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**MANAGEMENT REVIEW OF THE 1996-1998 UPPER COOK INLET
COMMERCIAL SALMON FISHERY**

A Report to the Alaska Board of Fisheries

By

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ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES DIVISION

MANAGEMENT REVIEW OF THE 1996-1998 UPPER COOK INLET
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Submitted by:

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INTRODUCTION

The Upper Cook Inlet management area consists of that portion of Cook Inlet north of the latitude of Anchor Point and is divided into the Central and Northern Districts (Figure 1). The Central District is approximately 75 mi long, averages 32 mi in width, and is further subdivided into six subdistricts. The Northern District is 50 mi long, averages 20 mi in width and is divided into two subdistricts. At present, all five species of Pacific salmon (*Oncorhynchus*), razor clams (*Siliqua patula*), and Pacific herring (*Clupea harengus pallasii*) are subject to commercial harvest in Upper Cook Inlet. Harvest statistics are gathered and reported by five-digit statistical areas and sub-areas.

Since the inception of a commercial fishery in 1882, many gear types, including fish traps, gillnets, and seines have been employed with varying degrees of success to harvest salmon in Upper Cook Inlet. Currently, set (fixed) gillnets are the only gear permitted in the Northern District, while both set and drift gillnets are used in the Central District. The use of seine gear is restricted to the Chinitna Bay Subdistrict where they are employed only sporadically. Drift gillnets have accounted for 57% of the average annual salmon harvest since 1966 with set gillnets harvesting virtually all of the remainder.

Commercial salmon harvest statistics specific to gear type and area are available only back to 1954. Run-timing and migration routes utilized by all species overlap to such a degree that the commercial fishery is largely mixed-stock and mixed-species in nature. Typically, the Upper Cook Inlet harvest represents approximately 5% of the statewide catch. In terms of their economic value, sockeye salmon (*O. nerka*) are by far the most important component of the catch followed by coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*) and chinook salmon (*O. tshawytscha*).

This report is intended to provide a brief overview of the events occurring within the commercial salmon fishery during the interval that has passed since the Alaska Board of Fisheries last conducted a comprehensive review of the area's regulations.

1996 COMMERCIAL SALMON FISHERY

The commercial harvest of 4.6 million salmon in Upper Cook Inlet in 1996 represents a modest increase over the previous year and was just slightly above the long-term average (Table 1). A significant improvement in the sockeye salmon harvest coupled with a stable sockeye price produced an overall exvessel value of \$30 million, up \$8 million from 1995 (Table 2).

The Alaska Board of Fisheries made numerous changes to the Upper Cook Inlet commercial fishing regulations for the 1996 season that directly affected the commercial fishery. The Kenai River sockeye salmon sonar goal, as defined in 5 AAC 21.360 Kenai River Sockeye Salmon Management Plan, was changed from a range of 450,000 to 700,000 to a new range of 550,000 to 800,000 for the 1996 season, 550,000 to 825,000 for the 1997 season and 550,000 to 850,000 beginning with the 1998 season. The new goals could be reduced by the Board if "non-commercial fishing, after consideration of mitigation efforts, results in a net loss of habitat units on the Kenai River...".

The Board adopted a Northern District Coho Salmon Management Plan that resulted in a mandatory restriction of the drift fleet to the three-mile corridor for the first regular period following July 25 and a season closing date for the drift fleet of August 9.

The Board adopted a staff proposal defining three new sections within the Upper Subdistrict of the Central District. That portion of the Upper Subdistrict south of the Blanchard Line and within three miles of shore would be labeled the Kasilof Section, that portion north of the Blanchard Line but south of Colliers Dock and within 3 miles of shore was designated the Kenai Section, and that portion north of Colliers Dock to Boulder Point within 1 mile of shore was identified as the East Foreland Section.

Closed waters at the mouth of Cannery Creek on the west side of the Inlet were redefined to be all waters within one mile of the mean lower low water terminus in order to protect milling coho salmon near the perched stream mouth.

All latitude and longitude references in regulation were changed to reflect the North American Datum of 1983. Most fishermen were already using the new charts and were not affected.

The Board also adopted new criteria to be used when considering regulation changes for Upper Cook Inlet and this language was added to the Upper Cook Inlet Salmon Management Plan. Many proposals were not specifically addressed by the Board, which chose instead to consider

broad topic areas. A number of proposals were set aside by the Board to be addressed at the November, 1996 meeting.

Throughout the 1996 season, emergency order announcements and fishery updates were provided to radio stations in Homer and the Kenai-Soldotna area and to processors, fishermen's organizations and other agencies via electronic facsimile. Emergency orders and daily escapement and harvest information were also made available through 24-hour recorded message telephone lines.

Sockeye Salmon

The harvest of nearly 3.9 million sockeye salmon represents the ninth highest catch on record and is approximately 1.5 million fish higher than the long-term average. The catch exceeded the forecast harvest of 3.3 million and was valued at \$28.6 million or 95% of the total fishery. Prices paid for sockeye were very low early in the season (\$0.75 per pound) but eventually equaled the 1995 price of \$1.15 per pound, generally paid retroactively to the beginning of the season. The distribution of the harvest between drift (57.4%) and set net gear (42.6%) was virtually identical to the long-term average.

Management of the Upper Cook Inlet sockeye salmon fishery integrates information received from a variety of programs, which together provide an in-season model of the actual return. These programs include offshore test fishing, escapement enumeration by sonar and weir, comparative analysis of historic commercial harvest and effort levels, and age composition studies. Two developing programs (genetic stock identification and in-district sonar enumeration) are beginning to provide additional information.

The offshore test fishing program employs a chartered gillnet vessel fishing standardized stations along a transect crossing Cook Inlet from Anchor Point to the Red River delta. The program provides an in-season estimation of sockeye salmon run-strength by determining fish passage rates (computed by correlating the vessel's daily catch with subsequent commercial harvests and escapement) and fitting these rates to the appropriate historic run-timing profile. In 1996-1998, the program was conducted aboard the F/V *Corrina Kay* captained by Roy Self.

Hydroacoustic devices to quantify salmon escapement into glacial rivers were first employed in Upper Cook Inlet in the Kenai and Kasilof Rivers in 1968 and expanded to the Susitna River in

1978 and the Crescent River in 1979. Operations followed standard procedures in all systems in 1996 and no unusual problems were observed. Weirs placed on Fish Creek and Packers Creek and operated by Sport Fish Division and Cook Inlet Aquaculture Association respectively provided daily escapement counts for those systems.

Upper Cook Inlet commercial catch statistics refined to gear type, area and date are available back to 1966. Availability of these statistics in a computerized database format makes them extremely valuable for evaluating in-season fishery performance.

Inseason determination of the age composition of sockeye salmon entering the principle rivers frequently provides information helpful in estimating the stock contributions in various fisheries. During the 1996 fishery approximately 27,000 sockeye salmon were examined from catch and escapement samples

Operating under the Big River Sockeye Salmon Management Plan adopted in 1989, a small set net fishery takes place in June in the northwest corner of the Central District. Between June 1 and June 24, fishing is allowed each Monday, Wednesday and Friday from 7:00 A.M. to 7:00 P.M. Permit holders are limited to a single 35-fathom net and the minimum distance between nets is 1800 feet, three times the normal separation. Targeting an early run of sockeye salmon returning to Big River, this fishery also encounters chinook salmon migrating through the area. In the plan, the bycatch of chinook is limited to 1,000 fish although harvests in recent years have been well below that level. The 1996 fishery produced a catch of 5,000 sockeye, about average, and a chinook catch of 135.

The next fishery to open is the set gill net fishery in the Western Subdistrict of the Central District. Harvesting primarily sockeye salmon bound for the Crescent River, this fishery opens on the first Monday or Friday following June 15th . The fishery has a regular schedule of two twelve-hour weekly fishing periods throughout the season unless modified by emergency order.

Following a period of record returns in the mid '80s, the Crescent River sockeye return has fallen off sharply in recent years resulting in closures of the local set net fishery and closing the southwest corner of the Central District to drift fishing the last two seasons. Despite the restrictions, success in achieving the Crescent River escapement goal has been spotty. When the 1996 initial escapement rate in the Crescent River fell below the desired level, the set net fishery south of Redoubt Point and the drift fishery west of Redoubt Point were closed until further notice from July 12 until late July. Although this approach worked well the previous season, the 1996 return proved to be too weak to achieve a satisfactory escapement level. The final sonar

count for Crescent River reached 28,729, well below the desired range of 50,000 to 100,000.

The general fishing season for Upper Cook Inlet except the Central District east side begins the first Monday or Friday after June 24. However, a special provision of the regulation calls for opening the southern portion of the east side set nets prior to July 1 if the escapement level of sockeye salmon in the Kasilof River exceeds 50,000. At the beginning of the 1996 season, this event did occur with the Kasilof count topping the 50,000 mark on June 27. The Kasilof Section of the east side set net fishery therefore opened along with most of the other fisheries on Friday, June 28. The remainder of the east side set net fishery opened on the normal date of July 1.

This portion of the season, from July through mid-August, is designated by the Upper Cook Inlet Management Plan as the time period in which salmon stocks are to be managed primarily for commercial purposes and covers the interval during which nearly all of the commercial harvest occurs. Several stocks are identified as non-target stocks for the commercial fishery – late-run Kenai River chinook, Susitna coho and early-run Kenai coho. Because of the overwhelming economic dominance of the sockeye salmon harvest, a fairly complex management program has developed centered on this species. An offshore test-fishing program provides inseason projections of the overall size of the sockeye return. Sonar counters in the Kenai, Kasilof, Yentna and Crescent Rivers as well as weirs in Fish Creek and Packers Creek provide daily estimates of instream abundance. Periodic sampling of catches in major fisheries provides age composition information, often useful in gauging the run strength of particular stocks. A fairly new genetic stock identification (GSI) program is capable of accurately determining the Kenai River component in commercial catches although inseason use of this program is very limited. Catches from each fishing period are sorted by species, gear and location by buyers and reported to the department on the day following the fishery, allowing for extensive use of comparative fishery performance data to determine the status of the return.

Based on past experience and the forecast of expected run-strength of individual stocks, the basic management strategy employed for the 1996 season followed the theme developed over the preceding decade. In general, it has been found that the sockeye return to the Susitna River would not be capable of maintaining a standard two-period-per-week schedule throughout the fishing season and still meet the escapement objective set for the Yentna River (the principle sockeye-producing tributary of the Susitna). Some reduction of fishing time, particularly in the mixed-stock drift harvest, would be required to adequately protect this stock. In contrast, Kasilof and Kenai River sockeye have demonstrated the ability to withstand a full fishing schedule. Reducing the Central District mixed-stock harvest would leave substantial surpluses of these fish

to be harvested in a more discrete manner, namely in the Central District east side set net fishery and by the drift fleet confined to a 3-mile-wide corridor along the east side. Experience had also shown that the greatest benefit in reducing the drift harvest of Susitna-bound sockeye could be gained from focusing on the period from July 10-15 when northbound fish are at their greatest abundance. Harvesting the resulting surpluses of Kenai and Kasilof River sockeye along the east side has led to higher harvests of Kenai River chinook and coho salmon.

The 1996 fishery got off to a quick start with strong early escapement into the Kasilof River allowing for the early opening of the southern portion or Kasilof Section of the eastside set nets. When the Kasilof escapement rate persisted in staying well ahead of the desired level, additional fishing was opened in the Kasilof Section on July 1, 2, 9 and 11. Standard practice allows drift gillnetting in portions of the three-mile corridor whenever adjacent sections are open for set netting but not including those hours from 10:00 P.M. to 5:00 A.M. when darkness precludes enforcement of the 3-mile line.

The July 10-15 window to reduce the drift harvest of Susitna sockeye offered two regular periods in 1996, the ones scheduled for July 12 and July 15. Sockeye salmon entering the Central District during the first half of July are prone to accumulating in rapidly increasing numbers in district before suddenly moving in large numbers to their respective rivers around mid month. The best results in reducing the Susitna catch can be achieved by restricting the fishing period immediately prior to the movement of fish out of the district. Information gathered prior to July 12 indicated that sockeye returns in general appeared to be slightly early. Therefore, the drift period scheduled for July 12 offered the greatest likelihood of providing the desired protection of northbound fish. Accordingly the drift fleet was restricted to fishing only in the 3-mile corridor for the July 12 regular period. The strategy proved successful when large numbers of fish began moving quickly toward their home rivers beginning late Saturday, July 13. Additional fishing time was opened in the Kasilof Section beginning July 14 but limited to only those set nets within one mile of shore since large numbers of Kenai bound fish were also present on these beaches. The Kenai had not as yet experienced any significant escapement. Restricting the additional fishery to only the near shore nets favors the harvest of Kasilof-bound fish although the Kenai component is still substantial. All areas fished the regular period on Monday, July 15 with the drift fleet having it's best period to date, taking 350,000 sockeye, the east side set nets taking 240,000 and the Northern District catch increasing from 3,000 on July 12 to 28,000 on July 15.

During the next week, additional fishing periods were opened on July 16 and 17 along the east side beach, escapement into the Kenai was initially very strong but began to taper off and early escapement counts at Yentna River were very strong. All areas fished the regular period on July

19. Additional fishing time on the east side was opened from 2:00 P.M. Saturday July 20 until 5:00 P.M. Sunday, July 21. With Yentna counts beginning to taper off more sharply than had been expected, the drift fleet was confined to the southern portion of the Central District for the Monday, July 22 period and set netting in the Northern District was closed. Additional fishing time was allowed along the east side starting late July 24 and continued into Monday, July 29 to slow escapement into both the Kenai and Kasilof Rivers. The drift fishery was restricted by the new Northern District Coho Salmon Management Plan to fishing only in the corridor on the July 26 regular period. Staff had estimated for the Board at the February meeting that the scheduled restriction would come on a period that would, on average, produce a catch of approximately 200,000 sockeye and 25,000 coho and it appears that estimate would have been fairly close for this season. Fishing in the corridor that day produced a catch of 85,000 sockeye and 4,000 coho. Having assumed that the two drift restrictions and the Northern District closure would adequately deal with the declining escapement at Yentna River, all areas were opened for the regular period on July 29, the last period that included sockeye salmon as a consideration for management. No further additional periods were opened along the east side, allowing the Kenai River escapement total to build toward the upper end of the goal range and assist in providing fish for the Russian River which was showing indications of a substandard return. The drift fleet, the eastside set nets and the Northern District set nets fished only standard periods for the remainder of the season.

In accordance with the Packers Creek Sockeye Salmon Management Plan, an additional fishing period was opened weekly for set nets on Kalgin Island beginning July 31 when the hatchery-enhanced Packers Creek return reached it's peak. Also, under the Fish Creek Sockeye Salmon Management Plan, three fishing periods (July 16, 21 and 23) were open for set gillnetting in Knik Arm near the terminus of Fish Creek. This fishery was quite successful, harvesting 36,000 sockeye while taking less than 2,000 coho.

Final sonar counts for sockeye salmon in the Kenai River reached 797,847 with the peak of escapement (117,296) occurring on July 15. The midpoint of the monitored escapement was reached on July 21. The goal range of 500,000 to 800,000 was satisfied close to the upper limit (Table 3). The Kasilof River total of 249,944 was just short of the upper end of the desired range of 150,000 to 250,000 with the peak day (28,125) occurring on July 14 and the midpoint reached on the same date. The Yentna River counters recorded 90,781 sockeye salmon, short of the lower end of the desired range of 100,00 to 150,000. The peak daily count of 19,675 occurred on July 17 while the midpoint was reached on July 18. Fish Creek weir counts for sockeye salmon totaled 63,160 with the highest daily count (8,056) observed on July 21 and the midpoint of the escapement reached on July 24.

Chum Salmon

Chum salmon returning to Upper Cook Inlet are bound principally for the Susitna River with much smaller returns bound for several streams in Knik and Turnagain Arms and along the west side of the Central District. The harvest occurs primarily in the drift fishery (87%), the Northern District set net fishery (7%) and the Central District west side set net fishery (6%). The timing of the Susitna River return significantly overlaps the timing of the sockeye salmon returns and as a result, management measures directed at sockeye salmon often influence the chum salmon harvest. The Susitna River chum salmon escapement is not measured and no escapement objectives are defined.

The 1996 harvest of 156,457 chum salmon was far below the long-term average of over 600,000 and nearly 400,000 below the previous season. The chum salmon catch, valued at \$212,451, accounted for just 0.7% of the exvessel value of the salmon fishery. The fairly conservative offshore drift fishery coupled with the mandatory drift restriction on July 26 under the coho management plan contributed to reducing the exploitation of the return and the resulting Susitna River escapement was subjectively judged to be poor to fair.

Chum salmon returns to Central District west side streams were also below average and harvests from these areas were below average. The new August 9 closure date for the drift fishery precluded any drift effort in Chinitna Bay and the minor set net fishery there was not active due to low prices. Chinitna Bay chum stocks were therefore generally unexploited and the resulting escapement into Clearwater Creek was quite high.

Pink Salmon

Returns to the Susitna and Kenai rivers combine to account for the majority of the pink salmon production in Upper Cook Inlet. Both rivers have abundant returns only in even-numbered years. The 1996 pink salmon return produced a harvest of 242,911 fish, far below average for an even-numbered year and easily the poorest even-year harvest on record. Pink salmon accounted for only 0.1% of the value of the salmon fishery with an exvessel value of \$44,000. No escapement objectives exist for even-year pink salmon and this species did not play a significant role in any management decision implemented during the 1996 season. Unless pink salmon are unusually

abundant, fishermen do not find it profitable to target on this species, actually actively avoiding areas of pink salmon concentrations in order to focus effort on more lucrative species. Given this behavior, the exploitation of weak pink salmon returns is thought to be quite low.

Coho Salmon

For discussion purposes, it is useful to divide Upper Cook Inlet's diverse coho salmon stocks impacted by the commercial fishery into three broad categories. The first category contains those stocks bound for the Susitna River and other Northern District streams. These migrate through the Central District during the last three weeks of July. The Cook Inlet Salmon Management Plan identifies Susitna River coho salmon as a stock that should experience a minimized commercial interception, to the extent consistent with other goals established within the Plan. While simple in concept, this directive is much more difficult to implement in practice. The management plan identifies a higher priority for the sustained commercial harvest of sockeye, chum and pink salmon stocks, many of which are bound for the same streams at similar times and along similar pathways utilized by Susitna River coho salmon stocks. Consequently, these stocks are normally exploited at fairly significant levels in the commercial drift and the Northern District set net fisheries. It is occasionally possible to time fishery closures aimed principally at stock conservation of sockeye salmon to take advantage of peaks in abundance of coho salmon but such opportunities arise too infrequently to consistently meet the Plan objectives.

The return of early- run Kenai River coho salmon peaks in abundance in early August and is intercepted in both the drift and eastside set net fisheries. The allocation status is the same as for Susitna coho salmon. Due to the overlap with the Kenai River sockeye salmon return, it is difficult to avoid a substantial interception of this stock in the commercial fishery.

The third stock grouping consists of a diverse collection of coho salmon returns to the numerous streams along the west side of Cook Inlet. Under the management plan, these stocks are managed primarily for commercial uses. Fishing time in the west side set net fisheries during August is based primarily on the strength of these returns.

The 1996 coho salmon harvest of 321,411 was equal to long-term average and accounted for 2.7% of the exvessel value of the salmon fishery. In general, coho salmon returns were about average and exhibited somewhat early run timing. Many northbound coho moved through the Central District along with the peak of the sockeye return, making the July 12 drift restriction for northern sockeye particularly effective in reducing the coho catch. Incidental harvest of Kenai-

bound coho was likely lower than would normally be the case since additional fishing time in the east side set net fishery was concluded by July 29, about a week earlier than normal. Freshwater abundance of both these stocks is not directly measured but the Yentna sonar index was quite high and seemed to be correlated with angler success while Kenai River coho seemed fairly abundant in early August but tapered off rapidly.

The west side coho salmon returns were generally average to above-average and fishing in these areas was extended to three weekly periods beginning August 14 for the remainder of the fishing season. Late-season effort was very light due to very low prices for coho.

Chinook Salmon

The 1996 commercial harvest of 14,248 chinook salmon was well below the long-term average and the lowest since 1991. Valued at \$403,000, chinook represented 1.4% of the value of the salmon fishery, more than pink and chum salmon combined.

The principle stocks of chinook salmon harvested in the commercial fishery are the return to the Susitna River and the late run to the Kenai River. Created by the Board six years previous and conducted under the direction of the Northern District King Salmon Management Plan, a minor fishery occurs each June for set gillnets in the Northern District. Each participant is allowed one 35 fathom net and a minimum distance of 1200 feet must be maintained between nets (twice the normal distance). Fishing is permitted for 6 hours each Monday in June until the quota of 12,500 chinook has been harvested or the regular season opens on June 25. Harvest levels approached or reached the quota in the first years of the fishery but have declined substantially in recent years as Susitna River chinook salmon run strength has dropped.

In concert with management restrictions of the Northern District recreational fisheries, for the last two seasons the commercial fishery has been limited by emergency order to a single fishing period. The 1996 fishing period on June 3 produced a catch of 1,679, the smallest catch on record for this fishery.

The other major stock of chinook salmon harvested in the commercial fishery, the late run to the Kenai River, generates the greatest controversy in Upper Cook Inlet, pitting Kenai River recreational anglers against Upper Subdistrict ("eastside") set netters. An average of over 13,000 chinook salmon were taken annually during the 1980's in the commercial set net fishery, frequently exceeding the sport fish harvest. Much smaller numbers are taken in the drift gillnet

fishery.

Throughout the course of the sockeye fishery, the projected spawning escapement of Kenai River chinook remained well above the optimum level of 22,300 and, therefore, none of the restrictive elements of the Kenai River Late-Run Chinook Salmon Management Plan were invoked. The eastside set net catch of 11,400 chinook salmon was about average for this fishery. The harvest was spread fairly evenly over the eastside beach areas with Ninilchik (244-21), Cohoe (244-22), Kalifonsky (244-30) and Salamatof (244-40) averaging 35, 26, 24 and 15 chinook salmon per permit holder, respectively. A total of 58 chinook salmon were reported as retained for personal use by commercial fishermen, 43 of those coming from the Central District eastside set net fishery.

1997 COMMERCIAL SALMON FISHERY

The commercial harvest of 4.5 million salmon in Upper Cook Inlet in 1997 was just slightly below the previous year and about 500,000 fish above the long-term average. A modest improvement in the sockeye salmon harvest coupled with a stable sockeye price produced an overall exvessel value of \$32.4 million, up \$2.7 million from 1996.

The Alaska Board of Fisheries made several changes to the Upper Cook Inlet commercial fishing regulations for the 1997 season that directly affected the commercial fishery. The Kenai River sockeye salmon sonar goal, as defined in 5 AAC 21.360 Kenai River Late Run Sockeye Salmon Management Plan, changed from a range of 550,000 to 800,000 to a new range of 550,000 to 825,000 for the 1997 season and 550,000 to 850,000 beginning with the 1998 season. The new goals can be reduced by the Board in the future if "non-commercial fishing, after consideration of mitigation efforts, results in a net loss of habitat units on the Kenai River...".

The Board amended the Northern District Chinook Salmon Management Plan by closing that portion of the Northern District from one mile south of the Theodore River to the Susitna River during the directed king salmon fishery in early June.

The Board delayed the start of the fishing season for set gillnetting in the East Forelands and Kenai Sections of the Upper Subdistrict (that portion north of the Blanchard Line) until the first regular period on or after July 8. The set gillnetting season would now end earlier in all sections of the Upper Subdistrict with the season closing date being the first regular period on or after August 10 rather than a fixed closing date of August 15.

Under new regulations, Upper Subdistrict setnetters could now register and obtain buoy stickers in groups, which allows the use of a buoy sticker trailer buoy with any of the nets belonging to multiple permit holders as long as they are registered as a group.

Sockeye Salmon

The 1997 commercial harvest of nearly 4.2 million sockeye salmon represents the eighth highest catch on record and is approximately 1.8 million fish higher than the long-term average but nearly a million fish below the average of the preceding ten years. The catch fell 1.1 million fish short of the forecast harvest of 5.3 million and was valued at \$31.4 million or 97% of the total fishery. As has become commonplace, prices paid for sockeye were very low early in the season (\$0.75 per pound) but eventually equaled the 1996 price of \$1.15 per pound, generally paid retroactively to the beginning of the season. The distribution of the harvest between drift (52.6%) and set net gear (47.4%) was shifted in favor of set nets by a few percentage points from the long-term average, due at least in part to the fishing pattern that provided fewer unrestricted drift periods.

The 1997 Big River fishery produced a catch of 2,400 sockeye, the lowest on record for this fishery and less than half the average, and a chinook catch of just 86, the lowest on record. Effort was atypically light with just 10 permits making landings at the peak of the fishery. Past years had seen effort levels peak at about 20 permits.

The next fishery to open was the set gill net fishery in the Western Subdistrict of the Central District. Harvesting primarily sockeye salmon bound for the Crescent River, this fishery opens on the first Monday or Friday following June 15th. Based largely on the very poor escapement achieved in 1996, the management strategy for 1997 was more pre-emptive in nature, with the Western Subdistrict south of Redoubt Point closed to set netting and drift fishing restricted to east of 152 degrees 25 minutes N lat. beginning June 30 when the Crescent River sonar counters were installed. Initial escapement values were quite good and the fishery restrictions were lifted beginning July 14. The Crescent River escapement totaled 70,768 sockeye salmon, comfortably within the 50,000 – 100,000 fish goal range. The Western Subdistrict sockeye salmon harvest was just under 12,000 fish, the worst year on record. Limnological samples gathered from Crescent Lake throughout the summer revealed that zooplankton populations remain severely depressed and the short-term outlook for sockeye salmon production from this system remains bleak.

The general fishing season for Upper Cook Inlet except the Central District east side begins the first Monday or Friday after June 24. However, a special provision of the regulation calls for opening the southern portion of the east side set nets (the Kasilof Section) prior to July 1 if the escapement level of sockeye salmon in the Kasilof River exceeds 50,000. At the beginning of the 1997 season, this event did occur with the Kasilof count topping the 50,000 mark on June 25. The Kasilof Section therefore opened along with most of the other fisheries on Friday, June 27. The remainder of the east side set net fishery (the Kenai and East Foreland Sections) opened on the new regulatory date of July 11 (the first regular period on or after July 10.)

Based on past experience and the forecast of expected run-strength of individual stocks, the basic management strategy employed for the 1997 season followed the theme developed over the preceding decade – limiting offshore drift catches to insure adequate passage of fish into the Northern District and deal with the remaining surpluses in the drift corridor and east side set net fisheries. The strong, early escapement into the Kasilof River that allowed for the early opening of the Kasilof Section of the eastside set nets persisted in staying well ahead of the desired level and additional fishing was opened in the Kasilof Section on July 2, July 4-5, and July 7-10. Standard practice allowed drift gillnetting in portions of the three-mile corridor whenever adjacent sections are open for set netting but not including those hours from 10:00 P.M. to 5:00 A.M. when darkness precludes enforcement of the 3-mile line.

The July 10-15 “window” coinciding with the peak abundance in the Central District of Susitna sockeye encompassed two regular periods in 1997, the ones scheduled for July 11 and July 14. With run-timing appearing to be slightly early, the drift period scheduled for July 11 appeared to offer the greatest likelihood of providing the desired protection of northbound fish. Accordingly the drift fleet was restricted to fishing only in the 3-mile corridor for the July 11 regular period. The strategy proved successful when significant numbers of fish began moving quickly toward their home rivers beginning July 10. Additional fishing time for both set and drift nets was opened in the Kenai and Kasilof Sections on July 13 to stem the rapidly rising escapement levels in both the Kenai and Kasilof Rivers. All areas fished the regular period on Monday, July 14 with the drift fleet having its best period to date, taking just under 300,000 sockeye, the east side set nets taking 65,000 and the Northern District catch increasing from 17,000 on July 11 to 30,000 on July 14.

During the next week, an additional fishing period was opened on July 17 in the Kenai and Kasilof Sections, as escapement into the Kenai remained strong. Early escapement counts at Yentna River were strong but faded after a few days. In order to provide additional protection to Susitna-bound fish, the drift fleet was restricted to the corridor for the regular period on Friday, July 18 and the Northern District was closed. Additional fishing time in the Kenai and Kasilof Sections was permitted from July

19 until the regular period on July 21 when the drift fleet was again restricted to the corridor and the Northern District closed as daily Yentna River counts remained light. Through July 20, the Yentna had achieved only 50% of the minimum counts required, the Kenai had achieved its' minimum goal and the Kasilof was well within its' desired range. Beginning at noon, July 23 the Kenai and Kasilof Sections were opened and remained opened nearly constantly through August 4 as maximum goals were achieved in both the Kenai and Kasilof Rivers. The drift fleet was confined to the corridor for the regular period on July 28 in accordance with the provisions of the Northern District Coho Salmon Management Plan. Yentna River counts improved sharply on July 21 and no further actions were necessary as the upper end of the desired escapement range was achieved and ultimately exceeded.

Under the Fish Creek Sockeye Salmon Management Plan, three fishing periods (July 15, 20 and 22) were scheduled to be open for set gillnetting in Knik Arm near the terminus of Fish Creek. When poor fishing results from the first two periods coupled with very poor escapement values in Fish Creek indicated a substandard return, the final period was closed and personal use dipnetting within the creek suspended. The commercial harvest of just 13,000 sockeye was one of the smallest harvests on record and the catch of 117 coho salmon was by far the smallest on record, reflecting the early end to the fishery and late run-timing and poor run-strength for coho.

Final sonar counts for sockeye salmon in the Kenai River reached 1,064,818 with the peak daily count (84,110) and the midpoint both occurring on July 18. The goal range of 500,000 to 825,000 was exceeded by a substantial margin. The Kasilof River total of 266,025 exceeded the upper end of the desired range of 150,000 to 250,000 with the peak day (13,026) occurring on June 26 and the midpoint reached on July 4. The Yentna River counters recorded 157,822 sockeye salmon, exceeding for the first time the upper end of the desired range of 100,000 to 150,000. The peak daily count of 10,491 occurred on July 22 while the midpoint was reached on July 24. Fish Creek weir counts for sockeye salmon totaled 54,656 with the highest daily count (5,105) observed on July 24 and the midpoint of the escapement reached on July 31.

Chum Salmon

The 1997 harvest of 103,036 chum salmon was lowest on record, far below the long-term average of just under 600,000. The chum salmon catch, valued at \$143,000, accounted for just 0.4% of the exvessel value of the salmon fishery. The very conservative offshore drift fishery coupled with the mandatory drift restriction on July 27 under the coho management plan contributed to reducing the exploitation of the return and the resulting Yentna River apportioned escapement, while poor, was not as bad as the harvest would suggest. The 1997 return was no doubt poor in strength, as many recent

chum salmon returns have been, but was subjected to very light harvest pressure.

Pink Salmon

The 1997 pink salmon return produced a harvest of 70,928 fish, about average for an odd-numbered year. Pink salmon accounted for less than 0.1% of the value of the salmon fishery with an exvessel value of \$12,000. No escapement objectives exist for odd-year pink salmon and this species did not play a role in any management decision implemented during the 1997 season. Unless pink salmon are unusually abundant, fishermen do not find it profitable to target on this species, actually actively avoiding areas of pink salmon concentrations in order to focus effort on more lucrative species. Given this behavior, the exploitation of weak pink salmon returns is thought to be quite low.

Coho Salmon

The 1997 coho salmon harvest of 152,404 was the lowest in 25 years and was about half of the long-term average. Coho salmon accounted for 1.3% of the exvessel value of the salmon fishery. In general, coho salmon returns were well below average in run strength and exhibited somewhat late run timing. District-wide drift periods were too infrequent to define the peak of abundance of Susitna-bound fish but exploitation was undoubtedly light due to the sockeye-related restrictions both in the drift fleet and the Northern District set net fisheries. Although coho abundance monitoring in freshwater systems is very limited, by early August all signs were pointing to very weak coho salmon returns. Despite the limited commercial exploitation due to sockeye-related restrictions, coho abundance appeared very poor in virtually all systems. In response, all Upper Cook Inlet commercial fishing was closed for the season on August 7 and all freshwater recreational fisheries except those targeting hatchery fish were limited to no bait and a single fish bag limit. Because escapement monitoring is so limited, it is difficult to measure the success of the fishery restrictions. Word-of-mouth input described instream coho abundance ranging from good to poor.

Chinook Salmon

The 1997 commercial harvest of 13,235 chinook salmon was well below the long-term average and the lowest since 1984. Valued at \$365,000, chinook represented 1.1% of the value of the salmon fishery, more than pink and chum salmon combined.

In concert with management restrictions of the Northern District recreational fisheries, for the last several seasons the commercial fishery has been limited by emergency order to a single fishing period. In 1997, the fishing period on June 2 produced a catch of 834, a very light catch influenced by poor tidal and weather conditions. When freshwater abundance of many stocks, particularly the Deshka River, proved to be very strong, the final scheduled period on June 23 was opened by emergency order although only a modest number of fish (47) were taken.

Throughout the course of the 1997 sockeye fishery the projected spawning escapement of Kenai River chinook remained well above the optimum level of 22,300 and, therefore, none of the restrictive elements of the Kenai River Late-Run Chinook Salmon Management Plan were invoked. The eastside set net catch of 11,281 chinook salmon was about average for this fishery. The harvest was spread fairly evenly over the eastside beach areas with Ninilchik (244-21), Cohoe (244-22), Kalifonsky (244-30) and Salamatof (244-40) averaging 25, 27, 24 and 17 chinook salmon per permit holder, respectively. A total of 57 chinook salmon were reported as retained for personal use by commercial fishermen, 44 of those coming from the Central District eastside set net fishery.

1998 COMMERCIAL SALMON FISHERY

The commercial harvest of just over 2.0 million salmon in Upper Cook Inlet in 1998 was less than half that of the previous year and about half the long-term average. A dramatic drop in the sockeye salmon harvest resulted in a much reduced exvessel value of \$9.5 million, down \$22.9 from 1997 and the lowest exvessel value since 1975.

The Alaska Board of Fisheries made only one change to the Upper Cook Inlet commercial fishing regulations for the 1998 season that directly affected the commercial fishery. The Kenai River sockeye salmon sonar goal, as defined in 5 AAC 21.360 Kenai River Sockeye Salmon Management Plan, changed from a range of 550,000 to 825,000 to a new range of 550,000 to 850,000 for the 1998 season, the last of three scheduled incremental increases in the upper end of the goal.

Sockeye Salmon

The 1998 commercial harvest of just over 1.2 million sockeye salmon represents the poorest catch in nearly 20 years, is approximately a half million fish lower than the long-term average and is only 26%

of the average of the preceding ten years. The catch was less than half of the forecast harvest of 2.5 million and was valued at \$8.8 million or 92.6% of the total fishery. As has become commonplace, prices paid for sockeye were very low early in the season (\$0.75 per pound) but eventually equaled the 1997 price of \$1.15 per pound, generally paid retroactively to the beginning of the season. The distribution of the harvest between drift (49.2%) and set net gear (50.8%) was shifted in favor of set nets by 6 percentage points from the long-term average.

The first targeted sockeye salmon fishery of the season, the small set net fishery at Big River, produced a catch of 2,600 sockeye, one of the poorer harvests on record for this fishery and less than half the average, and a chinook catch of just 78, the lowest on record. Effort was atypically light with just 7 permits making landings at the peak of the fishery. Past years had seen effort levels peak at about 20 permits.

The next fishery to open was the set gill net fishery in the Western Subdistrict of the Central District. Harvesting primarily sockeye salmon bound for the Crescent River, this fishery opens on the first Monday or Friday following June 15th. Based largely on the successful attainment of the goal at Crescent River in 1997, the management strategy for 1998 was similar, being pre-emptive in nature with the Western Subdistrict south of Redoubt Point closed to set netting and drift fishing restricted to east of 152 degrees 25 minutes N lat. beginning June 26, just prior to installation of the Crescent River sonar counters. Initial escapement values were mediocre but increased markedly in mid-July and the fishery restrictions were lifted beginning July 20. The Crescent River escapement totaled 62,257, comfortably within the 50,000 – 100,000 fish goal range. The Western Subdistrict sockeye salmon harvest was just under 20,000 fish, less than half the long-term average but nearly double the previous year's harvest in this area. An ongoing program of gathering limnological samples from Crescent Lake throughout the summer continued to profile zooplankton populations that remain severely depressed.

The general fishing season for Upper Cook Inlet except the Central District east side begins the first Monday or Friday after June 24. The southern portion (Kasilof Section) of the east side set nets opens on the first regular period beginning July 1 while the northern portion (Kenai and East Foreland Sections) begins fishing on the first regular period on or after July 8. A special provision of the regulation calls for opening the Kasilof Section prior to July 1 if the escapement level of sockeye salmon in the Kasilof River exceeds 50,000. At the beginning of the 1998 season, the Kasilof count exceeded the 50,000 mark on June 29 and the Kasilof Section set nets were open for the regular period occurring on that date. The remainder of the east side set net fishery (the Kenai and East Foreland Sections) opened on the regulatory date of July 10 (the first regular period on or after July 8.)

The strong, early escapement into the Kasilof River that allowed for the early opening of the Kasilof Section of the eastside set nets persisted in staying well ahead of the desired level and additional fishing was opened in the Kasilof Section on July 11 and July 15. Standard practice allows drift gillnetting in the offshore portions of this corridor whenever adjacent sections are open for set netting but not including those hours from 10:00 P.M. to 5:00 A.M. when darkness precludes enforcement of the offshore boundary. The east side-oriented drift area had for many years been comprised of a corridor along the Kenai Peninsula following the contours of the beach and having an offshore boundary of 3 miles. The three-mile contour boundary required use of a patrol vessel for enforcement, was difficult for fishermen to locate precisely and included some waters thought to be prone to mixed stock catches. Extensive discussions between staff, enforcement officers and fishermen prior to the season resulted in an offshore boundary described by a series of fixed points. While the new line closely resembled the old three-mile boundary, provisions were made to exclude potential mixed stock areas, add waters thought to provide target stock catches, and remain as user-friendly as possible for fishermen attempting to drift within the line while dealing with rapid tidal flow. Use of GPS navigation technology allowed fishermen to determine the location of the line with high precision and allowed enforcement to utilize patrol aircraft to take the place of vessels for much of the time. The new line was adopted by emergency order at the beginning of the season and was utilized whenever east side-limited drift fishing was employed. The results appeared to be very satisfactory for all involved although the weak return of Kenai River sockeye salmon precluded substantial use of the new boundary. The new line definition, slightly altered based on the experience of 1998, will be considered by the Board of Fisheries for permanent adoption into regulation prior to the 1999 fishing season.

The July 10-15 "window" coinciding with the peak abundance in the Central District of Susitna sockeye encompassed two regular periods in 1998, the ones scheduled for July 10 and July 13. Assessment of timing suggested the greatest savings of north-bound sockeye was likely to occur on the July 13 period and the drift fleet was restricted to fishing only in the east side corridor for that period. The expected rapid increase in escapement began occurring on July 15 with sonar counts escalating in the Kenai and Kasilof Rivers on July 16. With initial escapements proceeding satisfactorily, all areas fished the regular period on Friday, July 17 with the drift fleet having it's best period to date, taking 187,000 sockeye, the east side set nets taking 149,000 and the Northern District catch increasing from 2,000 on July 13 to 20,000 on July 17.

The fishing period results were illuminating. The drift catch was considerably lower than might be expected given the date and the forecast run-strength. It was the first strong indicator that the Kenai River return might be below expectations. The Northern District catch was also disappointing and indicated that additional management measures might be required to assure adequate Yentna River escapement.

After the initial entry of sockeye into the Kenai (a daily count of 36,000 on July 17), daily counts subsided on following days and, given the poor results of the July 17 fishing period, the period scheduled for Monday, July 20 was closed for the drift fleet, the Northern District set nets and all east side set nets except for those in the Kasilof Section within ½ mile of shore. Although Kenai entry had begun to improve by the end of the week, the cumulative count had only reached 250,000 by July 23 and offshore test fishing daily indices were not indicating a substantial buildup of fish entering the Central District. After three consecutive days of strong counts at the Yentna River counter on July 19-21, counts there also began to tail off. The scheduled fishing period on Friday, July 24 was closed for drifting and the east side set nets and the periods on Monday, July 27 and Friday, July 31 closed to drifting, the east side set nets and the Northern District set nets. It should be noted here that the Board-mandated restriction of the July 27 drift period under the Northern District Coho Salmon Management Plan became moot when the drift fishery for that period was closed in its entirety for sockeye conservation reasons by emergency order. Rapid entry of fish into the Kenai and Kasilof beginning July 31 triggered fishing time for the east side set nets and corridor drifting over the weekend and all areas fished the remaining regular periods as escapement goals in all major systems were attained or exceeded. The Kasilof escapement totaled 273,213, above the desired range of 150,000-250,000. The Kenai sonar count reached 767,558, well within the desired range of 550,000-850,000 and the final Yentna count was 119,623, near the midpoint of the 100,000-150,000 goal.

Under the Fish Creek Sockeye Salmon Management Plan, three fishing periods (July 19, 21 and 26) were scheduled to be open for set gillnetting in Knik Arm near the terminus of Fish Creek. When very poor fishing results from the first period coupled with very poor escapement values in Fish Creek indicated a substandard return, the remaining two periods were closed and personal use dip netting within the creek suspended. The commercial harvest of just 2,600 sockeye was the smallest on record and the catch of 548 coho salmon one of the smallest on record, as might be expected with the severely truncated fishery. The Fish Creek sockeye salmon escapement totaled just 22,853, less than half of the 50,000 fish goal.

Chum Salmon

The 1998 harvest of 95,654 chum salmon was lowest on record, far below the long-term average of just under 600,000 and just slightly below the previous year's harvest. The chum salmon catch, valued at \$127,000, accounted for just 1.3% of the exvessel value of the salmon fishery. The extraordinarily conservative offshore drift and Northern District set net fisheries afforded a great deal of protection to the poor chum return. The Yentna River apportioned escapement remained rather poor although many

reports were received from recreational anglers throughout the Susitna River drainage that chum abundance was considerably higher than it had been in many years. The 1998 return was most likely poor in strength, as many recent chum salmon returns have been, but was subjected to extremely very light harvest pressure.

Pink Salmon

The 1998 pink salmon return produced a harvest of 551,260 fish, the highest even-year catch since 1992 but only about 40% of the long-term average even-year harvest. Pink salmon accounted for 1.0% of the value of the salmon fishery with an exvessel value of \$96,000. No escapement objectives exist for pink salmon and this species did not play a direct role in any management decision implemented during the 1998 season. Unless pink salmon are unusually abundant, fishermen do not find it profitable to target on this species, actually actively avoiding areas of pink salmon concentrations in order to focus effort on more lucrative species. Given this behavior and the extremely restrictive nature of the 1998 fishery due to poor sockeye returns, the exploitation of the various pink salmon returns is thought to be very modest. Informal observations in both the Susitna and Kenai drainages indicated that spawner abundance was the highest in many years.

Coho Salmon

The 1998 coho salmon harvest of 160,644 was about half of the long-term average. Coho salmon accounted for \$281,000 or 1.3% of the exvessel value of the salmon fishery. In general, coho salmon returns appeared to be average in run strength. Due to widespread sockeye salmon conservation concerns, district-wide drift and set net fishing periods were too infrequent to define the peak of abundance of Susitna-bound fish but exploitation was undoubtedly unusually light in both the drift and set net fisheries. Word-of-mouth input described instream coho abundance ranging from good to excellent throughout Upper Cook Inlet drainages.

Chinook Salmon

The 1998 commercial harvest of 7,997 chinook salmon was less than half the long-term average and the lowest since 1975. Valued at \$200,000, chinook represented 2.1% of the value of the salmon fishery, roughly equal to pink and chum salmon combined.

It has been the policy of the Board to maintain the balance between user groups defined in the Northern District Chinook Salmon Management Plan when dealing with the rise and fall in abundance of Northern District chinook stocks on an annual basis through Department-generated emergency orders. For 1998, with an outlook of improved general run strength, harvest potential in sport fisheries were slightly liberalized (primarily by the reopening of the Deshka River fishery) and the commercial fishery, which had been limited to a single fishing period during poor runs, was allowed a second period. The harvest of just over 2,000 chinook salmon in the commercial fishery was rather modest as it appeared overall run strength was very good, and escapement objectives were achieved or exceeded in nearly all monitored streams.

During the latter part of July, the projected spawning escapement of late-run Kenai River chinook fell below the target level of 22,300, prompting a no-bait restriction in the recreational fishery on July 23. When projections failed to improve by July 28, the restriction was expanded to catch-and-release. Restriction of the commercial set net fishery was not called for under the management plan, a moot point since extended closures of this fishery were in place to conserve sockeye salmon. Late entry of chinook pushed the final spawning escapement level to more than 28,000, well above the optimum target. The recreational harvest is estimated to be 5,981 and the eastside set net harvest totaled 5,039.

STOCK STATUS AND OUTLOOK

In general, Upper Cook Inlet's salmon stocks remain in good condition although several areas merit some discussion. The overall return of sockeye salmon in 1998 was below expectations and the harvest level of only 1.2 million is considered very poor. Generally, it appeared that marine rearing conditions were less than optimal and, should these conditions persist, overall production will remain below recent levels. Monitoring of sockeye salmon fry abundance in the freshwater rearing areas of the Kenai River indicate a more acute problem for that system. Based on the number of fry observed in Kenai and Skilak Lakes in recent years indicates this system will have very poor returns in both 1999 and 2000. A significant upturn should occur in 2001. After experiencing record-level returns through the mid to late '80's, the Crescent River sockeye salmon run declined dramatically and has remained very poor. Limnological assessment work done in the past four years clearly indicates a dramatic drop in available zooplankton in Crescent Lake, which is no doubt responsible for the lack of juvenile fish production. The drop in zooplankton appears to be the result of increased turbidity in the lake, limiting light penetration and primary productivity. The Department is reducing the biological escapement goal (BEG) for this system from a range of 50,000 to 100,000 to a range of 25,000 to 50,000, reflecting the decreased capability of this system to rear juvenile fish. Staff will continue to monitor rearing conditions in Crescent Lake and adjust spawning escapement goals if conditions change. Recent returns of sockeye salmon to Fish Creek in Knik Arm have been relatively poor, particularly the 1998 return which experienced minimal harvest and produced less than 50% of the desired escapement. No causative factors for these poor returns are apparent and the outlook for this system is unknown. For 1999, the expected total return of sockeye salmon is forecast to be 3.5 million and the harvest should equal 2.0 million.

Chum salmon production has been relatively poor in recent years, in part due to after-effects of the catastrophic 1986 fall flooding of the Susitna Basin, but likely also due to poor general environmental factors. Chum salmon stocks throughout central Alaska have shown a similar drop in productivity. While the Department lacks quantitative escapement information, chum salmon escapement has undoubtedly been augmented by management actions or regulatory changes aimed principally at other species. Significant reductions in offshore drift and Northern District set net fishing time to conserve Yentna River sockeye, the adoption of a Northern District Coho Salmon Management Plan further limiting these two fisheries, lack of a directed chum salmon fishery in Chinitna Bay due to market conditions, and reduced efforts aimed at chum salmon in the drift fishery due to low abundance and value have combined to significantly reduce chum exploitation and no further major conservation measures aimed specifically at chum salmon appear to be warranted.

Until this past season, the situation with Upper Cook Inlet's pink salmon stocks closely paralleled that of chum salmon. Since the late 80's, pink salmon runs had been greatly reduced in strength and changes in management practices and regulations served to greatly limit harvest. The 1998 returns, however, saw a major increase in pink abundance in both the Susitna and Kenai River drainages. While harvest was severely limited, much improved freshwater abundance was readily apparent. While the 1998 returns cannot be characterized as strong, they did represent a major improvement over recent returns.

Upper Cook Inlet's coho salmon stocks generally produced very strong returns throughout most of the 1980's and early 1990's but the 1997 return appeared to be quite substandard in most drainages. Fortunately, the weak 1997 return appears to have been a singular event with most observed returns in 1998 being much improved. Downturns in Kenai River coho salmon smolt production appear to be reversing but careful monitoring of this stock will continue. Staff will be requesting the Board to consider a suite of options aimed at improving coho escapement in Knik Arm.

After experiencing a significant downturn in the early to mid '90s, Northern District chinook salmon stocks continue to trend significantly upward and no generalized conservation issues are currently applicable. Late-run Kenai River chinook salmon returns have been relatively stable and escapement objectives have been consistently achieved. The staff will request the Board to consider adoption of a more simplified management plan for this stock that more accurately reflects inseason management capabilities.

Table 1. Upper Cook Inlet commercial salmon harvest by species, 1954-1998.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1954	63,780	1,207,046	321,525	2,189,207	510,068	4,291,626
1955	45,926	1,027,528	170,777	101,680	248,343	1,594,254
1956	64,977	1,258,789	198,189	1,595,375	782,051	3,899,381
1957	42,158	643,712	125,434	21,228	1,001,470	1,834,002
1958	22,727	477,392	239,765	1,648,548	471,697	2,860,129
1959	32,651	612,676	106,312	12,527	300,319	1,064,485
1960	27,512	923,314	311,461	1,411,605	659,997	3,333,889
1961	19,737	1,162,303	117,778	34,017	349,628	1,683,463
1962	20,210	1,147,573	350,324	2,711,689	970,582	5,200,378
1963	17,536	942,980	197,140	30,436	387,027	1,575,119
1964	4,531	970,055	452,654	3,231,961	1,079,084	5,738,285
1965	9,741	1,412,350	153,619	23,963	316,444	1,916,117
1966	8,544	1,852,114	289,837	2,005,745	532,756	4,688,996
1967	7,859	1,380,062	177,729	32,229	296,837	1,894,716
1968	4,536	1,104,904	469,850	2,278,197	1,119,114	4,976,601
1969	12,397	692,175	100,777	33,383	269,847	1,108,579
1970	8,336	732,605	275,399	814,895	776,229	2,607,464
1971	19,765	636,303	100,636	35,624	327,029	1,119,357
1972	16,086	879,824	80,933	628,574	630,103	2,235,520
1973	5,194	670,098	104,420	326,184	667,573	1,773,469
1974	6,596	497,185	200,125	483,730	396,840	1,584,476
1975	4,787	684,752	227,379	336,333	951,796	2,205,047
1976	10,865	1,664,150	208,695	1,256,728	469,802	3,610,240
1977	14,790	2,052,291	192,599	553,855	1,233,722	4,047,257
1978	17,299	2,621,421	219,193	1,688,442	571,779	5,118,134
1979	13,738	924,415	265,166	72,982	650,357	1,926,658
1980	13,798	1,573,597	271,418	1,786,430	390,675	4,035,918
1981	12,240	1,439,277	484,411	127,164	833,542	2,896,634
1982	20,870	3,259,864	793,937	790,648	1,433,866	6,299,185
1983	20,634	5,049,733	516,322	70,327	1,114,858	6,771,874
1984	10,062	2,106,714	449,993	617,452	680,726	3,864,947
1985	24,088	4,060,429	667,213	87,828	772,849	5,612,407
1986	39,240	4,787,982	756,830	1,299,360	1,134,173	8,017,585
1987	39,661	9,500,186	451,404	109,801	349,139	10,450,191
1988	29,060	6,834,342	560,022	469,972	708,573	8,601,969
1989	26,742	5,010,698	339,201	67,430	122,027	5,566,098
1990	16,105	3,604,064	500,634	603,630	351,197	5,075,630
1991	13,535	2,177,576	425,724	14,663	280,223	2,911,721
1992	17,171	9,108,340	468,911	695,859	274,303	10,564,584
1993	18,719	4,754,698	306,822	100,918	122,767	5,303,924
1994	20,260	3,567,392	580,567	520,481	299,300	4,988,000
1995	17,857	2,951,827	446,954	133,575	529,422	4,079,635
1996	14,248	3,888,778	321,411	242,911	156,457	4,623,805
1997	13,235	4,176,696	152,404	70,928	103,036	4,516,299
1998	7,997	1,218,956	160,644	551,260	95,654	2,034,511
Average						
45 Year	19,951	2,383,315	318,056	709,328	571,628	4,002,279
10 Year	16,587	4,045,903	370,327	300,166	233,439	4,966,421

Table 2. Approximate exvessel value of Upper Cook Inlet commercial salmon harvest by species, 1960-1998.

Year	Chinook	%	Sockeye	%	Coho	%	Pink	%	Chum	%	Total
1960	\$ 140,000	5.0%	\$ 1,334,000	47.9%	\$ 307,000	11.0%	\$ 663,000	23.8%	\$ 343,000	12.3%	\$ 2,787,000
1961	\$ 100,000	4.7%	\$ 1,687,000	79.4%	\$ 118,000	5.6%	\$ 16,000	0.8%	\$ 204,000	9.6%	\$ 2,125,000
1962	\$ 100,000	2.5%	\$ 1,683,000	42.3%	\$ 342,000	8.6%	\$ 1,274,000	32.0%	\$ 582,000	14.6%	\$ 3,981,000
1963	\$ 89,000	4.6%	\$ 1,388,000	72.3%	\$ 193,000	10.1%	\$ 13,000	0.7%	\$ 236,000	12.3%	\$ 1,919,000
1964	\$ 20,000	0.5%	\$ 1,430,000	38.9%	\$ 451,000	12.3%	\$ 1,131,000	30.8%	\$ 646,000	17.6%	\$ 3,678,000
1965	\$ 50,000	2.0%	\$ 2,099,000	82.1%	\$ 109,000	4.3%	\$ 70,000	2.7%	\$ 230,000	9.0%	\$ 2,558,000
1966	\$ 50,000	1.2%	\$ 2,727,000	64.4%	\$ 295,000	7.0%	\$ 823,000	19.4%	\$ 338,000	8.0%	\$ 4,233,000
1967	\$ 49,000	1.9%	\$ 2,135,000	82.6%	\$ 187,000	7.2%	\$ 13,000	0.5%	\$ 202,000	7.8%	\$ 2,586,000
1968	\$ 30,000	0.7%	\$ 1,758,000	40.4%	\$ 515,000	11.8%	\$ 1,209,000	27.8%	\$ 843,000	19.4%	\$ 4,355,000
1969	\$ 70,000	4.0%	\$ 1,296,697	73.9%	\$ 134,003	7.6%	\$ 18,291	1.0%	\$ 236,404	13.5%	\$ 1,755,394
1970	\$ 89,382	3.0%	\$ 1,190,303	39.9%	\$ 468,179	15.7%	\$ 456,354	15.3%	\$ 780,622	26.2%	\$ 2,984,840
1971	\$ 189,504	9.2%	\$ 1,250,771	61.0%	\$ 137,815	6.7%	\$ 18,402	0.9%	\$ 454,483	22.2%	\$ 2,050,974
1972	\$ 224,396	6.3%	\$ 1,863,177	52.6%	\$ 137,315	3.9%	\$ 478,246	13.5%	\$ 840,057	23.7%	\$ 3,543,192
1973	\$ 121,156	2.0%	\$ 3,225,847	52.3%	\$ 318,950	5.2%	\$ 362,658	5.9%	\$ 2,135,025	34.6%	\$ 6,163,635
1974	\$ 209,712	3.2%	\$ 3,072,221	46.8%	\$ 843,048	12.8%	\$ 919,916	14.0%	\$ 1,517,637	23.1%	\$ 6,562,535
1975	\$ 63,990	1.0%	\$ 2,628,036	39.2%	\$ 838,859	12.5%	\$ 419,173	6.3%	\$ 2,752,555	41.1%	\$ 6,702,612
1976	\$ 274,172	2.0%	\$ 8,668,095	63.4%	\$ 819,006	6.0%	\$ 1,874,915	13.7%	\$ 2,041,225	14.9%	\$ 13,677,413
1977	\$ 523,776	2.4%	\$ 13,318,720	61.8%	\$ 932,540	4.3%	\$ 767,273	3.6%	\$ 5,995,611	27.8%	\$ 21,537,920
1978	\$ 661,375	2.0%	\$ 26,167,741	80.3%	\$ 1,380,312	4.2%	\$ 2,154,176	6.6%	\$ 2,217,510	6.8%	\$ 32,581,114
1979	\$ 616,360	4.2%	\$ 8,093,280	55.3%	\$ 1,640,277	11.2%	\$ 82,339	0.6%	\$ 4,199,765	28.7%	\$ 14,632,021
1980	\$ 414,771	3.2%	\$ 7,937,699	61.7%	\$ 891,098	6.9%	\$ 2,114,283	16.4%	\$ 1,513,960	11.8%	\$ 12,871,810
1981	\$ 424,390	2.3%	\$ 11,080,411	60.1%	\$ 2,623,598	14.2%	\$ 170,038	0.9%	\$ 4,150,158	22.5%	\$ 18,448,596
1982	\$ 763,267	2.4%	\$ 25,154,115	80.0%	\$ 4,080,570	13.0%	\$ 553,635	1.8%	\$ 886,129	2.8%	\$ 31,437,716
1983	\$ 590,730	2.0%	\$ 24,016,294	81.8%	\$ 1,601,976	5.5%	\$ 41,338	0.1%	\$ 3,109,814	10.6%	\$ 29,360,152
1984	\$ 310,899	1.8%	\$ 12,450,532	71.8%	\$ 2,039,681	11.8%	\$ 522,795	3.0%	\$ 2,011,253	11.6%	\$ 17,335,160
1985	\$ 799,318	2.3%	\$ 27,497,929	80.0%	\$ 3,359,824	9.8%	\$ 57,412	0.2%	\$ 2,644,995	7.7%	\$ 34,359,478
1986	\$ 915,189	2.0%	\$ 38,683,950	83.3%	\$ 2,909,043	6.3%	\$ 724,367	1.6%	\$ 3,197,973	6.9%	\$ 46,430,522
1987	\$ 1,609,777	1.6%	\$ 95,915,522	94.9%	\$ 2,373,254	2.3%	\$ 84,439	0.1%	\$ 1,116,165	1.1%	\$ 101,099,156
1988	\$ 1,120,885	0.9%	\$ 111,537,736	91.3%	\$ 4,738,463	3.9%	\$ 650,931	0.5%	\$ 4,129,002	3.4%	\$ 122,177,017
1989	\$ 803,494	1.4%	\$ 56,194,753	95.0%	\$ 1,674,393	2.8%	\$ 86,012	0.1%	\$ 415,535	0.7%	\$ 59,174,188
1990	\$ 436,822	1.1%	\$ 35,804,485	88.0%	\$ 2,422,214	6.0%	\$ 512,591	1.3%	\$ 1,495,827	3.7%	\$ 40,671,938
1991	\$ 348,522	2.3%	\$ 12,249,200	80.4%	\$ 1,996,049	13.1%	\$ 5,478	0.0%	\$ 643,400	4.2%	\$ 15,242,649
1992	\$ 634,466	0.6%	\$ 96,026,864	96.0%	\$ 2,261,862	2.3%	\$ 404,772	0.4%	\$ 740,294	0.7%	\$ 100,068,258
1993	\$ 617,092	2.1%	\$ 27,969,409	93.1%	\$ 1,081,175	3.6%	\$ 36,935	0.1%	\$ 322,205	1.1%	\$ 30,026,815
1994	\$ 642,291	1.9%	\$ 29,441,442	85.5%	\$ 3,297,865	9.6%	\$ 240,545	0.7%	\$ 831,121	2.4%	\$ 34,453,264
1995	\$ 474,475	2.2%	\$ 19,168,077	87.1%	\$ 1,295,353	5.9%	\$ 53,114	0.2%	\$ 1,023,926	4.7%	\$ 22,014,944
1996	\$ 402,980	1.4%	\$ 28,238,578	95.0%	\$ 800,423	2.7%	\$ 44,386	0.1%	\$ 225,751	0.8%	\$ 29,712,117
1997	\$ 365,316	1.1%	\$ 31,439,536	97.1%	\$ 434,327	1.3%	\$ 12,004	0.0%	\$ 143,244	0.4%	\$ 32,394,427
1998	\$ 199,925	2.1%	\$ 8,831,336	92.6%	\$ 281,341	3.0%	\$ 96,471	1.0%	\$ 127,220	1.3%	\$ 9,536,293

Table 3. Enumeration goals and counts of sockeye salmon in selected streams of Upper Cook Inlet, 1968-1998.

Year	Kenai River		Kasilof River		Fish Creek	
	Enumeration Goal	Enumeration Estimate ¹	Enumeration Goal	Enumeration Estimate ¹	Enumeration Goal	Enumeration Estimate ²
1968	0	88,000	0	93,000	0	19,616
1969	150,000	53,000	75,000	46,000	0	12,456
1970	150,000	73,000	75,000	37,000	0	25,000
1971	150,000	N/C	75,000	N/C	0	31,900
1972	150,000-250,000	318,000	75,000-150,000	112,000	0	6,981
1973	150,000-250,000	367,000	75,000-150,000	40,000	0	2,705
1974	150,000-250,000	161,000	75,000-150,000	64,000	0	16,225
1975	150,000-250,000	142,000	75,000-150,000	48,000	0	29,882
1976	150,000-250,000	380,000	75,000-150,000	140,000	0	14,032
1977	150,000-250,000	708,000	75,000-150,000	155,000	0	5,183
1978	350,000-500,000	399,000	75,000-150,000	117,000	0	3,555
1979	350,000-500,000	285,000	75,000-150,000	152,000	0	68,739
1980	350,000-500,000	464,000	75,000-150,000	187,000	0	62,828
1981	350,000-500,000	408,000	75,000-150,000	257,000	0	50,479
1982	350,000-500,000	620,000	75,000-150,000	180,000	50,000	28,164
1983	350,000-500,000	630,000	75,000-150,000	210,000	50,000	118,797
1984	350,000-500,000	345,000	75,000-150,000	232,000	50,000	192,352
1985	350,000-500,000	501,000	75,000-150,000	503,000	50,000	68,577
1986	350,000-500,000	501,000	75,000-150,000	276,000	50,000	29,800
1987	400,000-700,000	1,597,000	150,000-250,000	249,000	50,000	91,215
1988	400,000-700,000	1,021,500	150,000-250,000	202,000	50,000	71,603
1989	400,000-700,000	1,599,959	150,000-250,000	158,206	50,000	67,224
1990	400,000-700,000	658,908	150,000-250,000	144,289	50,000	50,000
1991	400,000-700,000	645,000	150,000-250,000	238,000	50,000	50,500
1992	400,000-700,000	994,760	150,000-250,000	183,178	50,000	71,385
1993	400,000-700,000	813,617	150,000-250,000	149,939	50,000	117,619
1994	400,000-700,000	1,003,446	150,000-250,000	205,117	50,000	95,107
1995	450,000-700,000	628,760	150,000-250,000	205,902	50,000	115,000
1996	550,000-800,000	797,847	150,000-250,000	249,944	50,000	63,160
1997	550,000-825,000	1,064,818	150,000-250,000	266,025	50,000	54,656
1998	550,000-850,000	767,558	150,000-250,000	273,213	50,000	22,853

Year	Susitna River		Crescent River		Packers Creek	
	Enumeration Goal	Enumeration Estimate ¹	Enumeration Goal	Enumeration Estimate ¹	Enumeration Goal	Enumeration Estimate ²
1978	200,000	94,000	0	N/C	0	N/C
1979	200,000	157,000	50,000	87,000	0	N/C
1980	200,000	191,000	50,000	91,000	0	16,477
1981	200,000	340,000	50,000	41,000	0	13,024
1982	200,000	216,000 ³	50,000	59,000	0	15,687
1983	200,000	112,000 ⁴	50,000	92,000	0	18,403
1984	200,000	279,000 ⁵	50,000	118,000	0	30,684
1985	200,000	228,000 ⁵	50,000	129,000	0	36,850
1986	100,000-150,000 ⁶	92,000 ⁶	50,000	N/C	0	29,604
1987	100,000-150,000 ⁶	66,000 ⁶	50,000-100,000	119,000	0	35,401
1988	100,000-150,000 ⁶	52,347 ⁶	50,000-100,000	57,716	15,000-25,000	18,607
1989	100,000-150,000 ⁶	96,269 ⁶	50,000-100,000	71,064	15,000-25,000	22,304
1990	100,000-150,000 ⁶	140,379 ⁶	50,000-100,000	52,180	15,000-25,000	31,868
1991	100,000-150,000 ⁶	105,000 ⁶	50,000-100,000	44,500	15,000-25,000	41,275
1992	100,000-150,000 ⁶	66,057 ⁶	50,000-100,000	58,227	15,000-25,000	28,361
1993	100,000-150,000 ⁶	141,694 ⁶	50,000-100,000	37,556	15,000-25,000	40,869
1994	100,000-150,000 ⁶	128,032 ⁶	50,000-100,000	30,355	15,000-25,000	30,788
1995	100,000-150,000 ⁶	121,479 ⁶	50,000-100,000	52,250	15,000-25,000	29,473
1996	100,000-150,000 ⁶	90,781 ⁶	50,000-100,000	28,729	15,000-25,000	19,095
1997	100,000-150,000 ⁶	157,822 ⁶	50,000-100,000	70,768	15,000-25,000	33,846
1998	100,000-150,000 ⁶	119,623 ⁶	50,000-100,000	62,257	15,000-25,000	17,732

¹ Derived from sonar counters unless otherwise noted.

² Weir Counts.

³ Poor field conditions make this a minimum estimate; mark/recapture estimate from Su-Hydro studies was 265,000.

⁴ Minimum estimate, combining Yentna River sonar with Sunshine Station mark/recapture estimate yields 176,000.

⁵ Yentna River sonar count combined with Sunshine Station mark/recapture estimate.

⁶ Yentna River only.

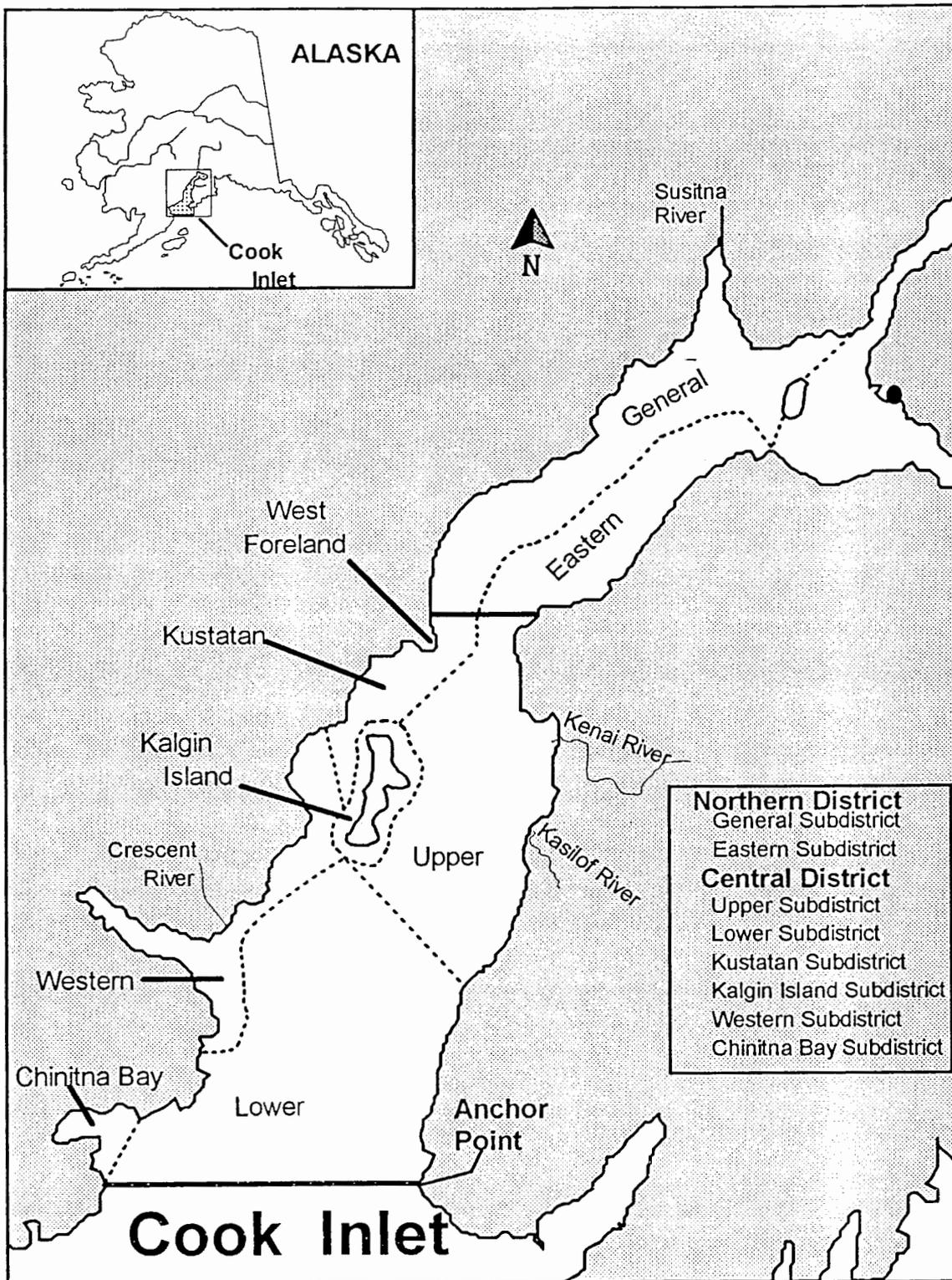


Figure 1. Upper Cook Inlet Salmon Subdistricts

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