weekly opening of gill net and purse seine fisheries. The sampling goal was intended to yield 510 ageable samples for each gear type/district/week strata which would allow accurate estimation of relative numbers of each major age class to within plus or minus 5 percentage points, 90% of the time, based on standard binomial formula (Cochran 1977). We assumed that 20% of the scales would be unageable due to regeneration or other causes. Recent

work by Thompson (1987) in simultaneously estimating parameters of a multinomial population indicates that 510 ageable scales of four major age classes yields an age proportion estimate with a precision of plus or minus 5% and a probability of 95%. Detailed age, gender, and length data for Southeast Alaskan catches and escapements are not presented in this report, but can be found in Rowse et al. (1990).

Escapements to lake systems in southern Southeast Alaska (Figure 1) were sampled by ADF&G Commercial Fisheries Division personnel. Approximately 1,000 to 1,500 scales each were collected from test fisheries operating in the lower reaches of the Nass and Skeena Rivers by Canadian Department of Fisheries and Oceans Canada personnel (CDFO) (Figure 2). CDFO personnel also sampled sockeye salmon from the Tahltan Lake weir.

Scales were sampled from the preferred area above the lateral line on the left side of the fish on a diagonal downward from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). Scales were mounted on gum cards and impressions made in cellulose acetate (Clutter and Whitesel 1956). Age determinations were based on examinations of scales under moderate 70 power magnification. Criteria used to assign ages were similar to those of Mosher (1968). Ages are reported in European notation. We measured incremental distances of zones that represent the life history stages of the fish (Figure 4). Measurements were made along a line starting at the scale focus (center) at an angle approximately 20 degrees from the long axis and perpendicular to the sculptured field.

### *Proportionate Cutpoint Discrimination*

Proportionate cutpoint discrimination is a method for estimation of stock composition in a fishery in which discrimination of two stocks, or two groups of stocks is desired. Proportionate cutpoint discrimination makes use of simple, rapidly obtained observations (relative size of scale growth zones in this case), input into a model to classify samples of unknown origin. The model is based on a cumulative relative frequency distribution of scales of both known Canadian and Alaskan origin. A gauged template with discrimination cutpoints unique to each age class is constructed. Our model used two cutpoints: the distance from the focus of the scale to the end of the first freshwater zone and the distance from the end of the freshwater growth zone to the end of the first marine growth zone. Impressions of scales of unknown origin from commercial catches are magnified to 70 power and the relative size of the freshwater and marine growth zones are gauged. Based on the relative size of the gauged growth zones, the unknowns are classified into one of the two groups.

### *Classification of Catches*

The commercial catches are classified to nation of origin by proportionate cutpoint discrimination based on age-specific standards assembled from the 1989 escapements. Four major age groups, 1.2, 1.3, 2.2, and 2.3, generally contribute more than 98% of the commercial catches. Whenever possible, standards are built for each age class. Standards are not built for age classes which contribute only a minor fraction of the escapement for a given stock or stock group because sample size would be insufficient. Age specific models are used in the analysis to: 1) account for differences in age composition between stocks, 2) remove potential bias due to differences in migratory timing of different age fish, and 3) eliminate the effect of different environmental conditions on the scale patterns of different age fish. Stock contributions are estimated for each week for major fisheries to track temporal patterns; however, in some smaller fisheries the number of samples are insufficient to classify unless pooled with an adjacent week's samples.

The stock apportionment of the minor age groups not classified assumes that the proportion of the minor ages belonging to any given stock is equal to the combined proportion of all classified age classes.

## RESULTS AND DISCUSSION

### *Fishery Dynamics*

Gill net fishing in southern Southeast Alaska Districts 101 and 106 opens by regulation the third Sunday in June. Opening of the District 108 gill net fishery is sometimes delayed until annual abundance of Stikine River stocks is known. Some purse seine fisheries (generally Districts 104 and 101) open the first Sunday in July while others, more terminal in nature and directed on local stocks, open as concentrations of fish, particularly pink salmon, become available. Primary management objectives include meeting spawning escapement goals and compliance with provisions of the Pacific Salmon Treaty. Achievement of management objectives is accomplished through manipulation of fishing time and harvest areas. This manipulation of time and area openings affects stock composition of catches. The amount of fishing time allowed early in the season depends to some extent on the abundance of sockeye and, to a lesser extent, chum salmon. Later in the season, length of openings depends on the abundance of pink salmon. Fishing time is also affected by an annex to the Pacific Salmon Treaty which limited purse seine sockeye harvest in District 104 through statistical week 30 (about mid-July) to a 4 year total (1985 - 1988) of 480,000 fish, or an average of 120,000 sockeye a year. While this annex expired in 1988 it's provisions limiting the annual catch to an average of 120,000 was "rolled over" for another year in 1989. In the District 101-11 gill net fishery the Treaty limits sockeye catch to a yearly average of 130,000. Purse seine fisheries in

Districts 103, 105, 106 and 107 are open only at times of localized pink salmon abundance generally occurring in late July and August and target on concentrations of pinks moving toward their spawning streams. Gear may move freely within Southeast Alaska fisheries and can concentrate rapidly where and when fish are abundant. In years of high pink salmon abundance, concentration of gear in conjunction with long openings can result in high incidental catches of sockeye salmon in late July and early August even though sockeye abundance is declining. Hours open, boats fishing, sockeye catch, and sockeye catch per boat-day (CPUE) by week for gill net and purse seine fisheries are detailed in Tables 1 and 2.

### *Fishery Performance*

The 1989 southern Southeast Alaska net catch of 1,060,682 sockeye salmon is the highest annual catch recorded for the area since statehood.

### *National Origin of Southern Southeast Sockeye Catches*

The proportion of Alaskan and Canadian sockeye salmon harvested in the catch varied between gear types, districts, and time.

Almost all sockeye salmon harvested in 1989 net fisheries in southern Southeast Alaska (Districts 101-108) have been allocated to nation of origin. Only about 10,000 sockeye salmon caught in the District 106 and 107 purse seine fisheries cannot be allocated due to a lack of samples. Of the 1,060,682 sockeye salmon analyzed, an estimated 332,100 (31%) were bound for systems in Alaska, 714,052 (68%) were bound for the Canadian Nass and Skeena Rivers and 14,530 (1%) were from the Transboundary Stikine (Table 3).

These estimated catches represent a record catch of Canadian origin sockeye as well as a relatively good catch of Alaskan stocks. This may have been due to a combination of factors, including better than average sockeye returns to Canada's Skeena River and average to good returns to several Alaskan systems. Catches in Canadian fisheries targeting on Skeena River sockeye stocks were below average due, in part, to a strike involving processors and also due to a large return of Fraser River sockeye. Both factors may have reduced fishing effort. The escapement of Skeena River sockeye, estimated at 1,100,000, was about 100,000 over the goal. A poor return of Nass River sockeye occurred, with below average catches in directed Canadian fisheries (further reduced by lack of effort during the strike) and with an escapement of 113,000, well below the goal of 220,000. Escapement to McDonald Lake (by far the most productive Alaskan system contributing to southern Southeast fisheries) was estimated at 78,000, slightly below average. However, McDonald Lake sockeye undoubtedly comprised a significant portion of the excellent catch in the inside fisheries. Another factor influencing nation-of-origin harvest compositions may have been excellent sockeye salmon catches in the more terminal fisheries. Excellent sockeye catches

were recorded in the District 101 and 102 seine fisheries along with the District 106 gill net fishery, which typically catch higher proportions of Alaskan sockeye. Catches in the District 104 purse seine and District 101 gill net fisheries, which typically are comprised of high proportions of Canadian sockeye, were above average but did not enjoy the magnitude of increase seen in the terminal fisheries. Excellent catches in terminal fisheries were due in part to increased fishing opportunities in these areas made possible by an excellent return of pink salmon. Significant numbers of south-migrating sockeye may have been taken in the District 104 purse seine fishery (Appendix 1).

*Stock Composition of the District 101-11 Gill Net Catch*

The District 101-11 gill net fishery occurs in the southeastern portion of District 101 along the mainland coast just north of the Alaska-Canada border (Figure 3). Early in the 1989 season fishing time was reduced to as few as two days a week due to below average catches of all salmon and poor escapements of both Alaskan and Nass River sockeye stocks. From mid-July through late August, as catches of pink salmon increased to record levels, fishing time was increased to as many as five days a week. In September, fishing time was again reduced due to below average catches of coho salmon.

The District 101-11 (Tree Point) gill net harvest of 144,936 sockeye salmon is slightly above the 1982-1988 average of 137,000. Catches since 1982 have ranged from a low of 88,226 to a high of 190,883 (Table 4). Catches were highest in late July and early August, with a catch of 53,486, 37% of the season's total, in week 30 through 31 (July 23-August 5). Sockeye catch-per-boat-day (CPUE) was 27 in the opening week, rising to a maximum of 80 in week in week 28 (July 9-15). CPUE was relatively strong from the opening of the fishery through week 31 (July 30-August 5) peaking in week 28 (July 9-15)(Table 1).

An estimated 33,655 sockeye (23% of the catch of 144,936) were of Alaskan origin, while 111,281 (77%) were of Canadian origin (Table 5, Figure 5). The catch of Alaskan sockeye was about the 1982-1988 average while the catch of Canadian sockeye was slightly better than average.

Catches of Alaskan sockeye stocks were relatively constant (a range of from 2,889 to 4,977 per week) from the opening of the season through week 31 (June 26-July 16); 83% of the estimated catch of Alaskan sockeye salmon occurred during this period. Peak CPUE of 17 Alaskan sockeye per boat day occurred in week 28 (July 9-15) (Table 6, Figure 6) and then dropped to less than 10 for the remainder of the season.

Estimated catch of Canadian origin sockeye salmon was from 8,081 to 12,929 per week in the first four weeks of the season (June 18-July 15; catches then increased to peak in weeks 30 and 31 (July 23-August 5) with catches of 23,997 and 21,623, respectively. Although CPUE of Canadian stocks was a relatively high 43 and 34 in weeks 30 and 31, the peak CPUE was in week 28 (July 9-15) at 62 fish per boat day.

*Stock Composition of the District 101 Purse Seine Catch*

The amount of District 101 open to the purse seine fishery varies weekly during the season, depending primarily on the abundance and distribution of pink salmon in the district. Areas and duration of openings also vary for the same week from year to year. As excellent pink returns built in 1989, progressively greater portions of the district were opened to fishing. Annual differences in the portions of the district that are open makes comparison of catches and stock composition estimates difficult both within and between seasons. In 1989 the District 101 purse seine fishery was open portions of week 27 through week 35 (July 2-Sept. 2). Relatively few boats fished in the first two weeks of the season. As the lengths of the openings increased along with the pink salmon returns, the numbers of boats fishing rose to over 200 per week. The total sockeye salmon catch of 117,732, as well as the interception estimate of 80,198 Canadian fish, were the highest on record.

Catches of sockeye salmon increased steadily from a few in the first two weeks of the season to a peak of 35,051 in week 30 (July 23-29), remaining relatively strong through mid-August. Peak CPUE of 184 fish per boat-day occurred in the second week of the season (Table 2).

Alaska sockeye contributed an estimated 37,534 (32%) of the season's catch while a record 80,198 (68%) were of Canadian origin (Table 7). Proportionally, the 32% contributed by Alaskan stocks is the lowest estimated since 1982; Alaskan stocks contributed a much higher proportion of the catch in most prior years, particularly when the overall catch was relatively high (Table 4). A peak Canadian catch of 31,073 occurred in week 30 (July 23-29) (Table 7, Figure 7). The peak CPUE of both Canadian and Alaska stocks occurred in the second week of the season at 152 and 28 fish per boat day, respectively (Table 6, Figure 8).

*Stock Composition of the District 102 Purse Seine Catch*

The District 102 purse seine fishery was open portions of weeks 28 through 35 (July 9-Sept. 2). In the later portion of the season, from late August through September, the fishery targeted local runs of fall chum salmon in terminal areas along the east coast of Prince of Wales Island but sockeye salmon were also caught. Similar to the District 101 purse seine fishery, a record sockeye catch and a relatively high estimated interception of Canadian sockeye salmon was realized (Table 4). Total sockeye catch of 57,641 was the highest ever recorded. The catch of Alaskan sockeye was estimated at a record 35,807 (62%), while the estimated catch of 21,834 Canadian fish (38%) is over twice the number estimated for prior years.

Unfortunately, scale sampling goals for the seine fisheries which normally took relatively few sockeye salmon, Districts 102-107, were reduced due to budget reductions. This reduction in samples made it impossible to produce weekly stock

composition estimates for these districts. Only two strata were possible for District 102 in 1989; weeks 28 through 30 (July 9-29) and weeks 31 through 35 (July 30-Sept. 2). Approximately 29,000 sockeye were caught in each period. In the first period, estimated Canadian contributions of 15,269 accounted for slightly over half the catch (52%), while Alaskan stocks contributed 13,882 (48%). In the second period Alaskan contributions were estimated at 21,925 (77%), while the catch of Canadian fish fell to 6,565 (23%)(Table 8). The peak CPUE of Canadian stocks occurred in the first period at 14 fish per boat day, while the peak Alaskan CPUE of 18 occurred in the second period (Table 6).

*Stock Composition of the District 103 Purse Seine Catch*

The District 103 purse seine fishery was open from week 30 through week 35 (July 23-Sept. 2). However, due to the aforementioned sampling reductions, only an overall season stock composition estimate was possible. An estimated 22,437 sockeye salmon were taken in District 103, the third highest catch on record. In prior years, a high proportion of the sockeye taken have been of Alaskan origin (Table 4). In 1989, 20,535 (96%) of the catch was estimated to be from Alaska, while only 951 (4%) were Canadian (Table 9). Seasonal CPUE of Alaskan sockeye was 14 fish per boat day as compared to 1 for Canadian fish (Table 6).

Historically, sockeye catches in District 103 have not been high. The fishery primarily targets late run pink salmon stocks returning to the west coast of Prince of Wales Island. The fishery does not open until sufficient pink salmon move into the area from outer coastal waters, by which time most sockeye salmon are in protected terminal areas or on the spawning grounds. In years of local low pink salmon abundance the fishery may not open at all. There are several systems in the district with small to moderate runs of sockeye as well as numerous systems which, in aggregate, may produce large runs of pink and chum salmon.

*Stock Composition of the District 104 Purse Seine Catch*

Unlike other southern Southeast purse seine fisheries, all portions of the District 104 fishery are usually open throughout the season. Purse seine effort in District 104 is concentrated near capes and headlands along the outer coast from Noyes to Dall Islands. There are no sockeye producing systems of any note in the district itself; however, there are several moderately productive systems located nearby on the west coast of Prince of Wales Island. Analyses have shown that maximum abundance of Alaskan and Canadian Nass River sockeye stocks usually occurs early in the season, while maximum abundance of Canadian Skeena stocks occurs somewhat later. In some years, south-migrating stocks (thought to be mostly of Fraser River origin but may include some central British Columbia coastal and/or Vancouver Island stocks) are harvested relatively late in the fishery. While sockeye abundance is usually greatest early in the season,

increases in hours open and boats fishing later in the season often result in large sockeye salmon catches. Enormous numbers of pink salmon, primarily bound for streams and rivers along the Alaska mainland early in the season and local Alaskan island streams later in the season, are often taken in this district (Hoffman 1983, 1984). In 1986, a record eight million pink salmon were taken in one week by the District 104 purse seine fleet at the peak of the season. In general the direction of sockeye migration through the district seems to be from north to south (Hoffman 1983, 1984). Weather along this unprotected coast can significantly affect catches regardless of fishing effort or the abundance of fish. Fishing time since 1985 has been restricted from the beginning of the season through week 30 (mid-July) to maintain sockeye catches within a four year (1985-1988) ceiling of 480,000, or an average annual catch of 120,000, as agreed under terms of an annex to the U.S./Canada Pacific Salmon Treaty. This annex was extended through 1989.

District 104 was open to purse seining portions of weeks 27 through 36 (July 3-Sept. 3). The catch of 516,069 sockeye was the third highest on record for the fishery, surpassed only by the 650,807 taken in 1983 and 591,285 in 1988. In 1989, much of the District 104 sockeye catch occurred late in the season when both fishing time and boat participating increased as enormous numbers of pink salmon (four million between Aug. 13-19) were taken in the fishery (Table 2). A catch of 317,517 sockeye salmon, over 60% of the total catch occurred between August 5-19 (weeks 31-33)(Table 2). The maximum CPUE of 867 fish per boat day occurred in the second week of the season when the hours open (15) and boats fishing (89) were still relatively low. CPUE dropped as the season progressed, but was still greater than the maxima seen in other area purse seine fisheries. In the three week period of peak catches, up to 187 boats were fishing for up to 84 hours a week with a weekly CPUE of up to 279 fish per boat day. Sockeye salmon catches in August included significant numbers of both Skeena River and south-migrating sockeye stocks (including fish bound for the Fraser River)(Appendix 1). The catch of south-migrating sockeye salmon was probably due to the excellent return of the Horsefly River component of the Fraser River sockeye stock complex combined with a northern diversion in the landfall of these stocks in 1989.

Alaska stocks accounted for an estimated 76,770 (15%) of the total catch, while Canadian stocks contributed an estimated 439,299 (85%). The proportion estimated for Canadian stocks was the highest recorded since analyses were begun in 1982. The catch of Alaskan stocks was the second lowest estimated (Table 4). Low catches of Alaskan stocks may have been due, in part, to restrictions on fishing time early in the season when Alaskan sockeye are relatively more abundant. The peak catch of Alaskan sockeye stocks occurred in week 33 (Aug. 13-19), when an estimated 28,346 were taken. Over half (61%) of the total estimated catch of Canadian stocks occurred in the three weeks between July 30-Aug. 19 (week 31-33) when an estimated 268,420 were taken (Table 10, Figure 9). The peak CPUE of Alaskan stocks was in week 29 at 87, while Canadian stock CPUE peaked one week earlier at 785 fish per boat day (Table 6, Figure 10). Estimated Canadian contributions ranged from 72% to 95% of the weekly catch.

*Stock Composition of the District 106 and 108 Gill Net Catch*

The District 106 gill net fishery was open for portions of weeks 26 through 38 (June 18-Sept. 23) in 1989. The sockeye salmon catch of 192,734 was the second highest on record, surpassed only by the 265,067 taken in 1985 (Table 4). Of this catch, an estimated 126,603 (66%) were of Alaskan origin, 59,959 (31%) were bound for the Canadian Nass and Skeena Rivers, and 6,172 (3%) were of transboundary Stikine River (including Tahltan Lake stock) origin (Table 4).

Only 10,083 sockeye were taken in District 108, of which 1,180 (12%) were Alaskan, 545 (9%) were from the Nass and Skeena Rivers, and 8,358 (80%) were transboundary Stikine River stocks.

The primary objective of the District 106 and 108 scale pattern research was to estimate abundance of transboundary Stikine River (including Tahltan Lake) stocks of sockeye salmon. For a detailed examination of the fisheries in these districts, as well as Canadian fisheries in the Stikine River, the reader is referred to Jensen and Frank (1990).

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Table 1. Weekly hours open, boats fishing, sockeye catch, and sockeye catch per boat day (CPUE) in southern Southeast Alaska gill net fisheries, 1989.

| | District 101-11 | | | | | District 106-30 | | | | | District 106-41 | | | | | District 108 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Week | Hours | Boats | Boat Days | Catch | CPUE | Hours | Boats | Boat Days | Catch | CPUE | Hours | Boats | Boat Days | Catch | CPUE | Hours | Boats | Boat Days | Catch | CPUE |
| 25 | 96 | 125 | 500 | 14,621 | 29 | 48 | 20 | 40 | 1,188 | 30 | 48 | 54 | 108 | 5,049 | 47 | 48 | 14 | 28 | 399 | 14 |
| 26 | 72 | 121 | 363 | 11,917 | 33 | 48 | 28 | 56 | 1,774 | 32 | 48 | 67 | 134 | 6,953 | 52 | 48 | 4 | 8 | 48 | 6 |
| 27 | 72 | 120 | 360 | 12,305 | 34 | 48 | 25 | 50 | 2,500 | 50 | 48 | 56 | 112 | 7,402 | 66 | - | - | - | - | - |
| 28 | 48 | 104 | 208 | 16,541 | 80 | 72 | 37 | 111 | 17,593 | 158 | 72 | 54 | 162 | 23,825 | 147 | 72 | 7 | 21 | 4,373 | 208 |
| 29 | 120 | 114 | 570 | 19,369 | 34 | 72 | 43 | 129 | 19,900 | 154 | 72 | 63 | 189 | 20,675 | 109 | 72 | 14 | 42 | 3,541 | 84 |
| 30 | 120 | 111 | 555 | 26,886 | 48 | 72 | 86 | 258 | 18,752 | 73 | 72 | 59 | 177 | 15,819 | 89 | 72 | 10 | 30 | 1,540 | 51 |
| 31 | 120 | 122 | 610 | 26,600 | 44 | 72 | 63 | 189 | 10,974 | 58 | 72 | 64 | 192 | 17,939 | 93 | 72 | 8 | 24 | 113 | 5 |
| 32 | 120 | 131 | 655 | 9,394 | 14 | 72 | 55 | 165 | 6,567 | 40 | 72 | 37 | 111 | 4,018 | 36 | 72 | 1 | 3 | 11 | 4 |
| 33 | 120 | 108 | 540 | 3,920 | 7 | 72 | 49 | 147 | 3,096 | 21 | 72 | 44 | 132 | 4,427 | 34 | 72 | 1 | 3 | 20 | 7 |
| 34 | 120 | 96 | 480 | 2,071 | 4 | 72 | 62 | 186 | 1,844 | 10 | 72 | 61 | 183 | 1,411 | 8 | 72 | 6 | 18 | 27 | 2 |
| 35 | 120 | 120 | 600 | 1,021 | 2 | 48 | 49 | 98 | 579 | 6 | 48 | 42 | 84 | 247 | 3 | 48 | 15 | 30 | 7 | 0 |
| 36 | 48 | 73 | 146 | 190 | 1 | 48 | 23 | 46 | 50 | 1 | 48 | 25 | 50 | 102 | 2 | 48 | 14 | 28 | 4 | 0 |
| 37 | 48 | 85 | 170 | 72 | 0 | 48 | 44 | 88 | 26 | 0 | 48 | 33 | 66 | 17 | 0 | | | | | |
| 38 | 48 | 59 | 118 | 29 | 0 | 24 | 20 | 20 | 5 | 0 | 24 | 16 | 16 | 2 | 0 | | | | | |

Table 2. Weekly hours open, boats fishing, sockeye catch, and sockeye catch per boat day (CPUE) in southern Southeast Alaska purse seine fisheries, 1989.

| Week | District 101 | | | | | District 102 | | | | | District 103 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hours | Boats | Boat Days | Catch | CPUE | Hours | Boats | Boat Days | Catch | CPUE | Hours | Boats | Boat Days | Catch | CPUE |
| 27 | 15 | 34 | 21 | 1,957 | 92 | | | | | | | | | | |
| 28 | 15 | 33 | 21 | 3,787 | 184 | 15 | 10 | 6 | 1,219 | 195 | | | | | |
| 29 | 54 | 105 | 236 | 13,332 | 56 | 54 | 58 | 131 | 7,013 | 54 | | | | | |
| 30 | 78 | 140 | 455 | 35,051 | 77 | 78 | 119 | 387 | 20,919 | 54 | 39 | 3 | 5 | 442 | 91 |
| 31 | 81 | 205 | 692 | 31,204 | 45 | 81 | 79 | 267 | 8,230 | 31 | 81 | 62 | 209 | 4,215 | 20 |
| 32 | 84 | 228 | 798 | 16,293 | 20 | 84 | 126 | 441 | 9,685 | 22 | 84 | 93 | 326 | 7,185 | 22 |
| 33 | 87 | 155 | 562 | 11,619 | 21 | 87 | 136 | 493 | 6,902 | 14 | 87 | 137 | 497 | 6,888 | 14 |
| 34 | 63 | 130 | 341 | 3,378 | 10 | 63 | 76 | 200 | 2,216 | 11 | 63 | 116 | 305 | 2,553 | 8 |
| 35 | 87 | 133 | 482 | 1,111 | 2 | 87 | 76 | 276 | 1,404 | 5 | 87 | 26 | 94 | 204 | 2 |
| 36 | | | | | | - | - | - | - | - | | | | | |
| 37 | | | | | | 12 | 37 | 19 | 33 | 2 | | | | | |
| 38 | | | | | | 36 | 12 | 18 | 18 | 1 | | | | | |
| 39 | | | | | | 89 | 7 | 26 | 2 | 0 | | | | | |

| Week | District 104 | | | | | District 106 | | | | | District 107 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hours | Boats | Boat Days | Catch | CPUE | Hours | Boats | Boat Days | Catch | CPUE | Hours | Boats | Boat Days | Catch | CPUE |
| 27 | 15 | 35 | 22 | 8,731 | 399 | | | | | | | | | | |
| 28 | 15 | 89 | 56 | 48,252 | 867 | | | | | | | | | | |
| 29 | 15 | 87 | 54 | 31,346 | 576 | | | | | | | | | | |
| 30 | 39 | 116 | 189 | 68,705 | 364 | | | | | | 39 | 24 | 39 | 1,704 | 44 |
| 31 | 81 | 146 | 493 | 117,238 | 238 | | | | | | - | - | - | - | - |
| 32 | 84 | 187 | 655 | 85,331 | 130 | 63 | 34 | 89 | 3,917 | 44 | 63 | 26 | 68 | 2,135 | 31 |
| 33 | 63 | 157 | 412 | 114,948 | 279 | | | | | | 87 | 15 | 54 | 2,077 | 38 |
| 34 | 63 | 104 | 273 | 26,683 | 98 | | | | | | 63 | 14 | 37 | 840 | 23 |
| 35 | 87 | 45 | 163 | 14,835 | 91 | | | | | | 63 | 22 | 58 | 191 | 3 |
| 36 | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | |

Table 3. Estimated contribution by stock group of origin of sockeye salmon harvested in net fisheries in Alaska Districts 101-108, 1989.

| District | Type | Group | Estimated number | Percent | Standard Error[a] | 90% C.I. Lower | 90% C.I. Upper |
|---|---|---|---|---|---|---|---|
| 101 | Gill net | Alaska | 33,655 | 23 | 2,986.7 | 28,742 | 38,568 |
| | | Canada | 111,281 | 77 | 2,988.0 | 106,366 | 116,196 |
| | | Total | 144,936 | | | | |
| 101 | Purse seine | Alaska | 37,534 | 32 | 3,297.1 | 32,110 | 42,958 |
| | | Canada | 80,198 | 68 | 3,296.8 | 74,775 | 85,621 |
| | | Total | 117,732 | | | | |
| 102 | Purse seine | Alaska | 35,807 | 62 | 2334.0 | 31,968 | 39,646 |
| | | Canada | 21,834 | 38 | 2334.3 | 17,994 | 25,674 |
| | | Total | 57,641 | | | | |
| 103 | Purse seine | Alaska | 20,551 | 96 | 1,248.3 | 18,498 | 22,605 |
| | | Canada | 936 | 4 | 1,251.3 | 0 | 2,994 |
| | | Total | 21,487 | | | | |
| 104 | Purse seine | Alaska | 76,770 | 15 | 13,953.1 | 53,817 | 99,723 |
| | | Canada | 439,299 | 85 | 13,950.9 | 416,350 | 462,248 |
| | | Total | 516,069 | | | | |
| 106 | Gill net | Alaska | 126,603 | 66 | 8,415.5 | 112,760 | 140,446 |
| | | Nass/Skeena | 59,959 | 31 | 2,983.7 | 55,051 | 64,867 |
| | | Tahltan | 1,111 | 0 | 957.0 | 0 | 2,685 |
| | | Stikine | 5,061 | 3 | 2,018.4 | 1,741 | 8,381 |
| | | Total | 192,734 | | | | |
| 108 | Gill net | Alaska | 1,180 | 12 | 329.7 | 638 | 1,722 |
| | | Nass/Skeena | 545 | 5 | 216.6 | 189 | 901 |
| | | Tahltan | 341 | 3 | 188.1 | 32 | 650 |
| | | Stikine | 8,017 | 80 | 385.3 | 7,383 | 8,651 |
| | | Total | 10,083 | | | | |
| All Districts | | Alaska | 332,100 | 31 | 17,100.1 | 303,970 | 360,230 |
| | | Canada | 714,052 | 67 | 15,178.6 | 689,083 | 739,021 |
| | | Stikine[b] | 14,530 | 2 | 2,274.6 | 10,788 | 18,272 |
| | | Total | 1,060,682 | | | | |

a Standard errors may be minimum estimates since no estimates of the variance for stocks contributing zero fish during a given week are avialable. The 90% confidence intervals are affected in a like manner.

b Includes Tahltan

Table 4. Estimated sockeye contributions by nation of origin to southern Southeast Alaska's Districts 101-108 gill net and purse seine fisheries, 1982-1989.

| | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fishery | Group | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| 101-11 Gill Net | Alaska | 69,510 | 36 | 48,942 | 36 | 34,762 | 39 | 30,904 | 18 | 12,732 | 9 | 25,091 | 23 | 14,813 | 13 | 33,655 | 23 |
| | Canada | 121,373 | 64 | 87,064 | 64 | 53,464 | 61 | 141,959 | 82 | 132,899 | 91 | 82,489 | 77 | 101,432 | 87 | 111,281 | 77 |
| | Total | 190,883 | | 136,006 | | 88,226 | | 172,863 | | 145,631 | | 107,580 | | 116,245 | | 144,936 | |
| 101 P. Seine | Alaska | 41,401 | 56 | 20,493 | 43 | 49,209 | 60 | 82,376 | 69 | 50,261 | 67 | 30,088 | 69 | 13,430 | 41 | 37,534 | 32 |
| | Canada | 32,416 | 44 | 27,419 | 57 | 32,445 | 40 | 37,189 | 31 | 24,484 | 33 | 13,241 | 31 | 19,245 | 59 | 80,198 | 68 |
| | Total | 73,817 | | 47,912 | | 81,654 | | 119,565 | | 74,745 | | 43,329 | | 32,675 | | 117,732 | |
| 102 P. Seine | Alaska | 18,296 | 80 | 6,620 | 59 | 17,653 | 82 | 27,197 | 78 | 8,698 | 73 | 16,397 | 94 | 10,344 | 70 | 35,807 | 62 |
| | Canada | 4,451 | 20 | 4,593 | 41 | 3,764 | 18 | 7,549 | 22 | 3,142 | 27 | 1,076 | 6 | 4,454 | 30 | 21,834 | 38 |
| | Total | 22,747 | | 11,213 | | 21,417 | | 34,746 | | 11,840 | | 17,473 | | 14,798 | | 57,641 | |
| 103 P. Seine | Alaska | | | 7,053 | 68 | | | 19,829 | 74 | 9,798 | 72 | 1,544 | 98 | 792 | 33 | 20,551 | 96 |
| | Canada | | | 3,336 | 32 | | | 6,795 | 26 | 3,773 | 28 | 37 | 2 | 1,591 | 67 | 936 | 4 |
| | Total | | | 10,389 | | | | 26,624 | | 13,571 | | 1,581 | | 2,383 | | 21,487 | |
| 104 P. Seine | Alaska | 107,492 | 38 | 157,795 | 24 | 78,821 | 27 | 93,988 | 22 | 100,966 | 23 | 68,741 | 40 | 104,042 | 18 | 77,163 | 15 |
| | Canada | 177,739 | 62 | 493,012 | 76 | 214,847 | 73 | 337,587 | 78 | 343,024 | 77 | 102,473 | 60 | 487,243 | 82 | 438,906 | 85 |
| | Total | 285,231 | | 650,807 | | 293,668 | | 431,575 | | 443,990 | | 171,214 | | 591,285 | | 516,069 | |
| 106 Gill Net | Alaska | 94,187 | 49 | 32,670 | 67 | 60,367 | 66 | 126,952 | 48 | 100,334 | 69 | 112,893 | 83 | 80,868 | 87 | 126,603 | 66 |
| | Canada | 61,976 | 32 | 10,610 | 22 | 24,661 | 27 | 111,051 | 42 | 42,784 | 29 | 21,190 | 15 | 9,784 | 11 | 59,959 | 31 |
| | Stikine[a] | 37,365 | 19 | 5,693 | 11 | 6,761 | 7 | 27,064 | 10 | 2,687 | 2 | 2,344 | 2 | 1,877 | 2 | 6,172 | 3 |
| | Total | 193,528 | | 48,973 | | 91,789 | | 265,067 | | 145,805 | | 136,427 | | 92,529 | | 192,734 | |
| 108 Gill Net | Alaska | 1,632 | 25 | | | | | | | 930 | 22 | | | 265 | 21 | 1,180 | 12 |
| | Canada | 3,787 | 58 | | | | | | | 73 | 2 | | | 48 | 4 | 545 | 5 |
| | Stikine | 1,110 | 17 | | | | | | | 3,184 | 76 | | | 933 | 75 | 8,358 | 83 |
| | Total | 6,529 | | | | | | | | 4,187 | | | | 1,246 | | 10,083 | |
| Total | Alaska | 332,518 | 43 | 273,573 | 30 | 240,812 | 42 | 381,246 | 36 | 283,719 | 34 | 254,754 | 53 | 224,554 | 27 | 332,100 | 31 |
| | Canada | 401,742 | 52 | 626,034 | 69 | 329,181 | 57 | 642,130 | 61 | 550,179 | 65 | 220,506 | 46 | 623,797 | 73 | 714,052 | 68 |
| | Stikine | 38,475 | 5 | 5,693 | 1 | 6,761 | 1 | 27,064 | 3 | 5,871 | 1 | 2,344 | 1 | 2,810 | 0 | 14,530 | 1 |
| | Total | 772,735 | | 905,300 | | 576,754 | | 1,050,440 | | 839,769 | | 477,604 | | 851,161 | | 1,060,682 | |

a Includes Tahltan Lake

Table 5. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 101-11 gill net fishery, 1989.

| Dates | Group | Catch By Age Class 1.2 | 1.3 | 2.2 | 2.3 | Other[a] | Total | Percent | Standard Error[b] | 90% C.I. Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/18-6/24 | AK | 1,504 | 1,727 | 529 | 153 | 418 | 4,331 | 30 | 569.7 | 3,394 | 5,268 |
| Week 25 | Can | 161 | 4,906 | 770 | 3,460 | 993 | 10,290 | 70 | 574.8 | 9,345 | 11,235 |
| | Total | 1,665 | 6,633 | 1,299 | 3,613 | 1,411 | 14,621 | | | | |
| 6/25-7/01 | AK | 1,986 | 734 | 419 | 584 | 113 | 3,836 | 32 | 486.2 | 3,036 | 4,636 |
| Week 26 | Can | 178 | 4,690 | 1,111 | 1,865 | 237 | 8,081 | 68 | 487.1 | 7,280 | 8,882 |
| | Total | 2,164 | 5,424 | 1,530 | 2,449 | 350 | 11,917 | | | | |
| 7/02-7/08 | AK | 1,285 | 1,740 | 272 | 696 | 86 | 4,079 | 33 | 544.4 | 3,183 | 4,975 |
| Week 27 | Can | 2,026 | 3,500 | 1,240 | 1,286 | 174 | 8,226 | 67 | 545.0 | 7,330 | 9,122 |
| | Total | 3,311 | 5,240 | 1,512 | 1,982 | 260 | 12,305 | | | | |
| 7/09-7/15 | AK | 721 | 1,751 | 57 | 1,042 | 41 | 3,612 | 22 | 1072.4 | 1,848 | 5,376 |
| Week 28 | Can | 1,874 | 9,005 | 1,319 | 584 | 147 | 12,929 | 78 | 1073.7 | 11,163 | 14,695 |
| | Total | 2,595 | 10,756 | 1,376 | 1,626 | 188 | 16,541 | | | | |
| 7/16-7/22 | AK | 173 | 1,946 | 274 | 1,848 | 9 | 4,250 | 22 | 1232.8 | 2,222 | 6,278 |
| Week 29 | Can | 3,305 | 10,782 | 872 | 129 | 31 | 15,119 | 78 | 1232.7 | 13,091 | 17,147 |
| | Total | 3,478 | 12,728 | 1,146 | 1,977 | 40 | 19,369 | | | | |
| 7/23-7/29 | AK | 0 | 0 | 524 | 2,365 | 0 | 2,889 | 11 | 1506.9 | 410 | 5,368 |
| Week 30 | Can | 4,524 | 18,455 | 1,018 | 0 | 0 | 23,997 | 89 | 1506.0 | 21,520 | 26,474 |
| | Total | 4,524 | 18,455 | 1,542 | 2,365 | 0 | 26,886 | | | | |
| 7/30-8/05 | AK | 0 | 3,245 | 830 | 887 | 15 | 4,977 | 19 | 1561.6 | 2,408 | 7,546 |
| Week 31 | Can | 5,980 | 13,500 | 819 | 1,257 | 67 | 21,623 | 81 | 1561.9 | 19,054 | 24,192 |
| | Total | 5,980 | 16,745 | 1,649 | 2,144 | 82 | 26,600 | | | | |
| 8/06-8/12 | AK | 0 | 695 | 334 | 759 | 5 | 1,793 | 19 | 1467.1 | 0 | 4,206 |
| Week 32 | Can | 2,409 | 4,662 | 325 | 183 | 22 | 7,601 | 81 | 1467.1 | 5,188 | 10,014 |
| | Total | 2,409 | 5,357 | 659 | 942 | 27 | 9,394 | | | | |
| 8/13-8/19 | AK | 17 | 942 | 239 | 866 | 11 | 2,075 | 53 | 199.5 | 1,747 | 2,403 |
| Week 33 | Can | 587 | 1,186 | 63 | 0 | 9 | 1,845 | 47 | 199.5 | 1,517 | 2,173 |
| | Total | 604 | 2,128 | 302 | 866 | 20 | 3,920 | | | | |
| 8/20-8/26 | AK | 10 | 441 | 104 | 486 | 8 | 1,049 | 51 | 221.6 | 685 | 1,413 |
| Week 34 | Can | 396 | 539 | 79 | 0 | 8 | 1,022 | 49 | 221.6 | 658 | 1,386 |
| | Total | 406 | 980 | 183 | 486 | 16 | 2,071 | | | | |
| 8/27-9/02 | AK | 31 | 184 | 16 | 295 | 0 | 526 | 51 | 237.4 | 135 | 917 |
| Week 35 | Can | 155 | 301 | 39 | 0 | 0 | 495 | 49 | 237.4 | 104 | 886 |
| | Total | 186 | 485 | 55 | 295 | 0 | 1,021 | | | | |
| 9/03-9/09 | AK | 17 | 68 | 9 | 144 | 0 | 238 | 82 | 252.2 | 0 | 653 |
| Week 36 | Can | 8 | 23 | 22 | 0 | 0 | 53 | 18 | 252.2 | 0 | 468 |
| | Total | 25 | 91 | 31 | 144 | 0 | 291 | | | | |
| | AK | 5,744 | 13,473 | 3,607 | 10,125 | 706 | 33,655 | 23 | 2986.7 | 28,742 | 38,568 |
| Fishery | Can | 21,603 | 71,549 | 7,677 | 8,764 | 1,688 | 111,281 | 77 | 2988.0 | 106,366 | 116,196 |
| Total | Total | 27,347 | 85,022 | 11,284 | 18,889 | 2,394 | 144,936 | | | | |

[a] 'Other' age class is determined from weighted averages of proportions of the four major age classes.

[b] Standard errors may be minimum estimates since no estimates of the variance for stocks contributing zero fish during a given week are avialable. The 90% confidence intervals are affected in a like manner.

Table 6. Estimated weekly catch per boat day (CPUE) of sockeye salmon by nation of origin for the southern Southeast Alaska purse seine and gill net fisheries, Districts 101-104, 1989.

| Statistic Week | Dist. 101-11 gill net | | Dist. 101 purse seine | | Dist. 102 purse seine | | Dist. 103 purse seine | | Dist. 104 purse seine | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alaska | Canada | Alaska | Canada | Alaska | Canada | Alaska | Canada | Alaska | Canada |
| 25 | 9 | 21 | | | | | | | | |
| 26 | 11 | 22 | | | | | | | | |
| 27 | 11 | 23 | 23 | 70 | | | | | 63 | 334 |
| 28 | 17 | 62 | 28 | 152 | | | | | 77 | 785 |
| 29 | 7 | 27 | 21 | 36 | | | | | 86 | 494 |
| 30 | 5 | 43 | 9 | 68 | 13 | 14[b] | 14 | 1[c] | 36 | 328 |
| 31 | 8 | 35 | 17 | 28 | 18 | 5[b] | | | 13 | 225 |
| 32 | 3 | 12 | 10 | 10 | | | | | 22 | 108 |
| 33 | 4 | 3 | 12 | 8 | | | | | 69 | 210 |
| 34 | 2 | 2 | 3 | 10[a] | | | | | 28 | 70 |
| 35 | 1 | 1 | | | | | | | 18 | 73 |
| 36 | 2 | 0 | | | | | | | | |

[a] Statistical weeks 34 and 35 are combined for District 101 purse seine
[b] Statistical weeks 28 through 30 are combined as are weeks 31 through 35 for District 102 purse seine
[c] Statistical weeks 30 through 35 are combined for District 103 purse seine

Table 7. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 101 purse seine fishery, 1989.

| Dates | Group | Catch By Age Class 1.2 | 1.3 | 2.2 | 2.3 | Other[a] | Total | Percent | Standard Error[b] | 90% C.I. Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/02-7/08 | AK | 168 | 235 | 0 | 70 | 20 | 493 | 25 | 106.1 | 318 | 668 |
| Week 27 | Can | 418 | 286 | 343 | 358 | 59 | 1,464 | 75 | 106.1 | 1,290 | 1,638 |
| | Total | 586 | 521 | 343 | 428 | 79 | 1,957 | | | | |
| 7/09-7/15 | AK | 16 | 298 | 68 | 212 | 1 | 595 | 16 | 186.4 | 288 | 902 |
| Week 28 | Can | 1,053 | 1,767 | 226 | 139 | 7 | 3,192 | 84 | 186.3 | 2,886 | 3,498 |
| | Total | 1,069 | 2,065 | 294 | 351 | 8 | 3,787 | | | | |
| 7/16-7/22 | AK | 190 | 3,617 | 328 | 672 | 64 | 4,871 | 37 | 729.1 | 3,672 | 6,070 |
| Week 29 | Can | 2,129 | 5,481 | 730 | 9 | 112 | 8,461 | 63 | 729.0 | 7,262 | 9,660 |
| | Total | 2,319 | 9,098 | 1,058 | 681 | 176 | 13,332 | | | | |
| 7/23-7/29 | AK | 0 | 2,429 | 718 | 817 | 14 | 3,978 | 11 | 1,606.8 | 1,335 | 6,621 |
| Week 30 | Can | 10,571 | 18,094 | 1,755 | 543 | 110 | 31,073 | 89 | 1,606.3 | 28,431 | 33,715 |
| | Total | 10,571 | 20,523 | 2,473 | 1,360 | 124 | 35,051 | | | | |
| 7/30-8/05 | AK | 0 | 8,121 | 1,392 | 1,974 | 107 | 11,594 | 37 | 2,224.2 | 7,935 | 15,253 |
| Week 31 | Can | 11,027 | 7,529 | 872 | 0 | 182 | 19,610 | 63 | 2,224.2 | 15,951 | 23,269 |
| | Total | 11,027 | 15,650 | 2,264 | 1,974 | 289 | 31,204 | | | | |
| 8/06-8/12 | AK | 540 | 3,689 | 1,009 | 2,497 | 233 | 7,968 | 49 | 1,369.9 | 5,715 | 10,221 |
| Week 32 | Can | 3,563 | 3,565 | 954 | 0 | 243 | 8,325 | 51 | 1,369.9 | 6,072 | 10,578 |
| | Total | 4,103 | 7,254 | 1,963 | 2,497 | 476 | 16,293 | | | | |
| 8/13-8/19 | AK | 247 | 3,544 | 1,101 | 1,741 | 367 | 7,000 | 60 | 1,583.2 | 4,396 | 9,604 |
| Week 33 | Can | 2,973 | 1,373 | 31 | 0 | 242 | 4,619 | 40 | 1,583.3 | 2,014 | 7,224 |
| | Total | 3,220 | 4,917 | 1,132 | 1,741 | 609 | 11,619 | | | | |
| 8/20-9/02 | AK | 115 | 371 | 151 | 377 | 21 | 1,035 | 23 | 1,558.7 | 0 | 3,599 |
| Wks 34-35 | Can | 2,109 | 1,060 | 216 | 0 | 69 | 3,454 | 77 | 1,558.7 | 890 | 6,018 |
| | Total | 2,224 | 1,431 | 367 | 377 | 90 | 4,489 | | | | |
| | AK | 1,276 | 22,304 | 4,767 | 8,360 | 827 | 37,534 | 32 | 3,297.1 | 32,110 | 42,958 |
| Fishery | Can | 33,843 | 39,155 | 5,127 | 1,049 | 1,024 | 80,198 | 68 | 3,296.8 | 74,775 | 85,621 |
| Total | Total | 35,119 | 61,459 | 9,894 | 9,409 | 1,851 | 117,732 | | | | |

[a] 'Other' age class is determined from weighted averages of proportions of the four major age classes.

[b] Standard errors may be minimum estimates since no estimates of the variance for stocks contributing zero fish during a given week are avialable. The 90% confidence intervals are affected in a like manner.

Table 8. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 102 purse seine fishery, 1989.

| Dates | Group | Catch By Age Class 1.2 | 1.3 | 2.2 | 2.3 | Other[a] | Total | Percent | Standard Error[b] | 90% C.I. Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/09-7/29 | AK | 2,736 | 6,166 | 3,041 | 1,719 | 220 | 13,882 | 48 | 1,497.6 | 11,418 | 16,346 |
| Wks 28-30 | Can | 7,774 | 7,253 | 0 | 0 | 242 | 15,269 | 52 | 1,497.7 | 12,805 | 17,733 |
| | Total | 10,510 | 13,419 | 3,041 | 1,719 | 462 | 29,151 | | | | |
| 7/30-9/02 | AK | 7,346 | 7,722 | 4,914 | 1,369 | 574 | 21,925 | 77 | 1,938.9 | 18,736 | 25,114 |
| Wks 31-35 | Can | 4,660 | 1,733 | 0 | 0 | 172 | 6,565 | 23 | 1,939.3 | 3,375 | 9,755 |
| | Total | 12,006 | 9,455 | 4,914 | 1,369 | 746 | 28,490 | | | | |
| | AK | 10,082 | 13,888 | 7,955 | 3,088 | 794 | 35,807 | 62 | 2,334.0 | 31,968 | 39,646 |
| Fishery | Can | 12,434 | 8,986 | 0 | 0 | 414 | 21,834 | 38 | 2,334.3 | 17,994 | 25,674 |
| Total | Total | 22,516 | 22,874 | 7,955 | 3,088 | 1,208 | 57,641 | | | | |

[a] 'Other' age class is determined from weighted averages of proportions of the four major age classes.

[b] Standard errors may be minimum estimates since no estimates of the variance for stocks contributing zero fish during a given week are avialable. The 90% confidence intervals are affected in a like manner.

Table 9. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 103 purse seine fishery, 1989.

| Dates | Group | Catch By Age Class 1.2 | 1.3 | 2.2 | 2.3 | Other[a] | Total | Percent | Standard Error[b] | 90% C.I. Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/23-9/02 | AK | 4,769 | 13,534 | 1,116 | 1,116 | 0 | 20,535 | 92 | 1,248.3 | 18,482 | 22,588 |
| Wks 30-35 | Can | 951 | 0 | 0 | 0 | 0 | 951 | 4 | 1,251.8 | 0 | 3,010 |
| | Total | 5,720 | 13,534 | 1,116 | 1,116 | 0 | 22,437 | | | | |
| | AK | 4,769 | 13,534 | 1,116 | 1,116 | 0 | 20,535 | 92 | 1,248.3 | 18,482 | 22,588 |
| Fishery | Can | 951 | 0 | 0 | 0 | 0 | 951 | 4 | 1,251.8 | 0 | 3,010 |
| Total | Total | 5,720 | 13,534 | 1,116 | 1,116 | 0 | 22,437 | | | | |

a 'Other' age class is determined from weighted averages of proportions of the four major age classes.

b Standard errors may be minimum estimates since no estimates of the variance for stocks contributing zero fish during a given week are avialable. The 90% confidence intervals are affected in a like manner.

Table 10. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 104 purse seine fishery, 1989.

| Dates | Group | Catch By Age Class 1.2 | 1.3 | 2.2 | 2.3 | Other[a] | Total | Percent | Standard Error[b] | 90% C.I. Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/02-7/08 | AK | 132 | 378 | 229 | 632 | 14 | 1,385 | 16 | 354.2 | 802 | 1,968 |
| Week 27 | Can | 1,338 | 5,006 | 692 | 236 | 74 | 7,346 | 84 | 354.1 | 6,764 | 7,928 |
| | Total | 1,470 | 5,384 | 921 | 868 | 88 | 8,731 | | | | |
| 7/09-7/15 | AK | 0 | 1,728 | 683 | 1,837 | 55 | 4,303 | 9 | 1,815.3 | 1,317 | 7,289 |
| Week 28 | Can | 11,523 | 28,931 | 2,609 | 324 | 562 | 43,949 | 91 | 1,814.1 | 40,965 | 46,933 |
| | Total | 11,523 | 30,659 | 3,292 | 2,161 | 617 | 48,252 | | | | |
| 7/16-7/22 | AK | 0 | 2,104 | 1,151 | 1,364 | 45 | 4,664 | 15 | 1,763.7 | 1,763 | 7,565 |
| Week 29 | Can | 8,885 | 16,563 | 945 | 34 | 255 | 26,682 | 85 | 1,763.5 | 23,781 | 29,583 |
| | Total | 8,885 | 18,667 | 2,096 | 1,398 | 300 | 31,346 | | | | |
| 7/23-7/29 | AK | 0 | 4,127 | 659 | 1,894 | 68 | 6,748 | 10 | 3,822.5 | 460 | 13,036 |
| Week 30 | Can | 23,457 | 35,013 | 1,701 | 1,160 | 626 | 61,957 | 90 | 3,821.5 | 55,671 | 68,243 |
| | Total | 23,457 | 39,140 | 2,360 | 3,054 | 694 | 68,705 | | | | |
| 7/30-8/05 | AK | 0 | 596 | 1,597 | 4,197 | 0 | 6,390 | 5 | 7,331.1 | 0 | 18,450 |
| Week 31 | Can | 49,973 | 57,505 | 3,072 | 298 | 0 | 110,848 | 95 | 7,330.2 | 98,790 | 122,906 |
| | Total | 49,973 | 58,101 | 4,669 | 4,495 | 0 | 117,238 | | | | |
| 8/06-8/12 | AK | 0 | 6,118 | 6,152 | 1,871 | 220 | 14,361 | 17 | 10,530.8 | 0 | 31,684 |
| Week 32 | Can | 46,921 | 20,944 | 1,268 | 748 | 1,089 | 70,970 | 83 | 10,530.1 | 53,648 | 88,292 |
| | Total | 46,921 | 27,062 | 7,420 | 2,619 | 1,309 | 85,331 | | | | |
| 8/13-8/19 | AK | 19,001 | 5,216 | 1,538 | 2,307 | 284 | 28,346 | 25 | 7,679.3 | 15,714 | 40,978 |
| Week 33 | Can | 72,881 | 12,852 | 0 | 0 | 869 | 86,602 | 75 | 7,678.1 | 73,972 | 99,232 |
| | Total | 91,882 | 18,068 | 1,538 | 2,307 | 1,153 | 114,948 | | | | |
| 8/20-8/26 | AK | 3,984 | 1,585 | 672 | 1,317 | 25 | 7,583 | 28 | 2,614.5 | 3,282 | 11,884 |
| Week 34 | Can | 14,799 | 3,857 | 381 | 0 | 63 | 19,100 | 72 | 2,614.3 | 14,799 | 23,401 |
| | Total | 18,783 | 5,442 | 1,053 | 1,317 | 88 | 26,683 | | | | |
| 8/27-9/02 | AK | 453 | 942 | 778 | 778 | 39 | 2,990 | 20 | 2,831.8 | 0 | 7,648 |
| Week 35 | Can | 9,372 | 2,317 | 0 | 0 | 156 | 11,845 | 80 | 2,831.7 | 7,187 | 16,503 |
| | Total | 9,825 | 3,259 | 778 | 778 | 195 | 14,835 | | | | |
| | AK | 23,570 | 22,794 | 13,459 | 16,197 | 750 | 76,770 | 15 | 13,953.1 | 53,817 | 99,723 |
| Fishery | Can | 239,149 | 182,988 | 10,668 | 2,800 | 3,694 | 439,299 | 85 | 13,950.9 | 416,350 | 462,248 |
| Total | Total | 262,719 | 205,782 | 24,127 | 18,997 | 4,444 | 516,069 | | | | |

[a] 'Other' age class is determined from weighted averages of proportions of the four major age classes.

[b] Standard errors may be minimum estimates since no estimates of the variance for stocks contributing zero fish during a given week are avialable. The 90% confidence intervals are affected in a like manner.

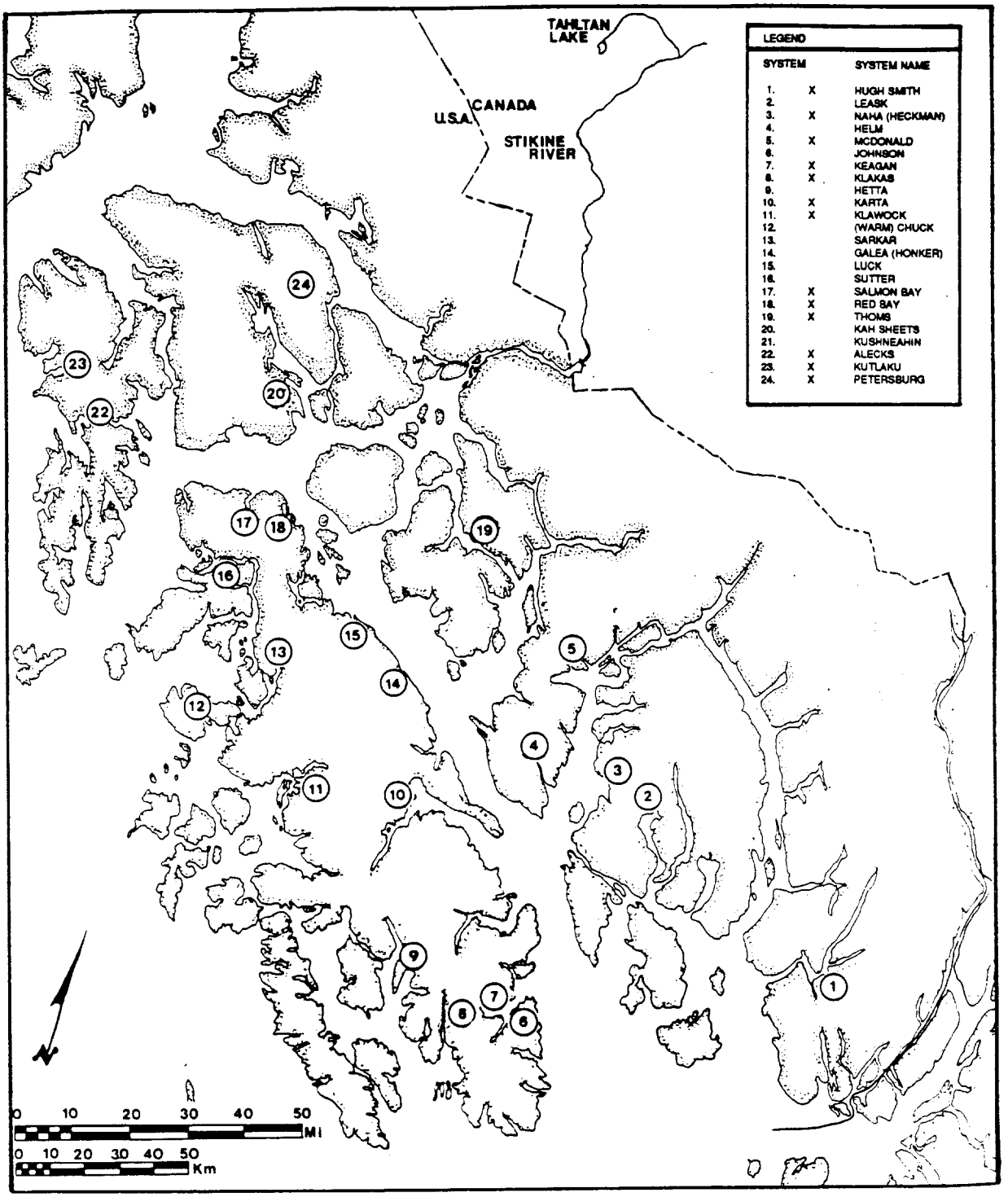


Figure 1. Major sockeye salmon systems of Southeast Alaska and the Transboundary Stikine; numbers identify Alaska systems where scales are commonly collected while "x" in the legend identifies stocks sampled in 1989.

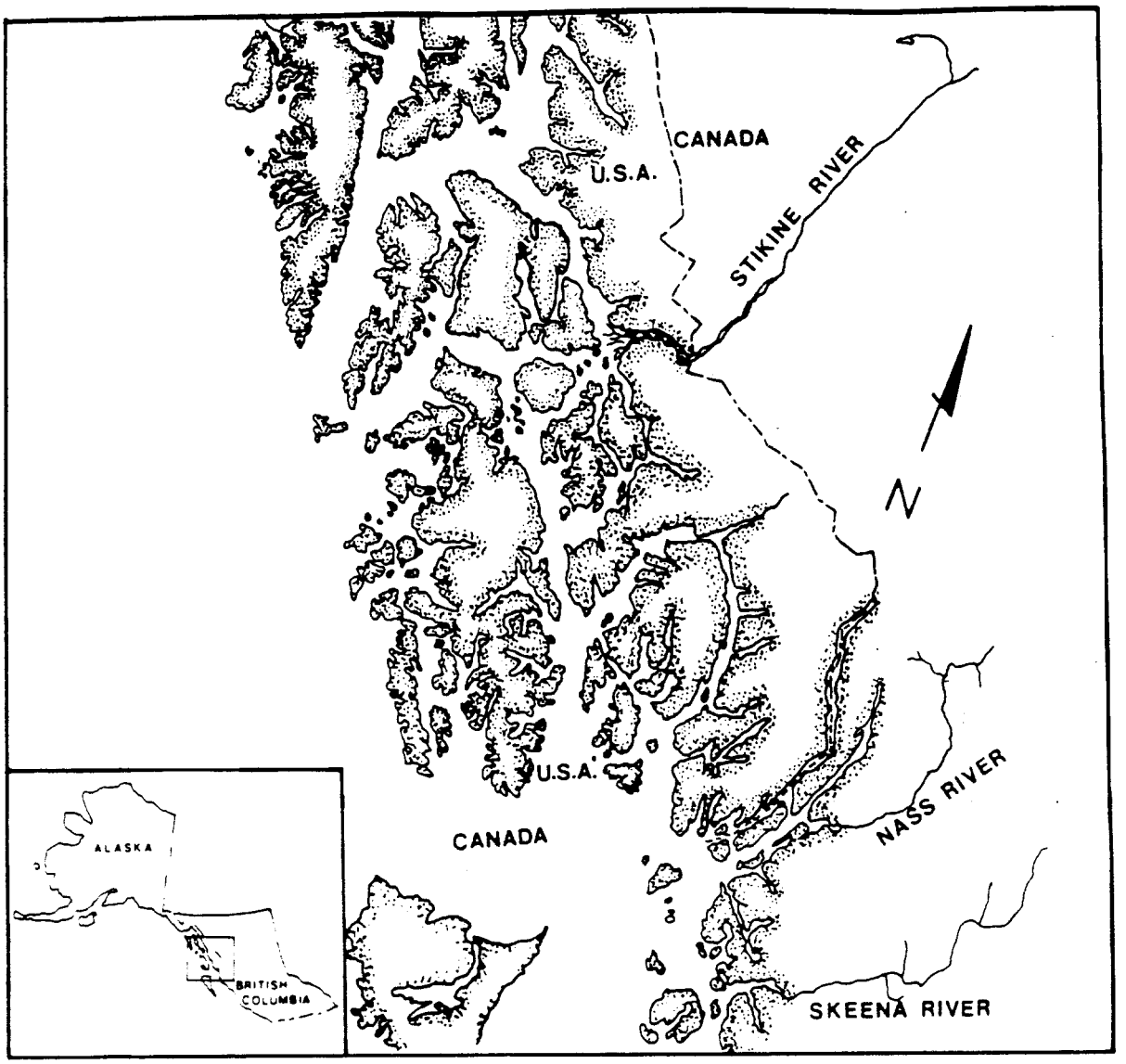


Figure 2. The Canadian Nass and Skeen Rivers and the Transboundary Stikine River.

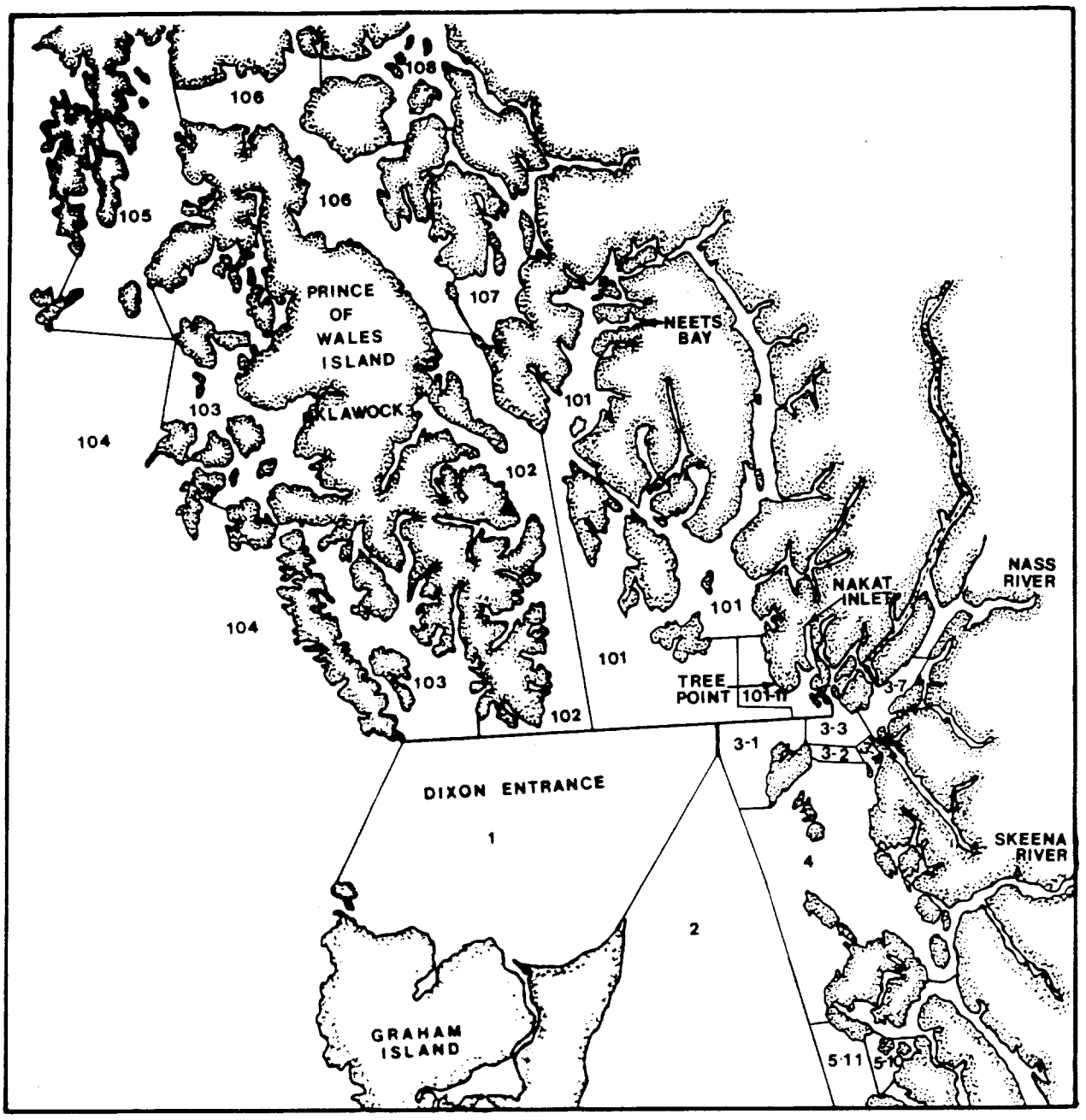


Figure 3. Fishery management districts in southern Southeast Alaska and northern British Columbia waters.

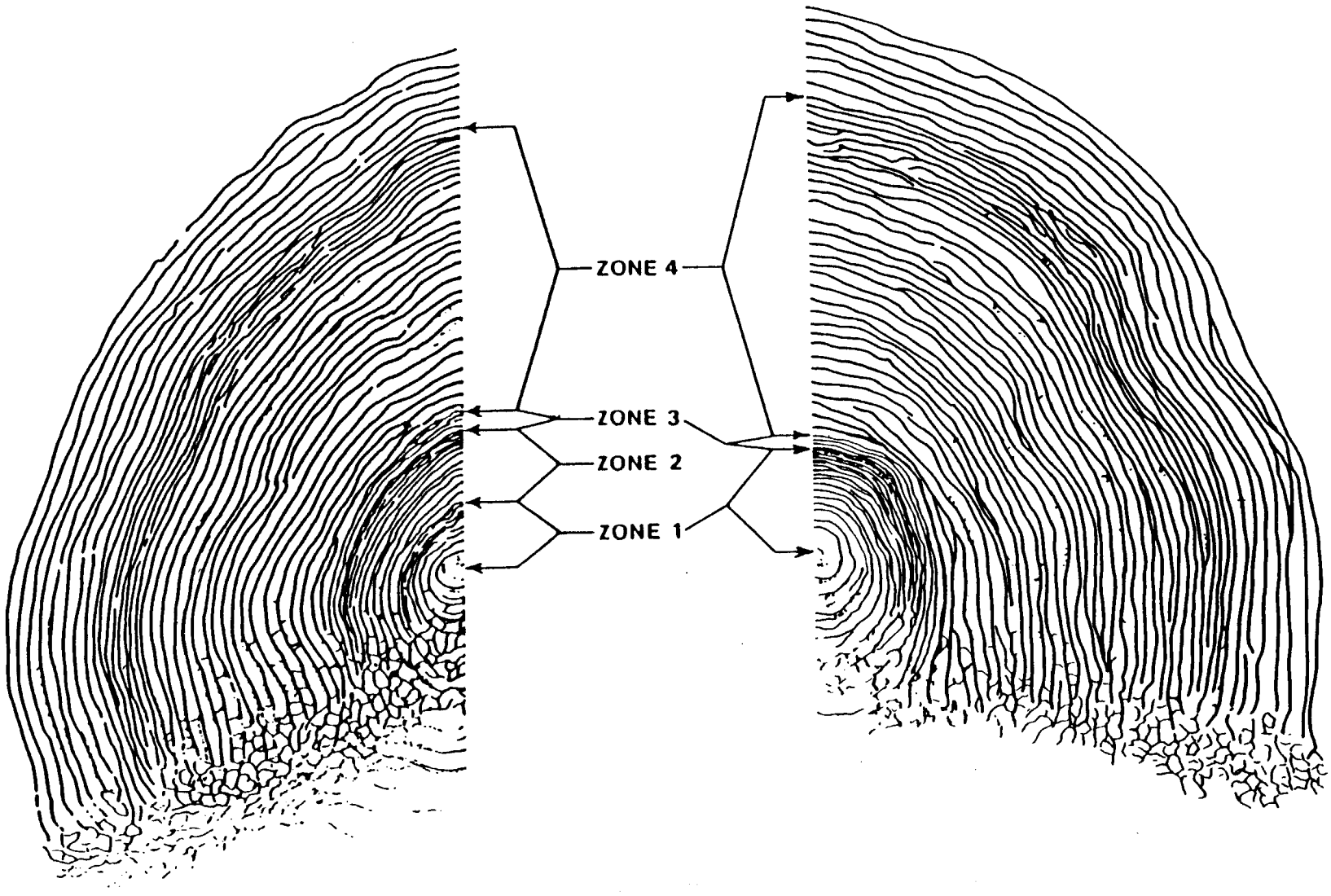


Figure 4. Typical scales with one and two freshwater growth zones showing the zones used for scale pattern analysis.

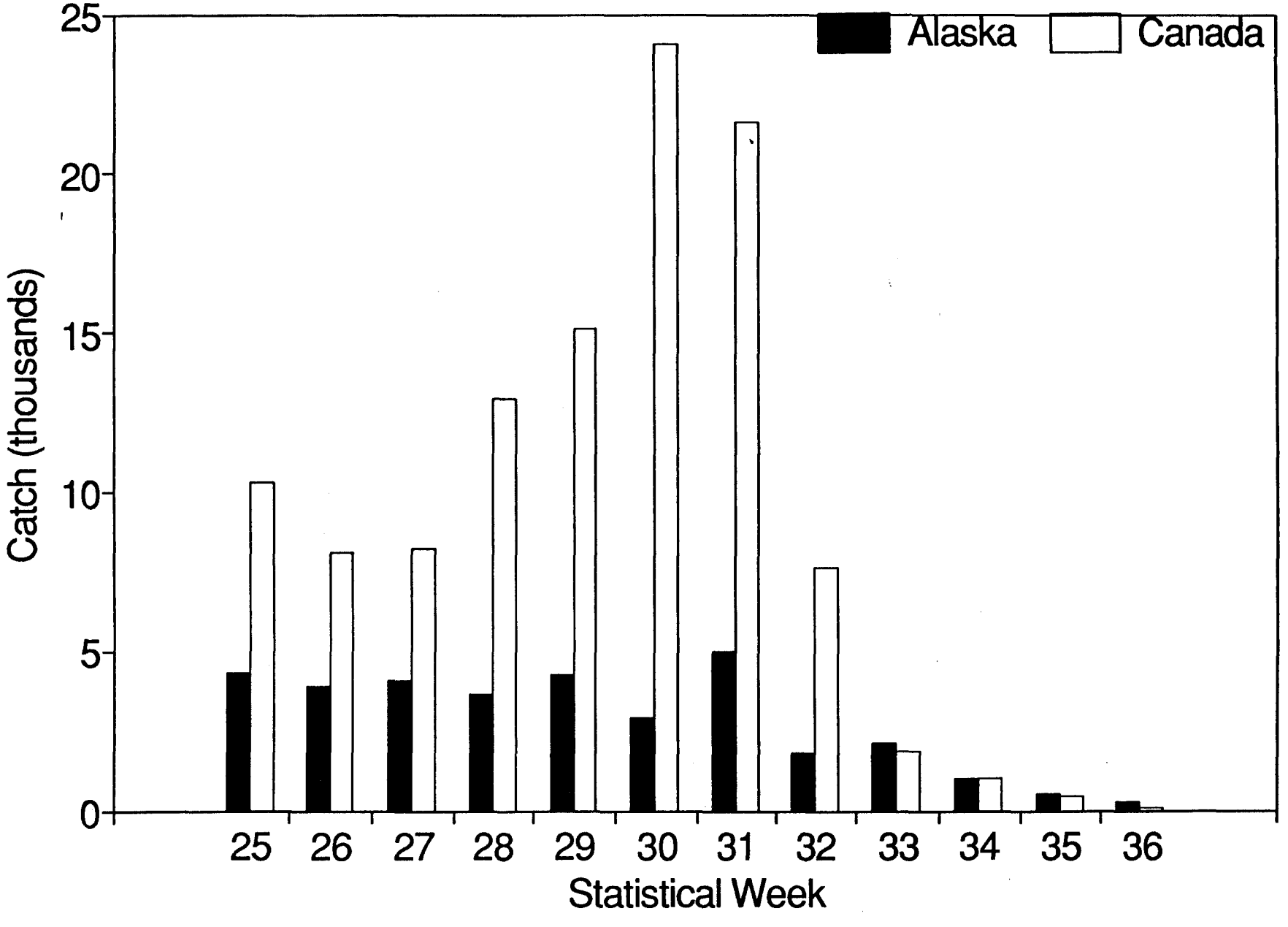


Figure 5. Weekly catch by nation of origin in Alaska's District 101-11 drift gill net fishery, 1989.

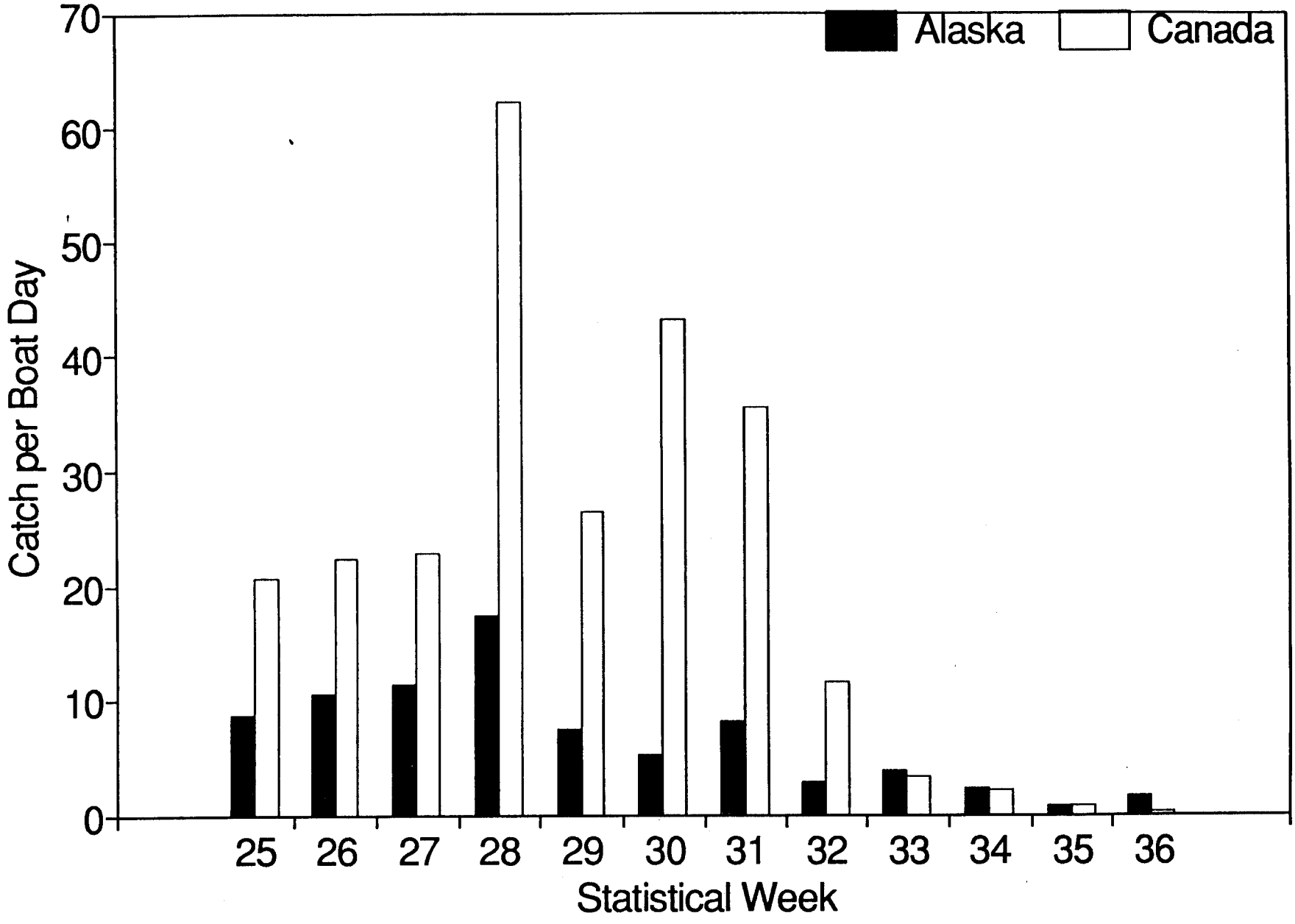


Figure 6. Weekly CPUE by nation of origin in Alaska's District 101-11 drift gill net fishery, 1989.

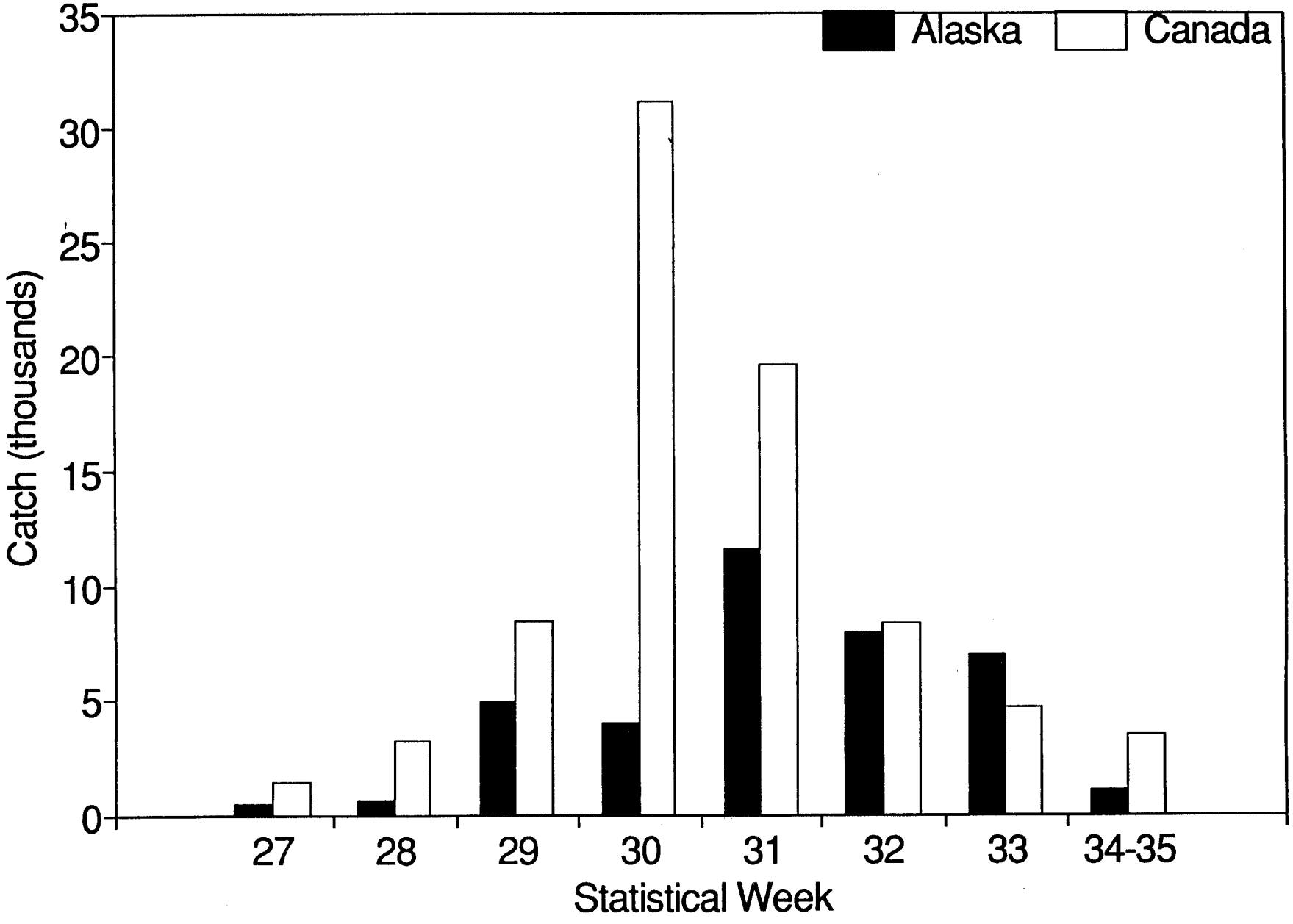


Figure 7. Weekly catch by nation of origin in Alaska's District 101 purse seine fishery, 1989.

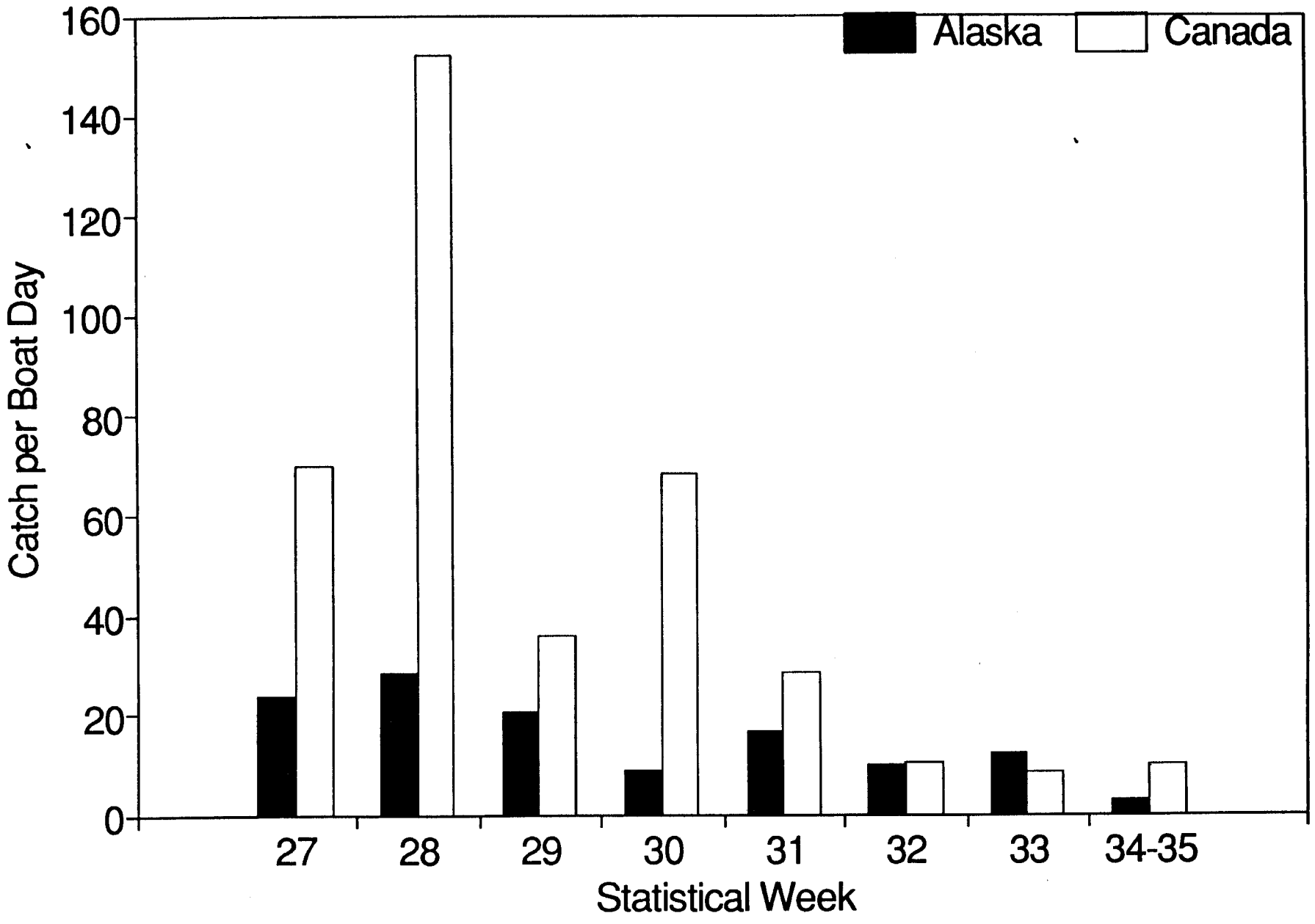


Figure 8. Weekly CPUE y nation of origin in Alaska's District 101 purse seine fishery, 1989.

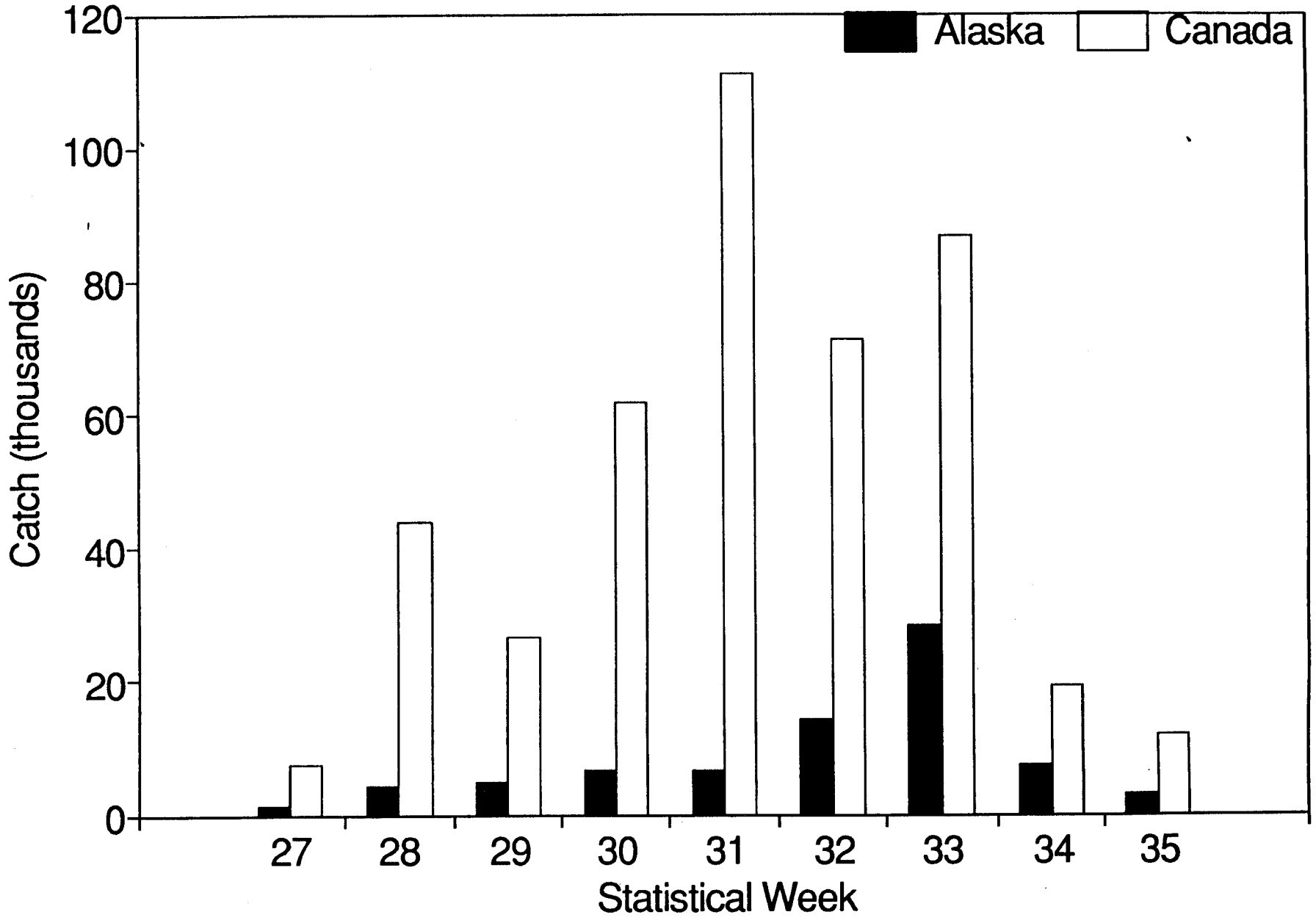


Figure 9. Weekly catch by nation of origin in Alaska's District 104 purse seine fishery, 1989.

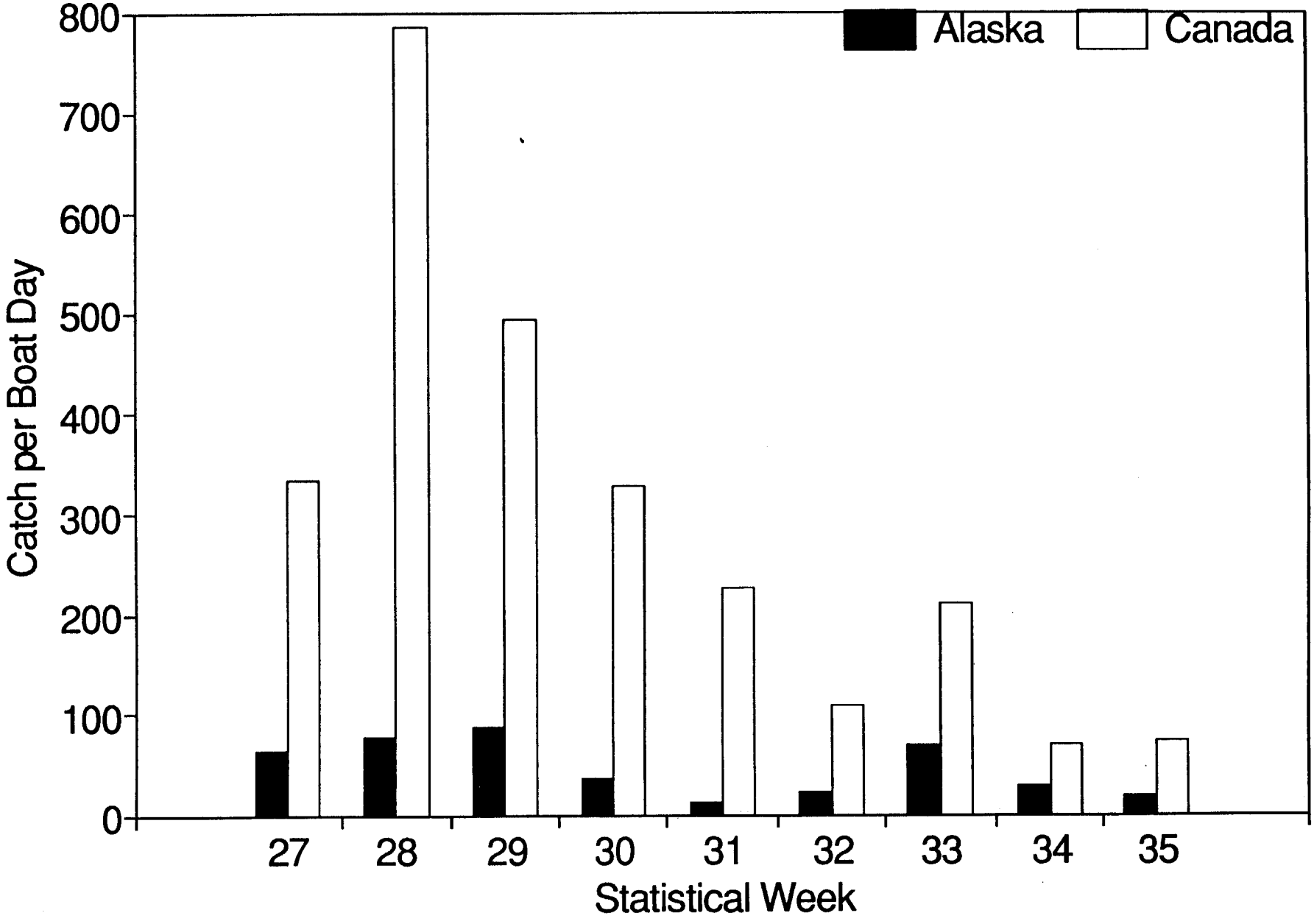


Figure 10. Weekly CPUE by nation of origin in Alaska's District 104 purse seine fishery, 1989.

# APPENDIX

Table A1. Estimated contribution of age 1.2 [illegible] originating in Alaska [illegible] purse seine fishery, [illegible] mon stocks rict 104

New (revised) Table (Jan. 1991)

| Dates | Group | Nu | | | 90% C.I. | |
|---|---|---|---|---|---|---|
| | | | | | er | Upper |
| 7/02-7/08 | Alaska | | | | 17 | 479 |
| Week 27 | Nass | | | | 9 | 911 |
| | Skeena | | | | 5 | 829 |
| | South Migrating | | | | ) | 0 |
| | Total | 1, | | | | |
| 7/09-7/15 | Alaska | 1,118 | 10 | 602.8 | 126 | 2,110 |
| Week 28 | Nass | 784 | 7 | 1,141.4 | 0 | 2,662 |
| | Skeena | 9,621 | 83 | 1,278.8 | 7,517 | 11,725 |
| | South Migrating | 0 | 0 | 0.0 | 0 | 0 |
| | Total | 11,523 | 100 | | | |
| 7/16-7/22 | Alaska | 871 | 10 | 415.9 | 187 | 1,555 |
| Week 29 | Nass | 0 | 0 | 0.0 | 0 | 0 |
| | Skeena | 8,014 | 90 | 654.9 | 6,937 | 9,091 |
| | South Migrating | 0 | 0 | 0.0 | 0 | 0 |
| | Total | 8,885 | 100 | | | |
| 7/23-7/29 | Alaska | 938 | 4 | 972.8 | 0 | 2,538 |
| Week 30 | Nass | 0 | 0 | 0.0 | 0 | 0 |
| | Skeena | 22,519 | 96 | 1,709.7 | 19,707 | 25,331 |
| | South Migrating | 0 | 0 | 0.0 | 0 | 0 |
| | Total | 23,457 | 100 | | | |
| 7/30-8/05 | Alaska | 6,946 | 14 | 2,503.2 | 2,828 | 11,064 |
| Week 31 | Nass | 0 | 0 | 0.0 | 0 | 0 |
| | Skeena | 38,529 | 77 | 4,050.8 | 31,865 | 45,193 |
| | South Migrating | 4,498 | 9 | 3,639.0 | 0 | 10,484 |
| | Total | 49,973 | 100 | | | |
| 8/06-8/12 | Alaska | 5,208 | 11 | 2,414.3 | 1,236 | 9,180 |
| Week 32 | Nass | 0 | 0 | 0.0 | 0 | 0 |
| | Skeena | 24,164 | 51 | 3,752.0 | 17,992 | 30,336 |
| | South Migrating | 17,549 | 37 | 4,077.9 | 10,841 | 24,257 |
| | Total | 46,921 | 100 | | | |
| 8/13-8/19 | Alaska | 1,930 | 2 | 4,989.3 | 0 | 10,137 |
| Week 33 | Nass | 0 | 0 | 0.0 | 0 | 0 |
| | Skeena | 0 | 0 | 0.0 | 0 | 0 |
| | South Migrating | 89,952 | 98 | 5,630.9 | 80,689 | 99,215 |
| | Total | 91,882 | 100 | | | |
| 8/20-9/09 | Alaska | 1,277 | 7 | 1,006.0 | 0 | 2,932 |
| Week 34 | Nass | 0 | 0 | 0.0 | 0 | 0 |
| | Skeena | 4,527 | 24 | 1,390.8 | 2,239 | 6,815 |
| | South Migrating | 12,979 | 69 | 1,779.9 | 10,051 | 15,907 |
| | Total | 18,783 | 100 | | | |
| 8/27-9/02 | Alaska | 1,474 | 15 | 565.2 | 544 | 2,404 |
| Week 35 | Nass | 0 | 0 | 0.0 | 0 | 0 |
| | Skeena | 3,370 | 34 | 738.1 | 2,156 | 4,584 |
| | South Migrating | 4,981 | 51 | 892.2 | 3,513 | 6,449 |
| | Total | 9,825 | 100 | | | |
| Fishery Total | Alaska | 20,050 | 8 | 6,309.9 | 9,670 | 30,430 |
| | Nass | 1,384 | 1 | 1,157.0 | 0 | 3,287 |
| | Skeena | 111,326 | 42 | 6,162.4 | 101,189 | 121,463 |
| | South Migrating | 129,959 | 49 | 8,095.8 | 116,641 | 143,277 |
| | Total | 262,719 | 100 | | | |

[a] Standard errors may be minimum estimates since no estimates of the variance for stocks contributing zero fish during a given week are available. The 90% confidence intervals are affected in a like manner.