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Stock and fishery data for chum salmon stocks of the west coast of Vancouver Island, 1983-1987, Statistic Areas 21-27

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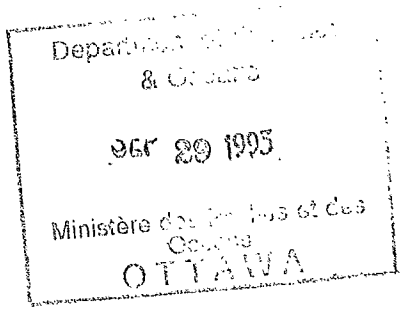
STOCK AND FISHERY DATA FOR CHUM SALMON STOCKS OF THE WEST COAST OF VANCOUVER ISLAND, 1983-1987, STATISTICAL AREAS 21-27



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ABSTRACT

Heizer, S. R. 1993. Stock and fishery data for chum salmon stocks of the west coast of Vancouver Island, 1983-1987, Statistical Areas 21-27. Can. Manuscr. Rep. Fish Aquat. Sci. 2151:135p.

The catch estimates for chum salmon in Statistical Areas 21-27 between 1983 and 1987 have varied between 8,500 in 1983 to 1,869,500 in 1985. Escapements varied between 236,400 in 1987 and 768,100 in 1985.

Included in the report are age compositions for commercial net fisheries and test fisheries, test fishing data, estimates of both natural and enhanced production, troll catch data, Indian food fishery data, and escapement data for each stream.

Commercial net fisheries have occurred sporadically and catches have been variable, with the most consistent production coming from Area 22, probably due to the enhanced run. The enhanced run in Area 25 has been less successful, and concern continues over the failure of rebuilding in unenhanced areas.

New management strategies have been employed in recent years including allocating a fixed proportion of enhanced runs to the commercial fleet prior to stock assessment, and the utilization of chartered seine vessels to find harvestable surpluses to escapement.

Key words: Chum salmon, west coast Vancouver Island, catches, escapements, net fisheries, stock assessment, run forecasting, test fishing, enhanced runs.

RÉSUMÉ

Heizer, S.R. 1992. Stock and fishery data for chum salmon stocks of the west coast of Vancouver Island, 1983-1987, Statistical Areas 21-27. Can. Manuscr. Rep. Fish. Aquat. Sci. 2151:135p.

Les estimations des prises de saumon kéta dans les zones statistiques 21-27 de 1983 à 1987 ont varié de 8 500 en 1983 à 1 869 500 en 1985. Les échappées ont varié de 236 400 en 1987 à 768 100 en 1985.

La composition par âge des péches commerciales au filet et des péches expériementales, des données sur la péche expérimentale, des estimations des remontes naturalles et des stocks mis en valeur, des données sur les prises de la péches à la cuiller, des données sur la péche de subsistance des Indiens et des données sur les échappées dans chaque cours d'eau figurent notamment dans le rapport.

La péche commerciale au filet a été pratiquée par endroits et les prises ont été variables, la région 22 affichant la production in plus réguliére, probablement en raison des activités de mise en valeur. Ces activités ont été moine fructueuses dans la région 25 et l'absence de reconstitution des stocks dans les zones sans activité de mise en valeur continue d'étre préoccupante.

Ces derniéres années, de nouvelles stratégies de gestion ont été utilisées, notamment l'allocation à la flotille commerciale, avant l'évaluation des stocks, d'un pourcentage fixe des remontes des stocks ayant fait l'objet d'activités de mise en valeur et le recours à des senneurs affrétés afin de repérer l'excédent exploitable de l'échappée.

Mots-clés: saumon kéta, côte ouest de l'île de Vancouver, prises, échappées, péche au filet, évaluation des stocks, prévisions de la remonte, péche expérimentale, remonte des stocks mis en valeur.

INTRODUCTION

The main purpose of this report is to present the 1983 to 1987 catch and escapement estimates for West Coast Vancouver Island (WCVI) chum salmon in Statistical Areas 21 through 27 (Fig. 1) as well as the available age composition data. Also included are discussions of commercial net fisheries and test fishing efforts, estimates of production from both natural and enhanced stocks, a discussion of factors influencing the fishing plans (often called "management strategies") including run forecasting and reforecasting. Data for each statistical area are presented in separate sections.

In this report, emphasis is placed on results from 1983 to 1987 as previous reports (Roberts 1970; Lightly **et al.** 1985) dealt with data through 1982. Some overlap occurs with Lightly **et al.** (1985) to maintain data continuity and to complete the brood returns using catch and escapement data after 1982.

Roberts (1970) and Lightly **et al.** (1985) provide historical perspectives of the fisheries and escapements of WCVI chum stocks up to 1982. Subsequent to 1982 there have been significant changes to the management of these stocks. Escapement targets have been changed. Test fishing gear and logistics have changed as has the emphasis and reliance placed on test fishing data. A new approach to management decisions has been instituted which reflects the effects of local hatcheries and the continued concern over the failure of natural stocks to rebuild. Each of these factors will be addressed in the discussion sections.

MANAGEMENT STRATEGIES FOR THE 1980's - FISHING IN THE FACE OF UNCERTAINTY

The history of chum fisheries, documented in Lightly et al. (1985) has been one of sporadic fishing due to the erratic production from WCVI areas. In the late 1970's, the Salmon Enhancement Program (SEP) built large production hatcheries in Area 22 (Nitinat) and in Area 25 (Tlupana Inlet). By 1981 the first of the production from these facilities was returning and surpluses were anticipated for harvest in 1984 (App. 1., Tables 1-13). As well, a number of smaller enhancement facilities (App.1., Table 1) have been built.

Stock assessment needs changed with the advent of these potential enhanced surpluses which were expected to be regular annual events. Preseason predictions, which had, in the past, been loosely based on stock:recruit relationships, were inadequate due to the enormous variability associated with these predictions (see App. 2). In the past, age composition data was applied to stock:recruit models to estimate productivity, and, by implication, surpluses. With large new potential returns, a need for additional inseason assessment, even if qualitative, was essential.

For this reason, seine vessels were chartered by the Department of Fisheries and Oceans (DFO) to fish in areas which had major production facilities (and were expected to have surpluses) to determine whether harvestable quantities were present. This activity is known as "test fishing."

Production from unenhanced areas remained uncertain, however, and these areas, particularly Kyuquot Sound (Area 26) also required annual stock assessment activity including test fishing.

Test fishing generally has the objective of determining abundance of fish, and, as data accumulates through time, how the run is building. The test boats fished in a manner and in areas that the vessel master and on-board DFO technician considered to provide representative catches, using standard commercial gear and standard fishing practices. The information from these activities (catches, areal extent of the schools, condition, size and movements of the fish) were periodically reviewed and a qualitative judgement of the run status was made. Additional discussion about test fishing can be found in the area-by-area discussion (summaries of test fishing data are included in this report in App. 3).

In 1987, local fishery officers reviewed escapement targets for the streams in their areas, and escapement targets for several statistical areas were increased in light of their findings. The target in Area 22 increased from 125,000 to 175,000 chums, Area 25 went from 150,000 to 195,000 chums, and Area 26 went from 100,000 to 180,000 chums. These changes were not initiated to protect building runs. Instead they were, in the best judgement of the local officers, more reflective of the potential carrying capacity of the streams.

In response to the factors mentioned above, a new approach to management evolved. Predetermined portions of the surpluses expected to the hatcheries in Areas 22 and 25, as determined from SEP production schedules, would be apportioned to harvest between gillnets and seines. The proportion would be dependent on the confidence in the prediction from SEP production tables, and would be an explicit allocation to the fishery to be taken before any **in situ** monitoring (test fishing) assessed abundance. As there was some uncertainty in SEP predictions and no history of their accuracy, this technique was dubbed a "calculated risk" plan; "risk" due to the uncertainty, and "calculated" as the allocation was only a portion of the predicted return to the hatcheries, and would have little impact on wild stocks. The risk was the possibility of fishing into the escapement allocation, and the benefits were: 1) better (brighter) fish could be taken in the earlier portion of the season; 2) DFO might better understand how the stock behaved in the earlier part of the season and might be able to use the data in aid of run size assessments, and; 3) this way of fishing would have less impact on the wild stocks as hatcheries would augment wild production (as hatcheries also contribute to wild stock) even if wild stock escapement were slightly compromised.

This early season portion would be taken during a predetermined period, whereupon the area would close until managers were certain escapement requirements would be achieved as determined by test fishing or stream surveys. This early season commercially caught allocation also served, then, as a sort of assessment fishery as it gave some insight into early run characteristics with little risk.

The area would reopen if stock size warrented, based on test fishing, numbers of fish returning to the hatchery, and comparisons with past performances. A "clean-up" fishery would take the remainder of the fish available for harvest, that is, those fish not allocated to escapement. Clean-up fisheries are fisheries designed to take all remaining fish available for harvest, and are usually not restricted in time.

The enhanced areas opened on a predetermined date designed to catch fish of high quality rather than large numbers of fish. Gillnets fished first, as their rate of catch, being slower, reduced the possibility of overharvest if initial stock size estimates were incorrect. Seines would follow gillnets until the predetermined catch was taken or until the time allocated to do so expired. Further assesment including test fishing was then required to determine when (or if) a clean-up fishery was required.

In those areas without major enhancement facilities (Areas 23, 24, 26 and 27) a different approach was taken. In these areas, escapement (or a reasonable proportion thereof) would have to be identified and protected (behind boundaries for example) and then a fishery on any identified surplus would be called if stock sizes, determined by test fisheries, warranted. Fish quality would suffer by delaying the fishery, but achieving escapement targets remained the primary management objective.

This calculated risk approach has generally been successful on WCVI. There have been fisheries in Areas 21 and 25 since 1984 and in Area 26 in 1984 and 1985 (see App. 5., Tables 1-10).

AREA 22 (NITINAT LAKE)

THE FISHERY

No commercial net fishery occurred in 1983, and the escapement was 8,000 chums. In 1984, fishing was too aggressive (catch 186,700 pieces) and the escapement (76,000) fell well short of the target of 125,000. In 1985 the catch was 1.6 million and escapement was 210,000, a success by any standard. In 1986 the catch was 387,500 and escapement was 142,800. In 1987 the target escapement was raised (see additional discussion p. 2) to 175,000. A catch of 395,400 chum was achieved, and it appeared that over 200,000 chum had escaped to the lake. On the night of Nov 6, 1987 the lake experienced a partial inversion of the toxic lower hydrogen sulphide water layer (the lake is said to have "turned over" - see discussion of this phenomenon on p. 4 and in Fedorenko (1979). Extensive searching of the lake could not find this body of fish, and although no physical evidence (such as carcasses) of a massive kill was ever found, it is presumed that the majority of these fish expired (Shortreed, Stockner and MacIssac, 1988). The ultimate escapement was 50,200 chums.

It appears that productivity in the system has increased (see Table 1) possibly due to the presence of the hatchery, and that some of this excess production may be finding its way into local rivers, thus rebuilding the natural spawnings.

App 5., Tables 1 through 4 show Area 21 catches by week and gear for all species taken in the net fisheries during the period 1984 through 1987. App 4., Tables 1 and 2 show catches and total returns for this period expressed as a percent of WCVI total catches and total returns, respectively.

CATCHES, ESCAPEMENTS AND RATES OF RETURN

The catch and escapement estimates for Area 22 chum salmon for the period 1980 to 1987 are shown in Table 1 and Fig. 2. Total area commercial net catches for that period averaged 356,600, including those years with zero catch, or 570,500 including only those years with commercial catches (range 0 - 1,609,300). Troll fishery and Indian food fish catches are shown in App.6, Tables 1 and 2 respectively. It should be noted that after 1980, the fishery inside Nitinat Lake (Area 22) was discontinued, and chum bound for that area were henceforth taken in Area 21 (Fig. 1). There were several reasons for this action, but it was mainly due to silting of the bar at the entrance to the lake which rendered the passage for larger vessels unsafe. The quality of the fish caught in the lake was such that all involved in this fishery agreed that it would be desirable to avoid fishing in the lake. Consequently, after 1980, the total chum stock in Area 22 was calculated as the sum of Area 21 catches and Area 22 escapements (note that Area 21 has unknown and presumably negligible chum escapements: see App. 7). Total area escapements for the 1980-1987 period averaged 103,600 (range 8,000 - 210,000) and represent 83% of the estimated optimum escapement of 125,000 chum for the area in use through 1986 or 59% of the estimated optimum of 175,000 in use from then on.

The age composition data for Area 22 chum are shown in Appendix 8, Tables 1 - 6. The age data were applied to catch and escapement totals (Tables 2 and 3 respectively) and the rates of return for each brood year were calculated (Table 4). The rates of return for the 1978 through 1982 brood years, averaged 7.27:1 (range 0.46:1 to 20.17:1). The proportions of fish returning at ages 3, 4 and 5 averaged 0.16, 0.72 and 0.12 respectively (Table 4).

The total chum returns to Area 22 were plotted against the corresponding brood spawning escapements (Fig. 3). Until the onset of hatchery returns beginning in 1984, rates of return were at or below the replacement (1:1) line. The 1981 and 1982 brood years, which yielded the first of the hatchery returns, show much improved productivity (see also App. 9., Table 1). It should be pointed out, however, that 1981 and 1982 showed much improved productivity in <u>all</u> WCVI areas (see the rest of App. 3): Consequently, the hatcheries are likely only partially responsible for the increased productivity.

Recent chum escapement estimates for individual streams in Area 22 (Fig. 4) are shown in Table 5 and App. 7. Nitinat River is by far the major chum producer and was responsible for 95% of the total chum escapement to Area 22 during 1980-1985.

The chum adults entering Nitinat Lake are vulnerable to occasional fish kills due to partial inversion of the hydrogen sulphide water layer (Fedorenko et al. 1979). The most recent incident occurred in early November 1987, and involved up to 200,000 chum adults holding in the lake at the time. A one-day survey of Nitinat Lake, conducted just after the incident by the staff from the Biological Science Branch, showed pronounced heterogeneity in the biophysical variables measured (Shortreed, Stockner and MacIsaac, 1988). The survey indicated that due to weak thermocline and halocline stratification in Nitinat Lake in the fall of 1987, the lake had the potential for upwelling if sufficiently strong winds occurred in the area. It was advised that a possible occurrence of such a catastrophic event in Nitinat Lake could be predicted, in the future, through regular monitoring of specific parameters.

Ongoing work with genetic stock identification techniques have identified that some portion of the chum stock caught in the commercial net fishery in Area 21 may not be of local (Area 22) origin. Other potential areas of origin include other areas on WCVI, the Fraser River, the Strait of Georgia and Puget Sound. This work is still preliminary, and for discussions of the results and their implications, see Vreeling, **et al.** (1987), Naylor **et al.**, (1988), Hop Wo **et al.**, (1989) and Hop Wo, **et al.**, (1990). For the purposes of this report, however, all catch in Area 21 is assumed to be of Area 22 origin.

TEST FISHING

Test fishing techniques have changed significantly in the 1980's. Prior to this time, test fishing was done in the lake by gillnet, and was designed primarily to get scale samples for age determination. These ages were viewed as yielding a sort of prediction of run to be expected based on cohort strength, but this prediction had little basis in empirical fact. These ages also served to document brood year production.

More recently, with the advent of fishing outside the lake (in Area 21), seines have been employed as well. These seine test fisheries are not designed to "index" stock, but rather to provide a qualitative estimate of abundance (largely based on the interpretation of the test fisherman), prior to the fishery or during closed times, so as to allow managers to assess the possibility of an opening. The gillnet test fishery in the lake is designed to give a similar qualitative estimate of numbers of chums in the lake, which is used as an in season indication of escapement. This indication is used later in the season to determine if or when clean-up fisheries can be called. "Clean-up" fisheries are generally fisheries called to take fish remaining in the fishing area after escapement requirements have been met. Summaries of test fishing data for the years 1983 through 1987 are shown in App. 3.

NITINAT HATCHERY

Nitinat hatchery, located at the confluence of the Nitinat and Little Nitinat Rivers, has been operating since 1980 (App. 1., Table 1.). It is a Japanese-style hatchery (where eggs are incubated in open channels rather than incubation boxes) with the capacity to incubate 28 million eggs and rear 20 million fry.

Chum production to 1987 is summarized in App. 1., Table 2. Maximum production was achieved in 1981 when 27.2 million chum fry were released into the lake at about 1.1g. Predicted and actual adult returns from hatchery operation for the period 1983 to 1990 are given in App. 1. Table 3. These calculations were based on SEP bio-standards (1987 revision) of 1.7% fry-to-adult survival for fed fry greater than 0.75g, 1.2% for fed fry less than 0.75g, and 0.7% for unfed fry. An approximate age composition of 40% age 3 and 60% age 4 was used (SEP Operations estimates).

AREA 23 (BARKLEY SOUND)

THE FISHERY

This area has not opened to a commercial net fishery for chum salmon since 1982. The area is now considered to be unlikely, on the basis of past performances and in the absence of a major hatchery, to produce a surplus. Test fisheries occur, when possible, to confirm this assumption. Total returns (Table 6 and App. 4, Tables 1 and 2) confirm that the decision not to fish has been a wise one. Only on one occasion since 1982 (1985) has the total return exceeded the estimated escapement optimum and then only by 9,800 chums.

CATCHES, ESCAPEMENTS AND RATES OF RETURN

The catch and escapement estimates for Area 23 chum salmon for the period 1980 to 1987 are shown in Table 6 and Fig. 5. Total area commercial net catches for that period averaged 14,400, including those years with zero catch, or 17,900 including only those years with commercial catches (range 0 - 87,400). Troll catches and Indian food fish catches are shown in App. 6, Tables 1 and 2 respectively. Total area escapements averaged 64,500 (range 0 - 152,400) and this average represents 43% of the estimated optimum escapement of 150,000 chum for the area.

The age composition data for Area 23 chum are shown in Appendix 8, Tables 1 - 6. The age data were applied to catch and escapement totals (Tables 7 and 8 respectively) and the rates of return for each brood year were calculated (Table 9). The rates of return since the 1978 brood year averaged 0.83:1 (range 0.21:1 to 1.69:1). The proportions of fish returning at ages 3, 4 and 5 averaged 0.39, 0.57 and 0.04 respectively (Table 9). These values show considerable variability within an age class; for example 0.06 to 0.56 rate of return for age 3 chum.

The total chum returns to Area 23 were plotted against the corresponding brood spawning escapements (Fig. 6). Except for the 1981 brood, return rates were below the replacement line, and poor

productivity has been the rule in this area (see also App. 9., Table 2).

Recent chum escapement estimates for individual streams in Area 23 (Fig. 4) are shown in Table 10 and App. 7. Nahmint, Sarita and Toquart Rivers have been the major chum producers; together they contributed 61% to the total chum escapement to Area 23 during 1980 to 1987.

This area appears not to be rebuilding in spite of the cessation of commercial net chum harvesting. In addition, no chum enhancement activities were undertaken after 1984.

TEST FISHING

Since 1982, there has been no expectation of surplus for harvest in Area 23. Test fishing efforts were directed towards areas with expected or potential surpluses (primarily Areas 22, 25 and 26) and Area 23 was testfished when the opportunity presented itself (all years except 1986). These test fisheries were designed only to double-check on preseason expectations. Summaries of test fish data are shown in App. 3.

THORNTON CREEK HATCHERY

Chum eggs from creeks in the Ucluelet Harbour area (Fig. 7) were incubated at a small pilot hatchery at Thornton Creek from 1976 to 1978 under SEP and from 1981 to 1984 under CEDP (App.1., Table 1). Between 26,000 and 1.4 million chum fry were released each year from the hatchery (App. 1., Table 4). Predicted adult returns from hatchery operation are given in App. 1., Table 5 and are based on similar bio-standards and assumptions regarding age compositions as those given for the Nitinat Hatchery production in the section above. Chum production was terminated after 1984 in favour of coho and chinook production.

AREA 24 (CLAYOQUOT SOUND)

THE FISHERY

This area has not opened to a commercial net fishery since 1982, and was test fished on an irregular, **adhoc** basis (App.3). As with Area 23, and for the same reasons, it is now considered that Area 24 is unlikely to produce a surplus. Unless one is identified by the sporadic test fishing activities, it is unlikely that there will be a fishery until escapements return to previous optimum levels. Total returns (Table 11 and App. 4., Tables 1 and 2) show that the decision not to fish has been correct.

CATCHES, ESCAPEMENTS AND RATES OF RETURN

The catch and escapement estimates for Area 24 chum salmon for the period 1980 to 1987 are shown in Table 11 and Figure 7. Total area commercial net catches for that period averaged 12,000,

including those years with zero catch, or 30,300 including only those years with commercial catches (range 0 - 38,000). Troll catches and Indian food fish catches are shown in App. 6, Tables 1 and 2 respectively. Total area escapements averaged 66,500 (range 23,800 - 118,000) and this average represents 67% of the estimated optimum escapement of 100,000 chum for the area.

The age composition data for Area 24 are shown in Appendix 8 Tables 1 - 6. The age data were applied to catch and escapement totals (Tables 12 and 13 respectively) and the rates of return for each brood year were calculated (Table 14). The rates of return since the 1978 brood year averaged 1.11:1 (range 0.33:1 to 1.65:1). The proportions of fish returning at ages 3, 4 and 5 averaged 0.32, 0.63 and 0.06 respectively (Table 14).

The total chum returns to Area 24 were plotted against the corresponding brood spawning escapements (Fig. 8). As in other areas without major enhancement facilities, Area 24 rates of return are only occasionally above the replacement line, and area productivity is poor (see also App. 9., Table 3).

Recent chum escapement estimates for individual streams in Area 24 (Fig. 9) are shown in Table 15 and App. 7. Atleo, Megin and Moyeha Rivers and Bawden Bay and Tranquil Creeks have been the major chum producers; together they contributed 70% to the total chum escapement to Area 24 during 1980 to 1987.

This area appears not to be rebuilding in spite of the cessation of chum harvesting.

TEST FISHING

In this area, as in Areas 23 and 27, there has been no expectation of surplus for harvest since 1982. Consequently, little test fishing effort has been employed since 1982, and none in 1986 or 1987. Summaries of test fishing data are shown in App.3.

AHOUSAT PUBLIC INVOLVEMENT PROJECT

Between 100 and 48,500 chums were released by this small enhancement facility between 1981 and 1986 (App 1., Table 6). Minor returns were predicted (App. 1., Table 7) of between 0 and 300 chums. There was no major enhancement facility in the area between 1980 and 1987.

AREA 25 (NOOTKA SOUND)

THE FISHERY

Nootka Sound has been open to commercial net fisheries for chum salmon every year since 1980 (except 1983), and thus has been the most consistent producer on WCVI with the advent of hatchery returns in 1984. The success of the management strategies has been more varied than at Nitinat.

A seine test fishery in 1983 caught 8,100 chums. The escapement that year was 161,100 chums. In 1984, the commercial

catch was 106,200 and escapement was 115,700, somewhat short of the 150,000 target. In 1985 catch was 212,300 and escapement was 148,000, barely short of the target. In 1986, the escapement target for Area 25 was changed to 195,000 chums. The catch this year was 144,100 and the escapement was 93,000.

On a 2 day opening for gillnets in 1987 to take the early season allocation, it became obvious that stock size was far less than that anticipated: The fishery was then closed. Catch for the season was 12,400 and escapement was 94,400. The reason for this failure, apparently, was low production from the 1983 brood (4 year olds) both from the hatchery and from naturally spawning stocks. The new management strategies detected this early enough to halt fishing early in the season and minimized impacts from fishing. Test fishing confirmed that stock levels were low after this closure, and the area did not reopen in 1987. Appendix 5, Tables 5 through 8 show Area 25 catches by week and gear for all species taken in net fisheries during the period 1984 through 1987.

Total returns (Table 16 and App. 4., Tables 1 and 2) show that fishing in most years (1984 through 1986) was too aggressive.

CATCHES, ESCAPEMENTS AND RATES OF RETURN

The catch and escapement estimates for Area 25 chum salmon for the period 1980 to 1987 are shown in Table 16 and Fig. 10. Total area commercial net catches for that period averaged 127,300 (range 8,100 - 259,200). Troll and Indian food fish catches are shown in App. 6, Tables 1 and 2 respectively. Total area escapements averaged 127,300 (range 93,000 - 164,300) and this average represents 85% of the estimated optimum escapement of 150,000 chum for the area for the period through 1986, or 65% of the estimated optimum escapement of 195,000 in 1987.

The age composition data for Area 25 are shown in Appendix 8, Tables 1 - 6. The age data were applied to catch and escapement totals (Tables 17 and 18 respectively) and the rates of return for each brood year were calculated (Table 19). The rates of return since the 1978 brood year averaged 2.64:1 (range 1.14:1 to 3.73:1). The proportions of fish returning at ages 3, 4 and 5 averaged 0.25, 0.69 and 0.06 respectively (Table 19).

The total chum returns to Area 25 were plotted against the corresponding brood escapements (Fig. 11). Return rates have been consistently above the replacement line and productivity was reasonable (see also App. 9., Table 4). Production, however, has not been up to the fishing effort brought to bear on the stock.

Recent chum escapement estimates for individual streams in Area 25 (Fig. 12) are shown in Table 20 and App. 7. Conuma, Sucwoa, Tahsis, Tlupana and Tsowwin Rivers and Ransom and Deserted Creeks have been the major chum producers; together they contributed 64% to the total chum escapement to Area 25 during 1980 to 1987.

Escapements have been consistently below optimum during the 1980's and 3 times in the 8 years between 1980 and 1987, <u>total returns</u> have been near or below optimum <u>escapement</u>. The hatchery

at Conuma has not produced as has the one at Nitinat. Fishing plans were designed around expectations of hatchery surpluses: Overfishing occurred as these expectations were not realized.

TEST FISHING

Test fisheries in Nootka Sound have been executed by seine vessels in recent years. In the past, gillnet test fisheries collected scale samples for age analysis. Seine vessels are now employed, and qualitative estimates of stock abundance are used to aid managers in decisions made regarding openings. Areas 25 and 21 receive the major effort in test fishing (followed by Area 26 and, to a lesser extent, Area 23 and 24) as they are two regions where fisheries and most likely to occur. The effort is applied before a fishery and during any closed period in an attempt to find surpluses after escapement is insured and before the area closes for the balance of the season. Summaries of test fishing data are shown in App. 3.

CONUMA RIVER HATCHERY

The Conuma River Hatchery has been operating since 1978 (App 1., Table 1). Chum production to 1987 is summarized in App. 1., Table 8. Maximum production was achieved in 1985 when 19.8 million chum fry were released at between 0.8 to 2.7 g. Predicted and actual adult returns from hatchery operation for the period 1983 to 1990 are given in App. 1., Table 9. The bio-standards used are included as a footnote to this Table. The hatchery has not lived up to expectations for reasons which are unclear but under investigation by SEP.

AREA 26 (KYUQUOT SOUND)

THE FISHERY

This area was considered to be the area without a major enhancement facility which was most likely to produce a surplus, and considerable effort has been directed towards identifying this surplus. Since 1980, catch and escapement data show this expectation to be ill-advised. The area was fished in 1984 and 1985. Only in 1985 (catch of 61,000) was the escapement target reached. The escapement target recently has been revised upwards to 180,000 chums, and if the area produces as it has in the recent past, it is unlikely that surpluses will be available for harvest.

Appendix 5 Tables 9 and 10 show Area 26 catches by week and gear for all species taken in the net fisheries during the periods 1984 and 1985. Total returns (Table 21 and App. 4., Tables 1 and 2) show that fishing was ill-advised in 1984 and 1985.

CATCHES, ESCAPEMENTS AND RATES OF RETURN

The catch and escapement estimates for Area 26 chum salmon for

the period 1980 to 1987 are shown in Table 21 and Fig. 13. Total area commercial net catches for that period averaged 64,500, including those years with zero catch, or 86,000 including only those years with commercial catches (range 0 - 224,000). Troll and Indian food fish catches are shown in App. 6, Tables 1 and 2 respectively. Total area escapements averaged 78,500 (range 41,300 - 125,000) and this average represents 79% of the estimated optimum escapement of 100,000 chum through 1986 for the area or 44% of the optimum of 180,000, in place since 1987.

The age composition data for Area 26 are shown in Appendix 8 Tables 1 - 6. The age data were applied to catch and escapement totals (Tables 22 and 23 respectively) and the rates of return for each brood year were calculated (Table 24). The rates of return since the 1978 brood year averaged 2.77:1 (range 0.95:1 to 4.09:1). The proportions of fish returning at ages 3, 4 and 5 averaged 0.31, 0.64 and 0.05 respectively (Table 24).

The total chum returns to Area 26 were plotted against the corresponding brood escapements (Fig 14). Rates of return have been above the replacement line, but production has been poor (see also App. 9., Table 5).

Recent chum escapement estimates for individual streams in Area 26 (Fig. 15) are shown in Table 25 and App. 7. Chamiss Creek and Kashutl, Kauwinch, Malksope and Tahsish Rivers have been the major producers; together they contributed 53% to the total chum escapement to Area 26 during 1980 to 1987.

TEST FISHING

Of all the areas on WCVI without major enhancement facilities, Area 26 was the one most often expected to produce surpluses for harvest. As a consequence, considerable test fishing effort was directed here to determine if surpluses were available. Fisheries have occurred here in 1984 and 1985, largely as a result of surplus stock identified mistakenly by test fishing. Test fish data are shown in App. 3.

KYUQUOT ENHANCEMENT

A small CEDP project in Kyuquot released 17,000 chums (see App. 1., Table 10) in 1985 (the 1984 brood was entirely lost). Estimated production was 119 adults (App. 1., Table 11).

AREA 27 (QUATSINO SOUND)

THE FISHERY

There has been no commercial net fishing effort directed towards chums in this area during the 1980 to 1987 period.

CATCHES, ESCAPEMENTS AND RATES OF RETURN

The catch and escapement estimates for Area 27 chum salmon for

the period 1980 to 1987 are shown in Table 26 and Fig. 16. Total area catches for that period averaged 500, including those years with zero catch, or 3,800 including only those years with catches (range 0 - 3,800). These catches are test fish catches, not commercial net catches. Troll catches and Indian food fish catches are shown in App. 6, Tables 1 and 2 respectively. Total area escapements averaged 44,000 (range 12,000 - 79,700) and this average represents 44% of the estimated optimum escapement of 100,000 chum for the area.

The age composition data for Area 27 are shown in Appendix 8 Tables 1-6. The age data were applied to escapement totals (Table 27) and the rates of return for each brood year were calculated (Table 28). Catch data were not used since there had been no commercial net fishery during the period in question.

The rates of return since the 1978 brood year averaged 1.18:1 (range 0.12:1 to 2.24:1). The proportions of fish returning at age 3, 4 and 5 averaged 0.30, 0.65 and 0.05 respectively (Table 28).

Total chum returns to Area 27 were plotted against the corresponding brood escapements (Fig. 17) and show the typical pattern of WCVI areas without production facilities: Rates of return are below the replacement line (see also App. 9., Table 6).

Recent chum escapement estimates for individual streams in Area 27 (Fig. 18) are shown in Table 29 and App. 7. Cayeghle and Jim's Creeks have been the major chum producers; together they contributed 20% to the total chum escapement to Area 27 during 1980 to 1987.

TEST FISHING

Due to its poor production, this area, as with Areas 23 and 24, is considered unlikely to produce a surplus for harvest. As a consequence, little test fishing has been done during the period covered by this report. Minor test fishing efforts were applied in 1985. Escapements have confirmed that the judgement to not test fish in this area extensively has been a good one. Summaries of test fish data are shown in App. 3.

QUATSINO ENHANCEMENT

Several small to moderate enhancement projects are in place in Quatsino Sound (App. 1., Table 1). Production from these facilities is shown in App. 1., Table 12. The predicted adult returns by project and year are shown in App. 1., Table 13, ranging between 0 and 9,400 chums. No major chum enhancement facility is operating in Quatsino Sound.

SUMMARY AND RECOMMENDATIONS

Chum salmon stocks on WCVI can be characterized as having varied productivity, but this productivity is generally low and stocks appear not to be rebuilding, with the possible exception of Nitinat. The reasons for the disappointing production in all areas

except Nitinat are unclear at best, but it must be pointed out that the area has undergone considerable industrialization in the last decade, and also that logging activities have compromised spawning habitat and added to fall and winter flooding. It is unlikely that local overfishing is a major contributor to this poor performance since in areas where commercial fishing has been completely eliminated, a similar lack of recovery is also apparent. It may be that poor production is a consequence of some factor not understood and far away from the local areas: The high seas driftnet fishery has been considered by some to be a potential culprit in part.

The new management strategies seem to be appropriate in this management environment, and although there is not a time series of data long enough the fully evaluate them, they do appear to be identifying surpluses and weaknesses in run strengths, and dealing with them with more successfully than previously. The successes have been in taking some big surpluses from Nitinat and still ensuring escapement (as in 1985), and in identifying weaknesses in Area 25 and stopping the fishery with minimal impact on escapement (as in 1987).

Several refinements to the process could be pursued. The most important of these would be to review historical test fishing data with the intent of determining if it could be used to determine some index of abundance. Could catch per unit effort (CPUE) be, in some fashion, used for this purpose? If not, test fishing procedures should be examined to the end of modifying them so that more quantitative information might be produced. If such refinements are not possible, test fishing still remains a valuable tool for inseason assessment when used in conjunction with the "calculated risk" strategy.

Stock:recruit relationships, which may be useful as predictors of run size, would benefit from more accurate and precise catch and escapement data. These activities are, however, extremely costly in both manpower and money requirements, and given the large variability in productivity, the resources would likely be better applied to refining the current management strategies.

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TABLES

Table 1. Annual catch, escapement and total stock estimates for chum salmon in Area 22, 1980–1987.[1,2]

YEAR	Catch (C)[3,4]			Escapement (E)	Escapement Target	Total Stock
	Gillnet	Seine	Total			
1980	37,500	236,400	273,900	54,500	125,000	328,400
1981	0	0	0	115,000	125,000	115,000
1982	0	0	0	22,500	125,000	22,500
1983	0	0	0	8,000	125,000	8,000
1984	10,800	175,900	186,700	76,000	125,000	262,700
1985	97,900	1,511,400	1,609,300	210,000	125,000	1,819,300
1986	70,700	316,800	387,500	142,800	125,000	530,300
1987	136,300	259,100	395,400	200,000 [5]	175,000	595,400
DECADE AVERAGES USING ONLY THOSE YEARS IN WHICH THERE WAS A CATCH						
1951–59	22,100	80,800	102,900	31,700	–	134,600
1960–69	6,500	41,700	48,200	41,100	–	89,300
1970–79	148,200	584,500	732,700	68,400	–	801,100
1980–87	70,600	499,900	570,500	136,700	–	707,200
DECADE AVERAGES USING ALL YEARS INCLUDING THOSE WITH ZERO CATCH						
1951–59	17,200	62,900	80,100	31,700	–	111,800
1960–69	700	4,200	4,900	41,100	–	46,000
1970–79	29,600	116,900	146,500	68,400	–	214,900
1980–87	44,200	312,500	356,600	103,600	–	460,200

1. Data sources: catches from B.C. Catch Statistics; escapements from SEDS databse at PBS.

2. Catch, escapement and decade average numbers rounded to the nearest hundred.

3. Zero catch indicates closed fishery or negligible catch, (< 50 pieces).

4. Catches for 1984–1987 are from Area 21.

5. Number of fish returning to the Area. Many were killed during a turnover of the Lake and the official escapement for this area and year is 50,200 chums. The larger figure is used as it is more appropriate for calculations of rate of return. The smaller number would be used for brood year calculations in subsequent years.

Table 2. Age composition of chum salmon catches in Area 21, 1980–1987.[1]

Year	Catch	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980 [2]	273,900	238,567	87.1	(1977)	35,333	12.9	(1976)	0	0.0	(1975)	0	0.0	(1974)
1981	0	–	–	(1978)	–	–	(1977)	–	–	(1976)	–	–	(1975)
1982	0	–	–	(1979)	–	–	(1978)	–	–	(1977)	–	–	(1976)
1983	0	–	–	(1980)	–	–	(1979)	–	–	(1978)	–	–	(1977)
1984	186,700	172,698	92.5	(1981)	13,442	7.2	(1980)	560	0.3	(1979)	0	0.0	(1978)
1985	1,609,300	49,888	3.1	(1982)	1,557,802	96.8	(1981)	3,219	0.2	(1980)	0	0.0	(1979)
1986	387,500	13,563	3.5	(1983)	143,763	37.1	(1982)	230,175	59.4	(1981)	0	0.0	(1980)
1987	395,400	208,376	52.7	(1984)	164,882	41.7	(1983)	21,352	5.4	(1982)	791	0.2	(1981)

1. See Appendix 8, Tables 1 – 7 for data sources for age compositions.

2. 1980 catch taken in Area 22.

Table 3. Age compositions of chum salmon escapements in Area 22, 1980–1987.[1]

Year	Escapement	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	54,500	47,470	87.1	(1977)	7,031	12.9	(1976)	0	0.0	(1975)	0	0.0	(1974)
1981	115,000	1,150	1.0	(1978)	113,390	98.6	(1977)	460	0.4	(1976)	0	0.0	(1975)
1982	22,500	2,385	10.6	(1979)	8,865	39.4	(1978)	11,048	49.1	(1977)	0	0.0	(1976)
1983	8,000	2,392	29.9	(1980)	4,480	56.0	(1979)	1,128	14.1	(1978)	0	0.0	(1977)
1984	76,000	70,300	92.5	(1981)	5,472	7.2	(1980)	228	0.3	(1979)	0	0.0	(1978)
1985	210,000	6,510	3.1	(1982)	203,280	96.8	(1981)	420	0.2	(1980)	0	0.0	(1979)
1986	142,800	4,998	3.5	(1983)	52,979	37.1	(1982)	84,823	59.4	(1981)	0	0.0	(1980)
1987	200,000 [2]	105,400	52.7	(1984)	83,400	41.7	(1983)	10,800	5.4	(1982)	400	0.2	(1981)

1. See Appendix 8, Tables 1 – 7 for data sources for age compositions.

2. Please note the figure of 200,000 is an estimate of the escapement to the area from test fishing. The effective escapement was 50,200 as many fish were killed by a turn–over of the lake (see text and Table 1).

Table 4. Brood year summaries and rates of return for chum salmon in Area 22, 1978–1982.

	Age 3 Return					Age 4 Return				Age 5 Return				All Ages	
Brood Year	Escapement	Year of Return	Catch	Escapement	Age 3 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 4 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 5 Rtn Ttl Rtn	Total Return	Rate of Return
(1978)	8,400	1981	0	1,150	0.10	1982	0	8,865	0.80	1983	0	1,128	0.10	11,143	1.33
(1979)	4,500	1982	0	2,385	0.31	1983	0	4,480	0.59	1984	560	228	0.10	7,653	1.70
(1980)	54,500	1983	0	2,392	0.10	1984	13,442	5,472	0.76	1985	3,219	420	0.15	24,945	0.46
(1981)	115,000	1984	172,698	70,300	0.10	1985	1,557,802	203,280	0.76	1986	230,175	84,823	0.14	2,319,078	20.17
(1982)	22,500	1985	49,888	6,510	0.20	1986	143,763	52,979	0.69	1987	21,352	10,800	0.11	285,292	12.68
Mean[1]					0.16				0.72				0.12		7.27
S.D.					0.08				0.07				0.02		7.85

1. Mean rates of return are averages of annual rates of return.

Table 5. Escapement levels for major chum producing streams in Area 22.[1]

Stream	Maximum Escapement Since 1953	Avg. Escapement (1980–1987)
Nitinat River	230,000	83,400
Hobiton Lake	7,500	2,400
Caycuse River	15,000	1,100
Area 22 Total	264,500	87,300 [2]

1. Escapement numbers rounded to the nearest hundred.

2. Sum of the 1980–1987 average escapements for all streams in Area 22.

Table 6. Annual catch, escapement and total stock estimates for chum salmon in Area 23, 1980–1987.[1,2,3]

YEAR	Catch			Escapement	Escapement Target	Total Stock
	Gillnet	Seine	Total			
1980	37,500	49,900	87,400	82,600	150,000	170,000
1981	16,400	1,700	18,100	67,500	150,000	85,600
1982	800	600	1,400	119,000	150,000	120,400
1983	100	300	400	36,500	150,000	36,900
1984	300	200	500	11,600	150,000	12,100
1985	1,000	6,400	7,400	152,400	150,000	159,800
1986	200	0	200	46,600	150,000	46,800
1987	0	0	0	N/A [4]	150,000	N/A
DECADE AVERAGE USING ONLY THOSE YEARS IN WHICH THERE WAS A CATCH						
1951–59	57,400	88,700	146,100	149,800	–	295,900
1960–69	36,800	10,400	47,200	98,800	–	146,000
1970–79	15,000	11,100	26,100	137,000	–	163,100
1980–87	8,000	9,900	17,900	73,700	–	91,600
DECADE AVERAGES USING ALL YEARS INCLUDING THOSE WITH ZERO CATCH						
1951–59	57,400	88,700	146,100	149,800	–	295,900
1960–69	11,000	3,100	14,100	98,800	–	112,900
1970–79	15,000	11,100	26,100	137,000	–	163,100
1980–87	7,000	7,400	14,400	64,500	–	78,900

1. Data sources: catches from B.C. Catch Statistics; escapements from SEDS database at PBS.

2. Catch, escapement and decade average numbers rounded to the nearest hundred.

3. Zero catch indicates closed fishery or negligible catch, (<50 pieces).

4. Although many streams were reported to have 0 escapements in 1987, major producers in the area (Sarita, Nahmint, and Toquart Rivers) were not inspected this year (see Appendix 7, Table 3).

Table 7. Age compositions of chum salmon catches in Area 23, 1980–1987.[1]

Year	Catch	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	87,400	57,771	66.1	(1977)	29,017	33.2	(1976)	612	0.7	(1975)	0	0.0	(1974)
1981	18,100	1,213	6.7	(1978)	16,652	92.0	(1977)	235	1.3	(1976)	0	0.0	(1975)
1982	1,400	260	18.6	(1979)	1,043	74.5	(1978)	95	6.8	(1977)	0	0.0	(1976)
1983	400	128	32.1	(1980)	184	45.9	(1979)	87	21.8	(1978)	0	0.0	(1977)
1984	500	263	52.6	(1981)	212	42.4	(1980)	22	4.4	(1979)	3	0.6	(1978)
1985	7,400	2,553	34.5	(1982)	4,743	64.1	(1981)	30	0.4	(1980)	81	1.1	(1979)
1986	200	35	17.6	(1983)	141	70.6	(1982)	24	11.8	(1981)	0	0.0	(1980)
1987	0	–	–	(1984)	–	–	(1983)	–	–	(1982)	–	–	(1981)

1. See Appendix 8, Tables 1 – 7 for data sources for age compositions.

Table 8. Age compositions of chum salmon escapements in Area 23, 1980–1987.[1]

Year	Escapement	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	82,600	54,599	66.1	(1977)	27,423	33.2	(1976)	578	0.7	(1975)	0	0.0	(1974)
1981	67,500	4,523	6.7	(1978)	62,100	92.0	(1977)	878	1.3	(1976)	0	0.0	(1975)
1982	119,000	22,134	18.6	(1979)	88,655	74.5	(1978)	8,092	6.8	(1977)	0	0.0	(1976)
1983	36,500	11,717	32.1	(1980)	16,754	45.9	(1979)	7,957	21.8	(1978)	0	0.0	(1977)
1984	11,600	6,102	52.6	(1981)	4,918	42.4	(1980)	510	4.4	(1979)	70	0.6	(1978)
1985	152,400	52,578	34.5	(1982)	97,688	64.1	(1981)	610	0.4	(1980)	1,676	1.1	(1979)
1986	46,600	8,202	17.6	(1983)	32,900	70.6	(1982)	5,499	11.8	(1981)	0	0.0	(1980)
1987	0	0	37.5	(1984)	0	29.2	(1983)	0	33.3	(1982)	0	0.0	(1981)

1. See Appendix 8, Tables 1 – 7 for data sources for age compositions.

Table 9. Brood year summaries and rates of return for chum salmon in Area 23, 1978–1982.

		Age 3 Return				Age 4 Return				Age 5 Return				All Ages	
Brood Year	Escapement	Year of Return	Catch	Escapement	Age 3 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 4 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 5 Rtn Ttl Rtn	Total Return	Rate of Return
(1978)	150,100	1981	1,213	4,523	0.06	1982	1,043	88,655	0.87	1983	87	7,957	0.08	103,478	0.69
(1979)	48,800	1982	260	22,134	0.56	1983	184	16,754	0.42	1984	22	510	0.01	39,864	0.82
(1980)	82,600	1983	128	11,717	0.67	1984	212	4,918	0.29	1985	30	610	0.04	17,615	0.21
(1981)	67,500	1984	263	6,102	0.06	1985	4,743	97,688	0.90	1986	24	5,499	0.05	114,319	1.69
(1982)	119,000	1985	2,553	52,578	0.63	1986	141	32,900	0.37	1987	0	0	0.00	88,172	0.74
Mean[1]					0.39				0.57				0.04		0.83
S.D.					0.28				0.26				0.03		0.48

1. Mean rates of return are averages of annual rates of return.

Table 10. Escapement levels for major chum producing streams in Area 23.[1]

Stream	Maximum Escapement Since 1953	Avg. Escapement (1980–1987)
Nahmint River	100,000	19,000
Sarita River	75,000	24,700
Toquart River	75,000	10,000
Area 23 Total	326,900	88,300 [2]

1. Escapement numbers rounded to the nearest hundred.

2. Sum of the 1980–1987 average escapements for all streams in Area 23.

Table 11. Annual catch, escapement and total stock estimates for chum salmon in Area 24, 1980–1987.[1,2]

YEAR	Catch [3]			Escapement (E)	Escapement Target	Total Stock
	Gillnet	Seine	Total			
1980	9,100	26,500	35,600	118,000	100,000	153,600
1981	3,800	18,600	22,400	63,900	100,000	86,300
1982	8,800	29,200	38,000	73,000	100,000	111,000
1983	0	0	0	47,800	100,000	47,800
1984	0	0	0	54,500	100,000	54,500
1985	200	0	200	78,900	100,000	79,100
1986	0	0	0	72,300	100,000	72,300
1987	0	0	0	23,800	100,000	23,800
DECADE AVERAGES USING ONLY THOSE YEARS IN WHICH THERE WAS A CATCH						
1951–59	1,900	37,900	39,800	68,700	–	108,500
1960–69	4,100	13,500	17,600	39,500	–	57,100
1970–79	4,400	35,200	39,600	59,000	–	98,600
1980–87	5,500	24,800	30,300	83,500	–	113,800
DECADE AVERAGES USING ALL YEARS INCLUDING YEARS WITH ZERO CATCH						
1951–59	1,900	37,900	39,800	68,700	–	108,500
1960–69	1,600	5,400	7,000	39,500	–	46,500
1970–79	2,200	21,100	23,300	59,000	–	82,300
1980–87	2,700	9,300	12,000	66,500	–	78,500

1. Data sources: catches from B.C. Catch Statistics; escapements from fishery officer's stream reports.

2. Catch, escapement and decade average numbers rounded to the nearest hundred.

3. Zero catch indicates closed fishery or negligible catch, (<50 pieces).

Table 12. Age compositions of chum salmon catches in Area 24, 1980–1987.[1]

Year	Catch	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	35,600	23,888	67.1	(1977)	11,463	32.2	(1976)	285	0.8	(1975)	0	0.0	(1974)
1981	22,400	1,501	6.7	(1978)	20,608	92.0	(1977)	291	1.3	(1976)	0	0.0	(1975)
1982	38,000	8,436	22.2	(1979)	29,564	77.8	(1978)	0	0.0	(1977)	0	0.0	(1976)
1983	0	–	–	(1980)	–	–	(1979)	–	–	(1978)	–	–	(1977)
1984	0	–	–	(1981)	–	–	(1980)	–	–	(1979)	–	–	(1978)
1985	200	69	34.5	(1982)	128	64.1	(1981)	1	0.3	(1980)	2	1.1	(1979)
1986	0	–	–	(1983)	–	–	(1982)	–	–	(1981)	–	–	(1980)
1987	0	–	–	(1984)	–	–	(1983)	–	–	(1982)	–	–	(1981)

1. See Appendix 8, Table 1 – 7 for data sources for age compositions.

Table 13. Age compositions of chum salmon escapements in Area 24, 1980–1987.[1]

Year	Escapement	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	118,000	79,178	67.1	(1977)	37,996	32.2	(1976)	944	0.8	(1975)	0	0.0	(1974)
1981	63,900	4,281	6.7	(1978)	58,788	92.0	(1977)	831	1.3	(1976)	0	0.0	(1975)
1982	73,000	16,206	22.2	(1979)	56,794	77.8	(1978)	0	0.0	(1977)	0	0.0	(1976)
1983	47,800	15,344	32.1	(1980)	21,940	45.9	(1979)	10,420	21.8	(1978)	0	0.0	(1977)
1984	54,500	28,667	52.6	(1981)	23,108	42.4	(1980)	2,398	4.4	(1979)	327	0.6	(1978)
1985	78,900	27,221	34.5	(1982)	50,575	64.1	(1981)	316	0.4	(1980)	868	1.1	(1979)
1986	72,300	4,049	5.6	(1983)	62,901	87.0	(1982)	5,278	7.3	(1981)	0	0.0	(1980)
1987	23,800	6,188	26.0	(1984)	12,400	52.1	(1983)	5,188	21.8	(1982)	0	0.0	(1981)

1. See Appendix 8, Table 1 – 7 for data sources for age compositions.

Table 14. Brood year summaries and rates of return for chum salmon in Area 24, 1978–1982.

		Age 3 Return				Age 4 Return				Age 5 Return				All Ages	
Brood Year	Escapement	Year of Return	Catch	Escapement	Age 3 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 4 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 5 Rtn Ttl Rtn	Total Return	Rate of Return
(1978)	110,300	1981	1,501	4,281	0.06	1982	29,564	56,794	0.84	1983	0	10,420	0.10	102,560	0.93
(1979)	29,600	1982	8,436	16,206	0.50	1983	0	21,940	0.45	1984	0	2,398	0.05	48,980	1.65
(1980)	118,000	1983	0	15,344	0.40	1984	0	23,108	0.60	1985	1	316	0.01	38,769	0.33
(1981)	63,900	1984	0	28,667	0.34	1985	128	50,575	0.60	1986	0	5,278	0.06	84,648	1.32
(1982)	73,000	1985	69	27,221	0.29	1986	0	62,901	0.66	1987	0	5,188	0.05	95,379	1.31
Mean[1]					0.32				0.63				0.06		1.11
S.D.					0.15				0.13				0.03		0.45

1. Mean rates of return are averages of annual rates of return.

Table 15. Escapement levels for major chum producing streams in Area 24.[1]

Stream	Maximum Escapement Since 1953	Avg. Escapement (1980–1987)
Atleo River	75,000	25,500
Bawden Bay Creek	15,000	4,800
Megin River	30,000	8,700
Moyeha River	15,000	5,000
Tranqil Creek	35,000	3,200
Area 24 Total	128,000	67,200[2]

1. Escapement numbers rounded to the nearest hundred.

2. Sum of the 1980–1987 average escapements for all streams in Area 24.

Table 16. Annual catch, escapement and total stock estimates for chum salmon in Area 25, 1980–1987.[1,2]

Year	Catch[3]			Escapement (E)	Escapement Target	Total Stock
	Gillnet	Seine	Total			
1980	66,900	140,100	207,000	125,500	150,000	332,500
1981	18,000	23,300	41,300	116,700	150,000	158,000
1982	103,900	155,300	259,200	164,300	150,000	423,500
1983	0	8,100	8,100	161,100	150,000	169,200
1984	36,100	70,100	106,200	115,700	150,000	221,900
1985	74,400	137,900	212,300	148,000	150,000	360,300
1986	72,500	71,600	144,100	93,000	150,000	237,100
1987	12,400	0 [4]	12,400	94,400	195,000	106,800
DECADE AVERAGE USING ONY THOSE YEARS IN WHICH THERE WAS A CATCH						
1951–59	9,400	95,600	105,000	76,000	–	181,000
1960–69	28,000	31,300	59,300	114,400	–	173,700
1970–79	27,000	46,900	73,900	94,300	–	168,200
1980–87	48,900	93,200	142,100	127,300	–	269,400
DECADE AVERAGE USING ALL YEARS INCLUDING YEARS WITH ZERO CATCH						
1951–59	9,400	95,600	105,000	76,000	–	181,000
1960–69	14,000	18,800	32,800	114,400	–	147,200
1970–79	24,300	42,200	66,500	94,300	–	160,800
1980–87	48,000	75,800 [5]	123,800	127,300	–	251,100

1. Data sources: catches from B.C. Catch Statistics; escapements from SEDS database at PBS.
2. Catch, escapement and decade average numbers rounded to the nearest hundred.
3. Zero catch indicates closed fishery or negligible catch, (< 50 pieces).
4. Stock levels did not permit a seine fishery this year.
5. Average does not include 1987 catch of 0.

Table 17. Age compositions of chum salmon catches in Area 25, 1980–1987.[1]

Year	Catch	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	207,000	164,979	79.7	(1977)	40,572	19.6	(1976)	1,242	0.6	(1975)	0	0.0	(1974)
1981	41,300	2,767	6.7	(1978)	37,996	92.0	(1977)	537	1.3	(1976)	0	0.0	(1975)
1982	259,200	23,587	9.1	(1979)	224,986	86.8	(1978)	10,627	4.1	(1977)	0	0.0	(1976)
1983 [2]	8,100	1,847	22.8	(1980)	3,588	44.3	(1979)	2,633	32.5	(1978)	0	0.0	(1977)
1984	106,200	52,463	49.4	(1981)	49,383	46.5	(1980)	4,354	4.1	(1979)	0	0.0	(1978)
1985	212,300	71,545	33.7	(1982)	139,693	65.8	(1981)	1,062	0.5	(1980)	0	0.0	(1979)
1986	144,100	2,450	1.7	(1983)	134,013	93.0	(1982)	7,493	5.2	(1981)	0	0.0	(1980)
1987	12,400	3,261	26.3	(1984)	6,423	51.8	(1983)	2,703	21.8	(1982)	0	0.0	(1981)

1. See Appendix 8, Table 1 – 7 for data sources for age compositions.

2. Insignificant numbers of 2 year olds were reported in 1983, but not included here (see App. 8., Table 2).

Table 18. Age compositions of chum salmon escapements in Area 25, 1980–1987.[1]

Year	Escapement	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	125,500	100,024	79.7	(1977)	24,598	19.6	(1976)	753	0.6	(1975)	0	0.0	(1974)
1981	116,700	7,819	6.7	(1978)	107,364	92.0	(1977)	1,517	1.3	(1976)	0	0.0	(1975)
1982	164,300	14,951	9.1	(1979)	142,612	86.8	(1978)	6,736	4.1	(1977)	0	0.0	(1976)
1983 [2]	161,100	36,731	22.8	(1980)	71,367	44.3	(1979)	52,358	32.5	(1978)	0	0.0	(1977)
1984	115,700	57,156	49.4	(1981)	53,801	46.5	(1980)	4,744	4.1	(1979)	0	0.0	(1978)
1985	148,000	49,876	33.7	(1982)	97,384	65.8	(1981)	740	0.5	(1980)	0	0.0	(1979)
1986	93,000	1,581	1.7	(1983)	86,490	93.0	(1982)	4,836	5.2	(1981)	0	0.0	(1980)
1987	94,400	24,827	26.3	(1984)	48,899	51.8	(1983)	20,579	21.8	(1982)	0	0.0	(1981)

1. See Appendix 8, Table 1 – 7 for data sources for age compositions.

2. Insignificant numbers of 2 year olds were reported in 1983, but not included here (see App.8., Table 2).

Table 19. Brood year summaries and rates of return for chum salmon in Area 25, 1978–1982.

Brood Year	Escapement	Age 3 Return: Year of Return	Age 3 Return: Catch	Age 3 Return: Escapement	Age 3 Return: Age 3 Rtn Ttl Rtn	Age 4 Return: Year of Return	Age 4 Return: Catch	Age 4 Return: Escapement	Age 4 Return: Age 4 Rtn Ttl Rtn	Age 5 Return: Year of Return	Age 5 Return: Catch	Age 5 Return: Escapement	Age 5 Return: Age 5 Rtn Ttl Rtn	All Ages: Total Return	All Ages: Rate of Return
(1978)	116,000	1981	2,767	7,819	0.02	1982	224,986	142,612	0.85	1983	2,633	52,358	0.13	433,175	3.73
(1979)	40,800	1982	23,587	14,951	0.31	1983	3,588	71,367	0.61	1984	4,354	4,744	0.07	122,591	3.00
(1980)	125,500	1983	1,847	36,731	0.27	1984	49,383	53,801	0.72	1985	1,062	740	0.01	143,564	1.14
(1981)	116,700	1984	52,463	57,156	0.31	1985	139,693	97,384	0.66	1986	7,493	4,836	0.03	359,025	3.08
(1982)	164,300	1985	71,545	49,876	0.33	1986	134,013	86,490	0.60	1987	2,703	20,579	0.06	365,206	2.22
Mean[1]					0.25				0.69				0.06		2.64
S.D.					0.11				0.09				0.04		0.89

1. Mean rates of return are averages of annual rates of return.

Table 20. Escapement levels for major chum producing streams in Area 25.[1]

Stream	Maximum Escapement Since 1953	Avg. Escapement (1980–1987)
Black Creek	13,300	10,400
Conuma River	40,000	24,400
Deserted Creek	20,000	13,400
Ransom Creek	35,000	7,500
Sucwoa River	15,000	9,500
Tahsis River	35,000	9,500
Tlupana River	10,000	7,400
Tsowwin River	17,000	8,900
Area 25 Total	293,900	142,000 [2]

1. Escapement numbers rounded to the nearest hundred.

2. Sum of the 1980–1987 average escapements for all streams in Area 25.

Table 21. Annual catch, escapement and total stock estimates for chum salmon in Area 26, 1980–1987.[1,2]

YEAR	Catch[3]			Escapement	Escapement Target	Total Stock
	Gillnet	Seine	Total			
1980	23,800	136,800	160,600	74,400	100,000	235,000
1981	13,900	36,600	50,500	50,000	100,000	100,500
1982	22,600	201,400	224,000	91,200	100,000	315,200
1983	0	0	0	86,200	100,000	86,200
1984	5,900	33,800	39,700	81,300	100,000	121,000
1985	9,000	31,200	40,200	125,000	100,000	165,200
1986	0	0	0	78,600	100,000	78,600
1987	0	1,200	1,200	41,300	180,000	42,500
DECADE AVERAGE USING ONLY THOSE YEARS IN WHICH THERE WAS A CATCH						
1951–59	1,300	51,800	53,100	67,300	–	120,400
1960–69	15,000	40,600	55,600	39,000	–	94,600
1970–79	9,600	14,200	23,800	59,900	–	83,700
1980–87	15,000	73,500	86,000	77,200	–	163,200
DECADE AVERAGE USING ALL YEARS INCLUDING THOSE WITH ZERO CATCH						
1951–59	700	51,800	52,500	67,300	–	119,800
1960–69	6,000	16,300	22,300	39,000	–	61,300
1970–79	6,700	8,500	15,200	59,900	–	75,100
1980–87	9,400	55,100	64,500	78,500	–	143,000

1. Data sources: catches from B.C. Catch Statistics; escapements from SEDS database at PBS.

2. Catch, escapement and decade average numbers rounded to the nearest hundred.

3. Zero catch indicates closed fishery or negligible catch, (< 50 pieces).

Table 22. Age compositions of chum salmon catches in Area 26, 1980–1987.[1]

Year	Catch	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	160,600	125,589	78.2	(1977)	34,208	21.3	(1976)	642	0.4	(1975)	0	0.0	(1974)
1981	50,500	3,384	6.7	(1978)	46,460	92.0	(1977)	657	1.3	(1976)	0	0.0	(1975)
1982	224,000	9,632	4.3	(1979)	209,664	93.6	(1978)	4,704	2.1	(1977)	0	0.0	(1976)
1983	0	–	–	(1980)	–	–	(1979)	–	–	(1978)	–	–	(1977)
1984	39,700	24,058	60.6	(1981)	12,823	32.3	(1980)	2,025	5.1	(1979)	794	2.0	(1978)
1985	40,200	14,633	36.4	(1982)	24,281	60.4	(1981)	0	0.0	(1980)	1,327	3.3	(1979)
1986	0	–	–	(1983)	–	–	(1982)	–	–	(1981)	–	–	(1980)
1987	1,200	295	24.6	(1984)	643	53.6	(1983)	262	21.8	(1982)	0	0.0	(1981)

1. See Appendix 8, Table 1 – 7 for data sources for age compositions.

Table 23. Age compositions of chum salmon escapements in Area 26, 1980–1987.[1]

Year	Escapement	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	74,400	58,181	78.2	(1977)	15,847	21.3	(1976)	298	0.4	(1975)	0	0.0	(1974)
1981	50,000	3,350	6.7	(1978)	46,000	92.0	(1977)	650	1.3	(1976)	0	0.0	(1975)
1982	91,200	3,922	4.3	(1979)	85,363	93.6	(1978)	1,915	2.1	(1977)	0	0.0	(1976)
1983	86,200	31,894	37.0	(1980)	40,342	46.8	(1979)	13,964	16.2	(1978)	0	0.0	(1977)
1984	81,300	49,268	60.6	(1981)	26,260	32.3	(1980)	4,146	5.1	(1979)	1,626	2.0	(1978)
1985	125,000	45,500	36.4	(1982)	75,500	60.4	(1981)	0	0.0	(1980)	4,125	3.3	(1979)
1986	78,600	5,423	6.9	(1983)	66,889	85.1	(1982)	6,288	8.0	(1981)	0	0.0	(1980)
1987	41,300	10,160	24.6	(1984)	22,137	53.6	(1983)	9,003	21.8	(1982)	0	0.0	(1981)

1. See Appendix 8, Tables 1 – 7 for data sources for age compositions.

Table 24. Brood year summaries and rates of return for chum salmon in Area 26, 1978–1982.

		Age 3 Return				Age 4 Return				Age 5 Return				All Ages	
Brood Year	Escapement	Year of Return	Catch	Escapement	Age 3 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 4 Rtn Ttl Rtn	Year of Return	Catch	Escapement	Age 5 Rtn Ttl Rtn	Total Return	Rate of Return
(1978)	84,500	1981	3,384	3,350	0.02	1982	209,664	85,363	0.93	1983	0	13,964	0.04	315,725	3.74
(1979)	14,700	1982	9,632	3,922	0.23	1983	0	40,342	0.67	1984	2,025	4,146	0.10	60,067	4.09
(1980)	74,400	1983	0	31,894	0.45	1984	12,823	26,260	0.55	1985	0	0	0.00	70,977	0.95
(1981)	50,000	1984	24,058	49,268	0.41	1985	24,281	75,500	0.56	1986	0	6,288	0.04	179,395	3.59
(1982)	91,200	1985	14,633	45,500	0.44	1986	0	66,889	0.49	1987	262	9,003	0.07	136,287	1.49
Mean[1]					0.31				0.64				0.05		2.77
S.D.					0.17				0.16				0.03		1.29

1. Mean rates of return are averages of annual rates of return.

Table 25. Escapement levels for major chum producing streams in Area 26.[1]

Stream	Maximum Escapement Since 1953	Avg. Escapement (1980–1987)
Chamiss Ceek	15,000	6,400
Kashutl River	11,000	5,900
Kauwinch River	25,000	9,800
Malksope River	35,000	7,300
Tahsish River	31,000	13,400
Area 26 Total	109,800	81,300 [2]

1. Escapement numbers rounded to the nearest hundred.

2. Sum of the 1980–1987 average escapements for all streams in Area 26.

Table 26. Annual catch, escapement and total stock estimates for chum salmon in Area 27, 1980–1987.[1,2]

YEAR	Catch[3]			Escapement	Escapement Target	Total Stock
	Gillnet	Seine	Total			
1980	0	0	0	79,700	100,000	79,700
1981	100	3,700	3,800	30,900	100,000	34,700
1982	0	0	0	78,100	100,000	78,100
1983	0	0	0	12,000	100,000	12,000
1984	0	0	0	13,300	100,000	13,300
1985	100	0	100	53,800	100,000	53,900
1986	0	0	0	59,900	100,000	59,900
1987	0	0	0	24,200	100,000	24,200
DECADE AVG USING ONLY THOSE YEARS IN WHICH THERE WAS A CATCH.						
1951–59	9,900	34,600	44,500	50,700	–	95,200
1960–69	3,300	36,900	40,200	23,400	–	63,600
1970–79	6,700	2,600	9,300	36,700	–	46,000
1980–87	100	3,700	3,800	42,400	–	46,200
DECADE AVG USING ALL YEARS INCLUDING THOSE WITH ZERO CATCH.						
1951–59	7,100	34,600	41,700	50,700	–	92,400
1960–69	2,600	3,700	6,300	23,400	–	29,700
1970–79	6,700	1,300	8,000	36,700	–	44,700
1980–87	0	500	500	44,000	–	44,500

1. Data sources: catches from B.C. Catch Statistics; escapements from SEDS database at PBS.

2. Catch, escapement and decade average numbers rounded to the nearest hundred.

3. Zero catch indicates closed fishery or negligible catch, (< 50 pieces).

Table 27. Age compositions of chum salmon escapements in Area 27, 1980–1987.[1,2]

Year	Escapement	Age 3			Age 4			Age 5			Age 6		
		No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year	No.	%	Brood Year
1980	79,700	50,769	63.7	(1977)	28,612	35.9	(1976)	319	0.4	(1975)	0	0.0	(1974)
1981	30,900	2,750	8.9	(1978)	27,656	89.5	(1977)	494	1.6	(1976)	0	0.0	(1975)
1982	78,100	11,403	14.6	(1979)	62,480	80.0	(1978)	4,217	5.4	(1977)	0	0.0	(1976)
1983	12,000	3,852	32.1	(1980)	5,508	45.9	(1979)	2,616	21.8	(1978)	0	0.0	(1977)
1984	13,300	6,996	52.6	(1981)	5,639	42.4	(1980)	585	4.4	(1979)	80	0.6	(1978)
1985	53,800	18,561	34.5	(1982)	34,486	64.1	(1981)	215	0.4	(1980)	592	1.1	(1979)
1986	59,900	3,354	5.6	(1983)	52,113	87.0	(1982)	4,373	7.3	(1981)	0	0.0	(1980)
1987	24,200	6,292	26.0	(1984)	12,608	52.1	(1983)	5,276	21.8	(1982)	0	0.0	(1981)

1 See Appendix 8, Tables 1 – 7 for data sources for age compositions.

2. No commercial fishery or test fishing has been carried out during 1980–1987.

Table 28. Brood year summaries and rates of return for chum salmon in Area 27, 1978–1982.

Brood Year	Escapement	Age 3 Return: Year of Return	Age 3 Return: Catch	Age 3 Return: Escapement	Age 3 Return: Age 3 Rtn Ttl Rtn	Age 4 Return: Year of Return	Age 4 Return: Catch	Age 4 Return: Escapement	Age 4 Return: Age 4 Rtn Ttl Rtn	Age 5 Return: Year of Return	Age 5 Return: Catch	Age 5 Return: Escapement	Age 5 Return: Age 5 Rtn Ttl Rtn	All Ages: Total Return	All Ages: Rate of Return
(1978)	30,300	1981	0	2,750	0.04	1982	0	62,480	0.92	1983	0	2,616	0.04	67,846	2.24
(1979)	16,200	1982	0	11,403	0.65	1983	0	5,508	0.31	1984	0	585	0.03	17,496	1.08
(1980)	79,700	1983	0	3,852	0.40	1984	0	5,639	0.58	1985	0	215	0.02	9,706	0.12
(1981)	30,900	1984	0	6,996	0.15	1985	0	34,486	0.75	1986	0	4,373	0.10	45,855	1.48
(1982)	78,100	1985	0	18,561	0.24	1986	0	52,113	0.69	1987	0	5,276	0.07	75,950	0.97
Mean[1,2]					0.30				0.65				0.05		1.18
S.D.					0.21				0.20				0.03		0.69

1. Mean rates of return are averages of annual rates of return.

2. Escapements only utilized since the catches probably represent stocks bound for other areas.

Table 29. Escapement levels for major chum producing streams in Area 27.[1]

Stream	Maximum Escapement Since 1953	Mean Escapement (1980–1987)
Cayeghle Creek	20,000	5,800
Jim's Creek	25,000	5,800
Area 27 Total	94,300	59,400 [2]

1. Escapement numbers rounded to the nearest hundred.

2. Sum of the 1980–1987 mean escapements for all streams in Area 27.

FIGURES

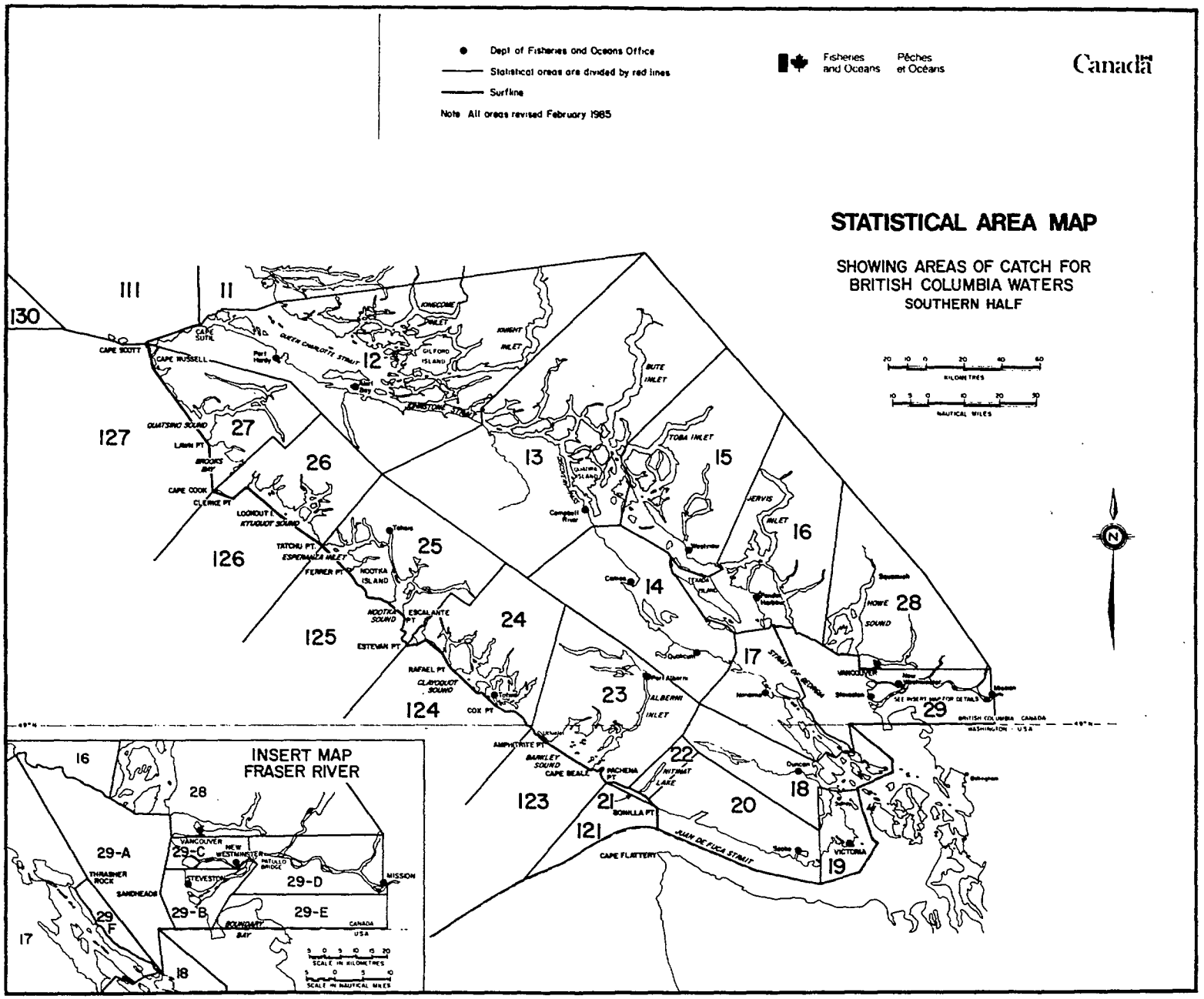

Fig. 1. Location of Statistical Areas in southern British Columbia.

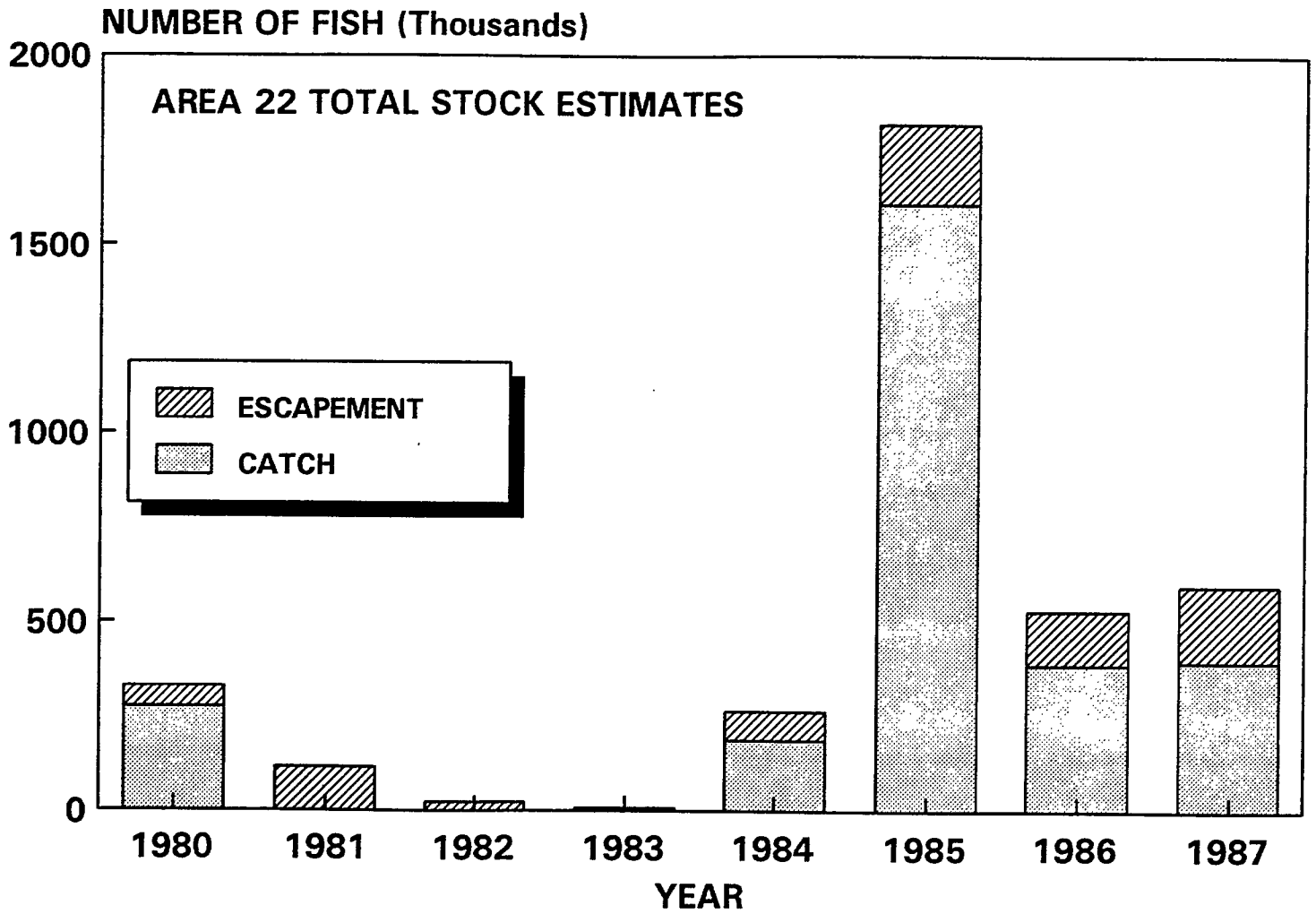

Fig. 2. Annual catch and escapement estimates for chum salmon in Area 22, 1980-1987.

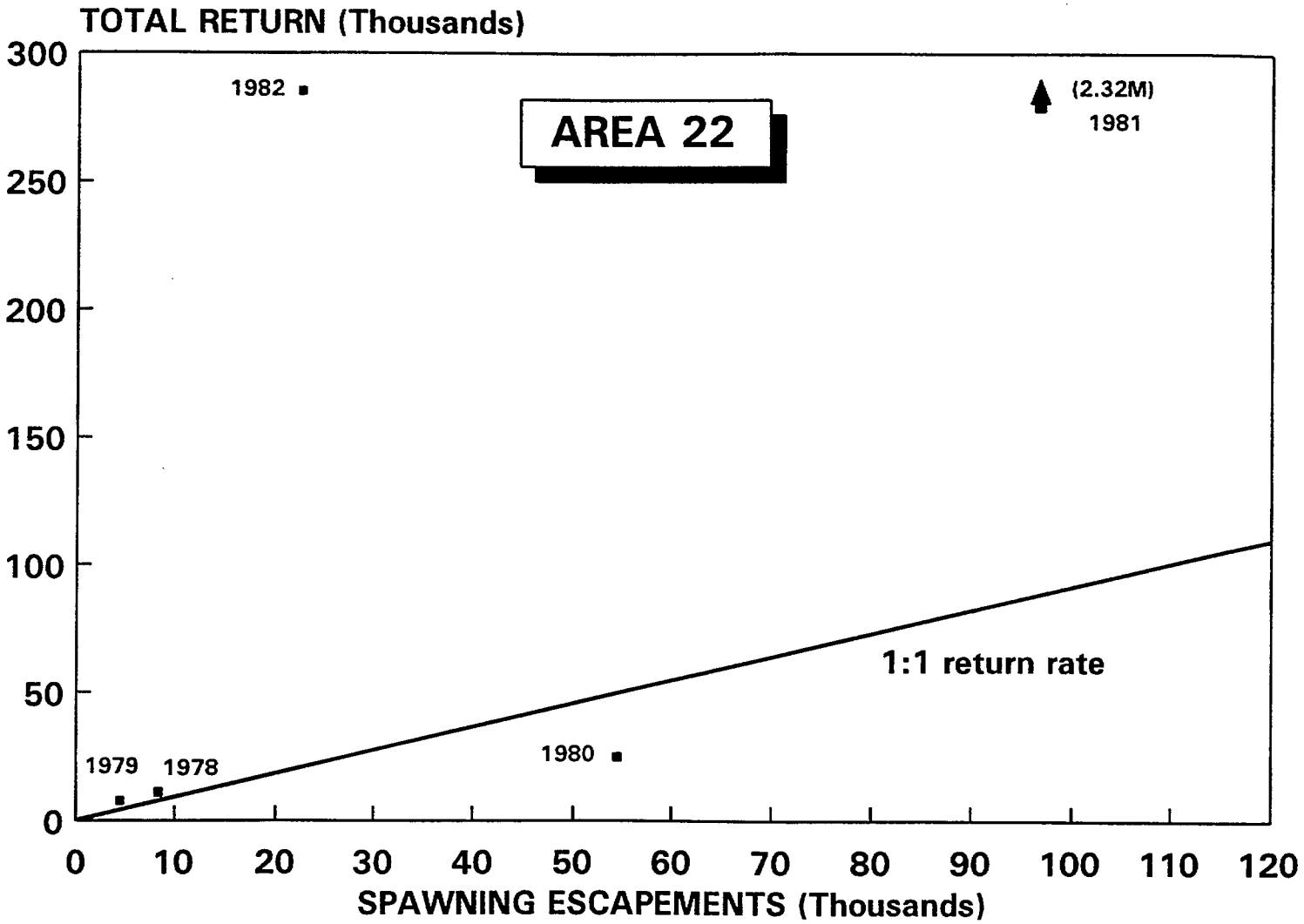

Fig 3. Relationship between brood spawning escapements and total returns for chum salmon in Area 22, 1978-1982 brood years.

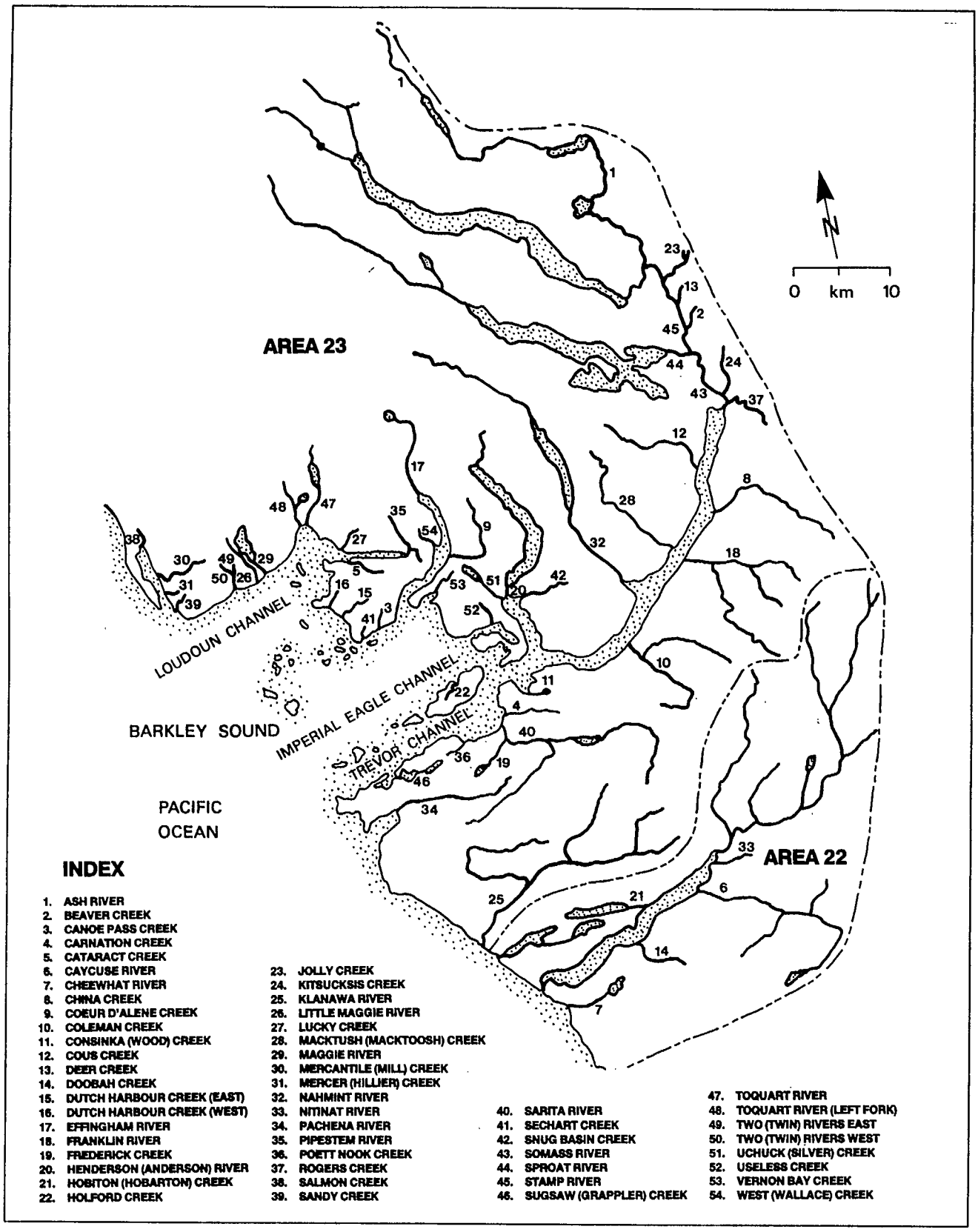

Figure 4. Spawning grounds of chum salmon in Areas 22 and 23.

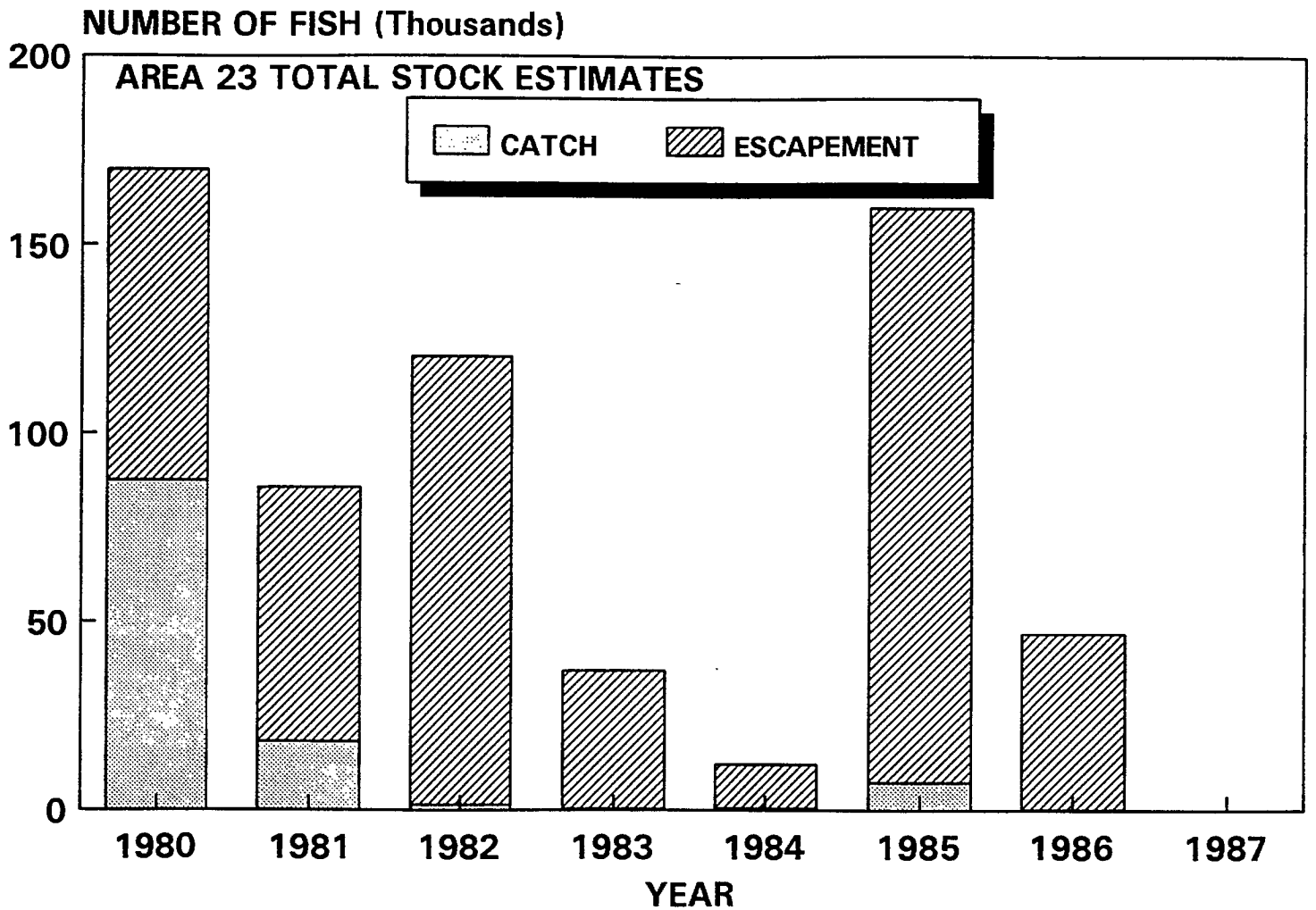

Fig 5. Annual catch and escapement estimates for chum salmon in Area 23, 1980-1987.

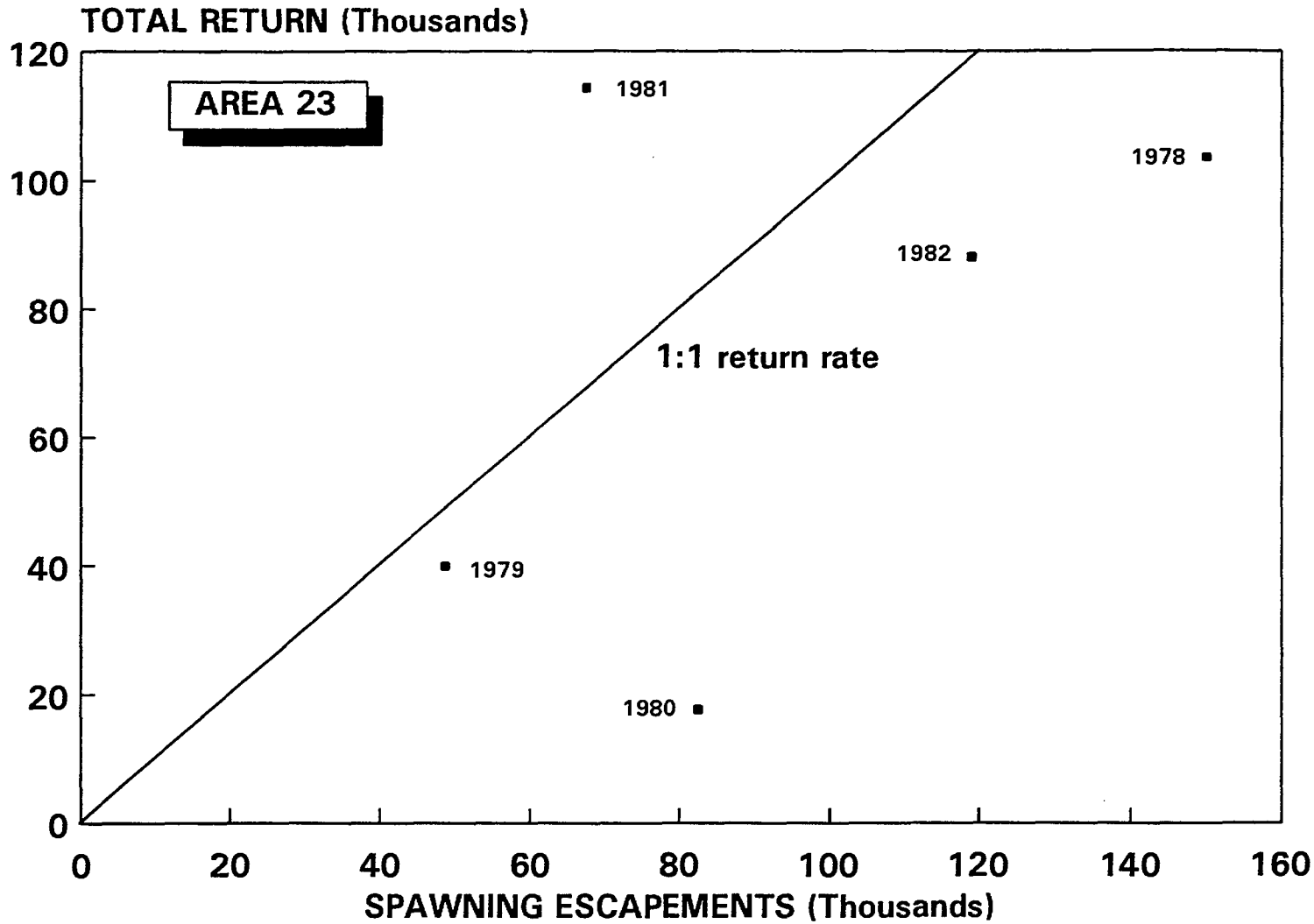

Fig. 6. Relationship between brood spawning escapements and total returns for chum salmon in Area 23, 1978-1982 brood years.

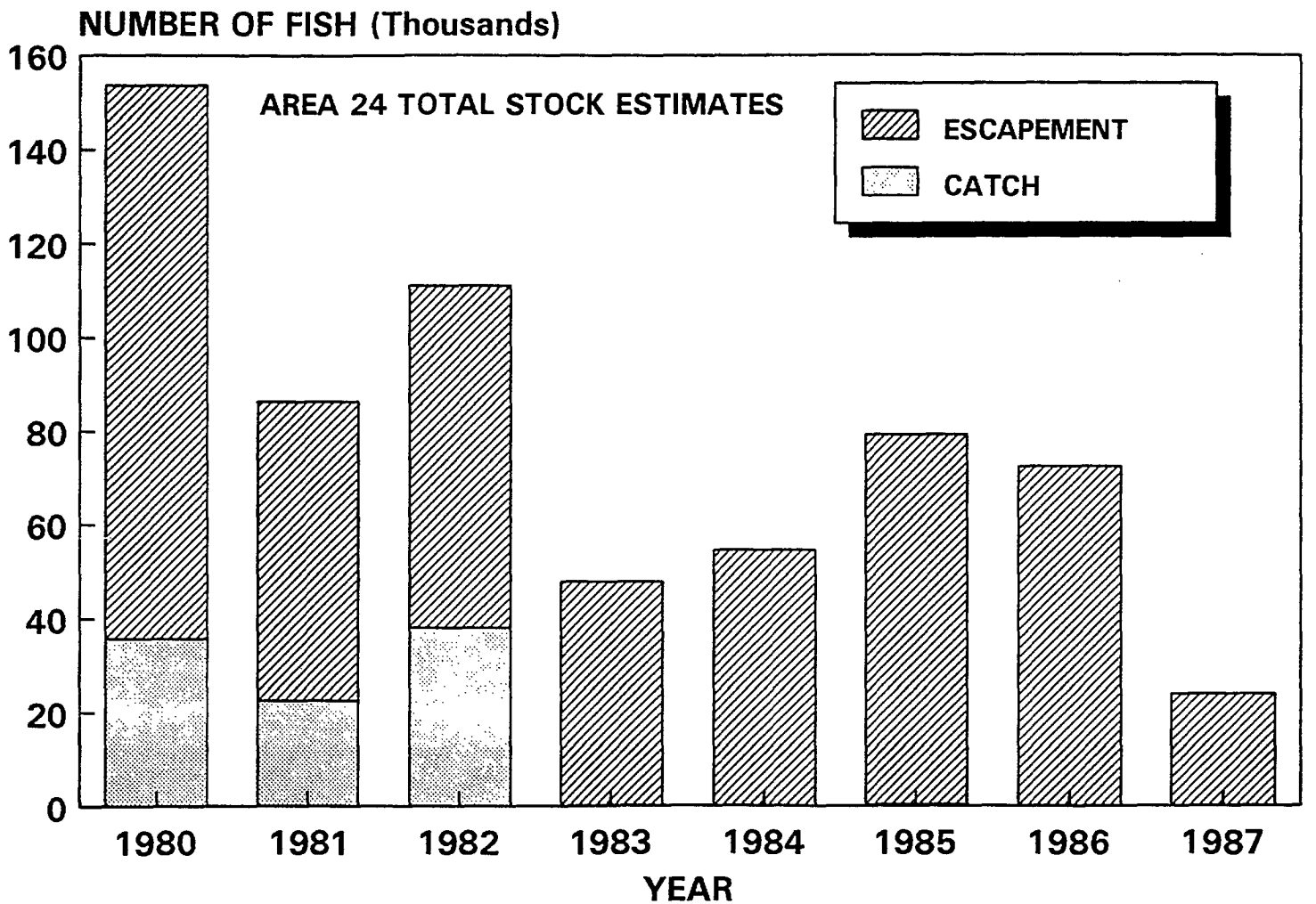

Fig. 7. Annual catch and escapement estimates for chum salmon in Area 24, 1980-1987.

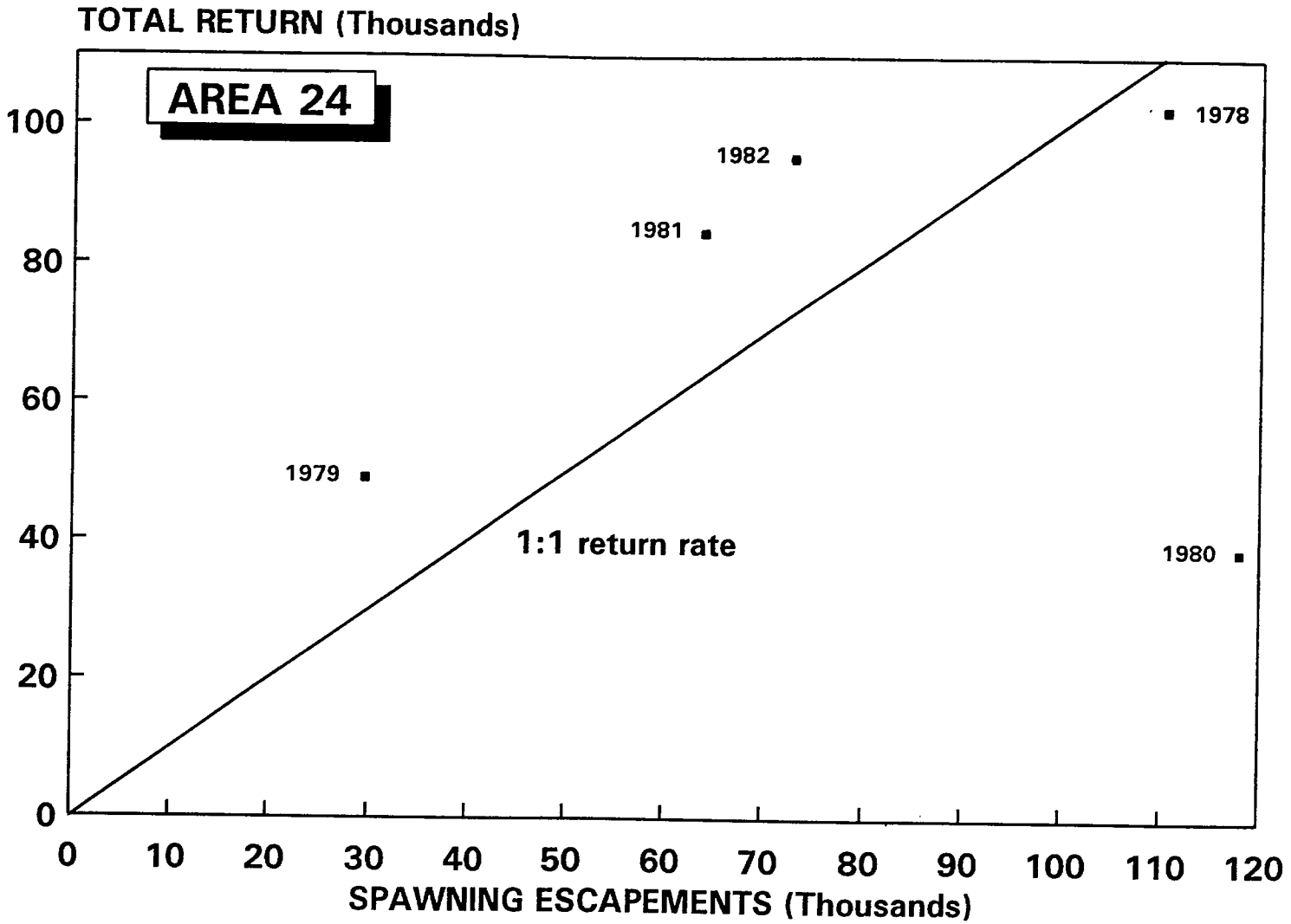

Fig 8. Relationship between brood spawning escapements and total returns for chum salmon in Area 24, 1978-1982 brood years.

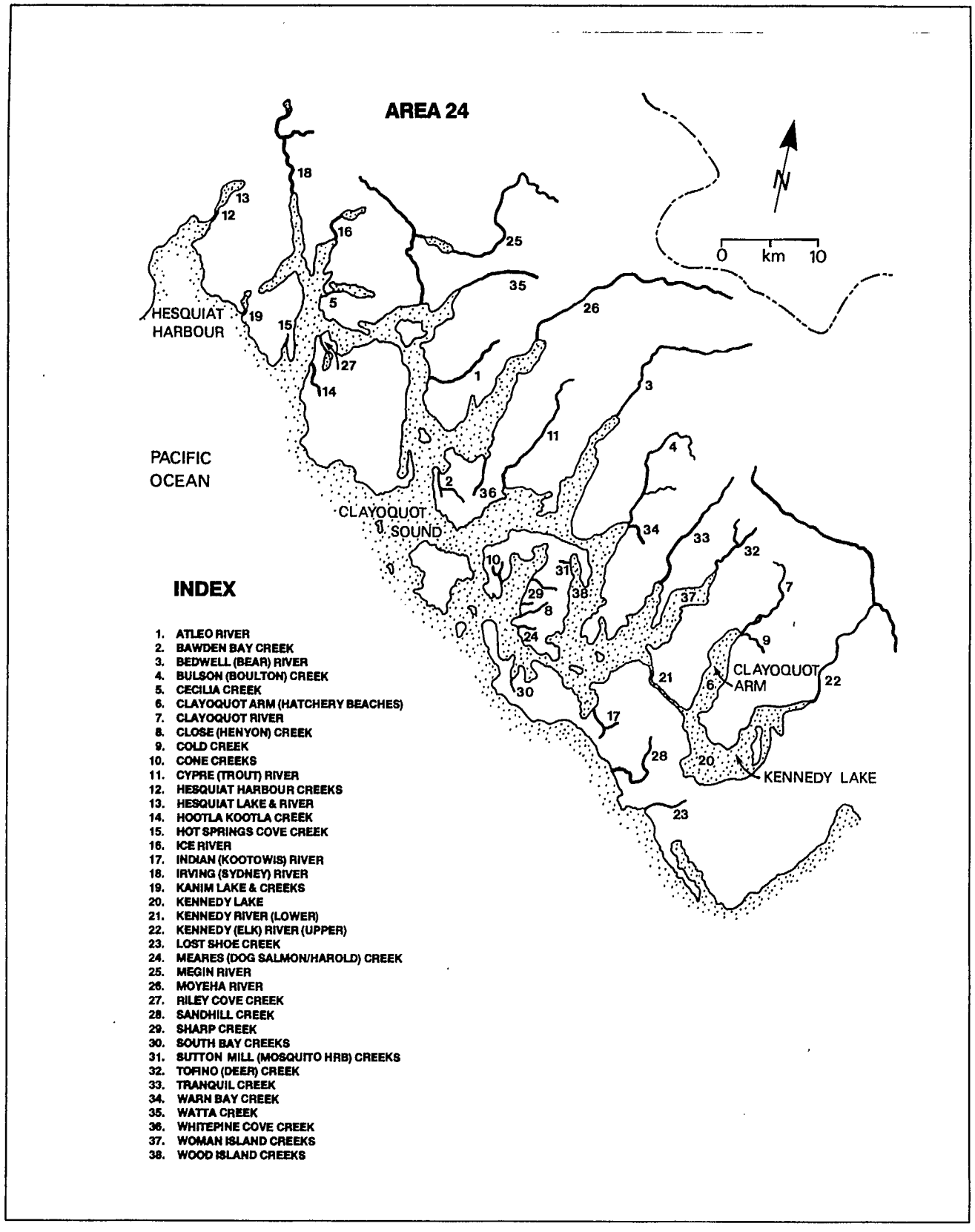

Figure 9. Spawning grounds of chum salmon in Area 24.

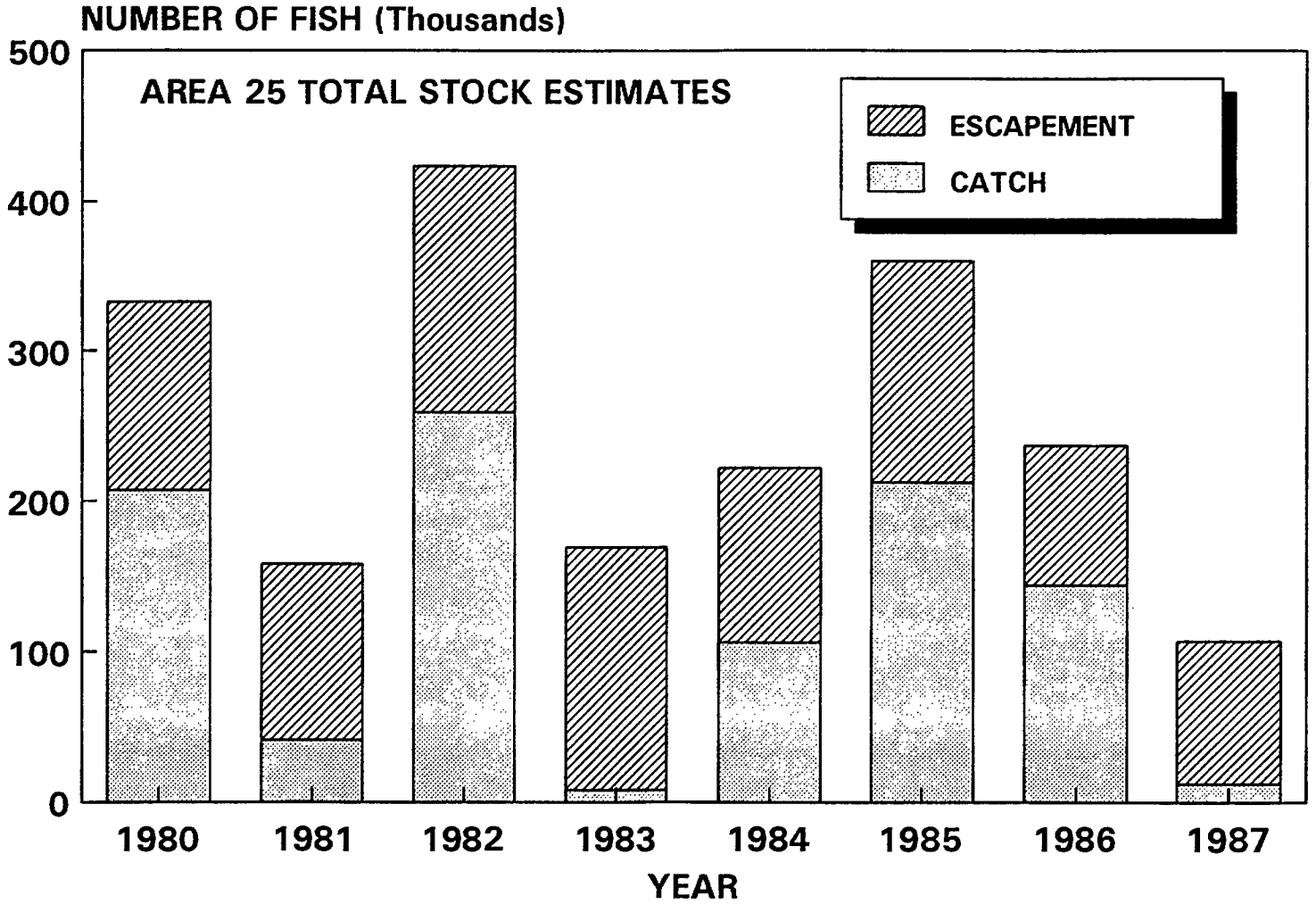

Fig. 10. Annual catch and escapement estimates for chum salmon in Area 25, 1980-1987.

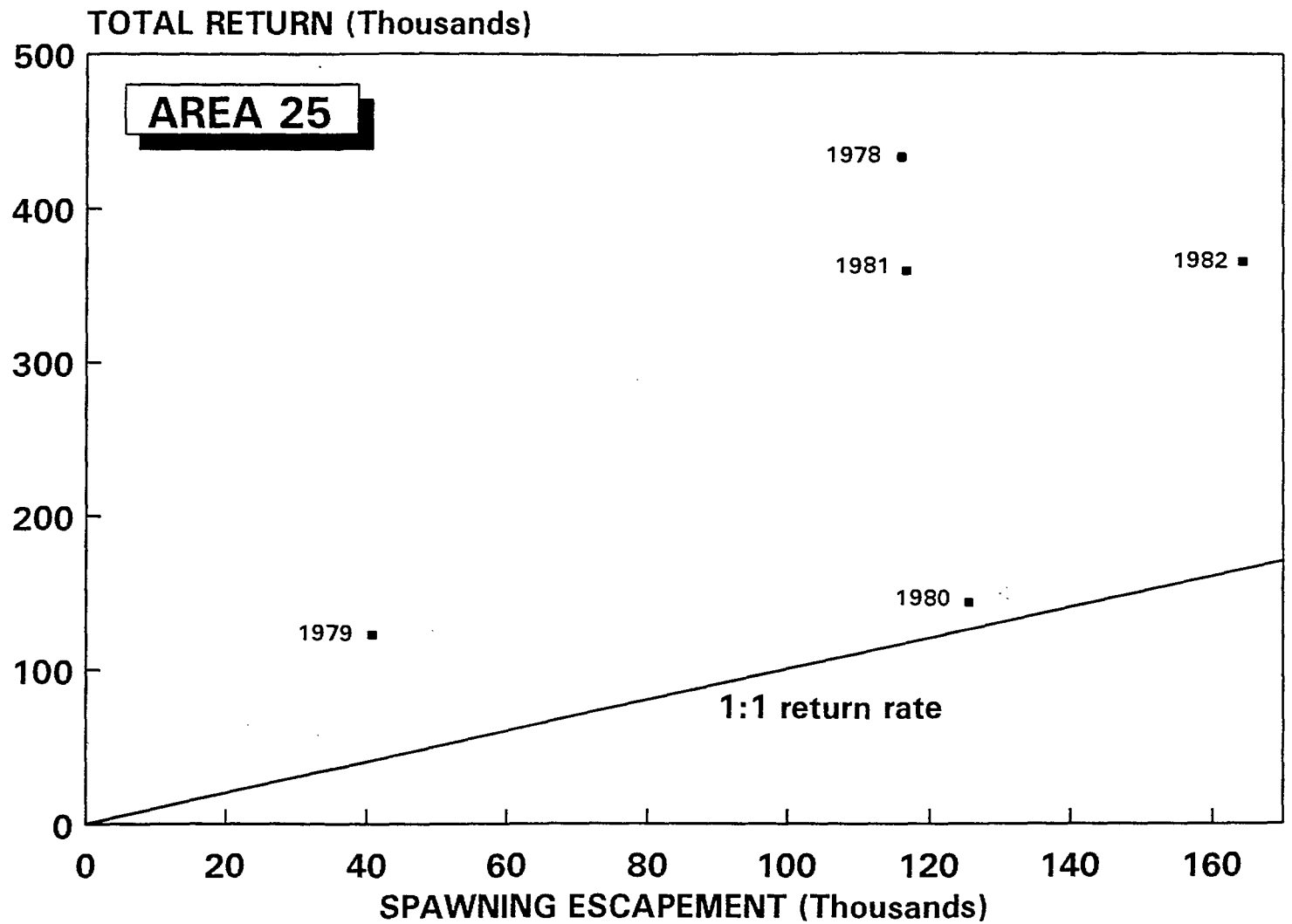

Fig. 11. Relationship between brood spawning escapements and total returns for chum salmon in Area 25, 1978-1982 brood years.

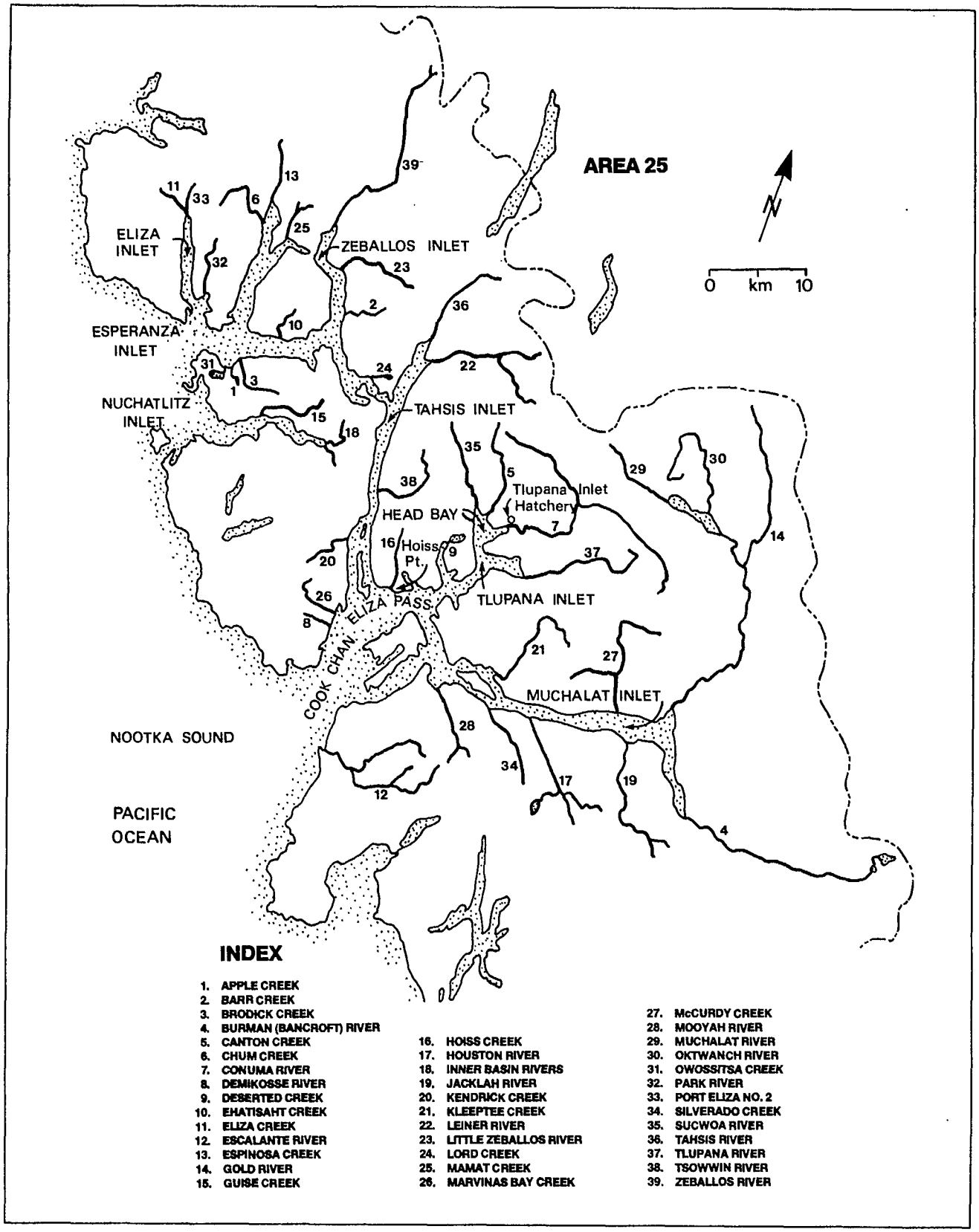

Figure 12. Spawning grounds of chum salmon in Area 25.

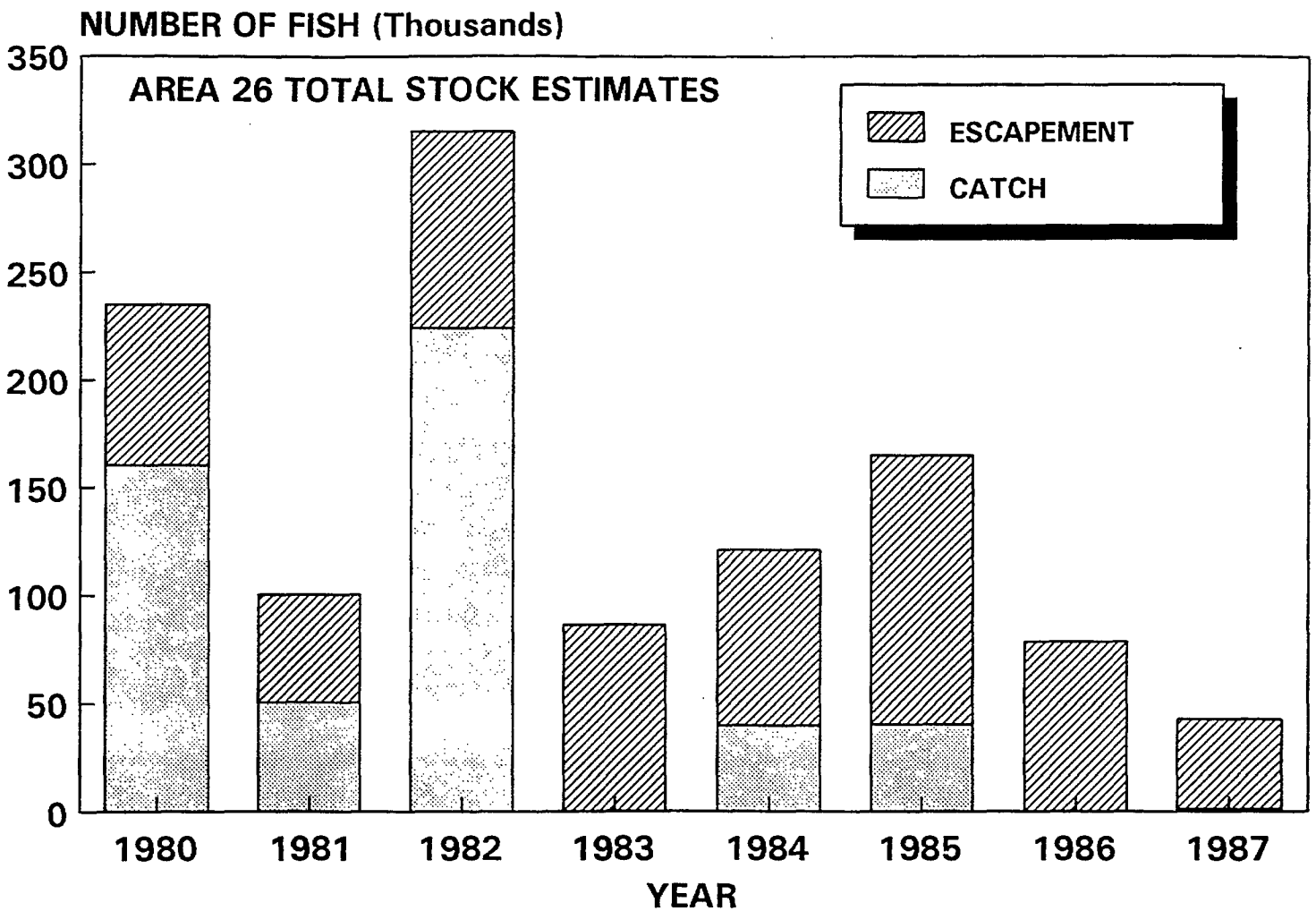

Fig. 13. Annual catch and escapement estimates for chum salmon in Area 26, 1980-1987.

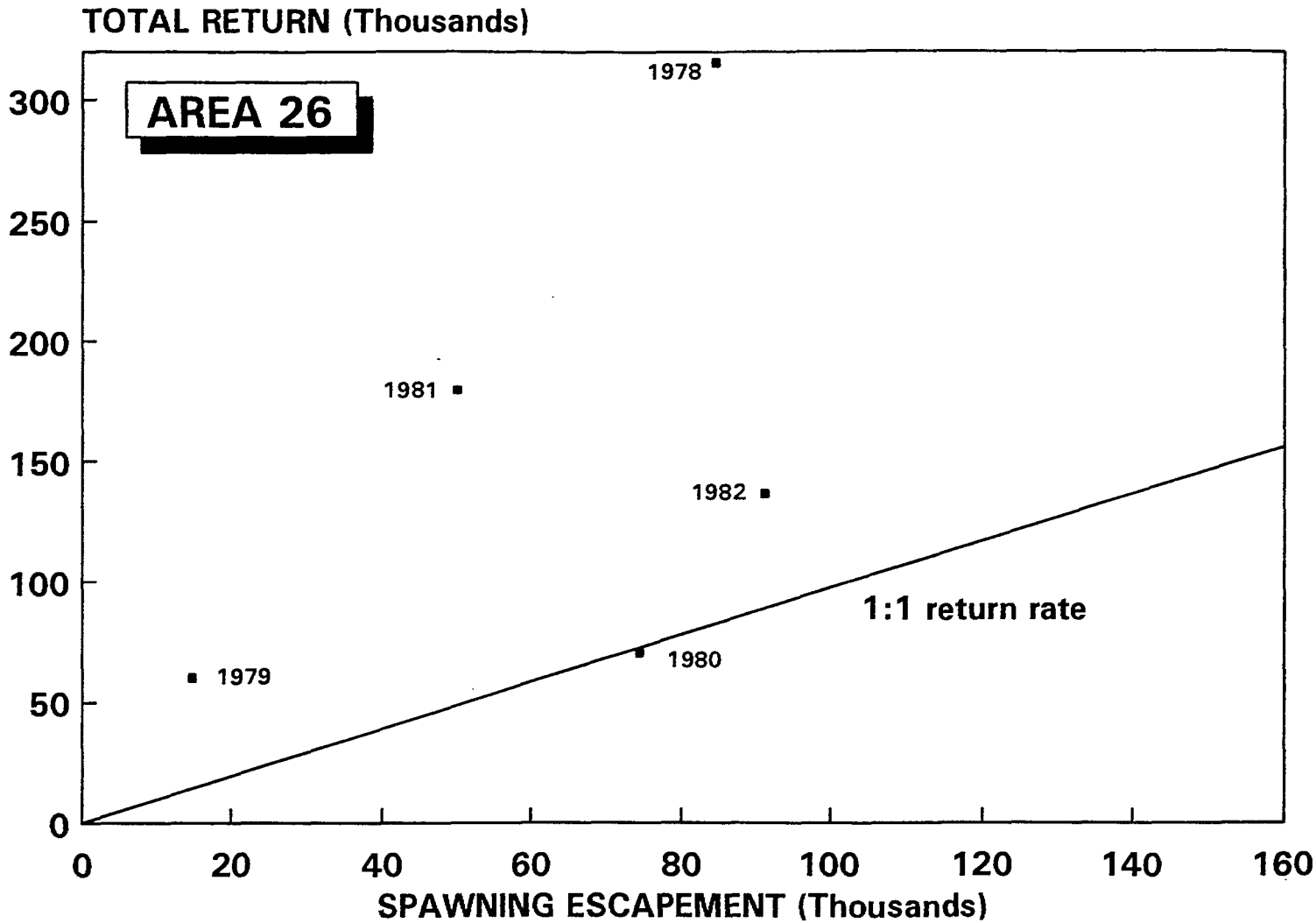

Fig. 14. Relationship between brood spawning escapements and total returns for chum salmon in Area 26, 1978-1982 brood years.

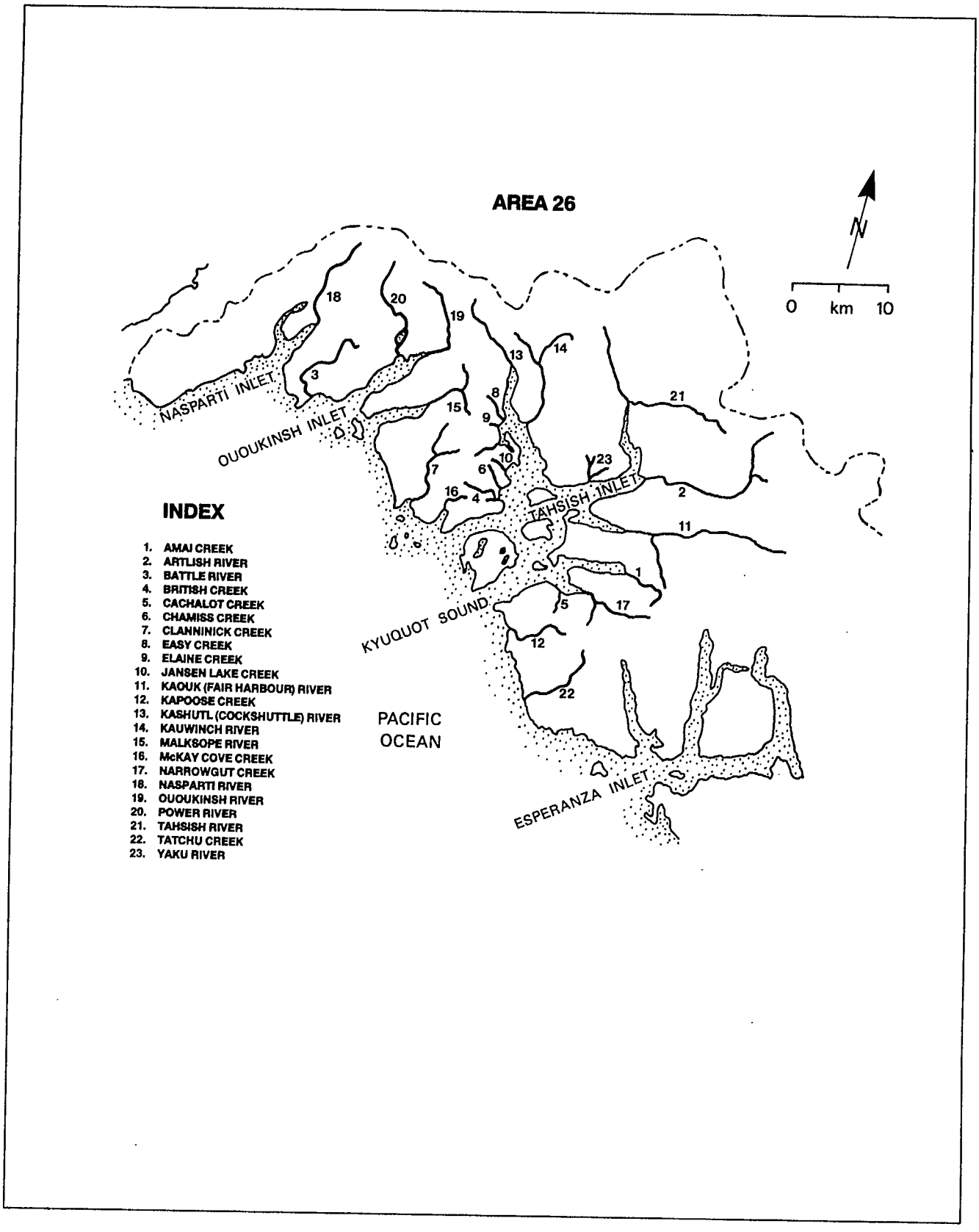

Figure 15. Spawning grounds of chum salmon in Area 26.

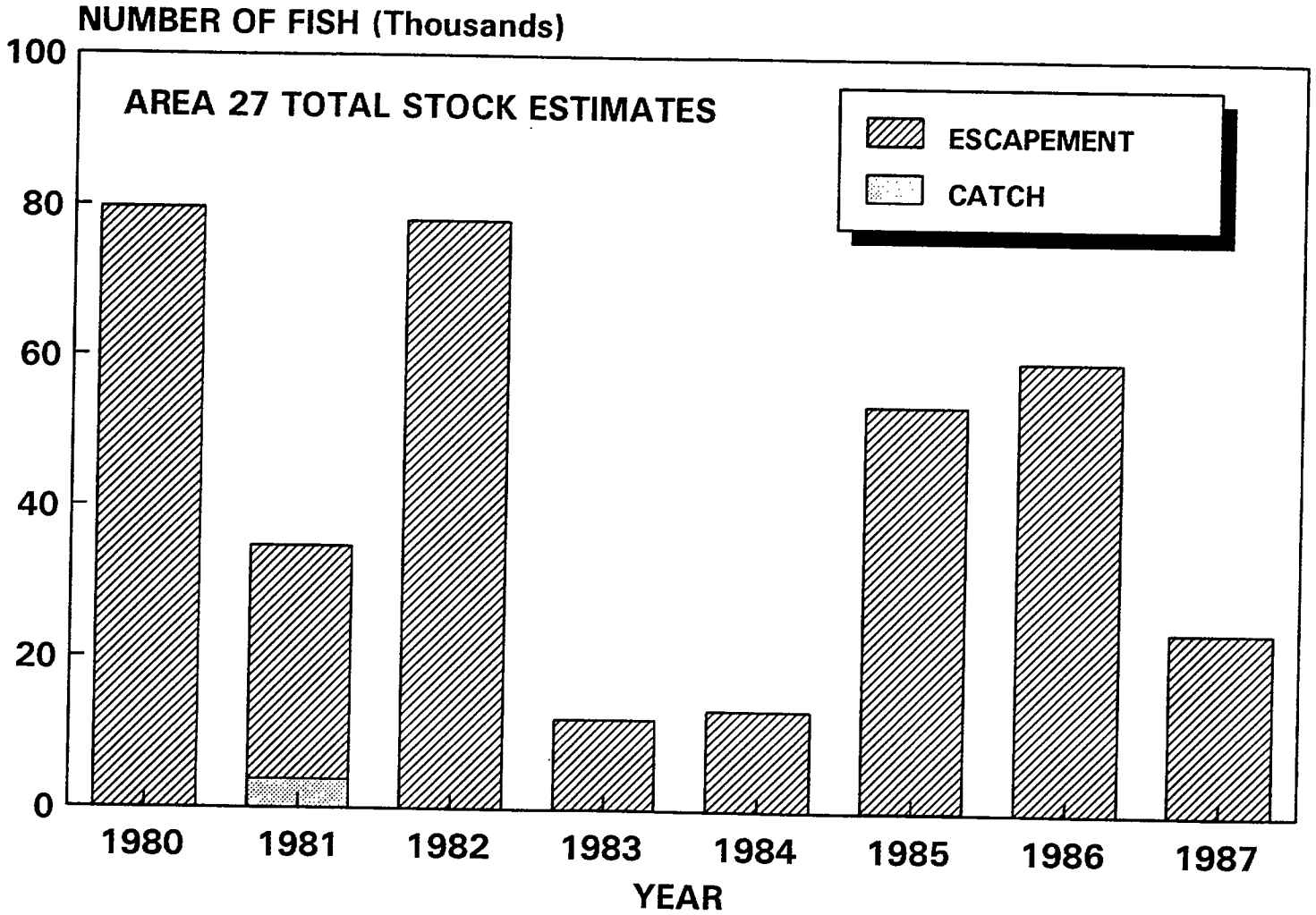

Fig. 16. Annual catch and escapement estimates for chum salmon in Area 27, 1980-1987.

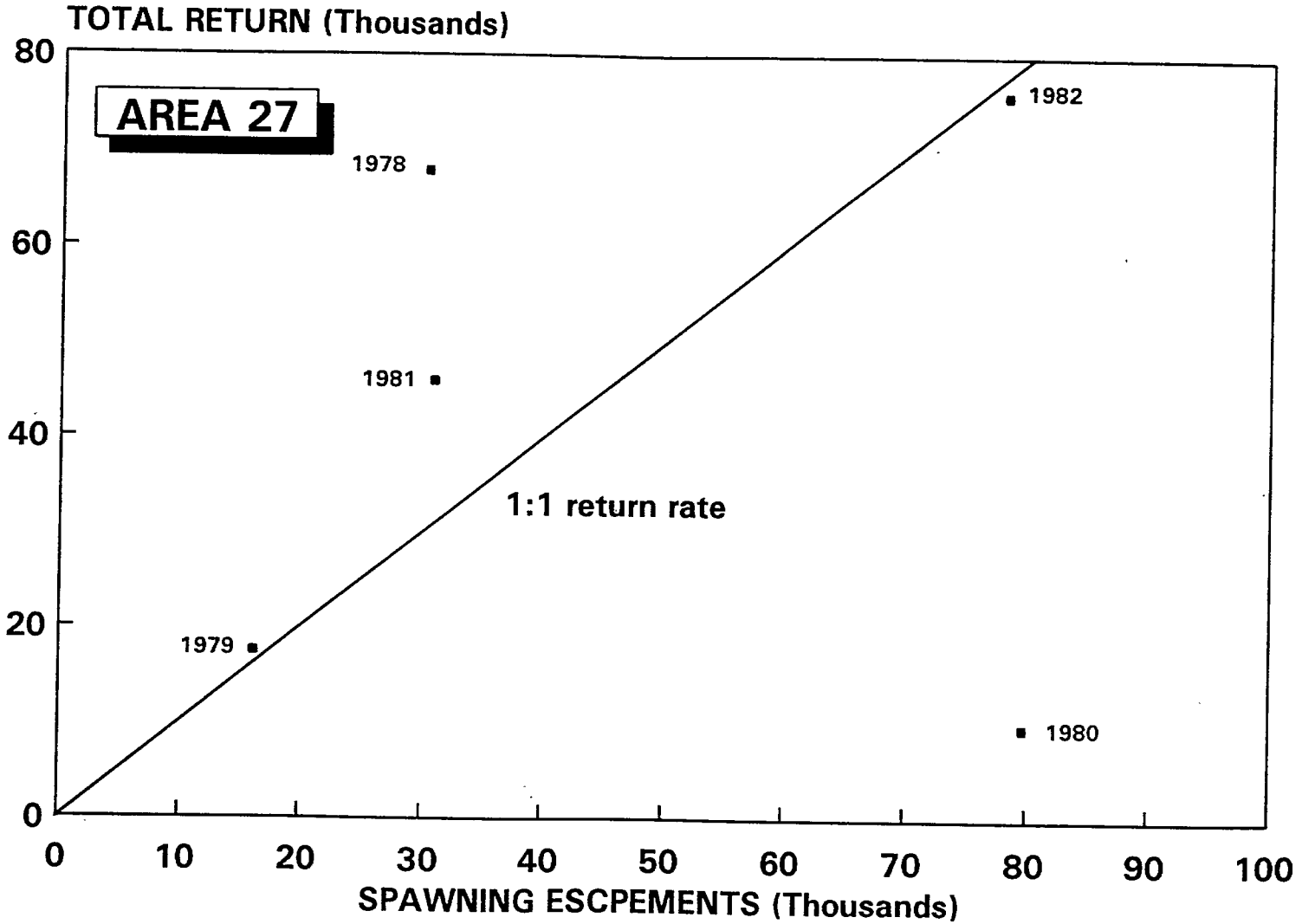

Fig. 17. Relationship between brood spawning escapements and total returns for chum salmon in Area 27, 1978-1982 brood years.

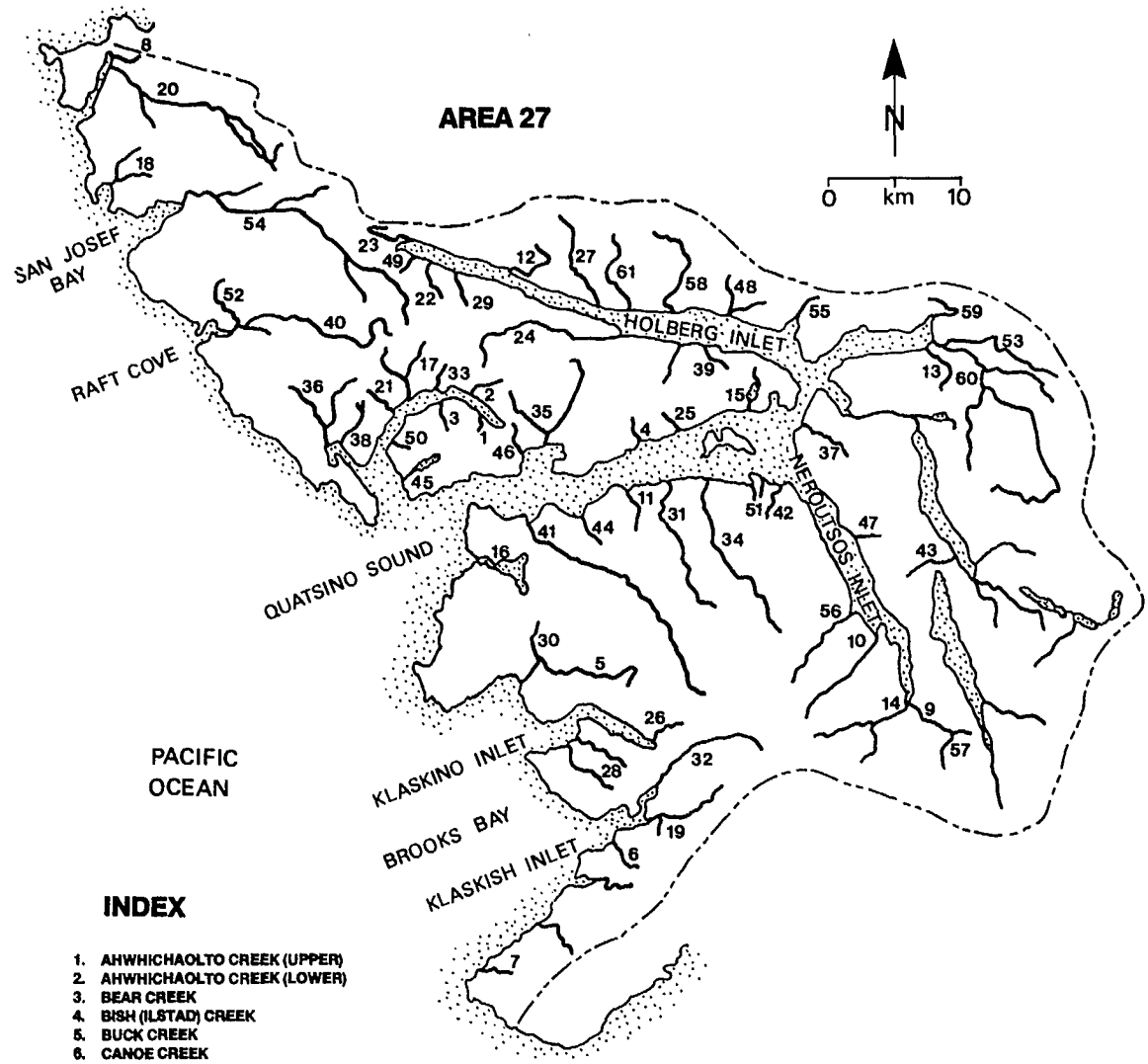

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Figure 18. Spawning grounds of chum salmon in Area 27.

APPENDICES

APPENDIX 1 - WCVI CHUM ENHANCEMENT

The following tables (App. 1, Tables 1 through 13), provided by SEP (Don Bailey, pers. comm.) document the chum production facilities on WCVI and administered by SEP, PIP and CEDP during the period covered by this report (1980-1987). For each facility the number of chums released, the predicted and actual returns from these releases (to Nitinat and Conuma hatcheries) and sizes at release are included.

Appendix 1, Table 1. Chum production facilities on WCVI, Areas 21–27. (Data from D. Bailey, pers. comm)

Statistical Area	Project	Brood Year Produced	Project Group
21	Nil	–	–
22	Nitinat Hatchery	1980 – Present	SEP
23	Thornton Creek	1976 – 1978	SEP
23	Thornton Creek	1981	PIP & CEDP
23	Thornton Creek	1982 – 1984[1]	CEDP
24	Ahousat	1981 – 1986	PIP
25	Conuma R. Hatchery	1978 – Present	SEP
26	Kyuquot	1984 – 1985	CEDP
27	Cordy Creek	1985 – Present	PIP
27	Marble River	1982	PIP
27	Monkey Creek	1985 – 1987	PIP
27	Nequiltpaalis Creek	1981 – 1985	PIP
27	Quatsino Creek	1982 – 1989	PIP
27	Stephens Creek	1983 – Present	CEDP

1. Chum production terminated after the 1984 brood in favour of coho and chinook production.

Appendix 1, Table 2. Nitinat hatchery chum production in Area 22, 1980–1987 broods. (Data from D. Bailey pers. comm.)

Brood Year	Females Spawned	No. Eggs Taken[1]	No. No. Fry Ponded[1]	Mean size at Release/ Group(g)	No. Released[1]
1980	1,001	2,518,300	2,364,200	0.9 – 1.1	2,339,900
1981	10,564	29,522,200	27,531,800	0.7 – 1.4	27,178,500
1982	3,689	9,120,400	8,509,900	0.8 – 1.1	8,432,100
1983	7,799	19,061,600	17,464,000	0.5 – 1.1	17,284,000
1984	10,809	28,070,000	26,434,900	0.5 – 1.0	26,226,700
1985	10,509	20,842,900	17,869,500	0.6 – 1.0	17,587,800
1986	8,499	18,936,700	16,688,900	0.9 – 1.3	16,576,700
1987	6,525	14,142,400	12,335,500	0.8 – 1.3	12,172,600

1. Rounded to nearest hundred.

Appendix 1, Table 3. Predicted and actual annual returns of Nitinat hatchery chum salmon for 1980–1987 broods. (Data from D. Bailey, pers. comm.)

Brood Year	Total Adult Production[1]	Expected Returns[2]								
		1983	1984	1985	1986	1987	1988	1989	1990	1991
1980	39,298	15,700	23,600	–	–	–	–	–	–	–
1981	427,836	–	171,100	256,700	–	–	–	–	–	–
1982	143,344	–	–	57,300	86,000	–	–	–	–	–
1983	278,289	–	–	–	111,300	167,000	–	–	–	–
1984	404,636	–	–	–	–	161,900	242,800	–	–	–
1985	285,910	–	–	–	–	–	114,400	171,500	–	–
1986	281,804	–	–	–	–	–	–	112,700	169,100	–
1987	204,684	–	–	–	–	–	–	–	81,900	122,800
Total	1,861,117	15,700	194,700	314,000	197,300	328,900	357,200	284,200	251,000	122,800

Brood Year	Total Adult Production[3]	Actual Returns								
		1983	1984	1985	1986	1987	1988	1989	1990	1991
1980	13,691	4,705	8,065	921	–	–	–	–		
1981	1,938,214	–	161,793	1,573,157	199,773	3,491	–	–		
1982	203,370	–	–	37,917	150,786	13,697	970	–		
1983	144,881	–	–	–	24,404	96,152	24,325	–		
1984	1,609,945	–	–	–	–	188,643	1,336,549	84,754		
1985	277,994	–	–	–	–	–	46,479	231,515		
1986	2,985	–	–	–	–	–	–	2,985		
Total	4,191,080	4,705	169,858	1,611,995	374,963	301,983	1,408,323	319,254		

1. Used 1.7% fry–to–adult survival for fed (>.75g) fry and 1.2% for fed (<.75g) fry (SEP bio–standards 1987 revision). Note that similar table in Lightly, Wood and Heizer (1985) used 2% fry–to–adult survival for 1980–82 broods (SEP bio–standards 1981 revision).

2. Used age composition at return of 40% age 3 and 60% age 4; numbers rounded to nearest hundred.

3. Data complete to 1989 return year.

Appendix 1, Table 4. Thornton Creek chum production in Area 23, 1976 to 1984 broods.[1]

Brood Year	No. Eggs Taken[2]	No. Fry Ponded[2]	Mean size at Release/ Group(g)	No. Released[2]
1976	1,099,100	1,011,600	0.7 – 1.2	874,100
1977	1,201,900	1,105,000	1.7 – 0.9	1,076,100
1978	1,776,400	1,618,900	1.1 – 1.2	1,387,100
1979	NIL	–	–	–
1980	NIL	–	–	–
1981	1,502,200	1,310,100	0.8	1,276,900
1981	36,500	–	0.4	26,000
1982	780,300	682,900	0.4 – 1.4	374,600
1983	253,600	172,600	1.4	122,200
1984[3]	317,000	289,000	0.4	289,000

1. Data from DFO–SEP brood summaries for 1976–1978 broods, and from Special Projects Division (SPD) Managment Information Systems for 1981–1984 broods. Facility operated under SEP until 1978 and under CEDP from 1981–1984. PIP was also involved in 1981.

2. Rounded to nearest hundred.

3. Chum production terminated after 1984 brood in favour of coho and chinook production.

Appendix 1, Table 5. Predicted annual returns of Thorton Creek chum salmon for 1976–1984 broods.[1,2]

Brood Year	Total Adult Production	Expected Returns[3]									
		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1976	14,558	5,800	8,700	–	–	–	–	–	–	–	–
1977	18,294	–	7,300	11,000	–	–	–	–	–	–	–
1978	23,581	–	–	9,400	14,100	–	–	–	–	–	–
1979	NIL	–	–	–	0	0	–	–	–	–	–
1980	NIL	–	–	–	–	0	0	–	–	–	–
1981	21,889	–	–	–	–	–	8,800	13,100	–	–	–
1982	4,278	–	–	–	–	–	–	1,700	2,600	–	–
1983	2,078	–	–	–	–	–	–	–	800	1,200	–
1984	2,023	–	–	–	–	–	–	–	–	800	1,200
Total	86,701	5,800	16,000	20,400	14,100	0	8,800	14,800	3,400	2,000	1,200

1. Used 1.7% fry–to–adult survival for fed (>.75g) fry, 1.2% for fed (<.75g) fry and 0.7% for unfed fry (SEP bio–standards, 1987 revision). Note that similar table in Lightly, Wood and Heizer (1985) used 2% for fed fry and 1.4% for unfed fry for 1976–1982 brood (SEP bio–standards, 1981 revision).

2. Data from SPD Management Information System.

3. Used age composition at return of 40% age 3 and 60% age 4; numbers rounded to nearest hundred.

Appendix 1, Table 6. Ahousat chum production in Area 24, 1981 – 1986 broods.[1]

Brood Year	No. Eggs Taken[2]	No. Fry Ponded[2]	Mean size at Release/ Group(g)	No. Released[2]
1981	26,000	100	0.4	100
1982	21,700	19,000	0.4	19,000
1983	17,800	5,600	0.4	5,600
1984	20,000	–	1.5	10,000
1985	60,000	48,500	0.4	48,500
1986	60,000	48,000	0.4	48,000

1. Data from SPD Management Information System.

2. Rounded to nearest hundred.

Appendix 1, Table 7. Predicted annual returns of Ahousat chum salmon for 1981 – 1986 broods.[1,2]

Brood Year	Total Adult Production	Expected Returns[3]						
		1984	1985	1986	1987	1988	1989	1990
1981	1	0	0	–	–	–	–	–
1982	133	–	50	80	–	–	–	–
1983	39	–	–	20	20	–	–	–
1984	170	–	–	–	70	100	–	–
1985	340	–	–	–	–	100	200	–
1986	336	–	–	–	–	–	100	200
TOTAL	1,019	0	50	100	90	200	300	200

1. Used 1.7% fry–to–adult survival for fed (>.75g) fry, and 0.7% for unfed fry (SEP bio–standards, 198

2. Data from SPD management Information System.

3. Used age composition at return of 40% age 3 and 60% age 4; numbers rounded to nearest hundred.

Appendix 1, Table 8. Conuma River chum production in Area 25, 1978–1987 broods. (Data from D. Bailey, pers. comm.)

Brood Year	Females Spawned	No. No. Eggs Taken[1]	No. Fry Ponded[1]	Mean size at Release/ Group(g)	No. Released[1]
1978	–	988,100	855,000	1.1 – 1.2	850,900
1979	1,720	4,112,700	3,247,300	0.8 – 2.0	2,616,900
1980	4,490	12,811,700	–[2]	0.4 – 2.1	8,944,200
1981	6,740	15,016,000	12,940,000	0.9 – 2.2	12,723,800
1982	9,800	20,663,300	18,876,600	0.8 – 1.6	18,795,400
1983	8,000	20,629,000	19,186,900	0.7 – 1.4	18,964,000
1984	8,345	21,698,800	19,735,700[3]	0.5 – 1.5	19,457,700
1985	9,527	23,040,500	19,915,500	0.8 – 2.7	19,757,800
1986	7,253	18,331,700	15,330,100	1.1 – 1.4	15,067,100
1987	5,335	12,461,100	10,839,700	1.0 – 1.3	10,734,600

1. Rounded to nearest hundred.

2. Data not available.

3. Of these, 476,696 fry were released as 0.5 – 3.6g (time and size at release study).

Appendix 1, Table 9. Predicted and actual annual returns of Conuma River Hatchery chum salmon for 1978–1986 broods. (Data from D. Bailey, pers. comm.)

Brood Year	Total Adult Production [1]	Expected Returns [2] 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1978	14,465	5,800	8,700	–	–	–	–	–	–	–	–	–
1979	44,487	–	17,800	26,700	–	–	–	–	–	–	–	–
1980	152,819	–	–	61,100	91,700	–	–	–	–	–	–	–
1981	213,645	–	–	–	85,500	128,200	–	–	–	–	–	–
1982	319,522	–	–	–	–	127,800	191,700	–	–	–	–	–
1983	313,808	–	–	–	–	–	125,500	188,300	–	–	–	–
1984	327,917	–	–	–	–	–	–	131,200	196,800	–	–	–
1985	335,882	–	–	–	–	–	–	–	134,400	201,500	–	–
1986	256,140	–	–	–	–	–	–	–	–	102,500	153,700	–
1987	183,488	–	–	–	–	–	–	–	–	–	73,000	109,500
TOTAL	2,162,173	5,800	26,500	87,800	177,200	256,000	317,200	319,500	331,200	304,000	226,700	109,500

Brood Year	Total Adult Production [3]	Actual Returns 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1978	11,859	336	9,480	2,042	–	–	–	–	–	–		
1979	66,522	–	36,879	27,893	1,750	–	–	–	–	–		
1980	54,818	–	–	18,769	35,906	142	–	–	–	–		
1981	143,679	–	–	318	53,425	81,413	8,523	–	–	–		
1982	213,316	–	–	–	–	81,923	114,381	16,599	413	–		
1983	20,406	–	–	–	–	–	4,334	15,059	1,013	–		
1984	44,645	–	–	–	–	–	–	8,946	32,845	2,936		
1985	36,327	–	–	–	–	–	–	–	549	35,778		
1986	6,752	–	–	–	–	–	–	–	–	6,725		
TOTAL	598,324	336	46,359	49,022	91,081	163,478	127,238	40,604	34,820	45,439		

1. Used 1.7% fry–to–adult survival for fed (>.75g)fry, 1.2% for fed (<.75g) fry and 0.7% for unfed fry (SEP bio–standards, 1987 revision). Note that similar table in Lightly, Wood and Heizer (1985) used 2% fry–to–adult survival for 1978–1982 broods (SEP bio–standards, 1981 revision).

2. Used age composition at return of 40% age 3 and 60% age 4; numbers rounded to nearest hundred.

3. Data complete to 1989 return year.

Appendix 1, Table 10. Kyuquot chum production in Area 26, 1984 and 1985 broods.[1]

Brood Year	No. Eggs Taken[2]	No. Fry Ponded[2]	Mean size at Release/ Group(g)	No. Released[2]
1984	50,000	0	–[3]	0
1985	19,000	17,000	0.4	17,000

1. Data from SPD Management Information System.

2. Rounded to nearest hundred.

3. All eggs lost.

Appendix 1, Table 11. Predicted annual returns of Kyuqot chum salmon for 1984 – 1985 broods.[1,2]

Brood Year	Total Adult Production	Expected Returns[3]		
		1987	1988	1989
1984	NIL	0	0	–
1985	119	–	50	70
TOTAL	119	0	50	70

1. Used 0.7% fry–to–adult survival for unfed fry (SEP bio–standards, 1987 revision).

2. Data from SPD Management Information System.

3. Used age composition at return of 40% age 3 and 60% age 4.

Appendix 1, Table 12. Chum production by project in Area 27, 1981 through 1989.[1,2]

Brood Year	No. Eggs Taken	No. Fry Ponded	Mean size at Release/ Group(g)	No. Released
		CORDY CREEK		
1985	42,000	40,000	0.6	40,000
1986	50,000	27,000	1.2	26,000
1987	120,000	108,000	1.5	102,800
1988	71,500	64,500	1.0	64,000
1989	78,800	77,500	1.0	77,000
		MARBLE RIVER		
1982	24,000	2,850	1.5	2,800
		MONKEY CREEK		
1985	37,500	34,000	2.0	27,000
1986	45,000	40,000	1.0–6.0	35,000
1987	18,000	16,200	2.0	16,000
		NEQUILTPAALIS CREEK		
1981	45,000	39,000	0.4	39,000
1982	15,000	14,500	0.4	14,500
1983	3,500	3,500	1.0	3,500
1984	14,000	0	–[3]	0[6]
1985	22,000	21,500	0.4 – 1.5	21,500
		QUATSINO CREEK		
1982	5,000	4,000	0.4	4,000
1983	500	500	0.4	500
1984	6,000	3,500	0.4	3,500
1985	16,200	10,000	0.4	10,000
1986	25,000	18,000	0.4	18,000
1987	15,000[5]	15,000	0.4	15,000
1988	10,400	10,400	0.4	10,000
		STEPHENS CREEK		
1983	601,600	–[3]	0.7 – 1.0	438,700
1984	626,500	589,900	0.4 – 0.6	589,900
1985	1,949,500	1,580,600	0.4	1,576,600
1986	1,345,600	881,100	0.4 – 0.8	881,100
1987	275,800[4]	237,900	0.5	237,900
1988	165,400	102,800	0.4 – 0.5	102,300
1989	404,300	292,000	0.4	292,000

1. Data from SPD Management Information System.
2. Rounded to nearest hundred.
3. All eggs lost.
4. Eggs obtained from other projects.
5. Data not available.
6. 15,000 eggs transferred to other project.

Appendix 1, Table 13. Predicted annual returns of chum salmon by project in Area 27, for 1981 –1989 broods.[1,2]

Brood Year	Total Adult Production	Expected Returns									
		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
						CORDY CREEK					
1985	480	–	–	–	–	200	300	–	–	–	–
1986	4442	–	–	–	–	–	200	250	–	–	–
1987	1748	–	–	–	–	–	–	700	1100	–	–
1988	1088	–	–	–	–	–	–	–	450	650	–
1989	1309	–	–	–	–	–	–	–	–	500	800
TOTAL	9067	0	0	0	0	200	500	950	1550	1150	800
						MARBLE RIVER					
1982	48	–	20	30	–	–	–	–	–	–	–
						MONKEY CREEK					
1985	459	–	–	–	–	200	250	–	–	–	–
1986	595	–	–	–	–	–	250	350	–	–	–
TOTAL	1,054	0	0	0	0	200	500	350	–	–	–
						NEQUILTPAALIS CREEK					
1981	273	100	150	–	–	–	–	–	–	–	–
1982	102	–	40	60	–	–	–	–	–	–	–
1983	60	–	–	20	40	–	–	–	–	–	–
1984	0	–	–	–	0	0	–	–	–	–	–
1985	306	–	–	–	–	100	200	–	–	–	–
TOTAL	741	100	190	80	40	100	200	0	–	–	–
						QUATSINO CREEK					
1982	28	–	10	15	–	–	–	–	–	–	–
1983	4	–	–	2	2	–	–	–	–	–	–
1984	25	–	–	–	10	15	–	–	–	–	–
1985	70	–	–	–	–	30	40	–	–	–	–
1986	126	–	–	–	–	–	50	75	–	–	–
1987	105	–	–	–	–	–	–	40	60	–	–
1988	73	–	–	–	–	–	–	–	30	40	–
TOTAL	431	0	10	17	12	45	90	115	90	40	0
						STEPHENS CREEK					
1983	6,779	–	–	2,700	4,100	–	–	–	–	–	–
1984	4,848	–	–	–	1,900	2,900	–	–	–	–	–
1985	11,036	–	–	–	–	4,400	6,600	–	–	–	–
1986	6,918	–	–	–	–	–	2,800	4,100	–	–	–
1987	1665	–	–	–	–	–	–	700	1000	–	–
1988	803	–	–	–	–	–	–	–	300	500	–
1989	3334	–	–	–	–	–	–	–	–	1300	2000
TOTAL	35,383	0	0	2,700	6,000	7,300	9,400	4,800	1,300	1,800	2,000

1. Used 1.7% fry–to–adult survival for fed (>.75g) fry, 1.2% for fed (<.75g) fry and 0.7% for unfed fry (SEP bio–standards, 1987 revision).

2. Used age composition at return of 40% age 3 and 60% age 4.

APPENDIX 2 - FORECASTING RUNS

The following tables (App. 2., Tables 1 through 5) illustrate the problem in using return per spawner data as a predictor of potential run size. The return per spawner data are averages of 1980 through 1987 data found in Lightly **et. al** (1985) and from the brood year summaries in this report (App 2., Table 6.)

The return rate of chum salmon of any particular age in the return years 1980 through 1987 from the appropriate brood year (for example the return of 3 year olds in 1983 from the 1980 brood year) are tabularized and averaged in App. 2, Table 6. These average values are then applied to the appropriate brood year to predict the number of chum salmon of any age which might be expected in the return year in question. Thus, for example, the average rate of return of 3 year olds in Area 22 is 2.29 per spawner in the brood year. App. 2, Table 1 indicates that in 1987, 174,135 3 year olds should have returned. In this fashion, App. 2, Tables 1 through 5 have been constructed for the years 1983 through 1987.

The variability in this prediction renders it useless (the standard deviation is often larger than the mean). The predicted numbers, calculated by this method, compared to the estimated actual numbers, are also shown in these tables. Again, the magnitude of the errors are apparent (up to 5.2x difference). It is for this reason that no attempt is made, on the basis of return per spawner, to quantify expectation: There is no empirical reason for doing so.

Expectations for returns to areas from major enhancement facilities are calculated each year by SEP, and a portion of this expected surplus is allocated, in the preseason fishing plans, to the two gear types. Returns of "natural" chums, if any, are discovered either during the fishing or test fishing activities and any surplus of these fish constitute an unexpected bonanza for the industry. In areas without major enhancement, no predictions are made, and, generally, poor past performance is taken to imply poor present performance.

Appendix 2, Table 1. Calculation of predicted numbers of returning chums at different ages, actual numbers at those ages, and the percent difference between them in 1987.

AREA	AGE	BROOD YEAR ESCAPEMENT	AVERAGE R/S	(STD)	PREDICTED NO. AT AGE IN 1987	(STD)	ACTUAL NO. AT AGE IN 1987	PERCENT DIFF. ACT/PRED
22	5s	22,500	0.64	0.91	14,392	20,427	32,152	223
	4s	8,000	7.78	10.02	62,240	80,181	248,282	399
	3s	76,000	2.29	2.07	174,135	157,591	313,776	180
	TOTAL				250,767	258,199	595,400 [1]	237
23	5s	119,000	0.03	0.03	3,421	3,336	16,650	487
	4s	36,500	0.58	0.43	21,307	15,586	14,600	69
	3s	11,600	0.31	0.33	3,582	3,771	18,750	524
	TOTAL				28,310	22,693	50,000	177
24	5s	73,000	0.05	0.04	3,376	2,579	5,760	171
	4s	47,800	0.72	0.31	34,184	14,617	16,650	49
	3s	54,500	0.44	0.47	24,048	25,770	7,590	32
	TOTAL				61,609	42,966	22,410	36
25	5s	164,300	0.18	0.15	29,163	24,017	25,070	86
	4s	161,100	1.76	0.88	283,939	142,243	59,570	21
	3s	115,700	0.87	1.50	100,948	173,659	30,245	30
	TOTAL				414,050	339,919	114,885	28
26	5s	91,200	0.17	0.15	15,504	13,951	10,726	69
	4s	86,200	2.37	1.72	203,971	147,985	26,371	13
	3s	81,300	1.86	3.51	151,015	285,036	12,103	8
	TOTAL				370,490	446,971	49,200	13
27	5s	78,100	0.08	0.07	5,858	5,411	4,646	79
	4s	12,000	1.01	0.60	12,090	7,238	13,431	111
	3s	13,300	0.59	0.79	7,781	10,553	6,123	79
	TOTAL				25,728	23,203	24,200	94

1. These totals also include 1191 6 year olds which were not included in this table.

Appendix 2, Table 2. Calculation of predicted numbers of returning chums at different ages, actual numbers at those ages and the percent difference between them in 1986.

AREA	AGE	BROOD YEAR ESCAPEMENT	AVERAGE R / S	(STD)	PREDICTED NO. AT AGE IN 1986	(STD)	ACTUAL NO. AT AGE IN 1986	PERCENT DIFF. ACT/PRED
22	5s	115,000	0.64	0.91	73,600	104,650	315,355	428
	4s	22,500	7.78	10.02	175,050	225,450	196,964	113
	3s	8,000	2.29	2.07	18,320	16,560	18,582	101
	TOTAL				266,970	346,660	530,900	199
23	5s	67,500	0.03	0.03	2,025	2,025	5,534	273
	4s	119,000	0.58	0.43	69,020	51,170	33,111	48
	3s	36,500	0.31	0.33	11,315	12,045	8,254	73
	TOTAL				82,360	65,240	46,900	57
24	5s	63,900	0.05	0.04	3,115	2,400	5,639	181
	4s	73,000	0.72	0.31	52,560	22,630	60,443	115
	3s	47,800	0.44	0.47	21,032	22,644	4,555	22
	TOTAL				76,707	47,674	66,082	86
25	5s	116,700	0.18	0.15	21,006	17,220	15,668	75
	4s	164,300	1.76	0.88	289,168	144,584	280,209	97
	3s	161,100	0.87	1.50	140,157	241,650	5,122	4
	TOTAL				450,331	403,454	300,999	67
26	5s	50,000	0.17	0.15	8,625	7,598	6,288	73
	4s	91,200	2.37	1.72	216,144	156,864	66,889	31
	3s	86,200	1.86	3.51	160,332	302,562	5,423	3
	TOTAL				385,101	467,024	78,600	20
27	5s	30,900	0.08	0.07	2,472	2,146	4,251	172
	4s	78,100	1.01	0.60	78,881	46,860	45,562	58
	3s	12,000	0.59	0.79	7,080	9,480	3,434	48
	TOTAL				88,433	58,486	53,247	60

Appendix 2, Table 3. Calculation of predicted numbers of returning chums at different ages, actual numbers at those ages and the percent difference between them in 1985.

AREA	AGE	BROOD YEAR ESCAPEMENT	AVERAGE R / S	(STD)	PREDICTED NO. AT AGE IN 1985	(STD)	ACTUAL NO. AT AGE IN 1985	PERCENT DIFF. ACT/PRED
22	5s	54,500	0.64	0.91	34,880	49,595	3,669	11
	4s	115,000	7.78	10.02	894,700	1,152,300	1,775,602	198
	3s	22,500	2.29	2.07	51,525	46,575	56,863	110
	TOTAL				981,105	1,248,470	1,836,134	187
23	5s	82,600	0.03	0.03	2,478	2,478	510	21
	4s	67,500	0.58	0.43	39,150	29,025	81,663	209
	3s	119,000	0.31	0.33	36,890	39,270	43,953	119
	TOTAL				78,518	70,773	126,126	161
24	5s	118,000	0.05	0.04	5,753	4,720	193	3
	4s	63,900	0.72	0.31	46,008	19,809	30,896	67
	3s	73,000	0.44	0.47	32,120	34,310	16,629	52
	TOTAL				83,881	58,839	31,089	37
25	5s	125,500	0.18	0.15	22,590	18,825	1,707	8
	4s	116,700	1.76	0.88	205,392	102,696	224,575	109
	3s	164,300	0.87	1.50	142,941	246,450	115,018	80
	TOTAL				370,923	367,971	341,300	92
26	5s	74,400	0.17	0.15	12,834	11,160	0	0
	4s	50,000	2.37	1.72	118,500	86,000	99,781	84
	3s	91,200	1.86	3.51	169,632	320,112	60,133	35
	TOTAL				300,966	417,272	159,914	53
27	5s	79,700	0.08	0.07	6,376	5,579	100	2
	4s	30,900	1.01	0.60	31,209	18,540	16,089	52
	3s	78,100	0.59	0.79	46,079	61,699	8,660	19
	TOTAL				83,664	85,818	24,849	30

Appendix 2, Table 4. Calculation of predicted numbers of returning chums at different ages, actual numbers at those ages and the precent difference between them in 1984.

AREA	AGE	BROOD YEAR ESCAPEMENT	AVERAGE R / S	(STD)	PREDICTED NO. AT AGE IN 1984	(STD)	ACTUAL NO. AT AGE IN 1984	PERCENT DIFF. ACT/PRED
22	5s	4,500	0.64	0.91	2,880	4,095	788	27
	4s	54,500	7.78	10.02	424,010	546,090	18,914	4
	3s	115,000	2.29	2.07	263,350	238,050	242,998	92
	TOTAL				690,240	788,235	262,700	38
23	5s	48,800	0.03	0.03	1,464	1,464	1,861	127
	4s	82,600	0.58	0.43	47,908	35,518	17,935	37
	3s	67,500	0.31	0.33	20,925	22,275	22,250	106
	TOTAL				70,297	59,257	42,046	60
24	5s	29,600	0.05	0.04	1,480	1,184	2,376	161
	4s	118,000	0.72	0.31	84,960	36,580	22,896	27
	3s	63,900	0.44	0.47	28,116	30,033	28,404	101
	TOTAL				114,556	67,797	25,272	22
25	5s	40,800	0.18	0.15	7,344	6,120	9,110	124
	4s	125,500	1.76	0.88	220,880	110,440	103,323	47
	3s	116,700	0.87	1.50	101,529	175,050	109,767	108
	TOTAL				329,753	291,610	222,200	67
26	5s	14,700	0.17	0.15	2,499	2,205	6,426	257
	4s	74,400	2.37	1.72	176,328	127,968	40,698	23
	3s	50,000	1.86	3.51	93,000	175,500	76,356	82
	TOTAL				271,827	305,673	123,480	45
27	5s	16,200	0.08	0.07	1,296	1,134	612	47
	4s	79,700	1.01	0.60	80,497	47,820	5,894	7
	3s	30,900	0.59	0.79	18,231	24,411	7,311	40
	TOTAL				100,024	73,365	13,817	14

Appendix 2, Table 5. Calculation of predicted numbers of returning chums at different ages, actual numbers at those ages and the percent difference between them in 1983.

AREA	AGE	BROOD YEAR ESCAPEMENT	AVERAGE R / S	(STD)	PREDICTED NO. AT AGE IN 1983	(STD)	ACTUAL NO. AT AGE IN 1983	PERCENT DIFF. ACT/PRED
22	5s	8,400	0.64	0.91	5,376	7,644	1,128	21
	4s	4,500	7.78	10.02	35,010	45,090	4,480	13
	3s	54,500	2.29	2.07	124,805	112,815	2,392	2
	TOTAL				165,191	165,549	8,000	5
23	5s	150,100	0.03	0.03	4,503	4,503	8,044	179
	4s	48,800	0.58	0.43	28,304	20,984	16,937	60
	3s	82,600	0.31	0.33	25,606	27,258	11,845	46
	TOTAL				58,413	52,745	36,826	63
24	5s	110,300	0.05	0.04	5,515	4,412	10,420	189
	4s	29,600	0.72	0.31	21,312	9,176	21,940	103
	3s	118,000	0.44	0.47	51,920	55,460	15,344	30
	TOTAL				78,747	69,048	32,361	41
25	5s	116,000	0.18	0.15	20,880	17,400	54,990	263
	4s	40,800	1.76	0.88	71,808	35,904	74,956	104
	3s	125,500	0.87	1.50	109,185	188,250	38,578	35
	TOTAL				201,873	241,554	168,523	83
26	5s	84,500	0.17	0.15	14,365	12,675	13,964	97
	4s	14,700	2.37	1.72	34,839	25,284	40,342	116
	3s	74,400	1.86	3.51	138,384	261,144	31,894	23
	TOTAL				187,588	299,103	86,200	46
27	5s	30,300	0.08	0.07	2,424	2,121	2,616	108
	4s	16,200	1.01	0.60	16,362	9,720	5,508	34
	3s	79,700	0.59	0.79	47,023	62,963	3,852	8
	TOTAL				65,809	74,804	11,976	18

Appendix 2, Table 6. Average rates of return (and STD) for WCVI Statistical Areas 22 – 27, 1980 – 1987.

RETURN YEAR	AREA 22 3s	AREA 22 4s	AREA 22 5s	AREA 23 3s	AREA 23 4s	AREA 23 5s	AREA 24 3s	AREA 24 4s	AREA 24 5s
1980	6.55	2.15	0.00	1.05	0.34	0.01	1.51	0.93	0.03
1981	0.14	2.59	0.02	0.04	0.62	0.01	0.05	1.16	0.02
1982	0.53	1.06	0.25	0.46	0.60	0.06	0.83	0.78	0.00
1983	0.04	1.00	0.13	0.14	0.35	0.05	0.13	0.74	0.09
1984	2.11	0.35	0.48	0.09	0.06	0.01	0.45	0.20	0.08
1985	2.51	15.31	0.07	0.46	1.52	0.01	0.37	0.79	0.00
1986	2.32	8.74	2.74	0.23	0.28	0.08	0.08	0.86	0.08
1987	4.13	31.04	1.43	0.00	0.90	0.00	0.11	0.26	0.07
AVG	2.29	7.78	0.64	0.31	0.58	0.03	0.44	0.72	0.05
STD	2.07	10.02	0.91	0.33	0.43	0.03	0.47	0.31	0.04

	AREA 25 3s	AREA 25 4s	AREA 25 5s	AREA 26 3s	AREA 26 4s	AREA 26 5s	AREA 27 3s	AREA 27 4s	AREA 27 5s
1980	4.81	1.79	0.03	11.05	3.57	0.03	2.62	1.42	0.02
1981	0.04	2.65	0.06	0.08	5.57	0.09	0.09	1.43	0.02
1982	0.63	3.17	0.32	0.92	3.49	0.40	0.70	2.06	0.22
1983	0.31	1.84	0.46	0.43	2.74	0.17	0.05	0.34	0.09
1984	0.47	0.76	0.26	1.53	0.55	0.44	0.23	0.07	0.04
1985	0.45	2.24	0.02	0.66	2.00	0.00	0.24	1.12	0.00
1986	0.03	1.31	0.14	0.06	0.73	0.13	0.28	0.67	0.14
1987	0.24	0.34	0.13	0.13	0.28	0.10	0.47	0.95	0.07
AVG	0.87	1.76	0.18	1.86	2.37	0.17	0.59	1.01	0.08
STD	1.50	0.88	0.15	3.51	1.72	0.15	0.79	0.60	0.07

Note: Each entry is calculated as total return of a specific age in a year divided by the escapement which produced it. For example, the rate of return in Area 22 for 3 year olds in 1981 (data from Table 1) is 1150/8400 = 0.14.

APPENDIX 3 - TEST FISHING DATA

The following tables (App. 3, Tables 1 through 10) are summaries of test fishing conducted on WCVI from 1984 to 1987. Tables 1 through 6 are daily summaries of chartered seine test fishing in Areas 21 and 23 through 27. These summaries are made from a database of individual set records, too tedious and of limited value for inclusion here. Tables 7 through 10 are individual sets from set logs from a gillnet vessel chartered to fish in Nitinat Lake during the period 1984 to 1987.

The seine vessels would scout an area looking for schools of chum, and set on them in a manner consistent with standard fishing techniques. An estimate of the numbers of chum salmon and other species for each set was made, and a sample of scales was taken for age analysis. Periodically, the seine vessel crew and the on-board DFO representative would discuss the results of the fishing activities and other observations (movement and condition of the fish, weather and its influence on escapement, for example) and would make an estimate of the numbers of chum salmon in the area. These data were transmitted to the managers, and decisions about openings were made in consideration of these findings.

Generally, this activity started near Nitinat (Area 21) as chum salmon return to this area first, and then progressed first to Nootka Sound and Esperanza Inlet (Area 25) and then to Kyuquot Sound (Area 26) when deemed necessary. Areas considered to have little chance of harvestable surpluses (Areas 23, 24 and 27) were test fished on an **ad hoc** basis when resources were available.

The gillnet test fishery in Nitinat Lake was designed to determine numbers of chums which had moved in from the ocean to the lake. Since no commercial fishing occurs in the lake, numbers in the lake are considered to be an approximation of the escapement, and its use inseason was to help determine when the clean-up fishery would start. The cleanup fishery would generally start when there were around 100,000 chum salmon in the lake, good numbers of chum salmon continuing to move into the lake, and adequate numbers outside the lake (as determined by the seine test fishery outside the lake).

As with the seine test vessels, this gillnet test vessel would scout the lake for schools of chum salmon, make some test sets, and at the end of the day, make an estimate of the numbers of chum salmon in the lake. These data, along with observations of fish movement and quality, were used to make management decisions.

Appendix 3, Table 1. Daily summary of Area 21 chum test fishery (average catch per set)

MON/DAY	YEAR 1984	1985	1986	1987
920				
921				
922				
923				
924				
925				
926				
927				
928				
929				
930				
1001				
1002				
1003				
1004				
1005		1710.0		
1006		407.0	60.8	
1007		1046.7	54.0	
1008		650.0		
1009			585.2	330.0
1010				461.8
1011				877.3
1012			1670.0	
1013			893.6	42.8
1014				526.8
1015				
1016	379.3			68.1
1017	450.8			1318.8
1018			80.2	314.9
1019			286.0	635.0
1020	497.0		53.1	307.6
1021				
1022			1500.0	
1023			1035.0	
1024				
1025				130.0
1026				384.2
1027				81.7
1028			1000.0	
1029				232.1
1030				7.0
1031				
1101				221.8
1102			800.0	160.6
1103			700.0	9.0
1104				
1105				0.0
1106				5.6
1107				18.3
1108				0.0
1109				
1110				
STOCK [1]	262,700	1,819,300	530,300	595,400

1. Total stock (catch and escapement) from Table 1.

Appendix 3, Table 2. Daily summary of Area 23 chum test fishery (average catch per set)

MON/DAY	YEAR			
	1984	1985	1986	1987
920				
921				
922				
923				
924				
925				
926				
927				
928				
929				
930				
1001				
1002				
1003				
1004				
1005				
1006				
1007				
1008				
1009				
1010		0.5		
1011	22.8	26.7		
1012		70.0		4.0
1013		88.0		354.7
1014				
1015				
1016				
1017				
1018				
1019				
1020			47.2	
1021			14.5	
1022				
1023				
1024				
1025				
1026				
1027				
1028			20.0	
1029				
1030				
1031				
1101				5.6
1102				
1103				
1104				
1105				1.5
1106				
1107				
1108				
1109				
1110				
STOCK [1]	12,100	159,800	46,800	N/A

1. Total stock (catch and escapement) from Table 6.

Appendix 3, Table 3. Daily summary of Area 24 chum test fishery (average catch per set)

	YEAR			
MON/DAY	1984	1985	1986	1987
920				
921				
922				
923				
924				
925				
926				
927				
928				
929				
930				
1001				
1002				
1003				
1004				
1005				
1006				
1007				
1008				
1009				
1010				
1011	0.5			
1012		23.0		
1013				
1014				
1015				
1016				
1017				
1018				
1019				
1020				
1021				
1022				
1023				
1024				
1025				
1026				
1027				
1028				
1029				
1030				
1031				
1101				
1102				
1103				
1104				
1105				
1106				
1107				
1108				
1109				
1110				
STOCK [1]	54,500	79,100	72,300	23,800

1. Total stock (catch and escapement) from Table 11.

Appendix 3, Table 4. Daily summary of Area 25 chum test fishery (average catch per set)

	YEAR			
MON/DAY	1984	1985	1986	1987
912				
913				
914				
915	10.0			
916	18.0			
917	8.6			
918	13.3			
919	0.8	34.3	13.8	
920	36.0	89.4	29.4	
921	24.2	20.4	16.0	47.5
922	22.2	31.1		17.2
923		28.3		166.0
924	120.0	17.2		96.0
925	104.0	26.0	71.7	18.3
926		32.0	39.7	21.7
927		32.3		47.0
928		103.3	130.0	20.9
929			70.0	30.2
930		121.7	49.8	278.2
1001		9.3	40.3	47.3
1002		25.4	125.3	43.4
1003	72.8	60.0	748.0	31.3
1004	19.0	85.0	150.0	95.5
1005	66.3		53.8	15.2
1006			108.7	23.9
1007			164.9	72.0
1008			127.5	780.2
1009			189.1	9.3
1010				8.5
1011				26.3
1012				41.0
1013				23.7
1014				19.0
1015			425.0	6.3
1016			14.0	47.5
1017			60.4	18.3
1018			467.2	
1019			39.7	5.0
1020				
1021				
1022				12.3
1023				48.0
1024				
1025				
1026				
1027				
1028				
1029				
1030				
1031				
1101				
STOCK [1]	221,900	360,300	237,100	106,800

1. Toyal stock (catch and escapement) from Table 16.

Appendix 3, Table 5. Daily summary of Area 26 chum test fishery (average catch per set)

	YEAR			
MON/DAY	1984	1985	1986	1987
917			0.0	
918			3.4	
919				
920				
921				
922				
923			6.3	
924		45.3	3.5	
925		24.0	7.3	
926	85.4		18.0	
927	81.0		44.1	81.8
928	64.3	63.1		264.3
929	150.0	51.4	166.4	139.6
930	72.5	86.8	59.3	105.7
1001	84.6	23.5	70.3	272.8
1002	90.1	118.3	104.3	43.3
1003		54.3	154.2	17.8
1004		88.9		37.7
1005				7.5
1006				693.3
1007	98.7			15.0
1008	229.4	112.0		
1009	116.4	234.9		
1010		96.3		
1011		296.7	97.5	
1012		118.4	114.5	
1013				
1014			66.0	
1015			65.5	
1016				
1017			20.8	
1018				
1019				
1020			31.8	47.2
1021			76.3	14.5
1022				
1023				
1024				
1025				
1026				
1027				
1028				
1029				
1030				
1031				
1101				
1102				
1103				
1104				
1105				
1106				
1107				
STOCK [1]	126,000	165,200	78,600	42,500

1. Total stock (catch and escapement) from Table 21.

Appendix 3, Table 6. Daily summary of Area 27 chum test fishery (average catch per set)

	YEAR			
MON/DAY	1984	1985	1986	1987
920				
921				
922				
923				
924				
925				
926		28.2		
927		36.0		
928				
929				
930				
1001				
1002				
1003				
1004				
1005				
1006				
1007				
1008				
1009				
1010				
1011				
1012				
1013				
1014				
1015				
1016				
1017				
1018				
1019				
1020				
1021				
1022				
1023				
1024				
1025				
1026				
1027				
1028				
1029				
1030				
1031				
1101				
1102				
1103				
1104				
1105				
1106				
1107				
1108				
1109				
1110				
STOCK [1]	11,300	53,900	59,900	24,200

1. Total stock (catch and escapement) from Table 26.

Appendix 3, Table 7. Summary of test fishing catches by gillnet in Nitinat Lake.

MON/DAY	YEAR							
	1984		1985		1986		1987	
	Avg. #/set	Est. # in Lake	Avg. #/set	Est. # in Lake	Avg. #/set	Est. # in Lake	Avg. #/set	Est. # in Lake
924								
925								
926								
927								
928								
929								
930								
1001								
1002								
1003								
1004								
1005							55.3	20,000 to
1006								50,000
1007								
1008								
1009								
1010								
1011								
1012								
1013					32.0	18,000		
1014								
1015								
1016			80.7	250,000 to	29.2	125,000		
1017				300,000				
1018							175.7	125,000
1019	41.0	40,000			49.8	5,000		
1020	43.3	45,000						
1021								
1022								
1023					30.7	20,000 to		
1024						25,000		
1025								
1026					14.5	40,000		
1027								
1028								
1029							88.5	no est.
1030					32.0	no est.		
1031								
1101								
1102					26.0	no est.		
1103								
1104								
1105							16.3	5,000
1106								
1107								
1108								
1109								
1110					5.5	10,000 to 12,000		
1111					3.5	15,000		
STOCK [1]		262,700		1,819,300		530,300		595,400

1. Total stock (catch and escapement) from Table 1.

APPENDIX 4 - COMPARISONS OF CATCH AND TOTAL RETURN OF EACH WCVI AREA TO THE WCVI TOTAL

The following tables (App. 4, Tables 1 and 2) summarize the performance of catch (Table 1) and total return (Table 2) as compared to the catch and total return for WCVI as a whole since 1951. These tables show the gradual shift in importance of the fishing areas during the period for which DFO has relatively reliable records.

Mean total returns for the 1980 - 1987 period are the highest since 1951, but mean catches for the 1980 - 1987 period are slightly lower than in the 1970s. This is probably a result of extra caution exercised in achieving escapement targets, largely as a result of the adoption of the new management strategies documented in this report.

Note also that Nitinat (Area 21/22) has had the largest increase in production, and that Area 23 has had the most reduced share, followed closely by Area 27.

Appendix 4 Table 1. Annual chum salmon catches including test fishing catches in Areas 22–27, expressed as percent of WCVI total chum catch, 1951–1987.

Year	Area 22	% Of Total	Area 23	% Of Total	Area 24	% Of Total	Area 25	% Of Total	Area 26	% Of Total	Area 27	% Of Total	Total Catch
1951	27,100	6.2	90,200	20.7	22,600	5.2	95,400	21.9	23,600	5.5	176,200	40.5	435,300
1952			45,100	37.6	13,400	11.2	47,200	39.3	6,900	5.7	7,500	6.2	120,100
1953	59,900	9.2	198,600	30.4	55,900	8.6	211,600	32.4	87,300	13.4	39,300	6.0	652,800
1954	217,200	23.7	315,700	34.4	95,900	10.4	173,500	18.9	62,600	6.8	53,400	5.8	918,300
1855	7,200	3.3	114,200	51.7	21,100	9.6	58,200	26.4	5,500	2.5	14,600	6.6	220,600
1956	118,300	19.5	257,300	42.5	53,500	8.8	88,300	14.6	39,100	6.5	48,700	8.0	605,200
1957	85,300	21.3	113,800	28.4	33,600	8.4	77,700	19.4	66,500	16.6	23,900	6.0	400,600
1958	205,800	38.2	103,700	19.3	24,400	4.5	115,200	21.4	87,300	16.2	1,600	0.3	538,200
1959			76,500	25.5	37,400	12.5	77,500	25.8	93,500	31.1	15,300	5.1	300,200
Mean 1951–59	102,971	21.1	148,122	29.9	39,756	8.1	104,978	21.5	52,500	10.7	42,300	8.7	488,627
1960	48,200	10.9	71,000	16.1	28,800	6.5	103,100	23.4	130,900	29.7	58,300	13.2	440,300
1961			33,100	18.9	15,200	8.7	78,900	45.0	48,300	27.5			175,500
1962			37,500	29.9	17,300	13.8	42,200	33.6	28,600	22.8			125,600
1963					8,900	11.4	55,000	70.2	14,500	18.5			78,400
1964							45,500	100.0					45,500
1965													
1966													
1967													
1968													
1969							3,200	100.0					3,200
Mean 1960–69	48,200	17.1	47,200	16.8	17,550	6.2	54,650	19.4	55,575	19.7	58,300	20.7	281,475
1970			20,400	16.5			103,300	83.5					123,700
1971			25,100	25.0	3,000	3.0	64,800	64.5	7,600	7.6			100,500
1972	1,290,500	87.2	40,400	2.7	33,600	2.3	103,700	7.0	11,400	0.8			1,479,600
1973	174,800	40.0	95,700	21.9	100	0.0	141,400	32.4	24,600	5.6			436,600
1974			2,400	1.1			162,900	71.9	61,300	27.1			226,600
1975			1,600	1.6			63,400	61.6	38,000	36.9			103,000
1976			2,700	2.8	68,200	69.5	18,600	19.0	8,600	8.8			98,100
1977			500	11.1	1,800	40.0	2,200	48.9					4,500
1978			69,900	34.8	124,800	62.1	5,300	2.6	1,000	0.5			201,000
1979			2,100	63.6	1,200	36.4							3,300
Mean 1970–79	732,650	82.5	26,080	2.9	33,271	3.7	73,956	8.3	21,786	2.5			887,743
1980	273,900	35.8	87,400	11.4	35,600	4.7	207,000	27.1	160,600	21.0			764,500
1981			18,100	13.3	22,400	16.5	41,300	30.3	50,500	37.1	3,800	2.8	136,100
1982			1,400	0.3	38,000	7.3	259,200	49.6	224,000	42.9			522,600
1983			400	4.7			8,100	95.3					8,500
1984	186,700 [1]	56.0	500	0.2			106,200	31.9	39,700	11.9			333,100
1985	1,609,300 [1]	86.1	7,400	0.4	200	0.0	212,300	11.4	40,200	2.2	100	0.0	1,869,500
1986	387,500 [1]	72.9	200	0.0			144,100	27.1					531,600
1987	395,400 [1]	96.7					12,400	3.0	1,200	0.3			409,000
Mean 1980–87	570,560	69.3	16,486	2.0	24,050	2.9	123,825	15.0	86,033	10.5	1,950	0.2	822,904
Overall Mean 1951–87	339,140	55.2	63,203	10.3	31,546	5.1	91,528	14.9	52,442	8.5	36,908	6.0	614,768

1. Area 22 catches in 1984–1987 were actually taken in Area 21.

Appendix 4, Table 2. Annual chum salmon stock estimates (catches and escapements) in Areas 22–27, expressed as a percent of WCVI total chum stock, 1951–1967.

Year	Area 22	% Of Total	Area 23	% Of Total	Area 24	% Of Total	Area 25	% Of Total	Area 26	% Of Total	Area 27	% Of Total	Total Stock
1951	39,600	4.6	233,300	27.0	91,600	10.6	149,300	17.3	80,700	9.3	270,500	31.3	865,000
1952	46,000	8.2	113,100	20.1	102,600	18.3	135,400	24.1	111,100	19.8	53,200	9.5	561,600
1953	76,400	6.3	426,300	35.1	121,600	10.0	344,600	28.4	164,700	13.5	81,500	6.7	1,215,500
1954	303,200	18.3	642,600	38.7	223,900	13.5	259,000	15.6	126,300	7.6	105,300	6.3	1,660,300
1855	19,700	4.9	167,700	41.7	56,900	14.6	89,900	22.3	31,600	7.9	34,700	8.6	402,500
1956	164,400	17.1	351,200	36.4	101,900	10.6	156,400	16.4	76,300	8.1	109,800	11.4	964,000
1957	108,600	13.5	253,900	31.5	84,200	10.4	122,100	15.1	140,900	17.5	96,700	12.0	806,400
1958	224,800	20.7	304,600	28.0	93,500	8.6	216,600	20.1	197,100	18.1	49,400	4.5	1,086,000
1959	23,000	3.7	171,000	27.3	97,600	15.6	151,100	24.1	147,200	23.5	36,300	5.8	626,200
Mean 1951–59	111,744	12.3	295,967	32.5	108,467	11.9	180,956	19.9	119,767	13.2	93,044	10.2	909,944
1960	92,300	9.3	125,400	12.6	113,200	11.4	397,000	40.0	193,500	19.5	70,000	7.1	991,400
1961	44,200	9.9	63,100	16.6	41,000	9.2	166,900	41.9	68,700	15.4	21,700	4.9	445,600
1962	18,700	4.9	95,700	25.3	65,900	17.4	123,100	32.5	64,400	17.0	11,100	2.9	376,900
1963	6,700	2.5	36,100	13.7	24,500	9.3	159,100	60.3	25,200	9.6	12,100	4.6	263,700
1964	44,200	11.1	75,500	19.0	32,600	8.2	169,200	42.7	36,300	9.2	36,800	9.8	396,600
1965	60,300	30.4	70,200	26.5	9,000	3.4	56,700	22.2	31,300	11.6	15,000	5.7	264,500
1966	8,500	2.4	115,400	33.0	12,300	3.5	109,600	31.4	73,500	21.0	30,300	6.7	349,800
1967	21,200	6.6	134,300	41.6	32,600	10.1	66,200	27.3	35,200	10.9	11,500	3.6	323,000
1968	124,700	20.6	223,000	36.6	94,200	15.6	67,400	14.4	36,000	6.3	36,000	6.3	605,300
1969	16,600	4.8	170,400	43.9	39,500	10.2	92,300	23.6	46,100	11.9	20,600	5.4	387,900
Mean 1960–69	45,960	10.4	112,910	25.6	46,460	10.5	147,170	33.4	61,220	13.9	26,930	6.1	440,670
1970	6,700	1.4	165,800	27.5	45,400	7.5	235,500	39.0	108,300	17.9	40,000	6.6	603,700
1971	55,200	13.2	115,000	27.4	21,500	5.1	134,000	32.0	75,300	18.0	16,000	4.3	419,000
1972	1,555,100	65.8	245,200	10.4	124,200	5.3	245,600	10.4	117,800	5.0	76,700	3.2	2,364,600
1973	345,800	29.8	243,000	20.9	56,400	5.0	326,600	28.2	124,500	10.7	61,800	5.3	1,160,100
1974	98,100	12.6	147,000	19.1	78,300	10.2	263,000	34.2	114,900	15.0	67,000	6.7	766,300
1975	9,900	2.6	117,000	30.6	37,700	9.9	129,500	33.8	71,500	18.7	17,100	4.5	382,700
1976	19,700	4.5	196,400	45.4	121,300	27.7	55,000	12.6	22,600	5.2	20,200	4.6	437,200
1977	43,700	13.0	126,500	36.3	70,000	20.9	57,300	17.1	16,600	4.9	19,400	5.8	335,500
1978	6,400	1.2	220,000	31.4	235,100	33.6	121,300	17.3	65,500	12.2	30,300	4.3	700,600
1979	4,500	2.6	50,900	32.2	30,800	19.5	40,800	25.8	14,700	9.3	16,200	10.3	157,900
Mean 1970–79	214,910	29.3	163,080	22.2	82,270	11.2	160,860	21.9	75,170	10.3	36,670	5.0	732,960
1980	326,400	25.3	170,000	13.1	153,600	11.8	332,500	25.6	235,000	18.1	79,700	6.1	1,299,200
1981	115,000	19.8	65,600	14.6	86,300	14.9	158,000	27.2	100,500	17.3	34,700	6.0	560,100
1982	22,500	2.1	120,400	11.2	111,000	10.4	423,500	39.6	315,200	29.4	76,100	7.3	1,070,700
1983	8,000	2.2	36,900	10.2	47,600	13.3	169,200	47.0	66,200	23.9	12,000	3.3	360,100
1984	262,700 [1]	36.3	12,100	1.8	54,500	8.0	221,900	32.4	121,000	17.7	13,300	1.9	685,500
1985	1,619,300 [1]	69.0	159,800	6.1	79,100	3.0	360,300	13.7	165,200	6.3	53,900	2.0	2,637,600
1986	530,300 [1]	51.7	46,800	4.6	72,300	7.1	237,100	23.1	78,600	7.7	59,900	5.8	1,025,000
1987	445,600 [1,3]	69.3	0 [2]	0.0	23,600	3.7	106,800	16.6	42,500	6.6	24,200	3.8	642,900
Mean 1980–87	441,475	42.5	76,950	7.6	78,550	7.6	251,163	24.2	143,025	13.8	44,475	4.3	1,037,636
Overall Mean 1951–87	193,141	25.3	163,654	21.5	78,165	10.2	181,573	23.8	96,919	12.7	49,436	6.5	762,669

1. Area 22 catches in 1984–1967 were actually taken in Area 21.
2. Catch and escapement not assessed for this area in 1967.
3. See footnote 5 on Table 1 for more information on this figure.

APPENDIX 5 - CATCH AND EFFORT FOR EACH AREA AND YEAR

The following tables (App.5, Tables 1 through 10) summarize the commercial fishing activities and catches (exclusive of test fishing) for each area and year on WCVI during the period 1983 to 1987.

Please note that tables are included only for years and areas having fisheries (that is Areas 21 and 25 - 1984 through 1987 and Area 26 - 1984 and 1985). Some catches listed in other tables in this report not included here are test fishery catches. Details regarding these test fishing catches are included in footnotes accompanying the appropriate table.

Effort is expressed only as days fished as gear counts for some areas and years are not reliable and often are not available.

Appendix 5, Table 1. Catch and effort, Area 21, 1984.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/4	OCT 27	GN	2	3,530	0	1	0	0	4
		SN	2	49,608	90	80	0	0	0
10/5	NOV 3	GN	1	7,223	0	9	0	0	2
		SN	1	126,302	79	263	0	0	0
TOTALS		GN	3	10,753	0	10	0	0	6
		SN	3	175,910	169	343	0	0	0
		ALL GEAR	6	186,663	169	353	0	0	6

Appendix 5, Table 2. Catch and effort Area 21, 1985.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/2	OCT 12	GN	1	16,877	3	20	1	0	2
		SN	0	0	0	0	0	0	0
10/3	OCT 19	GN	7	72,786	0	62	1,126	0	1
		SN	3	604,858	22	425	4	0	6
10/4	OCT 26	GN	7	8,007	19	225	0	0	0
		SN	7	834,951	414	455	2	12	13
10/5	NOV 02	GN	1	275	0	6	0	0	0
		SN	1	71,611	49	56	0	0	3
TOTALS		GN	16	97,945	22	313	1,127	0	3
		SN	11	1,511,420	485	936	6	12	22
		ALL GEAR	27	1,609,365	507	1,249	1,133	12	25

Appendix 5, Table 3. Catch and effort Area 21, 1986.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/1	OCT 04	GN	4	12,710	3	290	12	1,015	5
		SN	0	0	0	0	0	0	0
10/2	OCT 11	GN	4	33,629	2	104	0	2	34
		SN	0	7,524	0	11	1,331	0	0
10/3	OCT 18	GN	5	18,903	8	494	1	0	9
		SN	4	308,854	6	3,002	6,764	1	0
10/4	OCT 25	GN	2	5,452	4	121	0	6	0
		SN	0	0	0	0	0	0	0
TOTALS		GN	15	70,694	17	1,009	13	1,023	48
		SN	4	316,378 [1]	6	3,013	8,095	1	0
		ALL GEAR	19	387,072	23	4,022	8,108	1,024	48

1. An additional 390 SN caught chums were reported: These were test fish and bring the total SN landings to 316,768 and total landings to 387,462.

Appendix 5, Table 4. Catch and effort Area 21, 1987.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/1	OCT 03	GN	4	29,530	194	2,496	54	8	23
		SN	0	0	0	0	0	0	0
10/2	OCT 10	GN	4	59,909	86	891	263	49	21
		SN	0	0	0	0	0	0	0
10/3	OCT 17	GN	2	32,954	7	144	0	0	3
		SN	1	139,874	133	2,008	0	36	5
10/4	OCT 24	GN	1	8,524	7	96	0	8	8
		SN	1	104,113	11	790	1	0	3
10/5	OCT 31	GN	CLOSED						
		SN	CLOSED						
11/1	NOV 07	GN	4	4,950	6	89	0	0	6
		SN	4	15,133	4	115	0	0	1
TOTALS		GN	15	135,867 [1]	300	3,716	317	65	61
		SN	6	259,120	148	2,913	1	36	9
		ALL GEAR	21	394,987	448	6,629	318	101	70

1. An additional 426 GN caught chums were reported: These were test fish and bring the total GN landings to 136,293 and total landings to 395,413.

Appendix 5, Table 5. Catch and effort Area 25, 1984.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
9/4	SEP 29	GN	1	13,082	197	455	77	15	1
		SN	1	27,056	1,030	1,442	0	24	1
10/2	OCT 13	GN	1	22,185	56	264	453	6	1
		SN	1	39,808	1,013	376	187	184	4
TOTALS		GN	2	35,267	253	719	530	21	2
		SN	2	66,864	2,043	1,818	187	208	5
		ALL GEAR	4	102,131 [1]	2,296	2,537	717	229	7

1. An additional 816 GN and 3258 SN test chums were taken: Total chums taken by net gear in 1984 was 106,206. As well, 10 chinook, 44 coho and 1 steelhead were taken in the test fishery. Totals taken by net were: chinook, 2,306; coho, 2581; and steelhead, 8.

Appendix 5, Table 6. Catch and effort Area 25, 1985.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/1	OCT 5	GN	4	41,357	84	388	94	6	39
10/2	OCT 12	SN	3	47,001	413	1,888	8	7	7
10/3	OCT 19	GN	2	10,571	0	6	0	0	0
		SN	1	4,118	0	0	0	0	0
10/4	OCT 26	GN	6	19,010	5	26	0	3	1
		SN	6	85,437	194	147	0	42	1
10/5	NOV 2 [1]	GN		3,428	0	0	0	0	0
TOTALS		GN	12	74,366	89	420	94	9	40
		SN	10	136,556	607	2,035	8	49	8
		ALL GEAR	22	210,922 [2]	696	2,455	102	58	48

1. There was no fishery this week. These landings are likely from fish landed the week before.

2. An additional 1,379 SN test chums were taken: Total chums taken was 212,301. As well 127 127 coho were taken during the test fishery: Total coho taken 2,582.

Appendix 5, Table 7. Catch and effort Area 25, 1986.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/1	OCT 4	GN	5	32,966	584	625	885	730	3
10/2	OCT 11	GN	2	17,968	20	272	153	102	3
		SN	4	68,800	1,131	2,181	0	9	3
10/3	OCT 18	GN	2	21,591	32	667	0	0	5
		SN	1	2,768	17	124	1,154	0	0
TOTALS		GN	9	72,525	636	1,564	1,038	832	11
		SN	5	71,568	1,148	2,305	1,154	9	3
		ALL GEAR	14	144,093	1,784	3,869	2,192	841	14

Appendix 5, Table 8. Catch and effort Area 25, 1987.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/2	OCT 10	GN	2	12,423	16	499	0	0	0
TOTAL		ALL GEAR	2	12,423	16	499	0	0	0

Appendix 5, Table 9. Catch and effort Area 26, 1984.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/2	OCT 13	GN	1	5,426	3	38	0	0	0
		SN	1	31,986	145	130	0	0	2
TOTAL		ALL GEAR	2	37,412 [1]	148	168	0	0	2

1. An additional 513 GN and 1766 SN test fish were taken: Total chums taken by net gear in 1984 was 39,691.

Appendix 5, Table 10. Catch and effort Area 26, 1985.

WEEK	ENDING DATE	GEAR	DAYS OPEN	CHUM	CHIN	COHO	PINK	SOCK	STEEL HEAD
10/3	OCT 19	GN	2	5,635	0	14	0	0	0
		SN	1	5608	1	9	0	0	0
10/4	OCT 26	GN	3	3,323	0	12	0	0	0
		SN	3	25,593	34	41	0	0	3
TOTALS		GN	5	8,958	0	26	0	0	0
		SN	4	31,201	35	50	0	0	3
		ALL GEAR	9	40,159	35	76	0	0	3

APPENDIX 6 - WCVI TROLL AND INDIAN FOOD FISHERY CATCHES

The following tables (App. 6, Tables 1 and 2) document troll catches reported form WCVI areas, and Indian food fishery catches reported to DFO. They are included in the interest of completeness.

Appendix 6, Table 1. WCVI troll catches of chum salmon, 1970–1987. [1,2,3]

Year	Area 21	Area 23	Area 24	Area 25	Area 26	Area 27	Total
1970	522	904	1,452	1,013	1,564	4,182	9,637
1971	84	704	417	821	354	3,317	5,697
1972	12	387	67	262	131	423	1,282
1973	629	2,792	772	619	636	1,154	6,602
1974	51	539	525	2,579	223	674	4,591
1975	77	1,466	488	957	1,219	3,512	7,719
1976	86	545	403	650	513	849	3,046
1977	272	2,630	1,856	523	821	3,972	10,074
1978	264	1,766	3,016	4,479	4,153	17,781	31,459
1979	216	3,332	4,186	2,936	1,445	6,877	18,992
1980	160	1,613	5,307	811	1,243	11,934	21,068
1981	568	1,495	1,368	985	397	4,560	9,373
1982	617	7,043	11,949	9,872	3,018	39,519	72,018
1983	421	1,411	1,411	1,182	462	4,089	8,976
1984	292	746	304	470	907	10,200	12,919
1985	8,105	23,741	13,074	12,318	22,329	142,254	221,821
1986	487	21,167	30,843	45,028	32,012	134,703	264,240
1987	11	1,198	1,915	763	1,562	10,350	15,799

1. From: B.C. Commercial Catch Statistics.
2. No commercial troll catch in Area 22.
3. Troll catches are from the offshore areas of WCVI and are likely not from local area stocks.

Appendix 6, Table 2. WCVI Indian Food Fishery catches of chum salmon, 1958–1987.[1,2]

Year	Area 22	Area 23	Area 24	Area 25	Area 26	Area 27	Total
1958	–	–	4,450	–	685	–	5,135
1959	–	–	4,750	1,900	400	–	7,050
1960	–	–	5,935	5,000	575	350	11,860
1961	–	–	4,375	1,500	–	–	5,875
1962	–	–	4,620	2,500	–	–	7,120
1963	–	–	1,890	3,000	20	50	4,960
1964	–	–	7,422	1,500	600	28	9,550
1965	–	–	5,378	400	700	750	7,228
1966	174	1,435	1,060	3,000	135	0	5,804
1967	320	1,100	2,610	2,000	–	0	6,030
1968	642	1,870	7,420	1,220	–	28	11,180
1969	507	1,400	1,470	1,460	476	0	5,313
1970	–	–	0	1,500	50	4	1,554
1971	–	–	2,252	1,000	550	4	3,806
1972	420	–	4,416	–	700	70	5,606
1973	638	1,634	1,958	–	–	0	4,230
1974	1,413	2,000	2,180	–	730	0	6,323
1975	144	1,000	1,553	–	250	0	2,947
1976	125	–	2,675	–	340	0	3,140
1977	654	3,065	2,150	–	800	0	6,669
1978	350	2,500	2,388	400	550	0	6,188
1979	29	3,500	3,138	1,400	1,420	0	9,487
1980	500	1,000	3,691	200	–	0	5,391
1981	500	3,000	4,200	450	–	0	8,150
1982	5,000	500	4,690	350	300	0	10,840
1983	–	–	2,700	600	1,000	0	4,300
1984	–	2,400	5,274	364	320	0	8,358
1985	8,500	2,357	3,623	581	200	0	15,261
1986	4,000	–	7,282	665	580	0	12,527
1987	2,500	5,000	3,579	642	238	0	11,959

1. From DFO files, WCVI District Offices; unreported catches not included.

2. These records differ somewhat from Lightly et al. (1985) due to recent revisions by fishery officers. The present records represent the best information available to date.

APPENDIX 7 - STREAM ESCAPEMENT RECORDS

The following tables (App. 7, Tables 1 through 7) document the escapements of chum salmon for each stream on WCVI during the period 1980 through 1987. For those years in which no escapement is recorded, a code is applied. These codes and their meanings are included at the bottom of each table. Note the number of entries for which no inspection was made, or for which no record is on file. This problem is one which adds to the difficulty in determining reliable stock:recruit relationships. All escapement data in this report come from the SEDS database at the Pacific Biological Station (PBS).

Appendix 7, Table 1. Chum escapement Area 21, 1980–1985.

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
CHEEWHAT RIVER	−3	−3	−2	−3	0	−2	−2	0	0	0
KLANAWA RIVER	−3	−3	−3	−2	−2	−2	−2	−3	0	0
TOTALS	0	0	0	0	0	0	0	0	0	0

CODES: 0=STREAM INSPECTED,NO FISH OBSERVED (CONFIRMED)
−1=STREAM INSPECTED,NO FISH OBSERVED (NOT CONFIRMED)
−2=STREAM NOT INSPECTED OR NOT INSPECTED FOR SPECIES INDICATED
−3=NO REPORT (NO BC 16 ON FILE)

Appendix 7, Table 2. Chum escapement Area 22, 1980–1985.

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
CAMPUS CREEK	−3	−3	−3	−3	−3	−3	−3	−2	0	0
CARMANAH CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
CAYCUSE RIVER	3000	−3	−3	−3	−2	−2	300	100	3000	1133
DOOBAH CREEK	500	−2	−3	−3	−2	−2	320	100	500	307
HOBITON LAKE	1000	4000	−2	−2	−2	−2	2200	−2	4000	2400
KLAKTUS CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
MARCHAND CREEK	−3	−2	−3	−3	−2	−3	−3	−3	0	0
NITINAT RIVER	50000	111000	22500	7960	76000	210000	140000	50000	210000	83433
SMOKEHOUSE CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
WALBRAN CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
TOTALS	54500	115000	22500	7960	76000	210000	142820	50200	217500	87273

CODES: 0=STREAM INSPECTED,NO FISH OBSERVED (CONFIRMED)
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−3=NO REPORT (NO BC 16 ON FILE)

Appendix 7, Table 3. Chum escapement Area 23, 1980–1985.

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
ANTLER CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
ASH RIVER	-3	-3	-3	-3	0	-3	-3	0	0	0
BEAR CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
BEAVER CREEK	-3	-3	-3	-3	0	-3	-3	0	0	0
CANOE PASS CREEK	-3	-2	-3	-3	-2	350	-2	0	350	175
CARNATION CREEK	3000	2300	1600	1100	0	-2	-2	0	3000	1333
CASS CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
CATARACT CREEK	-3	-2	308	-3	-3	-2	500	0	500	269
CHERRY CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
CHINA CREEK	0	-1	-2	-3	-2	-2	-2	0	0	0
COEUR D'ALENE CREEK	-3	50	-1	20	-2	750	-2	0	750	205
COLEMAN CREEK	-3	-1	10	-3	-2	-2	-2	0	10	5
CONSINKA CREEK	-3	-1	550	-3	-2	700	100	0	700	338
COUS CREEK	-3	-1	36	700	-2	600	-2	0	700	334
DEER CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
DRINKWATER CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
DRY CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
DUTCH HARBOUR CREEK EA	3500	25	975	170	-2	-2	300	0	3500	828
DUTCH HARBOUR CREEK WE	700	-3	230	-3	-3	-2	-2	0	700	310
EFFINGHAM RIVER	500	3000	2700	560	-2	7200	-2	0	7200	2327
FISH CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
FORESTRY CAMP CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
FOSSIL CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
FRANKLIN RIVER	-3	-3	5	-3	-2	50	-2	0	50	18
FREDERICK CREEK	700	6000	6000	-2	-3	7800	-2	0	7800	4100
GOOSE CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
GRACIE CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
HEATH CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
HENDERSON LAKE	4000	400	-1	-3	-2	-2	-2	0	4000	1467
HILLIER CREEK	-3	-3	-3	-2	-2	3400	-2	0	3400	1700
HOLFORD CREEK	2000	-3	700	95	-2	450	-2	0	2000	649
ISLAND CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
ITATSOO CREEK	-3	-3	-3	-2	-3	-2	-2	0	0	0
KITSUCKSUS CREEK	-3	-3	-3	-3	0	-3	-3	0	0	0
LANTERMAN CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
LINDSAY CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
LITTLE MAGGIE RIVER	-3	-3	0	-3	-2	-2	60	-2	60	30
LITTLE TOQUART CREEK	100	-3	1500	-3	1000	-2	-2	-2	1500	867
LUCKY CREEK	-3	50	520	-3	-2	460	200	0	520	246
MACKTUSH CREEK	-3	-3	-3	-2	-2	-2	-2	0	0	0
MAGGIE RIVER SYSTEM	0	-2	-1	-2	-2	1500	4000	0	4000	1375
MCBRIDE CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
MCCOY CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
MERCANTILE CREEK	-3	-3	0	-3	3032	2500	-2	0	3032	1383
MORAN CREEK	-3	-3	-3	-3	-3	-3	-3	0	0	0
NAHMINT RIVER	20	16600	37500	15000	150	44000	20000	-2	44000	19039
PACHENA RIVER	-3	-3	-3	-2	-2	-2	-2	0	0	0
PANTHER CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
PIPESTEM CREEK	-3	60	400	-2	-2	50	-2	0	400	128
POETT NOOK CREEK	-3	500	800	-2	50	255	-2	0	800	321
REDFORD CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
RITHERDON CREEK	-3	-3	-3	-3	-3	10	-3	0	10	5
ROGERS CREEK	-3	-3	-3	-3	0	-3	-3	0	0	0
ROUND CREEK	-3	-3	-3	-3	-3	-3	-3	-3	0	0
SARITA RIVER	40000	16600	35000	14500	1000	46000	20000	-2	46000	24729

CONTINUED NEXT PAGE

CODES: 0=STREAM INSPECTED,NO FISH OBSERVED (CONFIRMED)
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-3=NO REPORT (NO BC 16 ON FILE)

Appendix 7, Table 3. Chum escapement Area 23, 1980–1985 (CONTINUED).

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
SECHART CREEK	−3	6	−3	78	−2	170	200	0	200	91
SMITH CREEK	−3	−3	2400	−2	4743	500	−2	0	4743	1911
SOMASS RIVER	−2	1000	−1	1	−3	2000	−2	−2	2000	1500
SPAHT CREEK	−3	−3	−3	−3	0	−3	−3	0	0	0
SPROAT RIVER	−3	−3	−3	−3	0	−3	−3	−3	0	0
ST ANDREW CREEK	−3	−3	−3	−3	−3	−3	−3	0	0	0
SUGSAW CREEK	11000	7000	3200	−2	−2	500	1000	0	11000	3783
SUMMERS CREEK	−3	−3	−3	−3	−3	−3	−3	0	0	0
TAYLOR FLATS NO.1 CR.	−3	−3	−3	−3	0	−3	−3	0	0	0
TAYLOR RIVER	−3	−3	−3	−3	0	−3	−3	−3	0	0
THIRTEEN MILE CREEK	−3	−3	−3	−3	0	−3	−3	−3	0	0
THOMPSON CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
THORNTON CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
TOQUART RIVER	−1	10000	11500	3000	600	25000	−2	−2	25000	10020
TRUEMAN CREEK	−3	−3	−3	−3	0	−3	−3	0	0	0
TUCKER CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
TWIN RIVERS EAST	−3	−3	300	−2	−2	−2	−2	0	300	150
TWIN RIVERS WEST	−3	500	9000	750	−2	−2	−2	0	9000	2563
UCHUCK CREEK	5000	1000	2700	−2	1010	1000	−2	0	5000	1785
USELESS CREEK	0	0	−3	−2	−2	−2	200	0	200	50
VERNON BAY CREEK	−3	−3	−3	−3	−2	800	−2	0	800	400
WARD CREEK	−3	−3	−3	−3	0	−3	−3	0	0	0
WEINER CREEK	−3	−3	−3	−3	0	−3	−3	0	0	0
WEST CREEK	10000	2000	0	455	−2	6000	−2	0	10000	3076
WHITE PINE CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
WOLF CREEK	−3	−3	−3	−3	−3	−3	−3	0	0	0
WOODWARD CREEK	−3	−3	−3	−3	0	−3	−3	0	0	0
TOTALS	82520	67491	118984	36429	11585	152445	46560	0	205225	88278

CODES: 0=STREAM INSPECTED,NO FISH OBSERVED (CONFIRMED)
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−3=NO REPORT (NO BC 16 ON FILE)

Appendix 7, Table 4. Chum escapement Area 24, 1980–1985.

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
ANGORA CREEK	−3	−3	−3	−3	−3	−3	−2	−3	0	0
ATLEO RIVER	34000	30000	18000	25000	22000	40000	30000	5200	40000	25525
BAWDEN BAY CREEK	6000	7000	8500	2800	5600	1700	6000	1100	8500	4838
BEDINGFIELD BAY CREEK	−3	−3	−3	−3	−3	−3	−2	0	0	0
BEDWELL RIVER	100	300	900	500	600	700	200	100	900	425
BULSON CREEK	0	−1	−3	−3	0	−2	300	250	300	138
CECELIA CREEK	400	500	100	100	150	300	36	5	500	199
CLAYOQUOT ARM BEACHES	0	0	0	0	0	−1	−2	0	0	0
CLAYOQUOT RIVER (L.)	0	0	0	0	0	−1	−2	0	0	0
CLAYOQUOT RIVER (U.)	−3	−3	−3	−3	−3	−2	−2	0	0	0
CLOSE CREEKS (2)	100	−3	−3	80	220	75	−2	0	220	95
COLD CREEK	0	0	0	0	0	−1	−2	0	0	0
CONE CREEKS (2)	1700	1300	900	500	900	1000	175	320	1700	849
COTTER CREEK	−3	−3	−3	−3	0	−3	−3	−3	0	0
CYPRE RIVER	5000	2300	4000	3500	2400	3000	2000	2000	5000	3025
HESQUIAT HARBOUR CR.	−3	−2	100	−1	0	−2	100	100	100	75
HESQUIAT LAKE CREEKS	1500	1250	1400	−3	800	700	1000	350	1500	1000
HOOTLA KOOTLA SYSTEM	0	0	0	500	−1	100	110	0	500	101
HOT SPRINGS COVE CR.	2000	82	350	150	70	100	50	200	2000	375
ICE RIVER	650	400	1100	600	750	1200	600	150	1200	681
ILTHPAYA LAKE	−3	−3	−3	−3	−3	−3	−2	−3	0	0
KAKAWIS CREEK	−3	−3	−3	−3	−2	50	−2	0	50	25
KANIM LAKE SYSTEM	−3	−3	−3	0	0	−2	−2	0	0	0
KENNEDY LAKE	0	0	0	0	0	−1	−2	−3	0	0
KENNEDY LAKE FEEDER ST	0	0	−3	0	0	−1	−3	0	0	0
KENNEDY RIVER (LOWER)	0	0	0	0	0	−1	−2	0	0	0
KENNEDY RIVER (UPPER)	0	0	0	−1	0	−1	−2	0	0	0
KOOTOWIS CREEK	5000	1500	0	70	800	2000	1500	1500	5000	1546
LITTLE WHITEPINE COVE	1650	400	−3	10	40	50	40	−2	1650	365
LOST SHOE CREEK	70	−2	−2	−2	20	25	−2	0	70	29
MEARES CREEK	1700	825	1700	1100	500	1100	500	400	1700	978
MEGIN RIVER	22000	5000	13000	5000	6500	6000	9000	3000	22000	8688
MOYEHA RIVER	11250	5000	6000	2000	1250	6300	6000	2500	11250	5038
MURIEL LAKE	−3	−3	−3	−3	−3	−2	−2	0	0	0
PURDON CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
RAFAEL POINT CREEKS	−3	−3	−3	−3	0	−3	−3	−3	0	0
RILEY COVE CREEK	0	−3	0	−2	0	−2	−2	−2	0	0
SANDHILL CREEK	15	100	−2	−2	−1	0	−2	−1	100	38
SATCHIE CREEK	−3	−3	−3	−1	0	−2	−3	−3	0	0
SHARP CREEK	290	−3	−3	200	40	−3	250	100	290	176
SOUTH BAY CREEKS	0	0	−1	−2	0	280	−2	−2	280	70
STAGHORN CREEK	−3	−3	−3	−3	−3	−2	−2	0	0	0
SUTTON MILL CREEK	2150	400	300	500	400	−3	225	20	2150	571
SYDNEY RIVER	600	1000	600	70	800	500	2500	75	2500	768
THUNDEROUS CREEK	−3	−3	−3	−3	−3	−3	−2	−3	0	0
TOFINO CREEK	50	100	100	100	80	50	50	250	250	98
TRANQUIL CREEK	7800	3000	6000	1700	3500	1500	1500	500	7800	3188
URSUS CREEK	−3	−3	−3	−3	0	−2	−2	−2	0	0
VARGAS ISLAND CREEKS	−3	−3	−3	−3	0	−3	−3	−3	0	0
WARN BAY CREEK	7650	750	4000	2000	5500	6000	5000	4500	7650	4425
WATTA CREEK	5200	1500	5000	800	1200	5500	4500	1100	5500	3100
WHITE PINE COVE CREEK	650	700	600	350	110	600	700	100	700	476
WOMAN ISLAND CREEK	50	200	−3	−1	0	50	5	−2	200	61
WOOD ISLET CREEKS	220	250	300	150	240	−2	−2	−2	300	232
TOTALS	117795	63857	72950	47780	54470	78880	72341	23820	131860	67196

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Appendix 7 Table 5. Chum escapement Area 25, 1980–1985.

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
APPLE CREEK	−3	−3	−3	−3	0	−3	0	−3	0	0
BANCROFT CREEK	−3	−3	−3	−3	0	−3	−2	−3	0	0
BARR CREEK	−3	−3	−3	100	0	−2	0	0	100	25
BEANO CREEK	−3	−3	−3	−3	−3	−2	−3	−3	0	0
BINGO CREEK	−3	−3	−3	−3	0	−3	−2	−3	0	0
BLACK CREEK	−3	−3	−3	−3	−3	13250	−3	7500	13250	10375
BLOWHOLE CREEK	−3	−3	−3	550	300	250	50	−3	550	288
BRODICK CREEK	750	−3	−3	1050	700	1400	1400	750	1400	1008
BURMAN RIVER	3000	7600	7500	3500	1000	1000	500	1700	7600	3225
CALVIN CREEK	−3	−3	−3	−3	−3	−2	−3	−3	0	0
CANTON CREEK	5000	7000	8000	5000	4500	5500	1500	300	8000	4600
CHUM CREEK	1500	500	−3	2500	870	−3	2250	2500	2500	1687
CONUMA RIVER	18000	30000	40000	36000	24000	21000	4400	22000	40000	24425
COUGAR CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
DEMIKOSSE RIVER	−3	30	−3	70	20	320	−3	−2	320	110
DESERTED CREEK	20000	9000	19000	18000	11987	12500	9000	7500	20000	13373
EHATISAHT CREEK	−3	−3	−3	−3	0	−2	500	300	500	267
ELIZA CREEK	1400	4500	6500	1600	1500	1900	1300	2000	6500	2588
ESCALANTE RIVER	−3	−3	−3	−3	0	−2	−2	−2	0	0
ESPERENZA CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
ESPINOSA CREEK	3500	3500	2500	3500	1200	2500	2100	4500	4500	2913
FRIEND CREEK	−3	−3	−3	−3	0	−3	−3	−3	0	0
GOLD RIVER	1000	2290	3500	2000	1000	1000	165	400	3500	1419
GUISE CREEK	150	−3	−3	−3	0	−3	700	−3	700	283
HAMMOND CREEK	900	0	−3	500	0	850	725	350	900	475
HANNA CREEK	−3	−3	−3	−3	−3	170	1000	−3	1000	585
HOISS CREEK	500	1500	2500	1050	100	2400	1700	750	2500	1313
HOUSTON RIVER	−3	−3	−3	−3	0	−2	−3	−2	0	0
JACKLAH RIVER	−3	−3	−3	−3	0	−2	1	−2	1	1
KENDRICK CREEK	−3	−3	−3	−3	500	1200	1150	200	1200	763
KLEEPTEE CREEK	400	1000	3500	1700	1400	1000	2250	265	3500	1439
LAURIE CREEK	50	−3	−3	−3	0	−3	−2	−3	50	25
LEINER RIVER	5000	5000	7500	6500	4200	5500	11650	7000	11650	6544
LITTLE ZEBALLOS RIVER	3200	200	1500	2050	4000	3500	1800	1200	4000	2181
LORD CREEK	−3	−3	1500	500	500	3000	1000	1000	3000	1250
MAMAT CREEK	1100	280	1750	800	750	1000	1800	1000	1800	1060
MARVINAS CREEK	−3	−3	75	220	500	500	300	−2	500	319
MCCURDY CREEK	−3	−3	−3	−3	0	−2	−2	−2	0	0
MOOYAH RIVER	2000	900	−3	450	1000	570	300	250	2000	781
MUCHALAT RIVER	−3	300	−3	−3	−1	−2	−2	−3	300	300
NESOOK RIVER	−3	−3	−3	−3	0	−3	0	−3	0	0
OKTWANCH RIVER	−3	−3	−3	0	−1	−2	−2	−3	0	0
OWOSSITSA CREEK	6600	1000	−3	2335	1000	2100	550	310	6600	1985
PARK RIVER	12000	6000	7500	11150	5000	6000	5000	3200	12000	6981
PERRY RIVER	−3	−3	−3	−3	0	−3	−2	−3	0	0
RANSOM CREEK	4000	−3	9000	10500	6000	13250	−3	2000	13250	7458
SILVERADO CREEK	−3	50	−3	−3	0	−2	0	−1	50	17
SUCWOA RIVER	11000	10000	9000	12000	11300	13000	8000	1450	13000	9469
TAHSIS RIVER	−3	7000	11000	9000	11300	11700	8400	8000	11700	9486
TLUPANA RIVER	10000	8000	7000	10000	4500	10000	3000	7000	10000	7438
TSOWWIN RIVER	5900	4000	4500	11000	9580	6380	17000	13000	17000	8920
UCONA RIVER	−3	−3	−3	−3	0	−3	−2	−3	0	0
UPANA RIVER	−3	−3	−3	−3	−3	−3	−2	−3	0	0
ZEBALLOS RIVER	8500	7000	11000	7500	7000	5250	3500	3500	11000	6656
TOTALS	125450	116650	164325	161125	115707	147990	92991	99925	236421	142030

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Appendix 7, Table 6. Chum escapement Area 26, 1980–1985.

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
AMAI CREEK	4000	1000	2000	8000	3000	5000	3500	1200	8000	3463
ARTLISH RIVER	4000	2000	1000	−3	2000	4000	1500	200	4000	2100
BATTLE CREEK	−3	0	−3	−3	0	500	100	200	500	160
BRITISH CREEK	400	−3	−3	−3	0	500	100	100	500	220
CACHALOT CREEK	1000	800	1000	3500	2000	2500	2500	400	3500	1713
CHAMISS CREEK	10000	2000	−3	10000	6000	10000	5000	1800	10000	6400
CLANNINICK CREEK	7000	3000	−3	5500	0	5000	1500	1400	7000	3343
EASY CREEK	2000	500	8000	7000	9000	9500	6500	1800	9500	5538
ELAINE CREEK	400	−3	−3	−3	0	200	1200	1600	1600	680
JANSEN LAKE CREEK	100	−3	0	0	0	200	100	100	200	71
KAOUK RIVER	7500	8000	10000	15000	15000	17000	7000	4000	17000	10438
KAPOOSE CREEK	−3	−3	−3	−3	−3	100	−2	100	100	100
KASHUTL RIVER	5000	2000	11000	1500	6000	7000	10000	5000	11000	5938
KAUWINCH RIVER	4000	4500	25000	10000	6000	12000	10000	7000	25000	9813
MALKSOPE RIVER	10000	10000	8000	5000	8000	9000	4000	4000	10000	7250
MCKAY COVE CREEK	1000	1000	−3	−3	300	2500	500	0	2500	883
NARROWGUT CREEK	1500	2000	1000	12000	6000	10000	5000	1200	12000	4838
NASPARTI RIVER	2000	−3	−3	200	0	2000	1000	500	2000	950
OUOUKINSH RIVER	1500	2700	6000	300	0	6000	2500	600	6000	2450
PORRITT CREEK	−3	−3	−3	−3	0	−3	−3	−2	0	0
POWER RIVER	1500	500	200	200	1000	1000	500	500	1500	675
SILBURN CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
SOATWOON CREEK	−3	−3	−3	−3	0	−3	−3	−2	0	0
TAHSISH RIVER	10000	10000	18000	8000	17000	20000	15000	9000	20000	13375
TATCHU CREEK	−3	−3	−3	−3	0	500	100	100	500	175
YAKU RIVER	1500	−3	−3	−3	0	500	1000	500	1500	700
TOTALS	74400	50000	91200	86200	81300	125000	78600	41300	153900	81270

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Appendix 7, Table 7. Chum escapement Area 27, 1980–1985.

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
BEAR CREEK	150	200	750	−2	−2	400	1100	550	1100	525
BISH CREEK	−1	−1	−3	−3	−2	50	−2	−2	50	50
BUCK CREEK	−2	−2	−1	300	−2	700	−2	−2	700	500
CANOE CREEK	750	−3	100	−1	−2	−1	−2	25	750	292
CAPE COOK CREEK	−1	−3	−3	−3	−2	−1	−2	−2	0	0
CAPE SCOTT CREEK	−3	−3	−3	−3	−2	−2	−2	−2	0	0
CAYEGHLE CREEK	8000	4600	6000	750	4500	12500	6000	4000	12500	5794
CAYUSE CREEK	−1	150	50	−3	−2	150	650	150	650	230
CLEAGH CREEK	−1	75	−1	−1	−2	−1	−1	−2	75	75
CLESKLAGH CREEK	1500	1000	2000	400	−2	−2	75	−1	2000	995
COETKWAUS CREEK	150	75	100	50	−2	600	350	30	600	194
COLONIAL CREEK	3500	4500	5000	1000	−3	−3	2000	1000	5000	2833
COLONY LAKE CREEK	0	0	0	0	0	−1	−2	0	0	0
CRAWFORDS CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0
CULLEET CREEK	−1	−3	−3	−3	−2	−2	−2	−2	0	0
DENAD CREEK	6000	1500	3000	−2	−2	75	2500	5000	6000	3013
DOMINIC CREEK	−3	−3	−3	−3	−2	50	−2	−2	50	50
EAST CREEK	3500	−3	−1	−3	−2	300	1500	−2	3500	1767
FISHERMAN RIVER	−1	−3	−3	−3	−2	−2	−2	0	0	0
GALATO CREEK	25	115	2500	−3	−2	175	300	1500	2500	769
GLERUP CREEK	25	60	1500	−3	−2	100	150	−2	1500	367
GOODSPEED RIVER	400	300	3000	1000	1200	700	1000	150	3000	969
HATHAWAY CREEK	25	100	3500	1500	−2	5000	5000	−2	5000	2521
HAWISNAKWI CREEK	−1	5	−3	−3	−2	−1	−2	−2	5	5
HEAD CREEK	3500	150	5000	−2	−2	200	700	500	5000	1675
HUSHAMU CREEK	−1	0	−3	−3	−2	−2	−2	−1	0	0
JIMS CREEK	25000	1000	2000	−2	−2	2000	4000	600	25000	5767
JOHNNY CREEK	6000	1000	6000	−2	−2	−1	5000	−2	6000	4500
JULIAN CREEK	25	50	50	−3	−2	150	200	300	300	129
KEITH RIVER	500	−3	−2	−2	−2	1500	3000	−2	3000	1667
KEWQUODIE CREEK	−1	50	−3	−3	−2	150	250	−2	250	150
KLASKISH RIVER	1500	300	−1	−1	−2	2000	2500	−2	2500	1575
KLAYINA CREEK	8000	2000	2000	−2	−2	2000	4000	2000	8000	3333
KLOOTCHLIMMIS CREEK	750	100	−3	−3	−2	100	600	500	750	410
KOPRINO RIVER	400	3000	3500	−2	2000	8500	1500	750	8500	2807
KWATLEO CREEK	1500	500	5000	−2	−2	1000	1000	1000	5000	1667
KWOKWESTA CREEK	1500	150	800	3000	2000	4500	1000	500	4500	1681
LEESON CREEK	25	50	2000	−2	−2	500	−1	200	2000	555
LEWIS CREEK	400	100	−3	−3	−2	100	350	100	400	210
LOWER AHWHICHAOLTO CRE	40	30	7500	−1	−2	500	1400	1200	7500	1778
MACJACK RIVER	0	0	−3	−2	−2	−2	−2	−2	0	0
MAHATTA CREEK	−1	−3	−2	−3	−2	−1	−1	0	0	0
MAHWHIECLAS CREEK	50	50	−3	−3	−2	−1	−1	−1	50	50
MARBLE RIVER	−1	2000	1000	500	1000	100	3000	1500	3000	1300
MCNIFFE CREEK	25	50	−3	−3	−2	100	20	−2	100	49
MONKEY CREEK	100	100	50	−3	75	350	250	325	350	179
MONTGOMERY POINT CR.	150	50	1000	−2	−2	800	−2	150	1000	430
NEQUILTPAALIS CREEK	6	10	10	9	150	200	10	50	200	56
NUKNIMISH CREEK	−1	−3	−3	−2	−2	400	800	100	800	433
PEGATTEM CREEK	5000	5000	6000	−2	700	1000	600	500	6000	2686
QUASHTIN CREEK	30	100	500	−2	−2	50	60	25	500	128
RONNING CREEK	−1	−3	−3	−3	−2	−2	−2	0	0	0
RUPERT CREEK	−1	50	−3	−3	−2	−2	−3	−2	50	50
SAN JOSEF RIVER	−2	400	0	−2	−2	−2	−2	−2	400	200
SHELFORDS CREEK	−3	−3	−3	−3	−3	−3	−3	−3	0	0

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Appendix 7, Table 7. Chum escapement Area 27, 1980–1985 (CONTINUED).

Stream Name	1980	1981	1982	1983	1984	1985	1986	1987	MAX	AVG
SKIDINE CREEK	−1	−1	−3	−3	−2	−1	−1	−1	0	0
STEPHENS CREEK	400	400	3000	3000	1200	4500	4500	400	4500	2175
TEETA CREEK	−1	50	−2	−3	−2	150	175	−2	175	125
UPPER AHWHICHAOLTO CRE	−1	−3	3000	−1	−2	300	700	700	3000	1175
UTLUH CREEK	−3	−3	−3	−3	0	0	−2	0	0	0
WANOKANA CREEK	−1	−1	−3	40	50	50	500	50	500	138
WASHLAWLIS CREEK	−1	500	200	−2	50	300	200	50	500	217
WAUKWAAS CREEK	750	1000	2000	500	400	1500	3000	300	3000	1181
YOUGHPAN CREEK	50	10	−3	−3	−2	−1	−1	−1	50	30
TOTALS	79726	30930	78110	12049	13325	53800	59940	24205	147855	59452

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APPENDIX 8 - AGE DATA

The following tables (App. 8, Tables 1 through 7) document the sources and interpretations of the age data used in the production of the age composition of catch and escapement, and ultimately the brood year summary tables which are derived from these tables.

App. 8, Table 1 is a list of the age compositions used in the generation of the tables mentioned above, and their sources are listed in the footnotes below the table. All data from 1980 to 1982 were from Lightly, Wood and Heizer (1985). For some areas (Area 23 in 1983-1985, Areas 24 and 27 in 1983-1987) no age data were available and the average age compositions for Areas 25 and 26 were used (see Lightly, Wood and Heizer (1985) for a discussion of the reasons for the selection of areas). These calculations are shown in App. 8, Table 7. The remainder of the data came from App. 8, Tables 2 through 6. The decision to use scales from either testfishing catches or commercial catches, when a choice was necessary, was based on sample sizes: When data from both sources were available, I selected data from the larger sample.

The data which forms these tables were obtained from the DFO Vancouver Scale Laboratory, for which I thank Camille Gosselin and his able crew. Many of the scale readings were in some disarray as scales had been read quickly for the purposes of inseason management decisions, and needed reorganization and, in some cases, rereading to insure data quality. Assistance in this endeavour was provided by Alice Fedorenko, whose rigour in such matters is legendary, and for which I am very grateful. The age compositions in this report, then, are likely the most accurate available for WCVI.

Appendix 8, Table 1. Percent chum age composition for commercial catches, test fishing catches and escapements in Areas 21–27, 1980–1987.

	Area 21 [1,2,11]				Area 23 [3,4,11]				Area 24 [5,11]				Area 25 [6,7,11]				Area 26 [8,9,11]				Area 27 [10,11]			
Year	Age 3	Age 4	Age 5	No. fish	Age 3	Age 4	Age 5	No. fish	Age 3	Age 4	Age 5	No. fish	Age 3	Age 4	Age 5	No. fish	Age 3	Age 4	Age 5	No. fish	Age 3	Age 4	Age 5	No. fish
1980	87.1	12.9	0.0	518	66.1	33.2	0.7	713	67.1	32.2	0.8	1,563	79.7	19.6	0.6	311	78.2	21.3	0.4	225	63.7	35.9	0.4	804
1981	1.0	98.6	0.4	210	6.7	92.0	1.3	–	6.7	92.0	1.3	–	6.7	92.0	1.3	–	6.7	92.0	1.3	–	8.9	89.5	1.6	562
1982	10.6	39.4	49.1	216	18.6	74.5	6.8	719	22.2	77.8	0.0	45	9.1	86.8	4.1	486	4.3	93.6	2.1	47	14.6	80.0	5.4	–
1983	29.9	56.0	14.1	184	32.1	45.9	21.8	–	32.1	45.9	21.8	–	22.8	44.3	32.5	246	37.0	46.8	16.2	468	32.1	45.9	21.8	–
1984	92.5	7.2	0.3	292	52.6	42.4	4.4	–	52.6	42.4	4.4	–	49.4	46.5	4.1	243	60.6	32.3	5.1	99	52.6	42.4	4.4	–
1985	3.1	96.8	0.2	651	34.5	64.1	0.4	–	34.5	64.1	0.4	–	33.7	65.8	0.5	582	36.4	60.4	0.0	275	34.5	64.1	0.4	–
1986	3.5	37.1	59.4	202	17.6	70.6	11.8	17	5.6	87.0	7.3	–	1.7	93.0	5.2	115	6.9	85.1	8.0	362	5.6	87.0	7.3	–
1987	52.7	41.7	5.4	1,092	37.5	29.2	33.3	24	26.0	52.1	21.8	–	26.3	51.8	21.8	790	24.6	53.6	21.8	179	26.0	52.1	21.8	–

1. Age composition data for 1984–1987 from commercial catches.
2. Age composition data for 1983 from Area 21 test fishing catches (See App. 8, Table 2).
3. 1983–1985 age compositions calculated from 1983–1985 age compositions from Area 25 & 26 (See App 8., Table 7.).
4. 1986–1987 age compositions from test fishing catches (See App. 8, Tables 5 and 6).
5. 1983–1987 age compositions calculated from 1983–1987 age compositions from Areas 25 & 26 (See App. 8, Table 7).
6. 1983,1986 & 1987 age compositions from test fishing catches as commercial samples were too small (See App. 8, Tables 5 and 6).
7. 1984–1985 age compostions from commercial catches (See App. 8, Tables 3 and 4).
8. 1985 age composition from commercial catches (See App. 8, Table 4).
9. 1983,1984,1986 & 1987 age compositions from test fishing catches (See App. 8, Tables 2, 3, 5 and 6).
10. 1983–1987 age compositions calculated from 1983–1987 age compositions from Area 25 & 26 (See App. 8, Table 7).
11. 1980–1982 figures from Lightly, Wood and Heizer, (1985).

Appendix 8, Table 2. Chum age compositions on the WCVI for 1983.

Fishing Area	Catch Week	Sample Location	Gear	Number Sampled	Number At Age				Percent At Age			
					2'S	3'S	4'S	5'S	2'S	3'S	4'S	5'S
TESTFISHING CATCHES												
NITINAT – AREA 21												
	104	Nitinat	SN	24	0	9	14	1	0.0%	37.5%	58.3%	4.2%
	105	Nitinat	SN	112	0	21	69	22	0.0%	18.8%	61.6%	19.6%
	111	Nitinat	SN	48	0	25	20	3	0.0%	52.1%	41.7%	6.3%
		TOTAL SN		184	0	55	103	26	0.0%	29.9%	56.0%	14.1%
NOOTKA – AREA 25												
	94	Various	SN	82	0	13	27	42	0.0%	15.9%	32.9%	51.2%
	101	Various	SN	132	1	39	59	33	0.8%	29.5%	44.7%	25.0%
	103	Various	SN	32	0	4	23	5	0.0%	12.5%	71.9%	15.6%
		TOTAL SN		246	1	56	109	80	0.4%	22.8%	44.3%	32.5%
KYUQUOT – AREA 26												
	102	Various	SN	133	0	43	62	28	0.0%	32.3%	46.6%	21.1%
	103	Various	SN	335	0	130	157	48	0.0%	38.8%	46.9%	14.3%
		TOTAL SN		468	0	173	219	76	0.0%	37.0%	46.8%	16.2%
ELECTROPHORETIC BASELINE SAMPLE												
NITINAT – AREA 22												
	111	Nitinat	B–SN	29	0	12	12	5	0.0%	41.4%	41.4%	17.2%

Appendix 8, Table 3. Chum age compositions on the WCVI for 1984.

Fishing Area	Catch Week	Sample Location	Gear	Number Sampled	Number At Age					Percent At Age				
					2'S	3'S	4'S	5'S	6's	2'S	3'S	4'S	5'S	6's
COMMERCIAL CATCHES														
NITINAT – AREA 21														
	105	Waterfront	SN	195	0	185	10	0	0	0.0%	94.9%	5.1%	0.0%	0.0%
	105	Steveston	SN	73	0	67	6	0	0	0.0%	91.8%	8.2%	0.0%	0.0%
	105	Steveston	GN	24	0	18	5	1	0	0.0%	75.0%	20.8%	4.2%	0.0%
	TOTAL SN			268	0	252	16	0	0	0.0%	94.0%	6.0%	0.0%	0.0%
	TOTAL GN			24	0	18	5	1	0	0.0%	75.0%	20.8%	4.2%	0.0%
	TOTAL SN/GN			292	0	270	21	1	0	0.0%	92.5%	7.2%	0.3%	0.0%
NOOTKA – AREA 25														
	101	Steveston	SN/GN	75	0	37	37	1	0	0.0%	49.3%	49.3%	1.3%	0.0%
	103	Waterfront	SN/GN	93	0	55	33	5	0	0.0%	59.1%	35.5%	5.4%	0.0%
	103	Steveston	SN/GN	75	0	28	43	4	0	0.0%	37.3%	57.3%	5.3%	0.0%
	TOTAL SN/GN			243	0	120	113	10	0	0.0%	49.4%	46.5%	4.1%	0.0%
KYUQUOT – AREA 26														
	103	Various	SN	99	0	60	32	5	2	0.0%	60.6%	32.3%	5.1%	2.0%
TESTFISHING CATCHES														
NOOTKA – AREA 25														
	92	Various	SN	6	0	4	2	0	0	0.0%	66.7%	33.3%	0.0%	0.0%
	93	Various	SN	203	0	107	87	8	1	0.0%	52.7%	42.9%	3.9%	0.5%
	94	Various	SN	25	0	12	12	1	0	0.0%	48.0%	48.0%	4.0%	0.0%
	101	Various	SN	37	0	27	10	0	0	0.0%	73.0%	27.0%	0.0%	0.0%
	TOTAL SN			265	0	146	109	9	1	0.0%	55.1%	41.1%	3.4%	0.4%
KYUQUOT – AREA 26														
	92	Various	SN	5	0	3	2	0	0	0.0%	60.0%	40.0%	0.0%	0.0%
	93	Various	SN	34	0	14	18	2	0	0.0%	41.2%	52.9%	5.9%	0.0%
	94	Various	SN	95	0	73	22	0	0	0.0%	76.8%	23.2%	0.0%	0.0%
	101	Various	SN	42	0	33	9	0	0	0.0%	78.6%	21.4%	0.0%	0.0%
	102	Various	SN	27	0	25	2	0	0	0.0%	92.6%	7.4%	0.0%	0.0%
	TOTAL SN			164	0	131	33	0	0	0.0%	79.9%	20.1%	0.0%	0.0%
ELECTROPHORETIC BASELINE DATA														
NITINAT – AREA 22														
	104	Nitinat	B–SN	98	1	96	1	0	0	1.0%	98.0%	1.0%	0.0%	0.0%
CLAYOQUOT – AREA 24														
	111	Atleo R.	B–SN	94	0	85	9	0	0	0.0%	90.4%	9.6%	0.0%	0.0%
KYUQUOT – AREA 26														
			B–SN	98	1	84	12	1	0	1.0%	85.7%	12.2%	1.0%	0.0%

Appendix 8, Table 4. Chum age compositions on the WCVI for 1985.

Fishing Area	Catch Week	Sample Location	Gear	Number Sampled	Number At Age					Percent At Age				
					2's	3'S	4'S	5'S	6's	2's	3'S	4'S	5'S	6's
COMMERCIAL CATCHES														
NITINAT – AREA 21														
	102	Steveston	GN	48	0	4	44	0	0	0.0%	8.3%	91.7%	0.0%	0.0%
	103	Steveston	SN	25	0	0	25	0	0	0.0%	0.0%	100.0%	0.0%	0.0%
	103	Steveston	GN	198	0	2	196	0	0	0.0%	1.0%	99.0%	0.0%	0.0%
	104	Steveston	SN	264	0	5	258	1	0	0.0%	1.9%	97.7%	0.4%	0.0%
	105	Steveston	SN	93	0	5	88	0	0	0.0%	5.4%	94.6%	0.0%	0.0%
		TOTAL GN		246	0	6	240	0	0	0.0%	2.4%	97.6%	0.0%	0.0%
		TOTAL SN		405	0	14	390	1	0	0.0%	3.5%	96.3%	0.2%	0.0%
		TOTAL GN/SN		651	0	20	630	1	0	0.0%	3.1%	96.8%	0.2%	0.0%
NOOTKA – AREA 25														
	101	Steveston	GN	171	0	34	134	3	0	0.0%	19.9%	78.4%	1.8%	0.0%
	104	Waterfront	SN	148	0	36	112	0	0	0.0%	24.3%	75.7%	0.0%	0.0%
	102	Steveston	GN	148	0	80	68	0	0	0.0%	54.1%	45.9%	0.0%	0.0%
	104	Steveston	SN	115	0	46	69	0	0	0.0%	40.0%	60.0%	0.0%	0.0%
		TOTAL GN		319	0	114	202	3	0	0.0%	35.7%	63.3%	0.9%	0.0%
		TOTAL SN		263	0	82	181	0	0	0.0%	31.2%	68.8%	0.0%	0.0%
		TOTAL GN/SN		582	0	196	383	3	0	0.0%	33.7%	65.8%	0.5%	0.0%
KYUQUOT – AREA 26														
	104	Steveston	SN	100	0	35	64	0	1	0.0%	35.0%	64.0%	0.0%	1.0%
	104	Steveston	GN	175	0	65	102	0	8	0.0%	37.1%	58.3%	0.0%	4.6%
		TOTAL GN/SN		275	0	100	166	0	9	0.0%	36.4%	60.4%	0.0%	3.3%
TESTFISHING CATCHES														
NOOTKA – AREA 25														
	101	Various	SN	22	0	8	10	4	0	0.0%	36.4%	45.5%	18.2%	0.0%
	102	Various	SN	193	0	55	116	22	0	0.0%	28.5%	60.1%	11.4%	0.0%
	103	Various	SN	122	0	35	72	15	0	0.0%	28.7%	59.0%	12.3%	0.0%
	104	Various	SN	46	0	14	27	4	1	0.0%	30.4%	58.7%	8.7%	2.2%
		TOTAL SN		383	0	112	225	45	1	0.0%	29.2%	58.7%	11.7%	0.3%
KYUQUOT – AREA 26														
	94	Various	SN	80	0	9	70	1	0	0.0%	11.3%	87.5%	1.3%	0.0%
	101	Various	SN	150	0	16	131	3	0	0.0%	10.7%	87.3%	2.0%	0.0%
	102	Various	SN	25	0	7	18	0	0	0.0%	28.0%	72.0%	0.0%	0.0%
	103	Various	SN	39	0	17	22	0	0	0.0%	43.6%	56.4%	0.0%	0.0%
		TOTAL SN		294	0	49	241	4	0	0.0%	16.7%	82.0%	1.4%	0.0%

Appendix 8, Table 5. Chum age compositions on the WCVI for 1986.

Fishing Area	Catch Week	Sample Location	Gear	Number Sampled	Number At Age					Percent At Age				
					2's	3'S	4'S	5'S	6's	2's	3'S	4'S	5'S	6's
COMMERCIAL CATCHES														
NITINAT – AREA 21														
	102	Steveston	GN	47	0	2	15	30	0	0.0%	4.3%	31.9%	63.8%	0.0%
	103	Steveston	SN	57	0	0	13	44	0	0.0%	0.0%	22.8%	77.2%	0.0%
	103	Pr. Rupert	SN	20	0	1	8	11	0	0.0%	5.0%	40.0%	55.0%	0.0%
	104	Ucluelet	GN	78	0	4	39	35	0	0.0%	5.1%	50.0%	44.9%	0.0%
		TOTAL GN		125	0	6	54	65	0	0.0%	4.8%	43.2%	52.0%	0.0%
		TOTAL SN		77	0	1	21	55	0	0.0%	1.3%	27.3%	71.4%	0.0%
		TOTAL GN/SN		202	0	7	75	120	0	0.0%	3.5%	37.1%	59.4%	0.0%
NOOTKA – AREA 25														
	102	Waterfront	SN	49	0	1	44	4	0	0.0%	2.0%	89.8%	8.2%	0.0%
TESTFISHING CATCHES														
NITINAT – AREA 21														
	102	Various	SN	68	0	3	16	49	0	0.0%	4.4%	23.5%	72.1%	0.0%
	103	Various	SN	81	0	7	22	52	0	0.0%	8.6%	27.2%	64.2%	0.0%
	104	Carmanah	SN	120	0	14	47	59	0	0.0%	11.7%	39.2%	49.2%	0.0%
	105	Various	SN	95	0	18	32	45	0	0.0%	18.9%	33.7%	47.4%	0.0%
		TOTAL SN		364	0	42	117	205	0	0.0%	11.5%	32.1%	56.3%	0.0%
BARKLEY SOUND – AREA 23														
	105	Trevor Ch	SN	17	0	3	12	2	0	0.0%	17.6%	70.6%	11.8%	0.0%
NOOTKA – AREA 25														
	93	Various	SN	47	0	1	44	2	0	0.0%	2.1%	93.6%	4.3%	0.0%
	94	Various	SN	23	0	0	20	3	0	0.0%	0.0%	87.0%	13.0%	0.0%
	103	Various	SN	45	0	1	43	1	0	0.0%	2.2%	95.6%	2.2%	0.0%
		TOTAL SN		115	0	2	107	6	0	0.0%	1.7%	93.0%	5.2%	0.0%
KYUQUOT – AREA 26														
	94	Various	SN	102	0	4	84	14	0	0.0%	3.9%	82.4%	13.7%	0.0%
	101	Various	SN	81	0	2	73	6	0	0.0%	2.5%	90.1%	7.4%	0.0%
	102	Various	SN	46	0	7	37	2	0	0.0%	15.2%	80.4%	4.3%	0.0%
	103	Various	SN	92	0	9	78	5	0	0.0%	9.8%	84.8%	5.4%	0.0%
	104	Various	SN	41	0	3	36	2	0	0.0%	7.3%	87.8%	4.9%	0.0%
		TOTAL SN		362	0	25	308	29	0	0.0%	6.9%	85.1%	8.0%	0.0%

Appendix 8, Table 6. Chum age compositions on the WCVI for 1987.

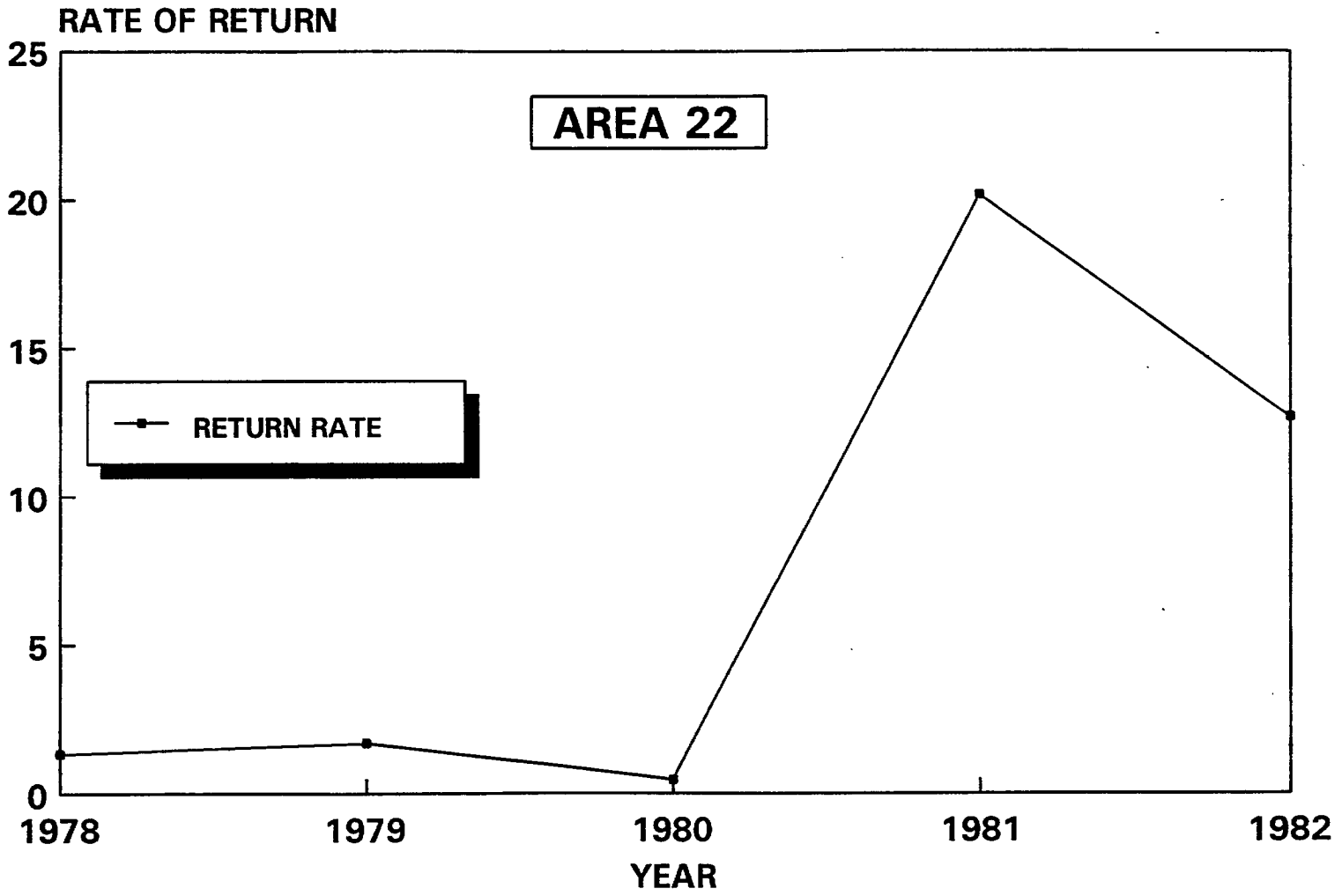
Fishing Area	Catch Week	Sample Location	Gear	Number Sampled	Number At Age					Percent At Age				
					2's	3'S	4'S	5'S	6's	2's	3'S	4'S	5'S	6's
COMMERCIAL CATCHES														
NITINAT – AREA 21														
	101	Ucluelet	GN	97	0	53	40	4	0	0.0%	54.6%	41.2%	4.1%	0.0%
	101	Steveston	GN	47	0	22	22	3	0	0.0%	46.8%	46.8%	6.4%	0.0%
	102	Steveston	GN	142	0	55	80	7	0	0.0%	38.7%	56.3%	4.9%	0.0%
	102	Ucluelet	GN	120	0	63	48	9	0	0.0%	52.5%	40.0%	7.5%	0.0%
	103	Steveston	SN	106	0	46	52	7	1	0.0%	43.4%	49.1%	6.6%	0.9%
	103	Steveston	GN	49	0	31	17	1	0	0.0%	63.3%	34.7%	2.0%	0.0%
	103	Ucluelet	GN	150	0	98	43	8	1	0.0%	65.3%	28.7%	5.3%	0.7%
	104	Steveston	SN	172	0	106	57	9	0	0.0%	61.6%	33.1%	5.2%	0.0%
	111	Steveston	SN	136	0	68	62	6	0	0.0%	50.0%	45.6%	4.4%	0.0%
	111	Ucluelet	GN	49	0	24	20	5	0	0.0%	49.0%	40.8%	10.2%	0.0%
	112	Steveston	SN	24	0	10	14	0	0	0.0%	41.7%	58.3%	0.0%	0.0%
		TOTAL GN		654	0	346	270	37	1	0.0%	52.9%	41.3%	5.7%	0.2%
		TOTAL SN		438	0	230	185	22	1	0.0%	52.5%	42.2%	5.0%	0.2%
		TOTAL GN/SN		1092	0	576	455	59	2	0.0%	52.7%	41.7%	5.4%	0.2%
NOOTKA – AREA 25														
	102	Nootka Snd	GN	50	0	14	31	5	0	0.0%	28.0%	62.0%	10.0%	0.0%
TESTFISHING CATCHES														
NITINAT – AREA 21														
	103	Nitinat	SN	148	0	84	58	6	0	0.0%	56.8%	39.2%	4.1%	0.0%
	105	Nitinat	SN	122	0	70	46	5	1	0.0%	57.4%	37.7%	4.1%	0.8%
	111	Nitinat	SN	198	0	107	81	9	1	0.0%	54.0%	40.9%	4.5%	0.5%
		TOTAL SN		468	0	261	185	20	2	0.0%	55.8%	39.5%	4.3%	0.4%
BARKLEY SOUND – AREA 23														
	103	Barkley Snd.	SN	24	0	9	7	8	0	0.0%	37.5%	29.2%	33.3%	0.0%
NOOTKA – AREA 25														
	94	Nootka Snd.	SN	117	0	20	57	40	0	0.0%	17.1%	48.7%	34.2%	0.0%
	101	Nootka Snd.	SN	290	0	76	127	87	0	0.0%	26.2%	43.8%	30.0%	0.0%
	102	Nootka Snd.	SN	142	0	41	82	19	0	0.0%	28.9%	57.7%	13.4%	0.0%
	103	Nootka Snd.	SN	195	0	57	116	22	0	0.0%	29.2%	59.5%	11.3%	0.0%
	104	Nootka Snd.	SN	46	0	14	27	4	1	0.0%	30.4%	58.7%	8.7%	2.2%
		TOTAL SN		790	0	208	409	172	1	0.0%	26.3%	51.8%	21.8%	0.1%
KYUQUOT – AREA 26														
	101	Kyuquot	SN	130	0	30	66	34	0	0.0%	23.1%	50.8%	26.2%	0.0%
	102	Kyuquot	SN	49	0	14	30	5	0	0.0%	28.6%	61.2%	10.2%	0.0%
		TOTAL SN		179	0	44	96	39	0	0.0%	24.6%	53.6%	21.8%	0.0%

Appendix 8, Table 7. Average age composition for Areas 22, 25 & 26 for years 1983–1987 used to generate Appendix 8, Table 1.

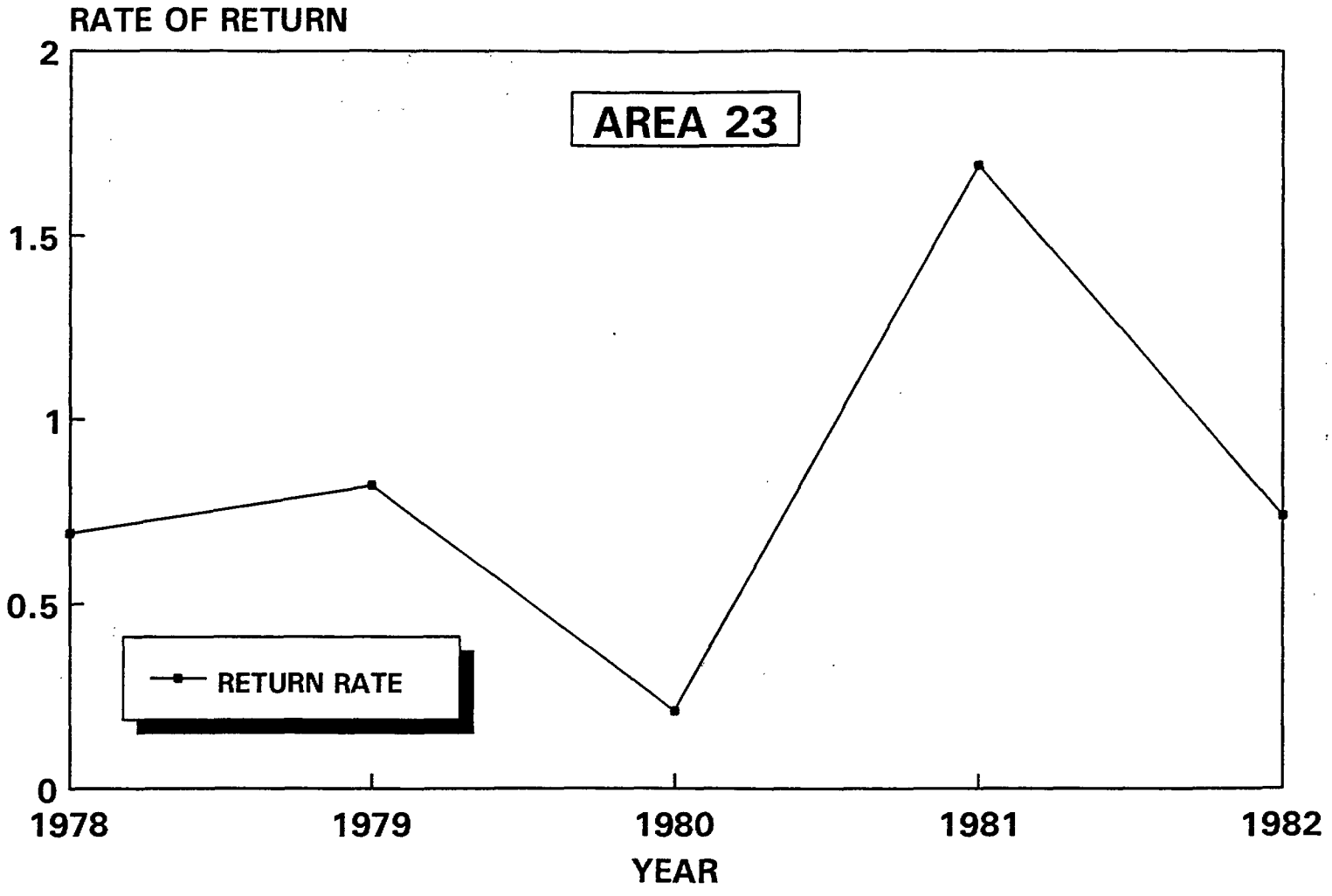
Year	Area	3's		4's		5's		6's		CATCHES
1983										
	25	56/246	22.8%	109/246	44.3%	80/246	32.5%	0/0	0.0%	Test Fishing
	26	173/468	37.0%	219/468	46.8%	76/468	16.2%	0/0	0.0%	Test Fishing
	AVG 25,26.		32.1%		45.9%		21.8%		0.0%	
1984										
	25	120/243	49.4%	113/243	46.5%	10/243	4.1%	0/243	0.0%	Commercial
	26	60/99	60.6%	32/99	32.3%	5/99	5.1%	2/99	2.0%	Test Fishing
	AVG 25,26.		52.6%		42.4%		4.4%		0.6%	
1985										
	25	196/582	33.7%	383/582	65.8%	3/582	0.5%	0/582	0.0%	Commercial
	26	100/275	36.4%	166/275	60.4%	0/275	0.0%	9/275	3.3%	Commercial
	AVG 25,26.		34.5%		64.1%		0.4%		1.1%	
1986										
	25	2/115	1.7%	107/115	93.0%	6/115	5.2%	0/49	0.0%	Test Fishing
	26	25/362	6.9%	308/362	85.1%	29/362	8.0%	0/362	0.0%	Test Fishing
	AVG 25,26.		5.6%		87.0%		7.3%		0.0%	
1987										
	25	208/790	26.3%	409/790	51.8%	172/790	21.8%	0/50	0.0%	Test Fishing
	26	44/179	24.6%	96/179	53.6%	39/179	21.8%	0/179	0.0%	Test Fishing
	AVG 25,26.		26.0%		52.1%		21.8%		0.0%	

APPENDIX 9 - RATES OF RETURN FOR EACH WCVI AREA

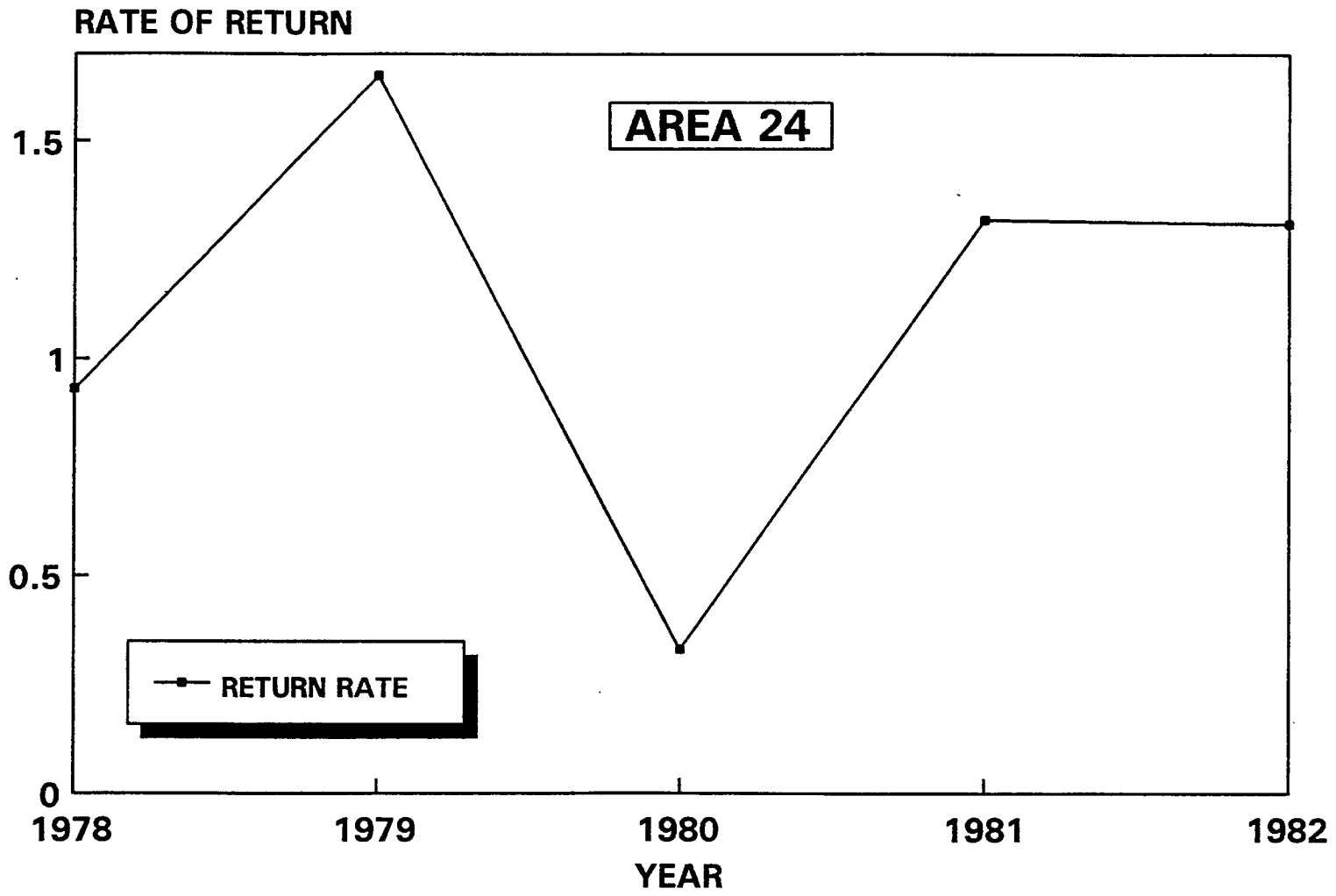
The following figures (App. 9, Figs. 1 through 6) illustrate the rates of return of chum salmon expressed as return per spawner, and are the graphical representation of the rate of return tables for each area which accompany the text.



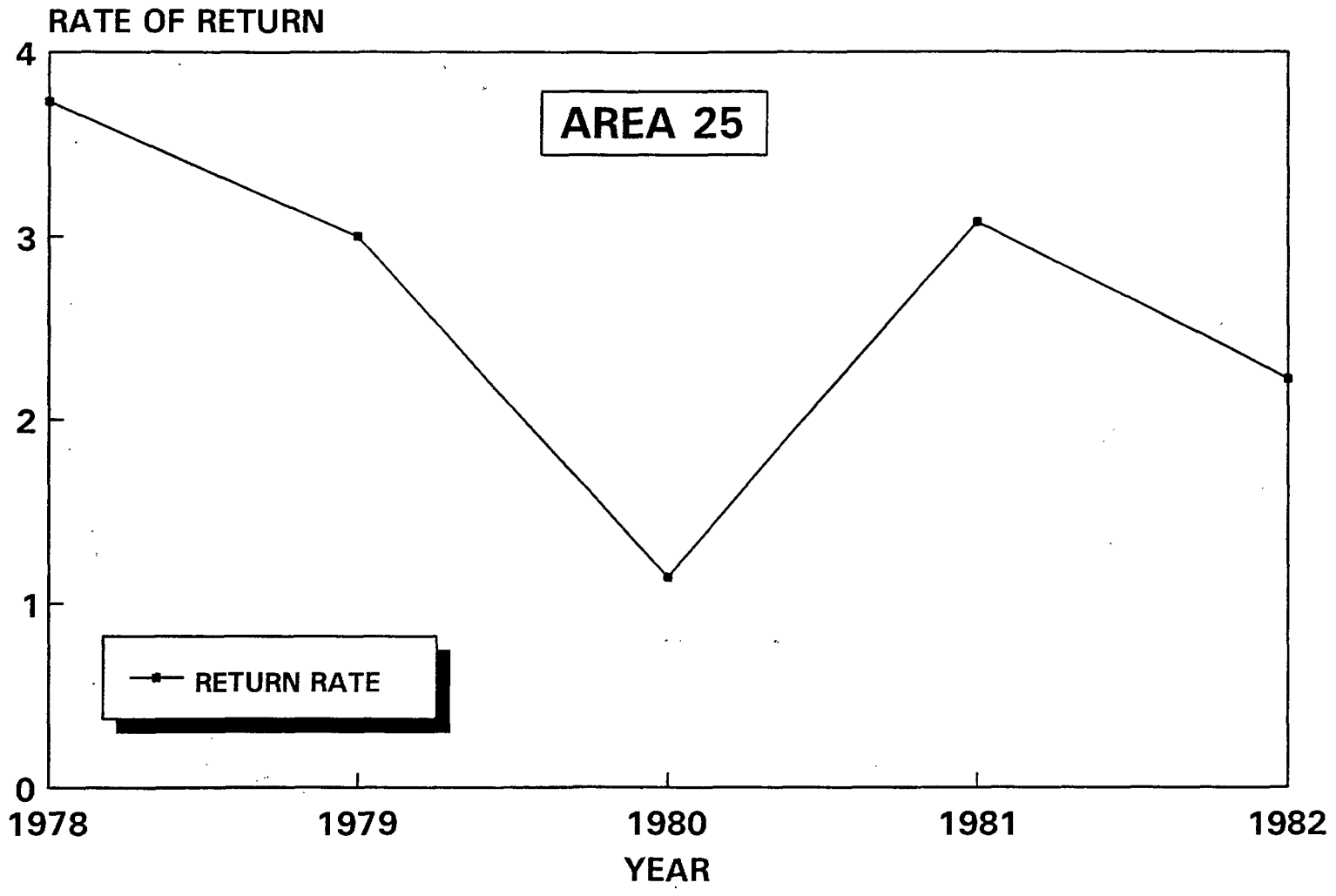
Appendix 9, Fig. 1. Rates of return for Area 22 for 1978-1982 brood years (Data from Table 4).



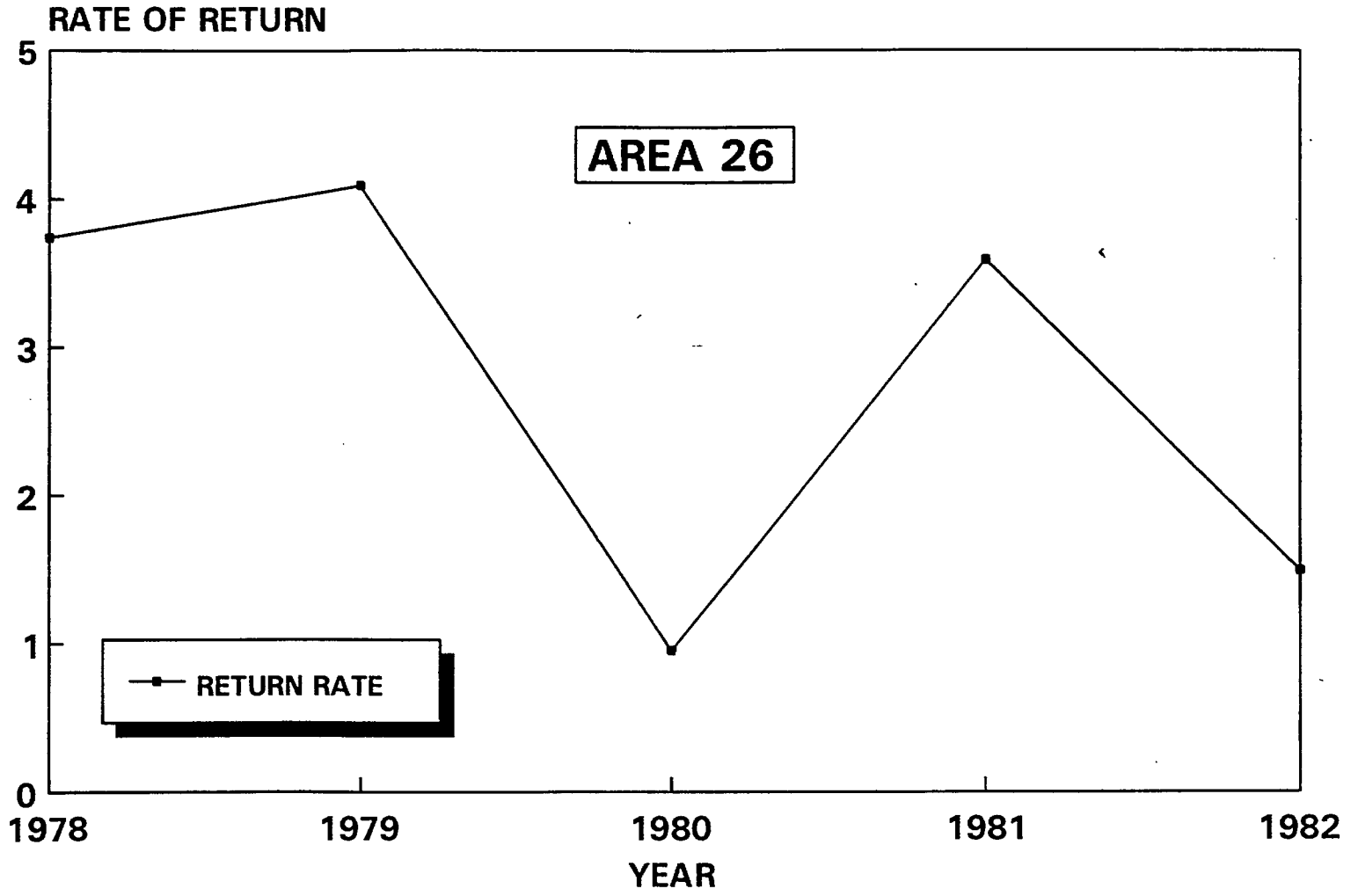
Appendix 9, Fig. 2. Rates of return for Area 23 for 1978-1982 brood years (Data from Table 9).



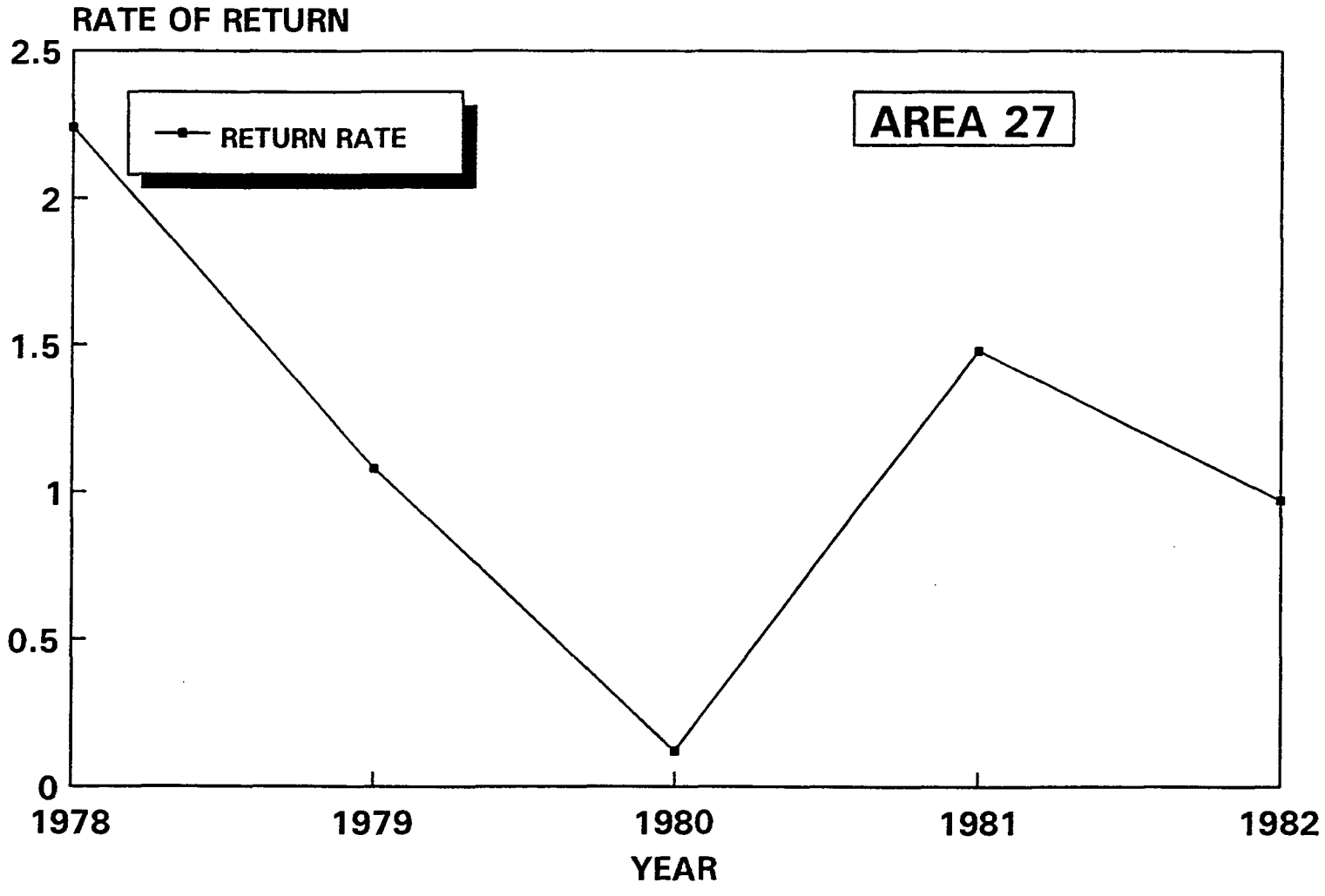
Appendix 9, Fig. 3. Rates of return for Area 24 for 1978-1982 brood years (Data from Table 14).



Appendix 9, Fig. 4. Rates of return for Area 25 for 1978-1982 brood years (Data from Table 19).



Appendix 9, Fig. 5. Rates of return for Area 26 for 1978-1982 brood years (Data from Table 24).



Appendix 9, Fig. 6. Rates of return for Area 27 for 1978-1982 brood years (Data from Table 24).