

1993 LOWER COOK INLET AREA  
ANNUAL FINFISH MANAGEMENT REPORT



by  
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## ACKNOWLEDGEMENTS

### 1993 COMMERCIAL FISHERIES MANAGEMENT & DEVELOPMENT STAFF

The finfish operations for the Commercial Fisheries Management and Development Division, Lower Cook Inlet, employed eight permanent employees and nine permanent-seasonal employees in various area management and research programs during the 1993 season. Appreciation is extended to all personnel for a successful program during 1993.

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**ANNUAL MANAGEMENT REPORT**  
**LOWER COOK INLET**  
**1993**

**COMMERCIAL SALMON FISHERY**

**INTRODUCTION**

The Lower Cook Inlet (LCI) management area is comprised of all waters west of the longitude of Cape Fairfield, north of the latitude of Cape Douglas, and south of the latitude of Anchor Point, and is divided into five fishing districts (Figure 1). The Barren Islands District is the only non-salmon fishing district, with the remaining districts (Southern, Outer, Eastern, and Kamishak Bay) separated into nearly 40 subdistricts and sections to facilitate management of discrete stocks of salmon and herring.

Despite a total catch nearly equal to the long-term average, the 1993 commercial season was the fourth consecutive economic hardship experienced by the LCI salmon fleet. Depressed prices for both sockeye and pink salmon led to a total LCI exvessel value of \$1.16 million, the lowest since 1976 (Table 7, Appendix Table 2). The overall harvest of 1.12 million fish (Figure 8, Appendix Table 5) accounted for 81% of the preseason forecast and was only 10% less than the all-species average over the past 20 years. Fishing effort decreased over 1992 levels with 51 seine and 17 set gillnet permit holders making deliveries (Appendix Table 1).

Nearly 91% of the sockeye salmon harvest resulted from Cook Inlet Aquaculture Association (CIAA) lake stocking projects throughout Lower Cook Inlet. Returns of both hatchery stocks and naturally

produced stocks of pink salmon, normally the dominant species in numbers of fish, were fair within the LCI management area, and the total harvest of 867,000 fish was only slightly less than the long-term average of 965,000 fish (Figure 12, Appendix Table 18). Pink salmon returns to Tutka Hatchery and a satellite release site at Halibut Cove, both in the Southern District, contributed 636,000 fish to the catches (Table 9), providing the bulk (73%) of the commercial pink harvests in LCI during 1993.

The 1993 summer season was also punctuated by extremely mild and exceptionally sunny weather. As a result, many of the management area's stream flows were reduced for a significant portion of the summer. This was particularly the case in the Outer District, where shorter streams were more susceptible to the dry weather. Although unquantified, it is probable that some salmon production was lost through predation and suffocation due to the low water conditions. Altered fish migration patterns and temporary "stranding" was observed at several locations, most notably in the small intertidal streams on Nuka Island.

#### PRESEASON FORECAST

The 1993 LCI salmon harvest was projected to be only 10% greater than the long-term average. The majority of the harvest was expected to come as a result of hatchery and lake stocking enhancement projects involving pink and sockeye salmon. Formal total run forecasts for natural salmon returns other than pink salmon were not prepared because long-term escapement and age-weight-length data are limited for those species. However, catch projections were calculated from relative estimates of parental run size, average age composition data, and recent relative productivity trends. Harvest potential and actual catches for all species in 1993 are listed in the following table:

SPECIES	PROJECTED HARVEST	ACTUAL HARVEST	1973-1992 AVERAGE
Chinook	<i>NO FORECAST</i>	2,168	988
Sockeye	284,000	233,834	158,803
Coho	<i>NO FORECAST</i>	13,477	11,838
Pink	975,000	866,774	964,686
Chum	121,000	4,367	109,728
TOTAL	1,380,000	1,120,620	1,246,043

Strong sockeye returns were anticipated in all areas, with the exception of English Bay in the Southern District and Chenik Lake in the Kamishak Bay District. Enhanced runs to Leisure and Hazel Lakes in the Southern District and Kirschner Lake in the Kamishak Bay District were expected to dominate the sockeye returns. Although Chenik Lake has benefited from regular fry stocking and intermittent fertilization during recent years, as well as from recent natural spawning escapements of up to 17,000 fish, adult sockeye returns in 1993 were expected to be relatively poor due to an epizootic of the IHN virus within the system. Additional adult returns resulting from sockeye enhancement projects at Bear Lake in the Eastern District and Bruin Lake in the Kamishak Bay District were anticipated to contribute to commercial harvests.

The 1993 LCI pink salmon harvest was expected to be slightly less than one million fish. Variable 1991 pink salmon escapements to major Outer and Kamishak Bay District systems contributed to a harvest projection of 451,000 naturally produced pinks throughout the entire LCI management area this season. Port Dick in the Outer District and Bruin Bay in the Kamishak Bay District were forecast to provide the largest harvestable surpluses. Natural pink returns were expected to be weak in the Eastern and Southern Districts.

Returns to the Tutka Bay Hatchery and a secondary fry release site at Halibut Cove Lagoon were expected to be the mainstay of the pink salmon fishery. A harvest of 434,000 pinks was expected as a result of fish returning to Tutka Bay Hatchery, with an additional 90,000 fish projected for Halibut Cove Lagoon. Nearly 30 million fry were released in 1992 at these locations and typical ocean survival rates for odd-year runs should have produced adult returns totalling over 500,000 fish.

Significant chum salmon harvests appeared unlikely in 1993. Despite relatively good escapements during the 1988 and 1989 parent years, especially in the Kamishak Bay District, a trend of weak returns over the past three seasons suggested that the 1993 chum return would likely be weak as well.

#### SUMMARY BY SPECIES

##### Chinook Salmon

The harvest of chinook salmon, not normally a commercially important species in LCI, was more than double the 1973-92 average and established a new historical high catch of 2,168 fish (Appendix Table 12). The catch was primarily due to enhanced production in Halibut Cove Lagoon and Seldovia Bay (Table 2). The chinook harvest was split evenly between set gillnet and purse seine gear (Table 1).

##### Sockeye Salmon

The total LCI harvest of 233,800 sockeyes was nearly equal to the recent 10-year average (Figure 9, Appendix Table 13). Although the harvest was about 18% below the preseason projection of 284,000 fish, and only accounted for one-fifth of the total number of fish

landed in 1993, the sockeye catch comprised nearly 70% of the total value of the LCI fishery (Table 7, Appendix Table 2).

Returns of sockeye salmon to Mikfik Creek in the Kamishak Bay District initially appeared weak as escapement was minimal during early June and no fish were harvested in the first week after the June 1 regulatory opening. A meager harvest by three vessels on June 10 and 11, which ultimately netted the entire season's targeted harvest on this return, apparently convinced the fleet that the run would be too weak to be economically viable. As a result, no further effort occurred on Mikfik sockeyes, with a final harvest totalling less than 1,000 fish. The cumulative estimated escapement of 6,350 fish fell within the goal of 5-7,000 fish, but fish entry into the system occurred in two distinct timing phases, one fairly normal and one relatively late due to very low water conditions.

Returns to enhancement projects, which account for the bulk of the sockeyes harvested in LCI, were variable in 1993. Despite a harvest forecast of only 10,000 fish at Chenik Lake in the Kamishak Bay District, primarily due to the outbreak of the IHN virus, the actual harvest of nearly 25,000 fish (including cost recovery; Appendix Table 16) was a pleasant surprise. Likewise, combined harvests at China Poot (Leisure Lake) and Neptune Bay (Hazel Lake), both in the Southern District, exceeded preseason projections, with a final catch of almost 145,000 fish (Appendix Table 15) or over 60% of the LCI sockeye total. In contrast, returns of sockeye salmon to enhancement sites at Bruin Lake in the Kamishak Bay District and Bear Lake in the Eastern District were far below expectations.

Natural sockeye runs to Delight and Desire Lakes in the East Arm of Nuka Bay in the Outer District were not strong although the escapement goal of 10,000 fish at Desire Lake was surpassed (Appendix Table 23) and a small surplus afforded the fleet a modest

harvest of 3,500 fish (Table 3). At Delight Lake the final estimated escapement of 5,600 fish was only slightly more than half of the desired goal, marking the fifth consecutive year in which the desired level was not reached (Table 3, Appendix Table 23). Returns to Ecstasy (Delectable) Lakes, a recently formed glacial lake system in East Nuka Bay which supported no documented salmon runs prior to the mid-1980's, had a peak aerial escapement estimate of 1,300 sockeye salmon during 1993.

Sockeye returns to the English Bay Lake system were the highest recorded since 1984 but still failed to reach the desired minimum goal of 10,000 fish. A complete closure of the commercial, sport, and subsistence fisheries for the duration of the sockeye run this year resulted in a total estimated escapement of 8,900 fish, marking the eighth straight year that the escapement into this system has failed to achieve the lower end of the desired range (Table 3, Appendix Table 23).

#### Coho Salmon

The coho harvest of 13,500 fish slightly exceeded the recent average (Appendix Table 17). However, two-thirds of the harvest was taken in the Eastern District (Table 1) as a result of Bear Lake hatchery cost recovery efforts, Seward Silver Salmon Derby catches, and incidental harvests during the commercial pink salmon seine fishery in Aialik Bay. The overall weakness of most natural returns, along with late run timing, discouraged the majority of the fleet from targeting this species in the Kamishak Bay District during the latter part of the season, thus contributing to the low harvests of non-enhanced stocks.

#### Pink Salmon

Returns of pink salmon, normally the dominant species in numbers of fish, were considered average throughout LCI. The harvest of

866,800 exceeded the recent 10-year average but was still 11% below preseason expectations (Appendix Table 18). For the first time in the last four years, the Tutka Hatchery pink return surpassed the forecast. The commercial harvest (including cost recovery) of hatchery pinks from Tutka Bay was 536,000 fish, while Halibut Cove Lagoon, a secondary release site for Tutka Hatchery fry, contributed an additional 100,000 fish to commercial catches this season (Table 9). Of these totals, approximately 409,000 fish (64%) were utilized for hatchery cost recovery, with the remaining 36% taken in the common property fishery. An additional 107,000 fish were collected for hatchery brood stock purposes.

Outside of the Southern District, only the Outer District produced any other significant pink catches during 1993. The catch of pink salmon in the Outer District, primarily from Nuka Island, Windy Bay, and Port Dick, totalled 159,000 fish (Table 5). Despite fair returns of pink salmon to Kamishak Bay District systems, only 4,200 fish were harvested, primarily because of the low prices again offered for pinks this year. In the Eastern District, the catch of just over 10,000 pinks was the lowest since 1989 and was indicative of the weak returns of pink salmon bound for adjacent Prince William Sound.

Pink salmon escapement goals for most major LCI systems were met or exceeded in 1993 (Table 5, Appendix Table 24). One notable exception was Port Graham River in the Southern District, where the final estimated escapement of 12,800 pinks was about 36% less than the lower end of the desired range of 20,000 to 40,000 fish. Undoubtedly the low levels of directed effort for pinks, particularly in the Kamishak Bay District, accounted for generally good escapements into most systems.

## Chum Salmon

The LCI chum salmon harvest of 4,400 fish was the lowest ever recorded and continued a trend of depressed commercial chum catches experienced during the past five years (Figure 8, Appendix Table 21). The poor returns were generally anticipated and conservative fishing schedules were implemented early in the season throughout the Kamishak Bay and Outer Districts to protect chum salmon stocks. Although most major systems failed to achieve their desired escapements, the conservative strategy was successful at limiting the commercial harvest and allowing the majority of the returns, particularly in the Kamishak Bay District, to reach their natal streams (Table 6, Appendix Table 25).

### EXVESSEL VALUE

The unadjusted exvessel value of the 1993 salmon harvest in LCI was approximately \$1,164,600 (Table 7, Appendix Table 2), making it the lowest since 1976. Purse seine gear in the common property fishery, which normally accounts for the majority of the catch, comprised \$837,600 or 72% of the total (Table 7). Set gillnets accounted for \$117,500 (10%). An estimated \$198,900, or about 17% of the entire exvessel value of the LCI salmon fishery, was utilized for hatchery cost recovery purposes. Average prices paid to fishermen in 1993, not including any postseason adjustments, were as follows: chinook - \$1.02/pound; sockeye - \$0.80/pound; coho - \$0.54/pound; pink - \$0.12/pound; and chum - \$0.28/pound (Appendix Table 3).

## DISTRICT INSEASON MANAGEMENT SUMMARIES

### Southern District

#### **Set Gillnet Fishery**

An Area H set gillnet permit holder is allowed to fish in both Upper and Lower Cook Inlet, but there are only five beach areas in LCI, all located along the south shore of Kachemak Bay in the Southern District, where set gillnets may be used (Figure 2). The limited area provides only enough productive fishing sites to accommodate approximately 25 set net permits.

The Southern District set gillnet harvest totalled 33,600 fish in 1993 (Table 1). The mixed-species harvest was only about half of the 1973-92 average, with increased percentages of chinooks, coho, and chums in the catches compared to the long-term average and decreased percentages of sockeyes and pinks (Appendix Table 7). Typically the gillnet harvest is comprised of about 50% sockeye salmon, 40% pink salmon, 5% chums, 5% cohos, and less than 1% chinooks. An additional 24 hours of fishing per week was allowed in the Halibut Cove area from July 5 through the end of the season, resulting in an increased harvest of all species in this subdistrict.

Coho catches by set gillnets were nearly equal to the long-term average, not reflecting the generally weak nature of most natural returns throughout the rest of the management area. The chinook salmon catch of nearly 1,100 fish represented the fifth highest set gillnet total for this species on record (Appendix Table 7). The high catches were primarily due to chinook salmon returning to enhancement projects at Halibut Cove Lagoon and Seldovia Bay.

Several factors contributed to the below average set gillnet harvests in 1993. The sockeye salmon return to the English Bay

Lakes system was poor for the ninth consecutive year. In anticipation of a weak return, the Port Graham Subdistrict, including the English Bay Section, was closed to both commercial and subsistence set gillnet fishing, while the freshwater drainage was also closed to sport fishing, all for the duration of the sockeye return. Even with these closures, the sockeye salmon escapement to the English Bay system reached only 8,900 fish, 11% less than the low end of the desired escapement range (Table 3, Appendix Table 23) but still the highest escapement since 1984. After the sockeye run was effectively over, the commercial and subsistence fisheries in Port Graham and English Bay were reopened on July 12 to target on pinks returning to the Port Graham Hatchery and Port Graham River. However, no commercial set gillnet effort or harvest occurred in the Port Graham Subdistrict this season, largely because of the tragic deaths of two Port Graham residents, coupled with a much weaker than expected pink return.

Overall fishing effort also affected the set gillnet harvest in the Southern District. The number of set gillnet permits actively fished in LCI this season (17) was the lowest since the limited entry permit system was instituted in 1975 (Appendix Table 1).

## **Seine Fishery**

### Sockeye Salmon

Purse seiners in the common property fishery accounted for 82% of the 156,900 sockeye salmon landed in the Southern District in 1993 (Table 1). The overall catch by all gear types was nearly half-again the recent 10-year average for the district (Appendix Table 13).

Purse seining was allowed to begin earlier than the traditional opening date in the Southern District this season. Upon preseason

requests from Cook Inlet Seiners Association (CISA), the Humpy Creek Subdistrict was opened to commercial fishing on June 1 to allow "exploratory" fishing opportunity in hopes of detecting early sockeye returns to upper Kachemak Bay. Despite remaining open on two 48-hour fishing periods per week through July 10, only three boats made landings from this area. Although very few sockeyes were taken, significant numbers of chinook salmon were caught, assumed to be returns to the Halibut Cove Lagoon enhancement project.

As in recent years, waters of China Poot Bay and Halibut Cove Subdistricts, and a portion of the Tutka Bay Subdistrict, were opened to seining five days per week beginning Thursday, June 25, in anticipation of strong returns to Leisure Lake. Unlike recent years, however, waters of the China Poot and Hazel Lake Special Harvest Areas (SHA's) were opened only to authorized agents of CIAA at this time, on a seven day per week basis, for the purpose of hatchery cost recovery; they were to be closed to the common property commercial fishery until the revenue goal at each SHA was achieved. Preseason combined harvest projections for returns to the Leisure and Hazel Lakes stocking projects were estimated at 90,000 fish. The actual harvest, including cost recovery, amounted to 144,700 fish (Appendix Table 15), comprising 62% of the total LCI sockeye salmon harvest (Table 3, Figure 5). Because of the geographical proximity of these two projects, the overlapping area of harvest, and the lack of tagging, no definitive estimate of separate returns to each system can be established. However, fish returning as a result of these two projects undoubtedly contributed to seine catches in the Halibut Cove and Tutka Bay Subdistricts, as well as those in China Poot Bay Subdistrict. Personal use dip net fishermen and sport fishermen harvested another 4,400 sockeyes at the head of China Poot Bay. The 1993 total return from both projects was estimated at 149,100 sockeyes (Appendix Table 15). Commercial catches peaked in the China Poot Section on July 12 at nearly 10,000 fish taken by 17 vessels, while the peak in Neptune

Bay occurred on July 19 when a similar number of fish was taken by 14 boats. The final commercial catch in the two sections, including cost recovery, surpassed the preseason forecast of 90,000 fish for both projects by 61%.

As outlined in the Trail Lakes Hatchery Annual Management Plan (AMP) prior to the season, the revenue goal necessary to meet operational expenses incurred in LCI sockeye salmon lake stocking projects was set at \$60,200, to be split amongst cost recovery harvests as follows: 30% from China Poot SHA and 20% from Hazel Lake SHA, both in the Southern District; and 25% each from the Chenik and Kirschner Lakes SHA's in the Kamishak Bay District. Cost recovery harvests inside the China Poot and Hazel Lake SHA's (Figures 3 and 4) were to occur at CIAA's discretion early in the runs since harvests would take place without interference or competition from the fleet at large. Projected harvests of 4,500 sockeyes at the China Poot SHA and 3,000 sockeyes at the Hazel Lake SHA were necessary to achieve the combined goal of \$30,100 for the two areas, assuming an average price of \$1.00 per pound and an average weight of 4.0 pounds per fish. As previously described, these SHA's were to remain closed to common property seining until the goal established for each was achieved.

No cost recovery harvest had occurred in the China Poot SHA prior to July 2 because of the relatively small buildup of sockeyes up to that point. Sockeye catches during open commercial periods in waters outside the SHA during the last week of June were slow as well, indicating that the run had not arrived in strength. Because the posted price for sockeye salmon was only \$0.75 per pound, an upward adjustment in the number of fish was necessary to achieve the cost recovery goals throughout LCI.

The first cost recovery harvest in the China Poot SHA on July 2 netted only 137 fish. However, harvests on July 4, 5, and 6 averaged nearly 1,000 sockeyes per day, indicating that run

strength was increasing. The fifth and final cost recovery harvest in the China Poot SHA took place on July 10 when 2,200 sockeyes were taken, bringing the cumulative total to nearly 5,300 fish with an actual value of just over \$17,000. Since this essentially achieved the revenue goal for China Poot SHA, waters of China Poot SHA were closed to cost recovery fishing and simultaneously opened to common property seining five days per week beginning July 12. At this time, the sockeye return appeared to be building to its peak in China Poot Bay as catches remained relatively good for the next week to ten days, averaging nearly 5,000 fish per day, before dwindling. The last sockeye landing in the China Poot Bay Section occurred on August 3, with a cumulative common property harvest of 62,400 fish (Table 3).

Despite the presence of sockeye salmon within the Hazel Lake SHA during a similar time frame as that of China Poot SHA, there were no early efforts to conduct cost recovery there. A single vessel finally made one set on July 11 in the Hazel Lake SHA which resulted in a harvest of 8,300 fish. This exceeded the preseason revenue goal, and the SHA was subsequently closed to cost recovery harvest and opened to common property fishing five days per week beginning July 13. Similar to China Poot Bay, seining in Neptune Bay remained good for a week to ten days thereafter, averaging over 4,600 sockeyes per day before beginning to decline. The last landing in the Neptune Bay Section was made on August 5. Total commercial harvest of sockeye salmon in the Hazel Lake Section of the China Poot Subdistrict, excluding cost recovery harvests, was 51,600 fish (Table 3).

Seining within the Hazel Lake Section during 1993 was not without incident. No regulatory markers had been erected to delineate the Hazel Lake SHA because: 1) spawning escapement is unnecessary and undesirable in the Hazel Lake system, and waters within Neptune Bay were only closed to facilitate hatchery cost recovery within the SHA; and 2) the stocking project at Hazel Lake was relatively new,

and had yet to experience any significant returns. Therefore, the designated SHA was established by emergency order on a trial basis, subject to change in subsequent years if adjustment or "fine-tuning" was necessary. The intended closure line, along with corresponding latitudes and longitudes plotted from a nautical chart, were published in a preseason handout chart issued by the Department.

The staff became aware of a problem on the morning of July 12, by which time the majority of the seine fleet within Kachemak Bay knew that the revenue goal had been achieved over the weekend and that an opening of the SHA was imminent. That morning, representatives of CISA contacted the Homer office to report some apparent confusion regarding the western end of the closure line at the Hazel Lake SHA. A few fishermen had concluded that the published latitude/longitude coordinates for the western end of the line did not coincide with the point of land shown on the handout, rather it was actually 300 to 500 yards inshore (south) of the point indicated on the handout chart. They stated that LORAN and/or Global Positioning System (GPS) coordinates generated from vessels on the grounds supported their claims.

At the time, waters of the Hazel Lake SHA were still closed to the common property fishery, but a few fishermen adamantly maintained that the "discrepancy" left a small area within the designated SHA legally open to fishing. Despite knowledge of the original intent to protect fish in Neptune Bay until the CIAA revenue goal was achieved, several boats elected to fish inside the area on July 12 based on the coordinates generated on the grounds. Since the revenue goal had been achieved over the weekend on July 11, it was announced on Monday, July 12, that the SHA would open to commercial fishing at 6:00 a.m. Tuesday, July 13.

In response to the initial reports, the staff, en route to conduct an aerial survey of the Outer District, flew over Neptune Bay on

the morning of July 12 and observed at least two boats fishing inside the designated SHA. Several other vessels appeared ready to make sets at the same location. Based on LORAN readings taken from the aircraft during overflights, it appeared that the LORAN signal at that particular location was the source of confusion. After landing and consulting with vessel skippers waiting to make sets on the grounds, it was decided to erect a marker on the beach at the location everyone believed to be the west end of the closure line. The staff felt this was the only fair method that would allow all fishermen to determine the boundary line.

Later that morning, a regulatory marker was erected approximately 300 to 400 yards inshore (south) of the point indicated on the handout for the western end of the closure line. Despite this attempt to resolve the immediate problem of confusion over the boundary line, erection of the marker served to incense other members of fleet who were not on the grounds. They claimed that establishment of a new line inshore of that which was published in the preseason handout amounted to an early, unannounced opening of the SHA, favoring only those fishermen who happened to be present.

On July 14, the staff returned to Neptune Bay with a hand-held GPS receiver to verify the coordinates published in the preseason handout and the Emergency Order establishing the Hazel Lake SHA. Readings obtained, based on independent signals from five satellite transmitters, confirmed that those original coordinates were, in fact, correct. When presented with this information, members of the fleet who had claimed that the published coordinates were incorrect conceded that the problem was actually "operator error" in failing to convert GPS and/or LORAN readings from minutes and tenths of a minute to minutes and seconds as published in the handout and E.O. However, because the marker erected by the staff created a new boundary line, it was determined that citations could not be issued for fishing in closed waters.

## Pink Salmon

Returns of pink salmon to the Tutka Bay Hatchery and to the satellite rearing project at Halibut Cove Lagoon contributed to an overall Southern District harvest of 692,800 pink salmon, over 40% greater than the recent 10-year average (Table 5, Appendix Table 18). The opening of Halibut Cove Lagoon to seining was delayed until July 5 to allow the recreational fishery, targeting on hatchery reared chinook salmon, to continue through the 4th of July holiday without interference from the commercial seine fleet. Waters of Tutka Bay Subdistrict outside of Tutka Bay proper were open to commercial seining five days per week beginning June 25, while waters within the Tutka Bay SHA (Figure 5) were open to hatchery brood stock and cost recovery harvest by authorized agents of CIAA on a continuous basis as established in the Tutka Hatchery Annual Management Plan. The plan called for hatchery incubators to be filled to maximum capacity if possible, and excess fish beyond brood stock and natural escapement requirements were to be harvested for cost recovery to help offset operational expenses. Approximately 76,000 fish (57,000 females) were desired for hatchery brood stock in order to achieve the goal of 60 million eggs, and an additional 10,000 pinks were needed to meet the natural spawning escapement goal for Tutka Creek.

Early commercial catches during the first week of July in the outside waters of Tutka Subdistrict were slow, but by the end of that week pink salmon abundance was building within Tutka Lagoon. Cost recovery harvests began on July 10, with harvests occurring primarily in Tutka Lagoon and secondarily in waters of Tutka Bay Special Harvest Area outside the lagoon. Daily cost recovery harvests averaged about 31,500 pinks for actual days fished between July 10 and July 27. Harvests peaked on July 21 and 22 when daily catches totalled 51,800 and 42,400 pinks, respectively. The last hatchery harvest took place on July 27, with the final tally totalling 409,000 pinks. Additionally, over 107,000 pinks were

captured for brood stock, and the natural escapement goal for Tutka Creek was achieved. Therefore, waters of Tutka Bay, including Tutka Lagoon, were closed to cost recovery harvests and opened to commercial seining five days per week beginning August 4.

With effort levels inside the lagoon expected to be high at the August 4 opening, staff was asked to conduct a "flare opening" to ensure a fair start. This was the first time such an opening had occurred since 1989. On the day of the opening, 10 vessels harvested over 36,000 pinks, mostly from within Tutka Lagoon, marking the peak single day common property catch for the 1993 LCI season. Catches declined significantly thereafter, with the final seine delivery in Tutka Bay reported on August 16.

The total commercial catch of pink salmon in Tutka Bay Subdistrict this season, including both seine and setnet catches but excluding hatchery cost recovery, was only 126,400 fish (Table 5). A total of 409,400 pinks were sold by CIAA for cost recovery, with an additional brood stock harvest of 107,200 fish (Table 9). The pink salmon escapement of 27,400 fish (Table 5, Appendix Table 24) into Tutka Creek exceeded the desired goal of 10,000 fish, but was once again assumed to include a high proportion of males discarded during hatchery egg-take operations.

Returns of wild pink salmon stocks to other systems in the Southern District were variable as indicated by ground survey escapement counts. Humpy Creek achieved its pink salmon escapement goal for the first time since 1990 while Seldovia River slightly exceeded the upper end of its desired range (Table 5, Appendix Table 24). Pink escapements fell short at Port Graham River, Barabara Creek, and China Poot Creek.

## Other Species

Southern District chum salmon returns were poor for a fourth consecutive year. Nonetheless, the chum harvest of 2,800 fish (Table 6) represented the highest total since 1989 despite being just half of the recent 10-year average for the district (Appendix Table 21). Set gillnets accounted for 93% of the harvest (Table 1), with 44% of the district-wide catch landed in the Seldovia Bay Subdistrict (Table 6).

Although minor in total numbers of fish, the majority of the Southern District chinook harvest usually consists of incidental catches of adult fish returning to three separate enhancement projects. The 1993 harvest of 2,160 chinooks set a new record for this district (Appendix Table 12) and was split about equally between seine and set gillnet gear. The coho salmon harvest of 4,400 fish was nearly equivalent to the 20-year average (Appendix Table 17).

## Kamishak Bay District

### **Sockeye Salmon**

The entire Kamishak Bay District, with the exception of the Paint River Subdistrict, opened to salmon seining by regulation on Monday, June 1, with two regular 48-hour weekly fishing periods established by emergency order. However, the Mikfik Creek sockeye return appeared weak as evidenced by early aerial surveys, and as a result no harvest occurred during the first week's openings. The earliest landings were reported on June 10 and 11 when just over 900 sockeyes were delivered, but very few fish had moved into McNeil Lagoon or into the lower part of Mikfik Creek by that date. The fishermen targeting this return subsequently decided the run was too weak to warrant further effort and moved to other areas.

The peak aerial survey, conducted on June 18, estimated 3,700 sockeyes in fresh water at Mikfik Creek, well below the lower end of the desired escapement range. Most of the fish observed in mid-June moved readily into the lake, followed by a "lull" in the return towards the end of month. On July 7, another significant buildup of sockeyes (2,600) was documented in McNeil Lagoon, but fish passage into the lake was hindered by extremely low water flows brought about by unseasonably dry and sunny weather. These fish remained in the lagoon until late July when water levels rose slightly and finally allowed access into the lake. The final escapement index at Mikfik Creek was estimated at 6,350 sockeyes (Table 3), within the desired range of 5,000 to 7,000 fish (Appendix Table 23), while the cumulative catch within the McNeil River Subdistrict totalled only 940 sockeyes (Table 3).

With the meager June catches of sockeye in the McNeil River Subdistrict, seiners shifted their efforts to the Kamishak and Douglas River Subdistricts. Normally effort would be directed towards the Chenik Lake sockeye return, however CIAA cost recovery activities, expected to occur during the early part of the run, kept most fishermen from prospecting in the Chenik Subdistrict. Sockeye catches at "Silver Beach" in the Douglas River Subdistrict proved to be disappointing as well, with only 1,300 fish landed between June 24 and July 6.

Preseason management strategy for the Chenik Subdistrict, as outlined in the Crooked Creek AMP, was to open the Chenik SHA (Figure 6) to cost recovery on a continuous basis beginning June 17 while keeping it closed to common property seining, thus allowing opportunity for CIAA to achieve the sales harvest goal of \$15,050 at the beginning of the run. As soon as the goal was met, Chenik SHA was to be closed to cost recovery harvest and opened to commercial seining so the fleet could work the area uninhibited for the remainder of the season. Once again, the preseason average price for sockeyes was projected to be \$1.00 per pound, and at an

average weight of 4.0 pounds per fish, CIAA needed to harvest approximately 3,800 sockeye salmon in order to achieve the revenue goal at Chenik.

Sockeyes first began to show at Chenik in late June. Cost recovery harvests on June 30 and July 3 netted 4,600 fish, worth \$15,840 at an actual price of \$0.75 per pound, thus meeting the revenue goal for the Chenik SHA. Because the cost recovery goal was achieved, the Chenik SHA was closed to cost recovery fishing and opened to commercial seining on two 48-hour weekly fishing periods, consistent with the remainder of the Kamishak Bay District, beginning July 5. Daily catches ranged from 1,100 to 4,100 sockeyes between July 5 and July 16, with the peak occurring on July 13.

The closure times for the commercial fishery (weekends and Wednesdays) in the Chenik Subdistrict were intended to afford some limited protection for escapement into Chenik Lake. Even though most of the sockeye salmon returning to Chenik Lake were produced from the Crooked Creek Hatchery stocking project, a natural spawning component is maintained through an escapement goal of 10,000 fish. Just prior to the reopening of the subdistrict to commercial fishing on July 5, escapement past the Chenik Lake weir stood at about 1,300 fish, which seemed strong and early by historical standards. However, steady effort by the fleet between July 5 and July 16, coupled with low water levels, suppressed escapements through the middle of the month. In an attempt to increase the escapement rate and thereby reach the goal of 10,000 sockeyes, the commercial fishery in Chenik Subdistrict was closed beginning July 19. Despite the closure, the tail of the run proved weaker than anticipated resulting in a weir count of only 3,650 fish when the project was terminated on July 30. Miscellaneous on-grounds observations of sockeyes entering the system after termination of the weir project increased the final escapement

estimate into Chenik Lake to 4,000 fish (Appendix Table 23). Cumulative catch in the Chenik Subdistrict, excluding hatchery cost recovery, was 20,000 sockeyes (Table 3).

Nearby Kirschner Lake in the Bruin Bay Subdistrict is the site of another sockeye salmon lake stocking project where a steep waterfall at the marine outlet prevents escapement. The sockeye revenue goal as set forth in the Trail Lakes Hatchery AMP called for 25% of the LCI total, or \$15,050, to be taken at the Kirschner Lake SHA (Figure 7). The forecasted total harvest for fish returning to this site was 40,000 fish in 1993. Similar to the Chenik SHA, the Kirschner SHA was opened to hatchery cost recovery harvests on a continuous basis beginning June 17, while simultaneously remaining closed to common property seining.

The first cost recovery effort at Kirschner SHA occurred on Saturday, July 10, resulting in the harvest of 3,300 sockeyes worth about \$12,000 or 80% of the goal. In anticipation of attaining the remainder of the goal in a subsequent set during the evening tide that same day, it was announced that the Kirschner SHA would close to cost recovery fishing and open to commercial seining on two regular 48-hour weekly fishing periods beginning 6:00 a.m. July 12. Although no further cost recovery harvests were made, the commercial fishery was allowed to open as scheduled.

Catches averaged about 1,700 sockeyes per day at Kirschner Lake for the first three days after the commercial fishery opened. Then, at the end of that week on July 16, a cooperative fishing agreement by five participating vessels resulted in the peak daily catch of 10,100 sockeyes. A similar agreement netted six vessels a nearly identical daily total on July 20. Catches began to decline thereafter, with the final landing made at Kirschner Lake on August 9. It should be noted that this last landing, very late by historical standards, consisted of fish that had become significantly freshwater marked. The cumulative common property

seine harvest in the Kirschner Lake Section of the Bruin Bay Subdistrict totalled 36,300 sockeyes for the season (Table 3).

Preseason projections for sockeye salmon returns resulting from enhancement efforts at Bruin Lake, whose outlet empties into Bruin Bay proper about five miles southwest of Kirschner Lake, ranged as high as 20,000 fish. However, because 1993 was the first year of adult returns to this enhancement site, it was uncertain whether survival would be similar to other Kamishak Bay enhanced returns. Fishermen reported difficulty locating sizeable concentrations of fish in the shallow waters near the mouth of Bruin Lake Creek, and only 1,200 sockeyes were harvested in Bruin Bay during the season. In early August about 1,500 sockeyes were documented in Bruin Lake Creek, blocked from ascending to the lake by a series of barrier falls. In addition, nearby Bruin Bay River, known to normally support a small run of sockeye salmon, had a peak daily aerial count of 800 sockeyes, the second highest on record.

#### **Pink Salmon**

Preseason pink salmon harvest projections for the Kamishak Bay District were fair to good, with returns to Bruin River and Ursus and Rocky Cove systems having the most potential for fulfilling the harvest forecast of 170,000 fish. Early aerial surveys of major pink salmon systems did not indicate particularly strong returns to any of the these areas. But by August 2, pink runs were picking up in strength, with aerial survey estimates of 15,000 fish in Bruin River, 10,000 fish in Sunday Creek (Rocky Cove), and 10,000 fish also estimated in Brown's Peak Creek (Ursus Cove). As Bruin Bay River has an escapement goal of 25,000 to 50,000 pinks while Sunday Creek and Brown's Peak Creek each have goals of 10,000 pinks, all areas presumably could have sustained directed commercial fishing pressure. Although Bruin Bay, Ursus Cove, and Rocky Cove Subdistricts had been open to seining on two 48-hour periods per week up to this time, depressed pink salmon prices and low market

demand for this species resulted in no directed effort for pinks and relatively insignificant incidental catches.

Pink escapements in the Kamishak Bay District continued to climb throughout the month of August, with all major systems exceeding their goals (Appendix Table 24). The total harvest of 4,200 pinks was just 4% of the long term average (Appendix Table 18) and consisted solely of incidental harvests during various sockeye fisheries. The Rocky Cove and Ursus Cove Subdistricts were closed to seining on August 9 to protect chum returns to those areas, but only minor pink harvests would likely have resulted from any directed effort after that late date.

### **Chum Salmon**

Cumulative chum salmon catches for the entire Kamishak Bay District totalled just 600 fish, the lowest harvest in the history of the fishery since statehood and less than 1% of the 10-year average (Appendix Table 21). Very little effort was directed specifically at chums in the Kamishak Bay District. The extremely low catches apparently convinced seiners the chum returns were not commercially viable.

Chum salmon escapement into McNeil River began to increase during the first week of July, and on July 19, the peak daily escapement count for the season occurred with 10,800 fish observed, representing 11% of the low end of the escapement range. Despite the fact that no effort was occurring in the McNeil River Subdistrict or in any Kamishak Bay subdistrict south of McNeil River, chum escapement into McNeil River began to drop off significantly after this date. Even though returns appeared weak, the McNeil River Subdistrict remained open until July 19, in anticipation of a strong showing of age-five fish, but the staff had made it abundantly clear that any significant catch of chums without a corresponding increase in the escapement rate in McNeil

River would result in immediate closure of the subdistrict. This strategy proved effective at protecting the chum return from any fishing mortality, allowing the entire run to enter the river. However, with an escapement goal of 20,000 to 40,000 chums for this system, the numbers of fish present were not sufficient to achieve the in-river goal. The final escapement estimate into McNeil River was nearly 16,000 chums (Appendix Table 25), while the final catch for the McNeil River Subdistrict was less than 400 chums (Table 6).

Elsewhere in the Kamishak Bay District, very little effort specifically targeting chum salmon was known to occur during 1993. When aerial surveys began to document marginal late chum returns to northern Kamishak Bay systems in early August, the Rocky Cove, Ursus Cove, Cottonwood Bay, and Iniskin Bay Subdistricts were closed to seining beginning August 9. Once again this conservative strategy allowed entire returns to enter their natal streams as escapement, and most northern Kamishak Bay systems achieved or slightly exceeded their established goals (Appendix Table 25).

#### **Other Species**

Chinook salmon harvests in the Kamishak Bay District historically have been insignificant (Appendix Table 12). On the other hand, coho harvests within the district have at times been substantial, sometimes providing fishermen with some lucrative late season catches. However, early indications suggested weak returns, and subsequently no effort was expended towards this species. The 1993 coho harvest total of three fish was the lowest ever recorded for this district (Appendix Table 17).

## Outer District

### **Sockeye Salmon**

Outer District sockeye harvests have historically been based on natural returns to the Delight and Desire Lakes systems in East Nuka Bay Subdistrict. A lake stocking project in the Port Dick area during the late 1980's provided additional fish for harvest in the early 1990's, but stocking was discontinued after 1989 and no adults were expected back in 1993. Preseason projections forecasted a harvest of up to 27,000 fish for the entire district, but returns were not strong and the actual harvest totalled only 4,600 fish (Table 3, Appendix Table 13), the fifth lowest total during the past 20 years.

Aerial surveys documented significant numbers of sockeyes at Desire Lake beginning in mid-June, indicating the potential for a strong run with a harvestable surplus. However, Delight Lake sockeyes did not begin to appear until late June, and even then in small numbers. Fish numbers present at Desire Lake leveled out during the last week of June but then substantially increased during the first days of July, actually surpassing the escapement goal of 10,000 fish with a peak single aerial estimate of nearly 11,000 fish on July 6. In order to protect fish returning to Delight Lake, where escapement continued to lag, yet still provide opportunity to harvest sockeyes excess to escapement needs at Desire Lake, the subdistrict was opened to fishing five days per week only between the latitude of the entrance to James Lagoon and the latitude of the regulatory markers near the Parks Service tent camp beginning July 7. Also, because the escapement goal into Desire Lake had already been achieved, the regulatory markers at the mouth of Desire Lake Creek were not in effect for the five-day-per-week fishery.

Five vessels began fishing the open area in Nuka Bay Subdistrict when it first opened, but initial catches were weak and effort quickly dropped to three vessels. During the first period of five consecutive fishing days (July 12-16), catches averaged only 230 fish per day, dropping off steadily thereafter. Sockeye catches continued into mid-August, however, primarily as incidental harvests when the fleet was targeting the later pink salmon run returning to Desire Lake Creek. Total sockeye catch in Nuka Bay Subdistrict for the season was 3,500 fish (Table 3).

Aerial escapement estimates peaked at Delight Lake on July 12, but at 5,000 sockeyes this number represented only half of the goal for the system. The dry, sunny weather resulted in a nearly complete dewatering of Delight Lake Creek in late July and early August, thus delaying fish entry into the lake and causing them to hold in the freshwater lagoon near tidewater until water levels rose sufficiently near the end of August. The cumulative escapement at Delight Lake was estimated at 5,600 sockeyes, short of the 10,000 fish goal by 44% (Appendix Table 23). At Desire Lake, low water flows were also noted but fish access into the lake was never prevented because of it. No further buildup or significant influx of fish was observed at Desire Lake after the peak aerial estimate on July 6, with the final estimate of 11,000 sockeyes exceeding the goal of 10,000 fish by 10%.

A third lake system known as Ecstasy (or Delectable) Lakes in East Nuka Subdistrict has been observed over the last several seasons to document the sockeye return there. Located near the head of the East Arm of Nuka Bay, the two-lake system is relatively new, formed during the late 1970's and early 1980's by a receding glacier. This fact was substantiated by reviewing charts and maps drawn prior to the mid-1980's, as no lakes are indicated at the site of the present bodies of water.

Prior to the 1980's, no salmon were known to utilize the system, but in approximately 1989, during a routine aerial survey, adult sockeye salmon were documented in the system by the staff for the first time. Each year since then, aerial surveys have revealed sockeye salmon as well as pink salmon in the system, with a peak aerial count of 1,300 sockeyes occurring during 1993. Little is known of the origins of this return, however sampling by ADF&G personnel, with help from University of Alaska students on site, was conducted in 1992 and 1993. Otoliths and length measurements indicated primarily large 3-ocean fish (six years old). Additional tissue samples were taken from post-spawning individuals in 1993 for inclusion into the genetic baseline data set and future genetic stock identification analysis.

At Port Dick, no adult sockeyes were expected to return to the former enhancement project site since stocking was discontinued after 1989, and no natural production is known to occur in this subdistrict. However, while fishing for pink salmon returning to Port Dick (Head End) Creek, seiners harvested over 1,000 sockeyes (Table 3) from mid-July through early August, presumably 3-ocean returns. Since these returns have been predominantly 2-ocean fish in past years, catches came as a surprise to fishermen as well as staff.

### **Pink Salmon**

Harvest forecasts for pink salmon in the Outer District were somewhat optimistic (224,000 fish), with the largest proportion expected at Port Dick at 152,000 fish, followed by Windy and Nuka Bays, with about 30,000 fish expected at each. The actual harvest of 159,200 pinks (Table 5, Appendix Table 18), taken by 21 vessels, fell short of the preseason projection by about 30%.

For the second consecutive season, a management strategy was employed in the Port Dick area based on input from fishermen over

the winter of 1991-92. Concerns over fish quality led to a plan whereby the outer areas of the subdistrict would be opened on a calendar date earlier than the traditional opening date (formerly openings were based on stream escapement rates and fish abundance in saltwater). It was hoped that opening areas further away from freshwater systems at an early date would allow the fleet opportunity to harvest higher quality fish before they became freshwater marked, thus increasing their market value. In 1992, pink salmon run strength in Port Dick was so weak that almost no effort or harvest occurred, leaving the management plan essentially untested going into the 1993 season.

As stated in the Port Dick Management Plan, the South and Outer Sections of the Port Dick Subdistrict opened to fishing for two 40-hour weekly fishing periods, from Monday 6:00 a.m. until Tuesday 10:00 p.m. and from Thursday 6:00 a.m. until Friday 10:00 p.m., beginning on Thursday July 15. At that time, both chums and pinks were present in Port Dick (head end) Creek and on the nearby saltwater flats, although in relatively small numbers. Nonetheless, the appearance of pinks in freshwater at that early date suggested the potential of a strong return, and aggressive fishing during the early stages was therefore justifiable. The North Section of Port Dick Subdistrict remained closed to protect chums returning to streams within that section, primarily Island Creek.

The early show of pinks never materialized into the strong return for which the fleet had hoped. No fish were ever harvested in the Outer Section of the subdistrict, while catches in the South Section peaked on August 9 when three vessels landed 5,400 pinks. The peak effort of four vessels in the South Section on August 10 was indicative of the relatively weak run strength. The North Section of Port Dick Subdistrict was opened to fishing five days per week on August 10 after aerial surveys revealed significant increases of fish into or near Island Creek, all protected by

regulatory markers. Resultant effort by four vessels yielded a catch of only 4,800 pinks in three days of fishing.

At Nuka Island, 200 pink salmon first appeared at South Nuka Island Creek on July 16, but that number quickly built to nearly 10,000 four days later, thus achieving the goal for that system. As a result, southern waters of the Nuka Island Subdistrict were opened to seining on two 48-hour periods per week beginning July 23. Waters on the west side of the island, as well as waters of Tonsina Bay, were kept closed to protect the small streams at those locations. The first day's meager catch of only 1,600 pinks discouraged further immediate effort. However, an aerial survey later that day revealed 14,000 pinks in South Nuka Island Creek, prompting the staff to announce that the regulatory markers at the mouth of the creek would be repealed beginning July 26.

Several vessels fished the open waters during the first week after the markers at South Nuka Island Creek had been removed. Catches appeared to peak on July 29 when four vessels landed nearly 11,000 pinks, with harvests decreasing over the next week. However, another buildup of fish over the weekend of August 7 and 8 afforded a harvest of 13,000 pinks on August 9, the highest single day's catch of the season at Nuka Island. Only one additional delivery was made after this date, with the final catch in Nuka Island Subdistrict totalling nearly 52,000 pinks (Table 5).

An aerial estimate of 65,000 pink salmon in saltwater at Windy Bay on July 27 compelled the staff to open this subdistrict to seining on two 48-hour weekly fishing periods beginning July 29. Once again, due to low water levels, almost no fish had migrated into the creeks at the time, yet nearly all observed fish were protected by regulatory markers. Encouraged by the aerial estimate and anticipating good fishing, about a dozen seiners were present for the opening day of fishing in Windy Bay, landing a total of over 17,000 pinks. Effort and resultant catches fell off steadily over

the next week, with the final delivery occurring on August 12. Total pink harvest in Windy Bay was 43,400 fish (Table 5). The regulatory markers proved effective in protecting the escapement, which totalled 26,000 and 14,000 fish in Windy Left and Windy Right Creeks, respectively (Table 5).

An unexpectedly strong pink return to Desire Lake Creek in the East Arm of Nuka Bay produced good catches during the first two weeks of August. By the end of July the sockeye harvests in waters around the mouth of Desire Lake Creek, which had been open to seining five days per week since July 7, began to decline, but catches of pink salmon increased simultaneously. Continued effort netted an average of over 1,500 pinks per day between August 2 and August 13, when the last landing was made. Total pink harvest in East Nuka Bay Subdistrict was 13,800 fish (Table 5).

Elsewhere in the Outer District, Port Chatham experienced a fair return of pinks and was opened to seining five days per week beginning August 11. Although a large number of fish had already staged behind the regulatory markers, waiting for water levels in the creeks to rise, nearly 15,000 pinks (Table 5) were landed in only four days of fishing effort ending August 19. Waters of Chugach Bay were also opened to seining on August 11, and 8,800 pinks were caught on August 12 and 16.

Most major systems in the Outer District achieved their pink salmon escapement goals during 1993 (Appendix Table 24), with only Windy Left Creek falling 4,000 fish short of the lower end of its range of 30,000 to 50,000 fish. One system which exceeded its goal was Rocky River, where an estimated 70,000 pink escapement occurred, notable because this formerly productive system had not experienced a pink escapement surpassing its goal of 50,000 fish since 1979, when 85,000 pinks were estimated. Another system exceeding its goal despite liberal fishing time was South Nuka Island Creek, where over 34,000 pinks entered the creek as escapement.

## **Chum Salmon**

Chum salmon numbers have experienced dramatic declines in the Outer District since the peak harvest years of the late 1970's and early 1980's. Large returns were not expected in 1993 due to a succession of poor returns over the past several seasons. No specific commercial openings targeting chum salmon occurred in 1993, and the harvest of 970 incidentally caught fish was the fifth lowest during the last 20 years (Appendix Table 21).

Escapements into the three monitored chum salmon systems in the Outer District were poor with all three failing to achieve their goals. Port Dick (Head End) Creek fell short of its 4,000 chum escapement goal by nearly 38% (Appendix Table 25). Island Creek chum escapement totalled only 3,600 fish, well shy of the lower end of the escapement goal range of 10,000 to 15,000 fish, while Rocky River experienced an apparent run failure with only an estimated 100 chum salmon in the escapement.

## **Eastern District**

### **Sockeye Salmon**

The Eastern District had potential for harvestable surpluses of sockeye salmon in Aialik and Resurrection Bay Subdistricts during 1993, with a district-wide preseason projection of up to 46,000 fish. However, the actual total catch amounted to only 1,800 sockeyes (Appendix Table 13), the second lowest total since 1980. Over 90% of this total was taken as hatchery cost recovery at the Bear Lake weir (Table 1).

At Bear Lake, near Seward in the Resurrection Bay Subdistrict, sockeye enhancement activities by CIAA fostered optimism for a total return ranging from 34,000 to 66,000 fish. Based upon the expected long-term increase of sockeyes returning to this system,

a Resurrection Bay Management Plan was drafted during the winter of 1991-92 to allow the seine fleet the opportunity to begin fishing on the Bear Lake sockeye run at a relatively early date in the outer reaches of Resurrection Bay in order to promote product quality. Therefore, the entire Resurrection Bay Subdistrict, up to a point one mile due south of Cape Resurrection and Aialik Cape, was opened to seining by emergency order on a schedule of two 40-hour fishing periods per week, beginning on Monday, May 10. Despite presumption of an early run timing for this enhanced run (since brood stock from Big River in Upper Cook Inlet had a documented run timing peaking in early June), the small first year adult return in 1992 actually trickled in over the course of two months, creating concern that future returns would perform quite differently than originally intended.

When the area first opened in 1993, no effort occurred in the outer areas of the subdistrict as the fleet adopted a "wait-and-see" attitude, hoping to locate fish nearer to the head of the bay before assessing run strength. A few fishermen actively scouted the head of the bay, and at least one fisherman "cruised" the outer areas looking for signs of fish, but only one set was made (in the Renard Island Subdistrict) in mid-July on what turned out to be pink salmon. No other effort occurred, and on July 15, as set forth in the management plan, the Resurrection Bay Subdistrict was closed to fishing to protect indigenous stocks of pink and chum salmon beginning to return to area streams.

The sockeye run to Bear Lake was much weaker than anticipated, with counts at the Bear Creek Weir facility, operated by CIAA, amounting to less than 7,000 fish for the entire season (5,000 escapement, 1,700 cost recovery). As was the case in 1992, sockeye escapement was rather protracted, beginning at the end of May and continuing into the middle of August.

At Aialik Lake in Aialik Subdistrict, aerial surveys were begun on June 18, but the first sockeyes were actually observed on June 23 with an estimate of 200. Subsequent flights over the next two weeks revealed no increase, suggesting a dismal return. Finally, on July 16, a survey estimated 3,000 sockeyes in Aialik Lake, achieving the escapement goal of 2,500 to 5,000 fish. In an effort to harvest all fish in excess of the escapement goal, waters of Aialik Subdistrict, including Aialik Lagoon, were subsequently opened to seining on two 48-hour weekly fishing periods beginning July 19. Although waters of the lagoon were actively scouted, no effort or harvest occurred, indicating that the Aialik sockeye return had occurred in one single "burst" and for all practical purposes was effectively over. The season's catch of less than 200 sockeyes within the subdistrict (Table 3) was all taken incidentally during effort directed at later pink returns. No further surveys of Aialik Lake were conducted, with the final escapement estimate equalling the peak survey amount of 3,000 sockeyes (Appendix Table 23).

### **Pink Salmon**

A pink salmon harvest of 22,000 fish was forecasted for the Eastern District during 1993 despite the fact that returns there in recent years have been weak. Limited ground surveys of the district in 1993 reflected relatively weak pink run strengths, and the Resurrection Bay Subdistrict was kept closed to fishing for pinks. Aialik Subdistrict, originally opened to two 48-hour fishing periods on July 19 for sockeye salmon, was never closed after the sockeye run was effectively over. A number of vessels travelled to this open district later in the season in hopes of fishing the outer areas for pink salmon as had been successfully done during 1991 and 1992. During those two years, the fishery had been allowed to continue despite knowledge that the targeted fish were bound for Prince William Sound. The staff elected to leave the

area open again in 1993 because the catches were relatively modest and did not threaten either local or non-local stocks.

The first late-season landing of pink salmon in Aialik Bay occurred on August 10 but only totalled 1,500 fish. Fishing continued until August 17, with a peak single day catch of only 3,200 pinks on August 16 and a peak effort of four vessels on August 11. Total harvest for the season in Aialik Subdistrict was just under 10,000 pinks (Table 5), the lowest since the fishery has occurred in the outer reaches of the subdistrict and indicative of the weak returns to adjacent Prince William Sound.

### **Other Species**

Chum salmon are the only other commercially important species in the Eastern District, but harvests during the previous four years have been dismal. This season's harvest was equally poor, with a total of only nine chums harvested, the lowest total since 1979 (Appendix Table 21).

## **SUBSISTENCE AND PERSONAL USE FISHERIES**

### **Kachemak Bay Personal Use Fishery**

The Southern District (Kachemak Bay) fall coho salmon set gillnet fishery dates back prior to statehood under varying names, being known as a "personal use" fishery during the years 1986-1990 and a "subsistence" fishery in 1991 and 1992. The target species has been coho salmon, with returning fish a mixture of natural stocks bound primarily for the Fox River drainage at the head of Kachemak Bay and enhanced runs bound for the Homer Spit fishing lagoon and Fox Creek near the head of Kachemak Bay. Due to the absence of suitable spawning habitat at both enhancement sites, all adult fish

resulting from the fry stocking projects are intended for harvest and have contributed significantly to both the gillnet fishery and sport fisheries.

The locally popular gillnet fishery was reviewed by the Alaska Board of Fisheries in the fall of 1992, shortly after the joint Boards of Fisheries and Game had distinguished between "Subsistence" and "Non-subsistence" areas. Board of Fisheries actions resulted in the elimination of the subsistence fishery for the Homer area and creation of a personal use gillnet fishery to be governed by the Southern District Personal Use Coho Salmon Fishery Management Plan. This plan directs the Department of Fish and Game to close the fishery when an estimated 2,500 to 3,500 coho salmon are harvested, an amount Board members felt significant for participants yet conservative enough to provide adequate protection to natural runs.

Although most regulations governing the fishery remained unchanged from previous years' subsistence fisheries, the Board did adopt two new regulations which were implemented in 1993. The first stated that no part of a set gillnet may be set further than 500 feet from mean high water, while the second required that no set gillnet may be set seaward of another set gillnet. Both new regulations were intended to return the fishery to its shore-based origins and to help with enforcement.

The regulatory opening date for the fishery was August 16. Legal gear was limited to a single set gillnet not exceeding 35 fathoms in length, 45 meshes in depth, and 6 inches in mesh size. A permit from the Homer office was required, with possession of a valid resident sport fishing license necessary to obtain a permit. The seasonal limit was 25 salmon per head of household and 10 additional salmon per each dependent. There were two 48-hour scheduled fishing periods each week, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and Thursday 6:00 a.m. until Saturday 6:00 a.m.

The number of personal use permits issued for the 1993 fishery (326) was the lowest since 1985 and only slightly greater than the average of all years since 1969 (Appendix Table 26). Prior to the opening on August 16, the Department requested voluntary daily reporting from each permit holder, and these voluntary inseason catch reports, combined with experience from previous years' fisheries, suggested that the lower end of the harvest range would be achieved by the end of the second regularly scheduled 48-hour fishing period. The closure was announced to coincide with the end of this period on August 21. A total of 96 hours fishing time (two regularly scheduled 48-hour fishing periods) was allowed, making the 1993 fishery equal to the second shortest on record, the other being 1992. Catch figures based on 317 permit holders reporting (97% of the total) were as follows: 1,992 cohos; 463 pinks; 44 sockeyes; 18 chums; and 6 chinooks (Appendix Table 26). The 1993 coho catch represents the lowest total since 1976 in this fishery.

The number of permits issued for the Southern District personal use fishery has steadily dropped since the peak in 1990 when nearly 600 permits were issued, and 1993 was no exception. Possible explanations for this decrease include the availability of similar fishing opportunities in Upper Cook Inlet and the targeted species in those fisheries, namely sockeye salmon. Many people who might normally fish the Southern District for cohos opted instead to fish Upper Cook Inlet for sockeye salmon because they often prefer the latter for their personal use if given a choice. Additionally, the coho returns to LCI were poor in 1993.

The low coho catches in the 1993 personal use fishery are primarily a reflection of below average natural run strengths and late run timing, a trend experienced locally for the past two seasons. Early coho catches in the commercial fishery suggested average returns, while informal observations in local sport fisheries indicated weak or late returns. The closure time was made based upon this early evaluation of run strength as well as catches

during the first open period. Based upon comparison of these catches to previous years' fishery performance, it appeared as though the lower end of the guideline range would be achieved by the end of the second open fishing period. In retrospect, however, catch per unit of effort was not as high during the second period as it traditionally had been during that same period in the past two seasons, especially along the north shore of Kachemak Bay between Mud Bay and Swift Creek. Additionally, the enhanced return to the Homer Spit, which had appeared weak in mid-August, picked up in strength towards the end of the month (after the gillnet fishery had closed), while natural returns, both locally and in adjacent management areas, did not exhibit the late season increase in run strength.

Despite recognition that the guideline level was not achieved, the staff felt confident that the short duration of the fishery afforded an extra measure of protection to wild stocks of coho salmon. Allowing additional gillnet fishing time could have easily resulted in an unacceptably high harvest rate on the natural returns, especially considering the weakness of the runs. An aerial survey flown in late September to assess coho escapement in the Fox River drainage documented moderate escapement (approximately 600 fish) by historical standards in Clearwater Slough (Table 4), a major coho salmon spawning tributary used as a coho "index" stream in the Southern District. This post-fishery information suggested that curtailment of personal use gillnet fishing allowed a significant portion of the natural Fox River coho return to avoid the personal use fishery and enter the drainage to spawn.

Enhancement efforts in Kachemak Bay continue to have a significant impact on the personal use gillnet fishery. Coho salmon produced from hatchery stocking projects have changed the nature of the fishery by shifting the areas considered most productive and consequently altering the intensity of effort in these areas.

Returns from enhancement projects have significantly contributed to harvests in the personal use gillnet fishery, particularly in the vicinity of the Homer Spit. Without the contribution of enhanced fish to the catches, the personal use fishery would undoubtedly become more prolonged and therefore more similar to historical fisheries prior to enhancement. Historically the fishery was generally allowed to proceed from the regulatory opening on August 15 until the regulatory closure on September 15. Most participants would have ample opportunity to set their nets over this month-long time period. It followed, then, that run timing in any given year had little effect on catches since effort could be arranged around the peak of the run. In recent years, however, intense competition for this resource has concentrated effort, and the subsequent harvest, at the start of the season. This has been most notable in the Homer Spit area due to the easy access and the attraction of the hatchery-stocked fish. As a result, catches over the past two seasons have approached the guideline harvest range within the first week after opening, effectively eliminating those fishermen who either are unable to fish during the opening week or who simply fail to secure a fishing site during that week. Additionally, for fishermen whose catches are comprised primarily of natural stocks, such as those fishing the south side of Kachemak Bay, a short season coupled with late run timing, as occurred in 1992 and 1993, may mean very few cohos in their catches.

The 1993 fishery once again demonstrated the extreme popularity of the east side of the Homer Spit as the most sought after fishing area, undeniably due to the easy road access and the coho enhancement project at the Homer Spit "fishing lagoon". In years past this combination led to numerous violations of the regulation requiring a minimum of 600 feet between nets, however the presence of Fish and Wildlife Protection personnel at 6:00 a.m. openings on the Spit, coupled with the acknowledged potential of citation, prevented any serious violations during the 1993 fishery. Most participants were cooperative in attempting to solve disputes with

fellow fishermen prior to issuance of any citations. Also, increased warnings from the Homer Harbormaster of the navigational hazard posed by nets located near the end of the Spit seemed to discourage fishermen from placing nets within vessel traffic lanes as has occurred during past fisheries.

Despite generally good compliance in the 1993 personal use fishery, local officers from the Division of Fish and Wildlife Protection strongly advised that a proposal requiring permit holders to be in attendance of their nets at all times when the net is actively fishing be submitted to the Board of Fisheries for their consideration. The most difficult part of the officers' enforcement efforts during the fishery stemmed from their inability to immediately contact the permit holder if a net is found to be in violation. Adopting such a regulation would also be consistent with a similar regulation already in place for personal use gillnet fisheries in adjacent Upper Cook Inlet.

#### **Nanwalek/Port Graham Subsistence Fishery**

The only true subsistence fishery presently in LCI occurs near the villages of Nanwalek (formerly English Bay) and Port Graham, located approximately 21 nautical miles southwest of Homer on the south side of Kachemak Bay (Figure 2). Most fishing occurs within close proximity to the respective villages and targets on sockeye salmon returning to the English Bay Lakes system. Some additional fishing also occurs in Koyuktolik ("Dogfish") Bay, located about seven nautical miles south of English Bay, targeting non-local stocks of chinook salmon.

The sockeye salmon run to English Bay Lakes has been severely depressed for much of the last decade, with returns failing to achieve the minimum escapement goal for eight consecutive years since 1984. As a result, the Port Graham Subdistrict, which includes both Port Graham and the English Bay Section, was closed

again in 1993 to commercial, sport, and subsistence fishing beginning June 7 to protect returning sockeye adults. These areas remained closed to fishing until July 12, when the sockeye run was effectively over. The final 1993 escapement estimate for English Bay Lakes, obtained from weir counts, was 8,900 sockeyes, less than the minimum established goal of 10,000 fish (Appendix Table 23) but still the highest escapement since 1984.

Closures of the Port Graham and English Bay areas to subsistence fishing resulted in significantly reduced catches of sockeye salmon at Port Graham compared to historical averages (Appendix Table 28). This reduction was somewhat mitigated by increased catches of both chinook and pink salmon, the latter perhaps due to hatchery returns to the Port Graham Hatchery. Interestingly, subsistence fishing success for residents of Nanwalek was considerably greater than that of Port Graham for all species. Despite a decreased number of households reporting, catches of all species except coho were above the long-term averages for Nanwalek, significantly so for both sockeyes and pinks (Appendix Table 29), with the 1993 sockeye harvest the largest for Nanwalek since 1984.

## **ENHANCEMENT AND REHABILITATION**

### **Introduction**

Fisheries enhancement has played a major role in LCI salmon production during recent years. Natural adult salmon returns to the LCI area continue to demonstrate wide fluctuations, often the result of environmental impacts such as flooding or ice scouring on spawning grounds. Since their inception in the mid-1970's, enhancement and rehabilitation projects have made significant contributions to both commercial and sport fishing harvests. These

contributions have historically ranged from 24% to 90% of the entire LCI commercial salmon harvest and are expected to remain high in future years.

Projects initiated by the former FRED Division and CIAA provided an estimated 76% (848,800 salmon) of the total 1993 LCI commercial harvest of 1,120,600 fish. The Leisure/Hazel, Chenik, Kirschner, Bear, Bruin, and Port Dick Lakes sockeye salmon enhancement projects produced approximately 91% (212,800 fish) of the total LCI sockeye harvest of 233,800 fish in 1993. Tutka Lagoon Hatchery production, along with the FRED/CIAA/CISA cooperative rearing and remote release project at Halibut Cove Lagoon, accounted for 73% (636,000 fish) of the 1993 LCI commercial pink salmon harvest of 866,800 fish.

Using average weights per fish and average prices per pound in LCI, the estimated contribution of FRED/CIAA-produced salmon was 80% (\$938,100) of the \$1.164 million total value of the 1993 LCI commercial salmon harvest. Over 17% (\$198,900) of the total exvessel value of the fishery was utilized for hatchery cost recovery purposes (Table 7). A brief description of the current enhancement projects in LCI follows.

### **Tutka Lagoon Hatchery**

The Tutka Lagoon Salmon Hatchery/Rearing Facility was constructed in 1976 with an initial production capacity of 10 million salmon eggs, but has been expanded over time to its 1993 capacity of approximately 70 million eggs. Pink salmon have been the primary species produced at the hatchery, with some secondary effort directed at chums. Work has recently been initiated to further expand the facility's capacity to accommodate 100 million eggs and also to test the feasibility of sockeye production.

In 1993 the adult pink salmon produced by Tutka Lagoon Hatchery totalled approximately 670,500 fish returning to the hatchery only (Table 9). The estimated 2.8% overall survival rate was about equal to the facility's historical average. The commercial harvest, including cost recovery, of 535,800 pink salmon from Tutka Bay and Lagoon (Table 9), accounted for approximately 77% of the pink salmon landed in the Southern District and 62% of the entire LCI commercial pink salmon harvest. Pinks taken for hatchery cost recovery purposes from the Tutka Bay Subdistrict totalled 409,400 fish, worth approximately \$106,500. Approximately 43.0 million short-term reared pink salmon fry were released into Tutka Bay in 1993.

#### Leisure and Hazel Lakes Sockeye Salmon Stocking

Leisure Lake, also called China Poot Lake, historically was a system barren of sockeye salmon. A study initiated in 1976 involved the stocking of hatchery produced sockeye salmon fry to determine optimum stocking levels prior to and after lake enrichment through fertilization. Because a barrier falls below the lake prevents upstream migration, and therefore precludes any adult spawning, it is desirable to harvest all returning adult fish in the terminal harvest area, China Poot Bay. A similar sockeye stocking program was initiated in Hazel Lake, which empties into Neptune Bay and is located approximately three miles south of Leisure Lake, beginning in 1988. Since the initiation of these projects, over 945,000 adult sockeyes are estimated to have returned as a result of the stocking programs, making a significant contribution to the commercial and sport sockeye harvests in the Southern District (Appendix Table 15).

Because of the close proximity of the two terminal harvest areas, and the absence of a mark/recovery program, adult returns to Leisure and Hazel Lakes cannot be separately identified through sampling within the commercial catches and are therefore presented

as a combined total. The total combined sockeye return to Leisure and Hazel Lakes in 1993 was estimated to be 149,100 fish (Figure 5, Appendix Table 15). The cumulative commercial harvest of 144,700 fish comprised 91% of the Southern District and 62% of the total LCI sockeye salmon harvest.

Approximately 2.0 million sockeye salmon fry were released into Leisure Lake in 1993, the tenth consecutive year of high-density stocking, while an additional 1.0 million fry were released into Hazel Lake (Appendix Table 30). The fry for both projects came from eggs originating from Glacier Flat (Tustumena Lake) brood stock and incubated at Crooked Creek Hatchery.

#### Halibut Cove Lagoon Salmon Enhancement

##### **Pink Salmon**

Pink salmon enhancement at Halibut Cove Lagoon was initiated in 1986 as a cooperative program between CISA, CIAA, and ADF&G. Pink salmon fry are transported from Tutka Hatchery to Halibut Cove Lagoon where they are held in floating net pens and fed for 30 days before release. The goal of this project is to disperse fry releases from the Tutka Hatchery over more underutilized rearing areas. It also serves to disperse the commercial seine fleet over larger areas. Since there is no suitable spawning habitat available at Halibut Cove Lagoon, all returning adult fish are targeted for harvest in the commercial seine and set gillnet fisheries.

The 1993 adult return from the 1992 release of six million pink salmon fry was estimated at 100,200 fish, representing a survival rate of approximately 1.7%. Previous tagging studies have shown that up to 15% of the fry released from Halibut Cove may have imprinted and returned to Tutka Creek, the original parent stream. The reasons for this year's relatively poor pink salmon survival

are unknown, but the 1993 return was very disappointing considering that past ocean survival rates exhibited by adults returning to this site have approached 10%. Similar to the previous four years, six million pink fry were released in Halibut Cove Lagoon during 1993 (Appendix Table 30).

### **Chinook Salmon**

The chinook salmon enhancement project at Halibut Cove Lagoon involves the release of chinook salmon smolts, with the objective of increasing sport fishing opportunities in Kachemak Bay. This is the oldest and one of the most popular sport fishing enhancement projects in LCI. An estimated 3,500 adult chinook salmon returned to Halibut Cove Lagoon in 1993.

Although adult returns from the Halibut Cove Lagoon stocking program are not intended for commercial harvest, there is incidental harvest of these chinook salmon in the commercial set gillnet and seine fisheries. In 1993 the incidental harvest by commercial fishermen was estimated at 1,225 fish, or about one-third of the total return. This percentage was similar to the long-term average commercial catch rate for Halibut Cove Lagoon bound chinooks. The catch was split between seiners and set gillnetters at about 60% and 40%, respectively. The bulk of the seine catch of chinooks was taken on July 5, the first day the commercial fishery (targeting on pink salmon) opened in Halibut Cove Lagoon. This terminal pink salmon fishery occurs near the end of the chinook return, after most sport angling effort for chinooks has shifted to more productive areas. A significant number of the commercially harvested chinook are small 2-ocean fish, which probably would not have been harvested by anglers and cannot spawn at Halibut Cove Lagoon due to a lack of suitable spawning habitat.

### Chenik Lake Sockeye Salmon Stocking

Chenik Lake, located in Kamishak Bay, historically was an excellent sockeye producer prior to the 1940's when annual runs approached 150,000 fish. Since that time, however, sockeye runs declined dramatically, forcing a complete closure of the Chenik area fishery beginning in 1952. By the mid-70's the annual return to this system was less than 500 fish.

In 1978 the former FRED Division initiated a program to re-establish the sockeye returns and subsequently increase commercial fishing opportunities in the Kamishak Bay area. Sockeye fry from Crooked Creek Hatchery have been annually stocked in Chenik Lake since that time, and a fish pass was developed at the intertidal mouth of Chenik Creek, alleviating a partial migrational barrier. Since 1987, lake enrichment has occurred through the application of liquid fertilizer, but not on an annual basis.

Increased sockeye escapements in the early 1980's augmented subsequent production, and the Chenik area was reopened to commercial fishing. Returns have produced up to 50% of the total LCI commercial sockeye harvest in some recent years, approaching the historical record high runs of the 1930's.

The 1993 commercial harvest of Chenik Lake sockeye salmon, including hatchery cost recovery, totalled 24,600 fish (Figure 6, Appendix Table 16), about two and one-half times the preseason projection for this system. The primary rationale for the low forecast was the detection of Infectious Hematopoietic Necrosis Virus (IHNV), a disease commonly affecting juvenile salmon and trout, which was documented in the Chenik system during the 1991, 1992, and 1993 smolt outmigrations. It is suspected of causing increased mortality to juvenile sockeyes and therefore reducing the adult returns. A thorough investigation of the relationship between the Chenik Lake sockeye stocking project and the IHNV

problem was initiated during the winter of 1992-93, ultimately resulting in a staff recommendation to reduce fry stocking densities from peak levels occurring in 1989 and 1990.

The outmigration of sockeye smolts at Chenik Lake has been monitored in recent years through use of a weir and live trap. Total outmigration in 1993 was only 14,000 smolts. The low smolt numbers were assumed to be the result of fry mortality from the residual of the IHNV after documented smolt epizootics in 1991 and 1992. Although the 1993 count was lower than the two previous years, only a very few fish exhibiting characteristics of the IHNV disease were observed in this year's smolts, primarily during the early portion of the emigration. Pathology sampling during the middle portion of the outmigration did not detect IHNV.

The factors relating to IHNV epizootics are very complex and currently not well understood. Although remotely possible that the stocked sockeye salmon fry were the source of the virus, a more likely theory is that Chenik Lake has become a reservoir for IHNV released from the sex products of naturally spawning adult sockeyes or their decomposing carcasses. It has been hypothesized that the tremendous population declines experienced by the sockeye stock at Chenik Lake in the late 1930's and 1940's may have resulted from IHNV epizootics caused by record high escapements of up to 53,000 adults in the 1930's.

Unfortunately, there is no known practical onsite treatment of IHNV other than perhaps decreasing fry stocking densities, which was begun in 1993 with a reduction to just over one million sockeye fry (Appendix Table 30). Additionally, cutting back the adult escapement should theoretically decrease transmission of IHNV into the littoral zone of Chenik Lake. Adult escapement into Chenik Lake, once again enumerated through the use of a counting weir at the lake outlet in 1993, totalled approximately 4,000 fish, only 40% of the 10,000 fish goal (Appendix Table 23). The escapement

shortfall, not intentional but of potential benefit in reducing the IHNV problem, was possibly caused by an earlier than normal run timing and a weaker than anticipated run tail. It is also possible that low water conditions discouraged fish entry into the creek and thereby increased the seine fleet's effectiveness in harvesting the fish.

The Department and CIAA are currently reviewing future stocking levels and potential for further fertilization of Chenik Lake. It is anticipated that the numbers of returning adult sockeye will continue to decrease in upcoming years because of the IHNV problem within the system.

#### **English Bay Sockeye Salmon Rehabilitation**

The English Bay Lake system has the only significant natural run of sockeye salmon in the Southern District of LCI. Unfortunately, the English Bay sockeye returns have declined in recent years to their lowest recorded levels. Sockeye escapements since 1985 have ranged from 2,500 to 7,000 fish, well below the 20-year average of 7,500 fish (Appendix Table 23). The 1993 escapement, tallied once again through the use of a counting weir operated by North Pacific Rim, totalled 8,900 fish, the highest return since 1984 but still short of the minimum desired goal of 10,000 fish. Optimum escapement for this system is estimated at 15,000 to 20,000 sockeyes.

The decline of the English Bay sockeye run has resulted in a very restrictive management strategy for this area. The commercial, sport, and subsistence fisheries have been closed for most of the last several seasons. Efforts to rehabilitate the depressed sockeye salmon stock at the English Bay Lakes system were initiated by the former FRED Division with an egg take in 1989 and the subsequent release of 350,000 sockeye salmon fry in 1990. North Pacific Rim, in cooperation with the village of Nanwalek (formerly English Bay) and the Bureau of Indian Affairs, has since taken over

this enhancement project and continued egg collections, fry stockings, and operation of a smolt/adult enumeration weir. During 1993, approximately 20,000 sockeye fry were released directly into one of the larger lakes while another 561,000 larger fry were released in October after a long-term pen rearing production project (Appendix Table 30). A total of 866,000 sockeye eggs were collected in 1993 for incubation at Port Graham Hatchery during the winter of 1993-94.

### **Bear Lake Sockeye Salmon Enhancement**

Bear Lake, located at the head of Resurrection Bay in the Eastern District, has been the target of sockeye salmon enhancement efforts over recent years. This system has been the centerpiece of a Division of Sport Fish coho salmon enhancement program since 1962, part of which included limiting the escapement of sockeye salmon into the lake. As a result, only a small remnant run of naturally occurring sockeye salmon remained at Bear Lake. In an effort to produce increasing numbers of adult sockeyes without adversely affecting coho salmon production, as mandated by Board of Fisheries policy, CIAA undertook a sockeye stocking program beginning in 1989 with the release of 2.2 million sockeye fingerlings. Since then, additional releases of both fingerlings and accelerated growth ("zero check") smolts have occurred, ranging from 1.6 to 2.4 million juvenile sockeye salmon each year (Appendix Table 30). The first year of adult returns in 1992 was discouraging, with a total of less than 2,000 fish, however this return was primarily based on the survival success of the "zero check" smolts. Although the 1993 return was expected to be better because of contributions from both fry and smolt plants, the entire return totalled only 6,700 sockeyes, another major disappointment. Reasons for the run failures are unclear at this time.

### Other Sockeye Salmon Lake Stocking

Several other LCI lakes were stocked in 1993 with sockeye salmon fry produced by Crooked Creek Hatchery. A total of five different lakes, evaluated through pre-stocking studies conducted between 1986 and 1989, were stocked with 1.50 million sockeye fry during 1993 (Appendix Table 30). The five lakes included Kirschner Lake, Bruin Lake, Ursus Lake, Upper Paint Lake, and Lower Paint Lake, all in the Kamishak Bay District.

The fourth year of adult sockeye returns to Kirschner Lake occurred in 1993. The total return to Kirschner Lake was nearly 40,000 sockeyes (Table 3), achieving the preseason forecast for that system. Up to 20,000 fish (as first year returns) were expected at Bruin Lake as a result of lake stocking initiated in 1990, but the final estimated total was less than 5,000 sockeyes.

At Port Dick in the Outer District, no adult sockeyes were expected in 1993 because stocking of Port Dick Lake was discontinued after 1989. Surprisingly, however, over 1,000 sockeyes were harvested in Port Dick (Table 3), presumably 3-ocean returns from the 1989 stocking.

### Paint River Fish Pass

The Paint River system in the Kamishak Bay District contains at least 40 kilometers (25 miles) of potential salmonid spawning and rearing habitat. Currently the Paint River system is barren of salmon because of a waterfall at tide line that was impassable prior to 1993. The former FRED Division and CIAA initiated feasibility studies for a fishway in 1979. CIAA received State and Federal grant funds to build the fishway, completing construction in the fall of 1991. Commissioner Carl Rosier declared the fish pass officially operational in January 1993.

The Paint River Lakes were first stocked with sockeye fry in 1986 and annually since 1988 to test the feasibility of developing a sockeye salmon return to the fish pass project site. A total of 0.75 million sockeye salmon fry were released into the two Paint Lakes via air drop in 1993 (Appendix Table 30).

A peak of 800 adult sockeyes was observed during aerial surveys of the Paint River mouth and Akjemguiga Cove during 1993, the third consecutive year of meager returns to this enhancement site. Because of the small numbers of returning fish, the fish pass was not opened to the migrating salmon and no freshwater escapement occurred.

### Port Graham Hatchery

In an effort to supplement natural fish production and provide increased employment opportunities in the native village of Port Graham, the Port Graham Hatchery Corporation applied for and received a permit to operate a private non-profit (PNP) hatchery in 1992. Port Graham is located approximately 21 nautical miles southwest of Homer on the south side of Kachemak Bay (Figure 2). The hatchery had conducted experimental egg-takes and fry releases via a scientific/educational permit from 1990 through 1992. An informal preseason forecast of 34,000 adult fish returning to the hatchery in 1993 failed to appear, similar to the situation in 1992. Although all efforts prior to 1993 were directed towards pink salmon, sockeye salmon production is now underway as the Port Graham Hatchery is currently incubating sockeye salmon eggs collected from English Bay Lakes (formerly eggs from this collection site were incubated at Big Lake Hatchery near Wasilla).

The PNP permit allows brood stock collection from a natural run of pink salmon in the Port Graham River, at the head of Port Graham. However, the Port Graham River pink run historically has experienced significant natural fluctuations in escapements despite

conservative fishing schedules, causing some concern over protection of the natural stocks. Consistent with the priority of managing for natural stocks (AS 16.05.730), a brood stock collection schedule based on the desired natural escapement into Port Graham River as well as historical escapement levels has been devised to offer maximum protection to the wild pink salmon stock during years of weak returns. In 1993, the hatchery collected 5,257 pinks for broodstock purposes.

Harvest of returning hatchery stocks could potentially occur in commercial purse seine and set gillnet fisheries as well as a subsistence set gillnet fishery in Port Graham. Hatchery fish will likely intermix with wild stocks bound for the Port Graham River. Management decisions must address the effects of these various fisheries so as to afford protection to the natural stocks until adequate escapement into Port Graham River is achieved. A small natural return of chum salmon to Port Graham River also occurs, but this run has been depressed in recent years and management measures must strive to protect this species as well.

The approved Port Graham Hatchery Basic Management Plan designated a Special Harvest Area (SHA) to allow for brood stock collection and cost recovery harvest (Figure 8). The SHA was designed to provide a migration corridor on the northeast side of the bay for wild stocks traveling to Port Graham River at the head of the bay. Restricting the harvest in Port Graham to the SHA is expected to afford some limited protection to the natural spawning stocks of pink and chum salmon. Once hatchery brood stock and cost recovery requirements are met, remaining surpluses may be harvested by the common property fishery inside the SHA. However, no guarantee of brood stock and/or cost recovery can be assumed. Fishing time will have to be restricted until the fish become spatially segregated or until adequate escapements are achieved in the river.

## 1994 COMMERCIAL SALMON FISHERY OUTLOOK

### Sockeye Salmon

Adult sockeye salmon returns to all LCI systems could approach 272,000 fish in 1994, nearly two-thirds of which (175,000 fish) should be a result of the continuing enhancement and lake stocking projects in LCI. Beneficial results of Leisure Lake fertilization should again be evident in the 1994 sockeye returns. Based on past emigration and survival estimates from annual releases of two million fry, approximately 70,000 sockeye salmon are projected to return to China Poot Bay in 1994. An additional 50,000 sockeyes are expected to return to Neptune Bay as a result of fry releases into Hazel Lake.

The 1994 sockeye salmon harvest at Chenik Lake is forecasted to be only 10,000 fish. Despite parent brood year escapements at or near desired levels, and annual stocking of up to 3.5 million sockeye fry, an epizootic of IHNV apparently has caused significant mortality to juvenile sockeyes and reduced the numbers of emigrating smolt from the system in recent years. As a result, the harvest forecast estimates are conservative to account for the poor freshwater survival.

Adult sockeye returns to Kirschner Lake have been very encouraging over the past three seasons, leading to a forecast of 30,000 fish in 1994. Bruin Lake, also in the Kamishak Bay District, has been stocked with sockeye fry since 1990, but the resulting second year adult return is only expected to total 5,000 fish in 1994 based on the return rate experienced to this system in 1993. The Paint River Lakes were also stocked with 2.0 million sockeye salmon fry in 1990 and 750,000 fry in 1991. However, based on poor adult returns from similar stocking levels at this system in recent years, no harvestable surplus of fish is forecast for 1994.

The third year enhanced sockeye return to Bear Lake in 1994 is expected to be marginally better than the disappointing 1992 and 1993 returns, with a forecast for only 10,000 fish. Success of this project has been discouraging thus far and therefore preseason predictions are uncertain.

Natural sockeye return projections for LCI are based solely on average historical harvests and could be expected to contribute up to 97,000 fish to commercial catches in 1994. However, runs of naturally produced sockeye have not reached expectations during recent years for unknown reasons. The Southern District is expected to contribute the most to the harvest of natural stocks, while additional catches could come from the East Nuka Bay systems of Delight and Desire Lakes in the Outer District and Mikfik Lake in the Kamishak Bay District.

#### **Pink Salmon**

Harvest of pink salmon in Lower Cook Inlet during 1994 is anticipated to reach nearly 600,000 fish, with enhanced production expected to provide over 80% of the total. The Tutka Hatchery, in the Southern District, is expected to contribute up to 390,000 pinks, while production from the remote release site at Halibut Cove Lagoon is projected to provide an additional 90,000 fish for harvest.

Natural spawning escapement levels into most major LCI systems were well below desired levels in 1992, contributing to a harvest projection of 115,500 naturally produced pinks throughout the entire LCI management area. The Port Dick and Nuka Bay areas in the Outer District have the greatest potential for harvestable surpluses.

## Chum Salmon

Based solely on historical average harvests, the total LCI commercial chum salmon catch could be as high as 111,000 fish during 1994. The LCI chum harvest will consist exclusively of natural production since no return to Tutka Hatchery is expected. Despite optimism for chum salmon during recent years, actual harvests during the past four seasons have failed to meet the preseason projections by significant amounts, suggesting that the historical average may be overly optimistic for 1994 as well.

The following table summarizes the projected harvest figures by species in the Lower Cook Inlet management area during 1994:

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	<u>Natural<sup>a</sup></u>	<u>Enhanced</u>	<u>Total</u>
CHINOOK	<i>NO FORECAST</i>	<sup>b</sup>	<i>NO FORECAST</i>
SOCKEYE	97,000	175,000	272,000
COHO	<i>NO FORECAST</i>	<sup>b</sup>	<i>NO FORECAST</i>
PINK	115,000	480,000 <sup>c</sup>	595,000
CHUM	111,000	0	111,000
<hr/>			
Total	323,000	655,000 <sup>c</sup>	978,000

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<sup>a</sup> Forecasts of natural harvests are simply average commercial harvests of non-enhanced salmon returns from 1980 through 1993.

<sup>b</sup> Enhanced returns of these species, intended to primarily benefit recreational fisheries, will probably contribute some amount of fish to commercial harvests.

<sup>c</sup> Includes common property plus hatchery cost recovery harvests.

# COMMERCIAL HERRING FISHERY

## INTRODUCTION

Similar to salmon, the LCI herring management area is divided into five separate fishing districts, with commercial herring fishing historically occurring in all but the Barren Islands District (Figure 1). Herring fishing began in the Southern District in 1914 as a gillnet fishery within Kachemak Bay. Eight saltries, six near Halibut Cove, were operating during the peak of the fishery. Fishing with purse seines began in 1923, and after three subsequent years of average annual harvests approaching 8,000 short tons (st), herring populations, along with the fishery, collapsed.

The next LCI herring fishery began in 1939 and was centered in the Resurrection Bay and Day Harbor area of the Eastern District. This was a purse seine fishery with the product used exclusively for oil and meal reduction. Peak harvests occurred from 1944 through 1946, averaging 16,000 st each year, and stocks sharply declined thereafter, apparently due to overexploitation.

Japanese markets for a salted herring roe product resulted in development of a sac roe fishery in the 1960's. Market demand and the relatively high prices paid to fishermen caused rapid expansion of the fishing fleet and harvest. Although Department management and research efforts lagged behind the rapid growth of the fishery, conservative management strategies and guideline harvest levels were established in response to historical overexploitation of the herring fisheries statewide.

## 1993 SEASON SUMMARY

A total of 3,570 st of Pacific herring was landed in the Kamishak Bay District during 1993 (Tables 10 and 11). The herring sac roe

harvest was about 56% higher than the 1992 harvest of 2,282 st but only about 58% of the record high catch of 6,132 st set in 1987 (Appendix Table 31). Estimated exvessel value of the 1993 harvest was \$2.2 million (Appendix Table 32).

Of the 76 LCI herring permits issued, 60 permit holders made deliveries in 1993. A total of 14 processors/buyers registered to buy herring in LCI, with 11 actually taking fish this season, and roe recoveries averaged 10.2% for the sac roe harvest (Appendix Table 32).

The total herring biomass in the Kamishak Bay District, estimated from aerial surveys, catch information, and postseason age composition analysis, was 32,439 st (Appendix Table 32), nearly 13% greater than the preseason forecast of 28,805 st. Age composition from the commercial catch was similar to the preseason projection, despite weaker than anticipated returns of age-5 fish and stronger returns of age-9 fish.

No sac roe herring fishery occurred in the Southern District in 1993 as fish were never present in sufficient numbers to allow a harvest. The Outer and Eastern Districts also were not opened to purse seining in 1993, due to both the oversupply besetting the market as well as the lack of interest by processors and fishermen in these areas. The historical predominance of young (age-3 and age-4) fish, roe recoveries historically below 10%, and the exploratory nature of the fishery, have discouraged effort in these two districts.

#### **ASSESSMENT METHODS**

Aerial surveys were conducted throughout the herring spawning season to determine relative abundance and distribution of herring in the Kamishak Bay and Southern Districts. Data collection

methods were consistent with those used the previous three seasons. Numbers and distribution of herring schools, location and extent of milt, and visibility factors affecting survey results were recorded on index maps for each survey. Standard conversion factors of 1.52 st (water depths of 16 ft or less), 2.56 st (water depths between 16 and 26 ft), and 2.83 st (water depths greater than 26 ft) per 538 square feet were used to convert estimated herring school surface areas to biomass.

Survey conditions in the Kamishak Bay District were generally only "fair" throughout the season, meaning nearly all surveys were hampered by high winds which created substantial water turbidity and thus hindered aerial observation. Only 10 surveys were completed in the Kamishak Bay District, with aerial surveys grounded for 10 consecutive days between April 28 and May 9. Just seven surveys were completed in the Southern District, while no comprehensive surveys of the Outer and Eastern Districts were conducted this season.

In the Kamishak Bay District, commercial landings were sampled to determine age, size, and sexual maturity of herring. In addition, test fishing by volunteer purse seine vessels was conducted to collect samples for roe recovery analysis prior to the fishery. Test fishing data was also used in postseason analysis to interpret aerial survey biomass data.

## **SPAWNING POPULATIONS**

### **Kamishak Bay District**

During the 1993 season aerial surveys to estimate biomass in the Kamishak Bay District were conducted from April 18 through June 3, with herring first observed April 23. Daily biomass estimates did not exhibit the normal trends in abundance i.e., build-up, peak,

and decline. The highest daily biomass observations were made on April 23 (1,465 st), and May 28 (1,284 st). As was the case in 1992, and unlike previous years, there was no distinct separation in age composition between those fish appearing on the grounds initially and those following later. Normally the early fish tend to be larger and older, and a steady influx of younger age fish typically occurs as the return progresses. Test fish samples in 1993 documented a relatively high percentage of age 5 fish early in the return, but this percentage actually decreased slightly between the time of initial sampling and that of the fishery.

Postseason data analysis from aerial surveys, test fishing, and commercial harvests resulted in a total returning biomass estimate of 32,400 st (Table 11, Appendix Table 32). This was considered a minimal estimate since an additional (undocumented) quantity of herring was known to be present during the period of late April and early May when aerial surveys were precluded by poor weather. Strong recruitment of age 4 herring in 1992 resulted in age 5 fish dominating the 1993 returns at nearly 50% of the total biomass by weight, followed by age 9 fish (15%) and age 6 fish (14%). Less than 2% of the returns were composed of fish older than age 10 or younger than age 5 (Figure 15, Table 11).

Very little spawning was actually observed during the 1993 season throughout the district, with only three observations recorded on April 23, April 27, and May 10. All sightings were relatively small in size, with the heaviest spawning observed at Chenik Head and Amakdedulia Cove on April 23 when a cumulative total of 4.0 linear miles was estimated.

### **Southern District**

A total of seven aerial surveys of the Southern District were flown between April 26 and May 28, resulting in a final biomass estimate of only 491 st. The majority of the herring were observed in Bear

Cove, Glacier Spit, Mud Bay, and Mallard Bay, with the peak individual biomass survey (240 st) occurring on May 21. Peak surveys in areas where herring have historically been observed were as follows: Bear Cove, 217 st on May 21; Glacier Spit, 45 st on May 18; Mallard Bay, 39 st on May 10; and 26 st east of the Homer Spit/Mud Bay on May 18. No age composition or roe recovery samples were collected from the Southern District in 1993. One observation of spawning occurred in the area between Bluff Point and Anchor Point, totalling nearly eight linear miles on May 20. It should be noted that this particular spawning event was being subjected to swift tidal currents which may have made the observed length somewhat misleading.

### **Outer and Eastern Districts**

No aerial surveys of the Outer and Eastern Districts were flown during the 1993 season. The size of the area and the characteristically poor weather in the Gulf of Alaska, which precludes surveys on a regular basis, makes aerial biomass estimation in these districts impractical. However, incidental observations of herring in June during the early part of the salmon season confirmed the presence of herring in these two districts again this season.

## **COMMERCIAL FISHERY**

### **Kamishak Bay District**

Spotter pilots and fishermen first located and fished the Kamishak Bay District herring populations in 1973, but after several years of commercial harvests in the late 1970's herring abundance severely declined and the district was completely closed beginning in 1980. Herring stocks appeared to quickly rebound in response to the closure, and the fishery was reopened in 1985. Since then, the

fishery has been regulated to achieve a 10% to 20% exploitation rate mandated by the Alaska Board of Fisheries.

By 1989, fishing efficiency had evolved to a level where intensive regulatory management was required to ensure maximum value of the harvest and maintain the guideline harvest level while protecting younger age fish. Management strategy during the last four years in the Kamishak Bay District had stabilized the harvest at approximately one-third the record high catch of 6,132 st set in 1987 (Appendix Tables 31 and 32).

Preseason management strategy in 1993 called for a guideline harvest level of 2,600 st based on a 10% exploitation of the forecasted biomass. The conservative harvest rate was selected because of concern regarding the low abundance of recruit age herring during 1990 and 1991. Although management prior to 1990 allowed this fishery to open on a specific calendar date, since that time industry technicians have been asked to evaluate test fish samples for roe recovery prior to commercial harvests to help maximize product quality and value.

The staff travelled to Kamishak Bay aboard the state's *R/V PANDALUS* on Saturday, April 17. The first aerial survey of the season was conducted the next day, April 18, but windy conditions and water turbidity precluded observation of herring. Nonetheless, warm water temperatures (40° F.) and early spring-like conditions provided sufficient justification to put the fleet on 24-hour advance notice effective at 6:30 p.m. that same day.

Poor weather prevented aerial surveys April 19, but a volunteer test fish program utilizing commercial purse seine vessels was initiated, with the first samples of the season caught that same day near Bruin Bay and Nordyke Island. Age analysis on these first fish, completed on April 20, showed close similarity to the preseason forecast, with age 5 fish dominating the samples at 55%,

followed by age 6 at 14%, age 7 at 6%, age 8 at 9%, and age 10 at 4%. Average weight of all fish was 187 grams, while roe recovery estimates generated by industry technicians yielded results of 12.0%, 13.5% and 11.7% mature roe in three separate samples from the first day's test fishing catches. In order to allow the staff to react to any rapid developments, it was announced on April 19 that the advance notice period would be reduced to six hours effective Tuesday, April 20, at 12:30 p.m.

Additional test fish samples on the morning of April 20 justified a reduction in the advance notice period, first to two hours effective late in the afternoon April 20, and then to one hour effective on that same evening, for a possible opening on that evening's tide. An aerial survey late in the afternoon of April 20 produced evidence of herring inside Bruin Bay but no estimate of abundance due to turbid water conditions. Many vessels reported locating fish throughout the day utilizing hydroacoustic gear, but it was impossible to collect samples due to rough seas. The staff felt that aerial survey results and weather conditions provided sufficient justification to delay the opening in order to gain more comprehensive sampling and evaluation. The fleet was advised to stand down until 9:00 a.m. the next morning, April 21, when the advance notice period would again be one hour. Late on the evening of April 20, test sets made south of Nordyke Island yielded mean roe recoveries of 9.6% with 1.3% immature roe and an average size of 196 grams.

Test fishing got underway again early on the morning of April 21, but there was insufficient information by 9:00 a.m. to make a decision on an opening. By 11:00 a.m. samples evaluated by several industry technicians from fish collected in two different locations showed roe maturities ranging from 7.1% to 13.0%, with average weights ranging from 208g to 232g.

Although the marine weather forecast was calling for a gradual improvement in local weather conditions, easterly (onshore) winds at 15-18k still prevailed. Further delay of the fishery could have presumably resulted in reduced roe recoveries due to the influx of younger, immature fish and/or an increase in the number of spawn-outs. Because the management strategy attempts to minimize the harvest of younger age fish, and given the projected improvement in weather conditions, at 11:00 a.m. a 30-minute fishing period was announced for Management Areas 5 and 6, commencing by field announcement some time between 11:55 a.m. and 12:05 p.m., April 21. The field announcement on SSB and VHF radio was used to alleviate the possibility of early sets.

Approximately 30 commercial spotter aircraft were present during the noon opening, but weather and water conditions made aerial observation of herring ineffective, and virtually all of the seining was done without the aid of airplanes. Preliminary catch estimates from processors were slow coming in, and most of the early oral catch reports were conservative. Apparently some buyers were having difficulty determining the size of the sets, or were reluctant to report their best guesses since several large sets were still being pumped. This delay made it difficult for the staff to evaluate the potential for another opening. However, as the reports continued to be revised, it appeared that the catch from one-half hour of fishing totalled approximately 2,200 tons or 85% of the preseason guideline harvest level.

With only 400 tons (15%) of the harvestable surplus remaining, the staff discussed at length whether to allow any further fishing. All information indicated that a significant quantity of high quality, older age herring remained in the area. It was estimated that another opening could likely result in the harvest of an additional 1,200 tons, significantly exceeding the guideline

harvest level. However, even at that harvest level, the overall exploitation rate of the Kamishak Bay herring stock would still be less than 12%.

Using that rationale, another 15-minute opening was scheduled for the same evening commencing between 7:25 p.m. and 7:35 p.m. That opening yielded an additional 1,013 tons. The cumulative harvest from both openings, finalized from fish tickets, was 3,570 tons with an average roe recovery of 10.2% mature roe. Since the preseason guideline harvest level was exceeded, it was announced at 9:00 p.m. that same evening that the Kamishak Bay District was closed for the season.

The majority of the catch was taken just south of Nordyke Island and east of Mushroom Islet in Management Area 5 (Figure 9). Of the 76 LCI herring seine permit holders, 60 actually made at least one delivery on April 21 (Table 10). Post-fishery age-weight-length analysis from the commercial harvest showed samples dominated by ages 5, 9, and 6 fish (47%, 15%, and 14%, respectively), followed in descending proportional order by ages 7, 8, and 10 fish (Table 11). The estimated exvessel value of the 1993 catch was \$2.23 million (Appendix Table 32) based on a sac roe price of \$600 per ton for 10% roe, plus or minus \$100 for each 1.0% change. Most companies paid an "on-grounds" base price with additional postseason settlements to be paid after price finalization with the foreign market.

By Alaska Board of Fisheries directive, the Kamishak Bay District herring fishery is managed with the intent of harvesting 10% to 20% of the available biomass. The overall exploitation in 1993 was 11.0% of the estimated total biomass, based on a total harvest of 3,570 st and an escapement biomass of 28,900 st (Appendix Table 32).

### Southern District

Management strategy for the Southern District sac roe fishery was changed in 1989 to allow for a limited harvest of 150 to 200 st for the purposes of obtaining age, weight, length and roe recovery information. Sac roe herring had not been fished in the Southern District since 1979 when poor stock conditions forced an area-wide closure. Only one other fishery has occurred since that time, when 171 st of herring averaging 8.9% roe recovery were harvested by 10 vessels in a single 2.5-hour opening in Mallard Bay during 1989.

After the completion of the Kamishak Bay herring fishery, management attention was directed toward the Southern District on April 26 when the first aerial survey was flown. Surveys continued into late May, but a commercial harvest of sac roe herring was not allowed in the Southern District in 1993 because abundance estimates failed to document sufficient quantities of herring to warrant an opening.

### Outer and Eastern Districts

During the early years of sac roe herring fishing in LCI, seining within the Outer and Eastern Districts primarily occurred in Resurrection Bay. Following a period of suspected over-exploitation, herring stocks throughout LCI generally declined after 1973. Concern over this decline prompted the Board of Fish and Game in 1974 to establish a 4,000-ton quota for all of Lower Cook Inlet, with the Outer and Eastern Districts each allocated 1,000 st. The quotas were never utilized since stock abundance continued to decline, and the Outer and Eastern Districts were closed to fishing from 1975 through 1984.

In 1985, the sac roe fishery was allowed to resume in the Outer and Eastern Districts on a very conservative basis, even though no noticeable change in spawning biomass had been observed. Because

of reduced stock abundance and extreme vulnerability to fishing, guideline harvest levels were set at 150 to 200 st for each of the four fishing areas created within these two districts. Fishing effort in 1985 was minimal and the majority of the harvest (216 st; Appendix Table 31) once again occurred in Resurrection Bay.

Only limited and sporadic harvests have occurred in these two districts since 1985, with the majority of both the herring harvest and the observed biomass during the past six years comprised of age-3 and age-4 fish. Unlike the Southern and Kamishak Bay Districts, samples from the Outer and Eastern Districts have contained up to 14% age-2 (sexually immature) herring. Although sampling has been limited, no discernable shift to older age herring has ever been observed, suggesting the possibility that the Outer and Eastern Districts may be feeding and rearing grounds for juvenile fish of Prince William Sound origin.

Despite significant opportunity for exploratory fishing on a daily basis in the Outer and Eastern Districts during 1991 and 1992, the predominance of juvenile herring in the population and the history of marginally acceptable roe recoveries from fish caught in these areas has contributed to a lack of interest by fishermen and processors. This condition was exacerbated in 1993 by a market suffering from oversupply, particularly of smaller fish, resulting in even less interest in harvesting fish from this area. Consequently, the Outer and Eastern Districts were not opened to purse seining this season.

#### HERRING OUTLOOK AND MANAGEMENT STRATEGY FOR 1994

##### Kamishak Bay District

The 1994 total biomass of herring in Kamishak Bay District is projected to be 25,300 st, approximately 22% less than the 1993

estimated biomass (Figure 14, Table 11). To prepare the 1994 Kamishak herring abundance forecast, an age structured analysis (ASA) was used for the first time. This methodology estimated mortality rates and initial population abundances that minimized differences between predicted and observed annual age composition data and biomass estimates. A regression model was used to predict 1994 mean weights from 1993 data. Over 70% of the 1994 projected biomass (by weight) will be comprised of age-6 fish from the 1988 year class (Figure 4). This should equate to a mean weight of 207 grams.

In addition to the spring sac roe fishery in LCI, a fall food and bait fishery on Kamishak Bay herring stocks occurs in the Shelikof Straits area of the Kodiak management area. By regulation, this fishery has an allocation not to exceed 2% of the total forecasted Kamishak Bay herring biomass. The actual guideline harvest level and exploitation rate for the fall Shelikof fishery is determined by the Kamishak Bay biomass forecast for the following spring and the expected age composition of that forecast.

Best available data indicates a stabilization or slight decrease in the 1994 herring abundance, which should be primarily comprised of fish from the 1988 year class. Although many factors affect overall herring abundance, a cautious management approach is essential to maintaining healthy populations. The Kamishak Bay District Herring Management Plan (**5 AAC 27.465.**), adopted by the Alaska Board of Fisheries in the fall of 1992, dictates that an overall 15% exploitation rate be utilized to set the 1994 guideline harvest level since the projected biomass falls between 20,000 and 30,000 short tons. Based on the forecasted 1994 biomass estimate of 25,300 st, a surplus of approximately 3,800 st would be available for harvest. Harvest allocation in accordance with the management plan would be as follows:

Table 2. Commercial chinook salmon catches and escapements in numbers of fish by subdistrict, Lower Cook Inlet, 1993.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpy Creek	17		17
Halibut Cove	615		615
Halibut Cove Lagoon	612		612
China Poot Bay	163		163
Neptune Bay	141		141
Tutka Bay	145		145
Barabara Creek	50		50
Seldovia Bay	<u>419</u>		<u>419</u>
<b>SOUTHERN DISTRICT TOTAL</b>	<b>2,162</b>		<b>2,162</b>
<b>OUTER DISTRICT</b>			
Nuka Island	1		1
East Arm Nuka	<u>1</u>		<u>1</u>
<b>OUTER DISTRICT TOTAL</b>	<b>2</b>		<b>2</b>
<b>EASTERN DISTRICT TOTAL</b>	<b>0</b>		<b>0</b>
<b>KAMISHAK DISTRICT</b>			
Chenik Lake	2		2
Douglas River	<u>2</u>		<u>2</u>
<b>KAMISHAK DISTRICT TOTAL</b>	<b>4</b>		<b>4</b>
<b>TOTAL LOWER COOK INLET</b>	<b>2,168</b>		<b>2,168</b>

<sup>a</sup> Chinook escapement in Lower Cook Inlet is very limited; no escapement surveys are conducted.

Table 3. Commercial sockeye salmon catches (including hatchery cost recovery) and escapements in numbers of fish by subdistrict, Lower Cook Inlet, 1993.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
SOUTHERN DISTRICT			
Humpy Creek	271	24	295
Halibut Cove	15,763		15,763
Halibut Cove Lagoon	3,271		3,271
China Poot Bay			
Common Property Fishery	62,430		
Hatchery Cost Recovery	5,258		
China Poot Creek		425 <sup>b</sup>	
Total Run			68,113
Neptune Bay			
Common Property Fishery	51,572		
Hatchery Cost Recovery	8,323		
Total Run			59,895
Tutka/Kasitsna Bays	5,805 <sup>c</sup>		5,805
Seldovia Bay/River	4,435	4	4,439
Barabara Creek	2,619		2,619
English Bay		8,936 <sup>d</sup>	8,936
<b>SOUTHERN DISTRICT TOTAL</b>	<b>159,747</b>	<b>9,389</b>	<b>169,136</b>
OUTER DISTRICT			
Port Chatham	7	1	8
Chugach Bay	11		11
Windy Bay	17	1	18
Port Dick			
South Section	1,010		
Head End Creek		25	
Total Run			1,035
Nuka Island	49		49
East Nuka (McCarty Fiord)	3,519		
James Lagoon		1	
Desire Lake		10,960	
Delight Lake		5,000	
Delectable (Ecstasy)		1,300	
Total Run			21,380
<b>OUTER DISTRICT TOTAL</b>	<b>4,613</b>	<b>17,888</b>	<b>22,501</b>

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		<u>Tons</u>
TOTAL ALLOWABLE HARVEST	(15.0%)	3,801
SHELIKOF STRAITS FOOD & BAIT	(1.5%)	380
KAMISHAK BAY SAC ROE HARVEST	(13.5%)	3,421

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As in recent years, a very conservative approach will be taken with regard to any harvest of young, newly recruited herring since these fish will provide future spawning stock and contribute to future harvests. No fishery on young (age 3-4) fish will be considered unless this recruit population exceeds 40-50% of the observed biomass. Unless data becomes available indicating that significant recruitment has occurred, or that an unusually large biomass has moved into the district, the Kamishak Bay sac roe harvest will not be allowed to exceed 3,421 tons.

#### Other Districts

Based on recent trends in herring abundance and age structure in the Southern, Outer, and Eastern Districts of LCI, no commercial herring harvests are anticipated in these areas during 1994. Sufficient quantities of herring in the Southern District must be documented before a commercial opening is considered. Monitoring of the Southern District herring stocks will occur as in the past through the use of aerial surveys in conjunction with possible test fishing samples. The Outer and Eastern Districts will only be allowed to open if adequate evidence becomes available suggesting commercial quantities of adult herring are present. Any potential fishery in these districts will be considered "exploratory" in nature and will be managed accordingly.

## REFERENCES

- Bucher, W. A. and L. Hammarstrom. 1993. 1992 Lower Cook Inlet Area Annual Finfish Management Report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 2H93-11, Anchorage.
- Commercial Fisheries Entry Commission. License Statistics. Unpublished data, 1974-1993, Juneau.
- Dudiak, N., T. Balland and M. Dickson. *In press*. Lower Cook Inlet CFM&D Division 1993 Annual Enhancement and Rehabilitation Report Summary. Alaska Department of Fish and Game, CFM&D Division Report (unpublished), Homer.
- Schollenberger, Mark. 1993. English Bay Sockeye Salmon Freshwater Net Pen Rearing and Smolt Production, 1993. Chugachmiut, Progress Report, Homer.
- Yuen, H.J. and W.A. Bucher. *In press*. Abundance, Age, Sex, and Size Statistics for Pacific herring in Lower Cook Inlet, 1993. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fishery Report, Anchorage.
- Yuen, H.J. and W.A. Bucher. *In press*. Abundance, Age, Sex, and Size Statistics for Sockeye, Chum, and Pink Salmon in Lower Cook Inlet, 1993. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fishery Report, Anchorage.

Table 1. Commercial, hatchery, and derby salmon catches in numbers of fish by species, district, and gear type, Lower Cook Inlet, 1993.

<i>DISTRICT</i>		Chinook	Sockeye	Coho	Pink	Chum	Total
	Gear Type						
<b>SOUTHERN</b>							
Commercial:							
	Set gillnet	1,089	14,791	3,088	12,008	2,591	33,567
	P. Seine	1,073	131,367	1,341	271,303	197	405,281
Hatchery:							
	P. Seine	0	13,589	2	409,483	0	423,074
	<b>TOTAL</b>	<b>2,162</b>	<b>159,747</b>	<b>4,431</b>	<b>692,794</b>	<b>2,788</b>	<b>861,922</b>
<b>OUTER</b>							
Commercial:							
	P. Seine	2	4,613	119	159,159	970	164,863
<b>EASTERN</b>							
Commercial:							
	P. Seine	0	171	247	10,616	9	11,043
Derby:							
	Hook & Line	0	0	1,428	0	0	1,428
Hatchery:							
	Weir	0	1,653	7,249	0	0	8,902
	<b>TOTAL</b>	<b>0</b>	<b>1,824</b>	<b>8,924</b>	<b>10,616</b>	<b>9</b>	<b>21,373</b>
<b>KAMISHAK</b>							
Commercial:							
	P. Seine	4	59,745	3	4,205	600	64,557
Hatchery:							
	P. Seine	0	7,905	0	0	0	7,905
	<b>TOTAL</b>	<b>4</b>	<b>67,650</b>	<b>3</b>	<b>4,205</b>	<b>600</b>	<b>72,462</b>
<hr/>							
LCI TOTAL		2,168	233,834	13,477	866,774	4,367	1,120,620
PERCENT		0.2	20.7	1.2	77.5	0.4	100.0
1973-92 AVERAGE		988	158,803	11,838	964,686	109,728	1,246,043

Table 2. Commercial chinook salmon catches and escapements in numbers of fish by subdistrict, Lower Cook Inlet, 1993.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpy Creek	17		17
Halibut Cove	615		615
Halibut Cove Lagoon	612		612
China Poot Bay	163		163
Neptune Bay	141		141
Tutka Bay	145		145
Barabara Creek	50		50
Seldovia Bay	<u>419</u>		<u>419</u>
<b>SOUTHERN DISTRICT TOTAL</b>	<b>2,162</b>		<b>2,162</b>
<b>OUTER DISTRICT</b>			
Nuka Island	1		1
East Arm Nuka	<u>1</u>		<u>1</u>
<b>OUTER DISTRICT TOTAL</b>	<b>2</b>		<b>2</b>
<b>EASTERN DISTRICT TOTAL</b>	<b>0</b>		<b>0</b>
<b>KAMISHAK DISTRICT</b>			
Chenik Lake	2		2
Douglas River	<u>2</u>		<u>2</u>
<b>KAMISHAK DISTRICT TOTAL</b>	<b>4</b>		<b>4</b>
<b>TOTAL LOWER COOK INLET</b>	<b>2,168</b>		<b>2,168</b>

<sup>a</sup> Chinook escapement in Lower Cook Inlet is very limited; no escapement surveys are conducted.

Table 3. Commercial sockeye salmon catches (including hatchery cost recovery) and escapements in numbers of fish by subdistrict, Lower Cook Inlet, 1993.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpy Creek	271	24	295
Halibut Cove	15,763		15,763
Halibut Cove Lagoon	3,271		3,271
China Poot Bay			
Common Property Fishery	62,430		
Hatchery Cost Recovery	5,258		
China Poot Creek		425 <sup>b</sup>	
Total Run			68,113
Neptune Bay			
Common Property Fishery	51,572		
Hatchery Cost Recovery	8,323		
Total Run			59,895
Tutka/Kasitsna Bays	5,805 <sup>c</sup>		5,805
Seldovia Bay/River	4,435	4	4,439
Barabara Creek	2,619		2,619
English Bay		8,936 <sup>d</sup>	8,936
<b>SOUTHERN DISTRICT TOTAL</b>	<b>159,747</b>	<b>9,389</b>	<b>169,136</b>
<b>OUTER DISTRICT</b>			
Port Chatham	7	1	8
Chugach Bay	11		11
Windy Bay	17	1	18
Port Dick			
South Section	1,010		
Head End Creek		25	
Total Run			1,035
Nuka Island	49		49
East Nuka (McCarty Fiord)	3,519		
James Lagoon		1	
Desire Lake		10,960	
Delight Lake		5,000	
Delectable (Ecstasy)		1,300	
Total Run			21,380
<b>OUTER DISTRICT TOTAL</b>	<b>4,613</b>	<b>17,888</b>	<b>22,501</b>

-continued-

Table 3. (page 2 of 3)

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>EASTERN DISTRICT</b>			
Aialik Bay	170	3,000	3,170
Resurrection Bay North			
Common Property Fishery	0		
Hatchery Cost Recovery	1,653		
Bear Lake		5,033 <sup>d</sup>	
Salmon Creek		115	
Clear Creek		2	
Total Run			6,803
Renard Island	<u>1</u>	<u>        </u>	<u>1</u>
<b>EASTERN DISTRICT TOTAL</b>	<b>1,824</b>	<b>8,150</b>	<b>9,974</b>
<b>KAMISHAK BAY DISTRICT</b>			
Iniskin Bay			
Iniskin River		30	
North Head Creek		20	
Total Run			50
Ursus Cove			
Brown's Peak Creek		100	
Ursus Lagoon (head end)		10	
Total Run			110
Kirschner Lake			
Common Property Fishery	36,322		
Hatchery Cost Recovery	3,326		
Total Run			39,648
Bruin Bay	1,243		
Bruin Lake Creek		1,500	
Bruin River		800	
Total Run			3,543
Chenik Lake			
Common Property Fishery	19,988		
Hatchery Cost Recovery	4,579		
Amakdedori Creek		1,950	
Chenik Creek/Lake		4,000 <sup>d</sup>	
Total Run			30,517
Paint River		800 <sup>e</sup>	800
McNeil Cove	941		
Mikfik Creek		6,350	
McNeil River		4	
Total Run			7,295

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Table 3. (page 3 of 3)

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
KAMISHAK DISTRICT cont'd.			
Kamishak/Douglas Reef	0		
Little Kamishak River		25	
Strike Creek		10	
Big Kamishak River		4,030	
Total Run			4,065
Douglas River/Silver Beach	<u>1,251</u>	<u>        </u>	<u>1,251</u>
<b>KAMISHAK BAY DISTRICT TOTAL</b>	<b>67,650</b>	<b>19,629</b>	<b>87,279</b>
<b>TOTAL COOK INLET</b>	<b>233,834</b>	<b>55,056</b>	<b>288,890</b>

- <sup>a</sup> Escapement estimates derived from limited aerial surveys. Numbers represent unexpanded aerial live counts.
- <sup>b</sup> No freshwater escapement, prevented by barrier falls.
- <sup>c</sup> Figure includes 6 sockeye taken during hatchery pink salmon cost recovery harvests.
- <sup>d</sup> Weir counts.
- <sup>e</sup> No freshwater escapement, ladder not opened during 1993.

Table 4. Commercial coho salmon catches (including hatchery cost recovery and sport fish derby) and escapements in numbers of fish by subdistrict, Lower Cook Inlet, 1993.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
N.shore (Clearwater Slough)		600	600
Humpy Creek	9		9
Halibut Cove	421		421
Halibut Cove Lagoon	50		50
China Poot Bay	462		462
Neptune Bay	477 <sup>b</sup>		477
Tutka/Kasitsna Bays	1,729 <sup>b</sup>		1,729
Seldovia Bay	420		420
Barabara Creek	863		863
<b>SOUTHERN DISTRICT TOTAL</b>	<b>4,431</b>	<b>600</b>	<b>5,031</b>
<b>OUTER DISTRICT</b>			
Port Chatham	1		1
Chugach Bay	1		1
Windy Bay	1		1
Port Dick North Section	13		13
Port Dick South Section	1		1
East Nuka (McCarty Fiord)	102		102
<b>OUTER DISTRICT TOTAL</b>	<b>119</b>		<b>119</b>
<b>EASTERN DISTRICT</b>			
Alice Bay	247		247
Resurrection Bay North			
Hatchery Cost Recovery	7,249		
Sport Derby	1,428		
Total Run			8,677
<b>EASTERN DISTRICT TOTAL</b>	<b>8,924</b>		<b>8,924</b>
<b>KAMISHAK BAY DISTRICT</b>			
Chenik Lake	1		1
Kirschner Lake	2		2
<b>KAMISHAK BAY DISTRICT TOTAL</b>	<b>3</b>		<b>3</b>
<b>TOTAL LOWER COOK INLET</b>	<b>13,477</b>	<b>600</b>	<b>14,077</b>

<sup>a</sup> Escapement estimates derived from limited aerial surveys. Numbers represent unexpanded aerial live counts.

<sup>b</sup> Figure includes 1 coho taken during hatchery sockeye (Neptune) and pink (Tutka) cost recovery.

Table 5. Commercial pink salmon catches (including hatchery cost recovery) and escapements in numbers of fish by subdistrict, Lower Cook Inlet, 1993.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpy Creek	223	35,973	36,196
Halibut Cove	25,494		25,494
Halibut Cove Lagoon	74,720		74,720
China Foot Bay/Creek	23,912 <sup>b</sup>	1,649	25,561
Neptune Bay	26,677 <sup>b</sup>		26,677
Tutka/Kasitsna Bays			
Common Property Fishery	128,347		
Hatchery Cost Recovery	409,431		
Hatchery Brood stock		107,242 <sup>c</sup>	
Tutka Lagoon Creek		27,403	
Total Run			672,423
Barabara Creek	1,601	11,887	13,488
Seldovia Bay & River	2,389	43,401	45,790
Port Graham			
Hatchery Brood Stock		5,257	
Port Graham River		12,800	
Port Graham Left		7,422	
Total Run			25,479
<b>SOUTHERN DISTRICT TOTAL</b>	<b>692,794</b>	<b>253,034</b>	<b>945,828</b>
<b>OUTER DISTRICT</b>			
Dogfish Bay		326	326
Port Chatham	14,672	22,221	36,893
Chugach Bay	8,801	9,351	18,152
Windy Bay	43,371		
Windy River Left		25,898	
Windy River Right		13,626	
Total Run			82,895
Rocky Bay			
Scurvy Creek		710	
Rocky River		69,950	
Total Run			70,660
Port Dick			
South Section	21,871		
North Section	4,755		
Head End Creek		37,014	
Slide Creek		5,944	
Middle Creek		193	
Island Creek		12,059	
Add'l. Saltwater Fish		18,300	
Total Run			100,136

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Table 5. (page 2 of 3)

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
OUTER DISTRICT (cont'd)			
Nuka Island	51,890		
South Nuka Island Creek		34,340	
Berger Bay		229	
Mike's Bay		909	
Home Cove		686	
Add'l. Saltwater Fish		5,200	
Total Run			93,254
East Nuka (McCarty Fiord)	13,799		
James Lagoon		3,298	
Desire Lake		19,329	
Delectable (Ecstasy)		74	
Total Run			36,500
<b>OUTER DISTRICT TOTAL</b>	<b>159,159</b>	<b>279,657</b>	<b>438,816</b>
EASTERN DISTRICT			
Aialik Bay	9,952		9,952
Resurrection Bay North	0		
Bear\Salmon Creeks		6,617	
Clear Creek		2,041	
Mayor Creek		1,587	
Sawmill Creek		517	
Spring Creek		589	
Tonsina Creek		3,187	
Thumb Cove		5,469	
Total Run			20,007
Renard Island (Humpy Cove)	664	923	1,587
<b>EASTERN DISTRICT TOTAL</b>	<b>10,616</b>	<b>20,930</b>	<b>31,546</b>
KAMISHAK BAY DISTRICT			
Iniskin Bay (N. Head Creek)	0	33,307	33,307
Ursus Cove (Br. Peak Creek)	0	41,566	41,566
Rocky Cove (Sunday Creek)	0	57,750	57,750
Kirschner Lake	4,005		4,005
Bruin Bay & River	77	86,361	86,438

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Table 5. (page 3 of 3)

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
KAMISHAK DISTRICT cont'd.			
Chenik Lake (Amakdedori Cr)	110	1,681	1,791
McNeil Cove	9		9
Douglas River/Silver Beach	<u>4</u>	<u>          </u>	<u>4</u>
<b>KAMISHAK BAY DISTRICT TOTAL</b>	<b>4,205</b>	<b>220,665</b>	<b>224,870</b>
<b>TOTAL COOK INLET</b>	<b>866,774</b>	<b>774,286</b>	<b>1,641,060</b>

<sup>a</sup> Escapement estimates in the Southern, Outer, and Eastern Districts derived from periodic ground surveys with stream life factors applied. Kamishak estimates are unexpanded peak aerial live counts.

<sup>b</sup> China Poot/Neptune catches include 14/38 pinks (respectively) caught during hatchery sockeye cost recovery.

<sup>c</sup> Of this total originally taken for brood stock purposes, 5,153 males were not utilized and were subsequently discarded.

Table 6. Commercial chum salmon catches and escapements in numbers of fish by subdistrict, Lower Cook Inlet, 1993.

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
<b>SOUTHERN DISTRICT</b>			
Humpy Creek	0	336	336
Halibut Cove	35		35
Halibut Cove Lagoon	3		3
China Poot Bay	47		47
Neptune Bay	38		38
Tutka Bay (Tutka Lagoon Cr)	861	30	891
Barabara Creek	571		571
Seldovia Bay/River	1,233	1,623	2,856
Port Graham			
Port Graham River		2,450	
Port Graham Left		19	
Total Run			<u>2,469</u>
<b>SOUTHERN DISTRICT TOTAL</b>	<b>2,788</b>	<b>4,458</b>	<b>7,246</b>
<b>OUTER DISTRICT</b>			
Dogfish Bay		5,374	5,374
Port Chatham	88	441	529
Chugach Bay	6		6
Windy Bay	133		
Windy River Left		305	
Windy River Right		385	
Total Run			823
Rocky Bay/River		50	50
Port Dick			
South Section	360		
North Section	364		
Head End Creek		2,548	
Slide Creek		96	
Middle Creek		204	
Island Creek		3,619	
Total Run			7,191
Nuka Island	6		
South Nuka Island Creek		1	
Petrof River		300	
Total Run			307
East Nuka (James Lagoon)	<u>13</u>	<u>628</u>	<u>641</u>
<b>OUTER DISTRICT TOTAL</b>	<b>970</b>	<b>13,951</b>	<b>14,921</b>

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Table 6. (page 2 of 2)

Subdistrict/System	Catch	Escapement <sup>a</sup>	Total Run
EASTERN DISTRICT			
Aialik Bay	9		9
Resurrection Bay North			
Clear Creek		31	
Sawmill Creek		54	
Spring Creek		120	
Tonsina Creek		1,591	
Thumb Cove		2	
Total Run			<u>1,798</u>
<b>EASTERN DISTRICT TOTAL</b>	<b>9</b>	<b>1,798</b>	<b>1,807</b>
KAMISHAK BAY DISTRICT			
Iniskin Bay	0		
Iniskin River		7,998	
Sugarloaf Creek		2,696	
North Head Creek		679	
Total Run			11,373
Cottonwood Bay/Creek	0	11,975	11,975
Ursus Cove	0		
Brown's Peak Creek		1,453	
Ursus Lagoon Creek		4,173	
Ursus Lagoon Right Creek		3,568	
Total Run			9,194
Rocky Cove (Sunday Creek)	0	1,331	1,331
Kirschner Lake	126		126
Bruin Bay/River	3	5,999	6,002
Chenik Lake	68		68
McNeil Cove	374		
McNeil River		15,619	
Add'l. Lagoon Fish		1,811	
Total Run			17,804
Kamishak River/Douglas Reef			
Little Kamishak River		6,311	
Strike Creek		1,111	
Big Kamishak River		9,111	
Total Run			16,533
Douglas R./Douglas Beach Cr	<u>29</u>	<u>5,846</u>	<u>5,875</u>
<b>KAMISHAK BAY DISTRICT TOTAL</b>	<b>600</b>	<b>79,681</b>	<b>80,281</b>
<b>TOTAL COOK INLET</b>	<b>4,367</b>	<b>99,888</b>	<b>104,255</b>

<sup>a</sup> Escapement estimates in the Southern, Outer, and Eastern Districts derived from periodic ground surveys with stream life factors applied. Kamishak estimates are unexpanded peak aerial live counts.

Table 7. Exvessel value<sup>a</sup> of the commercial salmon catch in number of dollars by species and gear type, Lower Cook Inlet, 1993.

	Chinook	Sockeye	Coho	Pink	Chum	Total
<b>COMMON PROPERTY - PURSE SEINE</b>						
No. Fish	1,079	195,896	1,710	445,283	1,776	645,744
Pounds	9,319	829,009	9,871	1,249,676	12,061	2,109,936
Price/Lb.	\$0.89	\$0.78	\$0.42	\$0.14	\$0.30	
Value	\$8,294	\$646,627	\$4,146	\$174,955	\$3,618	\$837,640
<b>COMMON PROPERTY - SET GILLNET</b>						
No. Fish	1,089	14,791	3,088	12,008	2,591	33,567
Pounds	16,748	79,617	18,884	41,788	14,753	171,790
Price/Lb.	\$1.10	\$1.00	\$0.58	\$0.13	\$0.26	
Value	\$18,423	\$79,617	\$10,953	\$5,432	\$3,836	\$118,261
<b>HATCHERY - PURSE SEINE &amp; WEIR</b>						
No. Fish		23,147	7,251	409,483		440,052
Pounds		98,778	42,878	1,065,592		1,189,185
Price/Lb.		\$0.77	\$0.38	\$0.10		
Value		\$76,059	\$16,294	\$106,559		\$198,912
<b>SPORT FISHING DERBY - HOOK &amp; LINE</b>						
No. Fish			1,428			1,428
Pounds			9,328			9,328
Price/Lb.			\$1.05			
Value			\$9,794			\$9,794
<b>TOTAL ALL GEARS</b>						
No. Fish	2,168	233,834	13,477	866,774	4,367	1,120,620
Pounds	26,067	1,007,404	80,961	2,357,056	26,814	3,498,302
Price/Lb.	\$1.02	\$0.80	\$0.51	\$0.12	\$0.28	
Value	\$26,717	\$802,303	\$41,187	\$286,946	\$7,454	\$1,164,607

<sup>a</sup> Exvessel value is calculated from average prices, which are determined only by fish ticket information and do not reflect any retroactive or postseason adjustments.

Table 8. Emergency orders issued for commercial, subsistence, and personal use salmon and herring fisheries in Lower Cook Inlet, 1993.

Number/ Issue Date	DESCRIPTION
2-F-H-001-93 April 21	Opens Management Areas 5 and 6 in the Kamishak Bay District to commercial herring sac roe seining for approximately one-half hour commencing by an ADF&G field announcement some time between 11:55 a.m. and 12:05 p.m., Wednesday, April 21, 1993. The fishery will close at 12:30 p.m.. Management Areas 5 and 6 include those waters south of 59° 23.13" N. latitude and west of 153° 37.0' W. longitude.
2-F-H-002-93 April 21	Opens Management Areas 5 and 6 in the Kamishak Bay District to commercial herring sac roe seining for approximately fifteen minutes commencing by an ADF&G field announcement some time between 7:25 p.m. and 7:35 p.m., Wednesday, April 21, 1993. The fishery will close at 7:45 p.m.. Management Areas 5 and 6 include those waters south of 59° 23.13" N. latitude and west of 153° 37.0' W. longitude.
2-F-H-003-93 May 7	Opens those waters of Resurrection Bay in the Eastern District enclosed by a line from Alice Cape south to a point one mile due south of Alice Cape, then northeast to a point one mile due south of Cape Resurrection, then north to Cape Resurrection, to commercial salmon seining on a schedule of two forty-hour weekly fishing periods, from Monday 6:00 a.m. until Tuesday 10:00 p.m. and from Thursday 6:00 a.m. until Friday 10:00 p.m., effective Monday, May 10, 1993, until further notice.
2-F-H-004-93 May 24	Closes the Port Graham and English Bay areas to commercial salmon set gillnet fishing prior to the regulatory opening date of June 7, 1993, until further notice.
2-F-H-005-93 May 24	Closes the Port Graham Subdistrict to subsistence salmon set gillnet fishing effective 6:00 a.m. Monday, June 7, 1993, until further notice.
2-F-H-006-93 May 28	Designates and establishes Special Harvest Areas for the Cook Inlet Aquaculture Association (CIAA)

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Number/ Issue Date	DESCRIPTION
	<p>seining is restricted to those waters seaward of a line extending from the "rock quarry" on the north side of the bay at approximately 59°30'14" N. latitude, 151°28'14" W. longitude, to the Tutka Bay Lodge on the south side of the bay at approximately 59°28'31" N. latitude, 151°28'55" W. longitude, five days per week effective 6:00 a.m. Friday, June 25, 1993.</p> <p>In addition, this emergency order opens the commercial set gillnet fishery in Halibut Cove Subdistrict five days per week effective 6:00 a.m. Monday, July 5, 1993, until further notice.</p> <p>Also, this emergency order repeals the regulatory closed waters markers in China Poot Bay, and also establishes temporary closed waters at the head of China Poot Bay to provide a Dungeness crab sanctuary.</p>
<p>2-F-H-011-93 June 23</p>	<p>Designates and establishes a Temporary Special Harvest Area for the Cook Inlet Aquaculture Association (CIAA) in the Tutka Bay Subdistrict within the Southern District of Lower Cook Inlet. The Tutka Bay Special Harvest Area (SHA) consists of all marine waters of the Tutka Bay Subdistrict southeast of the Homer Electric Association powerline crossing, including waters of Tutka Lagoon.</p>
<p>2-F-H-012-93 July 4</p>	<p>Closes waters of the Chenik Special Harvest Area (i.e. Chenik Lagoon; see LCI E.O. #2-F-H-006-93) in the Chenik Subdistrict of the Kamishak Bay District to the harvest of salmon by Cook Inlet Aquaculture Association and opens these waters to commercial salmon seining on a schedule of two 48-hour weekly fishing periods, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m., effective at 6:00 am. Monday, July 5, until further notice. The remaining waters of the Kamishak Bay District, with the exception of the Paint River Subdistrict and</p>

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Number/ Issue Date	DESCRIPTION
	the Kirschner Special Harvest Area, are also open on the same schedule of two 48-hour weekly periods until further notice.
2-F-H-013-93 July 6	Opens waters of the East Nuka Subdistrict between the latitude of the entrance to James Lagoon at approximately 59°33'30" N. latitude, and the regulatory markers near the Parks Service tent camp at approximately 59°37'30" N. latitude, to commercial salmon seining five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., effective at 6:00 a.m. Wednesday, July 7, until further notice. Waters south of the entrance to James Lagoon, as well as waters north of the regulatory markers by the Parks Service camp, remain closed to fishing. The closed waters markers at the mouth of Desire Lake Creek <b>WILL NOT</b> be in effect and fishing will be allowed up to the stream mouth.
2-F-H-014-93 July 10	Closes waters of the China Poot Special Harvest Area (see LCI E.O. #2-F-H-006-93) in the Southern District and the Kirschner Lake Special Harvest Area (see LCI E.O. #2-F-H-006-93) in the Kamishak Bay District to salmon hatchery cost recovery harvest by CIAA effective at 6:00 a.m. Monday, July 12, 1993, until further notice. It also opens waters of the China Poot SHA to commercial purse seine salmon fishing five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., and opens waters of Kirschner Lake SHA to commercial purse seine salmon fishing to two 48-hour weekly periods, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m., effective 6:00 a.m. Monday, July 12, 1993, until further notice.
	In addition, this emergency order closes waters of the Humpy Creek Subdistrict in the Southern District to commercial salmon seining effective 6:00 a.m. Monday, July 12, 1993, until further notice.

-continued-

Table 8. Page 2 of 9.

Number/ Issue Date	DESCRIPTION
	<p>in the Chenik, Paint River, Bruin Bay, and China Poot Subdistricts of the Lower Cook Inlet management area. During periods established by emergency order, CIAA may harvest a portion of the sockeye salmon returning to these areas for recovery of operational costs expended towards sockeye salmon enhancement programs in Lower Cook Inlet.</p>
<p>2-F-H-007-93 May 28</p>	<p>Establishes two 48-hour weekly fishing periods in the Kamishak Bay District commercial salmon seine fishery, which opens by regulation on June 1, 1993. These periods shall be from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m..</p>
<p>2-F-H-008-93 May 28</p>	<p>Opens the Humpy Creek Subdistrict in the Southern District to commercial salmon seine fishing effective June 1, 1993, on a schedule of two 48-hour fishing periods per week, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m., until further notice.</p>
<p>2-F-H-09-93 June 16</p>	<p>Closes the Chenik Lake and Kirschner Lake Special Harvest Areas to the common property salmon seine fishery and opens waters of the Chenik Lake, Kirschner Lake and Paint River Special Harvest Areas in the Kamishak Bay District, and the China Poot and Hazel Lake Special Harvest Areas in the Southern District, to the harvest of salmon seven days per week by authorized agents of Cook Inlet Aquaculture Association (CIAA) effective at 6:00 a.m. Thursday, June 17, 1993, until further notice. The Chenik Lake Special Harvest Area consists of all marine waters of the Chenik Subdistrict north of 59°12'30" N. latitude, and south of 59°14'30" N. latitude, and west of 154° 00'00" W. longitude (see LCI E.O. #2-F-H-006-93). The Kirschner Lake Special Harvest Area consists of all marine waters of the Bruin Bay Subdistrict northwest of a line drawn from a point on the north shore of the mouth of Bruin Bay at approximately 59°23'10" N.</p>

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Number/ Issue Date	DESCRIPTION
	<p>latitude, 153°56'54" W. longitude, to a point on Fortification Bluff at approximately 59°25'10" N. latitude, 153°50'30" W. longitude (see LCI E.O. #2-F-H-006-93). The Paint River Special Harvest Area consists of all marine waters of Akjemguiga Cove west of a line drawn from a point on the south shore at approximately 59°09'30" N. latitude, 154°12'50" W. longitude to a point on the north shore at approximately 59°10'00" N. latitude, 154°12'30" W. longitude (see LCI E.O. #2-F-H-006-93). The China Poot Special Harvest Area consists of all marine waters of China Poot Bay east of a line connecting 59°34'00" N. latitude, 151°17'30" W. longitude and 59°33'30" N. latitude, 151°17'32" W. longitude (see LCI E.O. #2-F-H-006-93). The Hazel Lake Special Harvest Area consists of all marine waters of Neptune Bay south of a line drawn from a point on the west shore of Neptune Bay at approximately 59°32'50" N. latitude, 151°25'00" W. longitude, to a point on the east shore of Neptune Bay at approximately 59°33'00" N. latitude, 151°22'20" W. longitude (see LCI E.O. #2-F-H-006-93). Regulatory markers in Chenik Lagoon have been covered and seining will be allowed up to the stream mouth.</p>
<p>2-F-H-010-93 June 23</p>	<p>Opens portions of the China Poot, Tutka Bay, and Halibut Cove Subdistricts, all within the Southern District, to commercial salmon seining five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., effective 6:00 a.m. Friday, June 25, 1993, until further notice. In the China Poot Subdistrict, commercial seining shall be allowed five days per week only in those waters outside (offshore) of the China Poot and Hazel Lake Special Harvest Areas (see LCI E.O. #2-F-H-006-93) beginning June 25. In the Halibut Cove Subdistrict, seining shall be allowed only in waters outside of Halibut Cove Lagoon beginning June 25 on a five days per week basis. Seining in Halibut Cove Lagoon shall be allowed effective 6:00 a.m. Monday, July 5, 1993, on a five days per week basis. In the Tutka Bay Subdistrict, commercial</p>

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Table 8. Page 6 of 9.

Number/ Issue Date	DESCRIPTION
2-F-H-015-93 July 12	<p>Closes waters of the Hazel Lake Special Harvest Area (see LCI E.O. #2-F-H-006-93) in the Southern District to salmon hatchery cost recovery harvest by CIAA effective at 6:00 a.m. Tuesday, July 13, 1993, until further notice. It also opens waters of the Hazel Lake SHA to commercial purse seine salmon fishing five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., effective 6:00 a.m. Tuesday, July 13, 1993, until further notice.</p> <p>In addition, this emergency order opens waters of the Port Graham Subdistrict in the Southern District to commercial salmon set gillnet fishing to two 48-hour weekly fishing periods, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m., effective 6:00 a.m. Thursday, July 15, 1993, until further notice. It also closes commercial salmon seining in waters of Resurrection Bay effective at 6:00 a.m. Thursday, July 15, until further notice.</p>
2-F-H-016-93 July 12	<p>Reopens the Port Graham Subdistrict to subsistence gillnet fishing effective 6:00 a.m. Thursday, July 15, 1993, until further notice.</p>
2-F-H-017-093 July 12	<p>Opens those waters of the Outer District described as the South Section of the Port Dick Subdistrict, which includes statistical reporting areas 232-06, 232-07 and 232-08, to commercial salmon seining for two 40-hour periods per week, from Monday 6:00 a.m. until Tuesday 10:00 p.m. and from Thursday 6:00 a.m. until Friday 10:00 p.m., effective at 6:00 a.m. Thursday, July 15, 1993, until further notice. Waters of the North Section of the Port Dick Subdistrict remain closed to fishing.</p>
2-F-H-018-93 July 16	<p>Opens waters of Aialik Subdistrict in the Eastern District, including Aialik Lagoon, to commercial salmon seining on a schedule of two 48 hour weekly fishing periods, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m., effective 6:00 a.m. Monday, July 19, until further notice.</p>

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Number/ Issue Date	DESCRIPTION
	<p>In addition this emergency order closes waters of the McNeil River and Chenik Subdistricts in the Kamishak Bay District to commercial salmon seining effective at 6:00 a.m. Monday, July 19, until further notice.</p>
<p>2-F-H-019-93 July 22</p>	<p>Opens waters of Nuka Island Subdistrict in the District south of the southern entrance to Westdahl Cove at approximately 59°19'00" N. latitude and east of the longitude of the entrance to Tonsina Bay at approximately 150°52'45" W. longitude to commercial salmon seining on two 48-hour weekly fishing periods, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m., effective at 6:00 a.m. Friday, July 23, until further notice.</p>
<p>2-F-H-020-93 July 23</p>	<p>Repeals the regulatory markers designating closed waters at the mouth of South Nuka Island Creek in the Nuka Island Subdistrict of the Outer District, thus allowing commercial salmon seining up to the stream mouth.</p>
<p>2-F-H-021-93 July 28</p>	<p>Opens waters of Windy Bay Subdistrict in the Outer District to commercial salmon seining on two 48-hour weekly fishing periods, from Monday 6:00 a.m. until Wednesday 6:00 a.m. and from Thursday 6:00 a.m. until Saturday 6:00 a.m., effective at 6:00 a.m. Thursday, July 23, 1993, until further notice.</p>
<p>2-F-H-022-93 July 28</p>	<p>Designates and establishes a Special Harvest Area for the Port Graham Hatchery Corporation (PGHC) in the Port Graham Subdistrict within the Southern District of Lower Cook Inlet. The Port Graham Special Harvest Area (SHA) consists of all marine waters of Port Graham Subdistrict north of 59°20'44" N. latitude, east of 151°53'05" W. longitude, and south and west of a line from the southernmost tip of Passage Island to the Coast Guard navigational buoy at approximately 151°50'03" W. longitude, 59°21'27" N. latitude, then southeast to a point on the mainland at approximately</p>

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Table 8. Page 8 of 9.

Number/ Issue Date	DESCRIPTION
	<p>151°48'32" W. longitude, 59°20'50" N. latitude. This area is located along the south shore of Port Graham from Passage Island to Duncan Slough.</p> <p>In addition, this emergency order opens waters of the Port Graham Special Harvest Area to the harvest of salmon for hatchery brood stock seven days per week by authorized agents of PGHC, effective at 6:00 a.m. Saturday, July 31, 1993, until further notice.</p>
<p>2-F-H-023-93 August 3</p>	<p>Closes waters of the Tutka Bay Special Harvest Area (see LCI E.O. 2-F-H-011-93) to the harvest and sale of salmon by authorized agents of CIAA, effective at 4:00 p.m. Wednesday, August 4, 1993, until further notice. Concurrently, all waters of Tutka Bay Subdistrict, including Tutka Lagoon, will open to commercial purse seine fishing five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., until further notice.</p> <p>In addition, this emergency order opens waters of Nuka Island Subdistrict in the Outer District south of the southern entrance to Westdahl Cove at approximately 59°19'00" N. latitude and east of the longitude of the entrance to Tonsina Bay at approximately 150°52'45" W. longitude to commercial salmon seining five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., effective at 4:00 p.m. Wednesday, August 4, until further notice.</p>
<p>2-F-H-024-93 August 6</p>	<p>Closes waters of the Rocky Cove, Ursus Cove, Cottonwood Bay, and Iniskin Bay Subdistricts in the Kamishak Bay District to commercial salmon seining effective at 6:00 a.m. Monday, August 9, 1993, until further notice.</p>
<p>2-F-H-025-93 August 6</p>	<p>Reinstates the regulatory closed waters markers in China Poot Bay in the China Poot Subdistrict of the Southern District and at the mouth of Desire Lake Creek in the East Nuka Subdistrict of the Outer District.</p>

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Table 8. Page 9 of 9.

Number/ Issue Date	DESCRIPTION
2-F-H-026-93 August 10	<p>Opens waters of the North Section of the Port Dick Subdistrict in the Outer District to commercial salmon seining five days per week, from Monday 6:00 a.m. until Saturday 6:00 a.m., and also amends the weekly fishing periods in all other waters of the Port Dick Subdistrict consistent with those of the North Section at five days per week, effective at 10:00 p.m. Tuesday, August 10, 1993, until further notice.</p> <p>In addition, this emergency order opens waters in the Outer District of the Port Chatham Subdistrict and waters of Chugach Bay west of a line from a point on the south shore at approximately 59°11'48" N. latitude, 151°29'38" W. longitude, to a point on the south shore at approximately 59°10'28" N. latitude, 151°34'15" W. longitude, to commercial salmon seining five days per week effective 6:00 a.m. Wednesday, August 11, 1993, until further notice. Also effective at that time, weekly fishing periods in Windy Bay Subdistrict will be amended to five days per week until further notice.</p> <p>In addition, this emergency order repeals the regulatory closed waters markers in Chugach Bay and at Desire Lake Creek, both in the Outer District, and allows commercial salmon seining up to the mouths of the streams at both locations.</p>
2-F-H-027-93 August 20	<p>Closes the Southern District (Kachemak Bay) personal use coho salmon set gillnet fishery effective at 6:00 a.m. Saturday, August 21, 1993, for the remainder of the 1993 season.</p>

Table 9. Total return of adult pink salmon to the Tutka Bay Hatchery and the Halibut Cove Lagoon remote release site in the Southern District of Lower Cook Inlet, 1993.

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**COMMERCIAL HARVEST**

Tutka Bay/Lagoon:	
Purse Seine	121,012
Set Gillnet	5,384 <sup>a</sup>
Hatchery Cost Recovery	<u>409,431</u>
Tutka Commercial Harvest	535,827
Halibut Cove/Lagoon:	
Purse Seine	99,531
Set Gillnet	<u>683</u>
Halibut Cove/Lagoon Commercial Harvest	100,214

**SPORT HARVEST**

Tutka Lagoon	2,000
Halibut Cove Lagoon	200
Homer Spit Fishing Lagoon	<u>3,000</u>
Total Sport Catch	5,200

**ESCAPEMENT**

Tutka Creek and Channel	27,403
Tutka Hatchery Brood Stock	<u>107,242<sup>b</sup></u>
Total Escapement	134,645
<hr/>	
TOTAL RETURN	775,886

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<sup>a</sup> Based primarily on run timing, approximately 75 percent of the set gillnet pink salmon catch in the Tutka Subdistrict was apportioned to the Tutka Hatchery return.

<sup>b</sup> Of this total originally taken for hatchery brood stock purposes, 5,153 males were not utilized and were subsequently discarded.

Table 10. Commercial purse seine catch of sac roe herring in short tons, and average roe recovery by statistical area and date, Kamishak Bay District, Lower Cook Inlet, 1993.

Date	Statistical Area & Location	No. of Permits	No. of Landings	Tons	Roe %
4/21 <sup>a</sup>	249-45 Kamishak/Douglas Reefs & Mushroom Islet	60	83	3,570.4	10.2
Totals		60	83	3,570.4	10.2

<sup>a</sup> The fishery on 4/21/93 consisted of two separate openings, one from 12:00 noon until 12:30 p.m., and one from 7:30 p.m. until 7:45 p.m..

Table 11. Total biomass estimates and commercial catch of Pacific herring in short tons by age class, Kamishak Bay District, 1993, and 1994 forecast.

Age	1993 Estimated Biomass	1993 Commercial Harvest	Percent by Weight	1994 Forecast Biomass	Percent by Weight
1					
2					
3	20.2	2.5	0.07	1,336	5.27
4	430.1	53.2	1.49	120	0.47
5	13,675.2	1,691.3	47.37	933	3.68
6	4,064.8	502.6	14.08	17,763	70.08
7	1,937.1	239.6	6.71	1,876	7.40
8	2,067.0	255.6	7.16	682	2.30
9	4,437.2	548.9	15.37	299	1.18
10	1,642.6	203.2	5.69	1,239	4.89
11	282.9	35.0	0.98	1,197	4.72
12	147.2	18.3	0.51		
13	89.5	11.0	0.31		
14	75.1	9.2	0.26		
15	0	0	0		
<b>TOTALS</b>	<b>28,869.0</b>	<b>3,570.4</b>	<b>100.00</b>	<b>25,345</b>	<b>99.99</b>

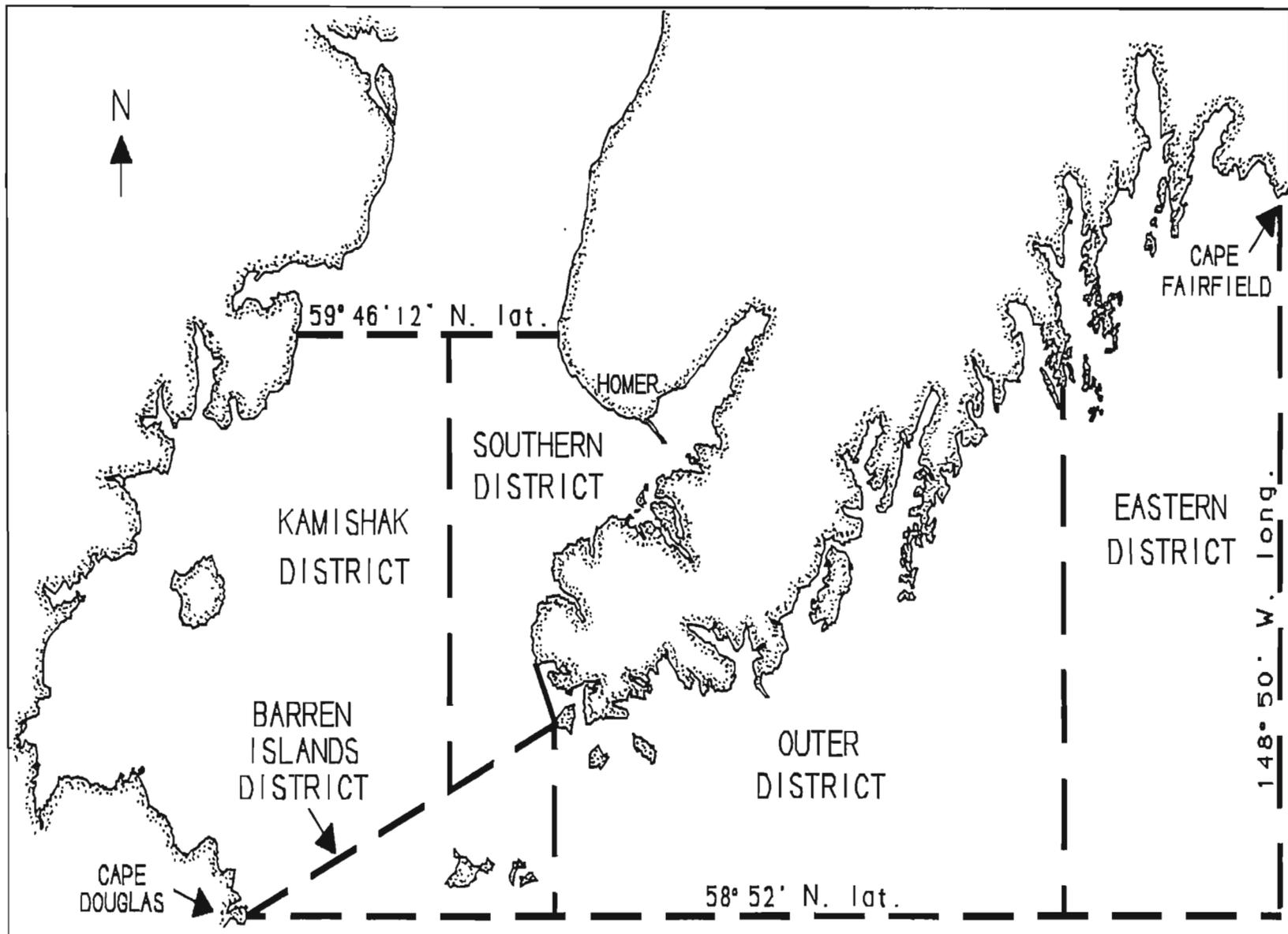


Figure 1. Lower Cook Inlet salmon and herring management area (not drawn to scale).

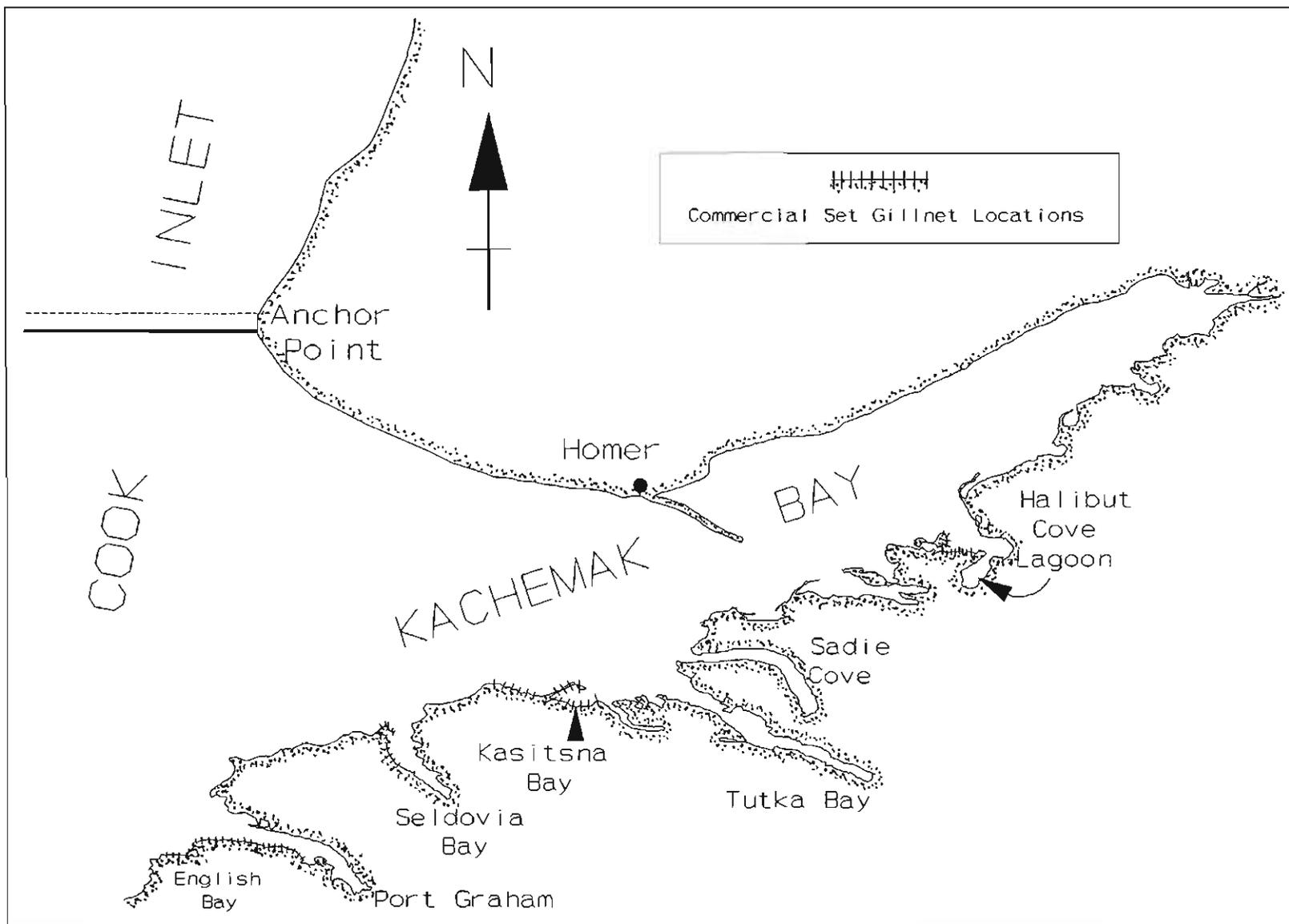


Figure 2. Commercial set gillnet locations in the Southern District of Lower Cook Inlet.

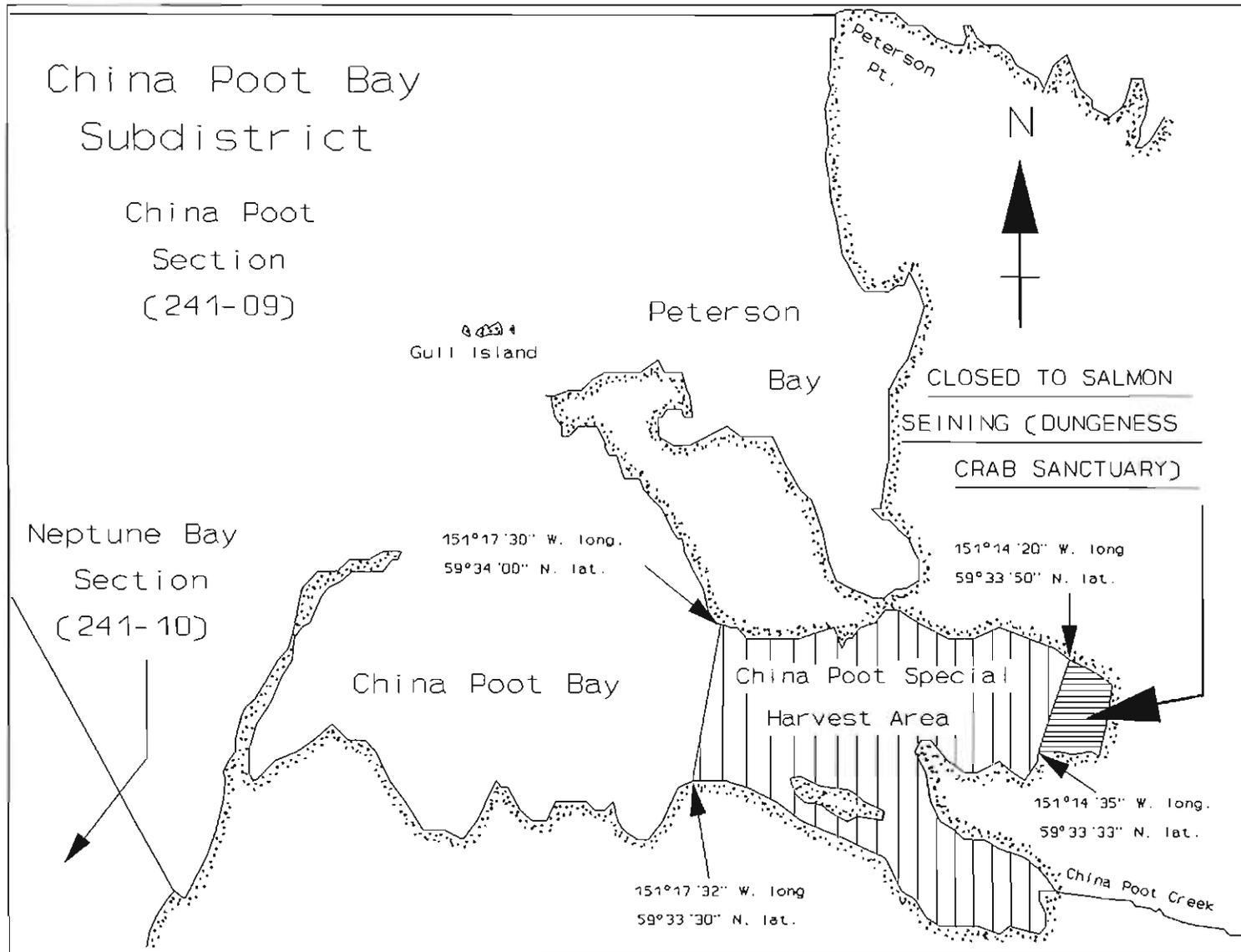


Figure 3. China Poot Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.

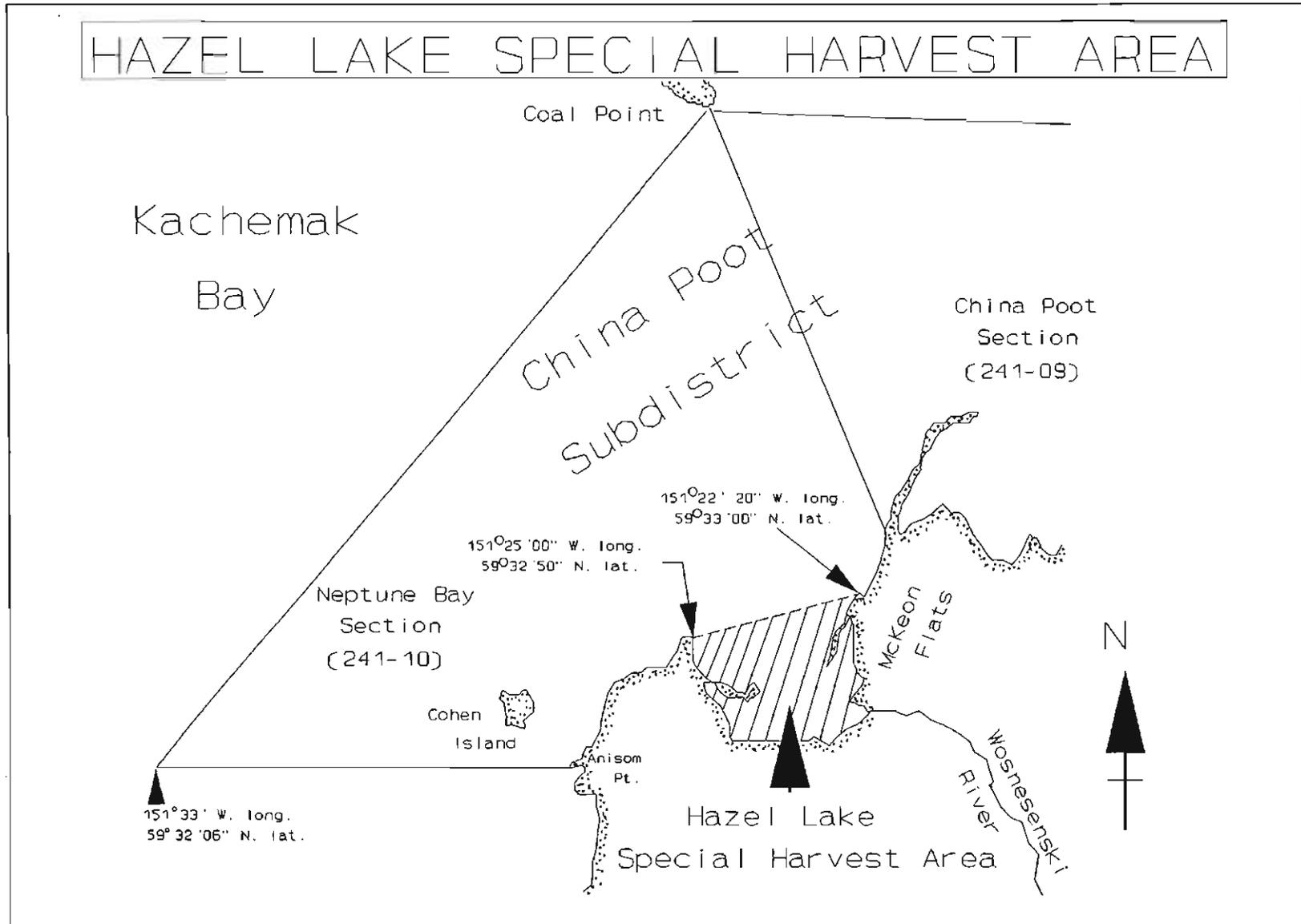


Figure 4. Hazel Lake Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.

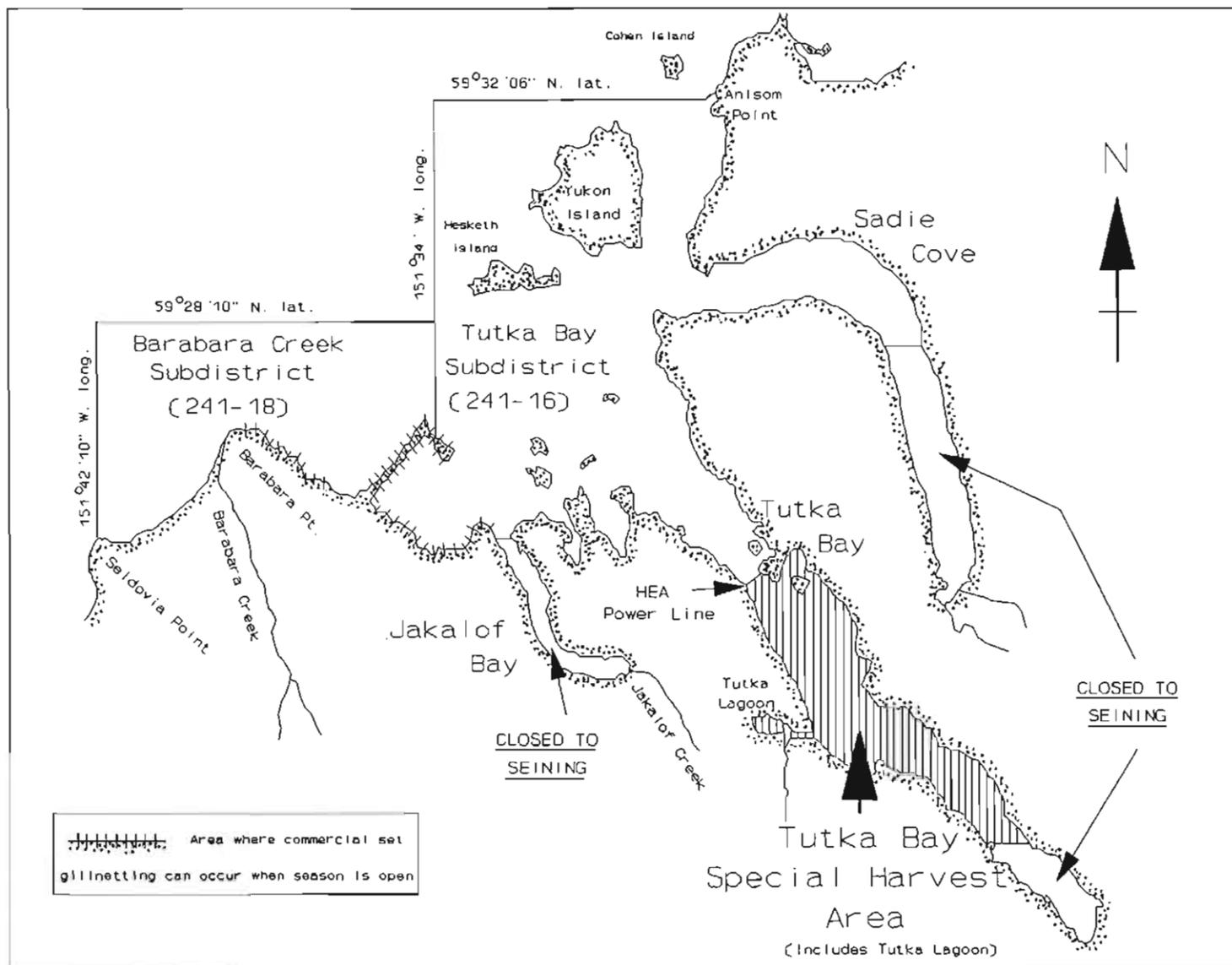


Figure 5. Tutka Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.

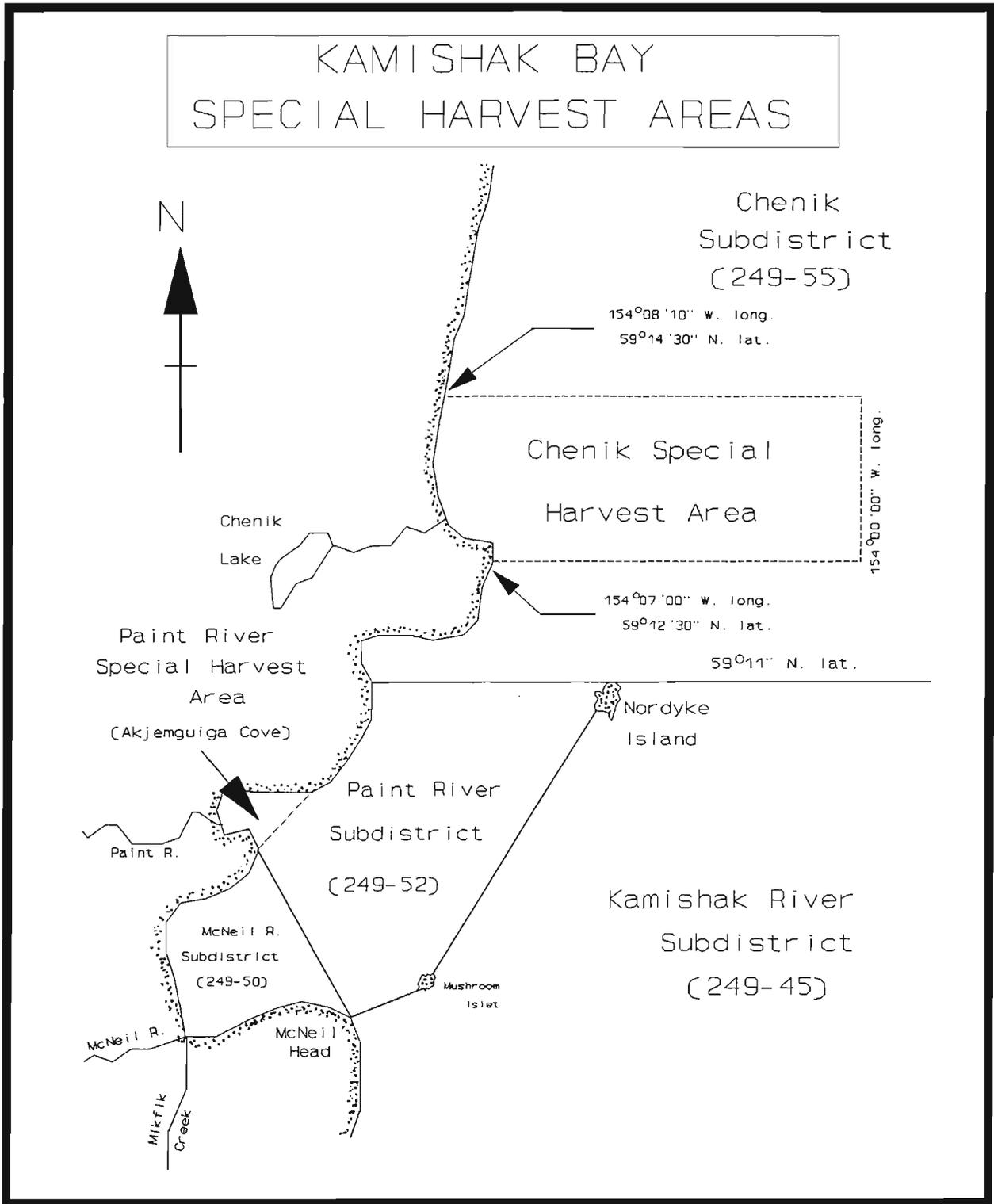
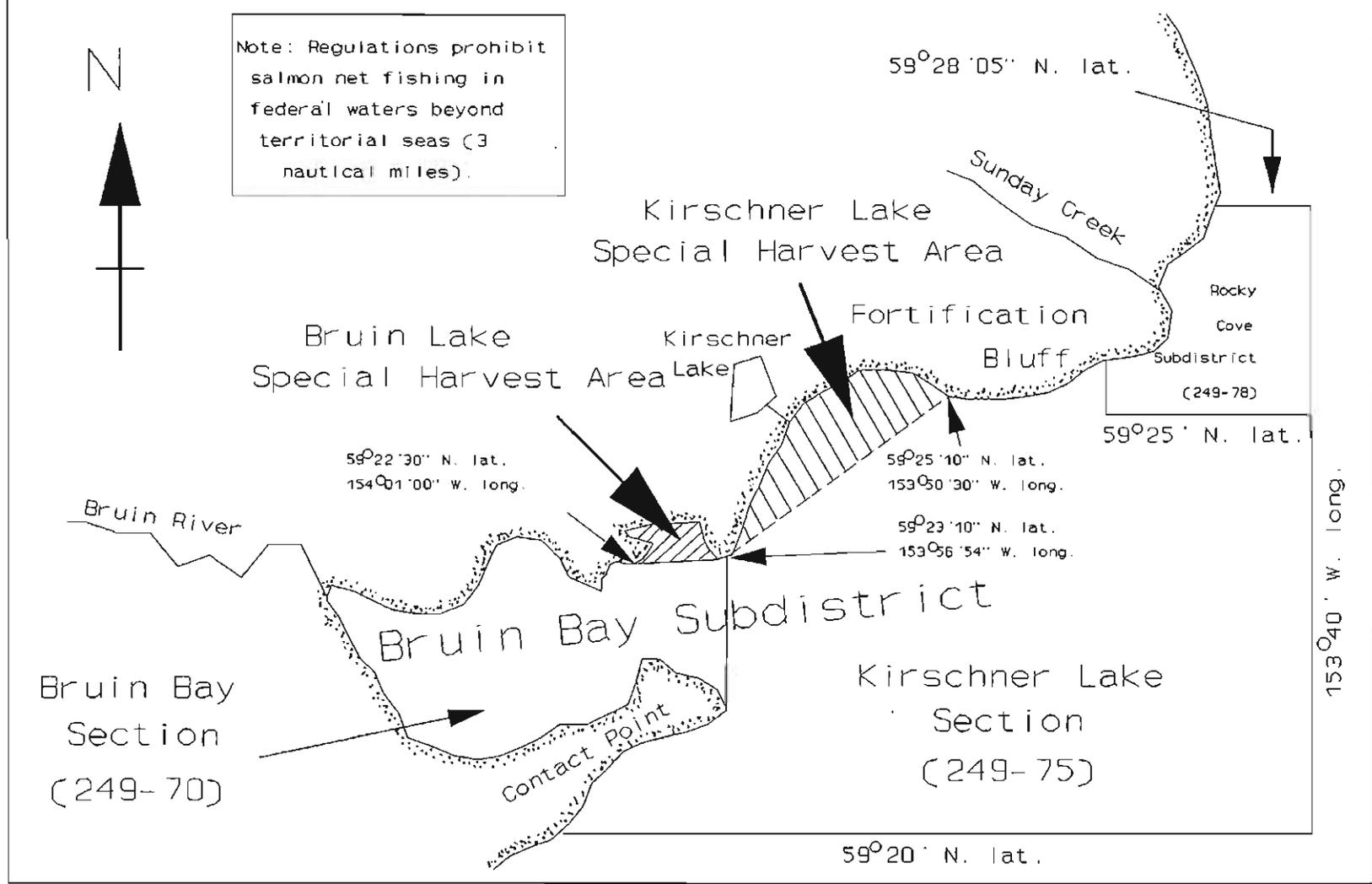


Figure 6. Chenik and Paint River Special Harvest Areas for salmon hatchery cost recovery in the Kamishak Bay District of Lower Cook Inlet.

# KIRSCHNER & BRUIN LAKES SPECIAL HARVEST AREAS



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Figure 7. Kirschner and Bruin Lakes Special Harvest Areas for salmon hatchery cost recovery in the Kamishak Bay District of Lower Cook Inlet.

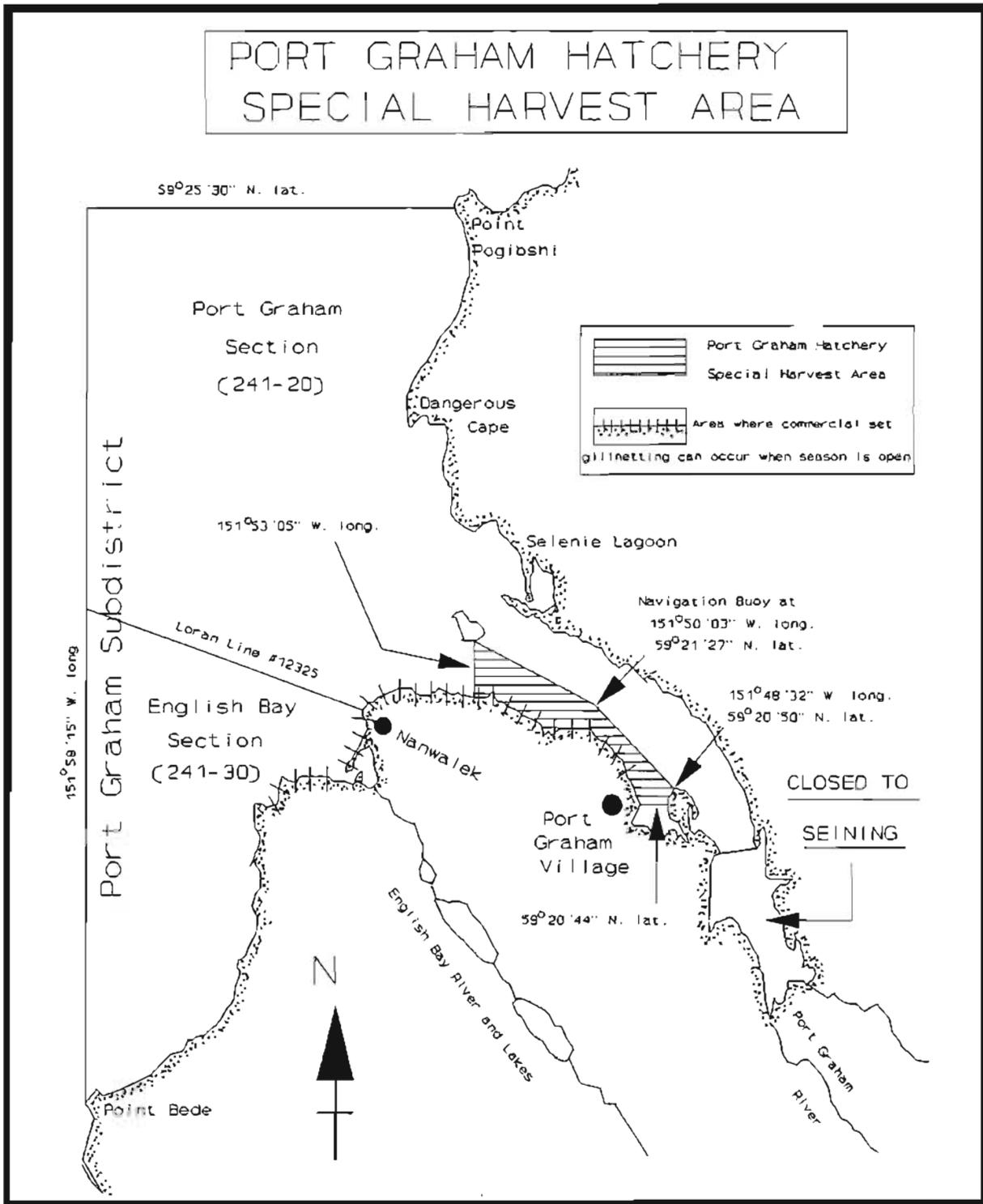


Figure 8. Port Graham Special Harvest Area for salmon hatchery cost recovery in the Southern District of Lower Cook Inlet.

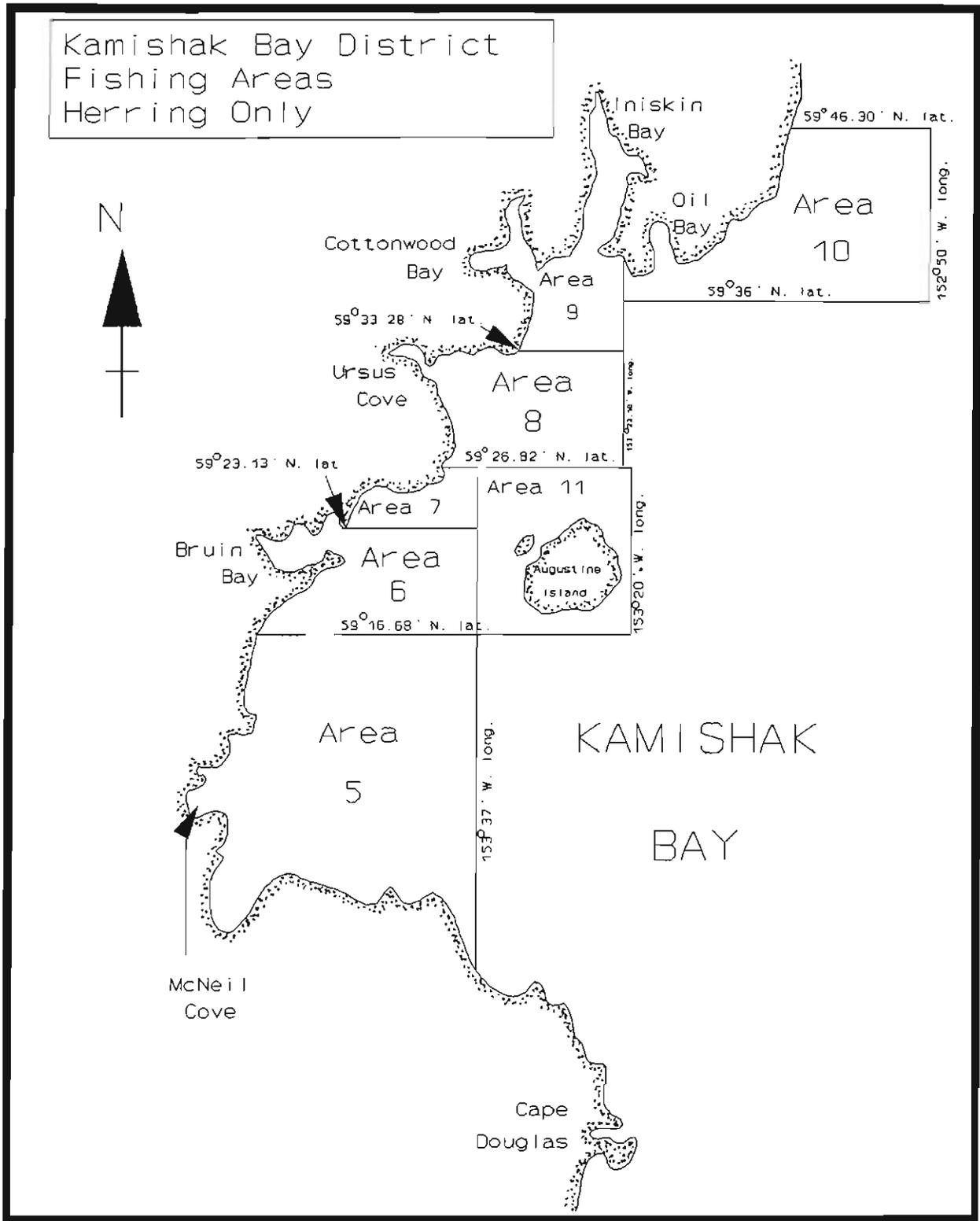


Figure 9. Commercial herring fishing areas in the Kamishak Bay District of the Lower Cook Inlet management area.

# LOWER COOK INLET COMMERCIAL SALMON CATCH

1973 - 1993 All Species Combined

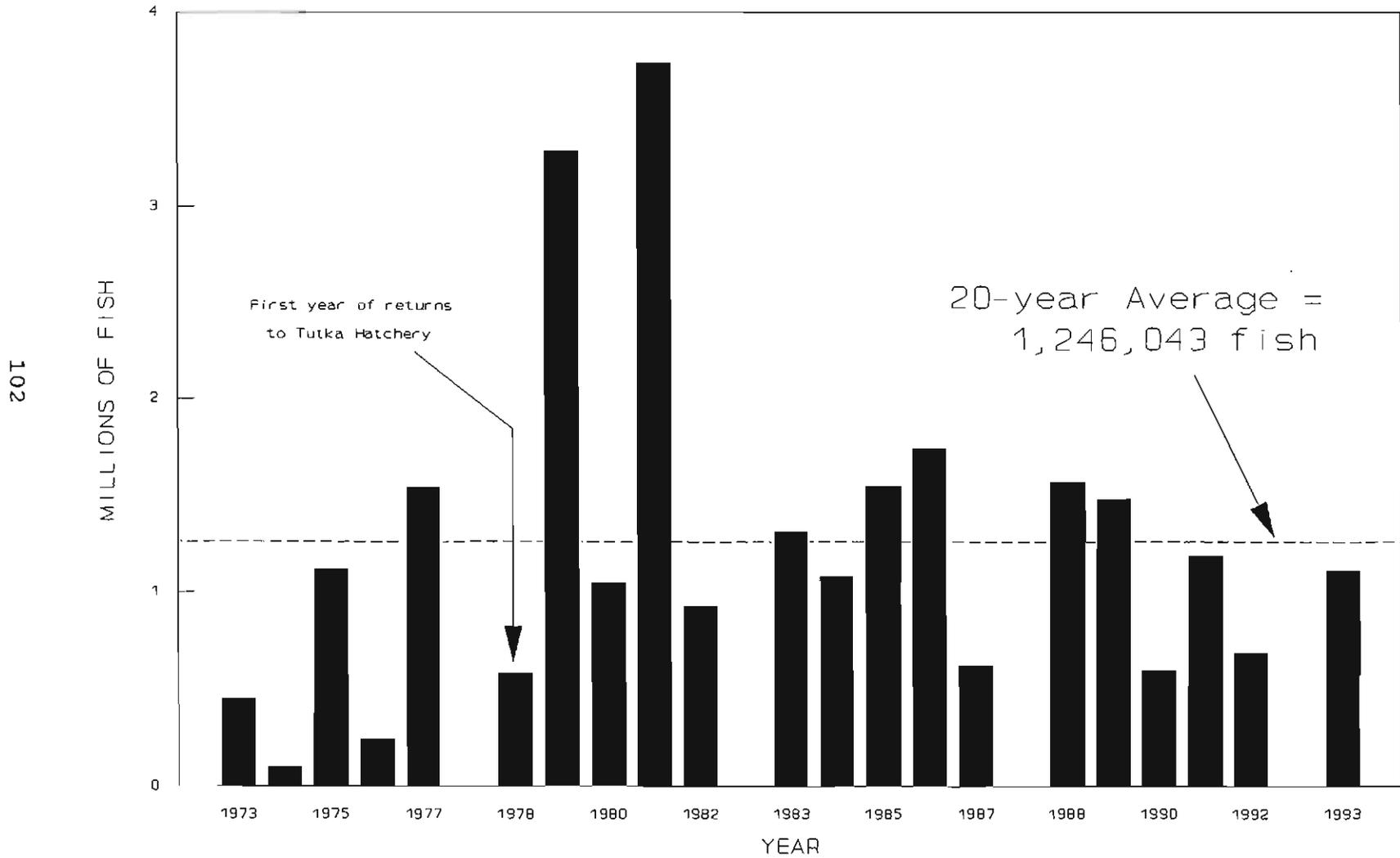


Figure 10. Total commercial salmon catch, Lower Cook Inlet, 1973 - 1993.

# LOWER COOK INLET COMMERCIAL SALMON CATCH 1973 - 1993 Sockeye

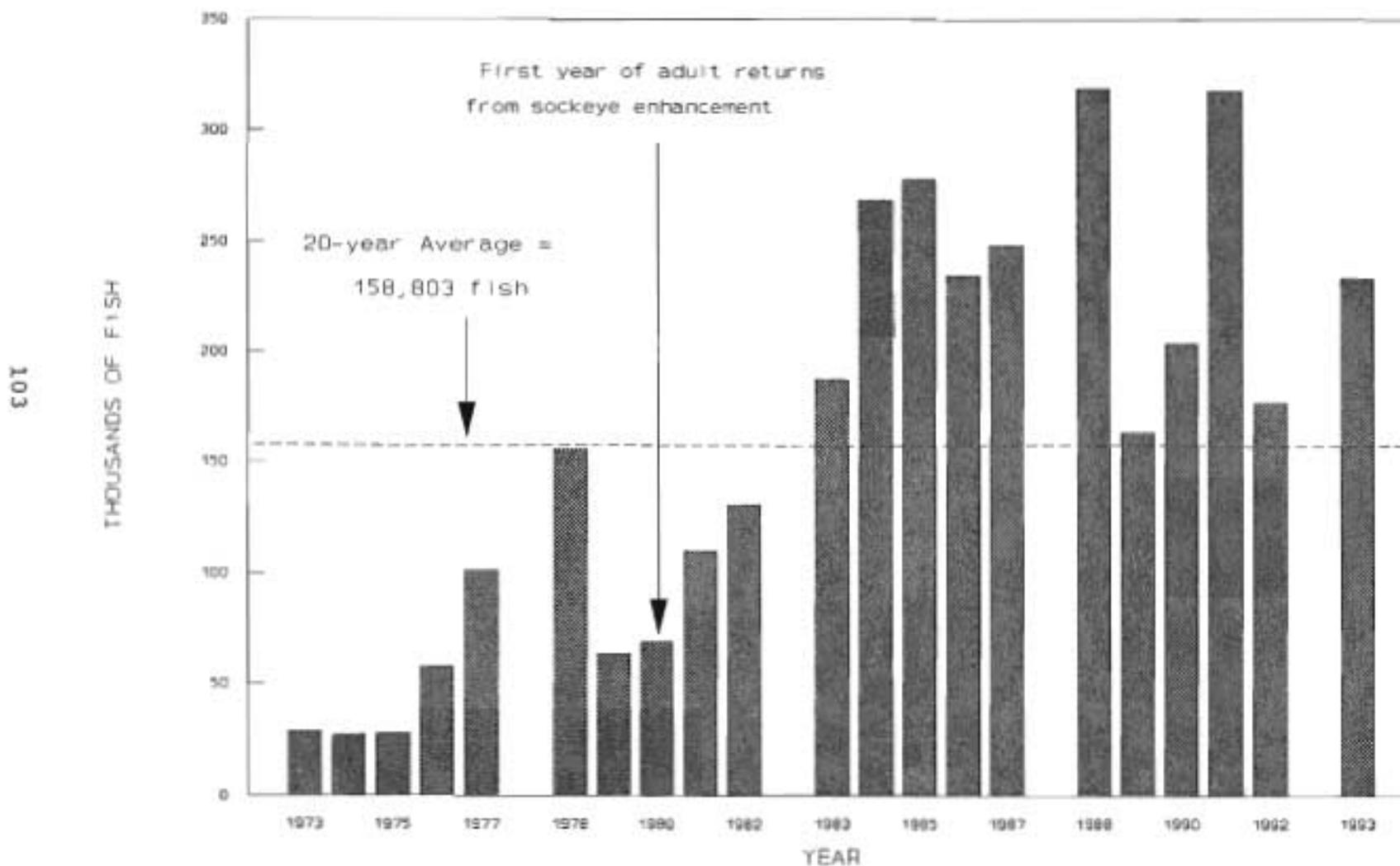


Figure 11. Commercial sockeye salmon catch, Lower Cook Inlet, 1973 - 1993.

# LEISURE LAKE SOCKEYE SALMON PRODUCTION

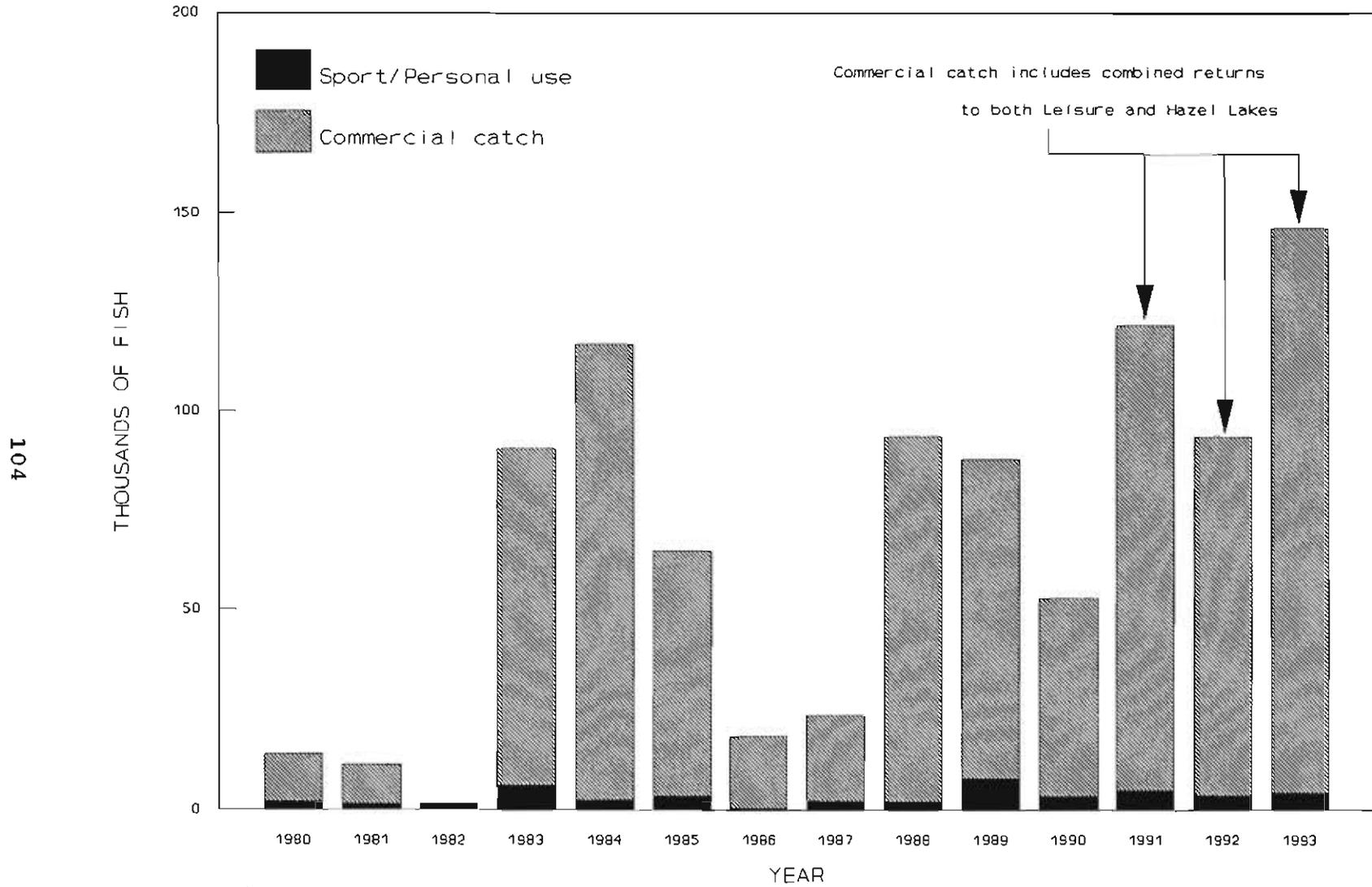


Figure 12. Sockeye salmon returns to Leisure Lake in the Southern District of Lower Cook Inlet, 1980 - 1993.

# CHENIK LAKE SOCKEYE SALMON RETURNS

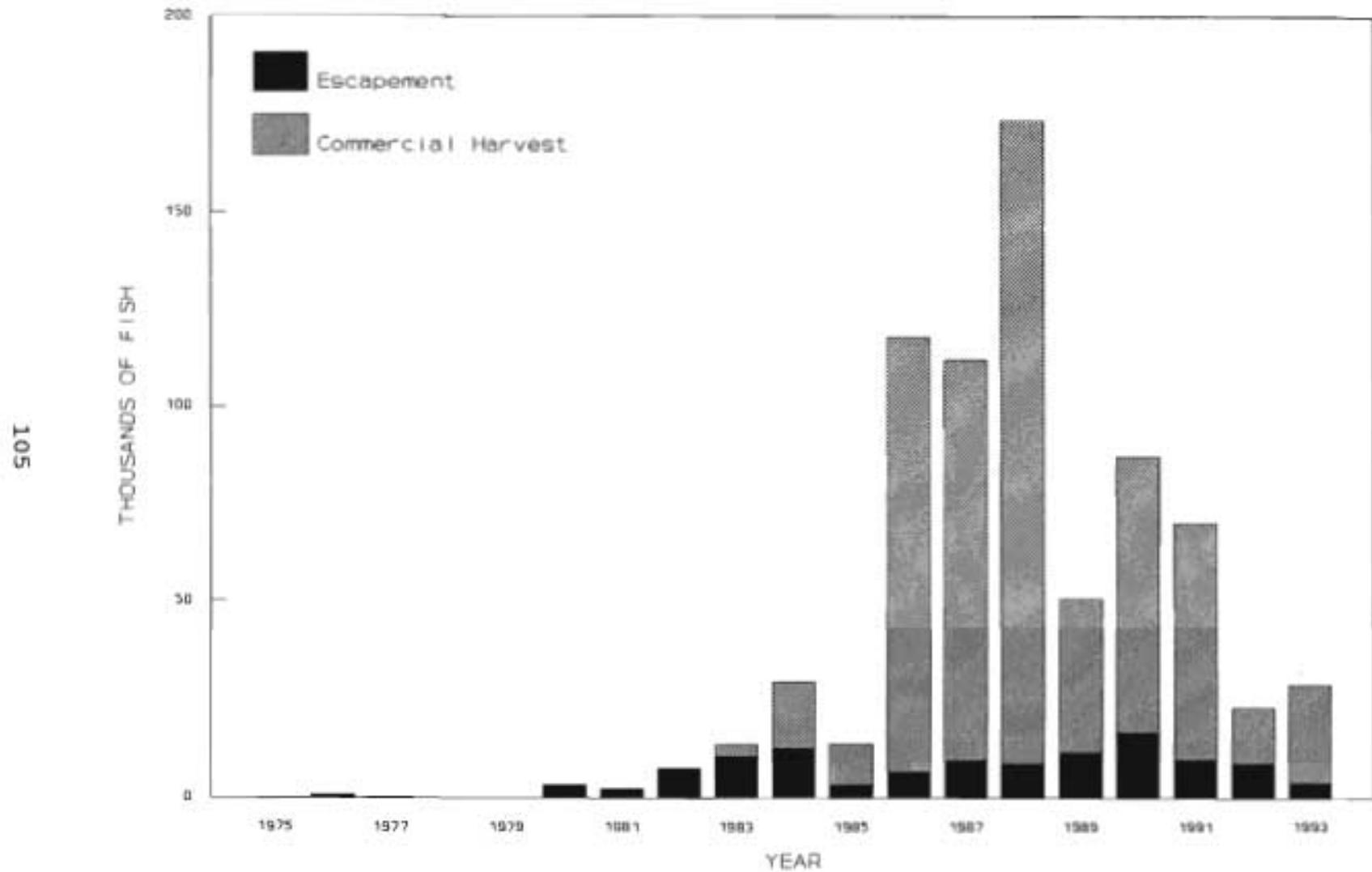


Figure 13. Sockeye salmon returns to Chenik Lake in the Kamishak Bay District of Lower Cook Inlet, 1975 - 1993.

# LOWER COOK INLET COMMERCIAL SALMON CATCH

1973 - 1993 Pink

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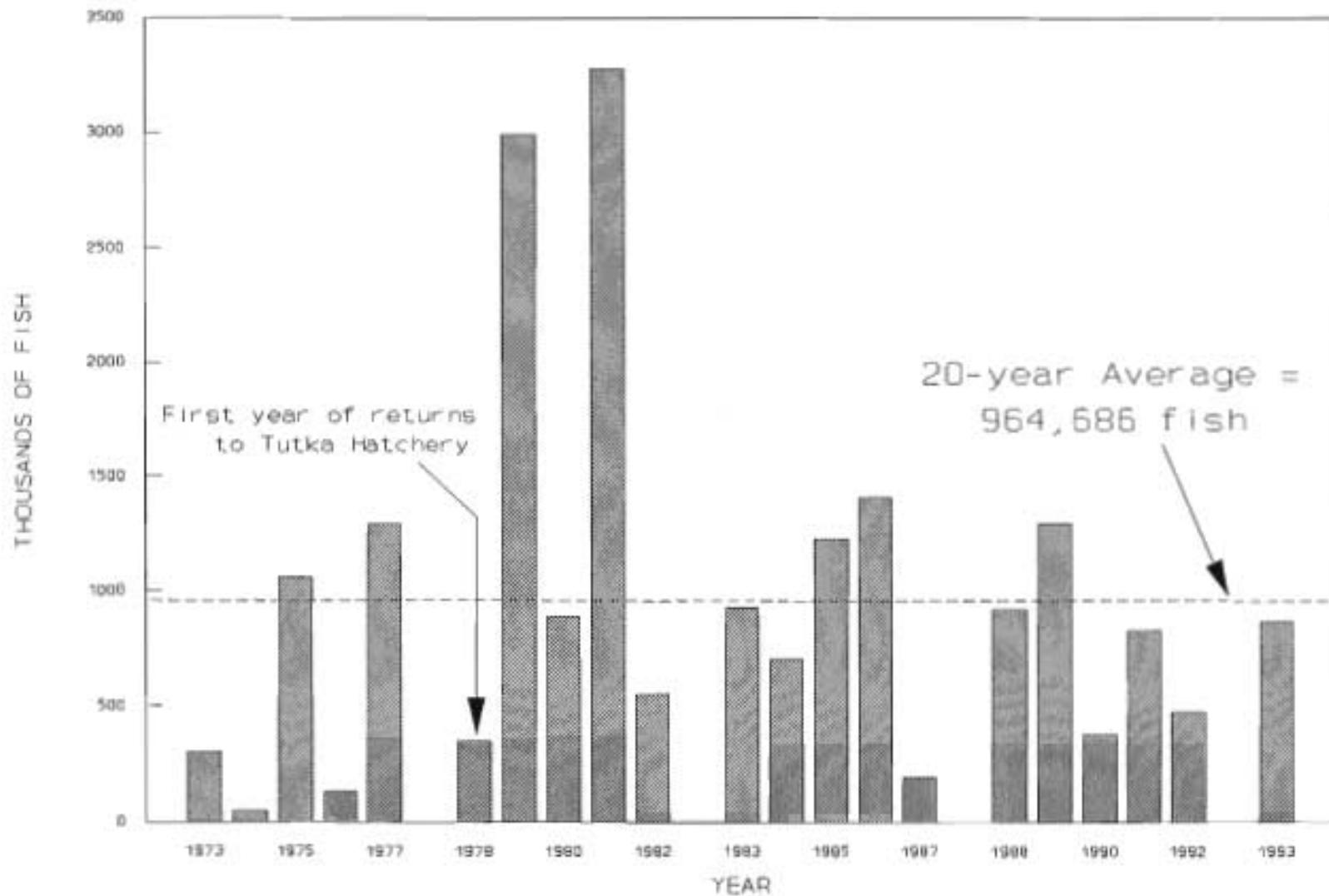


Figure 14. Commercial pink salmon catch, Lower Cook Inlet, 1973 - 1993.

# LOWER COOK INLET COMMERCIAL SALMON CATCH

1973 - 1993 Chum

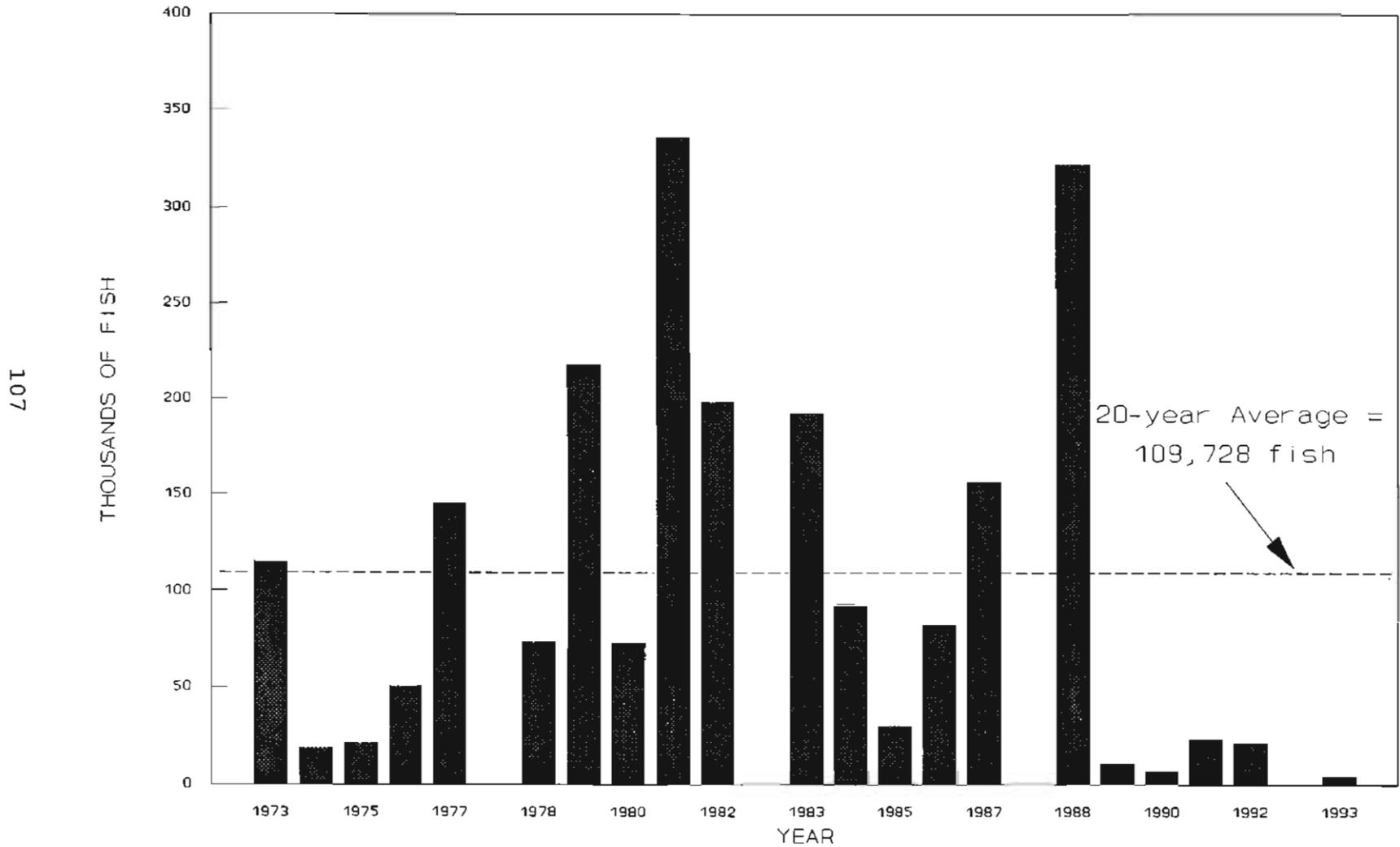


Figure 15. Commercial chum salmon catch, Lower Cook Inlet, 1973 - 1993.

# KAMISHAK BAY DISTRICT HERRING BIOMASS

TOTAL RETURNS 1978-93 and 1994 FORECAST

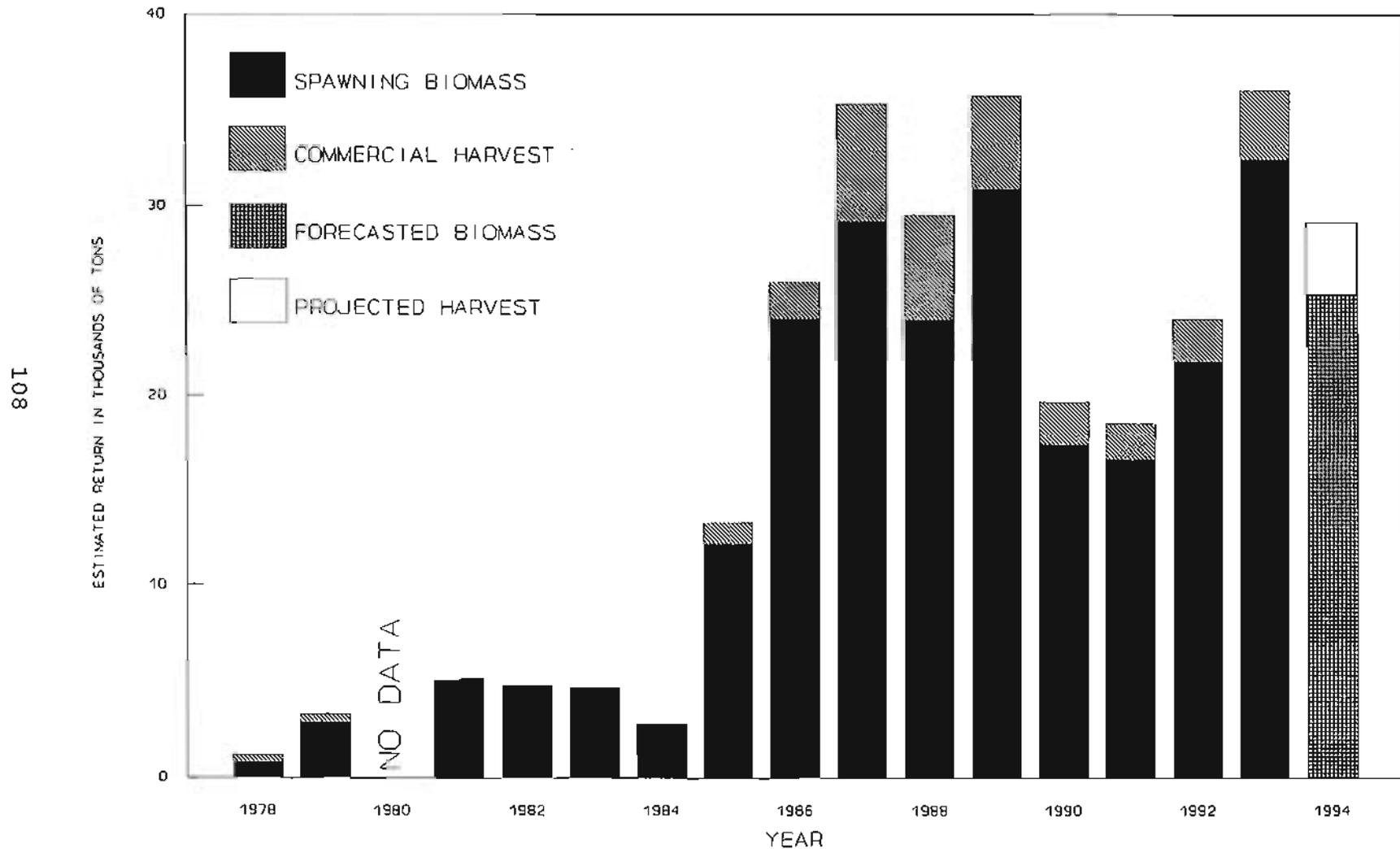


Figure 16. Biomass estimates and commercial harvests of Pacific herring in the sac roe seine fishery, Kamishak Bay District, Lower Cook Inlet, 1978 - 1993, and 1994 projection.

LCI - Kamishak District Herring Age Composition  
1993 Commercial Catch

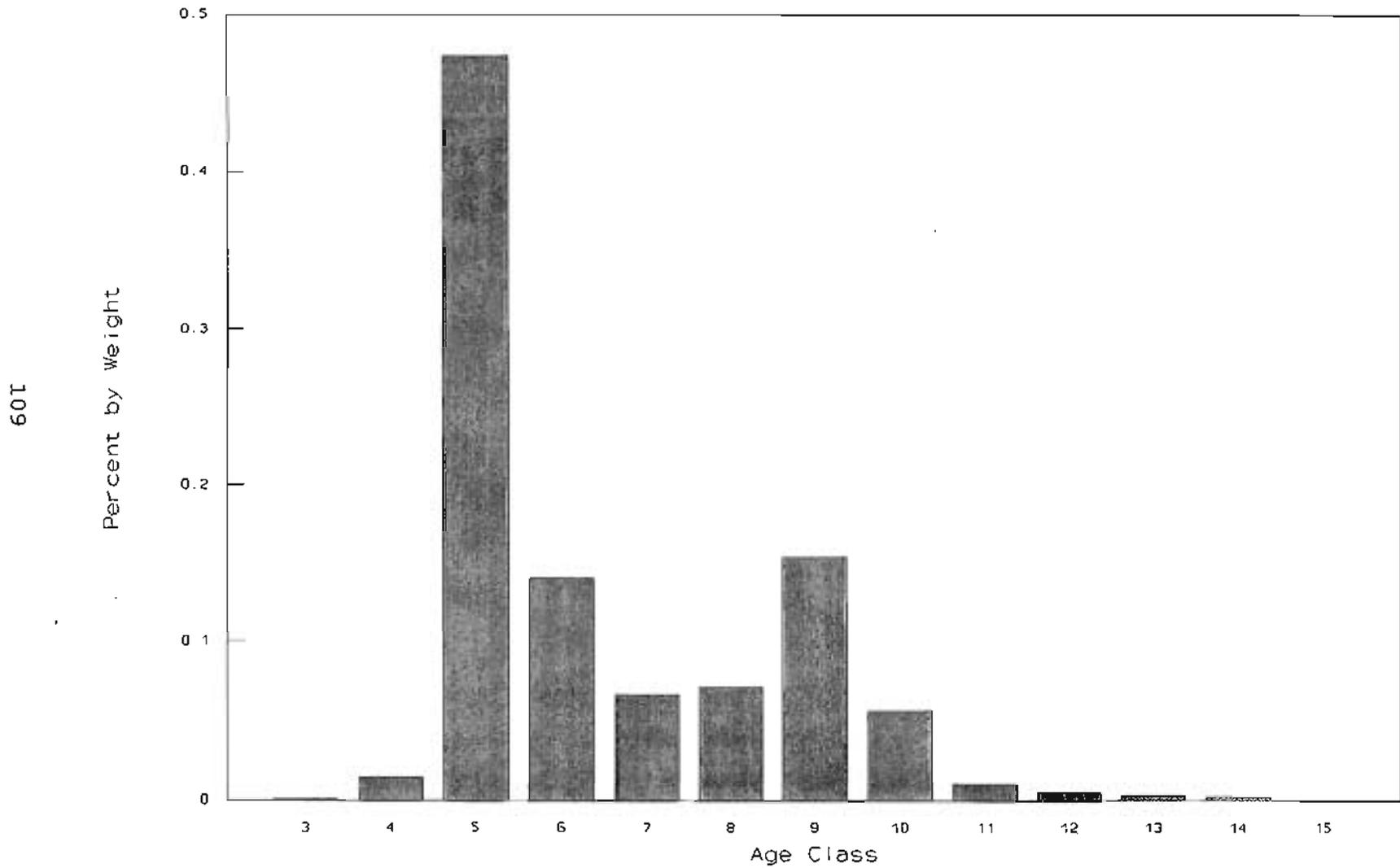


Figure 17. Weighted age class composition of the Pacific herring commercial sac roe harvest, Kamishak Bay District, Lower Cook Inlet, 1993.

Appendix Table 1. Salmon fishing permits issued and fished, by gear type, Lower Cook Inlet, 1975 - 1993<sup>a</sup>.

Year	Purse Seines				
	Permanent Permit	Interim Permit	Total Issued	Actively Fished	Set Nets Fished
1975	49	51	100	63	27
1976	63	16	79	53	25
1977	72	10	82	72	26
1978	74	9	83	72	39
1979	75	9	84	75	38
1980	75	9	84	83	40
1981	75	10	85	85	40
1982	77	7	84	69	39
1983	78	5	83	83	24
1984	78	3	81	54	35
1985	80	1	81	51	34
1986	79	0	79	62	34
1987	79	0	79	66	29
1988	79	0	79	71	27
1989	83	0	83	64	23
1990	82	1	83	71	20
1991	82	1	83	68	20
1992	82	1	83	63	21
1993	82	1	83	51	17
1975-92 Average	76	7	83	68	30

<sup>a</sup> Data source: Commercial Fisheries Entry Commission and final IBM computer runs.

Appendix Table 2. Exvessel value of the commercial salmon harvest in thousands of dollars by species, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1973	3	113	5	310	251	682
1974	5	283	30	100	77	495
1975	3	106	27	1,456	71	1,663
1976	7	287	13	207	217	731
1977	7	620	9	1,719	604	2,959
1978	62	1,516	52	370	341	2,341
1979	36	621	68	4,495	1,097	6,317
1980	12	336	64	1,196	298	1,906
1981	18	740	69	5,334	1,346	7,507
1982	28	827	367	406	820	2,448
1983	20	704	57	696	513	1,990
1984	23	1,393	120	635	242	2,413
1985	47	1,637	86	974	78	2,822
1986	21	1,414	132	1,245	201	3,013
1987	27	1,951	118	295	598	2,989
1988	32	3,812	127	2,237	2,548	8,756
1989	33	1,213	59	1,660	39	3,004
1990	29	1,287	28	306	31	1,681
1991	19	1,115	36	275	48	1,495 <sup>b</sup>
1992	30	1,151	20	213	52	1,466 <sup>b</sup>
1993	27	802	41	287	7	1,164 <sup>b</sup>
1973-92 Average	23	1,056	74	1,206	474	2,833

<sup>a</sup> Values obtained by using the formula: (average price per lb.) x (average weight of fish) x (catch) = Exvessel value; average prices are determined only from fish ticket information and do not reflect any retroactive or postseason adjustments.

<sup>b</sup> Includes hatchery cost recovery.

Appendix Table 3. Average salmon price in dollars per pound by species, Lower Cook Inlet, 1973 - 1993.<sup>a</sup>

Year	Chinook	Sockeye	Coho	Pink	Chum
1973	0.93	0.48	0.39	0.27	0.29
1974	0.76	1.54	0.72	0.48	0.56
1975	0.61	0.61	0.49	0.37	0.43
1976	0.91	0.77	0.59	0.37	0.48
1977	1.07	0.86	0.55	0.35	0.45
1978	1.09	1.31	0.97	0.30	0.54
1979	1.54	1.53	0.89	0.43	0.60
1980	1.30	0.88	0.85	0.42	0.52
1981	1.35	1.10	0.75	0.44	0.49
1982	1.29	1.05	0.87	0.23	0.46
1983	1.00	0.75	0.70	0.25	0.29
1984	1.29	1.05	0.77	0.26	0.28
1985	1.60	1.25	0.85	0.22	0.31
1986	1.25	1.40	0.85	0.26	0.30
1987	1.25	1.60	1.00	0.42	0.46
1988	1.25	2.50	1.80	0.80	0.84
1989	1.25	1.60	0.70	0.40	0.40
1990	1.35	1.55	0.60	0.30	0.50
1991	1.12	0.83	0.29	0.13	0.27
1992	1.29	1.47	0.43	0.14	0.27
1993	1.02	0.80	0.54	0.12	0.28
20-Year Average	1.18	1.21	0.75	0.34	0.44
1973-82 Average	1.09	1.01	0.71	0.37	0.48
1983-92 Average	1.27	1.40	0.80	0.32	0.39

<sup>a</sup> Average prices are determined only from fish ticket information and do not reflect any retroactive or postseason adjustments.

Appendix Table 4. Salmon average weight in pounds per fish by species in the commercial fishery, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum
1973	22.3	8.1	6.1	3.7	7.4
1974	36.1	6.7	6.4	4.1	7.2
1975	33.2	6.2	8.8	3.7	7.6
1976	16.1	6.4	7.0	4.1	8.9
1977	30.1	7.2	5.9	3.8	9.2
1978	32.3	7.4	8.2	3.5	8.6
1979	18.9	6.3	6.2	3.5	8.2
1980	21.7	5.5	5.2	3.2	7.8
1981	12.5	6.1	8.5	3.7	8.1
1982	20.6	6.0	9.0	3.2	9.0
1983	22.8	5.0	7.2	3.0	9.2
1984	28.8	4.7	8.8	3.5	8.9
1985	28.0	4.7	9.8	3.5	8.2
1986	20.6	4.3	8.6	3.4	8.1
1987	18.1	4.9	8.2	3.5	8.3
1988	15.3	4.8	8.9	3.0	9.4
1989	14.1	4.6	7.0	3.1	8.6
1990	13.8	4.1	7.1	2.8	8.9
1991	12.3	4.2	6.6	2.6	7.5
1992	12.3	4.4	7.7	3.2	8.8
1993	12.0	4.3	6.0	2.7	6.1
1973-92 Average	21.5	5.6	7.6	3.4	8.4

<sup>a</sup> Values obtained from commercial fish catch & production statistical leaflets (1971-74); remaining years from IBM computer runs.

Appendix Table 5. Commercial salmon catch in numbers of fish by species, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1973	145	29,136	2,101	307,403	115,513	454,298
1974	183	27,428	6,514	50,601	19,210	103,936
1975	142	28,142	6,211	1,063,338	21,646	1,119,479
1976	450	58,159	3,216	136,445	50,822	249,092
1977	217	101,597	1,798	1,293,932	145,789	1,543,333
1978	1,747	156,404	6,529	352,561	73,518	590,759
1979	1,238	64,417	12,393	2,990,929	218,490	3,287,467
1980	424	69,442	14,505	889,703	73,492	1,047,566
1981	1,086	110,255	10,776	3,279,183	336,093	3,737,393
1982	1,066	131,320	46,892	551,589	198,185	929,052
1983	873	187,645	11,219	927,607	192,319	1,319,663
1984	714	268,950	16,797	700,622	92,540	1,079,623
1985	1,043	278,694	10,327	1,229,708	30,640	1,550,412
1986	796	234,861	18,852	1,408,293	82,688	1,745,490
1987	1,179	248,848	14,354	201,429	157,018	622,828
1988	1,694	319,008	7,946	921,296	321,911	1,571,855
1989	1,893	163,271	12,089	1,296,926	11,305	1,485,484
1990	1,560	203,895	9,297	383,670	6,951	605,373
1991	1,419	317,947	19,047	828,709	24,232	1,191,354
1992	1,891	176,644	5,902	479,768	22,203	686,408
1993	2,168	233,834	13,477	866,774	4,367	1,120,620
20-Year Avg.	988	158,803	11,838	964,686	109,728	1,246,043
1973-82 Avg.	670	77,630	11,094	1,091,568	125,276	1,306,238
1983-92 Avg.	1,306	239,976	12,583	837,803	94,181	1,185,849
'93 % of Ttl.	0.19	20.87	1.20	77.35	0.39	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 6. Commercial salmon catch in numbers of fish by species in the Southern District, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1973	139	24,072	1,241	97,574	3,588	126,614
1974	182	27,029	3,054	48,875	2,752	81,865
1975	142	27,393	3,039	893,615	5,428	929,617
1976	442	35,280	1,905	99,817	1,517	138,961
1977	182	54,663	1,255	157,025	6,734	219,859
1978	1,511	141,088	4,318	251,761	5,525	404,203
1979	1,199	37,342	10,846	986,909	8,221	1,044,517
1980	414	42,929	11,568	478,019	4,605	537,535
1981	1,024	77,880	7,976	1,453,982	20,920	1,561,782
1982	926	43,433	7,165	296,556	18,466	366,546
1983	858	133,671	3,433	690,254	14,281	842,497
1984	661	160,654	3,193	336,595	8,065	509,168
1985	1,007	84,149	4,258	518,889	5,513	613,816
1986	776	36,838	3,095	542,521	5,560	588,790
1987	1,158	89,662	2,163	90,522	5,030	188,535
1988	1,655	105,302	2,987	852,382	7,742	970,068
1989	1,889	98,052	6,667	987,488	3,141	1,097,237
1990	1,546	82,412	1,552	178,087	2,433	266,030
1991	1,399	170,224	9,415	253,962	1,962	436,962
1992	1,852	106,793	1,277	417,021	1,885	528,828
1993	2,162	159,747	4,431	692,794	2,788	861,922
20-Year Avg.	948	78,943	4,520	481,593	6,667	572,672
1973-82 Avg.	616	51,111	5,237	476,413	7,773	541,150
1983-92 Avg.	1,280	106,776	3,804	486,772	5,561	604,193
'93 % of Ttl.	0.25	18.53	0.51	80.38	0.32	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 7. Commercial salmon set gillnet catch in numbers of fish by species in the Southern District, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1973	134	23,970	1,089	20,222	2,374	47,789
1974	175	26,996	3,010	11,097	2,713	43,991
1975	96	26,588	2,337	49,490	4,020	82,531
1976	176	33,993	1,321	13,412	1,353	50,255
1977	175	54,404	869	38,064	2,765	96,277
1978	1,052	86,934	3,053	11,556	4,117	106,712
1979	483	34,367	7,595	69,368	5,266	117,079
1980	225	29,922	8,038	26,613	2,576	67,374
1981	222	53,665	6,735	68,794	8,524	137,940
1982	894	42,389	5,557	15,838	7,113	71,791
1983	822	41,707	1,799	20,533	4,377	69,238
1984	639	40,987	2,862	17,836	5,008	67,332
1985	958	23,188	3,908	22,898	4,221	55,173
1986	745	21,807	2,827	14,244	2,426	42,049
1987	653	28,209	2,025	9,224	2,419	42,530
1988	1,145	14,758	2,819	29,268	4,423	52,413
1989	1,281	13,970	4,792	16,210	1,877	38,130
1990	1,361	15,863	1,046	12,646	1,938	32,854
1991	842	20,525	5,011	3,954	1,577	31,909
1992	1,288	17,002	848	15,958	1,687	36,783
1993	1,089	14,791	3,088	12,008	2,591	33,567
20-Year Avg.	668	32,562	3,377	24,361	3,539	64,508
1973-82 Avg.	363	41,323	3,960	32,445	4,082	82,174
1983-92 Avg.	973	23,802	2,794	16,277	2,995	46,841
'93 % of Ttl.	3.24	44.06	9.20	35.77	7.72	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 8. Commercial salmon catch in numbers of fish by species in the Outer District, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1973	1	2,006	31	195,342	76,286	273,666
1974	1	206	21	1,300	11,924	13,452
1975	0	124	7	159,908	11,348	171,387
1976	7	18,886	0	93	412	19,398
1977	34	33,733	78	1,129,250	70,167	1,233,262
1978	236	10,695	45	70,080	19,224	100,280
1979	30	25,297	135	1,945,536	180,558	2,151,556
1980	10	22,514	16	154,041	32,246	208,827
1981	61	18,133	485	1,714,115	238,393	1,971,187
1982	129	66,781	92	67,523	631,075	197,600
1983	14	16,835	54	199,794	27,203	243,900
1984	3	29,276	41	89,085	3,204	121,609
1985	19	91,957	3,210	618,222	11,844	725,252
1986	6	48,472	5,052	401,755	11,701	466,986
1987	14	31,845	2,481	23,890	28,663	86,893
1988	5	9,501	2	6,094	71,202	86,804
1989	1	10,286	72	52,677	43	63,079
1990	2	17,404	74	191,320	614	209,414
1991	2	6,408	12	359,664	14,337	380,423
1992	0	572	1	146	181	900
1993	2	4,613	119	159,159	970	164,863
20-Year Avg.	29	23,047	595	368,992	43,631	436,294
1973-82 Avg.	51	19,838	91	543,719	70,363	634,062
1983-92 Avg.	7	26,256	1,100	194,265	16,899	238,526
'93 % of Ttl.	0.00	2.80	0.07	96.54	0.59	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 9. Commercial salmon catch in numbers of fish by species in the Eastern District, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1973	5	3,057	801	1,919	55	5,837
1974	0	193	524	378	7	1,102
1975	0	596	124	383	2	1,105
1976	0	5	200	35,423	45	35,673
1977	0	5,776	360	1,349	3,229	10,714
1978	0	2	582	29,738	100	30,422
1979	0	0	296	0	0	296
1980	0	122	426	155,799	720	157,047
1981	0	9,270	470	44,989	3,279	58,088
1982	0	3,092	950	143,639	7,698	155,379
1983	0	25,932	594	36,154	7,934	70,614
1984	47	54,420	536	136,797	10,535	202,335
1985	11	24,338	835	92,403	5,144	122,731
1986	0	3,055	770	40,243	3,757	47,825
1987	0	3,687	1,631	14,333	14,913	34,564
1988	1	20,253	486	1,740	24,668	47,148
1989	0	8,538	5,346	92	312	14,288
1990	0	7,682	7,645 <sup>b</sup>	11,815	307	27,449
1991	1	4,703	7,283 <sup>b</sup>	167,250	80	179,317
1992	0	432	3,136 <sup>b</sup>	60,007	86	63,661
1993	0	1,824	8,924 <sup>b</sup>	10,616	9	21,373
20-Year Avg.	3	8,758	1,650	48,722	4,144	63,276
1973-82 Avg.	1	2,211	473	41,360	1,514	45,558
1983-92 Avg.	6	15,304	2,826	56,083	6,774	80,993
'93 % of Ttl.	0.00	8.53	41.75	49.67	0.04	100.00

<sup>a</sup> Data source: Final IBM computer runs.

<sup>b</sup> Includes commercial seine catches, Seward Silver Salmon Derby entries, and fish taken for hatchery cost recovery purposes.

Appendix Table 10. Commercial salmon catch in numbers of fish by species in the Kamishak Bay District, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1973	0	1	28	12,568	35,584	48,818
1974	0	0	2,915	48	4,554	7,517
1975	0	29	3,041	9,432	4,868	17,370
1976	1	3,988	1,111	1,112	48,848	55,060
1977	1	7,425	105	6,308	65,659	79,498
1978	0	4,619	1,584	982	48,669	55,854
1979	9	1,778	1,116	58,484	29,711	91,098
1980	0	3,877	2,495	101,864	35,921	144,157
1981	1	4,972	1,845	66,097	73,501	146,416
1982	11	18,014	38,685	43,871	108,946	209,527
1983	1	11,207	7,138	1,405	142,901	162,652
1984	3	24,600	13,027	138,145	70,736	246,511
1985	6	78,250	2,024	194	8,139	88,613
1986	14	146,496	9,935	423,774	61,670	641,889
1987	7	123,654	8,079	72,684	108,412	312,836
1988	33	183,952	4,471	61,080	218,299	467,835
1989	3	46,395	4	256,669	7,809	310,880
1990	12	96,397	26	2,448	3,597	102,480
1991	17	136,612	2,337	47,833	7,853	194,652
1992	39	68,847	1,488	2,594	20,051	93,019
1993	4	67,650	3	4,205	600	72,462
20-Year Avg.	8	48,056	5,073	65,380	55,286	173,802
1973-82 Avg.	2	4,470	5,293	30,077	45,626	85,468
1983-92 Avg.	14	91,641	4,853	100,683	64,947	262,137
'93 % of Ttl.	0.01	93.36	0.00	5.80	0.83	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 11. Total commercial salmon catch in numbers of fish by district, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Southern	Outer	Kamishak	Eastern	Total
1973	126,614	273,666	48,818	5,837	454,298
1974	81,865	13,452	7,517	1,102	103,936
1975	929,617	171,387	17,370	1,105	1,119,479
1976	138,961	19,398	55,060	35,673	249,092
1977	219,859	1,233,262	79,498	10,714	1,543,333
1978	404,203	100,280	55,854	30,422	590,759
1979	1,044,517	2,151,556	91,098	296	3,287,467
1980	537,535	208,827	144,157	157,047	1,047,566
1981	1,561,782	1,971,187	146,416	58,088	3,737,393
1982	366,546	197,600	209,527	155,379	929,052
1983	842,497	243,900	162,652	70,614	1,319,663
1984	509,168	121,609	246,511	202,335	1,079,623
1985	613,816	725,252	88,613	122,731	1,550,412
1986	588,790	466,986	641,889	47,825	1,745,490
1987	188,535	86,893	312,836	34,564	622,828
1988	970,068	86,804	467,835	47,148	1,571,855
1989	1,097,237	63,079	310,880	14,288	1,485,484
1990	266,030	209,414	102,480	27,449	605,373
1991	436,962	380,423	194,652	179,317	1,191,354
1992	528,828	900	93,019	63,661	686,408
1993	861,922	164,863	72,462	21,373	1,120,620
20-Year Avg.	572,672	436,294	173,802	63,276	1,246,043
1973-82 Avg.	541,150	634,062	85,468	45,558	1,306,238
1983-92 Avg.	604,193	238,526	262,137	80,993	1,185,849
'93 % of Ttl.	76.91	14.71	6.47	1.91	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 12. Commercial chinook salmon catch in numbers of fish by district, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Southern	Outer	Kamishak	Eastern	Total
1973	139	1	0	5	145
1974	182	1	0	0	183
1975	142	0	0	0	142
1976	442	7	1	0	450
1977	182	34	1	0	217
1978	1,511	236	0	0	1,747
1979	1,199	30	9	0	1,238
1980	414	10	0	0	424
1981	1,024	61	1	0	1,086
1982	926	129	11	0	1,066
1983	858	14	1	0	873
1984	661	3	3	47	714
1985	1,007	19	6	11	1,043
1986	776	6	14	0	796
1987	1,158	14	7	0	1,179
1988	1,655	5	33	1	1,694
1989	1,889	1	3	0	1,893
1990	1,546	2	12	0	1,560
1991	1,399	2	17	1	1,419
1992	1,852	0	39	0	1,891
1993	2,162	2	4	0	2,168
20-Year Avg.	948	29	8	3	988
1973-82 Avg.	616	51	2	1	670
1983-92 Avg.	1,280	7	14	6	1,306
'93 % of Ttl.	99.72	0.09	0.18	0.00	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 13. Commercial sockeye salmon catch in numbers of fish by district, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Southern	Outer	Kamishak	Eastern	Total
1973	24,072	2,006	1	3,057	29,136
1974	27,029	206	0	193	27,428
1975	27,393	124	29	596	28,142
1976	35,280	18,886	3,988	5	58,159
1977	54,663	33,733	7,425	5,776	101,597
1978	141,088	10,695	4,619	2	156,404
1979	37,342	25,297	1,778	0	64,417
1980	42,929	22,514	3,877	122	69,442
1981	77,880	18,133	4,972	9,270	110,255
1982	43,433	66,781	18,014	3,092	131,320
1983	133,671	16,835	11,207	25,932	187,645
1984	160,654	29,276	24,600	54,420	268,950
1985	84,149	91,957	78,250	24,338	278,694
1986	36,838	48,472	146,496	3,055	234,861
1987	89,662	31,845	123,654	3,687	248,848
1988	105,302	9,501	183,952	20,253	319,008
1989	98,052	10,286	46,395	8,538	163,271
1990	82,412	17,404	96,397	7,682	203,895
1991	170,224	6,408	136,612	4,703	317,947
1992	106,793	572	68,847	432	176,644
1993	159,747	4,613	67,650	1,824	233,834
20-Year Avg.	78,943	23,047	48,056	8,758	158,803
1973-82 Avg.	51,111	19,838	4,470	2,211	77,630
1983-92 Avg.	106,776	26,256	91,641	15,304	239,976
'93 % of Ttl.	68.32	1.97	28.93	0.78	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 14. Commercial sockeye salmon catch in thousands of fish by subdistrict, Lower Cook Inlet, 1959 - 1993<sup>a</sup>.

Location	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Resurrection Bay	0	0.1	0	0	0	0	0	0	0	74.5	99.4	1.8	2.2
Aialik Bay	1.3	0.2	4.3	2.6	0.5	0	0	0	0	0	0	3.1	0
Nuka Bay	8.3	6.7	8.2	5.1	0.5	0	2.0	0	2.2	1.5	0	1.0	1.6
Port Dick	0	0	0	0	0	0	0	0	0	0	0	0	0
Halibut Cove & Lagoon	1.3	1.4	0.8	2.0	1.1	0.7	1.4	1.5	1.9	2.7	1.7	1.3	1.3
Tutka/Barabara	1.1	1.7	3.0	5.2	2.9	9.0	5.2	6.0	11.8	6.3	5.6	6.0	10.0
Seldovia Bay	0.4	1.2	1.2	1.7	1.2	2.1	0.9	1.0	2.2	1.9	1.1	1.2	1.5
Port Graham Bay	6.6	7.8	5.2	6.8	7.8	5.5	3.5	2.7	10.4	7.7	4.3	3.7	5.6
Kamishak/Douglas	0	0	0	0	0	0	0	0	0	0	0	0	0
McNeil (Mikfik)	0	0.7	0	0	0	1.9	0.2	0	0	0	8.9	2.8	0
Paint River	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenik Lake	0	0	0	0	0	0	0	0	0.2	0	1.9	0	0
Bruin (Kirschner)	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	2.6	4.9	0.1	1.9	1.1	1.5	0.8	4.1	0.3	0.6	0.1	0	0
<b>Totals</b>	<b>21.6</b>	<b>24.7</b>	<b>22.8</b>	<b>25.3</b>	<b>15.1</b>	<b>20.7</b>	<b>14.0</b>	<b>15.3</b>	<b>29.0</b>	<b>95.2</b>	<b>122.8</b>	<b>20.9</b>	<b>22.2</b>
Location	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Resurrection Bay	0.1	0	0	0	0	0	0	0	0	0.6	0	0	3.4
Aialik Bay	0.3	3.1	0.2	0.6	0	5.8	0	0	0.1	8.7	3.0	25.9	50.8
Nuka Bay	26.1	1.1	0.1	0	18.9	31.1	10.6	24.4	21.5	17.2	66.3	16.8	29.2
Port Dick	0	0	0	0	0	0	0	0	0	0	0	0	0
Halibut Cove & Lagoon	3.7	2.1	3.0	3.4	5.1	3.6	12.9	5.3	11.5	11.2	1.2	77.7	116.6
Tutka/Barabara	14.8	8.1	10.8	12.6	14.2	21.3	92.1	15.6	13.2	41.0	15.8	35.9	26.7
Seldovia Bay	2.3	2.2	2.3	2.1	2.1	3.0	5.6	2.6	1.6	5.3	5.0	6.7	4.9
Port Graham Bay	10.5	11.7	10.9	9.2	13.6	16.6	30.5	12.9	16.5	20.3	21.5	13.4	12.5
Kamishak/Douglas	0	0	0	0	0.2	5.3	4.6	0.5	0	4.9	0	2.8	0
McNeil (Mikfik)	0	0	0	0	3.8	2.1	0	1.2	3.9	0	17.8	5.8	10.7
Paint River	0	0	0	0	0	0	0	0	0	0	0	0	0
Chenik Lake	0	0	0	0	0	0	0	0	0	0	0.3	2.7	13.9
Bruin (Kirschner)	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0.1	0.8	0.1	0.2	0.3	2.8	0.1	1.9	1.1	1.1	0.4	0	0.3
<b>Totals</b>	<b>57.9</b>	<b>29.1</b>	<b>27.4</b>	<b>28.1</b>	<b>58.2</b>	<b>101.6</b>	<b>156.4</b>	<b>64.4</b>	<b>69.4</b>	<b>110.3</b>	<b>131.3</b>	<b>187.6</b>	<b>269.0</b>
Location	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Resurrection Bay	0.3	0	0.2	0	0	0	0	0	1.7				
Aialik Bay	24.1	3.0	3.5	20.2	8.5	7.7	4.7	0.4	0.2				
Nuka Bay	91.8	48.4	31.8	9.5	10.3	5.7	1.8	0	3.5				
Port Dick	0	0	0	0	0	11.7	4.6	0.6	1.0				
Halibut Cove & Lagoon	63.2	15.2	69.1	24.9	46.6	20.3	36.0	14.7	19.0				
China Poot <sup>b</sup>				63.6	35.8	49.9	116.7	76.0	127.6				
Tutka/Barabara	14.9	16.3	14.7	12.9	13.4	7.9	13.4	12.9	8.4				
Seldovia Bay	2.6	3.2	3.5	2.5	1.8	4.3	4.0	3.3	4.4				
Port Graham Bay	3.5	2.0	2.4	1.4	0	0	0	0	0				
Kamishak/Douglas	0.7	7.6	2.3	5.0	0	0.1	7.0	9.9	1.3				
McNeil (Mikfik)	67.0	27.5	21.4	14.6	7.0	9.1	12.9	4.0	0.9				
Paint River	0	0	0	0	0	0	0.4	0	0				
Chenik Lake	10.6	111.3	98.5	164.2	38.9	70.3	60.4	14.4	24.6				
Bruin (Kirschner)	0	0	0	0	0.2	14.5	55.9	40.5	39.7				
Miscellaneous	0	0.4	1.6	0.2	0.8	2.4	0.1	0	1.5				
<b>Totals</b>	<b>278.7</b>	<b>234.9</b>	<b>248.8</b>	<b>319.0</b>	<b>163.3</b>	<b>203.9</b>	<b>317.9</b>	<b>176.6</b>	<b>233.8</b>				

<sup>a</sup> Data source: final IBM computer runs.

<sup>b</sup> China Poot was part of Halibut Cove Subdistrict prior to 1988; includes China Poot, Peterson, and Neptune Bays.

Appendix Table 15. Harvest of sockeye salmon returns to China Poot Bay in the Southern District of Lower Cook Inlet, by user group, 1979 - 1993.

Return Year	Sport Harvest	Personal Use Harvest	Commercial Harvest	Total Return <sup>a</sup>
1979	650	0	<sup>b</sup>	650
1980	1,000	1,000	12,000	14,000
1981	1,500	0	10,000	11,500
1982	450	1,320	200	3,400
1983	480	5,910	84,020	90,420
1984	500	2,000	114,360	117,360
1985	500	3,000	61,500	65,920
1986	100	150	18,350	18,800
1987	200	2,000	21,500	23,700
1988	500	1,500	91,469	93,939
1989	1,000	7,000	79,714	87,714
1990	500	3,000	49,587 <sup>c</sup>	53,087
1991	1,000	4,000	117,000 <sup>c,d</sup>	122,000 <sup>d</sup>
1992	300	3,500	89,791 <sup>c,d</sup>	93,951 <sup>d</sup>
1993	400	4,000	144,677 <sup>c,d</sup>	149,077 <sup>d</sup>
1979-92 Average	620	2,456	53,535	56,863

<sup>a</sup> Total return includes estimated escapements (i.e. non-harvested fish).

<sup>b</sup> No data.

<sup>c</sup> Portions of the commercial sockeye harvest in China Poot Bay, Halibut Cove, and Tutka Bay Subdistricts were attributed to the Leisure and/or Hazel Lakes returns.

<sup>d</sup> Includes returns to both Leisure and Hazel Lakes.

Appendix Table 16. Commercial catch and escapement of sockeye salmon at Chenik Lake in the Kamishak Bay District of Lower Cook Inlet, 1975 - 1993.

Return Year	Escapement <sup>a</sup>	Harvest	Total Return
1975	100	b	100
1976	900	b	900
1977	200	b	200
1978	100	b	100
1979	c	b	b
1980	3,500	b	3,500
1981	2,500	b	2,500
1982	8,000	b	8,000
1983	11,000	2,800	13,800
1984	13,000	16,500	29,500
1985	3,500	10,500	14,000
1986	7,000	111,000	118,000
1987	10,000	102,000	112,000
1988	9,000	164,200	173,200
1989	12,000 <sup>d</sup>	38,905	50,905
1990	17,000	70,347	87,347
1991	10,189 <sup>d</sup>	60,397	70,586
1992	9,269 <sup>d</sup>	14,378	23,647
1993	4,000 <sup>d</sup>	24,567	28,567

<sup>a</sup> Estimated from aerial surveys unless otherwise noted.

<sup>b</sup> Closed to fishing.

<sup>c</sup> No data.

<sup>d</sup> Weir counts.

Appendix Table 17. Commercial coho salmon catch in numbers of fish by district, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Southern	Outer	Kamishak	Eastern	Total
1973	1,241	31	28	801	2,101
1974	3,054	21	2,915	524	6,514
1975	3,039	7	3,041	124	6,211
1976	1,905	0	1,111	200	3,216
1977	1,255	78	105	360	1,798
1978	4,318	45	1,584	582	6,529
1979	10,846	135	1,116	296	12,393
1980	11,568	16	2,495	426	14,505
1981	7,976	485	1,845	470	10,776
1982	7,165	92	38,685	950	46,892
1983	3,433	54	7,138	594	11,219
1984	3,193	41	13,027	536	16,797
1985	4,258	3,210	2,024	835	10,327
1986	3,095	5,052	9,935	770	18,852
1987	2,163	2,481	8,079	1,631	14,354
1988	2,987	2	4,471	486	7,946
1989	6,667	72	4	5,346	12,089
1990	1,552	74	26	7,645 <sup>b</sup>	9,297
1991	9,415	12	2,337	7,283 <sup>b</sup>	19,047
1992	1,277	1	1,488	3,136 <sup>b</sup>	5,902
1993	4,431	119	3	8,924 <sup>b</sup>	13,477
20-Year Avg.	4,520	595	5,073	1,650	11,838
1973-82 Avg.	5,237	91	5,293	473	11,094
1983-92 Avg.	3,804	1,100	4,853	2,826	12,583
'93 % of Ttl.	32.88	0.88	0.02	66.21	100.00

<sup>a</sup> Data source: Final IBM computer runs.

<sup>b</sup> Includes commercial seine catches, Seward Silver Salmon Derby entries, and fish taken for hatchery cost recovery purposes.

Appendix Table 18. Commercial pink salmon catch in numbers of fish by district, Lower Cook Inlet, 1973-1993<sup>a</sup>.

Year	Southern	Outer	Kamishak	Eastern	Total
1973	97,574	195,342	12,568	1,919	307,403
1974	48,875	1,300	48	378	50,601
1975	893,615	159,908	9,432	383	1,063,338
1976	99,817	93	1,112	35,423	136,445
1977	157,025	1,129,250	6,308	1,349	1,293,932
1978	251,761	70,080	982	29,738	352,561
1979	986,909	1,945,536	58,484	0	2,990,929
1980	478,019	154,041	101,864	155,799	889,703
1981	1,453,982	1,714,115	66,097	44,989	3,279,183
1982	296,556	67,523	43,871	143,639	551,589
1983	690,254	199,794	1,405	36,154	927,607
1984	336,595	89,085	138,145	136,797	700,622
1985	518,889	618,222	194	92,403	1,229,708
1986	542,521	401,755	423,774	40,243	1,408,293
1987	90,522	23,890	72,684	14,333	201,429
1988	852,382	6,094	61,080	1,740	921,296
1989	987,488	52,677	256,669	92	1,296,926
1990	178,087	191,320	2,448	11,815	383,670
1991	253,962	359,664	47,833	167,250	828,709
1992	417,021	146	2,594	60,007	479,768
1993	692,794	159,159	4,205	10,616	866,774
20-Year Avg.	481,593	368,992	65,380	48,722	964,686
1973-82 Avg.	476,413	543,719	30,077	41,360	1,091,568
1983-92 Avg.	486,772	194,265	100,683	56,083	837,803
'93 % of Ttl.	79.93	18.36	0.49	1.22	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 19. Commercial pink salmon catch in thousands of fish by subdistrict during odd-numbered years, Lower Cook Inlet, 1959 - 1993<sup>a</sup>.

Location	1959	1961	1963	1965	1967	1969	1971	1973	1975	1977
Humpy Creek	13.2	34.5	20.6	6.7	6.9	0.6	0	37.3	242.1	26.4
Halibut Cove and Lagoon		33.4	36.9	7.1	33.4	0	11.4	7.2	97.2	16.3
Tutka/Barabara	14.4	106.8	37.7	44.6	31.6	32.9	3.9	20.0	89.2	21.9
Seldovia Bay	4.9	15.1	1.6	19.2	11.7	28.8	27.4	19.4	429.6	47.6
Pt. Graham Bay	5.3	1.0	2.7	12.4	5.1	2.0	1.0	13.9	18.3	44.8
Dogfish Bay	1.6	0	0	0.1	2.3	0	10.4	0.3	0	5.0
Port Chatham	1.2	0	0.8	0	0	0	26.3	20.6	16.0	1.4
Windy Bay	3.1	2.2	0	5.4	0	0	57.3	68.5	18.1	173.2
Rocky Bay	2.3	0	1.4	0.1	0	0	0.1	0.2	0	11.6
Port Dick Bay	28.2	92.9	19.0	15.3	259.9	51.5	94.6	96.6	90.3	881.7
Nuka Bay	33.3	2.0	0.3	0	0.1	0	119.7	8.1	35.4	56.3
Resurrection Bay	8.4	0	0	0	1.2	0	0	0	0	0
Bruin Bay	0	0	12.3	0.9	2.1	0	11.7	0	0	6.2
Rocky/Ursus Coves	3.7	2.7	44.2	0	13.0	52.8	16.4	7.9	0	0
Iniskin and Cottonwood Bays	1.5	3.3	21.8	0	0.1	26.0	0	4.7	0	0.1
Miscellaneous	3.6	9.5	4.3	3.8	8.1	7.8	12.7	2.7	27.1	1.4
<b>Total</b>	<b>124.7</b>	<b>303.4</b>	<b>203.6</b>	<b>115.6</b>	<b>375.5</b>	<b>202.4</b>	<b>392.9</b>	<b>307.4</b>	<b>1,063.3</b>	<b>1,293.9</b>

Location	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997
Humpy Creek	277.0	239.9	8.1	5.6	0	91.4	0	0.2		
Halibut Cove and Lagoon	27.1	11.1	18.8	5.9	30.5	254.4	91.1	100.2		
China Poot <sup>b</sup>						8.5	135.7	50.6		
Tutka/Barabara	416.8	1,026.6	616.0	491.2	56.5	632.1	117.6	539.4		
Seldovia Bay	140.8	126.4	43.3	3.8	1.2	1.1	0.3	2.4		
Pt. Graham Bay	124.7	45.9	4.1	12.5	2.3	0	0	0		
Dogfish Bay	7.4	22.9	0.2	0	0	0	0	0		
Port Chatham	174.4	55.8	3.3	7.0	0	9.7	7.5	14.7		
Windy Bay	552.7	2.9	0	4.8	0	0	49.1	43.4		
Rocky Bay	122.2	16.5	1.3	0	0	0	0	0		
Port Dick Bay	964.8	1,140.9	140.0	455.6	3.0	0	289.7	26.6		
Nuka Bay	121.7	395.1	55.0	150.8	20.9	43.0	10.6	13.8		
Resurrection Bay	0	32.6	27.1	74.6	11.8	0	0	0.7		
Bruin Bay	40.3	51.9	0.3	0	1.2	202.8	45.1	0.1		
Rocky/Ursus Coves	14.4	14.1	0	0	69.4	53.8	0	0		
Iniskin and Cottonwood Bays	0.2	0	0.3	0	0.2	0	0	0		
Miscellaneous	6.4	16.6	9.8	17.9	4.4	0.1	82.0	74.7		
<b>Total</b>	<b>2,990.9</b>	<b>3,199.2</b>	<b>927.6</b>	<b>1,229.7</b>	<b>201.4</b>	<b>1,296.9</b>	<b>828.7</b>	<b>866.8</b>		

<sup>a</sup> Data source: final IBM computer runs.

<sup>b</sup> China Poot (including Neptune Bay) was part of Halibut Cove Subdistrict prior to 1988.

Appendix Table 20. Commercial pink salmon catch in thousands of fish by subdistrict during even-numbered years, Lower Cook Inlet, 1960 - 1992<sup>a</sup>.

Location	1960	1962	1964	1966	1968	1970	1972	1974	1976	1978
Humpy Creek	51.0	73.9	53.5	24.6	2.6	85.2	1.7	33.3	3.3	16.3
Halibut Cove and Lagoon	20.7	35.5	28.9	16.0	41.3	28.9	0.4	.2	69.8	27.8
Tutka/Barabara	87.6	279.5	100.9	53.5	26.9	43.9	5.2	5.5	18.0	167.9
Seldovia Bay	42.6	142.8	37.4	44.1	23.6	29.0	0.2	3.5	3.0	35.8
Pt. Graham Bay	7.1	18.1	38.4	5.1	23.0	19.6	1.1	4.5	3.9	4.0
Dogfish Bay	1.8	1.4	0.1	7.1	0	9.8	0.3	0	0	0.3
Port Chatham	15.7	102.2	67.1	6.7	10.0	1.9	0	0	0	0
Windy Bay	29.2	85.5	68.6	20.1	3.4	0.8	0	0	0	0
Rocky Bay	17.0	225.9	53.2	0	10.8	36.8	0	0	0	0
Port Dick Bay	257.4	1,118.3	526.3	296.8	55.0	336.5	0	0.6	0	63.6
Nuka Bay	26.6	129.8	23.8	0	90.2	48.4	0.3	0.7	0.1	6.3
Resurrection Bay	5.8	0.1	0.3	0	37.4	40.2	18.2	0	35.4	29.7
Bruin Bay	2.6	0	0	0	126.2	10.2	0	0	0	0
Rocky/Ursus Coves	6.6	3.2	13.5	2.9	18.0	7.5	0	0	0	0.1
Iniskin and Cottonwood Bays	2.1	3.2	4.3	0	9.9	3.5	0	0	0.1	0.1
Miscellaneous	37.8	28.9	39.1	102.3	107.1	14.0	1.3	0.3	2.8	0.7
<b>Total</b>	<b>611.6</b>	<b>2,248.3</b>	<b>1,055.4</b>	<b>579.2</b>	<b>585.4</b>	<b>716.2</b>	<b>28.7</b>	<b>50.6</b>	<b>136.4</b>	<b>352.6</b>

Location	1980	1982	1984	1986	1988	1990	1992	1994	1996	1998
Humpy Creek	48.6	4.9	53.5	116.7	0	0	0			
Halibut Cove and Lagoon	4.7	1.0	10.9	14.0	106.8	91.0	58.4			
China Poot <sup>b</sup>					5.4	46.1	35.7			
Tutka/Barabara	312.5	184.9	262.0	400.2	723.9	37.4	320.9			
Seldovia Bay	81.7	70.3	2.2	2.8	5.5	3.6	1.9			
Pt. Graham Bay	30.5	35.4	8.0	8.8	10.7	0	0			
Dogfish Bay	4.7	1.7	0.1	0	0	0	0			
Port Chatham	1.8	12.6	0	0	0	22.1	0			
Windy Bay	0	0	0	0	0	0	0			
Rocky Bay	1.4	0	0	0	0	0	0			
Port Dick Bay	133.3	44.0	84.6	304.0	5.9	169.1	0.1			
Nuka Bay	12.8	8.7	4.4	97.8	0.2	0.2	0			
Resurrection Bay	155.8	137.4	122.3	36.5	0.5	0	0			
Bruin Bay	100.6	13.3	125.2	349.7	5.0	0.4	1.9			
Rocky/Ursus Coves	0	20.2	8.5	71.1	49.9	0	0.3			
Iniskin and Cottonwood Bays	0.1	0.4	0.4	0.2	1.3	0	T			
Miscellaneous	0.2	16.8	18.5	6.5	6.2	60.6	60.6			
<b>Total</b>	<b>889.7</b>	<b>551.6</b>	<b>700.6</b>	<b>1,408.3</b>	<b>921.3</b>	<b>383.7</b>	<b>479.8</b>			

<sup>a</sup> Data source: final IBM computer runs.

<sup>b</sup> China Poot (including Neptune Bay) was part of Halibut Cove Subdistrict prior to 1988.

Appendix Table 21. Commercial chum salmon catch in numbers of fish by district, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Southern	Outer	Kamishak	Eastern	Total
1973	3,588	76,286	35,584	55	115,513
1974	2,752	11,924	4,554	7	19,210
1975	5,428	11,348	4,868	2	21,646
1976	1,517	412	48,848	45	50,822
1977	6,734	70,167	65,659	3,229	145,789
1978	5,525	19,224	48,669	100	73,518
1979	8,221	180,558	29,711	0	218,490
1980	4,605	32,246	35,921	720	73,492
1981	20,920	238,393	73,501	3,279	336,093
1982	18,466	631075	108,946	7,698	198,185
1983	14,281	27,203	142,901	7,934	192,319
1984	8,065	3,204	70,736	10,535	92,540
1985	5,513	11,844	8,139	5,144	30,640
1986	5,560	11,701	61,670	3,757	82,688
1987	5,030	28,663	108,412	14,913	157,018
1988	7,742	71,202	218,299	24,668	321,911
1989	3,141	43	7,809	312	11,305
1990	2,433	614	3,597	307	6,951
1991	1,962	14,337	7,853	80	24,232
1992	1,885	181	20,051	86	22,203
1993	2,788	970	600	9	4,367
20-Year Avg.	6,667	43,631	55,286	4,144	109,728
1973-82 Avg.	7,773	70,363	45,626	1,514	125,276
1983-92 Avg.	5,561	16,899	64,947	6,774	94,181
'93 % of Ttl.	63.84	22.21	13.74	0.21	100.00

<sup>a</sup> Data source: Final IBM computer runs.

Appendix Table 22. Commercial chum salmon catch in thousands of fish by subdistrict, Lower Cook Inlet, 1959 - 1993<sup>a</sup>.

Location	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Tutka	0.1	2.4	1.8	2.9	2.4	5.6	1.1	3.9	4.0	1.3	0.7	1.6
Port Graham	2.3	1.8	0.5	4.0	3.8	2.1	0.9	5.3	3.0	2.3	1.3	4.8
Dogfish	4.9	0.4	0.1	0	0.2	0	0	7.0	15.3	0.1	0	50.9
Port Chatham	1.0	2.5	0	2.8	4.3	5.2	0	17.8	0	1.0	0	0.1
Rocky/Windy	14.9	6.4	2.2	8.5	0.3	33.8	8.1	1.7	0	0.5	0	39.4
Port Dick	42.4	51.0	36.8	112.0	110.8	227.4	14.2	60.9	36.0	10.9	5.4	41.2
Nuka	1.7	8.4	1.7	0.5	1.5	0	0	0	1.5	6.9	0	5.9
Resurrection	0.1	0.5	0	0	0	0	0	0	0.1	0.7	0	0.6
Douglas River	0.2	0	0	0	0	0	0	0	0	0	0	0
Kamishak River	0	0	0	0	0	0	0	0	0	3.7	0.4	0
McNeil River	0	0.4	0	0	0	2.7	0.9	0	0.4	8.3	4.4	1.9
Bruin Bay	0	0.3	0.5	0	0.1	0	0.4	0	1.0	7.5	0	12.8
Ursus/Rocky Coves	8.5	8.6	1.8	1.1	2.8	1.2	0	4.0	2.9	1.0	3.6	8.9
Cottonwood/Iniskin	12.1	33.4	10.2	41.7	10.9	10.9	0	0	19.0	25.5	44.4	71.9
Miscellaneous	22.6	0	0	5.8	1.4	1.4	2.5	28.5	2.2	5.4	1.0	2.4
<b>Total</b>	<b>110.8</b>	<b>116.1</b>	<b>55.6</b>	<b>179.3</b>	<b>138.5</b>	<b>323.3</b>	<b>28.1</b>	<b>129.1</b>	<b>85.4</b>	<b>75.1</b>	<b>61.2</b>	<b>242.4</b>

Location	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Tutka	0.5	1.3	0.8	1.4	2.0	0.9	0.8	2.6	2.7	1.8	7.9	8.3
Port Graham	2.0	3.2	2.6	1.0	2.2	0.5	5.0	2.4	4.3	2.5	11.2	7.4
Dogfish	114.5	41.1	0.4	0	0	0	9.4	0	8.5	2.1	71.8	15.6
Port Chatham	2.4	0	0.4	0	0.6	0	0.1	0	1.7	1.3	59.6	16.2
Rocky/Windy	1.4	0	0.9	0	0.3	0	17.7	0	76.7	2.1	7.4	0
Port Dick	0.7	0	33.4	8.1	6.8	0	25.6	10.3	79.0	19.0	95.8	30.3
Nuka	0.1	2.3	40.8	3.9	3.6	0.4	17.4	0.4	14.7	7.8	3.8	0.9
Resurrection	0.4	0.7	0	0	0	0	0	0.1	0	0.7	2.4	7.7
Douglas River	0	0	0	0	0.1	7.1	4.0	2.9	0.7	10.0	46.7	37.1
Kamishak River	0	2.4	0	1.8	0	10.5	0	23.9	17.8	2.8	8.6	9.2
McNeil River	0	2.3	0	2.0	0	16.9	38.5	4.9	6.5	6.3	11.6	32.6
Bruin Bay	1.6	1.8	0	0.7	0	0	0	0	4.0	11.0	1.7	1.3
Ursus/Rocky Coves	10.3	0.2	5.7	0	2.0	2.8	7.8	1.9	0.5	0.3	1.5	13.5
Cottonwood/Iniskin	14.5	19.7	29.9	0	2.8	11.5	15.3	14.9	0.2	5.4	3.5	21.6
Miscellaneous	0.2	0.5	0.6	0.3	1.2	0.2	4.2	9.2	1.2	0.4	2.6	3.5
<b>Total</b>	<b>148.6</b>	<b>75.5</b>	<b>115.5</b>	<b>19.2</b>	<b>21.6</b>	<b>50.8</b>	<b>145.8</b>	<b>73.5</b>	<b>218.5</b>	<b>73.5</b>	<b>336.1</b>	<b>198.0</b>

Location	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Tutka	9.9	3.4	3.2	3.9	3.9	4.7	2.5	1.5	0.8	0.6	0.9	
Port Graham	1.7	3.6	1.3	0.8	0.4	1.2	0	0	0	0	0	
Dogfish	2.8	1.1	0	0	0	0	0	0	0	0	0	
Port Chatham	2.1	0	1.3	0	0	0	0	0.1	0.1	0	0.1	
Rocky/Windy	3.2	0	0	0	0	0	0	0	0.5	0	0.1	
Port Dick	18.0	1.9	9.6	10.4	27.1	64.4	0	0.5	13.7	0.2	0.7	
Nuka	0.8	0.2	0.8	1.3	1.6	6.8	0	T	T	0	T	
Resurrection	6.9	3.0	3.0	3.5	13.9	23.9	0	0	0	0	0	
Douglas River	27.2	9.2	8.0	11.6	23.7	24.8	0	0.1	3.0	12.5	T	
Kamishak River	23.9	16.2	0.1	0.1	24.6	26.7	0	T	0.7	1.5	0	
McNeil River	67.9	12.0	0	13.7	32.9	104.0	0.1	0.1	0.1	2.0	0.4	
Bruin Bay	2.6	5.9	0	5.4	0.1	2.8	4.4	0.1	2.6	0.8	T	
Ursus/Rocky Coves	0	3.7	0	22.1	17.2	20.7	3.4	0	0	2.7	0	
Cottonwood/Iniskin	21.4	23.0	0	8.8	9.7	39.2	0	0	1.0	0.2	0	
Miscellaneous	3.9	9.3	3.3	1.1	1.9	2.7	0.9	4.7	1.7	1.6	2.1	
<b>Total</b>	<b>192.3</b>	<b>92.5</b>	<b>30.6</b>	<b>82.7</b>	<b>157.0</b>	<b>321.9</b>	<b>11.3</b>	<b>7.0</b>	<b>24.2</b>	<b>22.2</b>	<b>4.4</b>	

<sup>a</sup> Data source: final IBM computer runs.

Appendix Table 23. Estimated sockeye salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	English Bay	Ander. Beach	Delight Lake	Desire Lake	Bear Lake <sup>b</sup>	Aialik Lake	Mikfik Lake	Chenik Lake	Amakde. Creek	Kam. River	Doug. River	Doug. Beach	Total
1973	4.4	-	2.5	5.2	0.2	1.5	2.7	0.3	2.2	-	-	-	19.0
1974	-	-	-	-	0.1	2.2	0.9	0.1	0.4	-	-	-	3.7
1975	2.5	-	2.0	6.5	0	8.0	6.0	0.1	0.8	-	-	-	25.9
1976	6.0	-	6.0	11.0	0.6	8.0	10.0	0.9	1.6	-	0.2	0.1	44.4
1977	12.5	-	5.2	10.7	0	5.0	9.8	0.2	2.6	-	2.6	0.4	49.0
1978	13.5	0.6	8.0	10.0	0	3.0	12.0	0.1	2.6	1.0	-	0.1	50.9
1979	4.4	-	8.0	12.0	0	5.0	6.0	0	1.0	0.4	-	0.3	37.1
1980	12.0	0.3	10.0	17.0	1.5	6.6	6.5	3.5	2.6	0.1	0.4	0.5	61.0
1981	10.5	-	7.3	12.0	0.7	1.8	5.3	2.5	1.9	0.8	0.2	0.3	43.3
1982	20.0	0.6	25.0	18.0	0.5	22.4	35.0	8.0	3.2	10.0	4.2	1.6	148.5
1983	12.0	0.5	7.0	12.0	0.7	20.0	7.0	11.0	1.2	5.0	0.5	0.4	77.3
1984	11.1	1.2	10.5	15.0	0.5	22.0	6.0	13.0	1.4	2.5	0	0.1	83.3
1985	5.0	0.1	26.0	18.0	1.1	8.0	20.0	3.5	0.9	0.8	0	0	83.4
1986	2.8	0.9	13.0	10.0	0.8	7.6	7.8	7.0	1.9	5.0	0.2	0.2	57.2
1987	7.0	0.2	10.5	13.4	0.3	9.2	9.0	10.0	1.1	-	0.1	-	60.8
1988	2.5	0.3	1.2	9.0	0.1	13.0	10.1	9.0	0.4	0.5	0	0.1	46.2
1989	4.5	-	7.7	9.0	0.1	6.5	11.5	12.0	1.2	0.5	0.6	0.2	53.8
1990	3.3	-	5.2	9.5	1.1	5.7	8.8	17.0	1.8	0.2	0.6	-	53.2
1991	7.0	-	4.1	8.2	0.7	3.7	9.7	10.2	1.9	0.7	-	0.1	46.3
1992	6.4	-	5.9	11.9	1.9	2.5	7.8	9.3	1.9	4.9	0.2	-	52.7
1993	8.9	-	5.6	11.0	5.0	3.0	6.4	4.0	2.0	4.1	-	-	47.2
20-Year Average	7.8	0.5	8.7	11.5	0.5	8.1	9.6	5.9	1.6	2.3	0.7	0.3	57.5
1973-82 Average	9.5	0.5	8.2	11.4	0.4	6.4	9.4	1.6	1.9	2.5	1.5	0.5	53.8
1983-92 Average	6.2	0.5	9.1	11.6	0.7	9.8	9.8	10.2	1.4	2.2	0.2	0.2	61.9
Es. Goal	10-20	1	10	10	1	2.5-5	5-7	10	1	*	*	*	51-66

<sup>a</sup> Estimated escapements are either peak aerial survey counts or adjusted aerial survey counts based on survey conditions and time of surveys.

<sup>b</sup> Limited by Bear Lake Management Plan since 1971.

Appendix Table 24. Estimated pink salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1960 - 1993<sup>a</sup>.

Location	Y E A R											
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Humpy Creek	10.0	22.6	56.0	34.7	18.5	28.0	30.0	25.0	24.7	5.4	55.2	45.0
China Poot Creek	9.0	2.0	26.0	-	-	-	-	2.5	6.0	0.2	1.5	2.1
Tutka Lagoon Creek	15.0	15.0	30.0	10.0	20.0	20.0	12.0	7.0	7.9	6.5	6.5	16.7
Barabara Creek	2.0	0.1	1.5	0.1	-	-	5.0	-	2.0	0.9	0.4	4.0
Seldovia River	25.0	25.0	50.0	13.0	60.0	30.0	86.0	55.0	53.2	60.0	23.0	31.1
Port Graham River	15.0	5.0	50.0	2.0	16.0	1.5	24.0	2.0	24.4	4.0	16.6	13.2
Dogfish Lagoon	2.0	-	3.0	-	-	-	-	-	-	-	-	0.3
Port Chatham Creeks	4.0	7.0	7.0	-	-	-	10.0	-	-	-	3.0	15.5
Windy Right Creek	8.0	10.0	12.5	4.9	6.2	2.0	7.0	6.0	2.8	3.2	2.1	13.0
Windy Left Creek	8.0	5.0	12.5	4.5	7.7	10.0	7.0	6.0	6.9	23.0	13.0	35.4
Rocky River	130.0	2.0	200.0	12.0	80.0	0.3	44.0	1.0	43.1	1.0	32.0	1.6
Port Dick Creek	35.0	14.0	40.0	16.0	31.5	50.0	35.0	20.0	29.0	12.0	34.5	97.8
Island Creek	23.2	2.0	15.0	3.6	30.0	0.5	7.0	0.5	4.3	0.1	5.5	0.1
South Nuka Island Creek	20.0	2.0	22.0	0.1	10.0	-	10.0	-	10.0	3.0	11.0	14.0
Desire Lake Creek	-	-	18.0	-	1.3	-	-	-	-	-	-	30.0
James Lagoon	-	-	-	-	-	-	-	-	-	-	-	-
Alice Lagoon	-	-	25.0	0.3	-	-	2.0	-	-	-	-	-
Bear Creek	1.4	-	3.1	-	6.4	-	-	-	3.1	-	-	-
Salmon Creek	-	-	-	-	-	-	-	-	-	-	-	-
Thumb Cove	-	-	-	-	-	-	-	-	-	-	-	-
Humpy Cove	-	-	-	-	-	-	-	-	-	-	-	-
Tonsina Creek	-	-	-	-	-	-	-	-	2.9	0.1	-	-
Big Kamishak River	-	-	100.0	75.0	75.0	-	13.0	-	-	-	-	-
Little Kamishak River	-	-	100.0	24.0	-	-	28.0	3.5	-	0.5	2.0	-
Amakdedori Creek	60.0	-	80.0	-	10.0	-	8.0	-	-	1.0	13.0	-
Bruin Bay River	18.0	-	300.0	25.0	-	-	20.0	0.5	-	5.0	40.0	22.0
Sunday Creek	1.5	-	5.0	2.0	-	-	20.0	-	-	1.0	2.0	43.0
Brown's Peak Creek	-	-	25.0	10.0	20.0	10.0	11.0	-	-	2.0	-	8.0
Totals	387.1	111.7	1,181.6	237.2	392.6	152.3	379.0	129.0	220.3	128.9	261.3	392.8

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Appendix Table 24. (page 2 of 3)

Location	Y E A R											
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Humpy Creek	13.8	36.9	17.4	64.0	27.2	86.0	46.1	200.0	64.4	115.0	31.9	104.0
China Poot Creek	1.0	6.0	5.2	21.6	2.0	3.9	11.2	20.6	12.3	5.0	3.1	14.1
Tutka Lagoon Creek	1.5	6.5	2.6	17.6	11.5	14.0	15.0	10.6	17.3	21.1	18.5	12.9
Barabara Creek	0.6	-	0.2	22.7	0.2	5.7	1.4	10.0	5.8	16.8	2.1	14.8
Seldovia River	5.8	14.5	13.7	36.2	25.6	35.7	24.6	43.7	65.5	62.7	38.4	27.9
Port Graham River	2.4	7.0	2.8	27.3	6.5	20.6	6.7	32.7	40.2	18.4	28.9	4.6
Dogfish Lagoon	-	1.0	-	2.3	-	8.1	0.6	7.3	0.3	2.6	2.6	1.0
Port Chatham Creeks	1.0	5.0	0.2	7.7	-	14.2	0.3	20.8	7.7	11.2	2.0	3.5
Windy Right Creek	0.1	4.6	0.1	18.7	0.2	11.1	0.3	10.4	3.3	4.7	4.7	4.3
Windy Left Creek	0.4	12.9	0.1	9.7	0.2	47.3	1.1	74.8	10.9	31.3	4.4	11.9
Rocky River	8.2	2.0	1.5	4.4	2.7	36.7	8.2	85.0	6.4	25.0	6.6	16.6
Port Dick Creek	10.0	26.4	1.5	62.8	12.7	109.3	44.9	116.0	56.1	106.0	19.9	64.1
Island Creek	1.7	0.5	0.5	0.1	-	0.6	0.4	0.6	2.2	25.0	15.0	15.3
South Huka Island Creek	0.3	16.0	-	28.0	-	12.0	-	15.0	0.3	16.0	0.4	22.2
Desire Lake Creek	0.3	3.0	-	0.4	0.6	0.8	1.0	3.0	16.0	5.0	12.0	8.5
James Lagoon	-	-	-	-	-	-	-	-	4.6	14.0	6.0	5.1
Alice Lagoon	-	-	0.1	-	0.4	-	-	-	-	-	5.0	3.0
Bear Creek	0.5	-	4.9	-	10.0	-	7.8	-	13.3	0.4	7.9	0.8
Salmon Creek	-	-	-	-	16.9	-	11.0	-	15.5	0.1	21.0	0.5
Thumb Cove	-	-	1.1	-	2.0	-	2.0	-	1.2	1.0	7.9	4.9
Humpy Cove	-	-	0.6	-	1.4	-	0.9	-	5.7	0.4	4.0	2.0
Tonsina Creek	-	-	1.4	-	5.7	-	1.5	-	0.7	0.2	7.5	5.4
Big Kamishak River	-	15.0	1.0	-	8.0	-	12.0	10.0	2.0	-	5.0	-
Little Kamishak River	-	13.0	-	-	6.0	-	0.4	3.5	0.6	-	2.2	-
Amakdedori Creek	0.2	3.0	1.0	5.0	-	-	0.9	6.0	3.8	1.5	6.3	0.2
Bruin Bay River	2.5	2.0	0.6	20.0	13.5	60.0	33.0	200.0	400.0	95.0	75.0	4.0
Sunday Creek	2.0	5.0	0.1	20.0	0.3	9.0	0.2	12.0	5.2	14.2	12.0	4.7
Brown's Peak Creek	1.2	3.2	0.1	10.0	1.2	13.0	0.9	15.0	2.3	17.7	3.5	1.7
Totals	53.5	183.5	56.7	378.5	154.8	488.0	232.4	897.0	763.6	610.3	353.8	358.0

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Appendix Table 24. (page 3 of 3)

Location	Y E A R										1960-92	
	1984	1985	1986	1987	1988	1989	1990 <sup>b</sup>	1991 <sup>b</sup>	1992 <sup>b</sup>	1993 <sup>b</sup>	Average	Goal
Humpy Creek	84.2	117.0	49.7	26.6	21.4	93.0	27.0	17.4	14.9	36.0	48.9	25-50
China Poot Creek	8.4	1.9	11.5	3.1	3.9	8.5	4.2	2.6	4.1	1.6	7.0	5
Tutka Lagoon Creek	10.5	14.0	13.4	4.8	11.2	11.9	38.5	16.8	26.7	27.4	14.0	6-10
Barabara Creek	1.0	1.6	1.8	0.3	0.7	4.5	3.9	10.9	2.2	11.9	4.2	18-24
Seldovia River	14.2	22.8	28.2	7.6	16.9	26.2	27.8	30.0	14.7	43.4	33.2	25-35
Port Graham River	10.9	26.3	17.5	3.8	7.9	19.1	20.1	29.0	5.4	12.8	15.5	20-40
Dogfish Lagoon	0.6	0.2	0.4	1.2	0.3	0.2	7.1	9.3	<sup>c</sup>	0.3	2.5	-
Port Chatham Creeks	7.8	8.9	11.5	10.2	21.0	31.7	27.8	23.8	4.3	22.2	10.3	10-15
Windy Right Creek	3.4	5.4	2.5	2.0	1.3	6.6	7.1	20.7	3.9	12.6	5.9	10
Windy Left Creek	2.5	8.9	2.2	5.6	3.4	25.2	7.5	34.5	8.2	25.9	13.4	30-50
Rocky River	9.0	12.1	12.0	4.5	5.4	10.3	18.0	26.1	25.4	70.0	26.5	50
Port Dick Creek	44.6	65.3	41.6	4.5	12.0	55.4	41.7	54.2	6.9	37.0	41.5	20-100
Island Creek	35.0	27.9	16.6	0.1	7.2	6.7	25.0	24.4	12.6	12.1	9.7	12-18
South Nuka Island Cr.	0.6	3.6	7.0	2.8	1.2	7.3	13.3	16.4	6.1	34.3	9.7	10
Desire Lake Creek	23.0	62.5	32.0	11.0	2.5	47.0	1.0	1.3	0.4	19.3	12.2	10-20
James Lagoon	4.0	9.0	6.6	1.1	1.7	4.9	3.8	4.4	0.4	3.3	5.0	5-10
Alice Lagoon	4.0	9.4	6.0	1.5	0.7	0.8	-	-	<sup>c</sup>	-	4.5	5
Bear Creek	7.7	4.1	14.0	3.5	0.2	1.7	4.4	15.4 <sup>d</sup>	2.3	6.6 <sup>d</sup>	5.4	5
Salmon Creek	10.2	2.1	8.3	1.7	0.1	1.6	-	<sup>d</sup>	5.3	<sup>d</sup>	7.3	10
Thumb Cove	4.2	14.5	4.0	2.7	0.3	4.2	-	3.4	0.4	5.5	3.6	4
Humpy Cove	2.5	5.0	0.9	0.3	0.4	1.0	3.8	-	<sup>c</sup>	0.9	2.1	2
Tonsina Creek	6.0	48.2	11.2	3.4	0.1	0.5	1.2	0.3	<sup>c</sup>	3.2	5.7	5
Big Kamishak River	-	-	5.0	-	1.0	-	-	-	<sup>c</sup>	-	24.8	20
Little Kamishak River	0.1	1.6	2.0	-	0.5	-	-	0.9	<sup>c</sup>	-	11.1	20
Amakdedori Creek	-	1.0	6.0	0.4	1.0	2.0	0.1	0.7	3.2	1.7	8.9	5
Bruin Bay River	110.0	3.5	1,200.0	24.0	29.0	350.0	19.0	74.9	3.2	86.4	108.6	25-50
Sunday Creek	12.0	11.4	109.0	29.7	18.0	103.0	2.8	20.9	2.9	57.8	16.7	10
Brown's Peak Creek	6.8	7.0	28.0	40.2	17.0	120.0	1.0	16.7	5.0	41.6	14.2	10
Totals	423.2	495.2	1,648.9	196.6	186.3	943.3	306.1	455.0	158.4	574.8	478.5	377-593

<sup>a</sup> Estimated escapements are either peak aerial survey counts or adjusted aerial survey counts based on survey conditions and time of surveys.

<sup>b</sup> Escapement estimates in the Southern, Outer, and Eastern Districts are derived from periodic ground surveys with stream life factors applied. Kamishak Bay District estimates are unexpanded live counts.

<sup>c</sup> Insufficient survey data for escapement estimates.

<sup>d</sup> Escapement figure for Bear Creek actually represents the combined escapement for Bear and Salmon Creeks.

Appendix Table 25. Estimated chum salmon escapements in thousands of fish for the major spawning systems of Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Port Grhm.	Dogfish Lagoon	Rocky River	Pt.Dk Head	Isl. Creek	Big Kam.	Little Kam.	McNeil River	Bruin Bay	Ursus Cove	Cotton. Creek	Inisk. Bay	Total
1973	2.0	1.0	2.0	9.0	7.0	4.0	1.0	10.0	8.0	3.0	4.0	12.0	63.0
1974	0.5	0.6	1.0	0.8	5.0	7.1	0.6	1.5	3.0	3.5	2.5	7.0	33.1
1975	3.0	5.0	25.0	4.0	7.4	1.1	1.9	1.5	1.5	5.0	8.0	7.0	70.4
1976	0.4	3.0	12.0	1.5	1.0	24.0	21.0	10.0	4.0	6.0	5.0	13.5	101.4
1977	5.2	6.4	10.5	5.0	11.1	-	-	20.0	18.0	9.3	10.0	4.4	99.9
1978	4.8	9.3	6.3	8.9	16.9	23.0	30.0	45.0	4.0	9.7	12.5	11.4	181.8
1979	2.2	8.2	35.0	4.0	16.8	15.0	15.0	8.0	15.0	5.0	2.5	4.0	130.7
1980	1.1	4.0	23.0	4.2	10.9	10.0	13.0	8.0	15.0	8.0	4.2	9.3	110.7
1981	4.8	11.5	12.5	4.1	17.5	11.0	6.0	30.0	10.0	10.0	9.0	9.0	135.4
1982	2.5	8.5	2.8	1.7	8.7	25.0	18.0	25.0	10.0	9.0	7.0	12.8	131.0
1983	1.9	5.3	4.0	4.5	36.2	25.0	25.0	48.0	5.5	7.7	8.3	12.0	183.4
1984	2.1	8.6	3.5	2.7	25.6	19.0	12.0	21.0	8.0	7.0	6.5	9.8	125.8
1985	0.5	4.9	2.5	1.0	9.1	6.0	4.5	9.5	2.0	3.0	3.0	5.0	51.0
1986	0.6	2.5	2.0	1.7	8.6	24.0	17.0	22.0	2.0	11.0	11.0	5.9	108.3
1987	1.5	2.0	0.2	6.1	13.2	12.0	18.0	26.0	10.0	9.9	17.0	9.1	125.0
1988	3.5	8.6	0.3	9.0	7.8	15.0	13.0	49.0	7.0	9.4	16.0	9.5	148.1
1989	1.3	1.8	1.2	3.3	4.8	30.0	12.0	34.0	8.0	6.3	8.0	5.9	116.6
1990	2.6	1.0	0.8	1.1	2.3	2.5	7.9	8.0	4.0	3.8	4.3	8.4	46.7
1991	1.1	3.1	-	7.4	17.3	8.7	8.4	10.0	6.0	1.3	7.7	8.3	79.3
1992	1.4	0.8	1.7	5.4	6.7	4.5	7.1	19.2	8.5	1.7	6.1	3.4	65.0
1993	2.5	5.4	0.1	2.5	3.6	9.1	6.3	15.6	6.0	7.7	12.0	8.0	78.8
20-Year Average	2.1	4.8	7.7	4.3	11.7	14.0	12.2	20.3	7.5	6.5	7.6	8.4	107.1
1973-82 Average	2.7	5.8	13.0	4.3	10.2	13.4	11.8	15.9	8.9	6.9	6.5	9.0	108.3
1983-92 Average	1.6	3.9	1.8	4.2	13.2	14.7	12.5	24.7	6.1	6.1	8.8	7.7	105.2
Es.Goal	4-8	5-10	20	4	10-15	20	20	20-40	5-10	5-10	10	10	133-177

<sup>a</sup> Estimated escapements are either peak aerial survey counts or adjusted aerial survey counts based on survey conditions and time of surveys.

Appendix Table 26. Personal use/subsistence set gillnet salmon catch in numbers of fish by species, Southern District, Lower Cook Inlet, 1969 - 1993<sup>a</sup>.

Year	Total Permits Issued	Permits Returned		Permits Actually Fished	Permits Not Fished	NUMBERS OF FISH						Total
		Number	%			Chinook	Sockeye	Coho	Pink	Chum	Other	
1969	47	44	93.6	35	9	0	9	752	38	0	17	816
1970	78	73	93.6	55	18	0	12	1,179	143	13	39	1,386
1971	112	95	84.8	53	42	2	16	1,549	44	7	20	1,638
1972	135	105	77.8	64	41	1	11	975	48	69	19	1,123
1973	143	128	89.5	82	46	0	18	1,304	84	40	9	1,455
1974	148	118	79.7	52	66	0	16	376	43	77	27	539
1975	292	276	94.5	221	55	4	47	1,960	632	61	95	2,799
1976	242	221	91.3	138	83	16	46	1,962	1,513	56	75	3,668
1977	197	179	90.9	137	42	12	46	2,216	639	119	84	3,116
1978	311	264	84.9	151	113	4	35	2,482	595	34	89	3,239
1979	437	401	91.8	238	163	6	37	2,118	2,251	41	130	4,583
1980	533	494	92.7	299	195	43	32	3,491	1,021	25	153 <sup>b</sup>	4,765
1981	384	374	97.4	274	100	25	64	4,314	732	89	100	5,324
1982	395	378	95.7	307	71	39	46	7,303	955	123	8	8,474
1983	360	328	91.1	210	118	4	21	2,525	330	40	2	2,922
1984	390	346	88.7	219	127	4	25	3,666	821	87	25	4,628
1985	316	302	95.6	205	97	5	43	3,372	166	35	3	3,624
1986	338	310	91.7	247	63	7	68	3,831	3,132	56	0	7,094
1987	361	338	93.6	249	89	5	50	3,977	279	61	0	4,372
1988	438	404	92.2	287	117	14	60	4,877	1,422	75	0	6,448
1989	466	452	97.0	332	120	41	156	7,215	882	53	49	8,396
1990	578	543	93.9	420	123	12	200	8,323	1,846	69	0	10,450
1991	472	459	97.2	295	164	8	47	4,931	366	23	0	5,375
1992	365	350	95.9	239	111	5	63	2,277	643	21	0	3,009
1993	326	317	97.2	215	102	6	44	1,992	463	18	0	2,523
1969-92 Average	314	291	92.6	200	91	11	49	3,207	776	53	39	4,135

<sup>a</sup> Figures after 1991 include information from both returned permits and inseason oral reports.

<sup>b</sup> Steelhead trout (*Oncorhynchus mykiss*).

Appendix Table 27. Summary of personal use/subsistence salmon gillnet fishermen in the Southern District of Lower Cook Inlet (excluding the Port Graham/Nanwalek subsistence fishery) by area of residence, 1974 - 1993.

Year	A R E A				R E S I D E N C E								O F				P E R M I T T E E				Total Permits Issued
	Homer/ Fritz Creek		Anchorage Area <sup>a</sup>		Halibut Cove		Anchor Pt./ Ninilchik		Seldovia		Pt. Graham/ English Bay		Kenai/ Soldotna		Other						
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
1974	108	73.0	20	13.5	6	4.1	4	2.7	1	0.7	3	2.0	5	3.4	1	0.7			148		
1975	118	75.2	13	8.3	6	3.8	7	4.5	5	3.2	2	1.3	4	2.5	2	1.3			157		
1976	182	70.0	24	9.2	9	3.5	25	9.6	5	1.9	4	1.5	6	2.3	5	1.9			260		
1977	153	77.3	8	4.0	8	4.0	17	8.6	7	3.6	0	0.0	2	1.0	3	1.6			198		
1978	214	68.8	40	12.9	5	1.6	30	9.6	12	3.8	3	1.0	4	1.3	3	1.0			311		
1979	276	62.7	67	15.2	2	0.5	61	13.9	3	0.7	0	0.0	11	2.5	20	4.6			440		
1980	310	58.2	81	15.2	0	0.0	80	15.0	7	1.3	0	0.0	42	7.9	13	2.4			533		
1981	274	71.4	43	11.2	8	2.1	37	9.6	3	0.8	1	0.3	14	3.6	4	1.0			384		
1982	295	74.7	19	4.8	9	2.3	44	11.1	0	0.0	0	0.0	7	1.8	21	5.3			395		
1983	267	77.9	24	7.0	3	0.9	33	9.6	8	2.3	0	0.0	0	0.0	8	2.3			343		
1984	266	72.0	20	5.4	6	1.6	62	16.8	5	1.4	1	0.3	5	1.4	4	1.1			369		
1985	251	79.4	15	4.8	6	1.9	33	10.4	6	1.9	0	0.0	2	0.6	3	1.0			316		
1986	280	82.8	18	5.3	4	1.2	29	8.6	1	0.3	0	0.0	1	0.3	5	1.5			338		
1987	284	78.7	25	6.9	3	0.8	37	10.3	7	1.9	0	0.0	2	0.6	3	0.8			361		
1988	338	77.2	36	8.2	5	1.1	43	9.8	6	1.4	0	0.0	10	2.3	0	0.0			438		
1989	348	74.7	36	7.7	5	1.1	51	10.9	8	1.7	0	0.0	6	1.3	12	2.6			466		
1990	441	76.3	36	6.2	5	0.9	65	11.2	12	2.1	0	0.0	6	1.0	13	2.3			578		
1991	384	81.4	27	5.7	8	1.7	41	8.7	6	1.3	0	0.0	4	0.8	2	0.4			472		
1992	302	82.7	21	5.8	5	1.4	32	8.8	3	0.8	0	0.0	1	0.3	1	0.3			365		
1993	242	74.2	25	7.7	5	1.5	44	13.5	3	0.9	0	0.0	5	1.5	2	0.6			326		
'74-'92																					
Avg.	268	74.2	30	8.3	5	1.4	38	10.5	6	1.7	1	0.3	7	1.9	6	1.7			361		

<sup>a</sup> After 1989, "Anchorage Area" includes Eagle River, Chugiak, Mat-Su Valley, and/or Fort Richardson.

Appendix Table 28. Subsistence salmon catch in numbers of fish by species for the village of Port Graham, Lower Cook Inlet, 1981 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Households
1981 <sup>b</sup>	116	1,694	625	298	150	2,883	47
1982 <sup>b</sup>	98	798	508	851	193	2,448	38
1983 <sup>c</sup>	57	1,066	440	169	65	1,797	31
1984 <sup>c</sup>	21	2,095	166	215	6	2,503	34
1985 <sup>c</sup>	156	469	190	42	22	879	<sup>d</sup>
1986 <sup>b</sup>	118	279	179	234	13	823	36
1987 <sup>c</sup>	21	186	574	264	69	1,114	31
1988 <sup>f</sup>	90	380	447	577	88	1,582	31
1989	48	94	555	524	46	1,267	32
1990	180	472	811	1,107	68	2,638	31
1991	178	61	355	1,454	173	2,221	32
1992 <sup>b</sup>	127	100	440	532	164	1,368	37
1993 <sup>b</sup>	248	153	302	978	130	1,811	27
1981-92 Average	101	641	441	522	89	1,794	35

<sup>a</sup> Data source: ADF&G, Subsistence Division, data files.

<sup>b</sup> Data include both subsistence set gillnet and rod/reel harvest.

<sup>c</sup> Data include only subsistence set gillnet harvest.

<sup>d</sup> No data.

<sup>e</sup> 46% set gillnet harvest, 54% rod/reel.

<sup>f</sup> 51% set gillnet harvest, 49% rod/reel.

Appendix Table 29. Subsistence salmon catch in numbers of fish by species for the village of Nanwalek (formerly English Bay), Lower Cook Inlet, 1981 - 1993<sup>a</sup>.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Households
1981 <sup>b</sup>	24	1,075	314	621	19	2,053	29
1982 <sup>b</sup>	13	1,584	1,305	1,850	36	4,788	31
1983 <sup>c</sup>	0	1,784	367	363	10	2,524	28
1984 <sup>c</sup>	18	1,225	385	404	0	2,032	26
1985 <sup>c</sup>	5	696	530	313	2	1,546	<sup>d</sup>
1986 <sup>b</sup>	4	378	296	825	2	1,505	21
1987 <sup>c</sup>	2	626	322	476	45	1,471	21
1988 <sup>f</sup>	8	609	385	1,185	35	2,222	26
1989	0	60	651	868	0	1,579	29
1990	46	636	616	1,968	49	3,305	30
1991	4	574	1,508	3,087	46	5,219	35
1992 <sup>b</sup>	64	440	653	519	59	1,735	40
1993 <sup>b</sup>	20	1,018	570	1,703	115	3,426	21
1981-92 Average	16	807	611	1,041	25	2,498	29

<sup>a</sup> Data source: ADF&G, Subsistence Division, data files.

<sup>b</sup> Data include both subsistence set gillnet and rod/reel harvest.

<sup>c</sup> Data include only subsistence set gillnet harvest.

<sup>d</sup> No data.

<sup>e</sup> 63% set gillnet harvest, 37% rod/reel.

<sup>f</sup> 37% set gillnet harvest, 63% rod/reel.

Appendix Table 30. FRED Division and/or CIAA salmon stocking projects and releases of salmon fry, fingerling and smolt, in millions of fish, Lower Cook Inlet, 1984 - 1993.

Lake, River, or Bay	Species	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Leisure Lake	Sockeye	2.110	2.018	2.350	2.022	2.100	2.000	1.750	2.000	2.000	2.000
Chenik Lake	Sockeye	-	-	0.839	1.000	2.600	3.500	3.250	2.200	2.750	1.400
Paint River Lakes:											
Upper	Sockeye			0.500	-	1.100	1.000	1.000	0.500	0.500	0.500
Lower	Sockeye			0.320	-	0.552	0.500	0.500	0.250	0.250	0.250
Elusivak	Sockeye					0.521	0.500	0.500	0	0	0
Kirschner Lake	Sockeye				0.867	0.521	0.250	0.250	0.250	0.250	0.250
Bruin Lake	Sockeye							0.500	0.250	0.250	0.250
Ursus Lake	Sockeye									0.250	0.250
Port Dick Lake	Sockeye				0.705	0.222	0.430	0	0	0	0
Hazel Lake	Sockeye					0.783	1.000	1.250	1.300	1.000	1.000
English Bay Lakes	Sockeye							0.350	0.241	0.290	0.581
Bear Lake	Sockeye						2.200	2.400*	1.619*	2.370*	1.813
Total Sockeye		2.110	2.018	4.009	4.594	8.399	11.380	11.750	8.610	10.060	8.294
Tutka Bay Hatchery:											
	Pink	14.730	19.560	22.500	19.570	12.000	30.100	23.600	23.600	23.600	43.000
	Chum	0.026	0.018	0.449	4.050	3.180	2.103	1.500	0	0	0
Caribou Lake	Coho		0.139	0.138	0.150	0.150	0.182	0.180	0.180	0.150	0.150
Seldovia Lake	Coho		0.083	0.072	0.045	0.045	0.080	0.050	0.050	0	0
Seldovia Bay	Chinook				0.084	0.084	0.108	0.099	0.091	0.113	0.107
Halibut Cove Lagoon:	Chinook		0.098	0.101	0.094	0.094	0.115	0.112	0.092	0.117	0.100
	Pink			2.000	3.000	3.000	6.000	6.000	6.000	6.000	6.000
Homer Spit:	Chinook										
	early		0.152	0.104	0.104	0.104	0.104	0.212	0.191	0.226	0.212
	late									0.126	0.100
	Pink				0.295	0.300	0.332	0.303	0.303	0.300	0
	Coho					0.060	0.143	0.123	0.100	0.100	0.116

\* Includes both fingerlings and "zero check" smolts (see text).

Appendix Table 31. Catch of Pacific herring in short tons and effort in number of permits by district in the commercial sac roe seine fishery, Lower Cook Inlet, 1973 - 1993<sup>a</sup>.

Year	Southern		Kamishak		Eastern		Outer		Total	
	Tons	Permits	Tons	Permits	Tons	Permits	Tons	Permits	Tons	Permits
1973	204	16	243	14	831	25	301	12	1,579	2
1974	110	7	2,114	26	47	5	384	26	2,655	37
1975	24	5	4,119	40	-	-	-	-	4,143	45
1976	0	0	4,842	66	-	-	-	-	4,842	41
1977	291	13	2,908	57	-	-	-	-	3,199	66
1978	17	7	402	44	-	-	-	-	419	58
1979	13	3	415	35	-	-	-	-	428	44
1980	-	-	-	-	-	-	-	-	-	36
1981	-	-	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	-	-
1985	-	-	1,132	23	204	7	12	2	1,348	29
1986	-	-	1,959	54	167	4	28	3	2,154	57
1987	-	-	6,132	63	584	4	202	9	6,918	69
1988	-	-	5,548	75	0	0	0	0	5,605	75
1989	170	6	4,801	75	0	0	0	0	4,971	75
1990	-	-	2,264	75	-	-	-	-	2,264	75
1991	-	-	1,992	58	0	0	0	0	1,992	58
1992	-	-	2,282	56	0	0	0	0	2,282	56
1993	-	-	3,570	60	-	-	-	-	3,570	60
1973-92 Average	104	9	2,744	51	204	5	103	6	2,983	55
1973-82 Average	94	10	2,149	40	439	5	343	19	2,466	47
1983-92 Average	-	-	3,264	60	136	2	35	2	3,435	62

<sup>a</sup> Data source: final IBM computer runs.

Appendix Table 32. Estimated herring biomass and commercial purse seine catch of herring in short tons, exploitation rates, average roe recovery, number of permits fished, and exvessel value in millions of dollars, Kamishak Bay District, Lower Cook Inlet, 1978 - 1993.

Year	Spawning Biomass <sup>a</sup>	Commercial Catch	Total Biomass	Percent Exploitation	Average Roe %	No. of Permits	Exvessel Value <sup>b</sup>
1978	800	402	1,202	33.4	-	44	<sup>c</sup>
1979	2,900	415	3,315	12.5	-	36	<sup>c</sup>
1980	-	0	-	-	-	-	-
1981	5,130	0	5,130	-	-	-	-
1982	4,835	0	4,835	-	-	-	-
1983	4,750	0	4,750	-	-	-	-
1984	2,885 <sup>d</sup>	0	6,500	-	-	-	-
1985	12,188	1,132	13,320	8.5	11.3	23	1.0
1986	24,042	1,959	26,001	7.5	10.4	54	2.2
1987	29,200	6,132	35,332	17.4	11.3	63	8.4
1988	24,000	5,548	29,548	18.8	11.1	75	9.3
1989	30,900	4,801	35,701	13.5	9.5	75	3.5 <sup>e</sup>
1990	17,400	2,264	19,650	11.5	10.8	75	1.8
1991	16,171 <sup>f</sup>	1,992	18,163 <sup>f</sup>	11.0	11.3	58	1.3
1992	21,795	2,282	24,077	9.5	9.7	56	1.4
1993	28,869	3,570	32,439	11.0	10.2	60	2.2
1978-92 Avg. <sup>g</sup>	14,071	2,693	16,764	16.1	10.6	56	3.5

<sup>a</sup> Spawning biomass estimates are minimal estimates based on aerial surveys.

<sup>b</sup> Exvessel values exclude any postseason retroactive adjustments.

<sup>c</sup> Data not available.

<sup>d</sup> Spawning had already begun on first survey. Total spawning biomass estimate was higher than the peak survey estimate of 2,885 tons.

<sup>e</sup> Includes retroactive adjustment.

<sup>f</sup> Due to poor aerial survey conditions, 1991 biomass was calculated from the preseason estimate of abundance, adjusted to match observed age composition samples in the 1991 catch.

<sup>g</sup> Average excludes 1980 when no data was available.

Appendix Table 33. Summary of herring sac roe seine fishery openings and commercial harvests in the Kamishak Bay District of Lower Cook Inlet, 1969 - 1993.

Year	Dates of Openings	Total Hrs. Open	Harvest (short tons)	Catch Rate (st/hr. open)	No. of Permits Fished
1969-73	No Closed Periods				
1974	1/1 - 5/20		2,114		26
1975	1/1 - 6/6	(Closed Iniskin Bay 5/17)	4,119		40
1976	1/1 - 5/21	(Closed Iniskin Bay 5/17; reopened Kamishak 6/2)	4,842		66
1977	1/1 - 5/31	(Closed Kamishak Dist. 5/12; reopened 5/14 - 5/17; reopened 5/29 - 5/31)	2,908		57
1978 <sup>a</sup>	4/16 - 5/31	96	402	4.2	44
1979	5/12 - 5/15	72	415	5.8	36
1980	CLOSED	0	0		
1981	CLOSED	0	0		
1982	CLOSED	0	0		
1983	CLOSED	0	0		
1984	CLOSED	0	0		
1985	4/20 - 6/15	1,350 (56.2 days)	1,132	0.8	23
1986	4/20 - 6/13	1,303 (54.3 days)	1,303	1.5	54
1987	4/21 - 4/23	65	6,132	94.3	63
1988	4/22 - 4/29	42	5,548	132.1	75
1989	4/17 - 4/30	24.5	4,801	196.0	75
1990	4/22 - 4/23	8	2,264	283.0	75
1991	4/26	1	1,922	1,922.0	58
1992	4/24	0.5	2,282	4,564.0	56
1993	4/21	0.75	3,570	4,760.0	60

<sup>a</sup> Management by emergency order began.